ENVIRONMENTAL INVESTIGATION SERVICES

# REPORT

TO

# HEALTH INFRASTRUCTURE

ON

# REMEDIATION ACTION PLAN

FOR

# PROPOSED MULTI-STOREY STAFF CAR PARK

AT

# CORNER OF LUCAS STREET AND CHURCH STREET (PART OF 67-81 MISSENDEN ROAD), CAMPERDOWN, NSW

**1 JUNE 2016** **REF: E28939KB2rpt2.rev1-RAP**

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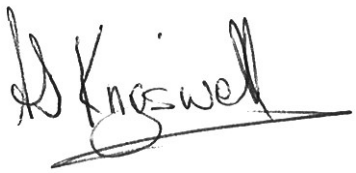

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# EXECUTIVE SUMMARY

Health Infrastructure ('the client') commissioned Environmental Investigation Services (EIS) to prepare a Remediation Action Plan (RAP) for the proposed multi-storey staff car park at corner of Lucas Street and Church Street (part of 67-81 Missenden Road), Camperdown, NSW.

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

This RAP may be subject to revision as the results of the further investigation become known.

The following documents have been previously prepared for the site:

- EIS (2016a[1]), *'Stage 1 Desktop Environmental Site Assessment'*. Report prepared for Health Infrastructure, Ref: E28939KBrpt, dated 2 February 2016;
- EIS (2016b[2]), *'Preliminary Stage 2 Environmental Site Assessment'*. Prepared for Health Infrastructure, Ref: E28939KB2rpt.rev2, dated 1 June 2016;

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

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 2016b ESA report, the following areas were identified which require remediation:

**Remediation of Impacted Fill within Basement Area**

Based on the supplied proposed development plans excavations of up to 2.5m bgl will be required for the proposed basement. The basement excavations are anticipated to remove the impacted fill from the site. The most viable option is excavation of the fill material and off-site disposal to an appropriate facility (Option 3).

**Remediation of Impacted Fill Outside Basement Area**

The proposed development does not include bulk earthworks for the proposed Brodie Street located along the southern boundary of the site. There are two options for the remediation of this area:

1. Excavate and remove all of the fill material in this area using remediation details outlined in Section 5.2.2. Validation samples would also be required as detailed above in Section 5.2.3;
2. If the fill material has to remain in place within the road area, then the area will need to be capped. The placement of concrete or Asphaltic concrete at the surface of Brodie Street would be adequate as a cap to prevent access to the underlying impacted fill soils. Another suitable capping strategy could include:
    - Removal of the top 300-500mm of fill soil, classify and dispose of appropriately;
    - Cover the exposed surface with a high visibility geofabric marker layer; and
    - Import clean materials to cover the geofabric layer followed by either a concrete or asphaltic concrete surface.

If the capping option is selected an Environmental Management Plan (EMP) must be prepared for the ongoing management of contamination remaining on site. The EMP will require establishment of appropriate public notification under Section 149(2) of the E&PAA 1979 or a covenant registered on the title to land under Section 88B of the Conveyancing Act 1919..

**Remediation of UST Tank Pit Area (if required)**

No USTs have been encountered at the site, however, in the event that a UST is encountered at the site, the most viable option for remediation is considered to be removal of the UST(s) and associated pipework followed

[1] Referred to as EIS 2016 Stage 1 ESA report

[2] Referred to as EIS 2016 Stage 2 ESA report

by excavation of the potentially contaminated (backfill) material and off-site disposal to an appropriate facility (Option 3).

**Remediation of Contaminated Groundwater**

Groundwater was not sampled as part of the EIS 2016b investigation. EIS are of the opinion that the elevated concentrations of PAHs encountered in BH104 are not likely to represent a significant migration risk to the groundwater system due to the following:

- PAH compounds associated with ash and slag contaminated fill material are generally considered to be bound tightly in a relatively insoluble matrix and therefore significant migration of PAHs from this material is unlikely to occur;
- TCLP analysis (acid) on the elevated samples indicate that the PAHs were not currently leaching; and
- The fill material is located above the groundwater table.

Groundwater testing is required in order assess whether the groundwater at the site is contaminated. Should elevated concentrations of contaminants be encountered in the groundwater at the site remediation will be required. Elevated concentrations of certain CoPC may pose risk to site receptors and also trigger a vapour assessment to be undertaken.

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 consent authority 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

Health Infrastructure ('the client') commissioned Environmental Investigation Services (EIS)[3] to prepare a Remediation Action Plan (RAP) for the proposed multi-storey staff car park at corner of Lucas Street and Church Street (part of 67-81 Missenden Road), Camperdown, NSW.

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

This RAP may be subject to revision as the results of the further investigation become known.

## 1.1 Proposed Development Details

The proposed development includes the demolition of the existing buildings and the construction of a ten storey car park. The lowest level of the car park will be at RL27.575m, which will require excavation to depths of approximately 0.3m below the Church Street frontage, approximately 0.3m to 1m below the Lucas Street footpath and to a maximum of approximately 2.5m for the majority of the site. A new internal road, known as Brodie Street, will be constructed along the southern boundary of the site and will be close to the existing ground surface RL.

## 1.2 Previous Investigations

The following documents have been previously prepared for the site:

- EIS (2016a[4]), *'Stage 1 Desktop Environmental Site Assessment'*. Report prepared for Health Infrastructure, Ref: E28939KBrpt, dated 2 February 2016;
- EIS (2016b[5]), *'Preliminary Stage 2 Environmental Site Assessment'*. Prepared for Health Infrastructure, Ref: E28939KB2rpt.rev2, dated 1 June 2016;

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

## 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.

[3] Environmental consulting division of Jeffery & Katauskas Pty Ltd (J&K)
[4] Referred to as EIS 2016 Stage 1 ESA report
[5] Referred to as EIS 2016 Stage 2 ESA report

## 1.4 Scope of Work

The RAP was prepared generally in accordance with an EIS proposal (Ref: EP9973K) of 20 May 2016 and written acceptance from the client of 20 May 2016.

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.

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[6]) |
| State Environmental Planning Policy No.55 – Remediation of Land (1998[7]) |
| Guidelines for Consultants Reporting on Contaminated Sites (2011[8]) |
| Guidelines for the NSW Site Auditor Scheme, 2nd Edition (2006[9]) |
| National Environmental Protection (Assessment of Site Contamination) Amendment Measure (2013[10]) |

[6] NSW Government Legislation, (2008), *Contaminated Land Management Act.* (referred to as CLM Act 1997)

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

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

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

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

# 2 SITE INFORMATION

## 2.1 Site Identification and Regional Setting

Table 2-1: Site Identification

| | |
|---|---|
| Site Address: | 67-81 Missenden Road, Camperdown, NSW |
| Lot & Deposited Plan: | Part Lot 101 in DP1179349 |
| Current Land Use: | Commercial (including Child care) |
| Proposed Land Use: | Infrastructure/Commercial |
| Local Government Authority (LGA): | City of Sydney |
| Current Zoning: | SP2 Infrastructure, R1 General Residential & B4 Mixed Use |
| Site Area ($m^2$): | 4,800 |
| RL (AHD in m) (approx.): | 29 |
| Geographical Location (MGA) (approx.): | N: 6248641<br>E: 331641 |
| Site Location Plan: | Figure 1 |
| Sample Location Plan: | Figure 2 |
| Site Contamination Data: | Figures 3 |
| Regional Geology: | The site is underlain by Ashfield Shale of the Wianamatta Group, which typically consists of black to dark grey shale and laminite. |
| 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 residual soils overlying relatively shallow bedrock. The occurrence of groundwater that could be utilised as a resource for beneficial use is considered to be relatively low under such conditions. A perched aquifer in the subsurface may be present. |
| Receiving Water Bodies: | Surface water bodies were not identified in the immediate vicinity of the site. The closest receiving water body in the vicinity of the site is a covered |

| | |
|---|---|
| | stormwater channel shown as Orphan School Creek located 500m to the south-west of the site which flows into Johnstons Creek approximately 800m north of the site. This is not considered to 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 2016b 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.

- Commercial Use:

The site has been used for commercial activities including manufacture and/or distribution of electrical items and white goods. Storage, leakage and spillage of petroleum hydrocarbon products could have resulted in site contamination.

- Off-Site Commercial Use:

The site is located within a commercial area. The business directories have indicated numerous land use activities (e.g dry cleaners, mechanical workshops etc) within 100 metres of the site. An underground storage tank/s (UST/s) was encountered in a previous EIS investigation undertaken immediately to the east of the site in another part of the hospital. Migration of spills and leaks from neighbouring properties could have resulted in site contamination.

- Hazardous Building Material:

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

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

## 2.3 Summary of Site Contamination

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

### 2.3.1 B(a)P TEQ above the Health Investigation Levels (HILs)

Fill sample BH104 (0.4-0.5m) encountered an elevated B(a)P TEQ concentration above the HIL-D SAC of 40mg/kg. This elevation is considered to be associated with the fill as no point sources for these contaminants were identified at these sample locations.

These contaminants are localised and confined to the fill, which extended to depths of approximately 0.4mbgl and 1.1mbgl. Some relatively minor concentrations, below HIL-D SAC, of B(a)P TEQ were detected in natural soil samples in BH104 and BH105.

## 2.4 Summary of Waste Classification for Off-Site Disposal

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

Table 2-2: Waste Classification

| Site Extent / Material Type | Classification | Disposal Option |
|---|---|---|
| Fill material containing ash and slag over the site | Fill material containing ash and slag with contaminant concentrations above the SCC criteria[1] has been classified as General Solid Waste (non-putrescible) (GSW) based on the TCLP concentrations alone as outlined in the GAI 1999/05 and GAI 2009/07 | The fill material classified under the GAI can only be disposed of to a NSW EPA landfill licensed to receive material classified using the GAI. The landfill should be contacted to obtain the required approvals prior to commencement of excavation.<br><br>Fill material containing ash contaminated material can only be disposed of to a NSW EPA licensed landfill with a leachate monitoring system. Treatment of this waste stream is not considered to be an economical option. |

Elevated concentrations of contaminants (predominately PAHs) were detected in the natural silty clay soil in BH104 and detectable concentrations of PAHs in BH105. Based on the present data the natural silty clay soil would be classified as General Solid Waste (non-putrescible) (GSW). Should a Virgin excavated natural material (VENM) classification be required for the natural soils and bedrock EIS recommend that further testing of the natural soil is undertaken across the site including in the vicinity of BH104 and BH105.

## 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 | B(a)P TEQ | Human Receptors – Site Workers<br>Site workers (construction/maintenance/future workers) will be exposed to the fill soil during development and post development work. The risk posed by the CoPC in the fill to workers is considered to be low and can be managed by appropriate PPE and dust mitigation methods.<br><br>Human Receptors – Future Occupants<br>The development of the site includes a multi-storey commercial car park with a single basement level. The development will include placement of a concrete slab over the majority of the site. The basement excavation will remove fill material from the site. Based on this, the risk of exposure to the CoPC in fill to future occupants is considered to be low. |

## 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 |
|---|---|
| B(a)P TEQ | The mobility of non-volatile 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.<br><br>B(a)P also binds strongly to soil particles and has a very low solubility in water (typically in the range of 0.2µg/L to 6.1µg/L). The risk of B(a)P leaching into groundwater is also considered to be very low.<br><br>TCLP analysis has confirmed that the B(a)P in the fill material is insoluble. |

| CoPC | Fate and Transport |
|---|---|
| | Non-volatile contaminants associated with ash and slag waste (heavy fraction PAHs) are bound within a relatively insoluble matrix. Slag and ash is usually formed as a by-product of combustion at high temperatures which 'locks in' the contaminants within the matrix. |

## 2.7 Data Gaps

The EIS 2016b ESA identified the following data gaps:

- The NSW EPA recommended minimum density for a Stage 2 ESA has not been met;
- A WorkCover NSW search for the licence of dangerous goods storage at the site has not been undertaken;
- The groundwater has not been assessed;
- The source of the trace concentrations of PAHs in the natural soil has not been adequately assessed;
- Areas beneath the existing buildings have not been included in the assessment; and
- The presence of hazardous building materials in the existing buildings has not been assessed.

These data gaps require clarification prior to remediation works commencing. It is noted that EIS have been engaged to undertake additional works to address the above data gaps and the additional works are currently underway. A copy of the proposal/SAQP to undertake the additional works is attached in Appendix A.

## 2.8 Proposed Additional Works

The following additional works will be undertaken:

- Purchase and review of WorkCover license records for the storage of dangerous goods, including fuel storage facilities.
- Soil sampling from 7 additional sampling points. This number along with the six from the EIS 2016 ESA meets the minimum density recommended in the NSW EPA Sampling Design Guidelines (1995) for the site area of approximately 4,800m$^2$;
- Three additional sampling locations will be drilled in the vicinity to the previous borehole locations which encountered detections of PAHs in the natural soils (BH104, BH105 and BH106);
- Four additional samples locations will drilled in the vicinity of BH104 and assessed for PAHs;
- Installation of three monitoring wells in selected boreholes drilled for soil sampling;
- Selected fill/natural soil samples will be analysed for combinations of the following contaminants: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); polycyclic aromatic hydrocarbons (PAHs); total recoverable hydrocarbons (TRH);

monocyclic aromatic hydrocarbons (BTEX); organochlorine (OC) and organophosphate (OP) pesticides; polychlorinated biphenyls (PCBs); and asbestos; and

- Groundwater samples will be analysed for the following: heavy metals; TRH/BTEX; low level PAHs; pH; electrical conductivity (EC); and hardness.

EIS have been engaged to undertake a hazardous building materials assessment which is to be completed prior to the demolition of site structures.

# 3 REMEDIATION EXTENT

The EIS2016b ESA investigation identified one sample with elevations above the health based SAC. Due to the preliminary nature of the investigation the impacted area has not been adequately characterised to limit the area to a 'hotspot'. Therefore the known extent of remediation at the site has been increased to include the entire site. Additional investigation/assessments have the potential to reduce the extent required to be remediated. This section will require updating when more information becomes available during additional works.

## 3.1 Known Extent

The extent of remediation is summarised in the table below. This will require updating when more information becomes available during the additional works attached in Appendix A. Reference should also be made to the attached Figure 3.

Table 3-1: Know Extent of Remediation

| Remediation Area, AEC and CoPC | Extent of Contamination | Potential Remediation Strategy |
|---|---|---|
| Fill impacted by B(a)P TEQ | The fill over the entire site has been impacted by B(a)P TEQ. This area is approximately 4,800m$^2$ and extends to the depth of fill which ranges from approximately 0.4mbgl to 1.1mbgl.<br><br>Slight detections of PAHs (including B(a)P TEQ) were encountered in the natural samples analysed at BH104 and BH105. Further testing is required in the vicinity of these areas along with other areas of the site. | The earthworks for the proposed development include excavations to a depth of approximately 2.5mbgl over the majority of the site. The fill impacted by B(a)P TEQ will be excavated and disposed of off-site. This will remove the B(a)P TEQ which was encountered within the fill as shown on the attached Figure 3.<br><br>Following successful validation, this B(a)P TEQ will not pose a risk to future site receptors.<br><br>The exposure to site workers during remediation can be managed by appropriate PPE and dust mitigation methods. |

## 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.

Where contamination is found to extend beyond the remediation boundaries (particularly in the vicinity of the USTs) through validation, remediation should be continued until the CoPC does not pose a risk to site receptors.

A number of data gaps have been identified at the site. The data gaps are outlined in **Section 2.7** of this report. The majority of the data gaps are to be assessed in conjunction with the implementation of the RAP.

# 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.

### 4.1.1 Site Specific Soil Remediation Options

The tables below summarise the site specific soil remediation options:

Table 4-1: Site Specific Soil Remediation Options

| Option | Discussion | Applicability |
|---|---|---|
| Option 1<br>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:<br><br>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.<br><br>Soil Washing: Soil is stripped of contaminants via a leaching process and the concentrated contaminated liquid product retained for disposal or additional treatment.<br><br>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.<br><br>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.<br><br>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. These are applicable for large scale remediation work of sites with large areas impacted by contaminants that can be treated.<br><br>This option is not considerable to be viable due to the entire fill soils will be excavated and disposed of off-site for the provision of the basement. |

| Option | Discussion | Applicability |
|---|---|---|
| Option 2<br>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.<br><br>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.<br><br>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. |
| Option 3<br>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.<br><br>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. | The most suitable and the preferred option for remediation of the site considering all of the fill soils will be excavated and disposed of off-site for the provision of the basement. |
| Option 4<br>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.<br><br>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.<br><br>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 | This option is considered to be a viable option for the fill material remaining on-site on completion of earthworks. The majority of the site will be paved with concrete which will limit the exposure to receptors.<br><br>EIS note that this option for remediation is not preferred due to the ongoing management requirements required under an EMP |

| Option | Discussion | Applicability |
|---|---|---|
| | the specific contaminants of concern.<br><br>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. | |

## 4.2 Groundwater Remediation

Groundwater was not sampled as part of the EIS 2016b ESA. The preferred order for the remediation and management of contaminated groundwater presented in the Groundwater Contamination Guidelines 2007 is outlined below:

1. Clean-up so that the natural background water quality is restored;
2. Clean-up to protect the environmental, human and ecological health; and
3. Clean-up to the extent practicable.

The remediation options for consideration are outlined in the following table:

Table 4-2: Groundwater Remediation Options

| Remediation Option | Details |
|---|---|
| Option 1<br>In-situ treatment | Some of the in-situ treatment options include:<br><br>Bio-remediation: Addition of oxygen and nutrient compounds to accelerate the natural process of organic compound decay within the environment.<br><br>Chemical oxidation: Addition of chemical compounds to oxidise the contaminants in groundwater into compounds that are less harmful to the environment<br><br>Air Sparging and Extraction: Air is forced through the contaminated groundwater system to volatilise organic contaminants. The air is then extracted and captured for treatment leaving reduced contaminant concentrations within the sub-strata |
| Option 2<br>Ex-situ treatment | Some of the ex-situ treatment options include:<br><br>Washing: Groundwater is stripped of contaminants via a leaching process, with the concentrated contaminated liquid product retained for disposal or additional treatment<br><br>Bioreactors: Groundwater is pumped into an above ground tank and treated with inorganic nutrients. Oxygen is introduced in to the tank by sparging. Hydrocarbons are broken down by naturally occurring bacteria<br><br>Contaminated groundwater is transported to an approved/licensed treatment facility, treated to remove/stabilise the contaminants then returned to the subject site or transported to an alternative facility for disposal |
| Option 3<br>On-going management & monitoring | Measures to manage groundwater contamination may include:<br>• Notifying appropriate government agencies, owners of subsurface facilities and any other appropriate parties of the presence of groundwater contamination;<br>• Plume containment;<br>• Active or passive cleanup of contaminated groundwater;<br>• Ongoing monitoring of natural attenuation;<br>• Implementing management or contingency plans to reduce risks; and<br>• Restricting groundwater use in and down gradient of the contaminated plume. |

# 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) | Health Infrastructure<br>Contact: Mr John Armstrong<br>P: (02) 9978 5426<br>A: Level 6,77 Pacific Highway, North Sydney NSW 2060<br>E: john.armstrong@health.nsw.gov.au<br><br>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<br><br>The RC is required to review all documents prepared for the project and implement the procedures outlined in this plan and the EIS 2014c ESA/RAP reports. 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<br><br>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 and the EIS 2014c ESA and 2015 WC reports. |

| | |
|---|---|
| | 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)<br>Contact: Mr Geoff Fletcher<br>P: 02-9888 5000<br>A: PO Box 976, North Ryde BC, NSW 1670<br>E: gfletcher@jkgroup.net.au<br><br>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 – if required<br><br>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<br><br>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 2016b ESA 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 Impacted Fill within Basement Area

### 5.2.1 Rationale for Selection of Remedial Strategy

Based on the supplied proposed development plans excavations of up to 2.5m bgl will be required for the proposed basement. The basement excavations are anticipated to remove the impacted fill from the site. The most viable option is excavation of the fill material and off-site disposal to an appropriate facility (Option 3).

### 5.2.2 Remediation Details

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

Table 5-2: Remediation Details of Impacted Fill within Basement Area

| Step | Procedure | Responsibility |
|---|---|---|
| 1. | Asbestos Management Plan:<br>If asbestos is encountered or likely to be present an Asbestos Management Plan (AMP) should be prepared. | PM/RC |
| 2 | Mark the Area:<br>Prior to the commencement of excavation, the remediation area should be clearly marked with spray paint and/or pegs. The impacted soil should be covered with builders plastic or similar in order to limit exposure. | RC |
| 3. | PPE and WHS:<br>Check PPE and WHS requirements prior to commencement of remediation works. This should be done daily. Reference should also be made to the AMP (if required) for any additional PPE required for working with asbestos. The minimum PPE required for the remediation includes the following:<br>• Disposable gloves;<br>• P2 dust mask;<br>• Eye protection; and<br>• Hard hat, covered clothing and steel toed boots. | All personnel who have access to the site |
| 4. | Site Preparation:<br>The pavement in the remediation area (if present) should be removed with care using an excavator or similar. Care should be taken not to track over the area with heavy machinery. | RC |
| 5. | Address Stability Issues:<br>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 |
| 6. | Excavation and Removal of the Contaminated Material:<br>Excavation and removal of the contaminated fill will include the following:<br>• Further samples of the fill material at the site should be analysed to confirm the waste classification for off-site disposal (See **Section 2.7** and Appendix A);<br>• Prior to the commencement of excavation, a suitable NSW EPA landfill facility (with an appropriate license to accept the waste stream) should be contacted and the necessary approvals should be obtained for disposal;<br>• The impacted fill material from this area should be excavated in small | RC<br><br>EC to complete sampling and validation report |

| Step | Procedure | Responsibility |
|---|---|---|
| | sections using an excavator or backhoe until the target depth has been reached;<br>• The fill should be directly loaded onto trucks with tracking systems for transport to the landfill and dispose in accordance with the assigned waste classification. Landfill dockets should be retained and forwarded to the EC for documentation;<br>• Obtain validation samples from the natural soil following the excavation and removal of impacted fill (see the validation plan below for more details);<br>• Any water encountered within the excavation should be sampled at the time of the soil validation sampling. The water should then be pumped out of the excavation by a liquid waste contractor and disposed of in accordance with Council/EPA requirements;<br>• 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 6.4** for more information; and<br>• All documents including landfill dockets should be retained and forwarded to the PM and EC for inclusion into the validation report prepared by the EC. | |
| 7. | Contingency Plan:<br>The contingency measures outlined in the RAP should be implemented in the event of unexpected finds or validation failure. | RC |
| 8. | Validation Report:<br>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 |

### 5.2.3 Validation Sampling

As a minimum the following validation samples should be obtained from the remediation area following the excavation and removal of impacted fill:

Table 5-3: Validation Sampling in Basement Area

| Sampling Frequency | Sampling Method | Laboratory Analytical Schedule |
|---|---|---|
| Validation samples should be undertaken as outlined below:<br><br>Excavation Base: | Samples will be obtained using hand equipment or directly from the | Samples will be analysed for: PAHs. Other |

| Sampling Frequency | Sampling Method | Laboratory Analytical Schedule |
|---|---|---|
| 1 sample per 100m$^2$ (10m grid spacing). As a minimum, 5 samples for an area of 500m$^2$.<br><br>Excavation Walls:<br>1 sample per 15m$^2$ (10 lineal meters of 1.5m high). Samples should be obtained from the fill soils exposed along the walls.<br><br>Pit Water:<br>If seepage is encountered at the base of the excavation, a minimum of one sample will be obtained using a disposable PVC bailer. | excavator bucket (based on the depth of excavation). Samples should be obtained approximately 200mm into the exposed profile where possible.<br><br>Appropriate field QA/QC samples should be obtained as outlined in the validation plan. | CoPC may be required to be analysed and these will be confirmed following the additional works.<br><br>The results will be assessed against the Validation Assessment Criteria (VAC) outlined in **Section 6.3.** |

## 5.3 Remediation of Impacted Fill Outside Basement Area

The proposed development does not include bulk earthworks for the proposed Brodie Street located along the southern boundary of the site. There are two options for the remediation of this area:

3. Excavate and remove all of the fill material in this area using remediation details outlined above in Section 5.2.2. Validation samples would also be required as detailed above in Section 5.2.3;
4. If the fill material has to remain in place within the road area, then the area will need to be capped. The placement of concrete or Asphaltic concrete at the surface of Brodie Street would be adequate as a cap to prevent access to the underlying impacted fill soils. Another suitable capping strategy could include:
    - Removal of the top 300-500mm of fill soil, classify and dispose of appropriately;
    - Cover the exposed surface with a high visibility geofabric marker layer; and
    - Import clean materials to cover the geofabric layer followed by either a concrete or asphaltic concrete surface.

    If the capping option is selected an Environmental Management Plan (EMP) must be prepared for the ongoing management of contamination remaining on site. The EMP will require establishment of appropriate public notification under Section 149(2) of the E&PAA 1979 or a covenant registered on the title to land under Section 88B of the Conveyancing Act 1919.

## 5.4 Remediation of UST Tank Pit Area (if required)

### 5.4.1 Rationale for Selection of Remedial Strategy

No USTs have been encountered at the site, however, in the event that a UST is encountered at the site, the most viable option for remediation is considered to be removal of the UST(s) and associated pipework followed by excavation of the potentially contaminated (backfill) material and off-site disposal to an appropriate facility (Option 3).

### 5.4.2 Remediation Details

The specific remediation details for a UST and associated pipework are described in the table below:

Table 5-4: Remediation Details in UST Areas

| Step | Procedure | Responsibility |
|---|---|---|
| 1. | Mark the UST Area:<br>Prior to the commencement of excavation, the remediation area should be clearly marked with spray paint and/or pegs. If required a Ground Penetrating Radar (GPR) survey should be undertaken in the vicinity of the USTs to mark the area. | RC and GPR Contractor. |
| 2. | PPE and WHS:<br>Check PPE and WHS requirements prior to commencement of remediation works. This should be done daily. Reference should also be made to the AMP for any additional PPE required for working with asbestos (if required). The minimum PPE required for the remediation includes the following:<br>• Disposable gloves;<br>• P2 dust mask;<br>• Eye protection; and<br>• Hard hat, covered clothing and steel toed boots. | All personnel who have access to the site |
| 3. | Site Preparation:<br>The pavement (if present) in the remediation area should be removed with care using an excavator or similar. An experienced contractor should be engaged for the removal of the USTs. Liquid and/or sludge within the UST and associated pipe work should be pumped out and disposed of by a licensed liquid waste operator. | RC and Liquid waste disposal contractor |
| 4. | Address Stability Issues:<br>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. | Removal of the UST:<br>The UST and associated infrastructure should be removed by an | RC, UST Contractor, EC to complete |

| Step | Procedure | Responsibility |
|---|---|---|
| | experienced contractor in accordance with AS4976-2008[11]. Following removal of the USTs, remediation of the area will be undertaken as follows:<br>• The backfill soils (most likely to be sandy fill) surrounding the UST should be excavated and stockpiled separately. This material should be analysed for TRH, BTEXN, PAHs, heavy metals and asbestos (as a minimum) to confirm the waste classification for off-site disposal;<br>• Submit an application to dispose of the backfill soil (in accordance with the assigned waste classification) to a NSW EPA landfill licensed to receive the waste and obtain authorisation to dispose;<br>• Excavate the remaining impacted soil from the tank pit to a depth of approximately 0.5m beyond the base of the UST and approximately 0.5m in all directions horizontally from the UST;<br>• A portable hand-held PID unit should be used during excavation as a guide to identify areas potentially impacted by TRH. Such areas should be targeted for validation sampling. In the event of high PID readings, the TRH impacted material should be over excavated until cleared material is encountered;<br>• Load the backfill soil onto trucks and dispose in accordance with the assigned waste classification;<br>• Obtain validation samples from the walls and base of the excavation (see the validation plan below for more details);<br>• Any water encountered within the pit should be sampled at the time of the soil validation sampling. The water should then be pumped out of the excavation by a liquid waste contractor and disposed of in accordance with Council/EPA requirements;<br>• Backfill the excavation 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 6.4** for more information; and<br>• All documents including landfill dockets, UST disposal dockets etc. should be retained and forwarded to the client for inclusion into the validation report prepared by the EC. | sampling and validation report |
| 6. | <u>Contingency Plan:</u><br>The contingency measures outlined in the RAP should be implemented in the event of unexpected finds or validation failure. | RC and UST Contractor |
| 7. | <u>Validation Report:</u><br>A validation report will be prepared documenting the remediation works undertaken above. The validation report will include documentation of tank disposal, waste tracking, results of the validation testing and other | EC |

[11] Australian Standard, (2008), *The removal and disposal of Underground Storage Tanks.* (referred to as AS4976-2008)

| Step | Procedure | Responsibility |
|---|---|---|
| | information as applicable. | |

### 5.4.3 Validation Sampling

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

Table 5-5: Validation Sampling in UST Area

| Sampling Frequency | Sampling Method | Laboratory Analytical Schedule |
|---|---|---|
| Validation samples should be undertaken in accordance with the EPA Technical Note for Service Station Sites as outlined below:<br><br>Excavation Base:<br>Minimum two samples will be obtained from the base of each tank removed.<br><br>Excavation Walls:<br>Samples will be obtained from both fill and natural soils exposed along the walls. A minimum of two samples will be obtained from each wall of the tank pit (minimum 2 samples per wall, total 8).<br><br>UST Pit Water:<br>If seepage is encountered at the base of the tank pit, a minimum of one sample will be obtained using a disposable PVC bailer.<br><br>Pipe Line Excavation:<br>In the event feed lines are encountered during the excavation, a minimum of one sample will be obtained per 5m of exposed length. | 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.<br><br>A portable hand-held PID unit should be used to select samples for the analytical testing.<br><br>Appropriate field QA/QC samples should be obtained as outlined in the validation plan. | Samples will be analysed for: lead, PAHs, BTEXN and TRH.<br><br>The results will be assessed against the Validation Assessment Criteria (VAC) outlined in **Section 6.3.** |

## 5.5 Remediation of Contaminated Groundwater

Groundwater was not sampled as part of the EIS 2016b investigation. EIS are of the opinion that the elevated concentrations of PAHs encountered in BH104 are not likely to represent a significant migration risk to the groundwater system due to the following:

- PAH compounds associated with ash and slag contaminated fill material are generally considered to be bound tightly in a relatively insoluble matrix and therefore significant migration of PAHs from this material is unlikely to occur;

- TCLP analysis (acid) on the elevated samples indicate that the PAHs were not currently leaching; and
- The fill material is located above the groundwater table.

Groundwater testing is required in order assess whether the groundwater at the site is contaminated. Should elevated concentrations of contaminants be encountered in the groundwater at the site remediation will be required. Elevated concentrations of certain CoPC may pose risk to site receptors and also trigger a vapour assessment to be undertaken.

## 5.6 Identification of Environmental Values and Potential Impacts

The following environmental values have been assessed as part of this remediation:

- **Terrestrial ecosystems** – The majority of the site has been paved and the site has been used for commercial industrial purposes from at least the since the mid-1900's. The site is located within a former industrialised area of Sydney and the ecological value of the site is considered to be low. The majority of the site will be excavated for the proposed basement or be used as a road pavement.

- **Aquatic ecosystems** – The closest receiving water body in the vicinity of the site is a covered stormwater channel shown as Orphan School Creek located 500m to the south-west of the site which flows into Johnstons Creek approximately 800m north of the site. Following remediation, the potential impact of the site on this ecosystem will be minimal.

- **Human Uses** –Groundwater is unlikely to be used as a drinking water source or for recreation uses at the site. Such activities will use potable water or town water supplied to the site. The potential for exposure to contaminants will be minimised by excavation and off-site disposal of the impacted fill material.

- **Buildings and Structures –** An assessment of the risk posed by the CoPC towards built structures has not been undertaken for this assessment. EIS are of the opinion that the CoPC are not aggressive to buildings and/or built structures.

## 5.7 Inspection Requirements

An environmental consultant who is a member of the Australian Contaminated Land Consultants Association (ACLCA[12]) 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

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

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

The site should be inspected by a qualified environmental consultant prior to and after the installation of geo-grid and marker membrane in the areas to be capped.

### 5.8 Documentation

The RC must retain all documentation associated with the remediation (e.g. landfill dockets, photographs, UST disposal dockets, 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.

In the event that any contamination on the site is capped photographs obtained prior to and after the installation of geo-grid and marker membrane should be retained and forwarded to EIS 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.

### 5.9 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.

# 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 Data Quality Objectives (DQO)

The NEPM 2013 defines the DQO process as a seven step iterative planning tool used to define the type, quantity and quality of data needed to inform decisions relating to the environmental condition of the site.

The DQO process is detailed in the US EPA document Guidance on systematic planning using the data quality process (2006 ) and the NSW DEC document The Guidelines for the NSW Site Auditor Scheme, 2nd Edition (2006 ).

These seven steps are applicable to the validation assessment and are summarised below.

### 6.1.1 State the Problem

The EIS2016b investigation has identified contamination issues at the site which pose a risk to the site receptors. Remediation of the site is required to address these issues.

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.

### 6.1.2 Identify the Decisions/Goals

The data collection will be designed based on the following:

- Review of existing site information and any additional information relevant to the remediation/validation process;
- Assess the risks to site receptors posed by contaminants remaining on site after remediation;
- Adopt a suitable Validation Assessment Criteria (VAC) to assess the analytical results; and
- Data interpretation based on the following decision statements:
    1. No single value exceeds 250% of the VAC;
    2. Statistical analysis will be used to assess the laboratory data against the VAC when there are results above the VAC. The following criteria will be adopted:
        - The 95% Upper Confidence Limit (UCL) value of the arithmetic mean concentration of each contaminant should be less than the VAC; and
        - The standard deviation (SD) of the results must be less than 50% of the VAC.
    3. Statistical calculations are not required if all results are below the VAC.

The goal of the study is to remediate the site to a point that it does not represent a risk to future site users.

### 6.1.3 Identify Information Inputs

The following information will be collected:

- Sampling of all media (soil, groundwater, vapour, ACM, surface water etc.) encountered as part of the remediation validation;
- The VAC will be designed based on the criteria outlined in NEPM 2013. Other criteria will be used as required and detailed in this report;
- The samples will be analysed in accordance with the analytical methods outlined in NEPM 2013;
- Field screening information (i.e. PID data, presence of hydrocarbons etc.) and observations made during validation will be taken into consideration in selecting the analytical schedule; and
- Any additional information that may arise during validation will also be used as data inputs.

### 6.1.4 Define the Study Boundary

The study boundary includes the entire site as shown on the attached figure 2.

### 6.1.5 Develop the Analytical Approach (or Decision Rule)

The analytical data will be assessed against the Validation Assessment Criteria (VAC) outlined in the plan. The importation of material will be assessed against the criteria outlined in **Section 6.4**.

As part of the data quality assessment the following data quality indicators (DQIs) will be assessed:

- Precision – The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD). The following acceptance criteria will be used to assess the RPD results:
  - results > 10 times the practical quantitation limit (PQL), RPDs < 50% are acceptable;
  - results between 5 and 10 times PQL, RPDs < 75% are acceptable;
  - results < 5 times PQL, RPDs < 100% are acceptable; and
  - An explanation is provided if RPD results are outside the acceptance criteria.

- Accuracy – Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured. The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes.

  The proximity of an averaged result to the true value, where all random errors have been statistically removed. Accuracy is measured by percent recovery. Acceptable limits for

accuracy generally lie between 70% to 130% recoveries. Certain laboratory methods may allow for values that lie outside these limits.

- Representativeness - Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handling and analysis protocols and use of proper chain-of-custody and documentation procedures.

- Completeness - Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:
  - Chain-of-custody forms; Sample receipt form;
  - All sample results reported; All blank data reported;
  - All laboratory duplicate and RPDs calculated;
  - All surrogate spike data reported;
  - All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
  - Spike recovery acceptable limits reported; and
  - NATA stamp on reports.

- Comparability - Comparability is the evaluation of the similarity of conditions (eg. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:
  - Collection and analysis of samples by different personnel; Use of different techniques;
  - Collection and analysis by the same personnel using the same methods but at different times; and
  - Spatial and temporal changes (due to environmental dynamics).

A summary of the DQI for the validation program is outlined in the table below:

Table 6-1: VAC DQI Summary

| DQI | Frequency | DQ Criteria |
|---|---|---|
| Precision: | | |
| Intra-laboratory duplicates | 1 per 20 samples | See above RPD Criteria |
| Inter-laboratory duplicates | 1 per 20 samples | See above RPD Criteria |
| Accuracy: | | |
| Laboratory duplicate samples | Set by NEPM 2013 | See above RPD Criteria |
| Laboratory control samples | 1 per lab batch | <PQL/LOR |
| Surrogate Spike | 1 per lab batch | 70%-130% |
| Matrix Spike | 1 per lab batch | 70%-130% |
| Laboratory blanks | 1 per lab batch | <PQL/LOR |
| Representativeness: | | |
| Sampling of appropriate media | All Samples | All Samples |
| Samples extracted and analysed within holding times | All Samples | All Samples |
| Samples analysed for the right analytes | All Samples | All Samples |
| Field rinsate samples | 1 per sample batch | <PQL/LOR |
| Trip spike samples | 1 per sample batch | 70%-130% |
| Trip blank samples | 1 per sample batch | <PQL/LOR |
| Completeness: | | |
| Appropriate field documentation<br>Chain-of-custody forms; sample receipt forms<br>NATA stamp on laboratory reports<br>Frequency of QA samples maintained | All samples | All samples |
| Comparability: | | |
| Standard sampling and operation procedures<br>Standard analytical methods for all analysis<br>Consistent sampling staff trained in sampling<br>Spatial and temporal changes (due to environmental dynamics) | All samples | All samples |

### 6.1.6 Specify the Performance or Acceptance Criteria

NEPM 2013 defines decision errors as 'incorrect decisions caused by using data which is not representative of site conditions'. This can arise from errors during sampling or analytical testing. A combination of these errors is referred to as 'total study error'. The study error can be managed through the correct choice of sample design and measurement.

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. In this case, for example, the contaminants identified in the RAP are considered to pose a risk to receptors unless proven not to. The null hypothesis has been adopted for this assessment.

### 6.1.7 Optimise the Design for Obtaining Data

The most resource-effective design will be used in an optimum manner to achieve the validation objectives.

## 6.2 Sampling Program

### 6.2.1 Sampling Frequency and Methodology

The sampling program for the validation is outlined under the remediation details in this plan. This is the minimum requirement based on conditions known to exist at the site. Additional validation sampling may be required based on information obtained during the additional works undertaken.

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.

### 6.2.2 Laboratory analysis

The analysis of all samples will be undertaken by NATA accredited laboratories. The laboratories are required to meet the QA/QC requirements outlined in NEPM 2013. The analytical schedule is outlined under the remediation details in this RAP.

## 6.3 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 6-2: VAC Adopted for this Investigation

| Guideline | Applicability |
|---|---|
| Health Investigation Levels (HILs) (NEPM 2013) | The HIL-D criteria for 'Commercial/industrial' will be adopted for the assessment. |

| Guideline | Applicability |
|---|---|
| | |
| Health Screening Levels (HSLs) (NEPM 2013) | The HSL-D criteria for 'Commercial/industrial' will be adopted for the assessment. |
| Direct Contact Limits for TRH (NEPM 2013) | These guidelines will be used after considering the relevant HSLs for adverse effects of TRH contamination where necessary. |
| Asbestos in Soil | The 'presence/absence' of asbestos in soil will be adopted. |
| Groundwater Investigation Levels (GILs) | The NSW Department of Environment and Conservation (now EPA) Guidelines for the Assessment and Management of Groundwater Contamination (2007[13]) require an assessment of environmental values including:<br><br>**Aquatic Ecosystems:**<br>The closest receiving water body in the vicinity of the site is Johnstons Creek located to the north of the site. This water body predominantly sustains a freshwater ecosystem. Hence the freshwater trigger values presented in Australian and New Zealand Guidelines for Fresh Water Quality (2000[14]) will be adopted for the validation works (referred to as GIL-ANZECC-Fresh).<br><br>The NSW EPA promotes the use of trigger values for the protection of 95% of aquatic ecosystems, except where the contaminants have the potential to bio-accumulate, in which case the 99% trigger values are recommended.<br><br>The 95% trigger values will be adopted for the validation works. Where necessary, the low reliability trigger values will be used.<br><br>The Hardness Modified Trigger Values (HMTVs) will be adopted for individual metals to factor the hardness of the groundwater.<br><br>**Human Uses:**<br>The ANZECC 2000 Recreational Water Quality guidelines are designed to protect the health of both primary contact (e.g. swimming) and secondary contact (e.g. boating) water users. |

[13] NSW DEC (2007), *Guidelines for the Assessment and Management of Groundwater Contamination* (referred to as Groundwater Guidelines 2011)

[14] ANZECC, (2000), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* (referred to as ANZECC 2000)

| Guideline | Applicability |
|---|---|
| | The site is also connected to the mains water supply. The Australian Drinking Water Guidelines (2011[15]) will only be used as a preliminary screening tool to assess individual PAHs and VOC compounds (referred to as GIL-ADWG).<br><br>In the absence of locally endorsed guidelines for individual PAHs and VOCs in groundwater, the USEPA Region 9 PRGs for 'Tap Water' will be used to assess individual PAHs and VOCs. It is noted that these guidelines have not been endorsed by NSW EPA and are used only as a preliminary screening tool.<br><br>**Health Risk in Non-use Scenarios:**<br>Health risks in non-use scenarios are usually associated with the presence of vapours associated with volatile contaminants.<br><br>As a conservative measure, the HSL-D: 'Commercial/Industrial' will be adopted for the assessment. |
| Waste Classification (WC) Criteria | The criteria outlined in the NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014[16]) will be adopted to classify the material for off-site disposal.<br><br>Waste classified as 'hazardous' in accordance with the Waste Classification Guidelines 2014 due to high levels of contaminants is generally not suitable for disposal to a landfill in NSW without treatment. However, if the contaminants are 'immobilised' so that they will not be released into the landfill leachate at levels of concern, then the EPA may grant an immobilisation approval to enable the waste to be landfilled. The immobilisation approvals are issued by the EPA under the Protection of the Environment Operations (Waste) Regulation 2014. The following approvals will be adopted if necessary:<br>• Approval 1999/05 - Ash, Ash-contaminated natural excavated materials or coal-contaminated natural excavated material; and<br>• Approval 2009/07 - Metallurgical furnace slag or metallurgical furnace slag contaminated natural excavated materials. |

## 6.4 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.

[15] National Health and Medical Research Council, (2011), *Australian Drinking Water Guidelines.* (referred to as ADWG 2011)
[16] NSW EPA, (2014), '*Waste Classification Guidelines, Part 1: Classifying Waste.* (referred to as Waste Classification Guidelines 2014)

### 6.4.1 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 for 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'.

### 6.4.2 Material Imported for Tank Pit Backfill

Material classed as VENM should be imported onto the site to use as backfill provided it meets the requirements outlined below.

#### 6.4.2.1 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 for all imported material:

- 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, ie. soil/rock description, colour, etc. This should be confirmed by photographic documentation;
- Source sites should be inspected by an experienced consultant and any relevant reports should be reviewed, prior to acceptance of any 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. In this case 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. In this case the material should be sampled and analysed in accordance with the NEPM 2013 guidelines.

A suitable QA/QC procedure should be adopted.

#### 6.4.2.2 Importation of Recycled Material (RM)

Recycled material such as crushed concrete, bricks, AC, road base, gravel etc. may be required for the master plan 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 meet the waste exemption requirements set out by the NSW EPA. The material should be inspected by the EC on arrival to confirm that the material is consistent with the documentation reviewed from

the source site and is free from evidence of contamination. The material should be sampled and analysed for the CoPC as a QA measure.

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 EC 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:

- Details of the remediation works undertaken at the site;
- Sampling, analysis and quality plan (SAQP) adopted for the validation assessment;
- Details of the validation results including the analytical results assessed against the VAC;
- Details of material disposal analysis and review of contractor documentation;
- Details of material imported onto the site;
- Any deviation to the remediation strategy adopted for the study;
- Data Quality Assessment;
- Details of on-going monitoring and/or management requirements; and
- Discussion on the suitability of the site for the proposed landuse.

# 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, a qualified occupational hygienist 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 6.4**, 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 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) | Health Infrastructure<br>Contact: John Armstrong | (02) 9978 5426 |
| 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[17]) 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.

[17] 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

In the event that ACM is encountered during excavation/constriction works, air monitoring should be undertaken in accordance with the NSW WorkCover requirements.

A qualified occupational hygienist or asbestos consultant should be appointed to assess the extent of monitoring required at the site. Appropriate NSW WorkCover 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[18];
- 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.

[18] 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 remediation of the site is technically feasible and can be made suitable for the proposed development provided the recommendations in this RAP are successfully implemented, including the pre-remediation assessment and 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:<br>A designated development;<br>• Carried out on land declared to be a critical habitat;<br>• Development for which another SEPP or REP requires a development consent; or<br>• Carried out in an area or zone classified as:<br>➢ Coastal Protection<br>➢ Conservation or heritage conservation<br>➢ Habitat protection, or habitat or wildlife corridor<br>➢ Environmental protection;<br>➢ Escarpment, escarpment protection or preservation;<br>➢ Floodway or wetland;<br>➢ Nature reserve, scenic area or scenic protection; etc.<br>• 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.<br><br>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 the consent authority 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[19] | 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. |
| Public Notification of EMP | The EMP will require public notification under Section 149(2) of the EPAA 1979 or a covenant registered on the title to land under Section 88B of the Conveyancing Act *1919*. |
| 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. |
| Water Management Act 2000[20] | The remediation of contaminated groundwater may require treatment. Relevant approval should be obtained from NSW EPA and NSW Office of Water (NOW) prior to the commencement of pumping and treatment. |
| 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[21] | Sites contaminated with asbestos become a 'workplace' when work is carried out there and require a register and asbestos management plan. |

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

[20] NSW Government Water Management Act 2000

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

## 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


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

0 20 40 60 80 100
SCALE 1:2000 @A4 METRES

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

Title: **SITE LOCATION PLAN**

Project: CNR LUCAS STREET & CHURCH STREET CAMPERDOWN, NSW

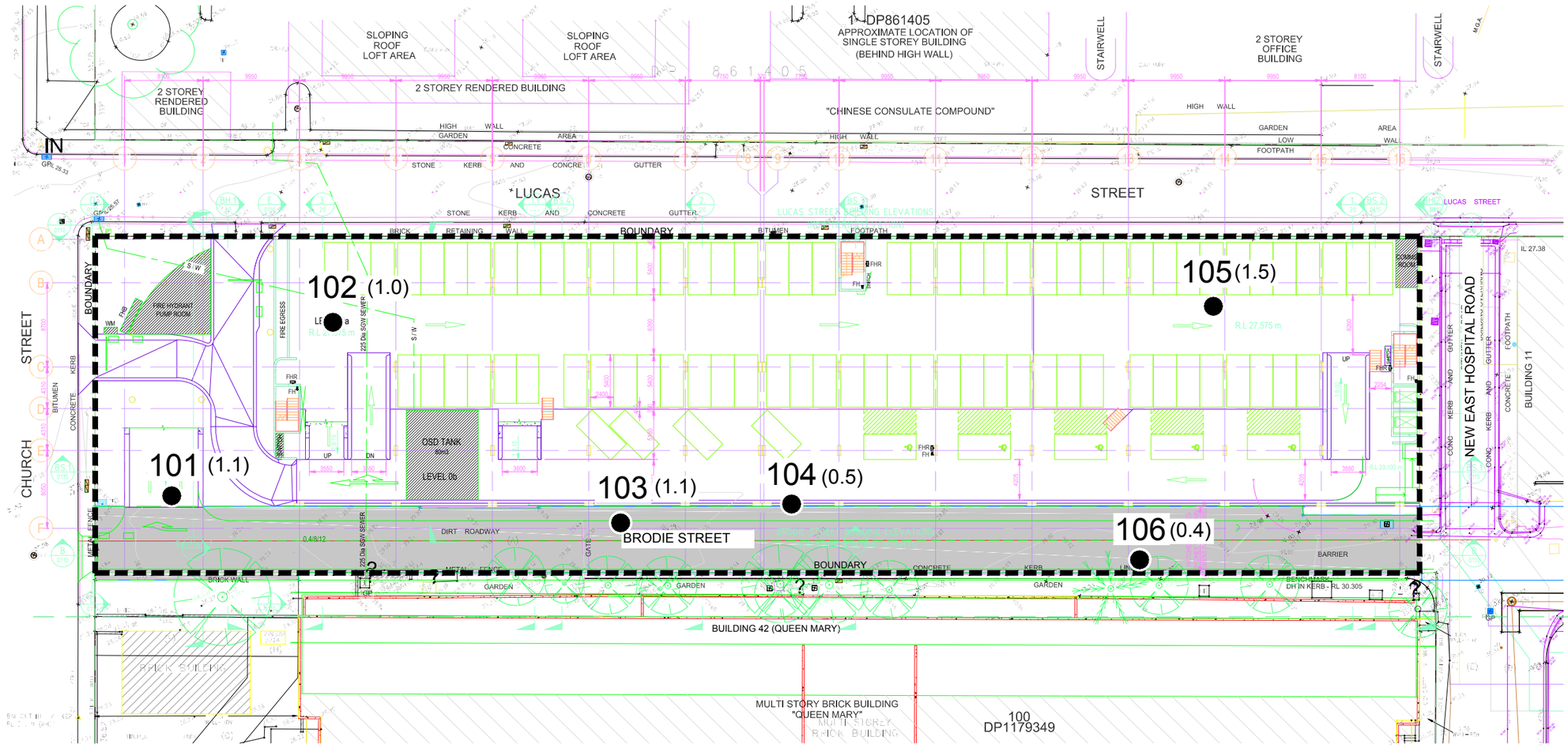
Report No: E28939SB2

Figure No: 1

**ENVIRONMENTAL INVESTIGATION SERVICES**

EIS

PLOT DATE: 28/04/2016 4:16:32 PM DWG FILE: S:\5 EIS\5C EIS JOBS\28000'S\E28939KB - CAMPERDOWN - RPA\CAD\E28939SB2.DWG




## LEGEND

APPROXIMATE SITE BOUNDARY

101 (0.1) BOREHOLE LOCATIONS

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

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

Title: **BOREHOLE LOCATION PLAN**

Project: CNR LUCAS STREET & CHURCH STREET CAMPERDOWN, NSW

Report No: E28939SB2

Figure No: 2

**ENVIRONMENTAL INVESTIGATION SERVICES**

EIS

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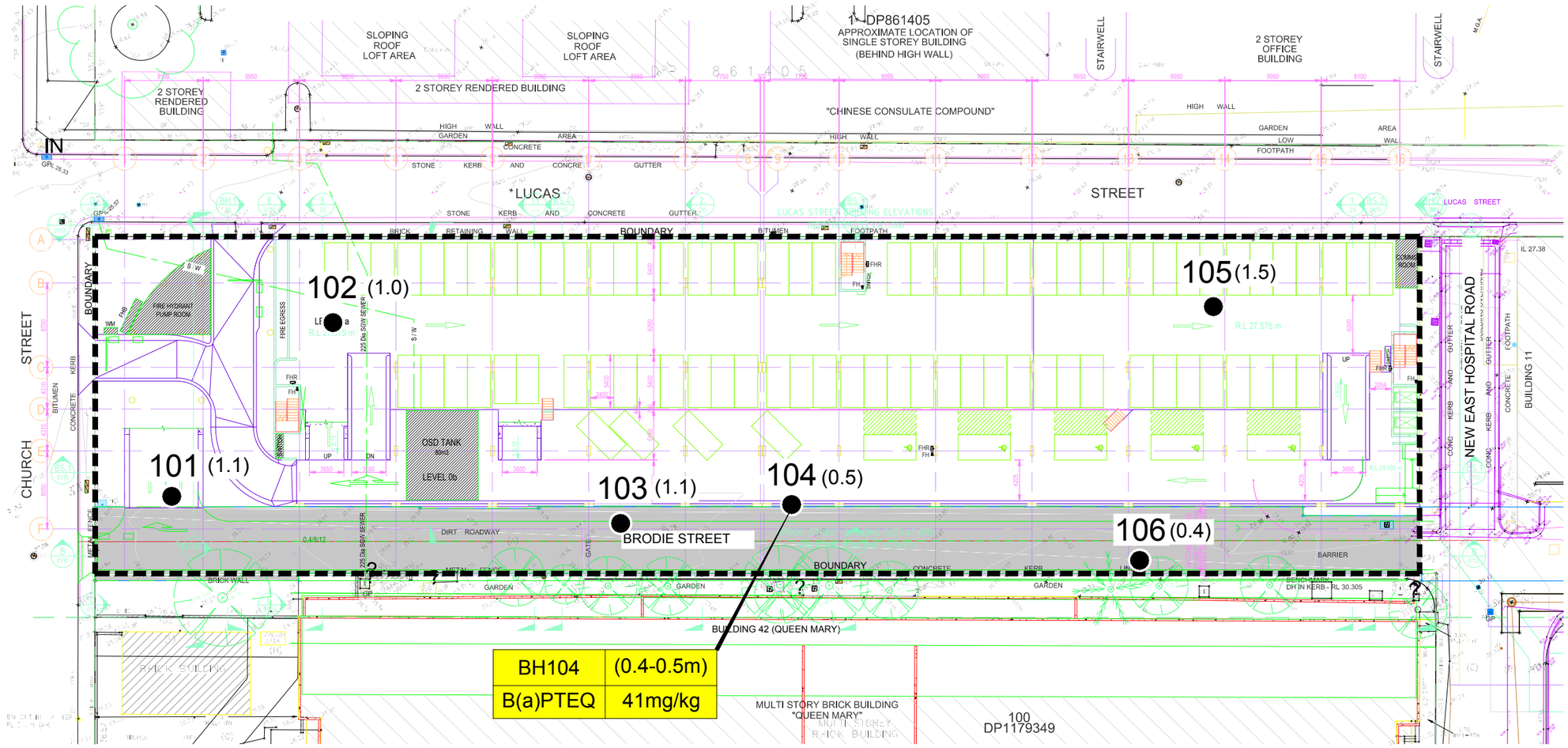



## LEGEND

APPROXIMATE SITE BOUNDARY

101 (0.1)
BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)

| BH (ID) | DEPTH (m) |
|---|---|
| CHEMICAL | CONCENTRATION (mg/kg) |

SOIL CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK

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

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

Title: **SITE CONTAMINATION PLAN**

Project: CNR LUCAS STREET & CHURCH STREET CAMPERDOWN, NSW

Report No: E28939SB2

Figure No: 3

**ENVIRONMENTAL INVESTIGATION SERVICES**

EIS

PLOT DATE: 28/04/2016 4:16:15 PM DWG FILE: S:\5 EIS\5C EIS JOBS\28000'S\E28939KB - CAMPERDOWN - RPA\CADD\E28939SB2.DWG

# Appendix A: EIS Proposal/SAQP

ENVIRONMENTAL INVESTIGATION SERVICES

# PROPOSAL

2/05/2016
EIS Ref: EP9917K

Health Infrastructure

Attention: John Armstrong
Email: John.Armstrong@health.nsw.gov.au

**ADDITIONAL ENVIRONMENTAL SITE ASSESSMENT**
**PROPOSED MULTI-STOREY CAR PARK**
**CORNER OF LUCAS STREET AND CHURCH STREET, CAMPERDOWN, NSW**

## 1 Introduction

EIS are pleased to provide this proposal based on the information provided by Health Infrastructure. The proposal aims to address the following data gaps that were identified in the EIS Preliminary Stage 2 Environmental Site Assessment (ESA):

- The NSW EPA recommended minimum density for a Stage 2 ESA has not been met;
- A WorkCover NSW search for the licence of dangerous goods storage at the site has not been undertaken;
- The groundwater has not been assessed;
- The source of the low concentrations of PAHs in the natural soil has not been adequately assessed;
- Areas beneath the existing buildings have not been included in the assessment; and
- The presence of hazardous building materials in the existing buildings has not been assessed.

## 2 Proposed Development Details / Background

The proposed development includes the demolition of the existing buildings and the construction of a ten storey car park. The lowest level of the car park will be at RL27.575m, which will require excavation to depths of approximately 0.3m below the Church Street frontage, approximately 0.3m to 1m below the Lucas Street footpath and to a maximum of approximately 2.5m for the majority of the site. A new internal road, known as Brodie Street, will be constructed along the southern boundary of the site and will be close to the existing ground surface RL.

Postal Address: PO Box 976, North Ryde BC NSW 1670
Tel: 02 9888 5000 • Fax: 9888 5004
EIS is a division of Jeffery and Katauskas Pty Ltd • ABN 17 003 550 801

EIs have recently completed a Preliminary Stage 2 ESA at the above site (Ref: E28939KB2rpt dated 29 April 2016). The above mentioned data gaps were identified from the report. An elevated concentration of B(a)P TEQ was detected above the human health SAC in one soil sample.

## 3 Scope of Work

The general framework of the proposed assessment has been designed with reference to the guidelines adopted by the NSW EPA for the assessment of contaminated sites (see http://www.epa.nsw.gov.au/clm/).

### 3.1 Site Information and Site History Assessment

- Review of the previous investigation reports prepared by EIS; and
- Purchase and review of WorkCover license records for the storage of dangerous goods, including fuel storage facilities.

### 3.2 Site Inspection and Field Work

- Preparation of a Safe Work Method Statement (SWMS) for the field work;
- Walkover inspection of the site and visual inspection of the immediate surrounds.

#### 3.2.1 Soil Sampling

- The EIS 2016 ESA included soil sampling from six sampling points. EIS propose to undertake soil sampling from 7 additional sampling sampling points. This number along with the six from the EIS 2016 ESA of sampling locations meets the minimum density recommended in the NSW EPA Sampling Design Guidelines (1995) for the site area of approximately 4,800m$^2$;
- Environmental samples will be obtained from the fill material (assumed to be no deeper than 2m) and from the upper 0.5-1m profile of natural material, based on field observations;
- Three additional sampling locations will be drilled in the vicinity to the previous borehole locations which encountered detections of PAHs in the natural soils (BH104, BH105 and BH106);
- Four additional samples locations will drilled in the vicinity of BH104 and assessed for PAHs;
- The sampling locations will be scanned for buried services prior to the commencement of drilling;
- The boreholes will be drilled using a truck/track mounted drill rig (spiral flight augers and SPT sampling methods);
- On completion of sampling, the boreholes will be backfilled to the surface with the borehole cuttings. Any boreholes drilled in paved areas will be plugged at the surface with concrete; and
- All samples will be screened for volatile organic compounds (VOCs) using a hand held photoionisation detector (PID).

### 3.2.2 Groundwater Sampling

- The scope includes an allowance to install three monitoring wells in selected boreholes drilled for soil sampling;
- The groundwater monitoring well locations will be dependent upon subsurface conditions encountered during the field investigation;
- The monitoring wells will be installed to a depth of approximately 6m below existing ground level or prior refusal;
- The monitoring wells will be installed as temporary wells. If required, the wells can be registered with the NSW Department of Primary Industries Water (DPIW) as permanent wells;
- The monitoring wells will be developed after installation using an electric pump; and
- Groundwater samples (if encountered) will be obtained approximately five to seven days after development using low flow sampling equipment.

## 3.3 Analysis of Samples by NATA Laboratory

The proposed analytical schedule is outlined in the attached cost breakdown.

- Selected fill/natural soil samples will be analysed for combinations of the following contaminants: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); polycyclic aromatic hydrocarbons (PAHs); total recoverable hydrocarbons (TRH); monocyclic aromatic hydrocarbons (BTEX); organochlorine (OC) and organophosphate (OP) pesticides; polychlorinated biphenyls (PCBs); and asbestos;
- A nominal allowance for TCLP leachability analysis for PAHs and selected metals has been included to provide a preliminary waste classification for the off-site disposal of soil in accordance with NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014[1]);
- Groundwater samples will be analysed for the following: heavy metals; TRH/BTEX; low level PAHs; pH; electrical conductivity (EC); and hardness; and
- Analysis of field Quality Assurance/Quality Control (QA/QC) samples.

## 3.4 Reporting

A report will be prepared presenting the results of the assessment. The report will be issued as a final version in electronic format (pdf copy) by email.

# 4 Costs

A cost breakdown for the scope of work is attached below.

The scope of work and costs may be subject to variation based on site conditions or additional information made available during the assessment. In the event that additional costs are likely to be incurred, EIS will seek approval from the client prior to proceeding with the variation.

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

## 5 Reporting Timeframe

The final report should be completed approximately 4 weeks after the completion of all fieldwork.

Review of client generated consultancy agreements or terms of engagement may delay the commencement of the investigation.

## 6 Proposal Acceptance

This proposal is valid for three months from the date of issue. The conditions of engagement are attached below. By accepting this proposal, the client agrees to the scope of work provided and acknowledges that they assume responsibility for any services outside the nominated scope of work.

In the event that additional services are required, the additional scope of services should be confirmed in writing via the preparation (and client acceptance) of a separate fee proposal or variation.

## 7 Assumptions and Limitations

### 7.1 Presence of Contamination

The site assessment/investigation process usually requires a staged approach. If contamination is encountered, additional work (outside the scope of this proposal) may be necessary in order to characterise the nature and extent of the problem.

### 7.2 Changes to Proposed Development Details and/or Site Information

The scope of work is based on the site/development details provided to EIS at the time of the preparation of this proposal. If this information changes, we may need to amend the scope which may incur additional costs.

All relevant plans and information in your possession regarding storage of dangerous goods, details of underground services, previous investigation reports and anecdotal site history should be made available to us prior to commission. Review of any such documents issued to EIS upon commission will be charged at unit rates.

### 7.3 Field Work

- All work would be completed during normal working hours (0700 to 1700 hours, Monday to Friday) unless stated in the scope of works;
- No allowance has been made for diatube coring through existing concrete slabs or asphalt pavements unless noted in the scope of works. Diatube coring will be charged at a rate of $150 per borehole (for pavement of approximately 300mm thick) plus a site establishment fee;
- The scope does not include an allowance to register the groundwater monitoring wells with the DPIW. Abandonment of groundwater monitoring wells installed for the investigation will incur an additional fee;

- No allowance has been made for site rectification works apart from backfilling the sampling locations. Some disturbance would be inevitable on landscaped areas or may occur on light duty pavements due to the size/weight of the sampling equipment (i.e. drill rig/excavator or similar);
- Standing time waiting for site access or instructions would be charged at unit rates;
- Cancellation of drill rigs, excavator, or other equipment booked for the investigation (refer to cost breakdown for unit rates) will incur the following fees:
  - Less than 48 hours notice: Minimum of 4 hours hire of sampling equipment; and
  - Less than 24 hours notice: Minimum of 6 hours hire of sampling equipment.

## 8 Additional Work

Any additional work undertaken outside the scope will be charged at our normal schedule of rates plus 10% GST. Please contact us if you require any of the following additional items and a revised proposal will be issued for your consideration:

- Detailed Environmental Site Assessment in accordance with SEPP55[2];
- Detailed screening of asbestos in soil in accordance with the Western Australia (WA) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites (2009);
- Classification of soil as Excavated Natural Material (ENM) in accordance with the NSW EPA Excavated Natural Material Exemption (2014[3]) and ENM Order (2014[4]);
- Review of Client Generated Consultancy Agreements or Terms of Engagement;
- Changes to reports issued as final versions;
- Additional sampling and analysis outside the scope;
- Meetings or additional site visits outside the scope;
- NSW EPA/Council/auditor liaison;
- Review of reports prepared by other consultants; and
- Preparation and issue of report hard copies.

## 9 About EIS

EIS is a division of Jeffery and Katauskas Group (JK). JK Group is a well-established environmental and geotechnical consulting engineering company. EIS has undertaken over 10,000 site assessments in the past 20 years. The firm has a skilled workforce of over sixty personnel in the Sydney office. The company owns and operates eight drill rigs and specialises in combined environmental, geotechnical and groundwater investigations. EIS is an active member of the Australian Contaminated Land Consultants Association (ACLCA[5]). We offer practical solutions to environmental problems at very competitive rates.

[2] State Environmental Planning Policy No. 55 – Remediation of Land 1998, (SEPP55)

[3] NSW EPA (2014), Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the Protection of the Environmental Operations (Waste) Regulation 2014 (ENM Exemption 2014)

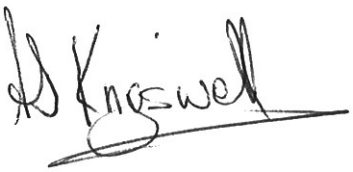
[4] NSW EPA (2014), Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environmental Operations (Waste) Regulation 2014 (ENM Order 2014)

[5] http://www.aclca.org.au/home/

Please visit our website for further information http://www.jkgroup.net.au/contamination-report.htm

Kind Regards

Geoff Fletcher
Environmental Scientist



Adrian Kingswell
Principal

**Attachments:**
Cost Breakdown
Summary of Proposal or Quotation Conditions and Conditions of Engagement
Acceptance of Proposal Form

EIS Proposal: EP9917K
Date: 2 May 2016

**Attachment 1**
**Cost Breakdown**

| | No | $Rate | Unit | $Total | $Sub-Total |
|---|---|---|---|---|---|
| **Site Information** | | | | | |
| WorkCover records search (per site) | 1 | 400 | Site | $400.00 | |
| | | | | | **$400.00** |
| **Field Work** | | | | | |
| Environmental Eng/Sci | 8 | 160 | Hour | $1,280.00 | |
| Environmental Eng/Sci (groundwater works) | 8 | 160 | Hour | $1,280.00 | |
| Drill rig hire - truck/truck rig | 8 | 270 | Hour | $2,160.00 | |
| Underground Services Locator | 1 | 300 | LS | $300.00 | |
| Vehicle (Eng/Sci) | 2 | 60 | Trip | $120.00 | |
| Groundwater development gear (pump, YSI, consumables) | 0.5 | 150 | Day | $75.00 | |
| Groundwater sampling gear (peristaltic, YSI, consumables) | 0.5 | 250 | Day | $125.00 | |
| Groundwater Disposal | 3 | 20 | Per Well | $60.00 | |
| GW monitoring well installation (6m well) | 3 | 400 | Each | $1,200.00 | |
| Monitoring well license documentation | | 300 | LS | $0.00 | |
| | | | | | **$6,600.00** |
| **Laboratory Testing - Soil Samples** | | | | | |
| Sample Processing and Lab Batch Fee | 1 | 100 | Batch | $100.00 | |
| #3a - TRH/BTEXN/PAH/HM(8)/Asb | 7 | 200 | Each | $1,400.00 | |
| PAHs | 7 | 80 | Each | $560.00 | |
| #3 - TRH/BTEXN/PAH/HM(8) | 4 | 180 | Each | $720.00 | |
| TCLP 6 Metals & PAHs (nominal) | 5 | 155 | Each | $775.00 | |
| Field QC/QA analyses[1] | 1 | 460 | LS | $460.00 | |
| | | | | | **$4,015.00** |
| **Laboratory Testing - Water Samples** | | | | | |
| Sample Processing and Lab Batch Fee | 1 | 100 | Batch | $100.00 | |
| #3L - TRH/BTEXN/LL PAH/HM(8), includes filter | 3 | 230 | Each | $690.00 | |
| EC/pH/Hardness | 3 | 45 | Each | $135.00 | |
| Field QC/QA analyses[2] | 1 | 330 | LS | $330.00 | |
| | | | | | **$1,255.00** |
| **Reporting** | | | | | |
| Environmental Eng/Sci | 24 | 160 | Hour | $3,840.00 | |
| Principal | 4 | 300 | Hour | $1,200.00 | |
| Borehole Logs (standard) | 11 | 25 | Each | $275.00 | |
| Hard Copies of Reports (per copy) | | 100 | Each | $0.00 | |
| | | | | | **$5,315.00** |
| Sum of Above Items | | | | $17,585.00 | $17,585.00 |
| GST at 10% | | | | | $1,758.50 |
| **TOTAL COST** | | | | | **$19,343.50** |

1 - QA/QC Soil Analysis: 1 inter and 1 intra-lab duplicates for #3, 1 Trip Blank (TB) and 1 Trip Spike (TS) for BTEX, 1 Field Rinsate (FR) for BTEX
2 - QA/QC Groundwater Analysis includes: 1 intra-lab duplicates for #3L

# SUMMARY OF PROPOSAL OR QUOTATION CONDITIONS & CONDITIONS OF ENGAGEMENT

**EIS is a Division of Jeffery and Katauskas Pty Ltd (A.C.N. 003 550 801 A.B.N. 17 003 550 801)**

1. A typed or handwritten fax message, email or letter on the letterhead of this company prepared by a staff member of the company, represents a formal proposal.
2. We require that you forward a copy of these conditions to your client if you are acting as an agent in this project.
3. We request that we be formally commissioned by Purchase Order, letter or handwritten facsimile message that our proposal is accepted. If we proceed with the commission on the basis of verbal instructions, the client will be deemed to have formally accepted these conditions. We also request that we be formally advised who should be invoiced for the works (the Client) including business name, ACN/ABN and address, the relevant contact name and telephone number. Our QA System does not permit results or reports to be issued without an order, letter or fax of commission.
4. Subject to the Privacy Act 1988, the client gives consent to collection of information in relation to the client and/or client representative or advisors regarding names, addresses and contact details. Such information is used for project communications and may be stored in our database for future retrieval of project information. Such information may be made available to third parties for the purposes of debt collection or credit referencing including notifying other credit providers by listing on national databases of a default by you.
5. If there are limiting time criteria, please advise this information prior to our proposal or quotation submission.
6. Environmental Investigation Services (EIS) provides Consulting Environmental Engineering activities as a division of Jeffery & Katauskas Pty Ltd (J&K). Commissioning EIS to undertake environmental consulting engineering activities does not imply that EIS will provide geotechnical engineering advice. Should you require geotechnical input in parallel with the EIS site activities, JK Geotechnics should be contracted separately for this service. EIS personnel are not geotechnical engineers and therefore cannot under any circumstances be held responsible for geotechnical performance of works undertaken on site by a contractor or subcontractor. EIS will not bear any liability whatsoever for damage caused by the contractor or subcontractor to existing structures either on, or adjacent to, the work site. EIS environmental logs are prepared by environmental scientists for environmental purposes and are not suitable for geotechnical engineering design.
7. For any geotechnical component of the investigation, please provide us with indicative building, strip footing, loadings etc prior to the commencement of the investigation. Details of all proposed basements or excavations should also be advised.
8. We require details of all buried services to be forwarded to us in drawing form so investigations are located to avoid any such services. We accept no responsibility for damaging buried services if their locations have not been advised. However, we will observe for surface indications of buried services and locate investigations away from them.
9. We request that all available survey information be forwarded to us at the time of formal acceptance of our proposal. Any relevant engineering or architectural drawings and, in particular, those which show site cuts, fills or basements should be provided.
10. Information of any relevance in assessment of the history of the site, including land title documents, plans, drawings, photographs or personal contacts should be provided to us and may be quoted in our report where appropriate. We hold no liability whatsoever for any inaccuracy in our report which is due to information being withheld which may invalidate our conclusions. It is essential that detailed information regarding any known or possible contamination at a site be forwarded to us prior to undertaking site work in order that we can ensure appropriate Health and Safety precautions are followed by our staff.
11. Where a Head Contract is in place between the recipient of this fee proposal (Lead Consultant or Contractor) and their Client, EIS will be subcontracted to the Lead Consultant or Contractor for the works. EIS will endeavor to carry out the works in such a way as to enable the Lead Consultant or Contractor meet their obligations under their Head Contract with their Client but EIS will not be bound to that Head Contract. Our engagement will be entirely between EIS and the Lead Consultant or Contractor on the basis of the scope of works and Summary Conditions of Engagement set out in this fee proposal.
12. No environmental site assessment can eliminate the risk that 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. EIS does not accept any liability whatsoever for any contaminants that are not detected during the work undertaken by EIS at any particular site or migration occurring from a nearby site.
13. We assume that free and uninterrupted access to the site is available and trafficable for a 2 wheel drive truck-mounted rig unless noted otherwise in our proposal. If a key to any gate is required, then we require this be supplied to our office prior to the commencement of the investigation, otherwise standing time will be claimed for time lost in attempting to gain access. The client shall be responsible for arranging legal access to a site prior to acceptance of our proposal. All work shall be within normal working hours of 0700 hours to 1700 hours, Monday to Friday unless noted otherwise in the proposal. Surcharges shall apply for work outside the above hours to cover penalty rates paid to staff. No allowance has been made for the following unless indicated otherwise: coring concrete or road pavements, reinstatement of disturbance to landscaped areas, site meetings, progress meetings, post-report consultations and additional copies of reports. (Concrete coring is usually at $4/10mm+GST and extra report copies $100 each+GST).
14. If any other party is to be advised regarding our presence on site, we request that the names, addresses and telephone numbers of such parties be advised or, alternatively, that

confirmation be given that the relevant parties have already been notified.

15. In providing the services, the firm shall exercise the degree of skill, care and diligence normally exercised by consulting engineers in similar circumstances. The services will not comply with AS1726 unless additional fees are paid for the extended brief.
16. All costs associated with damaged, lost or excessively worn equipment due to drilling in fill will be charged for at cost plus 10% unless agreed otherwise.
17. Where drilling time is lost due to the presence of significant asbestos containing material (ACM), additional costs will be charged to cover the lost time, special disposal of ACM to licensed landfill, and the costs associated with appointment of WHS Hygienist, if required. Work will be undertaken in accordance with NSW WorkCover requirements.
18. EIS (as a division of Jeffery and Katauskas Pty Ltd) (or its employees or agents) do not accept or undertake the role or responsibility of the Principal Contractor with respect to the Occupational Health & Safety Act (NSW) 2000 or the Occupational Health & Safety Regulation 2001, whether explicitly or by default or implication. Unless advised otherwise, the Client will be the Principal Contractor.
19. Our terms of payment are: Payment in full to be made within 10 business days of our invoice date. We incur substantial external and staff costs in the completion of an investigation and usually the invoice is submitted some weeks after our commitment to those costs. Therefore, if in default of payment by the due date, the client will be liable to pay Bank Overdraft and Accountancy Fees of 2.5% per month (calculated on a daily basis) on any outstanding amount and will indemnify us and pay all costs and expenses on a solicitor and own client basis if legal action is necessary, and/or fees from a debt recovery agency (such as EC Credit Control Pty Ltd), which we may incur in recovering from the client any overdue amount. The client gives consent to completion of a credit check on that individual, company or other entity.
20. A cost for surveying borehole locations and levels can be supplied on request.
21. Samples will be stored for a period of one (1) month from date of report and will then be discarded unless otherwise requested. If samples are found to contain hazardous levels of contamination then additional charges for safe disposal may apply.
22. Our liability to the Client, in respect of our commission, shall be limited to either three times our invoiced amount or $25,000, whichever is the lesser. Liability shall be limited to loss arising out of or in connection with our services under this agreement to the extent that the same is due to our negligence. Our liability shall be reduced proportionally to the extent that any acts or omissions of the Client or the Client's employees, subcontractors or agents contributed to such claim, liability or loss. Except for any asbestos related matter, our liability may be extended by negotiation. As a guide, our professional indemnity insurance may be extended to $1,000,000 and will be charged for at 2.5% of the invoiced amount or $300+GST, whichever is the greater. The requirement for additional cover must be indicated at the time of acceptance of our proposal, and the appropriate fee will be in addition to our estimate or quotation. Extension of our liability for any asbestos related matter is not available and is, in every case, limited as outlined above.
23. After the expiration of one (1) year from the date of invoice for any work or investigation, we shall be discharged from all liability in respect of the services whether under the law of contract, tort or otherwise.
24. Copyright in all documents (such as drawings, reports and specifications) provided by us shall remain the property of Environmental Investigation Services.
25. Subject to payment of fees due, the Client alone shall have a licence to use the documents provided for the purpose of completing the project, but the Client shall not use, or make copies of, such documents in connection with any work not included in the project. If the Client is in breach of any obligation to make a payment to us, we may revoke the licence to use our documents and the Client shall then return to us all documents provided by us and all copies thereof.
26. Unless otherwise noted, this proposal is for an environmental investigation only and does not provide for geotechnical testing. Such testing incurs further costs and requires specialist equipment. We can complete this work if you so commission us.
27. We are not responsible to the Client for the methods, techniques, sequences, procedures and use of equipment which are employed using the contractor or others in executing the project.
28. Termination of the commission, resolution of dispute and assignment, transfer or subletting of obligations under the commission by either party are subject to the Association of Consulting Engineers Australia (ACEA) Short Form of Agreement, a copy of which can be provided if required.
29. Detailed information regarding any known or possible contamination at a site must be forwarded to us prior to the site work in order that we can ensure appropriate Health and Safety precautions are followed by our staff. Additional costs will be involved if protective clothing, respirators etc. are required. If suspicious conditions are encountered on site, we will attempt to contact you to advise of the situation. If there is any doubt as to safety of our personnel, we will use our judgment as to appropriate precautions and the additional cost including delay time will be added to our quoted price.
30. A Certificate of Currency for Workers' Compensation, Public Liability or Professional Indemnity will be issued if requested. In the event that our invoice is not paid within our Standard Terms and Conditions time period and an updated Certificate of Currency is requested, as the previous certificate has expired, EIS will charge an administration fee of $40 for this certificate.
31. **Normally one PDF copy of the report is provided via email. A fee of $100+GST is charged for hardcopies of standard size reports.**
32. **The accompanying proposal only remains valid for 90 days from the date of issue. After 90 days, we reserve the right to revise our fee.**

# ACCEPTANCE OF PROPOSAL

**(Please return to EIS)**

| | | | |
|---|---|---|---|
| **To:** | **EIS** | **Fax:** | **02 9888 5004** |
| **Attention:** | **Geoff Fletcher** | **Email:** | **gfletcher@jkgroup.net.au** |
| **Re:** | **ADDITIONAL ENVIRONMENTAL SITE ASSESSMENT**<br>**PROPOSED MULTI-STOREY CAR PARK**<br>**CORNER OF LUCAS STREET AND CHURCH STREET, CAMPERDOWN, NSW** | | |

I/we request EIS to carry out the works described in their proposal EIS Ref: EP9917K dated 2/05/2016.

Client/Organisation Name: ABN:

**For Organisations Authorised Officer:**

Name of Representative: Position:

Signature: Date:

Contact Details:

Phone:
Email:
Mobile:
Fax:

Postal Address for Invoice:

If you are signing on behalf of another person, full contact details of the other person including a physical address must be provided. Acceptance on behalf of another company, as Client, must be followed up with a letter of commission on the Client's company letterhead.

Specify below any limitations or instructions regarding the proposed works:

**NOTES:**

❒ I/we require …….. hard copies of the report at $100 + GST per copy.