REPORT TO

WOOLWORTHS GROUP LIMITED

ON

REMEDIATION ACTION PLAN

FOR

PROPOSED WAREHOUSE AND CUSTOMER FULFILLMENT CENTRE WITH ANCILLARY OFFICES

AT

74 EDINBURGH ROAD, MARRICKVILLE, NSW

Date: 18 November 2021
Ref: E33191Brpt2-RAP

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Executive Summary

Root Partnerships Pty Ltd on behalf of Woolworths Group Limited ('the client') commissioned JK Environments (JKE) to prepare a Remediation Action Plan (RAP) for the proposed warehouse and customer fulfillment centre with ancillary offices at 74 Edinburgh Road, Marrickville, NSW. The site location is shown on Figure 1 and the RAP applies to the site boundaries as shown on Figure 2 attached in the appendices.

The RAP has been prepared to address the SEARS (SSD 10468) requirements under Item 8 – Contamination. The remediation and validation will be audited by Louise Walkden (Ramboll Australia Pty Ltd), NSW EPA accredited site auditor with regards to the Contaminated Land Management (CLM) Act (1997). A Site Audit Report (SAR, Ref: LW-009, 318001055, dated 19 October 2020) and a non-statutory Site Audit Statement (SAS, dated 19 October 2021) have been prepared by the auditor for the proposed development. Based on the previous investigations undertaken at the site, the SAR identified the potential for asbestos impacted fill and the potential for underground fuel tank/s (USTs) to be present at the site. The SAR recommended preparing a RAP to address these areas of environmental concern (AEC).

JKE understand that the proposed development includes a Woolworths Customer Fulfillment Centre (CFC); offices; online pick-up centre; warehouses and ancillary offices. The majority of the development will be at ground level with minor excavations anticipated for services. We understand that the footprint of the new development will occupy the majority of the site.

The goal of the remediation is to render the site suitable for the proposed development from a contamination viewpoint. The primary aim of the remediation at the site is to reduce the human health and environmental risks posed by site contamination to an acceptable level. The primary objectives of the RAP are to:

- Summarise previous investigations and historical contamination data;
- Provide a methodology to remediate and validate the site;
- Provide a contingency plan and unexpected finds protocol for the remediation works; and
- Outline site management procedures to be implemented during remediation.

Previous investigations by JKE have identified friable asbestos in the fill soil (see Figure 3 attached in the appendices). The source of the asbestos is considered likely to be associated with demolition of former structures, and to a lesser extent, impacted fill historically imported to the site. The previous investigations also identified the possibility of UST/s and associated infrastructure on-site. The investigations concluded the potential for extensive impacts from hydrocarbons associated with the UST/s and infrastructure was low. However, localised impacts may be encountered in the vicinity of the UST/s and associated infrastructure. The UST/s and infrastructure will be removed during the remediation process, and the residual risks assessed by the validation process. The groundwater has been impacted by heavy metals considered likely a regional/background issue. Further investigation is required to assess the groundwater conditions at the site.

For the purpose of the RAP, the extent of remediation will be determined by the post demolition additional site investigation (ASI) outlined in Section 4 of the RAP (see Figure 4 attached). At this stage, the extent of remediation includes the entire site and to the cadastral boundaries. The extent of remediation (horizontal and vertical) associated with individual hotspots and UST/s and associated infrastructure will be guided by the validation. It is anticipated that the tank pits and hotspots could be approximately 2-3m deep or to the base of the fill.

The groundwater has been impacted by heavy metals associated with background sources. Additional investigation of groundwater conditions is required in order to better characterise the groundwater conditions at the site. Based on the results of the ASI, remediation and/or management of groundwater may be required for the proposed development. Potential options for the remediation and management of groundwater are discussed in Section 5.2 of this RAP.

The preferred soil remediation approach is Option 4 in Table 5-1, which includes excavation and off-site disposal of the: fill impacted by asbestos and any other contaminants; UST/s and the associated infrastructure including any backfill; and any Asbestos Containing Material (ACM) identified during the ASI. The preferred groundwater remediation approach (if required based on the results of the ASI) is likely to be Option 3 in Table 5-2 which includes on-going management and monitoring. The above options are to be confirmed on completion of the ASI.

The preferred options for remediation are considered to be sustainable, economically viable, commensurate with the level of risk posed by the contaminants and technically achievable to implement concurrently with the proposed development works.

The RAP includes a methodology to remediate and validate the site. A contingency plan for remediation is included together with site management procedures and an unexpected find protocol (UFP) to be implemented during remediation.

A site validation report is to be prepared on completion of remediation activities and submitted to the site auditor and determining authority to demonstrate that the site is suitable for the proposed development. Any long-term environmental management plans (LTEMP) or groundwater management plans (GMP) prepared for the site will require appropriate public notification.

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

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Abbreviations

Ambient Background Concentrations	**ABC**
Asphaltic Concrete	**AC**
Australian Business Number	**ABN**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Additional Site Investigation	**ASI**
Australian Company Number	**CAN**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Below Ground Level	**BGL**
Benzo(a)pyrene Toxicity Equivalent Factor	**BaP TEQ**
Bureau of Meteorology	**BOM**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Cation Exchange Capacity	**CEC**
Construction Environment Management Plan	**CEMP**
Contaminated Land Management	**CLM**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Development Application	**DA**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Ecological Investigation Level	**EIL**
Environmental Investigation Services	**EIS**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
Excavated Natural Material	**ENM**
Environment Protection Authority	**EPA**
Environment Protection Licence	**EPL**
Environmental Site Assessment	**ESA**
Ecological Screening Level	**ESL**
Excavated Natural Material	**ENM**
Human Health Risk Assessment	**HHRA**
Health Investigation Level	**HILs**
Health Screening Level	**HSL**
Intermediate Bulk Container	**IBC**
JK Environments	**JKE**
Light non-Aqueous Phase Liquids	**LNAPL**
Long Term EMP	**LTEMP**
Map Grid of Australia	**MGA**
Monitored Natural Attenuation	**MNA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Polychlorinated Biphenyls	**PCBs**
Photo-ionisation Detector	**PID**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
Quality Control	**QC**
Remediation Action Plan	**RAP**
Relative Percentage Difference	**RPD**

Remediation Works Plan	**RWP**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Secretary Environmental Assessment Requirements	**SEARs**
Source, Pathway, Receptor	**SPR**
State Significant Development Application	**SSDA**
Standing Water Level	**SWL**
Total Recoverable Hydrocarbons	**TRH**
Upper Confidence Limit	**UCL**
United States Environmental Protection Agency	**USEPA**
Underground Storage Tank	**UST**
Validation Assessment Criteria	**VAC**
Virgin Excavated Natural Material	**VENM**
Work Health and Safety	**WHS**

Units

Litres	**L**
Metres BGL	**mBGL**
Metres	**m**
Millilitres	**ml or mL**
Milligrams per Kilogram	**mg/kg**
Percentage	**%**
Percentage weight for weight	**%w/w**

1 INTRODUCTION

Root Partnerships Pty Ltd on behalf of Woolworths Group Limited ('the client') commissioned JK Environments (JKE) to prepare a Remediation Action Plan (RAP) for the proposed warehouse and customer fulfillment centre with ancillary offices at 74 Edinburgh Road, Marrickville, NSW. The site location is shown on Figure 1 and the RAP applies to the site boundaries as shown on Figure 2 attached in the appendices.

The RAP has been prepared to address the SEARS (SSD 10468) requirements under Item 8 – Contamination. The remediation and validation will be audited by Louise Walkden (Ramboll Australia Pty Ltd), NSW EPA accredited site auditor with regards to the Contaminated Land Management (CLM) Act (1997)[1]. A Site Audit Report (SAR, Ref: LW-009, 318001055, dated 19 October 2020) and a non-statutory Site Audit Statement (SAS, dated 19 October 2020) have been prepared by the auditor for the proposed development. Based on the previous investigations undertaken at the site, the SAR identified the potential for asbestos impacted fill and the potential for underground fuel tank/s (USTs) to be present at the site. The SAR recommended preparing a RAP to address these areas of environmental concern (AEC).

A summary of previous investigations and site information is included in Section 2.

1.1 Proposed Development Details

JKE understand that the proposed development includes a Woolworths Customer Fulfillment Centre (CFC); offices; online pick-up centre; warehouses and ancillary offices. The majority of the development will be at ground level with minor excavations anticipated for services. We understand that the footprint of the new development will occupy the majority of the site. Selected development plans issued to JKE for the preparation of the RAP are attached in the appendices.

1.2 Remediation Goal, Aims and Objectives

The goal of the remediation is to render the site suitable for the proposed development from a contamination viewpoint. The primary aim of the remediation at the site is to reduce the human health and environmental risks posed by site contamination to an acceptable level.

The primary objectives of the RAP are to:

- Summarise previous investigations and historical contamination data;
- Provide a methodology to remediate and validate the site;
- Provide a contingency plan and unexpected finds protocol for the remediation works; and
- Outline site management procedures to be implemented during remediation.

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

1.3 Scope of Work

The RAP was prepared generally in accordance with a JKE proposal (Ref: EP54882B) of 31 August 2021 and written acceptance from Root Partnerships on behalf of the client of 21 September 2021. The scope of work included: consultation with the client; a review of previous reports including the SAR and SAS; and Conceptual Site Model (CSM), and preparation of the RAP.

The scope of work was undertaken with reference to the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[2], State Environmental Planning Policy No.55 – Remediation of Land (1998)[3] and other guidelines made under or with regards to the CLM Act 1997, including the Consultants Reporting on Contaminated Land (2020)[4] guidelines.

A list of reference documents/guidelines is included in the appendices.

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

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

[4] NSW EPA, (2020). *Consultants reporting on contaminated land, Contaminated Land Guidelines.* (referred to as Consultants Reporting Guidelines)

2 SITE INFORMATION

2.1 Background / Summary of Site History

JKE understand that the following investigation reports have been prepared for the site:

- DLA (2010), '*Phase 2 Detailed Environmental Site Assessment, 74 Edinburgh Road, Marrickville, NSW 2204*', dated 22 September 2010. Issued to JKE by Root Partnerships for the preparation of the RAP;
- Geo_Logix (2010), '*Environmental Due Diligence Report, Lot 201, 74 Edinburgh Road, Marrickville, NSW*', prepared for Hydrox Nominees Pty Ltd, Ref: 1001078RFinal_3rdDec10. Geo_Logix also completed a data gap analysis which was summarised in a letter dated 9 December 2010. Issued to JKE by Root Partnerships for the preparation of the RAP;
- Environmental Investigation Services (EIS, 2015), '*Acid Sulfate Soil Assessment and Management Plan, Proposed Masters Development, Cnr Edinburgh Road and Sydney Steel Road, Marrickville, NSW*', Ref: E28042KBlet, dated 3 February 2015; and
- JKE (2020), '*Report to Fabcot Pty Ltd on Detailed (Stage 2) Site Investigation for Proposed Warehouse and Customer Fulfillment Centre with Ancillary Offices at 74 Edinburgh Road, Marrickville, NSW*', Ref: E33191Brpt-rev1, dated 22 September 2020.

The SAR and SAS prepared for the proposed development are outlined in Section 1. A summary of relevant information applicable to this RAP is summarised below. This RAP should be read in conjunction with the above reports.

2.1.1 Phase 2 Detailed Environmental Site Assessment (DLA, 2010)

David Lane Associates (DLA) was commissioned by Hydrox Nominees Pty Ltd to prepare a Phase 2 - Detailed Environmental Site Assessment (ESA) at the subject site identified as Lot 202 DP1133999, 74 Edinburgh Road, Marrickville, NSW. The site was identified to occupy an area of approximately 2.752ha and zoned General Industrial (4a) in accordance with the Marrickville Local Environmental Plan (LEP) 2001. The ESA was undertaken as part of due diligence (DD) associated with a proposed redevelopment of the property. The land was occupied by Dairy Farmers production and storage facilities at the time of the assessment.

At the time of the ESA, the site consisted of a number of buildings including a number of warehouse type structures, administration/office building and an electrical substation. The site surface was covered with hard standing material such as concrete, asphalt and paving. A number of garden beds were observed, though they were limited in the site coverage. The ESA consisted of the collection of fifty-three (53) soil samples, including five (5) intra and two (2) inter Laboratory duplicate samples. The sampling locations are shown on the DLA figures attached in the appendices. During sampling of the site, resistance was encountered in a number of test holes, and ashy sandy fill was observed in a greater portion of the samples. No odours were observed during sample collection.

Site observations noted multiple ashy layers present on the site. However, chemical analysis of the layers indicated that they did not pose a risk to human health or the environment. Sampling in the vicinity of the UST's did not indicate any hydrocarbon contamination of the soils.

The laboratory results were compared with Commercial / Industrial land use criteria and included testing for petroleum related contaminants, heavy metals, PAH type compounds, pesticides and PCBs.

Minor hydrocarbon concentrations were detection at sample location M36. The heavy fractions reported in the analytical data suggested that the source of the hydrocarbon may be due to the presence of heavy oil or grease and is unlikely to be related to petroleum or diesel storage. During sampling, no odours were noted and no visible staining was observed. Samples collected from areas surrounding M36 did not have any observable concentrations of TPH compounds. The potential for groundwater contamination, based on site observations, geology and detected levels of contaminants in the soils was assessed to be low and no groundwater investigation was undertaken. Observations of the monitoring well on the boundary down hydraulic gradient from the site indicated no groundwater to be present.

The laboratory analysis suggested that the site soils comply with Commercial / Industrial land use criteria. The report stated that no evidence could be found to infer contamination by heavy metals, PAH type compounds, pesticides or PCBs in soils at the site. The report recommended a comprehensive Hazardous Materials Survey was required before any future demolition or refurbishment works at the site.

The report concluded that the site was deemed suitable for the intended land use. If the land use is to be changed in the future, the ESA should be reviewed to ensure compliance with suitable soil investigation levels for the appropriate end land use or zoning.

2.1.2 Environmental Due Diligence and Data Gap Analysis (Geo_Logix, 2010)

Geo-Logix was engaged by Hydrox Nominees Pty Ltd (Hydrox) to undertake environmental due diligence for the proposed purchase of the site identified as 74 Edinburgh Road, Marrickville, NSW. The site was identified as formerly part of a larger property used for manufacturing edible oils, packaging and distribution. The site has since been subdivided into Lots 201 and 202. With Lot 202 being the subject site.

Operations at the wider site comprised vegetable oil storage, oil processing (hydrogenation, fractionation, blending, bleaching and deodorising), packaging and storage /distribution. Oil was stored in two tank farms; both were located on the adjacent Lot, Lot 201. Most of the manufacturing occurred on Lot 201, while Lot 202 (subject site) was used for product storage, packaging and distribution.

The report stated that in 2005, ERM conducted an environmental site assessment (ESA) consisting of 51 boreholes across Lots 201/202. Shallow soil samples were collected for analysis of a vast range of contaminants of potential concern (COPC) including heavy metals, petroleum, volatile and semi volatile organics, polyaromatic hydrocarbons (PAHs), pesticides, phosphate and asbestos. The results of investigation did not identify site contamination in excess of commercial / industrial land use assessment criteria, with the exception of a minor exceedance of petroleum in shallow soil adjacent to a former underground petroleum storage tank (UST). ERM did not undertake further assessment of the UST as it appears they were relying on previous investigations (URS 2000) which were not available for Geo-Logix review.

The report also made a mention of an ESA by DLA in 2010 consisting of 37 boreholes across the subject site (Lot 202). Shallow soil samples were collected for analysis of a similar suite of COPC as ERM (2005). The results of assessment indicated the shallow soils beneath the site were not contaminated. DLA concluded based on the results of investigation that groundwater investigation was not required and the site was suitable for the intended commercial / industrial land use.

The scope of work by Geo_Logix included a review of available environmental reports provided by Hydrox (DLA 2010, ERM 2005) with a view of providing an independent assessment of environmental liability associated with site contamination and/or geotechnical characteristics. A due diligence report was issued by Geo_Logix on 3 December 2010 which concluded the following:

- There had been significant soil investigations carried out on the subject site to conclude subsurface soils beneath the existing pavements were not impacted by chemical contamination;
- Environmental Investigations of soil and groundwater on adjacent Lot 202, where most of the former edible oils manufacturing had occurred indicated soils and groundwater were largely free of chemical contamination; and
- Although the results of investigations to date were encouraging, there were significant data gaps which in Geo_Logix opinion warranted further investigation. The data gaps included the following: the contamination status of soils below the onsite buildings was unknown. Since site buildings cover approximately 40% of the site, a large area of the site had not been investigated and therefore presented a potentially significant unidentified liability; and no investigation of groundwater had been conducted beneath the subject site.

To address some of the data gaps, Geo_Logix mobilised to site on 9 and 10 December 2010 to undertake a limited intrusive investigation of soil beneath the buildings and groundwater. A plan showing the locations is attached in the appendices. The investigation consisted of the following:

- Drilling of six soil bores beneath the main warehouse building and former PMG store to assess subsurface fill/soil for chemical contamination (Bores B1, B2, B4 – B6, shown on the Geo_Logix figures attached in the appendices);
- Drilling of four groundwater wells (MW1 – MW4) across the site to assess groundwater for chemical contamination; and
- Analysis of soil and groundwater samples for a range of contaminants likely associated with historical operations and importation of fill materials. Those chemical contaminants include petroleum, heavy metals, polyaromatic hydrocarbons (PAHs), pesticides, volatile organic compounds (VOCs), semi volatile organic compounds (SVOCs) and phenols

Intrusive investigation beneath the existing building identified a similar soil profile to that described by other investigations carried out across the site. The results of laboratory testing of fill and native soils underneath the buildings did not identify contamination in soil at levels in excess of commercial land use assessment criteria.

The results of groundwater analysis identified very low concentrations of heavy metals (chromium, copper, nickel, lead and zinc) in groundwater. The levels detected are consistent with levels detected on the adjacent Lot (Lot 201) which were interpreted by the investigator to be representative of natural background levels.

Geo_Logix concluded that the risk to human health and environment from metals in groundwater to be negligible.

The investigation identified petroleum compounds (mainly oil and grease), PAHs and SVOC compounds at very low concentrations in groundwater collected from well MW-3 and MW-4. The report stated that due to timing and access constraints, wells MW-3 and MW-4 were installed and sampled on the same day and therefore not constructed or developed in a manner normally employed for groundwater investigations. The samples were very turbid and the analytical results may reflect contaminants introduced by entrained sediment during drilling. The report stated that the concentrations were very low and not indicative of significance with respect to potential environmental risk. During sampling of wells MW-3 and MW-4 the hydraulic head elevation would not stabilise at low pumping rates suggesting the aquifer has a low hydraulic conductivity and therefore negligible capacity to transport dissolved contaminants. In consideration of the above factors, the report concluded that the risk to human health and environment from organic contaminants reported in groundwater at MW-3 and MW-4 to be negligible.

The report concluded that the risk presented by unidentified site contamination to be low. The report also noted that the former Underground Fuel Tank (UST) still remains beneath the front of the PMG Store. The PMG store is located in the north section of the site. However, the location of the UST could not be determined by Geo_Logix or others. JKE understand that the UST was abandoned in-situ.

2.1.3 EIS Acid Sulfate Soil Assessment (EIS, 2015)

EIS was previously commissioned to undertake an ASS assessment in conjunction with the JKG geotechnical investigation in February 2015. The scope of work for the assessment included the review of the ASS risk maps prepared and soil sampling from 5 boreholes (BH1, BH4, BH7, BH9 and BH11) drilled for the JKG geotechnical investigation. The sampling locations for the ASS assessment are shown on the attached Figure 2.

The subsurface conditions encountered in the boreholes generally consisted of concrete or asphaltic concrete (AC) pavement which extended from approximately 170mm to 350mm, underlain by fill material to depths of approximately 1.7m to greater than 6mBGL, and underlain by natural silty clay soil to a depth of approximately 9.2mBGL. Siltstone bedrock was encountered beneath the silty clay in selected boreholes.

The fill material typically consisted of sandy gravel, silty clay or gravelly silty sand. Groundwater seepage was encountered during drilling at depths of approximately 6m to 8.8mBGL. Standing water level (SWL) was measured in the selected boreholes at depths of 2.5m to 8.8mBGL on completion of drilling. Reference should be made to the borehole logs attached in the appendices for further details of the subsurface conditions encountered at the site.

The soil laboratory results were assessed against the guidelines adopted for the assessment. The pH_{KCl} results ranged from 3.9 to 8.4. The results indicate that prior to oxidation the pH values of the soil suspended in potassium chloride solution ranged from strongly acidic to alkaline. Following oxidation, the pH_{ox} results for

the samples ranged from 4 to 7.8. These results are generally strongly acidic to neutral. The pH of the samples typically dropped by 2 or more units following oxidation.

Acid trail TAA results ranged from less than the PQL (LPQL) to 87mol H+/tonne. One result was above the action criteria of 62mol H+/tonne. TPA results ranged from LPQL to 70mol H+/tonne. One result was above the action criteria of 62mol H+/tonne. TSA results ranged from LPQL to 27mol H+/tonne. All of the results were below the action criteria of 62mol H+/tonne.

The S_{pos}% results ranged for 0.005% to 0.15%. The majority of the results were below the action criterion of 0.1%. One natural soil sample BH11 (3-3.45m) encountered an elevated S_{pos}% result of 0.15% which was above the action criterion. The liming rate required for neutralisation ranged from 1kgCaCO3/tonne to 7.7kgCaCO3/tonne

The soil samples encountered results which were above the action criteria adopted for the assessment. Based on these results, the EIS report concluded that the risk of generating ASS conditions following disturbance of the natural soils for the proposed development at the site is considered to be high. An ASS Management Plan (ASSMP) was recommended for the proposed development.

JKE understand that the proposed development outlined in the ASS assessment did not proceed. Hence, an ASSMP was not prepared or implement for the site. However, an ASSMP was prepared for the proposed development by JKE Ref: E33191Brpt3-ASSMP dated 12 November 2021.

2.1.4 Detailed (Stage 2) Site Investigation (DSI) (JKE, 2020)

JKE was commissioned by Fabcot to undertake a DSI for the proposed development at the site in July 2020. The purpose of the investigation was to make an assessment of site contamination. The DSI was confined to the site boundaries as shown on Figure 2 attached in the appendices. The DSI report was prepared to address the SEARS (SSD 10468) requirements under Item 8 – Contamination.

The primary aims of the DSI were to identify any past or present potentially contaminating activities at the site (PSI), identify the potential for site contamination, and make an assessment of the soil and groundwater contamination conditions (DSI). The objectives were to:

- Provide an appraisal of the past site use(s) based on a review of historical records;
- Review the previous EIS and JKG reports;
- Assess the current site conditions and use(s) via a site walkover inspection;
- Identify potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC);
- Assess the soil and groundwater contamination conditions via implementation of a sampling and analysis program;
- Prepare a conceptual site model (CSM);
- Assess the potential risks posed by contamination to the receptors identified in the CSM (Tier 1 assessment);

- Assess whether the site is suitable or can be made suitable for the proposed development (from a contamination viewpoint); and
- Assess whether further intrusive investigation and/or remediation is required.

The CSM identified the following potential contamination sources/AEC at the site:

- Fill material – The site appears to have been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. A former water body located on the west site boundary was filled as reviewed on the aerial photos. The previous investigations by JKG encountered relatively deep fill >6mBGL in some sections of the site;
- Chemicals and Fuel storage – The site has been used for various commercial purposes. Four USTs, an LPG and four hydrogen tanks were identified in the SafeWork. Records indicated that the USTs and ASTs were used to store diesel and petrol. The exact location of these tanks could not be determined;
- Use of pesticides – Pesticides may have been used beneath the buildings and/or around the site;
- Hazardous Building Material – Hazardous building materials may be present as a result of former building and demolition activities. These materials may also be present in the existing buildings/ structures on site; and
- Off-site Area 1 – A dry cleaner is located up-gradient of the site and is considered to be a potential off-site source of contamination.

The DSI included soil samples from 23 locations as shown on the attached Figure 2. Groundwater monitoring wells were installed in BH101 (MW101), BH118 (MW118) and BH121 (MW121). The sampling locations were placed on a judgemental sampling plan and were broadly positioned for site coverage, taking into consideration areas that were not easily accessible. This sampling plan was considered suitable to make an assessment of potential risks associated with the AEC and CoPC identified in the CSM, and assess whether further investigation is warranted. Selected soil and groundwater samples were analysed for a range of CoPC identified in the CSM.

The DSI did not identify widespread soil or groundwater contamination. Minor elevations of individual metals were detected in the soil and groundwater above the ecological Site Assessment Criteria (SAC). A detection of friable asbestos (AF/FA) was encountered in the fill in borehole BH117. The concentration of AF/FA was below the SAC. The location of the asbestos detection is shown on Figure 3 attached in the appendices.

The DSI recommended the following:

- Complete a Hazardous Building Materials Assessment (Hazmat) for the existing structures at the site;
- Prepare and implement an Asbestos Management Plan (AMP) for soil disturbance in the vicinity of BH117;
- Prepare and implement an Unexpected Finds Protocol (UFP) for the development works; and
- Prepare and implement an ASS Management Plan (ASSMP) for the proposed development.

2.2 Site Identification

Table 2-1: Site Identification

Current Site Owner (certificate of title):	Fabcot Pty Ltd
Site Address:	74 Edinburgh Road, Marrickville, NSW
Lot & Deposited Plan:	Lot 202 DP1133999, Lot 101 DP1237269 and Lot 1 DP539623
Current Land Use:	Commercial and Industrial Warehouses
Proposed Land Use:	Customer Fulfilment Centre
Local Government Authority:	Inner West Council
Current Zoning:	SP2 Infrastructure and IN1 General Industrial
Site Area (m^2) (approx.):	28,000
RL (AHD in m) (approx.):	2.9-5.0
Geographical Location (decimal degrees) (approx.):	Latitude: -33.908825 Longitude: 151.170157
Site Location Plan:	Figure 1
Sample Location Plan:	Figure 2

2.3 Site Condition and Surrounding Environment

2.3.1 Location and Regional Setting

The site is located within a residential, commercial and industrial area of Marrickville and is bound by Edinburgh Road to the north and Sydney Steel Road to the south and east. The site is located approximately 1,400m to the north-west of Alexandra Canal.

2.3.2 Topography

The regional topography is characterised by a south facing hillside. The site is relatively flat and located towards the toe of the hillside. It gently slopes at approximately 1° to 3°. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development.

2.3.3 Site Inspection

A walkover inspection of the site was undertaken by JKE on 12 August 2020 as a component of the DSI. A review of the NearMap imagery obtained on 6 October 2021 indicates the that site layout remains unchanged since August 2020.

At the time of the inspection, the majority of the site was occupied by three warehouses. The warehouse located on the north eastern section of the site was used for a furniture distribution business. The warehouse in the south section was used as part of three separate businesses i.e. Marley Spoon, wine distribution, metal wielding and spray painting. The warehouse in the north western section was vacant and had dangerous good signage for the use of anhydrous ammonia.

All of the warehouses on the site appeared in average condition. The north eastern warehouse was constructed from steel and concrete. The north western was constructed from steel, brick and cement fibre. The southern was constructed from steel and concrete. The northern section of the site had a toll booth which was constructed from cement and wood fibre which appeared in average condition.

The northern and eastern sections of the site were concreted and were used for storage for the welding business, a scaffolding business, a recycling drop off and several shipping containers. The site had fencing on all sides, however the gates which gave access were open and accessible to the public.

Several fuel drums, petrol and diesel fuel agents and coolants were located between the north western and southern warehouses and in the south eastern corner. Several black microtone spray paint drums were disposed of in a bin located in the centre of the site outside of welding and spray paint business. Two possible locations of underground storage tanks (USTs) were identified in the eastern concreted area of the site.

Cut and fill was evident near to the southern warehouse with an approximately 1.8m to 2m retaining wall located either side of the main loading dock. A fibre cement fragment (FCF1) was identified in the southern section of the site. The fragment FCF1 was sampled from the site during the JKE DSI investigation for asbestos screening. The laboratory analysis of the fragment did not detect any asbestos. The FCF was identified on the site surface over the concrete pavement. The source of the FCF is considered to be associated with hazardous building materials.

Drainage was expected to flow to the south with the topography. A major stormwater line runs through the northern and eastern sections of the site shown on Figure 2 attached in the appendices. Sensitive environments such as wetlands, ponds, creeks or extensive areas of natural vegetation were not identified on site or in the immediate surrounds. An assortment of native and exotic vegetation was located on site including trees and shrubs which appeared overgrown and in average condition.

2.3.4 Surrounding Land Use

During the JKE inspection, the following land uses were identified in the immediate surrounds:

- North – ADCO construction site, substation and residential properties;
- South – Vacant warehouse;
- East – Sydney Metro construction site; and
- West – Construction site.

2.3.5 Underground Services

A review of the 'Dial Before You Dig' (DBYD) plans undertaken for the DSI indicated that a stormwater main extends through the northern and eastern sections of the site. The stormwater is understood to be at a depth of approximately 1.5m and 3m BGL and also extends through the neighbouring property.
Considering the geological conditions (discussed below), there is a potential for the stormwater main to act as a preferential pathway for contamination migration (i.e. through relatively permeable backfill). Sewer and electrical services were also located on site. The approximate location of these services are shown on Figure 2.

2.4 Summary of Geology, Soils and Hydrogeology

2.4.1 Regional Geology

Regional geological information included in the DSI report indicated that the site is underlain by Quaternary deposits of silty to peaty quartz sand, silt and clay. Ferruginous and humic cementation are common in places with layers of shells.

A summary of the subsurface conditions encountered in the DSI boreholes is provided below:

Table 2-2: DSI Summary - Subsurface Conditions

Profile	Description
Pavement	Asphaltic Concrete (AC) and Concrete pavement was encountered at the surface in BH101 to BH107, BH110 toBH118 and BH120 to BH123. The pavement extended from approximately 140mm to 370mm.
Fill	Fill was encountered at the surface or beneath the pavement in all boreholes and extended to depths of approximately 0.5m to 4.5m BGL. BH102 to BH112, BH114, BH119, BH122 and BH123 were terminated in the fill at a maximum depth of approximately 1.0m BGL due to the use of hand tools and obstructions in the fill. The fill typically comprised silty sand, silty sandy clay, silty sandy clay, silty gravelly sand and silty clay with inclusions of sandstone and igneous gravel, ash, slag and building rubble (bricks, concrete and tile fragments). Organic odours were encountered in BH101 in silty sandy clay. Staining was not encountered in the fill material during fieldwork.
Natural Soil	Natural alluvial soil was encountered beneath the fill in BH101, BH113, BH115 to BH118 and BH120 to BH121. The natural soil comprised of silty clay. Neither staining nor odours were encountered in the natural material during fieldwork. Bedrock was not encountered during the investigation.
Groundwater	Groundwater seepage was encountered in BH101, BH118 and BH121 during drilling at depths between approximately 2.0m to 6.2mBGL. All other boreholes remained dry on completion of drilling. Monitoring wells installed at the site was monitored during development and sampling as outlined below.

2.4.2 Acid Sulfate Soil (ASS) Risk and Planning

Acid sulfate soil (ASS) information presented in the DSI report indicated the site is located within a Class 2 ASS risk area. Works in a Class 2 risk area that could pose an environmental risk in terms of ASS include all works below existing ground level and works by which the water table is likely to be lowered. The EIS 2015 ASS assessment identified ASS at the site and recommended preparing an ASSMP.

2.4.3 Hydrogeology

Hydrogeological information included in the DSI report indicated that:

- The subsurface conditions at the site are expected to consist of moderate to high permeability (alluvial) soils overlying relatively deep bedrock. Abstraction and use of groundwater at the site or in the immediate surrounds may be viable under these conditions, however the use of groundwater is not proposed as part of the development. There is a reticulated water supply in the area and consumption of groundwater is not expected to occur; and
- Considering the local topography and surrounding land features, JKE anticipate groundwater to flow towards the south.

A summary of the field screening results during groundwater sampling in the ASI is presented in the following table:

Table 2-3: DSI Summary - Groundwater Field Screening

Aspect	Details
Groundwater Depth & Flow	SWL measured in the monitoring wells installed at the site for the DSI ranged from approximately 2.77m to 3.08mBGL. Groundwater flow direction was not established.
Groundwater Field Parameters	Field measurements recorded during sampling were as follows: - pH ranged from 4.52 to 6.86; - EC ranged from 967µS/cm to 15274µS/cm; - Eh ranged from -108.3mV to 288.1mV; and - DO ranged from 0.3ppm to 4.6ppm.
Light non-aqueous phase liquids (LNAPL) e.g. petroleum hydrocarbons	Phase separated product (i.e. LNAPL) were not detected using the interphase probe during groundwater sampling.

2.4.4 Botany Groundwater Management Zone

The site is not located in the Botany Groundwater Management Zone associated with the Botany Sand Beds aquifer. An area mapped as management zone 2 is located approximately 219m to the east of the site.

2.4.5 Receiving Water Bodies

Information included in the DSI report indicated that surface water bodies were not identified in the immediate vicinity of the site. The closest surface water body is Alexandra Canal located approximately 1,400m to the south-east of the site. Due to the distance from the site the Canal is not considered to be a potential receptor.

3 SITE CHARACTERISATION AND CONCEPTUAL SITE MODEL

NEPM (2013) defines a CSM as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM for the site is presented in the following sub-sections and is based on the previous investigation data, site history and site information presented in Section 2.

3.1 Summary of Contamination (Site Characterisation)

A copy of the soil and groundwater data summary tables and borehole logs from the JKE DSI report is attached in the appendices. The DSI identified the following:

- Detection of friable asbestos AF/FA in fil sample BH117 (0.2-0.5) at concentrations of 0.0038mg/kg which was below the %(w/w) criterion for commercial/industrial landuse. The location of the sample is shown on the attached Figure 3. The field screening undertaken of the fill at this depth did not encounter any visible Fibre Cement Fragments (FCF). The source of this contamination was considered to be associated with the brick, concrete and tile fragments detected in the fill at this location;
- A copper elevation above the ecological SAC in fill sample BH110 (0.37-0.65m). The copper elevation was not considered to pose a risk to ecological receptors; and
- Elevations of copper, mercury and zinc were encountered in the groundwater samples above the ecological criteria. These elevations were attributed to background concentrations in urban environments.

3.2 CSM

The table below includes a review of the CSM which has been used to design the remediation strategy. The CSM will require further review if additional site data becomes available.

Table 3-1: CSM

Contaminant source(s) and contaminants of concern	The JKE DSI identified the following contamination sources: historically imported fill soil; chemical and fuel storage infrastructure; use of pesticides; hazardous building materials; and off-site dry cleaner. Contaminants of concern for the RAP include: Heavy metals; friable asbestos; TRHs; BTEX; and PAHs. The Contamination of Potential Concern (CoPC) for the DSI included: heavy metals; VOCs; BTEX; TRH; PAHs; organochlorine pesticides (OCPs); organophosphorus pesticides (OPPs); polychlorinated biphenyls (PCBs); and asbestos. The DSI did not include testing of samples for PFAS.
Affected media	Soil (mainly fill) and groundwater. Elevated concentrations of TRH, BTEX or VOCs was not detected during the DSI to indicate soil vapour to be impacted at the site. Hence, this media had not been included as an affected media of concern.

Receptor identification	Human receptors include construction workers, intrusive maintenance workers and future site users. The DSI did not identify any contaminant of potential concern that pose a significant risk to ecological receptors at the site. Considering the proposal development will include earthworks at the site, following development, the risks posed by soil contamination to ecological receptors is considered to be low.
Exposure pathways and mechanisms	Potential exposure pathways relevant to the human receptors include primary contact and inhalation of asbestos dust. The potential for exposure would typically be associated with the construction and excavation works, and future use of the site. Exposure during future site use could occur via direct contact with asbestos (dust and incidental contact) during development works.
Evaluation of data gaps	The JKE DSI recommended further investigation to assess soil conditions beneath existing structures for waste classification purposes.

3.3 Remediation Requirements

At this stage, the JKE DSI did not identify any major soil and/or groundwater contamination exceedances above the commercial/industrial landuse that require remediation. The previous investigations by DLA and Geo_Logix also concluded that the site was suitable for commercial/industrial land use. However, considering the historical landuse, data gaps and the recommendations outlined in the SAR, there is a requirement to address the following during development works:

- Fill characterisation – Friable asbestos was detected in one fill sample during the JKE DSI. The SAR has identified that there is potential for fill at the site to be impacted by asbestos. Additional testing of the fill is required post demolition, when site access under existing buildings become available. This is addressed in Section 4;
- Groundwater characterisation – The JKE DSI included limited groundwater sampling from three monitoring wells and one round of groundwater testing. The SAR has identified the need for additional groundwater monitoring. This is addressed in Section 4;
- Potential for UST/s and associated infrastructure – The previous investigations have indicated the possibility of former UST/s to be located at the site. Evidence of UST/s was not identified during the JKE DSI. The presence of tanks during development will require remediation as outlined in this RAP;
- Waste classification and off-site disposal of waste – Off-site disposal of waste will require additional testing in accordance with the NSW EPA Waste Classification guidelines. This should be assessed post demolition, when site access under existing buildings become available;
- Unexpected finds – An unexpected finds protocol (UFP) should be implemented during site works. A UFP is presented in Section 8 of the RAP; and
- Validation reporting – A validation assessment report should be prepared for remediation works undertaken at the site. The framework for the report is presented in Section 7 of the RAP.

3.4 Remediation Extent

The extent of remediation will be determined by the post demolition additional site investigation (ASI) outlined in Section 4 below. Based on the existing information, the likely extent of remediation will be associated with point sources associated with AEC such as USTs and other subsurface infrastructure, hotspots of localised contaminated material below buildings or asbestos impacted soils.

For the purpose of the RAP, the extent of remediation includes the entire site and to the cadastral boundaries. The extent of remediation (horizontal and vertical) associated with individual hotspots and UST/s and associated infrastructure will be guided by the validation. It is anticipated that the tank pits and hotspots could be approximately 2-3m deep or to the base of the fill.

The groundwater has been impacted by heavy metals associated with background sources. Additional investigation of groundwater conditions is required in order to better characterise the groundwater conditions at the site. Based on the results of the ASI, remediation and/or management of groundwater may be required for the proposed development. Potential options for the remediation and management of groundwater are discussed in Section 5.2.

4 POST DEMOLITION ADDITIONAL SITE INVESTIGATION

The JKE DSI identified data gaps (see Section 9.3 of the DSI report) which require addressing as part of the development works. The data gaps mainly included the following:

- The location of the former USTs could not be determined based on the hand drawn plans available via SafeWork. JKE DSI recommended undertaking a Ground Penetrating Radar (GPR) survey of the site as part of the development works;
- The groundwater testing undertaken for the DSI was limited to one round. Standing water level (SWL) was encountered at depths of approximately 2.77m to 3.08mBGL. The proposed development may include excavations that may intercept groundwater requiring dewatering. Additional testing of groundwater will be required to inform the treatment and management of groundwater; and
- Additional testing of soil was recommended for waste classification. The JKE DSI recommended targeting areas beneath buildings.

A Sampling Analysis Quality Plan (SAQP) should be prepared for the additional site investigation (ASI) prior to the commencement of works. The SAQP should be submitted to the site auditor for review. The ASI is to be undertaken post-demolition of the existing structures. A GPR survey should be undertaken post-demolition at the site to identify any possible former UST/s.

The ASI will include soil sampling from 40 sampling locations (as a minimum) as shown on Figure 4 in Appendix A. The sampling plan has been designed to target areas beneath the existing buildings. The total sampling density in conjunction with the JKE DSI meets the minimum density recommended in the NSW EPA Contaminated Sites Sampling Design Guidelines (1995).

The ASI should include installation of three (3) additional groundwater monitoring wells at the site as shown on the attached Figure 4. Sampling should be undertaken for a total of six (6) monitoring wells which includes the former JKE DSI wells installed at the site in 2020 (refer to Figure 4).

Soil sampling is to be undertaken from test pits using an excavator (where possible). The monitoring well locations are to be drilled using a drill rig to a minimum depth of approximately 6mBGL considering the depth of groundwater occurrence noted during the DSI. The wells are to be constructed as follows:

- 50mm diameter Class 18 PVC (machine slotted screen) is to be installed in the lower section of the well to intersect the groundwater;
- 50mm diameter Class 18 PVC casing is to be installed in the upper section of the well (screw-fixed);
- The rubber O-rings located within the screw-fixed joints (if present) are to be removed;
- A 2mm sand filter pack will be placed around the screen section for groundwater infiltration;
- A hydrated bentonite seal/plug is to be used on top of the sand pack to seal; and
- The well is to be finished with a concreted gatic cover, monument or similar to limit the inflow of surface water.

As a minimum, one soil sample per fill profile encountered (at each location) is to be analysed for heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRH/BTEX, PAHs, OCPs, OPPs and asbestos (500mL quantification sample). A bulk (10L) sample (to the extent achievable based on sample

return) from each fill profile encountered (at each location) is to be screened in the field for the presence of ACM. Additional sampling to be targeted based on the sub-surface conditions encountered during the investigation.

As a minimum, one sample of the natural profile is to be collected from each sampling location. A selection of the samples (approximately 20 samples) is to be analysed for heavy metals, TRH/BTEX and PAHs for waste classification purposes. The samples are to be selected based on the results of the fill soil analysis and field observations. One groundwater sample per monitoring well (new and existing) are to be analysed for heavy metals, TRH/BTEX, VOCs and PAHs. In the event that the existing groundwater monitoring wells cannot be located or are unserviceable (i.e. compromised, destroyed) after demolition works, replacement monitoring wells are to be installed in accordance with the above methodology within close proximity (i.e. 5m) from the existing wells. All monitoring wells are to be surveyed to determine the groundwater flow directions. QA/QC samples are to be obtained to meet the NEPM 2013 requirements (outlined in Section 7.3).

On completion of the ASI, a stand-alone report should be prepared in accordance with the Consultants Reporting Guidelines. The report should be issued to the site auditor for review. Based on the findings of the ASI, a remediation works plan (RWP) should be prepared to confirm the remedial approach in consideration of the ASI.

A record of any UST/s and/or potential point source/s of contamination identified after demolition is to be maintained. Additional testing around these AEC should be targeted as part of the ASI. The remediation of the infrastructure/point source, the UST/s and/or point source/s of contamination are to be undertaken in accordance with this RAP and RWP.

5 REMEDIATION OPTIONS

5.1 Soil Remediation

The NSW EPA follows the hierarchy set out in NEPM 2013 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;

Or if the above are not practicable:

3. Consolidation and isolation of the soil by on-site containment within a properly designed barrier; and
4. Removal of contaminated material to an approved site or facility, followed where necessary by replacement with clean material; or
5. Where the assessment indicates that remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

For simplicity herein, the above hierarchy are respectively referred to as Option 1, Option 2, Option 3 etc.

The NEPM 2013 and Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009)[5] prefer the following asbestos remediation hierarchy:

1. Minimisation of public risk;
2. Minimisation of contaminated soil disturbance; and
3. Minimisation of contaminated material/soil moved to landfill.

The NSW EPA Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd Edition) (2017)[6] provides 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.

The table below discusses and assesses a range of soil remediation options. This should be assessed based on the results of the ASI:

[5] Western Australian (WA) Department of Health (DoH), (2009). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia. (referred to as WA DoH 2009)

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

Table 5-1: Consideration of Soil Remediation Options

Option	Discussion	Assessment/Applicability
Option 1 **On-site treatment of contaminated soil**	On-site treatment can provide a mechanism to reuse the processed material, and in some instances, avoid the need for large scale earthworks. Treatment options are contaminant-specific and can include bio-remediation, soil washing, air sparging and soil vapour extraction, thermal desorption and physical removal of bonded ACM fragments. Depending on the treatment option, licences may be necessary for specific individual waste streams due to the potential for air pollution and the formation of harmful by-products during incineration processes. Licences for re-use of treated material/waste may also be required.	Potentially applicable for the contaminants of concern associated with the UST/s. However, treatment is unlikely to be viable on such a small scale and would not be the preferred option due to the extent of earthworks proposed. Physical removal of bonded ACM fragments is technically feasible and economically viable. Not considered viable for friable asbestos.
Option 2 **Off-site treatment of contaminated soil**	Contaminated soils are excavated, transported to an approved/licensed treatment facility, treated to remove/stabilise the contaminants then returned to the subject site, transported to an alternative site or disposed to an approved landfill facility. This option is also contaminant-specific. 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 under the waste and resource recovery regulatory framework.	Not feasible option for the site.
Option 3 **Consolidation and isolation of impacted soil by cap and containment**	This would include the consolidation of ACM-impacted and/or hydrocarbon impacted soil within an appropriately designed cell, followed by the placement of an appropriate barrier over the material to reduce the potential for future disturbance. The capping and/or containment must be appropriate for the specific contaminants of concern. Depending on the concentrations of contaminants being encapsulated, an ongoing environmental management plan (EMP) will be required and will need to be publicly notified and made to be legally enforceable (e.g. via listings in the Section 10.7 planning certificate and on the land title).	Technically feasible however given the likely small-scale of fill-impacted and/or hydrocarbon impacted soils, this would not be the preferred option due to the ongoing liabilities associated with complying with the EMP.
Option 4 **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 licensed landfill. The material would have to meet the requirements for landfill disposal. Landfill gate fees (which may be significant) would apply in addition to transport costs.	This option is the most applicable for the remediation of the USTs/infrastructure and asbestos impacted fill. This option aligns with any excavations proposed for the development work; is technically feasible; and economically viable.

Option	Discussion	Assessment/Applicability
Option 5 Implementation of management strategy	Contaminated soils would be managed in such a way to reduce risks to the receptors and monitor the conditions over time so that there is an on-going minimisation of risk. This may occur via the implementation of monitoring programs.	At this stage, not considered to be suitable as widespread contamination was not identified during the previous investigations.

5.2 Groundwater Remediation

The preferred order for the remediation and management of contaminated groundwater presented in the NSW EPA Contaminated Sites Guidelines for the Assessment and Management of Groundwater Contamination (2007)[7] 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. This should be assessed based on the results of the ASI:

Table 5-2: Consideration of Groundwater Remediation Options

Option	Discussion	Assessment/Applicability
Option 1 In-Situ Treatment	In-situ treatment options may include: Bio-remediation: Addition of oxygen and nutrient compounds to accelerate the natural process of organic compound decay within the environment. Chemical Oxidation: Addition of chemical compounds to oxidise the hydrocarbons in groundwater into compounds that are less harmful to the environment. Air Sparging and Extraction: Air is forced through the contaminated groundwater system to volatilise organic compounds. The air is then extracted and captured for treatment leaving reduced contaminant concentrations within the sub-strata.	The set-up and on-going costs and licencing requirements would need further consideration to assess the viability of these options.

[7] NSW EPA, (2007). *Contaminated Sites Guidelines for the Assessment and Management of Groundwater Contamination.* (referred to as Groundwater Contamination Guidelines 2007)

Option	Discussion	Assessment/Applicability
Option 2 **Ex-Situ Treatment**	Ex-situ treatment options may include: Washing: Groundwater is stripped of contaminants via a leaching process, with the concentrated contaminated liquid product retained for disposal or additional treatment. Bioreactors: Groundwater is pumped into an above-ground tank and treated with inorganic nutrients. Oxygen is introduced into the tank by sparging. Hydrocarbons are broken down by naturally occurring bacteria. Off-site Treatment: 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.	As above. The costs involved in transporting of contaminated groundwater off-site for treatment and/or disposal would be expensive and likely not viable for this project.
Option 3 **On-going Management & Monitoring**	Measures to manage groundwater contamination may include: • Notifying appropriate government agencies, owners of subsurface facilities and any other appropriate parties of the presence of groundwater contamination; • Plume containment; • Active or passive clean-up of contaminated groundwater; • Ongoing monitoring of natural attenuation; • Implementing management or contingency plans to reduce risks; and • Restricting groundwater use in and down-gradient of the contaminated plume.	This option would require the implementation of a legally enforceable long-term environmental management plan (LTEMP). The implementation of an LTEMP is technically feasible, sustainable, economically viable and commensurate with the risks posed by the contaminants in the context of the proposed development. This option would likely be the preferred remediation approach.

5.3 Rationale for the Preferred Option for Remediation

The preferred soil remediation approach is Option 4, which includes excavation and off-site disposal of the: fill impacted by asbestos and any other contaminants; UST/s and the associated infrastructure including any backfill; and any Asbestos Containing Material (ACM) identified during the ASI. The preferred groundwater remediation approach (if required based on the results of the ASI) is likely to be Option 3 which includes on-going management and monitoring. The above options are to be confirmed on completion of the ASI.

The preferred options for remediation are considered to be sustainable, economically viable, commensurate with the level of risk posed by the contaminants and technically achievable to implement concurrently with the proposed development works.

6 REMEDIATION DETAILS

6.1 Roles and Responsibilities

Table 6-1: Roles and Responsibilities

Role	Responsibility
Client / Developer	Woolworths Group Limited Contact: Thomas Stock The client/developer is required to appoint the project team for the remediation and must provide all investigation reports including this RAP to the project manager, remediation contractor, consent authority and any other relevant parties involved in the project.
Project Manager	To be appointed. The project manager is required to review all documents prepared for the project and manage the implementation of the procedures outlined in this RAP. The project manager is to take reasonable steps so that the remediation contractor and others have understood the RAP and will implement it in its totality. The project manager will review the RAP and other documents and will update the parties involved of any changes to the development or remediation sequence (in consultation with the validation consultant).
Remediation Contractor	To be appointed. The remediation contractor is required to review all documents prepared for the project, apply for any relevant removal licences or permits and implement the remediation requirements outlined in this RAP. The remediation contractor may also be the construction contractor. The remediation contractor is required to collect all necessary documentation associated with the remediation activities and forward this documentation onto the client, project manager and validation consultant as they become available. The remediation contractor is required to advise the validation consultant at key points in the remediation and validation program, and implement various aspects of the validation plan assigned to them.
SafeWork NSW Licensed Asbestos Assessor (LAA)	To be appointed. The LAA provides consulting advice and asbestos related clearance services in relation to the remediation, and prepares the clearance report/s, and any other associated documentation such as the Asbestos Management Plan (AMP) etc. The LAA is required to review any deviation to this RAP or in the event of asbestos related unexpected finds if and when encountered during the site work.
Validation Consultant	To be appointed. The validation consultant provides consulting advice and validation services in relation to the remediation, and prepares the site validation report, and any other associated documentation such as the RWP, Asbestos Management Plan (AMP) etc. The validation is required to review any deviation to this RAP or in the event of unexpected finds if and when encountered during the site work. It is recommended that the validation consultant has a LAA on staff.

Role	Responsibility
	The validation consultant is required to liaise with the client, project manager and remediation contractor on all matters pertaining to the site contamination, remediation and validation, carry out the required site inspections during capping, and collect validation samples for imported materials.
Site Auditor	Louise Walkden (Ramboll Australia) The site auditor would review the information provided by the validation consultant, including (but not limited to) the site validation report. The auditor is to be engaged to review the RAP prior to commencement of the remediation. The developer, project manager and validation consultant are to consult with the auditor in the event of unexpected finds and/or deviations to the RAP.

6.2 Pre-commencement

The project team is to have a pre-commencement meeting to discuss the sequence of remediation, and the remediation and validation tasks. The site management plan for remediation works (see Section 9) should be reviewed by the project manager and remediation contractor, and appropriate steps are to be taken to ensure the adequate implementation of the plan.

6.3 Remediation and Associated Tasks

The following general sequence of works is anticipated:

- **Hold Point -** Preparation of Asbestos Management Plan (AMP) for the proposed development. The AMP should factor the friable asbestos detected in the fill at the site;
- Site establishment and demolition;
- **Hold Point** – A site inspection should be completed by the validation consultant on completion of demolition to identify any additional sources of contamination such as ACM, UST/s etc. Any such areas identified should be targeted as part of the ASI;
- Completion of the ASI as outlined in Section 4;
- Preparation of a RWP based on the ASI results;
- Address ASSMP requirements outlined in JKE ASSMP E33191Brpt3-ASSMP dated 12 November 2021;
- Decommissioning and removal of the UST/s, backfill and associated infrastructure, followed by excavation and off-site disposal of soils associated with the tank pit and other impacted areas;
- Remediation of soil contamination issues identified at the site throughout the bulk excavation works;
- Remediation and/or management of contaminated groundwater (if required);
- Validation of the remediation works to occur progressively throughout the remediation program; and
- Preparation of a Validation Assessment report for the site.

6.3.1 Site Establishment and Demolition

The remediation contractor is to establish on site as required to facilitate the remediation. Consideration must be given to the work sequence and extent of remediation so that the site establishment (e.g. site sheds, fencing, access points etc) does not inhibit the remediation works.

Any hazardous building materials in the existing structures should be assessed prior to the commencement of demolition in accordance with the relevant codes and standards. A clearance certificate is to be obtained by a LAA following the removal of any hazardous materials. The concrete slabs should be inspected for potential ACM post-demolition by a LAA.

All waste from the demolition is to be disposed to facilities that are licenced by the NSW EPA to accept the waste. The demolition contractor is to maintain adequate records and retain all documentation for such activities including:

- A summary register including details such as waste disposal dates, waste materials descriptions, disposal locations (i.e. facility details) and reconciliation of this information with waste disposal docket numbers;
- Waste tracking records and transport certificates (where waste is required to be tracked/transported in accordance with the regulations); and
- Disposal dockets for the waste. Legible dockets are to be provided for all waste materials so they can be reconciled with the register.

The above information is to be supplied to the validation consultant for assessment and inclusion in the site validation report.

6.3.2 Asbestos Management Plan (AMP)

An AMP should be prepared for the site by a LAA and implemented for the site remediation and development works. The AMP should include the minimum PPE required for handling friable asbestos, WHS and other requirements outlined in the documents published by Safe Work Australia, WorkCover Authority of NSW, National Occupational Health and Safety Commission, and other relevant authorities as applicable.

6.3.3 Remediation of Fill

The procedure for the remediation of fill impacted by asbestos is outlined below. This should be reviewed based on the results of the ASI:

Table 6-2: Remediation Details – Asbestos impacted fill areas

Step	Primary Role/ Responsibility	Procedure
1.	Remediation contractor	A surface clearance should be undertaken by a LAA across the entirety of the site post demolition works. The clearance should be undertaken following demolition but prior to removal of the slabs and commencement of earthworks. Any ACM should be identified, recovered, weighed and its source location noted. The ACM should then be disposed of to an appropriate NSW EPA licensed facility (i.e. licensed to accept asbestos waste).
2.	Remediation contractor	Site Preparation Works: The remediation area should be surveyed and marked on the site prior to the commencement of excavation works. The remediation area should be barricaded and signposted to prevent unauthorised access. The extent of remediation will be determined based on the results of the ASI and the LAA clearance outlined in Step 1.

Step	Primary Role/ Responsibility	Procedure
		All underground services are to be appropriately disconnected or rerouted to facilitate the works. An AMP should be prepared. Air monitoring and appropriate fencing and other controls should be established on site for Work Health and Safety (WHS) purposes keeping in mind the presence of friable asbestos in fill soil. SafeWork NSW should be notified of the asbestos removal works at the site.
3.	Remediation contractor	<u>Removal of asbestos contaminated fill:</u> Excavation of the remediation area will be undertaken as follows: • Submit an application to dispose the fill (in accordance with the assigned waste classification and any findings of the ASI) to a landfill licensed by the NSW EPA to receive the waste containing asbestos and obtain authorisation to dispose; • Register with the **NSW EPA WasteLocate** tracking system to comply with the legislation in regards to transporting/movement of asbestos waste; • A water system will need to be in place to spray the excavated soil during excavation/ remediation works and to decontaminate trucks entering the work area. The general site area should be kept damp during remediation works to minimise the generation of dust; • The remediation area should be excavated to the base of the fill and down to the surface of the underlying natural soil (or bedrock, whichever is encountered first). The details of the excavation works will need to be agreed with the remediation contractor and validation consultant. The works should be done in the most efficient manner that minimises cross contamination. We note that the natural soil/rock levels may vary across the site and provisions will need to be made for careful, detailed excavation and removal of fill; • Following removal of the impacted fill, the excavations should be inspected by an LAA and the validation consultant to confirm there are no obvious indicators of contamination such as bonded ACM, stained or odorous soil, or residual underground infrastructure. Any unexpected conditions should be considered in the validation sampling program which should be adjusted accordingly; • Load the fill onto trucks and dispose in accordance with the assigned waste classification to the receiving licenced landfill facility; and • All documents including landfill dockets should be retained and forwarded to the client and validation consultant for inclusion into the validation report.
4.	Validation consultant	<u>Validation of Excavations:</u> • Once the impacted fill is removed, the base and walls of the excavation should be checked by the LAA prior to validation sampling by the validation consultant as outlined in Section 7; • If the validation fails, the contaminated area should be chased out until the validation is successful; and • If the validation is successful, the impacted area has been remediated.

6.3.4 Remediation of Former Fuel Infrastructure (UST/s)

Any UST/s and associated infrastructure (i.e. underground pipe work, vent pipes etc) are to be removed from the site in accordance with the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation (2019)[8], Guidelines for the Implementation of the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019 (2020)[9] and the Australian Standard for The Removal and Disposal of Underground Petroleum Storage Tanks (AS4976-2008)[10]. Reference is also to be made to the UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS (2010)[11] and the UPSS Technical Note: Site Validation Reporting (2010)[12].

It is noted that various guidelines are currently being updated to reflect the UPSS Regulation 2019. The remediation is to occur in accordance with the current regulation and best practice guidelines available when the remediation commences.

Table 6-3: Remediation – UST and Associated Infrastructure

Step	Primary Role/ Responsibility	Procedure
1.	Remediation contractor	Address Stability Issues and Underground Services: Geotechnical advice should be sought regarding the stability of the adjacent structures and/or adjacent areas prior to commencing remediation (as required). Stability issues should be addressed to the satisfaction of a suitably qualified geotechnical engineer. This may require the installation of temporary shoring. All underground services are to be appropriately disconnected or rerouted to facilitate the works.
2.	Remediation contractor (or their nominated sub-contractor) Validation consultant	Additional Groundwater Screening: Based on the results of the ASI, if required, a groundwater monitoring well should be installed in the vicinity of the UST to better assess the groundwater quality conditions. The groundwater should be sampled by the validation consultant and analysed for the contaminants of concern identified in the JKE DSI CSM (see Section 3.2).
3.	Remediation contractor (or their nominated sub-contractor)	Initial Preparation: The pavement in the remediation area should be cut and removed with care using an excavator, or similar. A licensed contractor should be engaged for the removal of the UST. Liquid and/or sludge within the USTs and associated pipe work should be pumped out and disposed of lawfully by a licensed liquid waste operator. All works to be undertaken in accordance with the AMP.

[8] *Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019* (NSW). (referred to as UPSS Regulation 2019)

[9] NSW EPA, (2020). *Guidelines for the Implementation of the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019.* (referred to as UPSS Guidelines 2020)

[10] Standards Australia, (2008). *The Removal and Disposal of Underground Petroleum Storage Tanks.* (referred to as AS4976-2008)

[11] NSW DECCW, (2010). *UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS*

[12] NSW DECCW, (2010). *UPSS Technical Note: Site Validation Reporting*

Step	Primary Role/ Responsibility	Procedure
4.	Remediation contractor (or their nominated sub-contractor) and validation consultant	<u>Removal of the USTs/infrastructure, impacted soils, followed by validation:</u> The UST and associated infrastructure is to be removed by a licensed contractor in accordance with AS4976-2008 and with regards to the Work Health and Safety Regulation (2017)[13]. Following removal, remediation of the area will be undertaken as follows: • The backfill soils (most likely to be sandy fill) surrounding the UST should be excavated and stockpiled separately (all stockpiles should be placed on the adjacent hardstand with appropriate silt control). This material is to be validated by the validation consultant (for waste classification purposes) as outlined in Section 7.1; • Submit an application to dispose of the backfill soil (in accordance with the assigned waste classification) to a facility that is appropriately licensed to receive the waste, and obtain authorisation to dispose; • Load the backfill soil onto trucks and dispose in accordance with the assigned waste classification; • Depending on the contamination status of the backfill, excavation of additional material at the base and walls of the tank pits may be required. This should initially involve excavation of material to extend the pits (say 0.5m initially) in the direction of the suspected impact. The validation consultant should be present during the excavation to provide advice on the potential extent of contamination based on visual and olfactory indicators, and PID screening results; • Stockpile the excavated material separately (to the backfill that was initially excavated) and undertake a waste classification outlined above, then load the soil onto trucks and dispose in accordance with the assigned waste classification; • The validation consultant is to obtain validation samples from the walls and base of the excavation (see the Validation Plan in Section 7). Based on the findings of the DSI, groundwater may be encountered at the base of the remedial excavation; • The groundwater seepage should be sampled and tested for contaminants (see Section 7). A liquid waste contractor should be engaged to pump out the seepage from the tank pit; and • Subject to successful validation, backfill or (preferably) isolate the remedial excavation. All documents including landfill disposal dockets, UST disposal/destruction dockets, liquid waste disposal etc. should be retained by the remediation contractor and forwarded to the client and validation consultant. This documentation forms a key part of the validation process and is to be included in the validation report.
5.	Validation consultant	Validation sampling of the tank pit, waste classification sampling of stockpiled backfill and any groundwater seepage as outlined in Section 7. Review of documentation issued by the remediation contractor and inclusion into validation report.

The detailed validation plan relevant to the above items is provided in Section 7.

[13] *Work Health and Safety Regulation 2017* (NSW). (Referred to as WHS regulation 2017)

6.4 Remediation of Contaminated Groundwater

The procedure for the remediation of contaminated groundwater is outlined below. This should be revised based on the ASI results.

Table 6-4: Remediation – Contaminated Groundwater

Step	Primary Role/ Responsibility	Procedure
1.	Validation Consultant	Identify the Extent of Contamination: Additional testing of groundwater will be required in order to confirm the extent of groundwater contamination. The additional testing will be undertaken as part of the ASI discussed in Section 4.
2.	Validation Consultant (and risk assessor, as required)	Assessment of Remediation Options: Based on the findings of the ASI, a Human Health Risk Assessment (HHRA) may be required to better assess the risks posed by the groundwater contamination, and identify appropriate remediation options. Potential remediation approaches are outlined in Section 5.2, however the ASI and HHRA will refine the remediation approach. An amended RAP/RWP will be prepared to outline the remediation and/or management approach for contaminated groundwater.
3.	Remediation contractor (or their nominated sub-contractor)	Implementation of the amended RAP/RWP: The remediation contractor is responsible for completing the remediation in accordance with the conditions and requirements specified in the amended RAP/RWP.
4.	Validation consultant	Validation sampling of the groundwater, as outlined in the amended RAP/RWP. Review of documentation issued by the remediation contractor and inclusion into validation report. Preparation of a LTEMP for the management of groundwater if required.

6.5 Remediation Documentation

The remediation contractor must retain all documentation associated with the remediation, including but not limited to:

- Waste register (see below);
- Asbestos management documentation, including all relevant notifications and monitoring reports;
- Photographs of remediation works;
- Waste tracking documentation (where applicable);
- Survey information; and
- Imported materials documentation from suppliers, including any routine analysis reports, product specifications and dockets for imported materials.

Copies of these documents must be forwarded to the project manager and the validation consultant on completion of the remediation for inclusion in the validation report.

6.5.1 Waste Register

All waste removed from the site is to be appropriately tracked and managed in accordance with the relevant regulations. The remediation contractor (and/or their nominated construction contractor) is to maintain adequate records and retain all documentation for waste disposal activities including:

- A summary register including details such as waste disposal dates, waste materials descriptions, disposal locations (i.e. facility details) and reconciliation of this information with waste disposal docket numbers; and
- Waste tracking records and transport certificates (where waste is required to be tracked/transported in accordance with the regulations); and
- Disposal dockets for the waste. Legible dockets are to be provided for all waste materials so they can be reconciled with the register.

Any soil waste classification documentation is to be prepared in accordance with the reporting requirements specified by the NSW EPA. Reports are to include:

- The full name, address, Australian Company Number (ACN) or Australian Business Number (ABN) of the organisation and person(s) providing the waste classification;
- Location of the site where the waste was generated, including the source site address;
- History of the material and the processes and activities that have taken place to produce the waste;
- Potential contaminating activities that may have occurred at the site where the waste was generated;
- Description of the waste, including photographs, visible signs of contamination, such as discolouration, staining, odours, etc;
- Quantity of the waste;
- Number of samples collected and analysed;
- Sampling method including pattern, depth, locations, sampling devices, procedures, and photos of the sample locations and samples;
- Contaminants tested;
- Laboratory documentation – chain-of-custody (COC), sample receipt, laboratory report;
- All results regardless of whether they are not used in the classification process;
- Results of sample mean, sample standard deviation and the 95% upper confidence limit (UCL) where relevant;
- Brief summary of findings including discussion of results; and
- A clear statement of the classification of the waste as at the time of the report.

A soil volume analysis should be undertaken on completion of remediation and reconciled with the quantities shown on the soil disposal dockets. This information is to be reviewed by the validation consultant on completion of the works and an assessment of the quantities of soil disposed off-site (e.g. comparison with the estimated and actual volumes) is to be included in the validation report. A review of the disposal facility's licence issued under the Protection of the Environment Operations (POEO) Act (1997)[14] should also be undertaken to assess whether the facility is appropriately licensed to receive the waste.

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

6.5.2 Imported Materials Register

The remediation contractor (and/or their nominated construction contractor) is to maintain for the duration of the project an imported material register. This must include a register (preferably in Microsoft Excel format) with details of each imported material type, supplier details, summary record of where the imported materials were placed on site, and importation docket numbers and a tally of quantities (separated for each import stream). Legible dockets for imported materials are to be provided electronically so these can be reconciled with the register.

The above information is to be provided to the validation consultant for inclusion in the validation report. It is recommended that the register be set up at the beginning of the project and provided to the validation consultant regularly (say on a monthly or two-monthly basis) so the details can be checked and any rectification of the record keeping process can occur in a timely manner.

7 VALIDATION PLAN

Validation is necessary to demonstrate that remedial measures described in the RAP have been successful and that the site is suitable for the intended land use. The sampling program for the validation is outlined in Section 7.1. This is the minimum requirement based on the remedial strategies provided. Additional validation sampling may be required based on observations made during remediation or in the event of an unexpected find.

7.1 Validation Sampling and Documentation

The table below outlines the validation requirements for the site:

Table 7-1: Validation Requirements

Aspect	Sampling	Analysis	Observations and Documentation
Asbestos			
Surface ACM	Bulk sample (10L field screening) of one sample per 20m x 20m grid for ACM. The approximately 20m grid is shown on Figure 4. Sampling will be confined to the ACM impacted grid areas identified by the LAA. The aim of the sampling is to demonstrate that the ACM has not impacted the underlying fill soil.	Bulk asbestos quantification in field i.e. sieving of 10L sample. Analysis of representative fill soil sample for asbestos quantification (500mL).	Field records to be maintained documenting the following: • Surface clearance inspection results showing impacted areas requiring raking; • The number of raked passes and the number of ACM fragments identified during each pass (clearly showing at least three passes were completed, and two consecutive passes, perpendicular to each other, occurred with no ACM encountered); • Presence/absence of ACM; and • Photographic log of remediation and clearances to be maintained. Disposal dockets to be retained and forwarded to validation consultant for inclusion in the validation report. LAA surface clearance certificate/s (for ACM) to be provided following completion of raking.
Asbestos in Fill (bonded and friable) Walls and base of the excavation	Bulk sample (10L field screening) of fill profile exposed along the walls of the excavation. Each wall should be screened in 5m linear intervals, with screening/samples at the surface (0-100mm) and every 0.5 vertical metre.	Bulk asbestos quantification of fill soil in field i.e. sieving of 10L sample. Analysis of representative fill and natural soil sample for asbestos quantification (500mL).	Observations to be recorded to confirm fill removal is acceptable. Photographs to be taken. Air monitoring results to be reviewed. Disposal dockets to be retained and forwarded to validation consultant for inclusion in the validation report.

Aspect	Sampling	Analysis	Observations and Documentation
	Additional screening is also to target obvious indicators of contamination and changes in soil profile. One sample per 5m*5m ($25m^2$) grid spacing from the base of the excavation. The base of the excavation is assumed to be natural soil.		Asbestos assessor to provide surface clearance certificate for visible asbestos to cover the base and walls of excavation.
UST, Associated Infrastructure and impacted Soils/Bedrock			
UST backfill	One sample per $25m^3$, collected using hand equipment.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRHs, BTEX, PAHs and asbestos. TCLP testing may be required for waste classification. Any other CoPC identified during the ASI.	Samples to be screened using photo-ionisation detection (PID) meter. Observations of staining and odour to be recorded. Photographs to be taken. Disposal dockets to be retained.
UST pit chase out spoil (if required)	One sample per $25m^3$, collected using hand equipment.	As above. Other analytes to be considered based on remediation failures.	As above.
UST pit – excavation base UST pit – excavation walls	Minimum of two samples per UST to be collected using the excavator after removal of the tank. One sample per excavation wall and per vertical metre. Additional sampling is also to target obvious indicators of contamination and changes in soil profile.	Lead, TRH/BTEXN Asbestos (500mL) if present in the backfill.	Samples to be screened using PID. Observations of staining and odour to be recorded. Photographs to be taken.

Aspect	Sampling	Analysis	Observations and Documentation
Pipe trenches	One sample per 5m lineal, obtained from the base of the trench. Additional samples to target any areas of staining or odours.	As above.	As above.
UST Bowser	One sample from the base of the bowser. Additional samples to target any areas of staining or odours.	As above.	As above.
Groundwater			
Groundwater	To be determined based on the amended RAP/RWP.	To be determined based on the amended RAP/RWP.	To be determined based on the amended RAP/RWP.
Imported Materials – validation of imported materials is required for any materials imported onto the site during the remediation and to the point in time that the site validation report is prepared (e.g. general fill to raise the site levels or reinstate remedial excavations, imported materials to create piling platform, gravels for site preparation, material used for capping layers etc).			
Imported VENM backfill (if required)	Minimum of three samples per source	Heavy metals (as above), TRHs, BTEX, PAHs, OCPs, PCBs and asbestos (500ml). Additional analysis may be required depending on the site history of the source property.	**Remediation contractor** to supply existing VENM documentation/report (report to be prepared in accordance with the NSW EPA waste classification reporting requirements). A hold point remains until the **validation consultant** approves the material for importation or advises on the next steps.
Imported garden mix/topsoil and mulches	Minimum of three samples per source	Analysis for CoPC outlined above.	Material is to be inspected upon importation by the **validation consultant** and samples obtained for analysis. Material to be inspected during sampling to confirm it is free of visible/olfactory indicators of contamination and is consistent with documentation. Photographic documentation and an inspection log are to be maintained. Where check sampling occurs by the **validation consultant** due to deficiencies or irregularities in existing VENM documentation, the following is required: - Date of sampling and description of material sampled; - An estimate of the volume of material imported at the time of sampling; - Sample location plan; and

Aspect	Sampling	Analysis	Observations and Documentation
			- Analytical reports and tabulated results with comparison to the Validation Assessment Criteria (VAC).
Imported engineering materials such as recycled aggregate, road base etc or Excavated Natural Material (ENM)	Minimum of three samples per source/material type. Additional testing may be required for ENM to meet the specification within the ENM Order.	Heavy metals (as above), TRHs, BTEX, PAHs, OCPs, PCBs and asbestos (500ml quantification). Additional testing may be required for ENM (e.g. foreign materials, pH and electrical conductivity) depending on available documentation.	**Remediation contractor** to provide product specification and documentation to confirm the material has been classified with reference to a relevant Resource Recovery Order/Exemption. A hold point remains until the **validation consultant** approves the material for importation or advises on the next steps. Review of the facility's Environment Protection Licence (EPL). Material is to be inspected by the **validation consultant** upon importation to confirm it is free of visible/olfactory indicators of contamination and is consistent with documentation. Where check sampling occurs by the **validation consultant** due to deficiencies or irregularities in existing documentation, the following is required: - Date of sampling and description of material sampled; - An estimate of the volume of material imported at the time of sampling; - Sample location plan; and - Analytical reports and tabulated results with comparison to the VAC.
Imported engineering materials comprising only natural quarried products.	At the validation consultant's discretion based on robustness of supplier documentation.	At the validation consultant's discretion based on robustness of supplier documentation.	**Remediation contractor** to provide documentation from the supplier confirming the material is a product comprising only VENM (i.e. natural quarried product). A hold point remains until the **validation consultant** approves the material for importation or advises on the next steps. Review of the quarry's EPL. Material is to be inspected by the **validation consultant** upon importation to confirm it is free of anthropogenic materials, visible and olfactory indicators of contamination, and is consistent with documentation. Where check sampling occurs by the **validation consultant** due to deficiencies or

Aspect	Sampling	Analysis	Observations and Documentation
			irregularities in existing documentation, the following is required: - Date of sampling and description of material sampled; - An estimate of the volume of material imported at the time of sampling; - Sample location plan; and - Analytical reports and tabulated results with comparison to the VAC.

7.2 Validation Assessment Criteria and Data Assessment

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

Table 7-2: VAC

Validation Aspect	VAC
Soil validation	Areas Impacted by asbestos: • Asbestos in soil to be assessed against HSL-D 'Commercial/Industrial' landuse criteria outlined in NEPM 2013; • Asbestos/ACM absent in the top 100mm of fill following at least three passes, with the final two passes (perpendicular to each other) demonstrating no ACM; • ACM visually absent in 10L screened soil validation sample; and • ACM not observed during surface clearance. UST/infrastructure: • TRH/BTEX = HSLs for commercial/industrial land use; • Lead = HIL for commercial/industrial land use; and • Free of staining and odours The presence of odours or exceedances of the VAC may compromise the VENM classification. However, from a risk perspective in the context of the proposed land use, such traces are unlikely to result in an unacceptable risk to future site users. In the event that persistent traces of TRH/BTEXN are reported above the VAC, these concentrations can be assessed in the context of human health risks, in accordance with Schedule B1 of NEPM (2013) and an alternative classification (other than VENM) would need to be pursued for this material if it is to be disposed off-site.
Waste classification (backfill/chase out soils associated with remediation of USTs, and supplementary waste classification of fill	In accordance with the procedures and criteria outlined in Part 1 of the Waste Classification Guidelines 2014 and any other exemptions/approvals as required.
Groundwater validation criteria	Groundwater data will be compared to relevant Tier 1 screening criteria in accordance with NEPM (2013), following an assessment of environmental values in accordance with the Guidelines for the Assessment and Management of Groundwater Contamination (2007). Environmental values include aquatic ecosystems, and human-health risks in non-use scenarios. The following validation criteria will be used: • HSLs for a 'commercial/industrial' exposure scenario (HSL-D). HSLs calculated based on the soil type and the observed depth to groundwater; • Site-specific assessment (SSA) for the Tier 1 screening of human health risks posed by volatile contaminants in groundwater; and • Groundwater Investigation Levels (GILs) for 95% protection of freshwater species were adopted based on the Default Guideline Values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018).
Imported materials	Material imported as general fill must only be VENM or ENM. VENM is defined in the POEO Act 1997 as material: • 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

Validation Aspect	VAC
	• 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. ENM and recycled materials are to meet the criteria of the relevant exemption/order under which they are produced. Analytical results for VENM and other imported materials will need to be consistent with expectations for those materials. For VENM, it is expected that: - Heavy metal concentrations are to be less than the most conservative Added Contaminant Limit (ACL) concentrations for an urban residential and public open space (URPOS) exposure setting presented in Schedule B1 of the NEPM 2013; and - Organic compounds are to be less than the laboratory PQLs and asbestos to be absent. All materials imported onto the site must also be adequately assessed as being appropriate for the final use of the site, including ecological considerations. A risk-based assessment approach is to be adopted with regards to the tier 1 screening criteria presented in Schedule B1 of NEPM 2013. Aesthetics: all imported materials are to be free of staining and odours.

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

7.3 Validation Sampling, Analysis and Quality Plan (SAQP)

Appropriate QA/QC samples should be obtained during the validation (where applicable) and analysed for the same suite of contaminants as the primary samples. As a minimum, QA/QC sampling should include duplicates (5% inter-laboratory and 5% intra-laboratory), trip spikes and trip blanks. Rinsate samples should be obtained if re-usable sampling equipment is utilised.

Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs) should be clearly outlined and assessed as part of the validation process. A framework for the DQO and DQI process is outlined below and should be reflected in the validation report.

DQOs have been broadly established for the validation with regards to the seven-step process outlined NEPM (2013). The seven steps include the following which are detailed further in the following subsections:

- State the problem;
- Identify the decisions/goal of the study;
- Identify information inputs;
- Define the study boundary;
- Develop the analytical approach/decision rule;
- Specify the performance/acceptance criteria; and
- Optimise the design for obtaining the data.

DQIs are to be assessed based on field and laboratory considerations for precision, accuracy, representativeness, completeness and comparability.

7.3.1 Step 1 - State the Problem

Validation data is required to demonstrate that the remediation is successful and that the site is suitable for the proposed land use described in Section 1.1.

7.3.2 Step 2 - Identify the Decisions of the Study

The remediation goal, aims and objectives are defined in Section 1.2. The decisions to be made reflect these objectives and are as follows:

- Was the remediation undertaken in accordance with the RAP?
- If there were any deviations, what were these and how do they impact the outcome of the validation?
- Are any of the validation results above the VAC?
- Is the site suitable for the proposed development from a contamination viewpoint?

7.3.3 Step 3 - Identify Information Inputs

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

- Existing relevant data from previous reports;
- Site information, including site observations, inspections, survey information, as-built drawings, waste and imported materials registers;
- Validation sampling of imported materials; and
- Field and laboratory QA/QC data.

7.3.4 Step 4 - Define the Study Boundary

The remediation and validation will be confined to the site boundaries as shown in Figure 2 in Appendix A and will be limited vertically to the fill soils for the remediation and validation of asbestos impacts. The validation will guide the horizontal and vertical extent of the remediation associated with the UST, though it is anticipated to be approximately 2m to 3m deep.

The waste classification will be confined to the site boundaries as shown in Figure 2 in Appendix A and will be limited vertically to the base of the fill, anticipated to range from 0.5mBGL to 4.5mBGL.

The ASI and HHRA, as discussed in Section 4, will guide the remediation extent of groundwater, if required.

7.3.5 Step 5 - Develop an Analytical Approach (or Decision Rule)

7.3.5.1 VAC

The validation data will be assessed in accordance with the requirements outlined in Section 7.2.

7.3.5.2 Field and Laboratory QA/QC

Field QA/QC is to include analysis of inter-laboratory duplicates (5% frequency), intra-laboratory duplicates (5% frequency), trip spike, trip blank and rinsate samples (one each for the assessment to demonstrate adequacy of standard sampling/handling procedures). Field QA/QC samples are to be analysed for the contaminants of concern, except asbestos. The trip spike will only be analysed for BTEX as BTEX will be considered a surrogate to assess potential loss of volatiles from TRH (F2).

DQIs for field and laboratory QA/QC samples are defined below:

Field Duplicates

Acceptable targets for precision of field duplicates will be 30% or less, consistent with NEPM (2013). RPD failures will be considered qualitatively on a case-by-case basis taking into account factors such as the concentrations used to calculate the RPD (i.e. RPD exceedance where concentrations are close to the PQL are typically not as significant as those where concentrations are reported at least five or 10 times the PQL), sample type, collection methods and the specific analyte where the RPD exceedance was reported.

Trip Blanks

Acceptable targets for trip blank samples will be less than the PQL for organic analytes. Metals will be considered on a case-by-case basis with regards to the reference material used as the blank medium.

Trip Spikes

Acceptable targets for trip spike samples will be 70% to 130%.

Laboratory QA/QC

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

A summary of the typical limits is provided below:

RPDs

- Results that are <5 times the PQL, any RPD is acceptable; and
- Results >5 times the PQL, RPDs between 0-50% are acceptable.

Laboratory Control Samples (LCS) and Matrix Spikes

- 70-130% recovery acceptable for metals and inorganics; and
- 60-140% recovery acceptable for organics.

Surrogate Spikes

- 60-140% recovery acceptable for general organics.

Method Blanks

- All results less than PQL.

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

7.3.5.3 Appropriateness of PQLs

The PQLs of the analytical methods are to be considered in relation to the VAC to confirm that the PQLs are less than the VAC. In cases where the PQLs are greater than the VAC, a discussion of this is to be provided.

7.3.6 Step 6 – Specify Limits on Decision Errors

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

7.3.7 Step 7 - Optimise the Design for Obtaining Data

The design is to be optimised via the collection of validation data to demonstrate the success of the key aspects of the remediation. Data collection will be via various methods including inspections and sampling.

7.3.8 Sampling Plan

The proposed sampling plan for the validation of imported materials is described in Section 7.1.

7.4 Validation Report and LTEMP

As part of the site validation process, a validation report will be prepared by the validation consultant. The report will present the results of the validation assessment and will be prepared in accordance with the Consultants Reporting Guidelines.

Based on the preferred remediation strategy, a long-term environmental management plan (LTEMP) may be required as a contingency in the event there is requirement for the management of groundwater impacted by CoPC. This will be assessed based on the results of the ASI and HHRA (if required).

8 CONTINGENCY PLAN

A review of the proposed remediation works has indicated that the greatest risks that may affect the success of the remediation include unexpected finds. A contingency plan for the remediation is provided below:

8.1 Unexpected Finds

Residual hazards that may exist at the site would generally be expected to be detectable through visual or olfactory means. The procedure to be followed in the event of an unexpected find is presented below:

- In the event of an unexpected find, all work in the immediate vicinity should cease and the remediation contractor should contact the validation consultant and the project manager;
- Temporary barricades should be erected to isolate the area from access to workers;
- The validation consultant is to attend the site, adequately characterise the contamination and provide advice in relation to site management and remediation. In the event that remediation differs from the procedures outlined in this RAP, an addendum RAP or RWP must be prepared in consultation with the project stakeholders and submitted to the site auditor and consent authority; and
- Contamination should be remediated and validated in accordance with the advice provided, and the results should be included in the validation report.

8.2 Importation Failure for VENM or other Imported Materials

Where material to be imported onto the site does not meet the importation VAC detailed in Section 7.2, the material should not be imported. Alternative material must be sourced that meets the importation requirements.

8.3 Contingency for Failure of Remediation Strategy

8.3.1 Impacted Soil Remaining On-site

In the unexpected event that 'pockets' of impacted soil/bedrock cannot be excavated and disposed off-site, this material must be validated to assess its suitability to remain on-site and the potential risks posed by this soil in the context of the future land use.

In the event that the soils present a potentially unacceptable risk, there may be a need to implement a 'cap and contain' strategy or other mitigation measures. The strategy would need to be documented in an addendum RAP/RWP and submitted to the auditor and consent authority. It is noted that this would result in a LTEMP for the site to manage the contamination.

Alternatively, a site-specific HHRA could be considered to establish whether the risks warrant long-term management via an LTEMP.

8.3.2 Contaminated Groundwater Remaining Beneath the Site

In the unexpected event that contaminated groundwater (above the Tier 1 screening criteria outlined in the ASI) remains beneath the site, additional mitigation and/or management measures may be required. The initial response should include undertaking a HHRA to account for the additional data and refine the risk-based scenarios. Additional investigation, such as soil vapour, may be necessary for the refinement of the HHRA, and should be discussed with the risk assessor at the outset.

A RWP will be prepared (if required) based on the findings of the HHRA. It is noted that the RWP would form part of the overall remedial strategy and must be approved by the site auditor/consent authority.

In the event the contamination does not pose an unacceptable risk, a LTEMP or Groundwater Management Plan (GMP) will be prepared for the site.

9 SITE MANAGEMENT PLAN FOR REMEDIATION WORKS

The information outlined in this section of the RAP is for the remediation work only. The client should make reference to the development consent for specific site management requirements for the overall development of the site.

9.1 Asbestos Management Plan (AMP)

Prior to the commencement of any works in the remediation areas, an AMP is to be prepared by the validation consultant or LAA to document the asbestos-related management requirements for the remediation. The AMP is to be implemented by the remediation contractor (and their nominated subcontractors where relevant) throughout the remediation.

9.2 Acid Sulfate Soil Management Plan (ASSMP)

ASS was previously encountered at the site as outlined in Section 2.1.3. An ASSMP was subsequently prepared for the proposed development by JKE (Ref: E33191Brpt3-ASSMP) dated 12 November 2021. The management recommendations outlined in the ASSMP should be implemented during the proposed development works.

9.3 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 available contact details are summarised in the following table:

Table 9-1: Project Contacts

Role	Company	Contact Details
Client/developer	Woolworths Group Pty Limited	Thomas Stock **tstock@woolworths.com.au**
Project Manager	To be appointed	-
Remediation Contractor	To be appointed	-
Validation Consultant	To be appointed	-
Certifier	To be appointed	-
NSW EPA	Pollution Line	131 555
NSW EPA Site Auditor	Louise Walkden (Ramboll Australia)	Louise Walkden **lwalkden@ramboll.com**
Emergency Services	Ambulance, Police, Fire	000

9.4 Security

Appropriate fencing should be installed as required to secure the site. Warning signs should be erected, which outline the personal protective equipment (PPE) required for remediation work.

9.5 Timing and Sequencing of Remediation Works

The anticipated sequence of remediation works is outlined in Section 6.3. Remediation will occur concurrently with the development works as the built form of the development and the landscaping forms part of the capping requirements.

9.6 Site Soil and Water Management Plan

The remediation contractor should prepare a detailed soil and water management plan prior to the commencement of site works and this should consider the requirements of the AMP. Silt fences should be used to control the surface water runoff at all appropriate locations of the site and appropriate measures are to be implemented to manage soil/water disturbance to the satisfaction of the regulator/determining authority. Reference should be made to the consent conditions for further 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/low-points, 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.

9.7 Noise and Vibration Control Plan

The guidelines for minimisation of noise on construction sites outlined in AS-2460 (2002)[15] 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 the determining authority (refer to 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 project manager, specifying the expected duration of the noisy works.

9.8 Dust Control Plan

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

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

- 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;
- 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 development area; and
- Geofabric/geotextile could be placed over exposed soils in the event that excavation is staged.

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

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 relevant waste classification guidelines.

9.9 Dewatering

Temporary dewatering may be required as part of the remediation works. The ASI will provide additional information relating to the depth to groundwater in relation to bulk excavation levels. Based on the information presented in the ASI, minor treatment of seepage water may be required during the development. The seepage water should be managed appropriately on site in accordance with the remediation contractor's soil and water management plan, and the validation plan in Section 7. This water should not be pumped to stormwater or sewer unless a prior application is made and this is approved by the relevant authorities.

9.10 Air Monitoring

Reference is to be made to the AMP for details regarding asbestos air fibre monitoring. Air monitoring must only be carried out by personnel registered and accredited by NATA (National Association of Testing Authorities). Filter analysis must only be carried out within a NATA certified laboratory. The monitoring results must conform to the requirements of the NOHSC Guidance note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003 (2005)].

A monitoring program will be used to assess whether the control procedures being applied are satisfactory and that criteria for airborne asbestos fibre levels are not being exceeded. The following levels will be used as action criteria during the air monitoring:

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

9.11 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;
- Demolition materials and other combustible waste should not be burnt on site;
- The spraying of a suitable proprietary product to suppress any odours that may be generated by excavated materials; and
- Use of protective covers (e.g. builder's plastic).

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

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;
- A suitable proprietary product could be sprayed on material during excavation and following stockpiling to reduce odours (subject to an appropriate assessment of the product by the validation consultant);
- 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:
    - 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.

9.12 Work Health and Safety (WHS) Plan

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

As a minimum requirement, personnel must wear appropriate protective clothing, including long sleeve shirts, long trousers, steel cap boots and hard hats. Additional asbestos-related PPE will be required and this will be specified in the AMP. 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.

9.13 Waste Management

Prior to commencement of remedial works and excavation for the proposed development, the remediation contractor should develop a waste management or recycling plan to minimise the amount of waste produced by the site. Consideration should be given to re-use material wherever possible.

9.14 Incident Management Contingency

The validation consultant should be contacted if any unexpected conditions are encountered at the site. This should enable the scope of remedial/validation works to be adjusted as required. Similarly, if any incident occurs at the site, the validation consultant should be advised to assess potential impacts on contamination conditions and the remediation/validation timetable.

9.15 Hours of Operation

Hours of operation should be between those approved by the determining authority under the development approval process.

9.16 Community Consultation and Complaints

The remediation contractor should provide details for managing community consultation and complaints within their construction environment management plan (CEMP).

10 CONCLUSION

Previous investigations by JKE have identified friable asbestos in the fill soil. The source of the asbestos is considered likely to be associated with demolition of former structures, and to a lesser extent, impacted fill historically imported to the site. The previous investigations also identified the possibility of UST/s and associated infrastructure on-site. The investigations concluded the potential for extensive impacts from hydrocarbons associated with the UST/s and infrastructure was low. However, localised impacts may be encountered in the vicinity of the UST/s and associated infrastructure. The UST/s and infrastructure will be removed during the remediation process, and the residual risks assessed by the validation process.

The groundwater has been impacted by heavy metals considered likely a regional/background issue. Further investigation is required to assess the groundwater conditions at the site.

The remediation strategy for soil includes off-site disposal of fill impacted by asbestos, UST/s, UST backfill and associated infrastructure. The remediation strategy for groundwater will likely involve ongoing monitoring and management, though this will be determined based on the findings of the further investigation and HHRA.

The remediation methods outlined in the RAP are assessed to be sustainable, economically viable, commensurate with the level of risk posed by the contaminants and technically achievable to implement concurrently with the proposed development works. On this basis, JKE are of the opinion that the site can be made suitable for the proposed development provided this RAP (and any addendums or revisions) and any requirements under a RWP is implemented.

A site validation report is to be prepared on completion of remediation activities and submitted to the site auditor and determining authority to demonstrate that the site is suitable for the proposed development. Any LTEMP or GMP prepared for the site will require appropriate public notification.

The RAP has met the objectives outlined in Section 1.2.

10.1 Regulatory Requirements

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

Table 10-1: Regulatory Requirement

Guideline / Legislation / Policy	Applicability
SEPP55	Under SEPP55, site remediation can fall under Category 1 or Category 2 remediation works. JKE recommend the client to consult the project planner to determine the remediation category prior to commencement of works. Approval is required from the consent authority for Category 1 remediation work. The RAP needs to be assessed as part of the development consent. Category 1 remediation work is identified as advertised development work unless the remediation work is a designated development or a state significant development (Clause 13 of SEPP55). 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. Under Clause 17 of SEPP55, a notice of completion of remediation work is to be given to council within 30 days of completion of the work. The notice of completion of remediation works must be in accordance with Clause 18 of SEPP55.
POEO Act 1997	Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner. Appropriate waste tracking is required for all waste that is disposed off-site. Activities should be carried out in a manner which does not result in the pollution of waters.
POEO (Waste) Regulation 2014	Part 7 of the POEO Waste Regulation 2014 set outs the requirements for the transportation and management of asbestos waste and Clause 79 of the POEO Waste Regulation requires waste transporters to provide information to the NSW EPA regarding the movement of any load in NSW of more than 10 square meters of asbestos sheeting, or 100 kilograms of asbestos waste. To fulfil these legal obligations, asbestos waste transporters must use WasteLocate.
SafeWork NSW Code of Practice: How to manage and control asbestos in the workplace (2019)	Sites with asbestos become a 'workplace' when work is carried out there and require a register and AMP. Appropriate SafeWork NSW notification will be required for licensed (e.g. Class A) asbestos removal works or handling.

11 LIMITATIONS

The report limitations are outlined below:

- JKE 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 JKE proposal; and terms of contract between JKE 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, JKE has not undertaken any verification process, except where specifically stated in the report;
- JKE 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;
- JKE 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;
- JKE have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or land use. JKE 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.

Important Information About This Report

These notes have been prepared by JKE 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 JKE 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.

JKE 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 JKE 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

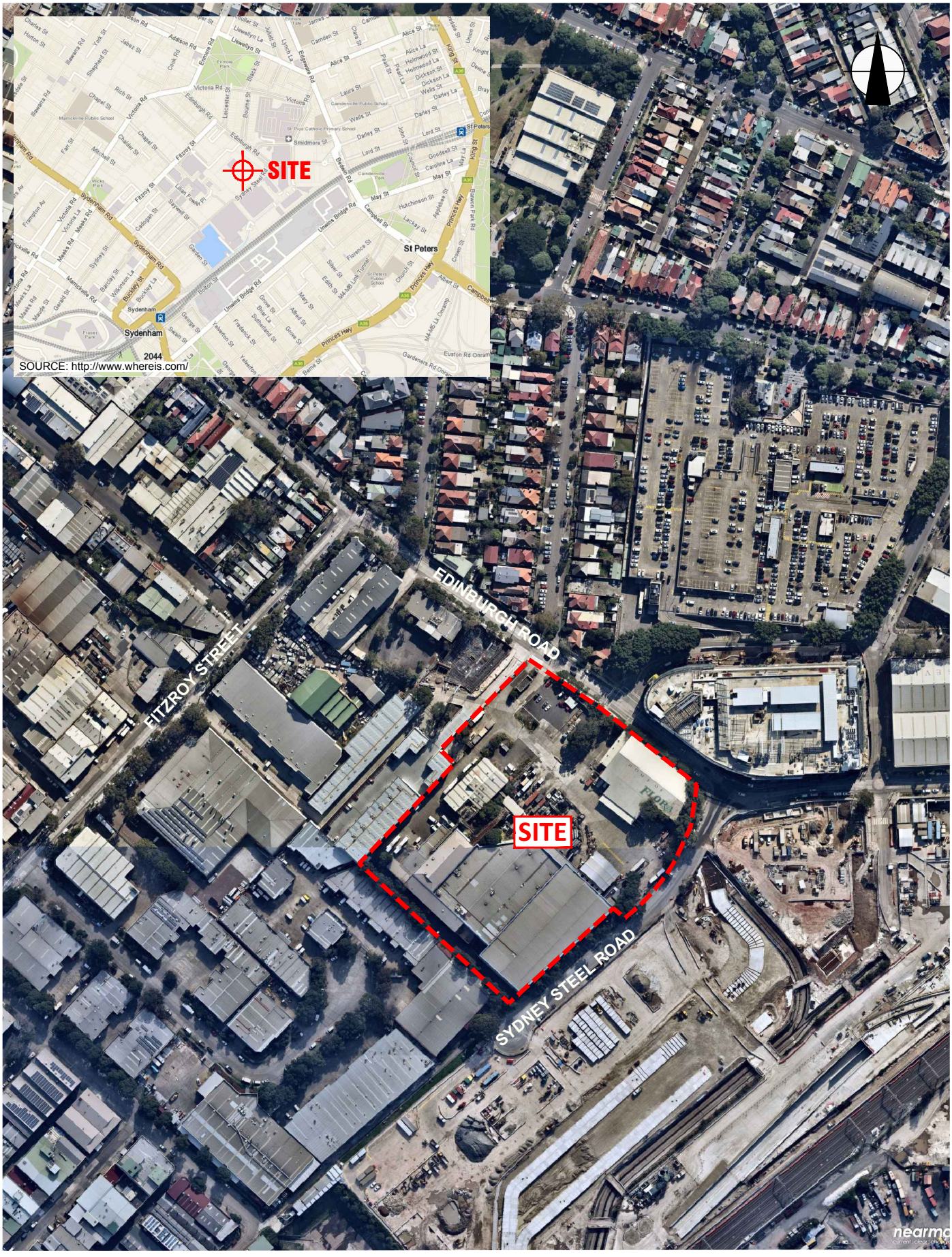
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other 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.

Appendix A: JKE Report Figures



AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

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

Title: **SITE LOCATION PLAN**

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Project No: E33191B

Figure No: 1

JKEnvironments

PLOT DATE: 21/08/2020 11:15:37 PM DWG FILE: Z:\5 EIS\5C- EIS JOBS\33000\SIE33191B MARRICKVILLE\CAD\E33191B.DWG

BH119 (>1.0)
BH114 (0.35)
BH7 (2.3)
BH120 (2.9)
BH121/MW121 (1.5)
BH115 (1.4)
BH9 (1.5)
BH109 (>0.3)
BH110 (>0.65)
BH122 (>0.35)
BH116 (1.3)
BH117 (1.2)
BH111 (>0.3)
BH105 (>0.3)
BH11 (>6.0)
BH118/MW118 (1.3)
BH1 (1.2)
BH112 (>0.5)
BH106 (>0.3)
BH101/MW101 (4.5)
BH113 (0.5)
BH123 (>0.3)
BH102 (>0.4)
BH108 (>0.7)
BH107 (>0.4)
BH4 (1.4)
BH103 (>0.3)
BH104 (>0.35)

LEGEND

APPROXIMATE SITE BOUNDARY	
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (FEBRUARY 2015)
BH/MW(Fill Depth)	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
APPROXIMATE ALIGNMENT OF SEWER MAINS	
APPROXIMATE ALIGNMENT OF ELECTRICAL SERVICES	
APPROXIMATE ALIGNMENT OF STORMWATER DRAIN	

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 10 20 30 40 50
SCALE 1:1000 @A3 METRES

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

Title: **SAMPLE LOCATION PLAN**

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Project No: E33191B

Figure No: 2

JKEnvironments

PLOT DATE: 3/09/2020 11:42:46 AM DWG FILE: Z:\5 EIS\5C EIS JOBS\33000'S\E33191B MARRICKVILLE\CAD\E33191B.DWG

BH119 (>1.0)
BH114 (0.35)
BH7 (2.3)
BH120 (2.9)
BH121/MW121 (1.5)
BH115 (1.4)
BH9 (1.5)
BH109 (>0.3)
BH110 (>0.65)
BH117 | 0.2-0.5m
FA/AF within soil | 0.0038mg/kg
BH122 (>0.35)
BH116 (1.3)
BH117 (1.2)
BH111 (>0.3)
BH105 (>0.3)
BH11 (>6.0)
BH118/MW118 (1.3)
BH1 (1.2)
BH112 (>0.5)
BH106 (>0.3)
BH101/MW101 (4.5)
BH113 (0.5)
BH123 (>0.3)
BH102 (>0.4)
BH108 (>0.7)
BH107 (>0.4)
BH4 (1.4)
BH103 (>0.3)
BH104 (>0.35)

LEGEND

- APPROXIMATE SITE BOUNDARY
- BH(Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- BH(Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (FEBRUARY 2015)
- BH/MW(Fill Depth) — BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION

SOIL/SURFACE SAMPLE EXCEEDANCE

PRESENCE OF FA/AF WITHIN SOIL

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 10 20 30 40 50
SCALE 1:1000 @A3 METRES

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

Title: **ASBESTOS LOCATION PLAN**

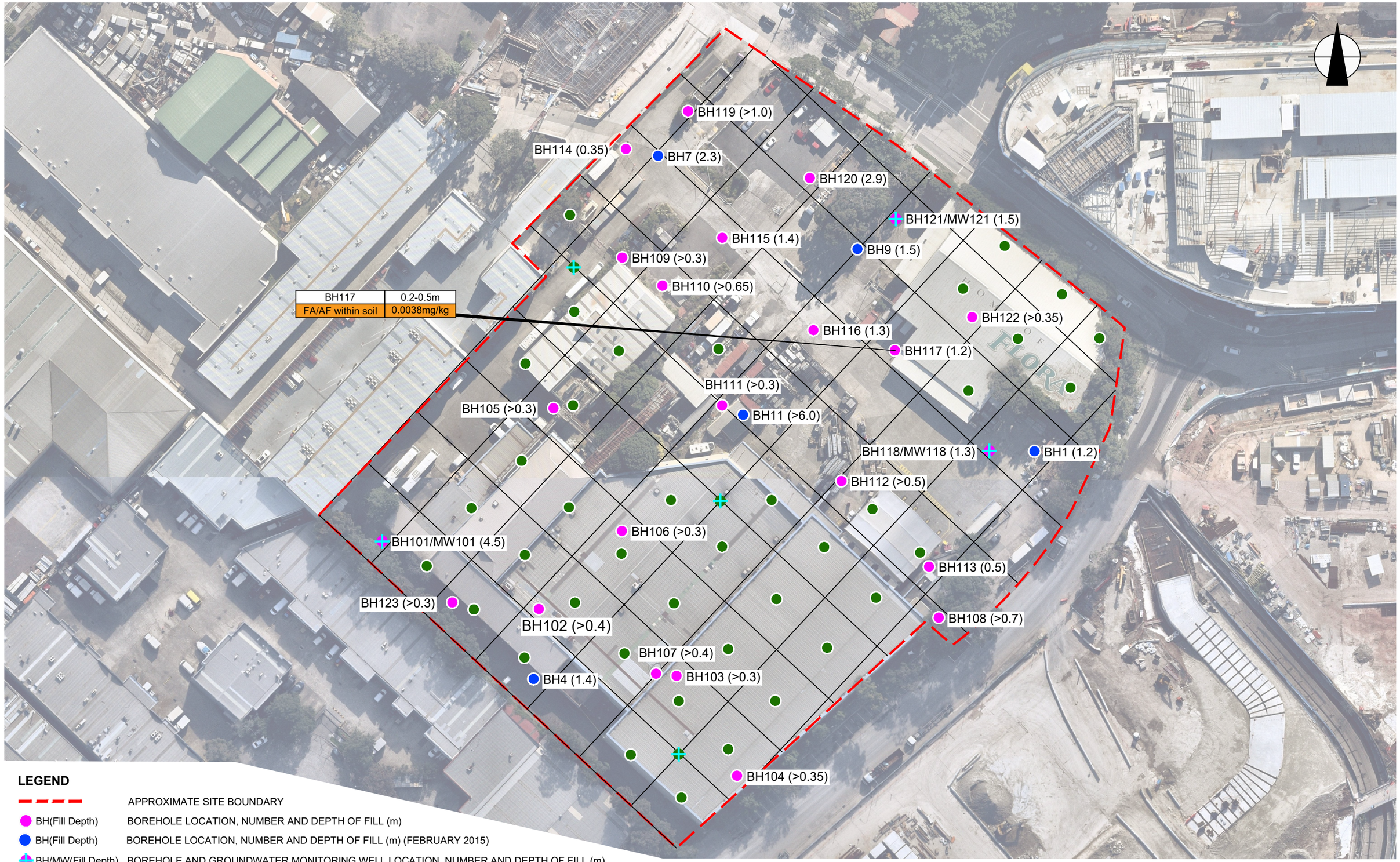
Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Project No: E33191B

Figure No: 3

JKEnvironments

PLOT DATE: 3/09/2020 11:41:18 AM DWG FILE: Z:\5 EIS\5C EIS JOBS\33000'S\E33191B MARRICKVILLE\CAD\E33191B.DWG



LEGEND

- APPROXIMATE SITE BOUNDARY
- BH(Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- BH(Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (FEBRUARY 2015)
- BH/MW(Fill Depth) — BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION

SOIL/SURFACE SAMPLE EXCEEDANCE

- PRESENCE OF FA/AF WITHIN SOIL
- PROPOSED BOREHOLE LOCATION
- PROPOSED BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 10 20 30 40 50
SCALE 1:1000 @A3 METRES

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

Title: **PROPOSED POST DEMOLITION SAMPLE LOCATION PLAN**

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Project No: E33191B

Figure No: 4

JKEnvironments

PLOT DATE: 20/10/2021 4:20:46 PM DWG FILE: S:\5 EIS\5C EIS JOBS\33000'S\E33191B MARRICKVILLE\CAD\E33191B.DWG

Appendix B: Selected Development Plans

1 Ground
1 : 500

Area Schedule

Land Use	Area
CFC	60 m²
Commercial	7,973 m²
Core	154 m²
Office	445 m²
Plant	1,882 m²
Warehouse	25,215 m²
Grand total	35,728 m²

Client

Issue	Description	Date
P2	Issued for discussion	27.03.2020
P1	For Review	12.03.2020

Builder

Project Name
Warehouse Facility

Project Address
74 Edinburgh Road, Marrickville, NSW, 2204

Key Plan
0 10000 25000

Drawing Title:
Ground Floor Plan

Author: Min | Checker: DC | Sheet Size:

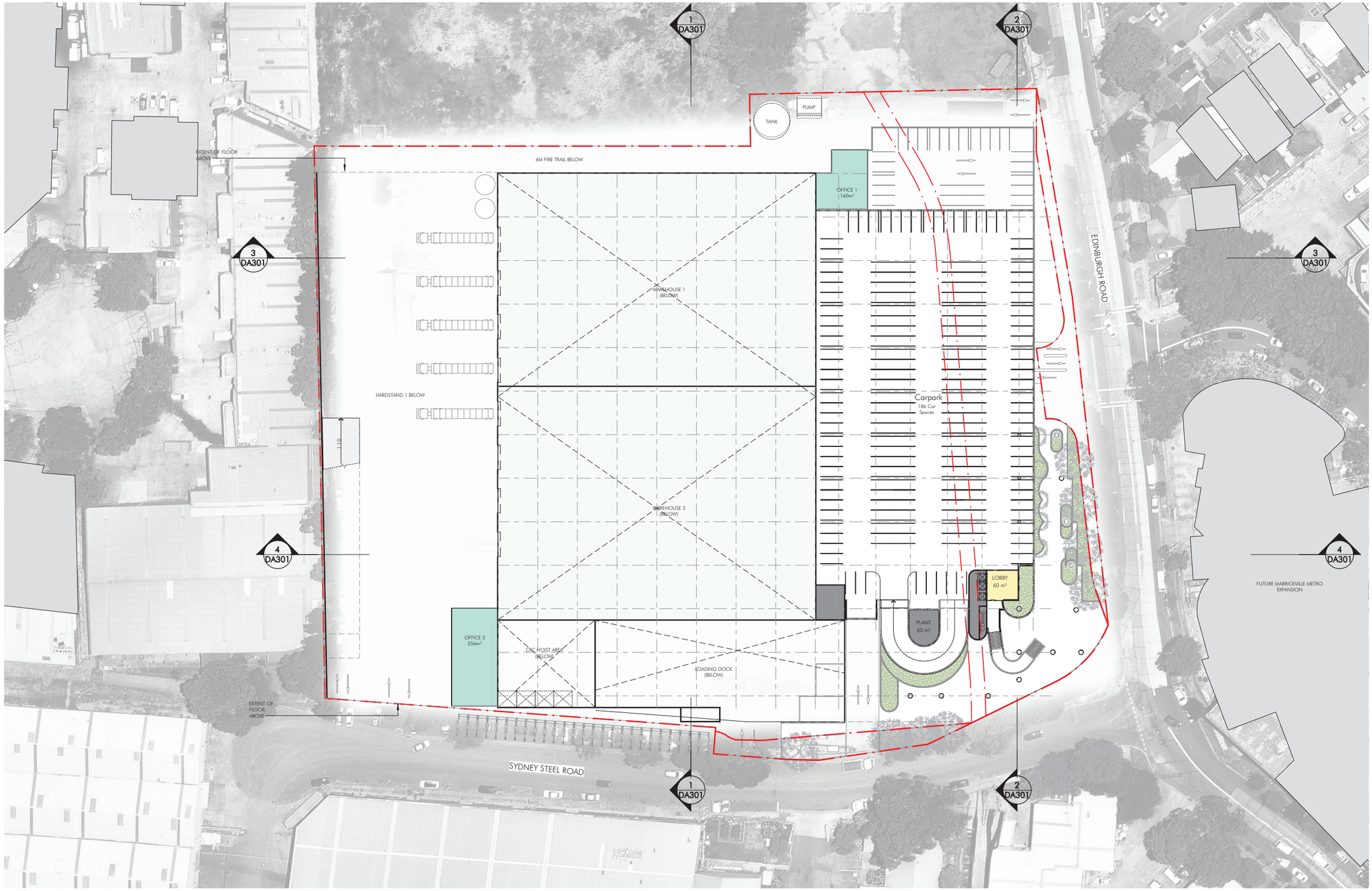
Scale: 1:500

Drawing Number: **10437_DA0101**

Issue: **P2**

nettletontribe

nettleton tribe partnership pty ltd ABN 58 161 683 122
117 Willoughby Road, Crows Nest, NSW 2065
t +61 2 9431 6431
e: sydney@nettletontribe.com.au w: nettletontribe.com.au



1 Level 1
1 : 500

Client

Issue	Description	Date
P2	Issued for discussion	27.03.2020
P1	For Review	12.03.2020

Builder

Project Name
Warehouse Facility

Project Address
74 Edinburgh Road, Marrickville, NSW, 2204

Key Plan
0 10000 25000

Drawing Title:
Level 1 Floor Plan

Author:	Checker:	Sheet Size:	Scale:
Min	DC	A1	1:500

Drawing Number: **10437_DA0102**
Issue: **P2**

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Area Schedule

Land Use	Area
CFC	60 m²
Commercial	7,973 m²
Core	154 m²
Office	445 m²
Plant	1,882 m²
Warehouse	25,215 m²
Grand total	35,728 m²

1 Level 2
1 : 500

Client

Issue	Description	Date
P2	Issued for discussion	27.03.2020
P1	For Review	12.03.2020

Builder

Project Name
Warehouse Facility

Project Address
74 Edinburgh Road, Marrickville, NSW, 2204

Key Plan
0 10000 25000

Drawing Title:
Level 2 Floor Plan

Author:	Checker:	Sheet Size:	Scale:
DT	MSS / DC	A1	1:500

Drawing Number: **10437_DA0103**
Issue: **P2**

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1 Level 3
1 : 500

Area Schedule

Land Use	Area
CFC	60 m²
Commercial	7,973 m²
Core	154 m²
Office	445 m²
Plant	1,882 m²
Warehouse	25,215 m²
Grand total	35,728 m²

Client

Issue	Description	Date
P1	Issued for discussion	27.03.2020

Builder

Project Name
Warehouse Facility

Project Address
74 Edinburgh Road, Marrickville, NSW, 2204

Key Plan
0 10000 25000

Drawing Title:
Level 3 Floor Plan

Author:	Checker:	Sheet Size:	Scale:
DT	MSS / DC		

Drawing Number: **10437_DA0104**
Issue: **P1**

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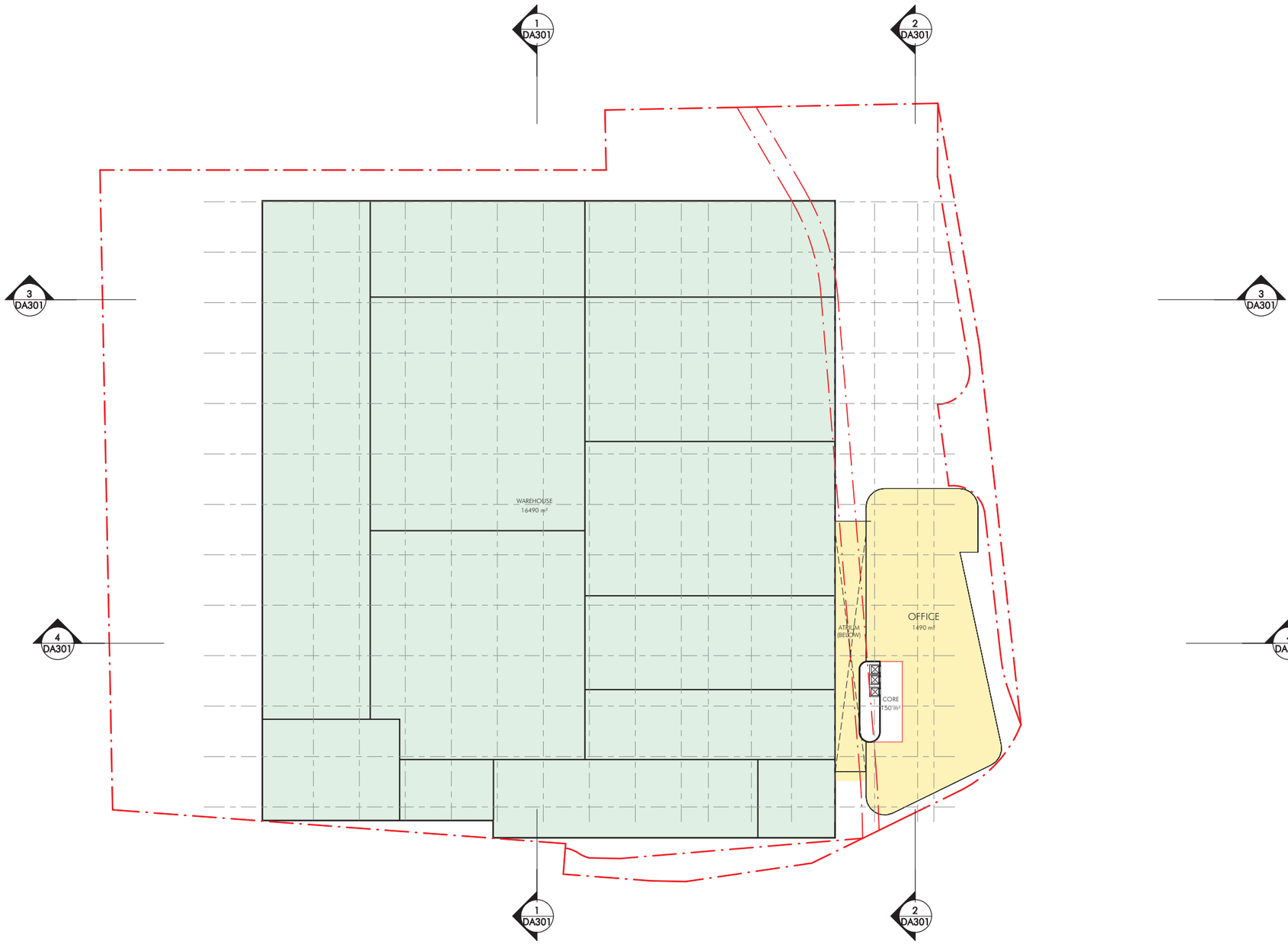

Area Schedule

Land Use	Area
CFC	60 m²
Commercial	7,973 m²
Core	154 m²
Office	445 m²
Plant	1,882 m²
Warehouse	25,215 m²
Grand total	35,728 m²

1 DA Level 4
1 : 500

Client

Issue	Description	Date
P1	Issued for discussion	27.03.2020

Builder

Project Name
Warehouse Facility

Project Address
74 Edinburgh Road, Marrickville, NSW, 2204

Key Plan
0 10000 25000

Drawing Title:
Level 4 Floor Plan

Author: DT
Checker: MSS / DC
Sheet Size:
Scale:
Drawing Number: **10437_DA0105**
Issue: **P1**

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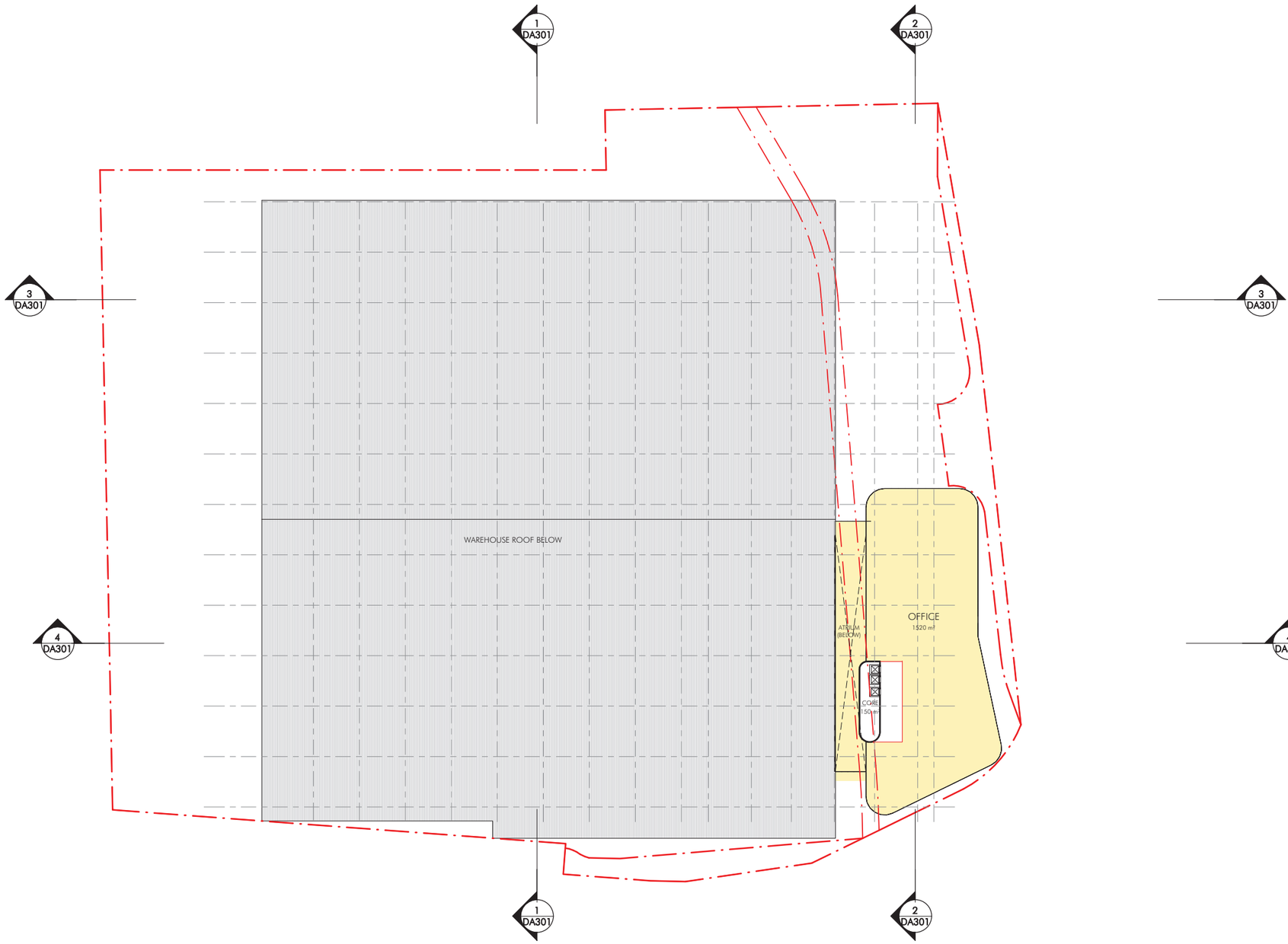

Area Schedule

Land Use	Area
CFC	60 m²
Commercial	7,973 m²
Core	154 m²
Office	445 m²
Plant	1,882 m²
Warehouse	25,215 m²
Grand total	35,728 m²

1 DA Level 5
1 : 500

Client

Issue	Description	Date
P1	Issued for discussion	27.03.2020

Builder

Project Name
Warehouse Facility

Project Address
74 Edinburgh Road, Marrickville, NSW, 2204

Key Plan
0 10000 25000

Drawing Title:
Level 5 Floor Plan

Author: DT
Checker: MSS / DC
Sheet Size:
Scale:
Drawing Number: **10437_DA0106**
Issue: **P1**

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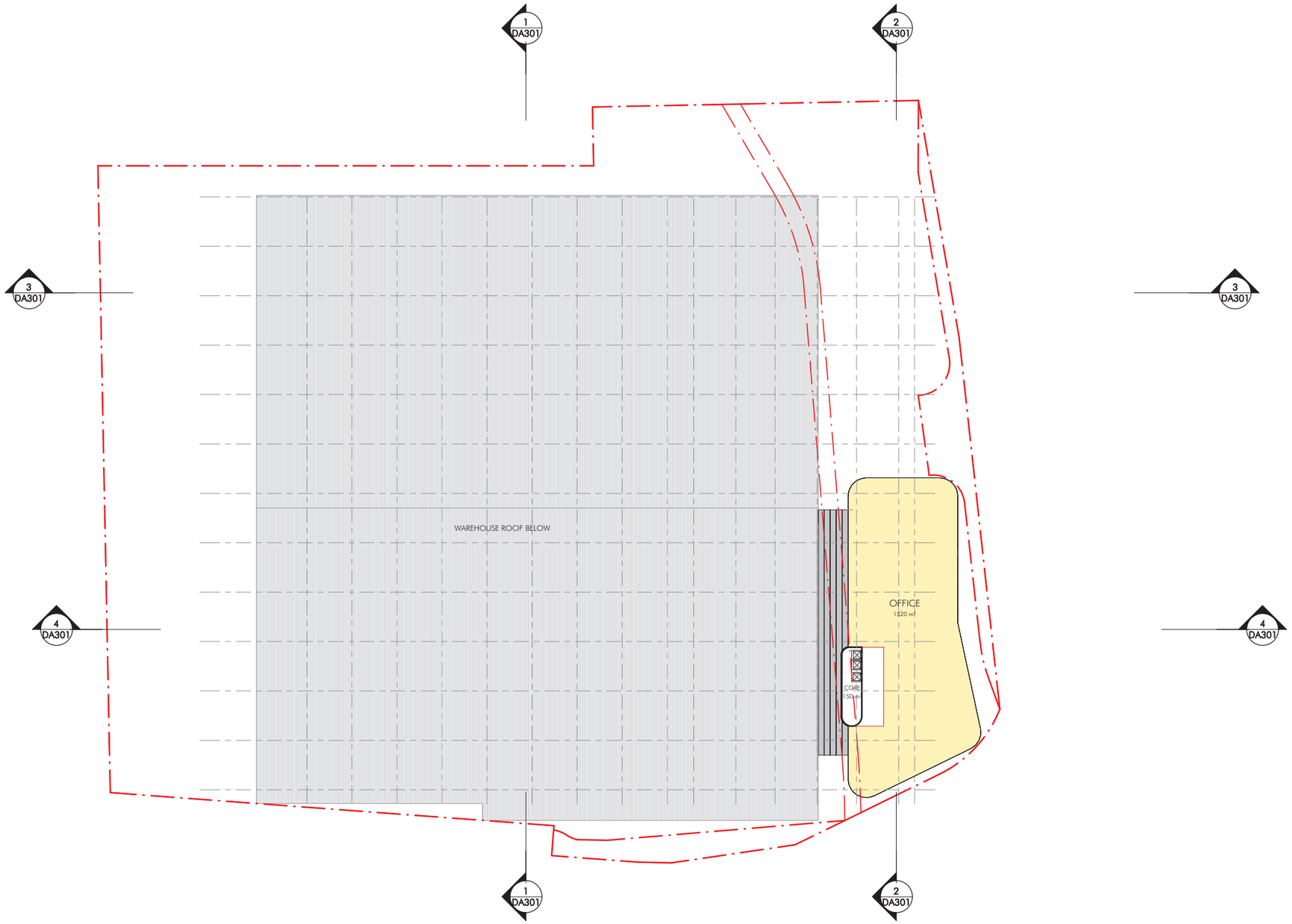

Area Schedule

Land Use	Area
CFC	60 m²
Commercial	7,973 m²
Core	154 m²
Office	445 m²
Plant	1,882 m²
Warehouse	25,215 m²
Grand total	35,728 m²

1 DA Level 6
1 : 500

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Client

Issue	Description	Date
P1	Issued for discussion	27.03.2020

Builder

Project Name
Warehouse Facility

Project Address
74 Edinburgh Road, Marrickville, NSW, 2204

Key Plan
0 10000 25000

Drawing Title:
Level 6 Floor Plan

Author: DT
Checker: MSS / DC
Sheet Size:
Scale:
Drawing Number: **10437_DA0107**
Issue: **P1**

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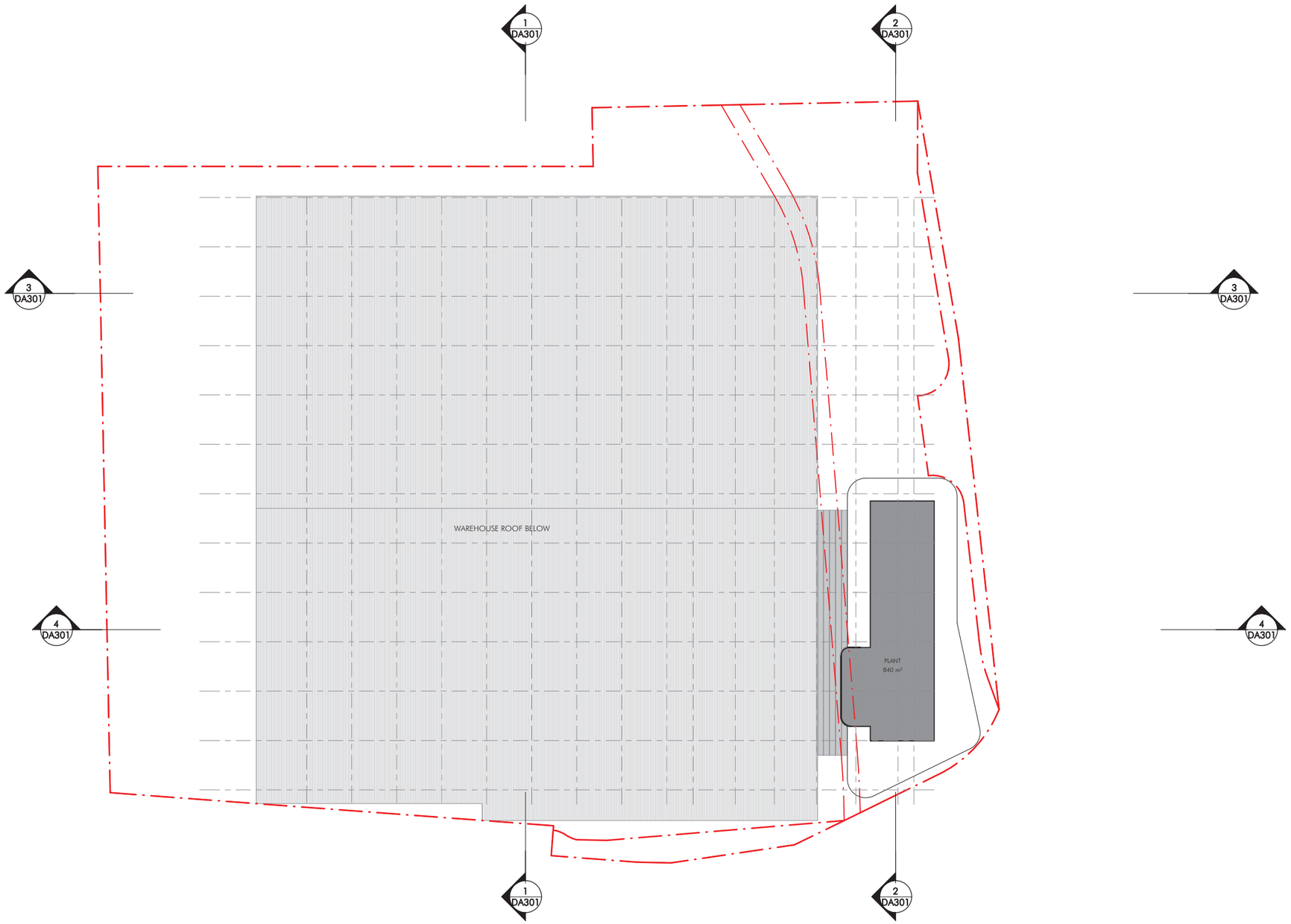

Area Schedule

Land Use	Area
CFC	60 m²
Commercial	7,973 m²
Core	154 m²
Office	445 m²
Plant	1,882 m²
Warehouse	25,215 m²
Grand total	35,728 m²

1 DA Plant
1 : 500

Client

Issue	Description	Date
P1	Issued for discussion	27.03.2020

Builder

Project Name
Warehouse Facility

Project Address
74 Edinburgh Road, Marrickville, NSW, 2204

Key Plan
0 2000 5000

Drawing Title:
Plant

Author: **Author** Checker: **Checker** Sheet Size: Scale:

Drawing Number: **10437_DA0109** Issue: **P1**

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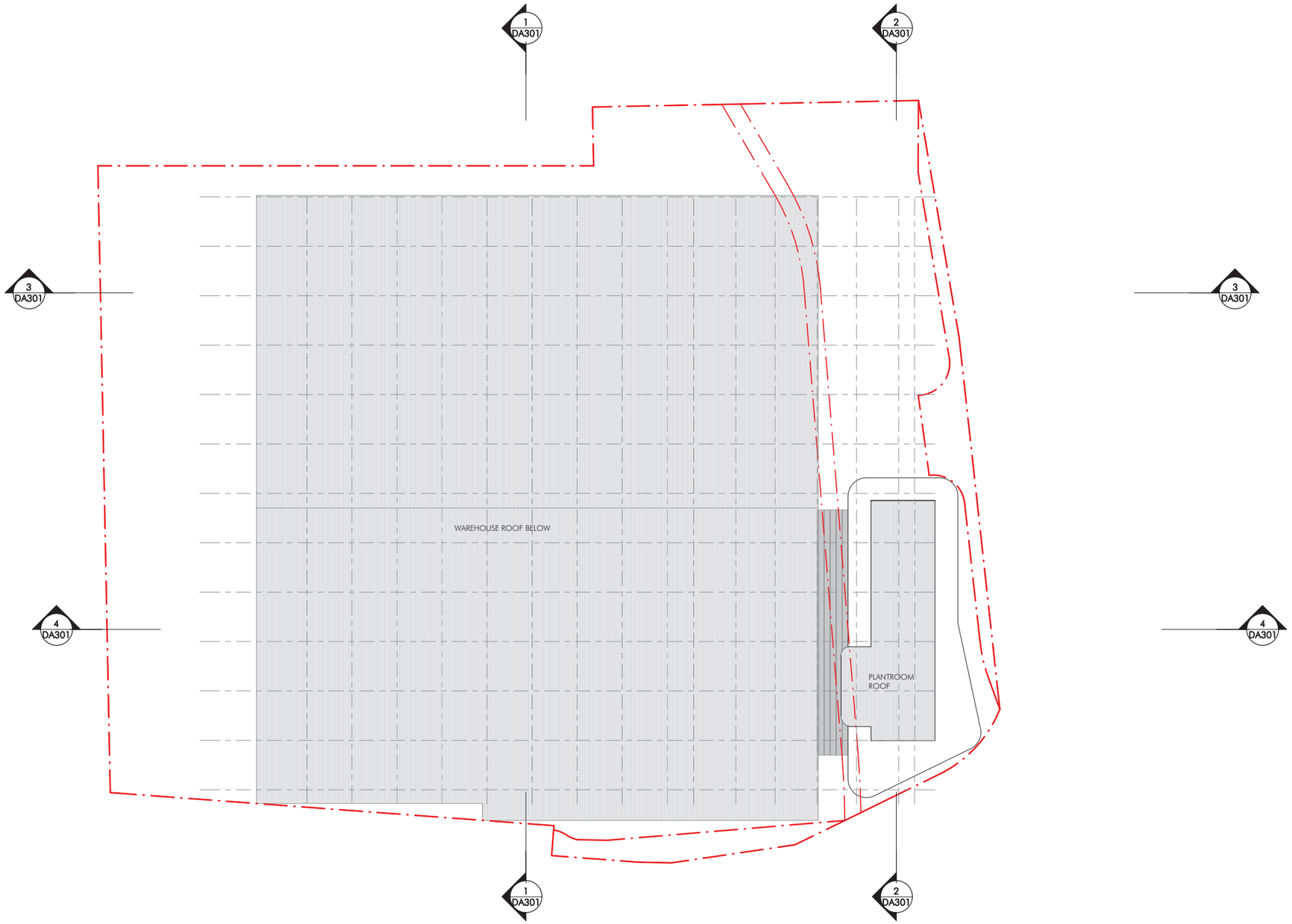

Area Schedule

Land Use	Area
CFC	60 m²
Commercial	7,973 m²
Core	154 m²
Office	445 m²
Plant	1,882 m²
Warehouse	25,215 m²
Grand total	35,728 m²

1 DA Roof
1 : 500

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Client

Issue	Description	Date
P1	Issued for discussion	27.03.2020

Builder

Project Name
Warehouse Facility

Project Address
74 Edinburgh Road, Marrickville, NSW, 2204

Key Plan
0 10000 25000

Drawing Title:
Roof Plan

Author: DT | Checker: MSS / DC | Sheet Size: A1 | Scale: 1:500

Drawing Number: **10437_DA110** | Issue: **P1**

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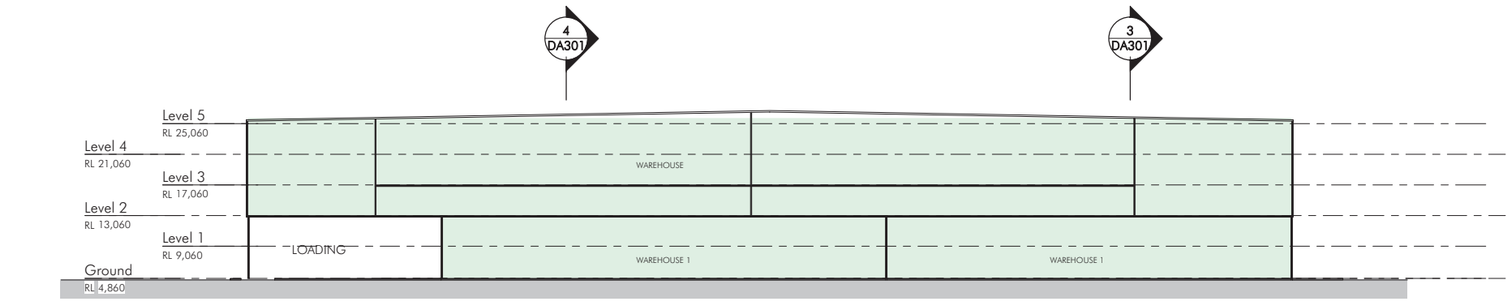

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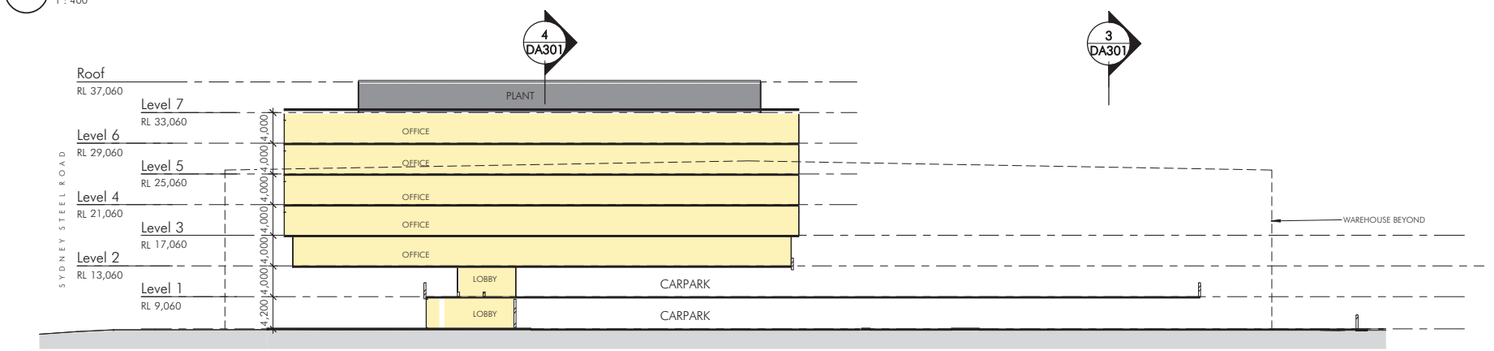
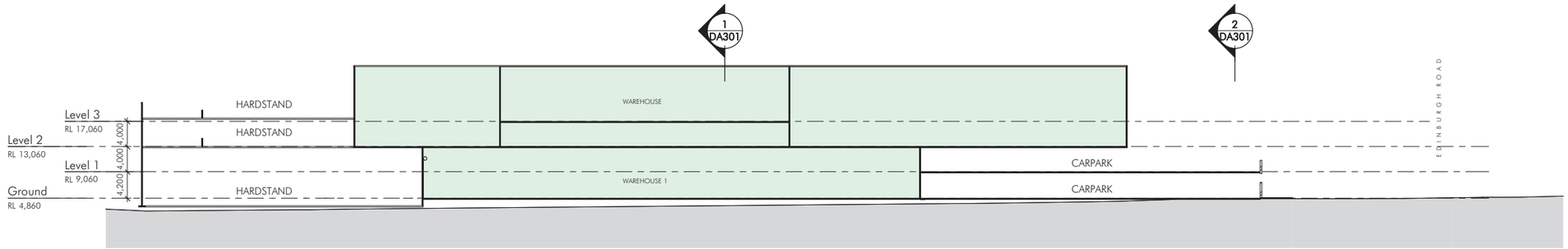
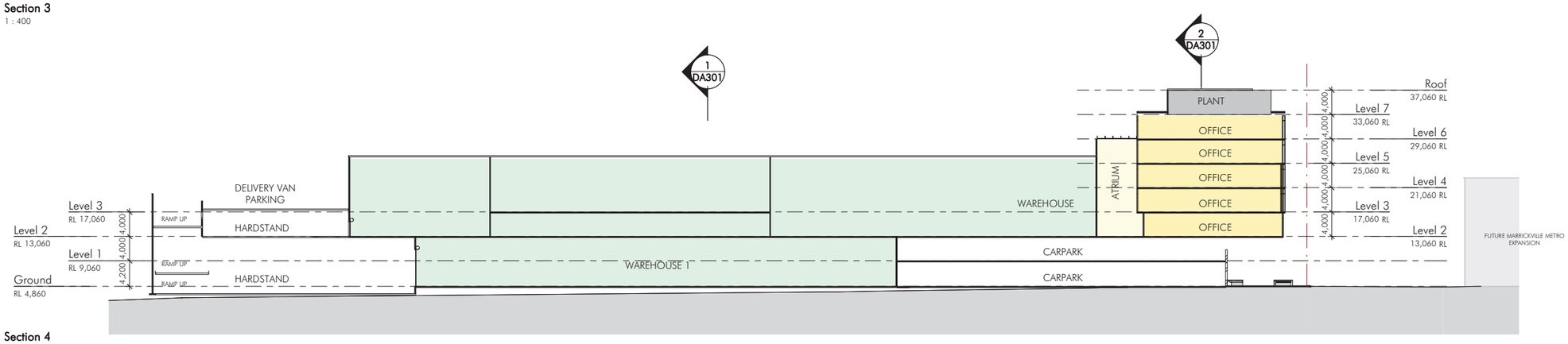


2 **Section 2**
1 : 400



3 **Section 3**
1 : 400



4 **Section 4**
1 : 400

Client

Issue	Description	Date
P1	Issued for discussion	27.03.2020

Builder

Project Name
Warehouse Facility

Project Address
74 Edinburgh Road, Marrickville, NSW, 2204

Key Plan
0 2000 5000

Drawing Title:
Sections

Author: DT
Checker: Checker
Sheet Size:
Scale:
Drawing Number: **10437_DA301**
Issue: **P1**

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Appendix C: Background Information

JKE DSI Data Summary Tables

JKEnvironments

TABLE S1
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013.
HIL-D: 'Commercial/Industrial'

All data in mg/kg unless stated otherwise			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium VI	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	Carcinogenic PAHs	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos		
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Site Assessment Criteria (SAC)			3000	900	3600	240000	1500	730	6000	400000	4000	40	80	2000	2500	45	530	3600	50	2000	7	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH101	0.5-0.95	Fill:Silty Sandy Clay	**4**	<0.4	**13**	**37**	**48**	<0.1	**8**	**61**	**0.3**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH101	1.5-1.95	Fill:Silty Sandy Clay	<4	<0.4	**5**	**17**	**31**	<0.1	**20**	**120**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH102	0.27-0.4	Fill: Silty Gravelly Sand	<4	<0.4	**8**	**85**	**2**	<0.1	**58**	**22**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH102 (Lab Du	0.27-0.4	Fill: Silty Gravelly Sand	<4	<0.4	**8**	**81**	**1**	<0.1	**58**	**24**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH103	0.14-0.3	Fill: Silty Gravelly Sand	<4	<0.4	**6**	**61**	**2**	<0.1	**49**	**22**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH104	0.2-0.35	Fill: Silty Gravelly Sand	<4	<0.4	**22**	**62**	**1**	<0.1	**79**	**32**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH105	0.19-0.3	Fill: Silty Sand Gravel	<4	<0.4	**14**	**68**	**61**	<0.1	**14**	**120**	**7.7**	**1.1**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH106	0.26-0.3	Fill: Silty Gravelly Sand	<4	<0.4	**9**	**97**	**3**	<0.1	**75**	**31**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH107	0.25-0.4	Fill: Silty Gravelly Sand	<4	<0.4	**15**	**68**	**3**	<0.1	**61**	**23**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH108	0-0.2	Fill: Silty Sand	<4	<0.4	**13**	**38**	**50**	<0.1	**9**	**240**	**4.3**	**0.6**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH108 (Lab Du	0-0.2	Fill: Silty Sand	<4	<0.4	**13**	**34**	**50**	**0.1**	**9**	**210**	**2**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH109	0.25-0.3	Fill: Silty Clay	<4	<0.4	**21**	**34**	**4**	<0.1	**89**	**39**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH110	0.37-0.65	Fill: Silty Clay	**7**	**1**	**34**	**470**	**1500**	**0.5**	**21**	**980**	**120**	**8.6**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH111	0.17-0.3	Fill: Silty Sand	<4	<0.4	**2**	**67**	**4**	<0.1	**2**	**16**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH112	0.4-0.5	Fill: Silty Clay	<4	<0.4	**20**	**33**	**72**	<0.1	**17**	**300**	**3.7**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH113	0.19-0.4	Fill: Silty Clay	**5**	<0.4	**9**	**30**	**13**	<0.1	**17**	**65**	**0.4**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH114	0.18-0.35	Fill: Silty Gravelly Sand	<4	<0.4	**37**	**120**	**360**	**0.2**	**45**	**310**	**25**	**1.9**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH115	0.21-0.4	Fill: Silty Sand	<4	<0.4	**7**	**34**	**11**	<0.1	**6**	**21**	**1.9**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH116	0.13-0.4	Fill: Silty Clay	<4	<0.4	**7**	**51**	**16**	<0.1	**5**	**82**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH117	0.2-0.5	Fill: Silty Sand	<4	<0.4	**10**	**20**	**32**	<0.1	**9**	**48**	**3.6**	**0.5**	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
BH118	0.6-0.9	Fill: Silty Clay	**5**	<0.4	**17**	**4**	**25**	<0.1	**4**	**8**	**0.62**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH119	0-0.2	Fill: Silty Sand	<4	**0.5**	**12**	**47**	**110**	<0.1	**10**	**240**	**0.9**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH120	0.04-0.3	Fill: Silty Clay	<4	<0.4	**16**	**27**	**64**	<0.1	**6**	**91**	**39**	**4.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH121	0.18-0.7	Fill: Silty Clay	<4	<0.4	**16**	**5**	**26**	<0.1	**2**	**10**	**1.1**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH122	0.14-0.25	Fill: Silty Sand	<4	<0.4	**5**	**4**	**7**	<0.1	**4**	**8**	**0.1**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH123	0.15-0.3	Fill: Silty Clay	<4	<0.4	**29**	**19**	**14**	<0.1	**34**	**44**	**0.1**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
SDUP1	-	Fill: Silty Sand	<4	**0.4**	**12**	**45**	**110**	<0.1	**10**	**230**	**1.1**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP2	-	Fill: Silty Clay	**5**	<0.4	**21**	**10**	**27**	<0.1	**3**	**23**	**1.8**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP4	-	Fill: Silty Sand	**5**	<0.4	**12**	**46**	**180**	**0.5**	**10**	**230**	**1.4**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP4 (Lab Du	-	Fill: Silty Sand	**11**	<0.4	**18**	**47**	**160**	**0.4**	**17**	**170**	**0.69**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
FCF1	Surface	Fragment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
Total Number of Samples			30	30	30	30	30	30	30	30	30	30	10	10	10	10	10	10	10	10	10	9
Maximum Value			11	1	37	470	1500	0.5	89	980	120	8.6	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	Detected

Concentration above the SAC **VALUE**
Concentration above the PQL **Bold**

TABLE S2
SOIL LABORATORY RESULTS COMPARED TO HSLs
All data in mg/kg unless stated otherwise

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Field PID Measurement
PQL - Envirolab Services					25	50	0.2	0.5	1	1	1	ppm
NEPM 2013 HSL Land Use Category					HSL-D: COMMERCIAL/INDUSTRIAL							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
BH101	0.5-0.95	Fill:Silty Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH101	1.5-1.95	Fill:Silty Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH102	0.27-0.4	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH102 (Lab Dupilcate)	0.27-0.4	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH103	0.14-0.3	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH104	0.2-0.35	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH105	0.19-0.3	Fill: Silty Sand Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH106	0.26-0.3	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH107	0.25-0.4	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH108	0-0.2	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH108 (Lab Duplicate)	0-0.2	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH109	0.25-0.3	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH110	0.37-0.65	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH111	0.17-0.3	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH112	0.4-0.5	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH113	0.19-0.4	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH114	0.18-0.35	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH115	0.21-0.4	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH116	0.13-0.4	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH117	0.2-0.5	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH118	0.6-0.9	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH119	0-0.2	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH120	0.04-0.3	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH121	0.18-0.7	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH122	0.14-0.25	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH123	0.15-0.3	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
SDUP1	-	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
SDUP2	-	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
SDUP4	-	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
SDUP4 (Lab Duplicate)	-	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
Total Number of Samples					30	30	30	30	30	30	30	26
Maximum Value					<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL

Concentration above the SAC — **VALUE**
Concentration above the PQL — **Bold**
The guideline corresponding to the concentration above the SAC is highlighted in grey in the Site Assessment Criteria Table below

HSL SOIL ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
BH101	0.5-0.95	Fill:Silty Sandy Clay	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH101	1.5-1.95	Fill:Silty Sandy Clay	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH102	0.27-0.4	Fill: Silty Gravelly Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH102 (Lab Dupilcate)	0.27-0.4	Fill: Silty Gravelly Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH103	0.14-0.3	Fill: Silty Gravelly Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH104	0.2-0.35	Fill: Silty Gravelly Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH105	0.19-0.3	Fill: Silty Sand Gravel	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH106	0.26-0.3	Fill: Silty Gravelly Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH107	0.25-0.4	Fill: Silty Gravelly Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH108	0-0.2	Fill: Silty Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH108 (Lab Duplicate)	0-0.2	Fill: Silty Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH109	0.25-0.3	Fill: Silty Clay	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH110	0.37-0.65	Fill: Silty Clay	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH111	0.17-0.3	Fill: Silty Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH112	0.4-0.5	Fill: Silty Clay	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH113	0.19-0.4	Fill: Silty Clay	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH114	0.18-0.35	Fill: Silty Gravelly Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH115	0.21-0.4	Fill: Silty Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH116	0.13-0.4	Fill: Silty Clay	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH117	0.2-0.5	Fill: Silty Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH118	0.6-0.9	Fill: Silty Clay	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH119	0-0.2	Fill: Silty Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH120	0.04-0.3	Fill: Silty Clay	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH121	0.18-0.7	Fill: Silty Clay	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH122	0.14-0.25	Fill: Silty Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH123	0.15-0.3	Fill: Silty Clay	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
SDUP1	-	Fill: Silty Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
SDUP2	-	Fill: Silty Clay	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
SDUP4	-	Fill: Silty Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
SDUP4 (Lab Duplicate)	-	Fill: Silty Sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL

TABLE S3
SOIL LABORATORY RESULTS COMPARED TO MANAGEMENT LIMITS
All data in mg/kg unless stated otherwise

			C_6-C_{10} (F1) plus BTEX	$>C_{10}$-C_{16} (F2) plus napthalene	$>C_{16}$-C_{34} (F3)	$>C_{34}$-C_{40} (F4)
PQL - Envirolab Services			25	50	100	100
NEPM 2013 Land Use Category			**COMMERCIAL/INDUSTRIAL**			
Sample Reference	**Sample Depth**	**Soil Texture**				
BH101	0.5-0.95	Coarse	<25	<50	<100	<100
BH101	1.5-1.95	Coarse	<25	<50	<100	<100
BH102	0.27-0.4	Coarse	<25	<50	<100	<100
BH102 (Lab Dupilcate)	0.27-0.4	Coarse	<25	<50	<100	<100
BH103	0.14-0.3	Coarse	<25	<50	<100	<100
BH104	0.2-0.35	Coarse	<25	<50	<100	<100
BH105	0.19-0.3	Coarse	<25	<50	**320**	**110**
BH106	0.26-0.3	Coarse	<25	<50	<100	<100
BH107	0.25-0.4	Coarse	<25	<50	<100	<100
BH108	0-0.2	Coarse	<25	<50	**240**	<100
BH108 (Lab Duplicate)	0-0.2	Coarse	<25	<50	**250**	<100
BH109	0.25-0.3	Coarse	<25	<50	<100	<100
BH110	0.37-0.65	Coarse	<25	<50	**690**	<100
BH111	0.17-0.3	Coarse	<25	<50	<100	<100
BH112	0.4-0.5	Coarse	<25	<50	<100	<100
BH113	0.19-0.4	Coarse	<25	<50	<100	<100
BH114	0.18-0.35	Coarse	<25	<50	**230**	<100
BH115	0.21-0.4	Coarse	<25	<50	<100	<100
BH116	0.13-0.4	Coarse	<25	<50	<100	<100
BH117	0.2-0.5	Coarse	<25	<50	**100**	<100
BH118	0.6-0.9	Coarse	<25	<50	<100	<100
BH119	0-0.2	Coarse	<25	<50	**140**	<100
BH120	0.04-0.3	Coarse	<25	<50	<100	<100
BH121	0.18-0.7	Coarse	<25	<50	<100	<100
BH122	0.14-0.25	Coarse	<25	<50	<100	<100
BH123	0.15-0.3	Coarse	<25	<50	<100	<100
SDUP1	-	Coarse	<25	<50	**130**	<100
SDUP2	-	Coarse	<25	<50	<100	<100
SDUP4	-	Coarse	<25	<50	**290**	**100**
SDUP4 (Lab Duplicate)	-	Coarse	<25	<50	**240**	<100
Total Number of Samples			30	30	30	30
Maximum Value			<PQL	<PQL	690	110

Concentration above the SAC **VALUE**
Concentration above the PQL **Bold**

MANAGEMENT LIMIT ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Soil Texture**	C_6-C_{10} (F1) plus BTEX	$>C_{10}$-C_{16} (F2) plus napthalene	$>C_{16}$-C_{34} (F3)	$>C_{34}$-C_{40} (F4)
BH101	0.5-0.95	Coarse	700	1000	3500	10000
BH101	1.5-1.95	Coarse	700	1000	3500	10000
BH102	0.27-0.4	Coarse	700	1000	3500	10000
BH102 (Lab Dupilcate)	0.27-0.4	Coarse	700	1000	3500	10000
BH103	0.14-0.3	Coarse	700	1000	3500	10000
BH104	0.2-0.35	Coarse	700	1000	3500	10000
BH105	0.19-0.3	Coarse	700	1000	3500	10000
BH106	0.26-0.3	Coarse	700	1000	3500	10000
BH107	0.25-0.4	Coarse	700	1000	3500	10000
BH108	0-0.2	Coarse	700	1000	3500	10000
BH108 (Lab Duplicate)	0-0.2	Coarse	700	1000	3500	10000
BH109	0.25-0.3	Coarse	700	1000	3500	10000
BH110	0.37-0.65	Coarse	700	1000	3500	10000
BH111	0.17-0.3	Coarse	700	1000	3500	10000
BH112	0.4-0.5	Coarse	700	1000	3500	10000
BH113	0.19-0.4	Coarse	700	1000	3500	10000
BH114	0.18-0.35	Coarse	700	1000	3500	10000
BH115	0.21-0.4	Coarse	700	1000	3500	10000
BH116	0.13-0.4	Coarse	700	1000	3500	10000
BH117	0.2-0.5	Coarse	700	1000	3500	10000
BH118	0.6-0.9	Coarse	700	1000	3500	10000
BH119	0-0.2	Coarse	700	1000	3500	10000
BH120	0.04-0.3	Coarse	700	1000	3500	10000
BH121	0.18-0.7	Coarse	700	1000	3500	10000
BH122	0.14-0.25	Coarse	700	1000	3500	10000
BH123	0.15-0.3	Coarse	700	1000	3500	10000
SDUP1	-	Coarse	700	1000	3500	10000
SDUP2	-	Coarse	700	1000	3500	10000
SDUP4	-	Coarse	700	1000	3500	10000
SDUP4 (Lab Duplicate)	-	Coarse	700	1000	3500	10000

JKEnvironments

TABLE S4
SOIL LABORATORY RESULTS COMPARED T0 DIRECT CONTACT CRITERIA
All data in mg/kg unless stated otherwise

Analyte		C_6-C_{10}	>C_{10}-C_{16}	>C_{16}-C_{34}	>C_{34}-C_{40}	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID
PQL - Envirolab Services		25	50	100	100	0.2	0.5	1	1	1	
CRC 2011 -Direct contact Criteria		26,000	20,000	27,000	38,000	430	99,000	27,000	81,000	11,000	
Site Use		**COMMERCIAL/INDUSTRIAL - DIRECT SOIL CONTACT**									
Sample Reference	**Sample Depth**										
BH101	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH101	1.5-1.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH102	0.27-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH102 (Lab Dupilcate)	0.27-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH103	0.14-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH104	0.2-0.35	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH105	0.19-0.3	<25	<50	**320**	**110**	<0.2	<0.5	<1	<3	<1	0
BH106	0.26-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH107	0.25-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH108	0-0.2	<25	<50	**240**	<100	<0.2	<0.5	<1	<3	<1	0
BH108 (Lab Duplicate)	0-0.2	<25	<50	**250**	<100	<0.2	<0.5	<1	<3	<1	0
BH109	0.25-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH110	0.37-0.65	<25	<50	**690**	<100	<0.2	<0.5	<1	<3	<1	0
BH111	0.17-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH112	0.4-0.5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH113	0.19-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH114	0.18-0.35	<25	<50	**230**	<100	<0.2	<0.5	<1	<3	<1	0
BH115	0.21-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH116	0.13-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH117	0.2-0.5	<25	<50	**100**	<100	<0.2	<0.5	<1	<3	<1	0
BH118	0.6-0.9	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH119	0-0.2	<25	<50	**140**	<100	<0.2	<0.5	<1	<3	<1	0
BH120	0.04-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH121	0.18-0.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH122	0.14-0.25	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH123	0.15-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
SDUP1	-	<25	<50	**130**	<100	<0.2	<0.5	<1	<3	<1	NA
SDUP2	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	NA
SDUP4	-	<25	<50	**290**	**100**	<0.2	<0.5	<1	<3	<1	NA
SDUP4 (Lab Duplicate)	-	<25	<50	**240**	<100	<0.2	<0.5	<1	<3	<1	NA
Total Number of Samples		30	30	30	30	30	30	30	30	30	26
Maximum Value		<PQL	<PQL	690	110	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL

Concentration above the SAC **VALUE**
Concentration above the PQL **Bold**

TABLE S5
ASBESTOS QUANTIFICATION - FIELD OBSERVATIONS AND LABORATORY RESULTS
HSL-A: Residential with garden/accessible soils; children's day care centers; preschools; and primary schools HIL-D:Commercial/Industrial

FIELD DATA															LABORATORY DATA											
Date Sampled	Sample reference	Sample Depth	Visible ACM in top 100mm	Approx. Volume of Soil (L)	Soil Mass (g)	Mass ACM (g)	Mass Asbestos in ACM (g)	[Asbestos from ACM in soil] (%w/w)	Mass ACM <7mm (g)	Mass Asbestos in ACM <7mm (g)	[Asbestos from ACM <7mm in soil] (%w/w)	Mass FA (g)	Mass Asbestos in FA (g)	[Asbestos from FA in soil] (%w/w)	Lab Report Number	Sample refeference	Sample Depth	Sample Mass (g)	Asbestos ID in soil (AS4964) >0.1g/kg	Trace Analysis	Total Asbestos (g/kg)	Asbestos ID in soil <0.1g/kg	ACM >7mm Estimation (g)	FA and AF Estimation (g)	ACM >7mm Estimation %(w/w)	FA and AF Estimatio n %(w/w)
SAC			**No**					**0.05**			**0.001**			**0.001**											**0.05**	**0.001**
13.8.20	BH101	0.5-1.5	NA	10	6,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14.8.20	BH108	0-0.2	No	10	9,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	249404	BH108	0-0.2	443.98	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected: Synthetic mineral fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
14.8.20	BH109	0-0.25	No	10	11,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14.8.20	BH111	0.17-0.3	NA	10	1,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14.8.20	BH112	0.19-0.4	NA	10	2,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14.8.20	BH113	0.19-0.5	NA	10	2,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	249404	BH113	0.19-0.4	886.77	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected: Synthetic mineral fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
14.8.20	BH114	0.18-0.35	NA	10	2,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13.8.20	BH115	0.4-0.6	NA	10	6,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13.8.20	BH116	0.13-0.7	NA	10	6,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	249404	BH116	0.13-0.4	514.34	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
13.8.20	BH116	0.7-1.3	NA	10	6,300	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13.8.20	BH117	0.2-1.0	NA	10	10,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	249404	BH117	0.2-0.5	705.17	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	Chrysotile	–	0.0038	<0.01	<0.001
13.8.20	BH117	1.0-1.2	NA	10	2,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13.8.20	BH118	0.6-1.3	NA	10	11,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	249404	BH118	0.6-0.9	551.44	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
12.8.20	BH119	0-0.6	No	10	3,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13.8.20	BH120	0.04-0.6	No	10	6,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	249404	BH120	0.04-0.3	585.74	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
13.8.20	BH120	0.6-1.0	NA	10	3,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13.8.20	BH121	0.18-1.0	NA	10	3,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13.8.20	BH121	1.0-1.5	NA	10	4,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	249404	BH122	0.14-0.25	872.21	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	249404	BH123	0.15-0.3	673.82	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001

Concentration above the SAC **VALUE**

TABLE S6
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013 EILs AND ESLs
All data in mg/kg unless stated otherwise

Land Use Category				COMMERCIAL/INDUSTRIAL																		
							AGED HEAVY METALS-EILs						EILs		ESLs							
				pH	CEC (cmolc/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	1	0.1	25	50	100	100	0.2	0.5	1	1	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																			
BH101	0.5-0.95	Fill:Silty Sandy Clay	Coarse	**8.35**	**32**	NA	**4**	**13**	**37**	**48**	**8**	**61**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH101	1.5-1.95	Fill:Silty Sandy Clay	Coarse	**8.35**	**32**	NA	<4	**5**	**17**	**31**	**20**	**120**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH102	0.27-0.4	Fill: Silty Gravelly Sand	Coarse	**8.35**	**32**	NA	<4	**8**	**85**	**2**	**58**	**22**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH102 (Lab Dupilcate)	0.27-0.4	Fill: Silty Gravelly Sand	Coarse	**8.35**	**32**	NA	<4	**8**	**81**	**1**	**58**	**24**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH103	0.14-0.3	Fill: Silty Gravelly Sand	Coarse	**8.35**	**32**	NA	<4	**6**	**61**	**2**	**49**	**22**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH104	0.2-0.35	Fill: Silty Gravelly Sand	Coarse	**8.35**	**32**	NA	<4	**22**	**62**	**1**	**79**	**32**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH105	0.19-0.3	Fill: Silty Sand Gravel	Coarse	**8.35**	**32**	NA	<4	**14**	**68**	**61**	**14**	**120**	<1	NA	<25	<50	**320**	**110**	<0.2	<0.5	<1	<3	**0.78**
BH106	0.26-0.3	Fill: Silty Gravelly Sand	Coarse	**8.35**	**32**	NA	<4	**9**	**97**	**3**	**75**	**31**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH107	0.25-0.4	Fill: Silty Gravelly Sand	Coarse	**8.35**	**32**	NA	<4	**15**	**68**	**3**	**61**	**23**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH108	0-0.2	Fill: Silty Sand	Coarse	**8.35**	**32**	NA	<4	**13**	**38**	**50**	**9**	**240**	<1	<0.1	<25	<50	**240**	<100	<0.2	<0.5	<1	<3	**0.4**
BH108 (Lab Duplicate)	0-0.2	Fill: Silty Sand	Coarse	**8.35**	**32**	NA	<4	**13**	**34**	**50**	**9**	**210**	<1	<0.1	<25	<50	**250**	<100	<0.2	<0.5	<1	<3	**0.2**
BH109	0.25-0.3	Fill: Silty Clay	Coarse	**8.35**	**32**	NA	<4	**21**	**34**	**4**	**89**	**39**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH110	0.37-0.65	Fill: Silty Clay	Coarse	**7.7**	**30**	NA	**7**	**34**	**470**	**1500**	**21**	**980**	<1	NA	<25	<50	**690**	<100	<0.2	<0.5	<1	<3	**6.2**
BH111	0.17-0.3	Fill: Silty Sand	Coarse	**8.35**	**32**	NA	<4	**2**	**67**	**4**	**2**	**16**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH112	0.4-0.5	Fill: Silty Clay	Coarse	**8.35**	**32**	NA	<4	**20**	**33**	**72**	**17**	**300**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.2**
BH113	0.19-0.4	Fill: Silty Clay	Coarse	**8.35**	**32**	NA	**5**	**9**	**30**	**13**	**17**	**65**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH114	0.18-0.35	Fill: Silty Gravelly Sand	Coarse	**9**	**34**	NA	<4	**37**	**120**	**360**	**45**	**310**	<1	NA	<25	<50	**230**	<100	<0.2	<0.5	<1	<3	**1.4**
BH115	0.21-0.4	Fill: Silty Sand	Coarse	**8.35**	**32**	NA	<4	**7**	**34**	**11**	**6**	**21**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.2**
BH116	0.13-0.4	Fill: Silty Clay	Coarse	**8.35**	**32**	NA	<4	**7**	**51**	**16**	**5**	**82**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH117	0.2-0.5	Fill: Silty Sand	Coarse	**8.35**	**32**	NA	<4	**10**	**20**	**32**	**9**	**48**	<1	NA	<25	<50	**100**	<100	<0.2	<0.5	<1	<3	**0.4**
BH118	0.6-0.9	Fill: Silty Clay	Coarse	**8.35**	**32**	NA	**5**	**17**	**4**	**25**	**4**	**8**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.08**
BH119	0-0.2	Fill: Silty Sand	Coarse	**8.35**	**32**	NA	<4	**12**	**47**	**110**	**10**	**240**	<1	NA	<25	<50	**140**	<100	<0.2	<0.5	<1	<3	**0.1**
BH120	0.04-0.3	Fill: Silty Clay	Coarse	**8.35**	**32**	NA	<4	**16**	**27**	**64**	**6**	**91**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**3**
BH121	0.18-0.7	Fill: Silty Clay	Coarse	**8.35**	**32**	NA	<4	**16**	**5**	**26**	**2**	**10**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.2**
BH122	0.14-0.25	Fill: Silty Sand	Coarse	**8.35**	**32**	NA	<4	**5**	**4**	**7**	**4**	**8**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH123	0.15-0.3	Fill: Silty Clay	Coarse	**8.35**	**32**	NA	<4	**29**	**19**	**14**	**34**	**44**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
SDUP1	-	Fill: Silty Sand	Coarse	**8.35**	**32**	NA	<4	**12**	**45**	**110**	**10**	**230**	<1	NA	<25	<50	**130**	<100	<0.2	<0.5	<1	<3	**0.2**
SDUP2	-	Fill: Silty Clay	Coarse	**8.35**	**32**	NA	**5**	**21**	**10**	**27**	**3**	**23**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.16**
SDUP4	-	Fill: Silty Sand	Coarse	**8.35**	**32**	NA	**5**	**12**	**46**	**180**	**10**	**230**	<1	<0.1	<25	<50	**290**	**100**	<0.2	<0.5	<1	<3	**0.09**
SDUP4 (Lab Duplicate)	-	Fill: Silty Sand	Coarse	**8.35**	**32**	NA	**11**	**18**	**47**	**160**	**17**	**170**	<1	<0.1	<25	<50	**240**	<100	<0.2	<0.5	<1	<3	**0.1**
Total Number of Samples				30	30	0	30	30	30	30	30	30	30	10	30	30	30	30	30	30	30	30	30
Maximum Value				9	34	NA	11	37	470	1500	89	980	<PQL	<PQL	<PQL	<PQL	690	110	<PQL	<PQL	<PQL	<PQL	6.2

Concentration above the SAC **VALUE**
Concentration above the PQL **Bold**
The guideline corresponding to the elevated value is highlighted in grey in the EIL and ESL Assessment Criteria Table below

EIL AND ESL ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**	pH	CEC (cmolc/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
BH101	0.5-0.95	Fill:Silty Sandy Clay	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH101	1.5-1.95	Fill:Silty Sandy Clay	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH102	0.27-0.4	Fill: Silty Gravelly Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	640	215	170	1700	3300	75	135	165	180	72
BH102 (Lab Dupilcate)	0.27-0.4	Fill: Silty Gravelly Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	640	215	170	1700	3300	75	135	165	180	72
BH103	0.14-0.3	Fill: Silty Gravelly Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	640	215	170	1700	3300	75	135	165	180	72
BH104	0.2-0.35	Fill: Silty Gravelly Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	640	215	170	1700	3300	75	135	165	180	72
BH105	0.19-0.3	Fill: Silty Sand Gravel	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH106	0.26-0.3	Fill: Silty Gravelly Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	640	215	170	1700	3300	75	135	165	180	72
BH107	0.25-0.4	Fill: Silty Gravelly Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH108	0-0.2	Fill: Silty Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	640	215	170	1700	3300	75	135	165	180	72
BH108 (Lab Duplicate)	0-0.2	Fill: Silty Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	640	215	170	1700	3300	75	135	165	180	72
BH109	0.25-0.3	Fill: Silty Clay	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH110	0.37-0.65	Fill: Silty Clay	Coarse	7.7	30	NA	160	320	350	2000	600	1600	370	--	215	170	1700	3300	75	135	165	180	72
BH111	0.17-0.3	Fill: Silty Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH112	0.4-0.5	Fill: Silty Clay	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH113	0.19-0.4	Fill: Silty Clay	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH114	0.18-0.35	Fill: Silty Gravelly Sand	Coarse	9	34	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH115	0.21-0.4	Fill: Silty Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH116	0.13-0.4	Fill: Silty Clay	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH117	0.2-0.5	Fill: Silty Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH118	0.6-0.9	Fill: Silty Clay	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH119	0-0.2	Fill: Silty Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH120	0.04-0.3	Fill: Silty Clay	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH121	0.18-0.7	Fill: Silty Clay	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
BH122	0.14-0.25	Fill: Silty Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	640	215	170	1700	3300	75	135	165	180	72
BH123	0.15-0.3	Fill: Silty Clay	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
SDUP1	-	Fill: Silty Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
SDUP2	-	Fill: Silty Clay	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	--	215	170	1700	3300	75	135	165	180	72
SDUP4	-	Fill: Silty Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	640	215	170	1700	3300	75	135	165	180	72
SDUP4 (Lab Duplicate)	-	Fill: Silty Sand	Coarse	8.35	32	NA	160	320	360	2000	740	2000	370	640	215	170	1700	3300	75	135	165	180	72

TABLE S7

SOIL LABORATORY TCLP RESULTS

All data in mg/L unless stated otherwise

			Arsenic	Cadmium	Chromium	Lead	Mercury	Nickel	B(a)P
PQL - Envirolab Services			0.05	0.01	0.01	0.03	0.0005	0.02	0.001
TCLP1 - General Solid Waste			5	1	5	5	0.2	2	0.04
TCLP2 - Restricted Solid Waste			20	4	20	20	0.8	8	0.16
TCLP3 - Hazardous Waste			>20	>4	>20	>20	>0.8	>8	>0.16
Sample Reference	**Sample Depth**	**Sample Description**							
BH109	0.25-0.3	Fill: Silty Clay	NA	NA	NA	NA	NA	**0.1**	NA
BH110	0.37-0.65	Fill: Silty Clay	NA	NA	NA	**4.5**	NA	NA	<0.001
Total Number of samples			0	0	0	1	0	1	1
Maximum Value			NA	NA	NA	4.50	NA	0.1	<PQL

General Solid Waste	**VALUE**
Restricted Solid Waste	**VALUE**
Hazardous Waste	**VALUE**
Concentration above PQL	**Bold**

TABLE G1
SUMMARY OF GROUNDWATER LABORATORY RESULTS COMPARED TO ECOLOGICAL GILs SAC
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	ANZG 2018 Fresh Waters	SAMPLES					
			MW101	MW101 (Lab Duplicate)	MW118	MW121	WDUP1	WDUP2
Metals and Metalloids								
Arsenic (As III)	1	24	<1	[NT]	<1	<1	<1	<1
Cadmium	0.1	0.2	<0.1	[NT]	<0.1	<0.1	<0.1	<0.2
Chromium (SAC for Cr III adopted)	1	3.3	<1	[NT]	<1	<1	<1	<1
Copper	1	1.4	<1	[NT]	**7**	**1**	**7**	<1
Lead	1	3.4	<1	[NT]	<1	<1	<1	<1
Total Mercury (inorganic)	0.05	0.06	<0.05	<0.05	<0.05	**0.07**	<0.05	<1
Nickel	1	11	**1**	[NT]	**3**	**6**	**3**	**6**
Zinc	1	8	**6**	[NT]	**11**	**42**	**11**	<0.05
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)								
Benzene	1	950	<1	<1	<1	<1	<1	<1
Toluene	1	180	<1	<1	<1	<1	<1	<1
Ethylbenzene	1	80	<1	<1	<1	<1	<1	<1
m+p-xylene	2	75	<2	<2	<2	<2	<2	<2
o-xylene	1	350	<1	<1	<1	<1	<1	<1
Total xylenes	2	NSL	<2	<2	<2	<2	<2	<2
Volatile Organic Compounds (VOCs), including chlorinated VOCs								
Dichlorodifluoromethane	10	NSL	<10	<10	<10	<10	<10	<10
Chloromethane	10	NSL	<10	<10	<10	<10	<10	<10
Vinyl Chloride	10	100	<10	<10	<10	<10	<10	<10
Bromomethane	10	NSL	<10	<10	<10	<10	<10	<10
Chloroethane	10	NSL	<10	<10	<10	<10	<10	<10
Trichlorofluoromethane	10	NSL	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	1	700	<1	<1	<1	<1	<1	<1
Trans-1,2-dichloroethene	1	NSL	<1	<1	<1	<1	<1	<1
1,1-dichloroethane	1	90	<1	<1	<1	<1	<1	<1
Cis-1,2-dichloroethene	1	NSL	<1	<1	<1	<1	<1	<1
Bromochloromethane	1	NSL	<1	<1	<1	<1	<1	<1
Chloroform	1	370	<1	<1	<1	<1	<1	<1
2,2-dichloropropane	1	NSL	<1	<1	<1	<1	<1	<1
1,2-dichloroethane	1	1900	<1	<1	<1	<1	<1	<1
1,1,1-trichloroethane	1	270	<1	<1	<1	<1	<1	<1
1,1-dichloropropene	1	NSL	<1	<1	<1	<1	<1	<1
Cyclohexane	1	NSL	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	1	240	<1	<1	<1	<1	<1	<1
Benzene	1	950	<1	<1	<1	<1	<1	<1
Dibromomethane	1	NSL	<1	<1	<1	<1	<1	<1
1,2-dichloropropane	1	900	<1	<1	<1	<1	<1	<1
Trichloroethene	1	330	<1	<1	<1	<1	<1	<1
Bromodichloromethane	1	NSL	<1	<1	<1	<1	<1	<1
trans-1,3-dichloropropene	1	NSL	<1	<1	<1	<1	<1	<1
cis-1,3-dichloropropene	1	NSL	<1	<1	<1	<1	<1	<1
1,1,2-trichloroethane	1	6500	<1	<1	<1	<1	<1	<1
Toluene	1	180	<1	<1	<1	<1	<1	<1
1,3-dichloropropane	1	1100	<1	<1	<1	<1	<1	<1
Dibromochloromethane	1	NSL	<1	<1	<1	<1	<1	<1
1,2-dibromoethane	1	NSL	<1	<1	<1	<1	<1	<1
Tetrachloroethene	1	70	<1	<1	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	1	NSL	<1	<1	<1	<1	<1	<1
Chlorobenzene	1	55	<1	<1	<1	<1	<1	<1
Ethylbenzene	1	80	<1	<1	<1	<1	<1	<1
Bromoform	1	NSL	<1	<1	<1	<1	<1	<1
m+p-xylene	2	75	<2	<2	<2	<2	<2	<2
Styrene	1	NSL	<1	<1	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	1	400	<1	<1	<1	<1	<1	<1
o-xylene	1	350	<1	<1	<1	<1	<1	<1
1,2,3-trichloropropane	1	NSL	<1	<1	<1	<1	<1	<1
Isopropylbenzene	1	30	<1	<1	<1	<1	<1	<1
Bromobenzene	1	NSL	<1	<1	<1	<1	<1	<1
n-propyl benzene	1	NSL	<1	<1	<1	<1	<1	<1
2-chlorotoluene	1	NSL	<1	<1	<1	<1	<1	<1
4-chlorotoluene	1	NSL	<1	<1	<1	<1	<1	<1
1,3,5-trimethyl benzene	1	NSL	<1	<1	<1	<1	<1	<1
Tert-butyl benzene	1	NSL	<1	<1	<1	<1	<1	<1
1,2,4-trimethyl benzene	1	NSL	<1	<1	<1	<1	<1	<1
1,3-dichlorobenzene	1	260	<1	<1	<1	<1	<1	<1
Sec-butyl benzene	1	NSL	<1	<1	<1	<1	<1	<1
1,4-dichlorobenzene	1	60	<1	<1	<1	<1	<1	<1
4-isopropyl toluene	1	NSL	<1	<1	<1	<1	<1	<1
1,2-dichlorobenzene	1	160	<1	<1	<1	<1	<1	<1
n-butyl benzene	1	NSL	<1	<1	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	1	NSL	<1	<1	<1	<1	<1	<1
1,2,4-trichlorobenzene	1	85	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	1	NSL	<1	<1	<1	<1	<1	<1
1,2,3-trichlorobenzene	1	3	<1	<1	<1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons (PAHs)								
Naphthalene	0.2	16	<0.2	NA	<0.2	<0.2	<0.2	<0.1
Acenaphthylene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1
Acenaphthene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1
Phenanthrene	0.1	0.6	<0.1	NA	<0.1	<0.1	<0.1	<0.1
Anthracene	0.1	0.01	<0.1	NA	<0.1	<0.1	<0.1	<0.1
Fluoranthene	0.1	1	<0.1	NA	<0.1	<0.1	<0.1	<0.1
Pyrene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1
Chrysene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	NA	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1

Concentration above the SAC	**VALUE**
Concentration above the PQL	**Bold**
GIL >PQL	Red

TABLE G2
GROUNDWATER LABORATORY RESULTS COMPARED TO SITE SPECIFIC HSLs - RISK ASSESSMENT
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	NHMRC ADWG 2011 (v3.5 2018)	WHO 2008	USEPA RSL Tapwater 2017	SAMPLES MW101	MW101	MW118	MW121	WDUP1	WDUP2
Total Recoverable Hydrocarbons (TRH)										
C_6-C_9 Aliphatics (assessed using F1)	10	-	15000	-	<10	<10	<10	<10	<10	<10
>C_9-C_{14} Aliphatics (assessed using F2)	50	-	100	-	<50	NA	<50	<50	<50	<50
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)										
Benzene	1	1	-	-	<1	<1	<1	<1	<1	<1
Toluene	1	800	-	-	<1	<1	<1	<1	<1	<1
Ethylbenzene	1	300	-	-	<1	<1	<1	<1	<1	<1
Total xylenes	2	600	-	-	<2	<2	<2	<2	<2	<2
Polycyclic Aromatic Hydrocarbons (PAHs)										
Naphthalene	1	-	-	6.1	<1	<1	<1	<1	<1	<1
Volatile Organic Compounds (VOCs), including chlorinated VOCs										
Dichlorodifluoromethane	10	-	-	-	<10	<10	<10	<10	<10	<10
Chloromethane	10	-	-	-	<10	<10	<10	<10	<10	<10
Vinyl Chloride	10	0.3	-	-	<10	<10	<10	<10	<10	<10
Bromomethane	10	-	-	-	<10	<10	<10	<10	<10	<10
Chloroethane	10	-	-	-	<10	<10	<10	<10	<10	<10
Trichlorofluoromethane	10	-	-	-	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	1	30	-	-	<1	<1	<1	<1	<1	<1
Trans-1,2-dichloroethene	1	60	-	-	<1	<1	<1	<1	<1	<1
1,1-dichloroethane	1	-	-	-	<1	<1	<1	<1	<1	<1
Cis-1,2-dichloroethene	1	60	-	-	<1	<1	<1	<1	<1	<1
Bromochloromethane	1	250	-	-	<1	<1	<1	<1	<1	<1
Chloroform	1		-	-	<1	<1	<1	<1	<1	<1
2,2-dichloropropane	1	-	-	-	<1	<1	<1	<1	<1	<1
1,2-dichloroethane	1	3	-	-	<1	<1	<1	<1	<1	<1
1,1,1-trichloroethane	1	-	-	-	<1	<1	<1	<1	<1	<1
1,1-dichloropropene	1	-	-	-	<1	<1	<1	<1	<1	<1
Cyclohexane	1	-	-	-	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	1	3	-	-	<1	<1	<1	<1	<1	<1
Benzene	1	1	-	-	<1	<1	<1	<1	<1	<1
Dibromomethane	1	-	-	-	<1	<1	<1	<1	<1	<1
1,2-dichloropropane	1	-	-	-	<1	<1	<1	<1	<1	<1
Trichloroethene	1	-	-	-	<1	<1	<1	<1	<1	<1
Bromodichloromethane	1	-	-	-	<1	<1	<1	<1	<1	<1
trans-1,3-dichloropropene	1	100	-	-	<1	<1	<1	<1	<1	<1
cis-1,3-dichloropropene	1	100	-	-	<1	<1	<1	<1	<1	<1
1,1,2-trichloroethane	1	-	-	-	<1	<1	<1	<1	<1	<1
Toluene	1	800	-	-	<1	<1	<1	<1	<1	<1
1,3-dichloropropane	1	-	-	-	<1	<1	<1	<1	<1	<1
Dibromochloromethane	1	-	-	-	<1	<1	<1	<1	<1	<1
1,2-dibromoethane	1	-	-	-	<1	<1	<1	<1	<1	<1
Tetrachloroethene	1	50	-	-	<1	<1	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	1	-	-	-	<1	<1	<1	<1	<1	<1
Chlorobenzene	1	300	-	-	<1	<1	<1	<1	<1	<1
Ethylbenzene	1	300	-	-	<1	<1	<1	<1	<1	<1
Bromoform	1	-	-	-	<1	<1	<1	<1	<1	<1
m+p-xylene	2	-	-	-	<2	<2	<2	<2	<2	<2
Styrene	1	30	-	-	<1	<1	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	1	-	-	-	<1	<1	<1	<1	<1	<1
o-xylene	1	-	-	-	<1	<1	<1	<1	<1	<1
1,2,3-trichloropropane	1	-	-	-	<1	<1	<1	<1	<1	<1
Isopropylbenzene	1	-	-	-	<1	<1	<1	<1	<1	<1
Bromobenzene	1	-	-	-	<1	<1	<1	<1	<1	<1
n-propyl benzene	1	-	-	-	<1	<1	<1	<1	<1	<1
2-chlorotoluene	1	-	-	-	<1	<1	<1	<1	<1	<1
4-chlorotoluene	1	-	-	-	<1	<1	<1	<1	<1	<1
1,3,5-trimethyl benzene	1	-	-	-	<1	<1	<1	<1	<1	<1
Tert-butyl benzene	1	-	-	-	<1	<1	<1	<1	<1	<1
1,2,4-trimethyl benzene	1	-	-	-	<1	<1	<1	<1	<1	<1
1,3-dichlorobenzene	1	20	-	-	<1	<1	<1	<1	<1	<1
Sec-butyl benzene	1	-	-	-	<1	<1	<1	<1	<1	<1
1,4-dichlorobenzene	1	40	-	-	<1	<1	<1	<1	<1	<1
4-isopropyl toluene	1	-	-	-	<1	<1	<1	<1	<1	<1
1,2-dichlorobenzene	1	1500	-	-	<1	<1	<1	<1	<1	<1
n-butyl benzene	1	-	-	-	<1	<1	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	1	-	-	-	<1	<1	<1	<1	<1	<1
1,2,4-trichlorobenzene	1	30	-	-	<1	<1	<1	<1	<1	<1
1,2,3-trichlorobenzene	1		-	-	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	1	7	-	-	<1	<1	<1	<1	<1	<1

Concentration above the SAC — **VALUE**
Concentration above the PQL — **Bold**
GIL >PQL — Red

TABLE Q1
SOIL QA/QC SUMMARY

			TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene
	PQL Envirolab SYD		25	50	100	100	0.2	0.5	1	2	1
	PQL Envirolab VIC		25	50	100	100	0.2	0.5	1.0	2.0	1.0
Intra laboratory duplicate	BH119	0-0.2	<25	<50	140	<100	<0.2	<0.5	<1	<2	<1
	SDUP1	-	<25	<50	130	<100	<0.2	<0.5	<1	<2	<1
	MEAN		nc	nc	135	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	7%	nc	nc	nc	nc	nc	nc
Inter laboratory duplicate	BH121	0.18-0.7	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
	SDUP2	-	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra laboratory duplicate	BH108	0-0.2	<25	<50	240	<100	<0.2	<0.5	<1	<2	<1
	SDUP4	-	<25	<50	290	100	<0.2	<0.5	<1	<2	<1
	MEAN		nc	nc	265	75	nc	nc	nc	nc	nc
	RPD %		nc	nc	19%	67%	nc	nc	nc	nc	nc
Field Blank	TB-S1 13/08/20	-	NA	NA	NA	NA	<0.2	<0.5	<1	<2	<1
Field Rinsate	FR-HA1 13/09/20	µg/L	NA	NA	NA	NA	<1	<1	<1	<2	<1
Trip Spike	TS-S1 13/08/20		-	-	-	-	95%	95%	105%	113%	111%

			Naphthalene	Acenaphthylene	Acenaph-thene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthra-cene	Benzo(g,h,i)perylene
	PQL Envirolab SYD		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.05	0.1	0.1	0.1
	PQL Envirolab VIC		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1
Intra laboratory duplicate	BH119	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	0.1	0.1	<0.2	0.1	<0.1	<0.1	<0.1
	SDUP1	-	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.3	0.2	0.1	0.1	<0.2	0.2	<0.1	<0.1	<0.1
	MEAN		nc	nc	nc	nc	0.075	nc	0.25	0.2	0.1	0.1	nc	0.15	nc	nc	nc
	RPD %		nc	nc	nc	nc	67%	nc	40%	0%	0%	0%	nc	67%	nc	nc	nc
Inter laboratory duplicate	BH121	0.18-0.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	0.3	0.1	0.1	<0.2	0.2	<0.1	<0.1	0.1
	SDUP2	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	0.3	0.2	0.2	0.4	0.16	0.1	<0.1	0.1
	MEAN		nc	nc	nc	nc	nc	nc	0.3	0.3	0.15	0.15	0.25	0.18	0.075	nc	0.1
	RPD %		nc	nc	nc	nc	nc	nc	0%	0%	67%	67%	120%	22%	67%	nc	0%
Intra laboratory duplicate	BH108	0-0.2	<0.1	<0.1	<0.1	<0.1	0.7	<0.1	0.6	0.7	0.3	0.5	0.7	0.4	0.2	<0.1	0.2
	SDUP4	-	<0.1	<0.1	<0.1	<0.1	0.4	<0.1	0.2	0.2	<0.1	0.2	0.2	0.09	<0.1	<0.1	<0.1
	MEAN		nc	nc	nc	nc	0.55	nc	0.4	0.45	0.175	0.35	0.45	0.245	0.125	nc	0.125
	RPD %		nc	nc	nc	nc	55%	nc	100%	111%	143%	86%	111%	127%	120%	nc	120%
Field Blank	TB-S1 13/08/20	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Rinsate	FR-HA1 13/09/20	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trip Spike	TS-S1 13/08/20		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

			HCB	alpha- BHC	gamma- BHC	beta- BHC	Heptachlor	delta- BHC	Aldrin	Heptachlor Epoxide	Gamma- Chlordane	alpha- chlordane	Endosulfan I	pp- DDE	Dieldrin	Endrin	pp- DDD	Endosulfan II	pp- DDT	Endrin Aldehyde	Endosulfan Sulphate	Methoxychlor
	PQL Envirolab SYD		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	PQL Envirolab VIC		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Intra laboratory duplicate	BH119	0-0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	SDUP1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter laboratory duplicate	BH121	0.18-0.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	SDUP2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra laboratory duplicate	BH108	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	SDUP4	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field Blank	TB-S1 13/08/20	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Rinsate	FR-HA1 13/09/20	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trip Spike	TS-S1 13/08/20		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

			Azinphos-methyl (Guthion)	Bromophos-ethyl	Chlorpyriphos	Chlorpyriphos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel	Total PCBS	Arsenic	Cadmium	Chromium VI	Copper	Lead	Mercury	Nickel	Zinc
	PQL Envirolab SYD		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	4	0.4	1	1	1	0.1	1	1
	PQL Envirolab VIC		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	4.0	0.4	1.0	1.0	1.0	0.1	1.0	1.0
Intra laboratory duplicate	BH119	0-0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<4	0.5	12	47	110	<0.1	10	240
	SDUP1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<4	0.4	12	45	110	<0.1	10	230
	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0.45	12	46	110	nc	10	235
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	22%	0%	4%	0%	nc	0%	4%
Inter laboratory duplicate	BH121	0.18-0.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<4	<0.4	16	5	26	<0.1	2	10
	SDUP2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5	<0.4	21	10	27	<0.1	3	23
	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	3.5	nc	18.5	7.5	26.5	nc	2.5	16.5
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	86%	nc	27%	67%	4%	nc	40%	79%
Intra laboratory duplicate	BH108	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	13	38	50	<0.1	9	240
	SDUP4	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	<0.4	12	46	180	0.5	10	230
	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	3.5	nc	12.5	42	115	0.275	9.5	235
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	86%	nc	8%	19%	113%	164%	11%	4%
Field Blank	TB-S1 13/08/20	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Rinsate	FR-HA1 13/09/20	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trip Spike	TS-S1 13/08/20		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Result outside of QA/QC acceptance criteria (highlighted)

JKEnviro

TABLE Q2
GROUNDWATER QA/QC SUMMARY

			Dichlorodifluoromethane	Chloromethane	Vinyl Chloride	Bromomethane	Chloroethane	Trichlorofluoromethane	1,1-Dichloroethene	Trans-1,2-dichloroethene	1,1-dichloroethane	Cis-1,2-dichloroethene	Bromochloromethane	Chloroform	2,2-dichloropropane	1,2-dichloroethane	1,1,1-trichloroethane	1,1-dichloropropene	Cyclohexane	Carbon tetrachloride	Benzene	Dibromomethane	1,2-dichloropropane	Trichloroethene	Bromodichloromethane	trans-1,3-dichloropropene	cis-1,3-dichloropropene	1,1,2-trichloroethane	Toluene	1,3-dichloropropane	Dibromochloromethane	1,2-dibromoethane	Tetrachloroethene	1,1,1,2-tetrachloroethane	Chlorobenzene	Ethylbenzene	Bromoform	m+p-xylene	Styrene	1,1,2,2-tetrachloroethane	o-xylene	1,2,3-trichloropropane	Isopropylbenzene	Bromobenzene	n-propyl benzene	2-chlorotoluene	4-chlorotoluene	1,3,5-trimethyl benzene	Tert-butyl benzene	1,2,4-trimethyl benzene	1,3-dichlorobenzene	Sec-butyl benzene	1,4-dichlorobenzene	4-isopropyl toluene	1,2-dichlorobenzene	n-butyl benzene	1,2-dibromo-3-chloropropane	1,2,4-trichlorobenzene	Hexachlorobutadiene	1,2,3-trichlorobenzene
PQL Envirolab SYD			10	10	10	10	10	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PQL Envirolab VIC			10	10	10	10	10	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Intra	MW118	2.83	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
laboratory	WDUP1	2.83	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
duplicate	MEAN	2.83	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	0%	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	MW101	3.08	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
laboratory	WDUP2	3.08	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
duplicate	MEAN	3.08	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	0%	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

			TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene	Naphthalene	Acenaphthylene	Acenaph-thene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthra-cene	Benzo(g,h,i)perylene	Arsenic	Cadmium	Chromium VI	Copper	Lead	Mercury	Nickel	Zinc
PQL Envirolab SYD			10	50	100	100	1	1	1	2	1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	1	0.1	1	1	1	0.05	1	1
PQL Envirolab VIC			10	50	100	100	1.0	1.0	1.0	2.0	1.0	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	1	0.1	1	1	1	0.05	1	1
Intra	MW118	2.83	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	7	<1	<0.05	3	11
laboratory	WDUP1	2.83	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	7	<1	<0.05	3	11
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	7	nc	nc	3	11
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0%	nc	nc	0%	0%
Inter	MW101	3.08	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<1	<1	<0.05	1	6
laboratory	WDUP2	3.08	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.2	<1	<1	<1	<1	6	<0.05
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	3.5	3.25
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	143%	169%
Field	TB-W1		NA	NA	NA	NA	<1	<1	<1	<2	<1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	19/08/2020																																	
Trip	TS-W1		-	-	-	-	115%	100%	95%	105%	102%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Spike	19/08/2020																																	

Result outside of QA/QC acceptance criteri Value

JKE DSI Borehole Logs

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH101** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 13/8/20 **Datum:** -

Plant Type: JK205 **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
							0		-	ASPHALTIC CONCRETE: 60mm.t CONCRETE: 240mm.t				
									-	VOID: 200mm.t				
						N = 4 2,2,2			-	FILL: Silty sandy clay, low to medium plasticity, dark grey, fine to medium grained sand, trace of sandstone gravel.	w>PL			SCREEN: 0.5-1.5m 6.8kg NO FCF
							1							
						N = 3 1,2,1								
▼ ON 19/8/20						N = 8 3,3,5	3							ORGANINC ODOUR
							4							GROUNDWATER MONITORING WELL INSTALLED TO 6.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 6.0m TO 2.0m. CASING 2.0m TO 0m. 2mm SAND FILTER PACK 6.0m TO 1.3m. BENTONITE SEAL 1.3m TO 0m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
						N = 11 3,4,7	5		CH	Silty CLAY: high plasticity, grey.	w>PL			
							6			END OF BORHOLE AT 6.0m				
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH102** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION			■				0			CONCRETE: 270mm.t				
	■								-	FILL: Silty gravelly sand, fine to medium grained, grey, fine to coarse grained, igneous, sub-angular.	D			ORANGE PLASTIC LAYER NOT ENOUGH SAMPLE FOR BUCKET
										END OF BOREHOLE AT 0.4m				HAND AUGER REFUSAL
							1							
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH103** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■				0			CONCRETE: 140mm.t				
									-	FILL: Silty gravelly sand, fine to medium grained, brown, fine to coarse grained, igneous, sub-angular.	D			NOT ENOUGH SAMPLE FOR BUCKET WEIGHT
										END OF BOREHOLE AT 0.3m				HAND AUGER REFUSAL
							1							
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH104** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			■				0			CONCRETE: 200mm.t				
	■								-	FILL: Silty gravelly sand, fine to medium grained, brown, fine to coarse grained igneous sub-angular and ash.	D			NOT ENOUGH SAMPLE FOR BUCKET WEIGHT
										END OF BOREHOLE AT 0.35m				HAND AUGER REFUSAL
							1							
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH105** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION		■	■				0			CONCRETE: 190mm.t				
									-	FILL: Silty sandy gravel, fine to coarse grained, igneous, sub-angular, grey, fine to medium grained sand, trace of slag.	M			NOT ENOUGH SAMPLE FOR BUCKET WEIGHT
										END OF BOREHOLE AT 0.3m				HAND AUGER REFUSAL
							1							
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No.
BH106
1/1

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION							0			CONCRETE: 260mm.t				
							-		-	FILL: Silty gravelly sand, fine to medium grained, grey, fine to medium grained, igneous, sub-angular.				HAND AUGER REFUSAL ON IGNEOUS BOULDER
										END OF BOREHOLE AT 0.3m				
							1							
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH107** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION			■				0			CONCRETE: 250mm.t				
	■								-	FILL: Silty gravelly sand, fine to medium grained, grey, fine to coarse grained, igneous, sub-angular.	D			NOT ENOUGH SAMPLE FOR BUCKET WEIGHT
										END OF BOREHOLE AT 0.4m				HAND AUGER REFUSAL
							1							
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. BH108 1/1

SDUP4: 0-0.2m

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, brown, with organic material, trace of igneous gravel and slag.	M			NO FCF: 0.1m SCREEN: 0-0.6m 9.2kg NO FCF
										FILL: Silty sandy clay, low to medium plasticity, brown, fine to medium grained sand, trace of igneous gravel and slag.	w>PL			NOT ENOUGH SAMPLE FOR BUCKET
							1			END OF BOREHOLE AT 0.7m				HAND AUGER REFUSAL ON INFERRED ROOTS
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. BH109 1/1

SDUP3: 0-0.2m

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION							0			FILL: Silty clay, low to medium plasticity, dark brown, trace of root fibres.	w>PL			GRASS COVER NO FCF: 0.1m
										FILL: Silty sand, fine to medium grained, brown, trace of igneous gravel, ash and root fibres.	M			SCREEN:0-0.25m 11.2kg NO FCF
							1			END OF BOREHOLE AT 0.3m				NOT ENOUGH SAMPLE FOR BUCKET WEIGHT HAND AUGER REFUSAL
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH110** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION			■				0		-	ASPHALTIC CONCRETE: 70mm.t				
									-	CONCRETE: 300mm.t				
	■									FILL: Silty clay, low to medium plasticity, brown, trace of igneous gravel and ash.	w>PL			NOT ENOUGH SAMPLE FOR BUCKET
										END OF BOREHOLE AT 0.65m				HAND AUGER REFUSAL
							1							
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No.
BH111
1/1

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■				0		-	CONCRETE: 170mm.t				
									-	FILL: Silty sand, fine to medium grained, light brown, trace of igneous gravel.	M			SCREEN: 0.17-0. 3m 1.7kg NO FCF HAND AUGER REFUSAL
										END OF BOREHOLE AT 0.3m				
							1							
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH112** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			CONCRETE: 190mm.t				
									-	FILL: Silty sand, fine to medium grained, with slag, trace of igneous gravel.	D			SCREEN: 0.19-0. 4m 2.4kg NO FCF
											w>PL			NOT ENOUGH SAMPLE FOR BUCKET WEIGHT
										FILL: Silty clay, low to medium plasticity, brown, trace of igneous gravel, slag and ash.				
							1			END OF BOREHOLE AT 0.5m				HAND AUGER REFUSAL
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No.
BH113
1/1

Environmental logs are not to be used for geotechnical purposes

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			CONCRETE: 190mm.t				
									-	FILL: Silty clay, low to medium plasticity, with siltstone gravel, trace of slag and sandstone gravel.	w>PL			SCREEN: 0.19-0.5m 2.4kg NO FCF
	■		■				1		CH	Silty CLAY: high plasticity, grey mottled red brown.	w>PL			
										END OF BOREHOLE AT 1.1m				
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH114** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			CONCRETE: 180mm.t				
									-	FILL: Silty gravelly sand, fine to medium grained, grey, fine to coarse grained, igneous, sub-angular.	M			SCREEN:0.18-0.3 5m 2.4kg NO FCF
										END OF BOREHOLE AT 0.35m				HAND AUGER REFUSAL
							1							
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH115** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 13/8/20 **Datum:** -

Plant Type: JK205 **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			CONCRETE: 30mm.t				
										CONCRETE: 180mm.t				
									-	FILL: Silty sand, fine to medium grained, brown, trace of igneous and sandstone gravel.	M			NOT ENOUGH SAMPLE FOR BUCKET
											w>PL			SCREEN:0.5 -1.0m
						N = 0 1,0,0	1			FILL: Silty clay, low to medium plasticity, brown, trace of igneous gravel.				6.4kg NO FCF SPT SUNK UNDER SELF WEIGHT
									CH	Silty CLAY: high plasticity, grey mottled red brown.	w>PL			
						N = 6 2,2,4	2							
										END OF BOREHOLE AT 1.95m				
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH116** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 13/8/20 **Datum:** -

Plant Type: JK205 **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION							0		-	CONCRETE: 130mm.t				
										FILL: Silty clay, low to medium plasticity, grey, with igneous gravel, trace of ash and slag.	w>PL			SCREEN: 0.13-0. 7m 6.2kg NO FCF
						N = 3 1,2,1				FILL: Silty clay, medium plasticity, brown, trace of igneous gravel.	w>PL			SCREEN: 0.7-1.3m 6.3kg NO FCF
							1		CH	Silty CLAY: high plasticity, grey mottled red brown and orange brown.	w>PL			
						N = 10 4,4,6								
							2			END OF BOREHOLE AT 1.95m				
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH117** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 13/8/20 **Datum:** -

Plant Type: JK205 **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			CONCRETE: 200mm.t				
						N = SPT 15/50mm REFUSAL			-	FILL: Silty sand, fine to medium grained, brown, with igneous gravel, trace of brick, concrete and tile fragments.	D			SCREEN: 0.2-1.0m 10.1kg NO FCF SPT REFUSAL
							1							SCREEN: 1.0-1.2m 2.2kg NO FCF
						N = 18 5,9,9			CH	Silty CLAY: high plasticity, grey mottled red brown.	w>PL			
							2			END OF BOREHOLE AT 1.95m				
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH118** **1/2**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 13/8/20 **Datum:** -

Plant Type: JK205 **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■						0			CONCRETE: 160mm.t				
									-	FILL: Silty gravelly sand, fine to medium grained, grey, fine to coarse grained igneous, sub-angular.	W			NOT ENOUGH SAMPLE FOR BUCKET WEIGHT
									-	CONCRETE: 200mm.t				
	■	■	■	■	■	N = 3 1,2,1	1		-	FILL: Silty clay, low to medium plasticity, brown, trace of igneous and sandstone gravel, and concrete fragments.	w>PL			SCREEN: 0.6-1.3m 11.2kg NO FCF
	■		■			N = 10 4,4,6			CH	Silty CLAY: high plasticity, grey mottled red brown.	w>PL			
▼ ON 19/8/20						N = 14 4,5,9	3							
						N = 20 6,8,12	5							
▶							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH118** **2/2**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 13/8/20 **Datum:** -

Plant Type: JK205 **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
							8		CH	Silty CLAY: high plasticity, grey mottled red brown. (continued)	w>PL			
							9			END OF BOREHOLE AT 9.0m				GROUNDWATER MONITORING WELL INSTALLED TO 9.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 9.0m TO 3.0m. CASING 3.0m TO 0m. 2mm SAND FILTER PACK 9.0m TO 2.7m. BENTONITE SEAL 2.7m TO 0m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							10							
							11							
							12							
							13							
							14							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. BH119 1/1

SDUP1: 0-0.2m

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 13/8/20 **Datum:** -

Plant Type: - **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, dark brown, with clay fines, trace of ash and slag.	D			GRASS COVER 0.1m NO FCF SCREEN: 0-0.6m 3.1kg NO FCF
	■		■							FILL: Silty clay, medium plasticity, orange brown, trace of igneous and ironstone gravel, and ash.	w>PL			NOT ENOUGH SAMPLE BUCKET WEIGHT
							1			END OF BOREHOLE AT 1.0m				HAND AUGER REFUSAL
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH120** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 13/8/20 **Datum:** -

Plant Type: JK205 **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION							0		-	ASPHALTIC CONCRETE: 40mm.t				
										FILL: Silty clay, low to medium plasticity, brown, trace of igneous gravel brick and concrete fragments, slag and ash.	w>PL			NO FCF: 0.1m SCREEN: 0.04-0. 6m 6.4kg NO FCF
						N = 6 3,3,3				FILL: Silty sand, fine to medium grained, light brown.	M			SCREEN: 0.6-1.0m 3.4kg NO FCF
							1							
						N = 3 2,1,2				FILL: Silty clay, low to medium plasticity, red brown, trace of igneous and ironstone gravel and ash.	w>PL			
							2							
						N = 15 7,7,8	3		CH	Silty CLAY: high plasticity, grey mottled red brown.	w>PL			
										END OF BOREHOLE AT 3.45m				
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. BH121 1/1

SDUP2: 0.18-0.7m

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 13/8/20 **Datum:** -

Plant Type: JK205 **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			CONCRETE: 180mm.t				
						N = 9 5,5,4			-	FILL: Silty clay, low to medium plasticity, brown, trace of ironstone gravel, and ash.	w>PL			SCREEN: 0.18-1. 0m 3kg NO FCF
							1							SCREEN: 1.0-1.5m 4.2kg NO FCF
						N = 39 9,21,18			CH	Silty CLAY: high plasticity, grey mottled red brown and orange brown.	w<PL			
							2			Silty CLAY: high plasticity, grey, trace of root fibres.	w>PL			
ON 19/8/20						N = 14 4,6,8	3							
							4			Silty CLAY: high plasticity, grey, with iron indurated bands.	w<PL			GROUNDWATER MONITORING WELL INSTALLED TO 6.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 6.0m TO 3.0m. CASING 3.0m TO 0m. 2mm SAND FILTER PACK 6.0m TO 2.5m. BENTONITE SEAL 2.5m TO 1.5m BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
						N = 24 11,12,12	5							
							6			END OF BOREHOLE AT 6.0m				
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. BH122 1/1

SDUP5: 0.14-0.25m

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: JK205 **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			CONCRETE: 140mm.t				
									-	FILL: Silty sand, fine to medium grained, light brown.	M D			NOT ENOUGH SAMPLE FOR BUCKET
										FILL: Silty gravelly sand, fine to medium grained, light brown, fine to medium grained igneous, sub-angular.				NOT ENOUGH SAMPLE FOR BUCKET
							1			END OF BOREHOLE AT 0.35m				HAND AUGER REFUSAL
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH123** **1/1**

Client: FABCOT PTY LTD

Project: PROPOSED COMMERCIAL DEVELOPEMT

Location: 74 EDINBURGH ROAD, MARRICKVILLE, NSW

Job No.: E33191B **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/8/20 **Datum:** -

Plant Type: JK205 **Logged/Checked by:** A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■				0		-	ASPHALTIC CONCRETE: 50mm.t	W			0.1m NO FCF
										FILL: Silty sandy gravel, fine to coarse grained, igneous, sub-angular, grey, fine to medium grained sand.	w>PL			NOT ENOUGH SAMPLE FOR BUCKET WEIGHT
										FILL: Silty clay, low to medium plasticity, brown, trace of igneous and ironstone gravel, concrete fragments and ash.				NOT ENOUGH SAMPLE FOR BUCKET WEIGHT
							1			END OF BOREHOLE AT 0.3m				HAND AUGER REFUSAL
							2							
							3							
							4							
							5							
							6							
							7							

ENVIRONMENTAL LOGS EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the environmental report in regard to classification methods, field procedures and certain matters relating to the logging of soil and rock. Not all notes are necessarily relevant to all reports.

Where geotechnical borehole logs are utilised for environmental purpose, reference should also be made to the explanatory notes included in the geotechnical report. Environmental logs are not suitable for geotechnical purposes.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Environmental studies include gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726:2017 *'Geotechnical Site Investigations'*. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geoenvironmental practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached soil classification table qualified by the grading of other particles present (eg. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	< 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2.36mm
Gravel	2.36 to 63mm
Cobbles	63 to 200mm
Boulders	> 200mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose (VL)	< 4
Loose (L)	4 to 10
Medium dense (MD)	10 to 30
Dense (D)	30 to 50
Very Dense (VD)	> 50

Cohesive soils are classified on the basis of strength (consistency) either by use of a hand penetrometer, vane shear, laboratory testing and/or tactile engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength (kPa)	Indicative Undrained Shear Strength (kPa)
Very Soft (VS)	≤ 25	≤ 12
Soft (S)	> 25 and ≤ 50	> 12 and ≤ 25
Firm (F)	> 50 and ≤ 100	> 25 and ≤ 50
Stiff (St)	> 100 and ≤ 200	> 50 and ≤ 100
Very Stiff (VSt)	> 200 and ≤ 400	> 100 and ≤ 200
Hard (Hd)	> 400	> 200
Friable (Fr)	Strength not attainable – soil crumbles	

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'shale' is used to describe fissile mudstone, with a weakness parallel to bedding. Rocks with alternating inter-laminations of different grain size (eg. siltstone/claystone and siltstone/fine grained sandstone) are referred to as 'laminite'.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All methods except test pits, hand auger drilling and portable Dynamic Cone Penetrometers require the use of a mechanical rig which is commonly mounted on a truck chassis or track base.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils and 'weaker' bedrock if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for a large excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the

structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Refusal of the hand auger can occur on a variety of materials such as obstructions within any fill, tree roots, hard clay, gravel or ironstone, cobbles and boulders, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of limited reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock cuttings. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be assessed from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg. from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, NMLC or HQ triple tube core barrels, which give a core of about 50mm and 61mm diameter, respectively, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as NO CORE. The location of NO CORE recovery is determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the bottom of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils, as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289.6.3.1–2004 (R2016) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Penetration Resistance of a Soil – Standard Penetration Test (SPT)'*.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63.5kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as

  N = 13
  4, 6, 7

- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as

  N > 30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

A modification to the SPT is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as 'N_c' on the borehole logs, together with the number of blows per 150mm penetration.

LOGS

The borehole or test pit logs presented herein are an interpretation of the subsurface conditions, and their reliability will depend to some extent on the frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will enable the most reliable assessment, but is not always practicable or possible to justify on economic grounds. In any case, the boreholes or test pits represent only a very small sample of the total subsurface conditions.

The terms and symbols used in preparation of the logs are defined in the following pages.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than 'straight line' variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

Where groundwater levels are measured in boreholes, there are several potential problems:

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or 'reverted' chemically if reliable water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after the groundwater level has stabilised at intervals ranging from several days to perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg. bricks, steel, etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably assess the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse environmental characteristics or behaviour. If the volume and nature of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing has not been undertaken to confirm the soil classification and rock strengths indicated on the environmental logs unless noted in the report.

SYMBOL LEGENDS

SOIL


FILL


TOPSOIL


CLAY (CL, CI, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CI, CH)


SILTY CLAY (CL, CI, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CI, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML, MH)


PEAT AND HIGHLY ORGANIC SOILS (Pt)

ROCK


CONGLOMERATE


SANDSTONE


SHALE/MUDSTONE


SILTSTONE


CLAYSTONE


COAL


LAMINITE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

OTHER MATERIALS


BRICKS OR PAVERS


CONCRETE


ASPHALTIC CONCRETE

CLASSIFICATION OF COARSE AND FINE GRAINED SOILS

Major Divisions		Group Symbol	Typical Names	Field Classification of Sand and Gravel	Laboratory Classification	
Coarse grained soil (more than 65% of soil excluding oversize fraction is greater than 0.075mm)	GRAVEL (more than half of coarse fraction is larger than 2.36mm	GW	Gravel and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 4$ $1 < C_c < 3$
		GP	Gravel and gravel-sand mixtures, little or no fines, uniform gravels	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		GM	Gravel-silt mixtures and gravel-sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	Fines behave as silt
		GC	Gravel-clay mixtures and gravel-sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	Fines behave as clay
	SAND (more than half of coarse fraction is smaller than 2.36mm)	SW	Sand and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 6$ $1 < C_c < 3$
		SP	Sand and gravel-sand mixtures, little or no fines	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		SM	Sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	N/A
		SC	Sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	

Major Divisions		Group Symbol	Typical Names	Field Classification of Silt and Clay			Laboratory Classification
				Dry Strength	Dilatancy	Toughness	% < 0.075mm
ine grained soils (more than 35% of soil excluding oversize fraction is less than 0.075mm)	SILT and CLAY (low to medium plasticity)	ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or silt with low plasticity	None to low	Slow to rapid	Low	Below A line
		CL, CI	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay	Medium to high	None to slow	Medium	Above A line
		OL	Organic silt	Low to medium	Slow	Low	Below A line
	SILT and CLAY (high plasticity)	MH	Inorganic silt	Low to medium	None to slow	Low to medium	Below A line
		CH	Inorganic clay of high plasticity	High to very high	None	High	Above A line
		OH	Organic clay of medium to high plasticity, organic silt	Medium to high	None to very slow	Low to medium	Below A line
	Highly organic soil	Pt	Peat, highly organic soil	–	–	–	–

Laboratory Classification Criteria

A well graded coarse grained soil is one for which the coefficient of uniformity $Cu > 4$ and the coefficient of curvature $1 < C_c < 3$. Otherwise, the soil is poorly graded. These coefficients are given by:

$$C_U = \frac{D_{60}}{D_{10}} \qquad and \qquad C_C = \frac{(D_{30})^2}{D_{10}\, D_{60}}$$

Where D_{10}, D_{30} and D_{60} are those grain sizes for which 10%, 30% and 60% of the soil grains, respectively, are smaller.

NOTES:

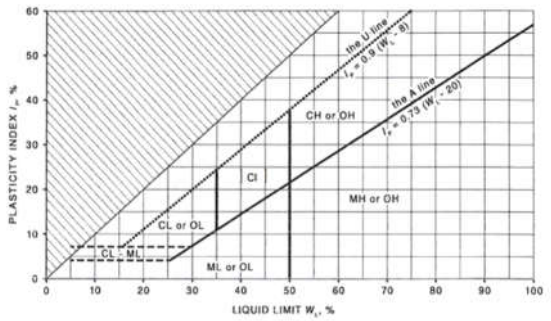
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

2 Where the grading is determined from laboratory tests, it is defined by coefficients of curvature (C_c) and uniformity (C_u) derived from the particle size distribution curve.

3 Clay soils with liquid limits > 35% and ≤ 50% may be classified as being of medium plasticity.

4 The U line on the Modified Casagrande Chart is an approximate upper bound for most natural soils.

Modified Casagrande Chart for Classifying Silts and Clays according to their Behaviour



LOG SYMBOLS

Log Column	Symbol	Definition
Groundwater Record		Standing water level. Time delay following completion of drilling/excavation may be shown.
		Extent of borehole/test pit collapse shortly after drilling/excavation.
		Groundwater seepage into borehole or test pit noted during drilling or excavation.
Samples	ES	Sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos analysis.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
	PFAS	Soil sample taken over depth indicated, for analysis of Per- and Polyfluoroalkyl Substances.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25 PID = 100	Vane shear reading in kPa of undrained shear strength. Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils)	w > PL $w \approx$ PL w < PL $w \approx$ LL w > LL	Moisture content estimated to be greater than plastic limit. Moisture content estimated to be approximately equal to plastic limit. Moisture content estimated to be less than plastic limit. Moisture content estimated to be near liquid limit. Moisture content estimated to be wet of liquid limit.
(Coarse Grained Soils)	D M W	DRY – runs freely through fingers. MOIST – does not run freely but no free water visible on soil surface. WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS S F St VSt Hd Fr ( )	VERY SOFT – unconfined compressive strength ≤ 25kPa. SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa. FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa. STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa. VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa. HARD – unconfined compressive strength > 400kPa. FRIABLE – strength not attainable, soil crumbles. Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.
Density Index/ Relative Density (Cohesionless Soils)	VL L MD D VD ( )	**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)** VERY LOOSE ≤ 15 / 0 – 4 LOOSE > 15 and ≤ 35 / 4 – 10 MEDIUM DENSE > 35 and ≤ 65 / 10 – 30 DENSE > 65 and ≤ 85 / 30 – 50 VERY DENSE > 85 / > 50 Bracketed symbol indicates estimated density based on ease of drilling or other assessment.

Log Column	Symbol	Definition
Hand Penetrometer Readings	300 250	Measures reading in kPa of unconfined compressive strength. Numbers indicate individual test results on representative undisturbed material unless noted otherwise.
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Twin pronged tungsten carbide bit.
	T_{60}	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.
	Soil Origin	The geological origin of the soil can generally be described as: RESIDUAL – soil formed directly from insitu weathering of the underlying rock. No visible structure or fabric of the parent rock. EXTREMELY WEATHERED – soil formed directly from insitu weathering of the underlying rock. Material is of soil strength but retains the structure and/or fabric of the parent rock. ALLUVIAL – soil deposited by creeks and rivers. ESTUARINE – soil deposited in coastal estuaries, including sediments caused by inflowing creeks and rivers, and tidal currents. MARINE – soil deposited in a marine environment. AEOLIAN – soil carried and deposited by wind. COLLUVIAL – soil and rock debris transported downslope by gravity, with or without the assistance of flowing water. Colluvium is usually a thick deposit formed from a landslide. The description 'slopewash' is used for thinner surficial deposits. LITTORAL – beach deposited soil.

Classification of Material Weathering

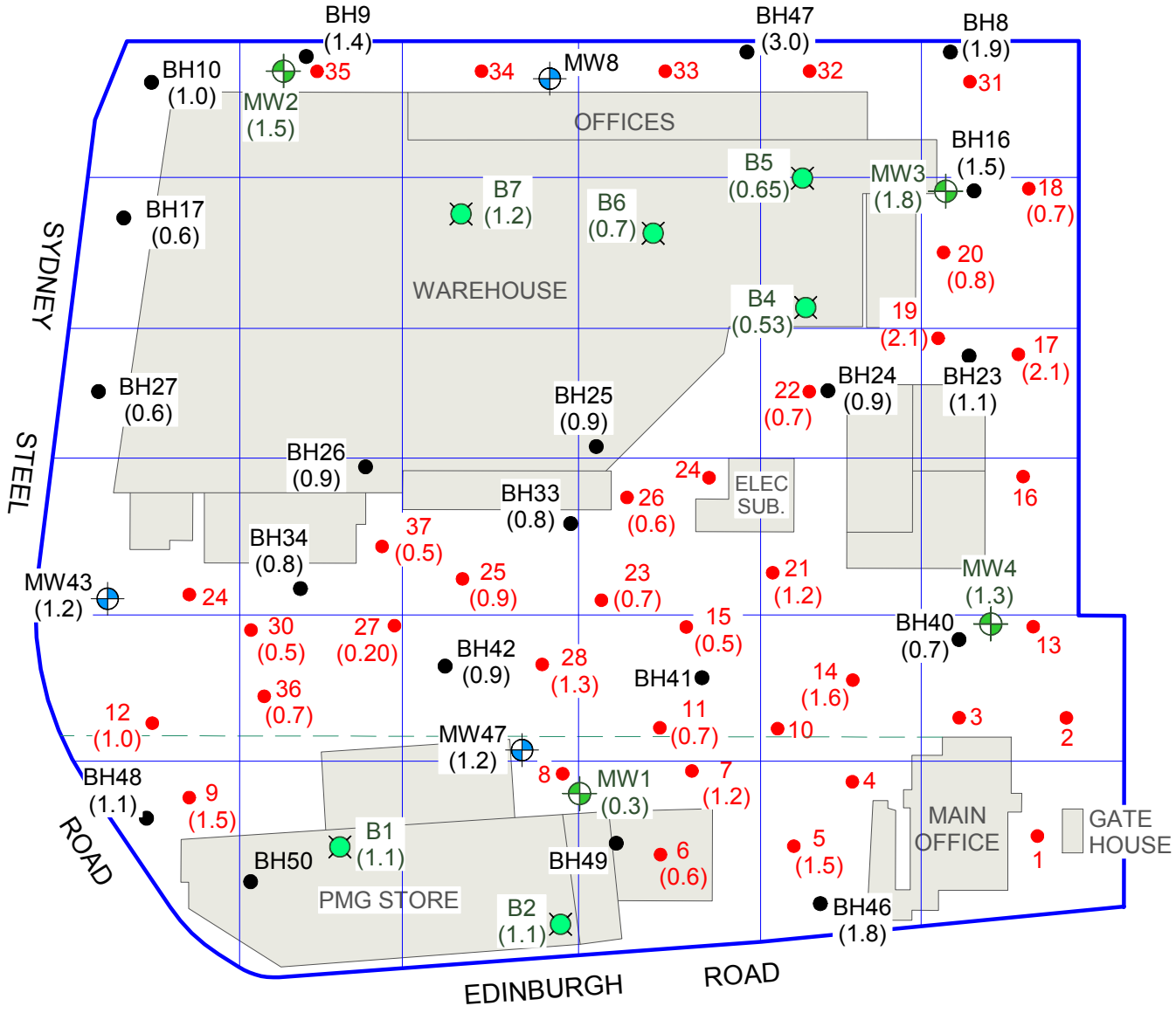
Term		Abbreviation		Definition
Residual Soil		RS		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely Weathered		XW		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.
Highly Weathered	Distinctly Weathered (Note 1)	HW	DW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately Weathered		MW		The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly Weathered		SW		Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh		FR		Rock shows no sign of decomposition of individual minerals or colour changes.

NOTE 1: The term 'Distinctly Weathered' is used where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock. 'Distinctly Weathered' is defined as follows: *'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores'*. There is some change in rock strength.

Rock Material Strength Classification

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Guide to Strength	
			Point Load Strength Index $Is_{(50)}$ (MPa)	Field Assessment
Very Low Strength	VL	0.6 to 2	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30mm thick can be broken by finger pressure.
Low Strength	L	2 to 6	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium Strength	M	6 to 20	0.3 to 1	Scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High Strength	H	20 to 60	1 to 3	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High Strength	VH	60 to 200	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High Strength	EH	> 200	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

DLA Phase 2 ESA Figures



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APPROVED:	D.G.
DATE:	06/12/2010

SITE MAP
HYDROX NOMINEES P/Y
74 EDINBURGH ROAD, MARRICKVILLE NSW 2204

SHEET SIZE:	PROJECT No.	REV:	
A4	1001078	01	FIGURE 2

Geo_Logix ESA Figures

SUBJECT SITE

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SITE MAP
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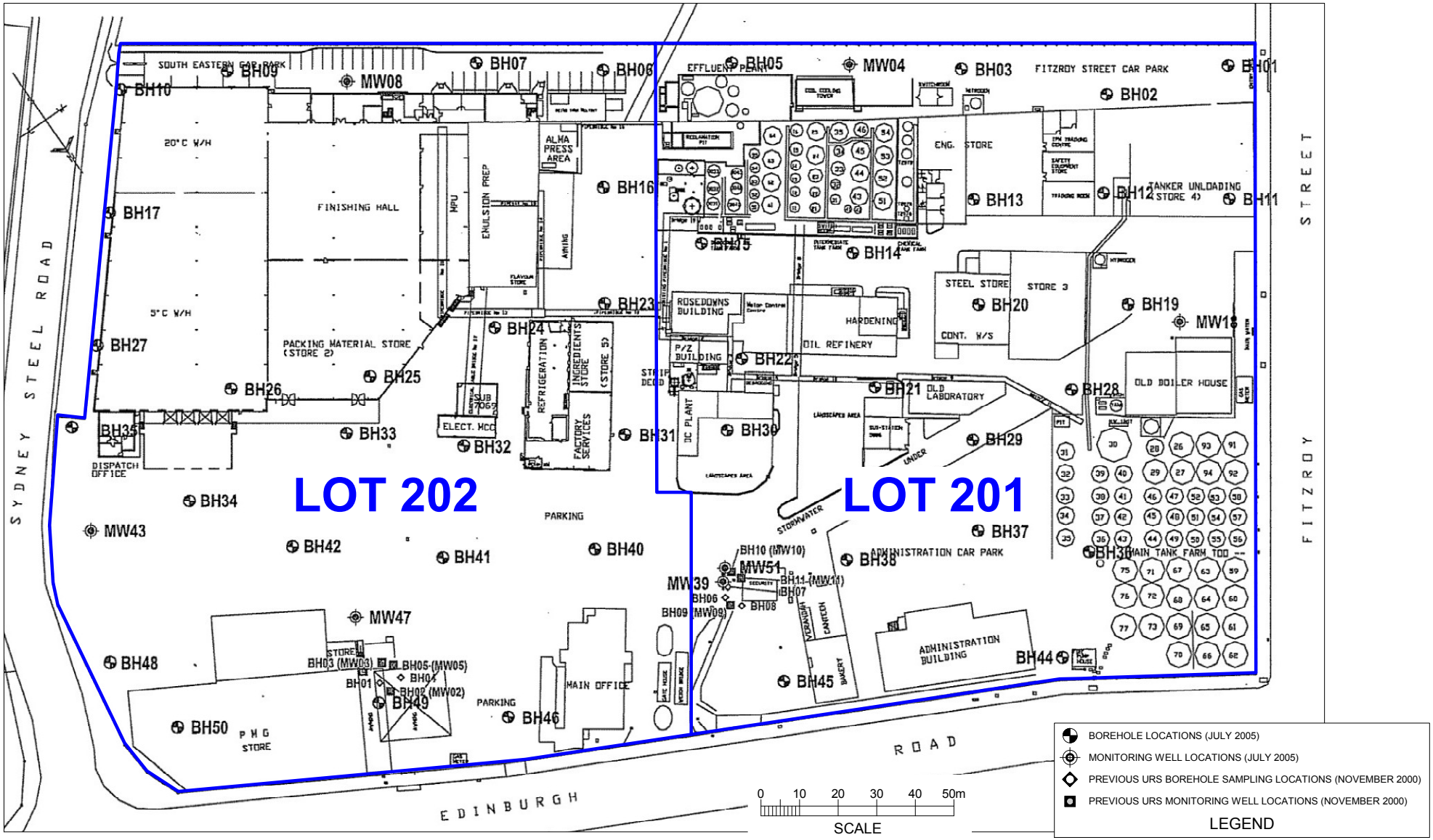
74 EDINBURGH ROAD, MARRICKVILLE NSW 2204

SHEET SIZE:	PROJECT No.	REV:	
A4	1001078	01	FIGURE 2



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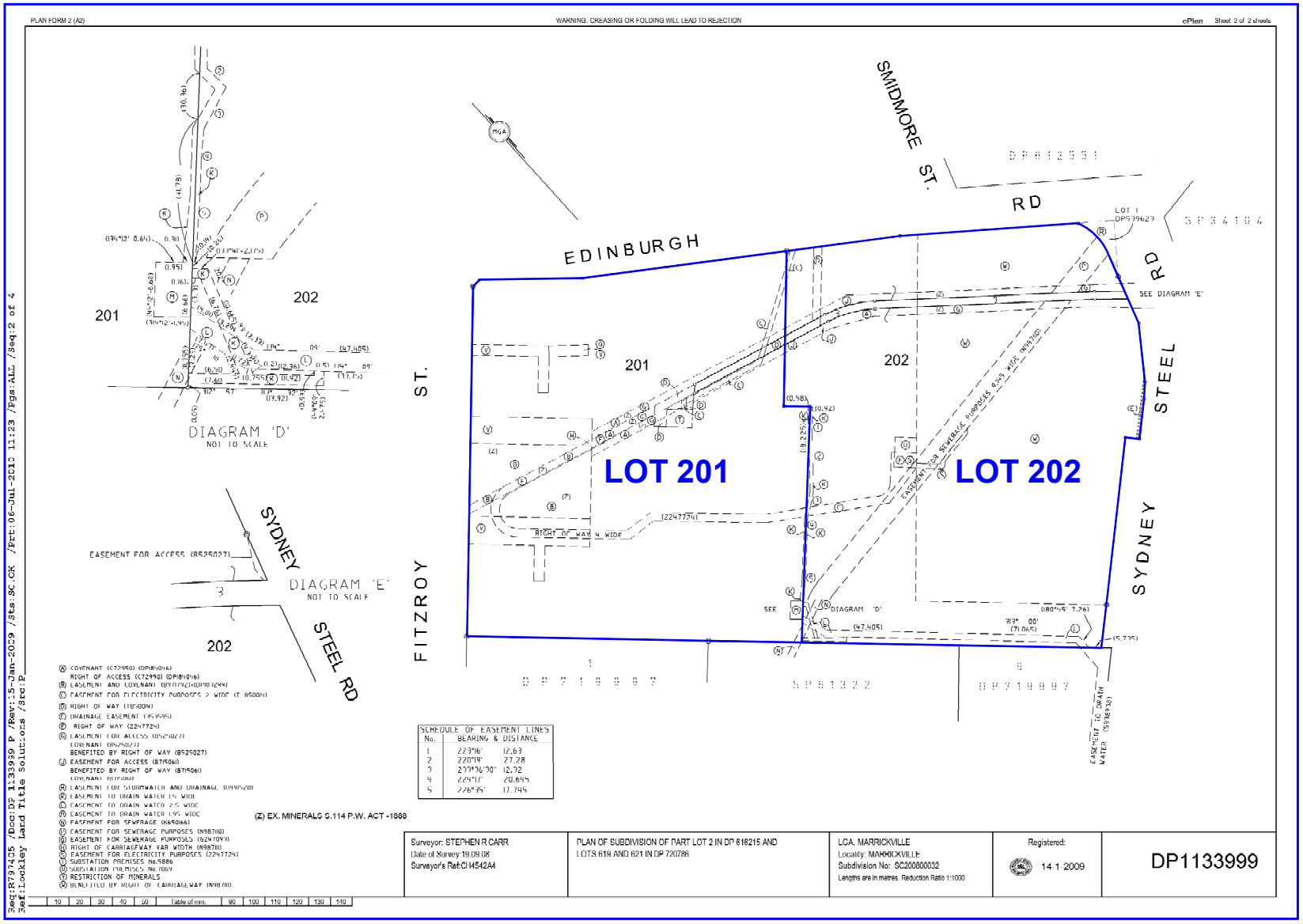
FORMER SITE INFRASTRUCTURE AND ERM (2005) INVESTIGATION LOCATIONS
HYDROX NOMINEES P/L
74 EDINBURGH ROAD, MARRICKVILLE NSW 2204

SHEET SIZE:	PROJECT No.	REV:	
A4	1001078	01	FIGURE 3



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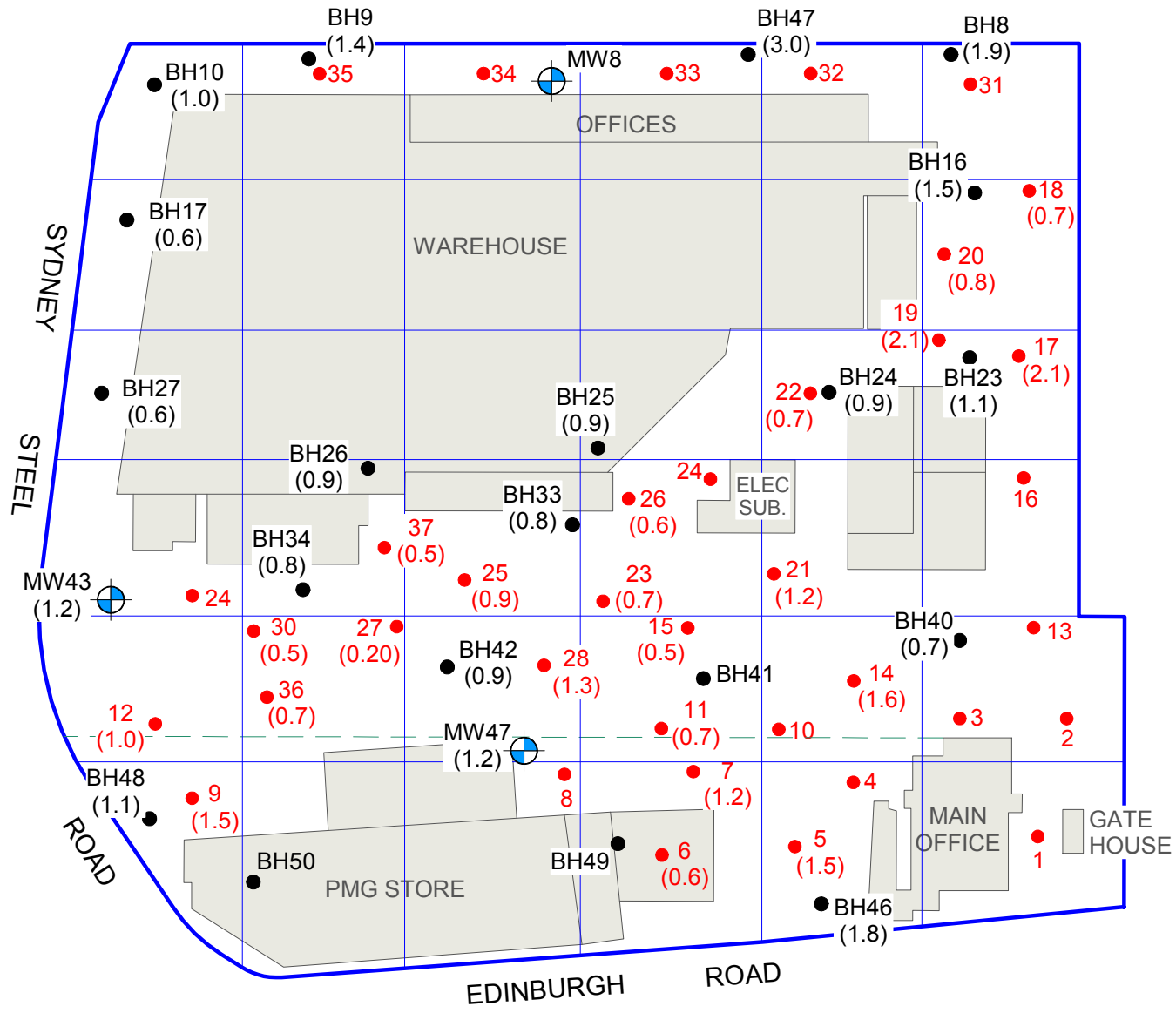
APPROVED:	D.G.
DATE:	02/12/2010

EASEMENT PLAN
HYDROX NOMINEES P/Y
74 EDINBURGH ROAD, MARRICKVILLE NSW 2204

SHEET SIZE:	PROJECT No.	REV:	
A4	1001078	01	FIGURE 4



PROPERTY BOUNDARY

BUILDING AS NOTED

SAMPLING GRID

FENCE

5 (1.5) DLA (2010) BORE LOCATIONS

BH9 (1.0) ERM (2005) BORE LOCATIONS

MW47 (1.2) ERM (2005) WELL LOCATIONS

(X.X) ALL BORE AND WELL READINGS DEPTH TO FILL NATIVE CONTACT (m)

LEGEND

PROPERTY BOUNDARY, SITE DETAILS, SAMPLE GRID & SAMPLE LOCATIONS TRACED OFF DLA ENVIRONMENTAL FIGURE 1 (30/09/2010). COLOUR, SHADING AND ADDITIONAL NOTATION BY GEO-LOGIX

NOTE

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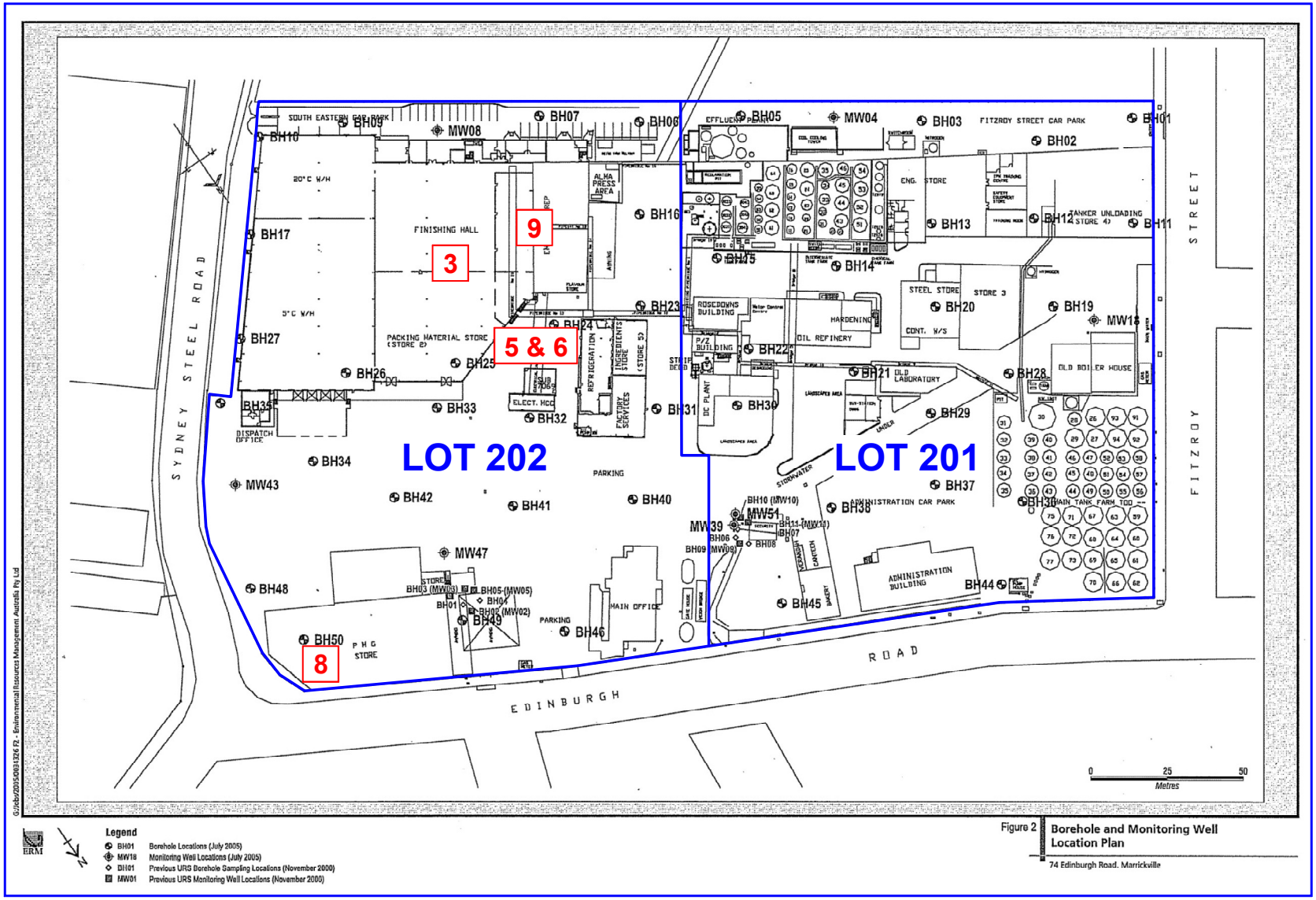
ERM (2005) DLA (2010) INVESTIGATION LOCATIONS

HYDROX NOMINEES P/Y

74 EDINBURGH ROAD, MARRICKVILLE NSW 2204

SHEET SIZE:	PROJECT No.	REV:	
A4	1001078	01	FIGURE 5



G:\jobs\2005\0061326 R2 - Environmental Resources Management Australia Pty Ltd

Legend

- BH01 Borehole Locations (July 2005)
- MW18 Monitoring Well Locations (July 2005)
- DH01 Previous URS Borehole Sampling Locations (November 2000)
- MW01 Previous URS Monitoring Well Locations (November 2000)

Figure 2 **Borehole and Monitoring Well Location Plan**

74 Edinburgh Road, Marrickville

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APPROVED:	D.G.
DATE:	02/12/2010

APPROXIMATE LOCATIONS OF DANGEROUS GOODS STORAGE DEPOTS 1998
HYDROX NOMINEES P/L
74 EDINBURGH ROAD, MARRICKVILLE NSW 2204

SHEET SIZE:	PROJECT No.	REV:	
A4	1001078	01	FIGURE 6

Appendix D: Example Waste Tracking Record

Offsite Disposal

Waste Classification Report/ Letter			Source Area Matches Area in Classification Letter/ Report?	Stockpile [2]					Material Observations		Treatments [7]				Statistics [7]	
Reference	Classification Under Letter[1]	Volume Classified Under Letter (m^3)		ID	Volume	Temporary Storage Area/ Reference	Volume (m^3)	Bulking Factor Used	Description	Evidence of Contamination	Treatment Details	Post-Treatment	Post Treatment Sampling	Post Treatment Classification [1]	Type	Results

[1] After NSW EPA Waste Classification Guidelines/ The excavated natural material order 2014 / Meets POEO VENM Definition / other

[2] If material was excavated and stockpiled post classification

[3] Samples must include those collected specifically for waste classification purposes and samples collected from the source area for purposes other than waste classification

[4] Keep Units Consistant

[5] If volume on docket is different to volume on Waste Classification Letter

[6] If one is available

[7] If undertaken

Disposal						
Receiving Facility	Receiving Facility Licence Numbr	Disposal Docket Reference	Quantity on Docket (m^3/ tonnes) [4]	Bulking Factor [5]	Consignment Note Reference [6]	Running Total Under the Waste Classification Letter (m3/ tonnes) [4]

Appendix E: Guidelines and Reference Documents

Contaminated Land Management Act 1997 (NSW)

Conveyancing Act (1919) (NSW).

Environmental Planning and Assessment Act 1979 (NSW)

Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998)

NSW DECCW, (2010). UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS

NSW DECCW, (2010). UPSS Technical Note: Site Validation Reporting

NSW EPA, (2015). Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997

NSW EPA, (2017). Guidelines for the NSW Site Auditor Scheme, 3rd Edition

NSW EPA, (2020). Consultants Reporting on Contaminated Land, Contaminated Land Guidelines

NSW EPA, (2020). Guidelines for the Implementation of the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019

National Environment Protection Council (NEPC), (2013). National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)

Protection of the Environment Operations Act 1997 (NSW)

Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019 (NSW)

SafeWork NSW, (2019). Code of Practice, How to Manage and Control Asbestos in the Workplace

Standards Australia, (2002). AS2460: Acoustics – Measurement of the Reverberation Time in Rooms

Standards Australia, (2008). AS4976: The Removal and Disposal of Underground Petroleum Storage Tanks

State Environmental Planning Policy No.55 – Remediation of Land 1998 (NSW)

WA DOH, (2009). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia

Work Health and Safety Regulation 2017 (NSW)