
Remediation Action Plan

UNSW G25 Education Building

8 High Street, Kensington, NSW

**Prepared for The University of New South
Wales**

Project 227492.04

17 February 2025

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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

Author		17 February 2025
Reviewer		17 February 2025

Consultant Declaration Form

PROJECT DETAILS	
PROJECT NAME	
Application number	SSD-74670005
Address of subject land	8 High Street, Kensington, NSW, 2033
Lot / DP	Lot 5 DP 1264171
APPLICANT DETAILS	
Applicant name	University of NSW
Applicant address	8 High Street, Kensington, NSW, 2033
REPORT DETAILS	
Name of report this declaration relates	Remediation Action Plan (RAP)
Report reference no.	227492.04.R.002.Rev3
Report date	17 February 2025
Company name (inc. ABN / ACN)	Douglas Partners Pty Ltd – ABN 75 053 980 117
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DECLARATION BY CONSULTANT	
Name	Michael Le
Registration no.	N/A
Organisation registered with	Douglas Partners Pty Ltd
Declaration	The undersigned declares that the Remediation Action Plan has been prepared in accordance with the following policy, guidelines, or legislative requirements: ○ NEPC National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM] (NEPC, 2013); and ○ NSW EPA Guidelines for Consultants Reporting on Contaminated Land (NSW EPA, 2020). • contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the Remediation Action Plan relates; • does not contain information that is false or misleading; • identifies and addresses the relevant Planning Secretary's environmental assessment requirements (SEARs) for the project; • identifies and addresses the relevant statutory requirements for the project, including any relevant matters for consideration in environmental planning instruments to which the Remediation Action Plan relates; • contains a consolidated summary of the proposed or necessary mitigation measures
Signature	
Date	17 February 2025

Executive Summary

Douglas Partners Pty Ltd (Douglas) has prepared this Remediation Action Plan (RAP) for a proposed teaching and learning facility (the Proposal) to be known as the UNSW G25 Education Building, within part of the University of New South Wales (UNSW) Kensington campus with the street address of 8 High Street, Street.

It is understood that this RAP will be submitted to support a State Significant Development Application (SSDA) that seeks approval for the construction and operation of an education building which includes the following (refer to Section 2 for further detail):

- Site preparation works including demolition of the existing at-grade car park, tree removal, and excavation works; and
- Construction of a new Teaching and Learning Building, including a basement.

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

Asbestos has previously been detected at two locations, BH8 (inside the proposed basement footprint) and BH7 (outside the proposed basement footprint).

The proposed remediation strategy will include:

- Data gap assessment to better define the extent and degree of asbestos contaminated fill and further assess previously inaccessible areas of the site;
- Excavation and disposal of asbestos contaminated fill present inside the proposed basement footprint; and
- Cap and contain of asbestos contaminated soils outside the proposed basement footprint (if deemed necessary following data gap assessment).

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.

If capping of asbestos contaminated soils (or other contaminated soils) is adopted a long-term environmental management plan (EMP) will be required to set out the post-construction management requirements. The EMP will also need to record the actual extent of contained contaminated soils and the constructed management (capping) system. The EMP must be prepared in accordance with NSW EPA guidelines and must be legally enforceable.

It is considered that the site can be made suitable for the proposed commercial (tertiary education) industrial development subject to implementation of this RAP. It should be noted that this RAP does not form a detailed specification for the proposed remediation works, but rather represents a planning document which outlines the means by which remediation of the development site can be achieved.

Table of Contents

	Page No
1. Introduction	1
2. Proposed development	2
3. Scope of work	3
4. Site description	4
4.1 Site context	4
4.2 Site description	5
4.3 Surrounding land use	6
4.4 Site information	7
5. Environmental setting	7
6. Summary of previous investigation	8
7. Conceptual site model	12
8. Data gap assessment	13
8.1 Data gaps	13
8.2 Detailed asbestos assessment	14
8.3 Data gap report	14
9. Remediation extent	15
10. Remediation options assessment	15
11. Preferred remediation strategy	15
11.1 Overview and rationale	15
11.2 Sequence of remediation	16
11.3 Task 1: Complete data gap assessment update or revise the RAP	16
11.4 Task 2: Remediation Area 1 –asbestos contaminated fill within the proposed basement footprint	17
11.5 Task 3: Remediation Area 2 – asbestos contaminated fill outside of the proposed basement footprint	17
12. Assessment criteria	19
12.1 Remediation acceptance criteria	19
12.2 Site assessment criteria	20
13. Validation plan	20
13.1 Data quality objectives	20
13.2 Validation assessment requirements	21

13.3	Visual inspections	21
13.4	Pre and post capping survey	21
13.5	Validation sampling	22
14.	Waste disposal	23
15.	Imported material.....	24
16.	Quality assurance and quality control.....	26
17.	Management and responsibilities	27
17.1	Site management plan	27
17.2	Site responsibilities	27
17.3	Contingency plan and unexpected finds protocol	27
18.	Validation reporting.....	27
18.1	Documentation	27
18.2	Reporting.....	28
19.	Conclusions.....	28
20.	Mitigation Measures.....	28
21.	References	29
22.	Limitations.....	30

Appendix A: Drawings

About this Report

Appendix B: Tabulated Summary Results from Previous Report

Appendix C: Borehole Logs from Previous Report

Appendix D: Remediation Options Assessment and Evaluation

Appendix E: Site Assessment Criteria

Appendix F: Data Quality Objectives

Appendix G: Site Management Plan

Appendix H: Contingency Plan and Unexpected Finds Protocol

Remediation Action Plan

UNSW G25 Education Building

8 High Street, Kensington, NSW

1. Introduction

Douglas Partners Pty Ltd (Douglas) has prepared this Remediation Action Plan (RAP) for a proposed teaching and learning facility (the Proposal) to be known as the UNSW G25 Education Building, within part of the University of New South Wales (UNSW) Kensington campus with the street address of 8 High Street, Street. This RAP was prepared in accordance with Douglas' proposal 227492.01.P.001.Rev1 dated 20 June 2024.

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.

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

This RAP has been prepared with reference to Douglas *Report on Preliminary / Detailed Site (Contamination) Investigation, UNSW G25 Education Building, 8 High Street, Kensington, NSW, 2033* (Douglas, 2025)(the DSI).

It is understood that this RAP will be submitted to support a State Significant Development Application (SSDA) that seeks approval for Proposal which involves the following (refer to Section 2 for further detail):

- Site preparation works including demolition of the existing at-grade car park; and
- Construction of the new Teaching and Learning Building.

Based on information available to Douglas at the time of reporting, it is considered that, the remediation works outlined in this report constitute Category 2 Remediation under Clause 4.13 of *SEPP (Resilience and Hazards) 2021*. The Council must be notified at least 30 days prior to the commencement of the remediation work unless alternative conditions are applicable under the development consent.

This RAP does not form a detailed specification for the proposed remediation works, but rather is a planning document which outlines the means by which remediation can be achieved.

The UNSW has engaged NSW EPA accredited site auditor Mr Tom Onus of Ramboll Australia Pty Ltd to complete a site audit under the *Contaminated Land Management Act 1997* (NSW), which involves their review 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.

This report has been prepared in response to the requirements contained within the Planning Secretary's Environmental Assessment Requirements (SEARs) for the UNSW G25 Building dated 15 August 2024 and issued for the State Significant Development (SSD 74670005). Specifically, this report has been prepared to respond to the SEARs requirements as shown in Table 1.

Table 1: SEARs addressed in this report

SEARs Item	Issue and Assessment Requirements	Documentation	Relevant Section of Report
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.	- Preliminary Site Investigation, if required: - Detailed Site Investigation - Remedial Action Plan - Preliminary Long Term Environmental Management Plan	This report provides the remediation action plan Remediation Strategy is outlined in Section 11.

2. Proposed development

The proposed development will include:

- Site preparation works including demolition of the existing at-grade car park, tree removal, and excavation works;
- Construction of an eleven (11) storey (plus roof plant) teaching and learning building with approximately 20,200 m² of gross floor area, comprising:
 - Basement including plant/services, Bike Storage, End of Trip facilities and staff amenities, ancillary service areas such as Mail and Print rooms;
 - Ground level Food and Beverage space and informal education spaces;
 - Teaching and Learning spaces and workspaces for UNSW Faculties for other levels;
 - (The internal fit-out will be subject to separate approval);

- o Rooftop level including landscaped outdoor terrace, multifunction space, mechanical plant and services;
- Associated landscaping, replacement trees and public domain embellishment works in and around the proposed building;
- Extension and augmentation of infrastructure and services as required; and
- New lift core in the adjacent building, H25 Botany Street Carpark and associated access improvements.

The Proposal will seek to deliver improvements including:

- Providing new, purpose built learning and teaching spaces to support the University activities and strategic goals such as the development of the Randwick Health and Education Precinct;
- Delivering an enhanced ground plane connection;
- Providing flexible and adaptable teaching and learning spaces;
- Creating a healthy, green, and welcoming place for students, staff and visitors;
- Creating an experience that is an open, permeable, and connected public realm; and
- Creating pedestrian priority and inclusive shared public space.

For a detailed project description refer to the Environmental Impact Statement prepared by Ethos Urban. Copies of the current plans are provided in Appendix A.

3. Scope of work

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

- Summarise the findings of the DSI (Douglas, 2025) 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 management and/or remediation 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;

- Include contingency plans and an unexpected finds protocol; and
- Identify the need for, and nature of, any long-term management and/or monitoring following the completion of management / remediation and, if required, provide an outline of an environmental management plan.

4. Site description

4.1 Site context

The site is situated within the UNSW Kensington upper campus, within the Randwick Local Government Area (LGA). The site address is 8 High Street, Kensington, which applies to the whole of the UNSW Kensington campus.

The UNSW campus forms part of the wider Randwick Health and Education Precinct, which has been strategically identified to provide a world-class coalition of education, research, innovation and healthcare organisations and to attract growth, investment and employment opportunities. This Precinct has been identified in the Greater Sydney Region Plan – A Metropolis of Three Cities and the Eastern City District Plan, for its strategic importance as a specialised centre providing for health and education research, innovation, teaching and learning.

The UNSW campus is located approximately 6km southeast of the Sydney CBD, immediately adjacent to the east is the Randwick Hospitals Complex which also forms part of the Randwick Health and Education Precinct. The UNSW site is within 600 m of the Randwick Shopping Centre to the east and adjacent to Royal Randwick Racecourse to the north (refer Figure 1 below).

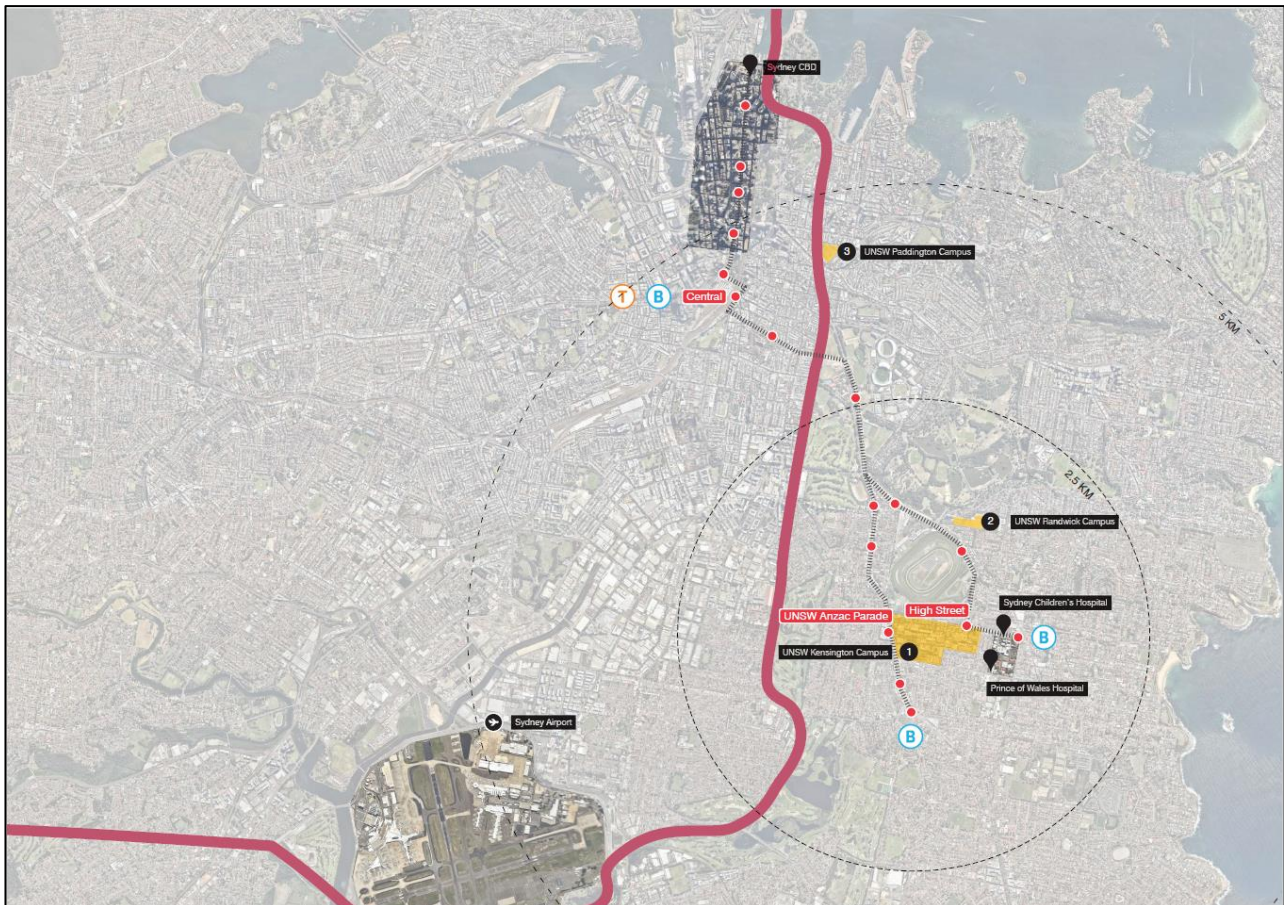


Figure 1: Site context

Source: Ethos Urban, Google Maps

4.2 Site description

The subject site known as the G25 site, is an existing on-grade carpark comprising of hardstand pavement with line-marked spaces, trees and landscaped areas. The site also includes the eastern portion of Library Walk and the loading dock area of the AGSM (Australian Graduate School of Management) Building (G27), with no other existing development on the site.

It is bounded to the north by the Samuels Building (F25) and Mathews Building (F23), to the west by the Solar Industrial Research Facility (SIRF) Building (G23), to the south by the multi-storey Botany Street Carpark Station (H25), and to the east by the Australian Graduate School of Management (AGSM) Building (G27) and the Gate 11 entrance to UNSW from Botany Street.

The broader UNSW Kensington Campus consists of five separate allotments. This site is situated within a single allotment legally described as Lot 5 DP 1264171. The UNSW Kensington campus is bounded by Anzac Parade (to the west), High Street (to the north), Botany Street (to the east), and Barker Street (to the south). It also includes developments to the west of Anzac Parade and north of Day Avenue, such as NIDA, the University Regiment, and the New College Post-Graduate Village. The campus currently has approximately 60,000 student enrolments.

Figure 2 provides an aerial image of the site and its location relative to the upper campus boundaries.

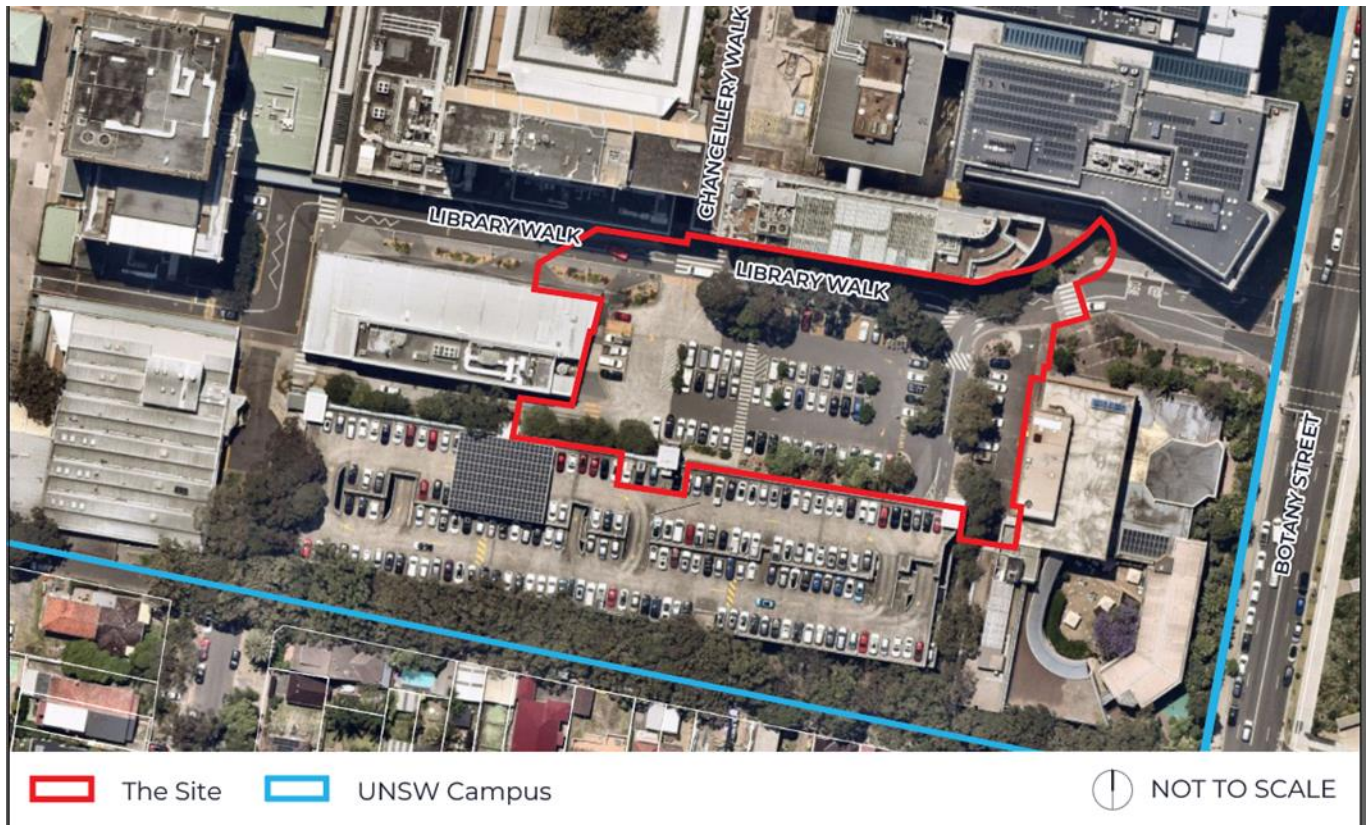


Figure 2: Site aerial (approximate site area outlined in red)

Source: Nearmap, Ethos Urban

4.3 Surrounding land use

The following land use surrounds the site:

- North: To the north and directly adjacent to the site across from the Library Walk are the Samuels (F25) Building and Mathews (F23) Building, which comprise up to 16-storeys. Further north within the campus are additional education, administration and library buildings. The wider context includes the UNSW High Street Light Rail stop, as well as low to medium density residential development north of High Street.
- South: South of the site is the UNSW Botany Street Carpark Station (H25) (5 storeys), which is accessed internally within the UNSW campus. This location includes a pedestrian link from Oval Lane. The wider context includes low-medium density residential development south of Oval Lane.
- East: The site directly abuts the ASGM Building (G27) to the east (5 storeys), which fronts Botany Street. To the east and also fronting Botany Street is the Randwick Hospitals Complex including the Prince of Wales Hospital, the Sydney Children's Hospital, and the Royal Hospital for Women, as well as low-medium density residential development to the south-east.
- West: The site directly adjoins the Solar Industrial Research Facility (SIRF) (G23) to the west, which also sits within the confines of Library Walk and Valentine Close. The western context of the subject site is primarily characterised by the wider UNSW campus (lower campus) as well as the Anzac Parade Light Rail stop.

4.4 Site information

Site address	Part of 8 High Street, Kensington, NSW
Legal description	Part Lot 5, DP 1264171.
Area	Approximately 5000 m ²
Zoning	SP2 – Infrastructure (Educational Establishment)
Local Council Area	Randwick City Council

The site boundary is shown on Figure 3.

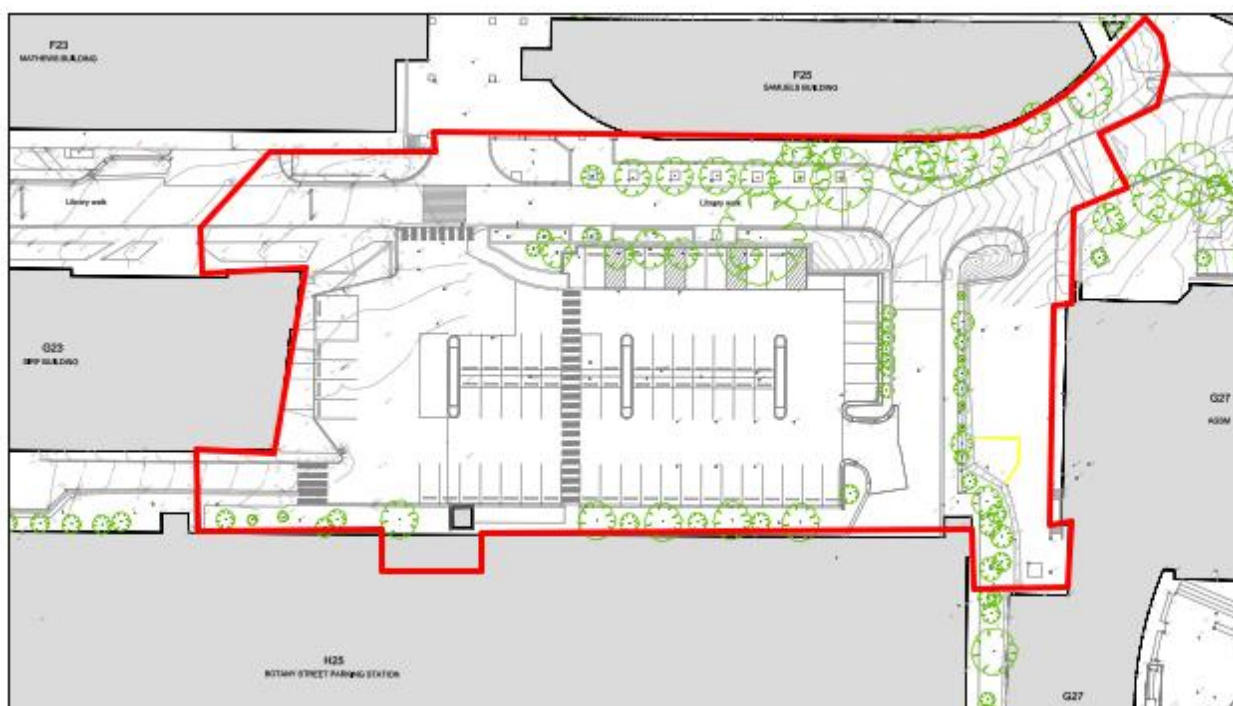


Figure 3: Site boundary in red outline (refer to Drawing 1 for full legend)

5. Environmental setting

Topography	The ground surface of the carpark slopes gently down towards the north and east at less than 5 degrees with surface levels ranging from about RL 56.5 to RL 55.4 relative to Australia height datum (AHD). Reference to NSW 10 m elevation contours indicates regional topography in the area generally rises to the south and east and slopes towards the north and west.
Soil landscape	Reference to the Sydney 1:100,000 Soils Landscape Sheet indicates that the site is underlain by aeolian (wind-blown) sand deposited within the Holocene Age. These soils are highly susceptible to soil erosion and are typically of very low soil fertility.

Geology	Reference to the New South Wales Seamless Geology Map indicates that the site is underlain by Hawkesbury Sandstone which typically comprises medium to coarse grained quartz sandstone with some shale and laminite bands or lenses. The site perimeter is shown to be underlain by marine-deposited and aeolian (wind-blown) fine to coarse-grained quartz-lithic sand.
Acid sulfate soils	Reference to the published national Acid Sulfate Soil (ASS) mapping, the site is mapped as an area with extremely low probability of occurrence of ASS. Reference to the Randwick Local Environment Plan (LEP) mapping indicates that the Site is mapped with 'no known occurrence' for ASS. Reference to regional ASS Risk map indicates the Site is mapped in an area of 'no known occurrence'. Douglas (2024) including a preliminary acid sulfate soil screening assessment which confirmed the low risk of acid sulfate soils. No further acid sulfate soil assessment was deemed to be necessary.
Surface water and Groundwater	Surface water is anticipated to follow the general regional topography and to drain to the local stormwater system. This includes a groundwater recharge system located on the Village Green, in the south-west portion of the UNSW campus which captures approximately 54% of overland flows. Groundwater under the site is part of the Botany Sands aquifer, and it is anticipated that groundwater flows generally to the west (but possibly to the east, noting the site's location on a ridgeline). The nearest water receiving body to the south-west is the Botany Wetlands which feed into Botany Bay (approximately 1.8 km down gradient of the Site). Douglas (2025) included the installation of groundwater wells in BH1, BH3, BH4 and BH15. Groundwater was measured on 19 August 2024 at a depth ranging from 3.2 m below ground level (bgl) to 5.03 m bgl or 50.49 m AHD to 54.42 m AHD. Based on the elevated topography and Douglas experience on surrounding sites at UNSW, regional groundwater is expected to be flowing to the south-west towards the Botany Wetlands. Based upon the groundwater level measurements within the site, local groundwater flow may be in a north to north-east direction.

6. Summary of previous investigation

The following previous report is relevant to this RAP: *Douglas Report on Preliminary / Detailed Site (Contamination) Investigation, UNSW G25 Education Building, 8 High Street, Kensington, NSW, 2033* (Douglas, 2025) (the DSI).

Douglas has also undertaken several investigations within the broader UNSW campus which are referenced and summarised in Douglas (2025) to provide further context of the general contaminant risk in the area.

(Douglas, 2025) was a detailed site investigation that included:

- A review of site history;
- A site inspection;
- Preparation of a conceptual site model (CSM);
- Drilling of 15 boreholes comprising:
 - o BH1 to BH4 and BH15 which were drilled primarily for geotechnical purposes and from which contamination soil samples were opportunistically collected;
 - o BH5 to BH14 which were drilled for contamination sampling purposes. The bores were auger drilled using a truck-mounted drilling rig with a 250 mm auger to depths of between 1.2 m and 2.5 m (except for BH13 that refused prematurely on a possible concrete slab in fill at 0.4 m depth), primarily for the purpose of the contamination investigation. The 250 mm auger was used to better characterise the asbestos risk, including allowing recovery of 10 L samples for assessment of the asbestos containing material (ACM) content;
 - o Installation and sampling of groundwater wells in boreholes BH1/MW1, BH15/MW2, BH3/MW3 and BH4/MW4;
- Dispatch of collected soil samples to a National Association of Testing Authorities (NATA) accredited laboratory for analysis of identified contaminants of potential concern (CoPC), as follows:
 - o Metals (including arsenic (As), cadmium (Cd), total chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni) and zinc (Zn));
 - o Total recoverable hydrocarbons (TRH);
 - o Benzene, toluene, ethyl benzene, total xylenes and naphthalene (BTEXN);
 - o Polycyclic aromatic hydrocarbons (PAH);
 - o Polychlorinated biphenyls (PCB);
 - o Organochlorine pesticides (OCP);
 - o Organophosphorus pesticides (OPP);
 - o Per- and poly-fluoroalkyl substances (PFAS);
 - o Phenols;
 - o Volatile organic compound (VOC);
 - o Asbestos;
 - o Toxicity characteristic leaching procedure (TCLP) (metals, and PFAS);
- Dispatch collected groundwater samples to a NATA accredited laboratory for analysis of identified CoPC, as follows:
 - o Heavy metals, TRH, BTEX, PAH, OCP/OPP, PCB, PFAS, VOC and hardness.

Site History

The site history information suggests that the majority of site was acquired by the current owner (UNSW) in 1959. Prior use of the site was part of Randwick Park which was used for recreational purposes. Following 1959, the site was utilised for the university campus which was developed over time to accommodate for developments to the campus. The at-grade carpark was constructed circa 1978 and has remained on-site to date with buildings constructed and removed over time. The proposed lift pit forms part of the adjacent H25 multistorey carpark.

Results

The detailed subsurface conditions encountered are presented in the borehole logs in Appendix C along with notes defining descriptive terms and classification methods.

The general subsurface profile encountered at the borehole locations may be summarised as follows:

ASPHALTIC CONCRETE PAVEMENT	- Asphaltic Concrete (AC) pavement about 30 mm to 60 mm thick in all boreholes (except BH7 that was located within a garden bed), underlain by sandy gravel fill (apparently cemented in some boreholes) generally to depths of about 0.1 m to 0.3 m in most of the boreholes.
FILL	- Gravelly sand, sand and silty sand fill, with inclusions of building waste such as charcoal, plastic, brick, glass, tiles, metal (wire or rods), ceramic, and ripped sandstone gravel in some boreholes, to depths of about 0.6 m to 1.5 m in all boreholes. BH13 encountered refusal possibly on concrete at 0.4 m depth in fill.
NATURAL SOIL	- non-plastic sand underlain by clayey sand (extremely weathered sandstone).
BEDROCK	- Very low, low and medium strength Hawkesbury Sandstone below depths of about 2.4 m (RL 53.6) and 3.6 m (RL 52.3) in the rock cored boreholes in the carpark area, and below 2.4 m (RL 51.3) at BH15 in the lower loading dock area. - Very low strength siltstone and laminite bands about 0.1 m to 0.6 m thick were encountered within the weathered rock. - Some possible very low strength rock and/or clay bands were encountered in the form of core loss sections within the weathered rock. - Consistent medium, medium to high and high strength Hawkesbury Sandstone below depths of about 6.7 m (RL 47.0) and 8.1 m (RL 48.2) extending to the termination depth of the boreholes.

The results of laboratory analysis are summarised in the following tables in Appendix B:

- Table B1: Summary of results of soil analysis;
- Table B2: Summary of results of groundwater analysis;
- Table B3: Summary of waste classification assessment;
- Table B4: Summary of acid sulfate soils analysis; and

- Table B5: Summary of Asbestos Sieve Testing.

Soils

The analytical results for BTEX, OCP, OPP, phenols, PCB, PFAS, and TRH in all samples tested were below either the practical quantitation limit (PQL) and / or the site assessment criteria (refer to Section 12.2). The analytical results for, in all samples were below the SAC except for the following:

- Asbestos was detected in the samples tested for fibrous asbestos / asbestos fines (FA/AF) as follows:
 - o Amosite FA/AF detected in sample BH7/0.5-0.6 at a concentration of less than 0.001%, as such below the SAC; and
 - o Chrysotile FA/AF detected in sample BH8/1-1.1. The FA/AF at concentration of 0.0053% exceeded the SAC.

Groundwater

Groundwater results were within the adopted assessment criteria with the exception of some heavy metals. The elevated heavy metals were considered to be consistent with diffuse source in urban environments and no further assessment or remediation of groundwater contamination was considered to be necessary.

Acid Sulfate Soils

Acid sulfate screening results were below the adopted action criteria and therefore no further acid sulfate soil assessment was deemed necessary.

Preliminary Waste Classification

Based on the observations at the time of sampling and the reported analytical results, the following preliminary waste classifications are provided for fill materials at the site:

- Fill soils in the vicinity of BH7 and BH8 – *Special Waste Asbestos - GSW (non-putrescible)* - further assessment of asbestos in soils should be conducted to confirm the waste classification and the extent of asbestos contamination across the site; and
- Remaining fill within the site – *GSW (non-putrescible)* subject to results of subsequent investigations showing that asbestos contamination is not widespread. If asbestos is identified in other area (which has a moderate to high risk) then the impacted material would be classified as Special Waste Asbestos.

Conclusion

Based on the results of the DSI it was considered that the site can be made suitable for the UNSW G25 Education Building subject to implementation of the following recommendations:

- A remediation action plan (RAP) is prepared in accordance with NSW EPA (2020) to address:
 - o Delineation, assessment and / or remediation of fill impacted by asbestos in the vicinity of BH7 and BH8. Further detailed asbestos investigation at the time of construction / bulk excavation is recommended to better define the extent of asbestos impacts throughout the site;

- o Protocols for the validation of site remediation;
- o Protocols for waste classification of any materials requiring off-site disposal, and protocols for material import, including check-sampling, where appropriate;
- o Unexpected Finds Protocol outlining the procedures that would be undertaken in the event unexpected contamination is encountered during excavation works;
- Preparation of a dewatering management plan (DMP) detailing dewatering requirements prior to discharge of groundwater; and
- For remediation involving the long-term management of contamination on-site, an environmental management plan (EMP) is prepared and administered in a way consistent with NSW EPA requirements. The EMP is to be prepared (if required) at the completion of the remediation works if asbestos or other contaminated soil) are capped within the site.

7. Conceptual site model

The data collected during previous investigation generally confirmed that for certain potential contaminant sources outlined in the CSM in Douglas (2024), potentially complete exposure pathways to the identified receptors exist, whereas for others, they do not. No other sources of contamination have been identified as a result of the testing results to date. The source (and associated contaminants of potential concern (CoPC)), pathway and receptor linkages are summarised in Table 2, Table 3 and Table 4.

Table 2: Summary of potential sources

Potential sources and associated CoPC
On-site sources
S1: Fill: Associated with levelling, demolition of former buildings on the Site CoPC include metals, PFAS, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos S2: Minor fuel leaks from parked vehicles CoPC include metals, TRH, BTEX and PAH Based on the findings of Douglas (2024) the primary contaminant of concern which warrants remediation / management and or further assessment was asbestos, potentially associated with the importation of uncontrolled fill and / or previous building demolition works.
Off-site sources
S3: Adjacent university buildings including laboratories that may have chemical stores including above ground and below ground tanks CoPC include metals, PFAS, TRH, BTEX, PAH, phenols, VOC such as solvents S4: Former quarry filled with uncontrolled fill located approximately 100 m north of the Site CoPC include metals, TRH, BTEX, PAH Based on the findings of Douglas (2024) the no significant risk / impact associated with the identified off-site sources was identified and no further consideration of the off-site sources was considered necessary.

The following potential human receptors, along with relevant potential pathways, have been identified and summarised in Table 2.

Table 3: Summary of potential receptors and pathways

Potential human receptors
HR1: Current users [university campus students and staff] HR2: Construction and maintenance workers HR3: End users [university campus students and staff] HR4: Adjacent Site users (UNSW campus users)
Potential pathways to human receptors
HP1: Ingestion and dermal contact HP2: Inhalation of dust and / or vapours

A summary of the potentially complete exposure pathways for the proposed land use is shown in the table below.

Table 4: Summary of potentially complete exposure pathways (proposed land use)

Source and CoPC	Exposure pathway	Receptor
Remediation Area 1: Asbestos impacted fill within the footprint of the proposed basement Remediation Area 2: Asbestos impacted fill outside the footprint of the proposed basement	HP2: Inhalation of dust and / or vapours	HR1: Current site users HR2: Construction and maintenance workers HR3: End users HR4: Adjacent site users

8. Data gap assessment

8.1 Data gaps

Douglas (2025) identified the following data gaps which require further assessment (or conservative assumptions) post demolition:

- There were areas of the development site that were inaccessible or did not include contamination testing at the time of fieldwork for Douglas (2025), including Library Walk and the western portion of the site (the loading bay) and the proposed lift pit in H25; and
- Asbestos has not been sufficiently characterised over the site. Douglas (2025) relied upon boreholes (100 mm and 250 mm diameter). Boreholes are not the preferred method of asbestos assessment, with test pits provide a better method of characterising asbestos risk. Therefore, whilst asbestos has been confirmed to be present in BH7 and BH8 (and above the

site assessment criteria (SAC¹) in BH8), the data is not considered sufficient to reliably characterise or delineate the extent of asbestos impact over the site. Douglas (2025) therefore recommended that it be assumed that remediation of asbestos impacts is required unless a further data gap assessment finds otherwise.

8.2 Detailed asbestos assessment

For detailed asbestos assessment, where asbestos has been identified, NSW EPA (2022)² recommends consideration of the sampling regimes in WA DoH (2021). In that regard it is recommended that detailed asbestos assessment be undertaken at double the sampling frequency in NSW EPA (2022). The previous investigation included asbestos testing from boreholes and did not include excavation of test pits as recommended in WA DoH (2021). On this basis prior to the commencement of bulk excavation works the following detailed asbestos assessment is recommended:

- Based on a site area of approximately 0.5 ha, with reference to NSW EPA (2022) and WA DOH (2021) excavation of 26 test pits (double the minimum number of test locations recommended in Table 2 of NSW EPA (2022));
- Collect soils samples at the surface and then 0.5 m intervals, at signs of contamination, changes in strata at the top of natural and at test pit completion; and
- Analyse each sample of fill for asbestos (500 ml AF/FA) and 10 L sieve sample on site for ACM).

If further delineation of contamination (e.g. asbestos) is desired, and the characterisation sampling above indicates that the asbestos may be in isolated pockets, excavate and sample from additional 'step out' test pits to inform the extent of the identified contamination.

It is recommended if off-site disposal of soils is proposed that sampling and analysis for waste classification purposes could also be conducted in conjunction with the proposed detailed asbestos assessment.

8.3 Data gap report

A data gap assessment report should be prepared, or may be prepared in stages which includes the results of the following:

- Results of additional asbestos assessment;
- Preliminary *in situ* waste classification; and
- Advice on requirements for any addenda or amendment to this RAP.

If capping of asbestos contaminated soils is to be adopted as the remediation strategy, an addendum to the RAP or update of the RAP is to be provided, and is to include a plan showing the proposed location/s of capping and provide cross-sections of the capping layer / capped material.

¹ Refer to Appendix E

² Refer to Section 21 for full references

9. Remediation extent

The extent of remediation is to comprise the portion of the site impacted by (or assumed to be impacted by) asbestos at concentrations above the site assessment criteria.

Based on the limitations in the previous investigation (as discussed above), and the presence of demolition materials in fill over the site it is considered possible that asbestos is more widespread than the two test locations where it was positively identified in Douglas (2024).

Pending results of the proposed data gap investigation, the entire site is assumed to be impacted by asbestos and therefore to potentially require remediation. The actual extent (the final remediation extent) will be established at the completion of the recommended data gap assessment outlined in Section 8, with the minimum extent being:

- Remediation Area 1 (proposed basement footprint): fibrous asbestos at BH8 and any additional asbestos impacted fill identified during the data gap assessment / excavation works; and
- Remediation Area 2 (outside of proposed basement footprint): area of any additional asbestos contaminated fill identified during the data gap assessment. Note: the fibrous asbestos detected in BH7 was at a concentration below the adopted SAC. The need for remediation at Remediation Area 2 will be subject to confirmation following the data gap assessment.

10. 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).

The remediation options assessment is included in Appendix D. The suitability of remediation options were considered with reference to the following two sub-areas:

- Area 1: area of the proposed basement footprint; and
- Area 2: area outside of the proposed basement footprint).

11. Preferred remediation strategy

11.1 Overview and rationale

The rationale for the selection of the preferred remediation strategy is outlined in Appendix D.

Based on the currently available data and proposed development the proposed remediation strategy will be:

- Remediation Area 1 (area of the proposed basement footprint): Excavation and off-site disposal of asbestos impacted fill; and

- Remediation Area 2 (area outside of the proposed basement footprint): Cap and contain for the asbestos impacted fill (subject to confirmation that remediation is warranted during data gap assessment).

11.2 Sequence of remediation

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 general sequence of remediation should consider the following recommended sequence:

The remediation should consider the following recommended general sequence:

- Task 1: Data-gap Assessment:
 - o Define the degree and extent of asbestos impacts at BH7 and BH8;
 - o Complete a detailed asbestos assessment of development site; and
 - o Update this RAP (if required).
- Task 2: Remediation Area 1 (including, as a minimum, asbestos identified at BH8).
- Excavation and off-site disposal of contaminated fill (fibrous asbestos at BH8 and additional contaminant finds within the basement footprint if identified during data gap assessment):
 - o Waste classification of unsuitable / surplus fill;
 - o Disposal of unsuitable / surplus fill; and
 - o Validation of remediation excavation.
- Task 3: Remediation Area 2:
- Capping of asbestos contaminated fill if encountered if encountered during the data gap assessment (noting that whilst asbestos has been identified in BH7 in this area, the concentrations were below the site assessment criteria):
 - o Placement of marker layer;
 - o Importation of fill;
 - o Construction of the capping layer;
 - o Validation of capping construction; and
 - o Preparation of an EMP for long term management of the contaminated fill.

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

11.3 Task 1: Complete data gap assessment update or revise the RAP

Following the completion of the data gap assessment. If required, based upon the outcome of the data gap assessment this RAP must be updated.

11.4 **Task 2: Remediation Area 1 –asbestos contaminated fill within the proposed basement footprint**

The proposed remediation sequence will be as follows:

- The asbestos impacted soils will be excavated to the extent recommended from data gap assessment or to the limit of the proposed basement;
- Waste classification of soils in accordance with the requirements of Section 14, if not previously conducted (e.g. as part of the data gap assessment). This could be conducted *in situ* or in stockpiles. The excavated soil is to be managed in accordance with the site management plan (Appendix G);
- Validation samples shall be collected and analysed from the remediation excavations as per the requirements of Section 13. Validation sampling locations should consider:
 - o Base of excavation: the basement excavation is expected to extend into natural soil/rock. If the asbestos contaminated fill extends to the natural materials, the validation samples should be conducted from the top of the natural profile, and can also be used as part of the waste classification / virgin excavated natural material assessment of the natural soil / rock;
 - o Walls of excavation: if the asbestos contamination extends beyond Remediation Area 1 then (a) sampling would not be required adjacent to portions of Remediation Area 2 where on-site management of asbestos is to occur; and (b) sampling may not be possible due to the presence of piles / foundations);
- If soils are stored or placed on bare uncontaminated ground validation samples shall be collected from the stockpile footprints per the requirements of Section 13; and
- All validation samples shall be tested for asbestos (AFFA in 500 ml samples and 10 L sieve samples for ACM).

11.5 **Task 3: Remediation Area 2 – asbestos contaminated fill outside of the proposed basement footprint**

If remediation of asbestos is deemed necessary following data gap a cap and contain strategy is proposed outside the proposed basement footprint (potentially including the lift pit in H25). Asbestos containing soil materials may be capped in either hardstand areas or landscaping areas subject to the requirements detailed below.

The asbestos impacted materials may be consolidated prior to capping, if warranted. The location of placement will be determined based upon the quantity of material encountered. If consolidation is proposed, an Addendum to this RAP will be prepared describing the proposed consolidation works, and additional validation requirements.

Construction of a capping layer must comprise:

- A geofabric marker layer overlain by a pavement (base course and bitumen or concrete); or
- A geofabric marker layer overlain by 500 mm of imported clean soil (meeting the requirements of Section 15) or (development) site won material that meets the site remediation acceptance criteria (RAC);

- For any tree protection zones around existing trees to be retained, a geofabric marker layer overlain by 100 mm of mulch or imported clean soil (meeting the requirements of Section 15), subject to approval of the Arborist. If an alternative capping system is approved, this is to be approved by the Environmental Consultant and Site Auditor;
- For any proposed new tree plantings, a tree planning pit is to be constructed to a depth of 1,500 mm to accommodate for tree root zones. The pit is to be lined with a geofabric marker layer overlain and then backfilled with imported clean soil or growing medium (meeting the requirements of Section 15) or (development) site won material that meets the site remediation acceptance criteria (RAC) for tree plantings. It is noted that approved planting materials may also need specific horticultural requirements. If an alternative capping system is approved, this is to be approved by the Environmental Consultant and Site Auditor;
- For new services which extend below the proposed capping layer the following is required:
 - o The depth and extent of the trench must be surveyed;
 - o The service trench must be lined with a geofabric marker layer;
 - o The trench must be backfill with imported material which meets the requirements or Section 15 or site won material that meets the RAC/SAC and is free of asbestos; and
 - o Services may only be placed below the capping layer with the written approval of the Principal.

The construction of the capping system must be validated via a programme of site inspections which will be required during the works at critical hold points as follows:

- Hold Point No.1: Completion of Earthworks. Following any preparatory earthworks prior to the installation of the geofabric and capping layer. The principal contractor must complete a site survey at this time (see principal contractor responsibilities below). A photographic record of the completed subgrade must be also undertaken;
- Hold Point No. 2: Installation of geofabric. Following the installation of the geofabric marker layer, the Environmental Consultant must complete a site inspection including provision of a photographic record to confirm the installation of the geo-fabric has been completed to a satisfactory standard;
- If capping undertaken in proposed landscaping areas - hold Point No 3A: Importation of Capping Soils. Following the importing of approved capping soils (or other materials) the Environmental Consultant must conduct an inspection of the imported (or site won) materials and collect check samples in accordance with Section 13.4. The material can only be used for construction of the capping layer after the results of laboratory analysis have been received and the material has been confirmed by the Environmental Consultant as being suitable for the proposed use;
- If capped in paved areas below buildings or roadways etc. - hold Point No. 3B: Completion of pavement. Following the completion of the pavement capping layer a site inspection must be undertaken by the environmental consultant to confirm that the capping layer has been constructed in accordance with the requirements of the RAP. A photographic record of the inspection must be maintained;
- Survey of the top of the completed capping layer by the site surveyor. Survey points are to target the same locations as the pre-capping survey. The site surveyor will prepare a plan overlaying the pre-capping survey points and contours and the post-capping survey points and contours; and

- Survey review. Following the completion of the capping layer the Environmental Consultant will review of the pre and post capping surveys to confirm that the capping layer meets the minimum thickness requirements. If the capping layer is less than the minimum requirement further capping may be required.

The principal contractor will be responsible, inter alia, for undertaking the following:

- Liaising with the Environmental Consultant to facilitate the above inspections, and to clarify any uncertainties in the requirements or in the event of unexpected finds;
- Provide material data sheets for the geofabric marker layer, provide the roll numbers of the geofabric used and provide the manufacturers quality assurance certificate for the geofabric;
- Complete site surveys. At a minimum a survey should be completed prior to construction of the capping layer (prior to installation of the geofabric) and a second site survey following the construction of the capping - to confirm the thickness of the capping layer and to inform of capping layer thickness for future maintenance works;
- Provide the Environmental Consultant with any records / reports related to soil (VENM / ENM / topsoil) materials proposed to be imported to the development site prior to import. No materials should be imported until the Environmental Consultant has granted approval; and
- Provide records of disposal, including the environmental protection licence number of the receiving facility, transport records, tipping dockets and NSW EPA asbestos tracking records.

Note: If preferred, excavation and disposal of all or a portion of any asbestos impacted soils identified in Remediation Area 2 may be adopted in a manner similar to that outlined in Section 11.3.

12. Assessment criteria

12.1 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, pre and post capping surveys 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 site assessment criteria (SAC) adopted for Douglas (2024), protective of human health. The following table provides a summary of the RAC.

Table 5: Remediation acceptance criteria

Item	Remediation acceptance criteria
Remediation Area 1 BH8 and additional asbestos finds within the basement footprint Excavation and off-site disposal Asbestos	Samples from the base and sides of the excavation (noting sampling requirements / limitations in Sections 11.4) must have a concentration of ACM below 0.05% w/w and an AFFA below 0.001% w/w and no asbestos at the surface (0.2 m from the surface).
Remediation Area 2 BH7 (if required based on data gap assessment) and additional asbestos finds outside the basement footprint Cap and Contain Asbestos	The cap must meet the nominated design thickness of 0.5 m over the brightly coloured (orange) geotextile marker layer or The cap must meet the nominated design of a permanent durable pavement (concrete / bitumen of a minimum thickness of 0.1 m over a brightly coloured (orange) geotextile marker layer.

12.2 Site assessment criteria

In the event that additional area(s) of contamination are encountered beyond those outlined in Section 9, during the course of the data gap assessment or remediation and site redevelopment will be subject to the contingency plan or unexpected find protocol (Appendix H) and assessed using the site assessment criteria (SAC) in Appendix E. The SAC are the same as the Tier 1 SAC adopted for Douglas (2024). This is on the provision that other considerations such as risks to groundwater are also taken into account. The broader list of contaminants and their SAC are included in Appendix E.

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), in conjunction with a broader assessment under the NSW EPA *Protection of the Environment Operations Act 1997* (POEO Act), as outlines in Section 15.

The adopted investigation and screening levels comprise levels for a generic commercial / industrial land use scenario. The derivation of the SAC is included in Appendix E and the adopted SAC are listed in the summary analytical results tables in Appendix B.

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 H.

13. Validation plan

13.1 Data quality objectives

The data quality objectives (DQO) for the validation plan are included in Appendix F.

13.2 Validation assessment requirements

The following site validation work will be required:

- Field assessment by the Environmental Consultant comprising:
 - o Visual inspection, including taking photographs for record purposes;
 - o Collecting validation samples from excavations resulting from the removal of contaminated soils, including contaminated soil stockpile footprints (if relevant); and
 - o Collecting validation / characterisation samples for materials to be imported onto or re-used on-site (as required herein).
- Surveying by the Surveyor comprising:
 - o Survey of the extent and levels of the base of the excavations;
 - o Survey of the extent and levels of the top of the marker layer (if constructed); and
 - o Survey of the extent and levels of the top of the capping layer (if constructed).
- Laboratory analysis of validation samples at a NATA accredited laboratory for:
 - o The CoPC relevant to the remediation area; and
 - o Quality control (QC) samples in accordance with Section 16.
- Comparison by the Environmental Consultant of the laboratory results with the SAC and / or RAC as appropriate (refer to Section 12);
- Comparison by the Environmental Consultant of the surveys from the base and top of the capping layer to verify the required thickness has been met; and
- Preparation by the Environmental Consultant of a validation report detailing the methods and results of the remediation works and validation assessment.

13.3 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 / staining (as appropriate for the remediation) must be removed prior to validation sampling, or targeted for validation sampling.

13.4 Pre and post capping survey

All areas where capping was installed including but not limited to landscaping, service trenching and hardstand areas must be surveyed prior to and following the construction of the capping to confirm that the capping layer meets the minimum thickness requirements and to inform of the extent of capping and geofabric layer for future maintenance works.

All services within the capped area are to be surveyed, and a drawing(s) prepared showing the alignment, depth and whether they are within or below the capping layer.

13.5 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.

Note the need for validation sampling will be based on the extent of remediation (i.e. validation of the walls of an excavation will not be required if remediation of the subject fill by on-site containment is proposed).

Small to medium excavations (base <500 m²):

- Base of excavation: one sample per 25 m² or part thereof, with a minimum of three samples. If the base is in natural soils, the Environmental Consultant may devise an alternate sampling programme based on the assessed risk; and
- Sides of excavation: one sample per 10 m to 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 m to 1.5 m depth in fill.

The sampling frequency for small excavations is generally consistent with the validation sampling recommendations in NSW EPA (2022).

Ground Surface or 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. If the base is in natural soils, the Environmental Consultant may devise an alternate sampling programme based on the assessed risk; 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 m to 1.5 m depth in filling.

Following the completion of any asbestos remediation and/or removal works an asbestos clearance inspection must be completed by a licenced asbestos assessor.

Where contaminated soils are stored or treated on uncontaminated bare soils, the footprint of the stockpile will require validation following removal of the contaminated soils. One sample per 25 m² or part thereof, with a minimum of three samples shall be adopted to validate the base of the contaminated stockpile footprints.

Stockpile Validation Sampling Requirements:

Where assessment of stockpiles is required the following sampling plan shall be adopted:

- For stockpiles less than 200 m³, the sampling frequency outlined in Table 3 of NSW EPA (2022) shall be adopted;

- For stockpiles greater than 200 m³ the sampling frequency outlined in Table 4 of NSW EPA (2022) shall be implemented. Note that stockpiles suspected of containing asbestos cannot be assessed using the 95% UCL sampling frequency of Table 4 of NSW EPA (2022); and
- Samples shall be analysed for the identified contaminants of concern.

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 (Appendix F). Where the RAC are considered to have not been met, the remediation will be expanded to 'chase-out' impacted material to the limit of excavation (or area of on-site containment), as approved by the Environmental Consultant, with the validation sampling then continuing into the extended excavation. This process will continue until the contaminated material at the site has been appropriately remediated.

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

14. Waste disposal

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

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

- 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);
- NSW EPA *Addendum to the Waste Classification Guidelines (2014) - Part 1: Classifying Waste* (NSW EPA, 2016) [addendum for per- and poly-fluoroalkyl substances (PFAS)]; or
- A NSW EPA issued resource recovery order (RRO) (as discussed further below).

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, heterogeneity of the material and regulatory requirements.

For waste classification of stockpiles comprising similar materials and a:

- Assessment under an RRO: as per the requirements of the RRO (with asbestos at a frequency of one sample per 25 m³);
- Volume up to 200 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 200 m³: a recommended minimum frequency of one sample per 25 m³, with a minimum of 12 samples OR 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 200 m³ which are impacted, or potentially impacted, by asbestos the Environmental Consultant shall provide guidance in accordance with NSW EPA (2022).

It should be assumed that asbestos could be present in all site sourced fill (and the appropriate testing frequency adopted) unless demonstrated via multiple lines including:

- No asbestos detected in the source area during data gap assessment;
- No significant quantities of demolition waste observed (e.g. bricks); and
- No ACM observed in the stockpile, either on the surface or within test pits.

Subject to the outcome of the data gap assessment, if no additional asbestos finds are encountered (or only isolated) it may be possible to classify excavated soil / fill for reuse on another site under a relevant RRO so that it can be used on other sites under the requirements of the corresponding NSW EPA resource recovery exemption (RRE). For this option, the frequency of sampling should be in accordance with the relevant RRO (with asbestos at a frequency of one sample per 25 m³) and the contaminants to be analysed will be determined by the Environmental Consultant. The Environmental Consultant will provide a report confirming the suitability of the spoil for reuse under a RRO, or otherwise.

All waste must be tracked (including, as required, using Integrated Waste Tracking Solution (IWTS)) 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.

15. Imported material

Any soil, aggregate etc imported onto the site must have contaminant concentrations that meet the relevant criteria outlined in Section 12. Imported materials will only be accepted for use at the development site if:

- It can legally be accepted onto the development 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 by the Principal contractor upon receipt confirms that the soil has no signs of concern and is consistent with those described in the supporting classification documentation. The Principal Contractor must also track the quantities of material imported to the site;
- Visual inspection of the imported soil by the Environmental Consultant confirms that the soil has no signs of concern and is consistent with those described in the supporting classification documentation;
- 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 development 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 or landscaping requirements which are to be assessed by others, as required.

The POEO Act defines virgin excavated natural material (VENM) as:

‘natural material (such as clay, gravel, sand, soil or rock fines):

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

Generally, “extractive materials” (as defined in the POEO Act, Schedule 1, clause 19) that are legally extracted from a quarry are not considered waste. Where this applies, the material is therefore not required to be classified under the waste classification process and does not require a VENM certificate.

Per NSW EPA website chemical testing is not mandatory, however, chemical testing is frequently required to ascertain whether an excavated material is contaminated with manufactured chemicals or process residues, or whether it contains sulfidic ores or soils. VENM certificates of material proposed to be imported to the development site must be supplied to the Environmental Consultant prior to importation. Testing requirements will be based upon the identified contaminants of concern (if any) at the source site. If there is insufficient testing the Environmental Consultant may request additional information or conduct check sampling.

If permitted by the development consent and approved by the site owner, Remediation Contractor and Environmental Consultant and (if appointed) Site Auditor, material classified under a NSW EPA RRO may also be accepted, provided the material can be used on the development 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 assessed risk, which will be based 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 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 the development site until the results of the inspection and laboratory analysis have been approved in writing by the Environmental Consultant.

Where feasible VENM is preferred, however any material which can legally be imported to the development site can be considered. Recycled materials have a higher risk of contamination than VENM or quarried materials, including presence of asbestos. Based upon the quality of documentation / testing from the supplier the recycled material may (if insufficient documentation is provided) be rejected or additional information requested and upon receipt

additional check sampling be undertaken i.e. based upon the contaminants of concern. Where asbestos is considered a potential risk check sampling shall include asbestos testing (10 L sieve samples and 500 ml AFFA samples) at the sampling frequency recommended in NSW EPA (2022) for stockpiles suspected of containing asbestos.

16. Quality assurance and quality control

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

- 5% sample inter-laboratory analysis, analysed for the same suite as primary sample;
- 5% sample intra-laboratory analysis, analysed for the same suite as primary sample;
- Rinsate samples (for chemical contaminants 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 (where relevant) 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 be collected from sampling equipment to show that the sampling equipment is free of introduced contaminants, i.e. the analytes show that the rinsate sample is within the normal range for deionised water.

17. Management and responsibilities

17.1 Site management plan

A general site management plan (relevant for remediation activities) for the operational phase of the development site remediation is included in Appendix G. 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 site management plan for the duration of remedial works by incorporating the requirements of the provided general plan into their over-arching construction environmental management plan (CEMP).

17.2 Site responsibilities

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

17.3 Contingency plan and unexpected finds protocol

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

18. Validation reporting

18.1 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);
- Transportation Record: comprising a record of all truck-loads of soil (including aggregate) entering the development 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);
- Disposal records: for any soil disposed off-site including transportation records, spoil source, spoil disposal location, receipt provided by the receiving waste facility / site, NSW EPA tracking records (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 development 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);
- If capping adopted, surveys pre- and post-installation of geotextile marker layer and clean fill cap, including an overlay of the pre- and post-capping surveys (Remediation Contractor);
- Asbestos management documentation, including SafeWork notification, asbestos removal control plan and airborne asbestos monitoring records (Remediation Contractor); and
- Interim / final visual and sampling clearances for any asbestos related works (Remediation Contractor).

18.2 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).

19. Conclusions

It is considered that the site can be made suitable for the proposed commercial (tertiary education) development subject to implementation of this RAP.

If capping of asbestos contaminated soils (or other contaminated soils) is adopted, on completion of remediation works, a long-term environmental management plan (EMP) to accurately capture the actual extent of contaminated soils contained within the site and the management (capping) system implemented. The EMP must be prepared in accordance with NSW EPA guidelines and is to include outline management procedures for future works to maintain the integrity of the cap, and in the event of penetration of the cap. The obligations within the EMP must be legally enforceable and have appropriate public notification.

20. Mitigation Measures

A number of mitigation measures for contamination risks associated with the proposed development are provided in this report and are summarised in Table 6.

Table 6: Mitigation measures addressed in this report

Project Stage Design (D) Construction (C) Operation (O)	Risk	Mitigation Measure	Relevant Section of Report
C	Extent of asbestos contamination not fully defined	<i>Data gap assessment</i>	Sections 8
C	Asbestos contamination is soil	<i>Excavate and validate or cap and containment of asbestos contaminated soils</i>	Sections 11 and 13
O	Management of residual asbestos contaminated soils (if retained on site)	<i>Preparation of a long-term environmental management plan</i>	Section 18.1 and 19

21. References

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.

Douglas. (2025). *Douglas Report on Detailed Site (Contamination) Investigation, UNSW G25 Education Building, 8 High Street, Kensington, NSW, 2033*. Report 227492.04.R.001.Rev3 dated 17 February 2025.

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

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

22. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 8 High Street, Kensington, NSW, 2033 (proposed UNSW G25 Education Building development) in accordance with Douglas' proposal 227492.01.P.001.Rev1 dated 20 June 2024 and acceptance received from Siobhan Hargroves of The University of New South Wales dated 16 April 2024. The work was carried out under a Supply Agreement (pending execution). This report is provided for the exclusive use of The University of New South Wales 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.

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.

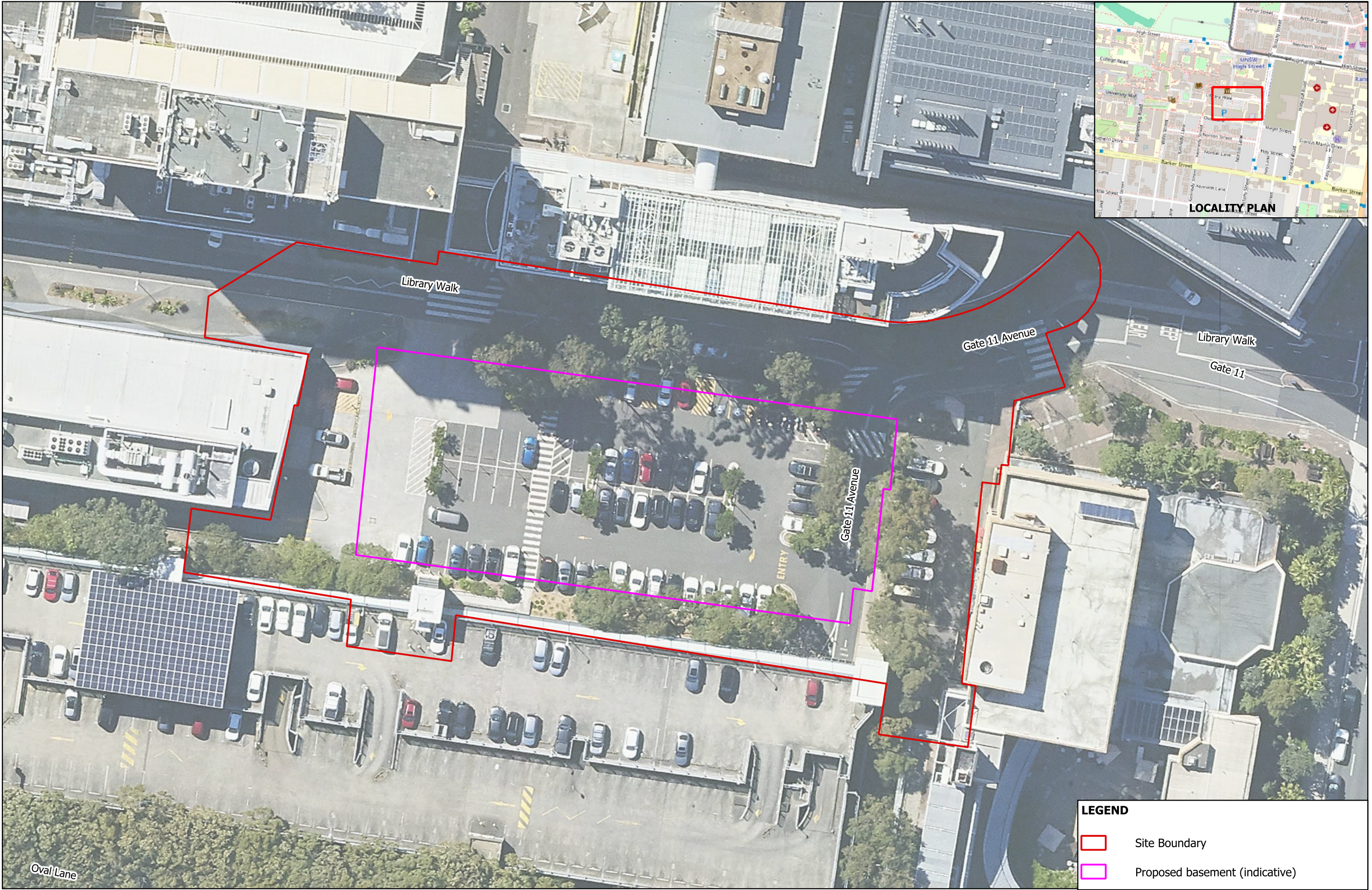
This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by Douglas. This is because this report has been written as advice and opinion rather than instructions for construction.

Asbestos has been detected by laboratory analysis, in filling materials at the selected test locations sampled and analysed. 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 and reasonable access. It is therefore considered possible that 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.

Appendix A

Drawings

About this Report



LEGEND	
	Site Boundary
	Proposed basement (indicative)

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
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SCALE:			
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Douglas
PARTNERS

OFFICE: SYDNEY
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(02)9809 0666

CLIENT:	The University of New South Wales
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NOTE:	1: Basemap from Metromap (Dated 26.06.2024)
COORDINATE REFERENCE SYSTEM:	GDA2020 / MGA zone 56

PROJECT NAME:	UNSW G25 Education Building
PROJECT ADDRESS:	8 High Street, Kensington, NSW 2033

DRAWING TITLE:	Site Location
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PROJECT NO:	227492.04
DRAWING NO:	1
REVISION:	2



LEGEND

Borehole Location (Douglas, 2010)

Shallow Augered Borehole

Rock Cored Borehole

MW Groundwater Monitoring Well

Site Boundary

Proposed basement (indicative)

REV		DESCRIPTION/COMMENT	DATE	DRAWN BY	 OFFICE: SYDNEY 96-98 Hermitage Rd, West Ryde NSW 2114 (02)9809 0666	CLIENT: The University of New South Wales	NOTE: 1: Basemap from Metromap (Dated 26.06.2024)	PROJECT NAME: UNSW G25 Education Building	PROJECT ADDRESS: 8 High Street, Kensington, NSW 2033	DRAWING TITLE: Locations of Tests	PROJECT NO: 227492.04
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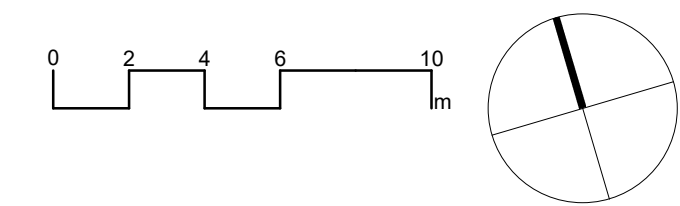
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- CAMPUS SERVICES
- EOT



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drawing

scale drawing no.

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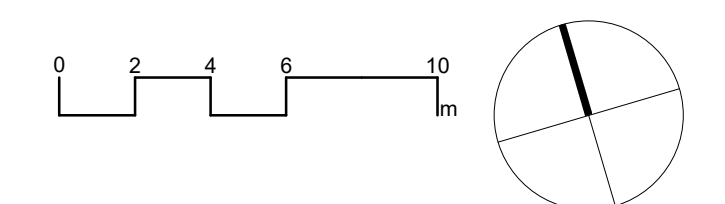
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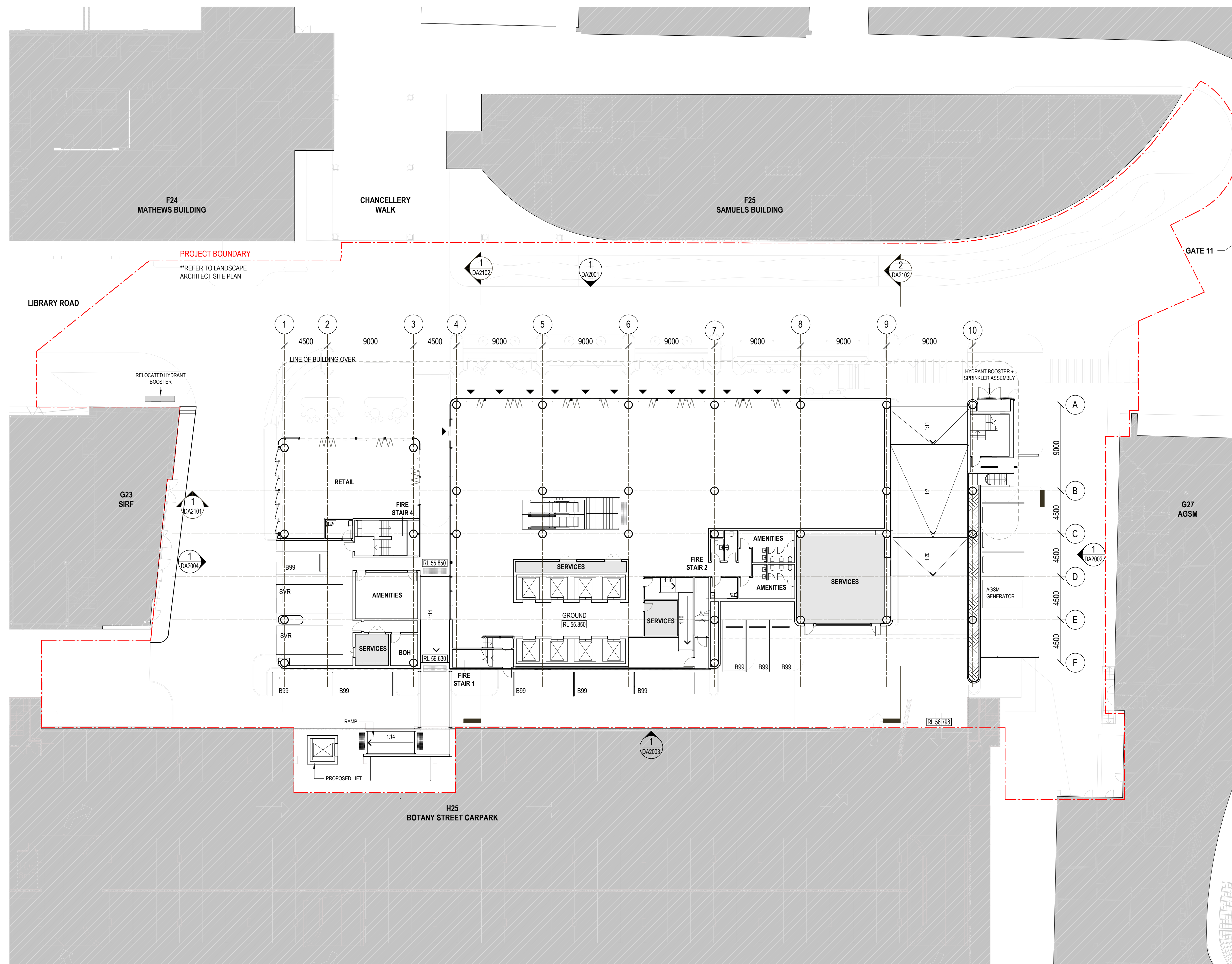
UNSW G25 EDUCATION
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drawing

GENERAL ARRANGEMENT PLAN - GROUND

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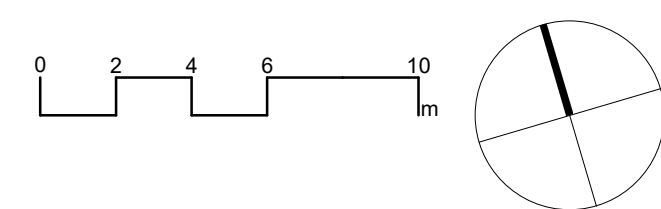
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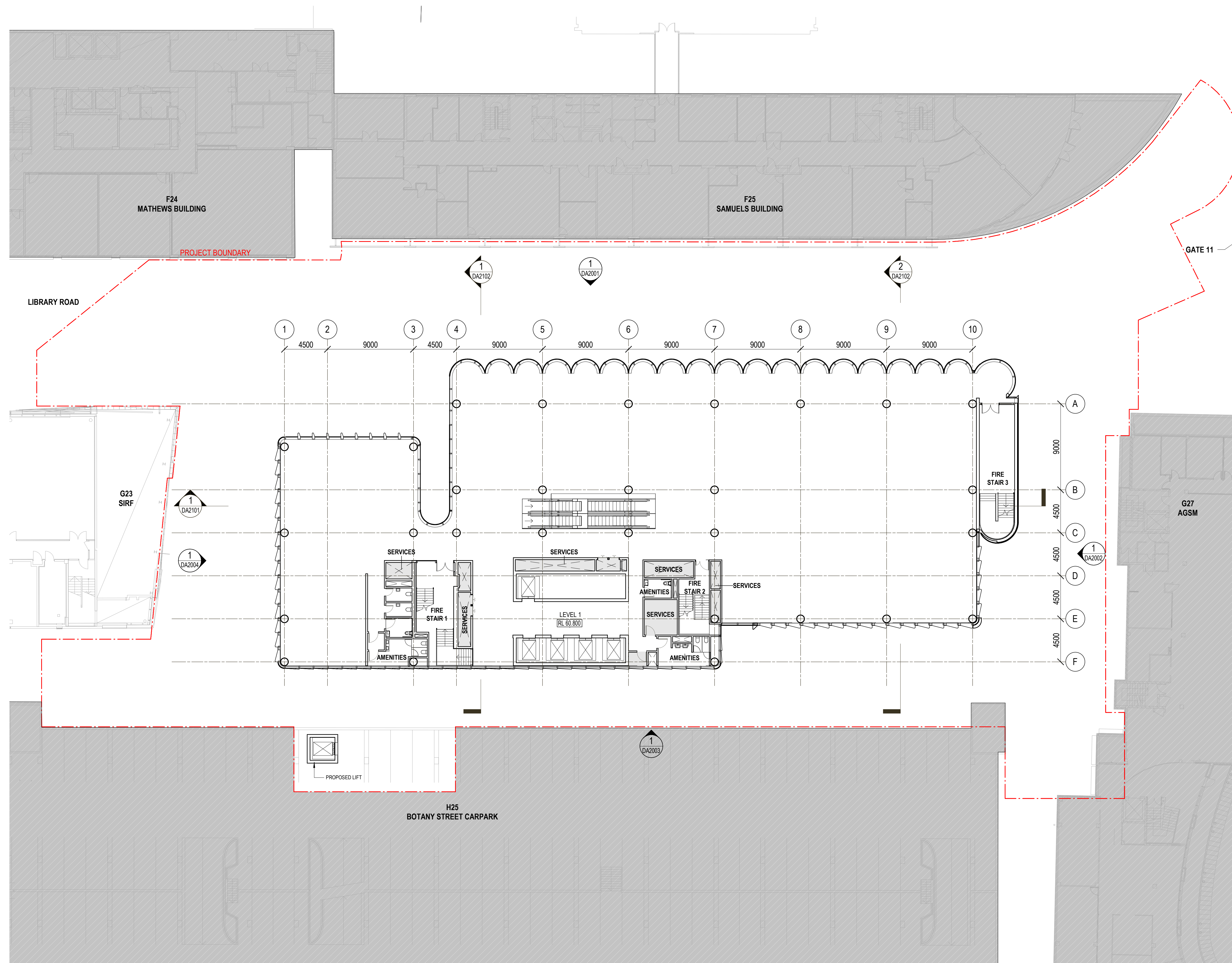
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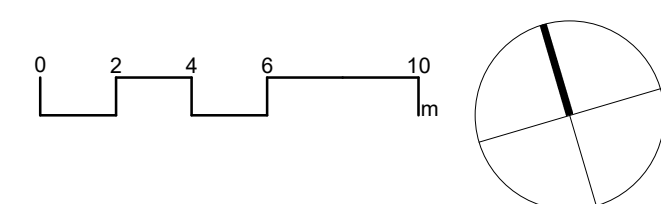


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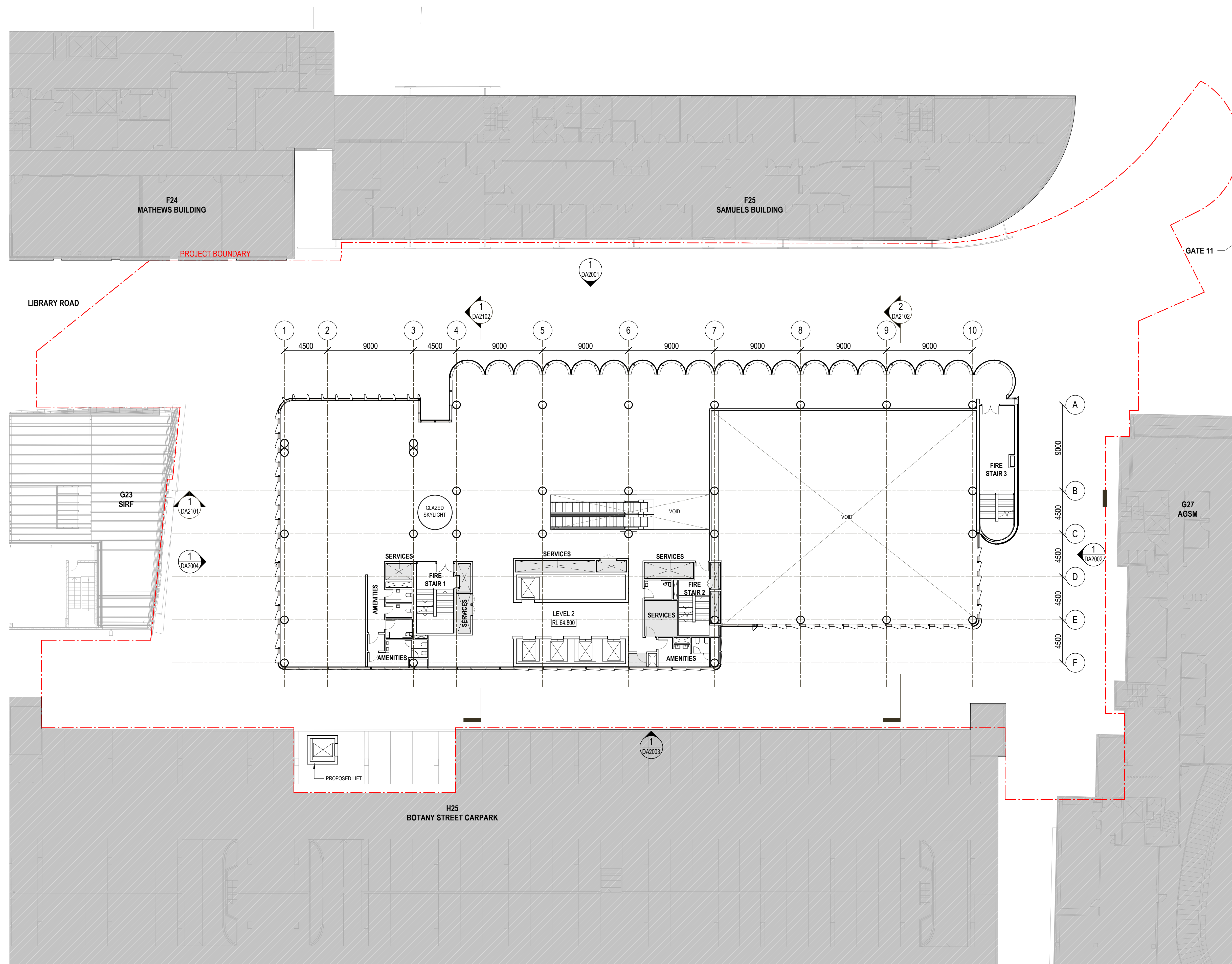
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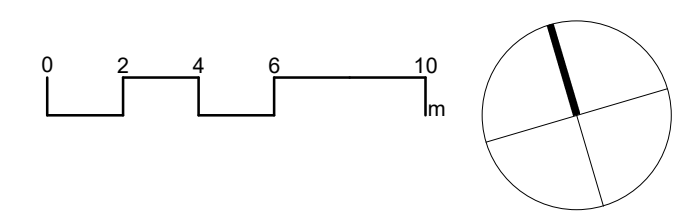
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GENERAL ARRANGEMENT PLAN -
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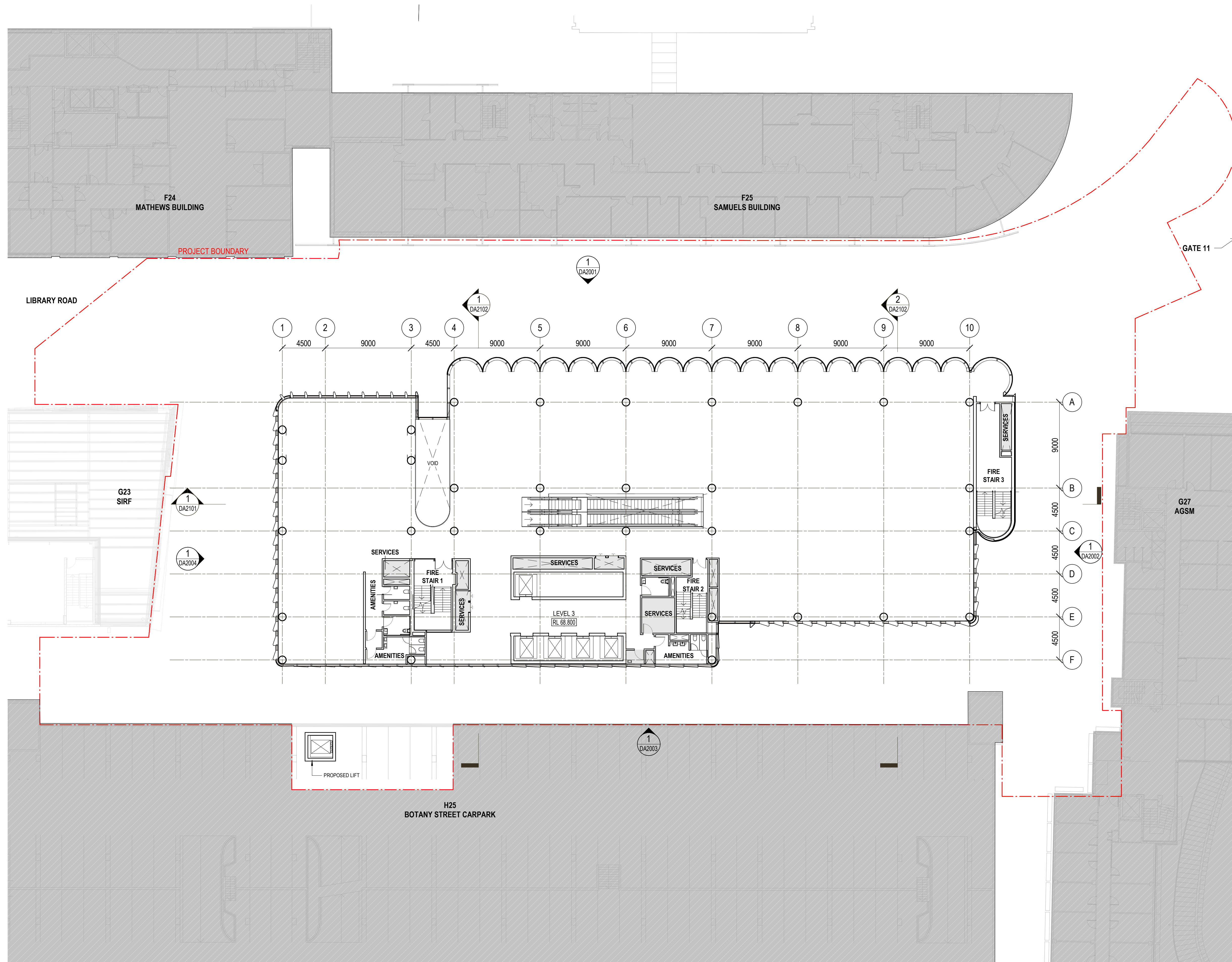
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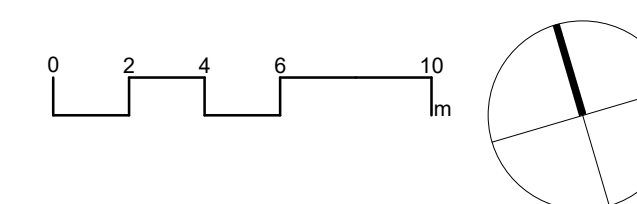
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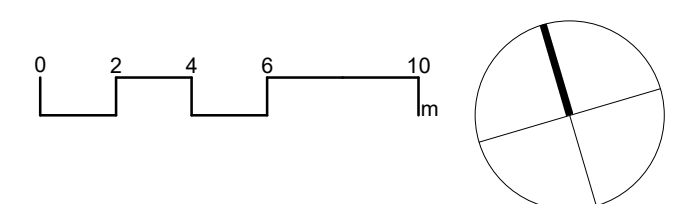
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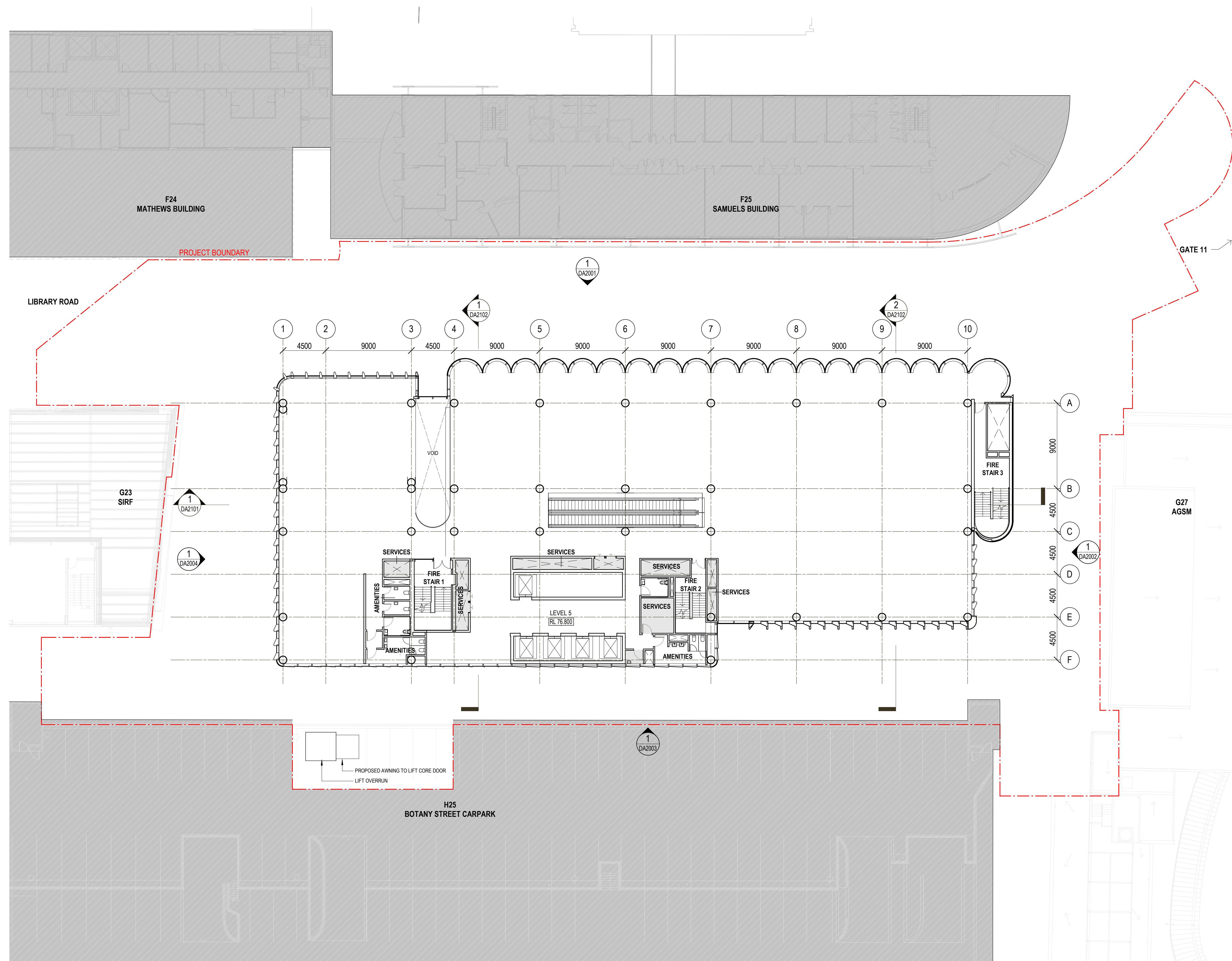
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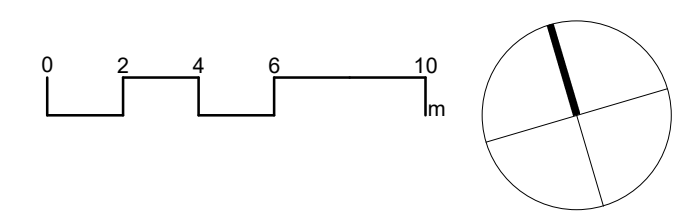
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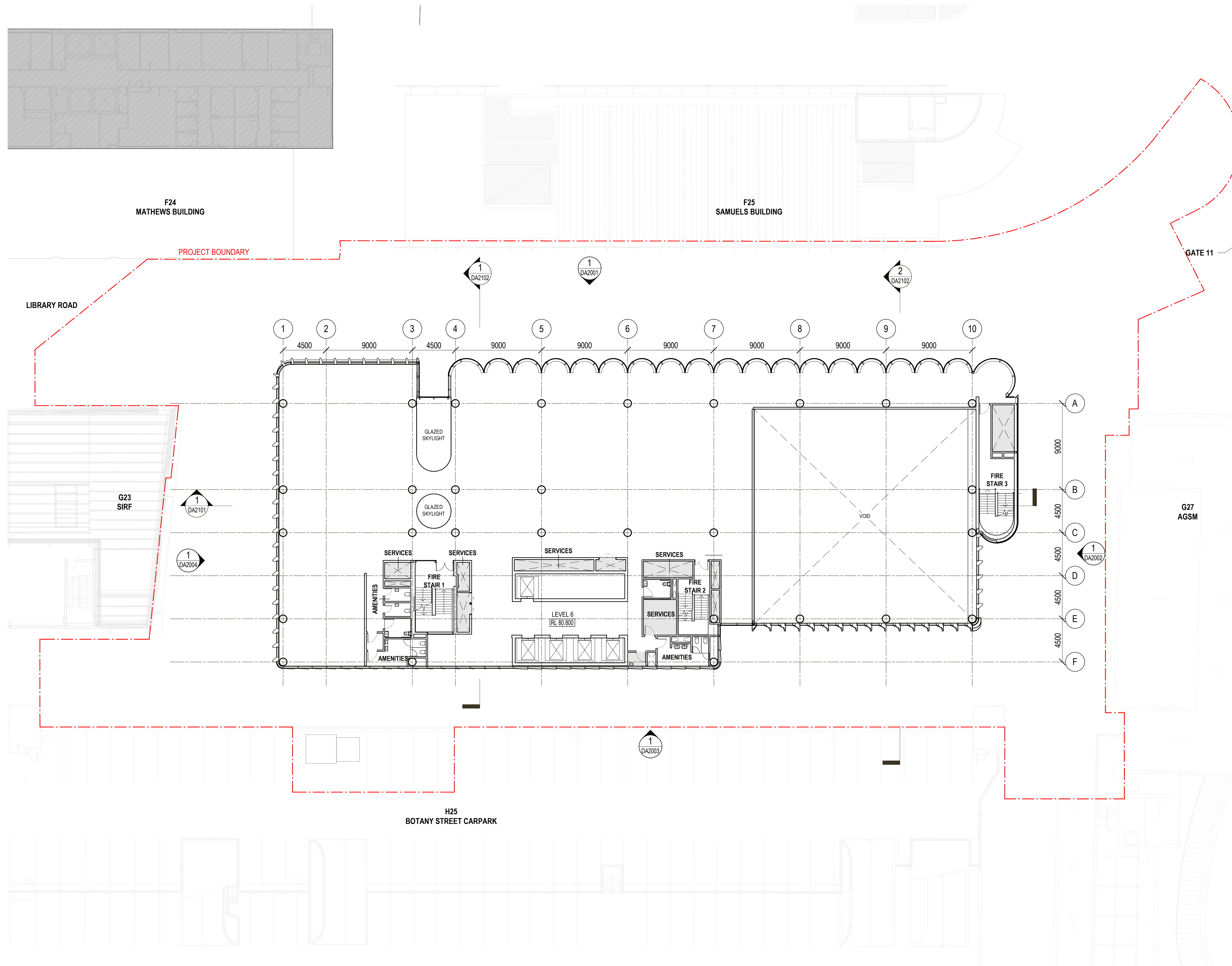
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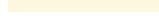
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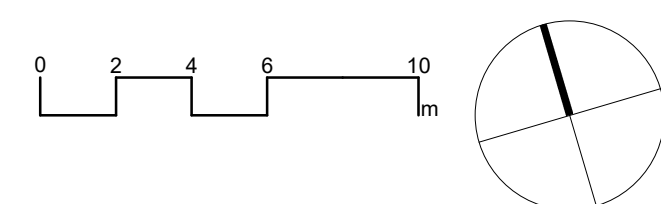
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- SERVICES



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project

UNSW G25 EDUCATION BUILDING

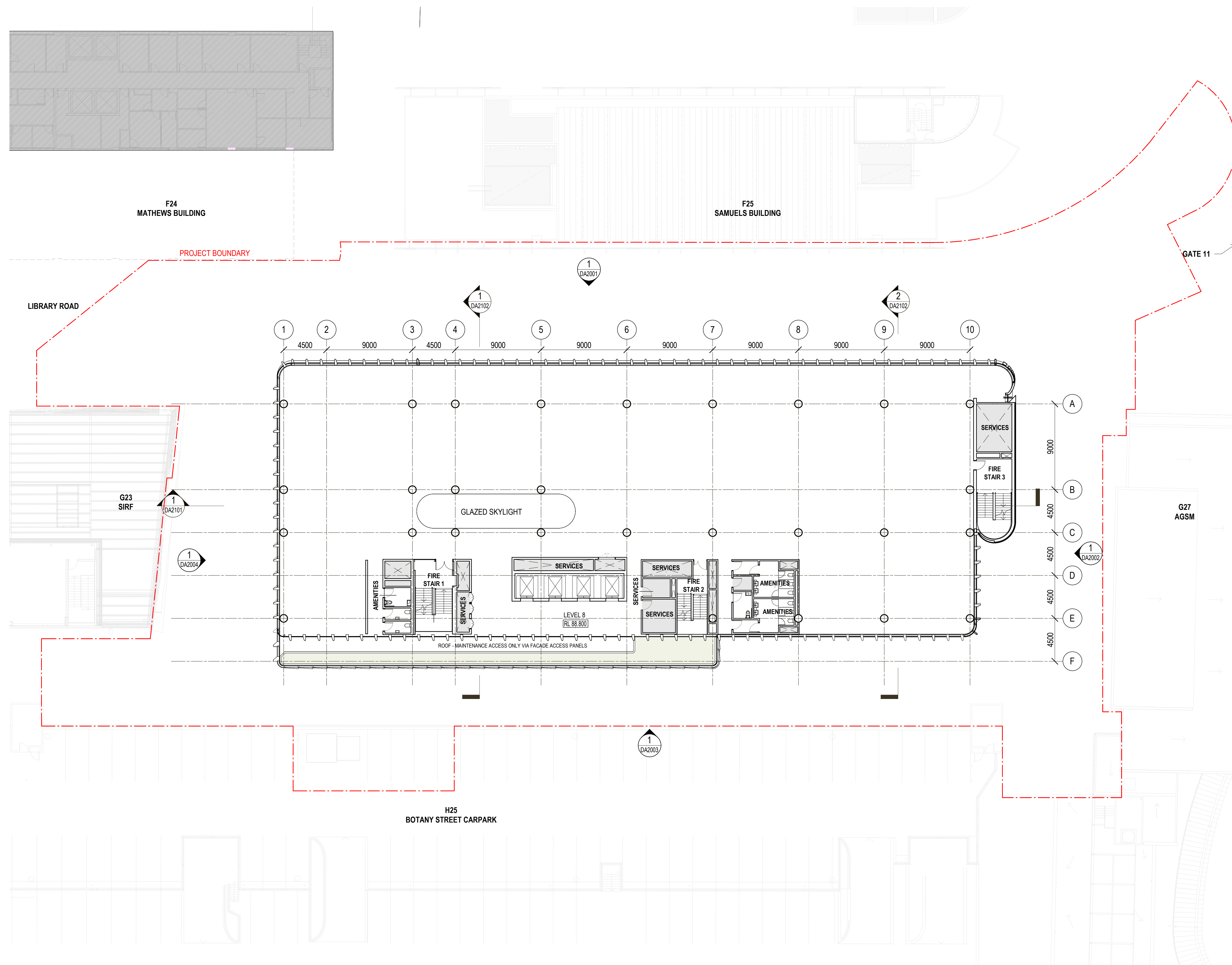
KENSINGTON SYDNEY

drawing

GENERAL ARRANGEMENT PLAN -
LEVEL 8

scale	1 : 200 @A1	drawing no.	
prepared	LC	AG25-ARC-DRW-DA1009	
approved	MT		revision
project no			

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20/02/2025 4:49:45 PM

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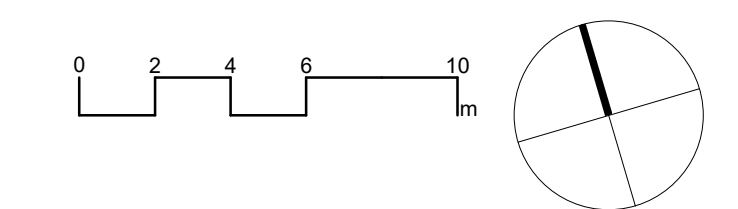
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LEGEND:

	PROJECT BOUNDARY
	EOT FACILITY AREAS
	PLANT / SERVICES
	PROPOSED WORKS
	AREAS OUT OF SCOPE

- WORKPLACE
- AMENITIES
- SERVICES

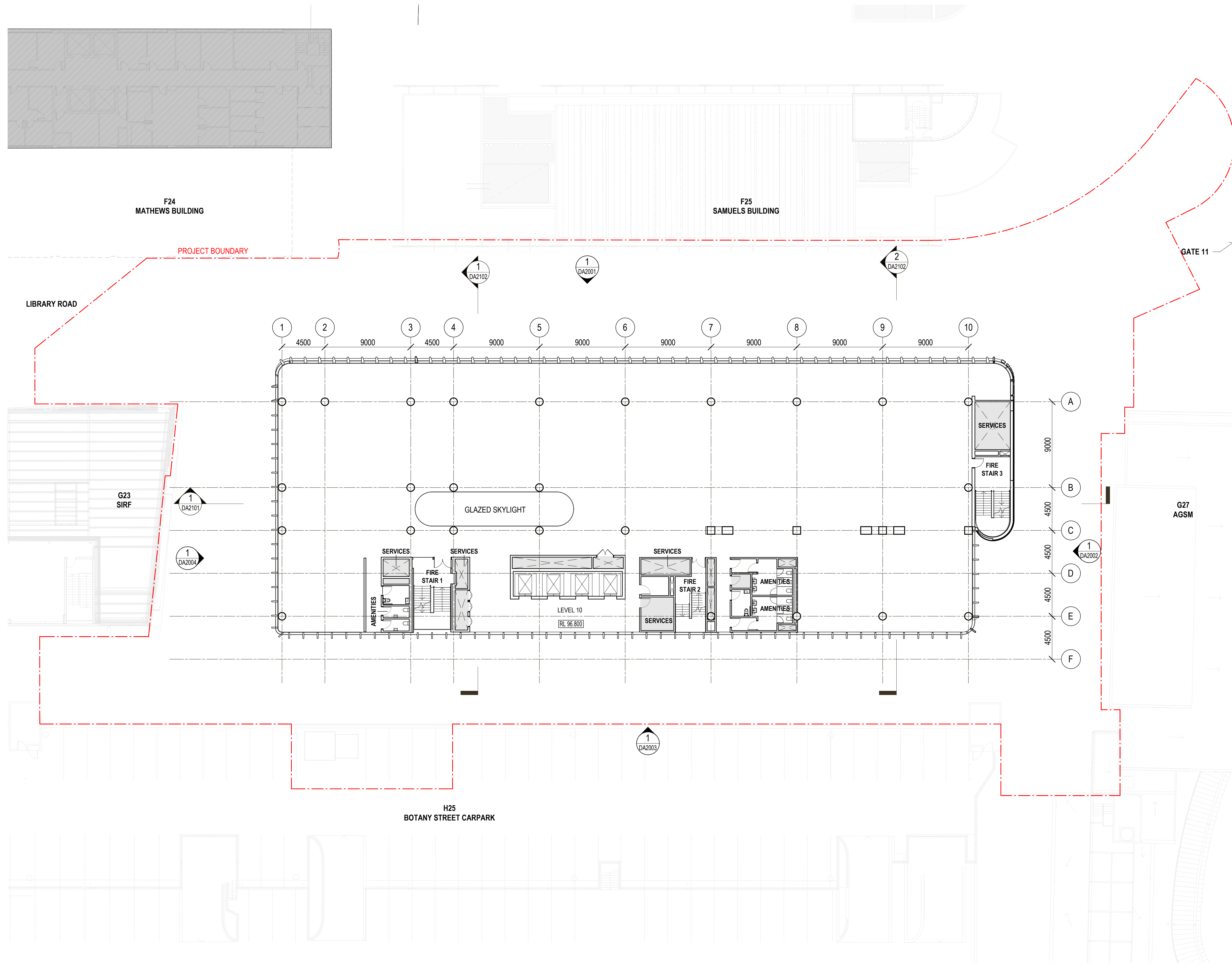


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drawing	
GENERAL ARRANGEMENT PLAN - LEVEL 10	
scale	1 : 200 @A1
prepared	LC
approved	MT
project no	240352.00
drawing no. AG25-ARC-DRW-DA1011	
revision	
A.01	

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SYDNEY

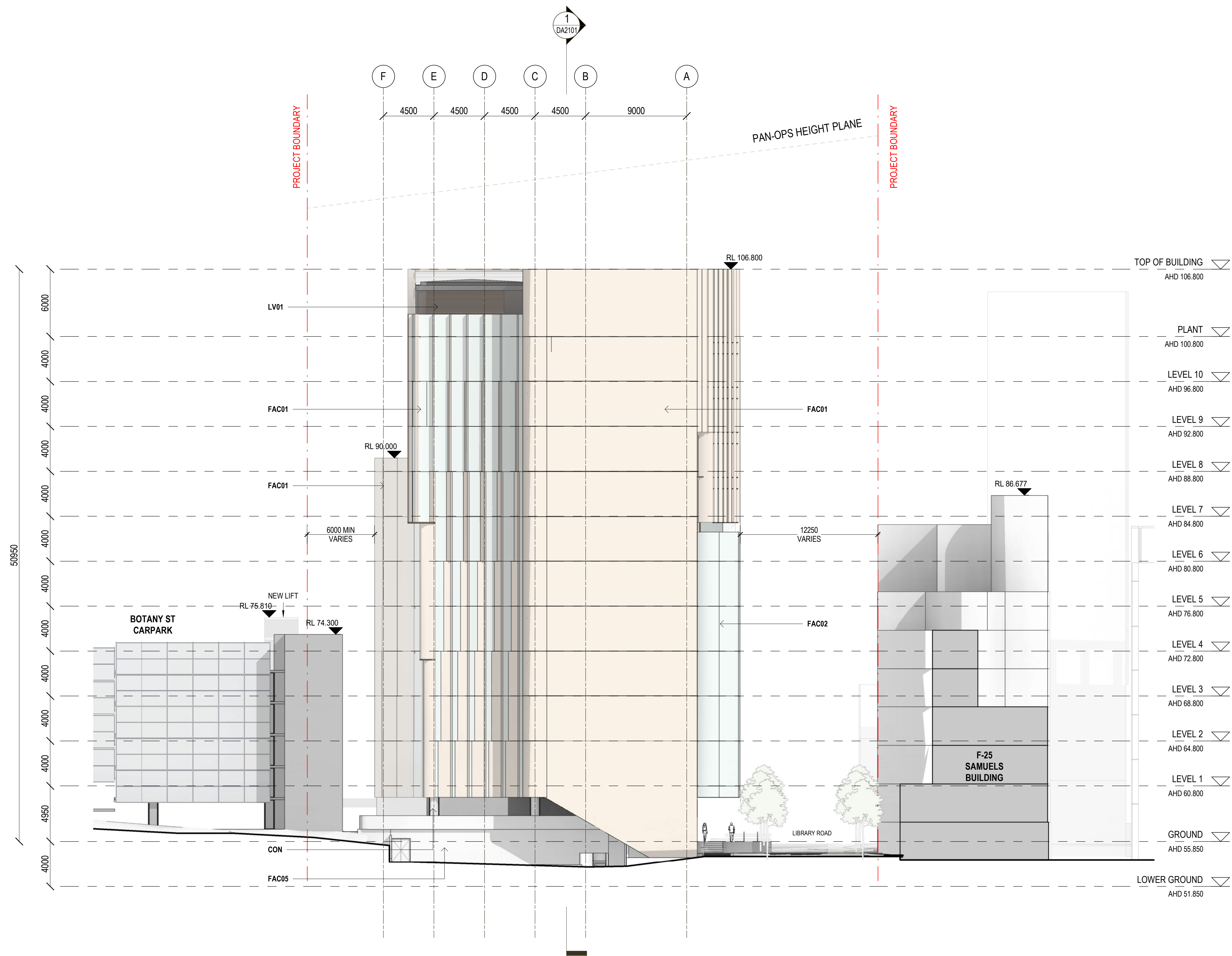
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drawing

scale	1 : 200 @A1	drawing no.
prepared	LC	AG25-ARC-DRW-DA2002
approved	MT	revision
project no	240352.00	A.01

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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.

Copyright

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

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 B

Tabulated Summary Results from Previous Report

Lab result

HIL/HSL value EIL/ESL/EGV value

■ 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

Site Assessment Criteria (SAC):			
SAC based on generic land use thresholds for Commercial/ industrial D			
Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:			
HIL	HIL-D (NEPC, 2013 or HEPA, 2020 (PFAS only))	EGV	EGV, all land uses, direct exposure (HEPA, 2020)
HSL (vapour intrusion)	HSL-D (NEPC, 2013)	ESL	Commercial and Industrial (NEPC, 2013)
DC	Direct contact HSL D Commercial/Industrial (CRC CARE, 2011)	ML	Commercial and Industrial (NEPC, 2013)
		EGV-Indir	EGV, all land uses, Indirect exposure (HEPA, 2020)



Table B1: Summary of Laboratory Results – Soil

			TRH		BTEX																													
			TRH C6 - C9	TRH C10-C16	Benzene	Toluene	Ethylbenzene	Total Xylenes	1,1,2-tetrachloroethane	1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-Dichloroethene	1,1-dichloropropene	1,2,3-trichlorobenzene	1,2,3-trichloropropane	1,2,4-trichlorobenzene	1,2,4-trimethyl benzene	1,2-dibromo-3-chloropropane	1,2-dibromoethane	1,2-dichlorobenzene	1,2-dichloroethane	1,2-dichloropropane	1,3,5-trimethyl benzene	1,3-dichlorobenzene	1,3-dichloropropane	1,4-dichlorobenzene	2,2-dichloropropane	2-chlorotoluene	4-chlorotoluene	4-isopropyl toluene	Bromobenzene	
		PQL	25	50	0.2	0.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
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	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HIL D (NEPC 2013)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D, Sand, 0-1 m (NEPC 2013)			-	-	3	NL	NL	230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EIL / ESL D (NEPC 2013)			-	-	75	135	165	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Management Limits (ML- D, NEPC 2013)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Health Screening Levels for Direct Contact (DC- HSL D, CRC Care 2011)			-	-	430	99000	27000	81000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Screening Levels of Intrusive Maintenance Workers (DC-HSL- IMW, CRC Care 2011)			-	-	1100	120000	85000	130000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HIL D for PFAS (HEPA 2020)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ecological Soil Guideline Values for PFAS (HEPA 2020) Direct Exposure / Indirect Exposure			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1 (2010)	0.1	19/10/2010	<25	<250	<0.5	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1	0.4 - 0.5 m	05/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	0.4 - 0.5 m	05/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH3	0.9 - 1 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH4	0.9 - 1 m	07/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH5	0.4 - 0.5 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH5	0.9 - 1 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH5 - [TRIPLICATE]	0.9 - 1 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH6	0.2 - 0.3 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH6	1.1 - 1.3 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH7	0.5 - 0.6 m	07/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH7	0 - 0.1 m	07/08/24	<25	110	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD4/20240807 (BH7/0-0.1)	0 m	07/08/24	-	-	<0.2	<0.5	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH8	0.1 - 0.2 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD1/20240806 (BH8/0.1-0.2)	0 m	06/08/24	-	-	<0.2	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH8	1 - 11 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH8	1.7 - 1.8 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH9	0.2 - 0.3 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH9	1 - 11 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.5 - 0.6 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH10	1.5 - 1.6 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	2.1 - 2.2 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	0.1 - 0.2 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD3/20240806 (BH11/0.1-0.2)	0.1 - 0.2 m	06/08/24	-	-	<0.2	<0.5	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	1.4 - 1.5 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.3 - 0.4 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.8 - 0.9 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD2/20240806 (BH12/0.8-0.9)	0.8 - 0.9 m	06/08/24	-	-	<0.2	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	0.1 - 0.2 m	07/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH14	0.5 - 0.6 m	07/08/24	<25	<50	<0.2	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH14	1.9 - 2 m	07/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH14 - [TRIPLICATE]	1.9 - 2 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	0.4 - 0.5 m	06/08/24	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Lab result

HIL/HSL value

EIL/ESL/EGV value

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

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 Napthalene 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

Site Assessment Criteria (SAC):			
SAC based on generic land use thresholds for Commercial/ industrial D			
Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:			
HIL	HIL-D (NEPC, 2013 or HEPA, 2020 (PFAS only))	EGV	EGV, all land uses, direct exposure (HEPA, 2020)
HSL (vapour intrusion)	HSL-D (NEPC, 2013)	ESL	Commercial and Industrial (NEPC, 2013)
DC	Direct contact HSL D Commercial/Industrial (CRC CARE, 2011)	ML	Commercial and Industrial (NEPC, 2013)
		EGV-indir	EGV, all land uses, Indirect exposure (HEPA, 2020)

Table B1: Summary of Laboratory Results – Soil

			VOC																										riority phenols			
			Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	carbon tetrachloride	Monochlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Cyclohexane	1,1-dibromochloroethane	Dibromomethane	Dichlorodifluoromethane	hexachlorobutadiene	Isopropylbenzene (cumene)	n-butyl benzene	n-propyl benzene	sec-butyl benzene	Styrene (vinylbenzene)	Tert-butyl benzene	tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	1,1,2-trichloroethylene	Trichlorofluoroethane	Vinyl Chloride	Total Phenolics	
		PQL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	
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	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
Guidelines																																
HIL D (NEPC 2013)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	660
HSL D, Sand, 0-1 m (NEPC 2013)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EIL / ESL D (NEPC 2013)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Management Limits (ML- D, NEPC 2013)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Health Screening Levels for Direct Contact (DC- HSL D, CRC Care 2011)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Screening Levels of Intrusive Maintenance Workers (DC-HSL- IMW, CRC Care 2011)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HIL D for PFAS (HEPA 2020)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ecological Soil Guideline Values for PFAS (HEPA 2020) Direct Exposure / Indirect Exposure			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1 (2010)	0.1	19/10/2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5
BH1	0.4 - 0.5 m	05/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	0.4 - 0.5 m	05/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH3	0.9 - 1 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH4	0.9 - 1 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH5	0.4 - 0.5 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH5	0.9 - 1 m	06/08/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5
BH5 - [TRIPLICATE]	0.9 - 1 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH6	0.2 - 0.3 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5
BH6	1.1 - 1.3 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH7	0.5 - 0.6 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH7	0 - 0.1 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5
BD4/20240807 (BH7/0-0.1)	0 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH8	0.1 - 0.2 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5
BD1/20240806 (BH8/0.1-0.2)	0 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH8	1 - 1.1 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH8	1.7 - 1.8 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5
BH9	0.2 - 0.3 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH9	1 - 1.1 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5
BH10	0.5 - 0.6 m	06/08/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5
BH10	1.5 - 1.6 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	2.1 - 2.2 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5
BH11	0.1 - 0.2 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5
BD3/20240806 (BH11/0.1-0.2)	0.1 - 0.2 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	1.4 - 1.5 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.3 - 0.4 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.8 - 0.9 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5
BD2/20240806 (BH12/0.8-0.9)	0.8 - 0.9 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	0.1 - 0.2 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5
BH14	0.5 - 0.6 m	07/08/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-
BH14	1.9 - 2 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5
BH14 - [TRIPLICATE]	1.9 - 2 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	0.4 - 0.5 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Lab result

HIL/HSL value

EIL/ESL/EGV value

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

Site Assessment Criteria (SAC):			
SAC based on generic land use thresholds for Commercial/ Industrial D			
Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:			
HIL	HIL-D (NEPC, 2013 or HEPA, 2020 (PFAS only))	EGV	EGV, all land uses, direct exposure (HEPA, 2020)
HSL (vapour intrusion)	HSL-D (NEPC, 2013)	ESL	Commercial and Industrial (NEPC, 2013)
DC	Direct contact HSL D Commercial/Industrial (CRC CARE, 2011)	ML	Commercial and Industrial (NEPC, 2013)
		EGV-Indir	EGV, all land uses, Indirect exposure (HEPA, 2020)



Table B1: Summary of Laboratory Results – Soil

			Priority OCP									OCP						Priority OPP	OPP														
			DDT+DDE+DDD c	Aldrin + Dieldrin	Total Chlordane	Total Endosulfan	Endrin	Heptachlor	Heachlorobenz ene	Methoxychlor	Mirex	Heptachlor Epoxide	Endrin Aldehyde	alpha-BHC	beta-BHC	delta-BHC	Lindane	Chlorpyrifos	Adinphos methyl (Guthion)	Bromophos- ethyl	Chlorpyrifos- methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Ronnel (fenchlorphos)	Fenitrothion	Fenthion	Malathion	parathion	Parathion- methyl	Methidathion	Fenamiphos
		PQL	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	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	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
HIL D (NEPC 2013)			3600	45	530	2000	100	50	80	2500	100	-	-	-	-	-	-	2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D, Sand, 0-1 m (NEPC 2013)			640	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EIL / ESL D (NEPC 2013)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Management Limits (ML- D, NEPC 2013)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Health Screening Levels for Direct Contact (DC- HSL D, CRC Care 2011)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Screening Levels of Intrusive Maintenance Workers (DC-HSL- IMW, CRC Care 2011)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HIL D for PFAS (HEPA 2020)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ecological Soil Guideline Values for PFAS (HEPA 2020) Direct Exposure / Indirect Exposure			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1 (2010)	0.1	19/10/2010	-	<0.1	<1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	-	-	-	-	-	
BH1	0.4 - 0.5 m	05/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH2	0.4 - 0.5 m	05/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH3	0.9 - 1 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH4	0.9 - 1 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH5	0.4 - 0.5 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH5	0.9 - 1 m	06/08/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BH5 - [TRIPLICATE]	0.9 - 1 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH6	0.2 - 0.3 m	06/08/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BH6	1.1 - 1.3 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH7	0.5 - 0.6 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH7	0 - 0.1 m	07/08/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BD4/20240807 (BH7/0-0.1)	0 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH8	0.1 - 0.2 m	06/08/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BD1/20240806 (BH8/0.1-0 m)	0 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH8	1 - 11 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH8	1.7 - 1.8 m	06/08/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BH9	0.2 - 0.3 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH9	1 - 11 m	06/08/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BH10	0.5 - 0.6 m	06/08/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BH10	1.5 - 1.6 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH10	21 - 2.2 m	06/08/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BH11	0.1 - 0.2 m	06/08/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BD3/20240806 (BH11/0.1-0.1 - 0.2 m)	0.1 - 0.2 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH11	1.4 - 1.5 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH12	0.3 - 0.4 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH12	0.8 - 0.9 m	06/08/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BD2/20240806 (BH12/0.8-0.1 - 0.2 m)	0.1 - 0.2 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH13	0.1 - 0.2 m	07/08/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BH14	0.5 - 0.6 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH14	1.9 - 2 m	07/08/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BH14 - [TRIPLICATE]	1.9 - 2 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH15	0.4 - 0.5 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Lab result

HIL/HSL value

EIL/ESL/EGV value

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

Site Assessment Criteria (SAC):			
SAC based on generic land use thresholds for Commercial/ Industrial D			
Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:			
HIL	HIL-D (NEPC, 2013 or HEPA, 2020 (PFAS only))	EGV	EGV, all land uses, direct exposure (HEPA, 2020)
HSL (vapour intrusion)	HSL-D (NEPC, 2013)	ESL	Commercial and Industrial (NEPC, 2013)
DC	Direct contact HSL D Commercial/Industrial (CRC CARE, 2011)	ML	Commercial and Industrial (NEPC, 2013)
		EGV-Indir	EGV, all land uses, Indirect exposure (HEPA, 2020)



Table B1: Summary of Laboratory Results – Soil

			PCB	Priority PFAS					PFAS		Asbestos (FA/AF)			Asbestos, Other							pH, EC and CEC	
			Total PCB	Total Positive PFAS	PFCA	PFOs + PFHxS	PFOS	PFHxS	6:2 FTS	8:2 FTS	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation	Asbestos ID in soil >0.1g/kg	Trace Analysis (A5)	Asbestos ID in soil >0.1g/kg	Asbestos ID in soil <0.1g/kg	Trace Analysis (NEPC)	Total Asbestos#†	Asbestos Summary	pH 15 soilwater	Cation Exchange Capacity
		PQL	0.1	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002				0.001						0.1	0.1	1
Sample ID	Depth	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	g	g	%(w/w)	-	-	-	-	-	g/kg		pH Units	cmol/kg
HIL D (NEPC 2013)			7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D, Sand, 0-1 m (NEPC 2013)			-	-	50	20	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-
EIL / ESL D (NEPC 2013)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Management Limits (ML- D, NEPC 2013)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Health Screening Levels for Direct Contact (DC- HSL D, CRC Care 2011)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Screening Levels of Intrusive Maintenance Workers (DC-HSL- IMW, CRC Care 2011)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HIL D for PFAS (HEPA 2020)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ecological Soil Guideline Values for PFAS (HEPA 2020) Direct Exposure / Indirect Exposure			-	-	10 / NC	-	1 / 0.01	NC / NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1 (2010)	0.1	19/10/2010	<0.7	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	-	-
BH1	0.4 - 0.5 m	05/08/24	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	-	-
BH2	0.4 - 0.5 m	05/08/24	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	-	-
BH3	0.9 - 1 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	-	-
BH4	0.9 - 1 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	-	-
BH5	0.4 - 0.5 m	06/08/24	-	-	-	-	-	-	-	-	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BH5	0.9 - 1 m	06/08/24	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	7.4	2.5
BH5 - [TRIPLICATE]	0.9 - 1 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH6	0.2 - 0.3 m	06/08/24	<0.1	-	-	-	-	-	-	-	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BH6	1.1 - 1.3 m	06/08/24	-	-	-	-	-	-	-	-	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BH7	0.5 - 0.6 m	07/08/24	-	-	-	-	-	-	-	-	0.0047	-	<0.001	-	-	NAD	Detected	NAD	<0.1	Detected	-	-
BH7	0 - 0.1 m	07/08/24	<0.1	0.001	0.0002	0.0008	0.0008	<0.0001	<0.0001	<0.0002	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	7.3	9.9
BD4/20240807 (BH7/0-0.1)	0 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH8	0.1 - 0.2 m	06/08/24	<0.1	-	-	-	-	-	-	-	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BD1/20240806 (BH8/0.1-0.2)	0 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH8	1 - 1.1 m	06/08/24	-	-	-	-	-	-	-	-	0.036	0.0053	-	-	-	NAD	Detected	NAD	<0.1	Detected	-	-
BH8	1.7 - 1.8 m	06/08/24	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH9	0.2 - 0.3 m	06/08/24	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BH9	1 - 1.1 m	06/08/24	<0.1	-	-	-	-	-	-	-	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BH10	0.5 - 0.6 m	06/08/24	<0.1	0.0002	<0.0001	0.0002	0.0002	<0.0001	<0.0001	<0.0002	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BH10	1.5 - 1.6 m	06/08/24	-	-	-	-	-	-	-	-	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BH10	2.1 - 2.2 m	06/08/24	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	0.1 - 0.2 m	06/08/24	<0.1	-	-	-	-	-	-	-	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BD3/20240806 (BH11/0.1-0.2)	0.1 - 0.2 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	1.4 - 1.5 m	06/08/24	-	-	-	-	-	-	-	-	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BH12	0.3 - 0.4 m	06/08/24	-	-	-	-	-	-	-	-	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BH12	0.8 - 0.9 m	06/08/24	<0.1	-	-	-	-	-	-	-	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BD2/20240806 (BH12/0.8-0.9)	0.8 - 0.9 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	0.1 - 0.2 m	07/08/24	<0.1	-	-	-	-	-	-	-	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BH14	0.5 - 0.6 m	07/08/24	-	-	-	-	-	-	-	-	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	6.9	2.2
BH14	1.9 - 2 m	07/08/24	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	-	-	<0.001	-	-	NAD	NAD	NAD	<0.1	-	-	-
BH14 - [TRIPLICATE]	1.9 - 2 m	07/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	0.4 - 0.5 m	06/08/24	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	-	-

Lab result

HIL/HSL value

EIL/ESL/EGV value

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

Site Assessment Criteria (SAC):			
SAC based on generic land use thresholds for Commercial/ Industrial D			
Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:			
HIL	HIL-D (NEPC, 2013 or HEPA, 2020 (PFAS only))	EGV	EGV, all land uses, direct exposure (HEPA, 2020)
HSL (vapour intrusion)	HSL-D (NEPC, 2013)	ESL	Commercial and Industrial (NEPC, 2013)
DC	Direct contact HSL D Commercial/Industrial (CRC CARE, 2011)	ML	Commercial and Industrial (NEPC, 2013)
		EGV-Indir	EGV, all land uses, Indirect exposure (HEPA, 2020)

Table B2: Summary of Laboratory Results – Groundwater

		Metals - Dissolved								TRH				BTEX						PAH																
		Total Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (Inorganic)	Nickel	Zinc	F1 (C6-C10)-BTEX	F2 (>C10-C16 less Naphthalene)	F3 (C16-C24)	F4 (C24-C40)	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene	Total Xylenes	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Naphthalene	Benzo[a]pyrene [B(a)P]	Benzo[k]fluoranthene	Benzo[ghi]perylene	Chrysene	Dibenz[a,h]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-c]dipylene	Phenanthrene	Pyrene	Sum of detected PAH	
	PQL	1	0.1	1	1	1	0.05	1	1	10	50	100	100	1	1	1	1	2	1	0.1	0.1	0.1	0.1	1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
ANZECC (2000) Irrigation Long Term Trigger Values		100	10	100	200	2,000	2	200	2,000																											
ANZECC (2000) Irrigation Short Term Trigger Values		2,000	50	1000	5,000	5,000	2	2,000	5,000																											
ANZG (2018) 95% LOP Fresh		13	0.2	1	1.4	3.4	0.06	11	8					950	180	80	350	75				0.01		16	0.1					1				0.6		
ANZG (2018) 95% LOP Fresh, Hardness Modified			0.6			16.1		31.1	22.6																											
HEPA (2020) 99% LOP Fresh																																				
NEPC (2013) HSL 2-4m										6,000	NL			5,000	NL	NL			NL					NL												
Sample ID	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	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	
MW1	19/08/24	<1	<0.1	<1	2	<1	<0.05	35	14	<10	53	<100	<100	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
MW2	19/08/24	1	<0.1	3	<1	<1	<0.05	12	18	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BD	19/08/24	1	<0.1	3	<1	<1	<0.05	12	17	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
MW4	19/08/24	<1	0.1	<1	8	<1	<0.05	150	59	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Notes:

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

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

NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013), health screening level Sand 2-4m

ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 95% level of protection of species for Fresh aquatic ecosystems [NB: 99% level of protection adopted for bioaccumulative chemicals]

HEPA (2018) PFAS National Environmental Management Plan, Version 2 99% level of protection for Fresh water aquatic ecosystems

ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Irrigation water Short Term Trigger Values

ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Irrigation water Long Term Trigger Values

ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, orange text is 'unknown' level of protection

Underlining of ANZG (2018) criteria indicates a criteria with an 'unknown' level of protection.

ANZG (2018) DGV adopted for most conservative species of following analytes; DGV for xylene (m) adopted for xylene (m+p); DGV for CrVI adopted for total chromium; DGV for AsV adopted for total arsenic

ANZG (2018) DGV adopted for aluminium in freshwater is for receiving waters with pH >6.5. For receiving waters with pH <6.5 suitability of the more conservative, low reliability DGV of unknown LOP should be considered

ANZG (2018) Ammonia DGV is pH and temperature dependant. DGV for a pH of 8 provided in table.

Hardness modified trigger value based on a average hardness of 102 mg/L.

Table B2: Summary of Laboratory Results – Groundwater

		OCP																				OPP		PCB	VOC (excluding BTEX)		PFAS			Anions & Cations - Dissolved				
		DDE	DDT	DDD	Aldrin	Dieldrin	Aldrin + Dieldrin (calculated)	alpha-chlordane	gamma-Chlordane	Endosulfan I	Endosulfan II	Endosulfan Sulphate	Endrin	Endrin Alderhyde	Hepachlor	Hepachlor Epoxide	Hexachlorobenzene	Methoxychlor	alpha-BHC	beta-BHC	delta-BHC	Lindane	Sum of detected OCP	Azinphos methyl (Guthion)	Sum of detected OPP	Sum of detected PCB	Chloroform	Sum of detected VOC	PFOS	PFOA	Sum of detected PFAS	Calcium	Magnesium	
	PQL	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.02	0.004	0.01	1	1	0.01	0.01	0.01	500	500	
ANZECC (2000) Irrigation Long Term Trigger Values																																		
ANZECC (2000) Irrigation Short Term Trigger Values																																		
ANZG (2018) 95% LOP Fresh			0.006		0.001	0.01							0.01		0.01		0.1	0.005				0.2		0.02			770							
ANZG (2018) 95% LOP Fresh, Hardness Modified																																		
HEPA (2020) 99% LOP Fresh																														0.00023	19			
NEPC (2013) HSL 2-4m																																		
Sample ID	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	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	
MW1	19/08/24	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.02	<0.004	<0.01	4	4	<0.01	<0.01	<0.01	7,800	6,100	
MW2	19/08/24	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.02	<0.004	<0.01	<1	<1	<0.01	0.01	0.03	30,000	20,000	
BD	19/08/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW4	19/08/24	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.02	<0.004	<0.01	2	2	<0.01	<0.01	<0.01	18,000	14,000	

Notes:

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

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

NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013), health screening level Sand 2-4m

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ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, irrigation water Long Term Trigger Values

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Underlining of ANZG (2018) criteria indicates a criteria with an 'unknown' level of protection.

ANZG (2018) DGV adopted for most conservative species of following analytes: DGV for xylene (m) adopted for xylene (m+p); DGV for CrVI adopted for total chromium; DGV for AsV adopted for total arsenic

ANZG (2018) DGV adopted for aluminium in freshwater is for receiving waters with pH >6.5. For receiving waters with pH <6.5 suitability of the more conservative, low reliability DGV of unknown LOP should be considered

ANZG (2018) Ammonia DGV is pH and temperature dependant. DGV for a pH of 8 provided in table.

Hardness modified trigger value based on a average hardness of 102 mg/L



Table B3: Summary of Laboratory Results – Preliminary Waste Classification

				Metals									TRH		BTEX				PAH		Phenols	OCP						
				Total Arsenic	Cadmium	Total Chromium	Copper	Lead	TCLP Lead	Mercury (inorganic)	Nickel	TCLP Nickel	Zinc	TRH C6 - C9	TRH C10-C36	Benzene	Toluene	Ethylbenzene	Total Xylenes	Benzo(a)pyrene (BaP)	Total PAH	Total Phenolics	Scheduled Chemical Waste (standard)	Total Endosulfan	Total Analysed OCP	Mirex		
		PQL		5	1	2		5	0.03	0.1	2	0.02		25	50	0.2	0.5	0.5	0.5	0.5	0.5	5	0.1	0.1	0.1	0.1		
Sample ID	Depth	Sample Date	Soil Type	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/L	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		
BH1 (2010)	0.1	19/10/2010	Fill	<4	<0.5	5	26	160	0.3	0.4	3	-	85	-	-	<0.5	<0.5	<1	<3	0.09	-	<5	-	<0.1	<0.1	-		
BH1	0.4 - 0.5 m	5/08/2024	Fill	<4	<0.4	4	11	42	-	<0.1	2	-	36	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-		
BH2	0.4 - 0.5 m	5/08/2024	Fill	4	<0.4	6	25	160	-	0.4	6	-	100	<25	<50	<0.2	<0.5	<1	<1	0.07	0.3	-	-	-	-	-		
BH3	0.9 - 1 m	6/08/2024	Fill	<4	<0.4	5	22	160	-	0.3	3	-	100	<25	<50	<0.2	<0.5	<1	<1	0.2	1.9	-	-	-	-	-		
BH4	0.9 - 1 m	7/08/2024	Fill	<4	<0.4	6	29	240	-	0.4	6	-	120	<25	<50	<0.2	<0.5	<1	<1	0.1	1.4	-	-	-	-	-		
BH5	0.4 - 0.5 m	6/08/2024	Fill	<4	<0.4	5	26	130	-	0.3	4	-	80	<25	<50	<0.2	<0.5	<1	<1	0.5	5.5	-	-	-	-	-		
BH5	0.9 - 1 m	6/08/2024	Fill	<4	<0.4	5	97	290	0.71	0.4	3	-	160	<25	<50	<0.2	<0.5	<1	<1	0.06	0.66	<5	<0.1	<0.1	<0.1	<0.1		
BH5 - [TRIPLICATE]	0.9 - 1 m	6/08/2024	Fill	<4	<0.4	7	87	340	-	0.4	4	-	180	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH6	0.2 - 0.3 m	6/08/2024	Fill	<4	<0.4	7	25	98	-	0.2	10	-	74	<25	<50	<0.2	<0.5	<1	<1	0.3	3.3	<5	<0.1	<0.1	<0.1	<0.1		
BH6	1.1 - 1.3 m	6/08/2024	Fill	<4	<0.4	3	12	49	-	0.1	2	-	31	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-		
BH7	0 - 0.1 m	7/08/2024	Fill	<4	<0.4	12	26	82	-	<0.1	6	-	130	<25	110	<0.2	<0.5	<1	<1	0.53	8.9	<5	<0.1	<0.1	<0.1	<0.1		
BD4/20240807 (BH7/0-0.1)	0 - 0.1 m	7/08/2024	Fill	6	<0.4	14	29	78	-	<0.1	12	-	96	-	-	<0.2	<0.5	<1	-	0.3	2.8	-	-	-	-	-		
BH7	0.5 - 0.6 m	7/08/2024	Fill	<4	<0.4	7	41	460	0.2	0.3	8	-	110	<25	<50	<0.2	<0.5	<1	<1	0.2	1.5	-	-	-	-	-		
BH8	0.1 - 0.2 m	6/08/2024	Fill	6	<0.4	6	40	220	-	0.3	6	-	110	<25	<50	<0.2	<0.5	<1	<1	<0.05	0.2	<5	<0.1	<0.1	<0.1	<0.1		
BD1/20240806 (BH8/0.1-0.2)	0.1 - 0.2 m	6/08/2024	Fill	<5	<1	5	27	190	-	0.5	3	-	95	-	-	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-		
BH8	1 - 1.1 m	6/08/2024	Fill	24	<0.4	11	43	200	-	0.4	14	-	220	<25	<50	<0.2	<0.5	<1	<1	0.1	0.5	-	-	-	-	-		
BH9	0.2 - 0.3 m	6/08/2024	Fill	<4	<0.4	5	28	160	-	0.4	3	-	100	<25	<50	<0.2	<0.5	<1	<1	0.1	1.5	-	-	-	-	-		
BH9	1 - 1.1 m	6/08/2024	Fill	11	<0.4	11	83	370	0.3	0.5	11	-	300	<25	<50	<0.2	<0.5	<1	<1	0.4	4.1	<5	<0.1	<0.1	<0.1	<0.1		
BH10	0.5 - 0.6 m	6/08/2024	Fill	<4	<0.4	10	43	120	-	0.2	30	-	84	<25	<50	<0.2	<0.5	<1	<1	0.08	0.78	<5	<0.1	<0.1	<0.1	<0.1		
BH10	1.5 - 1.6 m	6/08/2024	Fill	<4	<0.4	25	28	91	-	0.1	25	-	78	<25	<50	<0.2	<0.5	<1	<1	0.06	0.06	-	-	-	-	-		
BH11	0.1 - 0.2 m	6/08/2024	Fill	<4	<0.4	6	37	150	-	0.3	2	-	100	<25	<50	<0.2	<0.5	<1	<1	0.1	0.9	<5	<0.1	<0.1	<0.1	<0.1		
BD3/20240806 (BH11/0.1-0.2)	0.1 - 0.2 m	6/08/2024	Fill	<4	<0.4	5	34	170	-	0.3	3	-	130	-	-	<0.2	<0.5	<1	-	0.1	0.74	-	-	-	-	-		
BH11	1.4 - 1.5 m	6/08/2024	Fill	<4	<0.4	3	13	66	-	0.6	1	-	54	<25	<50	<0.2	<0.5	<1	<1	0.06	0.06	-	-	-	-	-		
BH12	0.3 - 0.4 m	6/08/2024	Fill	<4	<0.4	6	58	190	-	0.4	3	-	130	<25	<50	<0.2	<0.5	<1	<1	0.1	0.85	-	-	-	-	-		
BH12	0.8 - 0.9 m	6/08/2024	Fill	<4	<0.4	5	26	150	-	0.3	3	-	85	<25	<50	<0.2	<0.5	<1	<1	<0.05	0.5	<5	<0.1	<0.1	<0.1	<0.1		
BD2/20240806 (BH12/0.8-0.9)	0.8 - 0.9 m	6/08/2024	Fill	<5	<1	4	23	114	-	0.3	2	-	66	-	-	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-		
BH13	0.1 - 0.2 m	7/08/2024	Fill	<4	<0.4	14	100	7	-	0.1	100	0.09	72	<25	<50	<0.2	<0.5	<1	<1	<0.05	0.1	<5	<0.1	<0.1	<0.1	<0.1		
BH14	0.5 - 0.6 m	7/08/2024	Fill	4	0.6	9	82	460	4.3	0.6	7	-	430	<25	<50	<0.2	<0.5	<1	<1	0.2	2.1	-	-	-	-	-		
BH14	1.9 - 2 m	7/08/2024	Fill	<4	<0.4	5	18	57	-	0.1	3	-	63	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1		
BH14 - [TRIPLICATE]	1.9 - 2 m	7/08/2024	Fill	<4	<0.4	6	24	150	-	0.2	5	-	80	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH15	0.4 - 0.5 m	6/08/2024	Fill	<4	<0.4	5	41	230	-	0.4	4	-	140	<25	<50	<0.2	<0.5	<1	<1	0.2	2.5	-	-	-	-	-		
Waste Classification Criteria ^f																												
CT1				100	20	100	-	100	-	4	40	-	-	650	10,000	10	288	600	1000	0.8	200	288	<50	60	-	-		
SCC1				500	100	1,900	-	1,500	-	50	1,050	-	-	650	10,000	18	518	1,080	1,800	10	200	518	<50	108	-	-		
TCLP1				-	-	-	-	-	5	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
CT2				400	80	400	-	400	-	16	160	-	-	2,600	40,000	40	1,152	2,400	4,000	3.2	800	1,152	<50	240	-	-		
SCC2				2,000	400	7,600	-	6,000	-	200	4,200	-	-	2,600	40,000	72	2,073	4,320	7,200	23	800	2,073	<50	432	-	-		
TCLP2				-	-	-	-	-	20	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Natural Soil Samples																												
BH8			1.7 - 1.8 m	6/08/2024	Sand	<4	<0.4	2	3	11	-	<0.1	<1	-	9	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1
BH10			2.1 - 2.2 m	6/08/2024	Sand	<4	<0.4	2	<1	1	-	<0.1	1	-	1	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1
VENM Reference Levels																												
NEPC (1999)				1-50	1	5-1000	2-100	2-200	-	0.03	5-500	-	10-300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ANZECC (1992)				0.2-30	0.04-2	0.5-110	1-190	<2-200	-	0.001-0.1	2-400	-	2-180	-	-	0.05 - 1	0.1 - 1	-	-	-	0.95-5	0.03 – 0.5	-	-	<0.001 - <0.97	-	-	
ANZECC (2000)				1-53	0.016-0.78	2.5-673	0.4-412	2-81	-	-	1-517	-	1-263	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

□ 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:

- Detection in natural sample > background or laboratory detection limit
- 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
- NEPC (1999)

National Environment Protection Measure (Assessment of Site Contamination) Schedule B1, Table 5-A, Background Ranges
- ANZECC/NHMRC (1992)

Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, Environmental Soil Quality Guidelines Background A [ANZECC A];
- ANZECC (2000)

Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 3, Table 9.2.16 Datasets used to derive suggested upper background values for uncontaminated Australian soils



Table B3: Summary of Laboratory Results – Preliminary Waste Classification

				OPP	PCB	VOC															PFAS				Asbestos							
				Total Analysed Opp	Total PCB	carbon tetrachloride	Monochlorobenzene	Chloroform	1,2-dichlorobenzene	1,4-dichlorobenzene	1,2-dichloroethane	1,1-Dichloroethene	Styrene (vinylbenzene)	1,1,2-tetrachloroethane	1,1,2,2-tetrachloroethane	tetrachloroethene	1,1,1-trichloroethane	1,1,2-trichloroethane	1,1,2-trichloroethylene	Vinyl Chloride	PFOA	TCLP PFOA	PFOS + PFHxS	TCLP PFOS + PFHxS	Asbestos ID in soil >0.1g/kg	Trace Analysis (AS)	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation	Total Asbestos#	Asbestos Summary	
		PQL		0.1	0.1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.0001	0.00001	0.0001	0.00001						0.001	0.1	0.001
Sample ID	Depth	Sample Date	Soil Type	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/L	mg/kg	mg/L	-	-	g	g	%(w/w)	g/kg		
BH1 (2010)	0.1	19/10/2010	Fill	<0.1	<0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	
BH1	0.4 - 0.5 m	5/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	
BH2	0.4 - 0.5 m	5/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	
BH3	0.9 - 1 m	6/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	
BH4	0.9 - 1 m	7/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	
BH5	0.4 - 0.5 m	6/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.1	-		
BH5	0.9 - 1 m	6/08/2024	Fill	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.0001	-	<0.0001	-	-	-	-	-	<0.001	<0.1	-	
BH5 - [TRIPLICATE]	0.9 - 1 m	6/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH6	0.2 - 0.3 m	6/08/2024	Fill	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.1	-	
BH6	1.1 - 1.3 m	6/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.1	-	
BH7	0 - 0.1 m	7/08/2024	Fill	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.1	-	
BD4/20240807 (BH7/0-0.1)	0 - 0.1 m	7/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0002	<0.00001	0.0008	<0.00001	-	-	-	-	-	-	-	
BH7	0.5 - 0.6 m	7/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00001	-	-	-	0.0047	<0.001	<0.1	Detected	
BH8	0.1 - 0.2 m	6/08/2024	Fill	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.1	-	
BD1/20240806 (BH8/0.1-0.2)	0.1 - 0.2 m	6/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH8	1 - 1.1 m	6/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0360	0.0053	<0.1	Detected	
BH9	0.2 - 0.3 m	6/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	-	<0.0001	-	-	-	-	-	<0.001	<0.1	-	
BH9	1 - 1.1 m	6/08/2024	Fill	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.1	-	
BH10	0.5 - 0.6 m	6/08/2024	Fill	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.0001	<0.00001	0.0002	<0.00001	-	-	-	-	<0.001	<0.1	-	
BH10	1.5 - 1.6 m	6/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.1	-	
BH11	0.1 - 0.2 m	6/08/2024	Fill	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.1	-	
BD3/20240806 (BH11/0.1-0.2)	0.1 - 0.2 m	6/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH11	1.4 - 1.5 m	6/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.1	-	
BH12	0.3 - 0.4 m	6/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.1	-	
BH12	0.8 - 0.9 m	6/08/2024	Fill	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.1	-	
BD2/20240806 (BH12/0.8-0.9)	0.8 - 0.9 m	6/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH13	0.1 - 0.2 m	7/08/2024	Fill	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.1	-	
BH14	0.5 - 0.6 m	7/08/2024	Fill	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	<0.001	<0.1	-	
BH14	1.9 - 2 m	7/08/2024	Fill	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	-	<0.0001	-	-	-	-	-	<0.001	<0.1	-	
BH14 - [TRIPLICATE]	1.9 - 2 m	7/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH15	0.4 - 0.5 m	6/08/2024	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	
Waste Classification Criteria ^f																																
CT1				4	<50	10	2,000	120	86	150	10	14	60	200	26	14	600	24	10	4	-	-	-	-	-	-	-	-	-	-	-	-
SCC1				7.5	<50	18	3,600	126	155	270	18	25	108	360	46.8	25.2	1,080	43.2	18	7.2	18	-	1.8	-	-	-	-	-	-	-	-	-
TCLP1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.05	-	-	-	-	-	-	-	-
CT2				16	<50	40	8,000	480	344	600	40	56	240	800	104	56	2,400	96	40	16	-	-	-	-	-	-	-	-	-	-	-	-
SCC2				30	<50	72	14,400	864	620	1,080	72	100	432	1,440	187.2	100.8	4,320	172.8	72	28.8	72	-	7.2	-	-	-	-	-	-	-	-	-
TCLP2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	0.2	-	-	-	-	-	-	-	-
Natural Soil Samples																																
BH8	1.7 - 1.8 m	6/08/2024	Sand	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH10	2.1 - 2.2 m	6/08/2024	Sand	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
VENM Reference Levels																																
NEPC (1999)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANZECC (1992)				-	0.02 – 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANZECC (2000)				-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Detection in natural sample > background or laboratory detection limit

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
- NEPC (1999) National Environment Protection Measure (Assessment of Site Contamination) Schedule B1, Table 5-A, Background Ranges
- ANZECC/NHMRC (1992) Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, Environmental Soil Quality Guidelines Background A [ANZECC A];
- ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 3, Table 9.2.16 Datasets used to derive suggested upper background values for uncontaminated Australian soils

Acid Sulfate Soil Test Results v1.2

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Table B4: Summary of acid sulfate soils analysis

Project No:	227492.04
Project Name:	UNSW G25 Education Building
Location:	8 High Street, Kensington NSW 2033

Sample Information						Screening Test Results				Laboratory Analysis Results (Acid Base Accounting)								
Location ID	Depth from (m)	Depth to (m)	Reduced level (AHD)	Sample Description	Adopted Texture	pH _F (pH units)	pH _{FOX} (pH units)	Reaction Strength	pH change (pH units)	pH _{KCl} (pH units)	S _{KCl} (%S)	S _{HCl} (%S)	S _{Cr} (%S)	TAA (%S)	S _{NAS} (%S)	ANC _{BT} (%S)	ANC Corroborated (Y/N)	Net Acidity (%S)
Assessment Criteria (pH units)						<4	<3	-	1.0	Action Criteria (%S)		Coarse texture: sands to loamy sands and peats						0.03
												Medium texture: clayey sand to light clays						0.06 ^a /0.03 ^b
												Fine texture: light medium to heavy clays						0.1 ^a /0.03 ^b
BH1	1.00	1.45	55.00 to 54.55	Sand, pale grey and brown	C	7.3	5.3	Low reaction	2.0									
BH1	1.90	2.00	54.10 to 54.00	Sand, pale grey and brown	C	6.1	5.0	Low reaction	1.1									
BH1	2.40	2.50	53.60 to 53.50	Sandstone, paly grey and brown	C	5.4	4.8	Low reaction	0.6									
BH2	1.50	1.60	54.20 to 54.10	Sand and ripped sandstone, pale grey and brown	C	6.4	5.1	Low reaction	1.3									
BH2	1.90	2.00	53.80 to 53.70	Sand and ripped sandstone, pale grey and brown	C	8.9	5.9	Low reaction	3.0									
BH2	2.40	2.50	53.30 to 53.20	Sand, orange-brown	C	8.1	5.4	Low reaction	2.7									
BH2	2.50	2.95	53.20 to 52.75	Sand, orange-brown	C	5.8	5.0	Low reaction	0.8									
BH3	2.50	2.95	53.40 to 52.95	Sand, pale grey then brown	C	5.7	5.0	Low reaction	0.7									
BH4	1.50	1.60	54.80 to 54.70	Sand, grey	C	6.6	5.1	Low reaction	1.5									
BH4	1.90	2.00	54.40 to 54.30	Sand, grey	C	7.0	5.0	Low reaction	2.0									
BH4	2.50	2.95	53.80 to 53.35	Sand, pale grey	C	6.4	5.0	Low reaction	1.4									
BH4	3.00	3.10	53.30 to 53.20	Clayey sand, red-brown	C	6.4	5.0	Low reaction	1.4									
BH15	1.50	1.60	52.20 to 52.10	Sand, pale grey	C	6.4	5.0	Low reaction	1.4									
BH15	1.90	2.00	51.80 to 51.70	Clayey sand, pale brown to orange-brown	C	6.6	5.0	Low reaction	1.6									

Notes:

Adopted texutre - C = coarse, M = medium, F = fine

pH_F - Soil pH in water

pH_{FOX} - Soil pH in peroxide

Reaction strength: L - Low , M - Medium, H - High, X - Extreme, V - Volcanic, F - Frothing (indicative of organic material)

pH change = pH_F - pH_{FOX}

pH_{KCL} - KCl extractable pH

S_{KCl} - KCl extractable sulfur

S_{HCl} - HCl extractable sulfur

S_{Cr} - potential sulfidic acidity

TAA - titratable actual acidity (reported if pH_{KCL}<6.5)

S_{NAS} – retained acidity (reported if pH_{KCl} < 4.5)

ANC_{BT} – acid neutralising capacity (reported if pH_{KCl} ≥ 6.5)

NT - Not tested

Blue depths indicate where samples have been collected at or below the groundwater table

Bold results are indicators of ASS conditions, noting:

- Assessment criteria are considered a reasonable initial screening for AASS or PASS

- pH_F<4 is indicative of the presence of Actual ASS (AASS), although it is not conclusive of ASS on its own as naturally occurring non ASS soils can have pH_F<5

- pH_{FOX}<3 or pH Change ≥1 may indicate potential ASS (PASS), although exception apply. Laboratory testing required to confirm presence of Reduced Inorganic Sulfur (RIS)

- Refer to Table 5.1, A2, A3 of Sullivan,L. et al (2018) for further details

Shaded results trigger action (i.e. equal to or exceed the action criteria). Criteria is specific for soil texture and antipated tonnage of soil disturbed.

Net Acidity can only include the measured ANC where the ANC has been corroborated by other data (for example slab incubation data) that demonstrates the soil material does not experience acidification during complete oxidation under field conditions.

a - Action criterion for disturbance of 1-1000 tonnes of material

b - Action criterion for disturbance of more than 1000 tonnes of material

The action criteria apply only to ASS materials and not to other acidic soils such as acidic peatlands and coastal heaths.



Project:	UNSW E25	ACM Asbestos Content % (w/w):	15
Project No:	227492.04	Land Use:	HSL-D Commercial / Industrial
Location:	8 High Street, Kensington NSW	Criterion:	0.05

Table 1: Summary Results for Bonded Asbestos-Containing Material (ACM) in Soil

Sample ID / Test Location ID	Sample Depth Range (m bgl)	Weight of 10L Bulk Sample (g)	Approx. No. Fragments > 7mm	Condition of Fragments (good/poor)	Approx. Size of Largest Fragment (mm)	Weight of Screened ACM (g)	Concentration of Asbestos in Soil (% w/w)
BH5	0.4-0.9	14552	0	n/a	none detected	0	-
BH5	1.3-1.6	14435	0	n/a	none detected	0	-
BH6	0.2-0.7	15800	0	n/a	none detected	0	-
BH6	0.8-1.3	15216	0	n/a	none detected	0	-
BH6	1.3-1.6	14240	0	n/a	none detected	0	-
BH7	0.4-1	14217	0	n/a	none detected	0	-
BH7	0-0.4	15439	0	n/a	none detected	0	-
BH8	0.1-0.5	15839	0	n/a	none detected	0	-
BH8	1.1-1.6	14156	0	n/a	none detected	0	-
BH9	0.2-0.5	15099	0	n/a	none detected	0	-
BH9	0.5-1.0	15993	0	n/a	none detected	0	-
BH9	1.3-1.6	15244	0	n/a	none detected	0	-
BH10	0.1-0.5	13998	0	n/a	none detected	0	-
BH10	1.0-1.5	14337	0	n/a	none detected	0	-
BH11	0.1-0.5	16145	0	n/a	none detected	0	-
BH11	1.0-1.5	14042	0	n/a	none detected	0	-
BH12	0.2-0.7	16179	0	n/a	none detected	0	-
BH12	1.3-1.8	14483	0	n/a	none detected	0	-
BH12	1.8-2	15981	0	n/a	none detected	0	-
BH13	0.1-0.4	16799	0	n/a	none detected	0	-
BH14	0.1-0.5	15856	0	n/a	none detected	0	-
BH14	1.8-2	14572	0	n/a	none detected	0	-
BH14	1-1.5	14945	0	n/a	none detected	0	-

Appendix C

Borehole Logs from Previous Report

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Chancellery Walk
LOCATION: University of NSW, Kensington

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH1 (2010)
PROJECT No: 72075
DATE: 19/10/2010
SHEET 1 OF 1

[illegible]

RIG: Bobcat **DRILLER:** SY **LOGGED:** NJT **CASING:** None

SURVEY DATUM:

TYPE OF BORING: Solid flight auger to 1.9m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	G	Gas sample
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)



Douglas Partners
Geotechnics | Environment | Groundwater

BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 56.0 AHD
COORDINATE: E:336831.2, N:6245525.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1
PROJECT No: 227492.01
DATE: 02/08/24
SHEET: 1 of 3

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
	RL (m)														
02/08/24 No free groundwater observed whilst augering	0.04	ASPHALTIC CONCRETE		FILL	(WC)				A/ES	0.10					
	0.30	FILL / Sandy GRAVEL: grey; fine to medium, angular, aggregate; medium to coarse sand.		FILL					ES/A	0.20					
	0.60	FILL / SAND: grey amd grey brown; fine to medium; trace brick, glass fragment, charcoal, and plastics.								0.40					
	1	FILL / SAND: pale grey and brown; fine to medium; trace ripped sandstone gravel.		FILL	PC		M		A/ES	0.90					
	1.60	SAND (SP): pale grey brown; fine.							ES/A	1.50					
	2	2.00m: sandy clay and trace ironstone gravel		RS	(L)				ES/A	1.60					
	2.40	SANDSTONE: pale grey and brown, medium grained. Hawkesbury Sandstone							A	1.90					
	2.60	Continued as rock							A	2.00					
	3									2.40					
	4									2.55					
									</						

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: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: AD/T to 2.5m, WB to 2.6m, NMLC to 13.05m

CASING: HW to 2.5m

REMARKS: Standpipe installed to 9.0m (screen 3.0m-9.0m, PVC 0.1m-3.0m, Gravel 10.0m-13.0m, Bentonite 9.0m-10.0m, Gravel 2.9m-9.0m, Bentonite 2.5m-2.9m, Backfill to 0.1m, gatic cover at top)

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: The University of New South Wales

PROJECT: UNSW G25 Education Building

LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 56.0 AHD

COORDINATE: E:336831.2, N:6245525.9

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1

PROJECT No: 227492.01

DATE: 02/08/24

SHEET: 2 of 3

CONDITIONS ENCOUNTERED											SAMPLE				TESTING			
GROUNDWATER	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
02/08/24 No free groundwater observed whilst augering	RL (m)			BS L XW HW MW SW FR	VL L M H VH EH													
	55													1				
	54													2				
	53	Continued from soil SANDSTONE: pale grey and brown, medium grained; with iron cemented bands. Hawkesbury Sandstone			-2.40	L								3	PLT	PL(A)=0.20MPa		
	52			HW to MW	-3.25	VL to L	100	82		> 3.25-3.28m: CS				4	PLT	PL(A)=0.10MPa		
	51	SANDSTONE: pale grey and brown, medium to coarse grained. Hawkesbury Sandstone			-4.50	L				> 4.08-4.15m CS > 4.20-4.50m: DS				5				
	50			MW	-4.80	M				> 4.60m: B, 20°; PR, Fe, RF > 4.70m: B, 10°, Fe > 4.80m: B, 0°; Fe 10mm, Clay > 5.05m: B, 10°, Fe				6	PLT	PL(A)=0.40MPa		
	49	6.75m-6.99m: dark grey, very low strength laminite 7.06m-7.15m: dark grey, very low strength laminite			-5.40	M	100	68		> 5.40m: B, 10°, Fe 20mm, Clay				7	PLT	PL(A)=0.50MPa		
	48			HW	-6.10	M				> 6.10m: B, 0°, Clay 10mm				8				
	47	SANDSTONE: pale grey and grey, medium to coarse grained. Hawkesbury Sandstone			-6.75	VL				> 6.55m B, 0°, Clay 5mm > 6.75m: B, 0°, Fe 120mm, Clay				9	PLT	PL(A)=0.40MPa		
	46	8.15m-9.60m: cross bedded		FR	-7.20	M				> 7.06m: DS > 7.35m: B, 20°, CT CBS				10	PLT	PL(A)=1.3MPa		
	45				-8.15	H	100	99		> 8.10m B 5°, CT CBS 1mm				11	PLT	PL(A)=1.5MPa		
	44				-9.55	H				> 9.55m B, 0°, CT Clay 5mm				12	PLT	PL(A)=1.5MPa		

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

PLANT: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: AD/T to 2.5m, WB to 2.6m, NMLC to 13.05m

CASING: HW to 2.5m

REMARKS: Standpipe installed to 9.0m (screen 3.0m-9.0m, PVC 0.1m-3.0m, Gravel 10.0m-13.0m, Bentonite 9.0m-10.0m, Gravel 2.9m-9.0m, Bentonite 2.5m-2.9m, Backfill to 0.1m, gatic cover at top)

Refer to explanatory notes for symbol and abbreviation definitions

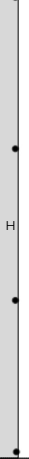


BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 56.0 AHD
COORDINATE: E:336831.2, N:6245525.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1
PROJECT No: 227492.01
DATE: 02/08/24
SHEET: 3 of 3

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																				
			[CONT] SANDSTONE: pale grey and grey, medium to coarse grained. Hawkesbury Sandstone						100	99		10.65m: B, 10°, CT Clay 5 mm				10.65m: B, 10°, CT Clay 5 mm					11	PLT	PL(A)=1.3MPa																						
45	11																																												
44	12																																												
43	13																																												
			Borehole discontinued at 13.05m depth. Target depth reached.																																										
42	14																																												
41	15																																												
40	16																																												
39	17																																												
38	18																																												
37	19																																												

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

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

PLANT: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: AD/T to 2.5m, WB to 2.6m, NMLC to 13.05m

CASING: HW to 2.5m

REMARKS: Standpipe installed to 9.0m (screen 3.0m-9.0m, PVC 0.1m-3.0m, Gravel 10.0m-13.0m, Bentonite 9.0m-10.0m, Gravel 2.9m-9.0m, Bentonite 2.5m-2.9m, Backfill to 0.1m, gatic cover at top)

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: The University of New South Wales

PROJECT: UNSW G25 Education Building

LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 56.0 AHD

COORDINATE: E:336831.2, N:6245525.9

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1

PROJECT No: 227492.01

DATE: 02/08/24

SHEET: 1 of 2



2.60-7.00 m depth



7.00-12.00 m depth

CORE PHOTO LOG

CLIENT: The University of New South Wales

PROJECT: UNSW G25 Education Building

LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 56.0 AHD

COORDINATE: E:336831.2, N:6245525.9

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1

PROJECT No: 227492.01

DATE: 02/08/24

SHEET: 2 of 2



12.00-13.50 m depth

BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.7 AHD
COORDINATE: E:336860.0, N:6245514.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 227492.01
DATE: 05/08/24
SHEET: 1 of 3

CONDITIONS ENCOUNTERED						SAMPLE		TESTING AND REMARKS	
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. (%)	DENSITY (g/cm³)	MOISTURE	REMARKS	TEST TYPE
RL (m)									
05/08/24 No free groundwater observed whilst augering	0.04	ASPHALTIC CONCRETE		FILL	MC				
	0.30	FILL / Sandy GRAVEL: grey; fine to coarse, angular, aggregates.		FILL	MC				
	0.80	FILL / SAND: grey and grey brown; fine to medium; trace gravel, charcoal, plastic, brick.		FILL	MC				
	1	FILL / SAND AND RIPPED SANDSTONE: pale grey brown; fine to coarse; ripped sandstone gravel and cobble.		FILL	MC				
	2.20	SAND (SP): orange-brown; fine to medium; trace of ironstone gravel and silt.		RS	MD				
	2.85	SANDSTONE: pale grey and brown, medium to coarse grained. Hawkesbury Sandstone							
	3.00	Continued as rock							
	4								
	5								
	6								
	7								
	8								
	9								

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: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: DT (300mm) to 0.04m, AD/T to 2.5m, WB to 3.0m, NMLC to 15.85m

CASING: HW to 2.5m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.7 AHD
COORDINATE: E:336860.0, N:6245514.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 227492.01
DATE: 05/08/24
SHEET: 2 of 3

[illegible]

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

PLANT: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: DT (300mm) to 0.04m, AD/T to 2.5m, WB to 3.0m, NMLC to 15.85m

CASING: HW to 2.5m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.7 AHD
COORDINATE: E:336860.0, N:6245514.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 227492.01
DATE: 05/08/24
SHEET: 3 of 3

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
					PS	SW	HW	DW	FW	SW	FR														

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

PLANT: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: DT (300mm) to 0.04m, AD/T to 2.5m, WB to 3.0m, NMLC to 15.85m

CASING: HW to 2.5m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

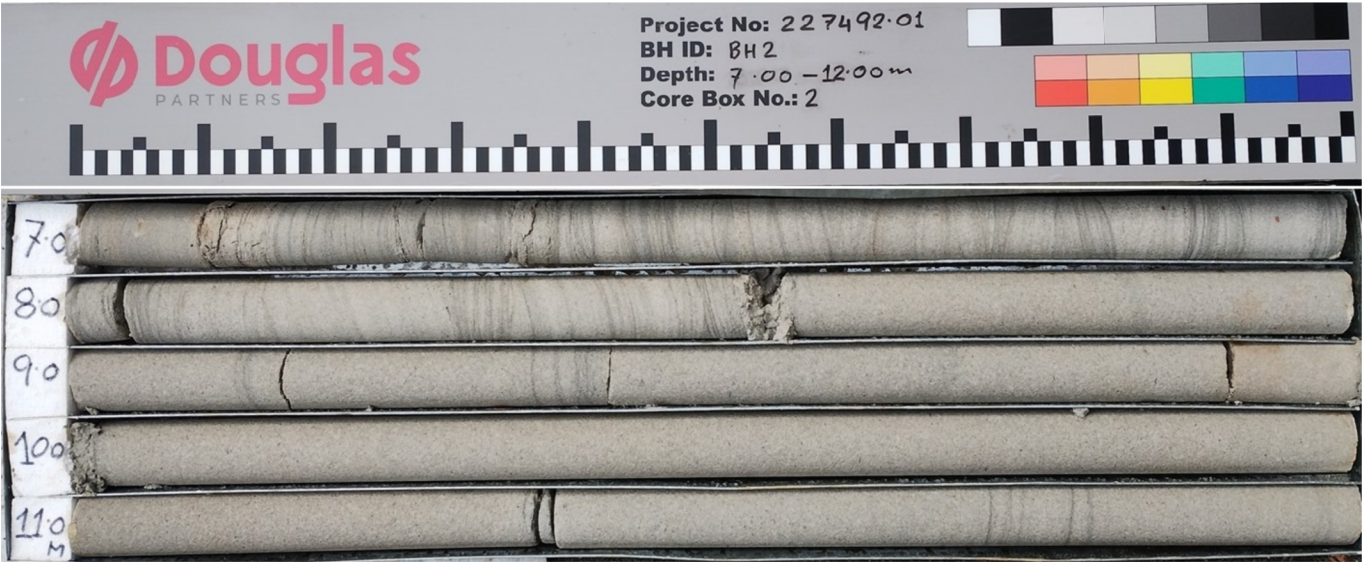
CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.7 AHD
COORDINATE: E:336860.0, N:6245514.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 227492.01
DATE: 05/08/24
SHEET: 1 of 2



3.00-7.00 m depth



7.00-12.00 m depth

CORE PHOTO LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.7 AHD
COORDINATE: E:336860.0, N:6245514.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 227492.01
DATE: 05/08/24
SHEET: 2 of 2



12.00-15.85 m depth

BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.9 AHD
COORDINATE: E:336845.1, N:6245497.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 227492.01
DATE: 06/08/24
SHEET: 1 of 3

CONDITIONS ENCOUNTERED							SAMPLE			TESTING AND REMARKS					
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS.(%)	DENSITY.(g/cm³)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
06/08/24 No free groundwater observed whilst augering	0.03	ASPHALTIC CONCRETE		FILL	(MC)				ES/A	0.10					
	0.30	FILL / Sandy GRAVEL: grey; fine to medium, angular; medium to coarse sand; aggregates.							ES/A	0.20					
		FILL / SAND: grey and brown; fine to medium; trace metal, building rubble, bricks, glass, charcoal.		FILL	MC				ES/A	0.40					
										0.50					
	1									0.90					
										1.00		SPT	4,6,5 N=11		
	1.70	SAND (SP): pale grey then brown; fine to medium.					M		A/ES	1.50					
	2								A/ES	1.60					
				AEO	MD					1.90					
										2.00		SPT	11,13,11 N=24		
3										3					
3.30	Clayey SAND (SC): red-brown; fine; extremely weathered sandstone.		RS	(D)				A		3.50					
3.60	Continued as rock														
4										4					
5										5					
6										6					
7										7					
8										8					
9										9					

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: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: DT (300mm) to 0.04m, AD/T to 3.6m, NMLC to 14.3m

CASING: HW to 3.6m

REMARKS: Standpipe installed to 4.0m (screen 2.0m-4.0m, PVC 0.1m-2.0m, Gravel 5.0m-14.3m, Bentonite 4.0m-5.0m, Gravel 1.7m-4.0m, Bentonite 0.5m-1.7m, Backfill to 0.1m, gatic cover at top)

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.9 AHD
COORDINATE: E:336845.1, N:6245497.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 227492.01
DATE: 06/08/24
SHEET: 2 of 3

CONDITIONS ENCOUNTERED										SAMPLE				TESTING				
GROUNDWATER	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
06/08/24 No free groundwater observed whilst augering	55													1				
	54													2				
	53													3				
	52	Continued from soil			3.60													
		SANDSTONE: pale grey and brown, medium to coarse grained; with iron cemented bands. Hawkesbury Sandstone			3.93	L to M				3.93m: B 0°, Clay 10mm				4	PLT	PL(A)=1.2MPa		
					4.40	VL				4.40-452m: DS								
					4.53													
					4.85	VL				4.85-4.94m: CS, DS				5				
					4.93	L to M				5.15-5.27m B x2, 5°, CT Clay 1mm								
					5.43	VL				5.43-5.50m: JT, 80°, UN 70mm, RF, CS								
	5.55				5.73													
	5.73									5.95m: JT, 60-70°, CU, HE Fe				6	PLT	PL(A)=0.90MPa		
	6																	
		6.55m-7.10m: laminite bands			6.55	VL				6.55m: B, 0°, Fe								
					6.90					6.65-6.70m: CS								
					7.10	M				6.77m: JT, 70°, UN, Clay, RF								
					7.40	L to M				6.87m: B, 0°, Clay 20mm								
					7.43	M to M				7.10-7.13m CS								
					7.75	M				7.37m: JT, 85°, PR, Clay 20mm, RF								
					8.00					7.70m: B, 5°, Clay 10mm								
	8.00									7.95m: B, 0° Clay 5mm				8				
		SANDSTONE: pale grey and grey, medium to coarse grained. Hawkesbury Sandstone																
	47													9	PLT	PL(A)=1.0MPa		
	46																	

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

PLANT: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: DT (300mm) to 0.04m, AD/T to 3.6m, NMLC to 14.3m

CASING: HW to 3.6m

REMARKS: Standpipe installed to 4.0m (screen 2.0m-4.0m, PVC 0.1m-2.0m, Gravel 5.0m-14.3m, Bentonite 4.0m-5.0m, Gravel 1.7m-4.0m, Bentonite 0.5m-1.7m, Backfill to 0.1m, gatic cover at top)

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.9 AHD
COORDINATE: E:336845.1, N:6245497.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 227492.01
DATE: 06/08/24
SHEET: 3 of 3

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
			[CONT] SANDSTONE: pale grey and grey, medium to coarse grained. Hawkesbury Sandstone		PS XW FW TW SW FR																
	45	11								100	100							PLT	PL(A)=1.1MPa		
	44	12			FR								12.08m: B, S°, VNR Clay					PLT	PL(A)=1.2MPa		
	43	13								100	100							PLT	PL(A)=0.90MPa		
	42	14																PLT	PL(A)=1.5MPa		
	41	15	Borehole discontinued at 14.30m depth. Target depth reached.																		
	40	16																			
	39	17																			
	38	18																			
	37	19																			
	36																				

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

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

PLANT: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: DT (300mm) to 0.04m, AD/T to 3.6m, NMLC to 14.3m

CASING: HW to 3.6m

REMARKS: Standpipe installed to 4.0m (screen 2.0m-4.0m, PVC 0.1m-2.0m, Gravel 5.0m-14.3m, Bentonite 4.0m-5.0m, Gravel 1.7m-4.0m, Bentonite 0.5m-1.7m, Backfill to 0.1m, gatic cover at top)

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.9 AHD
COORDINATE: E:336845.1, N:6245497.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 227492.01
DATE: 06/08/24
SHEET: 1 of 2



3.60-8.00 m depth



8.00-13.00 m depth

CORE PHOTO LOG

CLIENT: The University of New South Wales

PROJECT: UNSW G25 Education Building

LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.9 AHD

COORDINATE: E:336845.1, N:6245497.1

DATUM/GRID: MGA2020 Zone 56

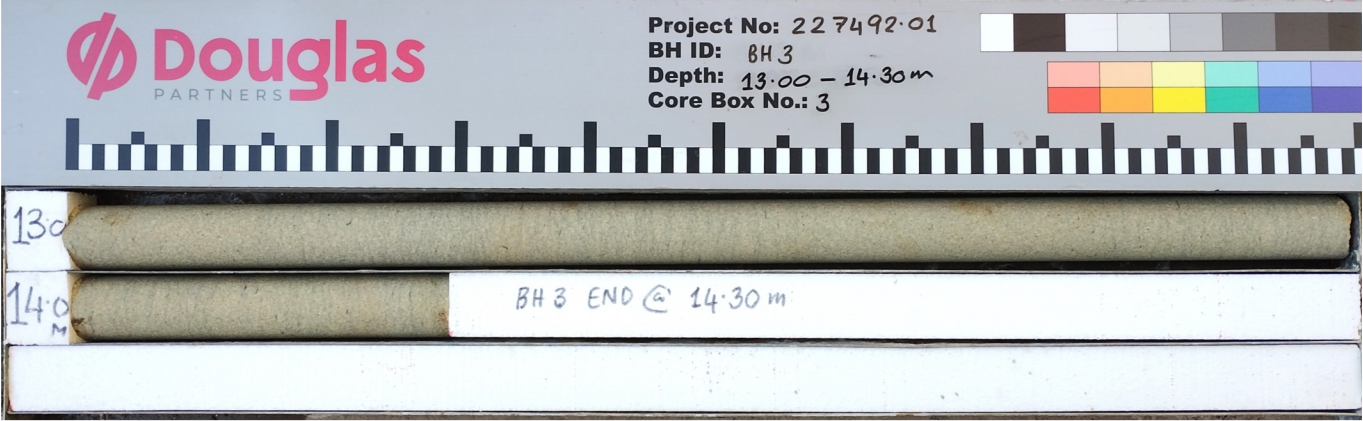
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3

PROJECT No: 227492.01

DATE: 06/08/24

SHEET: 2 of 2



13.00-14.30 m depth

BOREHOLE LOG

CLIENT: The University of New South Wales

PROJECT: UNSW G25 Education Building

LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 56.3 AHD

COORDINATE: E:336814.1, N:6245500.3

DATUM/GRID: MGA2020 Zone 56

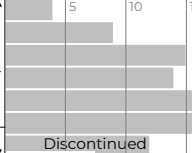
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH4

PROJECT No: 227492.01

DATE: 07/08/24 - 08/08/24

SHEET: 1 of 3

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		
07/08/24 No free groundwater observed	0.05	ASPHALTIC CONCRETE		FILL	D				A/ES		0.10	DCP9/150		Backfill			
	0.20	FILL / Sandy GRAVEL: grey; fine to medium, angular; medium to coarse sand; aggregates; apparently cemented.						ES/A		0.40							
		FILL / SAND: grey; fine to medium; trace building rubble, bricks, glass, wood, ceramics, and charcoal.						* ES/A		0.90							
	1							A/ES		1.50							
		1.80m: light grey brown sand (possible natural)						ES/A		1.90							
	2.20	SAND (SP): pale grey; fine to medium.		AEO	MD			ES/A		2.40	SPT	8,10,9 N=19	Bentonite				
	2.80	Clayey SAND (SC): red-brown; fine to medium.		RS													
	3.00	SANDSTONE: pale grey and red-brown, medium to coarse grained. Hawkesbury Sandstone						A		3.00							
	3.10	Continued as rock															
	4									4							
	5									5							
	6									6							
	7									7							
	8									8							
	9									9							

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: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: DT (300mm) to 0.05m, AD/T to 3.1m, WB to 3.2m, NMLC to 14.1m

CASING: HW to 3.1m

REMARKS: Standpipe installed to 9.0m (screen 3.5m-9.0m, PVC 0.1m-3.5m, Gravel 9.5m-14.1m, Bentonite 9.0m-9.5m, Gravel 3.3m-9.0m, Bentonite 2.5m-3.3m, Backfill to 0.1m, gatic cover at top)

* Field replicate BD207082024 taken at 0.9 to 1m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: The University of New South Wales

PROJECT: UNSW G25 Education Building

LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 56.3 AHD

COORDINATE: E:336814.1, N:6245500.3

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH4

PROJECT No: 227492.01

DATE: 07/08/24 - 08/08/24

SHEET: 2 of 3

CONDITIONS ENCOUNTERED										SAMPLE				TESTING				
GROUNDWATER	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
	RL (m)			[BS XW HW MW SW FR] DW														
07/08/24 No free groundwater observed	56																	
	1																	
	55																	
	2																	
	54																	
	3	Continued from soil																
	3.20	SANDSTONE: pale grey and red-brown, medium to coarse grained. Hawkesbury Sandstone																
	4	SANDSTONE: pale grey and brown, medium to coarse grained; with iron cemented bands. Hawkesbury Sandstone					100	100		3.60m: B, 5°, VNR Clay					PLT	PL(A)=0.50MPa		
	5					M				3.95-4.06m: B x3, 0-5°, Fe					PLT	PL(A)=0.50MPa		
	52																	
	51						100	90		5.05m: B, 0°, Fe 10mm, Clay 5.25m: B, 0°, Fe					PLT	PL(A)=0.50MPa		
	6									6.00m: B, 0°, Clay 5mm 6.15m: B, 0°, CT Clay 3 mm					PLT	PL(A)=0.70MPa		
	7									6.85m: B, 0°, Clay 15mm					PLT	PL(A)=1.1MPa		
	7.90	7.60m-8.10m: with very low strength siltstone								7.25m: B, 0°, VNR Fe, Clay								
	8.00									7.60m: B, 0°, Fe, Clay								
	8.10	SANDSTONE: pale grey and grey, medium to coarse grained. Hawkesbury Sandstone								7.80m: B, 0°, Clay 10mm 7.90m: B, 0°, Clay 10mm 8.00m: DS					PLT	PL(A)=1.0MPa		
	9	8.10m-10.20m: cross bedded					97	93		8.80m: JT, 30°, P,R, Clay 20mm, RF					PLT	PL(A)=1.4MPa		
	48																	
	47																	

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

PLANT: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: DT (300mm) to 0.05m, AD/T to 3.1m, WB to 3.2m, NMLC to 14.1m

CASING: HW to 3.1m

REMARKS: Standpipe installed to 9.0m (screen 3.5m-9.0m, PVC 0.1m-3.5m, Gravel 9.5m-14.1m, Bentonite 9.0m-9.5m, Gravel 3.3m-9.0m, Bentonite 2.5m-3.3m, Backfill to 0.1m, gatic cover at top)

* Field replicate BD207082024 taken at 0.9 to 1m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 56.3 AHD
COORDINATE: E:336814.1, N:6245500.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH4
PROJECT No: 227492.01
DATE: 07/08/24 - 08/08/24
SHEET: 3 of 3

CONDITIONS ENCOUNTERED										SAMPLE			TESTING							
GROUNDWATER	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		
	46	[CONT] SANDSTONE: pale grey and grey, medium to coarse grained. Hawkesbury Sandstone		FR	10.00		97	93												
	45																			
	44																			
	43																			
	42	Borehole discontinued at 14.10m depth. Target depth reached.		FR	13.00					12.90m: B, 0°, CT Clay 2 mm										
	41																			
	40																			
	39																			
	38									14.00m: B, 10°, Clay 10 mm										
	37																			

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

PLANT: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: DT (300mm) to 0.05m, AD/T to 3.1m, WB to 3.2m, NMLC to 14.1m

CASING: HW to 3.1m

REMARKS: Standpipe installed to 9.0m (screen 3.5m-9.0m, PVC 0.1m-3.5m, Gravel 9.5m-14.1m, Bentonite 9.0m-9.5m, Gravel 3.3m-9.0m, Bentonite 2.5m-3.3m, Backfill to 0.1m, gatic cover at top)

* Field replicate BD207082024 taken at 0.9 to 1m

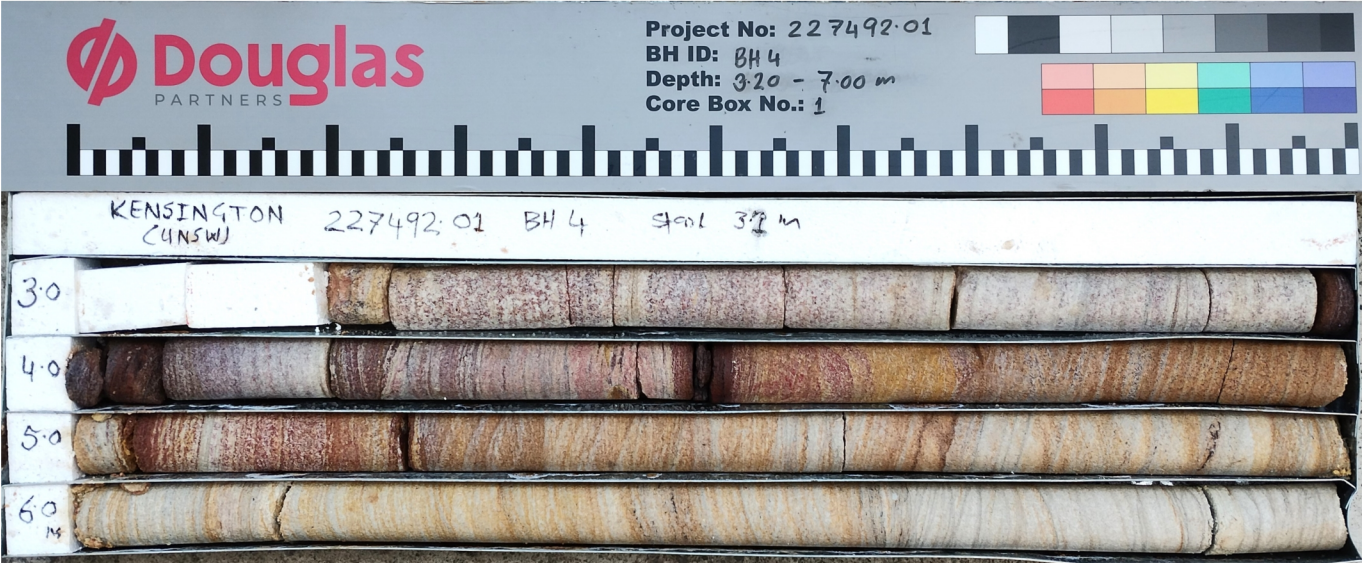
Refer to explanatory notes for symbol and abbreviation definitions

CORE PHOTO LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 56.3 AHD
COORDINATE: E:336814.1, N:6245500.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: BH4
PROJECT No: 227492.01
DATE: 07/08/24 - 08/08/24
SHEET: 1 of 2



3.20-7.00 m depth



7.00-12.00 m depth

CORE PHOTO LOG

CLIENT: The University of New South Wales

PROJECT: UNSW G25 Education Building

LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 56.3 AHD

COORDINATE: E:336814.1, N:6245500.3

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH4

PROJECT No: 227492.01

DATE: 07/08/24 - 08/08/24

SHEET: 2 of 2



12.00-14.10 m depth

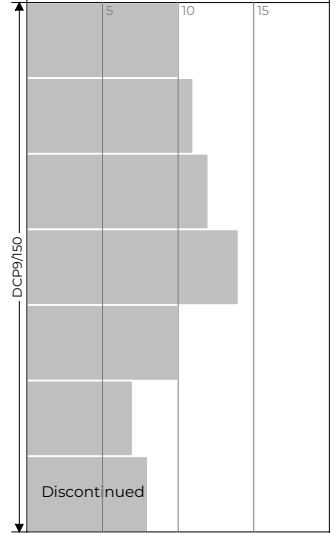
BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.9 AHD
COORDINATE: E:336841.6, N:6245524.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH5
PROJECT No: 227492.01
DATE: 06/08/24
SHEET: 1 of 1

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	
06/08/24 NCWO		0.06	ASPHALTIC CONCRETE.		NA	ND	NA							
		0.13	FILL / Sandy GRAVEL: grey; fine to medium; medium to coarse sand; aggregates; apparently cemented.		FILL									
			FILL / Sandy GRAVEL: dark grey; fine to coarse sand; fine to coarse sandstone and igneous gravel.		FILL		D							
		0.40	FILL / Silty SAND: brown; fine to coarse; trace fine to coarse, sandstone and igneous gravel, sub-rounded to sub-angular.						A/ES		0.40			
						MC		D						
					FILL									
								D		ES/A		0.90		
		1										1		
		1.30	FILL / SAND: yellow-brown; fine to coarse.		FILL			D		A/ES		1.40		
	1.60	SAND (SP): pale yellow; fine to medium.				ND			ES/A		1.60			
					AEO		D				1.70			
		2									2			
Borehole discontinued at 2.10m depth. Target depth reached.														
NOTES: [#] Soil origin is "probable" unless otherwise stated. ¹ Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.														



PLANT: Drillman GT10
METHOD: Diatube to 0.13 m, 250mm SFA to 2.1m
REMARKS:

OPERATOR: Ground Test

LOGGED: SAF
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.8 AHD
COORDINATE: E:336849.3, N:6245523.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH6
PROJECT No: 227492.01
DATE: 06/08/24
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			
06/08/24 NCWO		0.06	ASPHALTIC CONCRETE.		NA												
		0.15	FILL / Sandy GRAVEL: grey; fine to medium; medium to coarse sand; aggregates; apparently cemented.		FILL			NA									
			FILL / SAND: brown; fine to coarse; trace fine to coarse igneous and sandstone gravel, sub-rounded to sub-angular, trace plastic, brick gravel.		FILL					A/ES		0.20 0.30					
					FILL			D									
					FILL					ES/A		0.80 0.90					
		1.10	FILL / SAND: pale brown; fine to coarse; trace fine to coarse sandstone gravel, sub-rounded to sub-angular.		FILL			D		A/ES		1.10 1.20					
		1.50	SAND (SP): pale yellow; fine to medium.		AEO			D		ES/A		1.50 1.60					
		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: Drillman GT10
METHOD: Diatube to 0.15m, 250mm SFA to 2.0m
REMARKS:

OPERATOR: Ground Test

LOGGED: SAF
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.9 AHD
COORDINATE: E:336799.6, N:6245529.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH7
PROJECT No: 227492.01
DATE: 07/08/24
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				
07/08/24 NCWO			FILL / Silty SAND: dark grey to dark brown; trace wood chips, rootlets.		FILL			M		ES/A		0.10						
	0.40	FILL / SAND: dark brown; fine to coarse; trace fine to medium sandstone gravel, sub-rounded to sub-angular.	FILL		M			ES/A		0.50		0.60						
	1.00	FILL / SAND: brown; fine to coarse; trace fine to coarse sandstone gravel to cobbles, sub-rounded to sub-angular.	FILL	M	ES/A			1.00		1.10								
	Borehole discontinued at 1.20m depth. Refusal on sandstone cobbles.																	
										</								

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: Hand Auger to 1.2m
REMARKS: Blind Duplicate BD4/20240807 at 0-0.1m

OPERATOR: N/A

LOGGED: SAF
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.9 AHD
COORDINATE: E:336833.4, N:6245514.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH8
PROJECT No: 227492.01
DATE: 06/08/24
SHEET: 1 of 1

GROUNDWATER		CONDITIONS ENCOUNTERED					SAMPLE				TESTING AND REMARKS	
RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ⁽¹⁾ DENSITY. ⁽¹⁾	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
06/08/24 NCWO	0.06	ASPHALTIC CONCRETE.		NA		NA						
	0.10	FILL / Sandy GRAVEL: grey; fine to medium; medium to coarse sand; aggregates; apparently cemented.		FILL					ES/A	0.10 0.20		
		FILL / SAND: brown-pale brown; fine to coarse; trace fine to coarse sandstone gravel, sub-rounded to sub-angular, trace plastic, tile.										
				FILL		D			A/ES	0.60 0.70		
									A/ES	1.00 1.10		
		1.50m: becoming pale-brown							ES/A	1.50 1.60		
	1.70	SAND (SP): yellow-brown; fine to medium.		AEO					ES/A	1.70 1.80		
	1.90	SANDSTONE: red-yellow, fine to medium grained, possibly very low strength (Hawkesbury Sandstone).		NA								
	2	Borehole discontinued at 2.00m depth. Refusal on sandstone.										

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.

Generated with CORE-GS by Geroc - Soil Log

PLANT: Drillman GT10
METHOD: Diatube to 0.1m, 250mm SFA to 2.0m
REMARKS: Blind Duplicate BD1/20240806 at 0.1-0.2 m

OPERATOR: Ground Test

LOGGED: SAF
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.8 AHD
COORDINATE: E:336843.7, N:6245513.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH9
PROJECT No: 227492.01
DATE: 06/08/24
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			
06/08/24 NCWO		0.06	ASPHALTIC CONCRETE.		NA													
		0.15	FILL / Sandy GRAVEL: grey; fine to medium; medium to coarse sand; aggregates; apparently cemented.		FILL				NA									
			FILL / SAND: dark grey-brown; fine to coarse; with fine to coarse igneous gravel, sub-rounded to sub-angular.		FILL				D		A/ES		0.20 0.30					
		0.50	FILL / SAND: pale brown-brown; fine to coarse; trace fine to coarse sandstone gravel, sub-rounded to sub-angular, trace tile, plastic.		FILL						ES/A		0.50 0.60					
	55				FILL				D									
	1				FILL						ES/A		1.00 1.10					
		1.30	FILL / SAND: pale brown; fine to coarse.		FILL				D		ES/A		1.30 1.40					
		1.60	SAND (SP): yellow-brown; fine to medium.		AEO				D		ES/A		1.60 1.70					
	54																	
	2												2					
Borehole discontinued at 2.10m 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: Drillman GT10
METHOD: Diatube to 0.15m, 250mm SFA to 2.1m
REMARKS:

OPERATOR: Ground Test

LOGGED: SAF
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.5 AHD
COORDINATE: E:336859.3, N:6245509.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH10
PROJECT No: 227492.01
DATE: 06/08/24
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		
06/08/24 NCWO		0.06	ASPHALTIC CONCRETE.		NA			NA								
			FILL / Silty SAND: dark brown; fine to coarse; trace fine to coarse igneous and concrete gravel, sub-rounded to sub-angular, trace tile, plastic, metal rod, brick gravel.									0.10				
										ES/A		0.20				
		55														
		1														
		54														
											</					

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: Drillman GT10

OPERATOR: Ground Test

LOGGED: SAF

METHOD: Diatube to 0.06m, 250mm SFA to 2.5m

CASING: Uncased

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 56.2 AHD
COORDINATE: E:336817.9, N:6245513.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH11
PROJECT No: 227492.01
DATE: 06/08/24
SHEET: 1 of 1

GROUNDWATER		CONDITIONS ENCOUNTERED					SAMPLE				TESTING AND REMARKS	
RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ⁽¹⁾ DENSITY. ⁽²⁾	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
06/08/24 NCWO 36	0.06	ASPHALTIC CONCRETE.		NA		NA						
		FILL / SAND: brown; fine to coarse; trace fine to coarse sandstone gravel, sub-rounded to sub-angular, trace tile, plastic, brick gravel.						A/ES	0.10 0.20			
								A/ES	0.50 0.60			
								A/ES	0.90 1			
								ES/A	1.40			
								ES/A	1.90 2.00			
								ES/A	2.00 2.10			
	2.00	SAND (SP): yellow; fine to medium.		AEO		D						
Borehole discontinued at 2.30m depth. Target depth reached.												

Generated with CORE-GS by Geroc - Soil Log

PLANT: Drillman GT10
METHOD: Diatube to 0.06m, 250mm SFA to 2.3m
REMARKS: Blind Duplicate BD3/20240806 at 0.1-0.2 m

OPERATOR: Ground Test

LOGGED: SAF
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: The University of New South Wales

PROJECT: UNSW G25 Education Building

LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 55.9 AHD

COORDINATE: E:336837.6, N:6245506.9

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH12

PROJECT No: 227492.01

DATE: 06/08/24

SHEET: 1 of 1

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					
06/08/24 NCWO		0.06	ASPHALTIC CONCRETE.		NA													
		0.15	FILL / Sandy GRAVEL: grey; fine to medium; medium to coarse sand; aggregates; apparently cemented.		FILL		NA											
			FILL / SAND: brown to pale brown; fine to coarse; trace fine to coarse sandstone gravel, sub-rounded to sub-angular, trace glass, plastic, tile.		FILL													
					FILL													
					FILL													
					FILL													
					FILL													
					FILL													
					FILL													
					FILL													
		1.80	FILL / Gravelly SAND: brown to dark grey; fine to coarse; fine to medium igneous and sandstone gravel, sub-rounded to sub-angular.		FILL		D		A/ES		1.80 1.90							
		2.00	SAND (SP): yellow; fine to medium.		AEO		D		ES/A		2.00 2.10							
		2.20	SANDSTONE: red-yellow, fine to medium grained, possibly very low strength (Hawkesbury Sandstone).		NA		D											
			Borehole discontinued at 2.30m depth. Target depth reached.															

NOTES: ^(#) Soil origin is "probable" unless otherwise stated. ⁽¹⁾ 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: Drillman GT10

OPERATOR: Ground Test

LOGGED: SAF

METHOD: Diatube to 0.15m, 250mm SFA to 2.2m

CASING: Uncased

REMARKS: Blind Duplicate BD2/20240806 at 0.8-0.9 m

Generated with CORE-GS by Geroc - Soil Log

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 56.2 AHD
COORDINATE: E:336852.5, N:6245494.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH13
PROJECT No: 227492.01
DATE: 07/08/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED														SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ⁽¹⁾		DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS			
07/08/24 NCWO	56	0.06	ASPHALTIC CONCRETE.		NA				NA									
		FILL / Gravelly SAND: dark brown to dark grey; fine to coarse; fine to coarse igneous gravel, sub-rounded to sub-angular.		FILL			D		ES/A	0.10 0.20								
Borehole discontinued at 0.40m depth. Refusal on concrete slab.																		
		1																
	55																	
		2																
	54																	

NOTES: [#]Soil origin is "probable" unless otherwise stated. ⁽¹⁾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: Drillman GT10

OPERATOR: Ground Test

LOGGED: SAF

METHOD: Diatube to 0.06m, 250mm SFA to 0.4m

CASING: Uncased

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 56.1 AHD
COORDINATE: E:336829.4, N:6245499.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH14
PROJECT No: 227492.01
DATE: 07/08/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED						SAMPLE				TESTING AND REMARKS					
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ⁽¹⁾	DENSITY. ⁽¹⁾	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS		
	RL (m)				■	■									
07/08/24 NCWO	56	ASPHALTIC CONCRETE.	▲▲▲▲	NA	ND	NA									
	0.06	FILL / Sandy GRAVEL: grey; fine to medium; medium to coarse sand; aggregates; apparently cemented.	■■■■	FILL	ND	NA									
	0.10														
		FILL / SAND: dark brown to brown; fine to coarse; trace fine to coarse igneous and sandstone gravel, sub-rounded to sub-angular, trace tile, ceramic, plastic, glass, metal wire.	■■■■												

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: Drillman GT10

OPERATOR: Ground Test

LOGGED: SAF

METHOD: Diatube to 0.1m, 250mm SFA to 2.4m

CASING: Uncased

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 53.7 AHD
COORDINATE: E:336876.4, N:6245504.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH15
PROJECT No: 227492.01
DATE: 06/08/24 - 07/08/24
SHEET: 1 of 3

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
RL (m)															
06/08/24 No free groundwater observed whilst augering	0.03	ASPHALTIC CONCRETE		FILL	(WC)				ES/A	0.10		DCP9/150 SPT 8,17,20 N=37	5 10 15 Discontinued	Backfill	
	0.30	FILL / Sandy GRAVEL: grey brown; fine possibly medium, angular; medium to coarse sand; aggregates; slightly cemented.					ES/A	0.20							
	1	FILL / SAND: grey; fine to medium; trace building rubble, glass and bricks.		FILL	MC		ES/A	0.40							
	1.30	SAND (SP): pale grey brown; fine.		AEO	(MD)		ES/A	0.90							
	1.80	Clayey SAND (SC): pale brown to orange-brown; fine to medium; extremely weathered sandstone.		RS	(D)	ND	A/ES	1.50							
	2.40	Continued as rock						1.60							
	3							1.90							
	4							2.00							
	5														
	6														
7															
8															
9															
44															

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: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: DT (300mm) to 0.03m, AD/T to 2.4m, NMLC to 13.5m

CASING: HW to 2.5m

REMARKS: Standpipe installed to 9.0m (screen 3.0m-9.0m, PVC 0.1m-3.0m, Gravel 9.5m-13.5m, Bentonite 9.0m-9.5m, Gravel 2.7m-9.0m, Bentonite 2.0m-2.7m, Backfill to 0.1m, gatic cover at top)

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: The University of New South Wales

PROJECT: UNSW G25 Education Building

LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 53.7 AHD

COORDINATE: E:336876.4, N:6245504.7

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH15

PROJECT No: 227492.01

DATE: 06/08/24 - 07/08/24

SHEET: 2 of 3

[illegible]

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

PLANT: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: DT (300mm) to 0.03m, AD/T to 2.4m, NMLC to 13.5m

CASING: HW to 2.5m

REMARKS: Standpipe installed to 9.0m (screen 3.0m-9.0m, PVC 0.1m-3.0m, Gravel 9.5m-13.5m, Bentonite 9.0m-9.5m, Gravel 2.7m-9.0m, Bentonite 2.0m-2.7m, Backfill to 0.1m, gatic cover at top)

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 53.7 AHD
COORDINATE: E:336876.4, N:6245504.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH15
PROJECT No: 227492.01
DATE: 06/08/24 - 07/08/24
SHEET: 3 of 3

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	
	43		[CONT] SANDSTONE: pale grey, grey and brown, medium to coarse grained. Hawkesbury Sandstone																			
	42	11																				
	41	12																				
	40	13																				
	39																					
	38	14	Borehole discontinued at 13.50m depth. Target depth reached.																			
	37	15																				
	36	16																				
	35	17																				
	34	18																				
		19																				

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

PLANT: Bobcat

OPERATOR: Ground Test (CS)

LOGGED: SI

METHOD: DT (300mm) to 0.03m, AD/T to 2.4m, NMLC to 13.5m

CASING: HW to 2.5m

REMARKS: Standpipe installed to 9.0m (screen 3.0m-9.0m, PVC 0.1m-3.0m, Gravel 9.5m-13.5m, Bentonite 9.0m-9.5m, Gravel 2.7m-9.0m, Bentonite 2.0m-2.7m, Backfill to 0.1m, gatic cover at top)

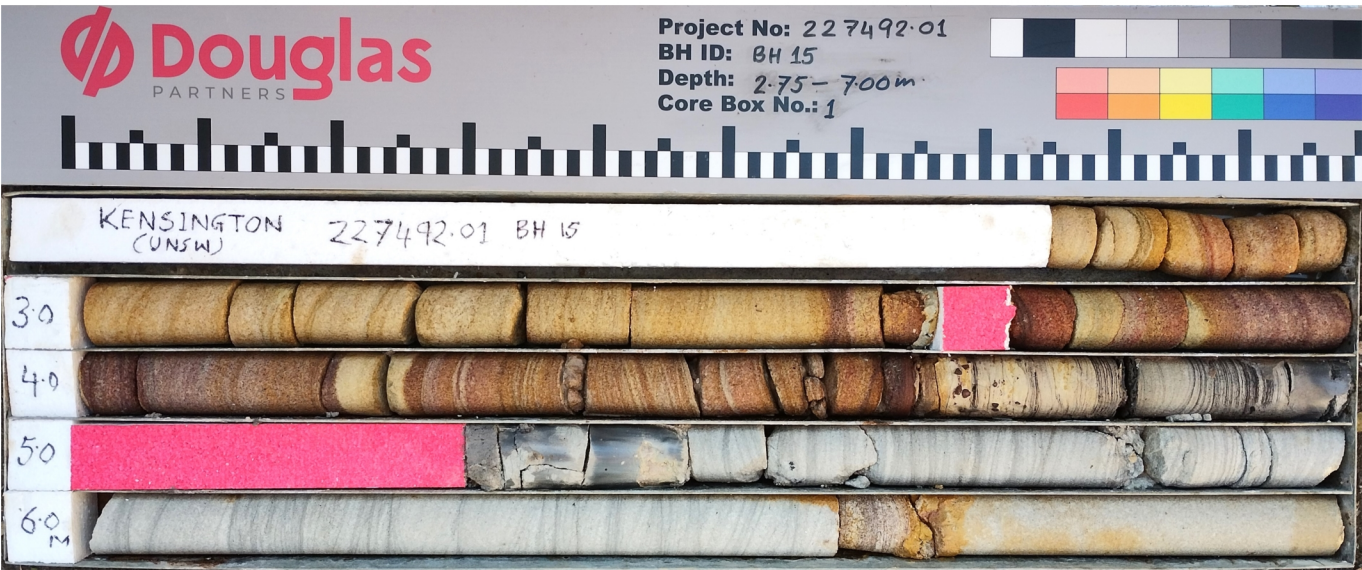
Refer to explanatory notes for symbol and abbreviation definitions

CORE PHOTO LOG

CLIENT: The University of New South Wales
PROJECT: UNSW G25 Education Building
LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 53.7 AHD
COORDINATE: E:336876.4, N:6245504.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH15
PROJECT No: 227492.01
DATE: 06/08/24 - 07/08/24
SHEET: 1 of 2



2.75-7.00 m depth



7.00-12.00 m depth

CORE PHOTO LOG

CLIENT: The University of New South Wales

PROJECT: UNSW G25 Education Building

LOCATION: 8 High Street, Kensington

SURFACE LEVEL: 53.7 AHD

COORDINATE: E:336876.4, N:6245504.7

DATUM/GRID: MGA2020 Zone 56

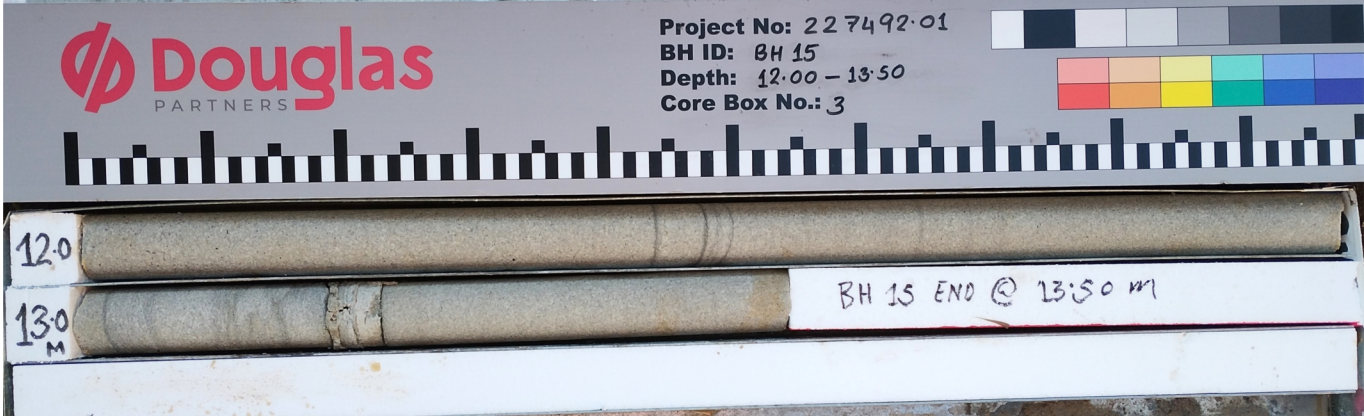
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH15

PROJECT No: 227492.01

DATE: 06/08/24 - 07/08/24

SHEET: 2 of 2



12.00-13.50 m depth

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

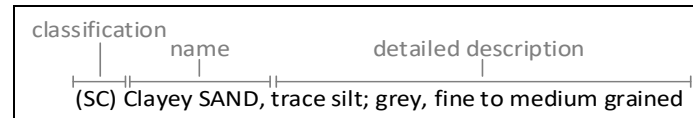
Graphic Symbols

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
	6.7 - 19	2.36 - 6.7
	2.36 - 6.7	0.6 - 2.36
Sand	0.6 - 2.36	0.21 - 0.6
	0.21 - 0.6	0.075 - 0.21
	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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Rock Strength

Rock strength is defined by the unconfined compressive strength, and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $I_{s(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Unconfined Compressive Strength (MPa)	Point Load Index ¹ $I_{s(50)}$ MPa	Abbreviation Code
Very low	0.6 - 2	0.03 - 0.1	VL
Low	2 - 6	0.1 - 0.3	L
Medium	6 - 20	0.3 - 1.0	M
High	20 - 60	1 - 3	H
Very high	60 - 200	3 - 10	VH
Extremely high	>200	>10	EH

¹ Rock strength classification is based on UCS. The UCS to $I_{s(50)}$ ratio varies significantly for different rock types and specific ratios may be required for each site. The point load Index ranges shown above are as suggested in AS1726 and should not be relied upon without supporting evidence.

The following abbreviation codes are used for soil layers or seams of material “within rock” but for which the equivalent UCS strength is less than 0.6 MPa.

Scenario	Abbreviation Code
The material encountered has an equivalent UCS strength of less than 0.6 MPa, and therefore is considered to be soil (as per Note 1 of Table 20 of AS 1726-2017). The properties of the material encountered over this interval are described in the “Description of Strata” and soil properties columns.	SOIL
The material encountered has an equivalent UCS strength of less than 0.6 MPa, and therefore is considered to be soil (as per Note 1 of Table 20 of AS 1726-2017). The prominence of the material is such that it can be considered to be a seam (as defined in Table 22 of AS1726-2017) and the properties of the material are described in the defect column.	SEAM

Degree of Weathering

The degree of weathering of rock is classified as follows:

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

¹ The parent rock type, of which the residual/extremely weathered material is a derivative, will be stated in the description (where discernible).

Degree of Alteration

The degree of alteration of the rock material (physical or chemical changes caused by hot gasses or liquids at depth) is classified as follows:

Term	Description	Abbreviation Code
Extremely altered	Material is altered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.	XA
Highly altered	The whole of the rock material is discoloured, usually by staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is changed by alteration. Some primary minerals are altered to clay minerals. Porosity may be increased by leaching or may be decreased due to precipitation of secondary materials in pores.	HA
Moderately altered	The whole of the rock material is discoloured, usually by staining or bleaching to the extent that the colour of the original rock is not recognisable but shows little or no change of strength from fresh rock.	MA
Slightly altered	Rock is slightly discoloured but shows little or no change of strength from fresh rock	SA
Note: If HA and MA cannot be differentiated use DA (see below)		
Distinctly altered	Rock strength usually changed by alteration. The rock may be highly discoloured, usually by staining or bleaching. Porosity may be increased by leaching or may be decreased due to precipitation of secondary minerals in pores.	DA

Degree of Fracturing

The following descriptive classification apply to the spacing of natural occurring fractures in the rock mass. It includes bedding plane partings, joints and other defects, but excludes drilling breaks. These terms are generally not required on investigation logs where fracture spacing is presented as a histogram, and where used are presented in an unabbreviated format.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$RQD \% = \frac{\text{cumulative length of 'sound' core sections} > 100 \text{ mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e., drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

These terms may be used to describe the spacing of bedding partings in sedimentary rocks. Where used, these terms are generally presented in an unabbreviated format

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Rock Descriptions

Terminology
Symbols
Abbreviations

Defect Descriptions

Defect Type

Term	Abbreviation Code
Bedding plane	B
Cleavage	CL
Crushed seam	CS
Crushed zone	CZ
Drilling break	DB
Decomposed seam	DS
Drill lift	DL
Extremely Weathered seam	EW
Fault	F
Fracture	FC
Fragmented	FG
Handling break	HB
Infilled seam	IS
Joint	JT
Lamination	LAM
Shear seam	SS
Shear zone	SZ
Vein	VN
Mechanical break	MB
Parting	P
Sheared Surface	S

Rock Defect Orientation

Term	Abbreviation Code
Horizontal	H
Vertical	V
Sub-horizontal	SH
Sub-vertical	SV

Rock Defect Coating

Term	Abbreviation Code
Clean	CN
Coating	CT
Healed	HE
Infilled	INF
Stained	SN
Tight	TI
Veneer	VNR

Rock Defect Infill

Term	Abbreviation Code
Calcite	CA
Carbonaceous	CBS
Clay	CLAY
Iron oxide	FE
Manganese	MN
Pyrite	Py
Secondary material	MS
Silt	M
Quartz	Qz
Unidentified material	MU

Rock Defect Shape/Planarity

Term	Abbreviation Code
Curved	CU
Discontinuous	DIS
Irregular	IR
Planar	PR
Stepped	ST
Undulating	UN

Rock Defect Roughness

Term	Abbreviation Code
Polished	PO
Rough	RF
Smooth	SM
Slickensided	SL
Very rough	VR

Defect Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

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Introduction

The Cone Penetration Test (CPT) is a sophisticated soil profiling test carried out in-situ. A special cone shaped probe is used which is connected to a digital data acquisition system. The cone and adjoining sleeve section contain a series of strain gauges and other transducers which continuously monitor and record various soil parameters as the cone penetrates the soils.

The soil parameters measured depend on the type of cone being used, however they always include the following basic measurements

- Cone tip resistance q_c
- Sleeve friction f_s
- Inclination (from vertical) i
- Depth below ground z

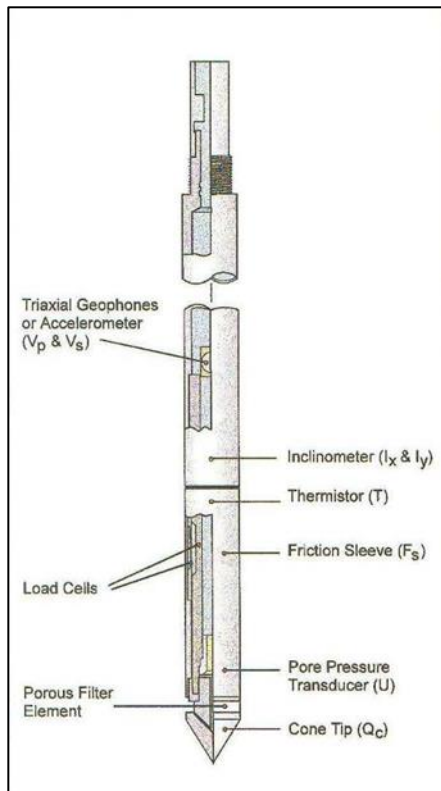


Figure 1: Cone Diagram

The inclinometer in the cone enables the verticality of the test to be confirmed and, if required, the vertical depth can be corrected.

The cone is thrust into the ground at a steady rate of about 20 mm/sec, usually using the hydraulic rams of a purpose built CPT rig, or a drilling rig. The testing is carried out in accordance with the Australian Standard AS1289 Test 6.5.1.



Figure 2: Purpose built CPT rig

The CPT can penetrate most soil types and is particularly suited to alluvial soils, being able to detect fine layering and strength variations. With sufficient thrust the cone can often penetrate a short distance into weathered rock. The cone will usually reach refusal in coarse filling, medium to coarse gravel and on very low strength or better rock. Tests have been successfully completed to more than 60 m.

Types of CPTs

Douglas Partners (and its subsidiary GroundTest) owns and operates the following types of CPT cones:

Type	Measures
Standard	Basic parameters (q_c , f_s , i & z)
Piezocone	Dynamic pore pressure (u) plus basic parameters. Dissipation tests estimate consolidation parameters
Conductivity	Bulk soil electrical conductivity ($\square$) plus basic parameters
Seismic	Shear wave velocity (V_s), compression wave velocity (V_p), plus basic parameters

Strata Interpretation

The CPT parameters can be used to infer the Soil Behaviour Type (SBT), based on normalised values of cone resistance (Q_t) and friction ratio (Fr). These are used in conjunction with soil classification charts, such as the one below (after Robertson 1990)

Cone Penetration testing

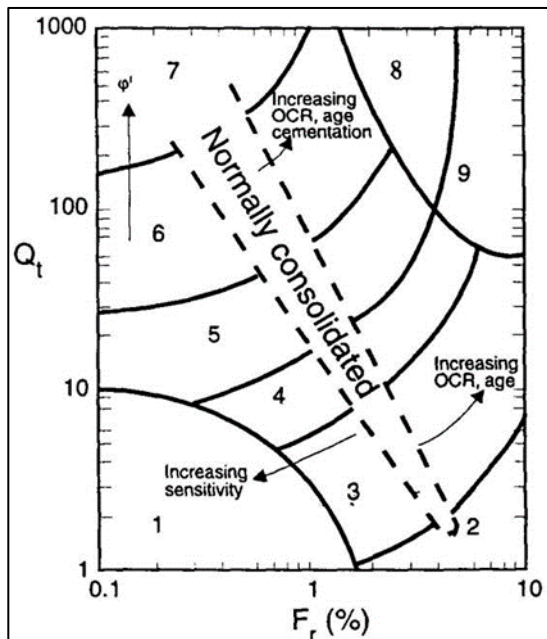


Figure 3: Soil Classification Chart

DP's in-house CPT software provides computer aided interpretation of soil strata, generating soil descriptions and strengths for each layer. The software can also produce plots of estimated soil parameters, including modulus, friction angle, relative density, shear strength and over consolidation ratio.

DP's CPT software helps our engineers quickly evaluate the critical soil layers and then focus on developing practical solutions for the client's project.

Engineering Applications

There are many uses for CPT data. The main applications are briefly introduced below:

Settlement

CPT provides a continuous profile of soil type and strength, providing an excellent basis for settlement analysis. Soil compressibility can be estimated from cone derived moduli, or known consolidation parameters for the critical layers (eg. from laboratory testing). Further, if pore pressure dissipation tests are undertaken using a piezocone, in-situ consolidation coefficients can be estimated to aid analysis.

Pile Capacity

The cone is, in effect, a small scale pile and, therefore, ideal for direct estimation of pile capacity. DP's in-house program ConePile can analyse most pile types and produces pile capacity versus depth plots. The analysis methods are based on proven static theory and empirical studies, taking account of scale effects, pile materials and method of installation.

The results are expressed in limit state format, consistent with the Piling Code AS2159.

Dynamic or Earthquake Analysis

CPT and, in particular, Seismic CPT are suitable for dynamic foundation studies and earthquake response analyses, by profiling the low strain shear modulus G_0 . Techniques have also been developed relating CPT results to the risk of soil liquefaction.

Other Applications

Other applications of CPT include ground improvement monitoring (testing before and after works), salinity and contaminant plume mapping (conductivity cone), preloading studies and verification of strength gain.

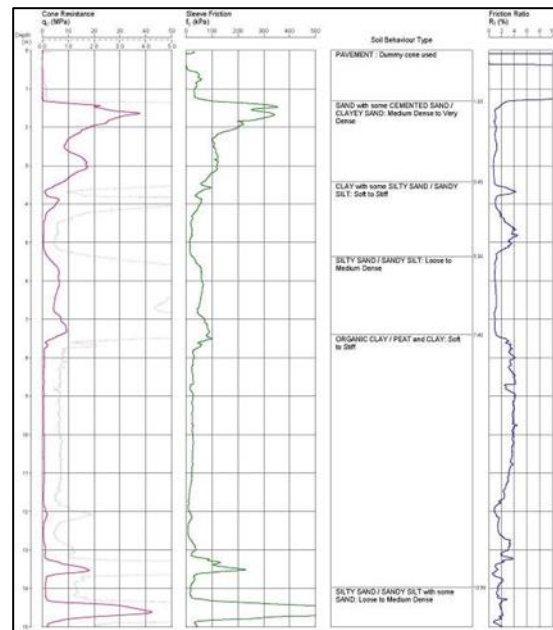
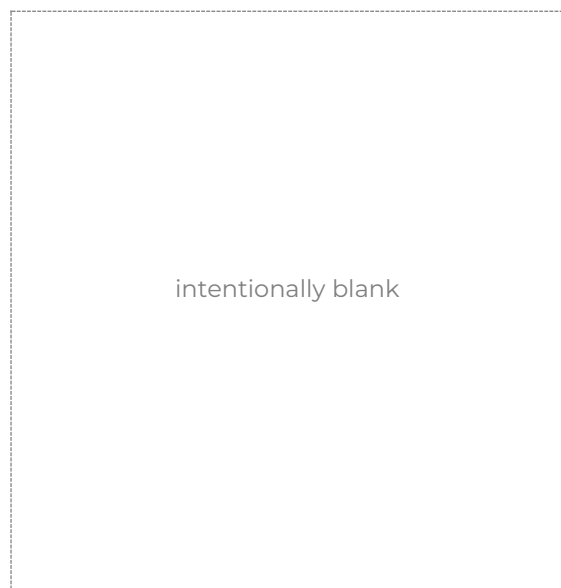


Figure 4: Sample Cone Plot



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

Appendix D

Remediation Options Assessment and Evaluation

1. Introduction

The following key guidelines and technical reports were consulted in the preparation of this remediation options assessment:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013); and
- CRC CARE *Remediation Action Plan: Development - Guideline on Performing Remediation Options Assessment* (CRC CARE, 2019a).

The first stage of developing a remediation strategy is to establish clear and measurable remediation objectives and remediation criteria (clean-up levels). These will form the requirements against which remediation options are assessed.

The next stage of the remediation options assessment is to select technology and management options, or combinations of options, that have the potential to reduce contaminant concentrations and/or apply management controls as necessary so that the remediation objectives are achieved, and no unacceptable risk is posed by the contamination in the context of the proposed site use. Where several viable options have been identified, an assessment of each of the options will be required to determine which option will most adequately and sustainably meet the remediation objectives (CRC CARE, 2019a).

The remediation objectives are to:

- Address potentially unacceptable risks to relevant environmental values from contamination (refer to the CSM in Section 7); and
- Render the site suitable, from a contamination perspective, for the proposed development (refer to Section 2).

2. Hierarchy of remediation options

NEPC (2013) stipulates the preferred hierarchy of options for site clean-up (remediation) and / or management which is outlined as follows:

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

or, if these two options are not practicable:

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

or,

- Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

3. Remediation options assessment

3.1 Introduction

The following issues have been identified at the site which require remediation:

- Asbestos-impacted fill.

3.2 Remediation options

Given the straightforward nature of the contamination issues at the site and the necessary earthworks (final landform) as part of the proposed development, only three options for the soil contamination have been considered, as follows:

- Do nothing;
- Excavation and offsite disposal; and
- On-site management (cap and contain).

The following key guidelines have therefore been consulted:

- CRC CARE *Technology Guide: Soil - Excavation* (CRC CARE, 2019b);
- CRC CARE *Technology Guide: Soil - Containment* (CRC CARE, 2019c);
- WA DoH *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (WA DoH, 2021); and
- WorkCover NSW *Managing Asbestos in or on Soil* (WorkCover NSW, 2014).

Based on the proposed development on-site containment or off-site disposal of asbestos contaminated soils are equally considered to be viable options subject to further delineation of the extent of asbestos contaminated soils present.

4. Summary of preferred remediation strategy

Based on the outcome of the options assessment, the preferred remediation strategy is:

- Undertake a data gap assessment to assess the extent of contamination impact. If unexpected finds are encountered the contingency plan (Appendix H) will be enacted;
- If asbestos impacts are limited / isolated the preferred remediation strategy is to excavate and dispose asbestos impacted soils off-site to avoid the need for ongoing management;
- If asbestos impacts are extensive, then:
 - o Area 1 (area of the proposed basement footprint): excavation and off-site disposal of impacted fill as part of the bulk excavation works; and

- o Area 2 (area outside of the proposed basement footprint): on-site containment (capping) and long term management.

5. References

CRC CARE. (2019a). *Remediation Action Plan: Development - Guideline on Performing Remediation Options Assessment*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

CRC CARE. (2019b). *Technology Guide: Soil - Excavation*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

CRC CARE. (2019c). *Technology Guide: Soil - Containment*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

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.

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

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); and
- *HEPA PFAS National Environmental Management Plan [NEMP]* (HEPA, 2020).

1.2 General

The SAC apply to imported soil / rock, any contingency or unexpected finds scenarios during site remediation and 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: commercial / industrial:
 - o Based on review of Appendix C, Schedule B7 of the NEPC (2013), HIL A, B and C were derived from parameters that take risk exposure factors for young children (0 – 5 years old) into consideration. Given that adult students or workers are more likely receptors within a university setting, Douglas considers that HIL D is the most appropriate criteria for this investigation. Furthermore, HIL D is consistent with previous investigations conducted within the university; and
- 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

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-D	DC HSL-IMW
Benzene	430	1100
Toluene	99 000	120 000
Ethylbenzene	27 000	85 000
Xylenes	81 000	130 000
Naphthalene	11 000	29 000
TRH F1	26 000	82 000
TRH F2	20 000	62 000
TRH F3	27 000	85 000
TRH F4	38 000	120 000

Notes: TRH F1 is TRH C₆-C₁₀ minus BTEX

TRH F2 is TRH >C₁₀-C₁₆ minus naphthalene

IMW intrusive maintenance worker

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

The SAC applied to any contingency or unexpected finds scenarios during site remediation for per- and poly-fluoroalkyl substances (PFAS) in soil will be 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

2.3 Asbestos in soil

The SAC applied during site remediation 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.

2.4 Ecological investigation levels

The SAC applied to any contingency or unexpected finds scenarios outside of the basement footprint in landscaping areas during site remediation will make reference ecological investigation levels (EIL) and added contaminant limits (ACL), where appropriate, as per NEPC (2013) for arsenic, copper, chromium (III), nickel, lead, zinc, DDT and naphthalene. The adopted EIL, derived using the interactive (excel) calculation spreadsheet on the NEPM toolbox website are shown in Table 7, with inputs into their derivation shown in Table 6.

Exceedances of the EIL or ecological screening levels (ESL) will not necessarily require remediation but will require further assessment of the significance.

Table 6: Inputs to the derivation of the ecological investigation levels

Variable	Input	Rationale
Age of contaminants	"Aged" (>2 years)	No recent development onsite
pH	8.88	Average calculated from laboratory results
CEC	5.5 cmol _c /kg	Average calculated from laboratory results
Clay content	10%	Assumed as a conservative measure
Traffic volumes	High	-
State / Territory	NSW	-

Table 7: Ecological investigation levels (mg/kg)

Contaminant	EIL-D
Metals	
Arsenic	160
Copper	180
Nickel	75
Chromium III	680
Lead	1800
Zinc	510
PAH	
Naphthalene	370
OCP	
DDT	640

Notes: EIL-AES area of ecological significance
EIL-D commercial industrial

2.5 Ecological screening levels

The SAC applied to any contingency or unexpected finds scenarios during site remediation will use ecological screening levels (ESL) to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. The adopted ESL are shown in Table 8.

Table 8: Ecological screening levels (mg/kg)

Contaminant	Soil Type	EIL-D
Benzene	Coarse	75
Toluene	Coarse	135
Ethylbenzene	Coarse	165
Xylenes	Coarse	180
TRH F1	Coarse/ Fine	215*
TRH F2	Coarse/ Fine	170*
TRH F3	Coarse	1700
TRH F4	Coarse	3300
B(a)P	Coarse	1.4

Notes: ESL are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability
 TRH F1 is TRH C₆-C₁₀ minus BTEX
 TRH F2 is TRH >C₁₀-C₁₆ including naphthalene
 EIL-D commercial / industrial

2.6 Ecological soil guideline values

The SAC applied to any contingency or unexpected finds scenarios during site remediation for PFAS will use the interim ecological soil guideline values (EGV) derived from Table 3 of HEPA (2020) are in Table 9.

Table 9: Ecological soil guideline values (mg/kg) – all land uses

Contaminant	Direct exposure	Indirect exposure
PFOS	1	0.01
PFOA	10	NC
PFHxS	NC	NC

Notes: NC no criterion

2.7 Management limits

The SAC applied to any contingency or unexpected finds scenarios during site remediation for TRH, 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; and
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

These 'management limits' (NEPC, 2013) are in Table 10. Management limits must not be used as remediation acceptance criteria, or validation criteria for imported material. They are included for reference only, and to aid in assessment of contingency or unexpected finds scenarios.

Table 10: 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. Groundwater investigation levels

At this stage further groundwater investigation and/or groundwater remediation is not proposed. Therefore, this RAP does not consider groundwater investigation levels. If unexpected finds are encountered during redevelopment and/or remediation that requires further groundwater investigation then reference should be made to groundwater investigation levels in Douglas (2024).

4. References

CRC CARE. (2011). *Health screening levels for petroleum hydrocarbons in soil and groundwater*. Parts 1 to 3, Technical Report No. 10: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

Douglas. (2024). *Douglas Report on Detailed Site (Contamination) Investigation, UNSW G25 Education Building, 8 High Street, Kensington, NSW, 2033*. Report 227492.04.R.001 dated 19 September 2024.

HEPA. (2020). *PFAS National Environmental Management Plan (NEMP)*. Version 2.0: Heads of EPAs Australia and New Zealand and Australian Government Department of the Environment.

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

Appendix F

Data Quality Objectives

1. Introduction

The objective of the validation plan is to assess whether the asbestos contaminated fill has been remediated either via excavation, disposal and validation or by construction of a capping layer in accordance with the RAP; to assess the resultant suitability of the site for the intended land use; and to provide information on any environmental impacts which may have resulted from the works.

The validation assessment will be conducted with reference to the seven step data quality objectives process (DQO) as outlined in NEPC (2013), described below. The DQO in NEPC (2013) is in turn, based on the DQO process outlined in USEPA (2006), and associated guidelines.

2. Data quality objectives

Table 1: Data quality objectives

Step	Summary
1: State the problem	The site requires remediation and validation of remediation in order to render it suitable for the proposed tertiary teaching and learning land use. The objective of the validation plan is to confirm the successful implementation of this remediation action plan. A conceptual site model (CSM) for the proposed development has been prepared (Section 7).
2: Identify the decisions / goal of the study	The decision is to determine if the site is suitable for the proposed commercial land use following remediation of the site. The CSM identifies contamination at the site which posed potentially unacceptable risks to human health. A data gap assessment is required, post demolition to confirm the extent of asbestos contaminated soils present, to assess previously inaccessible areas and to evaluate if cap and contain or off-site disposal of asbestos impacted soils is the most viable strategy if asbestos is identified outside of the proposed basement footprint. The decision is to establish whether the development site has been remediated in accordance with the RAP, including if any capping has been constructed in general accordance with the RAP.

Step	Summary
3: Identify the information inputs	Relevant inputs to the decision include: • The CSM identifying CoPC and affected media; • Results analysed for the relevant CoPC using NATA accredited laboratories and methods, where possible; • Field and laboratory QA/QC data to assess the suitability of the environmental data for the validation assessment; • Results compared with the RAC; • Inspections of the marker layer prior to capping works (as applicable); • Assessments of aggregates, soil, etc imported as part of the capping (as applicable); • Inspections of the capping (as applicable); • Review of the survey of the constructed capping (as applicable); • An enforceable long term environmental management plan (LTEMP) has been prepared for proposed development (as applicable); and • Details of the proposed development.
4: Define the study boundaries	The lateral boundaries of the site are shown on Drawing 1, Appendix A. The vertical boundaries are to the extent of contamination impact as determined from the site history assessment, site observations and previous investigations used to inform the RAP.
5: Develop the analytical approach (or decision rule)	The decision rule for an excavation and disposal option is to compare all analytical results with RAC. Initial comparisons will be with individual results then, where required and appropriate (noting statistical analysis is not considered appropriate for asbestos), summary statistics (including mean, standard deviation and 95% upper confidence limit (UCL) of the arithmetic mean (95% UCL) to assess potential risks posed by the site contamination. The decision rule for on-site containment will be the construction of the capping in accordance with the requirements of Section 11 of the RAP. Quality control results are to be assessed according to their relative percent difference (RPD) values. For field and laboratory duplicate results, RPDs should generally be below 30%; for field blanks, results should be at or less than the limits of reporting (NEPC, 2013). The field and laboratory quality assurance assessment is included in Section 16 of the RAP.
6: Specify the performance or acceptance criteria	Remediation Area 1 (excavation and disposal): • Baseline condition: Contaminants at the development site and/or statistical analysis of data exceed the RAC and pose a potentially unacceptable risk to receptors (null hypothesis); and • Alternative condition: Contaminants at the development site and statistical analysis of data complies with the RAC and as such, do not pose a potentially unacceptable risk to receptors (alternative hypothesis). Unless conclusive information from the collected data is sufficient to reject the null hypothesis, it is assumed that the baseline condition is true.

Step	Summary
	Remediation Area 2 (on-site management): - Baseline condition: The capping has not been constructed in accordance with this RAP (null hypothesis); and - Alternative condition: The capping has been constructed in accordance with this RAP (alternative hypothesis). Unless conclusive information from the collected data is sufficient to reject the null hypothesis, it is assumed that the baseline condition is true.
7: Optimise the design for obtaining data	Sampling design and procedures are to be implemented to optimise data collection for achieving the DQO include the following: - Adequately experienced environmental scientists / engineers will conduct field work and sample analysis interpretation; - Sampling frequencies in accordance with Sections 13 to 16c; - Analysis for the CoPC at NATA accredited laboratories using NATA endorsed methods will be used to perform laboratory analysis whenever possible; - If capping adopted: - Visual inspections of the cap construction by the Environmental Consultant; - Assessment and approval by the environmental Consultant of soil / rock to be used in the capping layer; and - Registered survey of the capping layer.

3. 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.

USEPA. (2006). *Guidance on systematic planning using the data quality objectives process, EPA QA/G-4*. Washington DC.: United States Environmental Protection Agency, Office of Environmental Information.

Appendix G

Site Management Plan

1. Introduction

This general site management plan (SMP) has been developed to provide strategies 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 to be used for the remediation and the proposed methods to be adopted. 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 Principal 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.);
 - 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 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 If capping is implemented, 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);
 - 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 the Principal and, 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 including work in asbestos impacted filling (including fill with the detectable asbestos recorded as concentrations less than the SAC). The Asbestos Contractor 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 Licenced asbestos assessor

A Licenced Asbestos Assessor will be required 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 during asbestos removal or remediation works;
- 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.

A groundwater management plan (GMP) is currently being prepared by Douglas (Report 227492.01.R.004). Additional considerations / requirements in accordance with the DMP must be accommodated.

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. high traffic pedestrian areas, 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 on fill / soil with a different contamination status. 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. 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 (where practicable) for entry and egress of vehicles used to transport 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, or as otherwise required to comply with traffic rules and consent conditions;

- Have securely covered loads to prevent any dust or odour emissions during transportation; and
- Exit the site in a forward direction.

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 swept prior to leaving the site.

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 cleaned by mechanical or hand methods, if necessary, to achieve a clean environment.

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, were required. This includes EPA tracking requirements for asbestos.

Materials imported onto the site shall only be carried out contractors holding the appropriate license(s), consent or approvals to transport the materials with the appropriate approvals obtained from the EPA, were 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 and / or review a safe work method statement (SWMS)¹ (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 set out general procedures and the minimum standards and guidelines for remediation that will need to be used in preparing the SWMS.

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 / approved by the Remediation Contractor must comply with policies specified in the Work Health and Safety Regulation 2011.

¹ or other equivalent document incorporating health and safety aspects of the proposed remedial works.

All appropriate permits, licences and notifications required for the remediation activities must be obtained prior to the commencement of remediation 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 (including asbestos works areas) and / or deep excavations. Fencing and signage must comply with relevant requirements of the WHS Regulation.

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 the WHSP and relevant 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 PAH and metals, given the presence of fill, asbestos. 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 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.

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.

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 works involving asbestos; 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); and
- 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-compliant 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 and organisations 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 amended, as required to keep it up to date.

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 available on-site, or contactable, during remediation and development works.

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

Role	Personnel / contact	Phone contact details
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 H

Contingency Plan and Unexpected Finds Protocol

1. General

Where the site conditions encountered during the remediation works are found to be different than that anticipated, 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 appointed) and client. 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 before its implementation (if appointed).

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 11) 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 were not 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 (if appointed);
- 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 find 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.

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 their 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.