
Remediation Action Plan

Proposed Research and Life Science Development

100 Botany Road, Alexandria NSW

Prepared for Kurraba Group Pty Ltd

Project 221233.03

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

Signature

Date

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Remediation Action Plan

Proposed Research and Life Science Development

100 Botany Road, Alexandria NSW

1. Introduction

This Remediation Action Plan (RAP) has been prepared on behalf of the Kurraba Group (the Proponent) by Douglas Partners Pty Ltd (Douglas). It is submitted to the Department of Planning, Housing and Infrastructure (DPHI) in support of a State Significant Development Application (SSDA) SSD-63067458 for the construction of a new health research facility located at 74-108 Botany Road and 86-100 Wyndham Street, Alexandria (herein referred to as 100 Botany Road or the site, as shown on Drawing 1, Appendix A).

In accordance with section 4.39 of the *Environmental Planning & Assessment Act 1979* (EP&A Act), Secretary's Environmental Assessment Requirements (SEARs) for SSD-63067458 were issued on 16 January 2024. This report has been prepared to respond to the relevant issued SEARs, as set out in the table below.

Table 1: Summary relevant SEARs

SEARs item	Section of report and comment
17. Contamination and remediation In accordance with Chapter 4 of SEPP (Resilience and Hazards) 2021, assess and quantify any soil and groundwater contamination and demonstrate that the site is suitable (or will be suitable, after remediation) for the development.	All sections, conclusions provided in Section 18. This report provides comment on the contamination status of the site, recommended data gap investigations and remediation strategies in order to render the site suitable for the proposed development.

The following key guidelines were consulted in the preparation of this report:

- NEPC National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM] (NEPC, 2013);
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020); and
- CRC CARE *Remediation Action Plan: Development - Guideline on Establishing Remediation Objectives* (CRC CARE, 2019a).

The remediation objectives, devised in accordance with CRC (2019a), are to:

- Address potentially unacceptable risks to relevant environmental values from contamination; and
- Render the site suitable, from a contamination perspective, for the proposed development.

Based on the current information it is considered that the required works comprise Category 2 remediation. It is however noted based on the SEARs requirements the remediation would be effectively conducted per the development consent.

This RAP provides details of the work that will be required at the site to meet the remediation objectives.

This RAP presents the procedures and plans which provide the means by which site remediation can be achieved. This RAP is not a detailed specification; therefore, the Remediation Contractor must base their detailed work methodologies around the requirements of this RAP.

The site layout is shown on Drawing 1, Appendix A.

This report must be read in conjunction with all appendices including the notes provided in Appendix A.

2. Proposed development

It is understood that the Proponent is seeking consent for the redevelopment of 100 Botany Road for a new health research facility. Specifically, the SSDA seeks approval for:

- Demolition of all existing buildings, site preparation and remediation works;
- Bulk excavation to create two (2) levels of basement with access from Wyndham Street, including allowance for a below ground Proton Therapy Cancer Treatment Centre, car parking, loading and services;
- Construction and use of two (2) new health research buildings. One (1) building is proposed along Botany Road which has a stepped built form and is between seven (7) storey to the south and eleven (11) storeys to the north. One (1) building is proposed along Wyndham Street which is five (5) storeys in height. The two (2) buildings will include the following:
 - o Ground floor lobby and retail uses fronting Botany Road and Wyndham Street;
 - o Proton Therapy patient lobby from Wyndham Street;
 - o Various laboratories, write up areas and office spaces;
 - o A series of outdoor landscaped terraces within the Botany Road building; and
 - o One (1) rooftop plant level on each building.
- Landscaping and public domain works including:
 - o Construction and extension of Wyndham Lane as a shared laneway; and
 - o Construction of a pedestrian network including two (2) pathways from Botany Road and an east-west through-site link.
- Extension and augmentation of services and utilities to the development, as required.

Relevant client provided drawings are attached in Appendix A. Notably as relevant to this RAP the development includes the requirement for excavation across the majority of the site to accommodate the extent of the level 1 basement (with reduced deeper excavation required for the 2nd and 3rd level basements). A minor area is noted outside of the proposed basement extent at the northern boundary.

3. Scope of work

The scope of work to achieve the objective is as follows:

- Summarise the findings of previous investigations used to inform the status of contamination and contamination risk at the site;
- Present a conceptual site model (CSM) to list potential and likely contamination source, pathway and receptor linkages to address potentially unacceptable risks to human health and relevant environmental values from contamination;
- Define the anticipated extent of remediation;
- Assess, select and justify a preferred approach to remediation approach to render the site suitable for its proposed use, and which will minimise potentially unacceptable risk to human health and / or the environment and which includes the consideration of the principles of ecologically sustainable development;
- Select an appropriate remediation strategy to render the site suitable, from a contamination perspective, for the proposed development;
- Establish the remediation acceptance criteria (RAC) to be adopted for validation of remediation;
- Identify how successful implementation of the RAP will be demonstrated / validated;
- Outline waste classification, handling and tracking requirements;
- Outline environmental safeguards required to complete the remediation works; and
- Include contingency plans and an unexpected finds protocol.

4. Site description

Site address	74-108 Botany Road and 86-100 Wyndham Street
Legal description	Lot 2 DP 136012 Lot 11 DP 219505 Lot 11 DP 135914 Lot 2 DP 659166 Lot 1 DP 510091 Lot 3 DP 1146614
Area	5,350.6 m ² (per client provided information)
Zoning	MU1 – mixed use
Local Council Area	The Council of the City of Sydney

Current use	Commercial / Industrial / Retail
Surrounding uses	North – Commercial East – Metro Waterloo Station Development South – Residential, commercial West – Residential, commercial



 Site Boundaries



Figure 1: Site location (imagery provided by Nearmap, Ethos Urban)

5. Environmental setting

Regional Topography	Regional topography is generally low-lying (< 20 m Australian Height Datum (AHD)) sloping to the south-west towards Sydney Park and Alexandria Canal located approximately 1.5 km to the south-west.
Site Topography	Site topography is relatively flat with levels of approximately ~14-16 m AHD, surveyed test locations ranged between 14.6 to 15.6 m AHD.
Soil Landscape	The site is mapped as being within the Aeolian (i.e., wind-blown dune sands) Tuggerah group which generally comprises shallow brown, to bleached / grey sand separated by layers of iron indurated

	sands (i.e., " <i>coffee rock</i> ") further underlain by yellow / yellow-brown sand / silty sands.
Geology	Reference to the NSW Seamless Geology dataset indicates that the site is underlain by Quaternary aeolian sand deposits of transgressive dune sands.
Acid Sulfate Soils (ASS)	The site is mapped in an area of extremely low to no ASS risk. Based on the previous investigations no further ASS management is considered necessary.
Surface Water	Surface water flows are anticipated to be intercepted by the local stormwater systems. The nearest surface water body is Alexandria Canal, located to the south-west.
Groundwater	Groundwater is expected to follow the regional topography and flow generally to the south and southwest. Review of previous desktop information indicated recorded standing water levels in the order of ~3.5-6 m bgl within the region. Previous results from on-site wells indicated standing water levels ranging between ~2.0 -3.2 m bgl. The site is noted to be located in the Botany Groundwater exclusion zone (Zone 2), which bans domestic uses of groundwater, and any industrial usage requires annual testing. Extraction for the purposes of construction dewatering is noted to be exempt (Botany Sands exemption¹)

6. Summary of previous investigations

6.1 Previous reports

The following previous reports are relevant to this RAP:

Regarding 74-88 Botany Road

- Alliance Geotechnical (AG) – Soil Waste Classification (AG, 2017a); and
- AG - Remediation Action Plan (AG, 2017b).

Regarding 90-108 Botany Road and 86-100 Wyndham Street

- Douglas Due Preliminary Contamination Assessment (DP, 2023a);
- Douglas Geotechnical Desktop Study (Douglas, 2023b); and
- Douglas Detailed Site Investigation (DSI) (DP, 2024).

¹ Expiration currently dated at 30 June 2025

The DSI provided a review of the previous reports, including results within the AG reports, including comparison of the AG results against the more recent results, and applicable screening levels for the current proposed development. The DSI itself included an intrusive testing programme for soils, groundwater and soil vapour, in addition to supplementary desktop reviews.

The following sections provide a summary of key information presented in the DSI. Previous results are attached in Appendix C, and previous borehole logs in Appendix D. Test locations are shown in the drawings in Appendix A.

6.1.1 **Site history and registers**

A review of historical aerial imagery noted that the site and surrounding area historically comprised a mixture of residential and commercial / industrial land-uses. Specifically, the site was redeveloped circa 1960-70 to the approximate existing configuration, and generally intensified development of the surrounding area beginning *circa* 1960. More recent significant development has occurred with the construction of the Waterloo Station development to the east.

No notable records were identified on NSW EPA public registers.

Business directory records indicated the following activities present within the site:

- Manufacturing and wholesale/retail: (including inter alia) tools, pumps, furniture, boat / ship accessories, motor exhaust / mufflers, metals and welding;
- Motor body repairs / painting;
- Motor garage (circa 1950-60);
- Service station (circa 1960), including potential underground storage tanks; and
- Dry cleaners (circa 1950).

Off-site sources also included a dry cleaner to the east (within the now current Waterloo Station development site), and another motor garage / service station to the west and north-west.



Figure 2: On-site and nearby dry cleaners / service stations (showing current site boundary), adapted from DP (2023a)

6.1.2 Fieldwork

Relevant previous investigations identified the following general below ground conditions:

- Hardstand – asphaltic concrete or concrete slabs generally to depths of 0.1 – 0.2 m;
- FILL – generally comprising sand with various inclusions such as brick, tile, terracotta, metal, wood, glass, charcoal / ash, and suspected asbestos containing materials generally to depths of ~0.8 - 1.0 m, and up to a maximum of 1.6 m (BH103);
- SAND – natural aeolian sands, to depth of the Douglas contamination boreholes. Aeolian sands were identified extending to depths of up to 7.6-9.5 m in deeper geotechnical boreholes;
- Silty SAND – isolated bands of silty sand (with organic / peaty inclusions) at BH3 between ~5.5 to 9.5 m; overlying;
- Silty CLAY / Gravelly CLAY: residual clays / extremely weathered materials soils between 7.6 to 17.4 m bgl; and
- BEDROCK – comprising shallow shale, laminite and deeper sandstone.

The presence of a second suspected buried slab was noted in the Alliance Geotechnical reports at 74-88 Botany Road, between ~0.8 to 1.0 m below existing ground levels.

No significant indicators of contamination such as elevated photo-ionisation detector (PID) readings were noted in soils, or gross staining. Suspect asbestos containing materials were recovered from one borehole for laboratory analysis. Alliance Geotechnical reports noted the presence of some hydrocarbons odours in fill materials (within 74-88 Botany Road).

Groundwater levels were identified between 2.0 to 3.1 m bgl, with an inferred flow direction to the south / south-west. No non-aqueous phase liquid (NAPL) was observed whilst sampling by visual inspection, or by an electronic interface meter during previous sampling.

Initial screening of soil vapour test locations with a PID indicated relatively low (i.e., <10 ppm) VOC concentrations.

6.1.3 Summary soil results

Summary exceedances of the previously adopted site assessment criteria (SAC) for soils is given below in Table 2. All test locations are from Douglas investigations unless noted with '(AG)', which include results reviewed by Douglas from previous Alliance Geotechnical reports against the relevant adopted SAC in the DSI (refer further discussion presented in Section 11).

Table 2: Summary exceedances of SAC (soils)

Analyte (Tier 1 SAC)	Location	Depth (m)	Result (mg/kg)
Lead (HIL D – 1500 mg/kg)	BH101	0.2-0.3	1,800
	BH101	0.5-0.6	8,100
	BH113	1-1.1	2,900
	BH2	0.2-0.3	21,000
	BH1(AG)	0.1-0.3	6,200
	BH1(AG)	0.7-0.8	5,000
	BH3(AG)	0.7-0.9	24,000
	BH4(AG)	0.2-0.3	4,900
	BH5(AG)	0.2-0.2	71,000
	MW3(AG)	0.5-0.7	2,700
	MW4(AG)	0.2-0.3	1,700
	BH9 (AG)	0.2-0.4	2,100
	BH9 (AG)	1-1.3	5,200
	BH13 (AG)	0.2-0.4	4,200
	BH15(AG)	0.7-0.9	1,600

Analyte (Tier 1 SAC)	Location	Depth (m)	Result (mg/kg)
Total Chromium (HIL D – 3600 mg/kg)	BH4(AG)	0.2-0.3	5,800
BaP TEQ (HIL D – 40 mg/kg)	BH2	0.1-0.2	200
Total PCB (HIL D – 7 mg/kg)	BH2	0.9-1.0	15.8
TRH (F3) Management Limits (3500 mg/kg)	BH3	0.1-0.2	9000
	BH101	0.5-0.6	4300
Asbestos (HSL D - 0.001% w/w [AF/FA] or detection)	BH101	0.2	Detected
		0.5-0.6	Detected, 0.0158 % w/w (AF/FA)
	BH102	0.5-0.6	Detected
	BH103	0.2-0.3	Detected
		0.5-0.6	Detected, 0.0283 % w/w (AF/FA)
	BH106	0.2-0.3	Detected
	BH107	0.2-0.3	Detected
	BH108	0.5-0.6	Detected
	BH1(AG)	0.1-0.3	Detected (including respirable fibres)
		0.7-0.8	Detected (including respirable fibres)
	BH3(AG)	0.2-0.4	Detected
	BH4(AG)	0.2-0.3	Detected (including respirable fibres)
	BH7(AG)	0.2-0.4	Detected
	BH8(AG)	0.2-0.4	Detected
	MW4(AG)	0.2-0.3	Detected

SAC – site assessment criteria
 HIL – health investigation level
 HSL – health screening level
 AF/FA – asbestos fines / fibrous asbestos

The above exceedances were noted to be limited to fill, with no exceedances detected within natural soils. Detections of other analytes in fill above the limit of reporting (but within the SAC) included:

- Heavy metals, predominately as copper and zinc;
- PAH, including benzo(a)pyrene (i.e. excluding BH2/0.1-0.2);
- TRH (excluding BH101/0.5-0.6);
- PFAS; and
- OCP (BH103/0.2-0.3 as Aldrin and Dieldrin).

No BTEX, VOC, OPP or phenols were detected above the limit of reporting.

High concentrations of lead detected in soils were also found to correspond to potentially leachable concentrations ranging up to 170 mg/L (under acidic conditions). With the highest leachable rate observed at BH113/1-1.1 (2,900 mg/kg primary sample, 170 mg/L leachable), compared to a lower leachability at the peak lead in soil concentration at BH2/0.2-0.3 (21,000 mg/kg primary sample, 44 mg/L leachable), which suggests inherent heterogeneity of the lead contamination in fill.

6.1.4 Groundwater summary results

All results were below the SAC, with the exception of:

- Copper (filtered metals): 2 to 84 µg/L;
- Zinc (filtered metals): 20 to 283 µg/L;
- Nickel (filtered metals) – 14 µg/L (BH1); and
- PFAS (as PFOS) – 0.003 to 0.297 µg/L.

Based on previous AG results, similar exceedances of metals were identified as follows:

- Copper (filtered metals): 2 to 4 µg/L; and
- Zinc (filtered metals): 20 to 66 µg/L.

It is noted that the following VOC and TRH were detected above the PQL (within the SAC):

- BH1 - tetrachloroethene (PCE) – 10 µg/L
- BH2 – trichloromethane (chloroform)- 8 µg/L ; and
- BH3 – TRH C10-16 - 150 µg/L.

6.1.5 Soil vapour

No exceedances of the SAC were identified in soil vapour. Concentrations above the laboratory detection limit included:

- PCE, 5 -731 µg/m³;
- Trichloroethene, 6 – 9 µg/m³;
- Benzene, 3 – 4 µg/m³;

- Toluene, 38 – 62 µg/m³;
- Ethylbenzene, 4 – 5 µg/m³;
- m+p Xylenes, 12 – 16 µg/m³;
- o-Xylene, 4 -5 µg/m³;
- Air-phase TRH F1, 324 – 472 µg/m³; and
- Air-phase TRH F2, 53 – 76 µg/m³.

The DSI concluded that no further management of soil vapour risks was required, with the residual risks considered to be further managed as part of basement excavation, and excavation dewatering. Particularly as regarding chlorinated VOC, based on the maximum magnitude of groundwater concentrations (10 µg/L, as PCE), and considering the soil vapour concentrations it was considered unlikely that an exposure scenario for the final landform of direct contact and seepage through basement walls would result in unacceptable vapour risks.

BH1 and BH2 are potential downgradient locations of the historical dry cleaner, (noting BH1 more likely cross gradient). BH1 included a screened interval of 12-15 m bgl (terminating at the start of rock, a potential aquitard to the overlying clays). BH2 included a screen to 7.6 m bgl (sitting above a silty clay layer) which is another potential aquitard for the more permeable sands / silty sands situated above. It is considered that any significant historical leaks of would have likely included indicators of significant chlorinated VOC at these potential aquitard layers (albeit noting potential for further vertical migration to deeper layers in joints / defects in rock).

The screening intervals are also noted to cover the expected basement excavation depths (~up to 7 m, for the majority of the site, and limited deeper excavation to 15 m bgl (refer design drawings in Appendix A)).

Furthermore, the proposed development would necessarily entail removal of potential sources of chlorinated VOC in soils, and to a lesser extent in groundwater during construction dewatering, such that any potential remnant sources would be considered minimal.

This conclusion was contingent on not undertaking a drained basement design (currently considered unlikely), otherwise further risk assessment may be required to assess the residual risk of vapour intrusion from direct seepage into the basement (i.e., potential higher volumes of ingress).

6.1.6 Waste classification of soils

Previous Douglas results identified exceedances of contaminant thresholds (CT) for general solid waste (CTI) as follows:

- Lead (multiple samples), ranging between 120 – 10340 mg/kg (CTI – 100 mg/kg);
- Benzo(a)pyrene, generally ranging between 0.88 to 1.9 mg/kg (CTI – 0.7 mg/kg). Higher results of 150 mg/kg were detected at BH2/0.2-0.3;
- Nickel BH101/0.5-0.6 (210 mg/kg), and BH1/0.2-0.3 (40 mg/kg) (CTI – 40 mg/kg); and
- Mercury (BH101/0.5-0.6, 7.9 mg/kg, and BH110-0.2-0.3, 8.5 mg/kg (CTI – 4 mg/kg).

Exceedances of specific contamination concentrations (SCC) for GSW and potentially exceeding restricted solid waste were also noted as follows:

- Lead exceeding SCC1 – 1500 mg/kg (BH101/0.2-0.3 and 0.5-0.6, BH113/1-1.1 and BH1/0.2-0.3);
- Lead exceeding SCC2 – 6000 mg/kg (BH1); and
- Benzo(a)pyrene exceeding SCC1 (10 mg/kg) and SCC2 (23 mg/kg) – BH2/0.1-0.2.

Additional toxicity characteristic leaching procedure (TCLP) testing was conducted on worst case samples for lead, metals and PAH. The following was noted from the results:

- PAH, nickel and mercury concentrations are generally non-leaching, suggesting further analysis may demonstrate suitability of classifying in conjunction with the SCC concentrations; and
- Lead concentrations ranged from low 0.1 mg/L to high 170 mg/L, including exceedances of TCLP1 (5 mg/L) and TCLP2 (20 mg/L). Current results indicatively show where exceedances of SCC1 or SCC2 occur, corresponding exceedances of the TCLP criteria exist. As noted in Section 12.1, higher SCC concentrations did not directly correspond to higher TCLP concentrations such that there likely exists inherent heterogeneity of the lead contamination in the fill.

Based the available results it is considered likely that additional asbestos is present throughout all fill soils until further assessed (e.g., further visual assessment / screening through test pitting following removal of hardstand). Current and previous results have identified both non-friable and friable asbestos.

Presence of PCB at BH2/0.9-1.0, OCP at BH103 above 2 mg/kg indicates materials in this area will need to be managed as per the NSW EPA Scheduled Chemical Wastes Chemical Control Order 2004. As the concentrations are less than a total of 50 mg/kg the materials may be transported off-site in accordance with the Order, to a receiving facility which can receive in accordance with their Environmental Protection Licence (EPL).

Previous AG results identified lead exceedances (relevant to 74-88 Botany Road) of SCC1 criteria, and limited exceedance of SCC2 (BH5[AG]) with corresponding exceedances of TCLP2 for lead.

Based on the previous results, preliminary waste classifications were provided in the DSI as follows:

- Restricted solid waste – special waste (asbestos). Currently identified at BH2/0.9-1, BH101/0.2-0.3, and more generally for the area at 74-88 Botany Road based on the previous AG results;
- Hazardous solid waste– special waste asbestos. Currently identified at/near BH5[AG], BH2/0.2-0.3, BH101/0.5-0.6, BH113/1-1.1;
- Materials to be managed as per the Scheduled Chemical Waste Control Order – BH2 and BH103; and
- Remainder of fill – general solid waste (non-putrescible) – special waste (asbestos).

Douglas also notes there is a risk of further elevated waste classifications due to the current detection of lead in soil, and similar fill encountered across the site. Therefore, further investigation / assessment is recommended to provide a waste management strategy for fill requiring off-site disposal.

7. Conceptual site model

The following conceptual site model (CSM) summarises the current potential contamination sources (S) – pathways (P) and receptors (R), and associated linkages, based on the results of the previous investigations.

Potential sources
S1: Fill: Associated with levelling, demolition of former buildings on the site, including potential uncontrolled fill. S4: Previous on-site commercial / industrial land-uses, including motor garage / repairs, manufacturing / wholesales etc. CoPC: metals, PAH, asbestos Secondary CoPC: OCP, PCB, TRH, BTEX, PFAS
S2: Former service station (on-site), including potentially disused / abandoned UST and appurtenances which may have caused leaks / spills of fuels (e.g., petrol / diesel), fuel additives or oils / greases. CoPC: lead, TRH, BTEX, PAH, phenols and VOC
S3: Former dry cleaner(on-site), including historical leaks / spills from chlorinated solvent usage / storage CoPC include chlorinated VOC
S5: Existing buildings (i.e., risk of cross contamination of soils after demolition) CoPC include asbestos, synthetic mineral fibres (SMF), lead (in paint) and PCB

Table 3: Summary of potential receptors and pathways

Potential human receptors
HR1: Current users [commercial] HR2: Construction and maintenance workers HR3: End users [commercial (workers and visitors)] HR4: Adjacent site users [residential, commercial]
Potential environmental receptors
ER1: Surface water [Alexandria Canal] ER2: Groundwater Based on the current and future proposed land-form it is considered that there would be no significant on-site terrestrial ecosystem receptors (i.e. hardstand cover or new basements).
Potential pathways to human receptors
HP1: Ingestion and dermal contact HP2: Inhalation of dust and / or vapours

Potential pathways to environmental receptors
EPI: Surface water run-off (considered limited to risks during construction works given existing hardstand cover) EP2: Leaching of contaminants and vertical migration into groundwater EP3: Lateral migration of groundwater providing base flow to water bodies

Table 4: Updated summary of potentially complete exposure pathways

Source and CoPC	Exposure pathway	Receptor	Risk management action
S1/S4: Fill CoPC include metals, PAH, asbestos Secondary CoPC: TRH, BTEX, PFAS	HP1: Ingestion and dermal contact HP2: Inhalation of dust and / or vapours	HR1: Current users [commercial] HR2: Construction and maintenance workers HR3: End users [commercial]	Data gap investigation following demolition to provide data principally for waste classification purposes to facilitate off-site disposal (all fill) during basement formation.
	EP3: Lateral migration of groundwater providing base flow to water bodies	ER1: Surface water	
	EP2: Leaching of contaminants and vertical migration into groundwater	ER2: Groundwater	
S2: Former service station (on-site), CoPC include lead, TRH, BTEX, PAH, phenols and VOC S3: Former dry cleaner(on-site) CoPC include chlorinated VOC	HP1: Ingestion and dermal contact HP2: Inhalation of vapours	HR2: Construction and maintenance workers	Decomissioning of suspected UST during site excavation works. Localised soil / water impacts may be present (e.g., tank pits) Residual vapour intrusion risks considered to be not significant dependent on a tanked basement design. Manage residual risk to groundwater as part of dewatering planning
	HP1: Ingestion and dermal contact HP2: Inhalation of vapours Including as a result of potential direct seepage through groundwater contact with basement	HR2: Construction and maintenance workers HR3: End users [commercial]	
	EP2: Leaching of contaminants and vertical migration into groundwater	ER2: Groundwater	

Source and CoPC	Exposure pathway	Receptor	Risk management action
	EP3: Lateral migration of groundwater providing base flow to water bodies	ERI: Surface water	
S5: Existing buildings (i.e. risk of cross contamination of soils after demolition) CoPC include asbestos, synthetic mineral fibres (SMF), lead (in paint) and PCB	HP1: Ingestion and dermal contact HP2: Inhalation of dust and / or vapours	HR1: Current users [commercial] HR2: Construction and maintenance workers HR3: End users [commercial]	Conduct hazardous building material survey prior to demolition. (Understood to have been conducted as part of the SSDA submission)
	HP2: Inhalation of dust and / or vapours	HR4: Adjacent site users [commercial / residential]	

8. Remediation extent

The extent of remediation comprises:

- Asbestos (all fill) - suspected or known to be contaminated with asbestos (friable and non-friable), results currently limited to identification in soil, and AF/FA analysis. However, based on current results it is considered there is a risk of exceedances of bulk w/w% SAC (bonded) asbestos in soils;
- Lead in soil – currently identified above Tier 1 SAC for 74-88 Botany Road, with additional exceedances identified at BH113 and BH2 (internal laneway) between other structures. Generally, it is considered there is a risk of additional elevated lead in soils which would require management, potentially given the source of lead may represent the same source as asbestos in soil (i.e., previous demolition and impacted fill). Given the comingling with asbestos it is considered these impacts are to be managed concurrently;
- Total chromium – BH4(AG) exceeding Tier 1 SAC;
- TRH in soil – BH101 (0.5-0.6 m) and BH3 (0.1-0.2) current exceeding management limits (TRH fractions F3). Noted to be comingled with the above. Current groundwater results do not indicate significant impacts to groundwater which may otherwise be suggestive of a management limit exceedance;
- PCB in soil – BH2 (deeper fill, ~1m) exceeding Tier 1 SAC (total PCB);
- PAH in soil – BH2 (shallow fill 0.1-0.2 m) exceeding Tier 1 SAC criteria for BaP TEQ. Further delineation / assessment is recommended to determine whether the impacts are as a result of asphalt / bitumen fragments; and
- Suspected UST (if present) – may include localised heavy metal, TRH/BTEX, PAH impacts in soils / groundwater. If present, remediation would require decommissioning and removal / destruction of tank(s).

As per the recommended data gap investigations (following demolition and removal of hardstands, refer Section 10.2) there may be potential to reduce the extent of remediation. However, given the requirement for basement formation it is considered that this will effectively comprise management of waste disposal streams.

The actual extent (the final remediation extent) will be established at the completion of the excavation of the area during remediation and as part of the validation process.

9. Remediation options assessment

The objective of the remediation options assessment and evaluation is to establish a preferred remediation strategy. The process involves canvassing various remedial options which may be viable and then ranking each option based on a number of evaluation criteria. The remediation options assessment was undertaken with reference to CRC CARE *Remediation Action Plan: Development - Guideline on Performing Remediation Options Assessment* (CRC CARE, 2019b), and is outlined below.

No action

Given the nature of contamination this option is currently not considered viable as:

- Asbestos concentrations have been identified exceeding HSL for friable asbestos (AF/FA);
- Further site-specific risk assessment for lead in soil would not significantly change the comparative screening criteria given the maturity of lead risk assessment inputs in existing Tier 1 criteria;
- Bulk soils are to be excavated as part of the proposed development, so the excavation and disposal process requires action based on soil contamination; and
- UST if present were likely not properly decommissioned (e.g., abandoned *in-situ*) and therefore would require management.

Treatment

Not considered viable for asbestos in soils given presence of potential friable materials (AF/FA).

Treatment of lead in soils may be beneficial to manage off-site disposal options, as previously considered for the 74-88 Botany Road RAP (AG, 2017b). Treatment may consider adoption of relatively simple soil additives to immobilise the lead concentrations through chemical additives, or physical (cement stabilised).

Any soil treatment will need to consider complications with treating soils contaminated with asbestos materials (bonded and friable). As such the relative merits of on- versus off-site treatment are as follows:

- On-site
 - Minimisation of transport costs (i.e., single trip to destination landfill);
 - Potential limitations to treatment rates based on site area / space; and
 - Additional safety considerations for managing asbestos contaminated soils, e.g., buffer to site boundaries, other workers / members of the public

- Off-site
 - Additional transport costs, i.e., transport to treatment facility, then transport to receiving site. This presents additional risks for asbestos cross-contamination during additional handling of the materials; and
 - Higher treatment rates, and amount of on-site space required. This would also eliminate potential delays to site works depending on the works sequence adopted by the remediation and civil contractor(s).

The above options would need to be combined with an application to the NSW EPA for a site-specific immobilisation order.

On-Site Management

Currently considered not viable given requirement for basement formation and therefore significant over excavation (below groundwater) would be required to encapsulate the soils beneath the bulk excavation level. Presence of groundwater in a potential burial cell may also require combination with soil immobilisation (e.g., lead in soils) to minimise risk of leaching into groundwater.

Off-Site Disposal

Considered viable given the requirement for basement formation. Without further remediation options (i.e., treatment) this option would however result in additional disposal costs given the currently identified preliminary waste classifications including restricted and hazardous solid waste, in addition to management of known asbestos waste (special waste).

Off-site disposal on this basis is adopted as the preferred remediation option.

10. Preferred remediation strategy

10.1 General sequence

The general sequence of remediation shall be determined by the Remediation Contractor with the aim of minimising the potential for cross contamination of 'clean' areas / soils with contaminated soils. This should include avoiding, wherever possible transporting or placing contaminated soil over 'clean' areas separating stockpiles of different origin / contamination profile and validating the complete removal of any contaminated material placed / potentially impacting 'clean' areas.

The below tasks have been formulated based on current plans requiring excavation across the site for basement formation. Minimal areas are noted outside of the proposed basement (i.e., level 1), which are currently proposed to be excavated as part of the bulk excavation remediation tasks proposed. Should any fill be proposed to be retained then further amendment of this RAP would be required.

Task 1

Data gap investigation following demolition to provide further assessment of asbestos in soil risks, to provide further data inputs for management of lead in soil contamination, i.e., if on- or off-site treatment is considered, assessment of the presence of USTs, and to further inform the waste classifications.

Task 2

Excavation of all fill for off-site disposal based on the following approach options:

- Option 1 – on-site treatment of soils, and off-site waste disposal;
- Option 2 – off-site treatment of soils and off-site waste disposal; and
- Option 3 (default fallback approach if no treatment is considered) – off-site waste disposal under waste classifications assigned without treatment.

Task 3 (concurrent with Task 2)

- Removal and decommissioning of UST (currently suspected, to be further investigated in Task 1).

Task 4

- Validation and classification of natural soils / rock following fill removal.

Roles and responsibilities are outlined in the site management plan (Appendix F).

10.2 Task 1: Data gap investigation

Based on the site area and previous sampling densities it is recommended to undertake sampling to provide approximate 'double' sampling density for the purposes of refining the extent of asbestos contaminated soils, and the risk of any further impacts as a result of demolition works. The data gap works may opportunistically be used to potentially identify the presence of suspected USTs following removal of existing building slabs which currently limit the effectiveness of ground penetrating radar (GPR).

The additional density testing would supplement the previous results, noting the limitations of boreholes to provide visual assessment of asbestos in soils, and more generally provide additional sampling density for the purposes of classifying the soils for off-site disposal.

Table 2 of NSW EPA (2022) recommends a minimum of 12 sampling points for a site of ~5,400 m², which is recommended as a minimum for the additional investigation. Additional targeted assessment is recommended to target potential SCC2 exceedances (lead in soil), and for management of schedule chemical waste.

The sequence would be as follows:

- Visual inspection and clearance following demolition and removal of hardstand by the Occupational Hygienist;
- Services screening and GPR in areas of suspected USTs;

- Set out a minimum 12 test locations to provide systematic site coverage;
- Excavate test pits to depth of fill (i.e., extending ~0.5 m into natural soils);
- Collection of soil samples at regular depth intervals to analyse for the primary CoPC i.e.:
 - o Metals;
 - o TRH / BTEX;
 - o PAH;
 - o Asbestos (AF/FA); and
 - o Limited analysis of the secondary CoPC, i.e. OCP, PCB, TRH, BTEX, and PFAS.
- Collection of additional ~10 L bulk samples (1 per each metre of fill or stata), and screening through a 7 mm sieve for potential asbestos materials in soil;
- Additional delineation test locations of the following previous test locations, i.e., 4 locations within 3-5 m targeting minimum 0.5 m depth below previously identified contamination:
 - o BH101 – lead;
 - o BH1 – lead;
 - o BH2 – PAH, lead and PCB;
 - o BH103 – OCP;
 - o BH3[AG] – lead; and
 - o BH5[AG] – lead.
- Analysis for the specific CoPC at each of the above locations, targeting depth of previously identified contamination;
- Provision of a revised *in-situ* waste classification, and otherwise to provide relevant information inputs if on or off-site treatment is to be considered;
- Preparation of a data gap investigation report in accordance with NSW EPA (2020), for Auditor review; and
- Revision of this RAP if required.

If any areas are potentially considered free of asbestos as a result of the testing then further test pitting is recommended to establish full double density testing (given limitations of previous borehole testing). This will be established per the rates established in Section 12.2.

The data gap investigation report (and revised RAP, if required) is to be provided to the Site Auditor for review and comment.

10.3 Task 2: Excavation, treatment and disposal of fill

The below options will apply to all fill at the site. Currently the proposed option has not been finalised and will depend on further consultation with specialist remediation contractors and may be revised based on outcomes of the recommended data gap testing.

10.3.1 Option 1 – On-site treatment

- Determination of an appropriate treatment method and process, potentially following field trials;
- Application to the NSW EPA for a site-specific immobilisation order. Confirmation should also be sought from receiving facilities (with respect to limits of their Environmental Protection Licences (EPL)) as to whether they can receive the materials under the site-specific order;
- **HOLD POINT – No treatment should commence until approval of the site specific order is provided, otherwise soils will be disposed under the default contingency off-site;**
- Preparation of a treatment area, noting requirements to handle materials as known / potential asbestos containing materials. In this regard the Occupational Hygienist should be consulted for any corresponding requirements;
- Excavation of soils and batchwise treatment using proposed additive by the Remediation Contractor;
- Stockpiling treated soils for verification sampling by the Environmental Consultant. Testing of stockpiles is to comprise assessment per requirements of the order but may be anticipated to require:
 - o Sampling rates per existing NSW EPA guidance, e.g., minimum 3-10 samples, and samples per 25-250 m³ of like material – depending on size of the stockpile;
 - o Laboratory analysis for lead (specific concentration in soils);
 - o Laboratory analysis for leachable lead concentrations, e.g., under acidic pH conditions; and
 - o Confirmation by the Environmental Consultant that the batch meets specifications and may be disposed at the designated receiving facility.
- Repeating for each batch of fill soils.

10.3.2 Option 2 – Offsite-site treatment

- Determination of an appropriate off site treatment facility, treatment method and process, potentially following field trials;
- Application to the NSW EPA for a site-specific immobilisation order. Confirmation should also be sought from receiving facilities (with respect to limits of their Environmental Protection Licences (EPL)) to whether they can receive the materials under the site-specific order;
- **HOLD POINT – No movement of material off-site should commence until approval of the site specific order is provided, otherwise soils will be disposed under the default contingency off-site;**
- Excavation of soils and transport to the nominated treatment facility. Noting requirements for transport of the materials as asbestos waste, and associated management specified by the Occupational Hygienist;
- Treatment of the soils at the nominated facility, likely batchwise;

- Testing of stockpiles per requirements of the order by the Environmental Consultant:
 - o Sampling rates per existing NSW EPA guidance, e.g., minimum 3-10 samples, and samples per 25-250 m³ of like material – depending on size of the stockpile;
 - o Laboratory analysis for lead (specific concentration in soils);
 - o Laboratory analysis for leachable lead concentrations, e.g. under acidic pH conditions; and
 - o Confirmation by the Environmental Consultant that the batch meets specifications and may be disposed at the designated receiving facility.
- Transport to nominated receiving facility; and
- Undertaking requisite decontamination (for asbestos) and clearances by the treatment facility / Occupational Hygienist.

10.3.3 **Option 3 – Offsite-site disposal (no-treatment)**

- Excavation of the soils for stockpiling and waste classification by the Environmental Consultant. Depending on outcomes of the data gap investigation it may be recommended to commence direct loading, e.g. with supervision by the Environmental Consultant / Occupational Hygienist;
- Transport to nominated receiving facility; and
- Undertaking requisite decontamination (for asbestos) and clearances by the treatment facility / Occupational Hygienist.

This option will be undertaken should treatment fail, no site-specific order is finalised, or the nominated treatment facility/receiving facility cannot accept material under specific requirements of the site-specific immobilisation order.

10.4 **Task 3: UST management**

UST removal works, if identified by the data gap investigation, or more generally during site excavation, are to be conducted with reference to the following safety considerations in addition to those in the below sequence and general requirements in Section 7 of the NSW EPA UPSS Guidelines (NSW EPA, 2020a):

- Australian Standard AS 1940–2017, The Storage and Handling of Flammable and Combustible Liquids (AS 1940, 2017);
- Australian Standard AS 4976–2008, The Removal and Disposal of Underground Petroleum Storage Tanks (AS 4976, 2008);
- SafeWork NSW safety alert WC01188, Potential Risks when Removing Underground Storage Tanks²; and
- Australian Standard AS 1674.1, Safety in Welding and Allied Processes - Fire Precautions (AS 1674.1, 1997).

² <https://www.safework.nsw.gov.au/resource-library/potential-risks-when-removing-underground-storage-tanks-safety-alert>

If suspected UST, or former UST pits (e.g., dark staining soils, liquid sheens, excessive hydrocarbon odours) are identified during site excavation the following general procedure is to be undertaken:

- Stop excavation works, and notify the Environmental Consultant, who is to inspect the area;
- Decommissioning of the UST (if present) by a suitably qualified contractor by the following process:
 - Pumping out of all fluids from the tank and de-gassing. Any pumped out liquid is to be disposed to an appropriately licensed receiving facility;
 - Ensure all associated pipework is disconnected and made safe so that no flammable or combustible liquids remain;
 - During any cutting or removal of the tank air monitoring should be undertaken to assess whether any potential flammable / explosive vapours are within or nearby the tank (e.g., as measured by lower explosive limit (LEL) of a representative gas);
 - Before removing the tank should be checked to ensure it can withstand lifting / transport; and
 - Removal of the tank (e.g., using chains or lifting lugs) and appropriate off-site disposal.
- Excavation of impacted soils surrounding the tank / tank pit as supervised by the Environmental Consultant.

At a minimum this is anticipated to comprise sandy / gravel fill typically used as backfill in UST pits but may also include other fill or adjacent natural soils. The depth of excavation is anticipated to extend to natural soils. The vertical (and lateral) extent will also be informed by field observations (staining, odours and PID screening of soils);

- Any free liquids in the excavation are to be additionally pumped out and disposed to an appropriately licensed facility;
- Collection of validation samples from the base (1 per 25 - 50 m²) and walls of the excavation as per Section 12. Analysis to comprise:
 - Field assessment using a PID by collection of a small bag sample (~40g), allowing it to equilibrate and then screening of headspace within the bag. Results in excess of 50 ppm may indicate requirement for further excavation; and
 - Collection of jar samples, and minimum laboratory analysis for TPH, BTEXN, PAH and metals. Analysis of other analytes (e.g., VOC, asbestos in backfill) may also be warranted and to be assessed by the Environmental Consultant.
- Expansion of the excavation as necessary and re-testing of soils at the base or side walls of the excavation until analytical results meet the RAC.

Classification of stockpiled soils by the Environmental Consultant in accordance with Section 13 for off-site disposal.

10.5 Validation and classification of natural soils / rock

Following removal of all fill, e.g., within a nominated subsection (provided potential cross contamination is appropriately managed) or whole site area, the following sequence is to be followed:

- Visual inspection and clearance following demolition and removal of hardstand by the Occupational Hygienist;
- Inspection and sampling from the base of the excavation at the rates set out in Section 12 by the Environmental Consultant. If areas extent to fill within the current site, then testing will also include sampling of walls at the rates set out in Section 12;
- Analysis for the CoPC per Sources S1 and S2:
 - o Metals;
 - o TRH / BTEX;
 - o PAH;
 - o Asbestos (AF/FA); and
 - o Limited analysis of the secondary CoPC.
- Confirmation that the soils meet the RAC and provision of a virgin excavated natural material (VENM) classification report;
- If soils do not meet the RAC, then localised excavation will be conducted using an initial extent of 5 x 5 m, to at least 0.5 m below the identified contaminants.
 - o Removal of the material under an assigned waste classification by the Environmental Consultant (potentially under Task 2 if required);
 - o Validation sampling of the walls and base of the excavation per Section 2 and the CoPC outlined in this section; and
 - o Repetition of this sequence until all results meet the RAC.

11. Assessment criteria

11.1 Remediation acceptance criteria

The overarching remediation acceptance criterion (RAC) to be adopted for the project is for 'no unacceptable risks posed by the relevant media (i.e., soils, groundwater or soil vapour) to human health or the environment'.

The remediation works are to be validated as meeting the RAC by the Environmental Consultant by means of visual inspection, field screening, recovery and analysis of samples and review of any available plans as set out in this report.

In the absence of derivation of Tier 2 site specific target levels (SSTL), the (RAC) for contaminants in soil are the same as the Tier 1 SAC adopted for Douglas (2024), protective of human.

The previously adopted screening levels comprise levels for a generic commercial land use scenario from NEPC (2013). The derivation of the SAC is included in Appendix E and the adopted SAC are listed in the summary analytical results tables in Appendix C.

The following table provides a summary of the RAC.

Table 5: Remediation acceptance criteria

Item	Remediation acceptance criteria
Fill (general)	Tier 1 SAC set out in Appendix E. Aesthetic criteria including no odours / staining for visible soils.
Asbestos in soil	No potentially impacted soils to be retained at ground surface. Any retained fill to meet SAC (HSL-D), unless assessment can demonstrate suitability otherwise, noting at present all fill will be removed off-site under the three management options given in Task 2 (Section 10.3)

The SAC should also be used as part of the assessment framework for imported soils (i.e., contaminant concentrations in imported soils must comply with the SAC).

The SAC are not RAC, and an exceedance of the SAC does not automatically trigger the need for remediation. Exceedances of the SAC will trigger the need for further assessment of risk by the Environmental Consultant to determine the need for remediation in accordance with NEPC (2013) and Appendix G.

12. Validation plan

12.1 Data quality objectives

The data quality objectives (DQO) for the validation plan are included below:

Table 6: Summary DQO

Step	Summary
1: State the problem	The objective of the remediation plan is to manage known contamination through a combination of additional data gap investigation (to refine the contamination extent) and procedures to facilitate off-site disposal of soils required for site development under different treatment options (on- or off-site), or as a contingency direct disposal to landfill.
2: Identify the decisions / goal of the study	The goal of the remediation works is to demonstrate that currently known (or additional contamination) has been appropriately managed through the remediation strategy outlined in Section 10. Namely this includes: - Appropriate removal and decommissioning of suspected UST present; - Management of asbestos in soil risks through off-site disposal of soils, and managing risks to direct receptors (workers, nearby public);

Step	Summary
	- Management of other known soil contaminants, namely lead, through off-site disposal; - Potentially reducing classification of lead impacted soils through development of a treatment strategy and site-specific immobilisation order, and demonstration of successful treatment - Assessment following removal of fill to validate removal of known (or additional contamination)
3: Identify the information inputs	Information inputs include the previous investigations (Section 6), results of the data gap investigation, waste classification and assessment of any soil treatment, and validation sampling. Additional inputs will include information / records by other parties as set out in Section 17. Field assessment will include visual / olfactory assessment, asbestos screening of soils, PID screening of soils and soil vapour test locations, and measurement of general groundwater parameters. Ground penetrating radar will be used to scan test locations and opportunistically look for potential UST.
4: Define the study boundaries	The lateral boundaries of the investigation area are shown on Drawing 1, Appendix A. The vertical boundaries are to the extent of contamination impact currently identified (preliminarily, to depth of fill). The assessment is limited to the timeframe over which the field works are to be undertaken.
5: Develop the analytical approach (or decision rule)	Soils Initial comparison will be made to individual results against Tier 1 screening criteria (SAC, based on national guidance documentation) and further statistical assessment if required (excluding asbestos in soils). Quality Control Samples Sample quality will be assessed through a mixture of field replicate samples, trip spike and blank pairs, and field rinsates.
6: Specify the performance or acceptance criteria	Soils Baseline condition: Contaminants at the site and / or statistical analysis of data (in line with NEPC (2013)) exceed the human health and environmental SAC and pose a potentially unacceptable risk to receptors (null hypothesis). Alternative condition: Contaminants at the site and statistical analysis of data (in line with NEPC (2013)) comply with the human health and environmental SAC and as such, do not pose a potentially unacceptable risk to receptors (alternative hypothesis). Statistical analysis is to consider the following to minimise decision errors (NEPC, 2013): - Comparison of a calculated 95% upper confidence limit (UCL) of the data set against the SAC; - Standard deviation less than 0.5 times the SAC;

Step	Summary
	No individual results greater than 2.5 times the SAC. Where limited soil data is present due to existing structures recommendations will be made for further testing. Where practicable (and usable) the statistical assessment will be used to infer the potential risks present at un-tested parts of the site. Treatment of soils If undertaken the successful treatment of soils will be compared against relevant NSW EPA waste classification requirements, and any specific performance criteria in a site-specific immobilisation order.
7: Optimise the design for obtaining data	The sampling design is outlined in the validation section in Section 10 and more generally in Section 12.

12.2 Validation assessment requirements

The following site validation work will be required:

- Field assessment by the Environmental Consultant comprising:
 - Visual inspection, including taking photographs for record purposes;
 - Collecting validation samples from excavations resulting from the removal of contaminated soils, including contaminated soil stockpile footprints (if relevant); and
 - Collecting validation / characterisation samples for materials to be re-used on site.
- Laboratory analysis of validation samples at a NATA accredited laboratory for:
 - The CoPC relevant to the remediation area; and
 - Quality control (QC) samples in accordance with Section 15;
- Comparison by the Environmental Consultant of the laboratory results with the SAC and / or RAC as appropriate (refer to Section 11); and
- Preparation by the Environmental Consultant of a validation report detailing the methods and results of the remediation works and validation assessment.

12.3 Visual inspections

All areas to be assessed and validated will first be subject to a visual inspection by the Environmental Consultant. Any areas of fill / ACM / suspect staining must be removed prior to validation sampling.

12.4 Validation sampling

The sampling frequency will depend on the volume or area to be assessed and the previous results. The following approximate sampling frequencies will be adopted but may be modified by the Environmental Consultant to take into account previous results, where applicable, and findings from the visual inspections:

- Small to medium excavations (base <500 m²):
- Base of excavation: one sample per 25 m² or part thereof, with a minimum of three samples where the base of the excavation is fill rather than natural soils; and
- Sides of excavation: one sample per 10 m length or part thereof with a minimum of one sample per wall. Additional samples will be collected at depths of concern where there is more than one depth of concern, with a minimum of one sample per 1.5 m depth in fill.

Large excavations (base ≥500 m²):

- Base of excavation: sampling on a grid at a density in accordance with Table 2 in NSW EPA (2022) or a minimum of 10 samples. In sub-areas with any specific signs of concern, a higher sampling density may be required; and
- Sides of excavation: one sample per 20 m length or part thereof with a minimum of one sample per wall. Additional samples will be collected at depths of concern where there is more than one depth of concern, with a minimum of one sample per 1.5 m depth in filling.

Assessment of UST / infrastructure will also consider requirements of NSW EPA Contamination assessment of service station sites (NSW EPA, 2023) if additional to the sampling frequencies set out above.

Where contaminated soils are stored or treated on bare soils (e.g. VENM), the footprint of the stockpile will require validation following removal of the contaminated soils.

Validation samples will be analysed by a NATA accredited laboratory for the relevant CoPC relevant to the remediation area.

Validation sample test results will be compared to the RAC, as per the DQO (Section 11.1). Where the RAC are considered to have not been met, the remediation excavation(s) will be expanded to 'chase-out' impacted material, as advised by the Environmental Consultant, with the validation sampling then continuing into the extended excavation. This process will continue until the impacted material has been fully chased out.

In the event that contamination extends beyond site boundaries or in areas that can't be practically chased out (e.g., under buildings), validation samples will be taken at the limit of excavation. Notwithstanding that there may be residual contamination present.

Advice may need to be obtained from a qualified geotechnical or structural engineer regarding excavation and / or structure stability if excavations approach site boundaries and / or existing structures.

13. Waste disposal

Disposal of waste must be to an appropriately licensed waste facility, as per *Protection of the Environment Operations Act 1997 NSW (POEO Act)* and the *Protection of the Environment (Waste) Regulation 2014 NSW*.

Any waste disposed off-site must be initially classified by the Environmental Consultant in accordance with:

- NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste* (NSW EPA, 2014a);
- NSW EPA *Waste Classification Guidelines, Part 2: Immobilisation of Waste* (NSW EPA, 2014b);
- NSW EPA *Waste Classification Guidelines, Part 4: Acid Sulfate Soils* (NSW EPA, 2014c); and
- NSW EPA *Addendum to the Waste Classification Guidelines (2014) - Part 1: Classifying Waste* (NSW EPA, 2016) [addendum for per- and poly-fluoroalkyl substances (PFAS)].

Samples will be collected from stockpiles / *in situ* fill at various depths to characterise the full depth of the material. The frequency is to be determined by the Environmental Consultant based on the risk of contamination and heterogeneity of the material.

For stockpiles comprising similar materials and a:

- Volume up to 250 m³: a recommended minimum frequency of one sample per 25 m³, with a minimum of three per stockpile (NSW EPA, 2022); or
- Volume greater than 250 m³: a recommended minimum frequency of one sample per 25 m³, with a minimum of 10 samples and calculation of the 95% upper confidence limit of the arithmetic mean for all applicable analytes (NSW EPA, 2022). Note that this does not apply to stockpiles impacted, or potentially impacted, by asbestos. For stockpiles greater than 250 m³ which are impacted, or potentially impacted, by asbestos the Environmental Consultant shall provide guidance in accordance with NSW EPA (2022).

All waste must be tracked by the Remediation Contractor from 'cradle to grave'. Copies of all consignment notes / disposal dockets (or similar) and Environment Protection Licences for receipt and disposal of the materials must be maintained by the Remediation Contractor as part of the site log and must be provided to the Environmental Consultant for inclusion in the validation report.

14. Imported material

Any soil, aggregate etc imported for the remediation works must have contaminant concentrations that meet the relevant criteria outlined in Section 11. Imported materials will only be accepted for use at the site if:

- It can legally be accepted onto the site (e.g., classified as virgin excavated natural material (VENM), accompanied by a report / certificate prepared by a qualified environmental consultant);
- Visual inspection of the imported soil confirms that the soil has no signs of concern and is consistent with those described in the supporting classification documentation; and

- Have no aesthetic issues of concern, and
- The materials are validated (by inspection / sampling) by the Environmental Consultant as being suitable for use at the site.

The classification report / certificate for all material proposed for import must be reviewed and approved in writing by the Environmental Consultant prior to import. Materials to be imported may need to meet geotechnical requirements which are to be assessed by others, as required.

If permitted by the development consent and approved by the site owner, Remediation Contractor and Environmental Consultant (and Site Auditor if required), material classified under a NSW EPA RRO may also be accepted, provided the material can be used on-site in accordance with the corresponding RRE. This could include excavated natural material (ENM), classified under NSW EPA *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, The excavated natural material order 2014* (NSW EPA, 2014d).

The need for check-sampling of RRO material is to be determined by the Environmental Consultant depending on the source of the material, adequacy of the supporting documentation provided and inspection(s) of material. Quarried material / VENM may need little or no check sampling.

Any imported recycled aggregates and blended materials must be sampled at a frequency of sampling of one sample per 25 m³, with a minimum of three samples per load. The recycled aggregate will not be permitted to be used on site until the results of the inspection and laboratory analysis have been approved in writing by the Environmental Consultant.

Analysis of imported materials shall depend on the nature of materials, supporting documentation, RRO requirements, and potential contamination risks. Indicatively this shall include:

- Common potential contaminants: metals, TRH, BTEX, PAH;
- Secondary potential contaminants: OCP, OPP, PCB, PFAS and phenols;
- Asbestos. All recycled materials (e.g. aggregates, landscaping soils, mulch etc.) shall include AF/FA analysis; and
- Aggregates will also include PCB analysis.

15. Quality assurance and quality control

Field quality assurance and quality control (QA / QC) testing will include the following:

- 10% sample intra-laboratory analysis, analysed for the same suite as primary sample:
 - o 5% sample inter-laboratory analysis, analysed for the same suite as primary sample; and
 - o 5% sample intra-laboratory analysis, analysed for the same suite as primary sample;
- Rinsate samples (where re-useable sampling equipment is used), analysed for the suite of analytes analysed by the majority of the primary samples; and
- Trip spike and trip blank samples (analysed for BTEX) (approximately one per batch of samples where volatile contaminants are CoPC).

The laboratory will undertake analysis in accordance with its NATA accreditation, including in-house QA / QC procedures:

- The QC analytical results will be assessed using the following criteria;
- Sampling location rationale met the sampling objective;
- Standard operating procedures (SOP) are followed;
- Appropriate QA/QC samples are collected / prepared and analysed;
- Samples are stored under secure, temperature-controlled conditions;
- Chain of custody documentation is employed for the handling, transport and delivery of samples to the selected laboratory;
- Conformance with specified holding times;
- Accuracy of spiked samples within the laboratory's acceptable range (typically 70-130% for inorganic contaminants and greater for some organic contaminants);
- Field and laboratory duplicate, and replicate samples will have a precision average of +/- 30% relative percentage difference (RPD); and
- Rinsate samples will show that re-usable sampling equipment (if used) is free of introduced contaminants, i.e., the analytes show that the rinsate sample is within the normal range for deionised water.

16. Management and responsibilities

16.1 Site management plan

A general site management plan for the operational phase of site remediation is included in Appendix F. The management plan includes soil, noise, dust, work health safety (WHS), remediation schedule, hours of operation and incident response. The Remediation Contractor is to implement the general site management plan for the duration of remediation works by incorporating the plan into their over-arching construction environmental management plan (CEMP).

16.2 Site responsibilities

The site management plan (Appendix F) provides a summary of the general program management and associated responsibilities. Contact details for key utilities are also included in the event of needing to respond to any incidents.

16.3 Contingency plan and unexpected finds protocol

Plans for contingency situations (e.g., encountering asbestos in fill), along with an unexpected finds protocol for dealing with unexpected finds during remediation work / earthworks, are included in Appendix G.

17. Validation reporting

17.1 Documentation

The following documents will need to be collated and reviewed by the Environmental Consultant as part of the validation assessment (including those items that are prepared by the Environmental Consultant):

- Any licences and approvals required for the remediation works (Remediation Contractor);
- Waste classification report(s) (Environmental Consultant);
- Specific to a site-specific immobilisation order (if undertaken):
 - o Any required compliance testing / record keeping by the Remediation Contractor or treatment facility;
 - o Requisite asbestos clearance / monitoring during treatment of asbestos co-contaminated soils; and
 - o Confirmation and record keeping by the receiving facility (if additional to any general waste tracking requirements).
- Transportation Record: comprising a record of all truckloads of soil (including aggregate) entering the site, including truck identification (e.g., registration number), date, time, source site, load characteristics (e.g., type of material, i.e., quarried aggregate, etc.), approximate volume, use (e.g., general site raising, service trenches, etc.) (Remediation Contractor). Hazardous or regulated waste (e.g., asbestos waste) is to be managed per the NSW EPA Integrated Waste Tracking Solution (IWTS) requirements;
- Disposal dockets: for any soil disposed off-site including transportation records, spoil source, spoil disposal location, receipt provided by the receiving waste facility / site (Remediation Contractor). Note: A record of the building materials disposed off-site is also to be kept and provided to the Principal, on request;
- Imported materials records: records for any soil imported onto the site, including source site, classification reports, inspection records of soil upon receipt at site and transportation records (Remediation Contractor);
- Records relating to any unexpected finds and contingency plans implemented (Remediation Contractor);
- Laboratory certificates and chain-of-custody documentation;
- Inspections records from the Environmental Consultant;
- Photographic records by all contractors and consultants of the works undertaken within their purview of responsibilities (Remediation Contractor);
- Airborne asbestos monitoring records (where asbestos works are undertaken) (Remediation Contractor); and
- Interim / final visual and sampling clearances for any asbestos related works (where asbestos works are undertaken) (Remediation Contractor).

17.2 Reporting

A validation assessment report will be prepared by the Environmental Consultant in accordance with NSW EPA (2020).

The validation report shall describe the remediation approach adopted, methodology, results and conclusion of the assessment and make a statement regarding the suitability of the site for the proposed development (commercial / industrial).

18. Conclusions

It is considered that the site can be made suitable for the proposed commercial development subject to implementation of this RAP. Recommended mitigation measures are summarised below:

Table 7: Summary of mitigation measures

ID	Mitigation measure
Contamination and Remediation	
CR001	Implementation of Douglas Partners Pty Ltd RAP dated 12 June 2024. Validation sampling and reporting undertaken by a suitably qualified Environmental Consultant in accordance with this RAP. Documentation to be provided to the Site Auditor for review as outlined herein.
CR002	Conduct a data gap assessment per this RAP. If required, updating of this RAP based on outcomes of the data gap investigation. Preparation of an in-situ waste classification report to determine appropriate management approach of known asbestos and lead in soil contamination.
CR003	Unexpected finds to be managed per requirements in Appendix G. UST (if present) to be decommissioned in accordance with procedures set out in this RAP.
CR004	Assessment of groundwater quality and potential treatment requirements as part of a dewatering management plan (if required).

19. References

- AG. (2017a). *Waste Classification Assessment, 74-88 Botany Road, Alexandria, NSW*. Reference 1726/ER-1-6.
- AG. (2017b). *Remediation Action Plan, 74-88 Botany Road, Alexandria, NSW*. Reference 1726/ER-1-3 (Revision 3).
- AS 1674.1. (1997). *Safety in welding and allied processes Fire precautions*. Standards Australia.
- AS 1940. (2017). *The storage and handling of flammable and combustible liquids*. Australian Standards.
- AS 4976. (2008). *The removal and disposal of underground petroleum storage tanks*. Australian Standards.
- CRC CARE. (2019a). *Remediation Action Plan: Development - Guideline on Establishing Remediation Objectives*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.
- CRC CARE. (2019b). *Remediation Action Plan: Development - Guideline on Performing Remediation Options Assessment*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.
- DP. (2023a). *Preliminary Contamination Assessment. Due Diligence Assessment, 100 Botany Road, Alexandria*. Reference 221233.01.R.001.Rev0 dated 27 April 2023.
- DP. (2023b). *Report on Geotechnical Desktop Study. Due Diligence Assessment, 100 Botany Road, Alexandria*. Reference 221233.00.R.001.rev0 dated 26 April 2023.
- DP. (2024). *Report on Detailed Site (Contamination) Investigation. 100 Botany Road, Alexandria NSW*. Reference 221233.03.R.001.Rev1 dated 12 June 2024.
- NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.
- NSW EPA. (2014a). *Waste Classification Guidelines, Part 1: Classifying Waste*. NSW Environment Protection Authority.
- NSW EPA. (2014b). *Waste Classification Guidelines, Part 2: Immobilisation of Waste*. NSW Environment Protection Authority.
- NSW EPA. (2014c). *Waste Classification Guidelines, Part 4: Acid Sulfate Soils*. NSW Environment Protection Authority.
- NSW EPA. (2014d). *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, The excavated natural material order 2014*. NSW Environment Protection Authority.

NSW EPA. (2016). *Addendum to the Waste Classification Guidelines (2014) - Part 1: Classifying Waste*. NSW Environment Protection Authority.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land*. Contaminated Land Guidelines: NSW Environment Protection Authority.

NSW EPA. (2020a). *Underground Petroleum Storage Systems - Guidelines for implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019*. Doc Ref: EPA 2020P2700: NSW Environment Protection Authority.

NSW EPA. (2022). *Sampling Design, Part 1: Application; Part 2: Interpretation*. NSW Environment Protection Authority.

NSW EPA. (2023). *Contamination assessment of service station sites, Minimum sampling requirements*.

20. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 100 Botany Road, Alexandria NSW in accordance with Douglas' proposal 221233.02.P.001.Rev0, dated 2 May 2024 and acceptance received from Lachlan Clancy dated 22 May 2024. The work was carried out under Douglas' Engagement Terms. This report is provided for the exclusive use of Kurraba Group Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and / or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and / or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after Douglas' field testing has been completed.

Douglas' advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by Douglas in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and / or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

Asbestos has been detected by observation and by laboratory analysis, in fill materials at the test locations sampled and analysed. Building demolition materials, such as brick, tile, terracotta, metal, wood and glass were also, located in below-ground fill, and these are considered as indicative of the possible presence of additional hazardous building materials (HBM), including asbestos.

Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to parts of the site being inaccessible and not available for inspection / sampling. It is therefore considered possible that additional HBM, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that asbestos is not present.

The assessment of atypical safety hazards arising from this advice is restricted to the environmental components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. Douglas cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by Douglas. This is because this report has been written as advice and opinion rather than instructions for construction.

Appendix A

Drawings



REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	INITIAL ISSUE	28.06.2024	EC / J3H

SCALE:
0 5 10 15 20 25 m
1:499.99999 A3

**Douglas**
PARTNERS

OFFICE: SYDNEY
96-98 Hermitage Rd, West Ryde NSW 2114
(02)9809 0666

CLIENT:
Kurraba Group Pty Ltd

NOTE:
1: Basemap from Metromap (Dated 25.03.2024)

COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56

PROJECT NAME:
Proposed Research and Life Science Development

PROJECT ADDRESS:
100 Botany Road, Waterloo

DRAWING TITLE:
TEST LOCATION PLAN

PROJECT NO:
221233.03

DRAWING NO:
1

REVISION:
0



Figure 3 – Sample Locations



KEY

- BH1 Borehole Locations – Previous Investigations.
- BH9 Borehole Locations – Current Investigations.
- MW1 Monitoring Well- Previous Investigations.
- MW3 Monitoring Well- Current Investigations.
- Approximate Site Boundary
- Approximate Extent of Second Concrete Slab

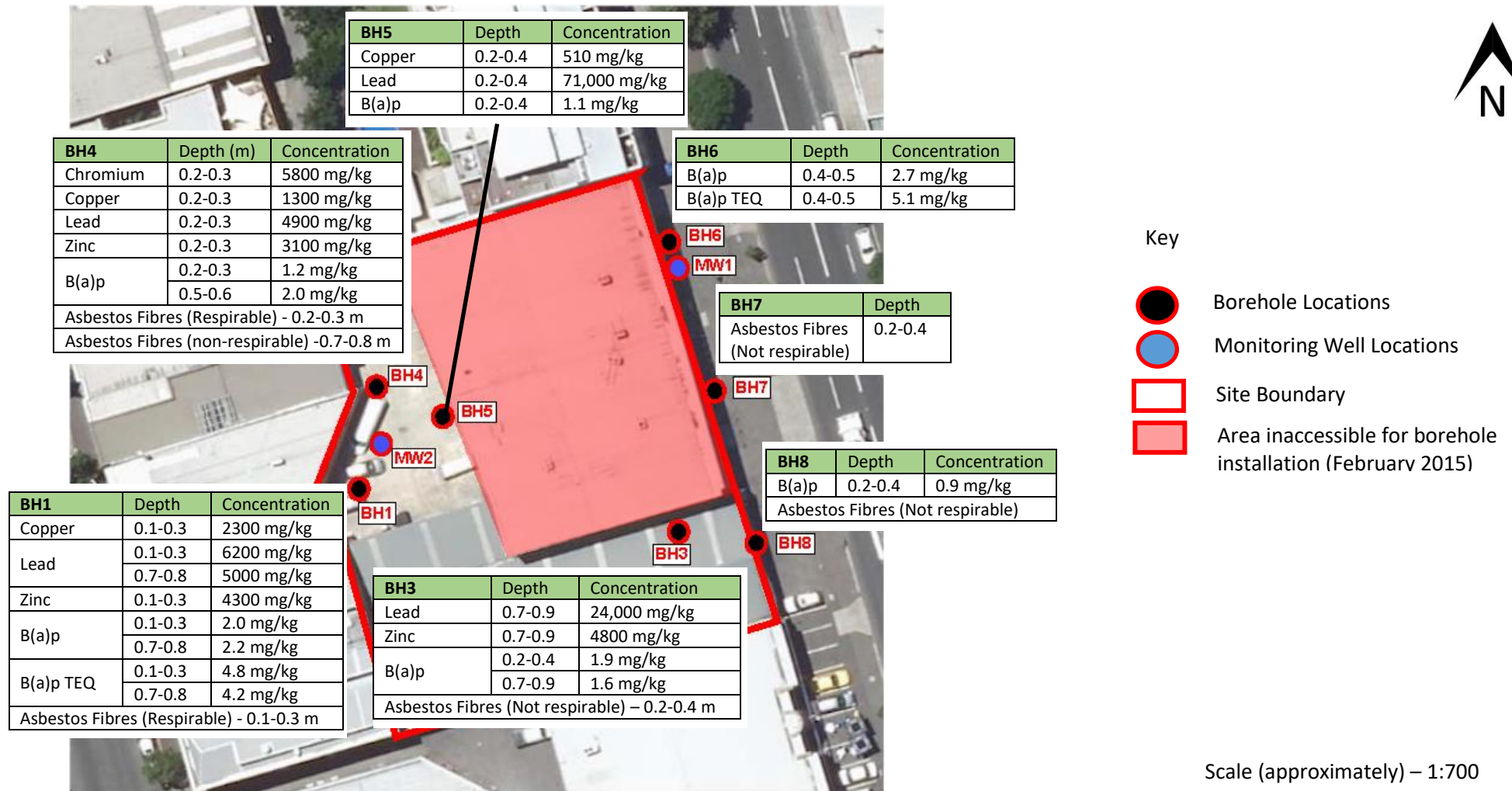
Source: <http://maps.six.nsw.gov.au/>

Your On-Site Geotechnical Specialists
Phone Us Today – 1800 288 188

Client: City West Housing
Project: 74-88 Botany Road, Alexandria, NSW
Location: 74-88 Botany Road, Alexandria, NSW

Job Number: 1726
Report Number: 1760-ER-1-6 REV 1
Report Date: 19/04/2017

Figure 4 – Detailed Site Investigation Sample Criteria Exceedances

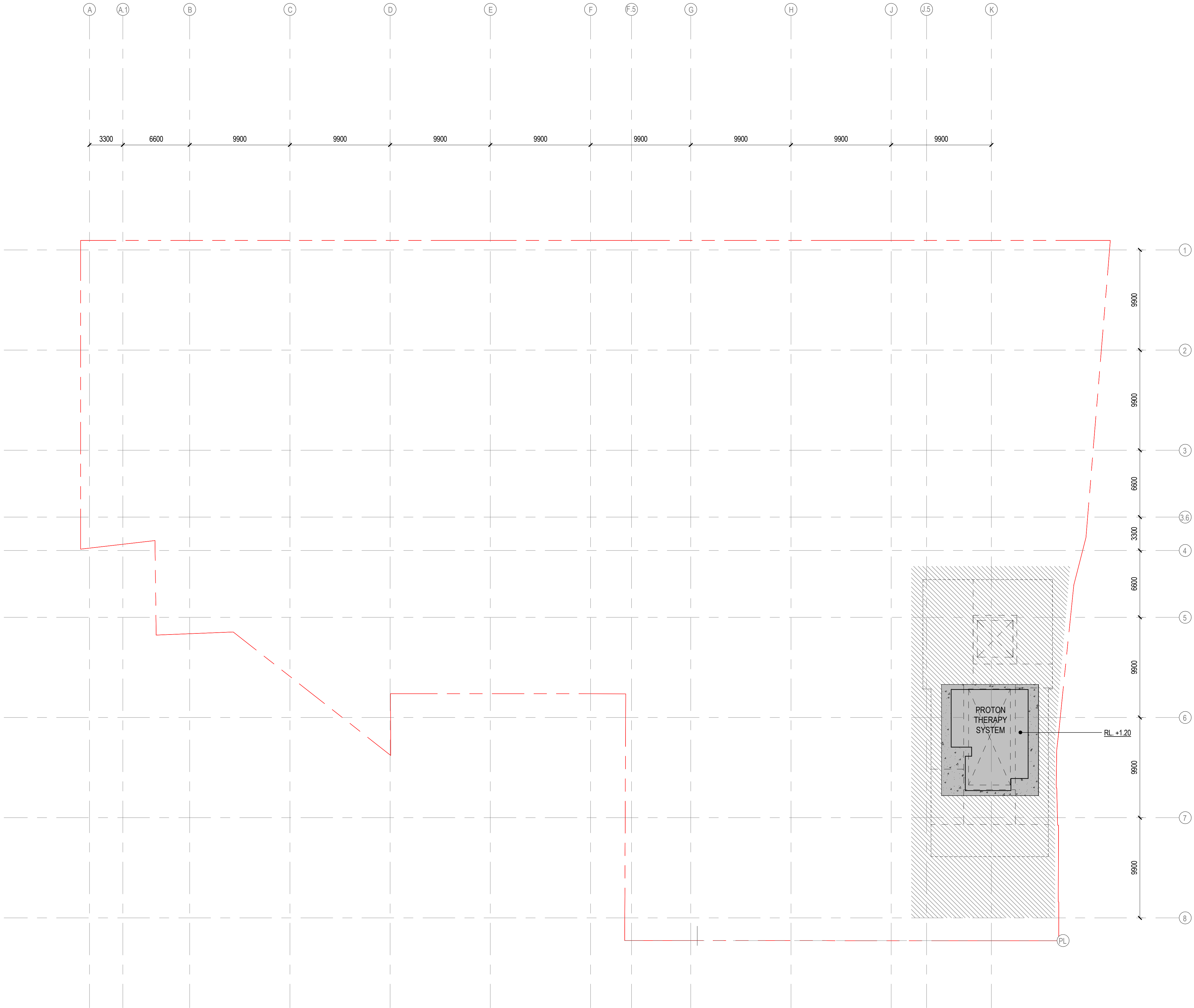


Source: SIX Maps

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Phone Us Today - 02 9675 1777

Client: City West Housing Pty Ltd
Project: Remediation Action Plan – Rev1
Location: 74-88 Botany Road, Alexandria, NSW

Job Number: 1726
Report Number: 1726-ER-1-3 Rev2
Report Date: 29/09/2016



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LEGENDS

SYSTEMS / BUILDING SPACES

Seal / Signature

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Project Name

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Project Number

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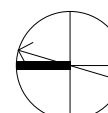
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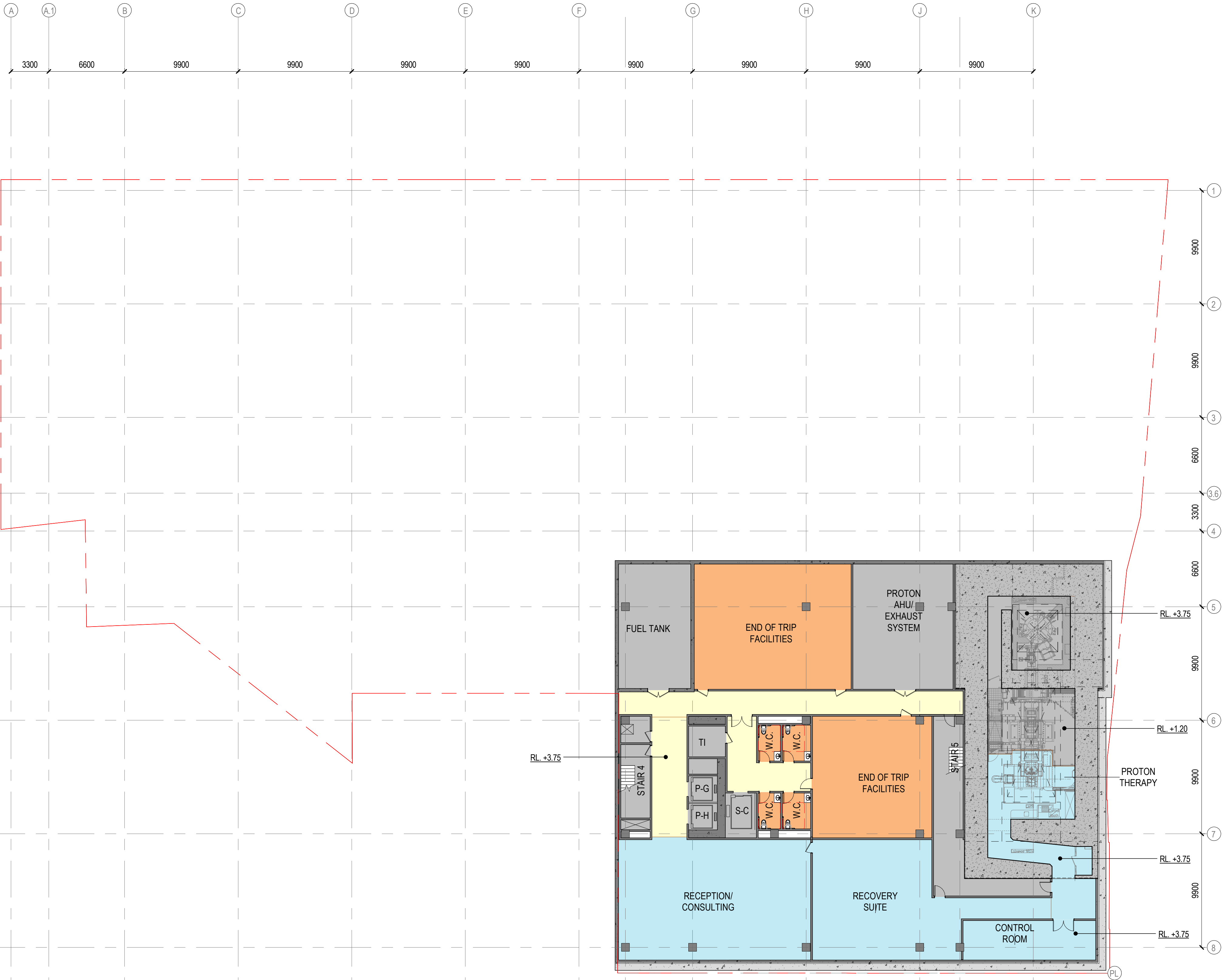
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LEGENDS

- CORRIDOR
- PROTON THERAPY
- SHARED SPACES
- SYSTEMS / BUILDING SPACES
- CORE

Seal / Signature

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Kurraba

Project Number

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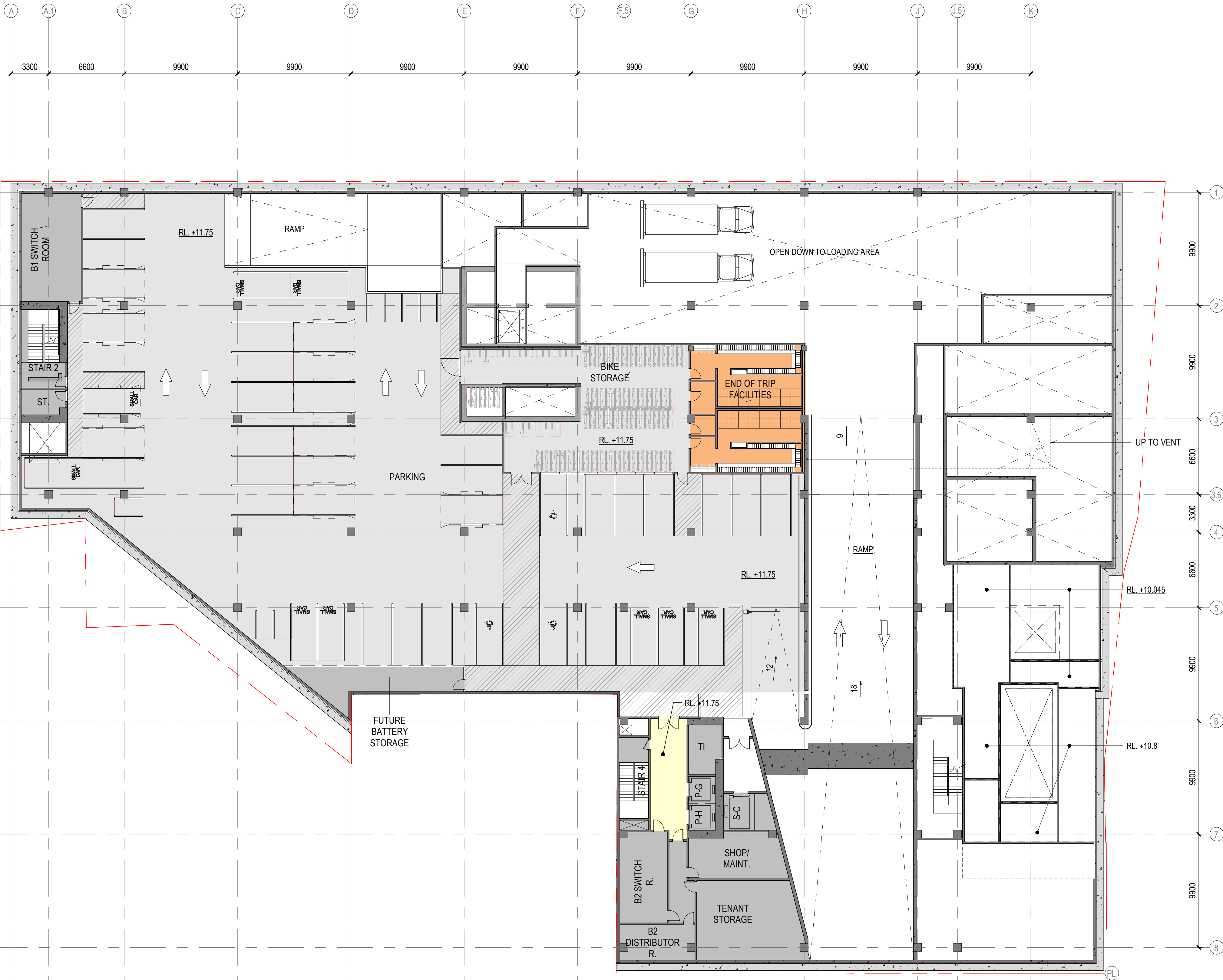
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Scale

As indicated

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GEN-BO-B2-D-A-1208



SHEET NOTES

PARKING TYPE	COUNT
--------------	-------

BASEMENT 01	
ACCESSIBLE	2
EV	18
MOTORCYCLE	7
SMALL CAR	13
STANDARD	18
	58

BASEMENT 01M	
ACCESSIBLE	3
MOTORCYCLE	7
SMALL CAR	9
STANDARD	32
	51
	109

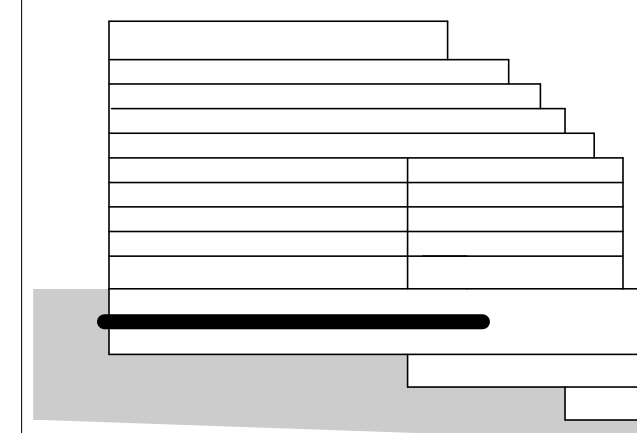
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WASTE COMPACTOR:	2 SPACES
VISITOR / STAFF PARKING:	95 SPACES
EV READY :	5 SPACES
FUTURE EV:	13 SPACES
ACCESSIBLE:	5 SPACES
STANDARD:	50 SPACES
SMALL CAR:	22 SPACES
MOTORCYCLE SPACES:	14 SPACES

LEGENDS

	CORRIDOR
	SHARED SPACES
	PARKING
	SYSTEMS / BUILDING SPACES
	CORE

KEY SECTION



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GENERAL ARRANGEMENT PLAN - BASEMENT 01M

Scale

As indicated

0m 4m 8m 12m

GEN-BO-B1-D-A-1209M



SHEET NOTES

PARKING TYPE	COUNT
--------------	-------

BASEMENT 01	
ACCESSIBLE	2
EV	18
MOTORCYCLE	7
SMALL CAR	13
STANDARD	18
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BASEMENT 01M	
ACCESSIBLE	3
MOTORCYCLE	7
SMALL CAR	9
STANDARD	32
	51
	109

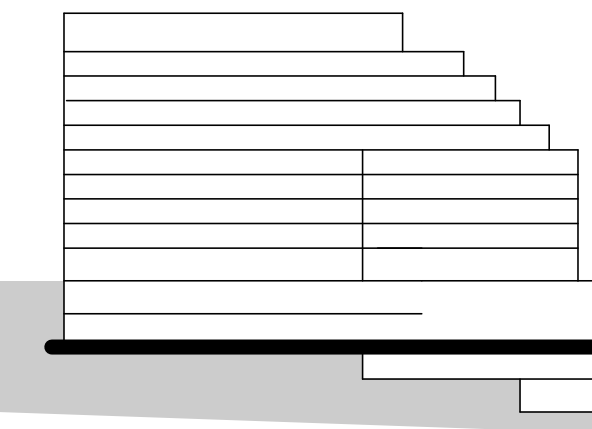
TOTAL PARKING COUNT

LOADING BAYS:	2 SPACES
WASTE COMPACTOR:	2 SPACES
VISITOR / STAFF PARKING:	95 SPACES
EV READY :	5 SPACES
FUTURE EV:	13 SPACES
ACCESSIBLE:	5 SPACES
STANDARD:	50 SPACES
SMALL CAR:	22 SPACES
MOTORCYCLE SPACES:	14 SPACES

LEGENDS

	CORRIDOR
	PROTON THERAPY
	OUTDOOR
	RETAIL
	SHARED SPACES
	PARKING
	PLANT
	SYSTEMS / BUILDING SPACES
	CORE

KEY SECTION



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Description

GENERAL ARRANGEMENT PLAN - BASEMENT 01

Scale

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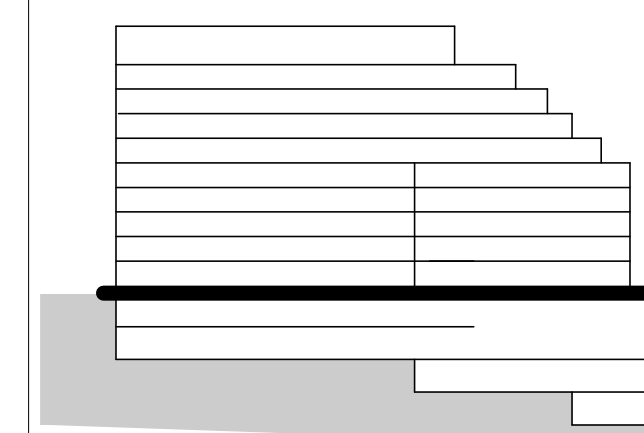
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- 02 PROJECTION OVER BOUNDARY FOR BUILDING ELEMENTS DESIGNED FOR DECORATION AND SUN SHADOWING. ALL PROJECTIONS ARE NO MORE THAN 450MM AS PER SYDNEY DCP 2012 SCHEDULE 4
- 03 SETBACK DISTANCE BETWEEN FACE OF MECHANICAL SCREEN AND PROPERTY LINE
- 04 SETBACK DISTANCE BETWEEN MECHANICAL SCREEN AND FACE OF FACADE
- 05 SETBACK DISTANCE BETWEEN FACE OF FACADE AND PROPERTY LINE
- 06 AWNING
- 07 PLANTER WITH A GARDRAIL
- 08 PLANTED ROOF

LEGENDS

- CORRIDOR
- LAB
- OUTDOOR
- RETAIL
- SHARED SPACES
- PARKING
- PLANT
- SYSTEMS / BUILDING SPACES
- CORE

KEY SECTION



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GENERAL ARRANGEMENT PLAN -
GROUND LEVEL

Scale

As indicated

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GENERAL ARRANGEMENT - BUILDING
SECTION 01

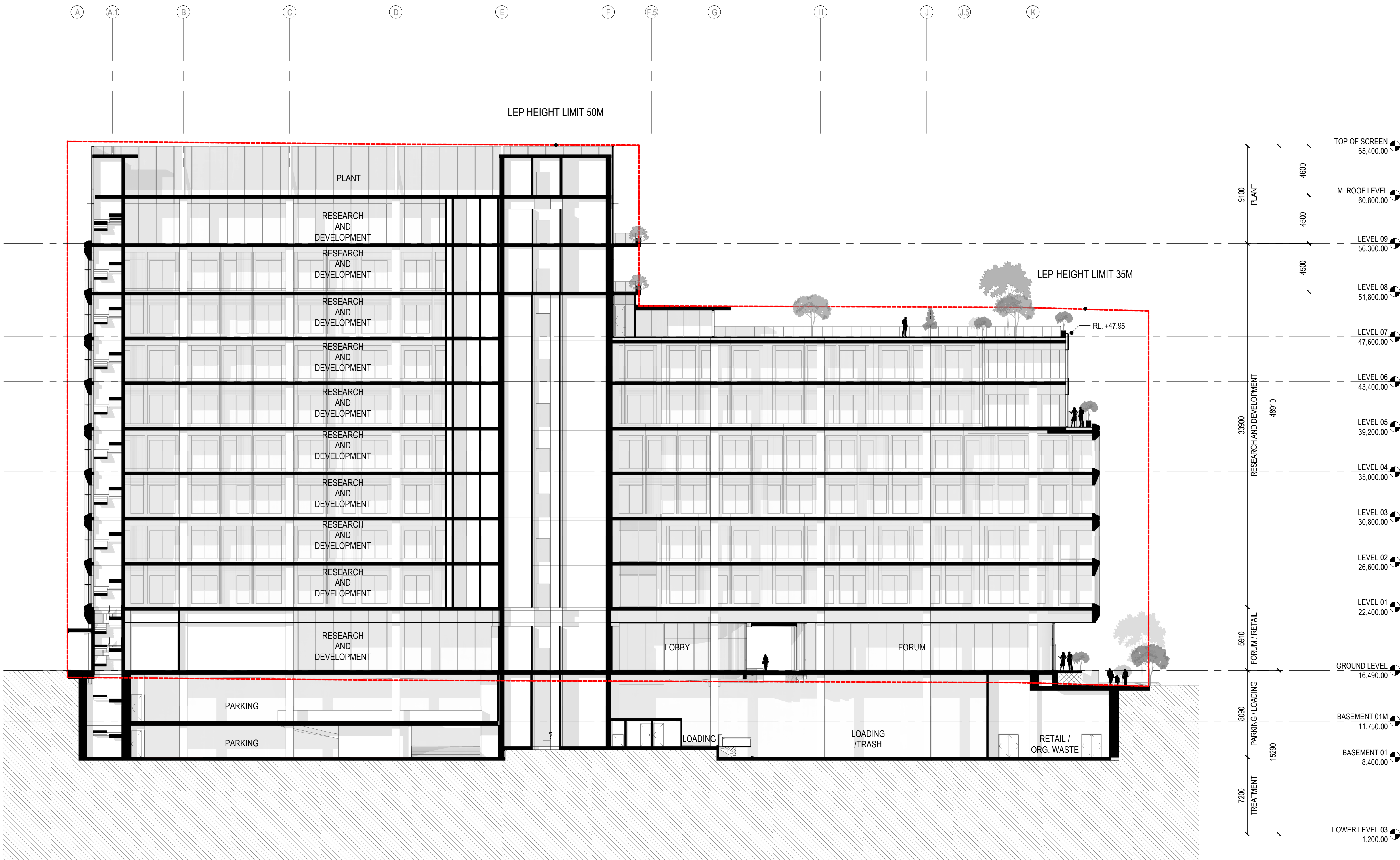
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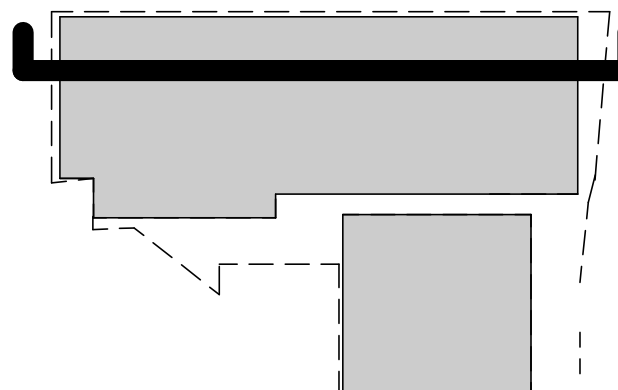
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| 02 METAL CLADDING TEXTURED | 10 METAL PLANTERS |
| 03 WINDOW WALL | 11 ELEVATED PAVERS |
| 04 GLASS RAILING | 12 EXPOSED CONC. |
| 05 FROSTED GLASS | 13 BRICK WALL , EXTRUDED |
| 06 CURTAIN WALL | 14 BRICK WALL |
| 07 METAL MECHANICAL SCREEN | 15 WINDOW SHADING |
| 08 CLEAR GLASS | 16 EXHAUST FLUE |

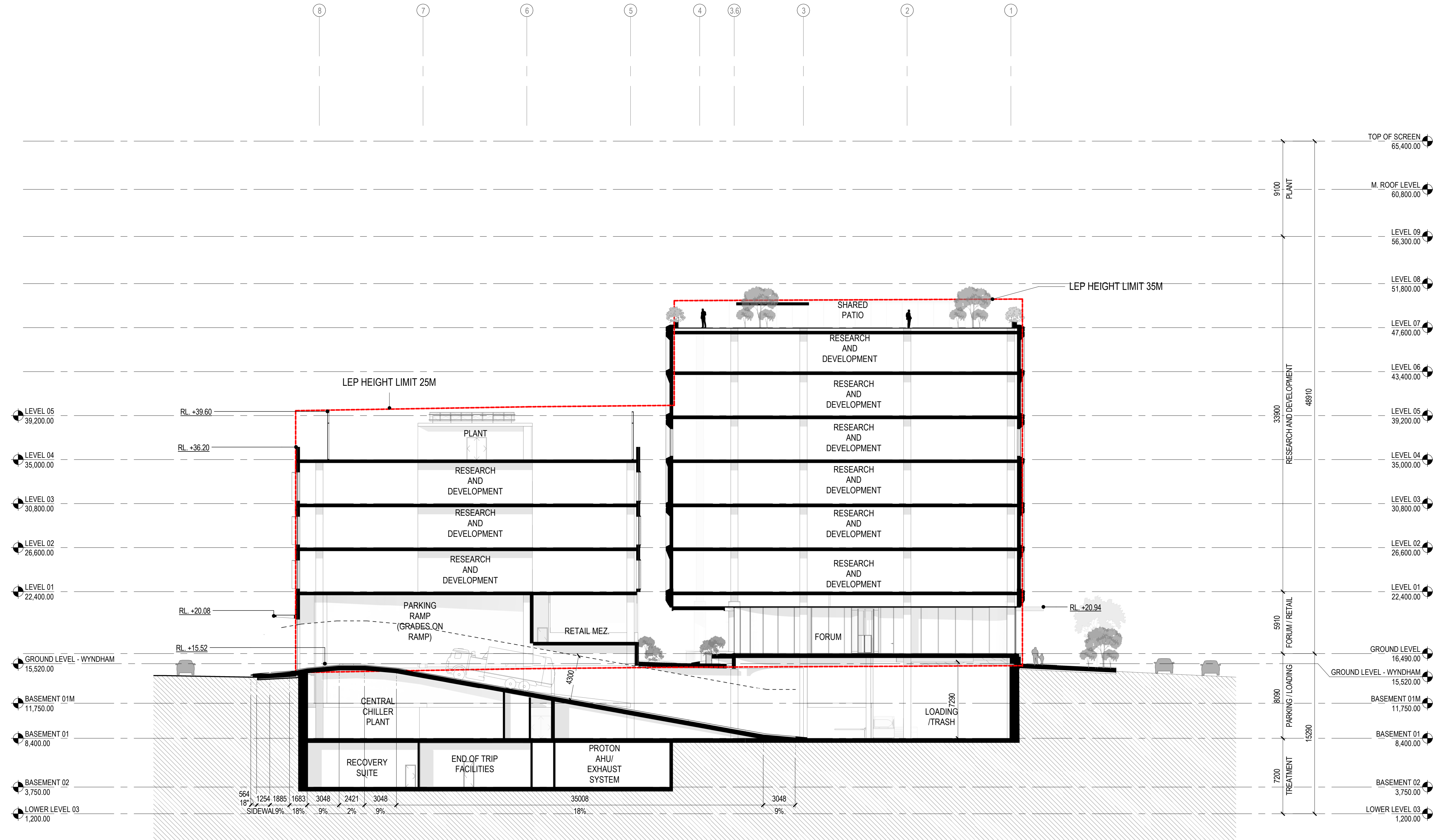
LEGENDS

- | | |
|--|--------------------------------------|
| | EARTH |
| | SYDNEY LEP 2012 MAXIMUM HEIGHT LIMIT |

KEY PLAN



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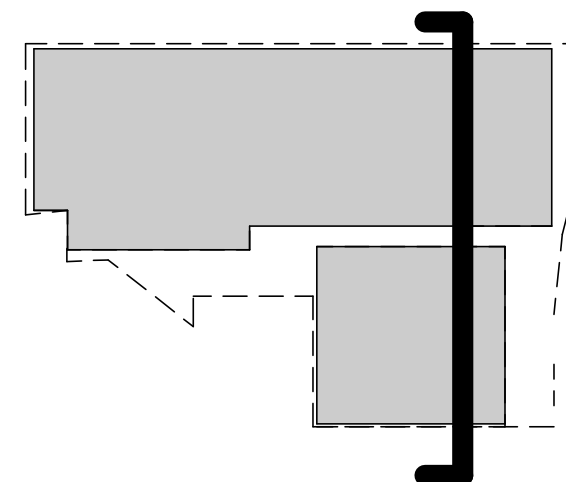
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| 03 WINDOW WALL | 11 ELEVATED PAVERS |
| 04 GLASS RAILING | 12 EXPOSED CONC. |
| 05 FROSTED GLASS | 13 BRICK WALL , EXTRUDED |
| 06 CURTAIN WALL | 14 BRICK WALL |
| 07 METAL MECHANICAL SCREEN | 15 WINDOW SHADING |
| 08 CLEAR GLASS | 16 EXHAUST FLUE |

LEGENDS

- | | |
|--|--------------------------------------|
| | EARTH |
| | SYDNEY LEP 2012 MAXIMUM HEIGHT LIMIT |

KEY PLAN



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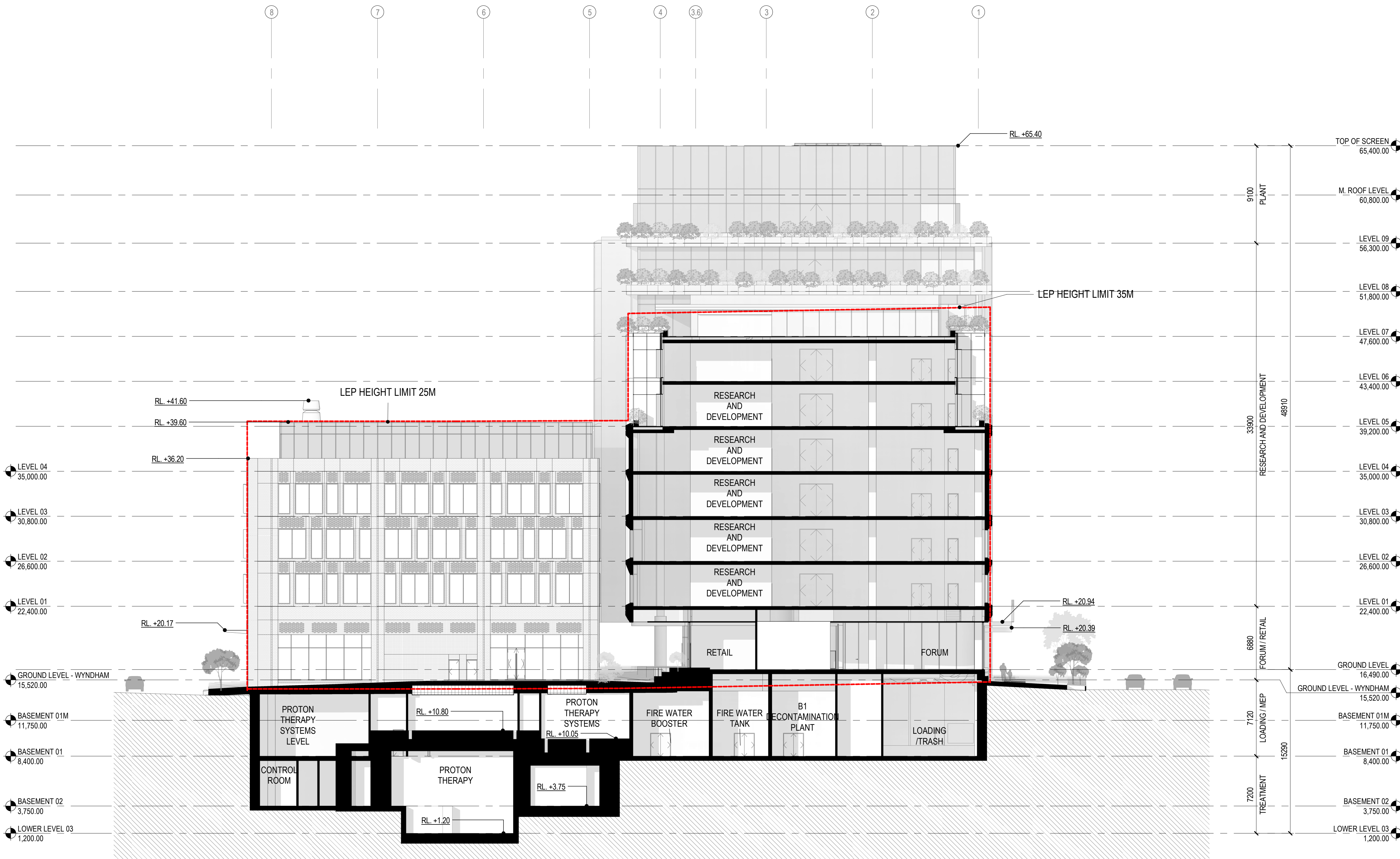
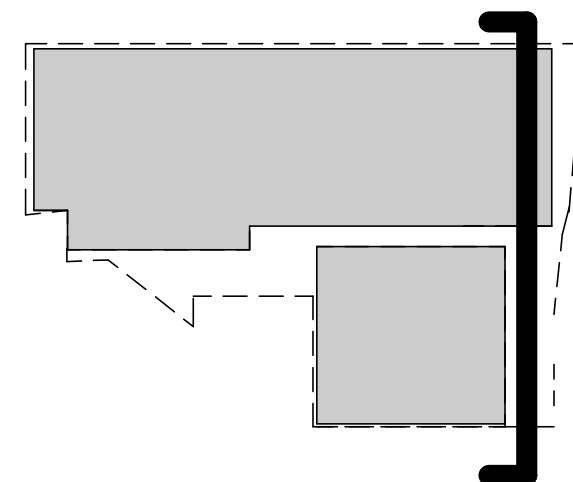
SHEET NOTES

- | | |
|----------------------------|--------------------------|
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| 02 METAL CLADDING TEXTURED | 10 METAL PLANTERS |
| 03 WINDOW WALL | 11 ELEVATED PAVERS |
| 04 GLASS RAILING | 12 EXPOSED CONC. |
| 05 FROSTED GLASS | 13 BRICK WALL , EXTRUDED |
| 06 CURTAIN WALL | 14 BRICK WALL |
| 07 METAL MECHANICAL SCREEN | 15 WINDOW SHADING |
| 08 CLEAR GLASS | 16 EXHAUST FLUE |

LEGENDS

- | | |
|--|--------------------------------------|
| | EARTH |
| | SYDNEY LEP 2012 MAXIMUM HEIGHT LIMIT |

KEY PLAN



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Project Name

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Description

GENERAL ARRANGEMENT - BUILDING
SECTION 03

Scale

As indicated

0m 4m 8m 12m

GEN-BO-ZZ-D-A-1402

74-108 Botany Road and 86-100 Wyndham
Street, Alexandria, NSW 2015

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SYDNEY, NSW 2000
AUSTRALIA
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	06/09/2024	Backgrounds

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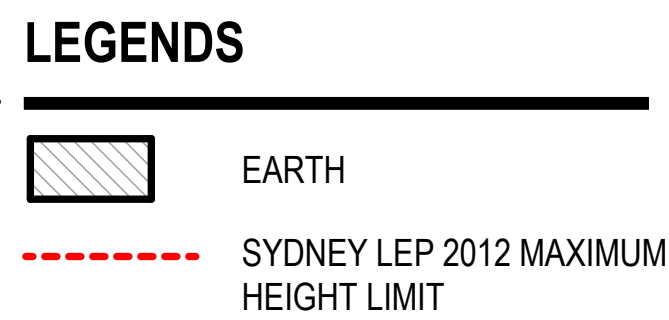
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Description
GENERAL ARRANGEMENT - BUILDING SECTION 04

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04	GLASS RAILING	12	EXPOSED CONC.
05	FROSTED GLASS	13	BRICK WALL , EXTRUDED
06	CURTAIN WALL	14	BRICK WALL
07	METAL MECHANICAL SCREEN	15	WINDOW SHADING
08	CLEAR GLASS	16	EXHAUST FLUE

Appendix B

About this Report

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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Borehole and Test Pit Logs

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

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

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

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole 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. They may not be the same at

the time of construction as are indicated in the report; and

- 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 first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or 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 a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

continued next page

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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Appendix C

Summary Results from Previous Reports

			Priority metals								Priority PAH				Priority TRH						Silica Gel TRH	
			Total Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Naphthalene ^b	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ (BaP TEQ)	Total PAH	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	F3 (>C16-C34)	F4 (>C34-C40)
		PQL	4	0.4	1	1	1	0.1	1	1	0.1	0.05	0.5	0.05	25	50	25	50	100	100	100	100
Sample ID	Depth	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH3	0.1 - 0.2 m	5/06/2024	<4	<0.4	22	83	49	<0.1	24	63	3.8	150	200	1,200	<25	<500	<25	<500	9,000	4,100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH3	0.5 - 0.6 m	5/06/2024	4	<0.4	4	39	460	10	3	180	<1	2.1	3	19	<25	<50	<25	<50	160	110	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH1	0.1 - 0.2 m	3/06/2024	<4	<0.4	37	68	62	<0.1	34	140	<1	0.09	<0.5	0.09	<25	<50	<25	<50	520	670	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH2	0.2 - 0.3 m	4/06/2024	59	7.5	42	780	21,000	1.9	50	2,100	<1	0.4	0.6	3.3	<25	<50	<25	<50	240	190	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH2	0.5 - 0.6 m	4/06/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH2	0.9 - 1 m	4/06/2024	<4	<0.4	3	31	200	2.7	2	60	<1	0.3	<0.5	3.2	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH2 - [TRIPLICATE]	0.2 - 0.3 m	4/06/2024	16	4	22	450	8,800	2.4	43	1,400	-	-	-	-	-	-	-	-	-	-	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH101	0.2 - 0.3 m	07/06/24	5	1	11	140	1,800	0.8	11	560	<1	0.2	<0.5	1.8	<25	<50	<25	<50	250	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH101	0.5 - 0.6 m	07/06/24	29	15	59	5,100	8,100	7.9	210	5,200	<1	1.9	3	22	<25	180	<25	180	4,300	550	2800	290
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH101	0.8 - 0.9 m	07/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH101	1.6 - 1.7 m	07/06/24	<4	<0.4	3	9	36	0.1	<1	25	<1	0.2	<0.5	1.4	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	370 -	NL -	- -	- -	- -	- -
BH102	0.2 - 0.3 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH102	0.5 - 0.6 m	06/06/24	<4	<0.4	30	90	250	0.6	26	190	<1	0.56	0.9	6.7	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH103	0.2 - 0.3 m	06/06/24	5	0.6	8	110	1,300	0.4	5	1,100	<1	1.1	1.6	14	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BD3/20240606	0.2 - 0.3 m	05/06/24	<4	0.6	6	81	390	0.4	5	1,700	<1	1.2	1.7	10	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH103	0.5 - 0.6 m	06/06/24	<4	0.4	6	81	400	0.5	4	970	<1	1.1	1.6	9.2	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH103 / PACM1	0.3 - 0.35 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH103	1 - 1.1 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH103/PACM2	0.6 - 0.65 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH104	0.2 - 0.3 m	06/06/24	<4	<0.4	4	45	230	0.2	3	540	<1	0.86	1.3	12	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH104	0.6 - 0.7 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH105	0.2 - 0.28 m	06/06/24	5	0.6	9	42	120	0.1	17	150	<1	0.3	<0.5	3.2	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -

			Priority metals								Priority PAH				Priority TRH						Silica Gel TRH	
			Total Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Naphthalene ^b	Benzo(a)pyrene (B(a)P)	Benzo(a)pyrene TEQ (B(a)P TEQ)	Total PAH	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	F3 (>C16-C34)	F4 (>C34-C40)
		PQL	4	0.4	1	1	1	0.1	1	1	0.1	0.05	0.5	0.05	25	50	25	50	100	100	100	100
BH106	0.2 - 0.3 m	06/06/24	<4	2	53	210	830	1.2	14	450	<1	0.92	1.4	12	<25	<50	<25	<50	170	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH107	0.2 - 0.3 m	05/06/24	<4	<0.4	3	4	19	<0.1	<1	170	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH108	0.2 - 0.3 m	05/06/24	5	0.5	5	30	220	0.2	3	280	<1	0.1	<0.5	0.58	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH108	0.5 - 0.6 m	05/06/24	4	0.6	4	32	250	0.2	4	250	<1	0.2	<0.5	1.8	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH108	1 - 1.1 m	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH109	0.2 - 0.3 m	05/06/24	<4	<0.4	4	36	390	0.5	4	200	<1	0.3	<0.5	3.2	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH109	0.5 - 0.6 m	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH110	0.2 - 0.3 m	05/06/24	<4	<0.4	5	20	170	8.5	3	260	<1	0.3	<0.5	3.9	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BD1/20240605	0.2 - 0.3 m	05/06/24	<4	<0.4	4	19	160	1	3	230	<1	0.3	<0.5	1.5	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH110	0.5 - 0.6 m	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH110	1 - 1.1 m	05/06/24	<4	<0.4	4	15	200	0.8	3	140	<1	0.2	<0.5	1.5	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	370 -	NL -	- -	- -	- -	- -
BH111	0.2 - 0.3 m	05/06/24	<4	<0.4	4	12	17	<0.1	3	39	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH111	0.5 - 0.6 m	05/06/24	<4	<0.4	4	50	250	0.6	4	220	<1	1.4	2	14	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH111	1 - 1.1 m	05/06/24	<4	<0.4	<1	7	13	<0.1	<1	23	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	370 -	NL -	- -	- -	- -	- -
BH112	0.2 - 0.3 m	05/06/24	<4	<0.4	3	16	100	<0.1	2	45	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH112	0.5 - 0.6 m	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH113	0.2 - 0.3 m	05/06/24	<4	<0.4	1	1	2	<0.1	<1	3	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	260 -	NL -	- -	- -	- -	- -
BH113	0.5 - 0.6 m	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH113	1 - 1.1 m	05/06/24	8	0.7	9	250	2,900	0.3	9	1,300	<1	0.88	1.1	6.2	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	370 -	NL -	- -	- -	- -	- -
BH113	1.4 - 1.5 m	05/06/24	<4	<0.4	2	12	21	0.1	<1	67	<1	0.7	1	7.8	<25	<50	<25	<50	<100	<100	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	NL -	- -	40 -	4,000 -	- -	- -	370 -	NL -	- -	- -	- -	- -
BH105 - [TRIPLICATE]	0.2 - 0.28 m	06/06/24	<4	0.5	9	42	120	0.1	15	170	-	-	-	-	-	-	-	-	-	-	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	-	-	-	-	-	-	-	-	-	-	-	-
BH111 - [TRIPLICATE]	0.2 - 0.3 m	05/06/24	<4	<0.4	4	13	34	<0.1	3	39	-	-	-	-	-	-	-	-	-	-	-	-
			3,000 -	900 -	3,600 -	240,000 -	1,500 -	730 -	6,000 -	400,000 -	-	-	-	-	-	-	-	-	-	-	-	-

HIL/HSL exceedance

EIL/ESL exceedance

HIL/HSL and EIL/ESL exceedance

ML exceedance

ML and HIL/HSL or EIL/ESL exceedance

Indicates that asbestos has been detected by the lab, refer to the lab report

Blue = DC exceedance

Red = EGV-indirect exceedance

HSL 0-<1 Exceedance

Bold = Lab detections - = Not tested or No HIL/HSL/EIL/ESL (as applicable) or Not applicable NL = Not limiting NAD = No Asbestos detected

HIL = Health investigation level HSL = Health screening level (excluding DC) EIL = Ecological investigation level ESL = Ecological screening level EGV = Environmental Guideline Value ML = Management Limit DC = Direct Contact HSL

Notes:

- a

QA/QC replicate of sample listed directly below the primary sample
- b

Naphthalene reported as highest detection from the BTEXN or PAH suite, or if both results <PQL as lowest PQL
- c

EIL criteria applies to DDT only

Lab result	
HIL/HSL value	EIL/ESL/EGV value

			BTEX				VOC	Priority phenol	OCP		OPP	PCB	Priority PFAS					Asbestos			
			Benzene	Toluene	Ethylbenzene	Total Xylenes	Total Positive VOC	Total Phenolics	Aldrin + Dieldrin	Total Positive OCP	Total Positive OPP	Total PCB	Total Positive PFAS	PFOA	PFOS + PFHxS	PFOS	PFHxS	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation	Asbestos ID (soil / material)
		PQL	0.2	0.5	1	1	1	5	0.1	0.1	0.1	0.1	0.0001	0.0001	0.0001	0.0001	0.0001			0.001	0.1
Sample ID	Depth	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	g	g	%(w/w)	-
BH3	0.1 - 0.2 m	5/06/2024	<0.2	<0.5	<1	<1	-	<5	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	<0.001	NAD
			3	-	NL	-	230	-	-	-	660	-	45	-	530	-	2,000	-	7	-	
BH3	0.5 - 0.6 m	5/06/2024	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	NAD
			3	-	NL	-	230	-	-	-	-	-	-	-	-	-	-	-	-	0.001	
BH1	0.1 - 0.2 m	3/06/2024	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD
			3	-	NL	-	230	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH2	0.2 - 0.3 m	4/06/2024	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD
			3	-	NL	-	230	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH2	0.5 - 0.6 m	4/06/2024	-	-	-	-	-	-	-	-	-	-	0.0003	<0.0001	0.0003	0.0003	<0.0001	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	50	20	20	20	-	-	-	
BH2	0.9 - 1 m	4/06/2024	<0.2	<0.5	<1	<1	-	<5	<0.1	<0.1	<0.1	15.8	-	-	-	-	-	-	-	<0.001	-
			3	-	NL	-	230	-	660	-	45	-	2,000	-	7	-	-	-	-	0.001	
BH2 - [TRIPLICATE]	0.2 - 0.3 m	4/06/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH101	0.2 - 0.3 m	07/06/24	<0.2	<0.5	<1	<1	<1	<5	<0.1	<0.1	<0.1	0.8	-	-	-	-	-	0.0146	0.0057	<0.001	Detected
			3	-	NL	-	230	-	660	-	45	-	2,000	-	7	-	-	-	-	0.001	
BH101	0.5 - 0.6 m	07/06/24	<0.2	<0.5	<1	<1	-	<5	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	0.4108	0.0864	0.0158	Detected
			3	-	NL	-	230	-	660	-	45	-	2,000	-	7	-	-	-	-	0.001	
BH101	0.8 - 0.9 m	07/06/24	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	50	20	20	20	-	-	-	
BH101	1.6 - 1.7 m	07/06/24	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			3	-	NL	-	NL	-	NL	-	-	-	-	-	-	-	-	-	-	-	
BH102	0.2 - 0.3 m	06/06/24	<0.2	<0.5	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			3	-	NL	-	230	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH102	0.5 - 0.6 m	06/06/24	<0.2	<0.5	<1	<1	-	<5	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	0.0005	<0.001	Detected
			3	-	NL	-	230	-	660	-	45	-	2,000	-	50	20	20	20	-	0.001	
BH103	0.2 - 0.3 m	06/06/24	<0.2	<0.5	<1	<1	-	<5	13.8	13.8	<0.1	<0.1	0.0004	<0.0001	0.0004	0.0004	<0.0001	-	0.0058	<0.001	Detected
			3	-	NL	-	230	-	660	-	45	-	2,000	-	50	20	20	20	-	0.001	
BD3/20240606	0.2 - 0.3 m	05/06/24	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			3	-	NL	-	230	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH103	0.5 - 0.6 m	06/06/24	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	0.2244	0.0283	Detected
			3	-	NL	-	230	-	-	-	-	-	-	-	-	-	-	-	-	0.001	
BH103 / PACM1	0.3 - 0.35 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Detected
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH103	1 - 1.1 m	06/06/24	<0.2	<0.5	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			3	-	NL	-	NL	-	NL	-	-	-	-	-	-	-	-	-	-	-	
BH103/PACM2	0.6 - 0.65 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Detected
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH104	0.2 - 0.3 m	06/06/24	<0.2	<0.5	<1	<1	-	<5	0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	<0.001	-
			3	-	NL	-	230	-	660	-	45	-	2,000	-	7	-	-	-	-	0.001	
BH104	0.6 - 0.7 m	06/06/24	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	50	20	20	20	-	-	-	
BH105	0.2 - 0.28 m	06/06/24	<0.2	<0.5	<1	<1	-	<5	<0.1	<0.1	<0.1	<0.1	0.0002	<0.0001	0.0002	0.0002	<0.0001	-	-	<0.001	-
			3	-	NL	-	230	-	660	-	45	-	2,000	-	7	-	50	20	20	20	0.001

Table C2: Summary Groundwater Results

			Dissolved Metals									Total Metals							
			Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Mercury	Nickel	Zinc	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
Practical Quantitation Limit (PQL)			1	0.1	1	1	-	1	0.05	1	1	1	0.1	1	1	1	0.05	1	1
ANZG (2018) Marine DGV 95% LOP			24 /13	0.7	4.4	1.3	-	4.4	0.1	7	8	24 /13	0.7	4.4	1.3	4.4	0.1	7	8
NPEC (2013) HSL - D for vapour intusion																			
HEPA (2020) Interim Marine DGV 99 % LOP																			
Sample ID	Sampling depth (m)	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
MW2	4.5-5	26/06/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW2	5.5-6	26/06/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH1	12-12.5	20/06/2024	<1	<0.1	4	2	28000	<1	<0.05	2	3	2	<0.1	15	25	9	<0.05	4	10
BH2	5.5-6	20/06/2024	<1	0.6	<1	84	130	1	<0.05	14	280	3	1	7	110	11	<0.05	18	320
BH3	8-8.5	20/06/2024	<1	0.2	<1	<1	4200	<1	<0.05	1	21	<1	1	3	2	3	<0.05	2	30
BD1	8-8.5	20/06/2024	<1	0.2	<1	<1	4400	<1	<0.05	<1	19	-	-	-	-	-	-	-	

Notes:

- * QA/QC replicate of sample listed directly below the primary sample
- PQL Practical quantitation limit
- No criterion / not defined / not tested / not applicable

Shaded cell is exceedance of guideline value

Where one or more guideline value is exceeded, the cell is shaded to the colour of the highest guideline value exceeded

NHMRC Recreational Water Screening Levels derived from 10 times Australian Drinking Water Guidelines 6 Ver 3.8 Updated September 2022

Table C2: Summary Groundwater Results

			TRH						BTEXN						VOC			Total +vePAH's	All Analysed OCP	All Analysed OPP	All Analysed PCB	Total Phenolics (as Phenol)	PFAS		
			TRH C6 - C10	VTPH C6 - C10 lessBTEX (F1)	TRH >C10 - C16less Naphthalene (F2)	TRH >C16-C34 (F3)	TRH >C34-C40 (F4)	Total +ve TRH >C10-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-xylene	Naphthalene	Chloroform	Tetrachloroethene	All Analysed VOCs						Perfluorooctanesulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	Total Positive PFAS
Practical Quantitation Limit (PQL)			10	10	50	100	100	50	1	1	1	-	3	1			-	0.1-0.5	0.001-0.002	0.004-0.1	-	5	0.0002	0.0002	0.0002
ANZG (2018) Marine DGV 95% LOP								500	180	80	75 / 200	350	50	370	330	-	-	-	-	-	-	11	-	-	-
NPEC (2013) HSL - D for vapour intusion			NL	NL				30 000	NL	NL	NL	NL	NL												
HEPA (2020) Interim Marine DGV 99 % LOP																						0.00023	19		
Sample ID	Sampling depth (m)	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L
MW2	4.5-5	26/06/2024	<10	<10	<50	<100	<100	<50	<1	<1	<1	<2	<1	<1	1	<1	1	-	-	-	-	-	-	-	-
MW2	5.5-6	26/06/2024	<10	<10	<50	<100	<100	<50	<1	<1	<1	<2	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-
BH1	12-12.5	20/06/2024	<10	<10	150	<100	<100	<50	<1	<1	<1	<2	<1	<1	8	<1	8	<PQL	<PQL	<PQL	<0.01	<0.05	0.0032	0.002	0.039
BH2	5.5-6	20/06/2024	13	13	<50	<100	<100	<50	<1	<1	<1	<2	<1	<1	<1	10	10	<PQL	<PQL	<PQL	<0.01	<0.05	0.11	0.015	0.013
BH3	8-8.5	20/06/2024	14	14	<50	<100	<100	<50	<1	<1	<1	<2	<1	<1	<1	<1	<1	<PQL	<PQL	<PQL	<0.01	<0.05	0.29	0.026	0.38
BD1	8-8.5	20/06/2024	11	11	<50	<100	<100	<50	<1	<1	<1	<2	<1	<1	-	-	-	<PQL	-	-	-	-	-	-	-

Notes:

- * QA/QC replicate of sample listed directly below the primary sample
- PQL Practical quantitation limit
- No criterion / not defined / not tested / not applicable

Shaded cell is exceedance of guideline value

Where one or more guideline value is exceeded, the cell is shaded to the colour of the highest guideline value exceeded

NHMRC Recreational Water Screening Levels derived from 10 times Australian Drinking Water Guidelines 6 Ver 3.8 Updated September 2022

Table C3: Summary of Laboratory Results – Soil Vapour.

		Isopropyl Alcohol	Vinyl chloride	Trichloroethene	1,1-Dichloroethene	trans-1,2-dichloroethene	cis-1,2-Dichloroethene	Tetrachloroethene	Benzene	Toluene	Ethylbenzene	m- & p-Xylene	o-Xylene	Naphthalene	TRH F1	TRH F2
	PQL	12	0.8	1.6	2	2	2	3.4	1.6	1.9	2.2	4.3	2.2	2.6		
Interrim HIL-D Commercial / Industrial		-	100	80	-	-	300	8000	-	-	-	-		-	-	-
NEPC (2013) HSL D - Sand 0-1m		-	-	-	-	-	-	-	4000	4 800 000	1 300 000	840 000		3000	680 000	500 000
Sample ID	Sample Date	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
SV202	20/06/2024	330	<0.8	6	<2	<2	<2	4	4	62	5	20	5	<2.6	<200	80
SV203	20/06/2024	410	<0.8	9	<2	<2	<2	570	3	53	5	10	5	<2.6	470	60
SV204	20/06/2024	190	<0.8	<1.6	<2	<2	<2	710	2	38	4	10	4	<2.6	320	<40
BD1	20/06/2024	200	<0.8	<1.6	<2	<2	<2	730	2	40	4	10	4	<2.6	370	<40
SV205	20/06/2024	290	<0.8	<1.6	<2	<2	<2	5	3	58	5	10	4	<2.6	<200	50
Shroud	20/06/2024	1300000	-	-	-	-	-	-	-		-	-	-	-	-	-

Notes:

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PQL

-
- QA/QC replicate of sample listed directly below the primary sample

Isopropyl alcohol used as QA analyte and hence detections have not been considered from a site suitability perspective

Practical quantitation limit

No criterion / not defined / not tested / not applicable

Shaded cell is an exceedance of the guideline value

Where one or more guideline value is exceeded, the cell is shaded to the colour of the highest guideline value exceeded

			Metals												TRH		BTEX			
			Total Arsenic	Total Arsenic TCLP	Cadmium	Cadmium TCLP	Total Chromium	Total Chromium TCLP	Lead	Lead TCLP	Mercury (inorganic)	Mercury TCLP	Nickel	Nickel TCLP	TRH C6 - C9	TRH ClO-C36	Benzene	Toluene	Ethylbenzene	Total Xylenes
		PQL	4	<0.05	0.4	<0.01	1	<0.01	1	0.03	0.1	<0.0005	1	<0.02	25	50	0.2	0.5	1	1
Sample ID	Depth	Sample Date	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH3	0.1 - 0.2 m	5/06/2024	<4	-	<0.4	-	22	-	49	-	<0.1	-	24	-	<25	21,700	<0.2	<0.5	<1	<1
BH3	0.5 - 0.6 m	5/06/2024	4	-	<0.4	-	4	-	460	0.1	10	-	3	-	<25	220	<0.2	<0.5	<1	<1
BH1	0.1 - 0.2 m	3/06/2024	<4	-	<0.4	-	37	-	62	-	<0.1	-	34	-	<25	1,440	<0.2	<0.5	<1	<1
BH2	0.2 - 0.3 m	4/06/2024	59	<0.05	7.5	0.05	42	<0.01	21,000	44	1.9	<0.0005	50	0.1	<25	600	<0.2	<0.5	<1	<1
BH2	0.5 - 0.6 m	4/06/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	0.9 - 1 m	4/06/2024	<4	-	<0.4	-	3	-	200	18	2.7	-	2	-	<25	<50	<0.2	<0.5	<1	<1
BH2 - [TRIPLICATE]	0.2 - 0.3 m	4/06/2024	16	-	4	-	22	-	8,800	-	2.4	-	43	-	-	-	-	-	-	-
BH101	0.2 - 0.3 m	07/06/24	5	-	1	-	11	-	1,800	9.8	0.8	-	11	-	<25	380	<0.2	<0.5	<1	<1
BH101	0.5 - 0.6 m	07/06/24	29	<0.05	15	0.17	59	<0.01	8,100	88	7.9	<0.0005	210	0.33	<25	9,373	<0.2	<0.5	<1	<1
BH101	0.8 - 0.9 m	07/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH101	1.6 - 1.7 m	07/06/24	<4	-	<0.4	-	3	-	36	-	0.1	-	<1	-	<25	<50	<0.2	<0.5	<1	<1
BH102	0.2 - 0.3 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.5	<1	<1
BH102	0.5 - 0.6 m	06/06/24	<4	-	<0.4	-	30	-	250	-	0.6	-	26	-	<25	<50	<0.2	<0.5	<1	<1
BH102	1 - 1.1 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103	0.2 - 0.3 m	06/06/24	5	-	0.6	-	8	-	1,300	0.67	0.4	-	5	-	<25	<50	<0.2	<0.5	<1	<1
BD3/20240606	0.2 - 0.3 m	05/06/24	<4	-	0.6	-	6	-	390	-	0.4	-	5	-	<25	<50	<0.2	<0.5	<1	<1
BH103	0.5 - 0.6 m	06/06/24	<4	-	0.4	-	6	-	400	-	0.5	-	4	-	<25	<50	<0.2	<0.5	<1	<1
BH103 / PACM1	0.3 - 0.35 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103	1 - 1.1 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.5	<1	<1
BH103/PACM2	0.6 - 0.65 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH104	0.2 - 0.3 m	06/06/24	<4	-	<0.4	-	4	-	230	-	0.2	-	3	-	<25	<50	<0.2	<0.5	<1	<1
BH104	0.6 - 0.7 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH105	0.2 - 0.28 m	06/06/24	5	-	0.6	-	9	-	120	-	0.1	-	17	-	<25	<50	<0.2	<0.5	<1	<1
BH106	0.2 - 0.3 m	06/06/24	<4	-	2	-	53	-	830	6.5	1.2	-	14	-	<25	260	<0.2	<0.5	<1	<1
BH107	0.2 - 0.3 m	05/06/24	<4	-	<0.4	-	3	-	19	-	<0.1	-	<1	-	<25	<50	<0.2	<0.5	<1	<1
BH108	0.2 - 0.3 m	05/06/24	5	-	0.5	-	5	-	220	-	0.2	-	3	-	<25	<50	<0.2	<0.5	<1	<1
BH108	0.5 - 0.6 m	05/06/24	4	-	0.6	-	4	-	250	-	0.2	-	4	-	<25	<50	<0.2	<0.5	<1	<1
BH108	1 - 1.1 m	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH108	1.3 - 1.4 m	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH109	0.2 - 0.3 m	05/06/24	<4	-	<0.4	-	4	-	390	0.1	0.5	-	4	-	<25	<50	<0.2	<0.5	<1	<1
BH109	0.5 - 0.6 m	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.5	<1	<1
BH110	0.2 - 0.3 m	05/06/24	<4	<0.05	<0.4	<0.01	5	<0.01	170	0.2	8.5	<0.0005	3	<0.02	<25	<50	<0.2	<0.5	<1	<1
BD1/20240605	0.2 - 0.3 m	05/06/24	<4	-	<0.4	-	4	-	160	-	1	-	3	-	<25	<50	<0.2	<0.5	<1	<1
BH110	0.5 - 0.6 m	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.5	<1	<1
BH110	1 - 1.1 m	05/06/24	<4	-	<0.4	-	4	-	200	-	0.8	-	3	-	<25	<50	<0.2	<0.5	<1	<1
BH111	0.2 - 0.3 m	05/06/24	<4	-	<0.4	-	4	-	17	-	<0.1	-	3	-	<25	<50	<0.2	<0.5	<1	<1
BH111	0.5 - 0.6 m	05/06/24	<4	-	<0.4	-	4	-	250	-	0.6	-	4	-	<25	<50	<0.2	<0.5	<1	<1
BH111	1 - 1.1 m	05/06/24	<4	-	<0.4	-	<1	-	13	-	<0.1	-	<1	-	<25	<50	<0.2	<0.5	<1	<1
BH112	0.2 - 0.3 m	05/06/24	<4	-	<0.4	-	3	-	100	-	<0.1	-	2	-	<25	<50	<0.2	<0.5	<1	<1
BH112	0.5 - 0.6 m	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

			Metals												TRH		BTEX			
			Total Arsenic	Total Arsenic TCLP	Cadmium	Cadmium TCLP	Total Chromium	Total Chromium TCLP	Lead	Lead TCLP	Mercury (inorganic)	Mercury TCLP	Nickel	Nickel TCLP	TRH C6 - C9	TRH C10-C36	Benzene	Toluene	Ethylbenzene	Total Xylenes
		PQL	4	<0.05	0.4	<0.01	1	<0.01	1	0.03	0.1	<0.0005	1	<0.02	25	50	0.2	0.5	1	1
Sample ID	Depth	Sample Date	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH113	0.2 - 0.3 m	05/06/24	<4	-	<0.4	-	1	-	2	-	<0.1	-	<1	-	<25	<50	<0.2	<0.5	<1	<1
BH113	0.5 - 0.6 m	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.5	<1	<1
BH113	1 - 1.1 m	05/06/24	8	-	0.7	-	9	-	2,900	170	0.3	-	9	-	<25	<50	<0.2	<0.5	<1	<1
BH113	1.4 - 1.5 m	05/06/24	<4	-	<0.4	-	2	-	21	-	0.1	-	<1	-	<25	<50	<0.2	<0.5	<1	<1
BH105 - [TRIPLICATE]	0.2 - 0.28 m	06/06/24	<4	-	0.5	-	9	-	120	-	0.1	-	15	-	-	-	-	-	-	-
BH111 - [TRIPLICATE]	0.2 - 0.3 m	05/06/24	<4	-	<0.4	-	4	-	34	-	<0.1	-	3	-	-	-	-	-	-	-
Waste Classification Criteria ^f																				
CT1			100	-	20	-	100	-	100	-	4	-	40	-	-	10,000	10	288	600	1000
SCC1			500	-	100	-	1,900	-	1,500	-	50	-	1,050	-	-	10,000	18	518	1,080	1,800
TCLP1			-	5	-	1	-	5	-	5	-	0.2	-	2	-	-	-	-	-	-
CT2			400	-	80	-	400	-	400	-	16	-	160	-	-	40,000	40	1,152	2,400	4,000
SCC2			2,000	-	400	-	7,600	-	6,000	-	200	-	4,200	-	-	40,000	72	2,073	4,320	7,200
TCLP2			-	20	-	4	-	20	-	20	-	0.8	-	8	-	-	-	-	-	-

CT1 exceedance TCLP1 and/or SCC1 exceedance CT2 exceedance TCLP2 and/or SCC2 exceedance Asbestos detection

- = Not tested, no criteria or not applicable NAD = no asbestos detected

- Notes:
- a

QA/QC replicate of sample listed directly below the primary sample
- b

Total chromium used as initial screen for chromium(VI).
- c

Total recoverable hydrocarbons (TRH) used as an initial screen for total petroleum hydrocarbons (TPH)
- d

Criteria for scheduled chemicals used as an initial screen
- e

Criteria for Chlorpyrifos used as initial screen
- f

NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste
- PQL

Practical quantitation limit
- CT1

Maximum values of specific contaminant concentration (SCC) for classification without TCLP: General solid waste
- SCC1

Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
- TCLP1

Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
- CT2

Maximum values of specific contaminant concentration (SCC) for classification without TCLP: Restricted solid waste
- SCC2

Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste
- TCLP2

Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

Table C4. Preliminary waste classification (soils)

			PAH				Phenols	OCP	OPP	PCB	Scheduled Chemical Waste	VOC	PFAS				Asbestos			
			Benzo(a)pyrene (BaP)	BaP TCLP	Total PAH	Total PAH TCLP	Total Phenolics	Total Analysed OCP	Total Analysed OPP	Total PCB		Total Positive VOC	PFOA	TCLP PFOA	PFOS + PFHxS	TCLP PFOS + PFHxS	Asbestos ID (soil/ material)	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation
		PQL	0.05	<0.001	0.05	-	5	0.1	0.1	0.1	0.1	1	0.0001	0.00001	0.0001	0.00001				0.001
Sample ID	Depth	Sample Date	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/L	-	g	g	%(w/w)
BH3	0.1 - 0.2 m	5/06/2024	150	-	1,200	-	<5	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	NAD	-	-	<0.001
BH3	0.5 - 0.6 m	5/06/2024	2.1	-	19	-	-	-	-	-	-	-	-	-	-	-	NAD	-	-	<0.001
BH1	0.1 - 0.2 m	3/06/2024	0.09	-	0.09	-	-	-	-	-	-	-	-	-	-	-	NAD	-	-	-
BH2	0.2 - 0.3 m	4/06/2024	0.4	-	3.3	-	-	-	-	-	-	-	-	-	-	-	NAD	-	-	-
BH2	0.5 - 0.6 m	4/06/2024	-	-	-	-	-	-	-	-	-	-	<0.0001	-	0.0003	-	-	-	-	-
BH2	0.9 - 1 m	4/06/2024	0.3	-	3.2	-	<5	<0.1	<0.1	15.8	15.8	-	-	-	-	-	NAD	-	-	<0.001
BH2 - [TRIPLICATE]	0.2 - 0.3 m	4/06/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH101	0.2 - 0.3 m	07/06/24	0.2	-	1.8	-	<5	<0.1	<0.1	0.8	<0.1	<1	-	-	-	-	Detected	0.0146	0.0057	<0.001
BH101	0.5 - 0.6 m	07/06/24	1.9	<0.001	22	<PQL	<5	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	Detected	0.4108	0.0864	0.0158
BH101	0.8 - 0.9 m	07/06/24	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.00001	<0.0001	<0.00001	-	-	-	-
BH101	1.6 - 1.7 m	07/06/24	0.2	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH102	0.2 - 0.3 m	06/06/24	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-
BH102	0.5 - 0.6 m	06/06/24	0.56	-	6.7	-	<5	<0.1	<0.1	<0.1	<0.1	-	<0.0001	<0.00001	<0.0001	<0.00001	Detected	-	0.0005	<0.001
BH102	1 - 1.1 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103	0.2 - 0.3 m	06/06/24	1.1	<0.001	14	<PQL	<5	13.8	<0.1	<0.1	13.8	-	<0.0001	<0.00001	0.0004	<0.00001	Detected	-	0.0058	<0.001
BD3/20240606	0.2 - 0.3 m	05/06/24	1.2	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103	0.5 - 0.6 m	06/06/24	1.1	-	9.2	-	-	-	-	-	-	-	-	-	-	-	Detected	-	0.2244	0.0283
BH103 / PACM1	0.3 - 0.35 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Detected	-	-	-
BH103	1 - 1.1 m	06/06/24	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-
BH103/PACM2	0.6 - 0.65 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Detected	-	-	-
BH104	0.2 - 0.3 m	06/06/24	0.86	-	12	-	<5	0.1	<0.1	<0.1	0.1	-	-	-	-	-	-	-	-	<0.001
BH104	0.6 - 0.7 m	06/06/24	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.00001	<0.0001	<0.00001	-	-	-	-
BH105	0.2 - 0.28 m	06/06/24	0.3	-	3.2	-	<5	<0.1	<0.1	<0.1	<0.1	-	<0.0001	<0.00001	0.0002	<0.00001	NAD	-	-	<0.001
BH106	0.2 - 0.3 m	06/06/24	0.92	-	12	-	<5	<0.1	<0.1	<0.1	<0.1	-	<0.0001	-	<0.0001	-	Detected	-	0.0016	<0.001
BH107	0.2 - 0.3 m	05/06/24	<0.05	-	<0.05	-	-	-	-	-	-	-	<0.0001	-	<0.0001	-	Detected	-	0.0006	<0.001
BH108	0.2 - 0.3 m	05/06/24	0.1	-	0.58	-	<5	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	NAD	-	-	<0.001
BH108	0.5 - 0.6 m	05/06/24	0.2	-	1.8	-	-	-	-	-	-	-	-	-	-	-	Detected	-	0.0005	<0.001
BH108	1 - 1.1 m	05/06/24	-	-	-	-	-	-	-	-	-	-	<0.0001	-	<0.0001	-	-	-	-	-
BH108	1.3 - 1.4 m	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH109	0.2 - 0.3 m	05/06/24	0.3	-	3.2	-	<5	<0.1	<0.1	<0.1	<0.1	-	<0.0001	-	<0.0001	-	NAD	-	-	<0.001
BH109	0.5 - 0.6 m	05/06/24	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-
BH110	0.2 - 0.3 m	05/06/24	0.3	-	3.9	-	<5	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	NAD	-	-	<0.001
BD1/20240605	0.2 - 0.3 m	05/06/24	0.3	-	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH110	0.5 - 0.6 m	05/06/24	-	-	-	-	-	-	-	-	-	<1	<0.0001	-	<0.0001	-	-	-	-	-
BH110	1 - 1.1 m	05/06/24	0.2	-	1.5	-	-	-	-	-	-	-	-	-	-	-	NAD	-	-	<0.001
BH111	0.2 - 0.3 m	05/06/24	<0.05	-	<0.05	-	<5	<0.1	<0.1	<0.1	<0.1	-	<0.0001	-	<0.0001	-	NAD	-	-	<0.001
BH111	0.5 - 0.6 m	05/06/24	1.4	<0.001	14	<PQL	-	-	-	-	-	-	-	-	-	-	NAD	-	-	<0.001
BH111	1 - 1.1 m	05/06/24	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH112	0.2 - 0.3 m	05/06/24	<0.05	-	<0.05	-	<5	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	NAD	-	-	<0.001
BH112	0.5 - 0.6 m	05/06/24	-	-	-	-	-	-	-	-	-	-	<0.0001	-	<0.0001	-	-	-	-	-

			PAH				Phenols	OCP	OPP	PCB	Scheduled Chemical Waste	VOC	PFAS				Asbestos			
			Benzo(a)pyrene (BaP)	BaP TCLP	Total PAH	Total PAH TCLP	Total Phenolics	Total Analysed OCP	Total Analysed OPP	Total PCB		Total Positive VOC	PFOA	TCLP PFOA	PFOS + PFHxS	TCLP PFOS + PFHxS	Asbestos ID (soil/ material)	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation
		PQL	0.05	<0.001	0.05	-	5	0.1	0.1	0.1	0.1	1	0.0001	0.00001	0.0001	0.00001				0.001
Sample ID	Depth	Sample Date	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/L	-	g	g	%(w/w)
BH113	0.2 - 0.3 m	05/06/24	<0.05	-	<0.05	-	<5	<0.1	<0.1	<0.1	<0.1	-	<0.0001	-	<0.0001	-	NAD	-	-	<0.001
BH113	0.5 - 0.6 m	05/06/24	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-
BH113	1 - 1.1 m	05/06/24	0.88	-	6.2	-	-	-	-	-	-	-	-	-	-	-	NAD	-	-	<0.001
BH113	1.4 - 1.5 m	05/06/24	0.7	-	7.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH105 - [TRIPLICATE]	0.2 - 0.28 m	06/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH111 - [TRIPLICATE]	0.2 - 0.3 m	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
									Waste Classification Criteria ^f											
CT1			0.8	-	200	-	288	-	4	<50	<50	-	-	-	-	-	-	-	-	-
SCC1			10	-	200	-	518	-	7.5	<50	<50	-	18	-	1.8	-	-	-	-	-
TCLP1			-	0.04	-	-	-	-	-	-	-	-	-	0.5	-	0.05	-	-	-	-
CT2			3.2	-	800	-	1,152	-	16	<50	<50	-	-	-	-	-	-	-	-	-
SCC2			23	-	800	-	2,073	-	30	<50	<50	-	72	-	7.2	-	-	-	-	-
TCLP2			-	0.16	-	-	-	-	-	-	-	-	-	2	-	0.2	-	-	-	-

CT1 exceedance

TCLP1 and/or SCC1 exceedance

CT2 exceedance

TCLP2 and/or SCC2 exceedance

Asbestos detection

- = Not tested, no criteria or not applicable NAD = no asbestos detected

- Notes:
- a

QA/QC replicate of sample listed directly below the primary sample
- b

Total chromium used as initial screen for chromium(VI).
- c

Total recoverable hydrocarbons (TRH) used as an initial screen for total petroleum hydrocarbons (TPH)
- d

Criteria for scheduled chemicals used as an initial screen
- e

Criteria for Chlorpyrifos used as initial screen
- f

NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste
- PQL

Practical quantitation limit
- CT1

Maximum values of specific contaminant concentration (SCC) for classification without TCLP: General solid waste
- SCC1

Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
- TCLP1

Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
- CT2

Maximum values of specific contaminant concentration (SCC) for classification without TCLP: Restricted solid waste
- SCC2

Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste
- TCLP2

Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

Table 1
74 - 88 Botany Road, Alexandria, NSW
Soil Results & Adopted Site Criteria - Fill Material Between Slabs at 74 Botany Road
1726-ER-1-6 (REV 1)

74 - 88 Botany Road, Alexandria, NSW												Reference		SE163058.007	SE163058.011	SE163058.012	SE163058.013	
Soil Results & Adopted Site Criteria - Fill Material Between Slabs at 74 Botany Road												Sample ID		BH9-0.2-0.4	BH10-0.2-0.4	BH13-0.2-0.4	BH15-0.4-0.6	
1726-ER-1-6 (REV 1)												Date Sampled		10-03-17	10-03-17	10-03-17	10-03-17	
												Sample Matrix		Soil	Soil	Soil	Soil	
Group	Analyte	Units	PQL	GSW Criteria CT1	RSW Criteria CT2	GSW Criteria TCLP1 (mg/L)	GSW Criteria SCC1 (mg/kg)	RSW Criteria TCLP2 (mg/L)	RSW Criteria SCC2 (mg/kg)	ENM Maximum Average	ENM Absolute Maximum	DATASET AVERAGE	DATASET MINIMUM	DATASET MAXIMUM	Fill	Fill	Fill	Fill
Metals	Arsenic	mg/kg	2	100	400	#	500	#	2,000	20	40	9.7	< 3	17	8	4	17	<3
	Cadmium	mg/kg	0.4	20	80	#	100	#	400	0.5	1	1.6	<0.3	3.4	3.4	0.6	0.9	<0.3
	Chromium	mg/kg	5	100	400	-	1,900	-	7,600	75	150	9	1.3	17	17	7.5	11	1.3
	Chromium (TCLP)	mg/L	-	-	-	5	-	20	-	-	-	-	-	0	-	-	-	-
	Copper	mg/kg	5	*	*	#	*	#	*	100	200	128	12	330	330	28	140	12
	Lead	mg/kg	5	100	400	-	1,500	-	6,000	50	100	1,621	64	4200	2,100	120	4,200	64
	Lead (TCLP)	mg/L	-	-	-	5	-	20	-	-	-	2	-	1.9	2	-	-	-
	Mercury	mg/kg	0.05	4	16	#	50	#	200	0.5	1	1	< 0.05	1	1	0.24	0.61	<0.05
	Nickel	mg/kg	5	40	160	-	1,050	-	4,200	30	60	32	1.4	110	110	7.6	7.7	1.4
	Nickel (TCLP)	mg/L	-	-	-	2	-	8	-	-	-	0	-	0.2	0.2	-	-	-
	Zinc	mg/kg	5	*	*	#	*	#	*	150	300	474	35	1100	1,100	210	550	35
PAHS	Acenaphthene	mg/kg	0.5	*	*	+	+	+	+	+	+	0	<0.1	0.1	0.1	<0.1	<0.1	<0.1
	Acenaphthylene	mg/kg	0.5	*	*	+	+	+	+	+	+	0	<0.1	1.1	1.1	<0.1	0.2	0.1
	Anthracene	mg/kg	0.5	*	*	+	+	+	+	+	+	1	<0.1	2.2	2.2	<0.1	0.2	0.2
	Benz(a)anthracene	mg/kg	0.5	*	*	+	+	+	+	+	+	1.8	0.2	5.1	5.1	0.2	1.5	0.3
	Benz(a)pyrene	mg/kg	0.5	0.8	3.2	-	10	-	23	0.5	1	1.9	0.4	5.5	5.5	0.2	1.5	0.4
	Benz(a)pyrene (TCLP)	mg/L	-	-	-	0.04	-	0.16	-	-	-	-	-	<0.1	-	-	<0.1	-
	Benz(a)pyrene TEQ (lower bound) *	mg/kg	0.5	*	+	+	+	+	+	+	+	3.5	<0.2	7.8	7.8	<0.2	2.3	0.5
	Benz(a)pyrene TEQ (medium bound) *	mg/kg	0.5	*	+	+	+	+	+	+	+	2.8	0.3	7.8	7.8	0.3	2.3	0.6
	Benz(a)pyrene TEQ (upper bound) *	mg/kg	0.5	*	+	+	+	+	+	+	+	2.7	0.2	7.8	7.8	0.2	2.3	0.5
	Benz(b)fluoranthene	mg/kg	0.5	*	+	+	+	+	+	+	+	2.2	0.2	6.3	6.3	0.2	1.9	0.3
	Benz(g,h,i)perylene	mg/kg	0.5	*	+	+	+	+	+	+	+	1.2	0.1	3.3	3.3	0.1	1.2	0.3
	Benz(k)fluoranthene	mg/kg	0.5	*	+	+	+	+	+	+	+	0.9	0.1	2.4	2.4	0.1	0.8	0.2
	Chrysene	mg/kg	0.5	*	+	+	+	+	+	+	+	1.5	0.1	4.4	4.4	0.1	1.2	0.3
	Dibenz(a,h)anthracene	mg/kg	0.5	*	+	+	+	+	+	+	+	0.4	<0.1	0.6	0.6	<0.1	0.2	<0.1
	Fluoranthene	mg/kg	0.5	*	+	+	+	+	+	+	+	4.1	0.3	13	13	0.3	2.2	0.8
	Fluorene	mg/kg	0.5	*	+	+	+	+	+	+	+	0.5	<0.1	0.8	0.8	<0.1	<0.1	0.1
	Indeno(1,2,3-cd)pyrene	mg/kg	0.5	*	+	+	+	+	+	+	+	1.3	<0.1	2.8	2.8	<0.1	1.0	0.2
	Naphthalene	mg/kg	0.5	*	+	+	+	+	+	+	+	0.2	<0.1	0.4	0.4	<0.1	0.1	0.1
	Phenanthrene	mg/kg	0.5	*	+	+	+	+	+	+	+	2.7	0.2	8.7	8.7	0.2	1.0	0.9
	Pyrene	mg/kg	0.5	*	+	+	+	+	+	+	+	3.8	0.3	12	12	0.3	2.3	0.7
	Total PAH*	mg/kg	0.5	200	800	N/A	200	N/A	800	20	40	22.3	1.5	68	68	1.5	15	4.8
TRH/TRH/BTEX	Naphthalene	mg/kg	0.5	*	+	+	+	+	+	+	+	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	TRH C ₁ - C ₉	mg/kg	20	650	2,600	N/A	650	N/A	2,600	*	*	<20	<20	<20	<20	<20	<20	<20
	TRH C ₁₀ -C ₁₆	mg/kg	50	10,000	40,000	N/A	10,000	N/A	40,000	250	500	137.5	<110	220	220	<110	<110	<110
	Benzene	mg/kg	0.1	10	40	#	18	#	72	*	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Ethylbenzene	mg/kg	0.1	600	2,400	#	1,080	#	4,320	*	25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Toluene	mg/kg	0.1	288	1,152	#	518	#	2,073	*	65	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Xylenes - Total	mg/kg	0.3	1,000	4,000	#	1,800	#	7,200	*	15	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Asbestos	Asbestos ID			Detection	Detection	Detection	Detection	Detection	Detection	Detection	Detection				-	No asbestos detected.	No asbestos detected.	No asbestos detected.

Concentration exceeding General Solid Waste Criteria CT1 (NSW EPA Waste Classification Guidelines)
Concentration exceeding General Solid Waste Criteria CT2 (NSW EPA Waste Classification Guidelines)
Concentration exceeding General Solid Waste Criteria TCLP1 (mg/L) (NSW EPA Waste Classification Guidelines)
Concentration exceeding General Solid Waste Criteria TCLP2 (mg/L) SCC1 (mg/kg) (NSW EPA Waste Classification Guidelines)
Concentration exceeding General Solid Waste Criteria SCC1 (mg/kg) (NSW EPA Waste Classification Guidelines)
Concentration exceeding General Solid Waste Criteria SCC2 (mg/kg) (NSW EPA Waste Classification Guidelines)
Concentration exceeding Excavated Natural Material Absolute Maximum Criteria (ENM Order 2014)
Concentration exceeding Excavated Natural Material Maximum Average Criteria (ENM Order 2014)
Special Waste due to asbestos detected

Guidelines not included as no sample analysed using this method
* =
No currently available criterion
- =
No sample analysed
N/A =
No TCLP analysis required
NC =
Not calculated

Table 2
74 - 88 Botany Road, Alexandria, NSW
Soil Results & Adopted Site Criteria - Fill Material
1726-ER-1-6 (REV 1)

74 - 88 Botany Road, Alexandria, NSW											Reference															S15-Fe14123															S15-Fe14124															S15-Fe14127															S15-Fe14128															S15-Fe14129															S15-Fe14130															S15-Fe14131															S15-Fe14133															S15-Fe14136															S15-Fe14139															S15-Fe14141															SE163058.001															SE163058.002															SE163058.004															SE163058.005															SE163058.008															SE163058.009															SE163058.014															SE163058.015																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Soil Results & Adopted Site Criteria - Fill Material											Sample ID															BH1 0.1-0.3															BH1 0.7-0.8															BH2 0.2-0.4															BH3 0.2-0.4															BH4 0.2-0.3															BH4 0.5-0.6															BH5 0.2-0.4															BH6 0.2-0.4															BH7 0.2-0.4															BH8 0.4-0.5															BH9 0.2-0.4															BH10 0.2-0.4															BH11 0.2-0.4															BH12 0.2-0.4															BH13 0.2-0.4															BH14 0.2-0.4															BH15 0.2-0.4															BH16 0.2-0.4															BH17 0.2-0.4															BH18 0.2-0.4															BH19 0.2-0.4															BH20 0.2-0.4															BH21 0.2-0.4															BH22 0.2-0.4															BH23 0.2-0.4															BH24 0.2-0.4															BH25 0.2-0.4															BH26 0.2-0.4															BH27 0.2-0.4															BH28 0.2-0.4															BH29 0.2-0.4															BH30 0.2-0.4															BH31 0.2-0.4															BH32 0.2-0.4															BH33 0.2-0.4															BH34 0.2-0.4															BH35 0.2-0.4															BH36 0.2-0.4															BH37 0.2-0.4															BH38 0.2-0.4															BH39 0.2-0.4															BH40 0.2-0.4															BH41 0.2-0.4															BH42 0.2-0.4															BH43 0.2-0.4															BH44 0.2-0.4															BH45 0.2-0.4															BH46 0.2-0.4															BH47 0.2-0.4															BH48 0.2-0.4															BH49 0.2-0.4															BH50 0.2-0.4															BH51 0.2-0.4															BH52 0.2-0.4															BH53 0.2-0.4															BH54 0.2-0.4															BH55 0.2-0.4															BH56 0.2-0.4															BH57 0.2-0.4															BH58 0.2-0.4															BH59 0.2-0.4															BH60 0.2-0.4															BH61 0.2-0.4															BH62 0.2-0.4															BH63 0.2-0.4															BH64 0.2-0.4															BH65 0.2-0.4															BH66 0.2-0.4															BH67 0.2-0.4															BH68 0.2-0.4															BH69 0.2-0.4															BH70 0.2-0.4															BH71 0.2-0.4															BH72 0.2-0.4															BH73 0.2-0.4															BH74 0.2-0.4															BH75 0.2-0.4															BH76 0.2-0.4															BH77 0.2-0.4															BH78 0.2-0.4															BH79 0.2-0.4															BH80 0.2-0.4															BH81 0.2-0.4															BH82 0.2-0.4															BH83 0.2-0.4															BH84 0.2-0.4															BH85 0.2-0.4															BH86 0.2-0.4															BH87 0.2-0.4															BH88 0.2-0.4															BH89 0.2-0.4															BH90 0.2-0.4															BH91 0.2-0.4															BH92 0.2-0.4															BH93 0.2-0.4															BH94 0.2-0.4															BH95 0.2-0.4															BH96 0.2-0.4															BH97 0.2-0.4															BH98 0.2-0.4															BH99 0.2-0.4															BH100 0.2-0.4															BH101 0.2-0.4															BH102 0.2-0.4															BH103 0.2-0.4															BH104 0.2-0.4															BH105 0.2-0.4															BH106 0.2-0.4															BH107 0.2-0.4															BH108 0.2-0.4															BH109 0.2-0.4															BH110 0.2-0.4															BH111 0.2-0.4															BH112 0.2-0.4															BH113 0.2-0.4															BH114 0.2-0.4															BH115 0.2-0.4															BH116 0.2-0.4															BH117 0.2-0.4															BH118 0.2-0.4															BH119 0.2-0.4															BH120 0.2-0.4															BH121 0.2-0.4															BH122 0.2-0.4															BH123 0.2-0.4															BH124 0.2-0.4															BH125 0.2-0.4															BH126 0.2-0.4															BH127 0.2-0.4															BH128 0.2-0.4															BH129 0.2-0.4															BH130 0.2-0.4															BH131 0.2-0.4															BH132 0.2-0.4															BH133 0.2-0.4															BH134 0.2-0.4															BH135 0.2-0.4															BH136 0.2-0.4															BH137 0.2-0.4															BH138 0.2-0.4															BH139 0.2-0.4															BH140 0.2-0.4															BH141 0.2-0.4															BH142 0.2-0.4															BH143 0.2-0.4															BH144 0.2-0.4															BH145 0.2-0.4															BH146 0.2-0.4															BH147 0.2-0.4															BH148 0.2-0.4															BH149 0.2-0.4															BH150 0.2-0.4															BH151 0.2-0.4															BH152 0.2-0.4															BH153 0.2-0.4															BH154 0.2-0.4															BH155 0.2-0.4															BH156 0.2-0.4															BH157 0.2-0.4															BH158 0.2-0.4															BH159 0.2-0.4															BH160 0.2-0.4															BH161 0.2-0.4															BH162 0.2-0.4															BH163 0.2-0.4															BH164 0.2-0.4															BH165 0.2-0.4															BH166 0.2-0.4															BH167 0.2-0.4															BH168 0.2-0.4															BH169 0.2-0.4															BH170 0.2-0.4															BH171 0.2-0.4															BH172 0.2-0.4															BH173 0.2-0.4															BH174 0.2-0.4															BH175 0.2-0.4															BH176 0.2-0.4															BH177 0.2-0.4															BH178 0.2-0.4															BH179 0.2-0.4															BH180 0.2-0.4															BH181 0.2-0.4															BH182 0.2-0.4															BH183 0.2-0.4															BH184 0.2-0.4															BH185 0.2-0.4															BH186 0.2-0.4															BH187 0.2-0.4															BH188 0.2-0.4															BH189 0.2-0.4															BH190 0.2-0.4															BH191 0.2-0.4															BH192 0.2-0.4															BH193 0.2-0.4															BH194 0.2-0.4															BH195 0.2-0.4															BH196 0.2-0.4															BH197 0.2-0.4															BH198 0.2-0.4															BH199 0.2-0.4															BH200 0.2-0.4															BH201 0.2-0.4															BH202 0.2-0.4															BH203 0.2-0.4															BH204 0.2-0.4															BH205 0.2-0.4															BH206 0.2-0.4															BH207 0.2-0.4															BH208 0.2-0.4															BH209 0.2-0.4															BH210 0.2-0.4															BH211 0.2-0.4															BH212 0.2-0.4															BH213 0.2-0.4															BH214 0.2-0.4															BH215 0.2-0.4															BH216 0.2-0.4															BH217 0.2-0.4															BH218 0.2-0.4															BH219 0.2-0.4															BH220 0.2-0.4															BH221 0.2-0.4															BH222 0.2-0.4															BH223 0.2-0.4															BH224 0.2-0.4															BH225 0.2-0.4															BH226 0.2-0.4															BH227 0.2-0.4															BH228 0.2-0.4															BH229 0.2-0.4															BH230 0.2-0.4															BH231 0.2-0.4															BH232 0.2-0.4															BH233 0.2-0.4															BH234 0.2-0.4															BH235 0.2-0.4															BH236 0.2-0.4															BH237 0.2-0.4															BH238 0.2-0.4															BH239 0.2-0.4															BH240 0.2-0.4															BH241 0.2-0.4															BH242 0.2-0.4															BH243 0.2-0.4															BH244 0.2-0.4															BH245 0.2-0.4															BH246 0.2-0.4															BH247 0.2-0.4															BH248 0.2-0.4															BH249 0.2-0.4															BH250 0.2-0.4															BH251 0.2-0.4															BH252 0.2-0.4															BH253 0.2-0.4															BH254 0.2-0.4															BH255 0.2-0.4															BH256 0.2-0.4															BH257 0.2-0.4															BH258 0.2-0.4															BH259 0.2-0.4															BH260 0.2-0.4															BH261 0.2-0.4															BH262 0.2-0.4															BH263 0.2-0.4															BH264 0.2-0.4															BH265 0.2-0.4															BH266 0.2-0.4															BH267 0.2-0.4															BH268 0.2-0.4															BH269 0.2-0.4															BH270 0.2-0.4															BH271 0.2-0.4															BH272 0.2-0.4															BH273 0.2-0.4															BH274 0.2-0.4															BH275 0.2-0.4															BH276 0.2-0.4															BH277 0.2-0.4															BH278 0.2-0.4															BH279 0.2-0.4															BH280 0.2-0.4															BH281 0.2-0.4															BH282 0.2-0.4															BH283 0.2-0.4															BH284 0.2-0.4															BH285 0.2-0.4															BH286 0.2-0.4															BH287 0.2-0.4															BH288 0.2-0.4															BH289 0.2-0.4															BH290 0.2-0.4															BH291 0.2-0.4															BH292 0.2-0.4															BH293 0.2-0.4															BH294 0.2-0.4															BH295 0.2-0.4															BH296 0.2-0.4															BH297 0.2-0.4															BH298 0.2-0.4															BH299 0.2-0.4															BH300 0.2-0.4															BH301 0.2-0.4															BH302 0.2-0.4															BH303 0.2-0.4															BH304 0.2-0.4															BH305 0.2-0.4															BH306 0.2-0.4															BH307 0.2-0.4															BH308 0.2-0.4															BH309 0.2-0.4															BH310 0.2-0.4															BH311 0.2-0.4															BH312 0.2-0.4															BH313 0.2-0.4															BH314 0.2-0.4															BH315 0.2-0.4															BH316 0.2-0.4															BH317 0.2-0.4															BH318 0.2-0.4															BH319 0.2-0.4															BH320 0.2-0.4															BH321 0.2-0.4															BH322 0.2-0.4															BH323 0.2-0.4															BH324 0.2-0.4															BH325 0.2-0.4															BH326 0.2-0.4															BH327 0.2-0.4															BH328 0.2-0.4															BH329 0.2-0.4															BH330 0.2-0.4															BH331 0.2-0.4															BH332 0.2-0.4															BH333 0.2-0.4															BH334 0.2-0.4															BH335 0.2-0.4															BH336 0.2-0.4															BH337 0.2-0.4															BH338 0.2-0.4															BH339 0.2-0.4															BH340 0.2-0.4															BH341 0.2-0.4															BH342 0.2-0.4															BH343 0.2-0.4															BH344 0.2-0.4															BH345 0.2-0.4															BH346 0.2-0.4															BH347 0.2-0.4															BH348 0.2-0.4															BH349 0.2-0.4															BH350 0.2-0.4															BH351 0.2-0.4															BH352 0.2-0.4															BH353 0.2-0.4															BH354 0.2-0.4															BH355 0.2-0.4															BH356 0.2-0.4															BH357 0.2-0.4															BH358 0.2-0.4															BH359 0.2-0.4															BH360 0.2-0.4															BH361 0.2-0.4															BH362 0.2-0.4															BH363 0.2-0.4															BH364 0.2-0.4															BH365 0.2-0.4															BH366 0.2-0.4															BH367 0.2-0.4															BH368 0.2-0.4															BH369 0.2-0.4															BH370 0.2-0.4															BH371 0.2-0.4															BH372 0.2-0.4															BH373 0.2-0.4															BH374 0.2-0.4															BH375 0.2-0.4															BH376 0.2-0.4															BH377 0.2-0.4															BH378 0.2-0.4															BH379 0.2-0.4															BH380 0.2-0.4															BH381 0.2-0.4															BH382 0.2-0.4															BH383 0.2-0.4															BH384 0.2-0.4															BH385 0.2-0.4															BH386 0.2-0.4															BH387 0.2-0.4															BH388 0.2-0.4															BH389 0.2-0.4															BH390 0.2-0.4															BH391 0.2-0.4															BH392 0.2-0.4															BH393 0.2-0.4															BH394 0.2-0.4															BH395 0.2-0.4															BH396 0.2-0.4															BH397 0.2-0.4															BH398 0.2-0.4															BH399 0.2-0.4															BH400 0.2-0.4															BH401 0.2-0.4															BH402 0.2-0.4															BH403 0.2-0.4															BH404 0.2-0.4															BH405 0.2-0.4															BH406 0.2-0.4															BH407 0.2-0.4															BH408 0.2-0.4															BH409 0.2-0.4															BH410 0.2-0.4															BH411 0.2-0.4															BH412 0.2-0.4															BH413 0.2-0.4															BH414 0.2-0.4															BH415 0.2-0.4															BH416 0.2-0.4															BH417 0.2-0.4															BH418 0.2-0.4															BH419 0.2-0.4															BH420 0.2-0.4															BH421 0.2-0.4															BH422 0.2-0.4															BH423 0.2-0.4															BH424 0.2-0.4															BH425 0.2-0.4															BH426 0.2-0.4															BH427 0.2-0.4															BH428 0.2-0.4															BH429 0.2-0.4															BH430 0.2-0.4															BH431 0.2-0.4															BH432 0.2-0.4															BH433 0.2-0.4															BH434 0.2-0.4															BH435 0.2-0.4															BH436 0.2-0.4															BH437 0.2-0.4															BH438 0.2-0.4															BH439 0.2-0.4															BH440 0.2-0.4															BH441 0.2-0.4															BH442 0.2-0.4															BH443 0.2-0.4															BH444 0.2-0.4															BH445 0.2-0.4															BH446 0.2-0.4															BH447 0.2-0.4															BH448 0.2-0.4															BH449 0.2-0.4															BH450 0.2-0.4															BH451 0.2-0.4															BH452 0.2-0.4															BH453 0.2-0.4															BH454 0.2-0.4															BH455 0.2-0.4															BH456 0.2-0.4															BH457 0.2-0.4															BH458 0.2-0.4															BH459 0.2-0.4															BH460 0.2-0.4															BH461 0.2-0.4															BH462 0.2-0.4															BH463 0.2-0.4															BH464 0.2-0.4															BH465 0.2-0.4															BH466 0.2-0.4															BH467 0.2-0.4															BH468 0.2-0.4															BH469 0.2-0.4															BH470 0.2-0.4															BH471 0.2-0.4															BH472 0.2-0.4															BH473 0.2-0.4															BH474 0.2-0.4															BH475 0.2-0.4															BH476 0.2-0.4															BH477 0.2-0.4															BH478 0.2-0.4															BH479 0.2-0.4															BH480 0.2-0.4															BH481 0.2-0.4															BH482 0.2-0.4															BH483 0.2-0.4															BH484 0.2-0.4															BH485 0.2-0.4															BH486 0.2-0.4															BH487 0.2-0.4															BH488 0.2-0.4															BH489 0.2-0.4															BH490 0.2-0.4															BH491 0.2-0.4															BH492 0.2-0.4															BH493 0.2-0.4															BH494 0.2-0.4															BH495 0.2-0.4															BH496 0.2-0.4															BH497 0.2-0.4															BH498 0.2-0.4															BH499 0.2-0.4															BH500 0.2-0.4															BH501 0.2-0.4															BH502 0.2-0.4															BH503 0.2-0.4															BH504 0.2-0.4															BH505 0.2-0.4															BH506 0.2-0.4															BH507 0.2-0.4															BH508 0.2-0.4															BH509 0.2-0.4															BH510 0.2-0.4															BH511 0.2-0.4															BH512 0.2-0.4															BH513 0.2-0.4															BH514 0.2-0.4															BH515 0.2-0.4															BH516 0.2-0.4															BH517 0.2-0.4															BH518 0.2-0.4															BH519 0.2-0.4															BH520 0.2-0.4															BH521 0.2-0.4															BH522 0.2-0.4															BH523 0.2-0.4															BH524 0.2-0.4															BH525 0.2-0.4															BH526 0.2-0.4															BH527 0.2-0.4															BH528 0.2-0.4															BH529 0.2-0.4															BH530 0.2-0.4															BH531 0.2-0.4															BH532 0.2-0.4															BH533 0.2-0.4															BH534 0.2-0.4															BH535 0.2-0.4															BH536 0.2-0.4															BH537 0.2-0.4															BH538 0.2-0.4															BH539 0.2-0.4															BH540 0.2-0.4															BH541 0.2-0.4															BH542 0.2-0.4															BH543 0.2-0.4															BH544 0.2-0.4															BH545 0.2-0.4															BH546 0.2-0.4															BH547 0.2-0.4															BH548 0.2-0.4															BH549 0.2-0.4															BH550 0.2-0.4															BH551 0.2-0.4															BH552 0.2-0.4															BH553 0.2-0.4															BH554 0.2-0.4															BH555 0.2-0.4															BH556 0.2-0.4															BH557 0.2-0.4															BH558 0.2-0.4															BH559 0.2-0.4															BH560 0.2-0.4															BH561 0.2-0.4															BH562 0.2-0.4															BH563 0.2-0.4															BH564 0.2-0.4															BH565 0.2-0.4															BH566 0.2-0.4															BH567 0.2-0.4															BH568 0.2-0.4															BH569 0.2-0.4															BH570 0.2-0.4															BH571 0.2-0.4															BH572 0.2-0.4														

	Concentration exceeding General Solid Waste Criteria CT1 (NSW EPA Waste Classification Guidelines)
	Concentration exceeding General Solid Waste Criteria CT2 (NSW EPA Waste Classification Guidelines)
	Concentration exceeding General Solid Waste Criteria TCLP1 (mg/L) (NSW EPA Waste Classification Guidelines)
	Concentration exceeding General Solid Waste Criteria TCLP2 (mg/L) SCC1 (mg/kg) (NSW EPA Waste Classification Guidelines)
	Concentration exceeding General Solid Waste Criteria SCC1 (mg/kg) (NSW EPA Waste Classification Guidelines)
	Concentration exceeding General Solid Waste Criteria SCC2 (mg/kg) (NSW EPA Waste Classification Guidelines)
	Concentration exceeding Excavated Natural Material Absolute Maximum Criteria (ENM Order 2014)
	Concentration exceeding Excavated Natural Material Maximum Average Criteria (ENM Order 2014)
	Special Waste due to asbestos detected
#	Guidelines not included as no sample analysed using this method
* =	No currently available criterion
- =	No sample analysed
N/A =	No TCLP analysis required
NC =	Not calculated

Table 3
74 - 88 Botany Road, Alexandria, NSW
Soil Results & Adopted Site Criteria - Natural Soils
1726-ER-1-6 REV 1

74 - 88 Botany Road, Alexandria, NSW									Reference											
Soil Results & Adopted Site Criteria - Natural Soils									Sample ID		S15-Fe19206	S15-Fe19213	S15-Fe14137	S15-Fe14140	S15-Fe14142	SE163058.003	SE163058.006	SE163058.010	SE163058A.017	
1726-ER-1-6 REV 1									Date Sampled		BH1-1.0-1.2	BH5 1.2-1.3	BH6 1.4-1.5	BH7 0.6-0.8	BH8 0.6-0.8	MW3-2.8-3.0	MW4 2.8-3.0	BH9-2.1-2.3	BH9-2.8-3.0	
									Sample Matrix		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Group	Analyte	Units	PQL	GSW Criteria CT1	GSW Criteria TCLP1 (mg/L)	GSW Criteria SCC1 (mg/kg)	ENM Maximum Average	ENM Absolute Maximum	DATASET AVERAGE	DATASET MINIMUM	DATASET MAXIMUM	Nat - dark brown SAND	Nat - light brown/grey gravelly, sandy CLAY	Nat - light brown SAND	Nat - white grey SAND	Nat - coffee rock SAND	Nat - yellow SAND	Nat - yellow/brown SAND	Nat - grey/white SAND	Nat - grey / white / brown SAND
Metals	Arsenic	mg/kg	2	100	#	500	20	40	2.2	< 1	<3	< 2	< 2	< 2	< 2	< 2	<3	<3	<3	<1
	Cadmium	mg/kg	0.4	20	#	100	0.5	1	0.4	< 0.3	<0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	<0.3	<0.3	<0.3	<0.3
	Chromium	mg/kg	5	100	-	1,900	75	150	3	<0.7	<5	< 5	< 5	< 5	< 5	< 5	0.7	0.7	1.3	0.7
	Chromium (TCLP)	mg/L	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Copper	mg/kg	5	*	#	*	100	200	4	< 0.5	10	< 5	< 5	< 5	< 5	< 5	<0.5	<0.5	10	2.7
	Lead	mg/kg	5	100	-	1,500	50	100	37	< 1	100	100	96	6.8	9	< 5	1	<1	94	23
	Lead (TCLP)	mg/L	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mercury	mg/kg	0.05	4	#	50	0.5	1	0.1	< 0.05	0.08	0.07	< 0.05	0.06	< 0.05	0.06	<0.05	<0.05	0.08	0.06
	Nickel	mg/kg	5	40	-	1,050	30	60	2	< 0.5	<5	< 5	< 5	< 5	< 5	< 5	<0.5	0.6	2	0.7
	Nickel (TCLP)	mg/L	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	5	*	#	*	150	300	65	8	310	35	19	310	9	8.4	9.9	9.4	160	21	
PAH5	Acenaphthene	mg/kg	0.5	*	*	*	*	*	0.3	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	<0.1	-
	Acenaphthylene	mg/kg	0.5	*	*	*	*	*	0.3	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	<0.1	-
	Anthracene	mg/kg	0.5	*	*	*	*	*	0.3	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	0.1	-
	Benz(a)anthracene	mg/kg	0.5	*	*	*	*	*	0.3	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	0.3	-
	Benzo(a)pyrene	mg/kg	0.5	0.8	-	10	0.5	1	0.3	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	0.2	-
	Benzo(a)pyrene (TCLP)	mg/L	-	-	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Benzo(a)pyrene TEQ (lower bound) *	mg/kg	0.5	*	*	*	*	*	0.4	< 0.2	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.2	<0.2	0.3	-
	Benzo(a)pyrene TEQ (medium bound) *	mg/kg	0.5	*	*	*	*	*	0.4	< 0.3	0.6	0.6	0.6	0.6	0.6	0.6	<0.3	<0.3	0.4	-
	Benzo(a)pyrene TEQ (upper bound) *	mg/kg	0.5	*	*	*	*	*	0.8	< 0.2	1.2	1.2	1.2	1.2	1.2	1.2	<0.2	<0.2	0.4	-
	Benzo(b,k)fluoranthene	mg/kg	0.5	*	*	*	*	*	0.3	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	0.3	-
	Benzo(g,h,i)perylene	mg/kg	0.5	*	*	*	*	*	0.3	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	0.2	-
	Benzo(k)fluoranthene	mg/kg	0.5	*	*	*	*	*	0.3	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	0.1	-
	Chrysene	mg/kg	0.5	*	*	*	*	*	0.3	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	0.2	-
	Dibenz(a,h)anthracene	mg/kg	0.5	*	*	*	*	*	0.3	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	<0.1	-
	Fluoranthene	mg/kg	0.5	*	*	*	*	*	0.4	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	0.7	-
	Fluorene	mg/kg	0.5	*	*	*	*	*	0.3	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	<0.1	-
	Indeno(1,2,3-cd)pyrene	mg/kg	0.5	*	*	*	*	*	0.3	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	0.1	-
	Naphthalene	mg/kg	0.5	*	*	*	*	*	0.3	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	<0.1	-
	Phenanthrene	mg/kg	0.5	*	*	*	*	*	0.4	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	0.5	-
	Pyrene	mg/kg	0.5	*	*	*	*	*	0.4	< 0.1	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	0.6	-
TRH/BTEX	Total PAH*	mg/kg	0.5	200	N/A	200	20	40	0.8	< 0.5	<0.8	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.8	<0.8	3.3	-
	Naphthalene	mg/kg	0.5	*	*	*	*	*	0.2	< 0.1	< 0.5	-	-	< 0.5	< 0.5	< 0.5	<0.1	<0.1	<0.1	-
	TRH C ₆ - C ₉	mg/kg	20	650	N/A	650	*	*	< 20	< 20	< 20	-	-	-	-	-	< 20	< 20	< 20	-
	TRH C ₁₀ -C ₁₆	mg/kg	50	10,000	N/A	10,000	250	500	<110	< 110	< 110	-	-	-	-	-	<110	<110	<110	-
	Benzene	mg/kg	0.1	10	#	18	*	0.5	< 0.1	< 0.1	< 0.1	-	-	-	-	-	< 0.1	< 0.1	< 0.1	-
	Ethylbenzene	mg/kg	0.1	600	#	1,080	*	25	< 0.1	< 0.1	< 0.1	-	-	-	-	-	< 0.1	< 0.1	< 0.1	-
	Toluene	mg/kg	0.1	288	#	518	*	65	< 0.1	< 0.1	< 0.1	-	-	-	-	-	< 0.1	< 0.1	< 0.1	-
	Xylenes - Total	mg/kg	0.3	1,000	#	1,800	*	15	< 0.3	< 0.3	< 0.3	-	-	-	-	-	< 0.3	< 0.3	< 0.3	-
Asbestos																				
	Asbestos ID			Detection	Detection	Detection	Detection	Detection				No asbestos detected.	-	-	No asbestos detected.	-	No asbestos detected.	-	-	-

Concentration exceeding General Solid Waste Criteria CT1 (NSW EPA Waste Classification Guidelines)
Concentration exceeding General Solid Waste Criteria TCLP1 (mg/L) (NSW EPA Waste Classification Guidelines)
Concentration exceeding General Solid Waste Criteria SCC1 (mg/kg) (NSW EPA Waste Classification Guidelines)
Concentration exceeding Excavated Natural Material Absolute Maximum Criteria (ENM Order 2014)
Concentration exceeding Excavated Natural Material Maximum Average Criteria (ENM Order 2014)
Guidelines not included as no sample analysed using this method
* = No currently available criterion
- = No sample analysed
N/A = No TCLP analysis required
NC = Not calculated

Table 2
74 - 88 Botany Road, Alexandria, NSW
Groundwater Analytical Data
1726-ER-1-3

Group	Analyte	Units	LOR	Drinking Water Criteria ¹	Aquatic Ecosystem Criteria ²	Recreational criteria- primary and secondary contact ³	Health Screening Levels - Residential - NEPM (2013) ⁴	DATASET MINIMUM	DATASET MAXIMUM								
Metals (filtered)	Arsenic	mg/L	0.001	0.01	-	0.05	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-
	Cadmium	mg/L	0.0001	0.002	0.0007	0.005	-	0	0	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-	-	-
	Chromium	mg/L	0.001	0.05	0.0044	0.5	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-
	Copper	mg/L	0.001	2	0.0013	1	-	0.002	0.004	0.002	0.002	0.002	0.004	0.003	-	-	-
	Lead	mg/L	0.001	0.01	0.0044	0.05	-	0.001	0.001	< 0.001	< 0.001	0.001	< 0.001	0.001	-	-	-
	Mercury	mg/L	0.0001	0.001	0.0001	0.001	-	0.0001	0.0002	0.0002	< 0.0001	0.0001	< 0.0001	< 0.0001	-	-	-
	Nickel	mg/L	0.001	0.02	0.007	0.1	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-
Metals (Total)	Zinc	mg/L	0.005	-	0.015	5	-	0.02	0.066	0.066	0.02	0.024	0.063	0.043	-	-	-
	Arsenic	mg/L	0.001	0.01	-	0.05	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-
	Cadmium	mg/L	0.0001	0.002	0.0007	0.005	-	0	0	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-	-	-
	Chromium	mg/L	0.001	0.05	0.0044	0.5	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-
	Copper	mg/L	0.001	2	0.0013	1	-	0.001	0.002	< 0.001	0.001	0.001	0.002	0.001	-	-	-
	Lead	mg/L	0.001	0.01	0.0044	0.05	-	0.002	0.004	< 0.001	0.002	0.004	< 0.001	0.004	-	-	-
	Mercury	mg/L	0.0001	0.001	0.0001	0.001	-	0	0	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	-	-
TRH	Nickel	mg/L	0.001	0.02	0.007	0.1	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-
	Zinc	mg/L	0.005	-	0.015	5	-	0.02	0.056	0.052	0.02	0.028	0.056	0.029	-	-	-
	Naphthalene	mg/L	0.01	-	-	-	-	0	0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-
	TRH >C10-C16	mg/L	0.05	-	-	-	-	0	0	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-
	TRH >C10-C16 less Naphthalene (F2)	mg/L	0.05	-	-	-	1	0	0	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-
	TRH >C16-C34	mg/L	0.1	-	-	-	NL	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-
	TRH >C34-C40	mg/L	0.1	-	-	-	NL	0	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-
Halogenated Volatile Organics	TRH C6-C10	mg/L	0.02	-	-	-	-	0	0	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	-
	TRH C6-C10 less BTEX (F1)	mg/L	0.02	-	-	-	1	0	0	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	-
	1,1,1,2-Tetrachloroethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,1,1-Trichloroethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,1,2,2-Tetrachloroethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,1,2-Trichloroethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,1-Dichloroethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,1-Dichloroethene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,2,3-Trichloropropane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,2-Dibromoethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,2-Dichlorobenzene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,2-Dichloroethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,2-Dichloropropane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,3-Dichlorobenzene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,3-Dichloropropane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,4-Dichlorobenzene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	Bromodichloromethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	Bromoform	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	Bromomethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	Carbon Tetrachloride	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
Chlorobenzene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	
Chloroform	mg/L	< 0.005	-	-	-	-	0	0	< 0.005	< 0.005	< 0.005	< 0.005	-	-	-	-	
VOCs	Chloromethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	cis-1,2-Dichloroethene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	cis-1,3-Dichloropropene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	Dibromochloromethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	Dibromomethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	Iodomethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	Methylene Chloride	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	Tetrachloroethene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	trans-1,2-Dichloroethene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	trans-1,3-Dichloropropene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	Trichloroethene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	Trichlorofluoromethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	Vinyl chloride	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-
	1,1,1,2-Tetrachloroethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	1,1,1-Trichloroethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	1,1,2,2-Tetrachloroethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	1,1,2-Trichloroethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1,1-Dichloroethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
1,1-Dichloroethene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
1,2,3-Trichloropropane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
1,2,4-Trimethylbenzene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
1,2-Dibromoethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
1,2-Dichlorobenzene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
1,2-Dichloroethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	

Table 2
74 - 88 Botany Road, Alexandria, NSW
Groundwater Analytical Data
1726-ER-1-3

								Reference	S17-Ma25699	S17-Ma25700	S17-Ma25701	S17-Ma25702	S17-Ma25703	S17-Ma25704	S17-Ma25705
								Sample ID	MW1	MW2	MW3	MW4	QC1	RINSATE BLANK	TRIP BLANK
								Date Sampled	23-03-17	23-03-17	23-03-17	23-03-17	23-03-17	23-03-17	23-03-17
								Sample Matrix	Water	Water	Water	Water	Water	Water	Water
Group	Analyte	Units	LOR	Drinking Water Criteria ¹	Aquatic Ecosystem Criteria ²	Recreational criteria- primary and secondary contact ³	Health Screening Levels - Residential - NEPM (2013) ⁴	DATASET MINIMUM	DATASET MAXIMUM						
	1,2-Dichloropropane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	1,3,5-Trimethylbenzene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	1,3-Dichlorobenzene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	1,3-Dichloropropane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	1,4-Dichlorobenzene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	2-Butanone (MEK)	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	2-Propanone (Acetone)	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	4-Chlorotoluene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	4-Methyl-2-pentanone (MIBK)	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Allyl chloride	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Benzene	mg/L	< 0.001	0.001	0.9	0.01	0.8	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Bromobenzene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Bromochloromethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Bromodichloromethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Bromoform	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Bromomethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Carbon disulfide	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Carbon Tetrachloride	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Chlorobenzene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Chloroethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Chloroform	mg/L	< 0.005	-	-	-	-	0	0	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	Chloromethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	cis-1,2-Dichloroethene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	cis-1,3-Dichloropropene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Dibromochloromethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Dibromomethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Dichlorodifluoromethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Ethylbenzene	mg/L	< 0.001	0.3	-	-	NL	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Iodomethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Isopropyl benzene (Cumene)	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	m&p-Xylenes	mg/L	< 0.002	-	-	-	-	0	0	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
	Methylene Chloride	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	o-Xylene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Styrene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Tetrachloroethene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Toluene	mg/L	< 0.001	0.8	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	trans-1,2-Dichloroethene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	trans-1,3-Dichloropropene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Trichloroethene	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Trichlorofluoromethane	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Vinyl chloride	mg/L	< 0.001	-	-	-	-	0	0	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Xylenes - Total	mg/L	< 0.003	0.6	-	-	-	0	0	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003

Notes

1. Groundwater Investigation Levels - Drinking Water (NEPC 2013)

2. Groundwater Investigation Levels - Marine Waters (NEPC 2013)

3. Groundwater Health Screening Levels for Vapour Intrusion, Residential, Sand (2m - <4m)/(NEPC 2013)

4. Recreational Trigger Values for Primary and Secondary Contact Recreation (ANZECC/ARMCANZ 2000)

LOR - Level of Reporting

-- No Guideline

NL - Not Limiting "If the derived groundwater HSL exceeds the water solubility limit, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario."

Appendix D

Logs from Previous Report

Introduction to Terminology, Symbols and Abbreviations

Douglas Partners' reports, investigation logs, and other correspondence may use terminology which has quantitative or qualitative connotations. To remove ambiguity or uncertainty surrounding the use of such terms, the following sets of notes pages may be attached Douglas Partners' reports, depending on the work performed and conditions encountered:

- Soil Descriptions;
- Rock Descriptions; and
- Sampling, insitu testing, and drilling methodologies

In addition to these pages, the following notes generally apply to most documents.

Abbreviation Codes

Site conditions may also be presented in a number of different formats, such as investigation logs, field mapping, or as a written summary. In some of these formats textual or symbolic terminology may be presented using textual abbreviation codes or graphic symbols, and, where commonly used, these are listed alongside the terminology definition. For ease of identification in these note pages, textual codes are presented in these notes in the following style **XW**. Code usage conforms with the following guidelines:

- Textual codes are case insensitive, although herein they are generally presented in upper case; and
- Textual codes are contextual (i.e. the same or similar combinations of characters may be used in different contexts with different meanings (for example `PL` is used for plastic limit in the context of soil moisture condition, as well as in `PL(A)` for point load test result in the testing results column)).

Data Integrity Codes

Subsurface investigation data recorded by Douglas Partners is generally managed in a highly structured database environment, where records "span" between a top and bottom depth interval. Depth interval "gaps" between records are considered to introduce ambiguity, and, where appropriate, our practice guidelines may require contiguous data sets. Recording meaningful data is not always appropriate (for example assigning a "strength" to a concrete pavement) and the following codes may be used to maintain contiguity in such circumstances.

Term	Description	Abbreviation Code
Core loss	No core recovery	KL
Unknown	Information was not available to allow classification of the property. For example, when auguring in loose, saturated sand auger cuttings may not be returned.	UK
No data	Information required to allow classification of the property was not available. For example if drilling is commenced from the base of a hole predrilled by others	ND
Not Applicable	Derivation of the properties not appropriate or beyond the scope of the investigation. For example providing a description of the strength of a concrete pavement	NA

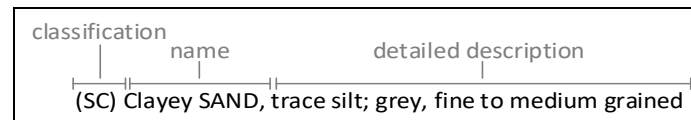
Graphic Symbols

Douglas Partners' logs contain a "graphic" column which provides a pictorial representation of the basic composition of the material. The symbols used are directly representing the material name stated in the adjacent "Description of Strata" column, and as such no specific graphic symbology legend has been provided in these notes.

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Introduction

All materials which are not considered to be “in-situ rock” are described in general accordance with the soil description model of AS 1726-2017 Part 6.1.3, and can be broken down into the following description structure:



The “classification” comprises a two character “group symbol” providing a general summary of dominant soil characteristics. The “name” summarises the particle sizes within the soil which most influence its behaviour. The detailed description presents more information about composition, condition, structure, and origin of the soil.

Classification, naming and description of soils require the relative proportion of particles of different sizes within the whole soil mixture to be considered.

Particle size designation and Behaviour Model

Solid particles within a soil are differentiated on the basis of size.

The engineering behaviour properties of a soil can subsequently be modelled to be either “fine grained” (also known as “cohesive” behaviour) or “coarse grained” (“non cohesive” behaviour), depending on the relative proportion of fine or coarse fractions in the soil mixture.

Particle Size Designation	Particle Size (mm)	Behaviour Model	
		Behaviour	Approximate Dry Mass
Boulder	>200	Excluded from particle behaviour model as “oversize”	
Cobble	63 - 200		
Gravel ¹	2.36 - 63	Coarse	>65%
Sand ¹	0.075 - 2.36		
Silt	0.002 - 0.075	Fine	>35%
Clay	<0.002		

¹ – refer grain size subdivision descriptions below

The behaviour model boundaries defined above are not precise, and the material behaviour should be assumed from the name given to the material (which considers the particle fraction which dominates the behaviour, refer “component proportions” below), rather than strict observance of the proportions of particle sizes. For example, if a material is named a “Sandy CLAY”, this is indicative that the material exhibits fine grained behaviour, even if the dry mass of coarse grained material may exceed 65%.

Component proportions

The relative proportion of the dry mass of each particle size fraction is assessed to be a “primary”, “secondary”, or “minor” component of the soil mixture, depending on its influence over the soil behaviour.

Component Proportion Designation	Definition ¹	Relative Proportion	
		In Fine Grained Soil	In Coarse Grained Soil
Primary	The component (particle size designation, refer above) which dominates the engineering behaviour of the soil	The clay/silt component with the greater proportion	The sand/gravel component with the greater proportion
Secondary	Any component which is not the primary, but is significant to the engineering properties of the soil	Any component with greater than 30% proportion	Any granular component with greater than 30%; or Any fine component with greater than 12%
Minor ²	Present in the soil, but not significant to its engineering properties	All other components	All other components

¹ As defined in AS1726-2017 6.1.4.4

² In the detailed material description, minor components are split into two further sub-categories. Refer “identification of minor components” below.

Composite Materials

In certain situations, a lithology description may describe more than one material, for example, collectively describing a layer of interbedded sand and clay. In such a scenario, the two materials would be described independently, with the names preceded or followed by a statement describing the arrangement by which the materials co-exist. For example, “INTERBEDDED Silty CLAY AND SAND”.

Classification

The soil classification comprises a two character group symbol. The first character identifies the primary component. The second character identifies either the grading or presence of fines in a coarse grained soil, or the plasticity in a fine grained soil. Refer AS1726-2017 6.1.6 for further clarification.

Soil Name

For most soils, the name is derived with the primary component included as the noun (in upper case), preceded by any secondary components stated in an adjective form. In this way, the soil name also describes the general composition and indicates the dominant behaviour of the material.

Component ¹	Prominence in Soil Name
Primary	Noun (eg "CLAY")
Secondary	Adjective modifier (eg "Sandy")
Minor	No influence

¹ – for determination of component proportions, refer component proportions on previous page

For materials which cannot be disaggregated, or which are not comprised of rock or mineral fragments, the names "ORGANIC MATTER" or "ARTIFICIAL MATERIAL" may be used, in accordance with AS1726-2017 Table 14.

Commercial or colloquial names are not used for the soil name where a component derived name is possible (for example "Gravelly SAND" rather than "CRACKER DUST").

Materials of "fill" or "topsoil" origin are generally assigned a name derived from the primary/secondary component (where appropriate). In log descriptions this is preceded by uppercase "FILL" or "TOPSOIL". Origin uncertainty is indicated in the description by the characters (?), with the degree of uncertainty described (using the terms "probably" or "possibly" in the origin column, or at the end of the description).

Identification of minor components

Minor components are identified in the soil description immediately following the soil name. The minor component fraction is usually preceded with a term indicating the relative proportion of the component.

Minor Component Proportion Term	Relative Proportion	
	In Fine Grained Soil	In Coarse Grained Soil
With	All fractions: 15-30%	Clay/silt: 5-12% sand/gravel: 15-30%
Trace	All fractions: 0-15%	Clay/silt: 0-5% sand/gravel: 0-15%

The terms "with" and "trace" generally apply only to gravel or fine particle fractions. Where cobbles/boulders are encountered in minor proportions (generally less than about 12%) the term "occasional" may be used. This term describes the sporadic distribution of the material within the confines of the investigation excavation only, and there may be considerable variation in proportion over a wider area which is difficult to factually characterise due to the relative size of the particles and the investigation methods.

Soil Composition

Plasticity

Descriptive Term	Laboratory liquid limit range	
	Silt	Clay
Non-plastic materials	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

Note, Plasticity descriptions generally describe the plasticity behaviour of the whole of the fine grained soil, not individual fine grained fractions.

Grain Size

Type	Particle size (mm)	
	Coarse	Fine
Gravel	19 - 63	6.7 - 19
	Medium	2.36 - 6.7
	Fine	0.6 - 2.36
Sand	0.21 - 0.6	0.075 - 0.21

Grading

Grading Term	Particle size (mm)
Well	A good representation of all particle sizes
Poorly	An excess or deficiency of particular sizes within the specified range
Uniformly	Essentially of one size
Gap	A deficiency of a particular size or size range within the total range

Note, AS1726-2017 provides terminology for additional attributes not listed here.

Soil Condition

Moisture

The moisture condition of soils is assessed relative to the plastic limit for fine grained soils, while for coarse grained soils it is assessed based on the appearance and feel of the material. The moisture condition of a material is considered to be independent of stratigraphy (although commonly these are related), and this data is presented in its own column on logs.

Applicability	Term	Tactile Assessment	Abbreviation code
Fine	Dry of plastic limit	Hard and friable or powdery	w<PL
	Near plastic limit	Can be moulded	w=PL
	Wet of plastic limit	Water residue remains on hands when handling	w>PL
	Near liquid limit	"oozes" when agitated	w=LL
	Wet of liquid limit	"oozes"	w>LL
Coarse	Dry	Non-cohesive and free running	D
	Moist	Feels cool, darkened in colour, particles may stick together	M
	Wet	Feels cool, darkened in colour, particles may stick together, free water forms when handling	W

The abbreviation code **NDF**, meaning "not-assessable due to drilling fluid use" may also be used.

Note, observations relating to free ground water or drilling fluids are provided independent of soil moisture condition.

Consistency/Density/Compaction/Cementation/Extremely Weathered Material

These concepts give an indication of how the material may respond to applied forces (when considered in conjunction with other attributes of the soil). This behaviour can vary independent of the composition of the material, and on logs these are described in an independent column and are generally mutually exclusive (i.e it is inappropriate to describe both consistency and compaction at the same time). The method by which the behaviour is described depends on the behaviour model and other characteristics of the soil as follows:

- In fine grained soils, the "consistency" describes the ease with which the soil can be remoulded, and is generally correlated against the materials undrained shear strength;
- In granular materials, the relative density describes how tightly packed the particles are, and is generally correlated against the density index;
- In anthropogenically modified materials, the compaction of the material is described qualitatively;
- In cemented soils (both natural and anthropogenic), the cemented "strength" is described qualitatively, relative to the difficulty with which the material is disaggregated; and
- In soils of extremely weathered material origin, the engineering behaviour may be governed by relic rock features, and expected behaviour needs to be assessed based the overall material description.

Quantitative engineering performance of these materials may be determined by laboratory testing or estimated by correlated field tests (for example penetration or shear vane testing). In some cases, performance may be assessed by tactile or other subjective methods, in which case investigation logs will show the estimated value enclosed in round brackets, for example **(VS)**.

Consistency (fine grained soils)

Consistency Term	Tactile Assessment	Undrained Shear Strength (kPa)	Abbreviation Code
Very soft	Extrudes between fingers when squeezed	<12	VS
Soft	Mouldable with light finger pressure	>12 - ≤25	S
Firm	Mouldable with strong finger pressure	>25 - ≤50	F
Stiff	Cannot be moulded by fingers	>50 - ≤100	St
Very stiff	Indented by thumbnail	>100 - ≤200	VSt
Hard	Indented by thumbnail with difficulty	>200	H
Friable	Easily crumbled or broken into small pieces by hand	-	Fr

Relative Density (coarse grained soils)

Relative Density Term	Density Index	Abbreviation Code
Very loose	<15	VL
Loose	>15 - ≤35	L
Medium dense	>35 - ≤65	MD
Dense	>65 - ≤85	D
Very dense	>85	VD

Note, tactile assessment of relative density is difficult, and generally requires penetration testing, hence a tactile assessment guide is not provided.

Compaction (anthropogenically modified soil)

Compaction Term	Abbreviation Code
Well compacted	WC
Poorly compacted	PC
Moderately compacted	MC
Variably compacted	VC

Cementation (natural and anthropogenic)

Cementation Term	Abbreviation Code
Moderately cemented	MOD
Weakly cemented	WEK

Extremely Weathered Material

AS1726-2017 considers weathered material to be soil if the unconfined compressive strength is less than 0.6 MPa (i.e. less than very low strength rock). These materials may be identified as “extremely weathered material” in reports and by the abbreviation code **XWM** on log sheets. This identification is not correlated to any specific qualitative or quantitative behaviour, and the engineering properties of this material must therefore be assessed according to engineering principles with reference to any relic rock structure, fabric, or texture described in the description.

Soil Origin

Term	Description	Abbreviation Code
Residual	Derived from in-situ weathering of the underlying rock	RS
Extremely weathered material	Formed from in-situ weathering of geological formations. Has strength of less than ‘very low’ as per as1726 but retains the structure or fabric of the parent rock.	XWM
Alluvial	Deposited by streams and rivers	ALV
Fluvial	Deposited by channel fill and overbank (natural levee, crevasse splay or flood basin)	FLV
Estuarine	Deposited in coastal estuaries	EST
Marine	Deposited in a marine environment	MAR
Lacustrine	Deposited in freshwater lakes	LAC
Aeolian	Carried and deposited by wind	AEO
Colluvial	Soil and rock debris transported down slopes by gravity	COL
Slopewash	Thin layers of soil and rock debris gradually and slowly deposited by gravity and possibly water	SW
Topsoil	Mantle of surface soil, often with high levels of organic material	TOP
Fill	Any material which has been moved by man	FILL
Littoral	Deposited on the lake or seashore	LIT
Unidentifiable	Not able to be identified	UID

Cobbles and Boulders

The presence of particles considered to be “oversize” may be described using one of the following strategies:

- Oversize encountered in a minor proportion (when considered relative to the wider area) are noted in the soil description; or
- Where a significant proportion of oversize is encountered, the cobbles/boulders are described independent of the soil description, in a similar manner to composite soils (described above) but qualified with “MIXTURE OF”.

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Sampling and Testing

A record of samples retained, and field testing performed is usually shown on a Douglas Partners' log with samples appearing to the left of a depth scale, and selected field and laboratory testing (including results, where relevant) appearing to the right of the scale, as illustrated below:

SAMPLE			DEPTH (m)	TESTING	
SAMPLE REMARKS	TYPE	INTERVAL		TEST TYPE	RESULTS AND REMARKS
	SPT		1.0 1.45	SPT	4,9,11 N=20

Sampling

The type or intended purpose for which a sample was taken is indicated by the following abbreviation codes.

Sample Type	Code
Auger sample	A
Acid Sulfate sample	ASS
Bulk sample	B
Core sample	C
Disturbed sample	D
Environmental sample	ES
Gas sample	G
Piston sample	P
Sample from SPT test	SPT
Undisturbed tube sample	U ¹
Water sample	W
Material Sample	MT
Core sample for unconfined compressive strength testing	UCS

¹ – numeric suffixes indicate tube diameter/width in mm

The above codes only indicate that a sample was retained, and not that testing was scheduled or performed.

Field and Laboratory Testing

A record that field and laboratory testing was performed is indicated by the following abbreviation codes.

Test Type	Code
Pocket penetrometer (kPa)	PP
Photo ionisation detector (ppm)	PID
Standard Penetration Test x/y = x blows for y mm penetration HB = hammer bouncing HW = fell under weight of hammer	SPT
Shear vane (kPa)	V
Unconfined compressive strength, (MPa)	UCS

Field and laboratory testing (continued)

Test Type	Code
Point load test, (MPa), axial (A), diametric (D), irregular (I)	PLT(L)
Dynamic cone penetrometer, followed by blow count penetration increment in mm (cone tip, generally in accordance with AS1289.6.3.2)	DCP/150
Perth sand penetrometer, followed by blow count penetration increment in mm (flat tip, generally in accordance with AS1289.6.3.3)	PSP/150

Groundwater Observations

▷	seepage/inflow
▽	standing or observed water level
NFGWO	no free groundwater observed
OBS	observations obscured by drilling fluids

Drilling or Excavation Methods/Tools

The drilling/excavation methods used to perform the investigation may be shown either in a dedicated column down the left-hand edge of the log, or stated in the log footer. In some circumstances abbreviation codes may be used.

Method	Abbreviation Code
Direct Push	DP
Solid flight auger. Suffixes: /T = tungsten carbide tip, /V = v-shaped tip	AD ¹
Air Track	AT
Diatube	DT ¹
Hand auger	HA ¹
Hand tools (unspecified)	HAND
Existing exposure	X
Hollow flight auger	HSA ¹
HQ coring	HQ3
HMLC series coring	HMLC
NMLC series coring	NMLC
NQ coring	NQ3
PQ coring	PQ3
Predrilled	PD
Push tube	PT ¹
Ripping tyne/ripper	R
Rock roller	RR ¹
Rock breaker/hydraulic hammer	EH
Sonic drilling	SON ¹
Mud/blade bucket	MB ¹
Toothed bucket	TB ¹
Vibrocure	VC ¹
Vacuum excavation	VE
Wash bore (unspecified bit type)	WB ¹

¹ – numeric suffixes indicate tool diameter/width in mm

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.3 AHD
COORDINATE: E:333462.6, N:6247699.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1
PROJECT No: 221233.02
DATE: 03/06/24 - 04/06/24
SHEET: 1 of 4

CONDITIONS ENCOUNTERED															SAMPLE			TESTING AND REMARKS			
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE						
	0.05	ASPHLATIC CONCRETE: dark grey. 50mm thick.		FILL					ES	0.10											
	0.30	FILL / SAND, with concrete, with gravel: dark grey; coarse; angular to sub-angular, blue metal and sandstone gravel.		FILL	ND				ES	0.50											
	0.80	FILL / SAND, trace ceramic, trace gravel: grey; coarse; angular to sub-angular, sandstone gravel.		AEO	VL				ES	0.90											
	1	Silty SAND (SM): brown to grey; fine to medium; <10% non plastic fines.					M		ES	1.40			1,0,1 N=1								
	1.50	SAND (SP): light brown; fine to medium.																			
	2																				
	2																				
	3																				
	3												2,6,7 N=13								
	4																				
	4												2,4,8 N=12								
	5																				
	5																				
	6																				
	6												13,19,25 N=44								
	6.40	Silty SAND, trace gravel: dark brown; fine to medium; fine to medium, sub-angular to sub-rounded, sandstone gravel; with peat/lenses. Organic odour.																			
	7																				
	7												4,11,17 N=28								
	8																				
	8																				
	9																				
	9												10,10,8 N=18								
	9.50	Silty CLAY (CL), trace gravel: grey mottled red-brown; low plasticity; angular to sub-angular, shale gravel.		RS	F	w>PL															

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Commachio Geo305
METHOD: AD to 4.0m, WB to 15.0m, NMLC to 21.9m
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ
CASING: HWT to 4.3m, then HQ to 15m, then HWT to 17.1m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.3 AHD
COORDINATE: E:333462.6, N:6247699.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1
PROJECT No: 221233.02
DATE: 03/06/24 - 04/06/24
SHEET: 2 of 4

CONDITIONS ENCOUNTERED										SAMPLE			TESTING AND REMARKS			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	5		[CONT] Silty CLAY (CL), trace gravel: grey mottled red-brown; low plasticity; angular to sub-angular, shale gravel.										SPT	0,1,4 N=5		
	11					F						11				
	12				RS			w>PL				12	SPT	6,7,12 N=19		
	13					VSt						13				
	14											14				
	14.70															
	15.00		SHALE: pale grey and red-brown; with indurated beds of red-brown ironstone. Ashfield Shale Continued as rock									15	SPT	9,19,25/100		
	16											16				
	17											17				
	18											18				
	19											19				

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PLANT: Commachio Geo305
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REMARKS:

OPERATOR: Ground Test (LC)

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Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.3 AHD
COORDINATE: E:333462.6, N:6247699.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1
PROJECT No: 221233.02
DATE: 03/06/24 - 04/06/24
SHEET: 3 of 4

CONDITIONS ENCOUNTERED										SAMPLE				TESTING							
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.			DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
					LS XS XW HW MW SW FR				VL L M H VH												
	5																				
		11																			
	4																				
		12																			
	3																				
		13																			
	2																				
		14																			
	1																				
		15	Continued from soil																		
	0		SHALE: pale grey and red-brown; with indurated beds or red-brown ironstone. Ashfield Shale			XW		15.00						14.50m: , Unless otherwise stated below, defects are B0°-10°, PR, SM, CN							
										100	72			15.16m: , ST, CT Clay, SM 15.28m: , IR, SN Fe, RF				PLT	PL(A)=0.7MPa		
														15.58m: , UN, CT Clay, RF 15.65m: , CT Clay				PLT	PL(A)=0.4MPa		
	16							15.90	VL					16.03m: , ST, SN Fe, RF				PLT	PL(A)=0.1MPa		
		16.35	LAMINITE: 80% shale and 20% siltstone. Ashfield Shale			HW				100	83							PLT	PL(A)=2.8MPa		
	17																				
		17.10	SANDSTONE: light brown becoming grey, fine to medium grained; laminated to medium bedded. Hawkesbury Sandstone			SW		17.10	L					17.20m: , ST, RF 17.26m: , UN, RF				PLT	PL(A)=0.2MPa		
		17.50				HW MW		17.30	VL to L												
		17.58						17.58						17.65m: B, 20°, UN, CN, RF							
		17.65				SW		17.65	L					17.68m: , CN, RF 17.74m: , CN, RF							
		17.75						17.75						17.75m: , RF 18.05m: , RF				PLT	PL(A)=1MPa		
	18		SANDSTONE: brown, medium to coarse grained, thinly bedded			SW to MW			L to M	95	67			18.48m: , RF 18.49m: , RF 18.56m: , RF							
			SANDSTONE: grey and brown, fine to medium grained, laminated to medium bedded											18.94m: , UN, INF Clay, RF				PLT	PL(A)=0.3MPa		
	19					SW to FR		19.00						19.25m: , UN, CT M, RF 19.49m: , UN, RF, sand INF				PLT	PL(A)=0.9MPa		
										100	81										

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PLANT: Commachio Geo305
METHOD: AD to 4.0m, WB to 15.0m, NMLC to 21.9m
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ

CASING: HWT to 4.3m, then HQ to 15m, then HWT to 17.1m

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.3 AHD
COORDINATE: E:333462.6, N:6247699.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1
PROJECT No: 221233.02
DATE: 03/06/24 - 04/06/24
SHEET: 4 of 4

CONDITIONS ENCOUNTERED										SAMPLE			TESTING									
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.			DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE	
	-5		[CONT] SANDSTONE: grey and brown, fine to medium grained, laminated to medium bedded		SW to FR								20.01m: JT, 45°, UN, CN, RF 20.32m: , INF M 20.33m: , INF M 20.34m: DS 10mm					PLT	PL(A)=0.9MPa			
	21		19.00m-21.00m: trace carbonaceous laminations and inclusions; thinly laminated to laminated 21.00m-21.90m: very thinly bedded		FR			21.00		100	81			20.97m: , UN, CN, RF 21.11m: , UN, CN, RF 21.18m: JT, 45°, UN, CN, RF 21.24m: , RF 21.32m: , ST, RF 21.48m: JT, 45°, UN, CN, RF				21	PLT			PL(A)=0.9MPa
	22		Borehole discontinued at 21.90m depth. Target depth reached.																			
	-7																					
	23																					
	-8																					
	24																					
	-9																					
	25																					
	-10																					
	26																					
	-11																					
	27																					
	-12																					
	28																					
	-13																					
	29																					
	-14																					

NOTES: [#]Soil origin is "probable" unless otherwise stated.

NOTES: #Soil origin is "probable" unless otherwise stated.

PLANT: Commachio Geo305
METHOD: AD to 4.0m, WB to 15.0m, NMLC to 21.9m
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ
CASING: HWT to 4.3m, then HQ to 15m, then HWT to 17.1m

Refer to explanatory notes for symbol and abbreviation definitions

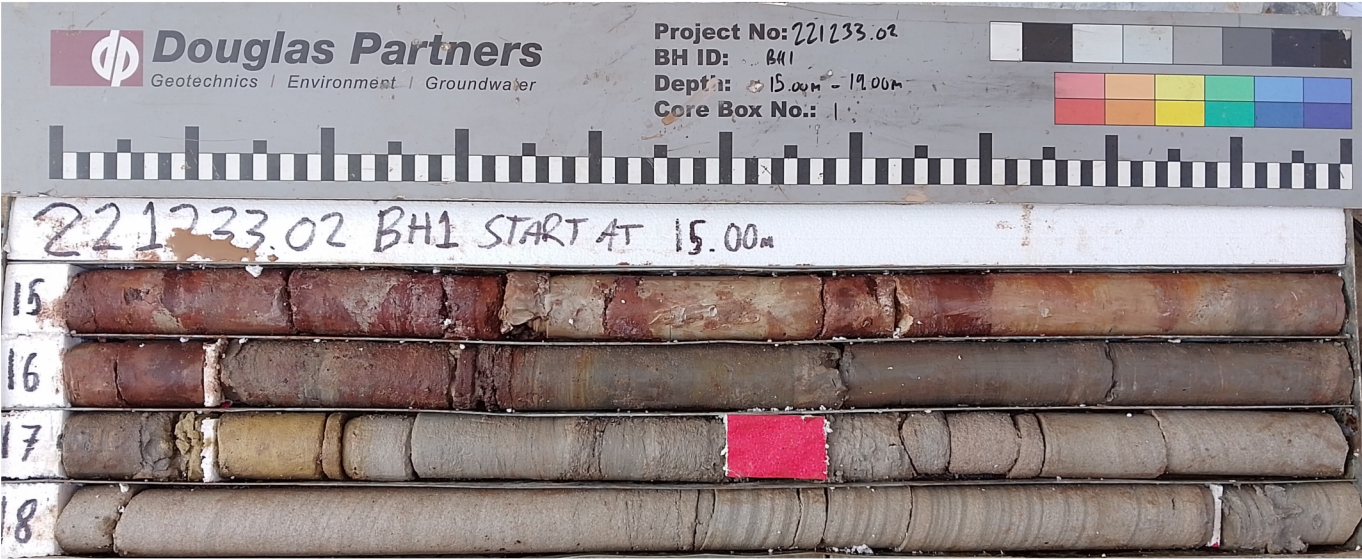


CORE PHOTO LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.3 AHD
COORDINATE: E:333462.6, N:6247699.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1
PROJECT No: 221233.02
DATE: 03/06/24 - 04/06/24
SHEET: 1 of 1



15.00-19.00 m depth



19.00-21.90 m depth

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 14.6 AHD
COORDINATE: E:333501.5, N:6247669.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 221233.02
DATE: 04/06/24
SHEET: 1 of 4

CONDITIONS ENCOUNTERED							SAMPLE			TESTING AND REMARKS						
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*) DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE	
04/06/24 ▼		0.20	FILL / Gravelly SAND: dark grey; medium to coarse; angular to sub-angular, blue metal gravel.		FILL		D		ES	0.10						
			SAND (SP): grey; fine to medium.			ID			ES	0.40						
		1									0.90					
			From 0.60m: brown to light brown; trace angular to sub-angular shale gravel			L	M				1.00		SPT	3,2,4 N=6		
		2										2				
		3			MAR							3	SPT	7,14,18 N=32		
		4										4				
		5					D	W				5				
		5.50	Silty SAND (SM), with gravel: grey; fine to medium gravel; <10% non plastic fines.											SPT	14,19,25 N=44	
		6			MAR							6				
		7										7	SPT	14,19,12 N=31		
		7.60	Silty CLAY (CL), trace gravel: grey mottled red-brown; low plasticity; angular to sub-angular, ironstone gravel.													
		8										8				
		9			RS	St	w=PL					9	SPT	3,5,7 N=12		

NOTES: ^(*)Soil origin is "probable" unless otherwise stated. ^(*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: #Soil origin is "probable" unless otherwise stated. %Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Commachio Geo305
METHOD: AD to 4.0m, WB to 17.5m, NMLC to 20.3m
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ
CASING: HWT to 11.2m

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 14.6 AHD
COORDINATE: E:333501.5, N:6247669.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 221233.02
DATE: 04/06/24
SHEET: 2 of 4

CONDITIONS ENCOUNTERED										SAMPLE			TESTING AND REMARKS			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
		4	[CONT] Silty CLAY (CL), trace gravel: grey mottled red-brown; low plasticity; angular to sub-angular, ironstone gravel.	<												

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Commachio Geo305
METHOD: AD to 4.0m, WB to 17.5m, NMLC to 20.3m
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ
CASING: HWT to 11.2m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 14.6 AHD
COORDINATE: E:333501.5, N:6247669.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 221233.02
DATE: 04/06/24
SHEET: 3 of 4

CONDITIONS ENCOUNTERED										SAMPLE			TESTING							
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	PS XS XW HW MW SW FR	WEATH. D W L M H VH	DEPTH (m)	STRENGTH VL L M H VH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	4	11														11				
	3	12														12				
	2	13														13				
	1	14														14				
	0	15														15				
	-1	16														16				
	-2	17														17				
	-3	18	Continued from soil SANDSTONE: grey, fine to medium grained, thinly bedded to thinly laminated; trace carbonaceous laminations. Hawkesbury Sandstone		MW		17.50 17.75	L M to H	96	91		18.23m: B, 10°, UN, CN, RF 18.28m: B, 10°, UN, CN, RF 18.34m: B, 5°, UN, CN, RF 18.46m: B, 10°, UN, CN, RF 18.61m: B, 0°, PR, CN, RF 18.72m: B, 0°, PR, CN, RF 18.91m: B, 0°, UN, CN, RF 19.58m: B, 0°, PR, CT M, RF 19.72m: B, 0°, PR, CT M, RF				PLT PLT PLT PLT	PL(A)=0.1MPa PL(A)=0.3MPa PL(A)=0.4MPa PL(A)=1.8MPa			
	-4	19			FR		18.90	H												
	-5																			
NOTES: [#] Soil origin is "probable" unless otherwise stated.																				

NOTES: #Soil origin is "probable" unless otherwise stated.

PLANT: Commachio Geo305
METHOD: AD to 4.0m, WB to 17.5m, NMLC to 20.3m
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ
CASING: HWT to 11.2m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 14.6 AHD
COORDINATE: E:333501.5, N:6247669.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 221233.02
DATE: 04/06/24
SHEET: 4 of 4

GROUNDWATER		CONDITIONS ENCOUNTERED										SAMPLE			TESTING						
RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	PS XW HW TW SW FR	WEATH. DW TW SW FR	DEPTH (m)	VL L M H VH EH	STRENGTH H	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE	
	20.18	[CONT] SANDSTONE: grey, fine to medium grained, thinly bedded to thinly laminated; trace carbonaceous laminations. Hawkesbury Sandstone							96	91		19.90m: B 0°, UN, CN, RF						PLT	PL(A)=1.3MPa		
	21																				
	22																				
	23																				
	24																				
	25	Borehole discontinued at 20.30m depth. Target depth reached.																			
	26																				
	27																				
	28																				
	29																				

NOTES: [#]Soil origin is "probable" unless otherwise stated.

NOTES: #Soil origin is "probable" unless otherwise stated.

PLANT: Commachio Geo305
METHOD: AD to 4.0m, WB to 17.5m, NMLC to 20.3m
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ
CASING: HWT to 11.2m

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: Kurraba Group Pty Ltd

PROJECT: Proposed Research and Life Science Development

LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 14.6 AHD

COORDINATE: E:333501.5, N:6247669.1

DATUM/GRID: MGA2020 Zone 56

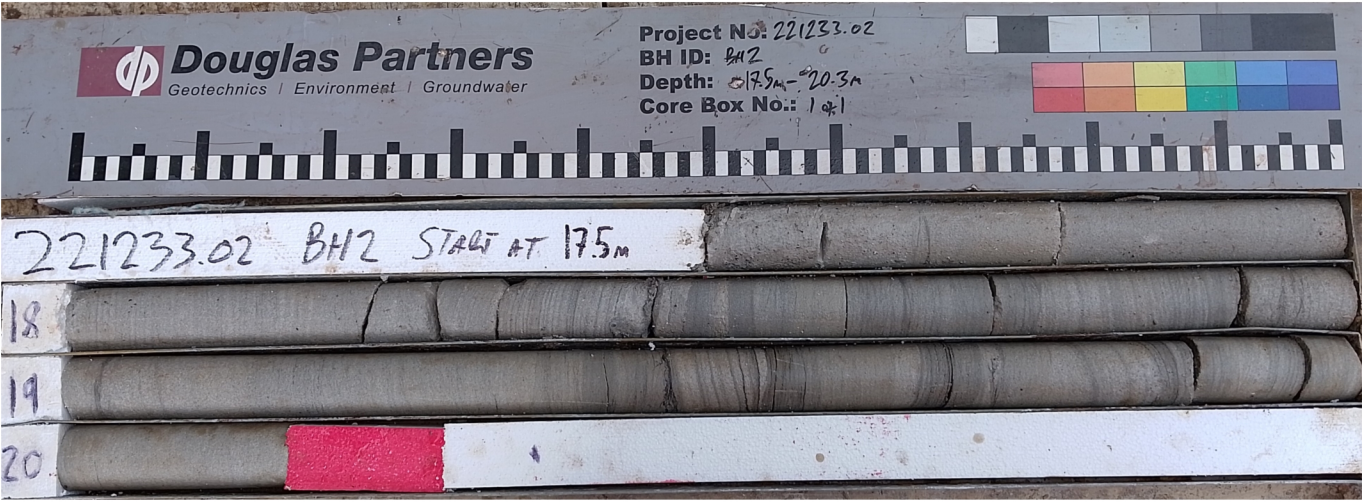
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2

PROJECT No: 221233.02

DATE: 04/06/24

SHEET: 1 of 1



17.50-20.30 m depth

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.5 AHD
COORDINATE: E:333471.3, N:6247733.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 221233.02
DATE: 05/06/24 - 07/06/24
SHEET: 1 of 4

[illegible]

PLANT: Commachio Geo305
METHOD: DT to 0.15m, AD to 4.0m, WB to 16.0m, NMLC to 21.8m
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ

CASING: HWT to 15m

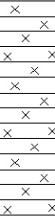
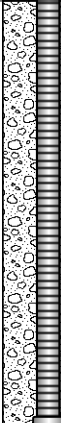
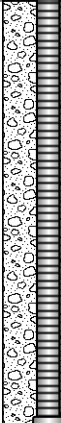
Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.5 AHD
COORDINATE: E:333471.3, N:6247733.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 221233.02
DATE: 05/06/24 - 07/06/24
SHEET: 2 of 4

CONDITIONS ENCOUNTERED															SAMPLE			TESTING AND REMARKS			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE					
	5		[CONT] Silty CLAY (CL), trace gravel: grey mottled red-brown; low plasticity; angular to sub-angular, ironstone gravel.		RS	F		w=PL					SPT	1,3,3 N=6							
	11											11									
	11.50		Shaly CLAY (CL): grey and red-brown; low plasticity; trace shale fragments, relic rock texture.									SPT	13,17,18 N=35								
	12											12									
	13											13									
	14				XWM	H		w<PL				14									
	15											15	SPT	19,24,21 N=45							
	16.00		Continued as rock									16									
	17											17									
	18											18									
	19											19									

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Commachio Geo305
METHOD: DT to 0.15m, AD to 4.0m, WB to 16.0m, NMLC to 21.8m
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ
CASING: HWT to 15m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.5 AHD
COORDINATE: E:333471.3, N:6247733.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 221233.02
DATE: 05/06/24 - 07/06/24
SHEET: 3 of 4

CONDITIONS ENCOUNTERED																			SAMPLE				TESTING			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.			DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE					
					RS XW HW MW SW FR	D W																				
		5																								
		11																								
		4																								
		12																								
		3																								
		13																								
		2																								
		14																								
		1																								
		15																								
		0																								
		16	Continued from soil																							
	16.10		SHALE: dark grey and red-brown. Ashfield Shale		XW			16.00 - 16.10																		
			SHALE: dark grey and grey, laminated. Ashfield Shale			HW			VL																	
		17																								
	17.35		SANDSTONE: brown and grey, medium to coarse grained, laminated to thinly bedded					17.35		100	73															
	17.55																									
	18		SANDSTONE: pale grey, fine to medium grained, laminated to thinly bedded. Hawkesbury Sandstone			MW to SW		18.00																		
	19																									
	19.11																									
	19.27		19.27m-19.40m: dark grey and grey shale bed					19.28		95	82															
	19.40					SW to FR		19.40																		

NOTES: #Soil origin is "probable" unless otherwise stated.

PLANT: Commachio Geo305
METHOD: DT to 0.15m, AD to 4.0m, WB to 16.0m, NMLC to 21.8m
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ
CASING: HWT to 15m

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.5 AHD
COORDINATE: E:333471.3, N:6247733.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 221233.02
DATE: 05/06/24 - 07/06/24
SHEET: 4 of 4

CONDITIONS ENCOUNTERED											SAMPLE			TESTING							
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	PS XW HW MW SW FR	WEATH.	DEPTH (m)	VL L M H VH	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	15		SANDSTONE: pale grey, fine to medium grained, laminated to thinly bedded. Hawkesbury Sandstone																		
	21		SANDSTONE: fine to medium grained, thinly laminated to thinly bedded		SW to FR			M		95	82						21	PLT	PL(A)=0.4MPa		
	16																	PLT	PL(A)=0.9MPa		
	22		Borehole discontinued at 21.80m depth. Target depth reached.																		
	17																				
	23																				
	18																				
	24																				
	19																				
	25																				
	10																				
	26																				
	11																				
	27																				
	12																				
	28																				
	13																				
	29																				
	14																				

NOTES: [#]Soil origin is "probable" unless otherwise stated.

NOTES: #Soil origin is "probable" unless otherwise stated.

PLANT: Commachio Geo305
METHOD: DT to 0.15m, AD to 4.0m, WB to 16.0m, NMLC to 21.8m
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ
CASING: HWT to 15m

CORE PHOTO LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.5 AHD
COORDINATE: E:333471.3, N:6247733.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 221233.02
DATE: 05/06/24 - 07/06/24
SHEET: 1 of 1



16.00-20.00 m depth



20.00-21.80 m depth

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.6 AHD
COORDINATE: E:333515.1, N:6247722.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH4
PROJECT No: 221233.02
DATE: 14/06/24 - 17/06/24
SHEET: 1 of 4

CONDITIONS ENCOUNTERED														SAMPLE			TESTING AND REMARKS		
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ⁽¹⁾ DENSITY. ⁽²⁾	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE				
14/06/24		0.15	CONCRETE: 150mm thick.																
		0.60	FILL / SAND, with gravel: dark grey; fine to coarse; angular to sub-angular, brick gravel.		FILL	ND			ES	0.20 0.30									
		1	SAND (SP): grey; fine to medium.						ES	0.80 1.00		SPT	2,3,2 N=5						
		1.4	From 1.30m: dark brown			L			SPT	1.10 1.50									
		2					M		ES	1.60									
		3	From 2.80m: brown		MAR	MD			SPT	2.50 2.95		SPT	5,7,9 N=16						
		4							SPT	4.00 4.45		SPT	3,8,21 N=29						
		5	From 4.30m: pale grey			D													
		6							SPT	6.00 6.55		SPT	4,4,5 N=9						
		7	7.00m-8.00m: trace peat/lenses and organic odour		MAR	D			SPT	7.00 7.45		SPT	10,11,11 N=22						
		8.00	Silty CLAY (CI): grey; medium plasticity.						SPT	8.00 8.50		SPT	3,6,9 N=15						
		9			RS	VSt	w=PL			8.50 8.95									
		6																	

NOTES: ⁽¹⁾ Soil origin is "probable" unless otherwise stated. ⁽²⁾ Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: #Soil origin is "probable" unless otherwise stated. %Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Commachio Geo305
METHOD: DT to 0.15, AD to 5.5, WB to 17.40, NMLC to 21.5
REMARKS:

OPERATOR: Ground Test (LC)

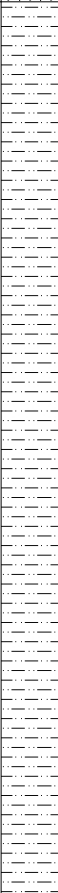
LOGGED: JJ
CASING: HWT to 5.8m

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.6 AHD
COORDINATE: E:333515.1, N:6247722.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH4
PROJECT No: 221233.02
DATE: 14/06/24 - 17/06/24
SHEET: 2 of 4

CONDITIONS ENCOUNTERED																SAMPLE			TESTING AND REMARKS		
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE					
		5	[CONT] Silty CLAY (CI): grey; medium plasticity.		RS																
		11										11									
		11.50	Shaly CLAY (CL), trace gravel: grey and red brown; low plasticity; angular to sub-angular, shale gravel.					w=PL		SPT		11.50	SPT	2,8,18 N=26							
		12										11.95									
		13										13									
		14										14									
		15			XWM					SPT		14.50	SPT	29,25,25/70							
		16										14.95									
		17										17									
		17.40	Continued as rock																		
		18										18									
		19										19									

NOTES: ^(*)Soil origin is "probable" unless otherwise stated. ^(*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: #Soil origin is "probable" unless otherwise stated. %Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Commachio Geo305
METHOD: DT to 0.15, AD to 5.5, WB to 17.40, NMLC to 21.5
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ
CASING: HWT to 5.8m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.6 AHD
COORDINATE: E:333515.1, N:6247722.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH4
PROJECT No: 221233.02
DATE: 14/06/24 - 17/06/24
SHEET: 3 of 4

CONDITIONS ENCOUNTERED										SAMPLE			TESTING								
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.			DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	5				PS	SW	HW	DW													
	11				SW	HW	DW														
	4				SW	HW	DW														
	12				SW	HW	DW														
	3				SW	HW	DW														
	13				SW	HW	DW														
	2				SW	HW	DW														
	14				SW	HW	DW														
	1				SW	HW	DW														
	15				SW	HW	DW														
	0				SW	HW	DW														
	16				SW	HW	DW														
	-1				SW	HW	DW														
	17				SW	HW	DW														
	-2		Continued from soil SANDSTONE: grey, fine to medium grained, laminated to thinly bedded. Hawkesbury Sandstone										17.40m: Unless otherwise stated, defects are B0°-10°, CN, PR, RF					PLT	PL(A)=0.6MPa		
	18									100	93		17.92m: B, 15° 17.94m JT, 30°, UN, CN, RF 17.96m: JT, 30°, UN, CN, RF 18.23m: B, 15°								
	-3																	PLT	PL(J)=0.9MPa		
	19									100	85										
	-4												19.44m: B, 15°					PLT	PL(A)=1.2MPa		

NOTES: #Soil origin is "probable" unless otherwise stated.

PLANT: Commachio Geo305
METHOD: DT to 0.15, AD to 5.5, WB to 17.40, NMLC to 21.5
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ
CASING: HWT to 5.8m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.6 AHD
COORDINATE: E:333515.1, N:6247722.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH4
PROJECT No: 221233.02
DATE: 14/06/24 - 17/06/24
SHEET: 4 of 4

CONDITIONS ENCOUNTERED											SAMPLE			TESTING							
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.			DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	15		[CONT] SANDSTONE: grey, fine to medium grained, laminated to thinly bedded. Hawkesbury Sandstone		PS XW HW MW SW FR	FR to SW			100	85							21	PLT	PL(A)=0.9MPa		
	16																Borehole discontinued at 21.50m depth. Target Depth Reached.	22			
	17																				
	18																				
	19																				
	20																				
	21																				
	22																				
	23																				
	24																				
	25																				
	26																				
	27																				
	28																				
	29																				

NOTES: [#]Soil origin is "probable" unless otherwise stated.

NOTES: #Soil origin is "probable" unless otherwise stated.

PLANT: Commachio Geo305
METHOD: DT to 0.15, AD to 5.5, WB to 17.40, NMLC to 21.5
REMARKS:

OPERATOR: Ground Test (LC)

LOGGED: JJ
CASING: HWT to 5.8m

CORE PHOTO LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2060

SURFACE LEVEL: 15.6 AHD
COORDINATE: E:333515.1, N:6247722.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH4
PROJECT No: 221233.02
DATE: 14/06/24 - 17/06/24
SHEET: 1 of 1



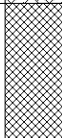
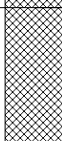
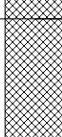
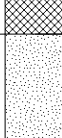
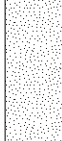
17.40-21.50 m depth

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2017

SURFACE LEVEL: 15.5 AHD
COORDINATE: E:333472.3, N:6247783.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH101
PROJECT No: 221233.03
DATE: 07/05/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED														SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS					
		0.12	CONCRETE: 120 mm thick					NA											
			FILL / SAND, with gravel: brown; fine to coarse; fine to medium, sandstone gravel; brick fragments, trace wood, igneous (blue metal) gravel, metal, glass.		FILL					*	ES	0.20 0.30	PID	1.1ppm					
		0.40	FILL / SAND, with igneous (blue-metal) gravel: pale brown; fine to medium, trace brick fragments, charcoal.		FILL						ES	0.50 0.60	PID	1.0ppm					
		0.70	FILL / SAND, with gravel: pale brown; fine to coarse; fine to medium, igneous (blue metal) gravel; trace brick fragments, charcoal.		FILL						ES	0.80 0.90	PID	<1ppm					
		1.00	SAND (SP): pale grey; fine to medium.			ND		M			ES	1.00 1.10	PID	1.2ppm					
		1.4	1.50m: dark brown and pale grey		AEO						ES	1.60 1.70	PID	1.4ppm					
		2	Borehole discontinued at 2.00m depth. Target depth reached.																
		2																	

NOTES: ^(*)Soil origin is "probable" unless otherwise stated. ^(*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools

OPERATOR: (SR)

LOGGED: SR

METHOD: DT to 0.12m, HA to 2.0m

CASING: Uncased

REMARKS: *Blind duplicate BD5/20240507 taken at 0.2-0.3m.
No free groundwater observed

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2017

SURFACE LEVEL:
COORDINATE: E:333486.4, N:6247700.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH102
PROJECT No: 221233.03
DATE: 07/05/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED													SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ⁽¹⁾	DENSITY. ⁽¹⁾	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS			
		0.07	ASPHALTIC CONCRETE: 70mm thick					NA									
			FILL / GRAVEL: dark grey; fine to medium, angular to sub-angular; fine to coarse sand, trace glass.		FILL			W		ES	0.20 0.30	PID	3.2ppm				
		0.30	FILL / SAND, with gravel: dark grey; fine to coarse; sandstone gravel; trace bricks, glass, tile.		FILL			M		ES	0.50 0.60	PID	2.4ppm				
			0.70m: additional brick fragments														
		0.90	SAND (SP): pale grey and dark grey; fine to medium.			ND				ES	1.00 1.10	PID	2.2ppm				
		1			AEO			M		ES	1.50 1.60	PID	<1ppm				
			1.60m: pale brown and pale grey														
		2	Borehole discontinued at 2.00m depth. Target depth reached.														

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: DT to 0.07m, HA to 2.0m
REMARKS: No free groundwater observed

OPERATOR: (SR)

LOGGED: SR
CASING: Uncased

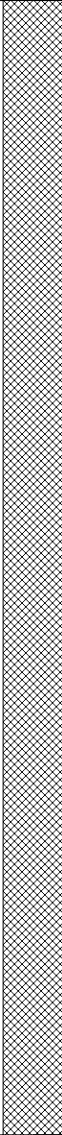
Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2017

SURFACE LEVEL:
COORDINATE: E:333469.2, N:6247656.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH103
PROJECT No: 221233.03
DATE: 06/05/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED															SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ⁽¹⁾	DENSITY. ⁽¹⁾	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS					
		0.10	CONCRETE: 100mm thick					NA											
			FILL / SAND: grey; fine to coarse; with bricks, trace tile, glass, metal, coarse sandstone gravel, terracotta pipe fragments.									0.20							
			0.30m: 1x potential asbestos containing fragment							ES		0.30							
										ES		0.35							
												0.50							
			0.60m: 3x potential asbestos containing fragment							ES		0.60							
										ES		0.65							
												1.00							
			1.10m: increased inclusions of glass							ES		1.10							
												1.50							
			1.30m: pale grey and inclusion of metal rods and glass							ES		1.60							
			Borehole discontinued at 1.60m depth. Practical refusal in fill (brick fragments).																

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools

OPERATOR: (SR)

LOGGED: SR

METHOD: DT to 0.1m, HA to 1.6m

CASING: Uncased

REMARKS: *Blind duplicate BD3/20240506 taken at 0.2-0.3m.
 No free groundwater observed

Refer to explanatory notes for symbol and abbreviation definitions

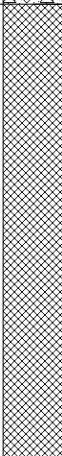
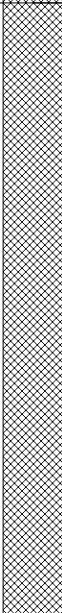


BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2017

SURFACE LEVEL:
COORDINATE: E:333492.1, N:6247662.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH104
PROJECT No: 221233.03
DATE: 06/05/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED															SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ⁽¹⁾	DENSITY. ⁽¹⁾	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS					
		0.10	CONCRETE: 100mm thick					NA											
			FILL / SAND: dark grey; fine to medium; trace tile, brick, coarse sandstone gravel, metal, glass.		FILL			D		ES		0.20 0.30	PID	<1ppm					
		0.40	FILL / SAND: pale brown; fine to coarse; with igneous gravel.			ND													
					FILL			D		ES		0.60 0.70	PID	<1ppm					
			0.80m: increased inclusions of glass, brick, sandstone gravel, tile, concrete and brick fragments																
			Borehole discontinued at 0.85m depth. Practical refusal in fill (brick fragments).																

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: DT to 0.1m, HA to 0.85m
REMARKS: No free groundwater observed

OPERATOR: (SR)

LOGGED: SR
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

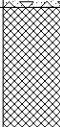


BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2017

SURFACE LEVEL:
COORDINATE: E:333500.5, N:6247728.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH105
PROJECT No: 221233.03
DATE: 06/05/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED															SAMPLE			TESTING AND REMARKS		
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS						
		0.20	CONCRETE: 200mm thick			ND		NA				0.20								
			FILL / SAND: pale brown; fine to coarse; with coarse sandstone gravel, bricks, trace igneous gravel, glass, tile.		FILL			M		ES		0.20	PID	<1ppm						
			Borehole discontinued at 0.28m depth. Practical refusal in fill (brick fragments).									0.28								

NOTES: [#]Soil origin is "probable" unless otherwise stated. ^(*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: DT to 0.2m, HA to 0.28m
REMARKS: No free groundwater observed

OPERATOR: (SR)

LOGGED: SR
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

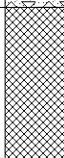


BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2017

SURFACE LEVEL:
COORDINATE: E:333484.1, N:6247749.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH106
PROJECT No: 221233.03
DATE: 06/05/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED														SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS				
		0.20	CONCRETE: 200mm thick					NA										
			FILL / SAND: dark grey; fine to coarse; with coarse sandstone gravel, bricks, and trace glass.		FILL			M		* ES		0.20	PID	<1ppm				
			Borehole discontinued at 0.30m depth. Refusal on inferred concrete slab.									0.30						

NOTES: ^(*)Soil origin is "probable" unless otherwise stated. ^(*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools

OPERATOR: (SR)

LOGGED: SR

METHOD: DT to 0.2m, HA to 0.3m

CASING: Uncased

REMARKS: *Blind duplicate BD4/20240506 taken at 0.2-0.3m.
 No free groundwater observed

Refer to explanatory notes for symbol and abbreviation definitions

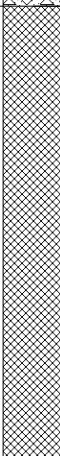


BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2017

SURFACE LEVEL:
COORDINATE: E:333527.4, N:6247674.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH107
PROJECT No: 221233.03
DATE: 05/05/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED															SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS					
		0.10	CONCRETE: 100mm thick					NA											
			FILL / SAND: pale brown; fine to coarse; with sandstone, igneous gravel, tile, glass.		FILL	ND		M		ES		0.20 0.30	PID	<1ppm					
Borehole discontinued at 0.40m depth. Refusal on inferred concrete slab.																			

NOTES: [#]Soil origin is "probable" unless otherwise stated. ^(*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: DT to 0.1m, HA to 0.4m
REMARKS: No free groundwater observed

OPERATOR: (SR)

LOGGED: SR
CASING: Uncased

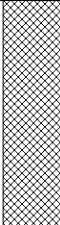
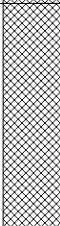
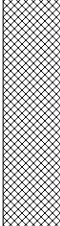
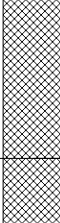
Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2017

SURFACE LEVEL:
COORDINATE: E:333508.6, N:6247671.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH108
PROJECT No: 221233.03
DATE: 05/05/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED															SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS					
		0.10	CONCRETE: 100mm thick					NA											
			FILL / SAND: yellow-brown; fine to coarse; with coarse sandstone and igneous gravel, glass, tile, bricks.		FILL					ES		0.20 0.30	PID	2.4ppm					
		0.40	FILL / SAND: pale grey and yellow-brown; fine to coarse; with silt, sandstone and igneous gravel, tile, glass, terracotta pipe fragments, bricks.							ES		0.50 0.60	PID	3.2ppm					
						ND													
		1	1.00m: pale grey and dark grey		FILL			M		ES		1.00 1.10	PID	2.0ppm					
		1.20	FILL / SAND: pale grey and dark grey; fine to coarse; with sandstone gravel, trace bricks.		FILL					ES		1.30 1.40	PID	<1ppm					
		Borehole discontinued at 1.50m depth. Practical refusal in fill (coarse sandstone gravel).																	
NOTES: ^(*) Soil origin is "probable" unless otherwise stated. ^(*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.																			

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: DT to 0.1m, HA to 1.5m
REMARKS: No free groundwater observed

OPERATOR: (SR)

LOGGED: SR
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

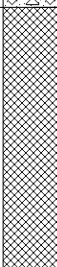
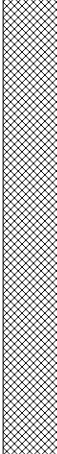


BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2017

SURFACE LEVEL:
COORDINATE: E:333488.1, N:6247681.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH109
PROJECT No: 221233.03
DATE: 05/05/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED														SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN ^(#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS					
		0.15	CONCRETE: 150mm thick																
		FILL / SAND: pale grey; fine to coarse; with sandstone, coarse gravel, bricks, tile, glass, and metal.		FILL	ND										NA	ES	0.20 0.30	PID — 3.4ppm	
		0.50m: dark grey, increased inclusions of bricks		FILL	ND										NA	ES	0.50 0.60	PID — 2.2ppm	
		1																	
		1.10	SAND (SP): pale grey, dark grey; fine to coarse.		AEO			M		ES	1.20 1.30	PID — <1ppm							
Borehole discontinued at 1.50m depth. Target depth reached.																			

NOTES: ^(#) Soil origin is "probable" unless otherwise stated. ^(*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: DT to 0.15m, HA to 1.5m
REMARKS: No free groundwater observed

OPERATOR: (SR)

LOGGED: SR
CASING: Uncased

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2017

SURFACE LEVEL:
COORDINATE: E:333509.3, N:6247698.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH110
PROJECT No: 221233.03
DATE: 05/05/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED										SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
		0.10	CONCRETE: 100mm thick					NA						
			FILL / SAND: pale grey to dark grey; fine to medium; with coarse sandstone gravel, concrete, bricks, tile, terracotta, pipe fragments, plastic, and glass.							*	ES	0.20 0.30	PID	4.6ppm
											ES	0.50 0.60	PID	4.0ppm
			0.70m: fine to coarse, dark grey		FILL			D						
		1									ES	1.00 1.10	PID	<1ppm
		1.20	SAND (SP): pale grey; fine to medium.		AEO			M			ES	1.30 1.40	PID	<1ppm
			Borehole discontinued at 1.50m depth. Target depth reached.											

NOTES: ^(#)Soil origin is "probable" unless otherwise stated. ^(*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: DT to 0.1m, HA to 1.5m
REMARKS: *Blind duplicate BD1/20240505 taken at 0.2-0.3m.
No free groundwater observed

OPERATOR: (SR)

LOGGED: SR
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

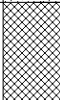
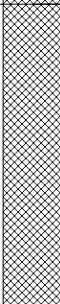
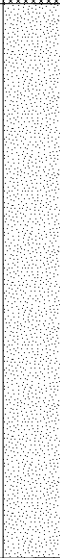


BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2017

SURFACE LEVEL:
COORDINATE: E:333502.4, N:6247717.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH111
PROJECT No: 221233.03
DATE: 05/05/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED														SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS					
		0.10	CONCRETE: 100mm thick																
			FILL / SAND: yellow-brown; with coarse igneous and shale gravel, and fine to medium sandstone gravel.		FILL			NA			ES	0.20 0.30	PID	4.2ppm					
		0.30	FILL / SAND: dark grey and pale grey; fine to coarse; with sandstone, igneous and shale gravel.		FILL						ES	0.50 0.60	PID	<1ppm					
		0.90	SAND (SP): grey; fine to medium.			ND					ES	1.00 1.10	PID	<1ppm					
		1						M											
			1.30m: pale grey		AEO														
			1.50m: dark grey								ES	1.50 1.60	PID	<1ppm					
		2	Borehole discontinued at 2.00m depth. Target depth reached.																

NOTES: ^(*)Soil origin is "probable" unless otherwise stated. ^(*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: DT to 0.1m, HA to 2.0m
REMARKS: No free groundwater observed

OPERATOR: (SR)

LOGGED: SR
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

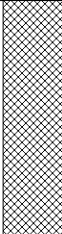
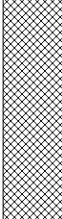


BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2017

SURFACE LEVEL:
COORDINATE: E:333482.2, N:6247714.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH112
PROJECT No: 221233.03
DATE: 05/05/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED																SAMPLE			TESTING AND REMARKS		
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN ^(*)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS							
		0.10	CONCRETE: 100mm thick					NA													
			FILL / SAND: yellow-brow; fine to coarse; with sandstone gravel, igneous gravel, and bricks.																		
			0.50m: increased inclusions of brick fragments		FILL		ND	D													
			Borehole discontinued at 0.70m depth. Practical refusal in fill (brick fragments).																		
		1																			

NOTES: ^(*)Soil origin is "probable" unless otherwise stated. ^(*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: DT to 0.1m, HA to 0.7m
REMARKS: No free groundwater observed

OPERATOR: (SR)

LOGGED: SR
CASING: Uncased

BOREHOLE LOG

CLIENT: Kurraba Group Pty Ltd
PROJECT: Proposed Research and Life Science Development
LOCATION: 100 Botany Road, Waterloo, NSW 2017

SURFACE LEVEL:
COORDINATE: E:333466.8, N:6247615.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH113
PROJECT No: 221233.03
DATE: 05/05/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED															SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(##)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS					
								ND											
		0.10	CONCRETE: 100mm thick																
			FILL / SAND: pale grey; fine to coarse; trace sandstone gravel.		FILL														
		0.30	FILL / SAND: dark grey; fine to coarse; with sandstone gravel, igneous gravel, brick, metal rods; trace clay.		FILL														
					FILL			ND											
					FILL			M											
		1			FILL														
					FILL														
		1.30	SAND (SP): pale grey and dark grey; fine to medium.		AEO														
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NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools

OPERATOR: (SR)

LOGGED: SR

METHOD: DT to 0.1m, HA to 1.7m

CASING: Uncased

REMARKS: *Blind duplicate BD2/20240505 taken at 0.2-0.3m.
 No free groundwater observed

Refer to explanatory notes for symbol and abbreviation definitions



Borehole Log

Client: City West Housing						Started: 19-2-15				
Project: Remediation Action Plan						Finished: 19-2-15				
Location: 74-88 Botany Road, Alexandria, NSW						Borehole Size: 100mm				
Rig Type: Solid Flight Auger			Hole Location: Refer to Figure 3			Driller:		Logged: BR		
RL Surface:			Contractor:			Bearing: ---		Checked:		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/Density Index	Additional Observations
No Groundwater Encountered			0.0			CONCRETE		SM		PAVEMENT
			0.1			FILL: Gravelly SAND, dark brown, fine grained, with some ash, charcoal, and suspected asbestos. HC odours	BH1-0.1-0.3 (QA1/QC1)			HC Odours
			0.5							
			0.7				BH1-0.7-0.8			
			1.0							
			1.0			NATURAL: SAND, coffee rock, dark brown and fine grained. No odours or staining	BH1-1.0-1.2			No Odours
			1.5							
			1.5			NATURAL: SAND, light brown/grey, medium grained, dry-damp, homogenous and soft. No odour	BH1-1.5-1.7	SM		
			2.0							
			2.5							
			2.5							
			3.0		Borehole BH1 terminated at 2.5m					
			3.5							
			4.0							



Borehole Log

Client: City West Housing						Started: 19-2-15		
Project: Remediation Action Plan						Finished: 19-2-15		
Location: 74-88 Botany Road, Alexandria, NSW						Borehole Size: 100mm		
Rig Type: Hand Auger		Hole Location: Refer to Figure 3			Driller:		Logged: BR	
RL Surface:		Contractor:			Bearing: ---		Checked:	

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/Density Index	Additional Observations
No Groundwater Encountered						Concrete	BH2-0.2-0.4		SM	PAVEMENT
						FILL: Gravelly SAND, dark brown, fine grained, with some ash and rubble				No Odours
			0.5			Borehole BH2 terminated at 0.4m				Refusal on Bricks
			1.0							
			1.5							
			2.0							



Borehole Log

Client: City West Housing						Started: 19-2-15		
Project: Remediation Action Plan						Finished: 19-2-15		
Location: 74-88 Botany Road, Alexandria, NSW						Borehole Size: 100mm		
Rig Type: Hand Auger		Hole Location: Refer to Figure 3			Driller:		Logged: BR	
RL Surface:		Contractor:			Bearing: ---		Checked:	

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/Density Index	Additional Observations
No Groundwater Encountered			0.0			CONCRETE				PAVEMENT
			0.5			FILL: Gravelly SAND, dark brown, fine grained, with ash, ceramic and brick fragments	BH3-0.2-0.4	SM	No Odours	
			1.0			FILL: Gravelly SAND, light brown and fine grained.	BH3-0.7-0.9	SM		
			1.0			Borehole BH3 terminated at 1m				
			1.5							
			2.0							
			2.5							
			3.0							

Borehole Log

Client: City West Housing

Started: 19-2-15

Project: Remediation Action Plan

Finished: 19-2-15

Location: 74-88 Botany Road, Alexandria, NSW

Borehole Size: 100mm

Rig Type: Solid Flight Auger

Hole Location: Refer to Figure 3

Driller:

Logged: BR

RL Surface:

Contractor:

Bearing: ---

Checked:

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition Consistency/Density Index	Additional Observations
No Groundwater Encountered			0.0			CONCRETE			PAVEMENT
			0.2			FILL: Gravelly SAND, dark brown, fine grained, with some brick, metal, ceramic, and suspected asbestos, HC odours	BH4-0.2-0.3	SM	HC Odours
			0.5				BH4-0.5-0.6		
			1.0			NATURAL: SAND, light brown/grey, medium grained, homogenous. No odour	BH4-1.0-1.2	SM	No Odours
			1.5			Borehole BH4 terminated at 1.5m			
			2.0						
			2.5						
			3.0						



Borehole Log

Client: City West Housing						Started: 19-2-15		
Project: Remediation Action Plan						Finished: 19-2-15		
Location: 74-88 Botany Road, Alexandria, NSW						Borehole Size: 100mm		
Rig Type: Solid Flight Auger			Hole Location: Refer to Figure 3			Driller:		Logged: BR
RL Surface:			Contractor:			Bearing: ---		Checked:

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition Consistency/ Density Index	Additional Observations
No Groundwater Encountered			0.0			CONCRETE			PAVEMENT
			0.5		FILL: Gravelly, Silty, SAND, minor clay, dark brown, with some brick, metal and ceramic, sand is fine grained. HC odour	BH5-0.2-0.4	SM	HC Odours	
			1.0		NATURAL: Gravelly, Silty, Sandy, CLAY, light brown/grey, medium grained, homogenous. No odour		SM	No Odours	
			1.5			BH5-1.2-1.3			
			2.0			Borehole BH5 terminated at 1.8m			
			2.5						
			3.0						
			3.5						
			4.0						

Borehole Log

Client: City West Housing

Started: 19-2-15

Project: Remediation Action Plan

Finished: 19-2-15

Location: 74-88 Botany Road, Alexandria, NSW

Borehole Size: 100mm

Rig Type: Solid Flight Auger

Hole Location: Refer to Figure 3

Driller:

Logged: BR

RL Surface:

Contractor:

Bearing: ---

Checked:

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition Consistency/ Density Index	Additional Observations
No Groundwater Encountered						BITUMEN and ROADBASE			PAVEMENT
			0.5			FILL: Silty SAND, dark brown, fine grained, loose, with some ash	BH6-0.4-0.5	SM	No Odours
			1.0			NATURAL: SAND, coffee rock, fine grained.		SM	No Odours
			1.5			NATURAL: SAND, light brown/grey, medium grained.	BH6-1.4-1.5	SM	
			2.0						
			2.5				BH6-2.5-2.6		
			3.0			Borehole BH6 terminated at 2.6m			
			3.5						
			4.0						



Borehole Log

Client: City West Housing						Started: 19-2-15		
Project: Remediation Action Plan						Finished: 19-2-15		
Location: 74-88 Botany Road, Alexandria, NSW						Borehole Size: 100mm		
Rig Type: Solid Flight Auger		Hole Location: Refer to Figure 3		Driller:		Logged: BR		
RL Surface:		Contractor:		Bearing: ---		Checked:		

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/Density Index	Additional Observations
No Groundwater Encountered			0.5			BITUMEN and ROADBASE				PAVEMENT
						FILL: Gravelly Silty SAND, dark brown, fine grained, loose, with some ash, brick, metal, and suspected ACM	BH7-0.2-0.4	SM	No Odours	
						NATURAL: SAND, white/grey, fine to coarse grained, and homogenous	BH7-0.6-0.8	M	No Odours	
						Borehole BH7 terminated at 1.5m				
			2.0							
			2.5							
			3.0							



Borehole Log

Client: City West Housing						Started: 19-2-15		
Project: Remediation Action Plan						Finished: 19-2-15		
Location: 74-88 Botany Road, Alexandria, NSW						Borehole Size: 100mm		
Rig Type: Solid Flight Auger		Hole Location: Refer to Figure 3		Driller:		Logged: BR		
RL Surface:		Contractor:		Bearing: ---		Checked:		

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition Consistency/ Density Index	Additional Observations
No Groundwater Encountered			0.5			BITUMEN and ROADBASE		SM	PAVEMENT
						FILL: Silty SAND, dark brown, fine grained, loose, with some ash brick, and metal fragments	BH8 0.2-0.8	SM	No Odours
						NATURAL: SAND, coffee rock, fine grained, homogenous.	BH8 0.6-0.8	SM	No Odours
						Borehole BH8 terminated at 1.5m			
			1.5						
			2.0						
			2.5						
			3.0						



Borehole Log

Client: City West Housing						Started: 19-2-15			
Project: Remediation Action Plan						Finished: 19-2-15			
Location: 74-88 Botany Road, Alexandria, NSW						Borehole Size: 100mm			
Rig Type: Solid Flight Auger		Hole Location: Refer to Figure 3		Driller:		Logged: BR			
RL Surface:		Contractor:		Bearing: ---		Checked:			

Method	Water	Well Details	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/Density Index	Additional Observations
							FILL: Bitumen and road base				PAVEMENT
							FILL: Silty SAND, dark brown, fine grained, minor ash				No Odour
							SAND, dark brown, fine grained (coffee rock)				No Odour
				1							
				2			SAND, light brown/grey, medium grained				
				3							
				4							
				5							
				6			Borehole MW1 terminated at 5.5m				

Groundwater Encountered 3.289m



Borehole Log

Client: City West Housing						Started: 19-2-15			
Project: Remediation Action Plan						Finished: 19-2-15			
Location: 74-88 Botany Road, Alexandria, NSW						Borehole Size: 100mm			
Rig Type: Solid Flight Auger		Hole Location: Refer to Figure 3		Driller:		Logged: BR			
RL Surface:		Contractor:		Bearing: ---		Checked:			

Method	Water	Well Details	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/Density Index	Additional Observations
							CONCRETE				PAVEMENT
							FILL: Gravelly Silty SAND, dark brown with brick, metal and ceramic				HC Odours
				1			SAND, light brown/grey, medium coarse				No Odours
				2							
				3							
				4							
				5							
				6			Borehole MW2 terminated at 5.5m				

Groundwater Encountered 3.478m

Borehole Log

Client: City West Housing

Started: 10-3-17

Project: Remediation Action Plan

Finished: 10-3-17

Location: 74-88 Botany Road, Alexandria, NSW

Borehole Size:

Rig Type: Dando Mini Rig

Hole Location: See Figure 2

Northing

Logged: BR

RL Surface:

Contractor: BG Drilling Pty Ltd

Easting:

Checked:

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition Consistency/ Density Index	Additional Observations
Dando Mini Rig					TS	CONCRETE.		D	No observed ACM hydrocarbon odours or staining.
			0.5		FILL	Silty SAND, dark grey to black, moist, well graded, fine to course grained with gravels including brick, concrete, glass and bitumen observed.	BH9-0.2-0.4	M	No observed ACM hydrocarbon odours or staining.
			1.0						
			1.5						
			2.0				BH9-1.0-1.3		
							BH9-1.8-2.0		
					NAT	SAND, grey/white, moist, medium dense, fine to course grained.	BH9-2.1-2.3	M	No observed ACM hydrocarbon odours or staining.
			2.5		NAT	Brown coffee rock.		M	
					NAT	Grey/white/brown.		M	
			3.0				BH9-2.8-3.0		
						End of hole BH09.			
			3.5						
			4.0						
			4.5						
			5.0						
			5.5						

Borehole BH09 terminated at 3m



Borehole Log

Client: City West Housing						Started: 10-3-17			
Project: Remediation Action Plan						Finished: 10-3-17			
Location: 74-88 Botany Road, Alexandria, NSW						Borehole Size:			
Rig Type: Dando Mini Rig		Hole Location: See Figure 2		Northing		Logged: BR			
RL Surface:		Contractor: BG Drilling Pty Ltd		Easting:		Checked:			
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition Consistency/Density Index	Additional Observations
Dando Mini Rig			0.5		TS	CONCRETE		D	No observed ACM hydrocarbon odours or staining.
					FILL	Silty SAND, dark brown/grey, moist, loose to medium density with brick and concrete observed.	BH10-0.2-0.4	M	No observed ACM hydrocarbon odours or staining.
			1.0			End of hole BH10, refusal at concrete slab.			
			1.5						
			2.0						
			2.5						
			3.0						
			3.5						
			4.0						
			4.5						
			5.0						
			5.5						

Borehole BH10 terminated at 1m



Borehole Log

Client: City West Housing						Started: 10-3-17			
Project: Remediation Action Plan						Finished: 10-3-17			
Location: 74-88 Botany Road, Alexandria, NSW						Borehole Size:			
Rig Type: Dando Mini Rig		Hole Location: See Figure 2		Northing		Logged: BR			
RL Surface:		Contractor: BG Drilling Pty Ltd		Easting:		Checked:			
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition Consistency/Density Index	Additional Observations
Dando Mini Rig			0.5		TS	CONCRETE		D	No observed ACM hydrocarbon odours or staining.
					FILL	Silty SAND, dark brown/grey, moist, loose to medium dense with bricks, sandstones, concrete and bitumen observed.	BH11-02-0.4	M	No observed ACM hydrocarbon odours or staining.
			1.0			End of hole BH11, refusal at concrete slab.			
			1.5						
			2.0						
			2.5						
			3.0						
			3.5						
			4.0						
			4.5						
			5.0						
			5.5						

Borehole BH11 terminated at 0.8m

Borehole Log

Client: City West Housing						Started: 10-3-17		
Project: Remediation Action Plan						Finished: 10-3-17		
Location: 74-88 Botany Road, Alexandria, NSW						Borehole Size:		
Rig Type: Dando Mini Rig		Hole Location: See Figure 2		Northing		Logged: BR		
RL Surface:		Contractor: BG Drilling Pty Ltd		Easting:		Checked:		

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/Density Index	Additional Observations
Dando Mini Rig					TS	CONCRETE.		D		No observed ACM hydrocarbon odours or staining.
			0.5		FILL	Silty SAND, dark brown, dry with brick observed.	BH12-0.2-0.4	D		No observed ACM hydrocarbon odours or staining.
						End of hole BH12, refusal at concrete slab.				
			1.0							
			1.5							
			2.0							
			2.5							
			3.0							
			3.5							
			4.0							
			4.5							
			5.0							
			5.5							

Borehole BH12 terminated at 0.7m

Borehole Log

Client: City West Housing						Started: 10-3-17		
Project: Remediation Action Plan						Finished: 10-3-17		
Location: 74-88 Botany Road, Alexandria, NSW						Borehole Size:		
Rig Type: Dando Mini Rig		Hole Location: See Figure 2		Northing		Logged: BR		
RL Surface:		Contractor: BG Drilling Pty Ltd		Easting:		Checked:		

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/Density Index	Additional Observations
Dando Mini Rig					TS	CONCRETE.		D		No observed ACM hydrocarbon odours or staining.
			0.5		FILL	Silty SAND, yellow/brown, dry, loose to medium dense with brick, concrete and bitumen observed.	BH13-0.2-0.4	D		No observed ACM hydrocarbon odours or staining.
					FILL	Darker brown.	BH13-0.5-0.7	D		No observed ACM hydrocarbon odours or staining.
			1.0			End of hole BH13, refusal at concrete slab.				
			1.5							
			2.0							
			2.5							
			3.0							
			3.5							
			4.0							
			4.5							
			5.0							
			5.5							

Borehole BH13 terminated at 0.7m

Borehole Log

Client: City West Housing						Started: 10-3-17		
Project: Remediation Action Plan						Finished: 10-3-17		
Location: 74-88 Botany Road, Alexandria, NSW						Borehole Size:		
Rig Type: Dando Mini Rig		Hole Location: See Figure 2		Northing		Logged: BR		
RL Surface:		Contractor: BG Drilling Pty Ltd		Easting:		Checked:		

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/Density Index	Additional Observations	
Dando Mini Rig					TS	CONCRETE.		D		No observed ACM hydrocarbon odours or staining.	
					FILL	Silty SAND, brown, dry to moist, medium dense with brick observed.	BH14-0.2-0.4	M		No observed ACM hydrocarbon odours or staining.	
			0.5		FILL	Dark brown.	BH14-0.4-0.5	M		No observed ACM hydrocarbon odours or staining.	
						End of hole BH14, refusal at concrete slab.					No observed ACM hydrocarbon odours or staining.
			1.0								
			1.5								
			2.0								
			2.5								
			3.0								
			3.5								
			4.0								
			4.5								
			5.0								
			5.5								

Borehole BH14 terminated at 0.5m

Borehole Log

Client: City West Housing

Started: 10-3-17

Project: Remediation Action Plan

Finished: 10-3-17

Location: 74-88 Botany Road, Alexandria, NSW

Borehole Size:

Rig Type: Dando Mini Rig

Hole Location: See Figure 2

Northing

Logged: BR

RL Surface:

Contractor: BG Drilling Pty Ltd

Easting:

Checked:

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition Consistency/Density Index	Additional Observations
Dando Mini Rig					TS	CONCRETE.		D	No observed ACM hydrocarbon odours or staining.
			0.5		FILL	SAND, yellow/grey, moist, medium dense, fine to course grained.	BH15-0.4-0.6	M	No observed ACM hydrocarbon odours or staining.
			1.0		FILL	SAND, dark brown/grey, very moist, dense, fine to medium grained with potential staining observed.	BH15-0.7-0.9	VM	No observed ACM hydrocarbon odours or staining.
			1.5						
			2.0		FILL	Slightly moist to moist with a piece of glass observed at 1.9 meters.	BH15-1.7-1.9	M	No observed ACM hydrocarbon odours or staining.
			2.5						
			3.0				BH15-2.7-2.9		
			3.5		FILL	SAND, yellow/brown, moist, dense, fine to course grained.	BH15-3.3-3.5	M	No observed ACM hydrocarbon odours or staining.
			4.0						
			4.5			End of hole BH15.			
			5.0						
			5.5						

Borehole BH15 terminated at 4m

Borehole Log

Client: City West Housing

Started: 10-3-17

Project: Remediation Action Plan

Finished: 10-3-17

Location: 74-88 Botany Road, Alexandria, NSW

Borehole Size:

Rig Type: Dando Mini Rig

Hole Location: See Figure 2

Northing

Logged: BR

RL Surface:

Contractor: BG Drilling Pty Ltd

Easting:

Checked:

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/Density Index	Additional Observations
Dando Mini Rig					TS	CONCRETE.		D		No observed ACM hydrocarbon odours or staining.
					FILL	SAND, yellow/grey, moist, medium dense.	MW3-0.2-0.4	M		Insufficient sample for bag.
			0.5		FILL	BRICK.		D		No observed ACM hydrocarbon odours or staining.
					FILL	Silty SAND, dark grey to black, moist, medium dense, fine grained. Becoming light grey at 1.1 meters.	MW3-0.5-0.7	M		No observed ACM hydrocarbon odours or staining.
							MW3-0.8-1.0			No observed ACM hydrocarbon odours or staining.
			1.0							
					FILL	SAND, light brown, dry to moist, fine to medium grained.		M		No observed ACM hydrocarbon odours or staining.
			1.5		FILL	Black with minor igneous gravels.	MW3-1.4-1.6	M		No observed ACM hydrocarbon odours or staining.
					FILL	SAND, white/grey, moist, fine to medium grained.	MW3-1.6-1.8	M		No observed ACM hydrocarbon odours or staining.
					FILL	Gravelly SAND, black, dry, fine grained with igneous gravels observed.	MW3-1.8-2.0	D		No observed ACM hydrocarbon odours or staining.
			2.0							
					NAT	SAND, grey to light grey, dry to moist, fine to course grained.	MW3-2.2-2.4	M		No observed ACM hydrocarbon odours or staining.
			2.5							
					NAT	Light brown.		M		No observed ACM hydrocarbon odours or staining.
			3.0		NAT	SAND, yellow, wet, dense, fine to course grained. Suspected water table at 2.8-2.9 meters.	MW3-2.8-3.0	W		No observed ACM hydrocarbon odours or staining.
			3.5							
			4.0							
			4.5							
			5.0			End of hole MW03				
			5.5							

Borehole MW03 terminated at 5m



Borehole Log

Client: City West Housing

Started: 10-3-17

Project: Remediation Action Plan

Finished: 10-3-17

Location: 74-88 Botany Road, Alexandria, NSW

Borehole Size:

Rig Type: Dando Mini Rig

Hole Location: See Figure 2

Northing

Logged: BR

RL Surface:

Contractor: BG Drilling Pty Ltd

Easting:

Checked:

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition Consistency/Density Index	Additional Observations
Dando Mini Rig					TS	CONCRETE/BITUMEN.		D	No observed ACM hydrocarbon odours or staining.
					FILL	GRAVEL including shale.	MW4-0.2-0.3	D	ACM observed
			0.5		FILL	SAND, dark grey, moist, medium dense, fine to course grained.	MW4-0.3-0.4	M	No observed ACM hydrocarbon odours or staining.
					FILL	White/grey, dry to moist, well graded.	MW4-0.5-0.6	M	No observed ACM hydrocarbon odours or staining.
			1.0						
					NAT	SAND, black, dry, dense, fine grained with suspected organic matter observed.	MW4-1.2-1.4	D	No observed ACM hydrocarbon odours or staining.
			1.5						
					NAT	Becoming light brown with less organic matter.		D	No observed ACM hydrocarbon odours or staining.
					NAT	Yellow/brown, moist, fine to course grained with no suspected organic matter observed.	MW4-1.8-2.0	M	No observed ACM hydrocarbon odours or staining.
			2.0						
			2.5		NAT	Wet soil, suspected water table.	MW4-2.4-2.5	w	No observed ACM hydrocarbon odours or staining.
			3.0				MW4-2.8-3.0		No observed ACM hydrocarbon odours or staining.
			3.5						
			4.0						
			4.5						
			5.0			End of hole MW04.			
			5.5						

Appendix E

Site Assessment Criteria

1. Introduction

1.1 Guidelines

The following key guidelines were consulted for deriving the site assessment criteria (SAC):

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).
- CRC CARE *Health screening levels for petroleum hydrocarbons in soil and groundwater* (CRC CARE, 2011).
- HEPA *PFAS National Environmental Management Plan (NEMP)* (HEPA, 2020).
- ANZG *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018).
- NHMRC *Guidelines for Managing Risks In Recreational Water* (NHMRC, 2008).
- NHMRC, NRMCC *Australian Drinking Water Guidelines 6 2011, Version 3.2* (NHMRC, NRMCC, 2022).
- ANZECC *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000).

1.2 General

The SAC applied in the current investigation are informed by the CSM which identified human and environmental receptors to potential contamination at the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The following inputs are relevant to the selection and / or derivation of the SAC:

- Land use: health facility, representative of a commercial land-use (workers) as the key site receptors.
 - Corresponding to land use category 'D', commercial / industrial such as shops, offices, factories and industrial sites.
- Soil type: sand.

2. Soils

2.1 Health investigation and screening levels

The generic health investigation levels (HIL) and health screening levels (HSL) are considered to be appropriate for the assessment of human health risk via all relevant pathways of exposure associated with contamination at the site. The adopted soil HIL and HSL for the contaminants of concern are in Table 1 and Table 2.

Table 1: Health investigation levels (mg/kg)

Contaminant	HIL-D
Metals	
Arsenic	3000
Cadmium	900
Chromium (VI)	3600
Copper	240 000
Lead	1500
Mercury (inorganic)	730
Nickel	6000
Zinc	400 000
PAH	
B(a)P TEQ	40
Total PAH	4000
Phenols	
Phenol	240 000
Pentachlorophenol	660
OCP	
DDT+DDE+DDD	3600
Aldrin and dieldrin	45
Chlordane	530
Endosulfan	2000
Endrin	100
Heptachlor	50
HCB	80
Methoxychlor	2500
OPP	
Chlorpyrifos	2000
PCB	
PCB	7

Notes: TRH F1 is TRH C₆-C₁₀ minus BTEX

TRH F2 is TRH >C₁₀-C₁₆ minus naphthalene

The soil saturation concentration (C_{sat}) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds C_{sat}, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

Table 2: Health screening levels (mg/kg)

Contaminant	HSL-D	HSL-D	HSL-D	HSL-D
SAND	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m+
Benzene	3	3	3	3
Toluene	NL	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	230	NL	NL	NL
Naphthalene	NL	NL	NL	NL
TRH F1	260	370	630	NL
TRH F2	NL	NL	NL	NL

Notes: TRH F1 is TRH C₆-C₁₀ minus BTEX

TRH F2 is TRH >C₁₀-C₁₆ minus naphthalene

The soil saturation concentration (C_{sat}) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds C_{sat}, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

The HSL for direct contact derived from CRC CARE (2011) are in Table 3.

Table 3: Health screening levels for direct contact (mg/kg)

Contaminant	DC HSL-A	DC HSL-B	DC HSL-C	DC HSL-D	DC HSL-IMW
Benzene	100	140	120	430	1100
Toluene	14 000	21 000	18 000	99 000	120 000
Ethylbenzene	4500	5900	5300	27 000	85 000
Xylenes	12 000	17 000	15 000	81 000	130 000
Naphthalene	1400	2200	1900	11 000	29 000
TRH F1	4400	5600	5100	26 000	82 000
TRH F2	3300	4200	3800	20 000	62 000
TRH F3	4500	5800	5300	27 000	85 000
TRH F4	6300	8100	7400	38 000	120 000

Notes: TRH F1 is TRH C₆-C₁₀ minus BTEX

TRH F2 is TRH >C₁₀-C₁₆ minus naphthalene

2.2 Health investigation levels for per- and poly-fluoroalkyl substances in soil

The laboratory analytical results for per- and poly-fluoroalkyl substances (PFAS) in soil have been assessed against HIL published in HEPA (2020). The HIL represent a nationally-agreed suite that should be used to inform site investigations. The HIL are intentionally conservative, and an exceedance of these criteria may not constitute a risk if other exposure pathways are controlled. An exceedance of the HIL should trigger further investigations, such as a site-specific risk assessment. At the time of this investigation, screening values were available only for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS).

The HIL derived from Table 2 of HEPA (2020) are in Table 4.

Table 4: Health investigation levels (mg/kg)

Contaminant	HIL-D
PFOS and PFHxS *	20
PFOA	50

Notes: * Includes PFOS only, PFHxS only and the sum of the two.

2.3 Asbestos in soil

The HSL for asbestos in soil are based on likely exposure levels for different scenarios published in NEPC (2013) for the following forms of asbestos:

- Bonded asbestos containing material (ACM); and
- Fibrous asbestos and asbestos fines (FA and AF).

The HSL are in Table 5.

Table 5: Health screening levels for asbestos

Form of asbestos	HSL-D
ACM	0.05%
FA and AF	0.001%
FA and AF and ACM	No visible asbestos for surface soil *

Notes: Surface soils defined as top 10 cm.

* Based on site observations at the sampling points and the analytical results of surface samples.

Where limited sample return is available (e.g., boreholes) the presence or absence of asbestos at a limit of reporting of 0.1 g/kg (AS:4964) has been adopted for this investigation / assessment as an initial screen.

2.4 Management limits

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards;
- Effects on buried infrastructure e.g., penetration of, or damage to, in-ground services.

The adopted management limits are in Table 6.

Table 6: Management limits (mg/kg)

Contaminant	Soil type	ML-D
TRH F1	Coarse	700
TRH F2	Coarse	1000
TRH F3	Coarse	3500
TRH F4	Coarse	10 000

Notes: TRH F1 is TRH C₆-C₁₀ including BTEX
 TRH F2 is TRH >C₁₀-C₁₆ including naphthalene
 ML-A-B-C residential, parkland and public open space

3. Soil Vapour

3.1 Interim soil vapour health investigation levels

Soil vapour interim HIL for specific chlorinated VOC were published by NEPC (2013) to assess the vapour intrusion exposure pathway.

The interim HIL for chlorinated VOC methodology employs a simple though conservative approach using an attenuation factor that relates the concentration of a volatile contaminant in indoor air to the concentration in soil gas immediately below a building foundation slab.

The interim health investigation levels (IHIL) derived from NEPC (2013) are in Table 7.

Table 7: Soil vapour interim health investigation levels, chlorinated hydrocarbons (µg/m³)

Chemical	Common / trade names	IHIL-D
trichloroethene	trichloroethylene, TCE	80
1,1,1-trichloroethane	TCA / 1,1,1-TCA	230 000
tetrachloroethene	Perchloroethylene, perc, PCE	8000
cis,1-2,dichloroethene	dichloroethylene, cis-DCE	300
chloromethane	Vinyl chloride, VC	100

3.2 Health screening levels

Soil vapour HSL for petroleum hydrocarbons were published by NEPC (2013) to assess the vapour intrusion exposure pathway.

The HSL derived from NEPC (2013) are in Table 8.

Table 8: Soil vapour health screening levels for vapour intrusion ($\mu\text{g}/\text{m}^3$)

Contaminant	HSL-D	HSL-D	HSL-D	HSL-D	HSL-D
SAND	0-1 m	1-2 m	2-4 m	4-8 m	>8 m
Benzene	4000	10000	30 000	6 5000	130 000
Toluene	4 800 000	16 000 000	39 000 000	84 000 000	NL
Ethylbenzene	1 300 000	4 600 000	11 000 000	25 000 000	53 000 000
Xylene Total	840 000	3 200 000	8 000 000	18 000 000	37 000 000
Naphthalene	3000	15 000	35 000	75 000	150 000
TRH F1	680 000	2 800 000	7 000 000	15 000 000	32 000 000
TRH F2	500 000	2 400 000	NL	NL	NL

Notes: TRH F1 is TRH C₆-C₁₀ minus BTEX

TRH F2 is TRH >C₁₀-C₁₆ minus naphthalene

The maximum possible soil vapour concentrations have been calculated based on vapour pressures of the pure chemicals. Where soil vapour HSL exceed these values, a soil-specific source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

4. Groundwater

4.1 Introduction

The groundwater investigation levels (GIL) used for interpretation of the groundwater data (as a Tier 1 assessment) have been selected based on the potential risks posed from contamination sourced from the site to receptors at or down-gradient of the site, as identified by the conceptual site model (CSM). The receptors, exposure points and pathways are summarised in Table 9.

Table 9: Summary of potential receptors and potential risks

Receptor	Location	Exposure point	Exposure pathway
Surface water aquatic ecosystem	Down-gradient from site.	Receiving surface water body (Alexandria Canal – Botany Bay) at the groundwater discharge point.	Exposure to contaminants.
Occupants of buildings	On site and down-gradient from site.	Enclosed buildings (existing / proposed).	Inhalation of VOC (including TRH and BTEX) overlying VOC impacted groundwater via the vapour intrusion pathway.

The rationale for the selection of GIL is in Table 10.

Table 10: Groundwater investigation level rationale

Receptor / beneficial use	GIL	Source	Comments / rationale
Aquatic ecosystem	DGV	ANZG (2018)	Marine water 99% LOP for bioaccumulative contaminants 95% LOP for non-bioaccumulative contaminants
Aquatic ecosystem	DGV	HEPA (2020)	Marine water 99% LOP as recommended for potential bioaccumulation Screening values were only available for PFOS and PFOA at the time of this investigation.
Building occupants (vapour intrusion)	HSL	NEPC (2013)	2 m to <4 m

Notes: DGV default guideline value
 % LOP percentage level of protection of species
 HSL health screening level

4.2 Groundwater investigation levels for aquatic ecosystems

The DGV for the protection of aquatic ecosystems derived from ANZG (2018) are in Table 11.

Table 11: Groundwater investigation levels for protection of aquatic ecosystems (µg/L)

Contaminant	Marine DGV 95% LOP	Notes
Metals / metalloids		
Arsenic	24 / 13	Levels provided for As III / As IV respectively as adopted from freshwater criteria in absence of marine criteria. Unknown reliability.
Cadmium	0.7	99% LOP adopted as recommended due to potential for bioaccumulation. Very high reliability.
Chromium (VI)	4.4	Chromium VI levels adopted as initial screen for total chromium. Very high reliability.
Copper	1.3	Very high reliability.
Lead	4.4	Low reliability.
Mercury (inorganic)	0.1	99% LOP adopted as recommended due to potential for bioaccumulation. Very high reliability.
Nickel	7	99% LOP adopted as recommended to protect key species from chronic toxicity. Very high reliability.
Zinc	8	Very high reliability.

Contaminant	Marine DGV 95% LOP	Notes
BTEX		
Benzene	500	99% LOP adopted as recommended to protect key species from chronic toxicity. Moderate reliability.
Ethylbenzene	80	Unknown reliability.
m-Xylene	75	Unknown reliability.
o-xylene	350	Adopted from freshwater criteria for in absence of marine criteria. Unknown reliability.
p-Xylene	200	Adopted from freshwater criteria for in absence of marine criteria. Unknown reliability.
Toluene	180	Unknown reliability.
PAH		
Anthracene	0.01	99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
Benzo(a)pyrene	0.1	99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
Fluoranthene	1	99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
Naphthalene	50	99% LOP adopted as recommended to protect key species from chronic toxicity. Moderate reliability.
Phenanthrene	0.6	99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
Phenols		
Phenol	400	Moderate reliability.
Pentachlorophenol	11	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
OCP		
Aldrin	0.003	Unknown reliability and LOP.
Chlordane	0.001	Unknown reliability and LOP.
DDT	0.0004	Unknown reliability and LOP.
Dieldrin	0.01	Freshwater criteria adopted in absence of marine criteria. Unknown reliability and LOP.
Endosulfan	0.005	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.

Contaminant	Marine DGV 95% LOP	Notes
Endrin	0.004	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
Heptachlor	0.0004	Unknown reliability and LOP.
Methoxychlor	0.004	Unknown reliability and LOP.
OPP		
Chlorpyrifos	0.009	Low reliability.
Diazinon	0.01	Freshwater criteria adopted in absence of marine criteria. Unknown reliability.
Dimethoate	0.15	Freshwater criteria adopted in absence of marine criteria. Unknown reliability.
Fenitrothion	0.001	Unknown reliability and LOP.
Malathion	0.05	Freshwater criteria adopted in absence of marine criteria. Unknown reliability.
Parathion	0.004	Freshwater criteria adopted in absence of marine criteria. Unknown reliability.
PCB		
Aroclor 1242	0.3	Adopted from freshwater criteria for in absence of marine criteria. 99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
Aroclor 1254	0.01	Adopted from freshwater criteria for in absence of marine criteria. 99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
VOC		
Tetrachloroethene (PCE)	70	Unknown reliability.
Trichloroethene (TCE)	330	Unknown reliability.
cis-1,2-dichloroethene (DCE)	700	Unknown reliability.
Chloroethene (vinyl chloride / VC)	100	Unknown reliability.
Tetrachloromethane (carbon tetrachloride / CT)	240	Unknown reliability.
Trichloromethane (chloroform / TCM)	370	99% LOP adopted as recommended to protect key species from chronic toxicity. Unknown reliability.

Notes: 95% LOP for non-bioaccumulative contaminants
 99% LOP for bioaccumulative contaminants

The DGV for the protection of aquatic ecosystems derived from HEPA (2020) are in Table 12.

Table 12: Groundwater investigation levels for protection of aquatic ecosystems (µg/L)

Contaminant / LOP	Freshwater DGV	Interim marine water DGV
PFOS 99% LOP	0.00023	0.00023
PFOA 99% LOP	19	19
PFOS 95% LOP	0.13	0.13
PFOA 95% LOP	220	220

4.3 Health screening levels for vapour intrusion

The HSL to evaluate potential vapour intrusion risks derived from NEPC (2013) are in Table 16.

Table 13: Groundwater health screening levels for vapour intrusion (µg/L)

Contaminant	HSL-D	HSL-D	HSL-D	Solubility limit
SAND	2 m to <4 m	4 m to <8 m	8 m+	-
Benzene	5000	5000	5000	59 000
Toluene	NL	NL	NL	61 000
Ethylbenzene	NL	NL	NL	3900
Xylenes	NL	NL	NL	21 000
Naphthalene	NL	NL	NL	170
TRH F1	6000	6000	7000	9000
TRH F2	NL	NL	NL	3000

Notes: TRH F1 is TRH C₆-C₁₀ minus BTEX

TRH F2 is TRH >C₁₀-C₁₆ minus naphthalene

The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour that is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the water solubility limit, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'.

5. References

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Appendix F

Site Management Plan

1. Introduction

This general site management plan (SMP) has been developed to minimise potentially adverse impacts on the environment, and worker and public health as a result of the proposed remediation works.

The Remediation Contractor must have in place a construction environmental management plan (CEMP) (or similar) which is specific to the equipment used for the remediation and the proposed methods to be adopted by the Remediation Contractor. This SMP has been prepared to augment the Remediation Contractor's CEMP and contains general details for aspects of the work, as per reporting requirements for a remediation action plan (RAP) under NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

Apart from the management principles outlined in this SMP, the Remediation Contractor must also ensure compliance with all relevant environmental legislation and regulations, including (but not limited to) the following:

- Contaminated Land Management Act 1997 NSW (CLM Act);
- Protection of the Environment Operations Act 1997 NSW (POEO Act);
- Protection of the Environment Legislation Amendment Act 2011 NSW;
- Protection of the Environment Operations Amendment (Scheduled Activities and Waste) Regulation 2008 NSW.
- Environmentally Hazardous Chemicals Act 1985 NSW;
- Environmental Offences and Penalties Act 1989 NSW;
- Pesticide Act 1999 NSW and Pesticides Regulation 2017; and
- Work Health and Safety Act 2017 NSW (WHS Act) and Work Health and Safety Regulations 2017 NSW.

2. Roles and responsibilities

2.1 Principal

The Principal is responsible for the environmental performance of the proposed remediation works, including implementation of acceptable environmental controls during remediation works. The Principal will retain the overall responsibility for ensuring this RAP is appropriately implemented. The Principal is to nominate a representative (the Principal's Representative), who is responsible for overseeing the implementation of this RAP. The actual implementation of the RAP will, however, be conducted by the Principal Contractor on behalf of the Principal.

The Principal is responsible for providing appropriate information to the Contractor to allow them to safely plan the required works. This includes the asbestos register for the site and this RAP.

The Principal is also responsible for implementing an appropriate communications plan.

2.2 Remediation contractor

The Remediation Contractor will be the party responsible for daily implementation of this RAP and shall fulfil the responsibilities of the Remediation Contractor as defined by SafeWork NSW. It is noted that the Remediation Contractor may appoint appropriately qualified sub-contractors or sub-consultants to assist in fulfilling the requirements of the procedures. The Remediation Contractor will appoint a Site Manager.

In addition to the implementation of the RAP it will be the Remediation Contractors responsibility to:

- Obtain / ensure relevant sub-contractors obtain specific related approvals as necessary to implement the earthworks including permits for removal of asbestos-containing material, SafeWork NSW notification etc.;
- Develop or request and review any site plans to manage the works to be conducted;
- Ensure that all remediation works and other related activities are undertaken in accordance with this RAP;
- Maintain all site records related to the implementation of this RAP including but not limited to:
 - o Tracking of all movement of soil within the site and off-site from cradle to grave;
 - o Transportation Record: comprising a record of all truckloads of soil (including aggregate) entering the site, including truck identification (e.g., registration number), date, time, source site, load characteristics (e.g., type of material, i.e., quarried aggregate, etc.), approximate volume, use (e.g., general site raising, service trenches, etc.). Hazardous or regulated waste (e.g. asbestos waste) is to be managed per the NSW EPA Integrated Waste Tracking Solution (IWTS) requirements;
 - o Disposal dockets: for any soil disposed off-site including transportation records, spoil source, spoil disposal location, receipt provided by the receiving waste facility / site;
 - o Specific to a site specific immobilisation order (if undertaken);
 - Any required compliance testing / record keeping by the Remediation Contractor or treatment facility;
 - Requisite asbestos clearance / monitoring during treatment of asbestos co-contaminated soils; and
 - Confirmation and record keeping by the receiving facility (if additional to any general waste tracking requirements).
 - o Imported materials records: records for any soil imported onto the site, including source site, classification reports, inspection records of soil upon receipt at site and transportation records;
 - o Records relating to any unexpected finds and contingency plans implemented;
 - o Photographic records by all contractors and consultants of the works undertaken within their purview of responsibilities;
 - o Surveys pre- and post-installation of geotextile marker layer and clean fill cap;
 - o Airborne asbestos monitoring records (in the event that asbestos works are undertaken); and

- o Interim / final visual and sampling clearances for any asbestos related works (in the event that asbestos works are undertaken);
- Ensure sufficient information is provided to engage or direct all required parties, including sub-contractors, to implement the requirements of the RAP other than those that are the direct responsibility of the Remediation Contractor;
- Manage the implementation of any recommendation made by those parties in relation to work undertaken in accordance with the RAP;
- Inform, if appropriate, the relevant regulatory authorities of any non-conformances with the procedures and requirements of the RAP in accordance with the procedures outlined in this document;
- Retain records of any contingency actions;
- On completion of the project, to review the RAP records for completeness and update as necessary; and
- Recommend any modification to general documentation which would further improve the environmental outcomes of this RAP.

2.3 Surveyor

The project surveyor will be a registered surveyor engaged by the Remediation Contractor to undertake surveying works as required by this RAP.

2.4 Asbestos contractor

The Asbestos Contractor will be responsible for undertaking all asbestos work involving any asbestos impacted filling and will hold a Class A licence for the removal of asbestos (issued by SafeWork NSW), on the basis that the asbestos identified at the site to date has included both friable and bonded asbestos.

The Asbestos Contractor can be the same entity as the Remediation Contractor.

2.5 Sub-contractors

All sub-contractors will be inducted onto the site, informed of their responsibilities in relation to this RAP and sign their agreement to abide by the RAP requirements. Where necessary, sub-contractors will also be trained in accordance with the requirements of this document. All sub-contractors must conduct their operations in accordance with the RAP as well as all applicable regulatory requirements.

2.6 Environmental consultant

The Environmental Consultant will provide advice on implementing the RAP. The Environmental Consultant will be responsible for:

- Undertake any required assessments where applicable (e.g., waste classification, validation);
- Provide advice and recommendations arising from monitoring and /or inspections, including unexpected finds; and
- Notify the Client with any results of assessments, and any observed non-conformances.

2.7 Occupational hygienist / licenced asbestos assessor

A Licenced Asbestos Assessor will be required (based on known friable asbestos contamination) to be engaged independently of the Asbestos Contractor to undertake the following:

- Review and approve documentation prepared by the Asbestos Contractor;
- Prepare any WHS plans and advice required by the Remediation Contractor;
- Undertake airborne asbestos monitoring;
- Undertake clearance inspections;
- Provide advice and recommendations arising from monitoring and/or inspections; and
- Notify the client with the results of any assessments and any observed non-conformances.

2.8 Site workers

All workers on the site are responsible for observing the requirements of this RAP and other management plans. These responsibilities include the following:

- Being inducted on the site and advised of the general nature of the remediation / environmental issues at the site;
- Being aware of the requirements of this plan;
- Wearing appropriate personal protective equipment (PPE) as required by this plan;
- Only entering restricted areas when permitted; and
- Requesting clarification when unclear of requirements of this or any other plans (e.g. safe work method statements (SWMS)).

3. Water management

3.1 Stormwater

Stormwater must be managed during the remediation works such that potential adverse impacts from surface runoff (e.g., cross contamination, mobilisation of contaminants in soil particles, etc.) are appropriately mitigated. Accordingly, the Remediation Contractor will take appropriate measures which may include:

- Construction, where necessary, of stormwater diversion channels, bunding and linear drainage sumps with catch pits in and around the remediation areas to divert stormwater from the contaminated areas;
- Provision of appropriately located sediment traps including geotextiles; and
- Discharge of excess water in excavations / low points on a regular basis to limit the potential for flooding.

3.2 Dewatering of excavations

Any runoff or seepage water accumulated in site excavations that requires removal must initially be sampled and tested for suspended solids, pH and any contaminants of potential concern (CoPC) as identified by the Environmental Consultant. The options for management of excavation pump-out water, dependent upon the test results, are for disposal of the water as follows:

- Discharge to stormwater with prior approval from Council. Provided the test results comply with relevant ANZG *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018), or any other compliance requirements stipulated by Council. The Environmental Consultant must consider the most appropriate criteria to be used; or
- Discharge to sewer, as industrial trade wastewater, with prior approval from Sydney Water. This option would require the analysis of a larger list of analytes, and compliance with the Sydney Water acceptance standards; or
- Pumping by a liquid waste contractor for removal of the water off-site, in accordance with regulatory requirements.

Note that, depending on the type and scale of the dewatering required, a permit (water use approval) may need to be obtained through NSW Water.

4. Soil management plan

The Remediation Contractor will develop a plan to mitigate cross contamination as part of the CEMP to be implemented throughout the works.

4.1 Stockpiling of contaminated material

Contaminated material shall be excavated and stockpiled at a suitably segregated location(s) away from sensitive areas (e.g. water bodies, drainage lines, stormwater pits, etc.) and ongoing excavations, and in a manner that will not cause nuisance to the neighbouring properties. Soil stockpiles are to be managed as follows:

- An impermeable membrane such as plastic sheeting should be provided at the surface by the Remediation Contractor prior to stockpiling. Plastic sheeting should be taped at joins, as necessary;
- All stockpiles of contaminated material shall be surrounded by star pickets and marking tape or other suitable material to clearly delineate their boundaries;
- Stockpiles shall be lightly conditioned by sprinkler or covered by geotextile or similar cover to prevent dust generation;
- Stockpiles impacted, or potentially impacted, with asbestos must be covered by geotextile;
- Measures should be taken by the Remediation Contractor to prevent the migration of stockpile materials (i.e. perimeter bunds, hay bales, silt fences, etc.); and
- A record of stockpile locations (stockpile register), dimensions, descriptions, environmental controls, etc. should be maintained by the Remediation Contractor.

All movement of soil within the site and off-site is to be tracked by the Remediation Contractor, from cradle to grave. Copies of tracking records must be provided to the Environmental Consultant.

4.2 Stockpiling imported material

Imported material shall be stockpiled at a suitably segregated location(s) away from sensitive areas (e.g., water bodies, drainage lines, stormwater pits, etc.) and ongoing excavations, and in a manner that will not cause nuisance to the neighbouring properties. Soil stockpiles are to be managed as follows:

- Imported material should not be stockpiled within un-remediated areas of the site. If this is unavoidable an impermeable membrane such as plastic sheeting should be provided at the surface by the Remediation Contractor prior to stockpiling. Plastic sheeting should be taped at joins, as necessary;
- All stockpiles of contaminated material shall be surrounded by star pickets and marking tape or other suitable material to clearly delineate their boundaries;
- Stockpiles shall be lightly conditioned by sprinkler or covered by geotextile or similar cover to prevent dust generation; and
- A record of stockpile locations (stockpile register), dimensions, descriptions, environmental controls, etc. should be maintained by the Remediation Contractor.

All movement of soil within the site is to be tracked by the Remediation Contractor, from cradle to grave. Copies of tracking records must be provided to the Environmental Consultant.

4.3 Transport of material off-site and on to site

Transport of contaminated material from the site and imported material to the site shall be via a clearly delineated haul route(s) and this route shall be used exclusively for entry and egress of vehicles used to transport contaminated materials within and away from the site, and onto and within the site. The proposed transport route(s) (to be determined by the Remediation Contractor) will be notified to Council and truck dispatch shall be logged and recorded by the Remediation Contractor for each load leaving or arriving the site. A record of the truck dispatch will be provided to the Environmental Consultant.

All haulage routes for trucks transporting soil, materials, equipment or machinery to and from the site should be selected to meet the following objectives:

- Comply with all road traffic rules;
- Minimise noise, vibration and dust to adjacent premises; and
- Use State roads and minimise use of local roads as far as practicable.

The remediation work will be conducted such that all vehicles:

- Conduct deliveries of soil, materials, equipment or machinery only during the specified hours of remediation;
- Have securely covered loads to prevent any dust or odour emissions during transportation; and

- Exit the site in a forward direction.

In addition, measures will be implemented to ensure no contaminated material is spilled onto public roadways or tracked off-site on vehicle wheels. Roadways will be kept clean throughout the remediation works and will be broomed, if necessary, to achieve a clean environment.

All loads will be securely covered and may be lightly wetted, if required, to ensure that no materials or dust are dropped or deposited outside or within the site. Prior to exiting the site each truck should be inspected by Remediation Contractor personnel and either noted as clean (wheels and chassis) or broomed prior to leaving the site. Any soil spilled onto surrounding streets will be cleaned by mechanical or hand methods, on a daily basis.

Removal of waste materials from the site shall only be carried out by contractors holding the appropriate license(s), consent or approvals to dispose the waste materials according to the waste classification and with the appropriate approvals obtained from the EPA, where required.

Materials imported onto the site shall only be carried out by contractors holding the appropriate license(s), consent or approvals to transport the materials with the appropriate approvals obtained from the EPA, where required.

All movement of soil within the site is to be tracked by the Remediation Contractor, from cradle to grave. Copies of tracking records must be provided to the Environmental Consultant.

5. Noise and vibration control plan

All equipment and machinery should be operated in an efficient manner to minimise the emission of noise. The use of any plant and/or machinery should not cause unacceptable vibrations to nearby properties and should meet Council requirements.

6. Dust control plan

Dust emissions must be confined within the site boundary as far as is practicable. The following example dust control procedures could be employed to comply with this requirement, as necessary:

- Erection of dust screens around the perimeter of the site (as applicable);
- Securely covering all loads entering or exiting the site;
- Use of water sprays across the site to suppress dust;
- Covering of all stockpiles of contaminated soil remaining on site more than 24 hours;
- Include wheel wash (if applicable); and
- Keeping excavation and stockpile surfaces moist.

Regular checking of the fugitive dust issues is to be undertaken. Remedial measures are to be undertaken to rectify any cases of excessive dust.

7. Odour control plan

No odours should be detected at any boundary of the site during remediation works by an authorised Council Officer relying solely on sense of smell. The following example procedures could be employed to comply with this requirement as necessary:

- Use of appropriate covering techniques such as plastic sheeting, polythene or geotextile membranes to cover excavation faces or stockpiles;
- Fine spray of water and/or hydrocarbon mitigating agent on impacted areas / stockpiles or loads to lightly condition the material;
- If required, restrict uncovered stockpiles to appropriate sizes to minimise odour generation;
- Ceasing works during periods of inclement weather such as high winds or heavy rain;
- Regular checking of the fugitive dust and odour issues to ensure compliance. Undertake immediate remediation measures to rectify any cases of excessive dust or odour (e.g., use of misting sprays or odour masking agent); and
- Adequate maintenance of equipment and machinery to minimise exhaust emissions.

8. Work health and safety plan

8.1 General

It is the Remediation Contractor's responsibility to devise a SWMS¹ (or series thereof, for various respective tasks) and to implement proper controls that enable the personnel undertaking the remediation to work in a safe environment. This RAP and SMP does not relieve the Remediation Contractor or other contractors of their ultimate responsibility for occupational health and safety of their workforce and to prevent contamination of areas outside the 'remediation' workspace. This RAP and SMP sets out general procedures and the minimum standards and guidelines for remediation that will need to be used in preparing the safe work method statement.

This work health safety plan (WHSP) has been prepared with reference to CRC CARE *Remediation Action Plan: Implementation - Guideline on Health and Safety* (CRC CARE, 2019). The requirements of this WHSP must be incorporated into the Remediation Contractor's SWMS.

All site work must be undertaken in a controlled and safe manner with due regard to potential hazards, training and safe work practices. To attain this the SWMS developed by the Remediation Contractor must comply with policies specified in the Work Health and Safety Regulation 2011.

All appropriate permits, licences and notifications required for the remediation activities must be obtained prior to the commencement of remediation works.

¹ Either a SWMS or construction environmental management plan (CEMP), or other equivalent document incorporating health and safety aspects of the proposed remedial works.

8.2 Site access

Appropriate fencing and signage must be installed around and within the site to prevent unauthorised access and restrict access to remediation areas and/or deep excavations. Access restrictions and administrative arrangements for management of entry of workers or related personnel on site is the responsibility of the Remediation Contractor.

Any existing pits or unstable areas on site that may generate potential safety, or operational risk should be demarcated and taped off, with appropriate rectification action undertaken (e.g., backfilling of pits).

8.3 Personnel and responsibilities

Before undertaking works on site, all personnel will be made aware of the officer responsible for implementing WHS procedures. All personnel must read and understand this WHSP and over-arching SWMS prior to commencing site works and sign a statement to that effect. Contractors employed at the site will be responsible for ensuring that their employees are aware of, and comply with, the requirements of this WHSP and Remediation Contractor's SWMS.

8.4 Chemical contamination hazards

Chemical compounds or substances that may be present in the soils at the site include the key CoPC asbestos and lead, with other contaminants including PAH, PCB, OCP, metals, TRH/BTEX. There is also a lower probability of other contaminants being present.

The risks associated with the identified contaminants to site personnel and workers involved in the remediation are considered to be low due to the concentrations within groundwater and soil vapour and limited exposure durations. These risks are associated with:

- Ingestion of contaminated soil and / or water;
- Dermal contact with contaminated soil and / or water; and
- Inhalation of dusts or vapours of the CoPC.

If asbestos is encountered in fill, this risk evaluation should be revised.

Personnel will endeavour, wherever possible, to avoid direct contact with potentially contaminated material. Workers must avoid the potential exposures listed above as far as is practicable. Appropriate personal protective equipment (PPE) must be used to mitigate potential risks.

Appropriate PPE for asbestos is to be determined by the Asbestos Contractor. Indicatively this may include P2 mask (minimum), disposable gloves, and for potential friable materials, a P3 half-face mask, disposable coveralls, boot covers, and gloves. Further requirements for asbestos decontamination is to be provided by the Asbestos Contractor.

Risks posed by elevated lead concentrations are considered to be generally managed as part of PPE protective for asbestos contaminated soils, i.e., P2 mask for dust inhalation, disposable gloves, and general requirements for long sleeve shirts / long pants to minimise risk of dermal contact.

8.5 Physical hazards

The following physical hazards are associated with conditions that may be created during remediation works:

- Heat exposure;
- Excavations;
- Buried services;
- Noise;
- Dust;
- Electrical equipment;
- Heavy equipment and truck operation; and
- Asbestos.

Safe work practices must be employed to manage the physical risks identified above. For the most part these risks can be managed through appropriate demarcation, access controls and the use of appropriate PPE.

8.6 Safe work practices

The appropriate safe work practices should be clearly defined by the Remediation Contractor in their SWMS. As a minimum, all personnel on site will be required to wear the following PPE:

- Steel-capped boots (mandatory);
- High visibility clothing / vest (mandatory);
- Safety glasses or safety goggles with side shields requirements (as necessary);
- Hard hat (as necessary);
- Appropriate respiratory and protective equipment for any works involving asbestos (as necessary); and
- Hearing protection when working in the vicinity of machinery or plant equipment if noise levels exceed exposure standards (as necessary).

Each item of PPE should meet the corresponding relevant Australian Standard(s).

Specific safe work practices will be adopted when working with asbestos, in accordance with (but not limited to) the following codes of practice:

- *SafeWork NSW Code of Practice, How to Manage and Control Asbestos in the Workplace* (SafeWork NSW, 2019a)
- *SafeWork NSW Code of Practice, How to Safely Remove Asbestos* (SafeWork NSW, 2019b);
- *WorkCover NSW Managing Asbestos in or on Soil* (WorkCover NSW, 2014);

- NOHSC *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Ed* (NOHSC, 2005).

9. Remediation schedule and hours of operation

The remediation works will be conducted within the days and hours specified in the development consent.

10. Response to incidents

The key to effective management of incidents is the timely action taken before any situation reaches a reportable or critical level. Therefore, surveillance activities are extremely important, and should be conducted for the measures prescribed herein and any other measures prescribed in any additional environmental management plan developed subsequently. During construction activities on the site, the following inspection or preventative actions should be performed by the Remediation Contractor:

- Regular inspection of works;
- Completion of routine environmental checklists and follow-up of non-compliance situations;
- Maintenance and supervision on-site; and
- An induction process for site personnel involved in the remediation works that includes relevant information on the contamination status of the site, the remediation works being undertaken, worker health and environmental protection requirements and ensures that all site personnel are familiar with the site emergency procedures.

An emergency response plan will be in place for all aspects of site works. Any emergency will be reported immediately to the site office and/or the Site Manager (and Safety Officer), and the appropriate emergency assistance should be sought. The Site Manager should be responsible for initiating an immediate emergency response using the resources available on the site. Where external assistance is required, the relevant emergency services should be contacted. A table such as that below, containing contact details for key personnel who may be involved in an environmental emergency response should be completed and be readily available to personnel at all times. The table should be completed, and thereafter amended, as required.

The Remediation Contractor will be responsible for ensuring that site personnel are aware of the emergency services available and the appropriate contact details. A site Safety Officer should be contactable, or available, on-site during remediation and development works.

Contact details for key utilities are included in the event of needing to respond to incidents. Blank cells are 'to be confirmed' and should be completed prior to works commencing when all entities are confirmed.

Table 1: Summary of roles and contact details

Role	Personnel / contact	Phone contact details
Principal		
Principal's Representative		
Site Manager		
Remediation Contractor and Builder		
Site Office		
Environmental Consultant		
Consent Authority		
Regulator	NSW EPA (pollution line and general enquiries)	131 555
Utility Provider	Water (Sydney Water Corporation)	13 20 92
Utility Provider	Power (Ausgrid)	13 13 88
Utility Provider	Gas (Jemena Limited)	131 909
Utility Provider	Telecommunications (Telstra Corporation Limited)	13 22 03
Utility Provider	Telecommunications (Optus)	1800 505 777
Utility Provider	Telecommunications (NBN Co Limited)	1800 687 626

11. References

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Canberra, ACT: Australian and New Zealand Governments and Australian state and territory governments.

CRC CARE. (2019). *Remediation Action Plan: Implementation - Guideline on Health and Safety*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

NOHSC. (2005). *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Ed*. Canberra, April 2005, NOHSC:3003: National Occupational Health and Safety Commission, Commonwealth of Australia.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land*. Contaminated Land Guidelines: NSW Environment Protection Authority.

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

SafeWork NSW. (2019b). *Code of Practice, How to Safely Remove Asbestos*. August 2019: SafeWork NSW, NSW Government.

WorkCover NSW. (2014). *Managing Asbestos in or on Soil*. March 2014: WorkCover NSW, NSW Government.

Appendix G

Contingency Plan and Unexpected Finds Protocol

1. General

Where the site conditions are found to be different than that anticipated during the remediation works, the proposed remediation approach may not be appropriate for the contamination encountered. In such cases the Environmental Consultant is to re-assess the contamination and remediation approach and inform the Site Auditor (if required). Where necessary the Environmental Consultant will prepare an addendum to, or revision of, this RAP. Any addendum or revision is to be reviewed and agreed by the Site Auditor (if required) before its implementation.

2. Contingency plan

This contingency plan has been developed to provide guidance on processes to follow if contamination (or indicators of contamination), other than that included in the remediation strategy, (Section 10) is encountered during the remediation works. Any such finds shall be surveyed and the location documented.

Although the site has been subject to previous investigation(s), there remains a potential for soil contamination to be present between sampled locations. In the event that signs of soil contamination, other than that included in the remediation strategy, are encountered during remediation e.g. evidence of asbestos containing material (ACM), petroleum, or other chemical odours which weren't previously identified the following protocols will apply:

- The Site Manager is to be notified and the affected area closed off by the use of barrier tape and warning signs;
- The Environmental Consultant is to be notified to inspect the area and assess the significance of the potential contamination and determine extent of remediation works (if deemed necessary) to be undertaken. An assessment report and management plan detailing this information will be compiled by the Environmental Consultant and provided to the Principal's Representative;
- The assessment results together with a suitable management plan shall be provided by the Principal's Representative to the Consent Authority (if required by the development consent) and Site Auditor for review and comment;
- The agreed management / remedial strategy, based on the RAP and relevant guidelines (e.g. WA DoH (2021), for asbestos issues), shall be implemented; and
- All details of the assessment and remedial works are to be included in the site validation report.

3. Unexpected finds protocol

This unexpected finds protocol (UFP) has been developed to provide guidance on processes to follow if any unexpected find is encountered during the remediation or future civil and construction works. Any unexpected finds should be surveyed and the location documented.

All site personnel are to be inducted into their responsibilities under this (UFP), which should be included or referenced in the Remediation Contractors Environmental Management Plan.

All site personnel are required to report unexpected signs of environmental concern to the Site Manager if observed during the course of their works e.g., presence of potential unexploded ordinance, unnatural staining, potential contamination sources (such as buried drums or tanks) or chemical spills.

Should signs of concern be observed, the Site Manager, as soon as practical, will:

- Stop work in the affected area and ensure the area is barricaded to prevent unauthorised access;
- Notify authorities needed to obtain emergency response for any health or environmental concerns (e.g. fire brigade);
- Notify the Principal's Representative of the occurrence;
- Notify any of the authorities that the Remediation Contractor is legally / contractually required to notify (e.g., EPA, Council); and
- Notify the Environmental Consultant and Site Auditor as soon as practicable.

The Principal's Representative is to notify any of the authorities which the Principal is legally / contractually required to notify (e.g., EPA, Council). Where appropriate the Principals Representative will also implement appropriate community consultation in accordance with a Communications Plan.

The Environmental Consultant will assess the extent and significance of the find and develop an investigation, remediation or management approach using (where possible) the principles and procedures already outlined in the RAP. Where a Site Auditor is involved, the proposed approach will be discussed and agreed with the Site Auditor prior to implementation.

4. References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

WA DoH. (2021). *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*. WA Department of Health.