Randwick City Council
Human Health Risk Assessment for Asbestos Impacted Soils

Jack Vanny Reserve
Marine Pde,
Maroubra, NSW

6 April 2018
54640-114700 (Revision A)
JBS&G Australia Pty Ltd

www.jbsg.com.au

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List of Abbreviations

Term	Definition
ACM	Asbestos Containing Material
AEC	Area of Environmental Concern
AF/FA	Asbestos Fines / Fibrous Asbestos
AHD	Australian Height Datum
bgl	Below Ground Level
COPC	Contaminant of Potential Concern
CoS	City of Sydney
Cr	Chromium
CSM	Conceptual Site Model
DA	Development Application
DQI	Data Quality Indicator
DQO	Data Quality Objectives
DP	Deposited Plan
DPI Water	NSW Department of Primary Industry - Water
EPA	NSW Environment Protection Authority
Ha	Hectare
HIL	Health-based Investigation Level
HSL	Health Screening Level
JBS&G	JBS&G Australia Pty Ltd
LOR	Limit of Reporting
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
OEH	NSW office of Environment and Heritage
PIL	Phytotoxicity Based Investigation Level
QA/QC	Quality Assurance/Quality Control
RCC	Randwick City Council
RME	Reasonably Maximum Exposed
RPD	Relative Percentage Difference
SAS	Site Audit Statement
SAR	Site Audit Report
SCS	Significantly Contaminated Site
SWA	Safe Work Australia
UR	Unit Risk
VENM	Virgin Excavation Natural Material (as defined in POEO Act)

Executive Summary

JBS&G was engaged by Randwick City Council (Council, the client) to assess for the occurrence, and estimate the associated health risk, of asbestos impact on the Jack Vanny Reserve as located at Marine Pde Randwick, NSW. The site assessment, comprising a total of 108 sample locations as undertaken across two stages of works in early 2018 has identified asbestos occurring in soils across the site as bonded asbestos containing material (ACM) and asbestos fines.

A human health risk assessment (HHRA) has been undertaken to determine whether asbestos as measured in soils on the Reserve is present at a level that poses an unacceptable health risk to current and/or potential future site users and/or residents in proximity of the site. A sensitivity analysis undertaken of the risk assessment process has found that risk estimates are appropriately conservative and suitable for decision making as to the suitability of the site.

In accordance with the limitations provided as **Section 11**, levels of asbestos on the site have not been found to pose a potentially unacceptable health risk to current and/or future users of the site as consistent with an ongoing recreational / open space site use, nor occupants of residential properties in proximity of the site.

The fate and transport assessment has estimated the potential worse case airborne concentration of asbestos fibres on the site. This has been found to be well below a level of 0.01 f/ml as identified in *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*, 2015, NSW EPA as a potential trigger to warrant reporting under the *Contaminated Lands Management Act 1997*. Further recent respirable fibre monitoring undertaken by JBS&G during site assessment works has not identified airborne levels of fibres exceeding 0.01 f/ml. It is concluded on this basis that there is not a requirement to report asbestos impact to the NSW EPA.

Notwithstanding the conclusions in respect of the potential human health risk, soils on the site are impacted with asbestos. Requirements with respect to asbestos as informed to the *Work Health and Safety Regulation 2017* do not differentiate as to whether levels of asbestos are sufficient to pose a health risk. In accordance with the requirements of the Regulation, it is recommended that a notation to the s.149 Certificate for the site is prepared to note the presence of trace levels of asbestos in soils, to meet the requirements for maintaining an Asbestos Register on site.

It is further noted that visible ACM is visible at the surface in some areas of the site. Though this material has been demonstrated to not pose a health risk, the visibility of the material would be considered unacceptable from an aesthetic perspective for a majority of the community. It is recommended that a detailed surface inspection is undertaken and visible ACM is removed from the site.

1. Introduction and Background

1.1 Background

JBS&G Australia Pty Ltd (JBS&G) was engaged by Randwick City Council (Council, the client) to initially undertake an assessment of a portion of Jack Vanny Reserve, located at Marine Parade, Maroubra, NSW to determine whether asbestos containing materials (ACM) were present. The initial asbestos assessment was requested in response to a Clean Up Notice issued by NSW Environmental Protection Authority (NSW EPA) following a site inspection that identified large amounts of ACM as fibre cement debris to the ground surface within the specific portion that was located in the northern section of Jack Vanny Reserve. The summary report, *Detailed Asbestos Assessment – Jack Vanny Reserve Marine Parade, Maroubra, NSW*, 2 March 2018, JBS&G Australia Pty Ltd (JBS&G 2018, provided to **Appendix A**) was issued which reported that ACM was present within the soil profile and the ground surface as bound and friable forms, were identified through this portion of the park.

Subsequent to receipt of this advice, Council have further engaged JBS&G to assess the whole of Jack Vanny Reserve (the site) for the presence of asbestos. Council has further requested a human health risk assessment (HHRA) to determine the potential risk posed by asbestos impact in soils. This report details the detailed assessment of soils across the extent of the site for the presence of asbestos, and an estimation of the potential health risk posed by asbestos to users of the Reserve, and potentially exposed receptors in proximity.

The risk assessment has been undertaken by a process of initially considering the worse-case concentration of each form of asbestos and assessing whether there will be a potentially unacceptable human health risk by comparison to conservative published criteria. Fate and transport modelling has been undertaken of potential asbestos emissions from the site and considered with toxicological review and exposure assessment to estimate levels of health risk. Site specific factors to assist in fate and transport calculations have also been considered here. Where an unacceptable human health risk is identified, recommendations have been made as to appropriate remediation / management / validation to be undertaken on the site.

Risk assessment is the process of estimating the potential impact of a chemical, physical, microbiological or psychosocial hazard on a specified human population or ecological system under a specific set of conditions and for a certain timeframe. The risk assessment here is restricted to the consideration of asbestos based materials present in soil within the site and the potential interactions with current and future human populations as may occur with the ongoing use of the site for recreational purposes, and further potentially sensitive receptors in proximity of the site (i.e. residents on Marine Pde).

The risk assessment has been undertaken by the methodology outlined in *Environmental Health Risk Assessment Guidelines for assessing human health risks from environmental hazards*, 2012, Department of Health and Ageing and enHealth Council (enHealth 2012) and *National Environment Protection (Assessment of Site Contamination) Measure*, 2013, National Environment Protection Council (NEPC 2013).

1.2 Objectives

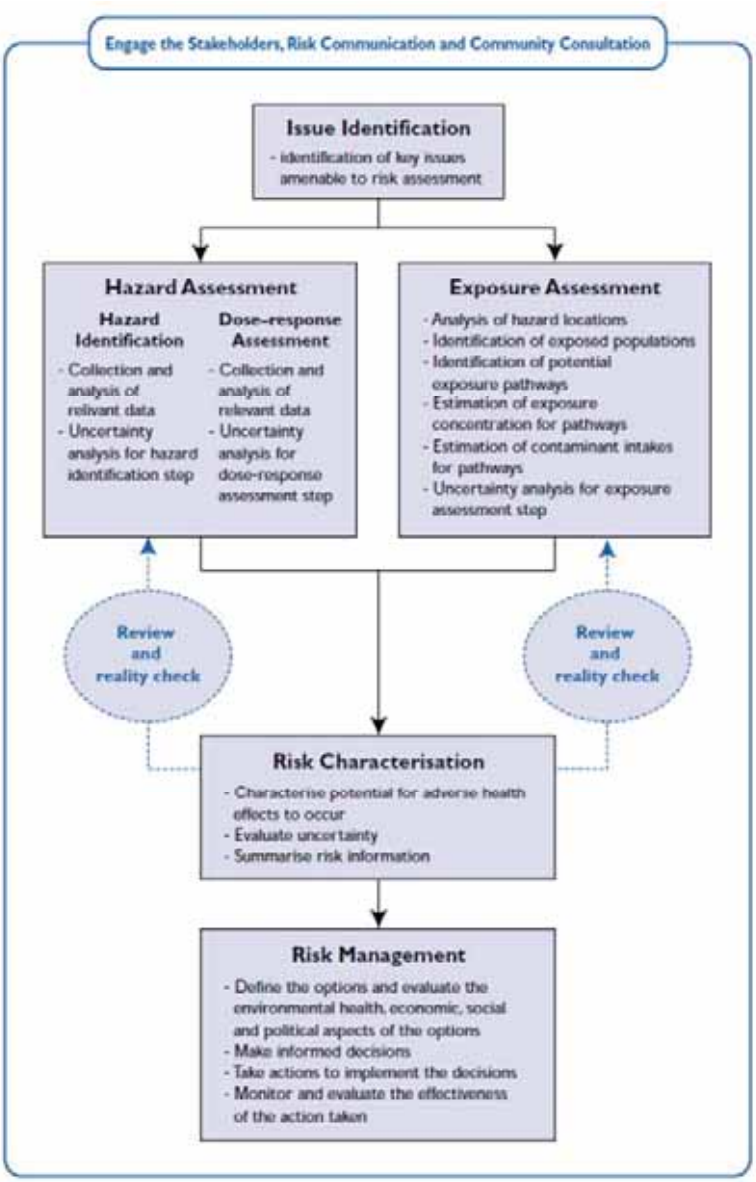
The objective of the HHRA is to determine whether levels of asbestos present in soils on the Jack Vanny Reserve site pose a potential human health risk as per an ongoing recreational / open space use of the site and to further determine if levels pose a potential health risk to potentially sensitive receptors in proximity of the site. An additional objective has been to determine whether the occurrence of asbestos impact poses a significant enough risk to necessitate a duty to report under section 60 of the *Contaminated Lands Management Act 1997*.

1.3 Risk Assessment Process

Risk assessment is the process of estimating the potential impact of a chemical, physical, microbiological or psychosocial hazard on a specified human population or ecological system under a specific set of conditions and for a certain timeframe. A schematic of the risk assessment process is shown in the diagram below (source: enHealth 2004).

- Issue Identification identifies issues amenable to the risk assessment and assists in establishing a context for the risk assessment by a process of identifying the problems that the risk assessment needs to address. This includes the selection of Constituents of Potential Concern (COPC's) for the site and each identified potential exposure population.
- Hazard Assessment including toxicological assessment and dose-response assessment. Toxicological assessment involves determining what types of (adverse) health effects might be caused by the agent; and how quickly the adverse health effects might be experienced and their duration. Dose-response assessment considers both qualitative and quantitative toxicity information to determine 'the incidence of adverse effects occurring in humans at different exposure levels'.
- Exposure Assessment involves the determination of the frequency, extent, duration and character of exposures in the past, currently, and in the future. There is also the identification of exposed populations, particularly sensitive sub populations, and potential exposure pathways.
- Risk Characterisation provides a qualitative and / or quantitative estimate, including attendant uncertainties, of the nature, severity and potential incidence of effects in a given population, based on the hazard identification and exposure assessments.

The risk assessment has specifically considered a range of potential human receptors who may use the site in the future, and existing and future human receptors in proximity of the site.


Engage the Stakeholders, Risk Communication and Community Consultation
Issue Identification
- identification of key issues amenable to risk assessment
Hazard Assessment
Hazard Identification
- Collection and analysis of relivant data
- Uncertainty analysis for hazard identification step
Dose-response Assessment
- Collection and analysis of relevant data
- Uncertainty analysis for dose-response assessment step
Exposure Assessment
- Analysis of hazard locations
- Identification of exposed populations
- Identification of potential exposure pathways
- Estimation of exposure concentration for pathways
- Estimation of contaminant intakes for pathways
- Uncertainty analysis for exposure assessment step
Review and reality check
Review and reality check
Risk Characterisation
- Characterise potential for adverse health effects to occur
- Evaluate uncertainty
- Summarise risk information
Risk Management
- Define the options and evaluate the environmental health, economic, social and political aspects of the options
- Make informed decisions
- Take actions to implement the decisions
- Monitor and evaluate the effectiveness of the action taken

1.4 Site Identification

The location of the site is shown in **Figure 1**, current layout is shown in **Figure 2**. Site details are summarised in **Table 1.2**.

Table 1.2: Summary Site Details

Lot/DP	Lot 1 Section 3 DP758649
Address	Marine Pde Maroubra NSW
Local Government Authority	Randwick City Council
Site Zoning	Open Space / Recreational
Current Use	Jack Vanny Reserve, open space / recreational / car parking
Proposed Use	Ongoing open space / recreational
Geographical Co-ordinates	E339470, N6248820
Area of the site	Approximately 4 hectares

1.5 Current Site Condition

The site is observed to extend across the area of headland to the south-east of Marine Drive to the north of Maroubra Beach. The site is characterised as being substantially longer in a south-west to north-east direction (approximately 600 m) and of variable extent in a north-west to south-east direction, being as great as 130 at the north-eastern extent of the site.

Site features are restricted to a car park in the central portion of the site, pathways through other areas of the site and general level / grassed areas elsewhere. The south-eastern and north-eastern boundaries of the site are characterised as being rock shelfs with no soils present. A steep and substantial drop to the Pacific Ocean is present at these boundaries to the site. Some more densely vegetated areas of the site are present, as assessed in JBS&G (2018), at the north-eastern portion of the site and discussed following, and in the central portion of the site.

The portion of the site as assessed in JBS&G (2018) was further described as comprising grassed areas with dense vegetation comprising dune shrubs (<2.0 m height) and protected native grasses, with rocky outcrops to the eastern portion. The site was bound by other public spaces with grassed areas of Jack Vanny Reserve to the north, west and south, and rock shelves and small cliffs to the east bordering the Pacific Ocean. The site was observed to slope to the south and east, forming a drainage path towards the Pacific Ocean. Small walking tracks were observed to traverse the site area between vegetated areas with exposed sand visible and large amounts of anthropogenic debris observed including ACM as asbestos cement sheeting debris, glass, tile, brick and concrete.

1.6 Surrounding Land Uses

The surrounding land uses have been identified as comprising:

- North-East and South-East – Pacific Ocean;
- North-West – Generally residential properties, consisting a range of low density and medium density detached / semi-detached dwellings are present on the opposite side of Marine Pde; and
- South-West – Maroubra Beach is present further south-west of the site, along the coastline.

The nearest potentially sensitive human exposures can be identified as the residential dwellings on the opposite side of Marine Pde to the reserve.

1.7 Topography

By comparison of the site level to the adjoining ocean, it is estimated that the site is present between 10 and 20 m AHD.

1.8 Geology

Soils on the site have been observed to generally consist of a shallow depth of sands overlying a sandstone bedrock. The sandstone can be observed to outcrop in several areas of the site, particularly in proximity of the boundary with the Ocean. The majority of the site is observed to have further sand based fill material placed over the assumed naturally occurring sands.

1.9 Site History

A brief review of the site history was undertaken in JBS&G (2018) by a review of aerial photographs. The findings of this review are summarised following:

- 1943 – the site appears to comprise rocky outcrops and small amounts of grassed areas with small cliffs and gullies visible within the boundaries of the present day site area.
- 2000 – the site appears to have been filled to a more even level with less visible rocky outcrops. Vegetation cover visible across area within boundaries of present day site. Site features such as the pathways and car park are apparent; and
- 2009 – the site appears to be covered with well established vegetation within the boundaries of the present day site. Vegetation cover is expected to be consistent with those observed in present day.

1.10 Meteorology

A review of average climatic data for the nearest Bureau of Meteorology monitoring location (Sydney Airport) indicates the site is located within the following meteorological setting:

- Average minimum temperatures vary from 7.2 in July to 19.1 in February;
- Average maximum temperatures vary from 17.0 in July to 26.5 in January;
- The average annual rainfall is approximately 1083.7 mm with rainfall greater than 1 mm occurring on an average of 95.9 days per year; and
- Monthly rainfall varies from 60.3 mm in September to 122.5 mm in June with the wettest periods occurring on average in March and June.

1.11 Previous Investigations

Environmental data to inform the HHRA of asbestos impacts has been collected by recent investigation works restricted to a portion of the site as reported in JBS&G (2018) and more extensive works reported here.

JBS&G (2018), as provided as **Appendix A**, comprised soil sampling and analysis from a total of 22 testpits as placed within a more densely vegetated portion of the site as located within the north-eastern portion of the overall site. An additional five near surface samples were also collected from the perimeter of this portion of the site. The locations were qualitatively assessed for presence of visible ACM. Soil samples were additionally collected from each location and analysed for presence of asbestos fibres / fines. Levels of asbestos fibres / fines in soil samples was quantified. As reported in JBS&G (2018):

- 26 of 78 primary soil samples reported the occurrence of fibrous asbestos (FA) and/or asbestos fines (AF); and
- 14 of 78 primary soil samples reported occurrence of ACM (>7 mm fraction) where no AF / FA was identified.

Data from this assessment has been used in the risk assessment. The laboratory analysis of samples has included multiple samples as collected from each sample location. The AF / FA data set has included the maximum concentration FA/AF as reported for the samples as available at each sample

location. By this means, a single data point has been established for each of the total of 27 sample locations undertaken.

The results of the ACM (>7 mm) analysis as undertaken on soil samples from each of these locations has been considered further. This data is potentially applicable to the estimation of levels of bonded asbestos. However, ACM (>7 mm) was not reported by the laboratory at each sample location where ACM was identified in the field. On this basis, the laboratory data will potentially underestimate the extent of bonded ACM as present in these soils.

It is noted that additional locations were undertaken with the March 2018 investigation works which incorporated locations within the JBS&G (2018) assessed portion of the site. Levels of bonded asbestos were quantified in the field.

1.12 Whole Site Investigation

A whole site investigation was undertaken to support the risk assessment and is reported here. The scope of work comprised:

- Placement of 81 testpits as evenly distributed across the extent of the Reserve as shown as sample locations on **Figure 3**. Borelogs from completed testpits are provided as **Appendix B**. Extension of testpits to depth of refusal on underlying sandstone bedrock or clean natural sand materials, whichever was shallower;
- Field quantification of visible ACM in the field on the basis of 1 m depth increments. Quantification on the basis of a 50 litre sample for soils as collected from the upper 1.0 m depth of the fill profile, and quantification on the basis of smaller 10 L samples for subsequent metre interval depths of soils as present at a minority of sample location. Field quantification was undertaken by field screening of soils through a 7 mm aperture sieve, identification and weighing of ACM present in the sieve oversize; and
- Submission of soil samples for laboratory analysis for asbestos as prepared from soil samples collected from the undersize fraction of field screening. Results of laboratory analysis for samples collected during this assessment are summarised in **Appendix C**. Laboratory documentation as specific to this assessment is included as **Appendix D**.

1.12.1 Field Observations

Soils across the site were observed to generally consist of silty sands and sands. Soils were generally present to shallow depths only, with deeper depths occurring in various areas of the site, typically where more vegetation was present. The sample locations where deeper depths of soils were observed generally had visually discernible fill based soils present at near surface depths.

ACM was identified (in the field) at 34 of the 81 sample locations completed. Observation of the sample locations where ACM was identified does not identify any distinct pattern or otherwise as to the occurrence of ACM apart from an increased likelihood of ACM being present on the south-eastern boundary as compared to the north-western boundary. ACM was typically in the form of fibre cement sheet debris.

1.12.2 Data Reliability

Data reliability has been assessed by a program of quality assurance / quality control (QA/QC) with all field and laboratory analysis works. The QA/QC program comprised:

- Preparation and analysis of six blind and split duplicate pairs from a total of 118 primary samples submitted for analysis. Comparison of each of the duplicate pairs has been summarised in the summarised results as provided to **Appendix C**. Based on a review of RPD's, repeatability has been able to be demonstrated between sample collection and between laboratories. There are some duplicate pairs where trace amounts of asbestos have been detected in one sample only of the duplicate pair, however, the concentrations of the asbestos are so low this is not considered to significantly affect the reliability of the dataset;
- Completion of all fieldworks by JBS&G staff appropriately trained and competent in the identification of ACM including the involvement of a SafeWork NSW Licensed Asbestos Assessor; and
- Use of NATA accredited laboratories for all analyses completed.

On the basis of this assessment the asbestos analysis data is considered to be reliable. To remain conservative, the highest reported concentration from the multiple samples as available in duplicate pairs should be adopted to characterise levels of asbestos at that location.

1.12.3 Results

Laboratory analysis results have been summarised in **Appendix C**, as related to the laboratory quantification of AF / FA. Field quantification calculations of the amount of bonded asbestos present at each sample where ACM was observed in the field have been summarised in **Appendix E** for all sample locations where asbestos was observed.

The laboratory has reported FA / AF as present at 15 of the sample locations assessed. These locations were typically more likely to be present in the northern portion of the site. By comparison to the locations where ACM was visually identified in the field, five locations have reported asbestos fibres as being present with no evidence of ACM as present in field observations.

The laboratory has additionally reported five sample locations as containing ACM (i.e. bonded asbestos > 7 mm). Each of these locations had visible ACM also observed during the fieldworks. Consistent with the distribution of visible ACM, these soils are distributed across the site.

1.12.4 Use of Data in Risk Assessment

Three data sets are available in the assessment works completed in March 2018 and reported here:

- AF / FA in soils as based on laboratory analysis;
- Bonded asbestos / ACM as present in soils as based on field quantification; and
- Bonded asbestos / ACM as present in soils as based on laboratory analysis.

The AF / FA dataset has been used in the risk assessment, and combined with the similar dataset as generated in JBS&G (2018) and reported in **Section 1.11**. Consistent with the JBS&G (2018) assessment, where multiple samples are available at a sample location that have identified AF / FA present, the highest reported concentration only has been adopted. Similarly, this has been undertaken where duplicate samples are available at a sample point.

The field generated bonded ACM dataset has been adopted to quantify levels of bonded ACM present in soils. For the cases where the laboratory bonded ACM dataset has reported a reading, the maximum of the laboratory and field generated concentration has been adopted. Similarly to the AF / FA dataset, the highest concentration of bonded asbestos as reported across the depth

ranges assessed has been adopted to characterise the whole of the soils at the particular sample location.

1.13 Risk Assessment Data Set

The AF / FA and bonded asbestos datasets as established and adopted in the risk assessment are summarised in **Appendix F**. Detection limits have been required to be established for the samples where the laboratory has reported non-detect levels, or no visible ACM has been observed in the field. This has been undertaken by setting the lowest reported AF / FA weight as reported by the laboratory and the lowest field weighed ACM as the detection limit for each of the datasets respectively. This is appropriate noting that common field staff / NATA accredited laboratories have been adopted for all analyses.

2. Conceptual Site Model

National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1) (NEPC 2013) identifies a conceptual site model (CSM) as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The development of a CSM is an essential part of all site assessments.

NEPC (1999) identified the essential elements of a CSM as including:

- Known and potential sources of contamination and contaminants of concern including the mechanism(s) of contamination;
- Potentially affected media (soil, sediment, groundwater, surface water, indoor and ambient air);
- Human and ecological receptors;
- Potential and complete exposure pathways; and
- Any potential preferential pathways for vapour migration (if potential for vapours identified).

The CSM has been defined following as restricted to the potential occurrence of asbestos impact.

2.1 Known and Potential Sources of Contamination

Asbestos impact has been identified occurring as fibre cement sheet debris as present across the site, visibly most prevalent in areas of the site when the densest coverage of vegetation is present (JBS&G 2018). Ensuing laboratory analysis has identified that asbestos fines are also present in soils as affected by the ACM, and further extensive soils in proximity of visual identification of ACM.

2.2 Extent of Environmental Impact

Asbestos has been identified in fill-based soils and associated likely reworked natural soils as generally present at near surface depths on the site. Asbestos has not been identified at all sample locations. However asbestos has been identified at sufficient sample locations to consider that it is not restricted to hot-spots and is likely present throughout fill materials, near surface soils and natural / fill soil horizons on the site. Asbestos has been detected at deeper depths in areas of the site where fill materials are observed to be at deeper depths.

Where ACM has been observed, it typically occurs with construction and building wastes. This indicates that historically asbestos impacted material has been imported to the site and used as fill material, or has otherwise been sourced from historical demolition activities as undertaken on the site.

2.3 Potential and Complete Exposure Pathways

Future human receptors on the site can be characterised as consisting of:

- Recreational users of the park / reserve inclusive of the vegetated open space areas and further extending the car park within the park;
- Landscapers / gardening personnel as retained on the to maintain areas of site landscaping on the park / reserve; and
- Potential future sub-surface maintenance / excavation workers.

Receptors will be potentially exposed to soil contaminants by oral, dermal and inhalation pathways. Oral and dermal exposures have not been considered any further as asbestos is not toxic by these pathways. Inhalation exposures will potentially occur by the release of fibres from impacted soils into human breathing zones.

Where asbestos fibres are released from soils on the site there is a potential that residential occupants in proximity of the site may be affected. Potentially complete exposure pathways may occur where airborne respirable asbestos fibres migrate to the extent of these properties. Residential dwellings are located in close proximity on the opposite side of Marine Pde.

2.4 Preferential Pathways

A range of preferential pathways are currently present on the site as associated with near surface fill horizons and potential services present across the site area (i.e. drainage lines, sumps, pits etc.).

These preferential pathways are not considered significant as asbestos occurs as a solid and is not readily transportable within the sub-surface.

2.5 Complete Source-Pathway-Receptor Linkages

Potentially complete source-pathway-receptor linkages are considered to be limited to potential inhalation exposures of fibres of on-site receptors and residential properties in proximity of the site.

3. Issue Identification

Issue identification is the first step of the risk assessment process.

3.1 Issue Identification

Issue identification determines whether risk assessment is useful, and establishes a context for the risk assessment by a process of identifying the concerns the risk assessment needs to address. Issue identification draws on all relevant lines of information.

Issue identification comprises several phases:

1. Identification of environmental health issues (or an individual issue) and determining whether there are hazards amenable to risk assessment. This will involve demarcating 'hazards' from 'issues' and may require environmental sampling;
2. Putting the hazards into their environmental health context (clarification and prioritising of problems and hazards);
3. Identification of potential interactions between agents; and
4. Stating clearly why risk assessment is needed and the scope and objectives of the risk assessment. This will involve identifying problems for which information is, or can be, available to undertake adequate risk assessments and problems which risk assessment cannot assist.

3.2 Identification of Environmental Hazards

Environmental health hazards may be caused by physical, chemical, biological or social factors in the environment. Physical factors include heat, cold, noise, mechanical hazards etc. Chemical factors include synthetic and naturally occurring substances. Biological factors include viruses, prions, bacteria, parasites and vermin.

Environmental impact is currently widespread in soils, reported to be consequent of historical placement of fill materials on the site.

The fill materials currently present underlying the site are impacted with asbestos fibres. Bonded ACM products have further been observed as present through site soils.

3.3 Environmental Sampling and Analysis

Environmental sampling and analysis are a key factor in identifying the agents that may be present, their concentrations and distributions. Environmental sampling and analysis should be targeted to address the identified potential environmental hazards.

Environmental sampling and analysis has been detailed in a previous investigation (JBS&G 2018) and a more extensive investigation reported here as summarised in **Sections 1.11** and **1.12**.

3.4 Putting Hazards into their Environmental Health Context

Putting the hazards into their environmental context entails a consideration of:

- Whether the hazard has single or multiple sources;
- Whether the type of environmental impact affects multiple environmental media;
- How stakeholders perceive the problem including the consideration of different groups; and
- How do the hazards compare to other environmental hazards affecting the community.

The environmental hazards across the open space / parkland are restricted to the impacted fill and associated near surface soils which have been historically disturbed on the site, or otherwise impacted from off-site locations.

The risk assessment takes into consideration of the ongoing use of the site as per the current recreational setting. The major human stakeholders identified for the ongoing use of the reserve include recreational users, landscapers and maintenance workers of above-ground and sub-surface services. Potential exposures of residential receptors in proximity of the site have also been identified.

As the environmental hazards present on the reserve are generally related to commonly occurring commercial / industrial contaminants, (i.e. asbestos) and are also commonly identified on urban development site in established areas of Sydney and/or commonly used in a range of processes, it can be assumed that the environmental hazard does not pose a unique hazard to the community. However, the presence of these contaminants in uncontrolled locations, potentially in proximity of sensitive populations, may serve to increase the exposure of the community and/or the environment to the environmental hazard.

3.5 Identification of Potential Interactions between Agents

There may be interactions between the physical, chemical, biological and social hazards that require identification and consideration as part of a risk assessment. There are several potential types of interactions between hazardous agents which include: additive effects; synergistic effects; potentiation effects and antagonistic effects.

It is widely acknowledged that activities such as smoking can increase the susceptibility of a person to the potential effects of some carcinogens. To this effect, it will be required to be ensured that conservatively derived data and reasonably maximum exposed receptors are used as the basis for any risk assessment.

3.6 Why is Risk Assessment Needed?

The occurrence of environmental hazards in a site sub-surface is unique for every site and location. Further, the particular populations exposed to an environmental hazard are unique for every occurrence of the environmental hazard. Regulatory authorities within NSW do not provide comprehensive guidance for the assessment of the range of contaminants identified within the reserve site as an environmental hazard. The limited guidance available is considered unsuitable to be solely applied to the ongoing use of the site, as based on potential human exposures. For example, the guidance provided for asbestos in NEPC (2013) and endorsed by the NSW EPA for investigation purposes, is based on assumptions derived from substantially drier Western Australian soils and very simplistic estimates as to potential exposures.

The requirement, and method, for remediation/management for an environmental hazard needs to be determined. The extent of this potential requirement must be determined by the assessment of the presence of an environmental hazard; the degree of potential harm posed by the environmental hazard (in an isolated environment); and the likely exposure of the environment to the environmental hazard. Only through the assessment of all these factors can the true impact of the

environmental hazard be assessed. The risk assessment process is designed to include all of these factors to determine a site-specific estimate of the risk posed by the level of asbestos present in soils on the site.

3.7 Limitations and Uncertainties

Potential limitations and uncertainties that may occur in the risk assessment process include:

- Information gaps, e.g. effects of mixtures, low level and variable exposures over time, relative contribution of 'lifestyle' factors;
- Poor exposure information, e.g. complex mixtures of hazards with complex behaviours in the environment; limited knowledge about the actual or potential sub-population;
- Limitations of toxicological or epidemiological research, e.g. small populations and limited exposure information, multifactorial causes of many diseases on health impacts; 'background noise' affecting research into common diseases or symptoms; population heterogeneity;
- Complexity, e.g. large numbers of combinations of hazards, exposures and health states;
- Confidentiality of health and commercial information;
- Charged atmosphere of fear, antagonism and distrust; and
- Value conflicts.

The risk assessment requires a thorough sensitivity analysis subsequent to the provision of the risk outcomes. The sensitivity analysis will take these matters into account, testing the outcome of the risk assessment of reasonable upper and lower bounds of each. Sensitivity analysis of all assumptions has been undertaken throughout the risk assessment. Risk assessment outcomes may require to be modified where sensitive parameters are observed to have large reasonable potential deviations.

4. Selection of Constituents of Potential Concern

The risk assessment has been restricted to the assessment of asbestos. Asbestos has been identified as friable asbestos and / or asbestos fines in soils at maximum levels exceeding NEPC (2013) criterion. Asbestos has also been identified occurring as bonded asbestos, again at maximum concentrations that exceed NEPC (2013) criterion.

5. Toxicological Assessment

There are two elements to the toxicological review for the human health risk assessment: hazard identification (using toxicological studies) and dose-response assessment. The Australian approach to each is discussed in detail following.

5.1 Hazard Identification

Hazard identification examines the capacity of an agent to cause adverse health effects in humans and other animals. The dose-response assessment examines the quantitative relationships between exposure and the effects of concern.

Hazard identification uses:

- Animal data. This is usually assessed by toxicological methods;
- Human data. This usually assessed by epidemiological methods when groups of people are involved, or by toxicological methods when using case studies and acute chamber studies; and
- Other data. This includes structure data such as structure activity data or in vitro data assessed by toxicologists.

Hazard identification mostly relies on the results of in vitro toxicity studies conducted according to standard protocols (e.g. OECD Test Guidelines). The following types of studies are defined:

- Acute toxicity studies are studies which investigate the effects of single doses of a substance. The standard acute toxicity studies include tests for: acute, oral, dermal and inhalational toxicity, eye irritation, skin irritation and skin sensitisation;
- Sub-chronic toxicity studies are short term repeat-dose studies. The main purpose of sub-chronic testing is to identify any target organs and to establish dose levels for chronic exposure studies;
- Chronic toxicity studies, or long-term studies, are defined as studies lasting for the greater part of the lifespan of the test animals. The protocol for these studies may cover the investigation of chronic toxicity or carcinogenicity, or both;
- Reproductive toxicity studies are studies designed to provide general information about the effects of a test substance on reproductive performance in both male and female animals;
- Developmental toxicity studies are studies which examine the spectrum of possible in utero outcomes for the conceptus, including death, malformations, functional deficits and developmental delays; and
- Genotoxicity studies are designed to determine whether test chemicals can perturb genetic material to cause gene or chromosomal mutations.

The essential purpose of toxicity studies is the detection of valid biological evidence of the hazard potential of the substance being investigated. The evaluation of the weight of evidence produced by toxicity studies is that process which considers the cumulative data pertinent to arriving at a level of concern about the potential adverse effects of a substance. In assessing toxicological studies and hazard analysis, judgement and supporting rationale are provided for:

- The acceptability of the study and its database;
- The existence of biologically important adverse effects;
- The relevance of any factors noted during the evaluation which might have had some bearing on the outcomes of the study and modified the findings in some way; and

- The likelihood that any of the observed effects were induced by the administered substance.

Toxicology assessments are often complemented with epidemiological studies in hazard assessment. Epidemiology is the direct human evidence component of the assessment. Epidemiological studies are used to investigate the cause of adverse health effects; the natural history of health conditions; the description of the health status of populations; and to evaluate the health status of populations; and to evaluate health related interventions.

5.2 Dose-Response Assessment

There are different ways of characterising dose-response relationships including:

- Effect levels (e.g. LD50, LC50, ED10) and no observed adverse effect levels (NOELs);
- Margins of safety;
- Therapeutic indices; and
- Models to interpolate high dose experimental data to the low doses likely to be experienced in the environment.

There are often limited human exposure data, animal bio-assay data are most often used for dose-response assessment. The use of these data requires extrapolations from animals to humans and interpolations from high doses to low doses.

Dose-response assessments and calculations are generally undertaken by either of a threshold approach or a non-threshold approach. Each is described in further detail following.

5.2.1 Threshold Approaches

A threshold is considered to occur because of biological mechanisms such as the ability to metabolise or excrete a toxin to repair damage up to a certain dose.

The approach with these models is to derive exposure limits such as an Acceptable Daily Intake (ADI), Tolerable Daily Intake (TDI) or Reference Dose (RfD). This approach makes no attempt to calculate a level of risk at low exposures. Rather, it derives a dose which is apparently without effect in a human population or suitable animal model, and then applies a factor to derive an exposure which has a high likelihood that no effect will occur in the general human population.

These exposure limits are first derived by determining the No Observed Adverse Effect Level (NOAEL) or, if the NOAEL cannot be determined, the Lowest Observed Adverse Effect Level (LOAEL) and dividing the value by factors to account for:

- Interspecies differences (extrapolating from animals to humans);
- Intraspecies differences (differing sensitivities between individuals);
- The severity of the adverse effect; and
- The quantity and quality of the scientific data.

Traditionally, safety factors for intraspecies and interspecies differences have each been assigned values of ten, and the other two have been assigned values between 1 and 10. An additional factor of ten is sometimes used if the NOAEL was not established in the study. The individual factors are then multiplied to determine an overall safety factor by which the NOAEL is divided to give the ADI, TDI or RfD.

Historically, the most common overall factor used by a number of regulatory bodies is 100, if a large toxicological database has been assessed, although the overall factor can range from 10 to 10,000. From the data available on humans and experimental animals, it appears that interspecies and intraspecies differences are in general less than 10, hence the often used safety factor of 100 for these two factors is conservative and adequately protective of public health.

5.2.2 Non-Threshold Approaches

These approaches do not recognise the possibility of a threshold effect and are appropriate for radiation and some genotoxic carcinogens. It is, as a science policy decision, applied to all carcinogens by the US EPA.

Non-threshold models assume linearity between the lowest experimentally derived dose and the zero dose (the origin). This implies that there is a calculable probability of an adverse effect (risk) no matter how small the dose. This does not mean that there is no dose that could be considered safe unless safety must be equated with zero risk.

Numerical estimates of risk probabilities are generated by fitting one or more mathematical models to the data in the experimental dose range and extrapolating to the low environmental exposure doses. For example, low-dose extrapolation using a linear model is a default approach for cancer risk assessment in the USA and is one approach which has been used by the WHO for genotoxic carcinogens in deriving water quality guidelines.

The outcomes are estimates of either:

- The dose at a predetermined acceptable risk level (note that this requires some judgement on what constitutes an acceptable level of risk); or
- The estimated risk level at any particular dose.

It has been recognised by IARC and other European based agencies that not all carcinogens have genotoxicity as their prime mode of action, the dose-response curve is assumed to be non-threshold for genotoxic carcinogens and threshold for non-genotoxic carcinogens. Accordingly, the Australian approach is to apply non-threshold and threshold models to genotoxic and non-genotoxic carcinogens.

5.3 Sources of Toxicological and Tolerable Intake Data

NEPC (2013) provides toxicological data sources that are considered to provide information that is compliant with Australian requirements for setting public health standards in the context of assessing potential human health risks. These sources include:

1. National Health and Medical Research Council documents (e.g. Australian Drinking Water Guidelines);
2. National Environmental Protection Council documents (e.g. NEPM Air Toxics, NEPM Ambient Air Quality and Air Quality Standard Setting Methodology);
3. Other Australian government sources of toxicity data (e.g. ADI list from the Therapeutic Goods Administration, enHealth Council documents and National Environmental Health Forum documents distributed by the Commonwealth Department of Health and Ageing);
4. South Australian Health which has published a series of workshops on risk assessment of contaminated land;
5. World Health Organisation (WHO) documents. Australia is a party to the WHO process and has incorporated their material in a variety of environmental health criteria. A range of documents include those from the WHO/ILO/UNEP International Programme on Chemical Safety (IPCS) which produces Environmental Health Criteria monographs and Concise International Chemical Assessment documents (CICADs). Documents detailing international Acceptable Daily Intakes (ADI's), Tolerable Daily Intakes (TDI) or Tolerable Weekly Intakes (TWI) may be found in evaluations by the WHO/FAO Joint Meeting on Pesticide Residues (JMPR) and by the Joint FAO/WHO Expert Committee on Food Additives (JECFA);
6. International Agency for Research on Cancer (IARC) documents;

7. US Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels and toxicological reviews;
8. Other Governmental sources of information (e.g. NICNAS, USEPA IRIS database and European Government Guidance);
9. Other sources of peer reviewed toxicity criteria (US EPA's PPRTV/HEAST, Cal EPA toxicity values and OEHHA); and
10. Peer reviewed journals for which robust justification is required if information is to be sourced as they generally are not compliant with the requirement for having carried out an extensive literature review.

Where physical and chemical data are necessary requirements in the risk assessment process, the following sources, in order, are recommended:

1. ORNL (Oak Ridge National Laboratory) Risk Assessment Information System (RAIS);
2. ATSDR toxicological profiles; and
3. Peer reviewed journals.

5.4 Review of Published Hazard Data

Available toxicological, epidemiological studies and dose-response studies have been reviewed for asbestos, as identified in **Section 4**, by the protocols established in **Section 5.1**. Consequently, citing the relevant agencies, there has been no requirement in this risk assessment to further review and comment upon the hazard studies reviewed by each organisation, or those that may be available elsewhere that are not endorsed by these organisations.

Instead, the pertinent toxicological effects identified for asbestos by the agencies has been reviewed and summarised. Risk / hazard factors and guideline values have also been identified from these sources.

5.5 Asbestos

Asbestos has been selected as a contaminant of potential concern (COPC) for the assessment of potential human health impacts. A brief summary of the toxicological data available for asbestos has been provided following. The summary has been generated by a review of the available data held by the agencies outlined in **Section 5.3**, as summarised in **Table 5.1**.

Table 5.1: Summary of Published Hazard Data for Asbestos

Organisation	Availability	Reference
NHMRC	YES	'Lung Cancer', Section 1, Epidemiology. http://www.nhmrc.gov.au/publications/synopses/_files/cp97_1.pdf 'Asbestos Related Diseases' http://www.nhmrc.gov.au/your_health/issues/asbestos.htm
NEPC	YES	NEPC (2013) 'Schedule B1: Soil and Groundwater Investigation Levels'
Therapeutic Goods Administration	No	
WHO	YES	'Elimination of Asbestos Related Diseases' http://whqlibdoc.who.int/hq/2006/WHO_SDE_OEH_06.03_eng.pdf 'Asbestos in Drinking Water' http://www.who.int/water_sanitation_health/dwq/asbestos.pdf Air Quality Guidelines, 2nd Edition, Section 6.2, 'Asbestos'. http://www.euro.who.int/document/aiq/6_2_asbestos.pdf 'Environmental exposure to asbestos and the exposure–response relationship with mesothelioma' http://www.emro.who.int/publications/emhj/1501/PDF/03.pdf
enHealth	YES	'Management of Asbestos in the Non-Occupational Environment' http://www.nphp.gov.au/enhealth/council/pubs/pdf/asbestos.pdf
NEHF	No	
S.A Health	No	
IARC	No	
WHO/FAO JMPR	No	
NICNAS PEC	YES	'Chrysotile Asbestos Priority Existing Chemical No. 9' http://www.nicnas.gov.au/publications/CAR/PEC/PEC9/PEC_9_Full_Report_PDF.pdf
ATSDR	YES	'ToxFAQs™ for Asbestos' http://www.atsdr.cdc.gov/tfacts61.html 'Regulations and Advisories' http://www.atsdr.cdc.gov/toxprofiles/tp61-c8.pdf
NTP	YES	Lifetime Carcinogenesis Studies of Amosite Asbestos in Syrian Golden Hamsters http://ntp.niehs.nih.gov/ntp/htdocs/LT_rpts/tr249.pdf Toxicology and Carcinogenesis Studies of Crocidolite Asbestos in F344/N Rats http://ntp.niehs.nih.gov/ntp/htdocs/LT_rpts/tr280.pdf Toxicology and Carcinogenesis Studies of Chrysotile Asbestos in F344/N Rats http://ntp.niehs.nih.gov/ntp/htdocs/LT_rpts/tr295.pdf
OECD SIDS SIAR	No	
US EPA	YES	'Asbestos (CASRN 1332-21-4)' http://www.epa.gov/NCEA/iris/subst/0371.htm US EPA (December 2014) 'Toxicological Review of Libby Amphibole Asbestos'

NHMRC

NHMRC define asbestos as a carcinogen with no clearly delineated limiting threshold, and support a cumulative exposure model for risk as defined by exposure. Asbestos has been found to cause pleural disease, asbestosis, lung cancer and mesothelioma.

NEPC

NEPC (2013) has adopted the asbestos criteria as provided in *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*, 2009, Western Australian Department of Health (WA DoH, 2009).

WA DoH (2009) provide assessment levels for asbestos cement products and free asbestos fibres in soils. The assessment criteria are based on the work of Swartjes et al (2003) and Swartjes & Tromp (2008), WHO risk figures for mesothelioma and division by a factor of ten, to account for greater dryness and dust generating potential of WA soils and treating all forms of asbestos as being of equivalent toxicity. The soil investigation criteria provided by WA DoH (2009) are listed as follows:

- 0.001% asbestos for all site uses, based on free asbestos fibres and asbestos fines;

- 0.01% asbestos for residential use, based on ACM;
- 0.04% asbestos for residential use with minimal soil access, based on ACM;
- 0.02% asbestos for parks, public open spaces, playing fields, based on ACM; and
- 0.05% asbestos for commercial / industrial based on ACM.

It is noted that only residential criterion are based on toxicology and risk based assessments using exposure parameters and unit risk levels. The other criteria are derived from the residential criteria using adopted exposure ratios which are loosely based on comparative exposure durations on the assessed populations.

WHO

WHO classify asbestos (actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite) as carcinogenic, based on a statement by the International Agency for Research on Cancer. Exposure to amosite, anthophyllite, chrysotile or crocidolite results in the increased risk of lung cancer, while occupational exposure to crocidolite, amosite, tremolite and chrysotile has resulted in mesotheliomas. The risk of bronchial cancer also increases, as may that of cancers of the larynx and gastrointestinal tract.

WHO finds that the occurrence of asbestos-related diseases is related to fibre type, size and dose, and to the industrial procession of that asbestos, while cigarette smoking increases the associated risk. Fibres with a diameter greater than 3 µm are not respirable; fibres shorter than 5 µm and thicker than 2 µm elicit little response, while those longer than 10 µm and thinner than 0.5 µm yield the highest response.

Asbestosis has only been found related to occupational asbestos exposure, while non-occupational asbestos exposure does not appear sufficient. The incidence of mesothelioma has been shown to increase with increased exposure.

WHO studies have not found asbestos to be teratogenic or mutagenic in mice, while there is no conclusive evidence that ingested asbestos is carcinogenic. Drinking water containing high levels of asbestos have not been shown to be carcinogenic.

WHO (2000) provides estimates of mesothelioma risk resulting from lifetime inhalation exposure to asbestos with a best estimate of a risk of $2 * 10^{-5}$ for a lifetime exposure to 100 f/m^3 ($1 * 10^{-4}$ f/ml). WHO (2000) further provides an estimate of $2.2 * 10^{-5}$ risk of lung cancer for a non-smoker exposed to a fibre concentration of 100 f/m^3. These values are each equivalent to an approximate unit risk of 0.2 (f/ml)$^{-1}$. The unit risk is a measure of the incremental lifetime risk of cancer associated with lifetime exposure to a unit concentration (1 f/ml)$^{-1}$ of asbestos in air. Unit risk factors are derived from the cancer slope factor for the inhalation of carcinogenic chemicals.

enHealth

enHealth defines asbestos as a carcinogen, with amphibole fibres (crocidolite, tremolite and amosite) considered more dangerous and the primary agents in the increased incidence of mesothelioma. enHealth quotes studies suggesting there is a direct correlation between exposure and risk, with chronic exposure being the largest contributor to asbestos related health risks, with significantly increased mortality rates reported in exposed workers with cumulative exposure estimates greater than 25-100 f/mL-years. A further study estimated a 1 per cent increase in the standardised mortality ratio for lung cancer per year of exposure to 1 f/mL

The shape and length of asbestos fibres are also found to alter health risks, with fibres >20 µm <100 µm consider to be most carcinogenic, while in terms of shape, those with fibres >8 µm long and <0.25 µm diameter, with an aspect ratio (length/width) ≥10 appear to be most dangerous.

For non-occupational risk, studies of a crocidolite mining town showed a mesothelioma rate of 260 per 100 million person-years, while the mesothelioma rate for residents living near an asbestos cement factory was 73 (female) and 114 (male) per million person-years, as compared to a background incidence rate of one per million person-years. enHealth quotes guidelines for asbestos exposure as 0.1 f/mL for occupational exposure in Australia, and para-occupational sampling if using a limit of detection of 0.01 f/mL, while there is a proposed standard of 0.033f/mL for ambient air in Tasmania. Further, Australia has set a cut-off of 0.1 per cent by weight asbestos in products for the purpose of carcinogenic classification of the products.

NEHF/NICNAS

NICNAS has declared chrysotile a Priority Existing Chemical (PEC) as it is prevalent and a known human carcinogen, causing asbestosis, mesothelioma, and lung cancer. No estimate is given as to a limiting threshold, but lung cancer occurrence estimates for the Australian friction material manufacturing industry are given as 1 to 2 cases from exposure to 1 f/mL, 1 case at 0.5 f/mL and 0.2 case at 0.1 f/mL, per 1000 workers. The PEC also cites the 1999 national exposure standard (TWA) for chrysotile as 1 f/mL, but suggests that monitoring methods do not distinguish between types of asbestos and a limit of 0.1 f/mL would protect against other forms of asbestos.

ATSDR

ATSDR recognizes asbestos as a carcinogen responsible for mesothelioma and lung cancer. They quote the US EPA as proposing a concentration limit of 7 million fibres per litre of drinking water for long fibres (lengths greater than or equal to 5 µm), while the Occupational Safety and Health Administration has set a limit of 100,000 f/m^3 with lengths greater than or equal to 5 µm for workplace air for 8-hour shifts and 40-hour work weeks. A number of sources are quoted as given US standards for limits, typically 0.1 – 1.0 f/mL.

NTP

NTP studies on hamsters and rats show that asbestos is not carcinogenic from ingestion.

US EPA

The US EPA established asbestos as a human carcinogen based on consistently higher mortality rates and cancers among occupationally exposed workers. Inhalation was identified as the primary cause, while evidence for carcinogenicity from ingestion remains inconclusive, as studies on white rats resulted in the development of benign polyps. A synergistic interaction between asbestos exposure and cigarette smoking, contributing to the development of lung cancer but not mesothelioma, was identified.

The US EPA identifies the Inhalation Unit Risk as 0.23 $(f/mL)^{-1}$. The unit risk is a measure of the incremental lifetime risk of cancer associated with lifetime exposure to a unit concentration (1 f/ml)-1 of asbestos in air. Unit risk factors are derived from the cancer slope factor for the inhalation of carcinogenic chemicals. The US EPA unit risk factor is very similar to the unit risk as derived from WHO reports.

Air Concentrations at Specified Risk Levels as provided by the US EPA are summarised following:

Risk Level	Concentration
E-4 (1 in 10,000)	$4*10^{-4}$ f/mL
E-5 (1 in 100,000)	$4*10^{-5}$ f/mL
E-6 (1 in 1,000,000)	$4*10^{-6}$ f/mL

Different types and fibre sizes of asbestos appear to have different health impacts, with fibre size and processing method appearing to impact relative risk as much as the specific type of asbestos. Evidence remains inconclusive as to the exact nature of these differences.

US EPA (2014) provides a further discussion of potential noncancer effects of exposure to amphibole forms of asbestos. These have been found to include pleural abnormalities, asbestosis, and reduced lung function as well as increased mortality from noncancer causes. Experimental animal studies are further reported to have demonstrated increased collagen deposition consistent with fibrosis following intratracheal instillation of asbestos fibre in mice as well as increased markers of pulmonary inflammation in a rat model for human cardiovascular disease.

US EPA (2014) nominates a reference concentration (RfC) of $9*10^{-5}$ f/ml for amphibole forms of asbestos as based on observations of increased pleural thickening (localized and diffuse) and signs of interstitial fibrosis (i.e. small opacities) in occupationally exposed workers. Localized pleural thickening (LPT) was selected as the critical effect due to its higher prevalence for the purposes of deriving an RfC. The RfC is intended to be applied on the basis of continuous exposure (i.e. 24 hours/day, 365 days/year, with exposure beginning at birth and continuing for 70 years). The derivation of the RfC is reported to have included three uncertainty factors (UF) for a composite UF of 300 (comprising an intraspecies UF of 10 and a database UF of 10). The RfC is reported to be applied by calculating the average concentration over a lifetime period – that is the RfC is intended to be applied to an averaging time of a lifetime exposure.

US EPA (2014) also present an estimate of unit risk, on the basis of combined mesothelioma and lung cancer mortality from exposure to amphibole asbestos on the basis of the workers assessed. The unit risk value of 0.17 $(f/ml)^{-1}$ provided for amphibole asbestos is similar to the unit risk of 0.23 $(f/ml)^{-1}$ recommended by the US EPA IRIS database for all forms of asbestos.

5.6 Adopted Value to Assess Risk of Asbestos

Potential toxicological effects of asbestos exposure will be assessed by the WHO recommended unit risk of 0.2 $(f/ml)^{-1}$. Asbestos is not toxic by oral or dermal exposure pathways. The unit risk to assess non-threshold effects, has been demonstrated as being suitably conservative to account for potential threshold effects of exposure to amphibole forms of asbestos.

6. Exposure Assessment

Exposure assessment involves the determination of the magnitude, frequency, extent, character and duration of exposures currently and into the future. This includes the identification of exposed populations and potential exposure pathways. The exposure assessment has derived exposure scenarios that are the most potentially conservative for the site and the surrounding area.

6.1 Potential Exposure Pathways and Populations

On the basis of preceding discussion, the potential receptors of concern for further assessment are:

- Recreational users of the reserve;
- Landscapers;
- Sub-surface maintenance / excavation workers; and
- Residents adjoining / in proximity of the site.

Recreational users will potentially undertake a range of surface activities across the reserve, as consistent with the locality and open space nature of the site. It is noted that these would be anticipated to be of short duration in nature as consistent with the absence of any fixed equipment, camping etc within the extent of the reserve. Shorter term exposures would also occur with the use of the car park as present within the central portion of the Reserve.

Landscapers are understood to be occupationally engaged to maintain the Reserve. Though these are a commercial / industrial receptor, exposure durations will not be consistent with the duration of commercial / industrial exposures, as only a minor amount of landscaping / maintenance works are required for the grassed / open areas across the reserve. There are no significant garden / landscaped areas within the Reserve that would warrant detailed works from a gardener / landscaper. However particular factors as unique to landscaping / gardening works may potentially cause increased exposures.

Periodic sub-surface / excavation works may be required on the site as associated with future maintenance of services. These exposures would be anticipated to be of short duration and intermittent. However, as noted for landscapers there is a potential for unique factors within these works that may potentially cause increased exposures to airborne asbestos fibres. Sub-surface maintenance worker exposures may further be caused to be highly localised, and assessment should be undertaken to maximum concentrations of constituents to remain conservative.

Asbestos fibres as potentially generated from site soils may potentially migrate to affect residential properties in proximity. The residential properties will potentially have sensitive receptors present. Further exposure durations within residential properties would be anticipated to be greater than exposure durations of recreational users within the Reserve. The risk assessment also requires to consider the potential levels of asbestos as may be caused at these adjoining residential properties. This will require additional factors to be considered in the fate and transport assessment, inclusive of the proportion of time that a residence may be downwind of the site, dispersion and associated reduction in concentration of airborne fibres between the reserve and the residential dwelling / property, and reductions of indoor to outdoor levels of respirable particles/ fibres.

6.2 Exposure Estimation

Exposure estimation has been undertaken by the consideration of a reasonable maximum exposure (RME) on a particular site (USEPA, 1989a). The goal of RME is to combine upper bound and average exposure factors in a manner such that the result represents an exposure scenario that is both protective and reasonable. This is not one which is the absolute worst case but that which represents a reasonable maximum exposure.

The approach for exposure assessment used here is based on the procedures developed by the US EPA (1989a and 1991). In general, assumptions employed in risk assessments are based on information presented by local authorities (i.e. enHealth (2001) 'Exposure Scenarios and Settings'), precedents established in previous risk assessments and recommendations by the US EPA.

The estimated exposure (or intake) of a person is normalised for time and body weight and is generally calculated as:

$$\text{Intake} = \frac{\text{Concentration x Contact Rate x Exposure Frequency x Exposure Duration}}{\text{Body Weight x Averaging Time}}$$

As an alternative to deriving criteria based on RME, probabilistic techniques such as Monte Carlo analysis can be used to account more realistically for variability and uncertainty. However, there is generally insufficient information available in an Australian context to allow reliable Monte Carlo analysis to be undertaken. Monte Carlo analysis has not been undertaken here.

6.3 Exposure Factors

The exposure factors adopted for the purposes of assessing risks from the site are consistent with those adopted in NEPC (2013) in the first instance. Where insufficient guidance is provided in NEPC (2013), further reference has been made to enHealth (2012) '*Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards*', enHealth (2012b) '*Australian Exposure Factor Guidance: Guidelines for assessing human health risks from environmental hazards*' and CRC CARE (2011) '*Technical Report no.10: Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater*' where available. For some exposure scenarios, specific or appropriate exposure factors have not been provided in enHealth (2012) or CRC CARE (2011). In these cases, available literature has been reviewed to determine the parameters that are most appropriate for an Australian context. Additional parameters, where required, are based on an RME receptor.

Exposure factors are summarised for each of these populations in the following **Tables 6.1** to **6.4**.

Table 6.1: Exposure Parameters – Recreational User

Exposure Parameter	Units	Factor	Reference
Exposure Frequency	days/year	365	NEPC (2013), assumed continuous
Exposure Duration	Years	70	NEPC (2013), assumed lifetime
Exposure Time	Hours	2	NEPC (2013), as recommended for recreational exposure durations
Averaging Time – non Threshold	Years	70	NEPC (2013)

Table 6.2: Exposure Parameters – Gardener / Landscaper

Exposure Parameter	Units	Factor	Reference
Exposure Frequency	days/year	52	Assumption of one day per week, 52 weeks per year
Exposure Duration	Years	30	NEPC (2013), commercial / industrial exposure duration
Exposure Time	Hours	8	NEPC (2013)
Averaging Time – non Threshold	Years	70	NEPC (2013)

Table 6.3: Exposure Parameters – Adult Sub-Surface Maintenance Workers

Exposure Parameter	Units	Factor	Reference
Exposure Frequency	days/year	15	Assumption of maximum time spent undertaking maintenance works, three weeks.
Exposure Duration	Years	10	Based on 10 repeat events
Exposure Time	Hours	8	NEPC (2013)
Averaging Time – non Threshold	Years	70	NEPC (2013)

Table 6.4: Exposure Parameters – Adjoining Resident

Exposure Parameter	Units	Factor	Reference
Exposure Frequency	days/year	365	NEPC (2013)
Exposure Duration	Years	35	enHealth (2012), 95% RME time at single residence.
Exposure Time	Hours	20	enHealth (2012)
Averaging Time – non Threshold	Years	70	NEPC (2013)

6.4 Estimation of Inhalation Exposure

When deriving screening levels for asbestos, inhalation exposures have been estimated by the approach in *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment)*, January 2009, US EPA. Equations are provided here for estimating exposure concentrations for assessing cancer risks and for calculating hazard quotients from chronic exposures as per the following:

EC = (CA * ET * EF * ED)/AT (cancer risks)

EC = (CA * ET * EF * ED)/AT (hazard quotients)

Where: EC – exposure concentration (µg/m^3);

CA – contaminant concentration in air (µg/m3);

ET – exposure time (hours/day)

EF – exposure frequency (days/year)

ED – exposure duration (years)

AT – averaging time, cancer risks (lifetime in years * 365 days/year * 24 hours/day)

AT – averaging time, hazard quotient (ED in years * 365 days/year * 24 hours/day)

Table 6.5, summarises each of the adjustment factors to be used for each of the receptors assessed by the risk assessment.

Table 6.5: Summary of Factors to Adjust Airborne Concentrations for Inhalation Exposure

Receptor	Cancer Risks (EC)
Recreational Site User	EC = $8.33*10^{-2}$ * CA
Landscaper / Gardener	EC = $2.04*10^{-2}$ * CA
Sub-Surface Maintenance Worker	EC = $1.96*10^{-3}$ * CA
Adjoining Resident	EC = 0.417 * CA

6.5 Asbestos Fibre Fate and Transport

Environmental assessment works undertaken have identified asbestos as present on the site as summarised in **Sections 1.11** and **1.12**. Asbestos data is presented as concentrations of asbestos fines (i.e. AF / FA) and asbestos within a bonded matrix within soils. However potential exposures require to be based on airborne concentrations of asbestos. On this basis, a fate and transport assessment has been completed to estimate potential airborne levels of asbestos from the site, as generated from known levels of asbestos in site soils.

6.5.1 Level of Asbestos in Site Soils

Statistical analysis of asbestos data has been undertaken using the US EPA ProUCL package using the risk assessment dataset summarised in **Appendix F**. Statistical outputs are provided as **Appendix G**. A summary of the characterisation data for asbestos occurring as asbestos fines, and occurring in a bonded matrix, is summarised in **Table 6.6** following.

Table 6.6: Summary of Statistical Analysis of Asbestos Data Sets (mg/kg)

Measure	Asbestos Fines	Asbestos in Bonded Matrix	Comment
95% UCL_{avg}	17	296	Kaplan Meier non-parametric UCL adopted for fines and bonded data set. ProUCL noted to recommended a Kaplan-Meier statistics based on log normal data, however the estimates 95% UCL_{avg} (5.6 mg/kg) is less than the mean. Kaplan-Meier adopted for fines consistent with recommendation for bonded data set.
Maximum	503	1909	
Mean	9.4	224	Including consideration of non detects
Number	109	81	

Consistent with guidance in *Sampling Design Guidelines*, 1995, NSW EPA the assessment has been undertaken on the basis of 95% UCL_{avg} concentrations, and further assuming that all asbestos present on the site occurs at the site surface.

6.5.2 Fibre Release from Contaminated Soils

Two published studies are available which have attempted to quantify the rate of asbestos fibre release from soils. These include Addison, J., Davies, L.S.T., Robertson, A., and Willey, R.J, 1988, '*The Release of Dispersed Asbestos Fibres from Soils Technical Memoranda',* TM/88/14, Institute of Occupational Medicine: 50, Edinburgh, UK (Addison et al 1988) and Swartjes, F.A., Tromp, P.C., , 2008, 'A Tiered Approach for the Assessment of Human Health Risks of Asbestos in Soils'*, Soil and Sediment Contamination*, Volume 14, Issue 4, pp. 137 – 149 incorporating Swartjes F.A, Tromp P.C, Wezenbeek J.M, 2003, '*Assessment of the Risks of Soil Contamination with Asbestos',* National Health and Environmental Institute, Netherlands, RIVM Report 711701034/2003 (Swartjes and Tromp 2008), as discussed below.

<u>Addison et al (1988)</u>

Assessment of the potential for asbestos fibre generation from asbestos contaminated soils has been undertaken in Addison et al (1988). This study assessed the potential generation of free asbestos fibres from asbestos contaminated soils.

It was found that potentially high concentrations of asbestos fibres could be present in dust as generated from contaminated soils. It was found that soils with a concentration of free asbestos fibre of 1% by weight could generate airborne fibre concentrations greater than 20 f/ml where dust levels were below 5 mg/m^3. Dry loose soils with 0.001% asbestos fibres reported respirable asbestos concentrations greater than 0.01 f/ml while dust levels were below 5 mg/m^3.

The potential generation of asbestos fibres was found to be reduced for chrysotile forms of asbestos when compared to amphibole forms. Increasing moisture content of soils reduced potential asbestos fibre generation. Clayey soils generated less asbestos fibres than loose sandy soils.

On the basis of the tests completed by Addison et al (1988) a relationship between the normalised airborne fibre concentration (f/ml / mg/m^3) and the proportion of asbestos in soil was produced (**Diagram 6.1**).

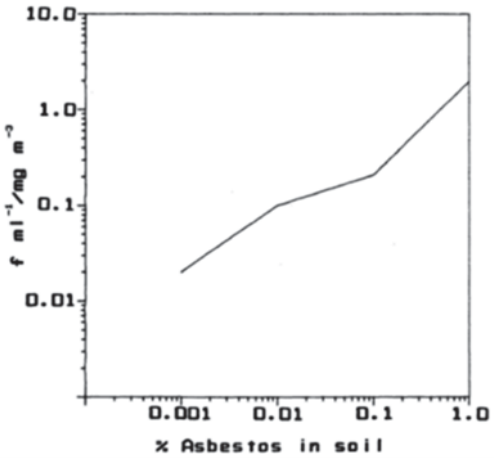


***Diagram 6.1**: The relationship between the normalised airborne fibre concentration (f/ml / mg/m^3) and the proportion of asbestos in soil; average results from all test runs (Addison et al 1988)*

Swartjes et al (2003) and Swartjes & Tromp (2008)

A more recent assessment than Addison et al (1998) of the generation of asbestos fibres from soils has been undertaken by Swartjes & Tromp (2008) as incorporating the findings of Swartjes et al (2003). An inventory of more than 1000 measurements of asbestos fibre generation from asbestos impacted soils is reported to have been reviewed. These data resulted from:

- Worst case simulation experiments (wind blower with dry soil and loose asbestos fibres);
- Field experiments consisting of daily practice activities including driving on contaminated roads, digging and dumping and sifting of humid soil on sites contaminated with:
    - Friable asbestos in soils; and
    - Bound asbestos (i.e. ACM) in soils.

Diagram 6.2 shows the data obtained by Swartjes et al (2003) and Swartjes & Tromp (2008) showing the relationship between soil and air concentrations of asbestos. The graph shows the airborne asbestos concentration during the simulation experiments and field measurements with friable and bound asbestos impact in soils. 95% confidence intervals are also shown. The lower fitted line is based on field measurements of asbestos fibre generation from impacted soils, and the upper fitted line is based on simulations of worst case asbestos fibre dispersal from impacted soils.

It is noted by the authors in the preparation of the graph that the worst case simulation experiments give higher airborne asbestos concentrations. This is shown by the higher of the fitted lines on **Diagram 6.2**.

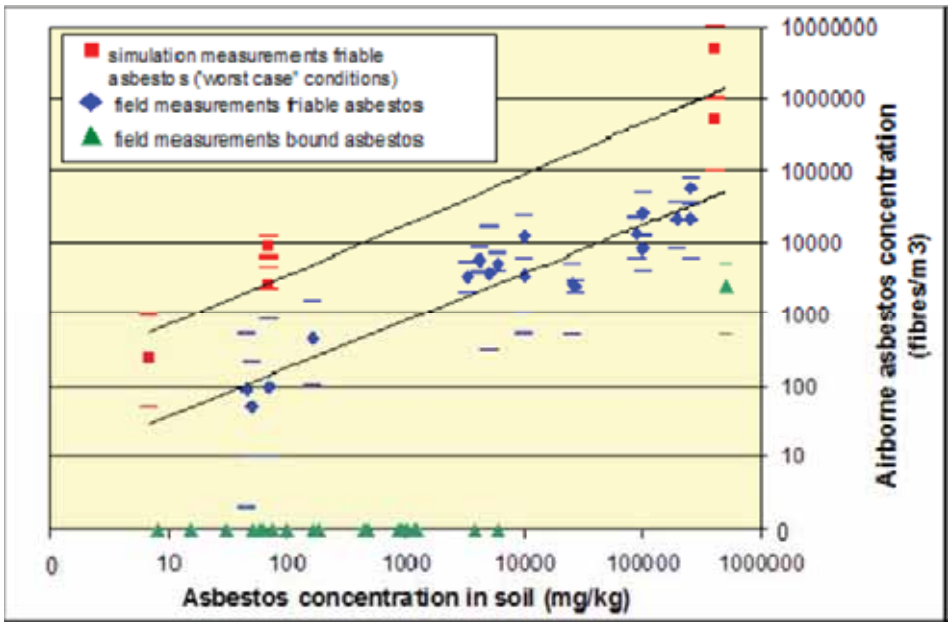


***Diagram 6.2**: Results showing the relationship developed between soil and air concentrations of asbestos*

Preferred Method

The Swartjes and Tromp (2008) method has been adopted to estimate potential airborne asbestos concentrations as caused by fibres in soils. This method is considered appropriately conservative for adoption on the site on the basis of:

- The asbestos fibre generation measurements in the field based data set have been collected during daily practice activities where soils are being actively agitated. Examples of the sort of agitation works being undertaken on the soils includes driving on contaminated roads and digging, dumping and sifting of humid soil. These activities will typically not be undertaken within the Reserve, or will be highly localised and of short duration when undertaken. This causes the estimated levels of asbestos over the chronic timescale of the majority of exposure assessed to be highly conservative;
- Soil moisture content is reported to control asbestos emissions as discussed further in **Section 6.5.3**. The Dutch soils on which the Swartjes and Tromp (2008) emissions data are based are presumably based are reported to have a typical moisture content of 10% (MHSP&E 2000). Noting that the site is landscaped with established lawn / vegetated areas, the moisture content of soils on the site would be anticipated to be at least 10%, if not greater. This confirms that Dutch data is appropriate to characterise the potential future behaviour of soils on the site;
- It is assumed with application of the method that exposures occur in direct proximity of the asbestos fibres. However, Swartjes and Trompe (2008) reports substantial reductions in airborne levels of asbestos fibres at small distances from the source of the fibres. These have not been considered in the assessment; and
- For the purposes of the modelling, it has been assumed that all asbestos fibres are present in near surface soils and are available to be released into the atmosphere. This is again highly conservative as it assumes that asbestos fibres are relocated to the upper surface layer of soils only and no vegetation is present in landscaped areas of the site, or otherwise present over the remainder of the site.

6.5.3 Locations of Asbestos Exposure

It has been assumed that recreational users, landscapers / gardeners and sub-surface excavation / intrusive workers will be exposed to asbestos fibres in soils consistent with the predicted airborne concentration above the asbestos fibres. There is also a potential that asbestos fibres may blow into nearby residential dwellings.

Langley & Sobardo (1996) 'Exposure factors in risk assessment' in Langley, Markey & Hill (eds) The health risk assessment and management of contaminated sites: proceedings of the Third National Workshop on the Health Risk Assessment and Management of Contaminated Sites, Contaminated Sites Monograph Series No. 3, South Australia Health Commission reports that 'inspirable particulates inside a house will be 75% of the level of inspirable particulates outdoors'. On this basis, it has been assumed that the 0.75 of the maximum concentration of asbestos fibres will occur within the residential buildings in proximity of the site.

It is further noted that the nearest residence is located at least 20 m from the boundary of the Reserve. Reduction in airborne concentrations of asbestos fibres would occur over this distance by dispersion of any asbestos emissions form the Park. Reductions in concentrations as caused by these dispersion processes have not been considered in the risk assessment, causing estimated airborne concentrations at adjoining residents to be conservative.

6.5.4 Reduced Asbestos Exposure during Rain Days

Review of meteorological data for the Sydney region indicates that the area is subject to rainfall approximately 96 days per year as discussed in **Section 1.10**. Significant asbestos fibre emissions are not anticipated to occur during periods of rainfall. Consistent with the guidance provided in Swartjes and Tromp (2008) and shown on **Diagram 6.3**, emissions of asbestos fibres substantially reduce with increased levels of soil moisture. This is particularly the case for sandy soils, as are observed on the site.

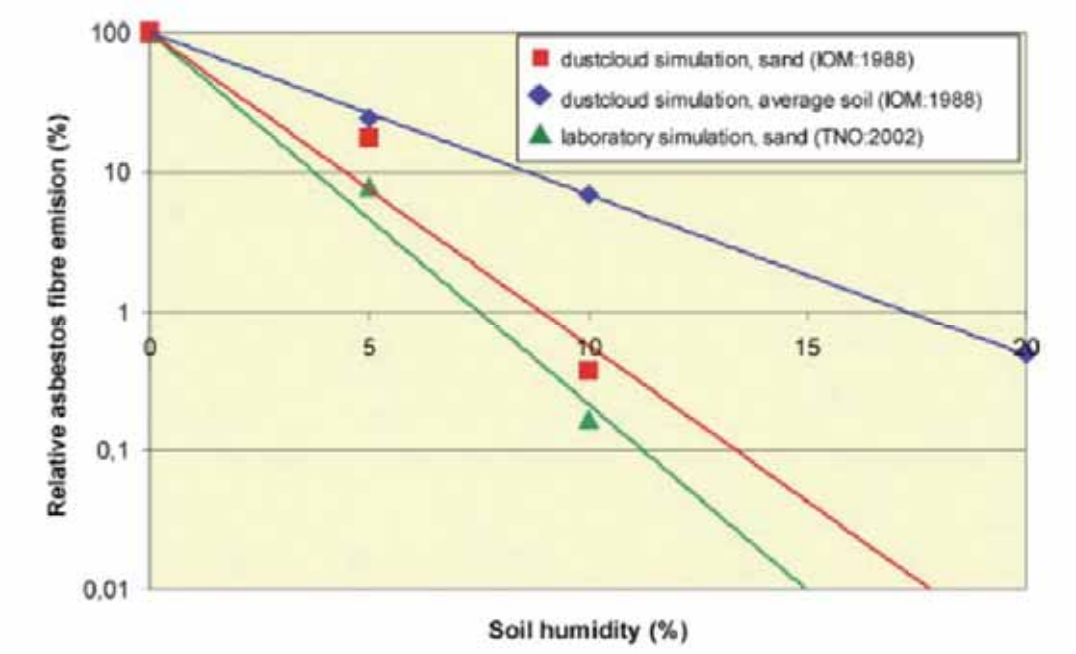


***Diagram 6.3**: Comparison of Soil Moisture and Relative Level of Asbestos Fibres Released*

On this basis, it has been assumed that no significant emissions of asbestos fibres will occur on rainy days. The potential assessment of long term exposures have been reduced by a factor consistent with (365-96)/365 days.

6.5.5 Reduced Asbestos Exposure based on Wind Direction

For human exposure to occur to asbestos emissions, the receptor is required to be downwind of the source of the asbestos fibres. However, for the risk calculations undertaken here, it has been assumed that the on-site receptors are constantly downwind of the source of asbestos fibres.

For the residential receptors in proximity, an adjustment factor of two has been adopted to occur for periods when the residential dwelling is cross-wind or otherwise upwind of the site.

6.5.6 Potential Increased Exposure of Excavation Workers and Gardeners

It is noted that some of the factors as summarised in **Section 6.5.2** to support the use of the Swartjes and Trompe (2008) relationship as conservative for the risk assessment may not apply to short duration excavation worker exposures and works where significant soil agitation may occur (i.e. gardening). On this basis, an additional order of magnitude safety factor has been adopted with these receptors, including potential intrusive / excavation workers and site gardeners in estimating potential levels of asbestos fibres.

6.5.7 Asbestos Release from Bonded Asbestos

A substantial proportion of the asbestos on the site occurs in a bonded matrix. As can be observed from the green data points on **Diagram 6.2**, asbestos emissions do not occur from bonded matrices. For asbestos emissions to occur from bonded asbestos, the bonded matrix is required to break down to release the asbestos fibres into the soils.

A minimum thickness of fibre cement sheet fragment of 4 mm has been observed on the site by the most recent JBS&G assessment. A fibre cement sheet weathering rate of 0.024 mm/year has been reported in *Asbestos fibre release by corroded and weather asbestos-cement products*, 1989, Spurney K R in IARC Science Publication. On the basis of 30, 35 and 70 year duration exposures in proximity of the site, this would indicate that between 18, 21 and 42% of asbestos fibres caused to be released and occur as asbestos fines. For the purpose of the risk assessment and assessment of asbestos as occurring in a bonded matrix, these levels of weathering of an asbestos cement matrix have been adopted as consistent with the exposure period assessed.

6.5.8 Summary of Exposure Concentrations

On the basis of the preceding sections, the potential exposure adjusted asbestos fibre concentration as estimated from the level of asbestos fibres in soils, is summarised for each of the site receptors in **Table 6.7**. This has been undertaken by the measured concentration of asbestos fines and the estimated concentration of asbestos fibres as may be released from bonded asbestos as relevant to the exposure period being assessed.

Table 6.7: Summary of Exposure Concentrations for Airborne Asbestos Fibres for Each Receptor Type Based on Asbestos Fines

Factor	Recreational User	Landscaper / Gardener	Sub-Surface Excavation Worker	Adjoining Resident
Asbestos Fines in soil (mg/kg)	17	17	503	17
Bonded Asbestos in Soil (mg/kg)	296	296	1909	296
Bonded Asbestos Weathering factor	0.42	0.18	0.18	0.21
Total Asbestos in Soils (Chronic Exposure), mg/kg	140	70	850	79
Estimated Airborne Concentration (Swartjes and Tromp), f/m^3	200	150	700	150
Rain day adjustment	0.74	0.74	1	0.74
Excavation works adjustment	1	10	10	1
Outdoor-Indoor Air adjustment	1	1	1	0.75
Wind direction adjustment	1	1	1	0.5
RAGS F Exposure Adjustment	0.0833	0.0204	0.00196	0.417
Exposure Concentration (f/ml)	$1.2*10^{-5}$	$2.3*10^{-5}$	$1.4*10^{-5}$	$1.7*10^{-5}$

It is noted that an additional order of magnitude conservative factor was provided for potential excavation worker and gardener exposures only, which is a substantial adjustment to the exposure level of these populations. Consistent with the discussion in **Section 6.5.2**, the data used to premise the estimate of the release of asbestos fibres from the site soils has been based on data collected from active excavation / earthworks / remediation sites. These activities are not consistent with normal site activities as associated with the anticipated chronic duration exposures for normal site users. However these activities may be consistent with a significant duration of intrusive / maintenance worker exposures and/or increased rates of soil agitation by a gardener, and the additional factor of ten has been adopted here to ensure a conservative approach to exposure characterisation.

It is further noted that only the maximum concentration of asbestos fines and bonded asbestos has been considered in the potential exposure of sub-surface maintenance / excavation workers. This is maintenance / excavation works will potentially be localised to small areas of the site, and unlikely to be exposed to the full extent of the site. On this basis a 95% UCL_{avg} estimate of the site level of asbestos is not appropriate.

7. Criteria for Assessment of Risk

7.1 Risk Measurement

For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the potential carcinogen. The slope factor (SF) converts estimated daily intakes averaged over a lifetime of exposure directly to incremental risk of an individual of developing cancer. Because relatively low intakes (compared to those experienced by test animals) occur with exposures on most contaminated sites it can generally be assumed that the dose response relationship is linear in the low-dose portion of the multistage model dose-response curve. Under this assumption the slope factor is constant and risk is directly related to intake. Thus the following linear based carcinogenic risk equation is used:

Risk = CDI * SF

where: Risk – unitless probability of an individual developing cancer;

CDI – chronic daily intake averaged over 70 years (mg/kg-day); and

SF – slope factor expressed in $(mg/kg\text{-}day)^{-1}$.

The slope factor is often an upper 95% percentile confidence limit of the probability of response based on experimental animal data used in the multistage model. Consequently, the carcinogenic risk estimate will often be an upper bound estimate (US EPA, 1989a).

For the case of estimating risk from asbestos exposure the following linear based carcinogenic risk equation is used:

Risk = Cadj * Unit Risk

where: Risk – unitless probability of an individual developing cancer;

C_{adj} – adjusted asbestos fibre air concentration (f/ml); and

Unit Risk – equal to 0.2 $(f/ml)^{-1}$ for asbestos fibres based on WHO increased incidence of mesothelioma and/or lung cancer.

7.2 Adopted Risk Criteria

Acceptable risk guidelines are available from a range of national and international environmental agencies. These include:

- US EPA (1991) states that "Where the cumulative site risk to an individual based on a reasonable maximum exposure for both current and future land use is less than 10^{-4}, action is generally not warranted unless there are adverse environmental impacts". Where the level of risk exceeds 10^{-4} it is recommended that remediation goals are developed based on a 10^{-6} cancer risk;
- WHO (2004b) 'Guidelines for Drinking Water Quality' are based on a risk of 1 in 100,000 (1×10^{-5}); and
- NHMRC/ARMCANZ (2011) 'Australian Drinking Water Guidelines' nominate a negligible level of risk of 1 in 1,000,000 (1×10^{-6}).

Risk based criteria have been derived by the risk assessment. Guidance for the Australia approach to the derivation of risk based criteria for the assessment of contaminated sites can be observed in NEPC (2013). To this extent, the worked examples provided to NEPC (2013) for the derivation of risk based criteria adopt a target risk of $1*10^{-5}$. The derivation of risk based criteria for benzene in CRC CARE (2011), as adopted in NEPC (2013), has adopted a target risk of $1*10^{-5}$. The guidelines for human health risk assessment as provided to NEPC (2013) further instructs that when using non-

threshold TRV as dose-response criteria, the recommended acceptable incremental lifetime risk of developing cancer arising from exposure to single or multiple carcinogens is 1 in 100,000 (10^{-5}).

For the purposes of this risk assessment an acceptable level of risk is defined as risk less than 1 x 10^{-5} incremental lifetime risk of cancer.

8. Assessment of Risk

Estimates of carcinogenic risk have been prepared for each of the nominated receptors on the basis of the exposure concentrations as summarised in **Table 6.7** and the unit risk adopted for asbestos inhalation. The estimates of carcinogenic risk for each of the receptors assessed are summarised within **Table 8.1** following.

Table 8.1: Estimate of Carcinogenic Risk for Each Receptor

Receptor	Cancer Risk Estimate
Recreational User	$2.5*10^{-6}$
Landscaper / Gardener	$4.5*10^{-6}$
Sub-Surface Maintenance Worker	$2.7*10^{-6}$
Adjoining Resident	$3.5*10^{-6}$

Each of the estimated levels of risk are well below the adopted acceptable level of risk for the site.

It is further noted that there is a likelihood that a resident located on the north-western side of Marine Pde may further use the Reserve for recreational purposes. As per this scenario, the incremental risk estimated for 'adjoining resident' and 'recreational user' scenarios should be added. The sum of these risk estimates is $5.9*10^{-6}$ which is still well below the adopted risk criterion.

On this basis, restricted to the assessment of asbestos on the site, it is considered that the levels of asbestos as present in soils on the site will not pose an unacceptable health risk to ongoing / potential future users of the site and/or potentially sensitive populations in proximity of the site.

9. Sensitivity Analysis

An assessment has been required to be undertaken of the sensitivity of the risk assessment outcomes. Risk assessment calculations can be observed to have been based on:

- Levels of COPCs (AF / FA and bonded asbestos) as estimated by soil sampling programs completed on the site;
- Toxicological parameters used to characterise COPCs;
- Anticipated and assessed current and future land-uses;
- Exposure parameters used to characterise future population behaviours on the site;
- Physical parameters used to characterise site areas and buildings where exposures may occur; and
- Equations and related relationships used to estimate levels of COPCs from reported levels in soils and groundwater to points of exposure.

Each of these are discussed as follows.

9.1 Sampling Programs

Analytical data used for the risk assessment have been obtained from sampling programs previously completed by JBS&G. As discussed in **Sections 1.11** and **1.12**, the AF / FA data in particular, as well as the bonded asbestos data, is considered to have grossly overestimated the actual concentration of asbestos fines that were present in the soils. This is consequent of:

- The disproportionate inclusion of a substantial number of data points within the vegetated portion at the north-east of the site, where a greater frequency of asbestos impacts were present, in the overall dataset. This has caused the biasing of the asbestos fines dataset higher than what it otherwise would be; and
- Biasing of asbestos fines and bonded asbestos data at each location by only adopting the maximum concentration of impacts as measured at each of the depth ranges assessed. In several cases this resulted in a higher concentration of asbestos present at a deep depth at a sample location being assumed to be present at a near surface depth, and further used to characterise the whole of the soils. This has biasing of both datasets as higher than what they otherwise would have been.

The use of a 95% UCL_{avg} to characterise levels of constituents is further observed to be conservative. Noting that the dose occurs by a process of fibres becoming airborne, mixing within a breathing zone, and then being inhaled, an average concentration would have been a more appropriate basis to characterise site soils.

Further, the assessment of a sub-surface excavation / maintenance worker has been based on a maximum concentration, even despite 10 repeat events being assessed and a very low likelihood that the maintenance activity would occur within the extent of the maximum concentrations of asbestos fines and bonded asbestos.

It is considered that the use and selection of environmental data has caused the risk assessment to derive overly conservative estimates of risk.

9.2 Toxicological Parameters

Toxicological data are generally derived by the conversion of dose factors as developed based on animal studies to appropriate levels for human exposure. The conservatism of these values is achieved through the use of uncertainty factors. An uncertainty factor of 100 is commonly applied in converting measured animal toxicity data for use for humans, comprising:

- A factor of 10 to allow for differences that affect the way a chemical behaves in humans rather than the animal species tested; and
- Another factor of 10 adequate to allow for differences in the way the chemical might affect different people, to allow for the most sensitive individuals.

Though the two processes most likely act in two separate ways, indicating a summed factor of 20 should be used, the factors are multiplied to generate an uncertainty factor of 100. It is also noted that most agencies will incorporate an additional factor of 10 where long term toxicity data are not available for a particular constituent, resulting in a total factor of 1 000.

Actual conversion factors used in the derivation of toxicological values has been extensively detailed in **Section 5**. Toxicological data used in the risk assessment has incorporated these uncertainty factors. This is considered an appropriately conservative process for the site.

9.3 Land-Use

The risk assessment outcomes are only valid for the assumed future land-use of the site. The risk assessment would need to be revised where the site was used for a future use other than what has been considered in this assessment.

It is noted that it has been assumed in the fate and transport assessment that the whole of the site is unpaved and clear of vegetation, and all asbestos within soils is potentially accessible to surface wind processes. This is a highly conservative assumption, and even in lieu of consideration of the extent of vegetation present and maintained across the site, is highly unlikely to ever be replicated on a site within the Sydney metropolitan region.

9.4 Exposure Parameters

Exposure parameters have been derived for the range of receptors as based on published guidance provided in Australian guidelines. Exposure parameters are based on reasonably maximum exposed persons and are considered to be conservative.

Risk results are generally found to adjust linearly with adjustments in exposure parameters.

9.5 Conclusion

There are several factors which may have caused the risk and hazard estimates provided in this risk assessment to be underestimated. However, it is more than likely that any underestimation caused by the risk assessment process and limitations of available data and modelling techniques has been overcome by the use of conservative assumptions throughout the assessment. Examples of conservative assumptions provided in this assessment include:

- Adoption of a known overly-conservative dataset to characterise levels of asbestos fines and bonded asbestos in soils;
- Consideration of maximum values for chemical contaminant concentrations across the whole of the Reserve in the selection of constituents of potential concern and characterisation of potential exposure levels;
- Used of a conservative modelling approach and associated physical parameters to characterise fate and transport of asbestos; and

- Use of RME (reasonable maximum exposed) based exposure parameters for receptors where locally available data is not present.

It is concluded that the risk estimates provided are overestimates of actual risk levels and can be used for future decision making for the site.

10. Conclusions and Recommendations

A human health risk assessment has been undertaken to determine whether asbestos as measured in soils on the Jack Vanny Reserve, occurring as bonded asbestos and friable asbestos / asbestos fines, is present at a level that poses an unacceptable health risk to an ongoing recreational use of the site and/or residents in proximity of the site. A sensitivity analysis undertaken of the risk assessment process has found that risk estimates are appropriately conservative and suitable for decision making as to the suitability of the site.

In accordance with the limitations provided as **Section 11**, levels of asbestos on the site have not been found to pose a potentially unacceptable health risk to current / future users of the site as consistent with a recreational land-use, nor occupants of residential properties in proximity of the site.

The fate and transport assessment has estimated the potential worse case airborne concentration of asbestos fibres on the site. This has been found to be well below a level of 0.01 f/ml as identified in *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*, 2015, NSW EPA as a potential trigger to warrant reporting under the *Contaminated Lands Management Act 1997*. Further recent respirable fibre monitoring undertaken by JBS&G during site assessment works has not identified airborne levels of fibres equal to or exceeding 0.01 f/ml. It is concluded on this basis that there is not a requirement to report asbestos impact to the NSW EPA.

Notwithstanding the conclusions in respect of the potential human health risk, soils on the site are impacted with asbestos. Requirements with respect to asbestos as informed to the *Work Health and Safety Regulation 2017* do not differentiate as to whether levels of asbestos are sufficient to pose a health risk. In accordance with the requirements of the Regulation, it is recommended that a notation to the s.149 Certificate for the site is prepared to note the presence of trace levels of asbestos in soils, to meet the requirements for maintaining an Asbestos Register on site.

It is further noted that visible ACM is visible at the surface in some areas of the site. Though this material has been demonstrated to not pose a health risk, the visibility of the material would be considered unacceptable from an aesthetic perspective for a majority of the community. It is recommended that a detailed surface inspection is undertaken and visible ACM is removed from the site.

11. Limitations

This report has been prepared for use by the client who commissioned the works in accordance with the project brief only and has been based in part on information obtained from other parties. The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquires.

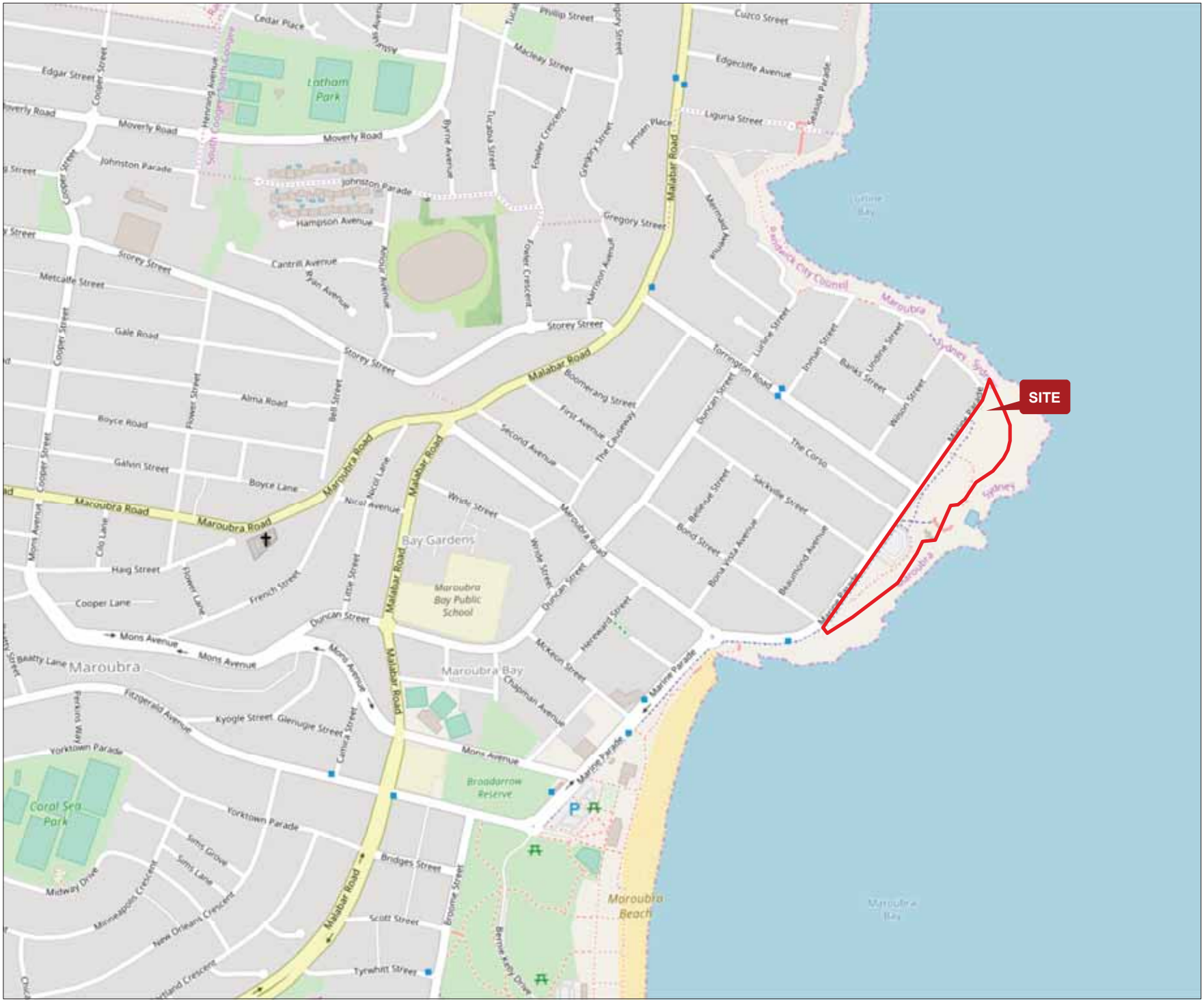
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Limited sampling and laboratory analyses were undertaken as part of the investigations, as described herein. Ground conditions between sampling locations may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the sites, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend:

Approximate Site Boundary

JBS&G

Job No: 54640

Client: Randwick City Council

Version: R01 Rev A | Checked By: MS

Date 4/04/2018 | Drawn By: AV

Scale 1:10,000

Z

0 120 240

metres

Coor. Sys. GDA 1994 MGA Zone 56

Marine Parade
Maroubra Randwick, NSW

Part Lot 1 Section 3 DP758649

SITE LOCATION

FIGURE: 1

File Name: 54640_01

Reference: © OpenStreetMap (and) contributors, CC-BY-SA



Legend:

Approximate Site Boundary

Carpark

JBS&G

Job No: 54640

Client: Randwick City Council

Version: R01 Rev A | Checked By: MS

Date 4/04/2018 | Drawn By: AV

Scale 1:2,800

N

0 30 60

metres

Coor. Sys. GDA 1994 MGA Zone 56

Marine Parade
Maroubra Randwick, NSW

Part Lot 1 Section 3 DP758649

SITE LAYOUT

FIGURE: 2

File Name: 54640_02
Reference: Nearmap - http://maps.au.nearmap.com - Imagery 19-01-2018



Legend:

- Approximate Site Boundary
- Sample Locations

JBS&G

Job No: 54640

Client: Randwick City Council

Version: R01 Rev A	Checked By: MS
Date 4/04/2018	Drawn By: AV

Scale 1:2,800

Z

0 30 60

metres

Coor. Sys. GDA 1994 MGA Zone 56

Marine Parade
Maroubra Randwick, NSW

Part Lot 1 Section 3 DP758649

SAMPLE LOCATIONS

FIGURE: 3

File Name: 54640_03
Reference: Nearmap - http://maps.au.nearmap.com - Imagery 19-01-2018

Appendix A – JBS (2018) Asbestos Assessment at Vegetated Area at North-East of Site

2 March 2018

Todd Clarke
Coordinator Projects
Randwick City Council
Via email: todd.clarke@randwick.nsw.gov.au

Detailed Asbestos Assessment – Jack Vanny Reserve
Marine Parade, Maroubra, NSW

Dear Todd,

1. Introduction and Requirements

JBS&G Australia Pty Ltd (JBS&G) was engaged by Randwick City Council (RCC, the client) to undertake a detailed asbestos assessment within a portion of the Jack Vanny Reserve, located at Mistral Point, Marine Parade, Maroubra, NSW (the site). The site is legally defined as part Lot 1 Section 3 in Deposited Plan 758649.

The location of the investigation area within the Jack Vanny Reserve is shown in **Figure 1** and **Figure 2** provided to **Attachment 2**. The approximate site area is 3200 m^2 as indicated to JBS&G by the client.

The detailed asbestos assessment was specifically required in response to Direction 'D' as advised to NSW EPA Clean Up Notice 1559630. The specific requirement addressed include:

***D**. By 5pm Friday 29 December 2017, engage an occupational hygienist (that is registered with the Australian Institute of Occupational Hygienists Inc) to determine the extent of the asbestos contamination in the Impacted Area. Asbestos fragments on the surface of the Impacted Area.*

A copy of the issued NSW EPA Clean Up Notice 1559630 and subsequent clarification from NSW EPA is included as **Attachment 8**.

It is understood that the original deadline for submission of the detailed asbestos assessment report has been extended to 2 March 2018.

2. Objectives

The objectives of the detailed asbestos assessment were as follows:

- Identify the extent of asbestos contamination to the ground surface across the site area;
- Identify the extent of asbestos contamination vertically through surface and underlying soils;
- Classify the condition of any identified asbestos contamination as either friable or non-friable; and
- Provide advice on the risk of any identified asbestos contamination in its current condition to future users of the site in its use as publicly accessible open space.

3. Scope of Works

The following scope of works was undertaken to satisfy the requirements of the issued NSW EPA Clean UP Notice:

- Undertake a review of available historical aerial imagery to assess the changing conditions of the site over time.
- Undertake a site walkover of accessible ground surfaces;
- Undertake an airborne asbestos fibre monitoring event at four static locations during the proposed detailed asbestos assessment in accordance with the National Occupational Health and Safety Commission's *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres – 2nd Edition* [NOHSC: 3003 (2005)].
- Collection of representative soil samples from 22 locations across the site area via mechanical or hand excavation to the depth of accessible fill materials;
- Collection of duplicate and triplicate samples for quality assurance / quality control purposes;
- Collection of representative surface soil samples from 5 locations outside the specified site area to undertake preliminary assessment of soil conditions outside the site area;
- Laboratory analysis of selected primary and duplicate soil and materials samples by Eurofins | mgt, a National Association of Testing Authorities (NATA) accredited laboratory to assess for the presence of asbestos containing material (ACM), friable asbestos (FA) and asbestos fines (AF) in accordance with NEPC (2013)[1];
- Laboratory analysis of triplicate soil samples by Envirolab, a NATA accredited laboratory to assess for the presence of asbestos containing material (ACM), friable asbestos (FA) and asbestos fines (AF) in accordance with NEPC (2013);
- Comparison of soil analytical results against NEPC (2013) health-based screening levels (HSLs) for asbestos contamination in soil for recreational public open space use (HSL-C); and
- Preparation of this letter report documenting the findings and conclusions of the detailed asbestos assessment.

4. Adopted Site Criteria

Soil data as generated by this detailed asbetsos assessment shall be compared to health based screening levels (HSL) advised by NEPC (2013) for recreational public open space use (HSL-C) as shown in **Table A** below.

Table A – Recreational (HSL-C) Health Screening Levels for Asbestos Contamination in Soil

Form of Asbestos	Health Screening Level
Bonded (non-friable) ACM (>7 mm fraction)	0.02 % w/w
FA and AF (friable asbestos)	0.001 % w/w
All forms of asbestos (bonded and friable)	No visible asbestos for surface soils

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

5. Detailed Asbestos Assessment

5.1 Historical Aerial Photographs

A review of available historical aerial photographs was undertaken within publicly accessible digital media[2].

A summary of the completed historical aerial photograph review is as follows:

- 1943 – the site appears to comprise rocky outcrops and small amounts of grassed areas with small cliffs and gullies visible within the boundaries of the present day site area.
- 2000 – the site appears to have been filled to a more even level with less visible rocky outcrops. Vegetation cover visible across area within boundaries of present day site.
- 2009 – the site appears to be covered with well established vegetation within the boundaries of the present day site. Vegetation cover is expected to be consistent with those observed in present day.

5.2 Site Description

The site was observed to comprise grassed areas with dense vegetation comprising dune shrubs (<2.0 m height) and protected native grasses, with rocky outcrops to the eastern portion. The site was bound by other public spaces with grassed areas of Jack Vanny Reserve to the north, west and south, and rock shelves and small cliffs to the east bordering the Pacific Ocean. The site was observed to slope to the south and east, forming a drainage path towards the Pacific Ocean. Small walking tracks were observed to traverse the site area between vegetated areas with exposed sand visible and large amounts of anthropogenic debris observed including assumed asbetsos containing materials (ACM) as asbestos cement sheeting debris, glass, tile, brick and concrete.

Evidence of erosion was observed in the eastern portion of the site in expected drainage paths towards the Pacific Ocean, with large amounts of collected anthropogenic debris including ACM, glass, tile and brick pieces in some areas.

The site was fenced to restrict general access at the time of the detailed asbestos assessment.

5.3 Field Works

The site was attended on 16 February 2018 by the appointed JBS&G project manager Michael Samuel. Michael is a SafeWork NSW Licensed Asbestos Assessor (LAA 000157) and an Associate member of the AIOH. Michael was accompanied by the appointed JBS&G field staff to ensure that the project objectives were understood and proposed field works were achievable.

The detailed asbestos assessment field works were undertaken on 16 February 2018, by Michael Cattlin, one of JBS&G's experienced SafeWork NSW Licensed Asbestos Assessor's (LAA 001218) and Jess Staehli, one of JBS&G's experienced environmental consultants who is also a competent person in accordance with the definition provided in the *Work Health and Safety Regulation* (2017).

A summary of the completed field works is as follows:

- The site was access via the southern fence line to enable access for the 8 tonne excavator.
- Four static air sampling pumps were installed on site boundaries at the commencement of the detailed asbestos assessment and prior to any intrusive works. Flow rates were set at 1.5 litres per minute and were proposed to run for the duration of the detailed asbestos assessment.

[2] NSW Government Spatial Services, viewed at https://maps.six.nsw.gov.au/ (21 February 2018)

- Proposed test pit locations were located using a hand-held GPS system, with test pit locations based on an approximate 12 m x 12 m systematic grid.
- A total of 22 test pits were installed within the site area via mechanical excavator or hand excavation.
- A further five shallow (0-0.1 m below ground surface (bgs)) test pits were installed via hand excavation to assess immediate areas outside the site boundaries at the request of the client.
- Test pit locations are shown in **Figure 3** provided to **Attachment 2**. Bore log descriptions of each test pit are included as **Attachment 4**.
- ACM, as asbestos cement fragments, were observed in all excavated test pits with the exception of TP03, TP06, TP12 and TP16.
- Representative 500 mL soil samples were collected from the soil profile at depths from each test pit selected by the field personnel to accurately determine the potential presence of free asbestos fibres within soil. Duplicate and triplicate samples were collected for quality assurance at a rate of one per 20- primary samples.
- Two material samples of suspected ACM were also collected during the field works. One sample (TP01_0.2-0.3-MAT) of fibrous white materials was collected from test pit TP01 and another (MAT_02) was collected from a large sheet of compressed asbestos cement observed to be buried adjacent TP20.
- Samples were collected using a new pair of nitrile gloves for each sample and were immediately transferred to individual plastic zip lock bags. Each sample was labelled with the JBS&G job number, the date of sampling, a unique sample identification and the samplers initials. Samples were then transferred to a storage container prior to transportation to the selected NATA accredited testing laboratory.
- A total of 78 primary samples, 4 duplicate samples, 4 triplicate samples and 2 material samples were transported under chain of custody documentation procedures to the primary NATA accredited testing laboratory (primary and duplicate soil samples and material samples) and secondary NATA accredited testing laboratory (triplicate samples).
- All airborne asbestos fibre monitoring samples were transported to the primary NATA accredited testing laboratory for analysis.

Photographs collected during the detailed asbestos assessment are included as **Attachment 3.**

6. Results

6.1 Soil Analytical Results

Asbestos in soil results summary table is included as **Attachment 5.**

Detailed laboratory reports and chain of custody documentation is included as **Attachment 6**.

The indicative extent of asbestos contamination is displayed in **Figure 4** provided to **Attachment 2.**

A summary of notable laboratory results is as follows:

- 26 of 78 primary soil samples reported the occurrence of FA and/or AF, with 9 of these samples reporting concentrations of FA/AF above the HSL-C threshold of 0.001 % w/w.
- 14 of 78 primary soil samples reported occurrence of ACM (>7 mm fraction), with 7 of these samples reporting concentrations of ACM above the HSL-C threshold of 0.02 % w/w.

- Test pit location TP03 reported occurrence of FA in sample TP03_0.2-0.3 above HSL-C threshold despite no visible ACM being observed during the field works.
- ACM (>7 mm fraction) was reported above the HSL-C threshold in duplicate sample QC02-16022018 which was collected in representation of primary sample TP09_0.2-0.3.
- No ACM or FA/AF was identified in any of the 5 surface soil samples collected from outside the site boundaries (SS01 – SS05, refer **Figure 3** to **Attachment 2**).
- No other duplicate or triplicate samples reported occurrences of ACM or FA/AF.
- The material sample TP1_0.2-0.3-MAT collected of white fibrous materials encountered at test pit TP01 approximately 0.2 m below ground surface was found not to contain asbestos.
- The material sample MAT-02 collected of the partially buried compressed asbestos cement sheet adjacent to TP20 was reported to contain chrysotile, amosite and crocidolite asbestos.

6.2 Airborne Asbestos Fibre Monitoring

The airborne asbetsos fibre monitoring report from the completed monitoring event during the detailed asbetsos assessment is included as **Attachment 7**.

All samples results were deemed satisfactory with all airborne respirable fibre concentrations reported at less than 0.01 fibres/mL.

7. Conclusions

Based on the observations made during the completed detailed asbetsos assessment, the reported laboratory results and the Limitations included as **Attachment 1**, the following conclusions are made:

- Friable and non-friable asbetsos was identified to ground surfaces and at various depths throughout the soil profile across the site area.
- Friable asbetsos above the adopted HSL-C threshold was reported in 9 samples collected at varying depths from 9 different test pit locations identified as:
    - TP03 (0.2-0.3 m bgs);
    - TP07 (0.5-0.6 m bgs);
    - TP09 (0.5-0.6 m bgs);
    - TP10 (0.2-0.3 m bgs);
    - TP14 (0.5-0.6 m bgs);
    - TP15 (0.2-0.3 m bgs);
    - TP17 (0.4-0.5 m bgs);
    - TP19 (0-0.1 m bgs); and
    - TP20 (0-0.1 m bgs).
- ACM was observed or identified via laboratory testing in 19 of the 22 installed test pits in the site area. No ACM or FA/AF was observed during investigation works or identified via laboratory testing of representative soil samples in Test pit locations TP06, TP12 and TP16.
- No ACM or FA/AF was observed during investigation works or identified via laboratory testing of representative surface soil samples in sample locations SS01, SS02 SS03, SS04 or SS05 located outside the site boundaries.

- It is presumed that all fill materials at the site are impacted by non-friable and/or friable asbetsos.
- Near surface contamination has the potential to migrate from site via surface water runoff and erosion given the exposed and sandy nature of soils. This is evidenced by the collections of anthropogenic debris, including ACM, in eastern low gradient portions of the site.

A program of management and/or remediation of the identified asbestos impacted fill materials is required to ensure the site is suitable for the ongoing use as public open space. Potential management and remediation options are available for the client to consider and shall be detailed as formal advice subsequent to this report.

Should you require further clarification, please contact the undersigned on 02 8245 0300 or by email msamuel@jbsg.com.au.

Yours sincerely:



Michael Samuel
Operations Manager Hazardous Materials
JBS&G Australia Pty Ltd

Reviewed / Approved by:



Matthew Parkinson
Certified Environmental Practitioner
JBS&G Australia Pty Ltd

Attachments:

(1) Limitations
(2) Figures
(3) Photos
(4) Test Pit Borelogs
(5) Asbestos in Soil Results Summary Table
(6) Laboratory Results and Chain of Custody Documentation
(7) Airborne Asbestos Fibre Monitoring Report – 16 February 2018
(8) NSW EPA Clean Up Notice and Supplementary Documentation

Attachment 1– Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquires.

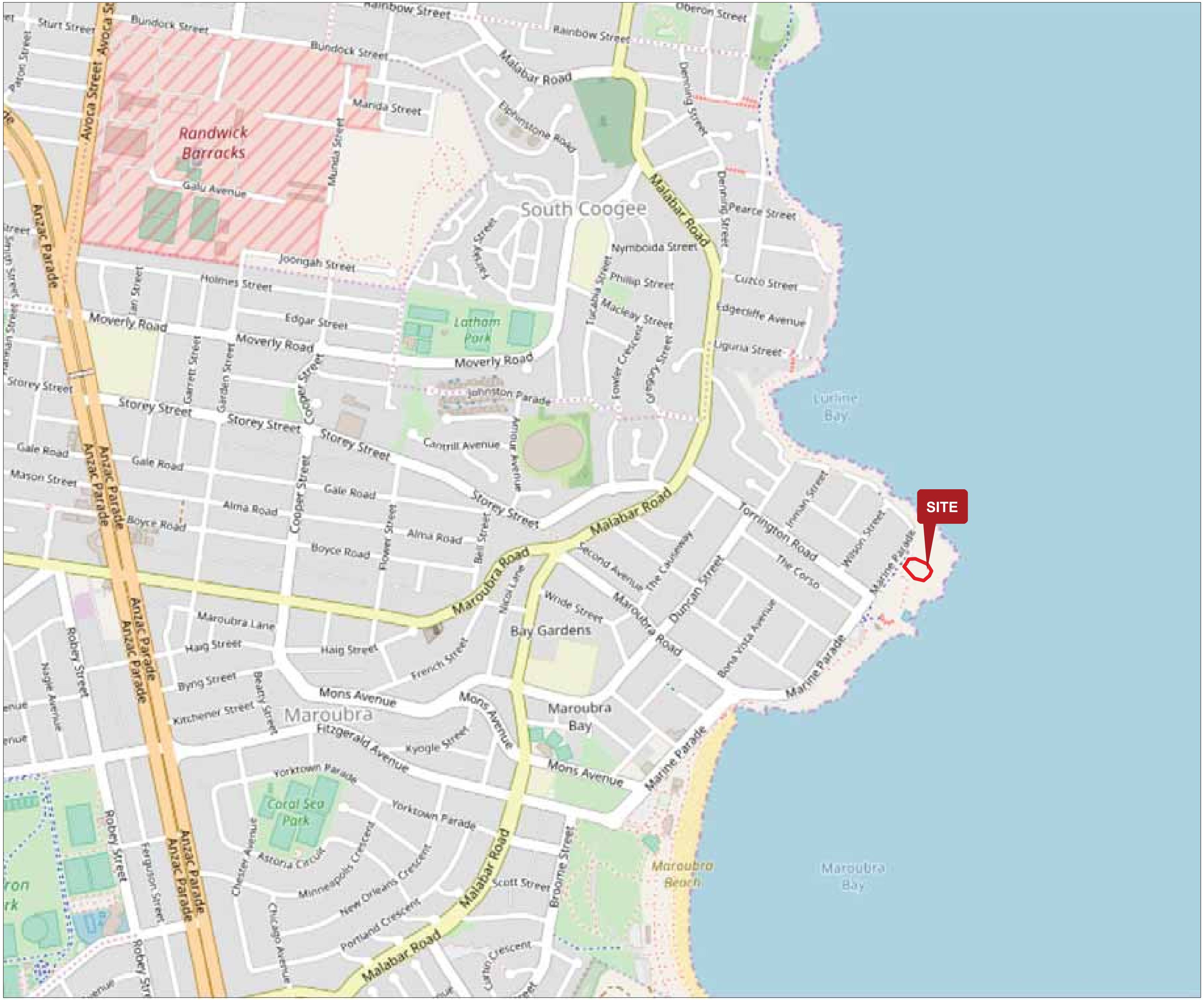
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Attachment 2 – Figures



Legend:

Approximate Site Boundary

Job No: 54640

Client: Randwick City Council

Version: R01 Rev A	Checked By: MS
Date 20/02/2018	Drawn By: AV

Scale 1:15,000

0 175 350

metres

Coor. Sys. GDA 1994 MGA Zone 56

Marine Parade
Maroubra Randwick, NSW

Part of Lot 1 Section 3 DP758649

SITE LOCATION

FIGURE: 1

File Name: 54640_01
Reference: (c) OpenStreetMap and contributors, Creative Commons-Share Alike License (CC-BY-SA)



Legend:

Approximate Site Boundary

JBS&G

Job No: 54640

Client: Randwick City Council

Version: R01 Rev A	Checked By: MS
Date 20/02/2018	Drawn By: AV

Scale 1:450

N

0 5.5 11

metres

Coor. Sys. GDA 1994 MGA Zone 56

Marine Parade
Maroubra Randwick, NSW

Part of Lot 1 Section 3 DP758649

SITE LAYOUT

FIGURE: 2

File Name: 54640_02
Reference: Nearmap - http://maps.au.nearmap.com - Imagery 19-01-2018



Legend:

- Approximate Site Boundary
- Surface Soil Sample Location
- Test Pit Location

JBS&G

Job No: 54640

Client: Randwick City Council

Version: Misc | Checked By: MS

Last updated on 20/02/2018 by avillafuerte

Scale 1:450

N

0 5.5 11

metres

Coor. Sys. GDA 1994 MGA Zone 56

Marine Parade
Maroubra Randwick, NSW

Part of Lot 1 Section 3 DP758649

SAMPLE LOCATIONS

FIGURE: 3

File Name: 54640_03
Reference: Nearmap - http://maps.au.nearmap.com - Imagery 19-01-2018



Legend:

- Approximate Site Boundary
- Friable Asbestos Above HSL-C (0.001% w/w)
- Friable Asbestos Below HSL-C (0.001% w/w)
- Non-friable ACM Identified Only
- Surface Soil Sample Location
- Test Pit Location

JBS&G

Job No: 54640

Client: Randwick City Council

Version: L01 Rev A | Checked By: MS

Last updated on 2/03/2018 by avillafuerte

Scale 1:450

N

0 5.5 11

metres

Coor. Sys. GDA 1994 MGA Zone 56

Marine Parade
Maroubra Randwick, NSW

Part of Lot 1 Section 3 DP758649

INDICATIVE ASBESTOS CONTAMINATION AREAS

FIGURE: 4

File Name: 54640_04
Reference: Nearmap - http://maps.au.nearmap.com - Imagery 19-01-2018

Attachment 3 – Photograph Log



Photo 1: Anthropogenic inclusions of brick, concrete and tile in excavated test pit spoil at TP04



Photo 2: ACM as fibre cement sheet debris and anthropogenic inclusions of brick and concrete in excavated test pit spoil at TP10



Photo 3: Tyre and metal industrial waste within excavated test pit spoil at TP11



Photo 4: Anthropogenic debris and ACM debris to ground surface at TP19. Surface water run off expected to have resulted in deposits of debris in this location.



Photo 5: ACM and anthropogenic debris visible to ground surface at TP20



Photo 6: Large compressed asbestos cement sheet partially buried adjacent TP20

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Source:

Rev	Description	Drn.	Date
DRAFT	Original Issue -	MS	01/03/2018

Attachment 3: Photographs

Client: Randwick City Council

Project: Jack Vanny Detailed Asbestos Assessment

Job No: 54640 File Name: L01 - Photo Log



Photo 7: Typical example of ACM debris within sub surface soils (TP04 shown)



Photo 8: Typical example of ACM debris within sub surface soils (TP10 shown)



Photo 9: Anthropogenic debris within excavated spoil at TP08



Photo 10: Anthropogenic and ACM debris within excavated spoil at TP15



Photo 11: exposed sandy soils along walking track traversing site. Anthropogenic debris visible in foreground



Photo 12: Large concrete waste adjacent TP18, natural sandstone outcrops visible in background

© JBS&G

Source:

Rev	Description	Drn.	Date
DRAFT	Original Issue -	MS	01/03/2018

JBS&G

Attachment 3: Photographs

Client: Randwick City Council

Project: Jack Vanny Detailed Asbestos Assessment

Job No: 54640 File Name: L01 - Photo Log

Attachment 4 – Test Pit Borelogs

TP01

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 0.7
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples / Tests / Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of brick, plastic, nails (10-20%)	TP01_0.0-0.1	No ACM observed
						TP01_0.2-0.3	
		0.30		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, increased inclusions (30-40%) of glass, concrete, metal nails, plastic, brick, suspect crumbly fibrous material (sample taken)		No ACM observed
	0.5						
		0.50		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of ACM fragments, concrete, brick, tin sheeting, plastic, glass (10-20%)	TP01_0.5-0.6	ACM observed
		0.70			Test Pit TP01 terminated at 0.7m		Test pit terminated in natural yellow-brown sand
	1.0						
	1.5						
	2.0						
	2.5						

TP02

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 1
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of organics (grasses)	TP02_0.0-0.1	No ACM observed
		0.10		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of trace amounts of plastics, tiles	TP02_0.2-0.3	No ACM observed
	0.5						
		0.50		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of ACM fragments, brick, concrete, tiles (40-50%)	TP02_0.5-0.6	ACM observed
		0.90		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of ACM fragments, concrete boulders, brick, tiles (10-20%)	TP02_0.9-1.0	ACM observed
	1.0						
		1.00			Test Pit TP02 terminated at 1m		Test pit terminated due to refusal on sandstone
	1.5						
	2.0						
	2.5						

TP03

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 1.1
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of plastic, wire, metal, brick (10%)	TP03_0-0.1.0	No ACM observed, QA16022018-1 and QC16022018-1 samples taken
		0.20		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of concrete boulder, terracotta tiles (20%	TP03_0.2-0.3	No ACM observed
		0.30		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of concrete, brick, terracotta tiles, tiles (40%), hit terracotta tiles at 0.3 mbgs		No ACM observed
	0.5					TP03_0.5-0.6	
	1.0					TP03_0.9-1.0	
		1.00		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, fewer inclusions of concrete, brick, terracotta tiles, tiles		No ACM observed
		1.10			Test Pit TP03 terminated at 1.1m		Test pit terminated due to hole collapse in natural sands
	1.5						
	2.0						
	2.5						

TP04_01

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 0.2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, dark brown, well-graded, medium density, coarse		No ACM observed
		0.20		Fill	FILL - SAND, dark brown, well-graded, medium density, coarse, inclusions of ACM fragments, brick, tiles, concrete (40%)		ACM observed
		0.30			Test Pit TP04_01 terminated at 0.2m		Test pit terminated due to refusal on sandstone
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						

TP04_02

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 1.2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, dark brown, well-graded, medium density, coarse	TP04_0.0-0.1	No ACM observed
		0.20		Fill	FILL - SAND, dark brown, well-graded, medium density, coarse, inclusions of ACM fragments, brick, tiles, concrete (40%)	TP04_0.2-0.3	ACM observed
	0.5						
		0.50		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of ACM fragments, brick, tiles, concrete, plastic (40%)	TP04_0.5-0.6	ACM observed
	1.0						
		1.00		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of ACM fragments, brick, concrete, tiles, plastics (high 40%)	TP04_1.0-1.1	ACM observed
		1.20			Test Pit TP04_02 terminated at 1.2m		Test pit terminated due to hole collapse in natural sands
	1.5						
	2.0						
	2.5						

TP05

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 1.2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, topsoil, dark brown, well-graded, medium sand, medium density, inclusions of plastics, organics (roots) (10%)	TP05_0.0-0.1	No ACM observed
		0.20		Fill	FILL - SAND, dark brown, well-graded, medium sand, medium density, inclusions of brick, terracotta tiles, concrete, plastic	TP05_0.2-0.3	No ACM observed
	0.5						
		0.50		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of brick, ACM fragments, concrete boulders, plastics, tiles (40%)	TP05_0.5-0.6	ACM observed
	1.0						
		1.00		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of brick, concrete, tiles, tin, plastic, increased ACM fragments (40%)	TP05_1.0-1.1	ACM observed
		1.20			Test Pit TP05 terminated at 1.2m		Test pit terminated due to hole collapse
	1.5						
	2.0						
	2.5						

TP06

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 0.6
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples / Tests / Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, topsoil, dark brown, well-graded, medium sand, loose, inclusions of organics (roots) (10%)	TP06_0-.00.1	No ACM observed
		0.10		Fill	FILL - SAND, dark brown, well-graded, medium sand, loose, inclusions of brick, one piece of steel (5%)		No ACM observed
						TP06_0.2-0.3	
		0.30		SW	SAND - light orange, well-graded, medium sand, loose		
	0.5						
		0.60			Test Pit TP06 terminated at 0.6m		Test pit terminated in natural sands
	1.0						
	1.5						
	2.0						
	2.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 2/3/18

TP07

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 1.2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, topsoil, dark brown, well-graded, coarse, loose, inclusions of organics (roots) (10%)	TP07_0.0-0.1	No ACM observed
		0.20		Fill	FILL - SAND, light orange, well-graded, coarse, loose, no inclusions observed	TP07_0.2-0.3	No ACM observed
	0.5						
		0.50		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of brick, concrete, terracotta tiles (40%)	TP07_0.5-0.6	No ACM observed
	1.0						
		1.00		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of ACM fragments, oil drum (old, in poor condition), brick, concrete, tiles, plastic, tin (40%)	TP07_1.0-1.1	ACM observed
		1.20			Test Pit TP07 terminated at 1.2m		Test pit terminated due to refusal on sandstone
	1.5						
	2.0						
	2.5						

TP08

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, dark brown, well-graded, medium sand, medium density, inclusions of organics (roots) (10%)	TP08_0.0-0.1	No ACM observed
		0.20		Fill	FILL - SAND, light orange, well-graded, coarse, loose, inclusions of organics (roots) (10%)	TP08_0.2-0.3	No ACM observed
	0.5						
		0.50		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of ACM fragments, brick, terracotta tiles, concrete (20%)	TP08_0.5-0.6	ACM observed
	1.0						
		1.00		Fill	FILL - SAND, light brown, well-graded, coarse, loose, inclusions of bricks, concrete, vinyl tile, tiles (20%)	TP08_1.0-1.1	No ACM observed
	1.5						
		1.50		Fill	FILL - SAND, light brown, well-graded, coarse, loose, inclusions of bricks, terracotta pipe, tiles, concrete, sandstone boulders	TP08_1.5-1.6	No ACM observed
	2.0						
		2.00			Test Pit TP08 terminated at 2m		Test pit terminated due to refusal on sandstone
	2.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 2/3/18

TP09

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 1.8
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of organics (roots) (10%)	TP09_0.0-0.1	No ACM observed
		0.20		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of brick, concrete (20%)	TP09_0.2-0.3	ACM observed, QA02-16022018 and QC02-16022018 samples taken
	0.5						
		0.50		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, high amount of inclusions of ACM fragments, brick, terracotta tiles, glass, tiles, plastic, steel, concrete (50%)	TP09_0.5-0.6	ACM observed
	1.0						
		1.00		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, high amount of inclusions of ACM fragments, brick, wood, concrete, glass, steel, tiles (50%)	TP09_1.0-1.1	ACM observed
	1.5						
		1.50		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of ACM fragments, burnt paper remains, brick, concrete, terracotta pipe, tiles, steel, glass (high 50%)	TP09_1.5-1.6	ACM observed
		1.80			Test Pit TP09 terminated at 1.8m		Test pit terminated due to refusal on sandstone
	2.0						
	2.5						

TP10

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 1.2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of fence poling, organics (roots) (10%)	TP10_0.0-0.1	No ACM observed
		0.20		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of ACM fragment, brick, concrete (20%)	TP10_0.2-0.3	ACM observed
	0.5						
		0.50		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of ACM fragments, brick, concrete, glass, tin can (40%)	TP10_0.5-0.6	ACM observed
	1.0						
		1.00		Fill	FILL - SAND, dark brown, well-graded, coarse, loose, inclusions of ACM fragments, brick, concrete, glass and plastic, black moist soil observed (approx. 1 L)	TP10_1.0-1.1	ACM observed
		1.20			Test Pit TP10 terminated at 1.2m		Test pit terminated due to refusal on sandstone
	1.5						
	2.0						
	2.5						

TP11

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 0.7
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, dark brown, well-graded, medium sand, medium density, inclusions of plastic, organics (roots) (10%)	TP11_0.0-0.1	No ACM observed
		0.20		Fill	FILL - SAND, dark brown, well-graded, coarse, medium density, inclusions of plastics, bricks, concrete, tiles, terracotta tiles, can	TP11_0.2-0.3	No ACM observed
	0.5						
		0.50		Fill	FILL - SAND, dark brown, well-graded, coarse, medium density, inclusions of 3 car tyres, old steel, bricks, concrete, ACM fragments, glass (50%)	TP11_0.5-0.6	ACM observed
		0.70			Test Pit TP11 terminated at 0.7m		Test pit terminated due to refusal on sandstone
	1.0						
	1.5						
	2.0						
	2.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 2/3/18

TP12

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 0.6
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, grey-brown, heterogeneous, dry, loose, fine sands, inclusions of roots/grasses, plastic	TP12_0.0-0.1	No ACM observed
		0.20		Fill	FILL - SAND, yellow, heterogeneous, dry, loose, fine sands, inclusions of sandstone cobbles and gravels	TP12_0.2-0.3	No ACM observed
		0.30		Fill	FILL - SAND, grey-brown, heterogeneous, dry, well-graded, inclusions of plastic, wood metal, glass, terracotta, bricks (20%)		No ACM observed
	0.5					TP12_0.5-0.6	
		0.60			Test Pit TP12 terminated at 0.6m		Test pit terminated due to refusal on sandstone
	1.0						
	1.5						
	2.0						
	2.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 2/3/18

TP13

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 1.5
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, grey-brown, heterogeneous, dry, well-graded, medium density, inclusions of ACM fragment, terracotta, sandstone cobbles, concrete, tiles, metal, brick (10%)	TP13_0.0-0.1	ACM observed
		0.10		Fill	FILL - SAND, grey-brown, heterogeneous, dry, well-graded, medium density, increased inclusions of ACM fragments, terracotta, sandstone cobbles, concrete, tiles, metal, brick (20-30%)		ACM observed
						TP13_0.2-0.3	
	0.5						
		0.50		Fill	FILL - SAND, grey-brown, heterogeneous, dry, well-graded, medium density, inclusions as above with large rusted metal hydrant, glass bottle, concrete boulders	TP13_0.5-0.6	ACM observed
						TP13_0.9-1.0	ACM observed
	1.0						
	1.5						
		1.50			Test Pit TP13 terminated at 1.5m		Test pit terminated due to hole collapse in fill materials
	2.0						
	2.5						

TP14

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 1.2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples / Tests / Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, brown, heterogeneous, dry, medium density, fine sands, inclusions of roots/grass, concrete gravels, glass, brick fragments (<10%)	TP14_0-0.1.0	No ACM observed
		0.20		Fill	FILL - SAND, brown, heterogeneous, dry, medium density, fine sands, inclusions of brick, tiles, concrete cobbles (10-20%)	TP14_0.2-0.3	No ACM observed
	0.5						
		0.50		Fill	FILL - SAND, brown, heterogeneous, dry, medium density, fine sands, inclusions of metal, concrete boulders, brick, sandstone boulders, ACM fragments, terracotta	TP14_0.5-0.6	ACM observed
	1.0					TP14_1.0-1.1	ACM observed
		1.20			Test Pit TP14 terminated at 1.2m		Test pit terminated due to hole collapse in fill materials
	1.5						
	2.0						
	2.5						

TP15

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, brown, well-graded, coarse, loose, inclusions of ACM fragments, glass, brick, concrete, organics (roots) (30%)	TP15_0.0-0.2	ACM observed
		0.20		Fill	FILL - SAND, brown, well-graded, coarse, loose, inclusions of bricks, concrete, metal	TP15_0.2-0.3	ACM observed
	0.5					TP15_0.5-0.6	
	1.0					TP15_1.0-1.1	
	1.5						
	2.0	2.00			Test Pit TP15 terminated at 2m		Test pit terminated due to refusal on sandstone
	2.5						

TP16

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 0.3
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, reddish-brown, heterogeneous, dry, loose, inclusions of bricks, concrete boulders, metal, roots, terracotta, tiles (10%)	TP16_0.0-0.1	No ACM observed
						TP16_0.2-0.3	
		0.30			Test Pit TP16 terminated at 0.3m		Test pit terminated due to refusal on sandstone
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 2/3/18

TP17

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 0.5
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, brown, heterogeneous, dry, medium sand, inclusions of ACM fragments, concrete, plastic, glass, brick, metal nails	TP17_0.0-0.1	ACM observed
						TP17_0.2-0.3	
		0.30		Fill	FILL - BRICK layer		
	0.5	0.40		Fill	FILL - SAND, brown, heterogeneous, dry, medium sand, inclusions of ACM fragments, concrete, plastic, glass, brick, metal nails	TP17_0.4-0.5	ACM observed
	1.0	0.50			Test Pit TP17 terminated at 0.5m		Test pit terminated due to refusal in fill materials (brick)
	1.5						
	2.0						
	2.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 2/3/18

TP18

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 0.5
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples / Tests / Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, brown, heterogeneous, damp, medium density, well-graded, inclusions of ACM fragments, plastic, terracotta (<10%)	TP18_0.0-0.1	Large quantities of ACM observed to ground surface
						TP18_0.2-0.3	
		0.30		SP	SAND - grey-brown, homogeneous, damp, medium density, poorly graded		No ACM observed
	0.5					TP18_0.4-0.5	
		0.50			Test Pit TP18 terminated at 0.5m		Test pit terminated due to refusal on sandstone
	1.0						
	1.5						
	2.0						
	2.5						

TP19

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 0.3
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, brown, dry, loose, fine sand, inclusions of ACM fragments, glass, metal nails, brick frags, sandstone boulder	TP19_0.0-0.1	Large quantities of ACM observed to ground surface
		0.10		Fill	FILL - SAND, brown, heterogeneous, damp, medium density, traces of plastic, concrete, glass	TP19_0.2-0.3	No ACM observed
		0.30			Test Pit TP19 terminated at 0.3m		Test pit terminated due to refusal on sandstone
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						

TP20

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 0.6
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, brown, dry, loose, fine sand, inclusions of ACM fragments, glass, tile, plastic, brick fragments, metal nails	TP20_0.0-0.1	ACM observed to ground surface and surrounding all pathways. South of test pit is ACM sheeting in poor condition, half-buried, sample MAT_02 taken
		0.20		Fill	FILL - SAND, brown, damp, loose, fine sand, inclusions of ACM fragments, glass, tile, plastic, brick fragments, metal nails	TP20_0.2-0.3	ACM observed
	0.5	0.50		SW	SAND - brown, homogeneous, damp, medium density	TP20_0.5-0.6	No ACM observed
		0.60			Test Pit TP20 terminated at 0.6m		Test pit terminated due to refusal on sandstone
	1.0						
	1.5						
	2.0						
	2.5						

TP21

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 0.7
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples / Tests / Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, grey, heterogeneous, damp, loose, fine sand, inclusions of ACM fragments, brick, plastic	TP21_0.0-0.1	ACM observed
		0.10		Fill	FILL - SAND, grey, heterogeneous, damp, loose, fine sand, inclusions of bricks, sandstone cobbles, terracotta	TP21_0.2-0.3	ACM observed
	0.5						
		0.50		Fill	FILL - SAND, grey, heterogeneous, damp, loose, fine sand, inclusions of bricks, tiles, terracotta tile, ACM fragments	TP21_0.5-0.6	ACM observed
		0.70			Test Pit TP21 terminated at 0.7m		Test pit terminated due to refusal on sandstone
	1.0						
	1.5						
	2.0						
	2.5						

TP22

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 16/02/2018
Logged By: MC/JS
Contractor: ANC Foster
Total Hole Depth (mbgs): 1.5
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples / Tests / Remarks	Additional Observations
Test Pit	0.0			Fill	FILL - SAND, brown, heterogeneous, dry, loose, inclusions of bricks, concrete, terracotta, ACM fragments, metal sheeting, plastic, glass (20%)	TP22_0.0-0.1	ACM observed, QA03-16022018 and QC03-16022018 samples taken
						TP22_0.2-0.3	ACM observed
	0.5	0.50		Fill	FILL - SAND, brown, heterogeneous, dry, loose, inclusions of bricks, concrete, terracotta, ACM fragments, metal sheeting, plastic, glass, brick wall boulders (30%)	TP22_0.5-0.6	ACM observed
	1.0					TP22_1.0-1.1	
	1.5	1.50			Test Pit TP22 terminated at 1.5m		Test pit terminated due to hole collapse in natural materials
	2.0						
	2.5						

Attachment 5 – Asbestos in Soil Results Summary Table

Sample ID and depth of sample (m bgs)	Test pit Location	Date of sample collection	Sample Type	Result	Friable or Non-friable Asbestos?
SS01	SS01	16/02/2018	Soil	No asbestos detected	-
SS02	SS02	16/02/2018	Soil	No asbestos detected	-
SS03	SS03	16/02/2018	Soil	No asbestos detected	-
SS04	SS04	16/02/2018	Soil	No asbestos detected	-
SS05	SS05	16/02/2018	Soil	No asbestos detected	-
TP01_0-0.1	TP01	16/02/2018	Soil	No asbestos detected	-
TP01_0.2-0.3	TP01	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (FA -0.00010 % w/w)	Friable
TP01_0.5-0.6	TP01	16/02/2018	Soil	No asbestos detected	-
TP02_0-0.1	TP01	16/02/2018	Soil	No asbestos detected	-
TP02_0.2-0.3	TP02	16/02/2018	Soil	No asbestos detected	-
TP02_0.5-0.6	TP02	16/02/2018	Soil	No asbestos detected	-
TP02_0.9-1.0	TP02	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (FA - 0.00015 % w/w)	Friable
TP03_0-0.1	TP03	16/02/2018	Soil	No asbestos detected	-
TP03_0.2-0.3	TP03	16/02/2018	Soil	**Asbestos detected FA – 0.0036% w/w**	Friable
TP03_0.5-0.6	TP03	16/02/2018	Soil	No asbestos detected	-
TP04_0-0.1	TP04	16/02/2018	Soil	No asbestos detected	-
TP04_0.2-0.3	TP04	16/02/2018	Soil	No asbestos detected	-
TP04_0.5-0.6	TP04	16/02/2018	Soil	**Asbestos detected ACM – 0.025% w/w**	Non-friable
TP04_1.0-1.1	TP04	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (FA - 0.000077% w/w)	Friable
TP05_0-0.1	TP05	16/02/2018	Soil	No asbestos detected at LOR 0.01 % w/w (ACM - 0.0067% w/w)	Non-friable
TP05_0.2-0.3	TP05	16/02/2018	Soil	No asbestos detected	-
TP05_0.5-0.6	TP05	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (FA - 0.00020% w/w)	Friable
TP05_1.0-1.1	TP05	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (FA and AF - 0.00060% w/w)	Friable
TP06_0-0.1	TP06	16/02/2018	Soil	No asbestos detected	-
TP06_0.2-0.3	TP06	16/02/2018	Soil	No asbestos detected	-
TP07_0-0.1	TP07	16/02/2018	Soil	No asbestos detected	-
TP07_0.2-0.3	TP07	16/02/2018	Soil	No asbestos detected	-
TP07_0.5-0.6	TP07	16/02/2018	Soil	**Asbestos detected FA – 0.0081% w/w**	Friable
TP07_1.0-1.1	TP07	16/02/2018	Soil	No asbestos detected	-
TP08_0-0.1	TP08	16/02/2018	Soil	No asbestos detected	-
TP08_0.2-0.3	TP08	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (FA -0.00045% w/w)	Friable
TP08_0.5-0.6	TP08	16/02/2018	Soil	No asbestos detected	-
TP08_1.0-1.1	TP08	16/02/2018	Soil	No asbestos detected	-
TP09_0-0.1	TP09	16/02/2018	Soil	No asbestos detected	-
TP09_0.2-0.3	TP09	16/02/2018	Soil	No asbestos detected	-
TP09_0.5-0.6	TP09	16/02/2018	Soil	**Asbestos detected FA and AF – 0.0065% w/w**	Friable
TP09_1.0-1.1	TP09	16/02/2018	Soil	No asbestos detected	-
TP09_1.5-1.6	TP09	16/02/2018	Soil	No asbestos detected at LOR 0.01 % w/w (ACM - 0.0071% w/w)	Non-friable
TP10_0-0.1	TP10	16/02/2018	Soil	No asbestos detected	-
TP10_0.2-0.3	TP10	16/02/2018	Soil	**Asbestos detected FA and AF – 0.0016% w/w**	Friable
TP10_0.5-0.6	TP10	16/02/2018	Soil	No asbestos detected	N/A
TP10_1.0-1.1	TP10	16/02/2018	Soil	**Asbestos detected ACM – 0.067% w/w**	Non-friable
TP11_0-0.1	TP11	16/02/2018	Soil	No asbestos detected	-
TP11_0.2-0.3	TP11	16/02/2018	Soil	No asbestos detected	-
TP11_0.5-0.6	TP11	16/02/2018	Soil	No asbestos detected	-
TP12_0-0.1	TP12	16/02/2018	Soil	No asbestos detected	-
TP12_0.2-0.3	TP12	16/02/2018	Soil	No asbestos detected	-
TP12_0.5-0.6	TP12	16/02/2018	Soil	No asbestos detected	-
TP13_0-0.1	TP13	16/02/2018	Soil	No asbestos detected	-
TP13_0.2-0.3	TP13	16/02/2018	Soil	No asbestos detected	-
TP13_0.5-0.6	TP13	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (AF - 0.000061% w/w)	Friable
TP13_0.9-1.0	TP13	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (FA - 0.00082% w/w)	Friable
TP14_0-0.1	TP14	16/02/2018	Soil	No asbestos detected	-
TP14_0.2-0.3	TP14	16/02/2018	Soil	No asbestos detected	-
TP14_0.5-0.6	TP14	16/02/2018	Soil	**Asbestos detected AF – 0.0025% w/w ACM – 0.032% w/w**	Friable

Sample ID and depth of sample (m bgs)	Test pit Location	Date of sample collection	Sample Type	Result	Friable or Non-friable Asbestos?
TP14_1.0-1.1	TP14	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (FA - 0.00055% w/w)	Friable
TP15_0-0.1	TP15	16/02/2018	Soil	**Asbestos detected** **ACM – 0.020% w/w**	Non-friable
TP15_0.2-0.3	TP15	16/02/2018	Soil	**Asbestos detected** **AF – 0.0029% w/w**	Friable
TP15_0.5-0.6	TP15	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (FA and AF - 0.00010% w/w) No asbestos detected at LOR 0.01 % w/w (ACM - 0.0022% w/w)	Friable
TP15_1.0-1.1	TP15	16/02/2018	Soil	No asbestos detected	-
TP16_0-0.1	TP16	16/02/2018	Soil	**Asbestos detected** **ACM – 0.20% w/w**	Non-friable
TP16_0.2-0.3	TP16	16/02/2018	Soil	**Asbestos detected** **ACM – 0.060% w/w**	Non-friable
TP17_0-0.1	TP17	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (AF - 0.00014% w/w)	Friable
TP17_0.2-0.3	TP17	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (FA - 0.00015% w/w)	Friable
TP17_0.4-0.5	TP17	16/02/2018	Soil	**Asbestos detected** **FA – 0.0018% w/w**	Friable
TP18_0-0.1	TP18	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (AF - 0.00022% w/w)	Friable
TP18_0.2-0.3	TP18	16/02/2018	Soil	**Asbestos detected** **ACM – 0.024% w/w** FA and AF detected below LOR of 0.001 % w/w (FA and AF - 0.00063% w/w)	Non-friable
TP18_0.4-0.5	TP18	16/02/2018	Soil	No asbestos detected	-
TP19_0-0.1	TP19	16/02/2018	Soil	**Asbestos detected** **AF – 0.0018% w/w**	Friable
TP19_0.2-0.3	TP19	16/02/2018	Soil	No asbestos detected	-
TP20_0-0.1	TP20	16/02/2018	Soil	**Asbestos detected** **FA and AF – 0.050% w/w** ACM detected below LOR of 0.01 % w/w (ACM - 0.0043% w/w)	Friable
TP20_0.2-0.3	TP20	16/02/2018	Soil	No asbestos detected	-
TP20_0.5-0.6	TP20	16/02/2018	Soil	No asbestos detected	-
TP21_0-0.1	TP21	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (FA - 0.00052% w/w)	Friable
TP21_0.2-0.3	TP21	16/02/2018	Soil	**Asbestos detected** **ACM – 0.068% w/w**	Non-friable
TP21_0.5-0.6	TP21	16/02/2018	Soil	No asbestos detected	-
TP22_0-0.1	TP22	16/02/2018	Soil	No asbestos detected	-
TP22_0.2-0.3	TP22	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (FA - 0.00086% w/w)	Friable
TP22_0.5-0.6	TP22	16/02/2018	Soil	No asbestos detected	-
TP22_1.0-1.1	TP22	16/02/2018	Soil	No asbestos detected at LOR 0.001 % w/w (FA and AF - 0.00027% w/w)	Friable
QC16022018-1 (collected at TP03_0-0.1)	TP03	16/02/2018	Soil	No asbestos detected	-
QA16022018-1 (collected at TP03_0-0.1	TP03	16/02/2018	Soil	No asbestos detected	-
QC02-16022018 (collected at TP09_0.2-0.3)	TP09	16/02/2018	Soil	**Asbestos detected** **ACM – 0.062% w/w**	Non-friable
QA02-16022018 (collected at TP09_0.2-0.3)	TP09	16/02/2018	Soil	No asbestos detected	-
QC03-16022018 (collected at TP22_0-0.1)	TP22	16/02/2018	Soil	No asbestos detected	-
QA03-16022018 (collected at TP22_0-0.1)	TP22	16/02/2018	Soil	No asbestos detected	-
QC16022018-4 (collected at SS02)	SS02	16/02/2018	Soil	No asbestos detected	-
QA16022018-4 (collected at SS02)	SS02	16/02/2018	Soil	No asbestos detected	-
TP01_0.2-0.3-MAT	TP01	16/02/2018	Material	No asbestos detected	-
MAT-02	Adjacent TP20	16/20/2018	Material	Chrysotile, Amosite and Crocidolite asbestos detected	Friable

Attachment 6 – Laboratory Results and Chain of Custody Documentation

Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

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

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

Sample Receipt Advice

Company name:	**JBS & G Australia (NSW) P/L**
Contact name:	Michael Samuel
Project name:	MAROUBRA
Project ID:	54640
COC number:	Not provided
Turn around time:	6 Day
Date/Time received:	Feb 19, 2018 12:40 PM
Eurofins | mgt reference:	**585454**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ Sample Temperature of a random sample selected from the batch as recorded by Eurofins | mgt Sample Receipt : 25 degrees Celsius.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Notes

2 bags received for sample "TP12_0.5-0.6", extra bag kept on hold.

Contact notes

If you have any questions with respect to these samples please contact:

Nibha Vaidya on Phone : +61 (2) 9900 8400 or by e.mail: NibhaVaidya@eurofins.com

Results will be delivered electronically via e.mail to Michael Samuel - msamuel@jbsg.com.au.

Note: A copy of these results will also be delivered to the general JBS & G Australia (NSW) P/L email address.

014262

CHAIN OF CUSTODY

JBS&G

PROJECT NO.: 54640	LABORATORY BATCH NO.:
PROJECT NAME: Jacaranda Maroubra	SAMPLERS: JS/MC
DATE NEEDED BY: STD T/A	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) msamuel@jbsg.com.au; (3) JStaehli@jbsg.com.au mcatlina@jbsg

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	ASBESTOS 500g	010HT	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES: 485454
SS01	soil	16/2/18	-	BAG		X			X	
SS02	↓	↓		↓		X			X	
SS03						X			X	
SS04						X			X	
SS05						X			X	
TP01_0-0.1						X			X	
↓ _0.2-0.3	↓					X			X	
↓ _0.2-0.5-MAT	material					X		X		
TP01_0.5-0.6	soil					X			X	
TP02_0-0.1						X			X	
↓ _0.2-0.3						X			X	
↓ _0.5-0.6						X			X	
↓ _0.9-1.0						X			X	
TP03_0-0.1						X			X	
↓ _0.2-0.3						X			X	
↓ _0.5-0.6						X			X	
↓ _0.9-1.0							X			
TP04_0-0.1						X			X	
↓ _0.2-0.3	↓	↓		↓		X			X	

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: Jessica DATE: 19/2/18	CONSIGNMENT NOTE NO.	NAME: DATE: 19/2	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	OF: 12:40pm	COOLER TEMP ..... deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

014263

CHAIN OF CUSTODY

JBS&G

PROJECT NO.: 54640	LABORATORY BATCH NO.:
PROJECT NAME: Maroubra	SAMPLERS: JS/MC
DATE NEEDED BY: STD TAT	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) msamuel@jbsg.com.au; (3) JStaehli@jbsg.com.au mcathro

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	Asbestos	HOLD	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
TP04_0.5-0.6	soil	16/2/18	-	BAG		X			X	FF5454
↓ _1.0-1.1	↓	↓		↓		X			X	
TP05_0-0.1						X			X	
_0.2-0.3						X			X	
_0.5-0.6						X			X	
↓ _1.0-1.1						X			X	
TP06_0-0.1						X			X	
↓ _0.2-0.3						X			X	
TP07_0-0.1						X			X	
_0.2-0.3						X			X	
_0.5-0.6						X			X	
↓ _1.0-1.1						X			X	
TP08_0-0.1						X			X	
_0.2-0.3						X			X	
_0.5-0.6						X			X	
_1.0-1.1						X			X	
↓ _1.5-1.6							X			
TP09_0-0.1						X			X	
↓ _0.2-0.3	↓	↓		↓		X			X	

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: Jessica DATE: 16/2/18	CONSIGNMENT NOTE NO.	NAME: DATE: 19/2	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	OF:	COOLER TEMP ..... deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

014264

CHAIN OF CUSTODY

JBS&G

PROJECT NO.: 54640	LABORATORY BATCH NO.:
PROJECT NAME: Maroubra	SAMPLERS: JS/MC
DATE NEEDED BY: STD TAT	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) mSamuel@jbsg.com.au; (3) JStaehli@jbsg.com.au MCatlin

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	Asbestos	HOLD	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES: E55454
TP09_0.5-0.6	Soil	16/2/18		BAG		X			X	
_1.0-1.1										
_1.5-1.6										
TP10_0-0.1										
_0.2-0.3										
_0.5-0.6										
_1.0-1.1										
TP10-BS01							X			
TP11_0-0.1						X			X	
_0.2-0.3										
_0.5-0.6										
TP12_0-0.1										
_0.2-0.3										
_0.5-0.6										
TP13_0-0.1										
_0.2-0.3										
_0.5-0.6										
_0.9-1.0										
TP14_0-0.1										

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: Jessica DATE: 19/2/18	CONSIGNMENT NOTE NO.	NAME: DATE: 19/2	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	OF: Eurofins	COOLER TEMP ..... deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial, S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

014265

CHAIN OF CUSTODY

JBS&G

PROJECT NO.: 54640	LABORATORY BATCH NO.:
PROJECT NAME: Maroubra	SAMPLERS: JS/MC
DATE NEEDED BY: STD TAT	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) msamuel@jbsg.com.au; (3) JStaehli@jbsg.com.au mCattlin

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	ASBESTOS	HOLD	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES: 485454
TP14_0.2-0.3	Soil	16/2/18		BAG		X			X	
↓ _0.5-0.6	↓	↓		↓		↓			↓	
_1.0-1.1										
TP15_0-0.1										
_0.2-0.3										
_0.5-0.6										
_1.0-1.1										
TP16_0-0.1										
↓ _0.2-0.3										
TP17_0-0.1										
↓ _0.2-0.3										
_0.4-0.5										
TP18_0-0.1										
↓ _0.2-0.3										
_0.4-0.5										
TP19_0-0.1										
↓ _0.2-0.3										
TP20_0-0.1										
↓ _0.2-0.3	↓	↓		↓		↓			↓	

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: Jessica DATE: 16/2/18	CONSIGNMENT NOTE NO.	NAME: DATE: 19/2	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	OF: 2:40pm	COOLER TEMP ..... deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

014266

CHAIN OF CUSTODY

JBS&G

PROJECT NO.: 54640	LABORATORY BATCH NO.:
PROJECT NAME: maroubra	SAMPLERS: JJ
DATE NEEDED BY: STD TAT.	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) msamuel@jbsg.com.au; (3) JStaehli@jbsg.com.au mcattlin@jb..

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	Asbestos	HOLD	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES: E85454
TP20_0.5-0.6	Soil	16/2/18	-	BAG		X			X	
TP21_0-0.1										
_0.2-0.3										
_0.5-0.6										
TP22_0-0.1										
_0.2-0.3										
_0.5-0.6										
_1.0-1.1										
QC16022018-1										
QC02-16022018										
QC03-16022018										
QC16022018-4										
MAT-02	material					X		X		

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: Jessica DATE: 19/2/18	CONSIGNMENT NOTE NO.	NAME:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	DATE: OF: UNSW Sydney 19/2	COOLER TEMP ..... deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

IMSO FormsO13 - Chain of Custody - Generic

Certificate of Analysis

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.

JBS & G Australia (NSW) P/L
Level 1, 50 Margaret St
Sydney
NSW 2000

Attention:	Michael Samuel
Report	585454-AID
Project Name	MAROUBRA
Project ID	54640
Received Date	Feb 19, 2018
Date Reported	Feb 27, 2018

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 AS4964 method for inhomogeneous samples is around 0.1 g/kg (0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis where required, this is considered to be at the nominal reporting limit of 0.01 % (w / w).The examination of large sample sizes(500 mL is recommended) may improve the likelihood of identifying ACM in the > 2mm fraction.The NEPM screening level of 0.001 % (w / w) asbestos in soil for FA(friable asbestos) and AF(asbestos fines) then applies where they are able to be quantified by gravimetric procedures.This quantitative screening is not generally applicable to FF(free fibres) and results of Trace Analysis are referred. *NOTE: NATA News March 2014, p.7, states in relation to AS4964: "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". Accordingly, NATA Accreditation does not cover the performance of this service (indicated with an asterisk).* *This report is consistent with the analytical procedures and reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, 2013 (as amended) and the 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, June 2011.*

Project Name MAROUBRA
Project ID 54640
Date Sampled Feb 16, 2018
Report 585454-AID

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
SS01	18-Fe21338	Feb 16, 2018	Approximate Sample 570g Sample consisted of: Brown fine grain sandy soil and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS02	18-Fe21339	Feb 16, 2018	Approximate Sample 627g Sample consisted of: Brown fine grain sandy soil and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS03	18-Fe21340	Feb 16, 2018	Approximate Sample 543g Sample consisted of: Brown fine grain sandy soil and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
SS04	18-Fe21341	Feb 16, 2018	Approximate Sample 737g Sample consisted of: Brown fine grain sandy soil and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS05	18-Fe21342	Feb 16, 2018	Approximate Sample 658g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP01_0-0.1	18-Fe21343	Feb 16, 2018	Approximate Sample 720g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP01_0.2-0.3	18-Fe21344	Feb 16, 2018	Approximate Sample 800g Sample consisted of: Brown coarse grain sandy soil, rocks and organic debris	AF: Amosite asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.00080g* Estimated asbestos content in AF = 0.00080g* Total estimated asbestos concentration in AF = 0.00010% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP01_0.2-0.3-MAT	18-Fe21345	Feb 16, 2018	Approximate Sample 15g / 60x50x12mm Sample consisted of: Light brown powdery insulation-like material	No asbestos detected. Organic fibre detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP01_0.5-0.6	18-Fe21346	Feb 16, 2018	Approximate Sample 833g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP02_0-0.1	18-Fe21347	Feb 16, 2018	Approximate Sample 601g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP02_0.2-0.3	18-Fe21348	Feb 16, 2018	Approximate Sample 811g Sample consisted of: Brown coarse grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP02_0.5-0.6	18-Fe21349	Feb 16, 2018	Approximate Sample 863g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP2_0.9-1.0	18-Fe21350	Feb 16, 2018	Approximate Sample 797g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	AF: Amosite asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.0012g* Estimated asbestos content in AF = 0.0012g* Total estimated asbestos concentration in AF = 0.00015% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP03_0-0.1	18-Fe21351	Feb 16, 2018	Approximate Sample 653g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP03_0.2-0.3	18-Fe21352	Feb 16, 2018	Approximate Sample 879g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	FA: Chrysotile asbestos detected in insulation-like material. Approximate raw weight of FA = 0.040g Estimated asbestos content in FA = 0.032g* Total estimated asbestos concentration in FA = 0.0036% w/w* Organic fibre detected. No respirable fibres detected.
TP03_0.5-0.6	18-Fe21353	Feb 16, 2018	Approximate Sample 818g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP04_0-0.1	18-Fe21354	Feb 16, 2018	Approximate Sample 814g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP04_0.2-0.3	18-Fe21355	Feb 16, 2018	Approximate Sample 876g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP4_0.5-0.6	18-Fe21356	Feb 16, 2018	Approximate Sample 892g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	ACM: Chrysotile and amosite asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 1.1g Total estimated asbestos content in ACM = 0.23g* Total estimated asbestos concentration in ACM = 0.025% w/w* Organic fibre detected. No respirable fibres detected.
TP4_1.0-1.1	18-Fe21357	Feb 16, 2018	Approximate Sample 829g Sample consisted of: Brown coarse grain sandy soil, rocks and debris	FA: Chrysotile and crocidolite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.00080g Estimated asbestos content in FA = 0.00064g* Total estimated asbestos concentration in FA = 0.000077% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP5_0-0.1	18-Fe21358	Feb 16, 2018	Approximate Sample 492g Sample consisted of: Brown coarse grain soil and debris	ACM: Chrysotile, amosite and crocidolite asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 0.22g Total estimated asbestos content in ACM = 0.033g* Total estimated asbestos concentration in ACM = 0.0067% w/w* No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
TP5_0.2-0.3	18-Fe21359	Feb 16, 2018	Approximate Sample 799g Sample consisted of: Brown fine grain sandy soil and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP5_0.5-0.6	18-Fe21360	Feb 16, 2018	Approximate Sample 820g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	FA: Chrysotile asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.0028g Estimated asbestos content in FA = 0.0017g* Total estimated asbestos concentration in FA = 0.00020% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP5_1.0-1.1	18-Fe21361	Feb 16, 2018	Approximate Sample 829g Sample consisted of: Brown coarse grain sandy soil, rocks and debris	FA: Chrysotile asbestos detected in weathered bitumen. Approximate Raw weight of FA = 0.024g Estimated asbestos content in FA = 0.0036g* AF: Chrysotile asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.0014g* Estimated asbestos content in AF = 0.0014g* Total estimated asbestos content in FA and AF = 0.0050g* Total estimated asbestos concentration in FA and AF = 0.00060% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP6-0-0.1	18-Fe21362	Feb 16, 2018	Approximate Sample 876g Sample consisted of: Brown coarse grain sandy soil, rocks and debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP6-0.2-0.3	18-Fe21363	Feb 16, 2018	Approximate Sample 830g Sample consisted of: Brown fine grain sandy soil	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP7_0-0.1	18-Fe21364	Feb 16, 2018	Approximate Sample 791g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP7_0.2-0.3	18-Fe21365	Feb 16, 2018	Approximate Sample 972g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP7_0.5-0.6	18-Fe21366	Feb 16, 2018	Approximate Sample 859g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	FA: Amosite asbestos detected in insulation-like material. Approximate raw weight of FA = 0.14g Estimated asbestos content in FA = 0.070g* Total estimated asbestos concentration in FA = 0.0081% w/w* Organic fibre detected. No respirable fibres detected.
TP7_1.0-1.1	18-Fe21367	Feb 16, 2018	Approximate Sample 825g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP08_0-0.1	18-Fe21368	Feb 16, 2018	Approximate Sample 898g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP08_0.2-0.3	18-Fe21369	Feb 16, 2018	Approximate Sample 963g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	FA: Chrysotile asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.011g Estimated asbestos content in FA = 0.0043g* Total estimated asbestos concentration in FA = 0.00045% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP08_0.5-0.6	18-Fe21370	Feb 16, 2018	Approximate Sample 984g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP08_1.0-1.1	18-Fe21371	Feb 16, 2018	Approximate Sample 894g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP09_0-0.1	18-Fe21372	Feb 16, 2018	Approximate Sample 780g Sample consisted of: Brown fine grain sandy soil and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP09_0.2-0.3	18-Fe21373	Feb 16, 2018	Approximate Sample 889g Sample consisted of: Brown fine grain sandy soil	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP09_0.5-0.6	18-Fe21374	Feb 16, 2018	Approximate Sample 945g Sample consisted of: Brown fine grain sandy soil and organic debris	FA: Chrysotile, amosite and crocidolite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.16g Estimated asbestos content in FA = 0.057g* AF: Chrysotile asbestos detected in fibre cement fragments. Approximate raw weight of AF = 0.037g* Estimated asbestos content in AF = 0.0037g* Total estimated asbestos content in FA and AF = 0.061g* Total estimated asbestos concentration in FA and AF = 0.0065% w/w* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP09_1.0-1.1	18-Fe21375	Feb 16, 2018	Approximate Sample 973g Sample consisted of: Brown fine grain sandy soil	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP09_1.5-1.6	18-Fe21376	Feb 16, 2018	Approximate Sample 931g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	ACM: Chrysotile, amosite and crocidolite asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 0.33g Total estimated asbestos content in ACM = 0.066g* Total estimated asbestos concentration in ACM = 0.0071% w/w* No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
TP10_0-0.1	18-Fe21377	Feb 16, 2018	Approximate Sample 798g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP10_0.2-0.3	18-Fe21378	Feb 16, 2018	Approximate Sample 839g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	FA: Chrysotile, amosite and crocidolite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.040g Estimated asbestos content in FA = 0.012g* AF: Chrysotile and amosite asbestos detected in fibre cement fragments. Chrysotile asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.0053g* Estimated asbestos content in AF = 0.0016g* Total estimated asbestos content in FA and AF = 0.014g* Total estimated asbestos concentration in FA and AF = 0.0016% w/w* Organic fibre detected. No respirable fibres detected.
TP10_0.5-0.6	18-Fe21379	Feb 16, 2018	Approximate Sample 947g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP10_1.0-1.1	18-Fe21380	Feb 16, 2018	Approximate Sample 875g Sample consisted of: Brown coarse grain sandy soil, rocks and organic debris	ACM: Chrysotile and crocidolite asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 7.3g Total estimated asbestos content in ACM = 0.59g* Total estimated asbestos concentration in ACM = 0.067% w/w* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP11_0-0.1	18-Fe21381	Feb 16, 2018	Approximate Sample 684g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP11_0.2-0.3	18-Fe21382	Feb 16, 2018	Approximate Sample 925g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP11_0.5-0.6	18-Fe21383	Feb 16, 2018	Approximate Sample 927g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP12_0-0.1	18-Fe21384	Feb 16, 2018	Approximate Sample 1019g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP12_0.2-0.3	18-Fe21385	Feb 16, 2018	Approximate Sample 1050g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP12_0.5-0.6	18-Fe21386	Feb 16, 2018	Approximate Sample 987g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP13_0-0.1	18-Fe21387	Feb 16, 2018	Approximate Sample 879g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP13_0.2-0.3	18-Fe21388	Feb 16, 2018	Approximate Sample 944g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP13_0.5-0.6	18-Fe21389	Feb 16, 2018	Approximate Sample 987g Sample consisted of: Brown fine grain sandy soil	AF: Amosite asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.00060g* Estimated asbestos content in AF = 0.00060g* Total estimated asbestos concentration in AF = 0.000061% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP13_0.9-1.0	18-Fe21390	Feb 16, 2018	Approximate Sample 883 Sample consisted of: Brown fine grain sandy soil, rocks and debris	FA: Chrysotile and amosite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.018g Estimated asbestos content in FA = 0.0072g* Total estimated asbestos concentration in FA = 0.00082% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP14_0-0.1	18-Fe21391	Feb 16, 2018	Approximate Sample 992g Sample consisted of: Brown fine grain sandy soil, rocks and debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP14_0.2-0.3	18-Fe21392	Feb 16, 2018	Approximate Sample 993g Sample consisted of: Brown fine grain sandy soil	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP14_0.5-0.6	18-Fe21393	Feb 16, 2018	Approximate Sample 1036g Sample consisted of: Brown fine grain sandy soil, rocks and debris	ACM: Chrysotile and amosite asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 3.0g Total estimated asbestos content in ACM = 0.33g* Total estimated asbestos concentration in ACM = 0.032% w/w* AF: Chrysotile and amosite asbestos detected in fibre cement fragments. Approximate raw weight of AF = 0.23g Estimated asbestos content in AF = 0.026g* Total estimated asbestos concentration in AF = 0.0025%w/w.* Synthetic mineral fibre detected. Organic fibre detected No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP14_1.0-1.1	18-Fe21394	Feb 16, 2018	Approximate Sample 956g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile, amosite and crocidolite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.018g Estimated asbestos content in FA = 0.0053g* Total estimated asbestos concentration in FA = 0.00055% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP15_0-0.1	18-Fe21395	Feb 16, 2018	Approximate Sample 861g Sample consisted of: Brown fine grain sandy soil, rocks and debris	ACM: Chrysotile asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 2.2g Total estimated asbestos content in ACM = 0.17g* Total estimated asbestos concentration in ACM = 0.020% w/w* Organic fibre detected. No respirable fibres detected.
TP15_0.2-0.3	18-Fe21396	Feb 16, 2018	Approximate Sample 848g Sample consisted of: Brown fine grain sandy soil, rocks and debris	FA: Chrysotile and amosite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.061g Estimated asbestos content in FA = 0.024g* Total estimated asbestos concentration in FA = 0.0029% w/w* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP15_0.5-0.6	18-Fe21397	Feb 16, 2018	Approximate Sample 917g Sample consisted of: Brown fine grain sandy soil and debris	ACM: Chrysotile and amosite asbestos detected detected in fibre cement fragments. Approximate raw weight of ACM = 0.14g Total estimated asbestos content in ACM = 0.020g* Total estimated asbestos concentration in ACM = 0.0022% w/w* No asbestos detected at the reporting limit of 0.01% w/w (ACM).* FA: Chrysotile and amosite asbestos detected detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.0021g Estimated asbestos content in FA = 0.00063g* AF: Chrysotile asbestos detected detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.00030g* Estimated asbestos content in AF = 0.00029g* Total estimated asbestos content in FA and AF = 0.00092g* Total estimated asbestos concentration in FA and AF = 0.00010% w/w* No asbestos detected at the reporting limit of 0.001% w/w (FA and AF).* Organic fibre detected. No respirable fibres detected.
TP15_1.0-1.1	18-Fe21398	Feb 16, 2018	Approximate Sample 786g Sample consisted of: Brown fine grain sandy soil, rocks and debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP16_0-0.1	18-Fe21399	Feb 16, 2018	Approximate Sample 796g Sample consisted of: Brown fine grain sandy soil and rocks	ACM: Chrysotile asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 10g Total estimated asbestos content in ACM = 1.6g* Total estimated asbestos concentration in ACM = 0.20% w/w* Organic fibre detected. No respirable fibres detected.
TP16_0.2-0.3	18-Fe21400	Feb 16, 2018	Approximate Sample 728g Sample consisted of: Brown fine grain sandy soil and rocks	ACM: Chrysotile asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 2.9g Total estimated asbestos content in ACM = 0.44g* Total estimated asbestos concentration in ACM = 0.060% w/w* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP17_0-0.1	18-Fe21401	Feb 16, 2018	Approximate Sample 917g Sample consisted of: Brown fine grain sandy soil, rocks and debris	AF: Chrysotile and crocidolite asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.0013g* Estimated asbestos content in AF = 0.0013g* Total estimated asbestos concentration in AF = 0.00014% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP17_0.2-0.3	18-Fe21402	Feb 16, 2018	Approximate Sample 882g Sample consisted of: Brown coarse grain sandy soil, rocks and debris	FA: Chrysotile, amosite and crocidolite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.0034g Estimated asbestos content in FA = 0.0014g* Total estimated asbestos concentration in FA = 0.00015% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP17_0.4-0.5	18-Fe21403	Feb 16, 2018	Approximate Sample 777g Sample consisted of: Brown coarse grain sandy soil, rocks and organic debris	FA: Chrysotile asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.024g Estimated asbestos content in FA = 0.014g* Total estimated asbestos concentration in FA = 0.0018% w/w* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP18_0-0.1	18-Fe21404	Feb 16, 2018	Approximate Sample 689g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	AF: Amosite asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.0015g* Estimated asbestos content in AF = 0.0015g* Total estimated asbestos concentration in AF = 0.00022% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP18_0.2-0.3	18-Fe21405	Feb 16, 2018	Approximate Sample 723g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	ACM: Chrysotile and amosite asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 2.0g Total estimated asbestos content in ACM = 0.18g* Total estimated asbestos concentration in ACM = 0.024% w/w* FA: Chrysotile and amosite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.0084g Estimated asbestos content in FA = 0.0034g* AF: Chrysotile and amosite asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.0012g* Estimated asbestos content in AF = 0.0012g* Total estimated asbestos content in FA and AF = 0.0046g* Total estimated asbestos concentration in FA and AF = 0.00063% w/w* No asbestos detected at the reporting limit of 0.001% w/w (FA and AF).* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP18_0.4-0.5	18-Fe21406	Feb 16, 2018	Approximate Sample 667g Sample consisted of: Brown coarse grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP19_0-0.1	18-Fe21407	Feb 16, 2018	Approximate Sample 968g Sample consisted of: Brown fine grain soil and rocks	AF: Chrysotile asbestos detected in fibre cement fragments. Chrysotile and crocidolite asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.12g* Estimated asbestos content in AF = 0.018g* Total estimated asbestos concentration in AF = 0.0018% w/w* Organic fibre detected. No respirable fibres detected.
TP19_0.2-0.3	18-Fe21408	Feb 16, 2018	Approximate Sample 887g Sample consisted of: Brown fine grain sandy soil, rocks and debris	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP20_0-0.1	18-Fe21409	Feb 16, 2018	Approximate Sample 1126g Sample consisted of: Brown fine grain sandy soil, rocks and debris	ACM: Chrysotile, amosite and crocidolite asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 0.45g Total estimated asbestos content in ACM = 0.049g* Total estimated asbestos concentration in ACM = 0.0043% w/w* No asbestos detected at the reporting limit of 0.01% w/w (ACM).* FA: Chrysotile, amosite and crocidolite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 1.4g Estimated asbestos content in FA = 0.56g* AF: Chrysotile and amosite asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.0028g* Estimated asbestos content in AF = 0.0028g* Total estimated asbestos content in FA and AF = 0.57g* Total estimated asbestos concentration in FA and AF = 0.050% w/w* Organic fibre detected. No respirable fibres detected.
TP20_0.2-0.3	18-Fe21410	Feb 16, 2018	Approximate Sample 945g Sample consisted of: Brown coarse grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP20_0.5-0.6	18-Fe21411	Feb 16, 2018	Approximate Sample 803g Sample consisted of: Brown fine grain sandy soil, rocks and debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP21_0-0.1	18-Fe21412	Feb 16, 2018	Approximate Sample 745g Sample consisted of: Brown fine grain sandy soil, rocks and debris	FA: Chrysotile asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.011g Estimated asbestos content in FA = 0.0039g* Total estimated asbestos concentration in FA = 0.00052% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP21_0.2-0.3	18-Fe21413	Feb 16, 2018	Approximate Sample 841g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	ACM: Chrysotile asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 4.8g Total estimated asbestos content in ACM = 0.57g* Total estimated asbestos concentration in ACM = 0.068% w/w* Organic fibre detected. No respirable fibres detected.
TP21_0.5-0.6	18-Fe21414	Feb 16, 2018	Approximate Sample 917g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP22_0-0.1	18-Fe21415	Feb 16, 2018	Approximate Sample 841g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP22_0.2-0.3	18-Fe21416	Feb 16, 2018	Approximate Sample 949g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	FA: Chrysotile asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.020g Estimated asbestos content in FA = 0.0081g* Total estimated asbestos concentration in FA = 0.00086% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP22_0.5-0.6	18-Fe21417	Feb 16, 2018	Approximate Sample 851g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP22_1.0-1.1	18-Fe21418	Feb 16, 2018	Approximate Sample 809g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.0059g Estimated asbestos content in FA = 0.0018g* AF: Chrysotile asbestos detected in fibre cement fragments. Approximate raw weight of AF = 0.0030g Estimated asbestos content in AF = 0.00045g* Total estimated asbestos content in FA and AF = 0.0022g Total estimated asbestos concentration in FA and AF = 0.00027% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
QC16022018-1	18-Fe21419	Feb 16, 2018	Approximate Sample 805g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
QC02-16022018	18-Fe21420	Feb 16, 2018	Approximate Sample 928g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	ACM: Chrysotile asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 3.9g Total estimated asbestos content in ACM = 0.58g* Total estimated asbestos concentration in ACM = 0.062% w/w* Organic fibre detected. No respirable fibres detected.
QC03-16022018	18-Fe21421	Feb 16, 2018	Approximate Sample 930g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
QC16022018-4	18-Fe21422	Feb 16, 2018	Approximate Sample 653g Sample consisted of: Brown fine grain sandy soil and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
MAT-02	18-Fe21423	Feb 16, 2018	Approximate Sample 13g / 110x50x5mm Sample consisted of: Grey compressed fibre cement material	Chrysotile, amosite and crocidolite 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 (regarding both quality and NATA accreditation).

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

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Sydney	Feb 19, 2018	Indefinite
Asbestos - LTM-ASB-8020	Sydney	Feb 19, 2018	Indefinite

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Site # 23736

Company Name: JBS & G Australia (NSW) P/L
Address: Level 1, 50 Margaret St
Sydney
NSW 2000

Project Name: MAROUBRA
Project ID: 54640

Order No.:
Report #: 585454
Phone: 02 8245 0300
Fax:

Received: Feb 19, 2018 12:40 PM
Due: Feb 27, 2018
Priority: 6 Day
Contact Name: Michael Samuel

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - WA guidelines	Asbestos Absence /Presence	HOLD
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						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	SS01	Feb 16, 2018		Soil	S18-Fe21338	X		
2	SS02	Feb 16, 2018		Soil	S18-Fe21339	X		
3	SS03	Feb 16, 2018		Soil	S18-Fe21340	X		
4	SS04	Feb 16, 2018		Soil	S18-Fe21341	X		
5	SS05	Feb 16, 2018		Soil	S18-Fe21342	X		
6	TP01_0-0.1	Feb 16, 2018		Soil	S18-Fe21343	X		
7	TP01_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21344	X		
8	TP01_0.2-0.3-MAT	Feb 16, 2018		Building Materials	S18-Fe21345		X	
9	TP01_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21346	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
10	TP02_0-0.1	Feb 16, 2018		Soil	S18-Fe21347	X		
11	TP02_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21348	X		
12	TP02_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21349	X		
13	TP2_0.9-1.0	Feb 16, 2018		Soil	S18-Fe21350	X		
14	TP03_0-0.1	Feb 16, 2018		Soil	S18-Fe21351	X		
15	TP03_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21352	X		
16	TP03_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21353	X		
17	TP04_0-0.1	Feb 16, 2018		Soil	S18-Fe21354	X		
18	TP04_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21355	X		
19	TP4_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21356	X		
20	TP4_1.0-1.1	Feb 16, 2018		Soil	S18-Fe21357	X		
21	TP5_0-0.1	Feb 16, 2018		Soil	S18-Fe21358	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
22	TP5_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21359	X		
23	TP5_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21360	X		
24	TP5_1.0-1.1	Feb 16, 2018		Soil	S18-Fe21361	X		
25	TP6-0-0.1	Feb 16, 2018		Soil	S18-Fe21362	X		
26	TP6-0.2-0.3	Feb 16, 2018		Soil	S18-Fe21363	X		
27	TP7_0-0.1	Feb 16, 2018		Soil	S18-Fe21364	X		
28	TP7_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21365	X		
29	TP7_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21366	X		
30	TP7_1.0-1.1	Feb 16, 2018		Soil	S18-Fe21367	X		
31	TP08_0-0.1	Feb 16, 2018		Soil	S18-Fe21368	X		
32	TP08_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21369	X		
33	TP08_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21370	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
34	TP08_1.0-1.1	Feb 16, 2018		Soil	S18-Fe21371	X		
35	TP09_0-0.1	Feb 16, 2018		Soil	S18-Fe21372	X		
36	TP09_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21373	X		
37	TP09_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21374	X		
38	TP09_1.0-1.1	Feb 16, 2018		Soil	S18-Fe21375	X		
39	TP09_1.5-1.6	Feb 16, 2018		Soil	S18-Fe21376	X		
40	TP10_0-0.1	Feb 16, 2018		Soil	S18-Fe21377	X		
41	TP10_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21378	X		
42	TP10_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21379	X		
43	TP10_1.0-1.1	Feb 16, 2018		Soil	S18-Fe21380	X		
44	TP11_0-0.1	Feb 16, 2018		Soil	S18-Fe21381	X		
45	TP11_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21382	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
46	TP11_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21383	X		
47	TP12_0-0.1	Feb 16, 2018		Soil	S18-Fe21384	X		
48	TP12_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21385	X		
49	TP12_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21386	X		
50	TP13_0-0.1	Feb 16, 2018		Soil	S18-Fe21387	X		
51	TP13_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21388	X		
52	TP13_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21389	X		
53	TP13_0.9-1.0	Feb 16, 2018		Soil	S18-Fe21390	X		
54	TP14_0-0.1	Feb 16, 2018		Soil	S18-Fe21391	X		
55	TP14_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21392	X		
56	TP14_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21393	X		
57	TP14_1.0-1.1	Feb 16, 2018		Soil	S18-Fe21394	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
58	TP15_0-0.1	Feb 16, 2018		Soil	S18-Fe21395	X		
59	TP15_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21396	X		
60	TP15_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21397	X		
61	TP15_1.0-1.1	Feb 16, 2018		Soil	S18-Fe21398	X		
62	TP16_0-0.1	Feb 16, 2018		Soil	S18-Fe21399	X		
63	TP16_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21400	X		
64	TP17_0-0.1	Feb 16, 2018		Soil	S18-Fe21401	X		
65	TP17_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21402	X		
66	TP17_0.4-0.5	Feb 16, 2018		Soil	S18-Fe21403	X		
67	TP18_0-0.1	Feb 16, 2018		Soil	S18-Fe21404	X		
68	TP18_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21405	X		
69	TP18_0.4-0.5	Feb 16, 2018		Soil	S18-Fe21406	X		

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Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
70	TP19_0-0.1	Feb 16, 2018		Soil	S18-Fe21407	X		
71	TP19_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21408	X		
72	TP20_0-0.1	Feb 16, 2018		Soil	S18-Fe21409	X		
73	TP20_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21410	X		
74	TP20_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21411	X		
75	TP21_0-0.1	Feb 16, 2018		Soil	S18-Fe21412	X		
76	TP21_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21413	X		
77	TP21_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21414	X		
78	TP22_0-0.1	Feb 16, 2018		Soil	S18-Fe21415	X		
79	TP22_0.2-0.3	Feb 16, 2018		Soil	S18-Fe21416	X		
80	TP22_0.5-0.6	Feb 16, 2018		Soil	S18-Fe21417	X		
81	TP22_1.0-1.1	Feb 16, 2018		Soil	S18-Fe21418	X		

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Sample Detail						Asbestos - WA guidelines	Asbestos Absence /Presence	HOLD
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Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
82	QC16022018-1	Feb 16, 2018		Soil	S18-Fe21419	X		
83	QC02-16022018	Feb 16, 2018		Soil	S18-Fe21420	X		
84	QC03-16022018	Feb 16, 2018		Soil	S18-Fe21421	X		
85	QC16022018-4	Feb 16, 2018		Soil	S18-Fe21422	X		
86	MAT-02	Feb 16, 2018		Building Materials	S18-Fe21423		X	
87	TP03_0.9-1.0	Feb 16, 2018		Building Materials	S18-Fe21424			X
88	TP08_1.5-1.6	Feb 16, 2018		Building Materials	S18-Fe21425			X

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Sample Detail						Asbestos - WA guidelines	Asbestos Absence /Presence	HOLD
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Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
89	TP10-BS01	Feb 16, 2018		Building Materials	S18-Fe21426			X
Test Counts						84	2	3

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis
LOR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Western Australia Department of Health
NOHSC	National Occupational Health and Safety Commission
ACM	Bonded asbestos-containing material means any material containing more than 1% asbestos and comprises asbestos-containing-material which is in sound condition, although possibly broken or fragmented, and where the asbestos is bound in a matrix such as cement or resin. Common examples of ACM include but are not limited to: pipe and boiler insulation, sprayed-on fireproofing, troweled-on acoustical plaster, floor tile and mastic, floor linoleum, transite shingles, roofing materials, wall and ceiling plaster, ceiling tiles, and gasket materials. This term is restricted to material that cannot pass a 7 mm x 7 mm sieve. This sieve size is selected because it approximates the thickness of common asbestos cement sheeting and for fragments to be smaller than this would imply a high degree of damage and hence potential for fibre release.
FA	FA comprises friable asbestos material and includes severely weathered cement sheet, insulation products and woven asbestos material. This type of friable asbestos is defined here as asbestos material that is in a degraded condition such that it can be broken or crumbled by hand pressure. This material is typically unbonded or was previously bonded and is now significantly degraded (crumbling).
PACM	Presumed Asbestos-Containing Material means thermal system insulation and surfacing material found in buildings, vessels, and vessel sections constructed no later than 1980 that are assumed to contain greater than one percent asbestos but have not been sampled or analyzed to verify or negate the presence of asbestos.
AF	Asbestos fines (AF) are defined as free fibres, or fibre bundles, smaller than 7mm. It is the free fibres which present the greatest risk to human health, although very small fibres (< 5 microns in length) are not considered to be such a risk. AF also includes small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve. (Note that for bonded ACM fragments to pass through a 7 mm x 7 mm sieve implies a substatntial degree of damage which increases the potential for fibre release.)
AC	Asbestos cement means a mixture of cement and asbestos fibres (typically 90:10 ratios).

Comments

Samples Fe21358 received were less than the nominal 500mL as recommended in Section 4.10 of the NEPM Schedule B1 - Guideline on Investigation Levels for Soil and Groundwater.

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

Comments

Qualifier Codes/Comments

Code	Description
N/A	Not applicable

Asbestos Counter/Identifier:

Sayeed Abu	Senior Analyst-Asbestos (NSW)

Authorised by:

Laxman Dias	Senior Analyst-Asbestos (NSW)



Glenn Jackson
National Operations Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Uncertainty data is available on request

Eurofins | mgt shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins | mgt be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

ENVIROLAB

014267

CHAIN OF CUSTODY

JBS&G

PROJECT NO.: 54640	LABORATORY BATCH NO.:
PROJECT NAME: Mavoubra	SAMPLERS: JS/MC
DATE NEEDED BY: STD T/A	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) msamuel@jbsg.com.au; (3) JStaehli@jbsg.com.au mCatlin

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

	SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	Asbestos	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
1	QA16022018-1	Soil	16/2/18		BAG		X		X	
2	QA02-16022018	↓	↓		↓		X		X	
3	QA03-16022018						X		X	
4	QA16022018-4						X		X	

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

Job No: 185810
Date Received: 19/2/18
Time Received: 16:45
Received by: MT
Temp: Cool/Ambient 26.4
Cooling: Ice/Icepack
Security: Intact/Broken/None

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: Jessica DATE: 16/2/18	CONSIGNMENT NOTE NO.	NAME: MT DATE: 19/2/18 16:45	COOLER SEAL – Yes ..... No ..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	OF: MT	COOLER TEMP 26.4 deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes ..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

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

CERTIFICATE OF ANALYSIS 185510

Client Details

Client	JBS & G (NSW & WA) Pty Ltd
Attention	M. Cattlin, Michael Samuel, J Staehli
Address	Level 1, 50 Margaret St, Sydney, NSW, 2000

Sample Details

Your Reference	**54640, Maroubra**
Number of Samples	4 Soil
Date samples received	19/02/2018
Date completed instructions received	19/02/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	26/02/2018
Date of Issue	23/02/2018

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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

Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lulu Scott
Results Approved By
Lulu Scott, Asbestos Supervisor

Authorised By

David Springer, General Manager

Asbestos ID - soils NEPM - ASB-001					
Our Reference		185510-1	185510-2	185510-3	185510-4
Your Reference	UNITS	QA16022018-1	QA02-16022018	QA03-16022018	QA16022018-4
Date Sampled		16/02/2018	16/02/2018	16/02/2018	16/02/2018
Type of sample		Soil	Soil	Soil	Soil
Date analysed	-	23/02/2018	23/02/2018	23/02/2018	23/02/2018
Sample mass tested	g	778.18	947.29	857.56	767.24
Sample Description	-	Brown sandy soil & debris	Brown sandy soil & debris	Brown sandy soil & debris	Brown sandy soil & debris
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos#1	g/kg	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–	–
FA and AF Estimation*	g	–	–	–	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
ASB-001	Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004. Results reported denoted with * are outside our scope of NATA accreditation. **NOTE** #1 Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF) **NOTE** #2 The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres. Estimation = Estimated asbestos weight Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.

Result Definitions

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

Report Comments

Asbestos-ID in soil: NEPM
This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013.
This is reported outside our scope of NATA accreditation.

Attachment 7 – Airborne Asbestos Fibre Monitoring Report (16 February 2018)

JBS&G (54640-113966)

20 February 2018

Todd Clarke
Coordinator Projects
Randwick City Council
Via Email: todd.clarke@randwick.nsw.gov.au

AMR001 – Daily Airborne Asbestos Fibre Monitoring Report
Jack Vanny Reserve, Marine Parade, Maroubra, NSW

Dear Todd,

Please find as **Attachment 1** the daily airborne asbestos fibre monitoring report for works completed at the Jack Vanny Reserve, Marine Parade, Maroubra, NSW on **16 February 2018.**

All air monitoring was completed in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres* [NOHSC: 3003(2005)], with NATA certification applying to all sample collection, handling and analytical procedures.

All reported results were satisfactory and below the minimum action level of less than 0.01 fibres/mL for control monitoring as outlined in:

- Work, Health and Safety (2017) Regulation; and
- Safework Australia (2016) Code of Practice – *How to Safely Remove Asbestos.*

If you have any questions regarding these results, please feel free to contact the undersigned on 02 8245 0300 or by email msamuel@jbsg.com.au.

Yours sincerely



Michael Samuel
Licensed Asbestos Assessor (LAA 000157)
JBS&G Australia Pty Ltd

Attachment 1 – Daily Airborne Asbestos Fibre Monitoring Report

Certificate of Analysis

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.

JBS & G Australia (NSW) P/L
Level 1, 50 Margaret St
Sydney
NSW 2000

Attention:	Michael Samuel
Report	585389-AFC
Project Name	MAROUBRA
Project ID	54640
Received Date	Feb 19, 2018
Date Reported	Feb 19, 2018

METHODOLOGY:

Asbestos Sampling	Sampling as per the National Occupational Health & Safety Commission - Guidance Note on The Membrane Filter Method For Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)]
Pump Calibration	Defender 520M: Calibrated against National Institute of Standards & Technology (NIST) SOP 13 Standard Operating Procedure for Calibration of Volumetric Ware, Gravimetric Method utilising a 1000 mL burette with a digital stop watch.
Asbestos Counting	Conducted in accordance with the National Occupational Health & Safety Commission - Guidance Note on The Membrane Filter Method For Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)] and in-house Method LTM-ASB-8010.

Project Name MAROUBRA
Project ID 54640
Date Sampled Feb 16, 2018
Report 585389-AFC

Eurofins | mgt Sample No.	Client Sample ID	Pump ID	Location	Start (time)	End (time)	Start Flow Rate (L/min)	End Flow Rate (L/min)	Result (Fibres/Fields)	Result (Fibres/mL)
18-Fe20685	DD132281	AC020	WESTERN BOUNDARY FENCE	7:01	15:00	1.5	1.5	1/100	< 0.01
18-Fe20686	DD132324	AC006	NORTHERN BOUNDARY FENCE	7:03	15:01	1.5	1.5	0/100	< 0.01
18-Fe20687	DD132303	AC007	EASTERN BOUNDARY FENCE	7:05	15:03	1.5	1.5	1.5/100	< 0.01
18-Fe20688	DD132244	AC035	SOUTHERN BOUNDARY FENCE	7:06	15:05	1.5	1.5	1/100	< 0.01
18-Fe20689	DD132296	BLANK	BLANK	--	--	--	--	0/100	--

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8010	Sydney	Feb 19, 2018	Indefinite
Asbestos - LTM-ASB-8010	Sydney	Feb 19, 2018	Indefinite

eurofins | mgt

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

Melbourne
3-5 Kingston Town Close
Oakleigh VIC 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

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

Company Name:	JBS & G Australia (NSW) P/L	**Order No.:**	
Address:	Level 1, 50 Margaret St Sydney NSW 2000	**Report #:**	585389
		Phone:	02 8245 0300
		Fax:	
Project Name:	MAROUBRA		
Project ID:	54640		

Received:	Feb 19, 2018 1:20 PM
Due:	Feb 19, 2018
Priority:	Same day
Contact Name:	Michael Samuel

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos (concentration of fibres in air)
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						X
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	DD132281	Feb 16, 2018	3:00PM	Air	S18-Fe20685	X
2	DD132324	Feb 16, 2018	3:01PM	Air	S18-Fe20686	X
3	DD132303	Feb 16, 2018	3:03PM	Air	S18-Fe20687	X
4	DD132244	Feb 16, 2018	3:05PM	Air	S18-Fe20688	X
5	DD132296	Feb 16, 2018		Air	S18-Fe20689	X
Test Counts						5

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis
LOR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Western Australia Department of Health
NOHSC	National Occupational Health and Safety Commission
ACM	Bonded asbestos-containing material means any material containing more than 1% asbestos and comprises asbestos-containing-material which is in sound condition, although possibly broken or fragmented, and where the asbestos is bound in a matrix such as cement or resin. Common examples of ACM include but are not limited to: pipe and boiler insulation, sprayed-on fireproofing, troweled-on acoustical plaster, floor tile and mastic, floor linoleum, transite shingles, roofing materials, wall and ceiling plaster, ceiling tiles, and gasket materials. This term is restricted to material that cannot pass a 7 mm x 7 mm sieve. This sieve size is selected because it approximates the thickness of common asbestos cement sheeting and for fragments to be smaller than this would imply a high degree of damage and hence potential for fibre release.
FA	FA comprises friable asbestos material and includes severely weathered cement sheet, insulation products and woven asbestos material. This type of friable asbestos is defined here as asbestos material that is in a degraded condition such that it can be broken or crumbled by hand pressure. This material is typically unbonded or was previously bonded and is now significantly degraded (crumbling).
PACM	Presumed Asbestos-Containing Material means thermal system insulation and surfacing material found in buildings, vessels, and vessel sections constructed no later than 1980 that are assumed to contain greater than one percent asbestos but have not been sampled or analyzed to verify or negate the presence of asbestos.
AF	Asbestos fines (AF) are defined as free fibres, or fibre bundles, smaller than 7mm. It is the free fibres which present the greatest risk to human health, although very small fibres (< 5 microns in length) are not considered to be such a risk. AF also includes small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve. (Note that for bonded ACM fragments to pass through a 7 mm x 7 mm sieve implies a substatntial degree of damage which increases the potential for fibre release.)
AC	Asbestos cement means a mixture of cement and asbestos fibres (typically 90:10 ratios).

Comments

Volume Measurement : Michael Cattlin, JBS & G Australia (NSW) P/L, has been trained by Eurofins | mgt and they conducted the sampling in accordance with the National Occupational Health & Safety Commission - Guidance Note on The Membrane Filter Method For Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)]methodology. Sampling pumps used by JBS & G Australia (NSW) P/L were calibrated by Eurofins | mgt and therefore volume measurements contained in this report are traceable back to Eurofins | mgt. Eurofins | mgt are responsible for all data contained in this report.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
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

Comments

Qualifier Codes/Comments

Code	Description
N/A	Not applicable

Asbestos Counter/Identifier:

Authorised by:

Matthew Quigley Senior Analyst-Asbestos (NSW)



Glenn Jackson
National Operations Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Uncertainty data is available on request

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Attachment 8 – NSW EPA Clean Up Notice and Supplementary Documentation

Clean-Up Notice

RANDWICK CITY COUNCIL
Trading as RANDWICK CITY COUNCIL
ABN 77 362 844 121
30 Frances Street
RANDWICK NSW 2031

Attention: Todd Clarke

Notice Number	1559630
File Number	EF17/14159
Date	20-Dec-2017

Dear Mr Brownlee,

The Environment Protection Authority provided Randwick City Council with a draft Notice of Clean-Up Action for comment on 14 December 2017 in relation to the land application of waste at Lot 1 Section 3 in Deposited Plan 758649, Mistral Point, Marine Pde, Maroubra.

Comments were received from Randwick City Council on 19 December 2017.

The EPA considered your comments and has issued the Notice.

NOTICE OF CLEAN-UP ACTION

BACKGROUND

1. The Environment Protection Authority (**the EPA**) is responsible for the administration and enforcement of the *Protection of the Environment Operations Act 1997* (**the POEO Act**), including the processing, transport and disposal of waste.
2. Section 6 of the POEO Act provides that the EPA is the Appropriate Regulatory Authority (**ARA**) for activities carried on by a state or public authority.
3. Under section 91(1) of the POEO Act, the EPA as the ARA may direct a person that is reasonably suspected of causing or having caused a pollution incident to take clean-up action.
4. The POEO Act defines "waste" to include:
   a. any substance (whether solid, liquid or gaseous) that is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment, or
   b. any discarded, rejected, unwanted, surplus or abandoned substance, or

c. any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or for recycling, processing, recovery or purification by a separate operation from that which produced the substance, or

d. any processed, recycled, re-used or recovered substance produced wholly or partly from waste that is applied to land, or used as fuel, but only in the circumstances prescribed by the regulations, or

e. any substance prescribed by the regulations to be waste.

A substance is not precluded from being waste for the purposes of the POEO Act merely because it is or may be processed, recycled, re-used or recovered.

5. "Asbestos waste" is defined for the purposes of Schedule 1 of the POEO Act to mean any waste that contains asbestos. The EPA *Waste Classification Guidelines* provides that any waste that contains asbestos is "asbestos waste" and is classified as "special waste"

6. On 11 December 2017, EPA officers conducted an inspection (**the Inspection**) of Lot 1 of Section 3 in Deposited Plan 758649, Marine Parade, Maroubra NSW 2035 (**the Premises**). The specific area inspected by EPA officers is shown on Map 1 attached (**the Impacted Area**).

7. During the Inspection, EPA officers inspected the walking trails from the top of the Impacted Area to the bottom of the Impacted Area at the rock shelf. It appears that fill material was placed in the Impacted Area some time ago, and vegetation has grown over the fill material. It is likely that the fill material was contaminated and over time, contaminants from the fill have been liberated from the fill and have been transported downhill.

8. EPA officers observed suspected asbestos fragments along most of the walking trails in the Impacted Area; within some of the vegetation in the Impacted Area; and around and on top of the rock shelf. Some of the suspected asbestos fragments appeared quite weathered. Several larger pieces of suspected asbestos piping was also found in the Impacted Area. EPA officers also observed brick, concrete, tile and glass along the pathways and in some of the vegetation in the Impacted Area. Photos have been attached to this Notice for your information.

9. EPA officers obtained 19 samples of suspected asbestos fragments from the Impacted Area. The samples were analysed with the EPA's microPHAZIR and all returned a positive reading for chrysotile asbestos. The samples have been submitted for laboratory analysis.

10. The EPA notes that the Impacted Area at the Premises can be accessed easily by the public. The EPA is concerned about the presence of multiple asbestos fragments observed during the Inspection and its impact on human health and the environment.

11. The EPA reasonably suspects that the application of asbestos waste to land at the Premises has resulted in land pollution which has occurred or is occurring as it:

a) is causing or likely to cause the degradation of the land, and

b) has potential human health and environmental impacts caused by the asbestos waste.

12. Land pollution or pollution of land means placing in or on, or otherwise introducing into or onto, the land (whether through an act or omission) any matter, whether solid, liquid or gaseous:

a) that causes or is likely to cause degradation of the land, resulting in actual or potential harm to the health or safety of human beings, animals or other terrestrial life or ecosystems, or actual or potential loss or property damage, that is not trivial, or

b) that is of a prescribed nature, description or class that does not comply with any standard prescribed in respect of that matter.

13. The EPA reasonably suspects that a land pollution incident is occurring and has occurred at the Premises. The EPA reasonably suspects that land pollution has occurred from the application of asbestos waste to land.
14. The EPA understands that Council is the occupier of the Premises and has management control of the Premises.
15. The EPA requires Council to take the clean-up actions as set out below.

DIRECTION TO TAKE CLEAN-UP ACTION

The Environment Protection Authority (EPA) directs RANDWICK CITY COUNCIL to take the following clean-up action:

A. **Immediately** secure the Impacted Area as identified in Map 1 at the Premises to prevent access to the Impacted Area by members of the public. Continue to prevent public access to the Impacted Area unless advised by the EPA.

B. Do not import any material to the Premises.

C. Do not export any material from the Premises, unless it has been classified in accordance with the EPA's *Waste Classification Guidelines.*

D. By **5pm Friday 29 December 2017,** engage an occupational hygienist (that is registered with the Australian Institute of Occupational Hygienists Inc) to determine the extent of the asbestos contamination in the Impacted Area. Asbestos fragments on the surface of the Impacted Area

E. By **5pm Friday 29 December 2017,** engage a suitably qualified expert to conduct a Waste Classification of the fill material that has been land applied in the Impacted Area at the Premises.

F. By **5pm Wednesday 31 January 2018,** provide a copy of the Waste Classification of the fill material (as required above) to the EPA and advise the EPA as to Council's proposed actions in relation to the fill material and remediation of the Impacted Area.

FEE TO BE PAID

- You are required by law to pay a fee of $535 for the administrative costs of issuing this notice. An invoice for the fee has been attached to this notice.
- It is an offence not to pay this fee. However you can apply for an extension of time to pay the fee or for the fee to be waived. At the end of this notice there is information about how and when to pay the fee and how to apply for an extension or a waiver of the fee.

Clean-Up Notice



Celeste Forestal

Unit Head

Waste & Resource Recovery

(by Delegation)

INFORMATION ABOUT THIS CLEAN-UP NOTICE

- This notice is issued under section 91 of the Protection of the Environment Operations Act 1997.
- It is an offence against the Act not to comply with a clean-up notice unless you have a reasonable excuse.

Penalty for not complying with this notice

- The maximum penalty for a corporation is $1,000,000 and a further $120,000 for each day the offence continues. The maximum penalty for an individual is $250,000 and a further $60,000 for each day the offence continues.

Cost recovery from the person who caused the incident

- If you comply with this clean-up notice but you are not the person who caused the pollution incident to which the notice relates, you have a right to go to court to recover your costs of complying with the notice from the person who caused the incident.

Deadline for paying the fee

- The fee must be paid by **no later than 30 days after the date of this notice**, unless the EPA extends the time to pay the fee, or waives the fee.

How to pay the fee

- Possible methods of payment are listed on the last page of the attached invoice/statement.
- Please include the payment slip from the attached invoice/statement with your payment.

How to apply for an extension of time to pay/waive the fee

- Any application for and extension of time to pay the fee or for the fee to be waived should be made in writing to the EPA. The application should set out clearly why you think your application should be granted.

Clean-Up Notice

Other costs

- The Protection of the Environment Operations Act allows the EPA to recover from you reasonable costs and expenses it incurs in monitoring action taken under this notice, ensuring the notice is complied with and associated matters. (If you are going to be required to pay these costs and expenses you will later be sent a separate notice called a "Notice Requiring Payment of Reasonable Costs and Expenses").

Continuing obligation

- Under section 319A of the Act, your obligation to comply with the requirements of this notice continues until the notice is complied with, even if the due date for compliance has passed.

Variation of this notice

- This notice may only be varied by subsequent notices issued by the EPA.

Clean-Up Notice

MAP 1



DOC18/48226

Randwick City Council
30 Frances St
RANDWICK NSW 2031

EMAIL

2 February 2018

Attention: Mr Clarke

Draft Asbestos Management Plan - Further Works Required

The EPA has reviewed the draft "*Asbestos Management Plan Jack Vanny Reserve (Mistral Point)*" prepared by Pickford & Rhyder Consulting Pty Ltd and dated 22 January 2018 (the AMP). The EPA does not consider that the AMP sufficiently:

- meets the requirements of Clean-Up Notice No.1559630; nor
- address the risk posed by the asbestos present in Jack Vanny Reserve.

You must determine the extent of the asbestos contamination

Action item D of Clean-Up Notice No.1559630 states: "*By 5pm Friday 29 December 2017, engage an occupational hygienist (that is registered with the Australian Institute of Occupational Hygienists Inc) to determine the extent of the asbestos contamination in the Impacted Area."*

The AMP does not sufficiently assess the extent of the contamination. No determination of the spread, density or depth of asbestos contamination has been made.

In addition, no assessment of the potential for friable asbestos in the soil has been made. The AMP states that "*there is no evidence of any 'friable' asbestos materials found on site*". However this has not been adequately demonstrated. We understand that the assessment undertaken by Pickford & Rhyder Consulting Pty Ltd has been a visual assessment. Friable asbestos contamination in soil can only be determined by laboratory analysis. The EPA understands that no soil sampling or testing has been undertaken to date.

By no later than **5pm 23 February 2018**, you must provide to the EPA a report which assesses the extent of the asbestos contamination in the *Impacted Area*.

You must remediate the area to remove any risk posed by the asbestos contamination

Without understanding the extent of the asbestos contamination, the EPA is unable to determine if the proposed measures in the AMP are sufficient to remove risk to public health and the environment.

Where the extent of contamination is significant, and there is risk of future exposure of asbestos, the EPA does not consider 'emu picking' an adequate control measure.

PO Box A290 Sydney South NSW 1232
59-61 Goulburn St Sydney NSW 2000
Tel: (02) 9995 5000 Fax: (02) 9995 5999
TTY (02) 9211 4723
ABN 43 692 285 758
www.epa.nsw.gov.au

You must revise the AMP based of the results of assessment of the extent of asbestos contamination. A revised AMP must be provided to the EPA by no later than **5pm 23 February 2018.**

If you have any questions regarding this matter, please contact Melissa Ward on 9995 5747.

Yours sincerely



DEANNE PITTS
A/Unit Head Waste Compliance
Environment Protection Authority

Appendix B – Borelogs

TP01

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.8
Pit Dimension (m3): 0.48

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Silty SAND, grey, heterogeneous, dry, well-graded, medium density, inclusions of roots		50 L AQ completed, no ACM observed
	0.5	0.30		Fill	FILL - Silty SAND, dark grey, heterogeneous, dry, well-graded, medium density, inclusions of roots	TP01_0-0.8	
	1.0	0.80			Test Pit TP01 terminated at 0.8m		Test pit terminated due to refusal on rock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP02

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3): 0.45

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, yellow-brown, heterogeneous, dry, well-graded, loose, inclusions of brick, concrete boulders, metal, glass	TP02_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00			Test Pit TP02 terminated at 1m		Test pit terminated due to refusal on bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP03

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1.2
Pit Dimension (m3): 0.54

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Silty SAND, grey-brown, heterogeneous, dry, well-graded, loose, inclusions of grass/roots and ACM		50 L AQ completed, one ACM fragment observed
		0.30		Fill	FILL - SAND, yellow, homogeneous, dry, poorly graded, medium density		
	0.5					TP03_0-1.0	
	1.0						
		1.00		Fill	FILL - SAND, grey, homogeneous, dry, poorly graded, medium density		
		1.20			Test Pit TP03 terminated at 1.2m		Test pit terminated due to refusal on rock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP04

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2
Pit Dimension (m3): 1.2

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, brown, heterogeneous, dry, well-graded, inclusions of roots/grass, concrete, glass, brick, metal, ACM	TP04_0-1.0	50 L AQ completed, multiple ACM fragments (>10) observed
	1.0	1.00		SW	SAND - Grey-brown, homogeneous, damp, medium density	TP04_1.0-2.0	10 L AQ completed, no ACM observed
	1.5						
	2.0	2.00			Test Pit TP04 terminated at 2m		Test pit terminated due to refusal on rock
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP05

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3): 0.45

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, brown, heterogeneous, dry, well-graded, loose, inclusions of tyre, brick, sandstone boulders, roots	TP05_0-1.0	50 L AQ completed, ACM observed on surface of rocks, very degraded, fragments collected, no ACM below surface
	1.0	1.00			Test Pit TP05 terminated at 1m		Test pit terminated due to refusal on rock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP06

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.8
Pit Dimension (m3): 0.48

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, brown, heterogeneous, dry, well-graded, medium density, inclusions of bricks, metal, sandstone gravel, tile, ACM	TP06_0-0.8	50 L AQ completed, one ACM fragment observed
		0.80			Test Pit TP06 terminated at 0.8m		Test pit terminated due to refusal on rock
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP07

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3): 0.45

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0			Fill	FILL - Silty SAND, grey, heterogeneous, damp, well-graded, loose, inclusions of roots/grass, brick/sandstone cobbles		50 L AQ completed, no ACM observed
		0.40		SP	SAND - Grey, homogeneous, damp, poorly graded, medium density	TP07_0-1.0	
	0.5						
	1.0	1.00			Test Pit TP07 terminated at 1m		Test pit terminated due to refusal on rock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP08

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.2
Pit Dimension (m3): 0.45

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Silty SAND, brown, heterogeneous, well-graded, medium density, inclusions of sandstone, gravels, grass, roots, ACM	TP08_0-0.2	50 L AQ completed, multiple ACM fragments observed on surface
		0.20			Test Pit TP08 terminated at 0.2m		Test pit terminated due to refusal on rock
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP09

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1.1
Pit Dimension (m3): 0.495

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5 1.0			Fill	FILL - Silty SAND, brown, heterogeneous, dry, medium density, inclusions of brick, terracotta, pipe fragments, ACM	TP09_0-1.0	50 L AQ completed, multiple ACM fragments observed, ACM pipe fragment in poor condition seen to travel south
	1.5 2.0 2.5 3.0 3.5	1.10			Test Pit TP09 terminated at 1.1m		Test pit terminated due to refusal on rock

TP10

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1.2
Pit Dimension (m3): 0.72

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, brown, heterogeneous, well-graded, medium density, inclusions of roots		50 L AQ completed, multiple ACM fragments observed
		0.20		Fill	FILL - SAND, yellow-brown, heterogeneous, well-graded, medium density, inclusions of ACM, brick, plastic pipe, metal sheeting, plastic		
	0.5					TP10_0-1.0	
	1.0						
		1.20			Test Pit TP10 terminated at 1.2m		Test pit terminated due to refusal on rock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP11

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1.1
Pit Dimension (m3): 0.66

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - SAND, brown, heterogeneous, damp, well-graded, medium density, inclusions of brick fragments, roots, ACM	TP11_0-1.0	50 L AQ completed, ACM fragments observed
	1.0	1.10			Test Pit TP11 terminated at 1.1m		Test pit terminated due to refusal on rock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP12

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1.2
Pit Dimension (m3): 0.72

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - SAND, grey-brown, heterogeneous, dry, loose, inclusions of grass/roots, brick, sandstone boulders, metal, glass, ACM	TP12_0-1.0	50 L AQ completed, multiple large ACM fragments observed
	1.0						
		1.20			Test Pit TP12 terminated at 1.2m		Test pit terminated due to refusal on rock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP13

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 3
Pit Dimension (m3): 1.5

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - SAND, light brown, inclusions of ACM, brick, tiles, debris	TP13_0-1.0	50 L AQ completed, multiple ACM fragments observed
	1.0	1.00		Fill	FILL - SAND, light brown, inclusions of ACM, brick, tiles, debris	TP13_1.0-2.0	10 L AQ completed, 24 ACM fragments observed
	2.0	2.00		Fill	FILL - SAND, dark brown, inclusions of ACM, brick, tiles, debris	TP13_2.0-3.0	10 L AQ completed, one ACM fragment observed
	3.0	3.00			Test Pit TP13 terminated at 3m		Test pit terminated on natural sediment
	3.5						

TP14

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2
Pit Dimension (m3): 0.9

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - SAND, brown, heterogeneous, well-graded, loose, inclusions of terracotta, brick, sandstone boulders, vegetation	TP14_0-1.0	50 L AQ completed, no ACM observed, QC/A27032018-1 taken
	1.0	1.00		Fill	FILL - SAND, brown, heterogeneous, well-graded, loose, inclusions of terracotta, brick, sandstone boulders, vegetation disappearing by 1.7 mbgs	TP14_1.0-2.0	10 L AQ completed, no ACM observed
	1.5						
	2.0	2.00			Test Pit TP14 terminated at 2m		Test pit terminated due to hole collapse
	2.5						
	3.0						
	3.5						

TP15

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 3
Pit Dimension (m3): 2.25

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - SAND, grey-brown, heterogeneous, damp, well-graded, medium density, inclusions of sandstone boulders, brick, terracotta, concrete, fabric, ACM	TP15_0-1.0	50 L AQ completed, one ACM fragment observed
	1.0						
	1.5					TP15_1.0-2.0	10 L AQ completed, one ACM fragment observed
	2.0						
	2.5					TP15_2.0-3.0	
	3.0						
		3.00			Test Pit TP15 terminated at 3m		Test pit terminated due to refusal on rock
	3.5						

TP16

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2
Pit Dimension (m3): 0.9

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - SAND, yellow-grey, heterogeneous, well-graded, medium density, inclusions of metal pipe, bitumen, grass/roots, metal sheeting, tile, brick		50 L AQ completed, no ACM observed, QA/C2703201802 taken
		0.50		Fill	FILL - SAND, brown, heterogeneous, well-graded, medium density, inclusions of metal pipe, bitumen, grass/roots, metal sheeting, tile, brick	TP16_0-1.0	
	1.0						10 L AQ completed, no ACM observed
	1.5					TP16_1.0-2.0	
	2.0						
		2.00			Test Pit TP16 terminated at 2m		Test pit terminated due to refusal on rock
	2.5						
	3.0						
	3.5						

TP17

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3): 0.45

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Hand Auger	0.5			Fill	FILL - SAND, grey, heterogeneous, dry, loose, inclusions of ACM, terracotta, brick	TP17_0-1.0	50 L AQ completed, ACM observed on surface and through test pit
	1.0	1.00			Test Pit TP17 terminated at 1m		Test pit terminated due to refusal on rock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP18

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.3
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Hand Auger				Fill	FILL - SAND, brown, heterogeneous, damp, well-graded, medium density, inclusions of ACM, tile, terracotta, brick fragments, concrete, grass	TP18_0-0.3	50 L AQ completed, multiple ACM fragments observed
		0.30			Test Pit TP18 terminated at 0.3m		Test pit terminated due to refusal on sandstone bedrock
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP19

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3): 0.45

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - SAND, yellow-brown, heterogeneous, dry becoming damp, medium density, inclusions of ACM, plastic, brick, concrete	TP19_0-1.0	50 L AQ completed, ACM observed on surface but not through test pit
	1.0	1.00			Test Pit TP19 terminated at 1m		Test pit terminated due to refusal on rock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP20

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2.6
Pit Dimension (m3): 1.56

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, brown, heterogeneous, dry, well-graded, medium density, inclusions of bricks, sandstone bricks, roots, ACM	TP20_0-1.0	50 L AQ completed, four large ACM fragments observed
	1.0						
	1.5					TP20_1.0-2.0	10 L AQ completed, one ACM fragment observed
	2.0						
	2.5	2.30		SW	SAND - Yellow, homogeneous, damp, well-graded, loose	TP20_2.0-2.6	10 L AQ completed, no ACM observed
	3.0	2.60			Test Pit TP20 terminated at 2.6m		Test pit terminated due to hole collapse
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP21

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.7
Pit Dimension (m3): 0.56

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - SAND, grey-brown, heterogeneous, dry becoming damp, medium density, inclusions of waste tyre, sandstone cobbles, brick fragments	TP21_0-0.7	50 L AQ completed, no ACM observed
	1.0	0.70			Test Pit TP21 terminated at 0.7m		Test pit terminated due to refusal on rock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP22

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.3
Pit Dimension (m3): 0.54

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Silty SAND, dark brown, heterogeneous, damp, inclusions of clay clasts, brick, glass, terracotta, wood, plastic	TP22_0-0.3	50 L AQ completed, no ACM observed
		0.30			Test Pit TP22 terminated at 0.3m		Test pit terminated due to refusal on sandstone rock
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP23

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.5
Pit Dimension (m3): 0.6

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - SAND, brown, heterogeneous, dry, fine, medium density, inclusions of brick, fabric, sandstone boulders, tile, plastic, reinforcing bars, waste tyre, ACM	TP23_0-0.5	50 L AQ completed, multiple ACM fragments observed
		0.50			Test Pit TP23 terminated at 0.5m		Test pit terminated due to refusal on sandstone bedrock
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP24

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - SAND, brown, heterogeneous, dry, well-graded, loose, inclusions of brick, metal sheeting, plastic, concrete boulders, tyres, reinforcing bars	TP24_0-1.0	50 L AQ completed, multiple ACM fragments observed
	1.0						
	1.5					TP24_1.0-2.0	10 L AQ completed, three ACM fragments observed
	2.0	2.00			Test Pit TP24 terminated at 2m		Test pit terminated due to refusal on bedrock
	2.5						
	3.0						
	3.5						

TP25

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.7
Pit Dimension (m3): 0.42

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, brown-yellow, damp, well-graded, medium density, inclusions of brick, roots, ACM fragments	TP25_0-0.7	50 L AQ completed, multiple ACM fragments observed, QA/C27032018-3 taken
	1.0	0.70			Test Pit TP25 terminated at 0.7m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP26

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.7
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, brown, heterogeneous, damp, well-graded, inclusions of grass/roots, bricks, bitumen, terracotta, metal, tiles, glass	TP26_0-0.7	50 L AQ completed, no ACM observed
	1.0	0.70			Test Pit TP26 terminated at 0.7m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP27

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1.5
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, grey, heterogeneous, dry, fine sands, loose, inclusions of metal sheeting, sandstone boulders, brick, glass, wood, concrete, roots, ACM fragments, tyre	TP27_0-1.0	50 L AQ completed, one ACM fragment observed
	1.0					TP27_1.0-1.5	10 L AQ completed, two small ACM fragments
	1.5	1.50			Test Pit TP27 terminated at 1.5m		Test pit terminated due to refusal on sandstone bedrock
	2.0						
	2.5						
	3.0						
	3.5						

TP28

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 27/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1.1
Pit Dimension (m3): 0.66

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty gravelly SAND, grey-brown, heterogeneous, dry, well-graded, medium density, inclusions of sandstone boulders, concrete, wires, brick	TP28_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.10			Test Pit TP28 terminated at 1.1m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP29

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.5
Pit Dimension (m3): 0.4

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Silty SAND, brown, heterogeneous, damp, well-graded, inclusions of bricks		50 L AQ completed, no ACM observed
		0.20		SP	SAND - Yellow, homogeneous, damp, poorly graded, medium density	TP29_0-0.5	
	0.5	0.50			Test Pit TP29 terminated at 0.5m		Test pit terminated due to refusal on sandstone bedrock
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP30

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 3
Pit Dimension (m3): 1.8

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, brown, heterogeneous, damp, well-graded, inclusions of bricks, roots/grass, terracotta, tile, ACM fragments	TP30_0-1.0	50 L AQ completed, multiple ACM fragments observed
	1.0	1.00		Fill	FILL - Silty SAND, dark brown, heterogeneous, damp, well-graded, inclusions of bricks, roots/grass, terracotta, tile, ACM fragments	TP30_1.0-2.0	10 L AQ completed, two small ACM fragments observed
	1.5						
	2.0	2.00		Fill	FILL - Sandy CLAY, mottled brown/orange, heterogeneous, dry, stiff, high plasticity, inclusions of ACM fragments	TP30_2.0-3.0	10 L AQ completed, two ACM fragments observed
	2.5						
	3.0	3.00			Test Pit TP30 terminated at 3m		Test pit terminated at program depth
	3.5						

TP31

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 3
Pit Dimension (m3): 1.35

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5	0.50		Fill	FILL - SAND, grey-brown, heterogeneous, damp, well-graded, medium density, inclusions of tiles, glass, brick fragments	TP31_0-1.0	50 L AQ completed, no ACM observed
				Fill	FILL - Sandy CLAY, orange-grey, stiff, high plasticity, traces of brick		
	1.0	0.60		SW	SAND - Grey, heterogeneous, damp, well-graded, medium density	TP31_1.0-2.0	10 L AQ completed, no ACM observed
	1.5						
	2.0					TP31_2.0-3.0	10 L AQ completed, no ACM observed
	2.5						
	3.0	3.00			Test Pit TP31 terminated at 3m		Test pit terminated at program depth
	3.5						

TP32

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - SAND, grey-brown, heterogeneous, dry, well-graded, medium density, inclusions of plastic, sandstone gravels, brick fragments, tile		50 L AQ completed, no ACM observed
		0.40		SP	SAND - Yellow, homogeneous, damp, poorly graded, medium density	TP32_0-1.0	
	0.5						
	1.0						
		1.00			Test Pit TP32 terminated at 1m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP33

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.2
Pit Dimension (m3): 0.54

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Clayey silty SAND, dark brown, heterogeneous, damp, well-graded, medium density, inclusions of roots/grass, fine sandstone gravels	TP33_0-0.2	50 L AQ completed, no ACM observed
		0.20			Test Pit TP33 terminated at 0.2m		Test pit terminated due to refusal on bedrock
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP34

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.1
Pit Dimension (m3): 0.15

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Clayey silty SAND, dark brown, heterogeneous, damp, well-graded, loose, inclusions of roots/grass	TP34_0-0.1	50 L AQ completed, no ACM observed
		0.10			Test Pit TP34 terminated at 0.1m		Test pit terminated due to refusal on sandstone bedrock

0.5
1.0
1.5
2.0
2.5
3.0
3.5

TP35

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2
Pit Dimension (m3): 1.2

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples / Tests / Remarks	Additional Observations
Test Pit	0.5	0.30		Fill	FILL - SAND, grey-brown, heterogeneous, damp, well-graded, medium density, inclusions of wood, netting, gravels		50 L AQ completed, no ACM observed
				Fill	FILL - SAND, yellow, heterogeneous, damp, well-graded, medium density, inclusions of metal, brick, plastic, bitumen		
	1.0	0.50		Fill	FILL - Sandy CLAY, heterogeneous, dry, stiff, high plasticity, inclusions of plastic (traces)	TP35_0-1.0	
	1.5	1.20		SP	SAND -Grey, homogeneous, damp, poorly graded, medium density	TP35_1.0-2.0	10 L AQ completed, no ACM observed
	2.0						
	2.5						Test pit terminated on natural sediment
	3.0						
	3.5	3.00			Test Pit TP35 terminated at 2m		

TP36

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2.3
Pit Dimension (m3): 1.035

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty clayey SAND, brown, heterogeneous, dry, well-graded, dense, inclusions of brick fragments, sandstone cobbles, clay clasts, metal, tiles	TP36_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00		Fill	FILL - Silty SAND, grey, heterogeneous, damp, medium density, inclusions of tile, brick fragments, sandstone cobbles, clay clasts	TP36_1.0-2.0	10 L AQ completed, no ACM observed
	1.5						
	2.0						
		2.30			Test Pit TP36 terminated at 2.3m		Test pit terminated due to hole collapse
	2.5						
	3.0						
	3.5						

TP37

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2
Pit Dimension (m3): 1.2

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, grey-brown, heterogeneous, damp, well-graded, medium density, inclusions of sandstone gravels, old plastic pipe fragments, brick	TP37_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00		SP	SAND - Grey-yellow, homogeneous, poorly graded, very loose	TP37_1.0-2.0	10 L AQ completed, no ACM observed
	1.5						
	2.0	2.00			Test Pit TP37 terminated at 2m		Test pit terminated due to hole collapse
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP38

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2
Pit Dimension (m3): 1.2

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, grey-brown, heterogeneous, dry, well-graded, medium density, inclusions of roots/grass, brick, sandstone gravels, glass, plastic, ACM	TP38_0-1.0	50 L AQ completed, one ACM fragment observed, QA/C28032018-1 taken
	1.0	0.50		Fill	FILL - Silty SAND, grey, heterogeneous, dry, loose, inclusions of brick, glass, sandstone gravels		
	1.5	1.50		SP	SAND - Grey-brown, homogeneous, damp, poorly graded, very loose	TP38_1.0-2.0	10 L AQ completed, no ACM observed
	2.0	2.00			Test Pit TP38 terminated at 2m		Test pit terminated due to hole collapse
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP39

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.5
Pit Dimension (m3): 0.5

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, dark brown-grey, heterogeneous, damp, well-graded, medium density, inclusions of plastic, brick, terracotta, concrete, tile, ACM	TP39_0-0.5	50 L AQ completed, two ACM fragments observed
		0.50			Test Pit TP39 terminated at 0.5m		Test pit terminated due to refusal on sandstone bedrock
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP40

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5	0.50		Fill	FILL - Silty SAND, dark brown, heterogeneous, damp, well-graded, medium density, inclusions of roots/grass, plastic, brick, terracotta		50 L AQ completed, no ACM observed
				Fill	FILL - Silty SAND, heterogeneous, damp, well-graded, loose, inclusions of sandstone gravels, brick fragments	TP40_0-1.0	
	1.0	0.80		SP	SAND - Grey, homogeneous, saturated, poorly graded, medium density		
	1.5					TP40_1.0-2.0	10 L AQ completed, no ACM observed
	2.0	2.00			Test Pit TP40 terminated at 2m		Test pit terminated due to refusal on sandstone bedrock
	2.5						
	3.0						
	3.5						

TP41

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.3
Pit Dimension (m3): 0.48

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Silty SAND, light brown, heterogeneous, dry, fine sands, loose, inclusions of roots, fine sandstone gravels, bricks	TP41_0-0.3	50 L AQ completed, no ACM observed
		0.30			Test Pit TP41 terminated at 0.3m		Test pit terminated due to refusal on sandstone bedrock
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP42

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, grey, heterogeneous, dry becoming damp, well-graded, medium density, inclusions of roots/grass, sandstone gravels, glass	TP42_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00		SP	SAND - Grey, homogeneous, moist, poorly graded, dense	TP42_1.0-2.0	10 L AQ completed, no ACM observed
	1.5						
	2.0	2.00			Test Pit TP42 terminated at 2m		Test pit terminated on natural sediment
	2.5						
	3.0						
	3.5						

TP43

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3): 0.6

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0			Fill	FILL - Silty SAND, light brown-yellow, heterogeneous, dry becoming damp, fine sands, well-graded, medium density, inclusions of roots/grass		50 L AQ completed, no ACM observed, QA/C28032018-2 taken
		0.30		SM	Silty SAND - Grey-brown, homogeneous, damp, poorly graded		
	0.5					TP43_0-1.0	
	1.0	1.00			Test Pit TP43 terminated at 1m		Test pit terminated on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP44

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2.5
Pit Dimension (m3): 1.5

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, brown, heterogeneous, dry, well-graded, medium density, inclusions of sandstone boulders, brick, roots	TP44_0-1.0	50 L AQ completed, no ACM observed
	1.0						
	1.5	1.50		SM	Silty SAND - Grey, homogeneous, moist, poorly graded, medium density	TP44_1.0-2.0	10 L AQ completed, no ACM observed
	2.0						
	2.5	2.50			Test Pit TP44 terminated at 2.5m		
	3.0						
	3.5						

TP45

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2
Pit Dimension (m3): 1.5

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty SAND, grey-brown, heterogeneous, damp, well-graded, medium density, inclusions of roots/grass, glass, sandstone cobbles	TP45_0-1.0	50 L AQ completed, no ACM observed
	1.0						
		1.20		Fill	FILL - Sandy CLAY, mottled grey/orange, stiff, high plasticity		10 L AQ completed, no ACM observed
	1.5					TP45_1.0-2.0	
		1.50		SP	SAND - Grey, homogeneous, moist, poorly graded, dense		
	2.0						
		2.00			Test Pit TP45 terminated at 2m		Test pit terminated on natural sediment
	2.5						
	3.0						
	3.5						

TP46

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.5
Pit Dimension (m3): 0.5

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Gravelly SAND, dark brown, heterogeneous, damp, well-graded, dense, inclusions of bitumen cobbles, road base gravels, tile, brick	TP46_0-0.5	50 L AQ completed, no ACM observed
		0.50			Test Pit TP46 terminated at 0.5m		Test pit terminated due to refusal on sandstone boulders
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP47

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.3
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Clayey silty SAND, heterogeneous, damp, well-graded, medium density, inclusions of roots/grass, sandstone gravels, tile	TP47_0-0.3	50 L AQ completed, no ACM observed
		0.30			Test Pit TP47 terminated at 0.3m		Test pit terminated due to refusal on sandstone bedrock
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP48

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Silty SAND, brown-grey, heterogeneous, dry, fine sands, well-graded, medium density, inclusions of grass/roots, sandstone gravels		50 L AQ completed, no ACM observed
		0.30		SP	SAND - Grey, homogeneous, damp, poorly graded, loose		
	0.5					TP48_0-1.0	
	1.0						
		1.00			Test Pit TP48 terminated at 1m		Test pit terminated due to hole collapse in natural sediment
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP49

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Clayey SAND, dark brown, heterogeneous, damp, well-graded, medium density, inclusions of roots/grass, tile, brick		50 L AQ completed, no ACM observed
		0.30		Fill	FILL - Sandy CLAY, mottled orange/grey, firm, high plasticity, inclusions of brick fragments		
	0.5					TP49_0-1.0	
	1.0	1.00			Test Pit TP49 terminated at 1m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP50

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.4
Pit Dimension (m3): 0.5

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Silty SAND, brown, dry, fine sand, well-graded, loose, inclusions of roots/grass	TP50_0-0.4	50 L AQ completed, no ACM observed
	0.5	0.40			Test Pit TP50 terminated at 0.4m		Test pit terminated due to refusal on bedrock
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP51

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 3
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, brown, heterogeneous, damp, medium density, inclusions of wood, sandstone gravels, tile, bitumen, brick, concrete boulders, ACM, increased inclusions from 1.0 to 2.0 m	TP51_0-1.0	50 L AQ completed, one ACM fragment observed on surface
	1.0						
	1.5					TP51_1.0-2.0	10 L AQ completed, three ACM fragments observed
	2.0						
	2.5					TP51_2.0-3.0	10 L AQ completed, no ACM observed
	3.0						
		3.00			Test Pit TP51 terminated at 3m		Test pit terminated at program depth
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP52

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3): 0.6

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, brown, heterogeneous, well-graded, medium density, inclusions of brick, grass.roots, bitumen, sandstone cobbles	TP52_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00			Test Pit TP52 terminated at 1m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP53

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2.2
Pit Dimension (m3): 1.65

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Clayey SAND, brown, heterogeneous, well-graded, medium density, inclusions of roots/grasses		50 L AQ completed, no ACM observed
		0.20		Fill	FILL - Gravelly silty SAND, yellow-brown, heterogeneous, dry, well-graded, medium density, inclusions of brick, sandstone cobbles, metal		
	0.5					TP53_0-1.0	
	1.0						10 L AQ completed, no ACM observed, QA/C28032018-3 taken
	1.5					TP53_1.0-2.0	
		1.80		Fill	SAND - Grey-brown, homogeneous, damp, well-graded, dense		
	2.0						
		2.20			Test Pit TP53 terminated at 2.2m		Test pit terminated on natural sediment
	2.5						
	3.0						
	3.5						

TP54

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 3
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, dark brown, heterogeneous, dry, fine sand, well-graded, inclusions of wood, fabric, tile, brick, plastic, glass, sandstone boulders, road base gravels	TP54_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00		Fill	FILL - Sandy CLAY, mottles orange/grey, heterogeneous, dry, stiff, high plasticity, inclusions of plastic	TP54_1.0-2.0	10 L AQ completed, no ACM observed
	1.5						
	2.0					TP54_2.0-3.0	10 L AQ completed, no ACM observed
	2.5	2.50		Fill	SAND - Black-brown, homogeneous, wet, poorly graded, dense		
	3.0	3.00			Test Pit TP54 terminated at 3m		Test pit terminated at program depth
	3.5						

TP55

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.8
Pit Dimension (m3): 0.48

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			SC	FILL - Clayey SAND, dark brown, heterogeneous, damp, well-graded, medium density, inclusions of roots/grass	TP55_0-0.8	50 L AQ completed, no ACM observed
	1.0	0.80			Test Pit TP55 terminated at 0.8m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP56

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, heterogeneous, damp, well-graded, medium density, inclusions of roots/grass	TP56_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00			Test Pit TP56 terminated at 1m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP57

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, brown, heterogeneous, damp, well-graded, medium density, inclusions of roots/grass	TP57_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00			Test Pit TP57 terminated at 1m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP58

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, brown, heterogeneous, well-graded, medium density, inclusions of roots/grass	TP58_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00			Test Pit TP58 terminated at 1m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP59

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, brown, heterogeneous, well-graded, medium density, inclusions of roots/grass, sandstone gravels/cobbles	TP59_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00			Test Pit TP59 terminated at 1m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP60

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3): 0.45

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, brown, heterogeneous, well-graded, medium density, inclusions of roots/grass	TP60_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00			Test Pit TP60 terminated at 1m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP61

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3): 0.45

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, brown, heterogeneous, damp, well-graded, medium density, inclusions of roots/grass, plastic	TP61_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00			Test Pit TP61 terminated at 1m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP62

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 28/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 3
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Clayey SAND, brown, heterogeneous, damp, well-graded, dense, inclusions of roots/grass, sandstone gravels		50 L AQ completed, no ACM observed, QA/C28032918-4 taken
		0.30		Fill	FILL - Silty SAND, brown-grey, heterogeneous, damp, well-graded, medium density, inclusions of tiles, brick, sandstone cobbles/bricks, plastic, ACM		
	0.5					TP62_0-1.0	
	1.0						10 L AQ completed, two ACM fragments observed
	1.5					TP62_1.0-2.0	
	2.0						10 L AQ completed, no ACM observed
		2.40		SM	SAND - Grey, homogeneous, moist, poorly graded, loose		
	2.5					TP62_2.0-3.0	
	3.0						
		3.00			Test Pit TP62 terminated at 3m		Test pit terminated due to hole collapse in natural sediment
	3.5						

TP63

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, dark brown, heterogeneous, damp, well-graded, medium density, inclusions of roots, grass, sandstone gravels, asphalt gravels	TP63_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00			Test Pit TP63 terminated at 1m		Test pit terminated due to refusal on sandstone bedrock
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP64

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2.4
Pit Dimension (m3): 1.44

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, brown, heterogeneous, damp, well-graded, medium density, inclusions of roots, sandstone gravels, concrete boulders, bricks, bitumen gravels	TP64_0-1.0	50 L AQ completed, no ACM observed
	1.0						
	1.5					TP64_1.0-2.0	10 L AQ completed, no ACM observed
	2.0	2.00		SP	SAND - Grey, homogeneous, poorly graded, medium density		
	2.5	2.40			Test Pit TP64 terminated at 2.4m		Test pit terminated due to hole collapse in natural sediment
	3.0						
	3.5						

TP65

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2
Pit Dimension (m3): 1.2

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, brown, hetereogeneous, damp, medium density, inclusions of roots, grass, sandstone gravels/cobbles, bricks, shale, tiles, glass, metal bucket/nails	TP65_0-1.0	50 L AQ completed, no ACM observed
	1.0						
	1.5					TP65_1.0-2.0	10 L AQ completed, no ACM observed
	2.0						
		2.00			Test Pit TP65 terminated at 2m		Test pit terminated due to refusal on sandstone bedrock
	2.5						
	3.0						
	3.5						

TP66

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2
Pit Dimension (m3): 1.5

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, dark brown, heterogeneous, damp, well-graded, medium density, inclusions of roots, sandstone gravels, bitumen gravels	TP66_0-1.0	50 L AQ completed, no ACM observed, QA/C29032018-1 taken
	1.0	1.00		Fill	FILL - Gravelly SAND, yellow-brown, heterogeneous, damp, well-graded, medium density, inclusions of asphalt, sandstone cobbles/boulders, brick wall	TP66_1.0-2.0	10 L AQ completed, no ACM observed
	1.5						
	2.0	2.00			Test Pit TP66 terminated at 2m		Test pit terminated due to refusal on sandstone bedrock
	2.5						
	3.0						
	3.5						

TP67

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 2.5
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Clayey SAND, brown, heterogeneous, moist, well-graded, medium density, inclusions of roots/grass, sandstone gravels	TP67_0-1.0	50 L AQ completed, no ACM observed
	1.0	1.00		Fill	FILL - Silty gravelly SAND, brown, heterogeneous, moist, well-graded, inclusions of sandstone cobbles, bitumen, metal, glass, large concrete slab fragments, ACM	TP67_1.0-2.0	10 L AQ completed, one ACM fragment observed
	1.5						
	2.0	2.00		SP	SAND - Grey-brown, heterogeneous, moist, poorly graded, medium density	TP67_2.0-2.5	10 L AQ completed, no ACM observed
	2.5	2.50			Test Pit TP67 terminated at 2.5m		Test pit terminated on natural sediment
	3.0						
	3.5						

TP68

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 3
Pit Dimension (m3): 1.8

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5			Fill	FILL - Silty gravelly SAND, heterogeneous, damp, well-graded, medium density, inclusions of brick, sandstone cobbles, tiles, glass, concrete, bitumen gravels, shale, ACM	TP68_0-1.0	50 L AQ completed, multiple ACM fragments observed
	1.0						
	1.5					TP68_1.0-2.0	10 L AQ completed, one ACM fragment observed
	2.0						
		2.00		SP	SAND - Grey, homogeneous, moist, poorly graded, medium density		10 L AQ completed, no ACM observed
	2.5					TP68_2.0-3.0	
	3.0						
		3.00			Test Pit TP68 terminated at 3m		Test pit terminated on natural sediment
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP69

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.2
Pit Dimension (m3): 0.32

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Hand Auger				Fill	FILL - Silty SAND, light brown, heterogeneous, damp, well-graded, loose, inclusions of brick, sandstone gravels, ACM fragments, glass, tiles, concrete cobbles	TP69_0-0.2	50 L AQ completed, multiple ACM fragments observed on surface and buried
		0.20			Test Pit TP69 terminated at 0.2m		Test pit terminated due to refusal on sandstone bedrock
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP70

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Hand Auger				Fill	FILL - Clayey silty SAND, brown, heterogeneous, damp, well-graded, medium density, inclusions of glass, ACM, brick, terracotta fragments	TP70_0-0.2	50 L AQ completed, three ACM fragments observed on surface
		0.20			Test Pit TP70 terminated at 0.2m		Test pit terminated due to refusal on sandstone bedrock

0.5
1.0
1.5
2.0
2.5
3.0
3.5

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP71

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.2
Pit Dimension (m3): 0.5

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Hand Auger				Fill	FILL - Silty SAND, light brown, heterogeneous, inclusions of brick fragments, tile, ACM fragments, concrete fragments	TP71_0-0.2	50 L AQ completed, one ACM fragment observed on surface
		0.20			Test Pit TP71 terminated at 0.2m		Test pit terminated due to refusal on sandstone bedrock
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP72

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Hand Auger				Fill	FILL - Clayey SAND, brown, heterogeneous, damp, well-graded, medium density, inclusions of roots/grass, sandstone gravels, ACM	TP72_0-0.2	50 L AQ completed, one ACM fragment observed on surface
		0.20			Test Pit TP72 terminated at 0.2m		Test pit terminated due to refusal on sandstone bedrock
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP73

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1.1
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit	0.5	0.40		Fill	FILL - Clayey SAND, brown, heterogeneous, dry, well-graded, medium density, inclusions of sandstone gravels, roots, wood		50 L AQ completed, no ACM observed
	1.0			SP	SAND - Grey, homogeneous, moist, poorly graded, medium density	TP73_0-1.0	
	1.5	1.10			Test Pit TP73 terminated at 1.1m		Test pit terminated on natural sediment
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP74

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 1
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Hand Auger	0.5			Fill	FILL - Silty SAND, yellow, heterogeneous, dry, well-graded, loose, inclusions of roots, leaves, sandstone gravels		50 L AQ completed, no ACM observed
	1.0	0.50		SP	SAND - Grey, homogeneous, damp, poorly graded, medium density	TP74_0-1.0	
	1.5	1.00			Test Pit TP74 terminated at 1m		Test pit terminated on natural sediment
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP75

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: MC
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.15
Pit Dimension (m3): 0.0375

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Hand Auger				Fill	FILL - Gravelly SAND, dark brown, dry, coarse, inclusions of glass, gravels, organics	TP75_0-0.15	50 L AQ completed, no ACM observed
		0.15			Test Pit TP75 terminated at 0.15m		Test pit terminated due to refusal
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP76

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: MC
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.2
Pit Dimension (m3): 0.05

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Hand Auger				Fill	FILL - Gravelly SAND, dark brown, dry, coarse, inclusions of glass, gravels, organics	TP76_0-0.2	50 L AQ completed, no ACM observed
		0.20			Test Pit TP76 terminated at 0.2m		Test pit terminated due to refusal
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP77

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: MC
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.3
Pit Dimension (m3): 0.075

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Hand Auger				Fill	FILL - Gravelly SAND, damp, coarse, inclusions of ACM, brick, glass, tiles, plastic	TP77_0-0.3	50 L AQ completed, ACM fragments observed on surface
		0.30			Test Pit TP77 terminated at 0.3m		Test pit terminated due to refusal
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TP78

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Hand Auger				Fill	FILL - Clayey SAND, brown, heterogeneous, well-graded, medium density, inclusions of roots/grass, glass, sandstone gravels	TP78_0-0.2	50 L AQ completed, no ACM observed
		0.20			Test Pit TP78 terminated at 0.2m		Test pit terminated due to refusal on sandstone bedrock
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP79

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.1
Pit Dimension (m3): 0.44

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Hand Auger				Fill	FILL - Clayey SAND, dark brown, moist, well-graded, medium density, inclusions of glass, sandstone gravels, roots/grass, ACM	TP79_0-0.1	50 L AQ completed, one ACM fragment observed
		0.10			Test Pit TP79 terminated at 0.1m		Test pit terminated due to refusal on sandstone bedrock
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP80

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: MC
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.3
Pit Dimension (m3): 0.45

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Hand Auger				Fill	FILL - SAND, light/dark brown, damp, coarse, inclusions of glass, organics	TP80_0-0.3	50 L AQ completed, no ACM observed
		0.30			Test Pit TP80 terminated at 0.3m		Test pit terminated due to refusal
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

TEST PIT JBSG TEST PIT - 2017.GPJ GINT STD AUSTRALIA.GDT 5/4/18

TP81

Project Number: 54640
Client: Randwick City Council
Project Name: Detailed Asbestos Assessment
Site Address: Jack Vanny Reserve, Marine Parade, Maroubra NSW

Date: 29/03/2018
Logged By: JS
Contractor: Ken Coles Excavating
Total Hole Depth (mbgs): 0.2
Pit Dimension (m3):

Eastings (GDA 94):
Northings (GDA 94):
Zone/Area/Permit#:
Reference Level: Ground Surface
Elevation (m):

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Test Pit				Fill	FILL - Silty SAND, grey, heterogeneous, wet, well-graded, medium density, inclusions of ACM, sandstone gravels, glass	TP81_0-0.2	50 L AQ completed, multiple small ACM fragments observed, QA/C29032018-2 taken
		0.20			Test Pit TP81 terminated at 0.2m		Test pit terminated due to refusal on sandstone bedrock
	0.5						
	1.0						
	1.5						
	2.0						
	2.5						
	3.0						
	3.5						

Appendix C – Results Summary Tables

Asbestos Quantification Summary Table
Project Number: 54640
Project Name: Jack Vanny Reserve Maroubra

			Asbestos												
			Approx. Sample Mass	Asbestos from ACM in Soil	Asbestos from FA & AF in Soil	Mass ACM	Mass Asbestos in ACM	Mass FA	Mass Asbestos in FA	Mass AF	Mass Asbestos in AF	Mass Asbestos in FA & AF	ACM >7mm Estimation*	FA and AF Estimation*#2	Total Asbestos#1
			g	%w/w	%w/w	g	g	g	g	g	g	g	%(w/w)	%(w/w)	g/kg
EQL															
NEPM 2013 Soil HIL C															
NEPM 2013 Soil HSL C for Vapour Intrusion - Sand 0 to <1m															
NEPM 2013 Soil HSL C for Vapour Intrusion - Sand 1 to <2m															
NEPM 2013 Soil HSL C for Vapour Intrusion - Sand 2 to <4m															
NEPM 2013 Soil HSL C for Vapour Intrusion - Sand 4m+															
Field_ID	**Date**	**Lab_Report**													
TP01_0-0.8	27/03/2018	591807	956	0	0	0	0	0	0	0	0	0	-	-	-
TP02_0-1.0	27/03/2018	591807	864	0	0.0003	0	0	0.0088	0.0026	0	0	0.0026	-	-	-
TP03_0-1.0	27/03/2018	591807	914	0	0	0	0	0	0	0	0	0	-	-	-
TP04_0-1.0	27/03/2018	591807	772	0.002	0	0.1008	0.0151	0	0	0	0	0	-	-	-
TP04_1.0-2.0	27/03/2018	591807	866	0	0	0	0	0	0	0	0	0	-	-	-
TP05_0-1.0	27/03/2018	591807	752	0	0	0	0	0	0	0	0	0	-	-	-
TP06_0-0.8	27/03/2018	591807	736	0	0.0001	0	0	0	0	0.0007	0.0007	0.0007	-	-	-
TP07_0-1.0	27/03/2018	591807	815	0	0	0	0	0	0	0	0	0	-	-	-
TP08_0-0.2	27/03/2018	591807	875	0	0.0037	0	0	0.0312	0.0094	0.1926	0.0231	0.0325	-	-	-
TP09_0-1.0	27/03/2018	591807	702	0	0.0011	0	0	0.0251	0.0075	0	0	0.0075	-	-	-
TP10_0-1.0	27/03/2018	591807	938	0.0128	0	1.335	0.1201	0	0	0	0	0	-	-	-
TP11_0-1.0	27/03/2018	591807	886	0	0	0	0	0	0	0	0	0	-	-	-
TP12_0-1.0	27/03/2018	591807	681	0	0	0	0	0	0	0	0	0	-	-	-
TP13_0-1.0	27/03/2018	591807	731	0	0	0	0	0	0	0	0	0	-	-	-
TP13_1.0-2.0	27/03/2018	591807	841	0	0	0	0	0	0	0	0	0	-	-	-
TP13_2.0-3.0	27/03/2018	591807	701	0	0	0	0	0	0	0	0	0	-	-	-
TP14_0-1.0	27/03/2018	591807	689	0	0	0	0	0	0	0	0	0	-	-	-
QA27032018-1 (triplicate pair TP14_0-0.1)	27/03/2018	188485	-	-	-	-	-	-	-	-	-	-	<0.01	<0.001	<0.1
QC27032018-1 (duplicate pair TP14_0-0.1)	27/03/2018	591807	703	0	0.0003	0	0	0.0078	0.0023	0	0	0.0023	-	-	-
TP14_1.0-2.0	27/03/2018	591807	808	0	0	0	0	0	0	0	0	0	-	-	-
TP15_0-1.0	27/03/2018	591807	665	0	0	0	0	0	0	0	0	0	-	-	-
TP15_1.0-2.0	27/03/2018	591807	718	0	0	0	0	0	0	0	0	0	-	-	-
TP15_2.0-3.0	27/03/2018	591807	743	0	0	0	0	0	0	0	0	0	-	-	-
TP16_0-1.0	27/03/2018	591807	712	0	0.0007	0	0	0.0202	0.0051	0	0	0.0051	-	-	-
QA27032018-2 (triplicate pair TP16_0-0.1)	27/03/2018	188485	-	-	-	-	-	-	-	-	-	-	<0.01	<0.001	<0.1
QC27032018-2 (duplicate pair TP16_0-0.1)	27/03/2018	591807	788	0	0	0	0	0	0	0	0	0	-	-	-
TP16_1.0-2.0	27/03/2018	591807	874	0	0	0	0	0	0	0	0	0	-	-	-
TP17_0-1.0	27/03/2018	591807	725	0.0267	0	1.934	0.1934	0	0	0	0	0	-	-	-
TP18_0-0.3	27/03/2018	591807	712	0	0	0	0	0	0	0	0	0	-	-	-
TP19_0-1.0	27/03/2018	591807	679	0	0.0015	0	0	0.0338	0.0084	0.0016	0.0016	0.0101	-	-	-
TP20_0-1.0	27/03/2018	591807	694	0	0	0	0	0	0	0	0	0	-	-	-
TP20_1.0-2.0	27/03/2018	591807	576	0	0	0	0	0	0	0	0	0	-	-	-
TP20_2.0-2.6	27/03/2018	591807	690	0	0.0013	0	0	0.0186	0.0093	0	0	0.0093	-	-	-
TP21_0-0.7	27/03/2018	591807	762	0	0	0	0	0	0	0	0	0	-	-	-
TP22_0-0.3	27/03/2018	591807	674	0	0	0	0	0	0	0	0	0	-	-	-
TP23_0-0.5	27/03/2018	591807	753	0	0.0005	0	0	0.0052	0.0031	0.0007	0.0007	0.0038	-	-	-
TP24_0-1.0	27/03/2018	591807	833	0	0.0003	0	0	0.0076	0.0023	0	0	0.0023	-	-	-
TP24_1.0-2.0	27/03/2018	591807	806	0	0.0006	0	0	0.0163	0.0049	0	0	0.0049	-	-	-
TP25_0-0.7	27/03/2018	591807	658	0	0	0	0	0	0	0	0	0	-	-	-
QA27032018-3 (triplicate pair TP25_0-0.7)	27/03/2018	188485	-	-	-	-	-	-	-	-	-	-	<0.01	<0.001	<0.1
QC27032018-3 (duplicate pair TP25_0-0.7)	27/03/2018	591807	743	0	0	0	0	0	0	0	0	0	-	-	-
TP26_0-0.7	27/03/2018	591807	815	0	0	0	0	0	0	0	0	0	-	-	-
TP27_0-1.0	27/03/2018	591807	678	0	0	0	0	0	0	0	0	0	-	-	-
TP27_1.0-1.5	27/03/2018	591807	514	0	0.0022	0	0	0.0285	0.0114	0	0	0.0114	-	-	-
TP28_0-1.0	27/03/2018	591807	753	0	0	0	0	0	0	0	0	0	-	-	-
TP29_0-0.5	28/03/2018	591807	713	0	0	0	0	0	0	0	0	0	-	-	-
TP30_0-1.0	28/03/2018	591807	685	0	0	0	0	0	0	0	0	0	-	-	-
TP30_1.0-2.0	28/03/2018	591807	675	0	0.0001	0	0	0	0	0.0109	0.0007	0.0007	-	-	-
TP30_2.0-3.0	28/03/2018	591807	760	0	0	0	0	0	0	0	0	0	-	-	-
TP31_0-1.0	28/03/2018	591807	775	0	0	0	0	0	0	0	0	0	-	-	-
TP31_1.0-2.0	28/03/2018	591807	830	0	0	0	0	0	0	0	0	0	-	-	-
TP31_2.0-3.0	28/03/2018	591807	625	0	0	0	0	0	0	0	0	0	-	-	-
TP32_0-1.0	28/03/2018	591807	899	0	0	0	0	0	0	0	0	0	-	-	-
TP33_0-0.2	28/03/2018	591807	587	0	0	0	0	0	0	0	0	0	-	-	-
TP34_0-0.1	28/03/2018	591807	380	0	0	0	0	0	0	0	0	0	-	-	-
TP35_0-1.0	28/03/2018	591807	830	0	0	0	0	0	0	0	0	0	-	-	-
TP35_1.0-2.0	28/03/2018	591807	833	0	0	0	0	0	0	0	0	0	-	-	-
TP36_0-1.0	28/03/2018	591807	803	0	0	0	0	0	0	0	0	0	-	-	-
TP36_1.0-2.0	28/03/2018	591807	809	0	0	0	0	0	0	0	0	0	-	-	-
TP37_0-1.0	28/03/2018	591807	880	0	0	0	0	0	0	0	0	0	-	-	-
TP37_1.0-2.0	28/03/2018	591807	896	0	0.0002	0	0	0.0028	0.0022	0	0	0.0022	-	-	-
TP38_0-1.0	28/03/2018	591807	846	0	0	0	0	0	0	0	0	0	-	-	-
QA28032018-1 (triplicate pair TP38_0-0.1)	28/03/2018	188485	-	-	-	-	-	-	-	-	-	-	<0.01	<0.001	<0.1
QC28032018-1 (duplicate pair TP38_0-0.1)	28/03/2018	591807	856	0	0	0	0	0	0	0	0	0	-	-	-
TP38_1.0-2.0	28/03/2018	591807	814	0	0	0	0	0	0	0	0	0	-	-	-
TP39_0-0.5	28/03/2018	591807	694	0	0	0	0	0	0	0	0	0	-	-	-
TP40_0-1.0	28/03/2018	591807	725	0	0	0	0	0	0	0	0	0	-	-	-
TP40_1.0-2.0	28/03/2018	591807	773	0	0	0	0	0	0	0	0	0	-	-	-
TP41_0-0.3	28/03/2018	591807	979	0	0	0	0	0	0	0	0	0	-	-	-
TP42_0-1.0	28/03/2018	591807	544	0	0	0	0	0	0	0	0	0	-	-	-
TP42_1.0-2.0	28/03/2018	591807	612	0	0	0	0	0	0	0	0	0	-	-	-
TP43_0-1.0	28/03/2018	591807	730	0	0	0	0	0	0	0	0	0	-	-	-
QA28032018-2 (triplicate pair TP43_0-0.1)	28/03/2018	188485	-	-	-	-	-	-	-	-	-	-	<0.01	<0.001	<0.1
QC28032018-2 (duplicate pair TP43_0-0.1)	28/03/2018	591807	777	0	0	0	0	0	0	0	0	0	-	-	-
TP44_0-1.0	28/03/2018	591807	838	0	0	0	0	0	0	0	0	0	-	-	-
TP44_1.0-2.0	28/03/2018	591807	760	0	0	0	0	0	0	0	0	0	-	-	-
TP45_0-1.0	28/03/2018	591807	726	0	0	0	0	0	0	0	0	0	-	-	-
TP45_1.0-2.0	28/03/2018	591807	791	0	0	0	0	0	0	0	0	0	-	-	-
TP46_0-0.5	28/03/2018	591807	741	0	0	0	0	0	0	0	0	0	-	-	-
TP47_0-0.3	28/03/2018	591807	688	0	0	0	0	0	0	0	0	0	-	-	-
TP48_0-1.0	28/03/2018	591807	743	0	0	0	0	0	0	0	0	0	-	-	-

Asbestos Quantification Summary Table
Project Number: 54640
Project Name: Jack Vanny Reserve Maroubra

			Asbestos												
			Approx. Sample Mass	Asbestos from ACM in Soil	Asbestos from FA & AF in Soil	Mass ACM	Mass Asbestos in ACM	Mass FA	Mass Asbestos in FA	Mass AF	Mass Asbestos in AF	Mass Asbestos in FA & AF	ACM >7mm Estimation*	FA and AF Estimation*#2	Total Asbestos#1
			g	%w/w	%w/w	g	g	g	g	g	g	g	%(w/w)	%(w/w)	g/kg
EQL															
NEPM 2013 Soil HIL C															
NEPM 2013 Soil HSL C for Vapour Intrusion - Sand 0 to <1m															
NEPM 2013 Soil HSL C for Vapour Intrusion - Sand 1 to <2m															
NEPM 2013 Soil HSL C for Vapour Intrusion - Sand 2 to <4m															
NEPM 2013 Soil HSL C for Vapour Intrusion - Sand 4m+															
Field_ID	**Date**	**Lab_Report**													
TP49_0-1.0	28/03/2018	591807	737	0	0	0	0	0	0	0	0	0	-	-	-
TP50_0-0.4	28/03/2018	591807	750	0.0726	0	3.631	0.5446	0	0	0	0	0	-	-	-
TP51_0-1.0	28/03/2018	591807	871	0.0137	0	0.7958	0.1194	0	0	0	0	0	-	-	-
TP51-1.0-2.0	28/03/2018	591807	727	0	0	0	0	0	0	0	0	0	-	-	-
TP51-2.0-3.0	28/03/2018	591807	800	0.0225	0	2.254	0.1803	0	0	0	0	0	-	-	-
TP52_0-1.0	28/03/2018	591807	837	0	0.0017	0	0	0.0476	0.0143	0	0	0.0143	-	-	-
TP53_0-1.0	28/03/2018	591807	785	0	0	0	0	0	0	0	0	0	-	-	-
TP53_1.0-2.0	28/03/2018	591807	837	0	0	0	0	0	0	0	0	0	-	-	-
QA29032018-1 (triplicate pair TP53_1.0-2.0)	29/03/2018	188485	-	-	-	-	-	-	-	-	-	-	<0.01	<0.001	<0.1
QC29032018-1 (duplicate pair TP53_1.0-2.0)	29/03/2018	591807	737	0	0	0	0	0	0	0	0	0	-	-	-
TP54_0-1.0	28/03/2018	591807	748	0	0	0	0	0	0	0	0	0	-	-	-
TP54_1.0-2.0	28/03/2018	591807	755	0	0	0	0	0	0	0	0	0	-	-	-
TP54_2.0-3.0	28/03/2018	591807	748	0	0	0	0	0	0	0	0	0	-	-	-
TP55_0-0.8	28/03/2018	591807	758	0	0	0	0	0	0	0	0	0	-	-	-
TP56_0-1.0	28/03/2018	591807	869	0	0	0	0	0	0	0	0	0	-	-	-
TP57_0-1.0	28/03/2018	591807	838	0	0	0	0	0	0	0	0	0	-	-	-
TP58_0-1.0	28/03/2018	591807	849	0	0	0	0	0	0	0	0	0	-	-	-
TP59_0-1.0	28/03/2018	591807	834	0	0	0	0	0	0	0	0	0	-	-	-
TP60_0-1.0	28/03/2018	591807	819	0	0	0	0	0	0	0	0	0	-	-	-
TP61_0-1.0	28/03/2018	591807	819	0	0	0	0	0	0	0	0	0	-	-	-
TP62_0-1.0	28/03/2018	591807	770	0	0	0	0	0	0	0	0	0	-	-	-
TP62_1.0-2.0	28/03/2018	591807	787	0	0	0	0	0	0	0	0	0	-	-	-
TP62_2.0-3.0	29/03/2018	591807	810	0	0	0	0	0	0	0	0	0	-	-	-
TP63_0-1.0	29/03/2018	591807	700	0	0	0	0	0	0	0	0	0	-	-	-
TP64_0-1.0	29/03/2018	591807	639	0	0	0	0	0	0	0	0	0	-	-	-
TP64_1.0-2.0	29/03/2018	591807	732	0	0	0	0	0	0	0	0	0	-	-	-
TP65_0-1.0	29/03/2018	591807	594	0	0	0	0	0	0	0	0	0	-	-	-
TP65_1.0-2.0	29/03/2018	591807	690	0	0	0	0	0	0	0	0	0	-	-	-
TP66_0-1.0	29/03/2018	591807	710	0	0	0	0	0	0	0	0	0	-	-	-
TP66_1.0-2.0	29/03/2018	591807	668	0	0	0	0	0	0	0	0	0	-	-	-
TP67_0-1.0	29/03/2018	591807	758	0	0	0	0	0	0	0	0	0	-	-	-
TP67_1.0-2.0	29/03/2018	591807	814	0	0	0	0	0	0	0	0	0	-	-	-
TP67_2.0-2.5	29/03/2018	591807	724	0	0	0	0	0	0	0	0	0	-	-	-
TP68_0-1.0	29/03/2018	591807	883	0	0	0	0	0	0	0	0	0	-	-	-
TP68_1.0-2.0	29/03/2018	591807	983	0	0	0	0	0	0	0	0	0	-	-	-
TP68_2.0-3.0	29/03/2018	591807	871	0	0	0	0	0	0	0	0	0	-	-	-
TP69_0-0.2	29/03/2018	591807	705	0	0	0	0	0	0	0	0	0	-	-	-
TP70_0-0.2	29/03/2018	591807	661	0	0	0	0	0	0	0	0	0	-	-	-
TP71_0-0.2	29/03/2018	591807	627	0	0	0	0	0	0	0	0	0	-	-	-
TP72_0-0.2	29/03/2018	591807	697	0	0	0	0	0	0	0	0	0	-	-	-
TP73_0-1.0	29/03/2018	591807	723	0	0	0	0	0	0	0	0	0	-	-	-
TP74_0-1.0	29/03/2018	591807	774	0	0	0	0	0	0	0	0	0	-	-	-
TP75_0-0.15	29/03/2018	591807	714	0	0	0	0	0	0	0	0	0	-	-	-
TP76_0-0.2	29/03/2018	591807	957	0	0	0	0	0	0	0	0	0	-	-	-
TP77_0-0.3	29/03/2018	591807	748	0	0	0	0	0	0	0	0	0	-	-	-
TP78_0-0.2	29/03/2018	591807	483	0	0	0	0	0	0	0	0	0	-	-	-
TP79_0-0.1	29/03/2018	591807	824	0	0	0	0	0	0	0	0	0	-	-	-
TP80_0-0.3	29/03/2018	591807	871	0	0	0	0	0	0	0	0	0	-	-	-
TP81_0-0.2	29/03/2018	591807	697	0	0	0	0	0	0	0	0	0	-	-	-

Appendix D – Laboratory Documentation

Certificate of Analysis

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.

JBS & G Australia (NSW) P/L
Level 1, 50 Margaret St
Sydney
NSW 2000

Attention:	Michael Samuel
Report	591807-AID
Project Name	MAROUBRA
Project ID	54640
Received Date	Mar 29, 2018
Date Reported	Apr 04, 2018

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 AS4964 method for inhomogeneous samples is around 0.1 g/kg (0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis where required, this is considered to be at the nominal reporting limit of 0.01 % (w / w).The examination of large sample sizes(500 mL is recommended) may improve the likelihood of identifying ACM in the > 2mm fraction.The NEPM screening level of 0.001 % (w / w) asbestos in soil for FA(friable asbestos) and AF(asbestos fines) then applies where they are able to be quantified by gravimetric procedures.This quantitative screening is not generally applicable to FF(free fibres) and results of Trace Analysis are referred. *NOTE: NATA News March 2014, p.7, states in relation to AS4964: "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". Accordingly, NATA Accreditation does not cover the performance of this service (indicated with an asterisk).* *This report is consistent with the analytical procedures and reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, 2013 (as amended) and the 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, June 2011.*

Project Name MAROUBRA
Project ID 54640
Date Sampled Mar 27, 2018 to Mar 29, 2018
Report 591807-AID

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP01_0-0.8	18-Ma34707	Mar 27, 2018	Approximate Sample 956g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP02_0-1.0	18-Ma34708	Mar 27, 2018	Approximate Sample 864g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.0088g Estimated asbestos content in FA = 0.0026g* Total estimated asbestos concentration in FA = 0.00031% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP03_0-1.0	18-Ma34709	Mar 27, 2018	Approximate Sample 914g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP04_0-1.0	18-Ma34710	Mar 27, 2018	Approximate Sample 772g Sample consisted of: Brown fine grain sandy soil and rocks	ACM: Chrysotile asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 0.10g Total estimated asbestos content in ACM = 0.015g* Total estimated asbestos concentration in ACM = 0.0020% w/w* No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
TP04_1.0-2.0	18-Ma34711	Mar 27, 2018	Approximate Sample 866g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP05_0-1.0	18-Ma34712	Mar 27, 2018	Approximate Sample 752g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP06_0-0.8	18-Ma34713	Mar 27, 2018	Approximate Sample 736g Sample consisted of: Brown fine grain sandy soil and rocks	AF: Chrysotile asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.00070g* Estimated asbestos content in AF = 0.00070g* Total estimated asbestos concentration in AF = 0.000095% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP07_0-1.0	18-Ma34714	Mar 27, 2018	Approximate Sample 815g Sample consisted of: Brown coarse grain soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP08_0-0.2	18-Ma34715	Mar 27, 2018	Approximate Sample 875g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile and amosite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.031g Estimated asbestos content in FA = 0.0094g* AF: Chrysotile and amosite asbestos detected in fibre cement fragments and in the form of loose fibre bundles. Approximate raw weight of AF = 0.19g* Estimated asbestos content in AF = 0.023g* Total estimated asbestos content in FA and AF = 0.032g* Total estimated asbestos concentration in FA and AF = 0.0037% w/w* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP09_0-1.0	18-Ma34716	Mar 27, 2018	Approximate Sample 702g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile and amosite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.025g Estimated asbestos content in FA = 0.0075g* Total estimated asbestos concentration in FA = 0.0011% w/w* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP10_0-1.0	18-Ma34717	Mar 27, 2018	Approximate Sample 938g Sample consisted of: Brown fine grain sandy soil and rocks	ACM: Chrysotile and crocidolite asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 1.3g Total estimated asbestos content in ACM = 0.12g* Total estimated asbestos concentration in ACM = 0.013% w/w* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP11_0-1.0	18-Ma34718	Mar 27, 2018	Approximate Sample 886g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP12_0-1.0	18-Ma34719	Mar 27, 2018	Approximate Sample 681g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP13_0-1.0	18-Ma34720	Mar 27, 2018	Approximate Sample 731g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP13_1.0-2.0	18-Ma34721	Mar 27, 2018	Approximate Sample 841g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP13_2.0-3.0	18-Ma34722	Mar 27, 2018	Approximate Sample 701g Sample consisted of: Brown coarse grain soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP14_0-1.0	18-Ma34723	Mar 27, 2018	Approximate Sample 689g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP14_1.0-2.0	18-Ma34724	Mar 27, 2018	Approximate Sample 808g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP15_0-1.0	18-Ma34725	Mar 27, 2018	Approximate Sample 665g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP15_1.0-2.0	18-Ma34726	Mar 27, 2018	Approximate Sample 718g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP15_2.0-3.0	18-Ma34727	Mar 27, 2018	Approximate Sample 743g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP16_0-1.0	18-Ma34728	Mar 27, 2018	Approximate Sample 712g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile and amosite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.020g Estimated asbestos content in FA = 0.0051g* Total estimated asbestos concentration in FA = 0.00071% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP16_1.0-2.0	18-Ma34729	Mar 27, 2018	Approximate Sample 874g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP17_0-1.0	18-Ma34730	Mar 27, 2018	Approximate Sample 725g Sample consisted of: Brown fine grain sandy soil and rocks	ACM: Chrysotile, amosite and crocidolite asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 1.9g Total estimated asbestos content in ACM = 0.19g* Total estimated asbestos concentration in ACM = 0.027% w/w* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP18_0-0.3	18-Ma34731	Mar 27, 2018	Approximate Sample 712g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP19_0-1.0	18-Ma34732	Mar 27, 2018	Approximate Sample 679g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile and amosite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.034g Estimated asbestos content in FA = 0.0085g* AF: Chrysotile and amosite asbestos detected in fibre cement fragments and in the form of loose fibre bundles. Approximate raw weight of AF = 0.0016g* Estimated asbestos content in AF = 0.0016g* Total estimated asbestos content in FA and AF = 0.010g* Total estimated asbestos concentration in FA and AF = 0.0015% w/w* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP20_0-1.0	18-Ma34733	Mar 27, 2018	Approximate Sample 694g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP20_1.0-2.0	18-Ma34734	Mar 27, 2018	Approximate Sample 576g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP20_2.0-2.6	18-Ma34735	Mar 27, 2018	Approximate Sample 690g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile and amosite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.019g Estimated asbestos content in FA = 0.0093g* Total estimated asbestos concentration in FA = 0.0013% w/w* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP21_0-0.7	18-Ma34736	Mar 27, 2018	Approximate Sample 762g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP22_0-0.3	18-Ma34737	Mar 27, 2018	Approximate Sample 674g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP23_0-0.5	18-Ma34738	Mar 27, 2018	Approximate Sample 753g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile asbestos detected in weathered fibre cement fragments. Approximate Raw weight of FA = 0.0052g Estimated asbestos content in FA = 0.0031g* AF: Chrysotile and crocidolite asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.00070g* Estimated asbestos content in AF = 0.00070g* Total estimated asbestos content in FA and AF = 0.0038g* Total estimated asbestos concentration in FA and AF = 0.00051% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP24_0-1.0	18-Ma34739	Mar 27, 2018	Approximate Sample 833g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.0076g Estimated asbestos content in FA = 0.0023g* Total estimated asbestos concentration in FA = 0.00027% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP24_1.0-2.0	18-Ma34740	Mar 27, 2018	Approximate Sample 806g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.016g Estimated asbestos content in FA = 0.0049g* Total estimated asbestos concentration in FA = 0.00061% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP25_0-0.7	18-Ma34741	Mar 27, 2018	Approximate Sample 658g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP26_0-0.7	18-Ma34742	Mar 27, 2018	Approximate Sample 815g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP27_0-1.0	18-Ma34743	Mar 27, 2018	Approximate Sample 678g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP27_1.0-1.5	18-Ma34744	Mar 27, 2018	Approximate Sample 514g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile and amosite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.029g Estimated asbestos content in FA = 0.011g* Total estimated asbestos concentration in FA = 0.0022% w/w* Organic fibre detected. No respirable fibres detected.
TP28_0-1.0	18-Ma34745	Mar 27, 2018	Approximate Sample 753g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP29_0-0.5	18-Ma34746	Mar 28, 2018	Approximate Sample 713g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP30_0-1.0	18-Ma34747	Mar 28, 2018	Approximate Sample 685g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP30_1.0-2.0	18-Ma34748	Mar 28, 2018	Approximate Sample 675g Sample consisted of: Brown fine grain sandy soil and rocks	AF: Chrysotile asbestos detected in bituminous material. Approximate raw weight of AF = 0.011g Estimated asbestos content in AF = 0.00065g* Total estimated asbestos concentration in AF = 0.000097% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP30_2.0-3.0	18-Ma34749	Mar 28, 2018	Approximate Sample 760g Sample consisted of: Brown coarse grain soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP31_0-1.0	18-Ma34750	Mar 28, 2018	Approximate Sample 775g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP31_1.0-2.0	18-Ma34751	Mar 28, 2018	Approximate Sample 830g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP31_2.0-3.0	18-Ma34752	Mar 28, 2018	Approximate Sample 625g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP32_0-1.0	18-Ma34753	Mar 28, 2018	Approximate Sample 899g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP33_0-0.2	18-Ma34754	Mar 28, 2018	Approximate Sample 587g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP35_0-1.0	18-Ma34756	Mar 28, 2018	Approximate Sample 830g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP35_1.0-2.0	18-Ma34757	Mar 28, 2018	Approximate Sample 833g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP36_0-1.0	18-Ma34758	Mar 28, 2018	Approximate Sample 803g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP36_1.0-2.0	18-Ma34759	Mar 28, 2018	Approximate Sample 809g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP37_0-1.0	18-Ma34760	Mar 28, 2018	Approximate Sample 880g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP37_1.0-2.0	18-Ma34761	Mar 28, 2018	Approximate Sample 896g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile and amosite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.0028g Estimated asbestos content in FA = 0.0022g* Total estimated asbestos concentration in FA = 0.00025% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP38_0-1.0	18-Ma34762	Mar 28, 2018	Approximate Sample 846g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP38_1.0-2.0	18-Ma34763	Mar 28, 2018	Approximate Sample 814g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP39_0-0.5	18-Ma34764	Mar 28, 2018	Approximate Sample 694g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP40_0-1.0	18-Ma34765	Mar 28, 2018	Approximate Sample 725g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP40_1.0-2.0	18-Ma34766	Mar 28, 2018	Approximate Sample 773g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP41_0-0.3	18-Ma34767	Mar 28, 2018	Approximate Sample 979g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP42_0-1.0	18-Ma34768	Mar 28, 2018	Approximate Sample 544g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP42_1.0-2.0	18-Ma34769	Mar 28, 2018	Approximate Sample 612g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP43_0-1.0	18-Ma34770	Mar 28, 2018	Approximate Sample 730g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP44_0-1.0	18-Ma34771	Mar 28, 2018	Approximate Sample 838g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP44_1.0-2.0	18-Ma34772	Mar 28, 2018	Approximate Sample 760g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP45_0-1.0	18-Ma34773	Mar 28, 2018	Approximate Sample 726g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP45_1.0-2.0	18-Ma34774	Mar 28, 2018	Approximate Sample 791g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP46_0-0.5	18-Ma34775	Mar 28, 2018	Approximate Sample 741g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP47_0-0.3	18-Ma34776	Mar 28, 2018	Approximate Sample 688g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP48_0-1.0	18-Ma34777	Mar 28, 2018	Approximate Sample 743g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP49_0-1.0	18-Ma34778	Mar 28, 2018	Approximate Sample 737g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP50_0-0.4	18-Ma34779	Mar 28, 2018	Approximate Sample 750g Sample consisted of: Brown fine grain sandy soil and rocks	ACM: Chrysotile and amosite asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 3.6g Total estimated asbestos content in ACM = 0.54g* Total estimated asbestos concentration in ACM = 0.073% w/w* Organic fibre detected. No respirable fibres detected.
TP51_0-1.0	18-Ma34780	Mar 28, 2018	Approximate Sample 871g Sample consisted of: Brown fine grain sandy soil and rocks	ACM: Chrysotile asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 0.80g Total estimated asbestos content in ACM = 0.12g* Total estimated asbestos concentration in ACM = 0.014% w/w* Organic fibre detected. No respirable fibres detected.
TP51-1.0-2.0	18-Ma34781	Mar 28, 2018	Approximate Sample 727g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP51-2.0-3.0	18-Ma34782	Mar 28, 2018	Approximate Sample 800g Sample consisted of: Brown fine grain sandy soil and rocks	ACM: Chrysotile asbestos detected in fibre cement fragments. Approximate raw weight of ACM = 2.3g Total estimated asbestos content in ACM = 0.18g* Total estimated asbestos concentration in ACM = 0.023% w/w* Organic fibre detected. No respirable fibres detected.
TP52_0-1.0	18-Ma34783	Mar 28, 2018	Approximate Sample 837g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile and amosite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.048g Estimated asbestos content in FA = 0.014g* Total estimated asbestos concentration in FA = 0.0017% w/w* Organic fibre detected. No respirable fibres detected.
TP53_0-1.0	18-Ma34784	Mar 28, 2018	Approximate Sample 785g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP53_1.0-2.0	18-Ma34785	Mar 28, 2018	Approximate Sample 837g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP54_0-1.0	18-Ma34786	Mar 28, 2018	Approximate Sample 748g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP54_1.0-2.0	18-Ma34787	Mar 28, 2018	Approximate Sample 755g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP54_2.0-3.0	18-Ma34788	Mar 28, 2018	Approximate Sample 748g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP55_0-0.8	18-Ma34789	Mar 28, 2018	Approximate Sample 758g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP56_0-1.0	18-Ma34790	Mar 28, 2018	Approximate Sample 869g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP57_0-1.0	18-Ma34791	Mar 28, 2018	Approximate Sample 838g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP58_0-1.0	18-Ma34792	Mar 28, 2018	Approximate Sample 849g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP59_0-1.0	18-Ma34793	Mar 28, 2018	Approximate Sample 834g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP60_0-1.0	18-Ma34794	Mar 28, 2018	Approximate Sample 819g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP61_0-1.0	18-Ma34795	Mar 28, 2018	Approximate Sample 819g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP62_0-1.0	18-Ma34796	Mar 28, 2018	Approximate Sample 770g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP62_1.0-2.0	18-Ma34797	Mar 28, 2018	Approximate Sample 787g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP63_0-1.0	18-Ma34799	Mar 29, 2018	Approximate Sample 700g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP64_0-1.0	18-Ma34800	Mar 29, 2018	Approximate Sample 639g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP64_1.0-2.0	18-Ma34801	Mar 29, 2018	Approximate Sample 732g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP65_0-1.0	18-Ma34802	Mar 29, 2018	Approximate Sample 594g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP65_1.0-2.0	18-Ma34803	Mar 29, 2018	Approximate Sample 690g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP66_0-1.0	18-Ma34804	Mar 29, 2018	Approximate Sample 710g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP66_1.0-2.0	18-Ma34805	Mar 29, 2018	Approximate Sample 668g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP67_0-1.0	18-Ma34806	Mar 29, 2018	Approximate Sample 758g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP67_1.0-2.0	18-Ma34807	Mar 29, 2018	Approximate Sample 814g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP67_2.0-2.5	18-Ma34808	Mar 29, 2018	Approximate Sample 724g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP68_0-1.0	18-Ma34809	Mar 29, 2018	Approximate Sample 883g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP68_1.0-2.0	18-Ma34810	Mar 29, 2018	Approximate Sample 983g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP68_2.0-3.0	18-Ma34811	Mar 29, 2018	Approximate Sample 871g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP69_0-0.2	18-Ma34812	Mar 29, 2018	Approximate Sample 705g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP70_0-0.2	18-Ma34813	Mar 29, 2018	Approximate Sample 661g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP71_0-0.2	18-Ma34814	Mar 29, 2018	Approximate Sample 627g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP72_0-0.2	18-Ma34815	Mar 29, 2018	Approximate Sample 697g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP73_0-1.0	18-Ma34816	Mar 29, 2018	Approximate Sample 723g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP74_0-1.0	18-Ma34817	Mar 29, 2018	Approximate Sample 774g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP75_0-0.15	18-Ma34818	Mar 29, 2018	Approximate Sample 714g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP76_0-0.2	18-Ma34819	Mar 29, 2018	Approximate Sample 957g Sample consisted of: Brown fine grain sandy soil, rocks and organic debris	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
TP77_0-0.3	18-Ma34820	Mar 29, 2018	Approximate Sample 748g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP78_0-0.2	18-Ma34821	Mar 29, 2018	Approximate Sample 483g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP79_0-0.1	18-Ma34822	Mar 29, 2018	Approximate Sample 824g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP80_0-0.3	18-Ma34823	Mar 29, 2018	Approximate Sample 871g Sample consisted of: Brown coarse grain soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP81_0-0.2	18-Ma34824	Mar 29, 2018	Approximate Sample 697g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
QC27032018-1	18-Ma34825	Mar 27, 2018	Approximate Sample 703g Sample consisted of: Brown fine grain sandy soil and rocks	FA: Chrysotile and crocidolite asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.0078g Estimated asbestos content in FA = 0.0023g* Total estimated asbestos concentration in FA = 0.00033% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
QC27032018-2	18-Ma34826	Mar 27, 2018	Approximate Sample 788g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.
QC27032018-3	18-Ma34827	Mar 27, 2018	Approximate Sample 743g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
QC28032018-1	18-Ma34828	Mar 28, 2018	Approximate Sample 856g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
QC28032018-2	18-Ma34829	Mar 28, 2018	Approximate Sample 777g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
QC29032018-1	18-Ma34832	Mar 29, 2018	Approximate Sample 737g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP34_0-0.1	18-Ma34881	Mar 28, 2018	Approximate Sample 380g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
TP62_2.0-3.0	18-Ma34915	Mar 29, 2018	Approximate Sample 810g Sample consisted of: Brown fine grain sandy soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Sydney	Mar 29, 2018	Indefinite

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Sydney
NSW 2000

Project Name: MAROUBRA
Project ID: 54640

Order No.:
Report #: 591807
Phone: 02 8245 0300
Fax:

Received: Mar 29, 2018 4:44 PM
Due: Apr 4, 2018
Priority: 2 Day
Contact Name: Michael Samuel

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						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	TP01_0-0.8	Mar 27, 2018		Soil	S18-Ma34707	X		
2	TP02_0-1.0	Mar 27, 2018		Soil	S18-Ma34708	X		
3	TP03_0-1.0	Mar 27, 2018		Soil	S18-Ma34709	X		
4	TP04_0-1.0	Mar 27, 2018		Soil	S18-Ma34710	X		
5	TP04_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34711	X		
6	TP05_0-1.0	Mar 27, 2018		Soil	S18-Ma34712	X		
7	TP06_0-0.8	Mar 27, 2018		Soil	S18-Ma34713	X		
8	TP07_0-1.0	Mar 27, 2018		Soil	S18-Ma34714	X		
9	TP08_0-0.2	Mar 27, 2018		Soil	S18-Ma34715	X		

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Project Name: MAROUBRA
Project ID: 54640

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Phone: 02 8245 0300
Fax:

Received: Mar 29, 2018 4:44 PM
Due: Apr 4, 2018
Priority: 2 Day
Contact Name: Michael Samuel

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
10	TP09_0-1.0	Mar 27, 2018		Soil	S18-Ma34716	X		
11	TP10_0-1.0	Mar 27, 2018		Soil	S18-Ma34717	X		
12	TP11_0-1.0	Mar 27, 2018		Soil	S18-Ma34718	X		
13	TP12_0-1.0	Mar 27, 2018		Soil	S18-Ma34719	X		
14	TP13_0-1.0	Mar 27, 2018		Soil	S18-Ma34720	X		
15	TP13_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34721	X		
16	TP13_2.0-3.0	Mar 27, 2018		Soil	S18-Ma34722	X		
17	TP14_0-1.0	Mar 27, 2018		Soil	S18-Ma34723	X		
18	TP14_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34724	X		
19	TP15_0-1.0	Mar 27, 2018		Soil	S18-Ma34725	X		
20	TP15_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34726	X		
21	TP15_2.0-3.0	Mar 27, 2018		Soil	S18-Ma34727	X		

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Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
22	TP16_0-1.0	Mar 27, 2018		Soil	S18-Ma34728	X		
23	TP16_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34729	X		
24	TP17_0-1.0	Mar 27, 2018		Soil	S18-Ma34730	X		
25	TP18_0-0.3	Mar 27, 2018		Soil	S18-Ma34731	X		
26	TP19_0-1.0	Mar 27, 2018		Soil	S18-Ma34732	X		
27	TP20_0-1.0	Mar 27, 2018		Soil	S18-Ma34733	X		
28	TP20_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34734	X		
29	TP20_2.0-2.6	Mar 27, 2018		Soil	S18-Ma34735	X		
30	TP21_0-0.7	Mar 27, 2018		Soil	S18-Ma34736	X		
31	TP22_0-0.3	Mar 27, 2018		Soil	S18-Ma34737	X		
32	TP23_0-0.5	Mar 27, 2018		Soil	S18-Ma34738	X		
33	TP24_0-1.0	Mar 27, 2018		Soil	S18-Ma34739	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
34	TP24_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34740	X		
35	TP25_0-0.7	Mar 27, 2018		Soil	S18-Ma34741	X		
36	TP26_0-0.7	Mar 27, 2018		Soil	S18-Ma34742	X		
37	TP27_0-1.0	Mar 27, 2018		Soil	S18-Ma34743	X		
38	TP27_1.0-1.5	Mar 27, 2018		Soil	S18-Ma34744	X		
39	TP28_0-1.0	Mar 27, 2018		Soil	S18-Ma34745	X		
40	TP29_0-0.5	Mar 28, 2018		Soil	S18-Ma34746	X		
41	TP30_0-1.0	Mar 28, 2018		Soil	S18-Ma34747	X		
42	TP30_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34748	X		
43	TP30_2.0-3.0	Mar 28, 2018		Soil	S18-Ma34749	X		
44	TP31_0-1.0	Mar 28, 2018		Soil	S18-Ma34750	X		
45	TP31_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34751	X		

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Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
46	TP31_2.0-3.0	Mar 28, 2018		Soil	S18-Ma34752	X		
47	TP32_0-1.0	Mar 28, 2018		Soil	S18-Ma34753	X		
48	TP33_0-0.2	Mar 28, 2018		Soil	S18-Ma34754	X		
49	TP34_0-0.1	Mar 28, 2018		Soil	S18-Ma34755		X	
50	TP35_0-1.0	Mar 28, 2018		Soil	S18-Ma34756	X		
51	TP35_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34757	X		
52	TP36_0-1.0	Mar 28, 2018		Soil	S18-Ma34758	X		
53	TP36_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34759	X		
54	TP37_0-1.0	Mar 28, 2018		Soil	S18-Ma34760	X		
55	TP37_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34761	X		
56	TP38_0-1.0	Mar 28, 2018		Soil	S18-Ma34762	X		
57	TP38_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34763	X		

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Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
58	TP39_0-0.5	Mar 28, 2018		Soil	S18-Ma34764	X		
59	TP40_0-1.0	Mar 28, 2018		Soil	S18-Ma34765	X		
60	TP40_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34766	X		
61	TP41_0-0.3	Mar 28, 2018		Soil	S18-Ma34767	X		
62	TP42_0-1.0	Mar 28, 2018		Soil	S18-Ma34768	X		
63	TP42_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34769	X		
64	TP43_0-1.0	Mar 28, 2018		Soil	S18-Ma34770	X		
65	TP44_0-1.0	Mar 28, 2018		Soil	S18-Ma34771	X		
66	TP44_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34772	X		
67	TP45_0-1.0	Mar 28, 2018		Soil	S18-Ma34773	X		
68	TP45_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34774	X		
69	TP46_0-0.5	Mar 28, 2018		Soil	S18-Ma34775	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
70	TP47_0-0.3	Mar 28, 2018		Soil	S18-Ma34776	X		
71	TP48_0-1.0	Mar 28, 2018		Soil	S18-Ma34777	X		
72	TP49_0-1.0	Mar 28, 2018		Soil	S18-Ma34778	X		
73	TP50_0-0.4	Mar 28, 2018		Soil	S18-Ma34779	X		
74	TP51_0-1.0	Mar 28, 2018		Soil	S18-Ma34780	X		
75	TP51-1.0-2.0	Mar 28, 2018		Soil	S18-Ma34781	X		
76	TP51-2.0-3.0	Mar 28, 2018		Soil	S18-Ma34782	X		
77	TP52_0-1.0	Mar 28, 2018		Soil	S18-Ma34783	X		
78	TP53_0-1.0	Mar 28, 2018		Soil	S18-Ma34784	X		
79	TP53_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34785	X		
80	TP54_0-1.0	Mar 28, 2018		Soil	S18-Ma34786	X		
81	TP54_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34787	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
82	TP54_2.0-3.0	Mar 28, 2018		Soil	S18-Ma34788	X		
83	TP55_0-0.8	Mar 28, 2018		Soil	S18-Ma34789	X		
84	TP56_0-1.0	Mar 28, 2018		Soil	S18-Ma34790	X		
85	TP57_0-1.0	Mar 28, 2018		Soil	S18-Ma34791	X		
86	TP58_0-1.0	Mar 28, 2018		Soil	S18-Ma34792	X		
87	TP59_0-1.0	Mar 28, 2018		Soil	S18-Ma34793	X		
88	TP60_0-1.0	Mar 28, 2018		Soil	S18-Ma34794	X		
89	TP61_0-1.0	Mar 28, 2018		Soil	S18-Ma34795	X		
90	TP62_0-1.0	Mar 28, 2018		Soil	S18-Ma34796	X		
91	TP62_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34797	X		
92	TP62_2.0-3.0	Mar 28, 2018		Soil	S18-Ma34798		X	
93	TP63_0-1.0	Mar 29, 2018		Soil	S18-Ma34799	X		

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Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
94	TP64_0-1.0	Mar 29, 2018		Soil	S18-Ma34800	X		
95	TP64_1.0-2.0	Mar 29, 2018		Soil	S18-Ma34801	X		
96	TP65_0-1.0	Mar 29, 2018		Soil	S18-Ma34802	X		
97	TP65_1.0-2.0	Mar 29, 2018		Soil	S18-Ma34803	X		
98	TP66_0-1.0	Mar 29, 2018		Soil	S18-Ma34804	X		
99	TP66_1.0-2.0	Mar 29, 2018		Soil	S18-Ma34805	X		
100	TP67_0-1.0	Mar 29, 2018		Soil	S18-Ma34806	X		
101	TP67_1.0-2.0	Mar 29, 2018		Soil	S18-Ma34807	X		
102	TP67_2.0-2.5	Mar 29, 2018		Soil	S18-Ma34808	X		
103	TP68_0-1.0	Mar 29, 2018		Soil	S18-Ma34809	X		
104	TP68_1.0-2.0	Mar 29, 2018		Soil	S18-Ma34810	X		
105	TP68_2.0-3.0	Mar 29, 2018		Soil	S18-Ma34811	X		

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Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
106	TP69_0-0.2	Mar 29, 2018		Soil	S18-Ma34812	X		
107	TP70_0-0.2	Mar 29, 2018		Soil	S18-Ma34813	X		
108	TP71_0-0.2	Mar 29, 2018		Soil	S18-Ma34814	X		
109	TP72_0-0.2	Mar 29, 2018		Soil	S18-Ma34815	X		
110	TP73_0-1.0	Mar 29, 2018		Soil	S18-Ma34816	X		
111	TP74_0-1.0	Mar 29, 2018		Soil	S18-Ma34817	X		
112	TP75_0-0.15	Mar 29, 2018		Soil	S18-Ma34818	X		
113	TP76_0-0.2	Mar 29, 2018		Soil	S18-Ma34819	X		
114	TP77_0-0.3	Mar 29, 2018		Soil	S18-Ma34820	X		
115	TP78_0-0.2	Mar 29, 2018		Soil	S18-Ma34821	X		
116	TP79_0-0.1	Mar 29, 2018		Soil	S18-Ma34822	X		
117	TP80_0-0.3	Mar 29, 2018		Soil	S18-Ma34823	X		

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Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
118	TP81_0-0.2	Mar 29, 2018		Soil	S18-Ma34824	X		
119	QC27032018-1	Mar 27, 2018		Soil	S18-Ma34825	X		
120	QC27032018-2	Mar 27, 2018		Soil	S18-Ma34826	X		
121	QC27032018-3	Mar 27, 2018		Soil	S18-Ma34827	X		
122	QC28032018-1	Mar 28, 2018		Soil	S18-Ma34828	X		
123	QC28032018-2	Mar 28, 2018		Soil	S18-Ma34829	X		
124	QC28032018-3	Mar 28, 2018		Soil	S18-Ma34830			X
125	QC28032018-	Mar 28, 2018		Soil	S18-Ma34831			X

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Melbourne
3-5 Kingston Town Close
Oakleigh VIC 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

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

Company Name: JBS & G Australia (NSW) P/L
Address: Level 1, 50 Margaret St
Sydney
NSW 2000

Project Name: MAROUBRA
Project ID: 54640

Order No.:
Report #: 591807
Phone: 02 8245 0300
Fax:

Received: Mar 29, 2018 4:44 PM
Due: Apr 4, 2018
Priority: 2 Day
Contact Name: Michael Samuel

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
	4							
126	QC29032018-1	Mar 29, 2018		Soil	S18-Ma34832	X		
127	QC29032018-3	Mar 29, 2018		Soil	S18-Ma34833			X
128	QA29032018-3	Mar 29, 2018		Soil	S18-Ma34834			X
129	TP34_0-0.1	Mar 28, 2018		Soil	S18-Ma34881	X		
130	TP62_2.0-3.0	Mar 29, 2018		Soil	S18-Ma34915	X		
Test Counts						124	2	4

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis
LOR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Western Australia Department of Health
NOHSC	National Occupational Health and Safety Commission
ACM	Bonded asbestos-containing material means any material containing more than 1% asbestos and comprises asbestos-containing-material which is in sound condition, although possibly broken or fragmented, and where the asbestos is bound in a matrix such as cement or resin. Common examples of ACM include but are not limited to: pipe and boiler insulation, sprayed-on fireproofing, troweled-on acoustical plaster, floor tile and mastic, floor linoleum, transite shingles, roofing materials, wall and ceiling plaster, ceiling tiles, and gasket materials. This term is restricted to material that cannot pass a 7 mm x 7 mm sieve. This sieve size is selected because it approximates the thickness of common asbestos cement sheeting and for fragments to be smaller than this would imply a high degree of damage and hence potential for fibre release.
FA	FA comprises friable asbestos material and includes severely weathered cement sheet, insulation products and woven asbestos material. This type of friable asbestos is defined here as asbestos material that is in a degraded condition such that it can be broken or crumbled by hand pressure. This material is typically unbonded or was previously bonded and is now significantly degraded (crumbling).
PACM	Presumed Asbestos-Containing Material means thermal system insulation and surfacing material found in buildings, vessels, and vessel sections constructed no later than 1980 that are assumed to contain greater than one percent asbestos but have not been sampled or analyzed to verify or negate the presence of asbestos.
AF	Asbestos fines (AF) are defined as free fibres, or fibre bundles, smaller than 7mm. It is the free fibres which present the greatest risk to human health, although very small fibres (< 5 microns in length) are not considered to be such a risk. AF also includes small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve. (Note that for bonded ACM fragments to pass through a 7 mm x 7 mm sieve implies a substatntial degree of damage which increases the potential for fibre release.)
AC	Asbestos cement means a mixture of cement and asbestos fibres (typically 90:10 ratios).

Comments

Samples Ma34821 & Ma34881 received was less than the nominal 500mL as recommended in Section 4.10 of the NEPM Schedule B1 - Guideline on Investigation Levels for Soil and Groundwater.

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N/A	Not applicable

Asbestos Counter/Identifier:

Laxman Dias	Senior Analyst-Asbestos (NSW)

Authorised by:

Sayeed Abu	Senior Analyst-Asbestos (NSW)



Glenn Jackson
National Operations Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Uncertainty data is available on request

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Company Name:	JBS & G Australia (NSW) P/L	**Order No.:**		**Received:**	Mar 29, 2018 4:44 PM
Address:	Level 1, 50 Margaret St Sydney NSW 2000	**Report #:** **Phone:** **Fax:**	591807 02 8245 0300	**Due:** **Priority:** **Contact Name:**	Apr 4, 2018 2 Day Michael Samuel
Project Name:	MAROUBRA				
Project ID:	54640				

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
elbourne Laboratory - NATA Site # 1254 & 14271								
dney Laboratory - NATA Site # 18217						X	X	X
isbane Laboratory - NATA Site # 20794								
rth Laboratory - NATA Site # 23736								
ternal Laboratory								
o	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
	TP01_0-0.8	Mar 27, 2018		Soil	S18-Ma34707	X		
	TP02_0-1.0	Mar 27, 2018		Soil	S18-Ma34708	X		
	TP03_0-1.0	Mar 27, 2018		Soil	S18-Ma34709	X		
	TP04_0-1.0	Mar 27, 2018		Soil	S18-Ma34710	X		
	TP04_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34711	X		
	TP05_0-1.0	Mar 27, 2018		Soil	S18-Ma34712	X		
	TP06_0-0.8	Mar 27, 2018		Soil	S18-Ma34713	X		
	TP07_0-1.0	Mar 27, 2018		Soil	S18-Ma34714	X		
	TP08_0-0.2	Mar 27, 2018		Soil	S18-Ma34715	X		

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Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
elbourne Laboratory - NATA Site # 1254 & 14271								
rdney Laboratory - NATA Site # 18217						X	X	X
risbane Laboratory - NATA Site # 20794								
erth Laboratory - NATA Site # 23736								
	TP09_0-1.0	Mar 27, 2018		Soil	S18-Ma34716	X		
	TP10_0-1.0	Mar 27, 2018		Soil	S18-Ma34717	X		
	TP11_0-1.0	Mar 27, 2018		Soil	S18-Ma34718	X		
	TP12_0-1.0	Mar 27, 2018		Soil	S18-Ma34719	X		
	TP13_0-1.0	Mar 27, 2018		Soil	S18-Ma34720	X		
	TP13_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34721	X		
	TP13_2.0-3.0	Mar 27, 2018		Soil	S18-Ma34722	X		
	TP14_0-1.0	Mar 27, 2018		Soil	S18-Ma34723	X		
	TP14_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34724	X		
	TP15_0-1.0	Mar 27, 2018		Soil	S18-Ma34725	X		
	TP15_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34726	X		
	TP15_2.0-3.0	Mar 27, 2018		Soil	S18-Ma34727	X		

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Project Name: **Project ID:**	MAROUBRA 54640				

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
elbourne Laboratory - NATA Site # 1254 & 14271								
rdney Laboratory - NATA Site # 18217						X	X	X
risbane Laboratory - NATA Site # 20794								
erth Laboratory - NATA Site # 23736								
	TP16_0-1.0	Mar 27, 2018		Soil	S18-Ma34728	X		
	TP16_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34729	X		
	TP17_0-1.0	Mar 27, 2018		Soil	S18-Ma34730	X		
	TP18_0-0.3	Mar 27, 2018		Soil	S18-Ma34731	X		
	TP19_0-1.0	Mar 27, 2018		Soil	S18-Ma34732	X		
	TP20_0-1.0	Mar 27, 2018		Soil	S18-Ma34733	X		
	TP20_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34734	X		
	TP20_2.0-2.6	Mar 27, 2018		Soil	S18-Ma34735	X		
	TP21_0-0.7	Mar 27, 2018		Soil	S18-Ma34736	X		
	TP22_0-0.3	Mar 27, 2018		Soil	S18-Ma34737	X		
	TP23_0-0.5	Mar 27, 2018		Soil	S18-Ma34738	X		
	TP24_0-1.0	Mar 27, 2018		Soil	S18-Ma34739	X		

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Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
elbourne Laboratory - NATA Site # 1254 & 14271								
rdney Laboratory - NATA Site # 18217						X	X	X
risbane Laboratory - NATA Site # 20794								
erth Laboratory - NATA Site # 23736								
	TP24_1.0-2.0	Mar 27, 2018		Soil	S18-Ma34740	X		
	TP25_0-0.7	Mar 27, 2018		Soil	S18-Ma34741	X		
	TP26_0-0.7	Mar 27, 2018		Soil	S18-Ma34742	X		
	TP27_0-1.0	Mar 27, 2018		Soil	S18-Ma34743	X		
	TP27_1.0-1.5	Mar 27, 2018		Soil	S18-Ma34744	X		
	TP28_0-1.0	Mar 27, 2018		Soil	S18-Ma34745	X		
	TP29_0-0.5	Mar 28, 2018		Soil	S18-Ma34746	X		
	TP30_0-1.0	Mar 28, 2018		Soil	S18-Ma34747	X		
	TP30_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34748	X		
	TP30_2.0-3.0	Mar 28, 2018		Soil	S18-Ma34749	X		
	TP31_0-1.0	Mar 28, 2018		Soil	S18-Ma34750	X		
	TP31_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34751	X		

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Project ID:	54640				

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
elbourne Laboratory - NATA Site # 1254 & 14271								
rdney Laboratory - NATA Site # 18217						X	X	X
risbane Laboratory - NATA Site # 20794								
erth Laboratory - NATA Site # 23736								
	TP31_2.0-3.0	Mar 28, 2018		Soil	S18-Ma34752	X		
	TP32_0-1.0	Mar 28, 2018		Soil	S18-Ma34753	X		
	TP33_0-0.2	Mar 28, 2018		Soil	S18-Ma34754	X		
	TP34_0-0.1	Mar 28, 2018		Soil	S18-Ma34755		X	
	TP35_0-1.0	Mar 28, 2018		Soil	S18-Ma34756	X		
	TP35_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34757	X		
	TP36_0-1.0	Mar 28, 2018		Soil	S18-Ma34758	X		
	TP36_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34759	X		
	TP37_0-1.0	Mar 28, 2018		Soil	S18-Ma34760	X		
	TP37_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34761	X		
	TP38_0-1.0	Mar 28, 2018		Soil	S18-Ma34762	X		
	TP38_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34763	X		

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Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
elbourne Laboratory - NATA Site # 1254 & 14271								
rdney Laboratory - NATA Site # 18217						X	X	X
risbane Laboratory - NATA Site # 20794								
erth Laboratory - NATA Site # 23736								
	TP39_0-0.5	Mar 28, 2018		Soil	S18-Ma34764	X		
	TP40_0-1.0	Mar 28, 2018		Soil	S18-Ma34765	X		
	TP40_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34766	X		
	TP41_0-0.3	Mar 28, 2018		Soil	S18-Ma34767	X		
	TP42_0-1.0	Mar 28, 2018		Soil	S18-Ma34768	X		
	TP42_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34769	X		
	TP43_0-1.0	Mar 28, 2018		Soil	S18-Ma34770	X		
	TP44_0-1.0	Mar 28, 2018		Soil	S18-Ma34771	X		
	TP44_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34772	X		
	TP45_0-1.0	Mar 28, 2018		Soil	S18-Ma34773	X		
	TP45_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34774	X		
	TP46_0-0.5	Mar 28, 2018		Soil	S18-Ma34775	X		

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Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
elbourne Laboratory - NATA Site # 1254 & 14271								
rdney Laboratory - NATA Site # 18217						X	X	X
risbane Laboratory - NATA Site # 20794								
erth Laboratory - NATA Site # 23736								
	TP47_0-0.3	Mar 28, 2018		Soil	S18-Ma34776	X		
	TP48_0-1.0	Mar 28, 2018		Soil	S18-Ma34777	X		
	TP49_0-1.0	Mar 28, 2018		Soil	S18-Ma34778	X		
	TP50_0-0.4	Mar 28, 2018		Soil	S18-Ma34779	X		
	TP51_0-1.0	Mar 28, 2018		Soil	S18-Ma34780	X		
	TP51-1.0-2.0	Mar 28, 2018		Soil	S18-Ma34781	X		
	TP51-2.0-3.0	Mar 28, 2018		Soil	S18-Ma34782	X		
	TP52_0-1.0	Mar 28, 2018		Soil	S18-Ma34783	X		
	TP53_0-1.0	Mar 28, 2018		Soil	S18-Ma34784	X		
	TP53_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34785	X		
	TP54_0-1.0	Mar 28, 2018		Soil	S18-Ma34786	X		
	TP54_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34787	X		

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Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
elbourne Laboratory - NATA Site # 1254 & 14271								
rdney Laboratory - NATA Site # 18217						X	X	X
risbane Laboratory - NATA Site # 20794								
erth Laboratory - NATA Site # 23736								
	TP54_2.0-3.0	Mar 28, 2018		Soil	S18-Ma34788	X		
	TP55_0-0.8	Mar 28, 2018		Soil	S18-Ma34789	X		
	TP56_0-1.0	Mar 28, 2018		Soil	S18-Ma34790	X		
	TP57_0-1.0	Mar 28, 2018		Soil	S18-Ma34791	X		
	TP58_0-1.0	Mar 28, 2018		Soil	S18-Ma34792	X		
	TP59_0-1.0	Mar 28, 2018		Soil	S18-Ma34793	X		
	TP60_0-1.0	Mar 28, 2018		Soil	S18-Ma34794	X		
	TP61_0-1.0	Mar 28, 2018		Soil	S18-Ma34795	X		
	TP62_0-1.0	Mar 28, 2018		Soil	S18-Ma34796	X		
	TP62_1.0-2.0	Mar 28, 2018		Soil	S18-Ma34797	X		
	TP62_2.0-3.0	Mar 28, 2018		Soil	S18-Ma34798		X	
	TP63_0-1.0	Mar 29, 2018		Soil	S18-Ma34799	X		

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Project ID:	54640				

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Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
elbourne Laboratory - NATA Site # 1254 & 14271								
rdney Laboratory - NATA Site # 18217						X	X	X
risbane Laboratory - NATA Site # 20794								
erth Laboratory - NATA Site # 23736								
	TP64_0-1.0	Mar 29, 2018		Soil	S18-Ma34800	X		
	TP64_1.0-2.0	Mar 29, 2018		Soil	S18-Ma34801	X		
	TP65_0-1.0	Mar 29, 2018		Soil	S18-Ma34802	X		
	TP65_1.0-2.0	Mar 29, 2018		Soil	S18-Ma34803	X		
	TP66_0-1.0	Mar 29, 2018		Soil	S18-Ma34804	X		
	TP66_1.0-2.0	Mar 29, 2018		Soil	S18-Ma34805	X		
0	TP67_0-1.0	Mar 29, 2018		Soil	S18-Ma34806	X		
1	TP67_1.0-2.0	Mar 29, 2018		Soil	S18-Ma34807	X		
2	TP67_2.0-2.5	Mar 29, 2018		Soil	S18-Ma34808	X		
3	TP68_0-1.0	Mar 29, 2018		Soil	S18-Ma34809	X		
4	TP68_1.0-2.0	Mar 29, 2018		Soil	S18-Ma34810	X		
5	TP68_2.0-3.0	Mar 29, 2018		Soil	S18-Ma34811	X		

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Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
elbourne Laboratory - NATA Site # 1254 & 14271								
rdney Laboratory - NATA Site # 18217						X	X	X
risbane Laboratory - NATA Site # 20794								
erth Laboratory - NATA Site # 23736								
6	TP69_0-0.2	Mar 29, 2018		Soil	S18-Ma34812	X		
7	TP70_0-0.2	Mar 29, 2018		Soil	S18-Ma34813	X		
8	TP71_0-0.2	Mar 29, 2018		Soil	S18-Ma34814	X		
9	TP72_0-0.2	Mar 29, 2018		Soil	S18-Ma34815	X		
0	TP73_0-1.0	Mar 29, 2018		Soil	S18-Ma34816	X		
1	TP74_0-1.0	Mar 29, 2018		Soil	S18-Ma34817	X		
2	TP75_0-0.15	Mar 29, 2018		Soil	S18-Ma34818	X		
3	TP76_0-0.2	Mar 29, 2018		Soil	S18-Ma34819	X		
4	TP77_0-0.3	Mar 29, 2018		Soil	S18-Ma34820	X		
5	TP78_0-0.2	Mar 29, 2018		Soil	S18-Ma34821	X		
6	TP79_0-0.1	Mar 29, 2018		Soil	S18-Ma34822	X		
7	TP80_0-0.3	Mar 29, 2018		Soil	S18-Ma34823	X		

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Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
elbourne Laboratory - NATA Site # 1254 & 14271								
rdney Laboratory - NATA Site # 18217						X	X	X
risbane Laboratory - NATA Site # 20794								
erth Laboratory - NATA Site # 23736								
8	TP81_0-0.2	Mar 29, 2018		Soil	S18-Ma34824	X		
9	QC27032018-1	Mar 27, 2018		Soil	S18-Ma34825	X		
0	QC27032018-2	Mar 27, 2018		Soil	S18-Ma34826	X		
1	QC27032018-3	Mar 27, 2018		Soil	S18-Ma34827	X		
2	QC28032018-1	Mar 28, 2018		Soil	S18-Ma34828	X		
3	QC28032018-2	Mar 28, 2018		Soil	S18-Ma34829	X		
4	QC28032018-3	Mar 28, 2018		Soil	S18-Ma34830			X
5	QC28032018-	Mar 28, 2018		Soil	S18-Ma34831			X

Company Name:	JBS & G Australia (NSW) P/L	**Order No.:**		**Received:**	Mar 29, 2018 4:44 PM
Address:	Level 1, 50 Margaret St Sydney NSW 2000	**Report #:** **Phone:** **Fax:**	591807 02 8245 0300	**Due:** **Priority:** **Contact Name:**	Apr 4, 2018 2 Day Michael Samuel
Project Name: **Project ID:**	MAROUBRA 54640				

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - WA guidelines	CANCELLED	HOLD
elbourne Laboratory - NATA Site # 1254 & 14271								
rdney Laboratory - NATA Site # 18217						X	X	X
risbane Laboratory - NATA Site # 20794								
erth Laboratory - NATA Site # 23736								
	4							
6	QC29032018-1	Mar 29, 2018		Soil	S18-Ma34832	X		
7	QC29032018-3	Mar 29, 2018		Soil	S18-Ma34833			X
8	QA29032018-3	Mar 29, 2018		Soil	S18-Ma34834			X
9	TP34_0-0.1	Mar 28, 2018		Soil	S18-Ma34881	X		
0	TP62_2.0-3.0	Mar 29, 2018		Soil	S18-Ma34915	X		
st Counts						124	2	4

eurofins | mgt

Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

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

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

Sample Receipt Advice

Company name:	**JBS & G Australia (NSW) P/L**
Contact name:	Michael Samuel
Project name:	MAROUBRA
Project ID:	54640
COC number:	012033-012039
Turn around time:	2 Day
Date/Time received:	Mar 29, 2018 4:44 PM
Eurofins | mgt reference:	**591807**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ Sample Temperature of a random sample selected from the batch as recorded by Eurofins | mgt Sample Receipt : 22.1 degrees Celsius.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Notes

TP34_0-0.1 & TP62_2.0-3.0 not received; analysis cancelled. Additional samples TP33_0-0.1 & TP63_2.0-3.0 placed on hold

Contact notes

If you have any questions with respect to these samples please contact:

Nibha Vaidya on Phone : +61 (2) 9900 8400 or by e.mail: NibhaVaidya@eurofins.com

Results will be delivered electronically via e.mail to Michael Samuel - msamuel@jbsg.com.au.

Note: A copy of these results will also be delivered to the general JBS & G Australia (NSW) P/L email address.

012033

CHAIN OF CUSTODY

JBS&G

PROJECT NO.: 54640	LABORATORY BATCH NO.:
PROJECT NAME: Maroubra	SAMPLERS: JStaehli
DATE NEEDED BY: 48 HR TAT	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) msamuel@jbsg.com.au; (3) JStaehli@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL.

591807

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	Asbestos	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
TP01_0-0.8	Soil	29/3/18		500mL Bag		X		X	
TP02_0-1.0	↓	↓		↓		↓		↓	
TP03_0-1.0									
TP04_0-1.0									
↓ _1.0-2.0									
TP05_0-1.0									
TP06_0-0.8									
TP07_0-1.0									
TP08_0-0.2									
TP09_0-1.0									
TP10_0-1.0									
TP11_0-1.0									
TP12_0-1.0									
TP13_0-1.0									
↓ _1.0-2.0									
_2.0-3.0									
TP14_0-1.0									
↓ _1.0-2.0									
TP15_0-1.0	↓	↓		↓		↓		↓	

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: Jessica Staehli DATE: 29/3/18	CONSIGNMENT NOTE NO.	NAME: Elvie D DATE: 29/3/18 4:44PM	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	OF: Eurofins	COOLER TEMP 22.1 deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

012034

CHAIN OF CUSTODY

JBS&G

PROJECT NO.: 51606	LABORATORY BATCH NO.:
PROJECT NAME: Manowora	SAMPLERS: JS
DATE NEEDED BY: 48 HR TAT	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) MSamuel@jbsg.com.au; (3) JStaehli@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL

591807

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	ASBESTOS	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
TP15_1.0-2.0	Soil	27/3/18		Bag		X		X	
↓ _2.0-3.0	↓	↓		↓		↓		↓	
TP16_0-1.0									
_1.0-2.0									
TP17_0-1.0									
TP18_0-0.3									
TP19_0-1.0									
TP20_0-1.0									
↓ _1.0-2.0									
↓ _2.0-2.6									
TP21_0-0.7									
TP22_0-0.3									
TP23_0-0.5									
TP24_0-1.0									
↓ _1.0-2.0									
TP25_0-0.7									
TP26_0-0.7									
TP27_0-1.0									
↓ _1.0-1.5	↓	↓		↓		↓		↓	

RELINQUISHED BY	METHOD OF SHIPMENT	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: J.Staehli DATE: 29/3/18	CONSIGNMENT NOTE NO.	NAME: Elvie D	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	DATE: 29/3/18 4:44PM	COOLER TEMP 22.1 deg C
		OF: Eurofins	
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

012035

3 of 7

CHAIN OF CUSTODY

JBS&G

PROJECT NO.: 54640	LABORATORY BATCH NO.:
PROJECT NAME: Maroubra	SAMPLERS: JS
DATE NEEDED BY: 48 HR T/A	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) mjannuel@jbsg.com.au; (3) JStachel@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

591807

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	Asbestos	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
TP28_0-1.0	Soil	27/3/18		BAG		X		X	
TP29_0-0.5		28/3/18							
TP30_0-1.0									
↓ _1.0-2.0									
↓ _2.0-3.0									
TP31_0-1.0									
↓ _1.0-2.0									
↓ _2.0-3.0									
TP32_0-1.0									
TP33_0-0.2									
TP34_0-0.1									
TP35_0-1.0									
↓ _1.0-2.0									
TP36_0-1.0									
↓ _1.0-2.0									
TP37_0-1.0									
↓ _1.0-2.0									
TP38_0-1.0									
↓ _1.0-2.0									

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: Jessica DATE: 29/3/18	CONSIGNMENT NOTE NO.	NAME: ELVISD	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G Stachel	TRANSPORT CO.	DATE: 29/3/18 4:44PM	COOLER TEMP 22.1 deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

012036

CHAIN OF CUSTODY

4 of 7

JBS&G

PROJECT NO.: 54640	LABORATORY BATCH NO.:
PROJECT NAME: Mavoubra	SAMPLERS: JS
DATE NEEDED BY: US HR TAT	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) msamuel@jbsg.com.au; (3) JStaehli@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

591807

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	Asbestos (ID)	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
TP39_0-0.5	Soil	28/3/18	-	BAG		X		X	
TP40_0-1.0	↓	↓	↓	↓		↓		↓	
↓ _1.0-2.0									
TP41_0-0.3									
TP42_0-1.0									
↓ _1.0-2.0									
TP43_0-1.0									
TP44_0-1.0									
↓ _1.0-2.0									
TP45_0-1.0									
↓ _1.0-2.0									
TP46_0-0.5									
TP47_0-0.3									
TP48_0-1.0									
TP49_0-1.0									
TP50_0-0.4									
TP51_0-1.0									
_1.0-2.0									
_2.0-3.0	↓	↓	↓	↓		↓		↓	

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: Jessica Staehli DATE: 29/3/18	CONSIGNMENT NOTE NO.	NAME: ELVIS D	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	DATE: 29/3/18 2:44 PM	COOLER TEMP 22.1 deg C
OF: Eurofins			
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

012037

CHAIN OF CUSTODY

5 of 7

JBS&G

PROJECT NO.: 54640	LABORATORY BATCH NO.:
PROJECT NAME: Maroubra	SAMPLERS: JS
DATE NEEDED BY: 48 HR T/A	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) MSamuel@jbsg.com.au; (3) JStaehli@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

591807

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	Soil Suite A	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
TP52_0-1.0	SOIL	28/3/18		BAG		X		X	
TP53_0-1.0	↓	↓		↓		↓		↓	
↓ _1.0-2.0									
TP54_0-1.0									
↓ _1.0-2.0									
↓ _2.0-3.0									
TP55_0-0.8									
TP56_0-1.0									
TP57_0-1.0									
TP58_0-1.0									
TP59_0-1.0									
TP60_0-1.0									
TP61_0-1.0									
TP62_0-1.0									
↓ _1.0-2.0									
_2.0-3.0									
TP63_0-1.0	9/3/18								
TP64_0-1.0	↓								
↓ _1.0-2.0	↓								

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: Jessica Staehli DATE: 29/3/18	CONSIGNMENT NOTE NO.	NAME: Elvis DATE: 29/3/18 4:44 PM	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	OF: Eurofins	COOLER TEMP 22.1 deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

012038

CHAIN OF CUSTODY

JBS&G

PROJECT NO.: 54640	LABORATORY BATCH NO.:
PROJECT NAME: Maroubra	SAMPLERS: JS
DATE NEEDED BY: 48 HR T/A	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) msamuel@jbsg.com.au; (3) JStaehli@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	Asbestos	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
TP65-0-1.0	~~Soil~~ Soil	29/3/18		Bag		X		X	591807
↓ -1.0-2.0									
TP66-0-1.0									
↓ -1.0-2.0									
TP67-0-1.0									
↓ -1.0-2.0									
↓ -2.0-2.5									
TP68-0-1.0									
↓ -1.0-2.0									
↓ -2.0-3.0									
TP69-0-0.2									
TP70-0-0.2									
TP71-0-0.2									
TP72-0-0.2									
TP73-0-1.0									
TP74-0-1.0									
TP75-0-0.15									
TP76-0-0.2									
TP77-0-0.3	↓	↓		↓		↓		↓	

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: Jessica DATE: 29/3/18	CONSIGNMENT NOTE NO.	NAME: Elvio	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G Staehli	TRANSPORT CO.	DATE: 29/3/18 4:44PM	COOLER TEMP 22.1 deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

012039

CHAIN OF CUSTODY

JBS&G

PROJECT NO.: 54640	LABORATORY BATCH NO.:
PROJECT NAME: Maroubra	SAMPLERS:
DATE NEEDED BY: 48 HR TAT	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) msamuel@jbsg.com.au; (3) jstaehli@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

591807

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	ASBESTOS	HOLD	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
TP78-0-0.2	Soil	29/3/18		BAG.		X				
TP79-0-0.3	↓	↓		↓		↓				
TP80-0-0.3										
TP81-0-0.2										
QC27032018-1		27/3/18				X				
↓ -2		↓				X				
-3						X				
QC28032018-1		28/3/18				X				
-2						X				
-3							X			
-4							X			
QC29032018-1		29/3/18				X				
QC29032018-3							X			
QA29032018-3							X			

RELINQUISHED BY	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: Jessica DATE: 29/3/18	CONSIGNMENT NOTE NO.	NAME: Elvis D	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G Staehli	TRANSPORT CO.	DATE: 29/3/18 4:44 PM	COOLER TEMP 22.1 deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

Envirolab Services Pty Ltd
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12 Ashley St Chatswood NSW 2067
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customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 188485

Client Details

Client	JBS & G (NSW & WA) Pty Ltd
Attention	Michael Samuel, J Staehli
Address	Level 1, 50 Margaret St, Sydney, NSW, 2000

Sample Details

Your Reference	**54640, Maroubra**
Number of Samples	8 Soil
Date samples received	29/03/2018
Date completed instructions received	29/03/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	04/04/2018
Date of Issue	03/04/2018

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu
Results Approved By
Lucy Zhu, Asbsestos Analyst

Authorised By



Jacinta Hurst, Laboratory Manager

Asbestos ID - soils NEPM - ASB-001						
Our Reference		188485-1	188485-2	188485-3	188485-4	188485-5
Your Reference	UNITS	QA27032018-1	QA27032018-2	QA27032018-3	QA28032018-1	QA28032018-2
Date Sampled		27/03/2018	27/03/2018	27/03/2018	28/03/2018	28/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	03/04/2018	03/04/2018	03/04/2018	03/04/2018	03/04/2018
Sample mass tested	g	644.7	803.9	533.1	895.5	860.2
Sample Description	-	Brown sandy soil	Brown sandy soil	Brown sandy soil	Brown sandy soil	Brown sandy soil
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos[#1]	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–	–	–
FA and AF Estimation*	g	–	–	–	–	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001		
Our Reference		188485-8
Your Reference	UNITS	QA29032018-1
Date Sampled		29/03/2018
Type of sample		Soil
Date analysed	-	03/04/2018
Sample mass tested	g	815.6
Sample Description	-	Brown sandy soil
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected
Total Asbestos[#1]	g/kg	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected
ACM >7mm Estimation*	g	–
FA and AF Estimation*	g	–
ACM >7mm Estimation*	%(w/w)	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
ASB-001	Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004. Results reported denoted with * are outside our scope of NATA accreditation. **NOTE** #1 Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF) **NOTE** #2 The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres. Estimation = Estimated asbestos weight Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.

Result Definitions

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

Report Comments

Asbestos-ID in soil: NEPM
This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013.
This is reported outside our scope of NATA accreditation.

012032

CHAIN OF CUSTODY

JBS&G

PROJECT NO.: 54640	LABORATORY BATCH NO.:
PROJECT NAME: Merrowbra	SAMPLERS: JS
DATE NEEDED BY: 48 HR T/A	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) MSamuel@jbsg.com.au; (3) JStaehli@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	SOILSAMPLE	0-10 g	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
QA27032018-1	Soil	27/3/18	1	Bag		X			X	
-2	↓	↓	2	↓		↓			↓	
-3			3							
QA28032018-1		28/3/18	4							
-2		↓	5							
-3			6				X			
QA28032018-4		28/3/18	7				X			
QA29032018 Spoonbag (2017 Q1 bag)		29/3/18	8							

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

Job No: 188485
Date Received: 29/3/2018
Time Received: 15:00
Received by: R
Temp: Cool/Ambient
Cooling: Icepack
Security: Intact/Broken/None
pH 7

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: Jessica Staehli DATE: 29/3/18	CONSIGNMENT NOTE NO.	NAME: PRa	COOLER SEAL – Yes..... No..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	DATE: 29/3/2018 1500 OF:	COOLER TEMP ..... deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

IMSO Forms013 – Chain of Custody - Generic

Appendix E – Asbestos Field Quantification Calculations

Summary of Quantified Levels of Asbestos as Estimated from Field Works
Jack Vanny Reserve, Maroubra

Sample ID	% Asbestos content	ACM Weight (kg)	Lab ACM (kg)	Soil Volume (L)	Soil Density (kg/L)	%w/w ACM
TP03_0-1.0	15	0.036		50	1.65	0.006545455
TP04_0-1.0	15	0.486	0.0001	50	1.65	0.088381818
TP05_0-1.0	15	0.04		50	1.65	0.007272727
TP06_0-1.0	15	0.034		50	1.65	0.006181818
TP08_0-1.0	15	0.564		50	1.65	0.102545455
TP09_0-1.0	15	0.386		50	1.65	0.070181818
TP10_0-1.0	15	0.22	0.0013	50	1.65	0.040236364
TP11_0-1.0	15	0.354		50	1.65	0.064363636
TP12_0-1.0	15	0.206		50	1.65	0.037454545
TP13_0-1.0	15	0.342		50	1.65	0.062181818
TP13_1.0-2.0	15	0.122		10	1.65	0.110909091
TP13_2.0-3.0	15	0.046		10	1.65	0.041818182
TP15_0-1.0	15	0.012		50	1.65	0.002181818
TP15_1.0-2.0	15	0.05		10	1.65	0.045454545
TP17_0-1.0	15	0.085	0.0019	50	1.65	0.0158
TP18_0-1.0	15	0.244		50	1.65	0.044363636
TP19_0-1.0	15	0.156		50	1.65	0.028363636
TP20_0-1.0	15	0.26		50	1.65	0.047272727
TP20_1.0-2.0	15	0.06		10	1.65	0.054545455
TP23_0-0.5	15	0.724		50	1.65	0.131636364
TP24_0-1.0	15	0.368		50	1.65	0.066909091
TP24_1.0-2.0	15	0.138		10	1.65	0.125454545
TP25_0-0.7	15	0.146		50	1.65	0.026545455
TP27_0-1.0	15	0.278		50	1.65	0.050545455
TP27_1.0-1.5	15	0.028		10	1.65	0.025454545
TP30_0-1.0	15	0.312		50	1.65	0.056727273
TP30_1.0-2.0	15	0.014		10	1.65	0.012727273
TP30_2.0-3.0	15	0.052		10	1.65	0.047272727
TP38_0-1.0	15	0.022		50	1.65	0.004
TP39_0-0.5	15	0.054		50	1.65	0.009818182
TP50_0-0.4	15	0	0.0036	50	1.65	0.000654545
TP51_0-1.0	15	0.042	0.0008	50	1.65	0.007781818
TP51_1.0-2.0	15	0.114		10	1.65	0.103636364
TP51_2.3-3.0	15	0	0.0023	10	1.65	0.002090909

Sample ID	% Asbestos content	ACM Weight (kg)	Lab ACM (kg)	Soil Volume (L)	Soil Density (kg/L)	%w/w ACM
TP62_1.0-2.0	15	0.21		10	1.65	0.190909091
TP67_1.0-2.0	15	0.106		10	1.65	0.096363636
TP68_0-1.0	15	0.196		50	1.65	0.035636364
TP68_1.0-2.0	15	0.056		10	1.65	0.050909091
TP69_0-0.2	15	0.138		50	1.65	0.025090909
TP70_0-0.2	15	0.006		50	1.65	0.001090909
TP71_0-0.2	15	0.024		50	1.65	0.004363636
TP72_0-0.2	15	0.008		50	1.65	0.001454545
TP77_0-0.3	15	0.416		50	1.65	0.075636364
TP79_0-0.1	15	0.004		50	1.65	0.000727273
TP81_0-0.2	15	0.062		50	1.65	0.011272727

Residential criteria (10L AQ)	15	0.022		10	1.65	0.02
Residential criteria (50L AQ)	15	0.11		50	1.65	0.02

Appendix F – Summary of Environmental Dataset for Risk Assessment

Summary of Analytical Data as Assigned to Each Sample Location and Adopted in Risk Assessment

	Lab Analysis					Field Assessment						
Sample ID	Sample Weight (g)	AF / FA Weight (g)	Detect	Conc. (mg/kg)	ACM weight (g)	ACM Weight (kg)	Soil Volume (L)	Detect	Conc. (mg/kg)		field (g/g)	lab (g/g)
TP01	956	0.0006	0	0.627615063	0	0.004	50	0	7.272727273		7.27E-06	
TP02	864	0.0026	1	3.009259259	0	0.004	50	0	7.272727273		7.27E-06	
TP03	914	0.0006	0	0.656455142	0	0.036	50	1	65.45454545		6.55E-05	
TP04	772	0.0006	0	0.777202073	0.1008	0.486	50	1	883.6363636		0.000884	1.96E-05
TP05	752	0.0006	0	0.79787234	0	0.04	50	1	72.72727273		7.27E-05	
TP06	736	0.0007	1	0.951086957	0	0.034	50	1	61.81818182		6.18E-05	
TP07	815	0.0006	0	0.736196319	0	0.004	50	0	7.272727273		7.27E-06	
TP08	875	0.0325	1	37.14285714	0	0.564	50	1	1025.454545		0.001025	
TP09	702	0.0075	1	10.68376068	0	0.386	50	1	701.8181818		0.000702	
TP10	938	0.0006	0	0.639658849	1.335	0.22	50	1	400		0.0004	0.000213
TP11	886	0.0006	0	0.677200903	0	0.354	50	1	643.6363636		0.000644	
TP12	681	0.0006	0	0.881057269	0	0.206	50	1	374.5454545		0.000375	
TP13	731	0.0006	0	0.820793434	0	0.122	10	1	1109.090909		0.001109	
TP14	703	0.0023	1	3.271692745	0	0.004	50	0	7.272727273		7.27E-06	
TP15	665	0.0006	0	0.902255639	0	0.05	10	1	454.5454545		0.000455	
TP16	712	0.0051	1	7.162921348	0	0.004	50	0	7.272727273		7.27E-06	
TP17	725	0.0006	0	0.827586207	1.934	0.085	50	1	400.137931		0.000155	0.0004
TP18	712	0.0006	0	0.842696629	0	0.244	50	1	443.6363636		0.000444	
TP19	679	0.0101	1	14.87481591	0	0.156	50	1	283.6363636		0.000284	
TP20	690	0.0093	1	13.47826087	0	0.26	50	1	472.7272727		0.000473	
TP21	762	0.0006	0	0.787401575	0	0.004	50	0	7.272727273		7.27E-06	
TP22	674	0.0006	0	0.890207715	0	0.004	50	0	7.272727273		7.27E-06	
TP23	753	0.0038	1	5.046480744	0	0.724	50	1	1316.363636		0.001316	
TP24	806	0.0049	1	6.079404467	0	0.138	10	1	1254.545455		0.001255	
TP25	658	0.0006	0	0.911854103	0	0.146	50	1	265.4545455		0.000265	
TP26	815	0.0006	0	0.736196319	0	0.004	50	0	7.272727273		7.27E-06	
TP27	514	0.0114	1	22.17898833	0	0.278	50	1	505.4545455		0.000505	
TP28	753	0.0006	0	0.796812749	0	0.004	50	0	7.272727273		7.27E-06	
TP29	713	0.0006	0	0.841514727	0	0.004	50	0	7.272727273		7.27E-06	
TP30	675	0.0007	1	1.037037037	0	0.312	50	1	567.2727273		0.000567	
TP31	775	0.0006	0	0.774193548	0	0.004	50	0	7.272727273		7.27E-06	
TP32	899	0.0006	0	0.667408231	0	0.004	50	0	7.272727273		7.27E-06	
TP33	587	0.0006	0	1.022146508	0	0.004	50	0	7.272727273		7.27E-06	
TP34	380	0.0006	0	1.578947368	0	0.004	50	0	7.272727273		7.27E-06	
TP35	830	0.0006	0	0.722891566	0	0.004	50	0	7.272727273		7.27E-06	
TP36	803	0.0006	0	0.747198007	0	0.004	50	0	7.272727273		7.27E-06	
TP37	896	0.0022	1	2.455357143	0	0.004	50	0	7.272727273		7.27E-06	
TP38	846	0.0006	0	0.709219858	0	0.022	50	1	40		0.00004	

	Lab Analysis					Field Assessment						
Sample ID	Sample Weight (g)	AF / FA Weight (g)	Detect	Conc. (mg/kg)	ACM weight (g)	ACM Weight (kg)	Soil Volume (L)	Detect	Conc. (mg/kg)		field (g/g)	lab (g/g)
TP39	694	0.0006	0	0.864553314	0	0.054	50	1	98.18181818		9.82E-05	
TP40	725	0.0006	0	0.827586207	0	0.004	50	0	7.272727273		7.27E-06	
TP41	979	0.0006	0	0.612870276	0	0.004	50	0	7.272727273		7.27E-06	
TP42	544	0.0006	0	1.102941176	0	0.004	50	0	7.272727273		7.27E-06	
TP43	730	0.0006	0	0.821917808	0	0.004	50	0	7.272727273		7.27E-06	
TP44	838	0.0006	0	0.715990453	0	0.004	50	0	7.272727273		7.27E-06	
TP45	726	0.0006	0	0.826446281	0	0.004	50	0	7.272727273		7.27E-06	
TP46	741	0.0006	0	0.809716599	0	0.004	50	0	7.272727273		7.27E-06	
TP47	688	0.0006	0	0.872093023	0	0.004	50	0	7.272727273		7.27E-06	
TP48	743	0.0006	0	0.807537012	0	0.004	50	0	7.272727273		7.27E-06	
TP49	737	0.0006	0	0.814111262	0	0.004	50	0	7.272727273		7.27E-06	
TP50	750	0.0006	0	0.8	3.631	0.004	50	1	726.2		7.27E-06	0.000726
TP51	871	0.0006	0	0.688863375	2.254	0.114	10	1	1036.363636		0.001036	0.000388
TP52	837	0.0143	1	17.08482676	0	0.004	50	0	7.272727273		7.27E-06	
TP53	785	0.0006	0	0.76433121	0	0.004	50	0	7.272727273		7.27E-06	
TP54	748	0.0006	0	0.802139037	0	0.004	50	0	7.272727273		7.27E-06	
TP55	758	0.0006	0	0.791556728	0	0.004	50	0	7.272727273		7.27E-06	
TP56	869	0.0006	0	0.690448792	0	0.004	50	0	7.272727273		7.27E-06	
TP57	838	0.0006	0	0.715990453	0	0.004	50	0	7.272727273		7.27E-06	
TP58	849	0.0006	0	0.706713781	0	0.004	50	0	7.272727273		7.27E-06	
TP59	834	0.0006	0	0.71942446	0	0.004	50	0	7.272727273		7.27E-06	
TP60	819	0.0006	0	0.732600733	0	0.004	50	0	7.272727273		7.27E-06	
TP61	819	0.0006	0	0.732600733	0	0.004	50	0	7.272727273		7.27E-06	
TP62	770	0.0006	0	0.779220779	0	0.21	10	1	1909.090909		0.001909	
TP63	700	0.0006	0	0.857142857	0	0.004	50	0	7.272727273		7.27E-06	
TP64	639	0.0006	0	0.938967136	0	0.004	50	0	7.272727273		7.27E-06	
TP65	594	0.0006	0	1.01010101	0	0.004	50	0	7.272727273		7.27E-06	
TP66	710	0.0006	0	0.845070423	0	0.004	50	0	7.272727273		7.27E-06	
TP67	758	0.0006	0	0.791556728	0	0.106	10	1	963.6363636		0.000964	
TP68	883	0.0006	0	0.679501699	0	0.056	10	1	509.0909091		0.000509	
TP69	705	0.0006	0	0.85106383	0	0.138	50	1	250.9090909		0.000251	
TP70	661	0.0006	0	0.907715582	0	0.006	50	1	10.90909091		1.09E-05	
TP71	627	0.0006	0	0.956937799	0	0.024	50	1	43.63636364		4.36E-05	
TP72	697	0.0006	0	0.860832138	0	0.008	50	1	14.54545455		1.45E-05	
TP73	723	0.0006	0	0.829875519	0	0.004	50	0	7.272727273		7.27E-06	
TP74	774	0.0006	0	0.775193798	0	0.004	50	0	7.272727273		7.27E-06	
TP75	714	0.0006	0	0.840336134	0	0.004	50	0	7.272727273		7.27E-06	
TP76	957	0.0006	0	0.626959248	0	0.004	50	0	7.272727273		7.27E-06	
TP77	748	0.0006	0	0.802139037	0	0.416	50	1	756.3636364		0.000756	
TP78	483	0.0006	0	1.242236025	0	0.004	50	0	7.272727273		7.27E-06	

Lab Analysis

Sample ID	Sample Weight (g)	AF / FA Weight (g)	Detect	Conc. (mg/kg)	ACM weight (g)
TP79	824	0.0006	0	0.72815534	0
TP80	871	0.0006	0	0.688863375	0
TP81	697	0.0006	0	0.860832138	0
SS01	570	0.0006	0	1.052631579	
SS02	627	0.0006	0	0.956937799	
SS03	543	0.0006	0	1.104972376	
SS04	737	0.0006	0	0.814111262	
SS05	658	0.0006	0	0.911854103	
TP01	800	0.0008	1	1	
TP02	797	0.0012	1	1.505646173	
TP03	879	0.0319	1	36.29124005	
TP04	876	0.0006	0	0.684931507	
TP08	963	0.0043	1	4.465212876	
TP09	945	0.0612	1	64.76190476	
TP10	839	0.0135	1	16.09058403	
TP11	925	0.0006	0	0.648648649	
TP12	1050	0.0006	0	0.571428571	
TP13	883	0.0072	1	8.154020385	
TP14	1036	0.0256	1	24.71042471	
TP15	848	0.0243	1	28.65566038	
TP16	728	0.0006	0	0.824175824	
TP17	777	0.0143	1	18.4041184	
TP18	723	0.0046	1	6.362378976	
TP19	968	0.0175	1	18.0785124	
TP20	1126	0.5664	1	503.0195382	
TP21	745	0.0039	1	5.234899329	
TP22	949	0.0081	1	8.535300316	
TP4	829	0.0006	1	0.723763571	
TP5	829	0.005	1	6.031363088	
TP6	830	0.0006	0	0.722891566	
TP7	859	0.0695	1	80.9080326	

Field Assessment

ACM Weight (kg)	Soil Volume (L)	Detect	Conc. (mg/kg)		field (g/g)	lab (g/g)
0.004	50	1	7.272727273		7.27E-06	
0.004	50	0	7.272727273		7.27E-06	
0.062	50	1	112.7272727		0.000113	

Appendix G – Statistical Analysis

	0	1	2	3
	Fines	d_Fines	Bonded	d_Bonded
1	627615063	0	272727273	0
2	009259259	1	272727273	0
3	656455142	0	5.45454545	1
4	777202073	0	33.6363636	1
5	0.79787234	0	2.72727273	1
6	951086957	1	1.81818182	1
7	736196319	0	272727273	0
8	7.14285714	1	025.454545	1
9	0.68376068	1	01.8181818	1
10	639658849	0	400	1
11	677200903	0	43.6363636	1
12	881057269	0	74.5454545	1
13	820793434	0	109.090909	1
14	271692745	1	272727273	0
15	902255639	0	54.5454545	1
16	162921348	1	272727273	0
17	827586207	0	400.137931	1
18	842696629	0	43.6363636	1
19	4.87481591	1	33.6363636	1
20	3.47826087	1	72.7272727	1
21	787401575	0	272727273	0
22	890207715	0	272727273	0
23	046480744	1	316.363636	1
24	794044670	1	254.545455	1
25	911854103	0	35.4545455	1
26	736196319	0	272727273	0
27	2.17898833	1	05.4545455	1
28	796812749	0	272727273	0
29	841514727	0	272727273	0
30	037037037	1	57.2727273	1
31	774193548	0	272727273	0
32	667408231	0	272727273	0
33	022146508	0	272727273	0
34	578947368	0	272727273	0
35	722891566	0	272727273	0
36	747198007	0	272727273	0
37	455357143	1	272727273	0
38	709219858	0	40	1
39	864553314	0	3.18181818	1
40	827586207	0	272727273	0
41	612870276	0	272727273	0
42	102941176	0	272727273	0
43	821917808	0	272727273	0
44	715990453	0	272727273	0
45	826446281	0	272727273	0
46	809716599	0	272727273	0
47	872093023	0	272727273	0
48	807537012	0	272727273	0
49	814111262	0	272727273	0
50	0.8	0	726.2	1
51	688863375	0	036.363636	1
52	7.08482676	1	272727273	0
53	0.76433121	0	272727273	0
54	802139037	0	272727273	0
55	791556728	0	272727273	0
56	690448792	0	272727273	0

	0	1	2	3
	Fines	d_Fines	Bonded	d_Bonded
57	715990453	0	272727273	0
58	706713781	0	272727273	0
59	.71942446	0	272727273	0
60	732600733	0	272727273	0
61	732600733	0	272727273	0
62	779220779	0	909.090909	1
63	857142857	0	272727273	0
64	938967136	0	272727273	0
65	1.01010101	0	272727273	0
66	845070423	0	272727273	0
67	791556728	0	63.6363636	1
68	679501699	0	09.0909091	1
69	.85106383	0	50.9090909	1
70	907715582	0	0.90909091	1
71	956937799	0	3.63636364	1
72	860832138	0	4.54545455	1
73	829875519	0	272727273	0
74	775193798	0	272727273	0
75	840336134	0	272727273	0
76	626959248	0	272727273	0
77	802139037	0	56.3636364	1
78	242236025	0	272727273	0
79	.72815534	0	272727273	1
80	688863375	0	272727273	0
81	860832138	0	12.7272727	1
82	052631579	0		
83	956937799	0		
84	104972376	0		
85	814111262	0		
86	911854103	0		
87	1	1		
88	505646173	1		
89	6.29124005	1		
90	684931507	0		
91	465212876	1		
92	4.76190476	1		
93	6.09058403	1		
94	648648649	0		
95	571428571	0		
96	154020385	1		
97	4.71042471	1		
98	3.65566038	1		
99	824175824	0		
100	18.4041184	1		
101	362378976	1		
102	18.0785124	1		
103	03.0195382	1		
104	234899329	1		
105	535300316	1		
106	723763571	1		
107	031363088	1		
108	722891566	0		
109	30.9080326	1		

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/04/2018 3:32:43 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Fines

General Statistics

Total Number of Observations	109	Number of Distinct Observations	97
Number of Detects	32	Number of Non-Detects	77
Number of Distinct Detects	32	Number of Distinct Non-Detects	65
Minimum Detect	0.724	Minimum Non-Detect	0.571
Maximum Detect	503	Maximum Non-Detect	1.579
Variance Detects	7764	Percent Non-Detects	70.64%
Mean Detects	30.54	SD Detects	88.11
Median Detects	8.345	CV Detects	2.885
Skewness Detects	5.296	Kurtosis Detects	29.07
Mean of Logged Detects	2.201	SD of Logged Detects	1.435

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.322	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.93	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.376	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.154	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	9.375	KM Standard Error of Mean	4.762
KM SD	48.93	95% KM (BCA) UCL	20.13
95% KM (t) UCL	17.28	95% KM (Percentile Bootstrap) UCL	18.61
95% KM (z) UCL	17.21	95% KM Bootstrap t UCL	42.24
90% KM Chebyshev UCL	23.66	95% KM Chebyshev UCL	30.13
97.5% KM Chebyshev UCL	39.11	99% KM Chebyshev UCL	56.75

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.88	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.809	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.193	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.164	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.519	k star (bias corrected MLE)	0.491
Theta hat (MLE)	58.9	Theta star (bias corrected MLE)	62.23
nu hat (MLE)	33.19	nu star (bias corrected)	31.41
Mean (detects)	30.54		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

58				Minimum	0.01			Mean	8.974		
59				Maximum	503			Median	0.01		
60				SD	49.23			CV	5.486		
61				k hat (MLE)	0.159			k star (bias corrected MLE)	0.16		
62				Theta hat (MLE)	56.53			Theta star (bias corrected MLE)	55.91		
63				nu hat (MLE)	34.61			nu star (bias corrected)	34.99		
64			Adjusted Level of Significance (β)		0.0478						
65			Approximate Chi Square Value (34.99, α)		22.46			Adjusted Chi Square Value (34.99, β)	22.32		
66		95% Gamma Approximate UCL (use when n>=50)			13.98			95% Gamma Adjusted UCL (use when n<50)	14.07		
67											
68				Estimates of Gamma Parameters using KM Estimates							
69				Mean (KM)	9.375			SD (KM)	48.93		
70				Variance (KM)	2394			SE of Mean (KM)	4.762		
71				k hat (KM)	0.0367			k star (KM)	0.0418		
72				nu hat (KM)	8.003			nu star (KM)	9.116		
73				theta hat (KM)	255.4			theta star (KM)	224.2		
74			80% gamma percentile (KM)		0.628			90% gamma percentile (KM)	10.98		
75			95% gamma percentile (KM)		46.09			99% gamma percentile (KM)	218.1		
76											
77				Gamma Kaplan-Meier (KM) Statistics							
78			Approximate Chi Square Value (9.12, α)		3.397			Adjusted Chi Square Value (9.12, β)	3.351		
79		95% Gamma Approximate KM-UCL (use when n>=50)			25.16			95% Gamma Adjusted KM-UCL (use when n<50)	25.51		
80											
81				Lognormal GOF Test on Detected Observations Only							
82			Shapiro Wilk Test Statistic		0.972			Shapiro Wilk GOF Test			
83			5% Shapiro Wilk Critical Value		0.93			Detected Data appear Lognormal at 5% Significance Level			
84			Lilliefors Test Statistic		0.0686			Lilliefors GOF Test			
85			5% Lilliefors Critical Value		0.154			Detected Data appear Lognormal at 5% Significance Level			
86				Detected Data appear Lognormal at 5% Significance Level							
87											
88				Lognormal ROS Statistics Using Imputed Non-Detects							
89				Mean in Original Scale	9.046			Mean in Log Scale	-0.996		
90				SD in Original Scale	49.22			SD in Log Scale	2.255		
91			95% t UCL (assumes normality of ROS data)		16.87			95% Percentile Bootstrap UCL	18.05		
92				95% BCA Bootstrap UCL	22.98			95% Bootstrap t UCL	42.03		
93				95% H-UCL (Log ROS)	10.32						
94											
95				Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution							
96				KM Mean (logged)	0.258			KM Geo Mean	1.294		
97				KM SD (logged)	1.469			95% Critical H Value (KM-Log)	2.691		
98			KM Standard Error of Mean (logged)		0.143			95% H-UCL (KM -Log)	5.567		
99				KM SD (logged)	1.469			95% Critical H Value (KM-Log)	2.691		
100			KM Standard Error of Mean (logged)		0.143						
101											
102				DL/2 Statistics							
103			DL/2 Normal					DL/2 Log-Transformed			
104				Mean in Original Scale	9.255			Mean in Log Scale	0.00218		
105				SD in Original Scale	49.18			SD in Log Scale	1.624		
106			95% t UCL (Assumes normality)		17.07			95% H-Stat UCL	5.866		
107				DL/2 is not a recommended method, provided for comparisons and historical reasons							
108											
109				Nonparametric Distribution Free UCL Statistics							
110				Detected Data appear Lognormal Distributed at 5% Significance Level							
111											
112				Suggested UCL to Use							
113				KM H-UCL	5.567						
114											

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Bonded

General Statistics

Total Number of Observations	81	Number of Distinct Observations	34
Number of Detects	34	Number of Non-Detects	47
Number of Distinct Detects	34	Number of Distinct Non-Detects	1
Minimum Detect	7.273	Minimum Non-Detect	7.273
Maximum Detect	1909	Maximum Non-Detect	7.273
Variance Detects	209125	Percent Non-Detects	58.02%
Mean Detects	523	SD Detects	457.3
Median Detects	449.1	CV Detects	0.874
Skewness Detects	1.031	Kurtosis Detects	1.033
Mean of Logged Detects	5.615	SD of Logged Detects	1.458

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.933	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.13	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.15	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Leve

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	223.7	KM Standard Error of Mean	43.68
KM SD	387.3	95% KM (BCA) UCL	300.1
95% KM (t) UCL	296.4	95% KM (Percentile Bootstrap) UCL	297.2
95% KM (z) UCL	295.6	95% KM Bootstrap t UCL	313
90% KM Chebyshev UCL	354.8	95% KM Chebyshev UCL	414.1
97.5% KM Chebyshev UCL	496.5	99% KM Chebyshev UCL	658.3

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.616	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.78	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.142	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.156	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Leve

Gamma Statistics on Detected Data Only

k hat (MLE)	0.906	k star (bias corrected MLE)	0.846
Theta hat (MLE)	577.2	Theta star (bias corrected MLE)	618.3
nu hat (MLE)	61.62	nu star (bias corrected)	57.51
Mean (detects)	523		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	219.7
Maximum	1909	Median	0.01
SD	391.9	CV	1.784
k hat (MLE)	0.14	k star (bias corrected MLE)	0.143

172				Theta hat (MLE)	1574			Theta star (bias corrected MLE)			1540
173				nu hat (MLE)	22.62			nu star (bias corrected)			23.11
174				Adjusted Level of Significance (β)	0.047						
175				Approximate Chi Square Value (23.11, α)	13.18			Adjusted Chi Square Value (23.11, β)			13.04
176				95% Gamma Approximate UCL (use when n>=50)	385.4			95% Gamma Adjusted UCL (use when n<50)			389.4
177											
178				Estimates of Gamma Parameters using KM Estimates							
179				Mean (KM)	223.7			SD (KM)			387.3
180				Variance (KM)	149972			SE of Mean (KM)			43.68
181				k hat (KM)	0.334			k star (KM)			0.33
182				nu hat (KM)	54.07			nu star (KM)			53.4
183				theta hat (KM)	670.3			theta star (KM)			678.7
184				80% gamma percentile (KM)	350.4			90% gamma percentile (KM)			651.8
185				95% gamma percentile (KM)	992.5			99% gamma percentile (KM)			1868
186											
187				Gamma Kaplan-Meier (KM) Statistics							
188				Approximate Chi Square Value (53.40, α)	37.62			Adjusted Chi Square Value (53.40, β)			37.38
189				95% Gamma Approximate KM-UCL (use when n>=50)	317.6			95% Gamma Adjusted KM-UCL (use when n<50)			319.7
190											
191				Lognormal GOF Test on Detected Observations Only							
192				Shapiro Wilk Test Statistic	0.885			Shapiro Wilk GOF Test			
193				5% Shapiro Wilk Critical Value	0.933			Detected Data Not Lognormal at 5% Significance Level			
194				Lilliefors Test Statistic	0.202			Lilliefors GOF Test			
195				5% Lilliefors Critical Value	0.15			Detected Data Not Lognormal at 5% Significance Level			
196				Detected Data Not Lognormal at 5% Significance Level							
197											
198				Lognormal ROS Statistics Using Imputed Non-Detects							
199				Mean in Original Scale	227.3			Mean in Log Scale			3.46
200				SD in Original Scale	387.8			SD in Log Scale			2.335
201				95% t UCL (assumes normality of ROS data)	299			95% Percentile Bootstrap UCL			299.7
202				95% BCA Bootstrap UCL	314.5			95% Bootstrap t UCL			313.5
203				95% H-UCL (Log ROS)	1305						
204											
205				Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution							
206				KM Mean (logged)	3.508			KM Geo Mean			33.39
207				KM SD (logged)	2.019			95% Critical H Value (KM-Log)			3.383
208				KM Standard Error of Mean (logged)	0.228			95% H-UCL (KM -Log)			550.2
209				KM SD (logged)	2.019			95% Critical H Value (KM-Log)			3.383
210				KM Standard Error of Mean (logged)	0.228						
211											
212				DL/2 Statistics							
213				DL/2 Normal				DL/2 Log-Transformed			
214				Mean in Original Scale	221.6			Mean in Log Scale			3.106
215				SD in Original Scale	390.9			SD in Log Scale			2.343
216				95% t UCL (Assumes normality)	293.9			95% H-Stat UCL			938.1
217				DL/2 is not a recommended method, provided for comparisons and historical reasons							
218											
219				Nonparametric Distribution Free UCL Statistics							
220				Detected Data appear Approximate Normal Distributed at 5% Significance Level							
221											
222				Suggested UCL to Use							
223				95% KM (t) UCL	296.4						
224											
225				When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test							
226				When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL							
227											
228				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							

	A	B	C	D	E	F	G	H	I	J	K	L
229	Recommendations are based upon data size, data distribution, and skewness.											
230	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
231	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
232												

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