ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

KMT CONSTRUCTIONS PTY LTD

ON

REMEDIATION ACTION PLAN

FOR

PROPOSED RESIDENTIAL DEVELOPMENT

AT

15 RYNAN AVENUE, EDMONDSON PARK, NSW

5 MAY 2016

REF: E28733Krpt2-RAP

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EXECUTIVE SUMMARY

Joshua Farkash & Associates Pty Ltd on behalf of KMT Constructions Pty Ltd ('the client') commissioned Environmental Investigation Services (EIS) to prepare a Remediation Action Plan (RAP) for the proposed residential development at 15 Rynan Avenue, Edmondson Park, NSW.

The site location is shown on Figure 1 and the site extent is shown on Figure 2.

This report has been prepared to support the lodgement of a Development Application (DA) for the proposed residential development of the site.

The following document has been previously prepared for the site:

- EIS (2016a), *'Stage 2 Environmental Site Assessment'*. Report prepared for KMT Constructions Pty Ltd, Ref: E28733Krpt, dated 24 February 2016;

This RAP should be read in conjunction with the above report.

The scope of work included the following: a review of background information; identify potential remediation options; outline the remediation procedures; outline the validation sampling and analysis plan for the remediation work; and preparation of the RAP report.

Based on the contamination issues identified in the EIS 2016a Stage 2 ESA report, the following areas were identified which require remediation (see attached Figure 4):

Remediation of Asbestos Impacted Fill (Hotspot A)

The most viable option for remediation is the excavation of the impacted fill material and off-site disposal to an appropriate facility (Option 3). Following successful validation, the CoPC identified will not pose a risk to future site receptors.

Remediation of the asbestos impacted area should be followed by validation sampling as outlined in Section 5.2.5.

The site remediation details are outlined in this report (see Section 5). Prior to commencement of remediation work, the site management plan (see Section 8) should be reviewed and implemented by the remediation contractor (RC). Validation sampling outlined in this plan should be undertaken and a report should be prepared on completion of remediation works (see Section 6).

The proposed remediation works are based on point source data that has been spatially interpreted between previous sampling points. Therefore, the precise extent of the remediation works will not be defined until successful validation data has been obtained.

Prior to proceeding with the remedial works, approval must be sought from the local council for the general acceptance of the proposed remediation strategy and clarifications should be sought on the remediation category (1 or 2).

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

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ABBREVIATIONS

Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Australian Drinking Water Guidelines	**ADWG**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Asbestos Health Screening Levels	**ASL**
Acid Sulfate Soil	**ASS**
Above Ground Storage Tank	**AST**
Below Ground Level	**BGL**
Bureau of Meteorology	**BOM**
Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene	**BTEXN**
Cation Exchange Capacity	**CEC**
Contaminated Land Management	**CLM**
Construction Management Plan	**CMP**
Chain of Custody	**COC**
Contaminant of Primary Concern	**CoPC**
Conceptual Site Model	**CSM**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Assessment Criteria	**EAC**
Ecological Investigation Levels	**EILs**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
Excavated Natural Material	**ENM**
Environmental Protection Agency	**EPA**
Environmental Site Assessment	**ESA**
Ecological Screening Level	**ESL**
General Approvals of Immobilisation	**GAI**
General Solid Waste	**GSW**
Health Investigation Level	**HILs**
Hardness Modified Trigger Values	**HMTV**
Health Screening Level	**HSLs**
International Organisation of Standardisation	**ISO**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Local Government Authority	**LGA**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Potential Contaminants of Concern	**PCC**
Photo-ionisation Detector	**PID**
Practical Quantitation Limit	**PQL**
Preliminary Site Investigation	**PSI**
Quality Assurance	**QA**
Quality Control	**QC**

ABBREVIATIONS

Remediation Action Plan	**RAP**
Relative Percentage Difference	**RPD**
Restricted Solid Waste	**RSW**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Site Audit Statement	**SAS**
Site Audit Report	**SAR**
Specific Contamination Concentration	**SCC**
Standard Penetration Test	**SPT**
Semi-Volatile Organic Compounds	**sVOC**
Standard Operating Practice	**SOP**
Standard Water Level	**SWL**
Standard Sampling Procedure	**SSP**
Trip Blank	**TB**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Upper Confidence Limit	**UCL**
United States Environmental Protection Agency	**USEPA**
Underground Storage Tank	**UST**
Virgin Excavated Natural Material	**VENM**
Volatile Organic Compounds	**VOC**
Volatile Organic Chlorinated Compound	**VOCC**
Workplace, Health and Safety	**WHS**

1 INTRODUCTION

Joshua Farkash & Associates Pty Ltd on behalf of KMT Constructions Pty Ltd ('the client') commissioned Environmental Investigation Services (EIS)[1] to prepare a Remediation Action Plan (RAP) for the proposed residential development at 15 Rynan Avenue, Edmondson Park, NSW.

The site location is shown on Figure 1 and the site extent is shown on Figure 2.

This report has been prepared to support the lodgement of a Development Application (DA) for the proposed residential development of the site.

1.1 Proposed Development Details

EIS understand that the proposed development includes demolition of the existing structures and construction of residential apartments with basement car parking facilities. The proposed development area is confined to the eastern third of 15 Rynan Avenue. It is understood that excavations of up to 5-6m will be required for the proposed basements. A new road will run off Rynan Avenue and divide the site. The road will stretch along the western boundary and link up with further new roads. It is understood that the northern proposed building will be joined to the adjoining property to the north (5 Rynan Avenue). We understand that development of the remaining two-thirds of the site is restricted and may possibly be sold back to council at a later stage.

1.2 Previous Investigations

The following document has been previously prepared for the site:

- EIS (2016a[2]), *'Stage 2 Environmental Site Assessment'*. Report prepared for KMT Constructions Pty Ltd, Ref: E28733Krpt, dated 24 February 2016;

This RAP should be read in conjunction with the above report.

1.3 Objectives

The objectives of the RAP are to:

- Summarise the site contamination issues;
- Identify remediation and management measures to minimise potential risk to site receptors;
- Outline the remediation and/or management procedures for the site;
- Prepare a validation plan to be implemented in conjunction with the remediation work;
- Prepare a contingency plan for the remediation works; and
- Outline site management procedures to be implemented during remediation work.

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

[2] Referred to as EIS 2016 ESA report

1.4 Scope of Work

The RAP was prepared generally in accordance with an EIS proposal (Ref: EP9809K) of 16 March 2016 and written acceptance from the Tim Shiu of Joshua Farkash and Associates on behalf of the client by email of 27 April 2016.

The scope of work included the following:

- A review of previous investigation reports prepared by EIS for the site;
- Identify potential remediation options;
- Outline the remediation procedures;
- Outline the validation sampling and analysis plan for the remediation work; and
- Preparation of the RAP report.

The report was prepared with reference to regulations/guidelines outlined in the table below. Individual guidelines are also referenced within the text of the report.

Table 1-1: Guidelines

Guidelines/Regulations
Contaminated Land Management Act (1997[3])
State Environmental Planning Policy No.55 – Remediation of Land (1998[4])
Guidelines for Consultants Reporting on Contaminated Sites (2011[5])
Guidelines for the NSW Site Auditor Scheme, 2nd Edition (2006[6])
National Environmental Protection (Assessment of Site Contamination) Amendment Measure (2013[7])
Guidelines for the Assessment Remediation and Management of Asbestos-Contaminated Sites in Western Australia 2009[8]

[3] NSW Government Legislation, (1997), *Contaminated Land Management Act.* (referred to as CLM Act 1997)

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

[5] NSW Office of Environment and Heritage (OEH), (2011), *Guidelines for Consultants Reporting on Contaminated Sites.* (referred to as Reporting Guidelines 2011)

[6] NSW DEC, (2006), *Guidelines for the NSW Site Auditor Scheme, 2nd ed.* (referred to as Site Auditor Guidelines 2006)

[7] National Environment Protection Council (NEPC), (2013), *National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1).* (referred to as NEPM 2013)

[8] Western Australian Department of Health (WADoH), (2009), *Guidelines for the Assessment Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (WADoH 2009)

2 SITE INFORMATION

2.1 Site Identification and Regional Setting

Table 2-1: Site Identification

Site Address:	15 Rynan Avenue, Edmondson Park
Lot & Deposited Plan:	Lot 22 in DP631868
Current Land Use:	Residential
Proposed Land Use:	Residential
Local Government Authority (LGA):	Liverpool City Council
Current Zoning:	R1 General Residential
Site Area (m^2):	6,109
RL (AHD in m) (approx.):	42.0
Geographical Location (MGA) (approx.):	N: 6240963 E: 301329
Site Location Plan:	Figure 1
Sample Location Plan:	Figure 2
Site Contamination Data:	Figures 3
Site Remediation Plan (Hotspots):	Figure 4
Regional Geology:	The site is underlain by both Bringelly Shale of the Wianamatta Group, which typically consists of shale, carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone, rare coal and tuff and Quaternary aged deposits of medium to fine-grained marine sands with podsols.
Acid Sulfate Soil (ASS):	The site is not located in an ASS risk area.
Hydrogeology:	A review of the regional geology and groundwater bore information indicates that the subsurface condition at the site is expected to consist of both residual soils overlying relatively shallow bedrock and alluvial soils overlying relatively deep bedrock. The occurrence of groundwater that could be utilised as a resource for beneficial use is considered to be relatively high under such conditions. A perched aquifer in the subsurface may be present.

Receiving Water Bodies:	The site location and regional topography indicates that excess surface water flows have the potential to enter Cabramatta Creek located close to the western boundary of the site. This water body can be a potential receptor.
NSW EPA Records:	There were no notices for the site under Section 58 of the Act. The site is not listed on the NSW EPA register. There were no notices for the site on the POEO register.
Site Inspection:	The site and immediate surrounds generally appeared similar to the layout outlined in the EIS 2016a ESA Report.

2.2 Site Characterisation

2.2.1 Summary of Conceptual Site Model (CSM) and Areas of Environmental Concern (AEC)

The CSM outlined in the EIS 2016a ESA report identified the following AEC at the site:

- Fill Material - Entire Site:

The site appears to have been historically filled to achieve existing levels. The fill may have been imported from various sources and can contain elevated concentrations of contaminants.

The EIS 2016a ESA identified Fibre Cement Fragments (FCF) containing asbestos in the fill. The FCF in fill could have originated from the demolition of former site buildings or imported onto the site from off-site sources.

- Poultry Farm and Rural Landuse:

The historical land titles indicated that the site use had been rural and had been owned by a poultry farming company. Numerous sheds containing hazardous building materials may have been demolished during this period. Chemicals such as pesticides could have been used at the site. Rubbish could have been buried at the site.

- Hazardous Building Material:

The buildings on the site were constructed prior to the 1990's. Hazardous building materials were used for construction purposes during this period. The material could represent a potential contamination source during demolition/development.

The aerial photographs indicate that former buildings at the site were demolished prior to 1991. The use of hazardous building material in the former buildings could have resulted in potential contamination.

2.3 Summary of Site Contamination

The EIS 2016a ESA identified the following issues associated with the AEC identified at the site. The site contamination data is shown on the attached Figure 3:

2.3.1.1 Asbestos in FCF and loose fibre bundles

FCF and loose fibre bundles containing asbestos were encountered within the fill at the site (see Figure 3). Due to the loose fibre bundles being assessed as 'friable' an Asbestos Management Plan (AMP) will be required for the remediation works.

The FCF could have been imported onto the site along with the fill. Alternatively demolition of the former site buildings could have resulted in remnant FCF. For the purposes of site remediation, Hotspot A has been identified and the fill material in this area should be treated as being impacted by FCF and loose fibre bundles containing asbestos.

The approximate extent of the asbestos impacted area (Hotspots A) is shown on the attached Figure 4. This area has been estimated by linking sample points where asbestos was not detected. The dimensions of the asbestos impacted areas are outlined below:

- Hotspots A has been estimated as approximately 1,200m^2; and
- The vertical extent is confined to the fill which ranges in depth from approximately 0.15mbgl to 0.9mbgl.

The loose fibre bundles are considered to be friable and must be handled by a Class A SafeWork NSW (formerly NSW WorkCover) licensed contractor in accordance with the AMP.

2.3.1.2 Groundwater Contamination

Groundwater samples encountered elevated concentrations of nickel and zinc above the ANZECC 2000 Fresh water guidelines. EIS are of the opinion that the elevated concentrations of heavy metals (nickel and zinc) detected in the groundwater samples are typical of urban/regional groundwater conditions and are most likely associated with leaking water infrastructure. No elevated nickel or zinc soil concentrations above the soil HIL SAC were detected during the soil sampling program.

2.4 Summary of Waste Classification for Off-Site Disposal

The waste classification presented in the EIS 2016a ESA is summarised in the following table:

Table 2-2: Waste Classification

Site Extent / Material Type	Classification	Disposal Option
Fill material impacted by asbestos (Hotspot A, see Figure 4)	General Solid Waste (non-putrescible) (GSW) containing asbestos	A NSW EPA landfill licensed to receive the waste stream. The landfill should be contacted to obtain the required approvals prior to commencement of excavation.
Fill material within proposed development area	General Solid Waste (non-putrescible) (GSW)	A NSW EPA landfill licensed to receive the waste stream. The landfill should be contacted to obtain the required approvals prior to

Site Extent / Material Type	Classification	Disposal Option
outside Hotspot A (listed above)		commencement of excavation. Alternatively, the fill material is considered to be suitable for re-use on the subject site (only) provided it meets geotechnical and earthwork requirements.
Natural silty clay soil and shale bedrock	Virgin excavated natural material (VENM). This will need to be validated following the removal of contaminated material from the site	VENM is considered suitable for re-use on-site, or alternatively, the information included in this report may be used to assess whether the material is suitable for beneficial reuse at another site as fill material. Alternatively, the natural material can be disposed of as VENM to a facility licensed by the NSW EPA to receive the waste stream.

2.5 Assessment of Risk to Site Receptors

For a contaminant to represent a risk to a receptor, the following three conditions must be present:

1. Source – The presence of a contaminant;
2. Pathway – A mechanism or action by which a receptor can become exposed to the contaminant; and
3. Receptor – The human or ecological entity which may be adversely impacted following exposure to contamination.

If one of the above components is missing, the potential for adverse risks is relatively low.

Table 2-3: Tier 1 Risk Assessment

AEC	CoPC	Discussion and Risk Rating
Fill Material	Asbestos in FCF and loose fibre bundles	Human Receptors – Site Workers Site workers (construction/maintenance/future workers) will be exposed to the fill soil during development and post development work. The presence of asbestos in the FCF poses a moderate risk to site workers. An asbestos management plan (AMP) should be prepared for the development works. All subsurface works should be undertaken under the supervision of a Class A SafeWork NSW licensed contractor in accordance with the AMP. Human Receptors – Future Occupants The development of the site includes two separate four storey residential

AEC	CoPC	Discussion and Risk Rating
		buildings with car parking basements. The development will include the construction of new roads along the western boundary and through the centre of the site to Rynan Avenue. Following remediation and development of the site the risk of exposure to the CoPC in fill to future occupants is considered to be low.
Groundwater	Nickel and Zinc	The groundwater at the site has been impacted with nickel and zinc. These contaminants do not pose a risk to human receptors. The source of the nickel and zinc is most likely an urban/regional issue. No elevated nickel and zinc soil concentrations above the HIL SAC were detected during the soil sampling program.

2.6 Fate and Transport of Contaminants

The potential fate and transport of CoPC identified at the site is summarised in the following table:

Table 2-4: Fate and Transport of CoPC

CoPC	Fate and Transport
Nickel, zinc and asbestos	With the exception of asbestos, non-volatile contaminants are predominantly confined to the soil and groundwater medium. The mobility of these contaminants varies depending on: the nature and type of contaminant present (e.g. leachability, viscosity etc.); soil type/porosity; surface water infiltration; groundwater levels; and the rate of groundwater movement. The potential transport of asbestos fibres is associated with the disturbance of asbestos contaminated soils and release of fibres into the atmosphere. This is most likely to occur during excavation works. A number of studies have found that soils effectively filter out asbestos fibres and retain them within the soil matrix. The studies concluded that there is no significant migration of asbestos fibres, either through soil or groundwater. Surface water has the potential to infiltrate into the subsurface at the subject site via garden beds, grassed areas, unlined water retention facilities etc. Surface water infiltration could increase the migration potential of certain contaminants. Excess surface water has the potential to run-off into Cabramatta Creek located to the west of the site.

3 REMEDIATION EXTENT

3.1 Known Extent

The extent of remediation is summarised in the table below. Reference should also be made to the attached Figure 4.

Table 3-1: Know Extent of Remediation

Remediation Area, AEC and CoPC	Extent of Contamination	Potential Remediation Strategy
Fill impacted by Asbestos (Hotspot A)	The approximate extent of the asbestos impacted area is shown on the attached Figure 4. This area is approximately 1,200m^2 and extends to the depth of fill which ranges from approximately 0.15mbgl to 0.9mbgl. The laboratory results indicate that neither the underlying residual soils nor shale bedrock have been impacted by this CoPC.	Based on the site information, the most cost effective remediation approach would be to excavate the impacted fill soil areas and dispose of off-site to a licensed NSW EPA Landfill. The exposure to site workers during remediation works can be managed by appropriate PPE, dust mitigation methods and by preparing a Construction Management Plan (CMP).

3.2 Unknown Extent

The proposed remediation works are based on point source data that has been spatially interpreted between previous sampling points. Therefore, the precise extent of the remediation works will not be defined until successful validation data has been obtained.

The areas beneath the existing buildings have not been investigated. However, should asbestos be encountered during the earthworks for the proposed development in these areas EIS should be contacted immediately and reference should be made to the unexpected finds section of this report (See **Section 7.1**). Where contamination is found to extend beyond the remediation boundaries through validation, remediation should be continued until the CoPC does not pose a risk to site receptors.

4 REMEDIATION OPTIONS

4.1 Soil Remediation

The NSW EPA follows the ANZECC/NHMRC 1992 published hierarchy for the remediation of contaminated sites. The preferred order for soil remediation and management is as follows:

1. On-site treatment of soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
2. Off-site treatment of excavated material so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site;
3. Removal of contaminated material to an approved site or facility, followed where necessary by replacement with clean material; and
4. Consolidation and isolation of the soil on-site by containment within a properly designed barrier.

The Site Auditor Guidelines 2006 provide the following additional requirements to be taken into consideration:

- Remediation should not proceed in the event that it is likely to cause a greater adverse effect than leaving the site undisturbed; and
- Where there are large quantities of soil with low levels of contamination, alternative strategies should be considered or developed.

4.2 Site Specific Remediation Options

The tables below summarise the site specific remediation options:

Table 4-1: Site Specific 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 include: Bio-remediation: Addition of oxygen and nutrient compounds to accelerate the natural process of organic compound decay within the environment. Soils require excavation and stockpiling prior to treatment. Not suitable for all contaminants. Soil Washing: Soil is stripped of contaminants via a leaching process and the concentrated contaminated liquid product retained for disposal or additional treatment. Air Sparging and Extraction: Air is forced through the contaminated soil to volatilise organic contaminants. The air is then extracted and captured for treatment leaving reduced contaminant concentrations within the sub-strata. Thermal Desorption: Contaminated soils are heated within an incinerator to volatilise or combust the contaminants. Contaminants are either broken down to water and carbon dioxide or alternatively trapped within an air filtration system. Licenses are necessary for specific individual waste streams due to the potential for air pollution and the formation of harmful by-products during the incineration process.	On-site treatment options are generally very expensive and time consuming. The CoPC at this site is asbestos. Soil containing asbestos is not suitable for treatment and this option is not considerable to be viable.

Option	Discussion	Applicability
Option 2 Off-site treatment of contaminated soil	Contaminated soils are excavated, transported to an approved/ licensed treatment facility, treated to remove/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. 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.	Off-site treatment of soil is very expensive and is not considered a preferred option. 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. Soils containing asbestos are not suitable for treatment.
Option 3 Removal of contaminated material to an appropriate facility and reinstatement with clean material	Contaminated soils would be classified in accordance with NSW EPA guidelines for waste disposal, excavated and disposed of off-site to a NSW EPA licensed landfill. The material would have to meet the requirements for landfill disposal. Landfill gate fees (which may be significant) would apply in addition to transport costs.	This is considered to be the most suitable and viable option of remediation at the site. Off-site disposal of soil is very expensive but is effective in the removal of contaminated soil from the site. Excavation of the impacted soils will remove the CoPC and after successful validation will not pose a risk to future site receptors.
Option 4 Consolidation and isolation of impacted soil by cap and containment	This would include the placement of an impermeable barrier such as concrete, or a warning barrier and non-contaminated soil material, over the existing ground surface to isolate the contaminated material and thereby reduce the health risk to future site users. This action may also reduce the transport of contamination via surface water movement, dust generation and potentially groundwater infiltration, however, environmental issues would need to be evaluated.	This option is considered to be an option for the fill material remaining on-site on completion of earthworks. EIS note that this option for remediation is not preferred due to the ongoing management requirements required under an EMP.

Option	Discussion	Applicability
	Such an option should only be considered where other preferred approaches from the NSW EPA hierarchy are not applicable. 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, possibly including the S.149 council planning certificate and/or the land title, would be modified to note the presence of the contamination. This may impact upon development approval conditions and limit the future potential land value.	

5 REMEDIATION DETAILS

Prior to commencement of remediation work, the site management plan for remediation works (see **Section 8**) should be reviewed and implemented by the Remediation/Construction Contractor.

Prior to proceeding with the remedial works, approval must be sought from the local council for the general acceptance of the proposed remediation strategy in order to comply with Section 3.4.6 of the Site Auditor Guidelines 2006.

Geotechnical advice should be sought regarding the requirements of any backfill material used for the reinstatement of remediation areas and retention strategies (if required) for excavations close to/on the site boundaries.

5.1 Roles and Responsibility

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

Table 5-1: Roles and Responsibilities

Role	Responsibility
Client appointed Project Manager (PM)	Joshua Farkash & Associates Pty Ltd Contact: Mr Tim Shiu P: (02) 9264 5155 A: Level 1, 235 Clarence Street, Sydney NSW 2000 E: Tim@jfarkash.com.au The PM is required to provide all investigation reports including this plan to the remediation/construction contractor (RC) prior to commencement of remediation work. The PM needs to ensure that the RC has understood the plan and will implement it in its totality. Further details are outlined in the sections below.
Remediation/ Construction Contractor (RC)	TBA The RC is required to review all documents prepared for the project and implement the procedures outlined in this plan. The RC is required to collect all necessary documentation and forward them onto the PM and environmental consultant as they become available. Further details are outlined in the sections below.
Earthworks-Sub Contactor (SC)	TBA The earthworks sub-contractor working on the project should be made aware of site contamination and this plan. The sub-contractor is required to review this document and implement the procedures outlined in this plan. The sub-contractor is required to collect all necessary documentation and forward them onto the PM and environmental consultant as they become available. Further

	details are outlined in the sections below.
Environmental Consultant (EC)	Environmental Investigation Services (EIS) Contact: Mr Geoff Fletcher P: 02-9888 5000 A: PO Box 976, North Ryde BC, NSW 1670 E: gfletcher@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 liaise with the site auditor on all matters pertaining to the site contamination and remediation. Further details are outlined in the sections below.
Asbestos Consultant (AC)	TBA The AC provides consulting advice on the ongoing remediation and management of asbestos containing material (ACM) at the site. The AC is required to review any deviation to the remediation plan or in the event of unexpected finds if and when encountered during the site work. The AC is required to liaise with the RC and EC on all matters pertaining to the remediation and management of ACM. Further details are outlined in the sections below.
Other Consultants & Contractors (Health Risk, Landscaping etc.)	TBA Other consultants who may become involved in the project from time to time should be made aware of this plan. The consultant is required to review this plan and implement the procedures outlined in this plan and the EIS 2014c ESA/RAP report. The consultant is required to collect all necessary documentation and forward them onto the PM and environmental consultant as they become available. Further details are outlined in the sections below.

5.2 Remediation of Asbestos Impacted Fill (Hotspot A)

5.2.1 Rationale for Selection of Remedial Strategy

The most viable option for remediation is the excavation of the impacted fill material and off-site disposal to an appropriate facility (Option 3). Following successful validation, the CoPC identified will not pose a risk to future site receptors.

5.2.2 Introduction to Asbestos Controls and Licensing Requirements

The following requirements should be met for excavation works at the site:

- A Class A licensed asbestos removalist should be engaged to undertake the excavation/removal works. The licenced contractor is to provide a copy of their licence and prepare an Asbestos Removal Control Plan for the site works and provide this to the EC for review;

- SafeWork NSW are to be notified prior to excavation works;
- All personnel and contractors must be informed of site conditions and asbestos work areas / exclusion zones.
- Mandatory air monitoring is to be undertaken on a daily basis during any works in the asbestos contaminated areas and all readings are to be below the detection limit of 0.01 fibres per millilitre. The requirement for daily air monitoring has been set due to the 'friable' nature of the asbestos, the highly visible nature of the site within a residential area and duty to eliminate or minimise exposure to airborne asbestos and to ensure the exposure standard of 0.01 fibres/ml is not exceeded;
- Asbestos clearance certificate/s should obtained by a SafeWork NSW licensed asbestos assessor following the removal of all asbestos contaminated fill material from the site. EIS note that validation sampling is required; and
- The site is managed in accordance with this plan and the general requirements of SafeWork NSW and strategies outlined in the regulations outlined above.

5.2.3 Remediation Details

The specific remediation details for this area are described in the table below:

Table 5-2: Remediation Details of Asbestos Impacted Areas (Hotspot A)

Step	Procedure	Responsibility
1.	Site Set-Up: Prior to the commencement of excavation, temporary wire mesh fencing should be installed along the boundary of the site and appropriate asbestos warning signage displayed. Areas of the site will need to be designated for a personnel decontamination zone and a barricaded asbestos work area. An asbestos removal control plan should be prepared by the RC/SC and provided to the EC for review. Only personnel employed by the licenced asbestos removal contractor are to work in the barricaded asbestos removal area. A temporary wash bay must be set up inside the barricaded asbestos work area. Trucks should park over the wash bay for loading of soil then be washed down with water prior to exiting the barricaded area. Further site set up conditions and controls associated with asbestos containing soil removal/ Remediation works are detailed in **Sections 5.3.4.**	RC
2.	PPE and WHS: Check PPE and WHS requirements prior to commencement of remediation works. This should be done daily. The minimum PPE required for the remediation of asbestos materials includes the following:	All personnel who have access to the site

Step	Procedure	Responsibility
	• Disposable coveralls rated type 5, category 3 (prEN ISO 13982–1) or equivalent. The hood must be worn; • Disposable gloves (heavy duty may be required); • P2/P3 respirator conforming to the requirements of AS/NZS 1716:2009; PPE cannot be re-used and can only be used within the designated barricaded asbestos work area. The personnel decontamination zone must be located on the edge of the barricaded asbestos work area and include an asbestos waste bin, wet rags/wipes and a sink with soap to wash hands. Decontamination must include: • Boots and hand tools should be cleaned by wetting down in the work area; • The worker should then walk to the decontamination area; • A damp rag or wet wipe is used to wipe down the exterior surface of the coveralls; • The damp rag or wet wipe is placed in the asbestos waste bin; • The coveralls are then carefully rolled down, removed and placed in the asbestos waste bin; • Remove and dispose gloves; • The disposable respirator is removed and placed in the asbestos waste bin; • Hands are thoroughly washed with soap and water; and • After removing PPE the worker must remain in the area of the site free of soil disturbance. Machinery and equipment should be sprayed with water prior to exiting the site, preferably over the truck bay wash. Other site specific PPE may be required and be dependent on the RC/SC.	
3.	<u>Site Preparation:</u> The existing structures and pavements at the site should be removed with care using an excavator or similar. Hazardous building materials within the existing buildings/structures will need to be identified and if present, will need to be removed prior to demolition works commencing. Appropriate clearance certificates for the identified hazardous materials will also need to be obtained prior to the demolition works. These clearance certificates will need to be provided to the EC. Following the removal of buildings the ground surface will need to remain wet and covered by plastic when personnel leave the site unattended or	RC and SC

Step	Procedure	Responsibility
	works cease for the day. Air monitoring should be undertaken on a daily basis during demolition. The air monitoring results should be forwarded to EC once received by the RC.	
4.	Address Stability Issues: Geotechnical advice should be sought regarding the stability of the adjacent structures and/or adjacent areas prior to commencing the excavation (as required).	RC to address the requirement for geotechnical advice
5.	Excavation and Removal of the Fill material: The fill material in this area has been impacted by FCF and loose fibre bundles (containing asbestos). The remediation of the site will include the following: • Register with the NSW EPA WasteLocate tracking system to comply with the legislation in regards to transporting/movement of asbestos waste; • Submit an application to dispose of the fill soil (in accordance with the assigned waste classification) to a NSW EPA landfill licensed to receive the waste and obtain authorisation to dispose. The receiving licenced landfill facility will also need to be registered with the NSW EPA WasteLocate system in order to receive the waste; • The excavation and removal of asbestos contaminated soil should be completed in accordance with the National Code of Practice "How to Manage and Control Asbestos in the Workplace", Safe Work Australia 2011; • A Class A licensed asbestos removalist (RC) should be engaged to undertake the excavation/removal works. The licenced contractor is to provide a copy of their licence and prepare an Asbestos Removal Control Plan for the site works and provide this to the EC for review; • Air monitoring will be required along the site boundaries targeted around remediation areas during the fill excavation works. Monitoring should commence prior to the start of works and continue daily for the duration of the works; • A water system will need to be in place to spray the excavated soil during excavation/remediation works and to decontaminate trucks entering the barricaded area. The general site area should be kept damp during remediation works. • The impacted fill material from this area should be excavated in small sections using an excavator or backhoe until the target depth has been reached; • The excavated impacted fill should be directly loaded onto trucks with tracking systems for transport to the landfill. The material should be disposed of as General Soil Waste (GSW) containing asbestos (see	RC Contractor, EC to complete sampling and validation report

Step	Procedure	Responsibility
	Section 2.4). Landfill disposal dockets should be retained and forwarded to the EC for documentation; • A licensed asbestos assessor (EC) is to undertake a site clearance inspection and obtain validation samples from the walls and base of the excavation (see the validation plan below for more details); • Backfill the excavation (if required) with clean virgin excavated natural material (VENM) which should be compacted to the requirements of the proposed development. Reference should be made to the importation criteria in **Section 6.3** for more information; • Following receipt/review of the validation soil sample results, an asbestos clearance certificate is to be issued to the RC and PC; and • All documents including landfill dockets, air fibre monitoring results, should be retained and forwarded to the client for inclusion into the validation report prepared by the EC	
6.	Contingency Plan: The contingency measures outlined in the RAP should be implemented in the event of unexpected finds or validation failure.	RC
7.	Validation Report: A validation report will be prepared documenting the remediation works undertaken above. The EC is to undertake a series of regular site inspections during the excavation and construction phases of the development in order to provide a comment on the compliance of the RAP. The validation report will include documentation of waste disposal, waste tracking, air monitoring results, results of the validation testing and other information as applicable.	EC

5.2.4 General Site Set Up for Asbestos Remediation Works

Barricaded Asbestos Work Area

Access to the barricaded asbestos work area must be restricted by the erection of temporary barrier tape/fencing and asbestos warning signage. Only personnel employed by the licenced asbestos removal contractor are to work in the barricaded asbestos removal area.

Personal Decontamination and Storage of PPE

A personal decontamination area must be set up in a designated area located on the edge of the asbestos work area. The area must include an asbestos waste bin, wet rags/wet wipes and a sink with soap to wash hands. Additional PPE must be located in this area. Personnel must enter / exit through this area only.

Watering System

A watering system such as a hose must be made available for the spray application to soil during excavation and to decontaminate trucks exiting the barricaded area. The general ground surface should also be kept damp.

Truck Wash Bay

A temporary wash bay must be set up inside the barricaded area. Trucks should park over the wash bay for loading of soil then be washed down with water prior to exiting the barricaded area.

Entry and exit to the barricaded area can be maintained simply by the temporary opening of the barrier/flagging tape.

5.2.5 Validation Sampling

As a minimum the following validation samples should be obtained from the remediation area:

Table 5-3: Validation Sampling in Asbestos Impacted Areas (Hotspot A)

Sampling Frequency	Sampling Method	Laboratory Analytical Schedule
Validation samples should be undertaken as outlined below: Excavation Base: The sampling density is to be twice the minimum density recommended in the NSW EPA Sampling Design Guidelines (1995) for the excavated area. Excavation Walls: Samples will be obtained from the fill soils exposed along the walls. A minimum of one sample per 5 metre length of the excavation wall. EIS are of the opinion that a Data Quality Assessment (DQA) for validation sampling of asbestos is not required.	Samples will be obtained using hand equipment or directly from the excavator bucket (based on the depth of excavation). Samples should be obtained approximately 200mm into the exposed profile where possible.	Samples will be analysed for the presence of asbestos. The results will be assessed against the Validation Assessment Criteria (VAC) outlined in **Section 6.2.**

5.3 Inspection Requirements

An environmental consultant who is a member of the Australian Contaminated Land Consultants Association (ACLCA[9]) should be present during the remediation works to assess the excavation and provide advice on the removal of any impacted soil.

During excavation of the fill material, environmental personnel should be available to make site visits as required to inspect unexpected conditions and manage any issues associated with removal of the

[9] http://www.aclca.org.au/

fill material. Following remediation, validation inspections will be undertaken and samples obtained as described in this plan.

5.4 Documentation

The RC must retain all documentation associated with the remediation (e.g. landfill dockets, photographs, daily air monitoring results letters from suppliers of products, reports issued by other consultants etc). Copies of these documents must be forwarded to EC on completion of the remediation for inclusion in the final validation report.

Adequate documentation of waste tracking (excavation, stockpiling, classification, transport and disposal) should be retained by the RC and forwarded to EIS for inclusion in the final validation report.

5.5 Fill Volume Analysis

A fill volume analysis should be included as part of the final validation assessment report based on the final remediation areas and depths. The analysis should be compared to landfill dockets.

Based on the remediation details outlined in this plan**,** we estimate the quantity of soil requiring off-site disposal from the asbestos impacted fill area (Hotspot A): as approximately 1,000 tonnes. This approximate quantity has been based on the impacted area (1,200m^2), the average depth of fill (0.45m) and the soil type bulk factor (1.8).

5.6 Asbestos Air Monitoring

Air monitoring will be required along the site boundaries, targeted around remediation areas during the fill excavation works. Monitoring should commence prior to the start of works and continue for the duration of the remediation works.

EIS recommend that air monitoring is undertaken on a daily basis for the following reasons:

- The site is within a residential area and is highly visible to the public; and
- There is a duty to eliminate or minimise exposure to airborne asbestos and to ensure the exposure standard of 0.01 fibres/mL is not exceeded.

Air monitoring must only be carried out by personnel registered and accredited by NATA (National Association of Testing Authorities). Filter analysis must only be carried out within a NATA certified laboratory.

The monitoring results must conform to the requirements of the NOHSC Guidance note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003 (2005)].

The monitoring program will be used to assess whether the control procedures being applied are satisfactory and that criteria for airborne asbestos fibre levels are not being exceeded.

The following levels will be used as action criteria during the air monitoring:

- <0.01 Fibres/ml: Work procedures deemed to be successful;
- 0.01 to 0.02 Fibres/ml: Inspection of the site and review of procedures; and
- >0.02 Fibres/ml: Stop work, inspection of the site, review of procedures, clean-up, rectification works where required and notify the relevant regulator.

6 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 validation will be staged to facilitate the remediation works.

6.1 Sampling Program

The sampling program for the validation is outlined in **Section 5**. This is the minimum requirement based on conditions known to exist at the site. 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 indicators such as the presence of ash/slag material or odours will be used to assist the validation process.

Where validation sampling indicates that contamination is likely to extend beneath adjacent properties, validation should be completed to the extent practical and the client advised of findings. If contamination is thought to extend beneath neighbouring properties the site owner should inform adjacent property owners that contamination may be present.

6.2 Validation Assessment Criteria (VAC)

The site specific VAC to be adopted for the validation assessment is outlined in the table below. The VAC has been derived from NEPM 2013 and other guidelines as outlined in **Section 1.4**.

Table 6-1: VAC Adopted for this Investigation

Guideline	Applicability
Asbestos in Soil	The 'presence/absence' of asbestos in soil will be adopted.
Waste Classification (WC) Criteria	The criteria outlined in the NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014[10]) will be adopted to classify the material for off-site disposal.

6.3 Material Importation Requirements

The importation criteria outlined in this section of the report should be used as a guide for an initial assessment. Marginal elevations of individual compounds should be assessed on a case by case basis in consultation with the regulatory authorities.

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

6.3.1 Material for Landscaping

The proposed development will 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 landscaped material such as Australian Native Landscapes (ANL) should be contacted to identify suitable material for importation;
- Prior to the importation of the topsoil, the following documentation should be obtained from the supplier:
  - Documentation from the source site indicating that the topsoil is VENM or natural soil;
  - 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 EAC outlined in the VAC;
  - 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 3 samples per 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/BTEXN, PAHs, OCP/OPP/PCBs; and asbestos. A suitable field QA/QC procedure should be adopted;
- The analytical data should be assessed against the site specific VAC;
- Provided that the analysis 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 what was initially sampled/supplied and is 'free from evidence of contamination'.

6.4 Recycled Materials

Recycled material such as crushed concrete, bricks, AC, road base, gravel etc. may be required for the development. Such materials should only be sourced from licensed suppliers who can demonstrate that adequate testing is undertaken on a regular basis to meet the waste exemption requirements set out by the NSW EPA.

Recycled material should be accompanied by appropriate documentation verifying that the material meets the waste exemption requirements set out by the NSW EPA. The material should be inspected on arrival by the environmental consultant to confirm that the material is consistent with the documentation reviewed from the source site. At a minimum two (2) samples are to be analysed for heavy metals, PAHs and asbestos and forwarded to a NATA accredited laboratory for analysis. The

recycled material must be quarantined until results are known. The results must satisfy the criteria specified for that particular waste exemption.

Recycled material can only be used as engineered fill in areas specified in the exemption guidelines provided it is geotechnically suitable.

All material importation documents should be issued to the client/PM and the environmental consultant for inclusion in the validation report.

6.5 Validation Report

As part of the validation process, a site validation report will be prepared by the environmental consultant. The report will outline the remediation work undertaken at the site and any deviations to the remediation strategy. The report will summarise the results of the validation assessment and will be prepared in accordance with the Guidelines for Consultants Reporting on Contaminated Sites 2011. The report will include:

- Summary of the remediation works undertaken at the site;
- Sampling, analysis and quality plan (SAQP) adopted for the validation assessment;
- Summary of the validation results including the analytical results assessed against the VAC;
- Summary of fill disposal analysis and review of contractor documentation;
- Data Quality Assessment; and
- Discussion and conclusion.

7 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 during earthworks.

7.1 Unexpected Finds

There is a possibility that additional hazards exist at the site. The extent of the contamination has been interpreted from point source data and a documented process of reviewing historical site activities. However, ground conditions may vary between sampling locations and additional hazards may arise as result.

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: additional UST, friable asbestos, odorous or stained hydrocarbon impacted soils, demolition waste or ash and slag contaminated 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 client should be contacted immediately;
- Temporary barricades should be erected to isolate the area from access to the public and works;
- In the event potential friable asbestos material is encountered outside of Hotspot A, the Class A asbestos removalist and/or asbestos consultant should be contacted;
- The client should engage a qualified environmental consultant to attend the site and assess the extent of remediation that may be required and/or adequately characterise the contamination in order to allow for cap and containment of the material;
- In the event remediation is required, the procedures outlined within this report should be adopted where appropriate, alternatively an additional remediation action plan (RAP) should be prepared;
- An additional sampling and analytical rationale should be established by the consultant and should be implemented with reference to the relevant guideline documents; and
- Appropriate validation sampling should be undertaken and the results should be included in the validation report.

7.2 Continual Validation Failure

Where validation sampling indicates that the contaminated material extends further than anticipated, there are two options:

- Re-excavate and re-sample until the validation sample results meet the VAC; or
- Revise the remedial strategy to include the cap and contain approach (if possible).

7.3 Importation Failure for VENM or Landscaping Soil Materials

Where material to be imported onto the site does not meet the importation acceptance criteria detailed in **Section 6.3**, the only option is to not accept the material. Alternative material must be sourced that meets the importation requirements.

7.4 Groundwater Seepage and Dewatering

In the event groundwater is intercepted during excavation works, dewatering will be required. Council and other relevant approvals will be required prior to disposal of groundwater into the stormwater system. Contaminated groundwater will require treatment prior to disposal.

8 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.

8.1 Interim Site Management

The following should be prepared and implemented prior to the commencement of site works. The following interim measures should be adopted immediately:

- Maintain fences to prevent access to the remediation area/site;
- Construct new fences following demolition of the existing buildings where necessary;
- Entrances to the site should be locked to prevent unauthorised access, tipping or dumping on the site; and
- Appropriate warning signage should be erected as required.

8.2 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 contacts will also facilitate registration of complaint acceptance points. The primary point for complaint acceptance will be the Project Manager (PM). The contact details of key project personnel are summarised below.

Table 8-1: Project Contacts

Task	Company	Contact Details
Project Manager (PM)	Joshua Farkash & Associates Pty Ltd Contact: Mr Tim Shiu	(02) 9264 5155
Remediation Contractor (RC)	TBA	TBA
Environmental Consultant (EC)	Environmental Investigation Services	9888 5000
Asbestos Consultant (AC)	TBA	TBA
Certifier	TBA	TBA
NSW EPA	Pollution Line	131 555
Emergency Services	Ambulance, Police, Fire	000

8.3 Security

Prior to the commencement of site 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 with coloured tape to reduce the risk to site personnel from injury by falling into open excavations.

8.4 Timing and Sequencing of Remediation Works

In general, all remedial works should be completed prior to the commencement of site construction and excavation works for the proposed development. In the event that remedial works are undertaken in conjunction with the development, all remediation areas should be clearly marked and covered with builder's plastic (or similar) in order to reduce the dust generation, surface water run-off and/or exposure to receptors.

In the event of unexpected delays, builder's plastic (or similar) should be used to cover the remediation areas in order to reduce the dust generation, surface water run-off and/or exposure to receptors.

8.5 Site Soil and Water Management Plan

The earthworks contractor should prepare a detailed soil and water management plan prior to the commencement of site 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.

8.6 Noise and Vibration Control Plan

The guidelines for minimisation of noise on construction sites outlined in Australian Standard 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 (refer to DA consent documents).

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 PM/Site Foreman/RC, specifying the expected duration of the noisy works.

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

8.7 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/or 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;
- 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 to achieve a clean and economical working environment.

If stockpiles are to remain on-site or an excavation remains open for a period of longer than 3 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, un-monitored 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.

8.8 Air Monitoring

At this stage, EIS has assessed the asbestos to be friable. Air monitoring is mandatory for the removal of friable asbestos from the site and should be undertaken constantly during remediation

works. Excavation/constriction works and air monitoring should be undertaken in accordance with the SafeWork NSW requirements.

A qualified occupational hygienist or asbestos consultant should be appointed to assess the extent of monitoring required at the site. Appropriate SafeWork NSW permits should be obtained for asbestos removal works.

8.9 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 POEO Act 1997[12];
- Demolition materials and other combustible waste should not be burnt on site;
- The spraying of a solution of Biosolve™ or other appropriate product if required to suppress any odours that may be generated by excavated materials; and
- Use of protective covers (e.g. HDPE).

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.

Disturbance of hydrocarbon contaminated soils is likely to result in odorous conditions. The following odour management plan should be implemented to limit the exposure of site personnel and surrounding residents to unpleasant odours:

- Excavation and stockpiling of material should be scheduled during periods with low winds if possible;
- Biosolve or a similar product should be sprayed on material during excavation and following stockpiling to reduce odours;
- All complaints from workers and neighbours should be logged and a response provided. Work should be rescheduled as necessary to minimise odour problems;
- The site foreman should consider the following odour control measures as outlined in NEPM 2013:
  - reduce the exposed surface of the odorous materials;
  - time excavation activities to reduce off-site nuisance (particularly during strong winds); and
  - cover exposed excavation faces overnight or during periods of low excavation activity.
- If continued complaints are received, alternative odour management strategies should be considered and implemented.

[12] NSW Government, (1997), *Protection of Environment Operations Act.* (referred to as POEO Act 1997)

8.10 Health and Safety Plan

A site specific work, health and safety (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 NSW WorkCover WHS regulations. The WHS plan also should make reference to the AMP prepared by AC for specific WHS requirements when working with ACM in soil.

As a minimum requirement, personnel must wear appropriate protective clothing, including long sleeve shirts, long trousers and steel cap boots. Gloves and dust masks should be worn when working on remediation activities. Reference should be made to the AMP for additional personal protective equipment (PPE) requirements for working with ACM in soil.

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.

8.11 Waste Management

Prior to 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 by the site. This should, as a minimum, include measures to recycle and re-use excavated material wherever possible.

8.12 Incident Management Contingency

The environmental consultant engaged to undertake the VA 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, the EC should be advised to assess potential impacts on site contamination conditions and the remediation/validation timetable.

8.13 Hours of Operation

Hours of operation should be between 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.

9 CONCLUSION

EIS are of the opinion that the site can be made suitable for the proposed development provided the recommendations in this RAP are successfully implemented, including a validation assessment.

9.1 Remediation Category

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

Table 9-1: Remediation Category

Category	Details	Applicability
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 SEPP or 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 (Part 6 of EPAA Regulation 1994).	The PM should contact council and obtain the required approvals for the remediation works.
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.	See above

9.2 Regulatory Requirements

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

Table 9-2: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination 2015[13]	At this stage, EIS consider that there is no requirement to notify the NSW EPA of the site contamination. After successful implementation of the RAP and validation assessment, the site contamination is unlikely to meet the Notification Triggers. However if air monitoring results encountered during remediation works indicate elevated levels of airborne asbestos fibres at or above 0.01 fibres/mL work should cease and the NSW EPA should be notified of the site contamination.
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.
POEO (waste) Regulation 2014	Clause 79 of the Protection of the Environment Operations (waste) Regulation 2014 requires waste transporters to provide information to the NSW EPA regarding the movement of any load in NSW of more than 10 square meters of asbestos sheeting, or 100 kilograms of asbestos waste. To fulfil these legal obligations, asbestos waste transporters must use WasteLocate.
Dewatering Approval	In the event groundwater is intercepted during excavation works, dewatering will be required. Council and other relevant approvals will be required prior to disposal of groundwater into the stormwater system.
WHS Code of Practice 2011[14]	Sites contaminated with asbestos become a 'workplace' when work is carried out there and require a register and asbestos management plan.
WHS Code of Practice 2011[15]	Section 3.6 indicates a licensed asbestos removalist must notify the regulator (WorkCover NSW) in writing at least 5 days before the licensed asbestos removal works commence.

[13] NSW Government Legislation, (2015), *Guidelines on the Duty to Report Contamination.* (referred to as Duty to Report Contamination 2015)

[14] WHS Regulation, (2011), *Code of Practice – How to Manage and Control Asbestos in the Workplace.*

[15] WHS Regulation, (2011), *Code of Practice – How to Safely Remove Asbestos.*

10 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 landuse. 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, eg 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.

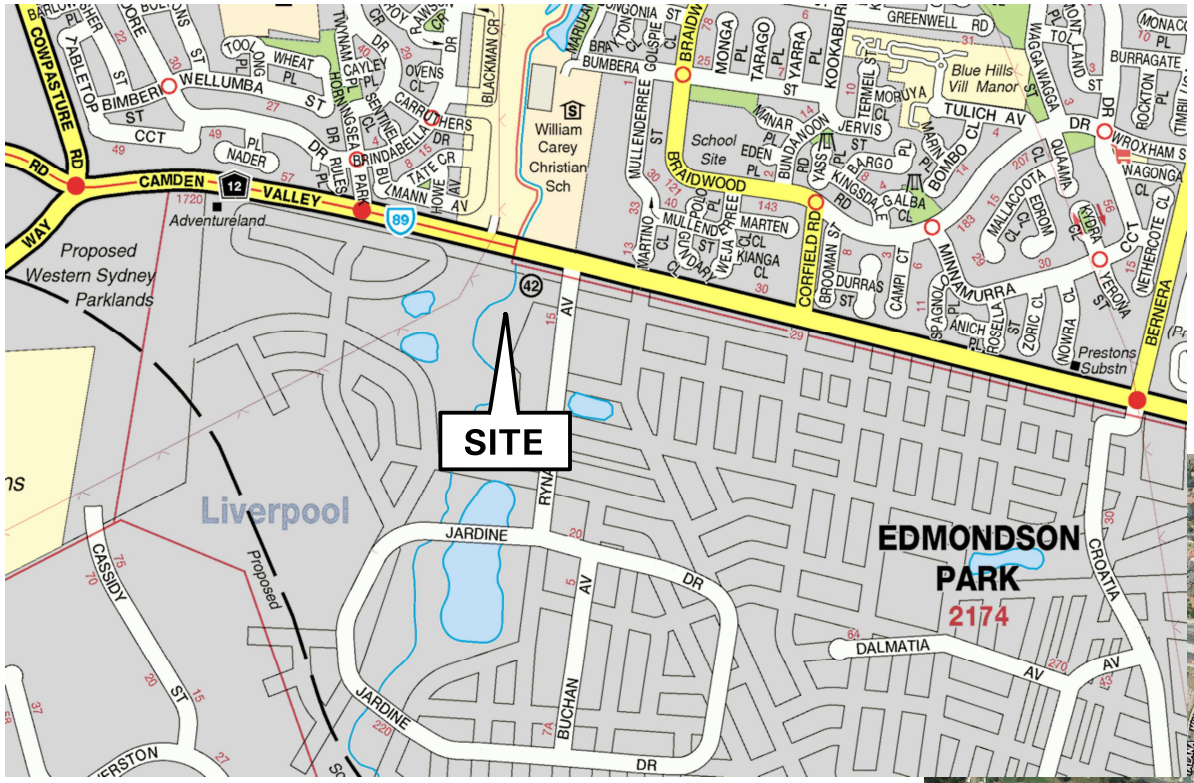
Misinterpretation of Site Assessments by Design Professionals:
Costly problems can occur when other design professionals develop plans based on misinterpretation of an assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with 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



N

NOTES:
Figure has been recreated from UBD on disc (version 7.1)

Figure is not to scale. UBD Map ref: 287 G1

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

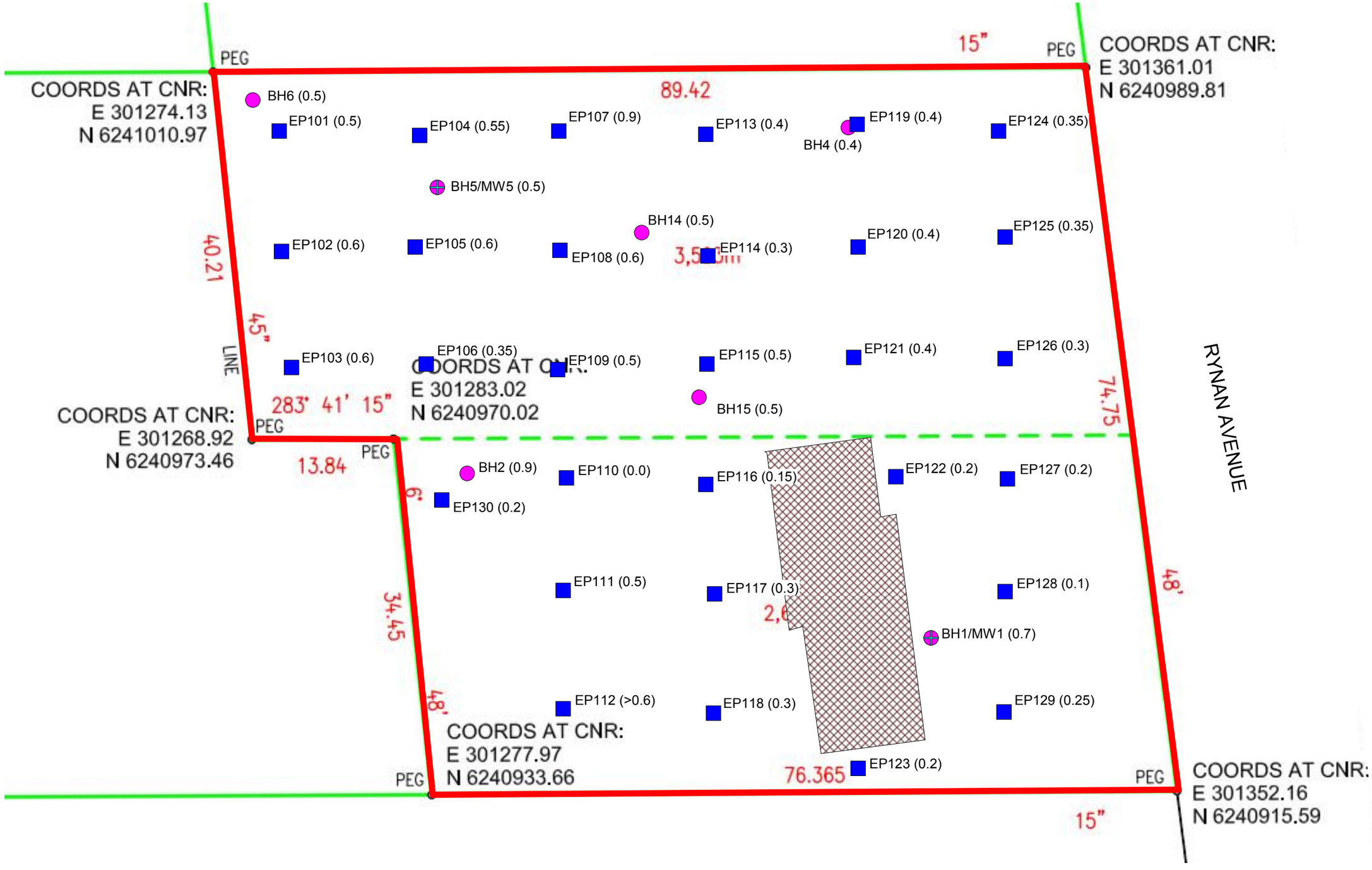
EIS
ENVIRONMENTAL INVESTIGATION SERVICES
www.jkgroup.net.au

SITE LOCATION PLAN

15 Rynan Avenue, Edmondson Park

PROJECT ID: E28733K

F1



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

- Approximate site boundary
- BH (Fill Depth) — Borehole location, number and depth of fill (m)
- BH (Fill Depth) — Test pit location, number and depth of fill (m)
- BH/MW — Groundwater monitoring well location
- SS — Surface Sample (SS) - Fibre Cement Fragment (FCF)
- Approximate location of existing house

SCALE (m) @ A3: 0 4 8 12 16 20

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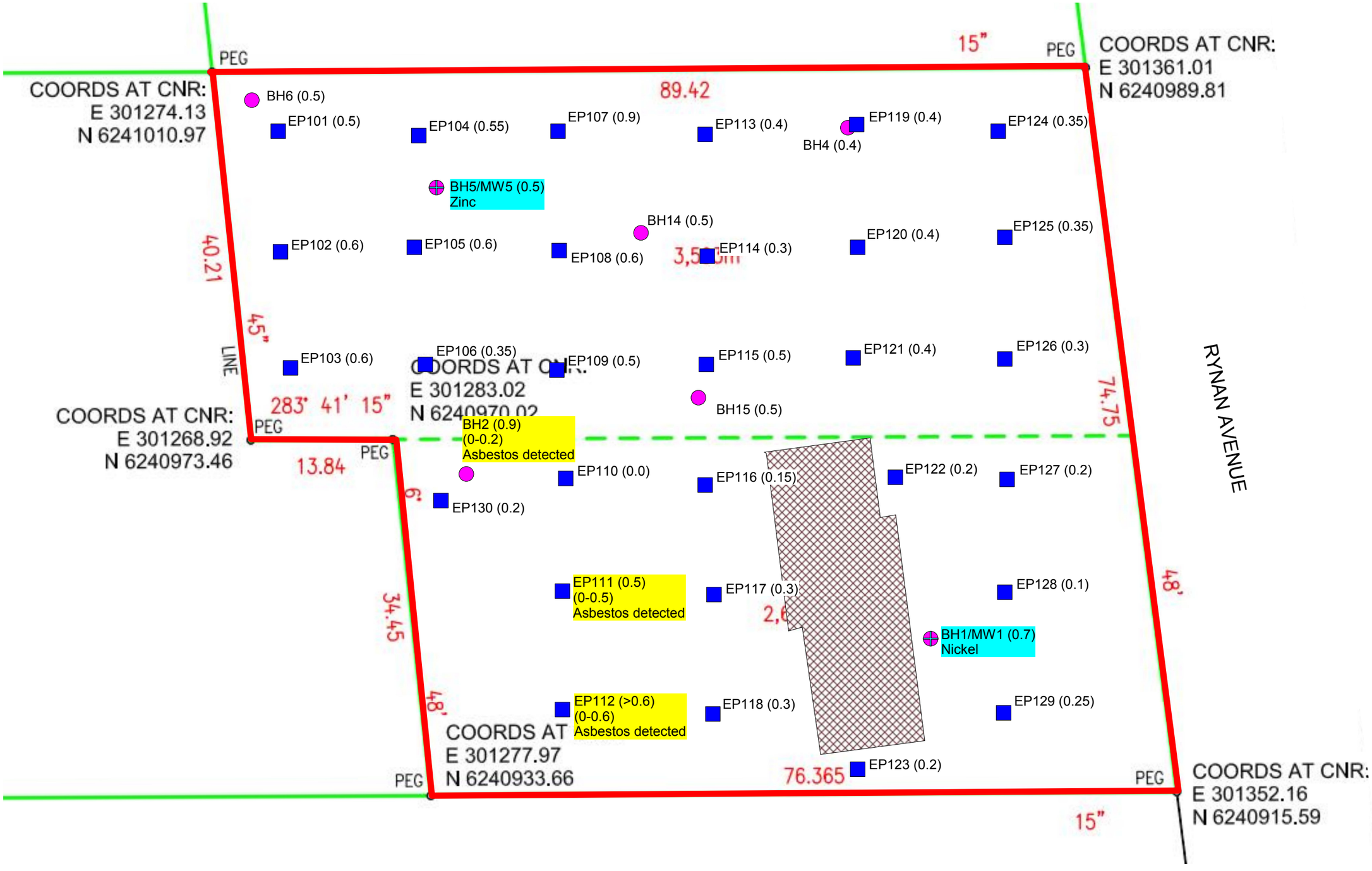
SAMPLE LOCATION PLAN

15 Rynan Avenue, Edmondson Park

PROJECT ID: E28733K

F2



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

- Approximate site boundary
- BH (Fill Depth) — Borehole location, number and depth of fill (m)
- BH (Fill Depth) — Test pit location, number and depth of fill (m)
- BH/MW — Groundwater monitoring well location
- Approximate location of existing house
- Soil contamination above SAC for Human Health Risk
- Groundwater contamination above SAC

SCALE (m) @ A3: 0 4 8 12 16 20

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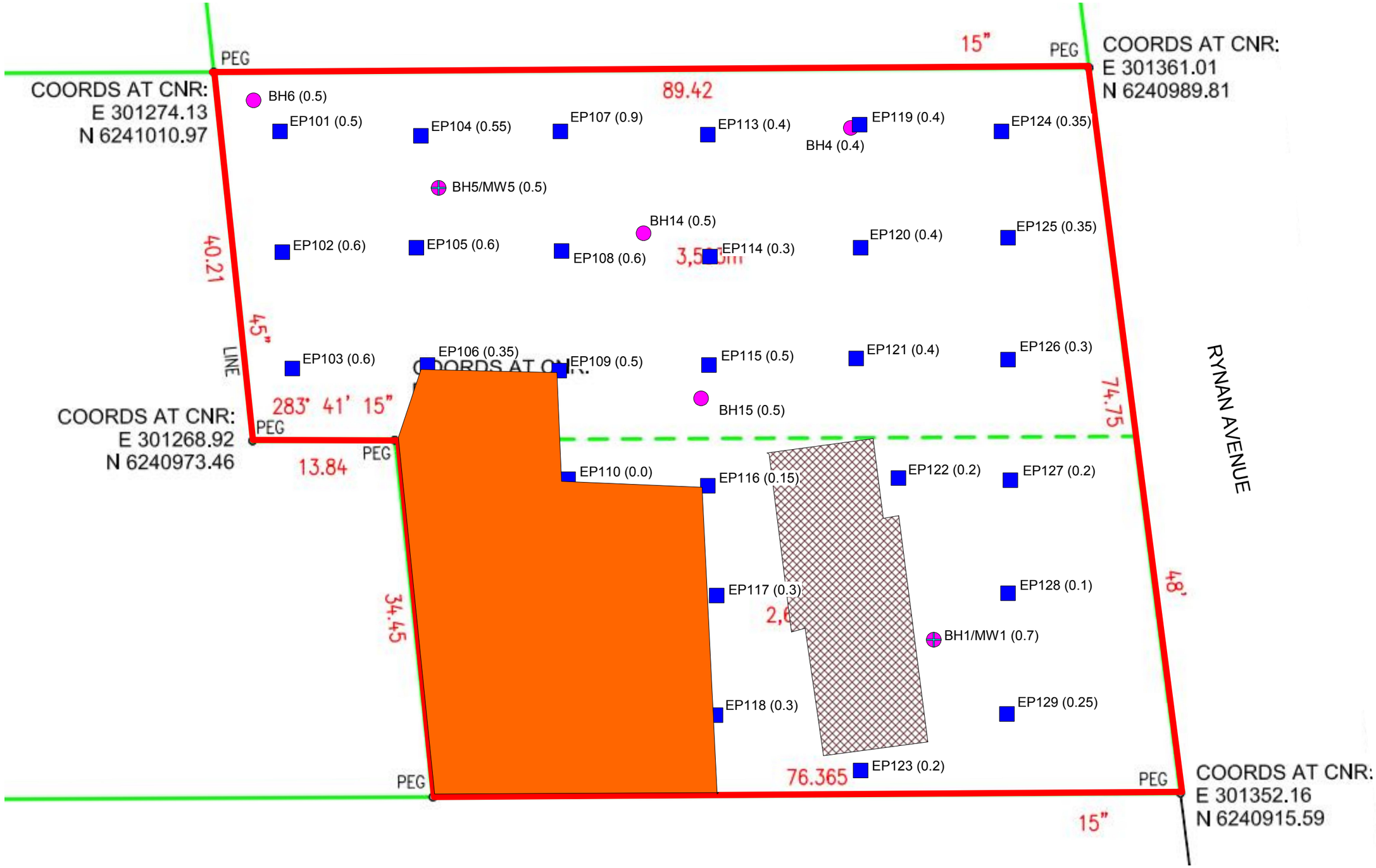
SITE CONTAMINATION PLAN

15 Rynan Avenue, Edmondson Park

PROJECT ID: E28733K

F3



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

Approximate site boundary	
BH (Fill Depth)	Borehole location, number and depth of fill (m)
BH (Fill Depth)	Test pit location, number and depth of fill (m)
BH/MW	Groundwater monitoring well location
Approximate location of existing house	
Contamination Hotspot A	

SCALE (m) @ A3: 0 4 8 12 16 20

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CONTAMINATION HOTSPOT PLAN

15 Rynan Avenue, Edmondson Park

PROJECT ID: E28733K

F4