ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

DESIGNINC SYDNEY PTY LTD

ON

REMEDIATION ACTION PLAN

FOR

PROPOSED LINDFIELD LEARNING VILLAGE DEVELOPMENT

AT

ETON ROAD, LINDFIELD

16 AUGUST 2018 **REF: E30259KMrpt3_RAP**

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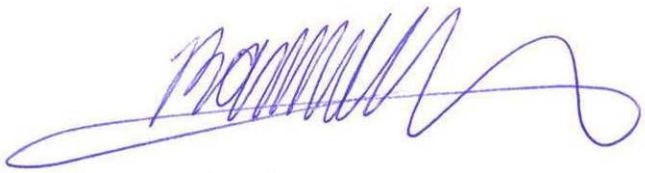

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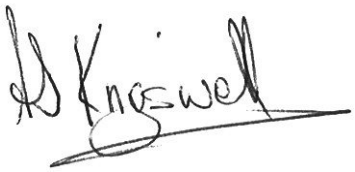

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EXECUTIVE SUMMARY

DesignInc Sydney Pty Ltd commissioned EIS to prepare a Remediation Action Plan (RAP) for the proposed Lindfield Learning Village development at Eton Road, Lindfield. Two areas understood to have proposed new external structures are located in the south of the Village. The proposed development in these areas includes an external covered outdoor learning area (COLA) and a new external stairway. The RAP applies to the two proposed development areas as shown on Figure 2, which are referred to as "the site".

In 2017 EIS completed a *Preliminary Environmental Site Assessment* (ESA) and a *Preliminary Stage 2 ESA* at the site. Summaries of the previous assessments are included in Section 2 of this report. The results of the assessments indicated that asbestos present in fill soils presents a risk to potential human receptors.

EIS understand that the construction plan for both the COLA and the external stairwell includes excavation to depths of up to 1m prior to construction of a concrete floor slab. The excavation works for the construction are expected to remove the contaminated fill material, which was encountered in those areas to a maximum depth of 0.35m in the COLA area and 0.2m in the stairwell area. Accordingly, a remediation strategy of removal of contaminated material to an appropriate facility is considered to be the preferred remedial strategy for the site.

The remediation procedure will include:

- Excavation of the fill material;
- Off-site disposal of the fill material as General Solid Waste (non-putrescible) containing Special Waste (asbestos);
- Validation of the excavated areas by the Environmental Consultant in accordance with the validation plan contained in Section 8 of the RAP; and
- If required, reinstate the area to the required levels using clean (validated) material.

A validation report will be prepared by the Environmental Consultant following completion of the remedial works.

Any material to be imported to the site should meet the requirements detailed in Section 8.3 of the RAP.

Section 9 of the RAP details procedures to be followed for any additional excavation works to be undertaken in areas that have not been previously assessed, such as the ring main to the fire hydrant system.

Section 10 of the RAP details a contingency plan to be implemented to address contingencies such as unexpected finds.

Section 11 of the RAP details the Site Management Plan for the Remediation Works.

EIS are of the opinion that the site can be made suitable for the proposed development provided that this RAP is implemented.

The conclusions and recommendations should be read in conjunction with the limitations presented in the body of the report.

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ABBREVIATIONS

Asbestos Fines/Fibrous Asbestos	**AF/FA**
Asbestos Containing Material	**ACM**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Benzo(a)pyrene Toxicity Equivalent Factor (carcinogenic PAHs)	**BaP TEQ**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Conceptual Site Model	**CSM**
Development Application	**DA**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Ecological Investigation Level	**EIL**
Environmental Investigation Services	**EIS**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
Environment Protection Authority	**EPA**
Ecological Screening Level	**ESL**
Health Investigation Level	**HILs**
Health Screening Level	**HSLs**
International Organisation of Standardisation	**ISO**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Polycyclic Aromatic Hydrocarbons	**PAH**
Polychlorinated Biphenyls	**PCBs**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
Quality Control	**QC**
Remediation Action Plan	**RAP**
Sampling, Analysis and Quality Plan	**SAQP**
Source, Pathway, Receptor	**SPR**
Standing Water Level	**SWL**
Trip Blank	**TB**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Validation Assessment Criteria	**VAC**
Virgin Excavated Natural Material	**VENM**
Work Health and Safety	**WHS**

1 INTRODUCTION

DesignInc Sydney Pty Ltd ('the client') commissioned Environmental Investigation Services (EIS)[1] to prepare a Remediation Action Plan (RAP) for the proposed Lindfield Learning Village development at Eton Road, Lindfield. The approximate site location is shown on Figure 1 and the RAP applies to the proposed development areas as shown on Figure 2. The proposed development areas are referred to as 'the site' in this report.

1.1 Proposed Development Details

EIS understand that the proposed development includes refurbishment of the existing facilities of the former UTS Lindfield campus to provide school facilities for students from kindergarten to Year 12, childcare facilities, an Intensive English Centre, Department of Education offices, a centre for education research and a conference and training centre. Demolition of the existing facilities and large-scale excavation or construction works are not understood to be part of the proposed development.

Two areas where new external structures are proposed are located in the south of the Village as shown on Figure 2. These structures include an external covered outdoor learning area (COLA) and a new external stairway.

1.2 Background

In 2017 EIS completed a *Preliminary Environmental Site Assessment*[2] (ESA) and a *Preliminary Stage 2 ESA*[3] at the site. Summaries of the previous assessments are included in Section 2 of this report. The results of the assessments indicated that asbestos in fill soils present a risk to potential human receptors. The Preliminary Stage 2 ESA report concluded that a RAP should be prepared.

1.3 Objectives

The objectives of the RAP are to:

- Provide a methodology to manage contamination, remediate and validate the site;
- Provide a contingency plan for the remedial works;
- Outline site management procedures to be implemented during remedial works; and
- Provide an unexpected finds protocol to be implemented during the remedial and development works.

[1] Environmental consulting division of Jeffery & Katauskas Pty Ltd (J&K)

[2] EIS (2017a) *Preliminary Environmental Site Assessment for Proposed Lindfield Learning Village Development at Eton Road, Lindfield* (Ref: E30259KMrpt dated 15 March 2017)

[3] EIS (2017b) *Preliminary Stage 2 Environmental Site Assessment for Proposed Lindfield Learning Village Development at Eton Road, Lindfield* (Ref: E30259KMrpt2 dated 16 October 2017)

1.4 Scope of Work

The RAP was prepared in accordance with an EIS proposal (Ref: EP47739KM) of 2 August 2018 and a sub-consultancy agreement between EIS and DesignInc of 9 August 2018. The scope of work included a review of previous assessment reports for the site and preparation of a RAP report.

The scope of work was undertaken with reference to the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[4], other guidelines made under or with regard to the Contaminated Land Management Act (1997)[5] and State Environmental Planning Policy No.55 – Remediation of Land (1998)[6]. Other guidelines are referenced throughout this report.

[4] National Environment Protection Council (NEPC), (2013). *National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013).* (referred to as NEPM 2013)

[5] Contaminated Land Management Act 1997 (NSW) (referred to as CLM Act 1997)

[6] *State Environmental Planning Policy No. 55 – Remediation of Land 1998* (NSW) (referred to as SEPP55)

2 SITE INFORMATION

2.1 Site Identification

Table 2-1: Site Identification

Current Site Owner:	NSW Minister for Education
Site Address:	Eton Road, Lindfield, NSW, 2070 (Listed in some sources as 100 Eton Rd, unnumbered in other sources.)
Lot & Deposited Plan:	Part of Lot 2 DP1151638
Current Land Use:	Vacant
Proposed Land Use:	Education
Local Government Authority:	Ku-ring-gai Council
Total Area of Former UTS Campus:	Approximately 5ha
Maximum Total Area of Proposed Soil Disturbance For Development of Site Areas:	Approximately 500m^2
RL (AHD) (approx.):	50m – 66m
Geographical Location (decimal degrees) (approx.):	Latitude: -33.789969° Longitude: 151.160619°

2.2 Site Location, Regional Setting and Topography

The campus is located close to a predominantly residential area of Lindfield. The campus is located on the crest of a hill, which in the vicinity of the site generally slopes downwards towards the south.

2.3 Regional Geology

A review of the regional geological map of Sydney (1983[7]) indicated that the site is underlain by Hawkesbury Sandstone, which typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses.

2.4 Acid Sulfate Soil Risk

The results of the previous assessments indicated that the site is not considered to be within an acid sulfate soil risk area.

[7] Department of Mineral Resources, (1983). *1:100,000 Geological Map of Sydney (Series 9130).*

2.5 Hydrogeology

Hydrogeological information reviewed for the previous assessments indicated that the regional aquifer on-site and in the areas immediately surrounding the site includes porous, extensive aquifers of low to moderate productivity. The subsurface conditions encountered during drilling works at the site consisted of residual soils overlying shallow sandstone bedrock. The potential for viable groundwater abstraction and use of groundwater under these conditions is considered to be low.

2.6 Receiving Water Bodies

The site location and regional topography indicated that excess surface water flows have the potential to enter Blue Gum Creek, located approximately 100m to the south of the site, and Sugarbag Creek, located approximately 100m east of the site. The creeks are considered to be potential receptors.

2.7 EIS Site Inspection

A walkover inspection of the proposed development areas was undertaken by EIS during the Preliminary Stage 2 ESA on 8 September 2017. The area where the COLA is proposed was located to the south of a 3-4 storey brick building and was generally covered with grass, trees and other vegetation, gravel or sandstone outcrops. The area where the new external stairway is proposed was located to the south-east of a 2-3 storey brick building and concrete stairway and was generally grass-covered.

2.8 Summary of Site History

A review of the site's history indicated that it was likely to have been undisturbed bushland until 1915, when it was acquired for use as part of an army rifle range. Historical aerial photographs indicated that the rifle range was actually located approximately 150m south-east of the site. Development occurred on the site from the 1960s with the construction of brick and concrete buildings, roadways and landscaped areas. The site was used as an education facility and served as the UTS campus for approximately 25 years until its closure at the end of 2015.

2.9 Summary of Previous Investigations by EIS

2.9.1 Preliminary ESA (March 2017)

A review of the site's history was undertaken, as summarised above. Potential contamination sources at the site include fill material that may have been used during construction, the former rifle range (although the risk of encountering spent ammunition was considered to be low), the use of pesticides and the use of hazardous building materials. It was considered that there was a low potential for widespread significant site contamination, and that if contamination was present it was likely to be located in discrete locations or hotspots. It was recommended that investigation of any unpaved areas where children could potentially come into regular contact with soil be undertaken, and that a hazardous building material assessment should be undertaken prior to any refurbishment works.

2.9.2 Preliminary Stage 2 ESA (October 2017)

Soil samples were obtained from five sampling points located within the proposed development areas, three from within the proposed COLA and two from within the proposed stairwell. Subsurface conditions at the sampling points consisted of fill material to depths ranging from 0.2m to 0.35m, underlain by natural silty sand and shallow sandstone bedrock, which was encountered at depths ranging from 0.5m to 1.6m. Sandstone outcrops were located within the COLA area.

Soil samples obtained from the fill and natural soils were analysed for a combination of heavy metals, total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAHs), organochlorine and organophosphate pesticides (OCPs and OPPs), polychlorinated biphenyls (PCBs) and asbestos.

A fibre cement fragment (FCF) containing chrysotile asbestos was encountered in the fill soils sampled from one of the boreholes (BH1) located within the COLA area, as shown on the attached Figure 3. The source of the FCF is not known. It may have been imported onto the site along with the fill material, or may be associated with the construction and/or demolition of site structures. EIS are of the opinion that the asbestos contamination is confined to the fill material at the site. All fill material in the proposed development areas that were assessed is considered to be potentially contaminated with asbestos and should be treated accordingly.

The following actions were recommended:

1. Prepare a Remediation Action Plan (RAP) to outline remedial measures for the site;
2. Prepare an Asbestos Management Plan to outline safety measures to be undertaken during the remedial works; and
3. Prepare a Validation Assessment report on completion of remediation.

3 REVIEW OF CONCEPTUAL SITE MODEL

A conceptual site model (CSM) was included in the Preliminary Stage 2 ESA to provide a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The table below includes an update of the conceptual site model (CSM) based on the findings of the previous assessments. This CSM has been used to design the remediation strategy.

Table 3-1: Updated CSM

CoPC[a]	AEC[b]	Receptor	Pathway	Potential Risk
Asbestos in fill soil	Fill soil within the development areas	Construction workers	Inhalation	There is an SPR[c] link that will need to be remediated.
		Students, teachers, other staff	Inhalation	There is an SPR link that will need to be remediated.

[a] CoPC Contaminant of Potential Concern

[b] Area of Environmental Concern

[c] SPR – Source, Pathway, Receptor

4 KNOWN REMEDIATION EXTENT

The known extent of remediation required is within the two proposed development areas, as shown on the attached Figure 4.

5 REMEDIATION OPTIONS

5.1 Soil Remediation Options

The Site Auditor Guidelines 2017 state that the hierarchy of options followed in New South Wales for site remediation or management is set out in s.6(16) Assessment of Site Contamination Policy Framework of Schedules A and B of the NEPM. The relevant section is reproduced below:

"In general, to achieve the desired environmental outcome, the process of the assessment of site contamination should be placed within the context of the broader site assessment and management process. In particular, in assessing the contamination, the site assessor and others should take into account the preferred hierarchy of options for site clean-up and/or management which is outlined as follows:

- *on-site treatment of the contamination so that it is destroyed or the associated risk is reduced to an acceptable level; and*
- *off-site treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level, after which soil is returned to the site;*

or if the above are not practicable,

- *consolidation and isolation of the soil on site by containment with a properly designed barrier; and*
- *removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material;*

or,

- *where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy. When deciding which option to choose, the sustainability (environmental, economic and social) of each option should be considered, in terms of achieving an appropriate balance between the benefits and effects of undertaking the option.*

In cases where no readily available or economically feasible method is available for remediation, it may be possible to adopt appropriate regulatory controls or develop other forms of remediation.

It should be emphasised that the appropriateness of any particular option will vary depending on a range of local factors. Acceptance of any specific option or mix of options in any particular set of circumstances is therefore a matter for the responsible participating jurisdiction."

Reference has also been made to the Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia 2009 (WA Guidelines 2009). These guidelines recommend that any asbestos remediation proposal should consider the following:

- minimisation of public risk;
- minimisation of contaminated soil disturbance; and
- minimisation of contaminated material/soil moved to landfill.

5.2 Consideration of Remediation Options

The table below discusses a range of remediation options:

Table 5-1: Consideration of Remediation Options

Option	Discussion	Applicability
Option 1 On-site treatment of contaminated soil	On-site treatment provides a mechanism to reuse the processed material and, in some instances, to avoid the need for large scale earthworks. Some of the treatment options available for various types of contamination include bio-remediation, soil washing, air sparging and soil vapour extraction, thermal desorption and physical removal of bonded ACM fragments.	Some limited removal of visible bonded ACM from the surface of the site could be incorporated into the remedial strategy. However attempting to pick out all of the bonded ACM would require significant earthworks. The remaining treatment options are not appropriate for asbestos.
Option 2 Off-site treatment of contaminated soil	Contaminated soils are excavated, transported to an approved/ licensed treatment facility, treated to remove or stabilise the contaminants, then returned to the subject site, transported to an alternative site or disposed to an approved landfill facility. This option provides for a relatively short program of on-site works, however there may be some delays if the material is to be returned to the site following treatment and regulatory requirements would need to be carefully considered. The cost per tonne for transport to and from the site and for treatment is considered to be relatively high. The material would also have to be assessed in terms of suitability for reuse as part of the proposed development works.	Similar issues that apply to Option 1 would also apply to Option 2. In addition, material which leaves the site as a waste stream can only be taken to a facility licensed by the NSW EPA license to receive the waste stream. The treated material cannot be brought back onto the site as it will be classed as a waste stream.

Option	Discussion	Applicability
Option 3 Consolidation and isolation of impacted soil by cap and containment	This would include the placement of a warning layer (such as geo-grid or geofabric) and pavement over the surface of the contaminated soil to isolate the material and thereby reduce the health risk to future site users. The capping and/or containment must be appropriate for the specific contaminants of concern. An ongoing Environmental Management Plan (EMP) would be required and site identification documentation, including the Section 10.7 Council planning certificate (or other appropriate notification mechanism), would be modified to note the presence of the contamination/EMP in the event that contamination remains at concentrations that exceed the Validation Assessment Criteria (VAC). This may impact upon development approval conditions, place restrictions on the use of the land and limit the future potential land value.	Option 3 is considered to be a viable option for the contamination at the site. However, as the contaminated fill material is expected to be excavated and removed during the construction works, it is not considered to be the preferred option.
Option 4 Removal of contaminated material to an appropriate facility	Contaminated soils would be classified in accordance with NSW EPA guidelines for waste disposal, excavated and disposed of off-site to an appropriately licensed facility. The material would have to meet the requirements for landfill disposal. Landfill gate fees would apply in addition to transport costs.	Option 4 is considered to be a viable option for the contamination at the site, and is considered to be the preferred option, as summarised below in Section 5.3.

5.3 Rationale for Selection of Remedial Strategy

EIS understand that the construction plan for both the COLA and the external stairwell includes excavation to depths of up to 1m prior to construction of a concrete floor slab. The excavation works for the construction are expected to remove the contaminated fill material, which was encountered in those areas to a maximum depth of 0.35m in the COLA area and 0.2m in the stairwell area.

In the event that the fill material is found to extend to a greater depth than the proposed excavation depth for construction, the excavation should be extended deeper until the fill material is removed and natural soil or bedrock is encountered.

The selected remediation strategy is considered most appropriate due to the following:

- The proposed development includes excavation of the fill material for the construction of concrete slabs;
- On-site and off-site treatment technologies are generally considered either uneconomical or unsuitable for ACM;
- The excavation and removal of the contaminated material from the site will remove the contamination; and
- The risk to site workers can be managed by wearing appropriate PPE during the works.

6 REMEDIATION DETAILS

6.1 Roles and Responsibilities

The major roles and responsibilities for the implementation of this RAP are outlined in the table below.

Table 6-1: Roles and Responsibilities

Role	Responsibility
Project Manager (PM)	Company Name: Savills Australia Contact: Emma Viljoen Phone: (02) 8913 4838 Address: Level 25, 1 Farrer Place, Sydney, NSW, 2000 Email: eviljoen@savills.com.au The PM is required to provide this RAP to the Remediation and Construction Contractor (RCC) prior to commencement of remediation and construction work. The PM must ensure that the RCC has understood the plan and will implement it in its totality. Further details are outlined in the sections below.
Remediation & Construction Contractor (RCC)	Company Name: Taylor Contact: Gary Shaw Phone: (02) 8736 9000 Address: Level 13, 157 Walker Street, North Sydney, NSW, 2060 Email: garysh@taylorau.com.au Prior to the commencement of remediation work, this RAP must be provided to the RCC and the management plan for remediation works (see Section 11) should be reviewed and implemented. The RCC is required to implement the procedures outlined in this plan. The RCC is required to collect all necessary documentation and forward them onto the Project Manager and Environmental Consultant as they become available. Further details are outlined in the sections below.
Environmental Consultant (EC)	Environmental Investigation Services (EIS) Contact: Rob Muller Phone: (02) 9888 5000 Address: PO Box 976, North Ryde BC, NSW 1670 Email: rmuller@jkgroup.net.au The EC provides consulting advice on the ongoing remediation work at the site. The EC is required to review any deviation to this plan or in the event of unexpected finds if and when encountered during the site work. The EC is required to collect validation samples and prepare a validation report for the site.

Other consultants and contractors (landscaping etc.)	Other consultants who may become involved in the project should be made aware of this RAP. The consultants are required to review this RAP and implement any relevant procedures outlined. The consultants are required to collect all relevant documentation and forward them onto the PM and EC as they become available.

6.2 Remediation Documentation

The RCC must retain all documentation associated with the remediation, including:

- Waste classification and waste tracking documents;
- Soil and waste disposal documents;
- Photographs of remediation works; and
- Imported materials documents.

Copies of the above must be forwarded to the EC for review and inclusion in the final site validation report.

6.3 Remediation Details

The specific remediation details are described in the table below:

Table 6-2: Remediation Procedure

Step	Procedure	Responsibility
1	Establish Asbestos Related Controls and Arrange Licenses and Tracking Requirements Prior to the commencement of any excavation: • Notification of bonded asbestos removal should be submitted to SafeWork NSW by the RCC, who must have a Class B asbestos removal license; • Register with NSW EPA WasteLocate for the transport of asbestos waste. Other notifications may also be required depending on the waste classification of the fill; and • An asbestos removal control plan should be prepared by the RCC for the works required. This should include details for works health and safety (WHS) and personal protective equipment (PPE), which as a minimum should include requirements for wearing safety helmets and steel capped boots, disposable coveralls rated type 5 category 3 (prEN ISO 13982–1) or equivalent and P2 masks conforming to the requirements of AS/NZS 1716:2009, and use of appropriate gloves.	RCC
2.	Mark the area: Prior to the commencement of excavation, the remediation areas should be clearly marked with spray paint and/or pegs.	RCC & EC

Step	Procedure	Responsibility
3.	Address stability issues: Geotechnical advice should be sought regarding the stability of any adjacent structures and/or adjacent areas prior to commencing the excavation.	PM & RCC
4.	Removal of fill material: Remediation of fill will be undertaken as follows: • Excavate the fill to the full extent of remediation under the guidance of the Environmental Consultant; • Load the fill onto trucks and dispose in accordance with the assigned waste classification. Based on the analytical results from the Preliminary Stage 2 ESA, the fill is classified for off-site disposal as General Solid Waste (non-putrescible) containing Special Waste (asbestos); • Validate the excavation in accordance with Section 8; and • If required, reinstate the area to an appropriate level using clean (validated) material.	RCC & EC
5.	Contingency Plan: The contingency measures outlined in Section 10 of the RAP should be implemented in the event of unexpected finds or validation failure.	RCC
6.	Validation Report: A validation report will be prepared documenting the remediation works undertaken above. The validation report will include documentation of waste disposal, waste tracking, results of the validation testing and other information as applicable.	EC

7 DATA QUALITY

7.1 Data Quality Objectives

Data Quality Objectives (DQOs) were developed to define the type and quality of data required to achieve the project objectives outlined in Section 1.3. The DQOs were prepared with reference to the process outlined in Schedule B2 of NEPM (2013) and the Guidelines for the NSW Site Auditor Scheme, 3rd Edition (2017)[8]. The seven-step DQO approach for this project is outlined in the following sub-sections.

7.1.1 Step 1 - State the Problem

The previous assessments at the site have identified contamination that poses a risk to human health. Remediation is required to minimise the risk to the receptors and to render the site suitable for the proposed development. Validation of the remedial works is to be summarised in a validation report.

7.1.2 Step 2 - Identify the Decisions of the Study

The objectives of the assessment are outlined in Section 1.3. The decisions to be made reflect these objectives and are as follows:

- Following remedial works, is the site suitable for the proposed development?
- Has all of the excavated material been disposed of appropriately?

7.1.3 Step 3 - Identify Information Inputs

The primary information inputs required to address the decisions outlined in Step 2 include the following:

- Existing data from previous assessments;
- Site information, including site observations and site history documentation;
- Validation sampling of soil;
- Observations of sub-surface materials;
- Laboratory analysis of soils for ACM; and
- Field and laboratory QA/QC data.

7.1.4 Step 4 - Define the Study Boundary

The sampling will be confined to the site boundaries as shown in the attached Figure 4.

[8] NSW EPA (2017). *Guidelines for the NSW Site Auditor Scheme, 3rd ed.* (referred to as Site Auditor Guidelines 2017)

7.1.5 Step 5 - Develop an Analytical Approach

7.1.5.1 Validation Assessment Criteria

The laboratory data will be assessed against relevant validation assessment criteria (referred to as VAC), as outlined in Section 8.2.

7.1.5.2 Field and Laboratory QA/QC

Analysis of intra- and inter-laboratory duplicates, trip blank, trip spike and rinsate samples are not considered to be required for asbestos analysis.

The suitability of the laboratory data will be assessed against the laboratory QA/QC criteria. These criteria have been developed and implemented in accordance with the laboratory's National Association of Testing Authorities, Australia (NATA) accreditation and align with the acceptable limits for QA/QC samples as outlined in NEPM (2013) and other relevant guidelines.

In the event that acceptable limits are not met by the laboratory analysis, other lines of evidence will be reviewed (e.g. field observations of samples, preservation, handling etc.) and where required, consultation with the laboratory will be undertaken in an effort to establish the cause of the non-conformance.

7.1.6 Step 6 – Specify Limits on Decision Errors

To limit the potential for decision errors, a range of quality assurance processes will be adopted. A quantitative assessment of the potential for false positives and false negatives in the analytical results will be undertaken with reference to Schedule B(3) of NEPM (2013) using the data quality assurance information collected.

Decision errors can be controlled through the use of hypothesis testing. The test can be used to show either that the baseline condition is false or that there is insufficient evidence to indicate that the baseline condition is false. The null hypothesis is an assumption that is assumed to be true in the absence of contrary evidence. For the validation assessment, the null hypothesis will be adopted, which is that there is considered to be a complete SPR linkage for the CoPC identified in the CSM unless this linkage can be proven not to, or unlikely to, exist.

7.1.7 Step 7 - Optimise the Design for Obtaining Data

The most resource-effective design will be used in an optimum manner to achieve the assessment objectives. Adjustment of the assessment design may occur following consultation or feedback from project stakeholders. The design will be optimised via consideration of the various lines of evidence used to select the sample locations, the media being sampled, and also by the way in which the data were collected.

7.2 Data Quality Indicators (DQIs)

The DQIs required to address inputs into the decision include: precision, accuracy, representativeness, completeness and comparability. The DQIs will be addressed as follows:

Table 7-1: DQIs

Indicator	Methods
Completeness	Data and documentation completeness will be achieved by: • Preparation of a validation sampling and analysis plan (see Section 8); • Preparation of chain of custody (COC) records; • Review of the laboratory sample receipt information; • Use of National Association of Testing Authorities (NATA) registered laboratories for all analysis; • Visual screening of samples during the investigation; and • Laboratory analysis to target CoPC. Any changes to the analytical schedule to be documented.
Comparability	Data comparability will be achieved by: • Maintaining consistency in sampling techniques; • Use of appropriate storage and transport methods; and • Use of consistent analytical techniques and reporting standards by the laboratories.
Representativeness	Data representativeness will be achieved by: • Appropriate coverage of the excavated area; and • Representative coverage of analysis for CoPC. Any changes to the analytical schedule to be documented.
Precision	Precision will be achieved by: • Use of National Association of Testing Authorities (NATA) registered laboratories for all analysis.
Accuracy	Accuracy will be achieved by: • Use of trained and qualified field staff; • Appropriate industry standard sampling equipment and decontamination procedures; • Sampling and equipment decontamination as required; • Appropriate sample preservation, handling, holding time and COC procedures; • Review of the primary laboratory QA/QC data including: RPDs, surrogate recovery, repeat analysis, blanks, laboratory control samples and matrix spikes; • The following acceptance criteria will be used to assess the primary laboratory QA/QC results. Non-compliance to be documented: ➢ RPDs: o results that are < 5 times the PQL, any RPD is acceptable; and o results > 5 times the PQL, RPDs between 0-50% are acceptable; ➢ Blanks: All less than PQL; and • Reporting to industry standards.

8 VALIDATION PLAN

Validation is necessary to demonstrate that remedial measures described in this RAP have been successful and that the site is suitable for the intended land use. The sampling program for the validation is outlined in Section 8.1. This is the minimum requirement based on the remedial strategies provided. Additional validation sampling may be required based on site observations made during remediation.

Site observations will also be used as a validation tool to assess the extent of site contamination. In particular visual and olfactory indicators such as odours and staining should be recorded.

8.1 Validation Sampling and Documentation

The table below outlines the validation requirements for the site.

Table 8-1: Validation Requirements

Aspect	Sampling	Analysis	Observations and Documentation
Fill Removal			
Base of excavation after fill removal is complete	One sample per 100m^2 (10m grid) of underlying soil	Asbestos (500mL samples for quantification)	Observations to be recorded. Photographs to be taken. Disposal dockets to be retained.
Imported Materials – relevant to all site works			
Imported VENM backfill (if required)	Minimum of three samples per source	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRH, BTEX PAHs, OCP/OPP, PCBs and asbestos. Additional analysis may be required depending on site history.	VENM documentation/ report required (should include source site history to demonstrate analytes are appropriate). Material to be inspected upon importation to confirm it is free of visible/olfactory indicators of contamination and is consistent with documentation.

Aspect	Sampling	Analysis	Observations and Documentation
Imported engineering materials such as recycled aggregate, road base etc.	Minimum of three samples per source/material type.	Heavy metals (as above), TRHs, BTEX, PAHs, OCP/OPP, PCBs and asbestos.	Documentation required to confirm material has been classified with reference to a relevant exemption and is fit for purpose on site. Material to be inspected upon importation to confirm it is free of visible/olfactory indicators of contamination and is consistent with documentation. Dockets for imported material to be provided.
Imported engineering materials comprising only natural quarried products such as blue metal etc.	At the Environmental Consultant's discretion based on supplier documentation.	At the Environmental Consultant's discretion based on supplier documentation.	Documentation to be provided from the supplier confirming the material is a product comprising only VENM (i.e. quarried product). Review of quarry POEO licence. Material to be inspected upon importation to confirm it is free of anthropogenic materials, visible and olfactory indicators of contamination, and is consistent with documentation. Dockets for imported material to be provided.

Aspect	Sampling	Analysis	Observations and Documentation
Imported landscaping materials	Minimum of three samples per source/material type.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRHs, BTEX, PAHs, OCPs, OPPs, PCBs and asbestos.	Documentation required to confirm material has been produced under an appropriate standard and is fit for purpose on site. Material to be inspected upon importation to confirm it is free of visible/olfactory indicators of contamination and is consistent with documentation. Dockets for imported material to be provided.

8.2 Validation Assessment Criteria (VAC)

The VAC to be adopted for the validation assessment are outlined in the table below:

Table 8-2: VAC

Validation Aspect	Criteria
Soil validation	HSL-A criteria for bonded ACM – 0.01% w/w. No asbestos present in the top 0.1m of soil. Aesthetics: soils to be free of staining and odours.

Data should initially be assessed as above or below the VAC. Statistical analysis may be applied if deemed appropriate by the consultant and undertaken in accordance with the NEPM (2013).

8.3 Material Importation Requirements

If any material is to be imported to the site, the importation criteria outlined in this section of the report should be used as a guide for an initial assessment. Elevations of individual compounds should be assessed on a case by case basis.

8.3.1 Material for Landscaping

The proposed development may require suitable material (topsoil, nutrient-rich soil, etc.) to be imported onto the site for landscaping purposes. In our experience, this type of material generally does not meet the definition of virgin excavated natural material (VENM) as outlined in the Waste Classification Guidelines 2014.

In order to minimise the risk of importing potentially contaminated material onto the site, the following measures should be adopted:

- A reputable supplier of landscaping material should be contacted to identify suitable material for importation;
- Prior to the importation of the material, the following documentation should be obtained from the supplier:
  - Regular laboratory testing data indicating that the material is not contaminated. The laboratory testing results should be reviewed by the EC and as a minimum should meet the environmental SAC outlined in the Stage 2 ESA report;
  - Product details and other documents;
- In the event the material is not from a reputed/licensed supplier, an inspection of the source material should be undertaken prior to importation onto the site. As a minimum, the stockpiled material should be sampled at a ratio of three samples for stockpiles up to 75m^3 (as outlined in NEPM 2013) of material to be imported. The samples should be analysed for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); TRH/BTEX; PAHs, OCP/OPP/PCBs and asbestos. A suitable field QA/QC procedure should be adopted;
- The analytical data should be assessed against the VAC;
- Provided that the analytical results do not exceed the VAC, the material can be imported onto the site and stockpiled away from the remediation area or any other stockpiles located on site; and
- Upon importation, the material should be inspected to confirm that the material is the same as that initially sampled/supplied and is free from visible and olfactory evidence of contamination.

8.3.2 Material Imported for Engineered Fill

If backfill material is required, only material classified as VENM or ENM should be imported onto the site to use as backfill provided it meets the requirements outlined below.

8.3.2.1 Importation of Virgin Excavated Natural Material (VENM)

The Waste Classification Guidelines 2014 define VENM as natural material (such as clay, gravel, sand, soil or rock fines):

- That has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial mining or agricultural activities;
- That does not contain sulfidic ores or other waste; and

- Includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette.

The following procedures should be adopted:

- An inspection of the source site to confirm and document that:
  - Historical and current use of the site has not resulted in contamination of the site;
  - Potential acid sulfate soil materials are not present at the site;
  - The appearance of material excavated from the site is consistent with natural material, i.e. relatively homogenous and without any debris (any fill material should have been removed prior to the inspection);
  - The physical characteristics of the material to be imported, i.e. soil/rock description, colour, etc. This should be confirmed by photographic documentation;
- Source sites should be inspected by the Environmental Consultant and any relevant reports should be reviewed prior to acceptance of material onto the site;
- All material imported as VENM should be accompanied by analytical data showing that the material has been analysed and meets the acceptance criteria specified in the table below;
- The material should be inspected on arrival to confirm that the material is consistent with the documentation reviewed from the source site and is free from evidence of contamination; and
- Geotechnical advice should be sought regarding compaction so that all backfilled areas are suitable for the proposed use.

Based on the site inspection and review of any relevant documentation there are likely to be two potential scenarios for selecting an appropriate sampling density:

1. The risk of the VENM being impacted by contamination is considered to be low: a minimum of three samples of the VENM should be sampled and analysed from across the site; or
2. The risk of the VENM being impacted by contamination is considered to be medium to high: the material should be sampled and analysed in accordance with the NEPM 2013 guidelines.

A suitable QA/QC procedure should be adopted.

8.3.2.2 Importation of Excavated Natural Material (ENM)

In the event that a source of VENM is not readily available and filling of the site is required, Excavated Natural Material (ENM) may be considered as an alternative. The inspection procedures specified for VENM should be undertaken when assessing imported ENM. All sampling, analysis and data interpretation must conform to the criteria specified in the Excavated Natural Material (ENM) exemption (2012[9]).

[9] Protection of the Environment Operations (Waste) Regulation, (2005), *General Exemption Under Part 6, Clause 51 and 51A, The excavated natural material exemption, 2012* (referred to as ENM exemption 2012)

The ENM should be accompanied by appropriate documentation verifying that the material has been assessed in accordance with the ENM exemption 2012. The material should be inspected on arrival to confirm that the material is consistent with the documentation reviewed from the source site and is free from evidence of contamination.

Material classed as ENM can only be used as engineered fill in areas specified in the ENM exemption 2012 provided it is geotechnically suitable.

8.4 Validation Report

As part of the validation process, a site validation report will be prepared by the environmental/validation consultant. The report will outline the remediation work undertaken at the site and will summarise the results of the validation assessment. The report is to be prepared in accordance with the NSW OEH *Guidelines for Consultants Reporting on Contaminated Sites* (2011). The report should draw conclusions regarding the success of the remediation/validation and the suitability of the site for the proposed development from a contamination perspective.

9 ADDITIONAL LINDFIELD LEARNING VILLAGE WORKS

We understand that some additional excavation works will be undertaken at various locations around the Lindfield Learning Village in order to install a ring main to the fire hydrant system and to introduce a fire trail to allow the NSW Rural Fire Service (RFS) to access the perimeter of the building and fight fire from these locations. We understand that the intention is to reuse the excavated material to backfill the excavations if found to be suitable. The Project Manager has requested that this be incorporated into the RAP.

The contamination status of soils outside the two areas assessed during the Preliminary Stage 2 ESA is currently unknown. Therefore, EIS consider that the following procedure should be implemented to address potential contamination issues associated with soils in areas outside the two areas that were previously assessed:

1. The Environmental Consultant should be present during all additional excavation works in order to undertake an inspection of the excavated material;

2. Excavated fill material and excavated natural soil and rock should be stockpiled separately;

3. Samples should be collected by the Environmental Consultant from the stockpiled fill material at a sampling rate specified in Section 7.5.2 of NEPM 2013, as summarised below:

Table 9-1: Number of Samples for Initial Assessment of Stockpiles

Stockpile Volume (m^3)	No. of Samples
<75	3
75 - <100	4
100 - <125	5
125 - <150	6
150 - <175	7
175 - <200	8

For stockpiles greater than 200m^3, lower sampling rates may be derived by applying statistical analysis. As a guide, for stockpiles of homogenous material of up to 2500m^3, the collection of ten samples is likely to provide sufficient data to characterise the stockpile by applying statistical analysis.

4. The fill stockpile samples should be analysed for the CoPC identified in the Preliminary Stage 2 ESA: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs) and asbestos.

5. The Environmental Consultant should make an assessment of the suitability of the fill soils to remain on-site by comparing the analytical results to the following criteria:

Table 9-2: Assessment Criteria for Suitability of Stockpiled Fill Material to Remain Onsite

Guideline	Applicability
Health Investigation Levels (HILs) (NEPM 2013)	The HIL-C criteria will be adopted for the stockpile assessment. The HIL-C criteria apply to public open space such as parks, playgrounds, playing fields, secondary schools and footpaths.
Health Screening Levels (HSLs) (NEPM 2013)	The HSL-C criteria will be adopted for the stockpile assessment. The HSL-C criteria apply to public open space such as parks, playgrounds, playing fields, secondary schools and footpaths.
Direct Contact Limits for TRH (NEPM 2013)	These guidelines will be used after considering the relevant HSLs for adverse effects of TRH contamination if necessary.
Asbestos in Soil	The 'presence/absence' of asbestos in soil will be adopted as the assessment criterion as a conservative measure.

In the event that the material is assessed to be unsuitable to remain on-site, it should be classified in accordance with the NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014[10]) to classify the material for off-site disposal.

The results of the stockpile assessment should be included in a report prepared by the Environmental Consultant.

6. Any material assessed to be unsuitable to remain on-site must be disposed to a landfill that is licensed by the NSW EPA to receive the waste stream. The landfill should be contacted to obtain the required approvals prior to commencement of excavation.

7. Material assessed to be suitable to remain on-site may be used to backfill those areas from which it was excavated.

[10] NSW EPA, (2014), *Waste Classification Guidelines, Part 1: Classifying Waste.* (referred to as Waste Classification Guidelines 2014)

8. The Environmental Consultant should also make an assessment of the suitability of any excavated and stockpiled natural soil and rock to be re-used on-site in accordance with established guidelines and procedures.

9. The Contingency Plan outlined in Section 10 of this RAP should be implemented in the event of any unexpected finds.

10 CONTINGENCY PLAN

A review of the proposed remediation works has indicated that the greatest risk that may affect the success of the remediation is an unexpected find. A contingency plan for unexpected finds is outlined below, together with a selection of other contingencies that may apply to this project.

10.1 Unexpected Finds

Residual hazards that may exist at the site would generally be expected to be detectable through visual or olfactory means. At this site, these types of hazards may include friable types of asbestos in soil and odorous or stained hydrocarbon impacted soils.

The procedure to be followed in the event of an unexpected find is presented below:

- In the event of an unexpected find, all work in the immediate vicinity should cease and the Remediation Contractor should contact the Environmental Consultant immediately;
- Temporary barricades should be erected to isolate the area from access to the workers and machinery;
- In the event that suspected friable asbestos material is encountered, an occupational hygienist or asbestos assessor should be contacted immediately. EIS has an in-house asbestos assessor;
- The Environmental Consultant should attend the site and assess the extent of additional remediation that may be required and/or adequately characterise the contamination;
- In the event that additional remediation is required outside the scope of this RAP, an addendum to the RAP should be prepared and submitted to the client and the Site Auditor for approval; and
- If appropriate, additional validation sampling should be undertaken and the results should be included in the validation report.

10.2 Soil Validation Failure

In the event of soil validation failure, further excavation of the area should be undertaken as directed by the Environmental Consultant and validation samples collected to confirm validation of the underlying material.

10.3 Importation Failure for VENM or other Imported Materials

Where material to be imported onto the site does not meet the importation acceptance criteria detailed in Section 8.1, the material must not be accepted or used on-site. Alternative material must be sourced that meets the importation requirements.

11 SITE MANAGEMENT PLAN FOR REMEDIATION WORKS

The information outlined in this section of the RAP is for the remediation work only. The client should contact the local consent authority (Council or certifier) for specific site management requirements for the overall development of the site.

11.1 Project Contacts

Emergency procedures and contact telephone numbers should be displayed in a prominent position at the site entrance gate and within the main site working areas. The contact details of key project personnel are summarised below.

Table 11-1: Project Contacts

Task	Company	Contact Details
Project Manager	Savills Australia	Emma Viljoen, (02) 8913 4838
Remediation and Construction Contractor	Taylor	Gary Shaw, (02) 8736 9000
Environmental Consultant	EIS	Rob Muller, (02) 9888 5000
NSW EPA	Pollution Line	131 555
Emergency Services	Ambulance, Police, Fire	000

11.2 Security

Prior to the commencement of remediation works, fencing should be installed as required to secure the remediation areas. Warning signs should be erected which outline the PPE required for remediation work. All excavations should be clearly marked and secured to reduce the risk to site personnel from injury by falling into open excavations.

11.3 Timing and Sequencing of Remediation Works

The remedial works should be completed prior to the commencement of building works. In the event of unexpected delays, geo-fabric should be used to cover the remediation area in order to reduce the potential for dust generation, surface water run-off and exposure to receptors.

11.4 Site Soil and Water Management Plan

The Remediation and Construction Contractor should prepare a detailed soil and water management plan prior to the commencement of the works. Silt fences should be used to control the surface water runoff at all appropriate locations of the site. Reference should be made to the consent conditions for more details.

All stockpiled materials should be placed within an erosion containment boundary with silt fences and sandbags employed to limit sediment movement. The containment area should be located away from drainage lines, gutters, stormwater pits and inlets and the site boundary. No liquid waste or runoff should be discharged to the stormwater or sewerage system without the approval of the appropriate authorities.

11.5 Noise and Vibration Control Plan

The guidelines for minimisation of noise on construction sites outlined in AS-2460 (2002)[11] should be adopted. Other measures specified in the consent conditions should also be complied with. Noise producing machinery and equipment should only be operated between the hours approved by Council.

All practicable measures should be taken to reduce the generation of noise and vibration to within acceptable limits. In the event that short-term noisy operations are necessary, and where these are likely to affect residences, notifications should be provided to the relevant authorities and the residents by the Project Manager, specifying the expected duration of the noisy works.

11.6 Dust Control Plan

All practicable measures should be taken to reduce dust emanating from the site. Factors that contribute to dust production are:

- Wind over a cleared surface;
- Wind over stockpiled material; and
- Movement of machinery in unpaved areas.

Visible dust should not be present at the site boundary. Measures to minimise the potential for dust generation include:

- Use of water sprays on unsealed or exposed soil surfaces;
- Covering of stockpiled materials and excavation faces (particularly during periods of site inactivity and during windy conditions) or alternatively the erection of hessian fences around stockpiled soil or large exposed areas of soil;
- Establishment of dust screens consisting of a 2m high shade cloth or similar material secured to a chain wire fence;
- Maintenance of dust control measures to keep the facilities in good operating condition;
- Concrete surfaces brushed or washed to remove dust;

[11] Australian Standard, (2002). *AS2460: Acoustics - Measurement of the Reverberation Time in Rooms.*

- Stopping work during strong winds;
- Loading or unloading of dry soil as close as possible to stockpiles to prevent spreading of loose material around the site; and
- The expanse of cleared land should be kept to a minimum.

If stockpiles are to remain on-site or an excavation remains open for a period of longer than several days, dust monitoring should be undertaken at the site. If excessive dust is generated all site activities should cease until either wind conditions are more acceptable or a revised method of excavation/remediation is developed.

Dust is also produced during the transfer of material to and from the site. All material should be covered during transport and should be properly disposed of on delivery. No material is to be left in an exposed, unmonitored condition.

All equipment and machinery should be brushed or washed down before leaving the site to limit dust and sediment movement off-site. In the event of prolonged rain and lack of paved areas all vehicles should be washed down prior to exit from the site, and any soil or dirt on the wheels of the vehicles removed. Water used to clean the vehicles should be collected and tested prior to appropriate disposal under the Waste Classification Guidelines 2014.

11.7 Air Monitoring

Requirements for air monitoring should be considered by the asbestos removal contractor for any asbestos-related works. EIS recommend that air monitoring be undertaken for the duration of remediation works.

11.8 Odour Control Plan

All activities undertaken at the site should be completed in a manner that minimises emissions of smoke, fumes and vapour into the atmosphere and any odours arising from the works or stockpiled material should be controlled. Control measures may include:

- Maintenance of construction equipment so that exhaust emissions comply with the Clean Air Regulations issued under the Protection of the Environment Operations Act (1997);
- Demolition materials and other combustible waste should not be burnt on site;
- The spraying of a suitable proprietary product to suppress any odours that may be generated by excavated materials; and
- Use of protective covers (e.g. tarpaulins or builder's plastic).

All practicable measures should be taken to reduce fugitive emissions emanating from the site so that associated odours do not constitute a nuisance and that the ambient air quality is not adversely impacted.

11.9 Work Health and Safety (WHS) Plan

A site specific WHS plan should be prepared by the contractor for all work to be undertaken at the site. The WHS plan should meet all the requirements outlined in SafeWork NSW WHS regulations.

As a minimum requirement, personnel must wear appropriate protective clothing, including long sleeve shirts, long trousers and steel cap boots. Asbestos-related PPE is also required as outlined in Section 6.3 (and to be formally documented in the asbestos removal control plan). Washroom and lunchroom facilities should also be provided to allow workers to remove potential contamination from their hands and clothing prior to eating or drinking.

11.10 Waste Management

Prior to the commencement of remedial works and excavation for the proposed development, the contractor should develop a waste management or recycling plan to minimise the amount of waste produced. This should, as a minimum, include measures to recycle and re-use natural excavated material wherever possible.

11.11 Incident Management Contingency

The Environmental Consultant should be contacted if any unexpected conditions are encountered at the site. This should enable the scope of remedial/validation works to be adjusted as required. Similarly, if any incident occurs on site that has the potential to impact the remedial/validation works, the Environmental Consultant should be immediately advised in order to assess potential impacts on site contamination conditions and the remediation/validation works.

11.12 Hours of Operation

Hours of operation for the remedial works should be those approved by Council under the development approval process. Reference should also be made to any specific conditions imposed by other consent authority/regulatory bodies.

12 CONCLUSION

EIS are of the opinion that the site can be made suitable for the proposed development provided that this RAP is implemented. A site validation report should be prepared on completion of the remedial and validation activities and submitted to the consent authority.

12.1 Remediation Category

Site remediation can fall under the following two categories outlined in SEPP55:

Table 12-1: Remediation Category

Category	Details
Category 1	Category 1 remediation works are those undertaken in the following areas specified under Clause 9 of SEPP55: • A designated development; • Carried out on land declared to be a critical habitat; • Development for which another State Environmental Planning Policy (SEPP) or Regional Environmental Plan (REP) requires a development consent; or • Carried out in an area or zone classified as: ➢ Coastal Protection; ➢ Conservation or heritage conservation; ➢ Habitat protection, or habitat or wildlife corridor; ➢ Environmental protection; ➢ Escarpment, escarpment protection or preservation; ➢ Floodway or wetland; ➢ Nature reserve, scenic area or scenic protection; etc. • Work that is not carried out in accordance with the site management provisions contained in the consent authority Development Control Plan (DCP)/Local Environmental Plan (LEP) etc. Approval is required from the consent authority for Category 1 remediation work. The RAP needs to be assessed and determined either as part of the existing DA or as a new and separate DA. Category 1 remediation work is identified as advertised development work unless the remediation work is a designated development or a state significant development.
Category 2	Remediation works which do not fall under the above category are classed as Category 2. Development consent is not required for Category 2 remediation works, however the consent authority should be given 30 days' notice prior to commencement of works.

EIS are of the opinion that the remedial works will be Category 2. However this should be confirmed with Council.

12.2 Regulatory Requirements

The regulatory requirements applicable for remediation are outlined in the following table:

Table 12-2: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination (2015)	At this stage, EIS consider that there is no requirement to notify the NSW EPA of the site contamination. This requirement should be reassessed following review of the validation results, including the asbestos air monitoring data.
POEO Act 1997	Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner. Appropriate waste tracking is required for all relevant waste that is disposed off-site.
WHS Code of Practice (2016)	Sites with asbestos become a 'workplace' when work is carried out there and require a register and asbestos management plan. Appropriate SafeWork NSW notification will be required for asbestos removal works or handling. Contractors are also required to be appropriately licensed for the asbestos works undertaken (i.e. bonded or friable asbestos works).

13 LIMITATIONS

The report limitations are outlined below:

- EIS accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the EIS proposal; and terms of contract between EIS and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, EIS has not undertaken any verification process, except where specifically stated in the report;
- EIS has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- EIS accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- EIS have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or land use. EIS should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa; and
- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose.

LIST OF IN-TEXT TABLES

IMPORTANT INFORMATION ABOUT THIS REPORT

These notes have been prepared by EIS to assist with the assessment and interpretation of this report.

The Report is based on a Unique Set of Project Specific Factors:
This report has been prepared in response to specific project requirements as stated in the EIS proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- The proposed land use is altered;
- The defined subject site is increased or sub-divided;
- The proposed development details including size, configuration, location, orientation of the structures or landscaped areas are modified;
- The proposed development levels are altered, e.g. addition of basement levels; or
- Ownership of the site changes.

EIS/J&K will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the assessment. If the subject site is sold, ownership of the assessment report should be transferred by EIS to the new site owners who will be informed of the conditions and limitations under which the assessment was undertaken. No person should apply an assessment for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions:
Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (e.g. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater contaminant concentrations may also vary over time through contaminant migration, natural attenuation of organic contaminants, ongoing contaminating activities and placement or removal of fill material. The conclusions of an assessment report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.

This Report is based on Professional Interpretations of Factual Data:
Site assessments identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on the proposed development and appropriate remediation measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Assessment Limitations:
Although information provided by a site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment may not detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant which may occur; only the most likely contaminants are screened.

Misinterpretation of Site Assessments by Design Professionals:
Costly problems can occur when other design professionals develop plans based on misinterpretation of an assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Assessment Report:
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the rest of the report to obtain a proper understanding of the assessment. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely:
Because an environmental site assessment is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

REPORT FIGURES

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.5.1557
AERIAL IMAGE ©: 2015 GOOGLE INC.

This plan should be read in conjunction with the EIS report.

Title: **SITE LOCATION PLAN**

Location: ETON ROAD
LINDFIELD, NSW

Report No: E30259KMrpt3_RAP

Figure No: 1

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

PLOT DATE: 14/08/2018 3:53:37 PM DWG FILE: S:\5 EIS\5C- EIS JOBS\30000'S\E30259KM LINDFIELD\CAD\E30259KMRPT3_RAP.DWG

RESIDENTIAL

RESIDENTIAL

RESIDENTIAL

ETON ROAD

APPROXIMATE LOCATION OF NEW EXTERNAL COVERED OUTDOOR LEARNING AREA

APPROXIMATE LOCATION OF NEW EXTERNAL STAIR

0 25 50 75 100 125

SCALE 1:2500 @A3 METRES

This plan should be read in conjunction with the EIS report.

Title: **PROPOSED DEVELOPMENT PLAN**

Location: ETON ROAD
LINDFIELD, NSW

Report No: E30259KMrpt3_RAP

Figure No: 2

ENVIRONMENTAL INVESTIGATION SERVICES

PLOT DATE: 15/08/2018 5:34:58 PM DWG FILE: S:\5 EIS\5C EIS JOBS\3000'S\E30259KM LINDFIELD\DCA\DE30259KMRPT3_RAP.DWG

LEGEND

- BH (Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- BH/MW(Fill Depth) — BOREHOLE AND GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION

SOIL CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK (mg/kg)

0 5 10 15 20 25
SCALE 1:500 @A3 METRES

This plan should be read in conjunction with the EIS report.

Title: **SAMPLE LOCATION PLAN PRELIMINARY STAGE 2 ESA**

Location: ETON ROAD LINDFIELD, NSW

Report No: E30259KMrpt3_RAP

Figure No: 3

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

PLOT DATE: 14/08/2018 3:56:34 PM DWG FILE: S:\5 EIS\5C EIS JOBS\30000'S\E30259KM LINDFIELD\CAD\E30259KMRPT3_RAP.DWG

0 5 10 15 20 25

SCALE 1:500 @A3 METRES

This plan should be read in conjunction with the EIS report.

Title: **REMEDIATION AREAS**

Location: ETON ROAD
LINDFIELD, NSW

Report No: E30259KMrpt3_RAP

Figure No: 4

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

PLOT DATE: 15/08/2018 5:35:51 PM DWG FILE: S:\5 EIS\5C EIS JOBS\30000'S\E30259KM LINDFIELD\CAD\E30259KMRPT3_RAP.DWG

Appendix A: Summary of Laboratory Results of Preliminary Stage 2 ESA

TABLE A
SOIL LABORATORY RESULTS COMPARED TO HILs
All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium VI [2]	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P TEQ [3]	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos		
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Site Assessment Criteria (SAC) [1]			100	20	100	6000	300	40	400	7400	300	3	10	270	300	6	50	240	6	160	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH1	0.0-0.2	Fill: silty sand	LPQL	LPQL	8	16	48	LPQL	9	44	0.06	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	**Chrysotile asbestos detected.**
BH1	0.3-0.5	Silty sand	LPQL	LPQL	6	3	10	LPQL	LPQL	6	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH2	0.0-0.2	Fill: silty sand	5	LPQL	17	5	14	LPQL	3	17	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected.
BH2	0.3-0.5	Silty sand	LPQL	LPQL	9	2	11	LPQL	2	12	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH3	0.0-0.2	Fill: silty sand	LPQL	LPQL	11	4	12	LPQL	3	18	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected.
BH3	0.6-0.8	Silty sand	LPQL	LPQL	12	LPQL	6	LPQL	LPQL	3	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH4	0.0-0.2	Fill: silty sand	LPQL	LPQL	10	14	20	LPQL	7	36	1.3	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected.
BH4	0.5-0.95	Silty sand	LPQL	LPQL	10	1	11	LPQL	1	30	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH5	0.0-0.2	Fill: silty sand	LPQL	LPQL	12	78	25	LPQL	9	48	LPQL	LPQL	LPQL	LPQL	LPQL	1.5	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected.
BH5	0.3-0.5	Silty sand	LPQL	LPQL	10	3	11	LPQL	3	19	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Number of Samples			10	10	10	10	10	10	10	10	10	10	5	5	5	5	5	5	5	5	5	5
Maximum Value			5	LPQL	17	78	48	LPQL	9	48	1.3	LPQL	LPQL	LPQL	LPQL	1.5	LPQL	LPQL	LPQL	LPQL	LPQL	NC

Explanation:

1 - Site Assessment Criteria (SAC): NEPM 2013, HIL-A: 'Residential with garden/accessible soils; children's day care centers; preschools; and primary schools'

2 - The results are for Total Chromium which includes Chromium III and VI. For initial screening purposes, we have assumed that the samples contain only Chromium VI unless demonstrated otherwise by additional analysis.

3 - B(a)P TEQ - Benzo(a)pyrene Toxicity Equivalence Quotient has been calculated based on 8 carcinogenic PAHs and their Toxic Equivalence Factors (TEFs) outlined in NEPM 2013

Concentration above the SAC **VALUE**

Abbreviations:

PAHs: Polycyclic Aromatic Hydrocarbons
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
LPQL: Less than PQL
OPP: Organophosphorus Pesticides
OCP: Organochlorine Pesticides
PCBs: Polychlorinated Biphenyls
UCL: Upper Level Confidence Limit on Mean Value
HILs: Health Investigation Levels
NA: Not Analysed
NC: Not Calculated
NSL: No Set Limit
SAC: Site Assessment Criteria
NEPM: National Environmental Protection Measure

TABLE B
SOIL LABORATORY RESULTS COMPARED TO HSLs
All data in mg/kg unless stated otherwise

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID [2]
PQL - Envirolab Services					25	50	0.2	0.5	1	3	1	
HSL Land Use Category [1]					**RESIDENTIAL WITH ACCESSIBLE SOIL**							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
BH1	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH1	0.3-0.5	Silty sand	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH2	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH2	0.3-0.5	Silty sand	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH3	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH3	0.6-0.8	Silty sand	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH4	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH4	0.5-0.95	Silty sand	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH5	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH5	0.3-0.5	Silty sand	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
Total Number of Samples					10	10	10	10	10	10	10	10
Maximum Value					LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL

Explanation:
1 - Site Assessment Criteria (SAC): NEPM 2013
2 - Field PID values obtained during the investigation

Concentration above the SAC **VALUE**
The guideline corresponding to the elevated value is highlighted in grey in the Site Assessment Criteria Table below

Abbreviations:
UCL: Upper Level Confidence Limit on Mean Value
HSLs: Health Screening Levels
NA: Not Analysed
NC: Not Calculated
NL: Not Limiting
SAC: Site Assessment Criteria
PQL: Practical Quantitation Limit
LPQL: Less than PQL
NEPM: National Environmental Protection Measure

SITE ASSESSMENT CRITERIA

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - Envirolab Services					25	50	0.2	0.5	1	3	1
HSL Land Use Category [1]					**RESIDENTIAL WITH ACCESSIBLE SOIL**						
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**							
BH1	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH1	0.3-0.5	Silty sand	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH2	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH2	0.3-0.5	Silty sand	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH3	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH3	0.6-0.8	Silty sand	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH4	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH4	0.5-0.95	Silty sand	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH5	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH5	0.3-0.5	Silty sand	0m to < 1m	Sand	45	110	0.5	160	55	40	3

TABLE C
SOIL LABORATORY RESULTS COMPARED TO EILs AND ESLs
All data in mg/kg unless stated otherwise

Land Use Category [1]				URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																	
							AGED HEAVY METALS-EILs						EILs		ESLs						
				pH	CEC ($cmol_c/kg$)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	0.1	0.1	25	50	100	100	0.2	0.5	1	3	0.05
Ambient Background Concentration (ABC) [2]				-	-	-	NSL	8	18	104	5	77	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH1	0.0-0.2	Fill: silty sand	Coarse	NA	NA	NA	LPQL	8	16	48	9	44	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.06
BH1	0.3-0.5	Silty sand	Coarse	NA	NA	NA	LPQL	6	3	10	LPQL	6	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH2	0.0-0.2	Fill: silty sand	Coarse	NA	NA	NA	5	17	5	14	3	17	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH2	0.3-0.5	Silty sand	Coarse	NA	NA	NA	LPQL	9	2	11	2	12	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH3	0.0-0.2	Fill: silty sand	Coarse	NA	NA	NA	LPQL	11	4	12	3	18	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH3	0.6-0.8	Silty sand	Coarse	NA	NA	NA	LPQL	12	LPQL	6	LPQL	3	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH4	0.0-0.2	Fill: silty sand	Coarse	NA	NA	NA	LPQL	10	14	20	7	36	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.1
BH4	0.5-0.95	Silty sand	Coarse	NA	NA	NA	LPQL	10	1	11	1	30	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH5	0.0-0.2	Fill: silty sand	Coarse	NA	NA	NA	LPQL	12	78	25	9	48	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH5	0.3-0.5	Silty sand	Coarse	NA	NA	NA	LPQL	10	3	11	3	19	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
Total Number of Samples				0	0	0	10	10	10	10	10	10	10	5	10	10	10	10	10	10	10	10	10
Maximum Value				LPQL	LPQL	LPQL	5	17	78	48	9	48	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.1

Explanation:

1 - Site Assessment Criteria (SAC): NEPM 2013

2 - ABC Values for selected metals has been adopted from the published background concentrations presented in Olszowy et. al., (1995), Trace Element Concentrations in Soils from Rural and Urban New South Wales (the 25th percentile values for old suburbs with low traffic have been quoted)

Concentration above the SAC VALUE

The guideline corresponding to the elevated value is highlighted in grey in the EIL and ESL Assessment Criteria Table below

Abbreviations:

EILs: Ecological Investigation Levels
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
UCL: Upper Level Confidence Limit on Mean Value
ESLs: Ecological Screening Levels
NA: Not Analysed
LPQL: Less than PQL
SAC: Site Assessment Criteria
NEPM: National Environmental Protection Measure
NC: Not Calculated
NSL: No Set Limit
ABC: Ambient Background Concentration

EIL AND ESL ASSESSMENT CRITERIA

Land Use Category [1]				URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																	
							AGED HEAVY METALS-EILs						EILs		ESLs						
				pH	CEC ($cmol_c/kg$)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	0.1	0.1	25	50	100	100	0.2	0.5	1	3	0.05
Ambient Background Concentration (ABC) [2]				-	-	-	NSL	8	18	104	5	77	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH1	0.0-0.2	Fill: silty sand	Coarse	NA	NA	NA	100	198	78	1204	35	147	170	180	180	120	300	2800	50	85	70	105	33
BH1	0.3-0.5	Silty sand	Coarse	NA	NA	NA	100	198	78	1204	35	147	170	--	180	120	300	2800	50	85	70	105	33
BH2	0.0-0.2	Fill: silty sand	Coarse	NA	NA	NA	100	198	78	1204	35	147	170	180	180	120	300	2800	50	85	70	105	33
BH2	0.3-0.5	Silty sand	Coarse	NA	NA	NA	100	198	78	1204	35	147	170	--	180	120	300	2800	50	85	70	105	33
BH3	0.0-0.2	Fill: silty sand	Coarse	NA	NA	NA	100	198	78	1204	35	147	170	180	180	120	300	2800	50	85	70	105	33
BH3	0.6-0.8	Silty sand	Coarse	NA	NA	NA	100	198	78	1204	35	147	170	--	180	120	300	2800	50	85	70	105	33
BH4	0.0-0.2	Fill: silty sand	Coarse	NA	NA	NA	100	198	78	1204	35	147	170	180	180	120	300	2800	50	85	70	105	33
BH4	0.5-0.95	Silty sand	Coarse	NA	NA	NA	100	198	78	1204	35	147	170	--	180	120	300	2800	50	85	70	105	33
BH5	0.0-0.2	Fill: silty sand	Coarse	NA	NA	NA	100	198	78	1204	35	147	170	180	180	120	300	2800	50	85	70	105	33
BH5	0.3-0.5	Silty sand	Coarse	NA	NA	NA	100	198	78	1204	35	147	170	--	180	120	300	2800	50	85	70	105	33

TABLE D
SOIL LABORATORY RESULTS COMPARED TO WASTE CLASSIFICATION GUIDELINES
All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total PCBs	TRH					BTEX COMPOUNDS				ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Total Endosulfans	Chloropyrifos	Total Moderately Harmful [2]	Total Scheduled [3]		C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	Total C_{10}-C_{36}	Benzene	Toluene	Ethyl benzene	Total Xylenes	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	25	50	100	100	250	0.2	0.5	1	3	100
General Solid Waste CT1 [1]			100	20	100	NSL	100	4	40	NSL	200	0.8	60	4	250	<50	<50	650		NSL		10,000	10	288	600	1,000	-
General Solid Waste SCC1 [1]			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	<50	<50	650		NSL		10,000	18	518	1,080	1,800	-
Restricted Solid Waste CT2 [1]			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	<50	<50	2600		NSL		40,000	40	1,152	2,400	4,000	-
Restricted Solid Waste SCC2 [1]			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	<50	<50	2600		NSL		40,000	72	2,073	4,320	7,200	-
Sample Reference	**Sample Depth**	**Sample Description**																									
BH1	0.0-0.2	Fill: silty sand	LPQL	LPQL	8	16	48	LPQL	9	44	0.06	0.06	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Chrysotile asbestos detected.
BH1	0.3-0.5	Silty sand	LPQL	LPQL	6	3	10	LPQL	LPQL	6	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH2	0.0-0.2	Fill: silty sand	5	LPQL	17	5	14	LPQL	3	17	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected.
BH2	0.3-0.5	Silty sand	LPQL	LPQL	9	2	11	LPQL	2	12	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH3	0.0-0.2	Fill: silty sand	LPQL	LPQL	11	4	12	LPQL	3	18	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected.
BH3	0.6-0.8	Silty sand	LPQL	LPQL	12	LPQL	6	LPQL	LPQL	3	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH4	0.0-0.2	Fill: silty sand	LPQL	LPQL	10	14	20	LPQL	7	36	1.3	0.1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected.
BH4	0.5-0.95	Silty sand	LPQL	LPQL	10	1	11	LPQL	1	30	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH5	0.0-0.2	Fill: silty sand	LPQL	LPQL	12	78	25	LPQL	9	48	LPQL	LPQL	LPQL	LPQL	LPQL	1.5	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected.
BH5	0.3-0.5	Silty sand	LPQL	LPQL	10	3	11	LPQL	3	19	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
Total Number of samples			10	10	10	10	10	10	10	10	10	10	5	5	5	5	5	10	10	10	10	10	10	10	10	10	5
Maximum Value			5	LPQL	17	78	48	LPQL	9	48	1.3	0.1	LPQL	LPQL	LPQL	1.5	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NC

Explanation:

[1] - NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste (2014)

[2] - Assessment of Total Moderately Harmful pesticides includes: Dichlorovos, Dimethoate, Fenitrothion, Ethion, Malathion and Parathion

[3] - Assessment of Total Scheduled pesticides include: HBC, alpha-BHC, gamma-BHC, beta-BHC, Heptachlor, Aldrin, Heptachlor Epoxide, gamma-Chlordane, alpha-chlordane, pp-DDE, Dieldrin, Endrin, pp-DDD, pp-DDT, Endrin Aldehyde

Concentration above the CT1 — VALUE
Concentration above SCC1 — VALUE
Concentration above the SCC2 — VALUE

Abbreviations:

PAHs: Polycyclic Aromatic Hydrocarbons
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
LPQL: Less than PQL
PID: Photoionisation Detector
PCBs: Polychlorinated Biphenyls
UCL: Upper Level Confidence Limit on Mean Value
NA: Not Analysed
NC: Not Calculated
NSL: No Set Limit
SAC: Site Assessment Criteria
TRH: Total Recoverable Hydrocarbons
CT: Contaminant Threshold
SCC: Specific Contaminant Concentration
HILs: Health Investigation Levels
NEPM: National Environmental Protection Measure
BTEX: Monocyclic Aromatic Hydrocarbons