

17 OXFORD STREET PTY LTD



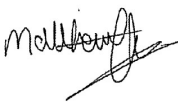
Remediation Action Plan

13-15 Oxford Street, 17 Oxford Street & 2 Verona Street,
Paddington NSW

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Executive Summary

EI Australia (EI) was engaged by 17 Oxford Street Pty Ltd ('the client') to prepare a Remediation Action Plan (RAP) for 13-15 Oxford Street, 17 Oxford Street & 2 Verona Street, Paddington NSW ('the site').

The site is located within the local government area (LGA) of City of Sydney Council, and covers a total area of 2,533 m². The site is comprised of three land (lot and deposited plan (DP) cadastral) parcels, identified as:

- Strata Plan (SP) 22113 (13-15 Oxford Street)
- Lot 1 in DP75105 (2 Verona Street)
- Lot 1 in DP 137013 (17 Oxford Street)

Based on the findings from the investigation phase, two asbestos impacted hotspots BH103 and BH105 (17 Oxford Street) were found within the basement footprint area. In accordance with *State Environmental Planning Policy (Resilience and Hazards) 2021*, remediation of the land is warranted, in order to make it suitable for the proposed mixed residential, commercial and recreational use.

The purpose of this RAP, therefore, is to establish a sequential process for remediation (excavation / disposal) and validation of the site, thereby enabling the client to meet its obligations under the *Contaminated Land Management Act 1997*.

Proposed Development

Based on the provided architectural plans (TonkinZulaikhaGreer, 2025), site redevelopment will involve;

- The demolition of existing structures on site, with retention of the two-storey masonry façade at 17 Oxford Street.
- Construction of a seven-storey, mixed use infill affordable housing development comprising:
 - Apartments located along the Oxford and Verona Street frontages including:
 - 30 market dwellings; and
 - 14 affordable housing dwellings, to be managed by a registered Community Housing Provider for a minimum of 15 years.
 - Four Terraces on the existing 2 Verona Street lot.
 - Cultural and creative uses (including cinema/bar) at basement and ground levels.
 - Ground level retail.
 - Two levels of basement car parking.
 - Associated landscaping including a central landscaped courtyard and rooftop communal open space.

The bottom basement is proposed to have a relative level (RL) of 36.95 metres Australian Height Datum (mAHD), with potential locally deeper excavations required for footings, lift overrun pits, crane pads and service trenches.

Remediation Strategy

The preferred remedial option for the site involves: Excavation and off-site disposal of ACM impacted soil to licensed waste facilities. Wastes shall be transported to appropriate, EPA-licensed facilities, after formal classification.

It is envisaged that the remediation works will be implemented in stages, as follows:

- **Stage 1** – Preliminaries and site establishment;
- **Stage 2** – Demolition and surface (clearance) inspection for remnant demolition waste and potential contaminants;
- **Stage 3** – Data Gap Closure Investigation;
- **Stage 4** – Remedial Excavation of identified asbestos impacted soils;
- **Stage 5** – Waste classification and waste management;
- **Stage 6** – Final site validation and reporting.

This RAP provides protocols for the appropriate management of any unexpected finds in that may be discovered during the course of the remediation works. In addition, should any phase of the validation assessment identify residual contamination requiring additional remediation, the procedures described under the validation plan will be implemented until the remediation goals have been achieved and the site is deemed suitable for proposed land use.

In conclusion, EI considers that the site can be made suitable for the proposed mixed residential, commercial and recreational land use through the implementation of the site remediation and validation process described in this RAP.

1. Introduction

EI Australia (EI) was engaged by 17 Oxford Street Pty Ltd ('the client') to prepare a Remediation Action Plan (RAP) for 13-15 Oxford Street, 17 Oxford Street & 2 Verona Street, Paddington NSW (henceforth referred to as 'the site').

The site is located within the Local Government Area (LGA) of Sydney (**Figure 1, Appendix A**). The site is comprised of three land cadastral parcels, identified as:

- Strata Plan (SP) 22113 (13-15 Oxford Street)
- Lot 1 in Deposited Plan (DP) 75105 (2 Verona Street)
- Lot 1 in DP 137013 (17 Oxford Street)

The site has an approximate total site area of 2,533m², as shown in **Figure 2, Appendix A**. At the time of most recent site inspection on 16 September 2025, the site consisted of residential apartments, consisting of 27 units (13-15 Oxford Street), and a commercial building at 2 Verona Street currently in use as a construction site office. 17 Oxford Street exists as a three storey commercial property with a raised carpark area on the ground floor.

Environmental investigations were previously undertaken by EI at the adjacent site at 17 Oxford Street (EI, 2023 and EI 2024a), which then received a notice of determination of development application (DA) D/2022/1169 for a proposed redevelopment. A new development, under a State Significant Development Application (SSDA) SSD-87245208, dated 15 July 2025, now encompasses 13-15 Oxford Street, 17 Oxford Street and 2 Verona Street. Specifically, this report has been prepared to respond to the SEARs requirements issued below.

13. Contamination and Remediation

- In accordance with Chapter 4 of the State Environmental Planning Policy (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.

The site can be made suitable for the proposed development provided that the recommendations presented in **Section 11** are followed.

See **Section 11: Recommendations**.

Based on the findings from the investigation phase, asbestos impacted fill soils were found in two locations BH103 and BH105 (17 Oxford Street).

In accordance with *State Environmental Planning Policy (Resilience and Hazards) 2021*, remediation or management of the land is required, in order to make it suitable for mixed residential, commercial and recreational use.

The purpose of this RAP is to establish a sequential process for remediation and validation of the site, to enable the client to meet its obligations under the *Contaminated Land Management Act 1997*.

1.1 Proposed Development

The site consists of three adjoining land parcels, identified as 13-15 Oxford Street, 17 Oxford Street and 2 Verona Street (previously investigated) (EI, 2023 and EI 2024a). Based on the provided architectural plans (TonkinZulaikhaGreer, 2025), site redevelopment will involve;

- The demolition of existing structures on site, with retention of the two-storey masonry façade at 17 Oxford Street.

- Construction of a seven-storey, mixed use infill affordable housing development comprising:
 - Apartments located along the Oxford and Verona Street frontages including:
 - 30 market dwellings; and
 - 14 affordable housing dwellings, to be managed by a registered Community Housing Provider for a minimum of 15 years.
 - Four Terraces on the existing 2 Verona Street lot.
 - Cultural and creative uses (including cinema/bar) at basement and ground levels.
 - Ground level retail.
 - Two levels of basement car parking.
 - Associated landscaping including a central landscaped courtyard and rooftop communal open space.

The bottom basement is proposed to have a relative level (RL) of 36.95 metres Australian Height Datum (mAHD), with potential locally deeper excavations required for footings, lift overrun pits, crane pads and service trenches.

1.2 Objectives of the RAP

The principal objectives of this RAP are to:

- Describe the investigation data gap closure requirements;
- Identify the required remedial works for the site;
- Establish a sequential process of removal of asbestos impacted fill materials;
- Outline the required validation program, to confirm effectiveness of the remedial works; and
- Provide measures ensuring all works occur in a safe and acceptable manner, in compliance with relevant guidelines and minimal adverse effects on human health and the environment.

1.3 Regulatory Framework

The following legislation and guidelines were considered during the preparation of this RAP:

Legislation

- *Contaminated Land Management Act 1997* (CLM Act 1997);
- *Protection of the Environment Operations Act 1997* (POEO Act 1997) and associated regulations, including the *Protection of the Environment Operations (Waste) Regulation 2014*;
- *Environmental Planning and Assessment Act 1979* (EP&A Act 1979);
- *State Environmental Planning Policy (Resilience and Hazards) 2021*;
- *Work Health and Safety Act 2011* (WHS Act 2011);
- *Sydney Local Environmental Plan (LEP) 2012*;;
- Sydney Development Control Plan (DCP) 2012

Guidelines made or approved by NSW EPA including:

- EPA (2014a) Waste Classification Guidelines;
- EPA (2017) Guidelines for the NSW Site Auditor Scheme (NSW);

- EPA (2020a) Consultants Reporting on Contaminated Land;
- EPA (2022a) Sampling Design Part 1 – Application;
- EPA (2022b) Sampling Design Part 2 – Interpretation; and
- NEPC (2013) National Environment Protection (Assessment of Site Contamination) Amendment Measure.
- WADOH (2009) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.

1.4 Deviations from the RAP

During the course of the program, it may become necessary to vary the sequence and/or details of the remediation and validation works to meet site constraints. If so, these changes must be properly documented, and are subject to approval, as required under the EPA (2020a) *Consultants Reporting on Contaminated Land*.

Performing remedial works without the supervision of a qualified environmental engineer/scientist may lead to project delays and extra costs, due to additional investigation requirements to confirm the environmental status of the site.

In worst case scenarios, waste materials removed from the site without proper characterisation and/or tracking may lead to regulatory action and potential penalties, as described under the *Protection of the Environment Operations (Waste) Regulation 2014* and the *Contaminated Land Management Act 1997*.

2. Site Description

2.1 Property Identification, Location and Physical Setting

The site identification details and associated information are presented in **Table 2-1**. The site locality and assessment area are illustrated in **Appendix A, Figures 1 and 2**.

Table 2-1 Site Identification, Location and Zoning

Attribute	Description
Street Address	13-15 Oxford Street, 17 Oxford Street & 2 Verona Street, Paddington NSW
Site Area	2,533 m ²
Lot and Deposited Plan (DP)	Strata Plan (SP) 22113 (13-15 Oxford Street) Lot 1 in Deposited Plan (DP) 75105 (2 Verona Street) Lot 1 in DP 137013 (17 Oxford Street)
Site Coordinates	13-15 Oxford Street: coordinates of the north-eastern corner; Easting: 335356.736576; Northing: 6249493.243566; and 2 Verona Street: coordinates of the south-western corner: Easting: 335353.605903; Northing: 6249413.916189. Coordinate system GDA2020-MGA56. (Source: https://portal.spatial.nsw.gov.au/explorer/index.html).
State Survey Marks	Five permanent marks and one state survey mark are situated within close proximity to the site: ▪ PM45774: on Oxford Street (approximately 44m north); ▪ PM30692: on Oxford Street (approximately 55m north); ▪ PM30689D: on Oxford Street (approximately 21m east); ▪ PM30684D: on Oxford Street (approximately 60m south-east); ▪ PM30686D: on Oxford Street (approximately 61m south-east); and ▪ SS50275: on Napier Street (approximately 57m south-west). (Source: http://maps.six.nsw.gov.au)
LGA	City of Sydney Council
Current Zoning	E1- Local Centre (13-15 and 17 Oxford Street) R1- General Residential (2 Verona Street) (Sydney Local Environmental Plan 2012- Land Zoning Map – Sheet LAN_022)

2.2 Surrounding Land Use

The site is situated within an area of mixed uses on surrounding land as described in **Table 2-2**. The local sensitive receptors within close proximity to the site are also identified.

Table 2-2 Surrounding Land Uses

Direction	Land Use Description	Sensitive Receptor (and distance from site)
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Direction	Land Use Description	Sensitive Receptor (and distance from site)
North	Commercial Properties; Corner South Dowling Street and Oxford Street; Residential properties; and St Vincent's Hospital Sydney The University of Notre Dame Australia	Visitors and owners of commercial properties occupants (immediately adjacent) Pedestrians on Oxford Street and South Dowling Street (approximately 70m north); and St Vincent's Hospital Sydney users (approximately 140m north-east). Students and employees of The University of Notre Dame Australia (approximately 180m north)
South	Verona Street; Residential properties; and UNSW Art & Design	Verona Street users (immediately adjacent), Residential occupants (approximately 25m south); Students and employees of UNSW Art & Design (approximately 180m south)
East	Oxford Street; Commercial properties; and Residential properties	Workers and customers (immediately adjacent); and Residential occupants (approximately 25m east). Pedestrians on Oxford Street (immediately adjacent);
West	Marshall Street; and Residential properties	Pedestrians on Marshall Street (immediately adjacent); Residential occupants (immediately adjacent)

2.3 Regional Setting

Regional topography, geology and landscape information is summarised in **Table 2-3**.

Table 2-3 Regional Setting Information

Attribute	Description
Topography	Based on EI's previous geotechnical report (EI, 2022), the site is located on the high west side of Oxford Street within gently (0° to 10°) east dipping topography. Locally the existing site is relatively flat, with the existing loading dock within the western area of the site at an approximate RL of 50.2 mAHD and the ground floor retail areas within the central and eastern portions of the site at RLs of approximately RL 47.92 to RL 47.45 mAHD.
Drainage	Likely to be consistent with the general slope of the site (to the north-east). Any runoff would be expected to flow into either the municipal stormwater system or surface flow, consistently with the site topography, into the drainage pathways.
Geology	According to the Department of Mineral Resources <i>Sydney 1:100,000 Geological Series Sheet 9130</i> (DMR, 1983), the site is situated within the transition from Ashfield Shale (<i>Rwa</i>) to Hawkesbury Sandstone (<i>Rh</i>). Ashfield Shale consists of black to dark-grey shale and laminite, and Hawkesbury Sandstone consists of medium to coarse-grained quartz sandstone, very minor shale and laminate lenses. Note: Based on the borehole log from previous Geotechnical Investigation (EI 2022), sandstone bedrock was encountered in depth 6.2 mBGL.

Attribute	Description
Soil Landscape	The Office of Environment and Heritage <i>Soil Landscapes of the Penrith 1:100,000 Sheet</i> (Bannerman and Hazelton, 2011) indicates that the site overlies the transition from Blacktown (<i>bt</i>) residual landscape to Gymea (<i>gy</i>) erosional landscape. Blacktown (<i>bt</i>) residual landscape is characterised by gently undulating rises on Wianamatta Group shales, and Gymea (<i>gy</i>) erosional landscape is characterised by undulating to rolling rises and low hills on Hawkesbury Sandstone. Note: Based on the borehole log from previous Geotechnical Investigation (EI 2022), sandstone bedrock was encountered in depth 6.2 mBGL.
Acid Sulfate Soil (ASS) Risk	The <i>Sydney Local Environmental Plan 2012 Acid Sulfate Soils Map</i> shows the site to be within a <i>Class 5</i> area with respect to ASS. In such cases, council consent is required prior to commencing any works within 500m of adjacent Class 1, 2, 3 or 4 land that is below 5m AHD and where the water table is likely to be lowered below 1m AHD on adjacent Class 1, 2, 3 or 4 land. With reference to the <i>Botany Bay Acid Sulfate Soil Risk Map</i> (1:25,000 scale; Murphy, 1997), the site lies within the class description of '<i>No Known Occurrence</i>'. In such cases, ASSs are not known or expected to occur and "land management activities are not likely to be affected by ASS materials." Therefore, the potential for ASS presence on-site was considered to be low and further assessment is unwarranted.
Nearest Surface Water Feature	Rushcutters Bay, approximately 1.3km north-east of the site
Groundwater Flow Direction	Inferred to be in a north-easterly direction towards Rushcutters Bay, approximately 1.3km north-east of the site.

3. Site Characterisation

3.1 Previous Investigations

The site investigation phase was recorded under the following reports:

- EI (2022); *Preliminary Site Investigation for 17 Oxford Street, Paddington NSW* (EI Australia Reference. Ref. E25559.E01 _Rev0, dated 9 December 2022);
- EI (2023) *Detailed Site Investigation for 17 Oxford Street, Paddington NSW* (EI Australia Reference E25559.E02 _Rev0, dated 16 August 2023);
- EI (2025) *Detailed Site Investigation for 13-15 Oxford Street, 17 Oxford Street & 2 Verona Street, Paddington NSW* (EI Australia Reference E25559.E02 _Rev0, dated 18 November 2025);

A summary of the relevant information is provided in **Table 3-1**. Refer also to **Appendix C**.

Table 3-1 Summary of Previous Investigations

Project Task	Description
EI (2022) Preliminary Site Investigation	
Objective	The primary aims of the investigation were to make a qualitative assessment of the potential for contamination based on historical land uses and anecdotal and documentary evidence.
Scope of Works	The scope of the investigation included: ▪ A desktop review of site history; ▪ A site walkover inspection, to form an understanding of current site conditions; Assessment of data and reporting.
Key Findings	Site history review: ▪ Historical information suggested that the site has been used for commercial purposes since at least the mid-1940s, early 1950s. Surrounding properties were residential / commercial since the 1940s; and ▪ Surrounding lands use is commercial and residential. A dry-cleaning business is located approximately 130m north-west (cross-gradient) and a service station approximately 81m south-east (cross-gradient) from the site. ▪ The site consists of a four-storey commercial building with brick and steel facades. The ground floor, level 1 and level 2 were used for commercial / retail purposes (including bar & cinema and clothing retail shop). Level 3 had no access at the time of this site inspection. Building structures were generally in fair to good condition. Searches of EPA online databases ▪ A search of the <i>Stored Chemical Information Database</i> maintained by SafeWork relating to the storage of dangerous goods confirmed there are no records relating to the site, in particular licenced underground and above-ground storage tanks. ▪ The site is free of statutory notices and licensing agreements issued under the <i>Contaminated Land Management Act 1997</i>. The site was not included on the <i>List of NSW Contaminated Sites Notified to the EPA</i>. ▪ The potential for acid sulfate soils (ASS) on the site was considered low. Review of the council records Council records indicated light industrial activities carried out prior to 1985, including industrial manufacturing and warehousing; and altered to retail/entertainment purposes post 1985.

Project Task	Description
	Site walkover inspection (23 November 2022) <u>Current Site Use</u> - The ground floor, Level 1 and Level 2 were used for commercial / retail purposes (including bar & cinema and clothing retail shop). Level 3 was used for private purposes with no access at the time of site inspection (Photographs 4). - No obvious (i.e. visible or olfactory) signs of gross contamination were observed during the inspection. - There was no evidence that underground petroleum storage systems (UPSS), underground storage tanks (USTs) or above-ground storage tanks (ASTs) were present on site <u>Site Surroundings</u> - The site is located in a local centre area. Local commercial activities include retail shops, restaurants and mixed businesses; - There are no NSW Fire and Rescue Station (or Training College) in the vicinity (<100m) of the site; - A dry-cleaning business (Eurostar Dry Cleaners) is located approximately 130m north / north-west (cross-gradient) from the site; and - A service station (7-Eleven) is located approximately 81m south-east (cross-gradient) from the site.
EI (2023) Detailed Site Investigation	
Objective	The main objectives of the detailed investigation are as follows: - Provide a qualitative assessment of the potential for site contamination on the basis of historical land uses and anecdotal and documentary evidence of possible pollutant sources; - Establish the degree of any potential site contamination, by intrusive sampling and laboratory analysis for relevant contaminants; and - Make recommendations for the appropriate management of any contaminated soils and/or groundwater (if contamination were identified).
Scope of Works	Desktop Study - Review of previous environmental investigation EI Australia (2022) <i>17 Oxford Street, Paddington NSW</i> (EI Australia Reference.: <i>Ref. E25559.E01 _Rev0</i>, dated 9 December 2022); and - Review of client supplied development plans for information relating to proposed land use and design. Field Work - Site inspection; - Review of existing underground services on-site, utilising <i>Before-You-Dig</i> plans and electro-magnetic equipment operated by a licensed services locator; - Drilling of eight boreholes (BH101 to BH108) positioned in accessible areas of the site; - Conversion of one of the boreholes into a groundwater monitoring well (BH101M);

Project Task	Description
	▪ Multiple level soil sampling within fill and natural soils in each borehole; ▪ Completion of a groundwater monitoring event (GME), including measurement of standing water levels (SWLs) and representative sampling at the installed well; and ▪ Laboratory analysis of selected soil and groundwater samples for relevant analytical parameters, as determined by the desktop study and field observations. Reporting Data interpretation and reporting in accordance with NSW EPA guidelines
Findings	Soil assessment ▪ Based on the logs for the boreholes, the site lithology generalised under the detailed site investigation was refined as follows: ▸ Pavement (0-0.27m BGL); overlying ▸ Fill: Sand, fine grained, brown to yellow, with builders plastic and concrete fragments (0.0 to 3.6m BGL); overlying ▸ Residual SAND, fine grained, yellow (0.5 to 4.0m BGL); overlaying ▸ Weathered Sandstone (6.5 m BGL +). ▪ A total of eight boreholes (BH1 to BH8) were conducted at accessible areas of the site. Samples were collected from both fill and natural soil: ▪ Friable ACM was found in recovered soil samples from two locations (BH103 and BH105). Note: At both locations the laboratory report described the asbestos as chrysotile fibrous mass, and the fragment size was less than 7mm, According to NEPC (2013) Schedule B1, Section 4.4, the reported asbestos was friable ▪ No other potential contaminants including petroleum hydrocarbons and BTEX compounds in soil exceed the adopted health-based criteria. Groundwater assessment ▪ One groundwater monitoring well (BH101M) was installed at the north-west section of the site; Concentrations of the potential contaminants were below the adopted GILs (where available), with the exception of: ▪ Zinc was reported at a concentration of 23 µg/L (BH101M) which exceeded the adopted marine GIL of 8 µg/L; and ▪ No petroleum hydrocarbons or BTEX compounds were reported in groundwater at MW1.
Conclusion and Recommendations	EI concluded that there is potential for contamination to be present on site. Remediation is required to render the site suitable for the proposed development. EI made the following recommendations: ▪ Conduct a Hazardous Materials Survey (HMS) of the current site prior to site demolition; ▪ Preparation and implementation of a Remediation Action Plan (RAP) which should include, but not necessarily be limited to, the following: ▸ In situ soil sampling in the northern half of the site which was inaccessible at the time of investigation;

Project Task	Description
	- Remediation options for management and disposal of asbestos (friable) found in fill soils at two locations (BH103 and BH104); - Areas impacted by asbestos should be segregated from the remainder of the site, and marked by prominent features that withstand weather (e.g. star picket and danger tape); - A sampling and analysis quality plan (SAQP) for the validation of the remediation activities to be conducted on the site; - Procedures to deal with any unexpected finds identified during remediation and construction; - Preparation of a final site validation report by a qualified environmental consultant, certifying site suitability for the proposed development.
EI (2025) Detailed Site Investigation	
Objective	The main objectives of the detailed investigation are as follows: - Provide a qualitative assessment of the potential for site contamination on the basis of historical land uses and anecdotal and documentary evidence of possible pollutant sources; - Establish the degree of any potential site contamination, by intrusive sampling and laboratory analysis for relevant contaminants; and - Make recommendations for the appropriate management of any contaminated soils and/or groundwater (if contamination were identified).
Scope of Works	Desktop Study - Review of previous environmental investigations for the site; - Review of online databases to determine site history for 13-15 Oxford Street; and - Review of client supplied development plans for information relating to proposed land use and design. Field Work - Site inspection; - Review of existing underground services on-site, utilising <i>Before-You-Dig</i> plans and electro-magnetic equipment operated by a licensed services locator; - Drilling of 8 boreholes (BH202 to BH209) systematically located across the basement level of 13-15 Oxford Street; - Drilling of 1 borehole (BH201M) located at 2 Verona Street. - Conversion of two boreholes into a groundwater monitoring well (BH201M and BH208M); - Multiple level soil sampling within fill and natural soils in each borehole; - Completion of a groundwater monitoring event (GME), including measurement of standing water levels (SWLs) and representative sampling at the installed and existing wells; and - Laboratory analysis of selected soil and groundwater samples for relevant analytical parameters, as determined by the desktop study and field

Project Task	Description
	observations. Reporting Data interpretation and reporting in accordance with NSW EPA guidelines
Findings	Soil assessment - The site lithology was generalised as a ground level concrete slab overlying sand fill to a maximum depth of 46.72 mAHD followed by sand and sandy clay (to a maximum depth of 40 mAHD) then sandstone bedrock, first encountered at 44.52 mAHD. The basement slab at 13-15 Oxford Street was underlain by gravel fill then sand. A total of nine boreholes (BH201M to BH209) were conducted at accessible areas of the site. Samples were collected from both fill and natural soil: - Concentrations of contaminants of concern were reported below the adopted guidelines with the exception of friable asbestos was identified in fill at locations BH103_1.8-1.9 and BH105_1.3-1.4 within 17 Oxford Street - No asbestos was found (at laboratory LOR of 0.01 %w/w) in soil at 13-15 Oxford Street or 2 Verona Street - No other potential contaminants including petroleum hydrocarbons and BTEX compounds in soil exceed the adopted health-based criteria. Groundwater assessment - Two groundwater monitoring wells (BH201M and BH208M) were installed at 13-15 Oxford Street and 2 Verona Street; Concentrations of the potential contaminants were below the adopted GILs (where available), with the exception of: - Copper (Cu) at BH201M, BH208M and B101M-2; - Zinc (Zn) at BH201M, BH208M and B101M-2; - TRH F1 at BH208M (reported above LOR); and - TRH F2 at BH201M and BH208M (reported above LOR). - The concentrations of the priority metals (Cu and Zn) across the site exceeded the marine water GILs, however there was no evidence of contamination from in-situ soil material. Hence, concentrations of metals observed are consistent with expected background concentrations of an urban environment. - Concentrations of petroleum hydrocarbons (TRH-F1 and TRH-F2) were reported marginally above the LOR at BH208M and BH201M. The human health and ecological risk from petroleum hydrocarbons detected in groundwater was considered to be low and acceptable.
Conclusion and Recommendations	EI concluded that there is potential for contamination to be present on site. Remediation is required to render the site suitable for the proposed development. EI made the following recommendations: - Conduct a Hazardous Materials Survey (HMS) of the current site prior to site demolition; - Implementation of a Remediation Action Plan (RAP) - An asbestos clearance inspection and certificate should be completed by a

Project Task	Description
	suitably qualified professional (SafeWork NSW Licensed Asbestos Assessor) following demolition of existing site structures. - Preparation of an asbestos management plan for management of asbestos during demolition and subsequent soil remediation according to Work Health and Safety Regulation 2017. - Preparation of a final site validation report by a qualified environmental consultant, certifying site suitability for the proposed development.

3.2 Conceptual Site Model

In accordance with NEPC (2013) *Schedule B2 - Guideline on Site Characterisation*, EI developed a CSM based on the available investigation information, assessing plausible linkages between potential contamination sources, migration pathways and receptors.

3.2.1 Summary of Site History

The overall site has been used from commercial/industrial purposes since before the 1940's.

The property at 13-15 Oxford Street existed was used for commercial purposes including use as a fuel service station, until 1981 or 1982, after which it was redeveloped between 1982 and 1984 for the current use as residential apartments including a 2-level basement carpark which occupies the majority of the site footprint. Excavation at that time for construction of the 2-level basement car park likely removed all UPSS infrastructure and impacted soil (if present) previously associated with the service station.

With reference to the previous preliminary site investigation for 2 Verona Street (EI, 2024b), the building at 2 Verona Street was constructed between 1930 and 1943 (based on title records, construction likely by 1934) and used for light industrial and warehousing purposes. The property was refurbished for commercial use in 1982 and appeared unchanged since.

The building at 17 Oxford Street was constructed in the 1940s and used for light industrial and warehousing purposes before being refurbished for current retail/commercial use as a local entertainment premises. The property appeared unchanged since.

Residential, commercial and light industrial properties have been constructed in the surrounding lands since the 1940s. S Sites immediately adjacent south and north were redeveloped in 1955 and 2022 respectively. The most recent historical site usage and of the surrounding area remains mostly consistent to the current date with the exception of a completed development immediately adjacent north.

3.2.2 Subsurface Conditions

The site is situated within a region of transition from Ashfield Shale (*Rwa*) to Hawkesbury Sandstone (*Rh*). Ashfield Shale consists of black to dark-grey shale and laminite, and Hawkesbury Sandstone consists of medium to coarse-grained quartz sandstone, very minor shale and laminate lenses. Based on fieldwork conducted, the

The site lithology was generalised as concrete overlying sand fill to a maximum depth of 46.72 mAHD followed by marine sand to sandy clay (to a maximum depth of 40 mAHD) then sandstone bedrock, first encountered at 44.52 mAHD (BH101M). Gravel fill was observed within 13-15 Oxford Street between depths of 43.8 and 42.9 mAHD (existing 2-level basement car park was excavated to approximately 4 metres below surrounding ground level).

3.2.3 Existing Site Contamination

Findings from the investigation stages are as follows:

- Friable asbestos detected in fill at boreholes BH103_1.8-1.9 (greater than LOR of 0.01 %w/w) and BH105_1.3-1.4 (less than LOR of 0.01 %w/w). Laboratory descriptions reported asbestos as fibrous;
- Concentrations of potential contaminants in groundwater were found to be below the adopted human health-based criteria for site land use settings (ANZG, 2018), with the exception of:
 - Zinc (Zn) at BH201M, BH208M and B101M-2 and BH101M;
 - Copper (Cu) at BH201M, BH208M and B101M-2;
 - TRH F1 at BH208M (reported above LOR); and
 - TRH F2 at BH201M and BH208M (reported above LOR).

The concentrations of the priority metals (Cu and Zn) across the site exceeded the marine water GILs, however there was no evidence of contamination from in-situ soil material. Hence, concentrations of metals observed are consistent with expected background concentrations of an urban environment.

Concentrations of petroleum hydrocarbons (TRH-F1 and TRH-F2) were reported marginally above the LOR at BH208M and BH201M. The human health and ecological risk from petroleum hydrocarbons detected in groundwater was considered to be low and acceptable.

3.2.4 Data Gaps

The distribution of soil sampling locations was limited to accessible areas of the site. There were occupied residential and commercial properties at the site and soil sampling was not conducted within the footprints of these buildings due to access constraints. These areas include;

- The western portion of 13-15 Oxford Street. Under the proposed development, a landscape/ deep soils zone is to be provided within this area;
- The eastern portion of 17 Oxford Street. Previous investigations (EI, 2023) did not conduct any intrusive works within this area; and
- The northern portion of 2 Verona Street, currently occupied by a commercial property, Under the proposed developments, soils in this area are outside the basement footprint.

3.2.5 Potential Sources, Exposure Pathways and Receptors

Details of the contamination sources, exposure pathways and human and environmental receptors relevant for this site are summarised in **Table 3-2**.

Table 3-2 Summary of the CSM

Potential Source	COPC	Media	Sensitive Receptor	Transport Mechanism	Exposure Pathway	Complete source-pathway receptor linkage
Former site usage as historical petrol station (at 13-15 Oxford Street) and other commercial /light industrial activities	HM, TRH, VOC (BTEX), PAH, PFAS, phenols, PCBs and asbestos	Soil Groundwater	Future site residents; Aquatic environment off-site; Future intrusive workers.	Leaching Site earthworks Erosion & Surface runoff Advection and diffusion in groundwater	Inhalation Dermal contact Ingestion Vapour intrusion	Potentially complete. No evidence of the presence of such COPCs from tested soil samples. However, the western portion of 13-15 Oxford Street was not previously investigated. Concentration of petroleum hydrocarbons (TRH-F1 and TRH F2) marginally reported above LOR in groundwater.
Imported fill soils of unknown origin and quality	HM, TRH, VOC (BTEX), PAH, OCP, OPP, PCB and asbestos	Surface soil	Site workers during construction; Future site residents.	Site earthworks Environmental erosion Surface runoff	Inhalation of asbestos fibres (if present) Dermal contact Ingestion Vapour intrusion	Potentially complete. No evidence of the presence of such COPCs from tested samples. However, the entirety of the site was not accessible at time of writing this DSI.
Historical application of pesticides	OPP, OCP	Surface soil	Site workers during construction; Future site residents.	Direct spraying Leaching Site earthworks Environmental erosion	Dermal contact Ingestion	
Weathering of exposed building fabrics containing hazardous materials	Asbestos, HM	Surface soil	Site workers during construction; Future site residents.	Site earthworks	Inhalation of asbestos fibres (if present) Dermal contact Ingestion	Potentially complete. No evidence based on tested samples. However recommended controls (Sections 6) should eliminate this

Potential Source	COPC	Media	Sensitive Receptor	Transport Mechanism	Exposure Pathway	Complete source-pathway receptor linkage
Migration of contaminants from off-site (upgradient) sources;	HM, TRH and VOC (BTEX), PFAS, Phenols	Groundwater	Site workers during construction; Future site residents; Aquatic environment; Future intrusive workers.	Leaching Advection and diffusion in groundwater	Inhalation of vapour Dermal contact Ingestion Biota uptake	contamination source during future works. Not complete. No upgradient sources of contamination identified based on anticipated groundwater flow direction (north east).

4. Remediation Goal and Criteria

4.1 Remediation Goal

The remediation goal is to make the site suitable for the proposed (mixed residential, commercial and recreational) land use, consistent with *State Environmental Planning Policy (Resilience and Hazards) 2021*.

4.2 Remediation Criteria

The proposed development involves partial demolition of existing structures, followed by the reconstruction of five-storey commercial building, overlying a 2-level basement. The proposed basement covers the majority of the site area (**Section 1.1**).

The following remediation criteria are adopted for the site, as outlined in **Table 4-1**. These were selected from available NSW EPA statutory made or approved guidelines, or NSW EPA non-statutory published or endorsed guidelines (where necessary and justified), with due consideration of the exposure scenario that is expected for the site, the likely exposure pathways and the identified potential receptors.

Table 4-1 Remediation Acceptance Criteria

Media	Criteria	Rationale
Soil	NEPC (2013) HILs, HSLs, EILs, ESLs and Management Limits	Soil Health-based Investigation Levels (HILs) NEPC (2013) <i>HIL-A</i> thresholds for residential settings with accessible soils were adopted due to the proposed deep soil zone covering the north-west portion of the site (refer Section 1.2). NEPC (2013) <i>HIL-B</i> thresholds for residential settings with minimal opportunities for soil access adopted for non-landscape areas. Soil Health-based Screening Levels (HSLs) NEPC (2013) <i>HSL-A&B</i> thresholds for vapour intrusion for residential (soil texture classification – sand) were applied for conservatism, due to residential apartments constructed as slab on ground. This will assess potential human health impacts from residual vapours resulting from petroleum, BTEX and naphthalene. Asbestos Health Based Screening Levels Presence / absence of asbestos (not-detected) were utilised for preliminary screening purposes. The WADoH (2009)) assessment criteria, as presented in NEPM (2013), were not adopted for this investigation. Ecological Investigation / Screening Levels (EILs / ESLs) NEPC (2013) EILs/ESLs for urban residential and public open space land use scenarios were adopted, to assess the potential impact to proposed landscaping areas, where plants could be exposed to soils and where precipitation may result in subsurface infiltration and resulting leaching of soil impacts to groundwater. The derived EILs were determined by the addition of site specific Added Contaminant Limit and the Ambient Background Concentration for a high traffic NSW suburb. The adopted ESL's were based on soil texture. Physical characteristics of the soil were based on data gathered from the EI Geotechnical Investigation (EI, 2022) (pH) and from the eSPADE portal (DPIE, 2022) (Cation exchange capacity and Clay content) Management Limits for Petroleum Hydrocarbons

Media	Criteria	Rationale
		Where the HSLs and ESLs for petroleum hydrocarbons were exceeded, sample results were also assessed against the NEPC (2013) <i>Management Limits</i> for the TRH F1-F4 fractions, to assess propensity for phase-separated hydrocarbons (PSH), fire and explosive hazards and adverse effects on buried infrastructure..

Waste Classification

Prior to being removed from the site, any excavated soils must be classified in accordance with the NSW EPA (2014) *Waste Classification Guidelines*. Under these guidelines, waste soils are classified into the following groups: General Solid Waste (including Virgin Excavated Natural Materials (VENM)), Restricted Solid Waste, or Hazardous Waste, subject to chemical assessment. The chemical assessment must use NATA-registered laboratory methods for testing total contaminant concentrations and leachable contaminant concentrations using the toxicity characteristics leaching procedure (TCLP) methodology. Any soils containing asbestos would additionally be classified as Special Waste - Asbestos Waste.

In accordance with the NSW EPA (2014), waste soils must only be disposed to a waste facility that is appropriately licenced to receive the incoming waste. It is therefore recommended that confirmation is obtained from the waste facility prior the materials being removed from the site. In the case of Asbestos Waste, special tracking requirements include entering relevant details of the waste transfer into the NSW EPA's Waste Locate Tracking System, as described in **Section 7**.

Should the importation of 'clean' materials be required to backfill remedial voids and bring the site to the intended finished floor levels, materials must be classified before delivery as virgin excavated natural material (VENM) or excavated natural material (ENM), or deemed suitable under an NSW EPA resource recovery exemption/order. In the absence of suitable validation information (as confirmed by the appointed environmental scientist), imported materials must be sampled and analysed to confirm suitability for on-site use. The corresponding methodology is outlined in **Section 9.1**.

5. Quality Objective

5.1 Data Quality Objectives

In accordance with USEPA (2006) *Data Quality Assessment* and EPA (2017) *Guidelines for the NSW Site Auditor Scheme*, DQOs will be defined for the specific requirements of the project. The DQO process to be applied for the remediation / validation is summarised in **Table 5-1**.

Table 5-1 Summary of the Data Quality Objectives

Step	Description
State the Problem	The proposed development will involve demolition of existing buildings with retention of the two-storey masonry façade at 17 Oxford Street and the construction of a seven storey mixed use building overlying a three storey basement, with the proposed usage for ground floor being mixed retail, cultural and creative. The proposed site use is equivalent to a generic NEPC (2013) scenario of residential with garden/accessible soil. Friable asbestos was found in the sandy fill material located at two locations; and Total site characterisation has been limited due to access restrictions. In accordance with <i>State Environmental Planning Policy (Resilience and Hazards) 2021</i>, remediation of the land is warranted, in order to make it suitable for mixed residential, commercial and recreational use.
Identify the Decisions	Based on the remediation objectives outlined in Section 1.2, the following decisions must be made: - Has the site been remediated to a level suitable for the proposed mixed residential, commercial and recreational use? - Have all excavated materials been suitably waste classified to enable off-site disposal? - Have all remaining soils, including VENM / ENM and any imported fill (if required), been suitably validated? - Are there any on-going (long term) environmental monitoring and/or management requirements for the site?
Identify Inputs to the Decision Making Process	Inputs to the decision-making process will include: - Physical observations made during the data gap closure and remediation activities; - Waste classification reports for the (contaminated) soils to be removed from the site; - Waste disposal (tipping) documentation for the soils removed from the site; - Analytical data for soil validation samples collected from excavation areas; - Analytical data for soil validation samples collected from the final site surface; and - Validation documentation for VENM / ENM and/or imported fill.
Define the Boundaries of the Remediation	Lateral – Works will be limited to within the site boundaries (Figure 2, Appendix A). Vertical – From the existing ground surface and underlying fill, to the natural soil horizons or base of excavation pit / trench. Temporal – Validation and classification results will be valid from the day samples are collected, remaining so if no changes to site use occur, and contamination (if present) does not migrate from off-site sources.
Develop a Decision Rule	The decision rules for site validation are: - Is the site suitable for the proposed land use? <i>If the concentrations of contaminants in remaining soils are below the criteria (Section 4.2), then the site will be deemed suitable for the proposed mixed residential, commercial and recreational use.</i> - Is additional information required to determine the suitability of the site for proposed use? <i>Should additional information be required, as determined by the updated / final CSM, then appropriate recommendations will be provided.</i> Decision rules for accepting analytical data are defined by the DQIs in Table 5-2.

Step	Description
Specify Acceptable Limits on Decision Errors	- Specific acceptable limits for this project will be in accordance with the NEPM and appropriate, pre-determined DQIs for assessing reliability of analytical data. - The recommended DQIs for precision, accuracy, representativeness, completeness and comparability are provided in Table 5-2. - If any of the DQIs are not met, further assessment will be necessary to determine whether the non-conformance significantly affects data useability. Corrective actions may include requesting further information from samplers and/or analytical laboratories, downgrading of the quality of the data and/or re-collection of samples.
Optimise the Design for Obtaining Data	In order to optimise the data generating design and minimise sampling / analytical errors, the following measures shall be integrated into the validation program: - Written instructions will be issued, to guide personnel during the fieldwork activities; - Standard procedures for field work and sampling handling shall be adopted; - Remediation works are to be performed as per Section 7; - Validation sampling is to be completed as per Section 9 methodology; and - Review of the results will be undertaken, to determine if further excavation and/or additional sampling are warranted; most particularly - Additional works would be warranted where contaminant concentrations exceed the remediation criteria.

5.2 Data Quality Indicators

To confirm that the validation data are of acceptable quality, analytical results will be evaluated against the DQIs outlined in **Table 5-2**.

Table 5-2 Recommended Data Quality Indicators

QA/QC Component	Data Quality Indicator(s)
Precision A quantitative measure of the variability (or reproducibility) of data	Data precision will be assessed by reviewing the performance of intra-laboratory duplicates, through calculation of relative percentage differences (RPDs). Data precision shall be deemed acceptable if RPDs are less than 30%. RPDs that exceed this range will be considered acceptable where: - Results are less than 10 times the corresponding limit of reporting (LOR); - Results are less than 20 times the LOR and the RPD is less than 50%; or - Heterogeneous materials or volatile compounds are encountered.
Accuracy A quantitative measure of the closeness of reported data to the "true" value	Data accuracy will be assessed through the analysis of: - Inter-laboratory duplicates (with <30% RPD); - Field and method blanks (with results <LOR); - Matrix spike samples; and - Laboratory control samples.
Representativeness The confidence (expressed qualitatively) that data are representative of each medium present on-site	To ensure that data are representative of conditions encountered in the field, the following measures will be undertaken: - Blank samples run in parallel with field samples, to confirm no unacceptable instances of laboratory artefacts; - Review of RPDs for field and laboratory duplicates, to provide an indication that the samples are generally homogeneous (i.e. no significant sample matrix heterogeneities); and - Adoption of standard operating procedures (SOPs) for sample collection, handling and preservation, to ensure minimal opportunity for sample interference or degradation (e.g. loss during transport due to incorrect preservation / transport methods).
Completeness A measure of the amount of useable data from a data collection activity	Analytical data sets acquired during the validation will be deemed complete upon confirmation that: - SOPs were adhered to; - Copies of all chain of custody (COC) documentation are included and found to be properly completed; and

QA/QC Component	Data Quality Indicator(s)
	All analyses prescribed on the COC form were reported.
Comparability The confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event	Concerns relating to comparability between individual data sets will be reduced through the employment of experienced samplers, whom adhere to SOPs and regulator-endorsed guidelines during each sampling event. The contracted analytical laboratories shall be NATA-accredited for the required testing methods.

6. Remediation Technology

6.1 Regulatory Overview

Under the NEPC (2013) *National Environment Protection (Assessment of Site Contamination) Amendment Measure*, the preferred hierarchy for site remediation and/or management is:

- 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 the above are not practicable:
 - Consolidation and isolation of the soil on-site by containment with a properly designed barrier; or
 - 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.

In order to achieve an appropriate balance between the benefits and effects of undertaking the remediation method, sustainability (environmental, economic, and social) of each remediation option should be considered in decision making.

For the subject site, a number of remediation options were reviewed to examine the suitability of each method, the surrounding properties, geological and hydrogeological limitations and the following considerations:

- Development requirements;
- Prioritisation of works in areas of most concern;
- Ability of remedial method to treat contamination with respect to material and infrastructure limitations;
- Remedial timeframes;
- Defensible method to ensure the site is remediated to appropriate levels / validation criteria; and regulatory compliance.

6.2 Remediation Technologies Review

A number of soil remediation options were reviewed to examine the suitability of each method, with due regard for the surrounding land uses, as well as geological limitations.

Brief discussion on the various remediation technology options is provided in **Appendix G**. Each of the available remediation technologies is summarised in terms of their suitability for treatment of soils and groundwater, as detailed in **Table 6-1**.

Table 6-1 Remedial Technology Review – Soil and Groundwater

Remediation Methodology	Description	Advantages	Disadvantages	Suitability
No Action	'No Action' can be considered if: - There is no measurable contamination (i.e. contaminant concentrations are below adopted criteria); or - Exposure is unlikely and contaminants are not mobile.	No remediation costs. Creates minimal disturbance to the site.	Contamination would remain <i>in situ</i> allowing potential vapour intrusion and off-site migration of contamination and impacts on groundwater. Would pose limitations on land use options. May require an Environmental Management Plan (EMP) and ongoing monitoring.	<u>Not Suitable</u> – Friable asbestos is present in the fill material within the basement footprint area of the site.
On-site bioremediation	Excavated soils are thoroughly broken down and aerated, mixed with reagents to help microorganism populations grow, stockpiled and aerated above ground.	Cost effective if soils are reused on site. Lower disposal costs (if any). Limited requirement to import fill material to site.	Material handling area required. Longer remediation timeframes. Potential for odour problems.	<u>Not suitable</u> – Not suitable for asbestos impacts.
<i>In situ</i> treatment	<i>In situ</i> treatment of impacted soils within the vadose and saturated zones using forced advection or abiotic injection methods, such as soil vapour extraction, in situ chemical oxidation, etc.	Minimal disturbance (no excavation). Cost effective for large scale site remediation of lighter petroleum hydrocarbons. Potential to simultaneously remediate dissolved phase hydrocarbons in site groundwater.	High establishment costs (equipment and installation). Potential for odour and/or health and safety problems. Requires detailed design and pilot trials.	<u>Not suitable</u> – Not suitable for asbestos impacts.
Consolidation and/or capping	Risk minimisation approach, where impacted soils are managed on-site by capping the ground surface with geotextiles and/or a clean, impermeable layer of fill material.	Effectively removes risk to human health by eliminating exposure pathways.	Requires detailed capping design. Contamination would remain <i>in situ</i> allowing potential off-site migration of contamination and impacts on groundwater. Would pose limitations on land use. Typically requires an EMP.	<u>Not suitable</u> – Not suitable for the proposed site development in which a two-level basement footprint covers majority of the site meaning all surpluses soil will be removed off-site.
Excavation and off-site disposal	Excavate impacted materials. Transport directly to a licensed landfill facility. Reinstate site with imported clean fill material.	Fast, as the impacted material can be removed immediately, significantly reducing potential for impact to groundwater. No storage or treatment problems.	Transfer of waste to another location (licensed waste facility). High costs associated with the disposal of waste soils and importation of backfill. Requires waste classification prior to	<u>Suitable</u> – For meeting the key project objective to make the site suitable for future use without the need for ongoing monitoring.

Remediation Methodology	Description	Advantages	Disadvantages	Suitability
		Reduced vapour/odour issues as impacted materials removed from site. Minimal design and management costs.	disposal, keeping of thorough waste records, waste tracking and reporting. Sustainability issues related with disposal to landfill.	

6.3 Preferred Remediation Option

Based on the available remedial technologies, the proposed development (**Section 1.1:** partial demolition of existing structures and construction of a five-storey commercial building with a two-level basement to be used for mixed commercial purposes), the potential risk to human health and the environment, as well as the relative cost effectiveness of feasible remedial techniques, the preferred remedial options for the site are: Excavation of ACM impacted soil and offsite disposal to licensed waste facilities.

All wastes shall be transported to appropriate, EPA-licensed facilities, after formal classification. All excavated (remediation) areas shall be validated by base and wall soil sampling. Where required, the site will be reinstated with validated, imported (or recovered) excavated natural materials.

6.4 Remediation Works Category, Consent and Planning

6.4.1 Consent Requirements

In accordance with *State Environmental Planning Policy (Resilience and Hazards) 2021*, the category of the remediation works defines whether consent is required prior to commencement. Under *SEPP 2021*, works in specific or sensitive areas or where there is the potential for significant environmental impact are classed as *Category 1* and require development consent. *Category 2* works pose a low potential for environmental impact and do not require prior consent.

The determination for this site is outlined in **Table 5-1**. Based on this determination, the remediation works for the site are considered *Category 2* and will not require development consent.

Table 6-2 Remediation Works Category Determination

Significant Environment Impact	Yes/No	Category
Designated Development or State Significant Development	No	1
Critical or threatened species habitat	No	2
Impact on threatened species, populations, ecological communities or their habitats	No	2
In area identified environmental significance such as scenic areas, wetlands (see list*)	No	2
Comply with a policy made under the contaminated land planning guidelines by the council	Yes	2
Is work ancillary to designated development	No	2

Footnote: * Environmental significance list - coastal protection, conservation or heritage conservation, habitat area, habitat protection area, habitat or wildlife corridor, environment protection, escarpment, escarpment protection or escarpment preservation, floodway, littoral rainforest, nature reserve, scenic area or scenic protection, or wetland.

Based on the above determination, the remediation works for the site are considered Category 1 and development consent will be provided by the SEARs of SSD-87245208. Notification to the consent authority (NSW Department of Planning, Housing and Infrastructure) is required prior to commencement of remediation. Council should also be notified. It is anticipated that notification should be provided no later than 30 days prior to the commencement of remediation works. The notification will;

- Be in writing;
- Provide contact details for the notice;
- Briefly describe the remediation work;
- Show why the work is considered *Category 2* remediation;

- Specify the property address and description on which the remediation is to be carried out;
- Provide a location map; and
- Provide estimates for commencement and completion dates of the work.

Provision of this RAP, as well as an indication of commencement and completion dates of the works in writing, is usually sufficient to meet the requirements of this notification.

6.4.2 Development Consent and Control Plans

All works should be in accordance with State Environmental Planning Policy and any development consent (SEARs) issued by NSW Department of Planning, Housing and Infrastructure for the development.

6.4.3 Planning Requirements

The appointed site remediation contractor must prepare a site-specific work health and safety plan (WHSP), construction environmental management plan (CEMP) and asbestos management plan (AMP) for the project, covering human / environmental health and safety issues.

7. Remediation Works

7.1 Remediation Sequence

Site characterisation revealed the presence of asbestos impacted fill soils at two locations (BH103 and BH105) **Appendix A, Figure 2**.

Depending on data gap closure investigations, remediation of other areas may be necessary before the site is deemed suitable for the proposed (mixed residential, commercial and recreational) land use.

It is envisaged that the remediation works will include (though not necessarily be limited to):

- **Stage 1** – Preliminaries and site establishment;
- **Stage 2** – Demolition and surface (clearance) inspection for evidence of remnant demolition waste and potential contaminants;
- **Stage 3** – Data Gap Closure Investigation;
- **Stage 4** – Remedial Excavation of identified asbestos impacted soils;
- **Stage 5** – Waste classification and management;
- **Stage 6** – Final site validation and reporting.

Contingent Action

Should an unexpected find or area of high level (residual) contamination be encountered during the course of the remediation, then the procedures described under *Contingency Management* (**Section 8.5**), *Unexpected Find Protocol* (**Appendix F**) and/or the *Validation Strategy* (**Section 9**) will be implemented, until the remediation goal has been achieved and the site is deemed suitable for the proposed (mixed residential, commercial and recreational) use.

7.2 Stage 1 – Preliminaries and Site Establishment

Council Notification

Notice must be given to NSW Department of Planning, Housing and Infrastructure at least 30 days prior to the commencement of remediation works as outlined in **Section 6.4.1**. A list of all required work permits must be obtained from Council and arrangements are to be made to obtain the necessary approvals from the relevant regulatory authorities.

Site Preparation and Planning

The site should be prepared in accordance with the general requirements of the site management details outlined in **Section 6**. Before site works commence, the site contractor will prepare site specific plans including a work health and safety plan (WHSP), construction environment management plan (CEMP) and an asbestos management plan (AMP).

It will also be necessary to establish environmental controls, site access, security, fencing and any required warning signage prior to works commencement.

A project plan should also be developed to outline engineering design for excavation support (if required), dewatering management, water treatment requirements and design (if required), staging of excavation works, stockpiling, waste stabilisation, waste material loading, traffic management and waste tracking.

The Project Plan should incorporate a staging plan that outlines the basic stages of the remediation works. The staging plan should include, but not be limited to:

- Staging of areas to be excavated;
- Asbestos Air Monitoring (AAM) set up prior to commencement involving friable ACM impact area;
- Areas designated for waste segregation, screening and storage (stockpiling), amenities, soil and groundwater treatment (if required);
- Truck movements to allow loading to mitigate impacts to surrounding land users and council infrastructure; and
- Details of any required environmental management measures such as, dust control.

Remediation Workshop

As part of the site preparation phase a remediation workshop should be conducted with the appointed contractor(s) to further develop required remedial measures, excavation plans, waste classifications, and environmental management requirements.

It would be appropriate for the appointed environmental consultant to be present at the workshop to provide guidance in relation to environmental management measures to be applied during the remediation and site validation activities.

7.3 Stage 2 – Demolition and Surface Inspection

Demolition of Structures

A Hazardous Materials Survey will be required prior to demolition of any existing structures, to ensure that hazardous materials that may have been used within the structures are identified and appropriately managed during demolition to prevent potential spreading of contamination and potential health risk to site workers. The removal of hazardous materials shall be completed by a suitably qualified contractor. Building demolition should be in accordance with Australian Standard AS2601-2001 and wherever possible, waste should be segregated into metal, wood

and brick / concrete. Further guidance is provided by SafeWork NSW (2019) Code of Practice – Demolition Work August 2019.

Surface Inspection

Following building / pavement demolition and removal of demolition wastes, an inspection of the surface/exposed soil surface is to be performed by a qualified and experienced environmental consultant to assess any visual signs of contamination, such as remnant asbestos contamination remaining on surface soils following demolition, buried building waste (potentially containing asbestos) and foreign materials, and other features such as surface staining/discolouration and odour.

The objectives of the inspection are to check for:

- Contamination by fragments of ACMs;
- The presence of sub-surface slabs;
- Petroleum / chlorinated hydrocarbon staining and odour, or other soil discolouration; and
- The presence of buried waste.

Since friable asbestos was identified during investigation phase, asbestos clearance should involve remedial soil excavation, sampling, laboratory analysis (asbestos quantification) and inspection by a SafeWork NSW Licensed Asbestos Assessor (LAA).

Should an unexpected find be discovered, then the procedures described under *Contingency Management (Section 8.5)*, *Unexpected Find Protocol (Appendix F)* and/or the *Validation Strategy (Section 9)* will be implemented. If additional areas of ACMs are encountered, soil sampling and asbestos fibre analysis will be triggered.

All findings from the surface inspection are to be documented in the final site validation report.

7.4 Stage 3 – Data Gap Closure Investigation

Additional soil characterisation will be conducted as follows. Sampling locations area shown on **Figure 2, Appendix A:**

- Eight test pits within the boundaries of 17 Oxford Street to delineate ACM impact in (fill) soils around borehole BH103 and BH105;
- Eleven test pits within the site boundary to investigate areas that were previously inaccessible:
 - One test pit within the western proposed landscape area of 13-15 Oxford Street, for waste classification and site characterisation purposes.
 - Three test pits within the boundary of 2 Verona Street, for waste classification and site characterisation purposes.
 - Seven test pits at locations previously not investigated and within the 17 Oxford Street boundary for verification of asbestos impacts and for waste classification purposes
- Fill (at least one sample from each test pit) and natural soil samples are to be collected and representative samples analysed for asbestos quantification.
- The total number of sampling locations, using test pits, satisfies double density soil sampling requirements, in accordance with WADOH (2009/2021) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.
- Analytical results of tested samples will verify the contamination status of the soil and will aid in the Waste Classification process.

Note: An AMP will need to be prepared, and appropriately licenced asbestos removal contractors should be engaged, prior to any excavation work relating to the ACM impacted area.

7.5 Stage 4 – Remedial Excavation of ACM impacted soils

Remedial excavation of friable asbestos-impacted fill (BH103, BH105 and any other area identified in **Stage 3**) must be conducted by Class A asbestos removal contractor (ARC) and supervised by suitably qualified environmental professional. Appropriate control measures must be implemented during excavation of soil material at the site, as described in **Section 8**. Air monitoring for asbestos will be required during asbestos removal works. The assumed extent of remedial excavation of BH103 and BH105 hotspots is a 5m x 5m area, for the depth of fill. The proposed remedial excavation area is shown of **Figure 2, Appendix A**.

Should odours be significant enough to cause nuisance at a site boundary, then measures for odour control must be adopted, as described under the unexpected find protocol (**Appendix F**).

Soil contamination (i.e. asbestos) will be remediated using the following procedure:

- Mark out the impacted area. The extent of the impact should be marked in a way to withstand external conditions and should be readily identifiable during the entire remedial works program, to enable contaminated soil chase-out excavations and revalidation, if necessary.
- Plant, machinery and/or other equipment used for the excavation works should be dedicated to the individual excavation, and should be clean and free of all solid materials prior to the start of remedial excavation works.
- Soils which have been classified under the same waste category will be excavated and directly loaded onto the same transport vehicle.
- Under the NSW Waste Regulations 2014, different waste streams must be kept separate. Soils with different waste classifications cannot be loaded onto the same waste transport vehicle, for landfill disposal purposes.
- Should the temporary stockpiling of excavated, contamination soils be necessary, soils from different areas must be stockpiled separately and isolated from all other excavated materials, on an impermeable surface (such as a plastic liner). Stockpiles should also be protected from wind to avoid airborne dispersion of dust.
- Any soils with heavy staining and/or exhibiting odours are to be isolated from other excavated materials, for additional waste classification sampling and testing.
- Validation samples will be collected from excavation surfaces for laboratory analysis of the contaminant (or group of contaminants) for which the respective area is being remediated (i.e. asbestos). Validation sampling methodology is described in **Section 9**.
- Should any validation sample from any remedial excavation be found to contain contaminant concentrations that exceed the adopted soil remediation criteria, additional chase-out excavations will be conducted to remove more fill from the area of residual impacts, followed by resampling for revalidation testing.
- When all validation samples show results that are below the adopted remediation criteria, the area will be deemed as effectively remediated.

Notes:

The “chase-out” excavation procedure shall be adopted for any unexpected finds identified during the remediation program. Validation testing of such will depend on the specific COPC(s).

Appropriate shoring and soil stability should be considered for remedial excavation and chase-out of sand fill. Clean-up to the extent practicable (CUTEP) should be adopted for excavations at site boundaries. Geotechnical advice should be sought for excavation works, particularly in sand.

Additional waste classification may be necessary for suspicious materials which exhibit odours or appear stained or discoloured. The discovery of such soils should be treated as an “unexpected find” and will trigger application of the *Unexpected Finds Protocol* provided in **Appendix F**. In this situation, the

appointed environmental consultant should be immediately informed, so that evaluation and waste characterisation can be undertaken.

Generators and transporters of *Special Waste (Asbestos)* have a legal obligation to ensure their waste is transported to a lawful place under Clauses 76 and 79 of the *Protection of the Environment (Waste) Regulation 2014*. Consignors, transporters and facilities receiving such waste must use "WasteLocate" to provide information to the EPA regarding their movement within NSW. The EPA website <https://wastelocate.epa.nsw.gov.au/> provides further information

7.6 Stage 5 – Waste Management and Waste Classification

Material handling and management procedures will be implemented as detailed in **Section 8** for any excavated material. Any material designated for offsite disposal must be classified in accordance with NSW EPA (2014) *Waste Classification Guidelines*.

Note: Previous in situ investigation data can be utilised for this purpose.

The procedure for waste classification will occur as follows:

7.6.1 Waste Classification – Stockpile

- Stockpiled materials designated for waste classification would be collected at a rate of one sample per 25 m³ (minimum of three samples) up to 250 m³. For stockpiles exceeding 250 m³ but less than 2,500 m³, a minimum of 10 samples is required and 95% UCL statistical calculations of contaminant concentrations may be used for classification.
- The analytical suite for waste classification will include six priority metals (arsenic, cadmium, chromium, lead, mercury and nickel), TPH, BTEX, PAH, OCP, OPP, PCB and asbestos (presence/absence), with TCLP testing (as required) and any additional chemicals of potential concern that may be identified during site remediation.
- Preparation of a Waste Classification report detailing the interpreted soil waste classification for each stockpile, NSW EPA (2014) *Waste Classification Guidelines*, to enable appropriate off-site disposal.
- Stockpiles from different remediation areas and different soil profiles shall be kept separate. Stockpiles should be placed on either intact hardstand pavement or high density polyethylene (HDPE) plastic liner and limited to a maximum height of 2m. Stockpiles should be surrounded by star pickets and marking tape, or other suitable material, to clearly delineate boundaries. Stockpiles shall be lightly conditioned by water sprinkler to prevent dust blow and/or covered with tarp if longer duration is required. Where stockpiles are to remain onsite for a period >24 hours, silt fences or hay bales should be erected around each stockpile to prevent losses from surface erosion (runoff).

7.6.2 Waste Management

The general process for conducting appropriate waste characterisation, transport and disposal is as follows:

- Surplus fill and natural soil to be disposed from the site must be classified according to NSW EPA (2014) *Waste Classification Guidelines*.
 - **Note:** Data gap investigation (**Stage 3**) and previous investigation results (**Section 3**) can be utilised for in situ classification of surplus fill and natural soil, that will be removed for basement construction and following remedial excavation of impacted soil (**Stage 4**). This enables excavation and direct load-out of surplus soil for offsite disposal according to waste classification.

- Waste Classification reports must be issued by the environmental consultant according to the assessed classification and quantity prior to off-site disposal.
- The earthworks contractor must identify suitably licenced waste landfill premises for disposal of waste materials and confirm that the premises will accept the waste in accordance with its Environmental Protection License (EPL).
- Waste classified soils for disposal shall be loaded onto NSW EPA-licensed waste vehicles for transport to the designated landfill premises.
- Waste transport contractors must carry a copy of the relevant Waste Classification with every transported load.
- The waste must be transferred to the designated premises in accordance with applicable legislation.
- Transport of contaminated material should be via a clearly designated haul route from the site to the landfill premises that minimises exposure to sensitive communities. The proposed waste transport route should be notified to Council and truck dispatch shall be logged and recorded by the contractor for each load leaving the site.
- The earthworks contractor must supply the individual waste dockets for each waste load to the environmental consultant via the Site Manager, in a timely manner. The waste dockets are required for validation reporting purposes.

Other important requirements as part of the waste management are as follows:

- Additional waste classification may be necessary for suspicious materials which exhibit odours or appear stained or discoloured. The discovery of such soils should be treated as “unexpected finds” and will trigger application of the Unexpected Finds Protocol provided in **Section 8.5**. In this situation, the Environmental Consultant should be immediately consulted for evaluation and waste characterisation of the materials.
- A site log shall be maintained by the contractor for each discrete excavation (numbered locations) to enable the tracking of disposed loads against on-site origin and location of the materials.
- Environmental controls must be implemented to prevent exposure to workers and the public and are described further in **Section 8** of this RAP.

7.6.3 Management of VENM

During site works, virgin excavated natural materials (VENM), as defined in the NSW EPA (2014) *Waste Classification Guidelines*, may be identified as suitable for off-site re-use. Confirmation of the VENM waste classification must be made with the concurrence of appointed environmental consultant. The re-use of VENM at an off-site location must be approved in writing by the receiving site land owner before it is transported from the site.

Once fill has been removed, visual inspection of exposed natural soil should be undertaken by the Environmental Consultant to verify fill removal. Validation samples may be required of the exposed natural soil to verify data and in situ waste classification from data gap and previous investigations.

The earthworks contractor must provide the following to the environmental consultant and client for reporting purposes:

- All approval documents and correspondence from the receiving site authority and approver;
- Details of VENM volumes excavated from the site, including the measured depth below existing ground level, or surveyed elevation of the VENM at the top and bottom excavation levels;
- Laboratory results from samples of designated material verifying a classification as VENM;

- A description of the VENM that was sent to the receiving site; and
- Copies of VENM weighbridge dockets, trip tickets and/or consignment disposal confirmation that confirms the date, exit time, and truck license plate and operator for each load.

In advance of VENM excavation, VENM must be protected from exposure to site contamination activities or materials. Measures to protect VENM from exposure to contamination may include:

- Covering VENM in-situ or in stockpile with plastic sheeting;
- Placing stockpiled VENM on top of protective plastic sheeting;
- Minimising time of exposure to the site environmental conditions; and
- Relocating contaminated soils and/or contaminating activities (i.e. plant refuelling) away from VENM.

7.6.4 Management of ENM

If the volume of natural soils to be removed includes up to 2% of foreign materials, then a classification of *excavated natural material* (ENM) might be achievable, subject to compliance with the ENM classification. This classification must be verified by sampling and laboratory analysis to confirm that the materials meet the specific chemical and other material requirements detailed in the NSW EPA *Excavated natural material order 2014*; and *The excavated natural material exemption 2014*.

7.7 Stage 6 – Final Surface Inspection, Validation Sampling and Reporting

Validation sampling should be performed as detailed in **Section 9**. All results shall be presented in a Site Validation Report, prepared by the Environmental Consultant in accordance with the EPA (2020) *Consultants Reporting on Contaminated Land: Contaminated Land Guidelines*. The report will document all aspects of the remediation and site validation program, include an assessment of the environmental data for remaining site soil against the adopted remediation acceptance criteria and provide a clear conclusion that the site has been remediated to a suitable standard for the proposed land uses.

Further details on what will be included in the validation report are provided in **Section 9**.

7.8 Remedial Contingencies

It is anticipated that the proposed remedial technology will be effective in dealing with the identified contamination; however, remedial contingencies may be required should the scenarios detailed in **Table 7-1** arise.

Table 7-1 Remedial Contingencies

Scenario	Remedial Contingencies/Actions Required
Contaminated soils not identified during previous investigations are encountered, particularly at site boundaries	Work to be suspended until the Environmental Consultant can further assess impacted soils/ materials and associated risks. Follow the unexpected finds protocol as detailed in Appendix F of this RAP.
Underground storage tanks (USTs) are encountered at the site	Systems to be removed and the excavations appropriately validated and backfilled by experienced contractor. Tank removal works reported by appropriate environmental consultant in accordance with NSW EPA (2020b) <i>Guidelines for the implementation of the POEO (underground petroleum storage systems) Regulation 2019</i> and Australian Standard AS4976 (2008). Follow the unexpected finds protocol as detailed in Appendix F .
Additional asbestos wastes are encountered	Work to be suspended and asbestos work removed by a suitably qualified contractor, in accordance with SafeWork NSW regulations. Follow the unexpected finds protocol as detailed in Appendix F .
Remnant soil impacts remain on-site	Review/assess soil conditions. Carry out site specific second tier risk assessment (if required). Review/assess potential vapour hazard. If there is a vapour risk additional remedial measures may be required such as installation of a vapour barrier or passive or active vapour extraction system. Amendment to RAP required.
Contaminated groundwater (including LNAPL or DNAPL) encountered	Review groundwater conditions on site (if required) and determine need for further investigation/remediation and/or longer-term management plan. Any dewatering may require approval under the <i>Water Management Act 2000</i> . Remedial options may include natural attenuation, extraction, bio-remediation, phase-separated hydrocarbons (PSH) recovery using active pumping (including hydraulic control), installation of a groundwater permeability barrier, in situ oxidation or stabilisation. Amendment to RAP required.
Groundwater contaminant plume is identified and is migrating off-site, or there are increases in concentration due to increased infiltration	Review contaminant increase and analytes. Review active remediation alternatives (if necessary). Ensure down-gradient monitoring is undertaken. Carry out fate and transport modelling (if required) and assess the need for further action. Amendment to RAP required.
Contamination is identified near heritage items or significant trees (if identified)	Stop work. Review contaminant concentrations and risks to heritage items / flora. Assess human health and environmental risks if contamination remains in place. Review natural attenuation options.
Changes in proposed excavation depth or lateral extent	Review remediation works for the site.
Changes in proposed land use(s) at the site	Review remediation works for the site.

8. Site Management

8.1 Roles and Responsibilities

The responsibilities for the various parties involved with the remediation program are outlined in **Table 8-1**.

Table 8-1 Site Management Responsibilities

Responsible Party	Details	Responsibilities
Property Owner / Principal	17 OXFORD ST PTY LTD	Implementation of and compliance with the RAP. Notification to contractors of the existence of RAP. Provision of copies of the RAP. Notification of commencement of remediation to NSW Department of Planning, Housing and Infrastructure
Project Manager	17 OXFORD ST PTY LTD	Overall management of the site remedial activities.
Remediation Contractor	To be confirmed	Preparation of a site-specific WHSP and CEMP. Liaison between the appointed Environmental Consultant and Council, providing regular updates and informing of any problems encountered. Ensuring site remediation works are carried out in an environmentally responsible manner, as identified in the approved RAP. Ensuring all environmental protection measures are in place and functioning correctly. Reporting any environmental issues to the Project Manager and Environmental Consultant. Inducting all site personnel, including subcontractors and authorised visitors, on procedures with respect to site works, the WHSP and environmental management. Maintaining site induction, site visitor and complaint registers. Ensuring that fugitive emissions are suitably controlled and minimised. Ensuring that water containing any suspended matter or contaminants is minimised, does not leave the site and is suitably controlled, so as not to pollute the environment. Ensuring that vehicles are cleaned and secured so that no mud, soil or water is deposited on any public roadways or adjacent areas. Ensuring that noise and vibration levels comply with the legislative requirements.
Environmental Consultant	EI Australia	On-site guidance of the remedial works. Coordination of validation works, documentation, notifications and permits required to conduct remedial works to a standard suitable of obtaining approval from the EPA. Completing validation sampling and monitoring as requested by the Remediation Contractor and dictated by the RAP. Liaison between remediation contractor and the client. Preparation and submission of supporting documentation.

8.2 Work Health and Safety Plan

As required by the NSW *Work Health and Safety Act 2011* and associated regulations, a site-specific WHSP must be prepared, to manage the health and safety of site workers and nearby residents, and address such issues as site security, exclusion zones, excavation safety, vibration, noise, odour and dust levels. The plan should address the risks during the remediation works and cover site specific requirements associated with the contaminants present within the site soils and groundwater.

The remediation contractor shall be responsible for drafting and implementing the WHSP, including the induction of all site personnel. It is the contractor's responsibility, with assistance from the principal / project manager, to ensure that all permits, approvals, consents or licences are current.

Potential Hazards

The potential hazards and mitigation measures relevant to the remedial works are summarised in **Table 8-2**.

Table 8-2 Remedial Hazards

Anticipated Problem	Corrective Actions
Chemical Hazards	Contaminated sites have chemical compounds, substances or materials that may present a risk to human health and the environment. Asbestos in fill is a contaminant of concern and associated risks for the site are as detailed in the Conceptual Site Model Section 3.2 . The site specific WHSP should set out controls to mitigate any potential risks.
Physical Hazards	The following hazards are associated with conditions that may be created during site remediation works: ▪ Heat exposure; ▪ Buried services; ▪ Noise, vibration and dust; ▪ Electrical equipment; and ▪ The operation of heavy plant equipment.
PPE	Personnel should, wherever possible, avoid direct contact with potentially contaminated material. Workers are to ensure that surface / ground water is not ingested and that direct skin contact with soil and water is avoided. Standard PPE with the addition of (disposable) P2 dust masks are to be made available during the remedial works. Standard PPE includes: ▪ Long sleeve shirt and trousers; ▪ Steel-toe footwear; ▪ Safety glasses (as required); ▪ Helmet (as required); ▪ Hi-visibility vest/clothing (as required).

Air Monitoring

Friable asbestos has been identified on-site; hence, during the building demolition and soil remediation, monitoring of air-borne asbestos fibres is required by regulation. The methodology of air monitoring is to be in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres* [NOHSC: 3003 (2005)], with the filters to be analysed by a NATA-accredited laboratory. The criteria and actions that will apply to this project are summarised in **Table 8-3**.

Table 8-3 Criteria for Air Monitoring of Asbestos Fibres

Control Level (fibres/mL)	Control / Action
<0.01	No Action. Continue with existing control measures.
≥0.01	Asbestos Consultant to notify Project Manager as soon as practicable. Asbestos Consultant and Project Manager to review current methodology and/or control measures, and improve / incorporate new measures, where applicable.
≥0.02	Asbestos Consultant to notify <i>Class A</i> contractor and Project Manager as soon as practicable. <u>Stop work</u> immediately. Asbestos Consultant, and Project Manager to review current methodology and/or control measures, and improve / incorporate new measures, where applicable Asbestos Consultant to conduct investigations to establish cause of problem. Air monitoring to be continued. Contractors will be allowed to return to works area after results are <0.01 fibres/mL.

8.3 Materials Handling and Management

Table 8-4 summarises the measures that should be implemented in respect of materials handling during remedial and excavation works at the site.

Table 8-4 Material Handling Requirements

Item	Requirements
Earthworks contractors	Excavation of fill materials should be completed by a suitably qualified contractor. The contractor must ensure: - No discernible release of dust into the atmosphere as a consequence of the works. - No discernible release of contaminated soil into a waterway as a consequence of the works. - There are no pollution incidents, health impacts or complaints. - All site-specific management plans such as WHSP, CEMP and AMP should be followed.
Stockpiling of materials	All stockpiles will be maintained as follows: - Stockpiles must be located on sealed surfaces such as sealed concrete, asphalt, or high density polyethylene. - Should stockpiles be placed on bare soils, the surface should be lined with builder's plastic or geofabric before stockpile placement, in a location that will not pose any environmental risk, and then covered with builder's plastic. - Excavated soils should be stored in an orderly and safe condition (≤2m height). - Stockpiles should be battered with sloped angles to prevent collapse. - Stockpiles should be covered after being lightly conditioned by water sprinkler to prevent dust blow and control odours. - Air emissions to be controlled by using a hydrocarbon mitigation agent, such as BioSolve®, Pinkwater®, Anotech® or an equivalent product selected by the contractor, in combination with the fine mist spraying. - Should a stockpile remain <i>in situ</i> for over 24 hours, silt fences or hay bales are to be erected around it, to prevent losses from surface erosion (runoff). - Stockpiles shall be strategically located to mitigate environmental impacts while facilitating material handling requirements.
Loading of material	Loading of stockpiles / materials will be as follows: - Transport of contaminated material off the site is to be via a clearly distinguished haul route. - Measures shall be implemented to ensure that no contaminated material is spilled onto public roadways or tracked off-site on vehicle wheels. Such measures should include the use of a wheel washing/cleaning facility, placed before the egress point on the site, and should be able to handle all vehicles and plant operating on-site. - Residue from the cleaning facility should be collected and either dewatered on site in a contained / bunded area, or disposed as a slurry to an approved facility. Such residue will be

Item	Requirements
	deemed contaminated unless proven otherwise.
Transport of materials	Prior to being assigned to an appropriate waste disposal facility, all waste fill/soils will be classified in accordance with the EPA (2014a) <i>Waste Classification Guidelines</i>. If prior immobilisation treatment of the waste soils is required, disposal consent will be obtained from the EPA prior to spoil transport. ▪ All trucks transporting soils from the site are to be covered with tarpaulins (or equivalent). ▪ All haulage routes for trucks transporting soil, materials, equipment and machinery shall comply with all road traffic rules, minimise noise, vibration and odour to adjacent premises, utilise state roads and minimise use of local road. ▪ All deliveries of soil, materials equipment or machinery should be completed during the approved hours of remediation and exit the site in a forward direction. ▪ Removal of waste materials from the site shall only be carried out by a recognised contractor holding the appropriate EPA licenses, consents and approvals. ▪ Waste materials must be transported less than 150km from the source (POEO 1997 Waste 2014) and landfills are required to be licensed for the category of waste they are scheduled to receive. Additional conditions apply to material that is classified as <i>Hazardous Waste</i>.
Material tracking	Materials excavated from the site should be tracked from the time of excavation until disposal. Tracking of the excavated materials should be completed by recording the following: ▪ Origin of material; ▪ Material type and approximate amount (volume / tonnage); and ▪ Truck registration number. Disposal locations will be determined by the remediation contractor. Disposal location, waste disposal documentation (weighbridge dockets) and the above listed information should be provided to the remediation consultant for reporting purposes. Consignors, transporters and receivers of <i>Special Waste (Asbestos)</i> must use "WasteLocate" to provide information to the EPA regarding their movement within NSW. Further information about the "WasteLocate" system is available online at https://wastelocate.epa.nsw.gov.au/.
Visual inspection prior to sampling	Upon completion of the remedial works as specified within this RAP, the following will apply: ▪ A LAA should undertake a visual inspection of the work area. If visual observations indicate contamination, the earthworks contractors should rectify any issues arising from the inspection (i.e. further excavation or 'chasing out' until soils show no evidence of contamination based on visual inspection and/or odours). ▪ Following satisfactory completion of the visual inspection, validation sampling of soils should be completed. Validation sampling is discussed in Section 9. Only following satisfactory validation will remedial works be deemed as completed.

8.4 Environmental Management

All remediation work must be undertaken with due regard to the minimisation of environmental effects and meet all statutory environmental and safety requirements. The WHSP, CEMP and AMP must therefore address the issues identified in **Table 8-5**.

Table 8-5 Environmental Management Requirements

Category	Measure
Site Stormwater Management and Control	Appropriate measures shall be taken to ensure that potentially contaminated water does not leave the site. Such measures should include, but not be limited to: ▪ Diversion and isolation of any stormwater from any contaminated areas; ▪ Provision of sediment traps including geotextiles or hay bales; and ▪ Discharge of any water to drains and water bodies must meet the appropriate effluent discharge consent condition under the <i>Protection of the Environmental Operations Act 1997</i>.
Soil Management	Appropriate measures shall be taken to ensure soils are excavated using an appropriate methodology, to reduce nuisance dust and odours from leaving the boundary. Soils are to be disposed of in accordance with the NSW <i>Protection of the Environment</i>

Category	Measure
	<i>Operations (Waste) Regulation 2014.</i>
Dust and Odour	Control of dust and odour during the course of the remediation works shall be maintained by the contractor to ensure no nuisance dust or odours are received at the site boundary according to requirements of the <i>City of Sydney Development Control Plan 2012</i>. Action levels and specific control measures would be described in the site CEMP and may include, but not necessarily be limited to the following: ▪ Site wide water spraying, as and when appropriate, to eliminate wind-blown dust; ▪ Use of mist sprays on stockpiles and fill screening areas to lightly condition the material; ▪ Use of tarpaulin or tack-coat emulsion to prevent dust blow from stockpiles or vehicle loads; ▪ Covering of stockpiles or loads with polythene or geotextile membranes; ▪ Restriction of stockpile heights to 2m above surrounding site level; ▪ Ceasing works during periods of high winds and/or heavy rain; and ▪ Regular checking of fugitive dust and odour levels, to ensure compliance with the CEMP, undertaking immediate remedial measures to rectify any cases of excessive dust or odour (e.g. use of misting sprays or odour masking agent). It is advised that all site workers use adequate dust masks during soil excavation and that machine operators remain within an enclosed, air conditioned cabin.
Noise and Vibration	Noise and vibration will be restricted to reasonable levels. All plant and machinery used on site will be noise muffled to ensure emissions do not breach statutory levels as defined within the <i>City of Sydney Development Control Plan (DCP)</i>
Hours of Operation	Working hours will be restricted to those specified in the site-specific development application conditions.
Community Engagement	Community engagement should be carried out in accordance with Schedule B(8) of the NEPM (NEPC, 2013). Prior to the commencement of any remediation works at the site, every owner and occupier of any land located either wholly or partly within 100m of the boundary of the premises (including local council) should be notified at least 30 days in advance. The notice should include: ▪ Advice of demolition and excavation work to be carried out on the premises; ▪ State the time and date such work is to commence; ▪ Indicate that the works are being conducted to minimise any risk of site contamination impacting on off-site receptors; ▪ Provide appropriate signage at an easily readable location on the site fencing, including contact name and phone number should any matter arise; and ▪ Provide contact information and procedure for registering any complaints.
Incident Management and Community Relations	To ensure that a suitable response is carried out quickly, reporting of any incident on-site is to be completed and the responsibilities assigned. The WHSP and CEMP should document the procedure and responsibilities, and incident contact numbers should be maintained in an on-site register. All other relevant emergency contact numbers such as Police, Fire Brigade, and Hospital should be listed in the WHSP and posted on-site for easy access.

8.5 Contingency Management

It is anticipated that the proposed remediation methodology will be effective in dealing with the identified contamination; however, remedial contingencies may be required should the scenarios detailed in **Table 8-6** arise. The *Unexpected Find Protocol (Appendix F)* should also be followed should an incident occur.

Table 8-6 Contingency Management Procedures

Problem	Corrective Actions
Chemical / Fuel Spill	Stop work, notify project manager. Use accessible soil or appropriate absorbent material on-site to absorb the spill (if practicable). Stockpile the impacted material in a secure location, sample and determine the

	appropriate disposal/treatment option.
Excessive Dust	Use water spray to suppress. Stop site activities generating the dust until it abates.
Excessive Noise	Identify and isolate the source if possible. Modify the actions of the source or erect temporary noise barriers if required.
Excessive Odour / Vapour	Stage works to minimise odours/vapours. If excessive organic odours are being generated, stop works and monitor ambient air with a photoionisation detector (PID) at site boundaries. Implement control measures including respirators for on-site workers, use of odour suppressants, wetting down of excavated material. No nuisance odours shall be detected at any site boundary as part of the remedial works. Should odour emissions be detected at or beyond the site boundary, it is recommended, as part of the CEMP and community consultation, that the remediation contractor and project manager notify the owners and occupiers of adjoining premises. Notification should be in writing. In the notification, as well as on street signage, provide contact details of the site personnel for anyone who may be concerned by odour emission during the remediation. Hydrocarbon based air emissions to be controlled by using a hydrocarbon mitigation agent, such as BioSolve®, Pinkwater®, Anotech® or an equivalent product selected by the contractor, in combination with the fine mist spraying. Temporarily pause site works to allow for excess odour to subside to a level acceptable by off-site receptors, should it be necessary, after implementation of the above-listed control measures. Record logs for volatile emissions and odours. Such records should be kept on-site and made available for inspection on request. In regard to off-site impact from petroleum vapour, odour is generally detected at concentrations much lower than what will constitute a health-based risk. Measures noted above for odour control may also be applied for vapour control.
Excessive Rainfall	Ensure sediment and surface water controls are operating correctly. If possible, divert surface water away from active work areas or excavations.
Water in Excavations	Collect samples and assess against relevant POEO requirements to enable disposal options to be formulated.
Leaking Machinery or Equipment	Stop the identified leak (if possible). Clean up the spill with absorbent material. Stockpile the impacted material in a secure location, sample and determine the appropriate disposal/treatment option.
Failure of Erosion / Sedimentation Control Measures	Stop work, repair failed control measure.
Highly Contaminated Soils Encountered	Work to be suspended until the environmental consultant can assess impacted materials and associated risks. Follow the unexpected find protocol detailed in Appendix F of this RAP.
Additional UST Encountered	Systems to be removed and the area appropriately validated and backfilled. Tank removal works to be reported by the environmental consultant in accordance with EPA (2020b) <i>Guidelines for the Implementation of the POEO (Underground Petroleum Storage Systems) Regulation 2019</i> . Follow the unexpected find protocol detailed in Appendix F of this RAP.
Unearthing Unexpected Materials, Fill or Waste	Stop activities, contact the site project manager. Follow the unexpected finds protocol as detailed in Appendix F of this RAP. Prepare a management plan if required, to address the issue.
Equipment Failures	Ensure that spare equipment is on hand at site, or that the failed equipment can be serviced by site personnel or a local contractor.
Contaminated	Review groundwater conditions on site (if required) and determine need for further

Groundwater (including LNAPL or DNAPL) Encountered	investigation/remediation and/or longer-term management plan. Any dewatering may require approval under the <i>Water Management Act 2000</i>. Remedial options may include natural attenuation, extraction, bio-remediation, phase-separated hydrocarbon recovery using active pumping (including hydraulic control), installation of a groundwater permeability barrier, <i>in situ</i> oxidation or stabilisation. Amend RAP as required.
Contaminated Groundwater Plume Migrating Off-site	Review contaminant increase and analytes. Review active remediation alternatives (if necessary). Ensure down-gradient monitoring is undertaken. Carry out fate and transport modelling, and assess need for further action. Amend RAP as required.
Identification of Cultural or Building Heritage Items and/or Impact Thereof	Stop work and notify project manager. Prepare action or conservation plan as required. Review contaminant concentrations and risks to heritage items / flora. Assess human health and environmental risks if contamination remains in place. Review natural attenuation options.
Complaint Management	Notify client, project manager and environmental consultant (if required). Report complaint as per management procedures. Implement control measures to address reason of complaint (if possible). Notify complainant of results of remedial actions.

9. Validation Strategy

Remediation of the site will be deemed acceptable based on the achievement of the following:

- **Validation of Remedial Excavations** – Validation of all remedial excavation areas and stockpiles following the removal of site structures, and contaminated soils will be achieved through sampling and analysis of contaminants of concern to ensure that the remaining soils are suitable for the proposed land use.
- **Validation of Imported Materials** – Should backfilling be required, validation of imported fill materials used for the backfilling of remediated areas would be required to verify their suitability for the proposed land use.

The sampling and analysis quality plan (SAQP) will be crucial to the site validation phase. It must ensure that the data are representative and provide a robust basis for site decisions.

Soil

Validation sampling and analysis are required to confirm that soil materials remaining on-site, are suitable for the proposed mixed residential, commercial and recreational use. Site validation will be achieved when:

- All requirements of the RAP are confirmed as completed,
- All concentrations of the contaminants of concern in soil validation samples are below the adopted remediation criteria (**Section 4.2**); and/or
- The 95% upper confidence limit (UCL) of the average concentration for each analyte within retained material is below the corresponding remediation criterion.

Crucial to the site validation phase shall be the data quality objectives (DQOs), data quality indicators (DQIs) and sampling, analytical and quality plan (SAQP), the appropriate combination of which will confirm that the remediation goal is achieved and all sample data collected are accurate and representative, providing a robust basis for site decisions.

9.1 Sampling Methodology

Validation sampling will be undertaken following the removal of identified contaminated material to ensure that the vertical and lateral extent of the contamination has been defined, as outlined in **Table 9-1**. Soil sampling and handling of the collected samples will be as described in **Table 9-2**.

Table 9-1 Sampling Design

Task / Site Feature	Sampling Density	Analytical Program
Data Gap Investigation		
Additional test pits, to delineate hot spots and within previously unassessed areas (Figure 2, Appendix A)	8 test pits: 4 delineation test pits from each of locations BH103 and BH105	Asbestos delineation test pits: asbestos quantification (visual inspection of excavator bucket/10 L bulk sample and 500mL sample)
	11 test pits systematically located across the target area.	Unassessed areas: Fill and selected natural samples - Priority metals, TRH, BTEX, PAH, OCP, OPP, PCB, asbestos (visual inspection and 500mL sample)

Task / Site Feature	Sampling Density	Analytical Program
Validation		
Asbestos impacted locations (BH103 and BH105 (friable asbestos))	Wall – 1 sampling location per wall or per 5m length of excavation wall Base – 1 sample per 25m ²	Asbestos assessment: visual inspection of excavator bucket and 500mL sample
Chase-out excavation of impacted fill for a larger area	Sampling density must meet the requirements of NSW EPA (2022a) <i>Sampling Design Part 1 – Application</i> .	As determined during remedial programs
Stockpile Footprints (if stockpile pile not formed on hardstand, plastic sheeting or geofabric)	Systematic sampling on a 5m grid	Based on the contaminant identified in the stockpile during the remedial program)
Imported Soil materials (if required)	If material is required to be sourced from off-site to reinstate excavations, it will be certified suitable for the intended use. If no supporting documentation is available, confirmatory samples shall be collected at a rate of 1 per 100 m ³ .	Priority metals, TRH, BTEX, PAH, OCP, OPP, PCB, asbestos (presence / absence).
Waste Classification		
Surplus Soil (if required)	Equivalent to: One sample per 25m ³ of waste up to 250m ³ For wastes >250m ³ but <2500m ³ , ten samples (minimum) to be collected and statistical analysis by 95% UCLs to be applied	Waste Classification Parameters: Priority metals, TRH, BTEX, PAH, OCP, OPP, PCB and asbestos (with TCLP testing as required)
Stockpile	One sample per 25m ³ of waste up to 250m ³ For wastes >250m ³ but <2500m ³ , ten samples (minimum) to be collected and statistical analysis by 95% UCLs to be applied	Waste Classification Parameters: Priority metals, TRH, BTEX, PAH, OCP, OPP, PCB and asbestos (with TCLP testing as required)

Excavation of contaminated material shall continue until the analytical results indicate compliance with the adopted criteria (i.e. the concentrations of all contaminants of concern comply with the corresponding criterion), or the 95% UCL of the average concentration for each contaminant of concern is below the corresponding criterion. If results indicate that additional excavation is necessary, the contamination will be “chased out” until all material exceeding the validation criteria has been removed (and/or the 95% UCL is below the remediation criterion). Excavation chase out may be limited by site boundaries or geotechnical aspects. For these limitations, “clean-up to the extent possible” (CUTEP) should be adopted

Validation sampling and handling of collected samples are described in **Table 9-2 and 9-3**.

Table 9-2 Soil Validation Sample Collection and Handling Procedures

Action	Description of Methodology
Sample Collection	- Soil sampling will be directly from the exposed (excavated) surface / stockpile, or from the material brought to the surface by the backhoe / excavator bucket. - Sampling information, including soil classification, shall be recorded.
Field Screening (Site inspection, including remediation)	Soil will be assessed in-field for contamination indicators such as discolouration, staining, odour and presence of ACM. Sampling to be performed where impact is suspected.
Sampling, Handling, Transport and Tracking	The use of stainless-steel or disposable (one time use) equipment. All sampling equipment to be washed in a 3% solution of phosphate free detergent (Decon 90), followed by a rinse with potable water, prior to each sample being collected.

Action	Description of Methodology
	▪ Direct transfer of the sample into laboratory-supplied glass jars or plastic (zip-lock) bags, with each container sealed to eliminate cross contamination during storage and transportation to the laboratory. ▪ Each container shall be labelled with an individual and unique identification, including project number, sample number, depth, date and time of collection. ▪ Sealed sample containers shall be placed in an enclosed chest (containing ice bricks), prior to and during transport to the laboratory. ▪ COC documentation will be maintained, to ensure sample tracking / custody is confirmed.
Sample Containers and Holding Times	▪ Metals - glass jar or HDPE bottle / refrigeration 4°C / 6 months (maximum holding period). ▪ TRH/BTEX/PAH/OCP/OPP/PCB/phenols - glass jar, bottle and/or vials / refrigeration 4°C / 14 days (maximum holding period). ▪ PFAS - 50g HDPE jar or 50mL HDPE vial / refrigeration 4°C / 28 days (maximum holding period). ▪ Asbestos – up to 10 litre sealable 2 x plastic bags / no refrigeration / indefinite holding time. (asbestos quantification according to NEPC (2013) protocol)
Field Quality Assurance and Quality Control	Quality Assurance (QA) shall be maintained through: ▪ Development of site safety plans prior to works commencement; ▪ Adherence to SOPs; ▪ Storage of samples under secure, temperature-controlled conditions; and ▪ Completion of COC documentation. Quality Control (QC) measures shall include: ▪ Collection and analysis of intra- and inter- laboratory duplicates (10% collection rates, with DQI of <30% RPD); ▪ Analysis of one laboratory-prepared trip blank per sampling event (with results <LOR); ▪ Analysis of one laboratory-prepared trip spike per sampling event (with recoveries 80-120%); and ▪ Analysis of one equipment wash / rinsate blank per sampling event (with results <LOR).
Laboratory QA/QC	The contracted laboratory will conduct routine in-house QA/QC procedures in accordance with NATA-accreditation requirements, including the analysis of: ▪ Reagent blanks; ▪ Matrix spike and surrogate recoveries; ▪ Duplicates; and ▪ Laboratory control standards.
Achievement of DQOs and DQIs	An assessment of the DQO process and analytical data quality will be presented in the final site validation report, in accordance with the EPA (2017) <i>Guidelines for the NSW Site Auditor Scheme</i>.

9.2 Validation Reporting

Upon completion of the site remediation and validation phases, a *Site Validation Report* shall be prepared by the appointed environmental consultant in accordance with the EPA (2020a) *Consultants Reporting on Contaminated Land* and EPA (2017) *Guidelines for the NSW Site Auditor Scheme*.

The validation report will document all desk study findings, fieldwork methodologies, landfill tipping dockets, laboratory analyses, the updated CSM, the implementation of the RAP, investigation methodologies, results, and data quality assessment. It shall conclude with a statement regarding the suitability of the site for the proposed (mixed residential, commercial and recreational) land use and prepared in accordance with requirements described in:

- NSW EPA (2020a) *Consultants Reporting on Contaminated Land: Contaminated Land Guidelines, Table 2.6 Site Remediation and Validation*; and
- NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme*.

The site validation report should also:

- Provide a clear concluding statement that the site has been remediated to a suitable standard for the proposed development; and
- Be submitted for Council and/or a Site Auditor (if engaged) at the completion of the remediation program.

10. Conclusion

This RAP has been prepared to inform the remediation works at 17 Oxford Street, Paddington NSW in order to render the site suitable for the proposed use.

The purpose of this RAP is to establish a sequential process for remediation and validation works to guide remedial activities for the identified contamination at the site, and to comply with the *State Environmental Planning Policy* (Resilience and Hazards) (2021).

The objectives of this RAP, as outlined in **Section 1.2**, have been addressed. The preferred remedial option for the site involves excavation and off-site disposal of USTs, associated UPSS infrastructure and associated impacted soils to licensed waste facilities. All wastes shall be transported to appropriate, EPA-licensed facilities, after formal classification.

It is envisaged that the remediation works will include (though not necessarily be limited to):

- **Stage 1** – Preliminaries and site establishment;
- **Stage 2** – Demolition and surface (clearance) inspection for remnant demolition waste and potential contaminants;
- **Stage 3** – Data Gap Closure Investigation;
- **Stage 4** – Remedial Excavation of identified asbestos impacted soils;
- **Stage 5** – Waste classification and waste management;
- **Stage 6** – Final site validation and reporting.

Should an unexpected find or area of significant contamination be encountered during the course of the remediation, then the procedures described under *Contingency Management* (**Section 8.5**), *Unexpected Find Protocol* (**Appendix F**) and/or the *Validation Strategy* (**Section 9**) will be implemented, until the remediation goal has been achieved and the site is deemed suitable for the proposed use.

EI considers that the site can be made suitable for the proposed (mixed residential, commercial and recreational) use through the implementation of this RAP.

11. Statement of Limitations

This report has been prepared for the exclusive use of 17 Oxford Street Pty Ltd (the client), being the only intended beneficiary of our work. The scope of the RAP is limited to that agreed with our client.

No other party should rely on the document without the prior written consent of EI, and EI undertakes no duty, or accepts any responsibility or liability, to any third party who purports to rely upon this document without EI's approval.

EI has used a degree of care and skill ordinarily exercised in similar investigations by reputable members of the environmental industry in Australia as at the date of this document. No other warranty, expressed or implied, is made or intended. Each section of this report must be read in conjunction with the whole of this report, including its appendices and attachments.

The methods and conclusions presented in this report are based on a limited investigation of conditions, with specific sampling locations chosen to be as representative as possible under the given circumstances.

EI's professional opinions are reasonable and based on its professional judgment, experience, training and results from analytical data. EI may also have relied upon information provided by the client and other third parties to prepare this document, some of which may not have been verified by EI.

EI's professional opinions contained in this document are subject to modification if additional information is obtained through further investigation, observations, or validation testing and analysis during remedial activities. In some cases, further testing and analysis may be required, which may result in a further report with different conclusions.

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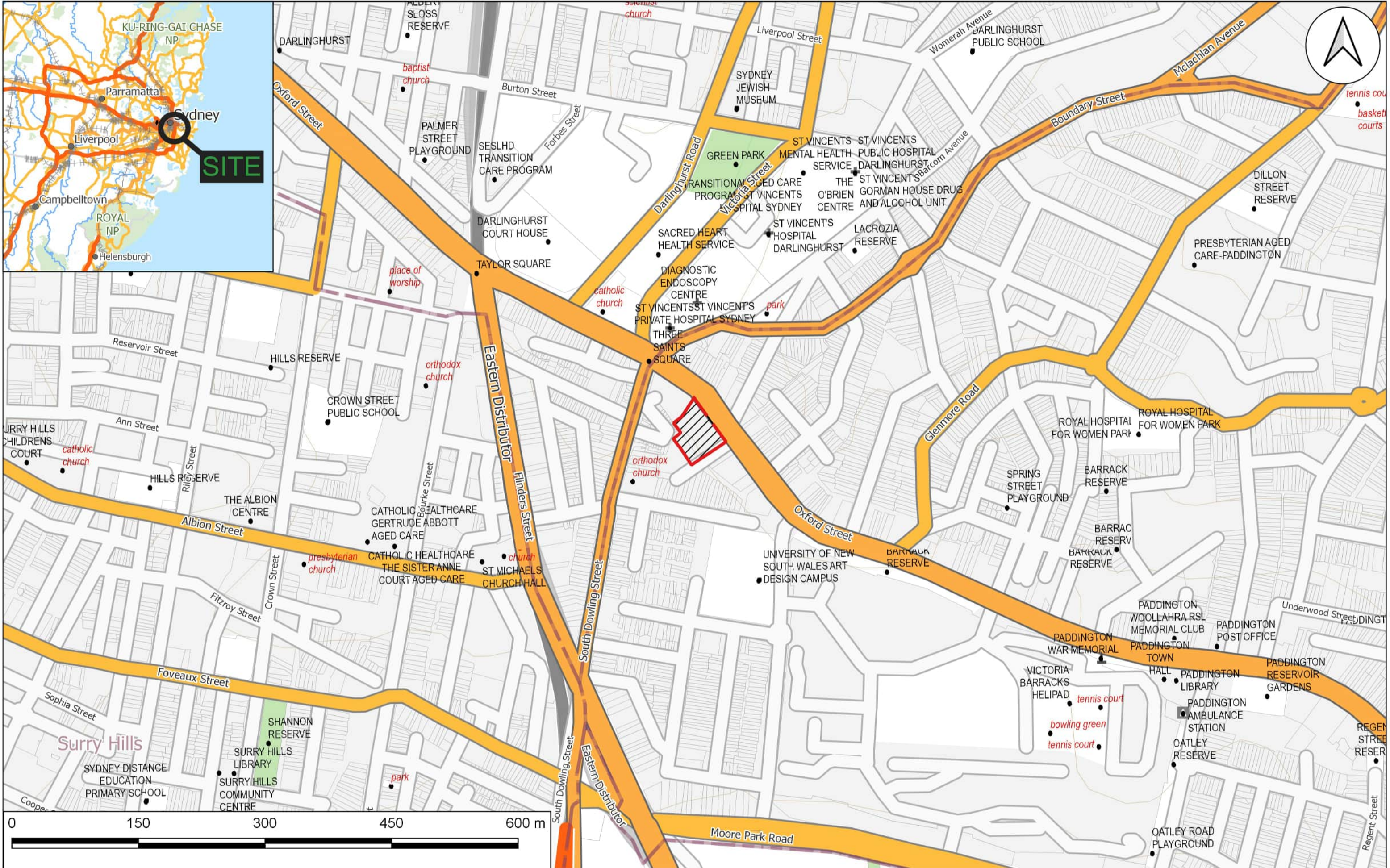
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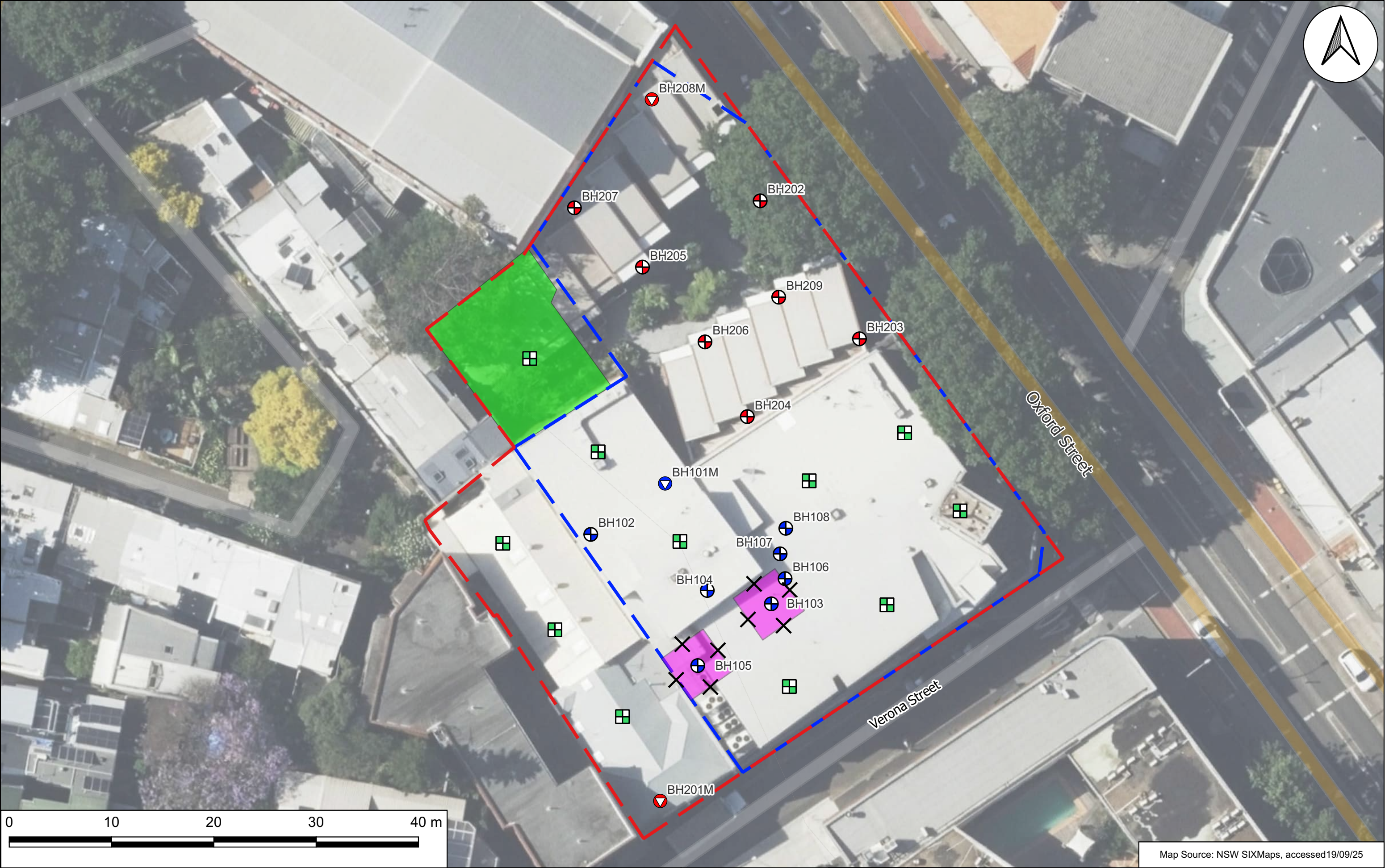
Appendix A - Figures

Figure 1: Site Location

Figure 2: Proposed Sampling Location Plan



LEGEND Note: All locations are approximate  Site Location		 Practical Solutions for Built Environments Suite 6.01, 55 Miller Street, PYRMONT 2009 Ph (02) 9516 0722 Fax (02) 9518 5088		Drawn: M.C. Approved: Date: 17/11/2025		17 Oxford Street Pty Ltd Remediation Action Plan 13-15 Oxford Street, 17 Oxford Street & 2 Verona Street, Paddington NSW Site Locality Plan		Figure: 1 Project: E25559.E06 Rev1
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LEGEND Note: Areas are approximate Site Boundary Proposed Basement Boundary Proposed deep soil landscape area Asbestos hotspot area Additional test pit locations Borehole location Borehole/monitoring well location Previous borehole location (EI DSI, 2023) Proposed asbestos delineation locations Previous borehole/monitoring well location (EI DSI, 2023)			eiaustralia Practical Solutions for Built Environments Suite 6.01, 55 Miller Street, PYRMONT 2009 Ph (02) 9516 0722 Fax (02) 9518 5088	Drawn: M.C. Approved: Date: 18/11/2025	17 Oxford Street Pty Ltd Remediation Action Plan 13-15 Oxford Street, 17 Oxford Street & 2 Verona Street, Paddington NSW Proposed Sampling Plan	Figure: 2 Project: E25559.E06_Rev1
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Appendix B – Plans of the Proposed Development

An aerial photograph of a residential street in Paddington, Sydney. The street is lined with houses and trees. A building, located at the intersection of Oxford Street and Verona Street, is highlighted in a bright orange color. The building has a complex, multi-gabled roof. The surrounding area is densely packed with residential buildings and greenery.

TonkinZulaikhaGreer

Verona, Paddington

13 - 17 Oxford Street, and 2 Verona Street

SSDA Architectural Drawings

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DRAWING LIST			
		Scale @ A3	REV
A 000 GENERAL INFORMATION			
A 000	COVER PAGE		-
A 001	DRAWING LIST AND LEGEND		-
A 002	SITE PLAN		-
A 003	SITE ANALYSIS		-
A 050 DEMOLITION AND EXCAVATION PLANS			
A 050	EXCAVATION AND DEMOLITION PLAN - BASEMENT 3	1:200	-
A 051	EXCAVATION AND DEMOLITION PLAN - BASEMENT 1	1:200	-
A 052	EXCAVATION AND DEMOLITION PLAN - GROUND FLOOR	1:200	-
A 053	DEMOLITION PLAN - LEVEL 1	1:200	-
A 060 DEMOLITION ELEVATION AND SECTION			
A 060	DEMOLITION ELEVATION AND SECTION - OXFORD STREET	1:200	-
A 061	DEMOLITION ELEVATION AND SECTION - VERONA STREET	1:200	-
A 100 GENERAL ARRANGEMENT PLANS			
A 100	BASEMENT 3 PLAN	1:200	-
A 101	BASEMENT 2 PLAN	1:200	-
A 102	BASEMENT 1 PLAN	1:200	-
A 103	GROUND FLOOR PLAN	1:200	-
A 104	TERRACES GROUND FLOOR PLAN	1:200	-
A 105	LEVEL 1 FLOOR PLAN	1:200	-
A 106	LEVEL 2 FLOOR PLAN	1:200	-
A 107	LEVEL 3 FLOOR PLAN	1:200	-
A 108	LEVEL 4 FLOOR PLAN	1:200	-
A 109	LEVEL 5 FLOOR PLAN	1:200	-
A 110	LEVEL 6 FLOOR PLAN	1:200	-
A 111	LEVEL 7 ROOFTOP FLOOR PLAN	1:200	-
A 200 ELEVATIONS AND SECTIONS			
A 200	NORTH ELEVATION - OXFORD STREET	1:200	-
A 201	SOUTH ELEVATION - MARSHALL STREET	1:200	-
A 202	EAST ELEVATION - VERONA STREET	1:200	-
A 203	WEST ELEVATION	1:200	-
A 204	NORTH ELEVATION AND SECTION - TERRACES	1:200	-
A 205	SOUTH ELEVATION AND SECTION - COURTYARD	1:200	-
A 206	WEST ELEVATION AND SECTION - COURTYARD	1:200	-

		Scale @ A3	REV
A 400 SHADOW DIAGRAMS AND EYE OF THE SUN			
A 400	SOLAR ACCESS IMPACTED PROPERTIES DIAGRAM	1:500	-
A 401	SHADOW DIAGRAMS 21st JUNE - 0900 AND 1000	1:1000	-
A 402	SHADOW DIAGRAMS 21st JUNE - 1030 AND 1100	1:1000	-
A 403	SHADOW DIAGRAMS 21st JUNE - 1130 AND 1200	1:1000	-
A 404	SHADOW DIAGRAMS 21st JUNE - 1230 AND 1300	1:1000	-
A 405	SHADOW DIAGRAMS 21st JUNE - 1330 AND 1400	1:1000	-
A 406	SHADOW DIAGRAMS 21st JUNE - 1500	1:1000	-
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A 408	EYE OF THE SUN DIAGRAMS - 2		-
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A 410	EYE OF THE SUN DIAGRAMS - 4		-
A 411	EYE OF THE SUN DIAGRAMS - 5		-
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A 500	GFA DIAGRAMS	1:1000	-
A 550 COMPLIANCE DIAGRAMS			
A 550	ADAPTABLE APARTMENT PLANS - 2 BED	1:100	-
A 551	ADAPTABLE APARTMENT PLANS - 3 BED	1:100	-
A 552	HEIGHT PLANE DIAGRAMS		-
A 553	OPEN SPACE DIAGRAMS	1:1000	-
A 554	SOLAR ACCESS DIAGRAMS - 1	1:500	-
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A 558	ADG COMPLIANCE TABLE 1		-
A 559	ADG COMPLIANCE TABLE 2		-
A 600 MATERIALS			
A 600	MATERIALS AND FINISHES SCHEDULE		-
A 700 PERSPECTIVE IMAGES			
A 700	PERSPECTIVE 01		-
A 701	PERSPECTIVE 02		-

LEGEND	
Legend Code	Legend Description
BATT	Battens, Timber
BGL	Balustrade, Glass
BR1	Brickwork1
BR2	Brickwork2
BRA	Brass
C/L	Centre-Line
CCF	Coloured Concrete Finish
CM	Cladding, Metal
CO	Concrete
COMMS	Communications Cupboard
COS	Confirm on Site
ELEC	Electrical Cupboard
FC	Fibre-Cement
FCL	Finished Ceiling Level
FFL	Finished Floor Level
FN	Fence
GLL	Glass Louvres
Legend Code	Legend Description
MECH	Mechanical
ML	Metal Louvres
MW	Metal Window
PCO	Pavers, Concrete
PST	Pavers, Stone
PV	Photovoltaics, Solar
RL	Reduced Level
RSC	Roof Sheet, Copper
RSM	Roof Sheet, Metal
SSL	Structural Slab Level
TL1	Pool Tiles
TL2	Wall Tiles
TOH	Top of Hob
TOW	Top of Wall
U/S	Underside

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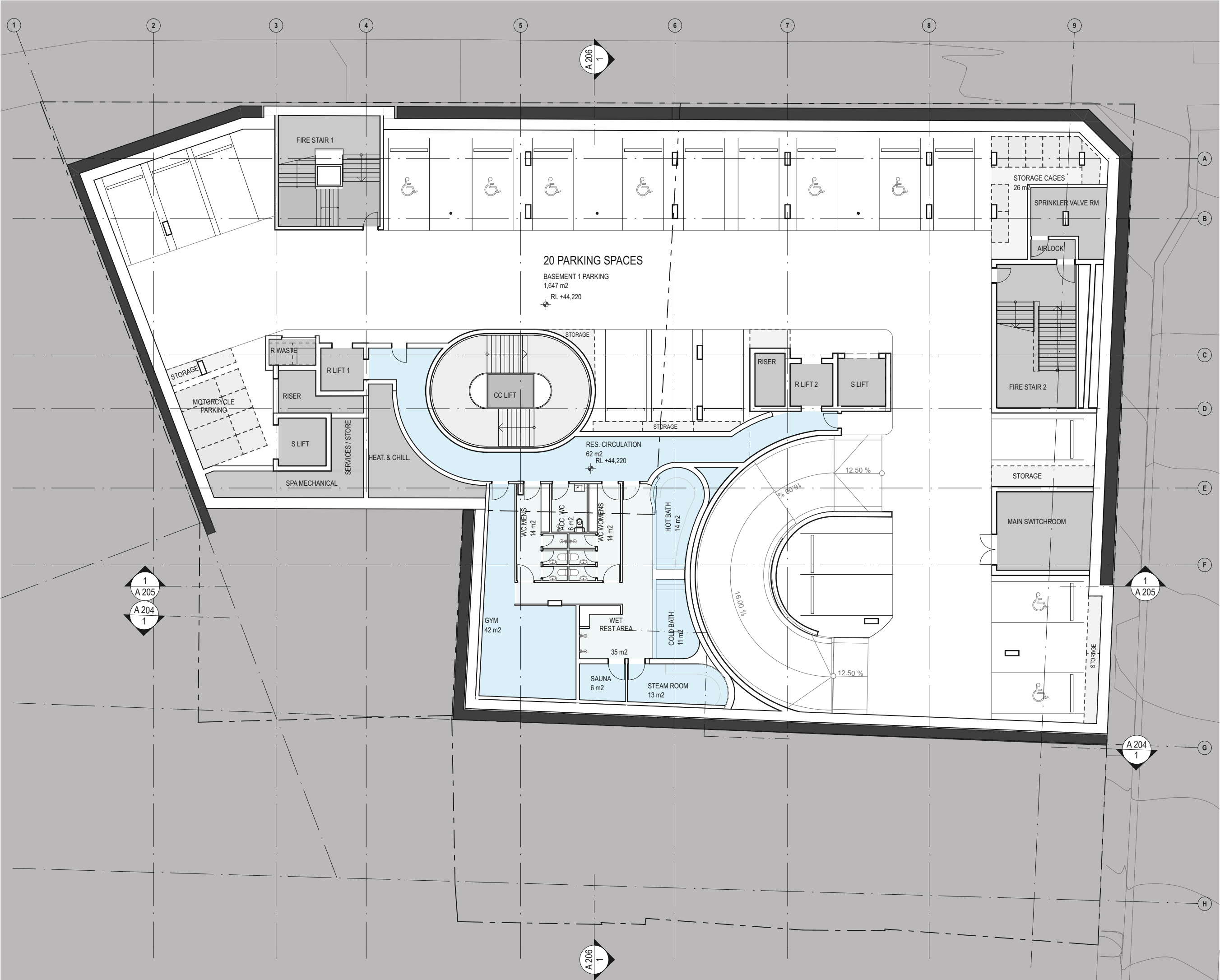
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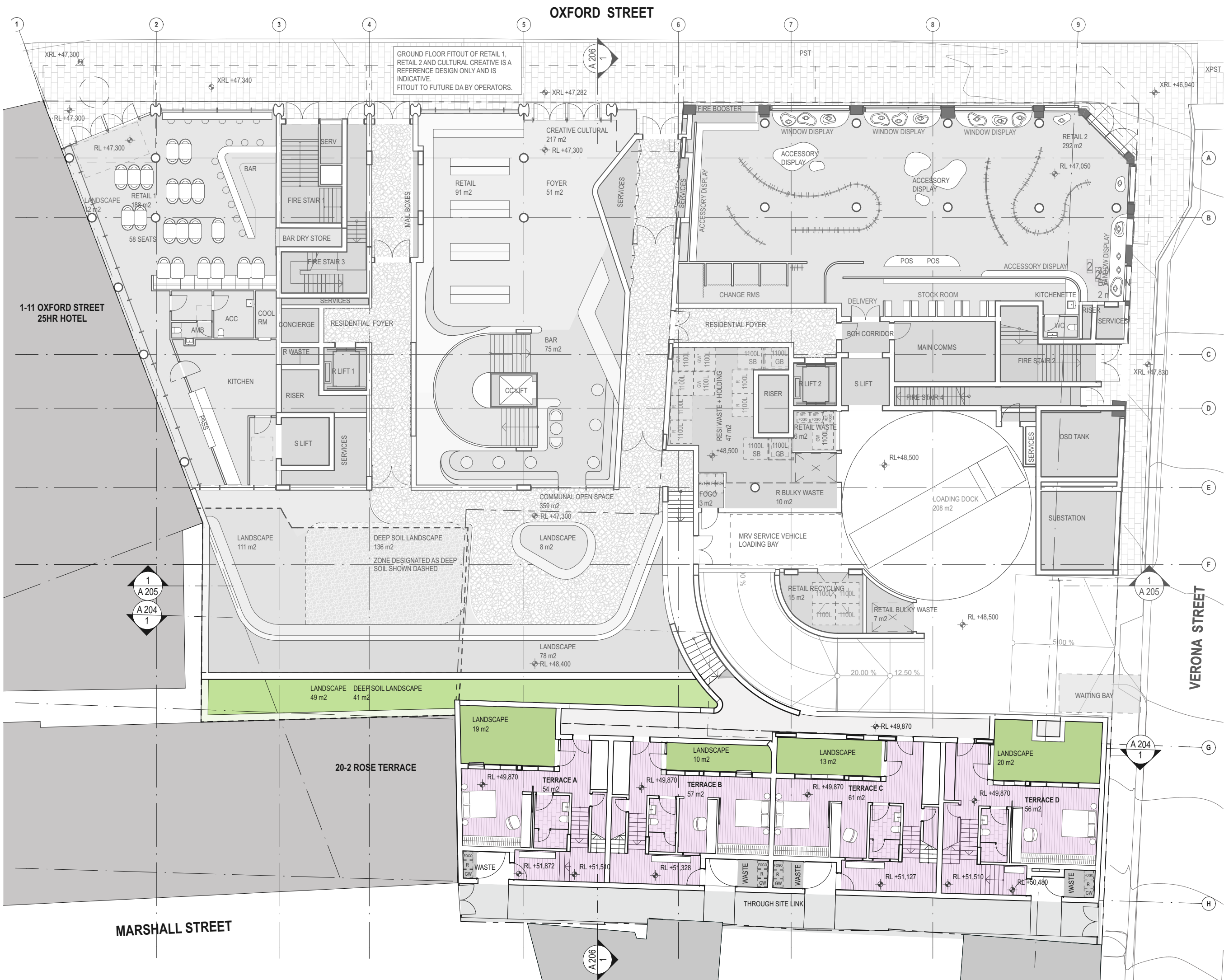
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Drawing Title BASEMENT 1 PLAN		
Drawing No. A 102	Rev No. -	
Drawn MG, AM, IR, CY, WR	Date 17/11/2025	
Checked TG		
Scale 0 2 4 8 m @A3	1:200@A3	
Nominated Architects Peter Tonkin NSW Registration 4147 Tim Greer NSW Registration 5603		



DATE	REV	DESCRIPTION
17/11/2025	-	For SSDA

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Landscape Architect Wyer & Co	Geotech EI Australia
Structure Northop	BCA + Access Jensen Hughes
Building Services O&S Consulting	Traffic JMT Consulting
Basix + ESD Credwell	Waste Elephants Foot
Acoustic E-Lab	Fire E-Lab

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Project
Verona, Paddington

Phase
SSDA

Job No.
24026

Drawing Title
TERRACES GROUND FLOOR PLAN

Drawing No.
A 104

Drawn
MG, AM, IR, CY, WR

Checked
TG

Scale
0 2 4 8 m @A3

Nominated Architects
Peter Tonkin NSW Registration 4147
Tim Greer NSW Registration 5603



DATE	REV	DESCRIPTION
17/11/2025	-	For SSDA

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Structure Northop	BCA + Access Jensen Hughes
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Project

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Phase

SSDA

Job No.
24026

Drawing Title

PERSPECTIVE 01

Drawing No.
A 700

Rev No.
-

Drawn
MG, AM, IR, CY, WR

Date
17/11/2025

Checked

TG



DATE	REV	DESCRIPTION
17/11/2025	-	For SSDA

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Landscape Architect Wyer & Co	Geotech EI Australia
Structure Northop	BCA + Access Jensen Hughes
Building Services O&S Consulting	Traffic JMT Consulting
Basix + ESD Credwell	Waste Elephants Foot
Acoustic E-Lab	Fire E-Lab

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Project Verona, Paddington	
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Phase SSDA	
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Job No. 24026	
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Drawing Title PERSPECTIVE 02	
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Drawing No. A 701	Rev No. -
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Drawn MG, AM, IR, CY, WR	Date 17/11/2025
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Checked TG	
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Nominated Architects
Peter Tonkin NSW Registration 4147
Tim Greer NSW Registration 5603

Appendix C – Supporting Information from the Investigation Phase

Appendix D – Site Photographs



Photograph 1: General site conditions (23/11/2022.).



Photograph 2: General Site Topography (24/03/2022.).



Photograph 3: Sandy Fill Material in BH103 (28/07/2023).



Photograph 4: Existing on-grade carpark on site (10/03/2022).



Photograph 1: Front view of 2 Verona Street (8/9/25).



Photograph 2: Front view of 13-15 Oxford Street (8/9/25)



Photograph 3: View from 13-15 Oxford Street, facing north-west towards Oxford Street (8/9/25)

Appendix E – Unexpected Find Protocol

BOREHOLE LOG BH ID: BH202										
Location13-15 Oxford Strreet & 2 Verona Street, Paddington NSW					Started08 September 2025					
ClientWT Malouf Pty Ltd					Completed08 September 2025					
Job No.E25559.E02					Logged ByMC		Date08 September 2025			
Sheets1 of 1					Review By		Date			
Drilling Contractor-					Surface RL≈44.00 m (AHD)		Latitude-			
Plant-					Inclination90°		Longitude-			
METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
HA	GWNE	BH202_0.2-0.3 PID = 0.10 PPM		0.00		44.00	CONCRETE: 150mm thick	W		CONCRETE
		BH202_0.5-0.6 PID = 0.20 PPM		0.15		43.85	GRAVEL: coarse grained, subangular to angular, dark grey, no odour			RESIDUAL SOIL
				0.30		43.70	SAND: medium to coarse grained, orange brown mottled red, with sandstone fragments			
						43.40	Terminated at 0.60m. Refusal on sandstone bedrock.			
				1						
				2						
				3						
				4						
				5						

BOREHOLE LOG BH ID: BH203										
Location13-15 Oxford Strreet & 2 Verona Street, Paddington NSW					Started08 September 2025					
ClientWT Malouf Pty Ltd					Completed08 September 2025					
Job No.E25559.E02					Logged ByMC		Date08 September 2025			
Sheets1 of 1					Review By		Date			
Drilling Contractor-					Surface RL≈43.50 m (AHD)		Latitude-			
Plant-					Inclination90°		Longitude-			
METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T	GWNE	BH203_0.2-0.3 PID = 0.20 PPM BH203_0.3-0.4 PID = 0.70 PPM		0.00		43.50	CONCRETE: 150mm thick	W		CONCRETE
				0.15		43.35	GRAVEL: coarse grained, subangular to angular, dark grey, no odour			
				0.30		43.20	SAND: medium to coarse grained, orange brown mottled red, with sandstone fragments			RESIDUAL SOIL
				43.10		43.10	SAND: medium to coarse grained, orange brown mottled red, with sandstone fragments Terminated at 0.40m. Refusal on sandstone bedrock.			
				1						
				2						
				3						
				4						
				5						

BOREHOLE LOG BH ID: BH204										
Location13-15 Oxford Strreet & 2 Verona Street, Paddington NSW					Started08 September 2025					
ClientWT Malouf Pty Ltd					Completed08 September 2025					
Job No.E25559.E02					Logged ByMC		Date08 September 2025			
Sheets1 of 1					Review By		Date			
Drilling Contractor-					Surface RL≈43.50 m (AHD)		Latitude-			
Plant-					Inclination90°		Longitude-			
METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T	GWNE	BH204_0.15-0.2 PID = 0.40 PPM		0.00		43.50	CONCRETE: 150mm thick	W		CONCRETE
		0.15		43.35	GRAVEL: coarse grained, subangular to angular, dark grey, no odour	RESIDUAL SOIL				
		0.25		43.25	SAND: medium to coarse grained, orange brown mottled red, with sandstone fragments					
		BH204_0.5-0.6 PID = 0.10 PPM				42.90	Terminated at 0.60m. Refusal on sandstone bedrock.			
				1						
				2						
				3						
				4						
				5						

BOREHOLE LOG BH ID: BH205										
Location13-15 Oxford Strreet & 2 Verona Street, Paddington NSW					Started08 September 2025					
ClientWT Malouf Pty Ltd					Completed08 September 2025					
Job No.E25559.E02					Logged ByMC		Date08 September 2025			
Sheets1 of 1					Review By		Date			
Drilling Contractor-					Surface RL≈43.90 m (AHD)		Latitude-			
Plant-					Inclination90°		Longitude-			
METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T	GWNE	BH205_0.2-0.3 PID = 0.60 PPM		0.00		43.90	CONCRETE: 150mm thick	W		CONCRETE
		BH205_0.4-0.5 PID = 0.50 PPM		0.15		43.75	GRAVEL: coarse grained, subangular to angular, dark grey, no odour			RESIDUAL SOIL
				0.30		43.60	SAND: medium to coarse grained, orange brown mottled red, with sandstone fragments			
						43.35	Terminated at 0.55m. Refusal on sandstone bedrock.			
				1						
				2						
				3						
				4						
				5						

BOREHOLE LOG BH ID: BH206										
Location13-15 Oxford Strreet & 2 Verona Street, Paddington NSW					Started08 September 2025					
ClientWT Malouf Pty Ltd					Completed08 September 2025					
Job No.E25559.E02					Logged ByMC		Date08 September 2025			
Sheets1 of 1					Review By		Date			
Drilling Contractor-					Surface RL≈44.00 m (AHD)		Latitude-			
Plant-					Inclination90°		Longitude-			
METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T	GWNE	BH206_0.15-0.2 PID = 0.90 PPM		0.00		44.00	CONCRETE: 150mm thick	W		CONCRETE
		BH206_0.3-0.4 PID = 1.20 PPM		0.15		43.85	GRAVEL: coarse grained, subangular to angular, dark grey, no odour			RESIDUAL SOIL
				0.20		43.80	SAND: medium to coarse grained, orange brown mottled red, with sandstone fragments			
						43.60	Terminated at 0.40m. Refusal on sandstone bedrock.			
				1						
				2						
				3						
				4						
				5						

BOREHOLE LOG BH ID: BH207										
Location13-15 Oxford Strreet & 2 Verona Street, Paddington NSW ClientWT Malouf Pty Ltd Job No.E25559.E02 Sheets1 of 1					Started08 September 2025 Completed08 September 2025 Logged ByMC Date08 September 2025 Review By Date					
Drilling Contractor- Plant-					Surface RL≈43.50 m (AHD) Inclination90° Latitude- Longitude-					
METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T	GWNE	BH207_0.2-0.3 PID = 0.30 PPM		0.00		43.50	CONCRETE: 200mm thick	W		CONCRETE
				0.20		43.30	GRAVEL: coarse grained, subangular to angular, dark grey, no odour			
							42.90	Terminated at 0.60m. Refusal on gravels.		
				1						
				2						
				3						
				4						
				5						

BH ID: BH209

Started	08 September 2025
----------------	-------------------

Completed 08 September 2025

Logged By MC **Date** 08 September 2025

Review By _____ Date _____

Latitude

Longitude -

METHOD		GROUND WATER LEVELS		SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T	GWNE											
		BH209_0.2-0.3 PID = 0.30 PPM				0.00		43.90	CONCRETE: 150mm thick	W		CONCRETE
						0.15		43.75	GRAVEL: coarse grained, subangular to angular, dark grey, no odour			
						0.30		43.60	SAND: medium to coarse grained, orange brown mottled red, with sandstone fragments			
		BH209_0.8-0.9 PID = 0.10 PPM						43.00	Terminated at 0.90m. Refusal on sandstone bedrock.			RESIDUAL SOIL
						1						
						2						

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



BOREHOLE LOG

BH ID: BH101M

Location	17 Oxford Street	Started	28 July 2023		
Client	Verona Co Pty Ltd.	Completed	28 July 2023		
Job No.	E25559	Logged By	AL	Date	28 July 2023
Sheets	1 of 1	Review By		Date	
Drilling Contractor	Geosense	Surface RL	≈50.22 m (AHD)	Latitude	-
Plant	GEO205 drill	Inclination	90°	Longitude	-

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T	GWNE	BH101M_0.3-0.4 PID = 1.3 PPM	0.27	0.00	0.27	50.22	Concrete Slab:			CONCRETE
		BH101M_0.8-0.9 PID = 1.1 PPM		0.27		49.95	FILL: SAND: Fine Grained plasticity, Brown to yellow with builders plastic and concrete, dry, no odour			FILL
		BH101M_1.3-1.4 PID = 0.4 PPM	1.20	1.20		49.02	SAND: Fine Grained plasticity, Yellow, dry, no odour			RESIDUAL SOIL
WB				5.70		44.52	Bedrock: weathered sandstone			BEDROCK
				9.00		41.22	Terminated at 9.00m. Target Depth Reached.			

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



MONITORING WELL LOG

BH ID: BH101M

Location	17 Oxford Street	Started	28 July 2023		
Client	Verona Co Pty Ltd.	Completed	28 July 2023		
Job No.	E25559	Logged By	AL	Date	28 July 2023
Sheets	1 of 1	Review By		Date	
Drilling Contractor	Geosense	Surface RL	≈50.22 m (AHD)	Latitude	-
Plant	GEO205 drill	Inclination	90°	Longitude	-

WATER	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	BACKFILL DETAILS	STANDPIPE DETAILS
GWNE	BH101M_0.3-0.4 PID = 1.3 PPM	0.00		50.22	Concrete Slab:		Steel Cover at Surface	Well Stickup = -0.05m (RL 50.17m)
	BH101M_0.8-0.9 PID = 1.1 PPM	0.27		49.95	FILL: SAND: Fine Grained plasticity, Brown to yellow with builders plastic and concrete, dry, no odour			
	BH101M_1.3-1.4 PID = 0.4 PPM	1.20		49.02	SAND: Fine Grained plasticity, Yellow, dry, no odour			
		2					Grout 0.00m - 5.00m	
		3						0.05m - 6.0m PVC casing (50mm Ø)
		4						
		5					Bentonite 5.00m - 5.50m	
		5.70		44.52	Bedrock: weathered sandstone			
		6						
		7					Sand 5.50m - 9.00m	6.0m - 9.0m PVC screen (50mm Ø)
		9		41.22	Terminated at 9.00m. Target Depth Reached.			
		10						

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



BOREHOLE LOG

BH ID: BH102

Location	17 Oxford Street	Started	28 July 2023		
Client	Verona Co Pty Ltd.	Completed	28 July 2023		
Job No.	E25559	Logged By	AL	Date	28 July 2023
Sheets	1 of 1	Review By		Date	

Drilling Contractor	Geosense	Surface RL	≈50.22 m (AHD)	Latitude	-
Plant	GEO205 drill	Inclination	90°	Longitude	-

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T	GWNE	BH102_0.3-0.4 PID = 1.7 PPM		0.00		50.22	Concrete Slab:			CONCRETE
				0.27		49.95	FILL: SAND: Fine Grained plasticity, Brown to yellow with builders plastic and concrete, dry, no odour			FILL
		BH102_0.8-0.9 PID = 1.2 PPM		0.50		49.72	SAND: Fine Grained plasticity, Yellow, dry, no odour			RESIDUAL SOIL
				1						
						48.72	Terminated at 1.50m. Target Depth Reached.			
				2						
				3						
				4						
				5						
				6						
				7						
				8						
				9						
				10						

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



BOREHOLE LOG

BH ID: BH104

Location	17 Oxford Street	Started	28 July 2023	
Client	Verona Co Pty Ltd.	Completed	28 July 2023	
Job No.	E25559	Logged By	AL	Date 28 July 2023
Sheets	1 of 1	Review By		Date
Drilling Contractor	Geosense	Surface RL	≈50.22 m (AHD)	Latitude -
Plant	GEO205 drill	Inclination	90°	Longitude -

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T	GWNE	BH104_0.3-0.4 PID = 3.8 PPM	0.27	0.00	50.22	Concrete Slab:				CONCRETE
		BH104_0.8-0.9 PID = 3.6 PPM		0.27	49.95	FILL: SAND: Fine Grained plasticity, Brown to yellow with builders plastic and concrete, dry, no odour				FILL
		BH104_1.3-1.4 PID = 3.7 PPM		1						
		BH104_1.8-1.9 PID = 3.3 PPM		2						
		BH104_2.3-2.4 PID = 2.1 PPM		3						
		BH104_2.8-2.9 PID = 1.4 PPM		3.00	47.22	SAND: Fine Grained plasticity, Yellow, dry, no odour				RESIDUAL SOIL
		BH104_3.3-3.4 PID = 1.2 PPM		3.00	46.72	Terminated at 3.50m. Target Depth Reached.				
				4						
				5						
				6						
				7						
				8						
				9						
				10						

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



BOREHOLE LOG

BH ID: BH105

Location	17 Oxford Street	Started	28 July 2023
Client	Verona Co Pty Ltd.	Completed	28 July 2023
Job No.	E25559	Logged By	AL
Sheets	1 of 1	Review By	Date

Drilling Contractor	Geosense	Surface RL	≈50.22 m (AHD)	Latitude	-
Plant	GEO205 drill	Inclination	90°	Longitude	-

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
AD/T	GWNE	BH105_0.3-0.4 PID = 4.1 PPM	0.27	0.00	50.22	Concrete Slab:				CONCRETE
		BH105_0.8-0.9 PID = 3.7 PPM		0.27	49.95	FILL: SAND: Fine Grained plasticity, Brown to yellow with builders plastic and concrete, dry, no odour				FILL
		BH105_1.3-1.4 PID = 4.2 PPM		1						
		BH105_1.8-1.9 PID = 3.2 PPM		2						
		BH105_2.3-2.4 PID = 3.1 PPM		3						
		BH105_2.8-2.9 PID = 1.1 PPM		3.00	47.22	SAND: Fine Grained plasticity, Yellow, dry, no odour				RESIDUAL SOIL
		BH105_3.3-3.4 PID = 0.6 PPM		3.00	46.72	Terminated at 3.50m. Target Depth Reached.				
				4						
				5						
				6						
				7						
				8						
				9						
				10						

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



BOREHOLE LOG

BH ID: BH106

Location	17 Oxford Street	Started	28 July 2023		
Client	Verona Co Pty Ltd.	Completed	28 July 2023		
Job No.	E25559	Logged By	AL	Date	28 July 2023
Sheets	1 of 1	Review By		Date	
Drilling Contractor	Geosense	Surface RL	≈50.22 m (AHD)	Latitude	-
Plant	GEO205 drill	Inclination	90°	Longitude	-

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
HA	GWNE	BH106_0.3-0.4 PID = 3.3 PPM		0.00		50.22	Concrete Slab:			CONCRETE
				0.26		49.96	FILL: SAND: Fine Grained plasticity, Brown to yellow with builders plastic and concrete, dry, no odour			FILL
						49.82	Terminated at 0.40m. Unable to advance due to hole collapse.			
				1						
				2						
				3						
				4						
				5						
				6						
				7						
				8						
				9						
				10						

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



BOREHOLE LOG

BH ID: BH107

Location	17 Oxford Street	Started	28 July 2023		
Client	Verona Co Pty Ltd.	Completed	28 July 2023		
Job No.	E25559	Logged By	AL	Date	28 July 2023
Sheets	1 of 1	Review By		Date	
Drilling Contractor	Geosense	Surface RL	≈50.22 m (AHD)	Latitude	-
Plant	GEO205 drill	Inclination	90°	Longitude	-

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
HA	GWNE	BH107_0.3-0.4 PID = 3.3 PPM		0.00		50.22	Concrete Slab:			CONCRETE
			0.26		49.96		FILL: SAND: Fine Grained plasticity, Brown to yellow with builders plastic and concrete, dry, no odour			FILL
			0.40		49.82		SAND: Fine Grained plasticity, Yellow, dry, no odour			RESIDUAL SOIL
		BH107_0.8-0.9 PID = 2.1 PPM		1		49.22	Terminated at 1.00m. Target Depth Reached.			
				2						
				3						
				4						
				5						
				6						
				7						
				8						
				9						
				10						

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



BOREHOLE LOG

BH ID: BH108

Location	17 Oxford Street	Started	28 July 2023
Client	Verona Co Pty Ltd.	Completed	28 July 2023
Job No.	E25559	Logged By	AL
Sheets	1 of 1	Date	28 July 2023
Drilling Contractor	Geosense	Review By	Date

Plant	GEO205 drill	Surface RL	-	Latitude	-
		Inclination	90°	Longitude	-

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	MATERIAL ORIGIN & OBSERVATIONS
HA	GWNE	BH108_0.3-0.4 PID = 4.1 PPM		0.00			Concrete Slab:			CONCRETE
				0.27			FILL: SAND: Fine Grained plasticity, Brown to yellow with builders plastic and concrete, dry, no odour Terminated at 0.40m. Unable to advance due to hole collapse.			FILL
				1						
				2						
				3						
				4						
				5						
				6						
				7						
				8						
				9						
				10						

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



BOREHOLE LOG

BH ID: BH201M

Location	13-15, Oxford Street and 2 Verona Street Paddington NSW			Started	09 September 2025	
Client	Aspire Property Consulting			Completed	10 September 2025	
Job No.	E25559.G04			Logged By	S2	Date 09 September 2025
Sheets	1 of 3			Review By	SK	Date
Drilling Contractor	STS Geotechnics		Surface RL	≈50.10 m (AHD)	Northing	6250678.9 (MGA 2020 Zone 56)
Plant	Christie		Inclination	90°	Easting	332768.0 (MGA 2020 Zone 56)

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
DT				0.00		50.10	CONCRETE: 200mm thick	-	-		CONCRETE
		BH201M_0.40-0.50		0.20		49.90	SAND: fine to medium grained, pale brown				MARINE SOIL
		BH201M_0.80-1.00		1					VL - L		
				2				D			
		BH201M_2.60-3.00		3					D - VD		
		BH201M_3.40-3.60		4							
		BH201M_3.50-3.70		5							
				6							
		BH201M_5.20-5.30		5.00		45.10	From 5.00m, red brown with clay nodules.	M			
				6							
				7							
				8							
				9							
				9.50		40.60	Sandy CLAY: low plasticity, pale grey	M > PL			RESIDUAL SOIL
				10							

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



BOREHOLE LOG

BH ID: BH201M

Location	13-15, Oxford Street and 2 Verona Street Paddington NSW			Started	09 September 2025	
Client	Aspire Property Consulting			Completed	10 September 2025	
Job No.	E25559.G04			Logged By	S2	Date 09 September 2025
Sheets	2 of 3			Review By	SK	Date
Drilling Contractor	STS Geotechnics		Surface RL	≈50.10 m (AHD)	Northing	6250678.9 (MGA 2020 Zone 56)
Plant	Christie		Inclination	90°	Easting	332768.0 (MGA 2020 Zone 56)

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
ADP				10.10		40.00	Sandy CLAY: low plasticity, pale grey Log continued on next page.	M > PL	-		RESIDUAL SOIL
				11							
				12							
				13							
				14							
				15							
				16							
				17							
				18							
				19							
				20							

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



BOREHOLE CORE LOG

BH ID: BH201M

Location	13-15, Oxford Street and 2 Verona Street Paddington NSW			Started	09 September 2025	
Client	Aspire Property Consulting			Completed	10 September 2025	
Job No.	E25559.G04			Logged By	S2	Date 09 September 2025
Sheets	3 of 3			Review By	SK	Date
Drilling Contractor	STS Geotechnics			Surface RL	≈50.10 m (AHD)	
Plant	Christie			Inclination	90°	
				Northing	6250678.9 (MGA 2020 Zone 56)	
				Easting	332768.0 (MGA 2020 Zone 56)	

METHOD	Flush Return	TCR %	RQD %	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	WEATHERING	ESTIMATED STRENGTH Is(50) ▼ - Axial ▽ - Diametral	DISCONTINUITIES & ADDITIONAL DATA	FRACTURE SPACING
									VL 0-1 L 0-3 M 1 H 3 VH 10 EH		30 100 300 1000 3000
NMLC	30%			10		39.87	<i>Log continued from previous page.</i>	---			
				10.23			NO CORE: 130mm thick	---		10.23-10.25: CS	
		91	81				SANDSTONE: fine to medium grained, with dark grey laminate, thinly bedded.			10.28-10.33: CS	
				11						10.38-10.42: CS	
										10.52-10.56: CS	
				11				FR		11.03-11.06: XWS	
		76	46							11.62-11.85: XWZ	
				12						12.06: JT 80° RO Fe SN	
										12.68-12.73: XWS	
				12.73		37.37	NO CORE: 370mm thick	---			
				13		37.00	SANDSTONE: fine to medium grained, with dark grey laminate, thinly bedded.	FR		13.20-13.79: XWZ	
		46	0								
				13.79		36.31	NO CORE: 810mm thick	---			
		100	0					FR		14.60-15.00: XWZ	
				14.60		35.50	SANDSTONE: fine to medium grained, with extremely weathered bands and dark grey laminate, thinly bedded.	FR			
				15		35.10	NO CORE: 200mm thick	---			
		80	25				SANDSTONE: fine to medium grained, with extremely weathered bands and dark grey and brown laminate, thinly bedded.	FR		15.40: JT 30° PR RO Fe SN	
				15.20		34.90				15.62: JT 50-60° PR RO Fe SN	
										15.77-16.00: XWZ	
		48	10				NO CORE: 520mm thick	---			
				16		34.10					
				16.00							
		100	100				SANDSTONE: fine to medium grained, grey with dark grey laminate, thinly bedded.	FR		16.60-16.65: CS	
				16.52		33.58				16.77-16.80: XWS	
				17						16.95: JT 90° PR RO CN	
				17.78		32.30	Terminated at 17.80m. Target Depth Reached.			17.78: BP 5° PR SM In-filled	
				18							
				19							
				20							

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



MONITORING WELL LOG

BH ID: BH201M

Location	13-15, Oxford Street and 2 Verona Street Paddington NSW			Started	09 September 2025	
Client	Aspire Property Consulting			Completed	10 September 2025	
Job No.	E25559.G04			Logged By	S2	Date 09 September 2025
Sheets	1 of 2			Review By	SK	Date
Drilling Contractor	STS Geotechnics			Surface RL	≈50.10 m (AHD)	
Plant	Christie			Inclination	90°	
				Northing	6250678.9 (MGA 2020 Zone 56)	
				Easting	332768.0 (MGA 2020 Zone 56)	

WATER	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	BACKFILL DETAILS	STANDPIPE DETAILS
▽	BH201M_0.40-0.50	0.00		50.10	CONCRETE: 200mm thick	-	Grout 0.00m - 1.00m	Well Stickup =0.0m (RL 50.10m)
	BH201M_0.80-1.00	0.20		49.90	SAND: fine to medium grained, pale brown			
		1				D		
	BH201M_2.60-3.00	2						
	BH201M_3.40-3.60 BH201M_3.50-3.70	3						
		4				M	Sand 1.00m - 8.50m	0.0m - 11.10m PVC casing (50mm Ø)
	BH201M_5.20-5.30	5.00		45.10	From 5.00m, red brown with clay nodules.			
		6						
		7						
		8				W		
		9					Bentonite 8.50m - 9.50m	
		9.50		40.60	Sandy CLAY: low plasticity, pale grey	M > PL		
		10						

This log should be read in conjunction with EI Australia's accompanying explanatory notes.

MONITORING WELL LOG

BH ID: BH201M

Location	13-15, Oxford Street and 2 Verona Street Paddington NSW			Started	09 September 2025	
Client	Aspire Property Consulting			Completed	10 September 2025	
Job No.	E25559.G04			Logged By	S2	Date 09 September 2025
Sheets	2 of 2			Review By	SK	Date
Drilling Contractor	STS Geotechnics		Surface RL	≈50.10 m (AHD)	Northing	6250678.9 (MGA 2020 Zone 56)
Plant	Christie		Inclination	90°	Easting	332768.0 (MGA 2020 Zone 56)

WATER	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	BACKFILL DETAILS	STANDPIPE DETAILS
		10.10		40.00	Sandy CLAY: low plasticity, pale grey	M		
		10.23		39.87	NO CORE: 130mm thick	PL		
					SANDSTONE: fine to medium grained, with dark grey laminate, thinly bedded.			
		11						
		12						
		12.73		37.37	NO CORE: 370mm thick			
		13						
		13.10		37.00	SANDSTONE: fine to medium grained, with dark grey laminate, thinly bedded.			
		13.79		36.31	NO CORE: 810mm thick			
		14						
		14.60		35.60	SANDSTONE: fine to medium grained, with extremely weathered bands and dark grey laminate, thinly bedded.			
		15.00		35.10	NO CORE: 200mm thick			
		15.20		34.90	SANDSTONE: fine to medium grained, with extremely weathered bands and dark grey and brown laminate, thinly bedded.			
		16						
		16.00		34.10	NO CORE: 520mm thick			
		16.52		33.58	SANDSTONE: fine to medium grained, grey with dark grey laminate, thinly bedded.			
		17						
		18		32.30	Terminated at 17.80m. Target Depth Reached.			
		19						
		20						

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



BOREHOLE LOG

BH ID: BH208M

Location	13-15, Oxford Street and 2 Verona Street Paddington NSW			Started	08 September 2025	
Client	Aspire Property Consulting			Completed	08 September 2025	
Job No.	E25559.G04			Logged By	S2	Date 08 September 2025
Sheets	1 of 3			Review By	SK	Date
Drilling Contractor	Tightsite Geotechnical & Environmental Drilling			Surface RL	≈43.50 m (AHD)	
Plant	Hand Portable Rig			Inclination	90°	
				Northing	6251631.2 (MGA 2020 Zone 56)	
				Easting	333765.5 (MGA 2020 Zone 56)	

METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	SAMPLE RECOVERY	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY / REL. DENSITY	DCP BLOWS	MATERIAL ORIGIN & OBSERVATIONS
DT				0.00		43.50	CONCRETE: 200mm thick	-	-		CONCRETE
HA	▽	BH208M_0.60-0.70		0.20		43.30	Sandy CLAY: low plasticity, pale brown and red brown, with fine to coarse grained sandstone gravels.	M	St		RESIDUAL SOIL
				1				W	VSt		
				2.00		41.50	Log continued on next page.				
				3							
				4							
				5							
				6							
				7							
				8							
				9							
				10							

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



BOREHOLE CORE LOG

BH ID: BH208M

Location	13-15, Oxford Street and 2 Verona Street Paddington NSW			Started	08 September 2025	
Client	Aspire Property Consulting			Completed	08 September 2025	
Job No.	E25559.G04			Logged By	S2	Date 08 September 2025
Sheets	2 of 3			Review By	SK	Date
Drilling Contractor	Tightsite Geotechnical & Environmental Drilling			Surface RL	≈43.50 m (AHD)	
Plant	Hand Portable Rig			Inclination	90°	
				Northing	6251631.2 (MGA 2020 Zone 56)	
				Easting	333765.5 (MGA 2020 Zone 56)	

METHOD	Flush Return	TCR %	RQD %	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	WEATHERING	ESTIMATED STRENGTH Is(50) ▼ - Axial ▽ - Diametral	DISCONTINUITIES & ADDITIONAL DATA	FRACTURE SPACING
				0			Log continued from previous page.		VL 0-1 L 0-3 M 1 H 3 VH 10 EH		30 100 300 1000 3000
				1							
				2			SANDSTONE: fine to medium grained, red brown and grey, ironstained, with extremely weathered bands, thinly bedded.			2.30-3.00: XWZ	
		100	31	3.00		40.50	SANDSTONE: fine to medium grained, red brown and grey, ironstained, with dark brown and grey laminate, thinly bedded.	DW		3.22-3.24: CS	
				4.00		39.50	SANDSTONE: fine to medium grained, grey and red brown, ironstained, with dark grey laminate and trace of carbonaceous lenses, thinly bedded.	SW		3.80-3.96: CZ	
		100	90	5.60		37.90	SANDSTONE: fine to medium grained, grey with dark grey laminate, thinly bedded.			6.48: BP 5° PR RO Clay VN	
		100	100	7.60		35.90	From 7.60m, interbedded siltstone bands.	FR		6.88-6.91: XWS	
				8.00		35.50	SANDSTONE: fine to medium grained, grey with dark grey laminate, thinly bedded.			7.61-7.63: CS	
		100	100	8.30		35.20	From 8.30m, thinly to medium bedded.				
				9							
				10							

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



BOREHOLE CORE LOG

BH ID: BH208M

Location	13-15, Oxford Street and 2 Verona Street Paddington NSW			Started	08 September 2025	
Client	Aspire Property Consulting			Completed	08 September 2025	
Job No.	E25559.G04			Logged By	S2	Date 08 September 2025
Sheets	3 of 3			Review By	SK	Date
Drilling Contractor	Tightsite Geotechnical & Environmental Drilling			Surface RL	≈43.50 m (AHD)	
Plant	Hand Portable Rig			Inclination	90°	
				Northing	6251631.2 (MGA 2020 Zone 56)	
				Easting	333765.5 (MGA 2020 Zone 56)	

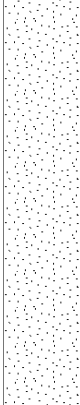
METHOD	Flush Return	TCR %	RQD %	DEPTH (m)	GRAPHIC LOG	RL (m(AHD))	MATERIAL DESCRIPTION	WEATHERING	ESTIMATED STRENGTH Is(50) ▼ - Axial ▽ - Diametral	DISCONTINUITIES & ADDITIONAL DATA	FRACTURE SPACING
NMLC	95%	100	100						VL 0-1 L 0-3 M 1 H 3 VH 10 EH		30 100 300 1000 3000
				11			From 8.30m, thinly to medium bedded.	FR			
				32.12			Terminated at 11.38m. Target Depth Reached.				
				12							
				13							
				14							
				15							
				16							
				17							
				18							
				19							
				20							

This log should be read in conjunction with EI Australia's accompanying explanatory notes.

MONITORING WELL LOG

BH ID: BH208M

Location	13-15, Oxford Street and 2 Verona Street Paddington NSW	Started	08 September 2025
Client	Aspire Property Consulting	Completed	08 September 2025
Job No.	E25559.G04	Logged By	S2
Sheets	1 of 2	Date	08 September 2025
Drilling Contractor	Tightsite Geotechnical & Environmental Drilling	Surface RL	≈43.50 m (AHD)
Plant	Hand Portable Rig	Inclination	90°
		Northing	6251631.2 (MGA 2020 Zone 56)
		Easting	333765.5 (MGA 2020 Zone 56)

WATER	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	BACKFILL DETAILS	STANDPIPE DETAILS
▽	BH208M_0.60-0.70	0.00		43.50	CONCRETE: 200mm thick	-		Well Stickup =0.0m (RL 43.50m)
		0.20		43.30	Sandy CLAY: low plasticity, pale brown and red brown, with fine to coarse grained sandstone gravels.	M		
95%		1		41.50	SANDSTONE: fine to medium grained, red brown and grey, ironstained, with extremely weathered bands, thinly bedded.	W		0.0m - 5.10m PVC casing (50mm Ø)
		2.00		41.50	SANDSTONE: fine to medium grained, red brown and grey, ironstained, with extremely weathered bands, thinly bedded.			
		3.00		40.50	SANDSTONE: fine to medium grained, red brown and grey, ironstained, with dark brown and grey laminate, thinly bedded.			
		4.00		39.50	SANDSTONE: fine to medium grained, grey and red brown, ironstained, with dark grey laminate and trace of carbonaceous lenses, thinly bedded.			
		5.60		37.90	SANDSTONE: fine to medium grained, grey with dark grey laminate, thinly bedded.			
		7.60		35.90	From 7.60m, interbedded siltstone bands.			5.10m - 8.10m PVC screen (50mm Ø)
		8.00		35.50	SANDSTONE: fine to medium grained, grey with dark grey laminate, thinly bedded.			
		8.30		35.20	From 8.30m, thinly to medium bedded.			

This log should be read in conjunction with EI Australia's accompanying explanatory notes.



MONITORING WELL LOG

BH ID: BH208M

Location	13-15, Oxford Street and 2 Verona Street Paddington NSW			Started	08 September 2025	
Client	Aspire Property Consulting			Completed	08 September 2025	
Job No.	E25559.G04			Logged By	S2	Date 08 September 2025
Sheets	2 of 2			Review By	SK	Date
Drilling Contractor	Tightsite Geotechnical & Environmental Drilling			Surface RL	≈43.50 m (AHD)	
Plant	Hand Portable Rig			Inclination	90°	
				Northing	6251631.2 (MGA 2020 Zone 56)	
				Easting	333765.5 (MGA 2020 Zone 56)	

WATER	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	RL (m AHD)	MATERIAL DESCRIPTION	MOISTURE CONDITION	BACKFILL DETAILS	STANDPIPE DETAILS
95%		11		32.12	From 8.30m, thinly to medium bedded.		Sand 8.60m - 11.38m	
		12			Terminated at 11.38m. Target Depth Reached.			
		13						
		14						
		15						
		16						
		17						
		18						
		19						
		20						

This log should be read in conjunction with EI Australia's accompanying explanatory notes.

Table T2 - Summary of Groundwater Analytical Results

Sample ID	Sampling Date	Metals								PAHs			Total VOC	BTEX					TRHs				PFAS			Total Phenols
		As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	Total PAHs	Benzo(a)pyrene	Naphthalene		Benzene	Toluene	Ethylbenzene	m,p-xylene	o-xylene	F1	F2	F3	F4	PFOS + PFHxS	PFOS	PFOA	
EI DSI, 2023																										
GW-BH101M	2/8/2023	<1	<0.1	<1	<1	<1	<0.1	3	23	<1	<0.1	<0.1	<10	<0.5	<0.5	<0.5	<0.5	<1	<50	<60	<500	<500	N.A.	N.A.	N.A.	<50
EI DSI, 2025																										
BH201M	16/9/2025	<1	<0.1	2	6	<1	<0.05	8	35	<1	<0.1	<0.1	N.A.	<0.5	3	<0.5	<1	<0.5	<50	83	<500	<500	N.A.	N.A.	N.A.	<0.05
BH208M		<1	<0.1	<1	3	<1	<0.05	4	13	N.A.	<0.1	<0.1	86.0	<0.5	86	<0.5	<1	<0.5	130	68	<500	<500	0.04	0.03	0.04	<0.05
BH101M-2		<1	<0.1	1	6	<1	<0.1	3	65	<1	<0.1	<0.1	N.A.	<0.5	<0.5	<0.5	<1	<0.5	<50	<60	<500	<500	N.A.	N.A.	N.A.	<0.05
Statistical Analysis																										
Minimum Concentration		<1	<0.1	<1	<1	<1	<0.1	3	13	<1	<0.1	<0.1	<10	<0.5	<0.5	<0.5	<1	<0.5	<50	<60	<500	<500	0.04	0.03	0.04	<0.05
Maximum Concentration		<1	<0.1	2	6	<1	<0.1	8	65	<1	<0.1	<0.1	86	<0.5	86	<0.5	<1	<0.5	130	83	<500	<500	0.04	0.03	0.04	<0.05
GILs																										
HSL A & B - Low to high density residential Soil texture classification – Sand		2m to <4m												800	NL	NL	NL	NL	1,000	1,000						
		4m to <8m												800	NL	NL	NL	NL	1,000	1,000						
		8m+												900	NL	NL	NL	NL	1,000	1,000						
ANZG (2018) Marine Water ¹		24 (AsIII) 13 (AsV) ⁶	0.7 ²	4.4(Cr VI) 27 (Cr III)	1.3	4.4	0.1 ²	70	8		70		700 ³	180 ⁴	80 ⁴	275 ⁴	350 ⁴	50 ⁵	60 ⁵	500 ⁵	500 ⁵		0.13 ^{3,7}	220 ^{3,7}		

Notes:

	Highlighted indicates criteria exceeded
	Highlighted indicates criteria exceeded ANZG (2018) marine water criteria

All values are µg/L unless stated otherwise

HSL D NEPC 1999 Amendment 2013 'HSL D' Health Based Screening Levels for vapour intrusion applicable for commercial/industrial settings.

NL Not Limiting

F1 To obtain F1 subtract the sum of BTEX concentrations from the C6-C10 fraction.

F2 To obtain F2 subtract naphthalene from the >C10-C16 fraction.

F3 (>C16-C34)

F4 (>C34-C40)

1 ANZG (2018) Groundwater Investigation Levels for fresh and marine water quality, based on ANZECC & ARMCANZ (2000)

2 Chemical for which possible bioaccumulation and secondary poisoning effects should be considered, refer to ANZG (2018) for further guidance.

3 Figure may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance

4 Low reliability toxicity data, refer to ANZECC & ARMCANZ (2000)

5 In lack of a criteria the laboratory PQL has been used (DEC, 2007).

6 Based on NHMRC (2011 - update June 2025 v4.0) Drinking Water Guidelines. The lowest of the Health Guideline x10 or the Aesthetic Guideline has been chosen as the assessment criteria. Aesthetic based criteria have been indicated by *

7 Value derived from the National Environmental Management Plan for PFAS - 95% species protection for slightly to moderately disturbed systems.

Table B1 – Summary of Soil Investigation Results

E25559.E02 - Paddington

Sample ID	Sampling Date	Priority Metals								PAHs				BTEX				TRHs				Pesticides		Total PCBs	Asbestos	
		As	Cd	Cr ⁶	Cu	Pb	Hg	Ni	Zn	Carcinogenic PAHs (as B(a)P TEQ)	Benzo(a)pyrene	Total PAHs	Naphthalene	Benzene	Toluene	Ethylbenzene	Total Xylenes	F1 (C6 - C10)	F2 (C10 - C16)	F3 (C16 - C34)	F4 (C34 - C40)	OCPs	OPPs			
EI DSI, 2023																										
BH101M_0.3-0.4	28/07/2023	1	<0.3	2	5.6	54	0.08	0.7	78	0.4	0.2	2.1	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<1	<1.7	<1	Absent	
BH101M_1.3-1.4		<1	<0.3	1	0.5	3	<0.05	<0.5	15	<0.3	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	NA	NA	NA	NA	
BH102_0.3-0.4		1	<0.3	2.4	8	110	0.2	0.9	89	0.5	0.3	2.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<1	<1.7	<1	Absent	
BH103_0.3-0.4		1	<0.3	2.2	8.3	51	0.08	1.4	51	0.3	0.2	1.6	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<1	<1.7	<1	Absent	
BH103_1.8-1.9		1	<0.3	2.2	5.9	75	0.11	0.9	69	1.2	0.8	7.1	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<1	<1.7	<1	Chrysotile asbestos found as approx 7x4x2mm fibrous mass.	
BH104_0.8-0.9		<1	<0.3	1.9	4.3	42	0.08	0.9	46	<0.3	0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<1	<1.7	<1	Absent	
BH104_1.3-1.4		1	<0.3	2.5	4.8	59	0.1	1.1	95	0.5	0.3	3.2	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	NA	NA	NA	NA	
BH104_2.8-2.9		1	<0.3	5.1	11	75	0.08	10	150	0.3	0.2	2	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<1	<1.7	<1	Absent	
BH105_1.3-1.4		1	<0.3	2.2	6.8	56	0.06	1.1	80	<0.3	0.1	0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<1	<1.7	<1	Chrysotile asbestos found as approx 6x4x2mm fibrous mass	
BH105_3.3-3.4		<1	<0.3	1.6	3.2	32	<0.05	0.8	65	0.5	0.3	3.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	NA	NA	NA	NA	
BH106_0.3-0.4		1	<0.3	2	4.6	64	0.83	1.1	100	0.3	0.2	1.9	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<1	<1.7	<1	Absent	
BH107_0.3-0.4		1	<0.3	1.7	3.5	84	0.29	0.9	100	0.5	0.3	3	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<1	<1.7	<1	Absent	
BH107_0.8-0.9		1	<0.3	1.4	2.4	75	0.32	0.9	95	0.5	0.3	3.5	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	NA	NA	NA	NA	
BH108_0.3-0.4		<1	<0.3	1.5	5.8	99	0.27	0.7	95	0.8	0.5	5.1	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<1	<1.7	<1	Absent	
Soil Sampling Results																										
BH202_0.2-0.3	8/9/2025	1	<0.3	<0.5	100	1	<0.05	3.6	8.7	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<1.7	<0.1	Absent	
BH203-0.2-0.3		1	<0.3	4	3.7	18	0.06	0.6	9.7	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<1.7	<0.1	Absent	
BH204-0.15-0.2		1	<0.3	0.8	670	2	<0.05	3.8	44	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<1.7	<0.1	Absent	
BH204-0.5-0.6		1	<0.3	6.7	1.2	8	0.06	<0.5	6.9	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	N.A.	N.A.	N.A.	N.A.	
BH205-0.2-0.3		1	<0.3	1.3	97	1	<0.05	3.6	11	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<1.7	<0.1	Absent	
BH205-0.4-0.5		1	<0.3	7.9	0.7	9	<0.05	<0.5	8.7	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	N.A.	N.A.	N.A.	N.A.	
BH206-0.15-0.2		1	<0.3	5.3	22	6	<0.05	1.2	7	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<1.7	<0.1	Absent	
BH207-0.2-0.3		1	<0.3	0.7	180	2	<0.05	3.2	39	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<1.7	<0.1	Absent	
BH208M-0.7-0.8		1	<0.3	15	<0.5	10	<0.05	1	6.9	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	N.A.	N.A.	N.A.	N.A.	
BH209-0.2-0.3		1	<0.3	0.7	120	4	<0.05	3	11	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<1.7	<0.1	Absent	
BH209-0.8-0.9	9/9/2025	<1	<0.3	2.4	0.5	9	0.08	<0.5	5.9	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	N.A.	N.A.	N.A.	N.A.	
BH201M-0.8-1.0		<1	<0.3	1.2	1.9	10	0.08	0.6	15	0.5	0.3	3.3	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	N.A.	N.A.	N.A.	N.A.	
Statistical Analysis																										
Minimum concentration		<1	<0.3	<0.5	<0.5	1	<0.05	<0.5	5.9	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<1.7	<0.1	Chrysotile Asbestos	
Maximum concentration		1	<0.3	15	670	110	0.83	10	150	1.2	0.8	7.1	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<1.7	<0.1	Chrysotile Asbestos	
NEPM (2013) Criteria																										
HIL A - Residential with garden / accessible soil		100	20	100 Cr(VI)	7,000	300	200	400	8,000		3	300									240			1		
HIL B - Residential with minimal soil access		500	150	500 Cr(VI)	30,000	1,200	120	1,200	60,000	4		400									600			1		
HSL A & B - Low to high density residential Soil texture classification – SAND		Source depths (0 m to <1 m. BGL)											3	0.5	160	55	40	45	110					0.01 / 0.001		
		Source depths (1 m to <2 m. BGL)											NL	0.5	220	NL	60	70	240							
		Source depths (2 m to <4 m. BGL)											NL	0.5	310	NL	95	110	440							
		Source depths (4 m + BGL)											NL	0.5	510	NL	170	200	NL							
EILs / ESLs - Urban residential and public open space ^{1 2}		100		550	120	1,100		170	520		0.7		170	50	85	70	105	180	120	300	2,800					
Management Limits Comercial / Industrial ¹																		700	1,000	3,500	10,000					

Notes:

		Highlighted values exceed HIL / HSL
		Highlighted values exceed EIL / ESL
		Concentration exceeds highlighted criteria

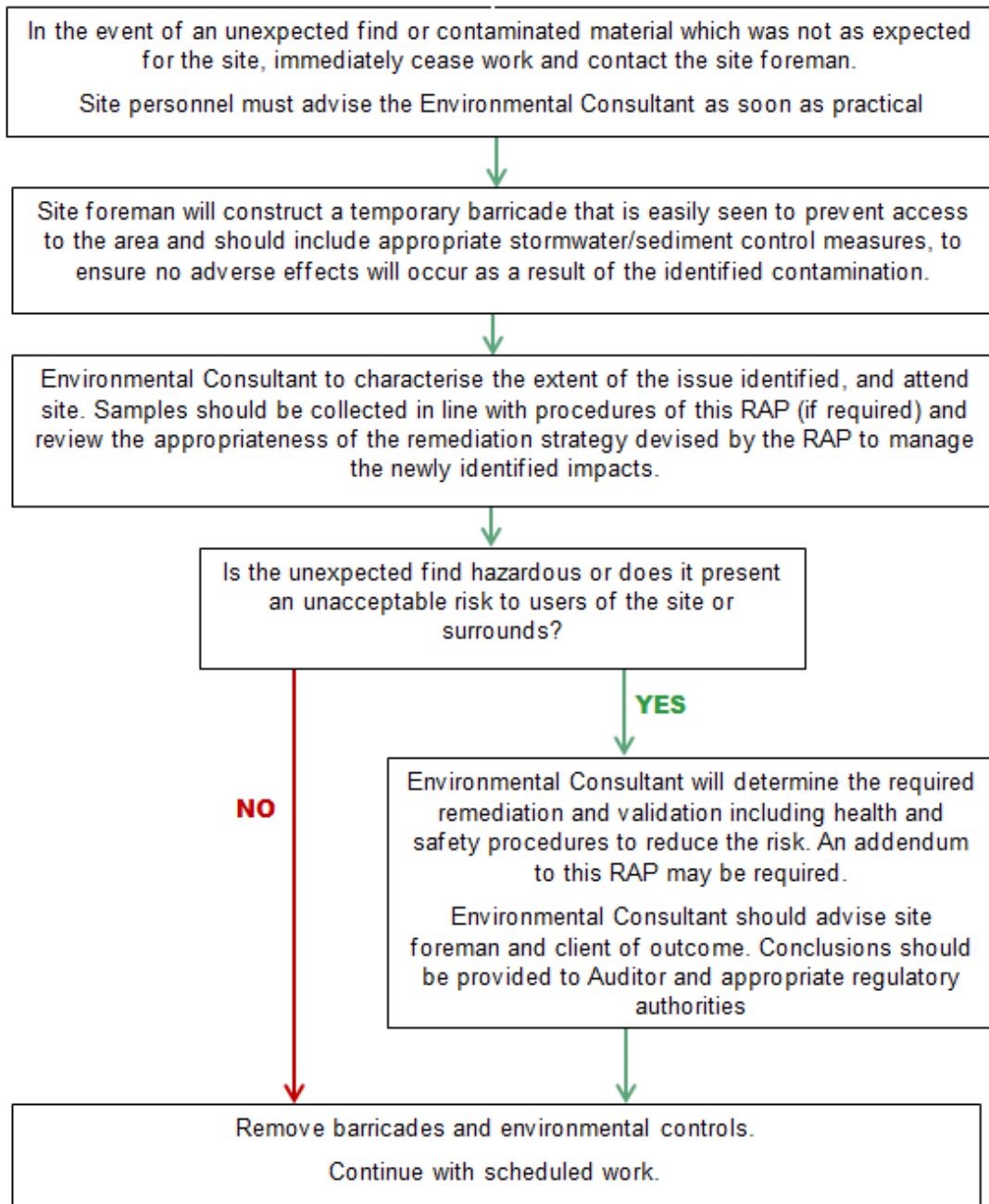
Results are recorded in mg/kg

HIL D
HSL D
NA
NL
1
2
F1
F2
F3
F4

NEPC 1999 Amendment 2013 'HIL D' - Health based commercial / industrial settings.
NEPC 1999 Amendment 2013 'HSL D' Health Based Screening Levels applicable for vapour intrusion values applicable for commercial / industrial settings.
Not Analysed
Not Limiting' If the derived soil vapour limit exceeds the soil concentration at which the pore water phase cannot dissolve any more of the individual chemical
Coarse grained soil assessment criteria values were applied.
Ecological criteria calculated based on physical properties reported in Ei Geotechnical Investigation, 2022 and the eSPADE portal (DPIE, 2020)
To obtain F1 subtract the sum of BTEX concentrations from the C6-C10 fraction.
To obtain F2 subtract naphthalene from the >C10-C16 fraction.
>C16-C34)
>C34-C40)



Unexpected Finds Protocol



Appendix F – Review of Remediation Options and Technologies

REVIEW OF REMEDIATION OPTIONS AND TECHNOLOGIES

A number of soil and groundwater remediation options were reviewed to examine the suitability of each method, in considering the remedial options available for the site, the surrounding lands and the geological and hydrogeological limitations, the following issues have been considered:

- Development requirements;
- Prioritisation of works in areas of most concern;
- Ability of remedial method to treat contamination with respect to material and infrastructure limitations;
- Remedial timeframes;
- Defensible method to ensure the site is remediated to appropriate levels / validation criteria; and
- Regulatory compliance.

The following sections provide details on various remediation options for the material found on site.

G1 FILL SOILS & NATURAL SANDS

G1.1. BIOVENTING

Bioventing stimulates the natural in situ biodegradation of aerobically degradable compounds in soil by increasing oxygen flow to existing soil microorganisms. In contrast to soil vapour vacuum extraction, bioventing uses low air flow rates to provide only enough oxygen to sustain microbial activity. Oxygen is most commonly supplied through direct air injection into residual contamination in soil. In addition to degradation of adsorbed fuel residuals, volatile compounds are biodegraded as vapours move slowly through biologically active soil. Bioventing techniques have been successfully used to remediate soils contaminated by petroleum hydrocarbons, non-chlorinated solvents, some pesticides, wood preservatives, and other organic chemicals.

Factors that may limit the applicability and effectiveness of the process include:

- A high water table within 1-2 m of the surface and saturated soil lenses may reduce bioventing performance.
- Vapours can build up in basements or underneath buildings within the radius of influence of air injection wells. This problem can be alleviated by extracting air near the structure of concern.
- Extremely low soil moisture content may limit biodegradation and the effectiveness of bioventing.
- Monitoring of off-gases at the soil surface may be required.
- Aerobic biodegradation of many chlorinated compounds may not be effective unless there is a co-metabolite present, or an anaerobic cycle.

G1.2 ENHANCED BIOREMEDIATION

Enhanced bioremediation is a process in which indigenous or inoculated micro-organisms (e.g., fungi, bacteria, and other microbes) degrade organic contaminants found in soil and/or ground water, converting them to harmless end products. Nutrients, oxygen, or other additives are used to enhance bioremediation and contaminant desorption from subsurface materials. In the presence of sufficient oxygen (aerobic conditions), and other nutrient elements, microorganisms will ultimately convert many organic contaminants to carbon dioxide, water, and microbial cell mass. In the absence of oxygen (anaerobic conditions), the organic contaminants will be ultimately metabolized to methane, limited amounts of carbon dioxide, and trace amounts of

hydrogen gas. Under sulfate-reduction conditions, sulfate is converted to sulfide or elemental sulfur, and under nitrate-reduction conditions, nitrogen gas is ultimately produced.

Factors that may limit the applicability and effectiveness bio remediation of the process include:

- Interaction between the soil matrix and microorganisms influence the results.
- Contaminants may be subject to leaching requiring treatment of the underlying ground water.
- Preferential flow paths may severely decrease contact between injected fluids and contaminants throughout the contaminated zones.
- High concentrations of heavy metals, highly chlorinated organics, long chain hydrocarbons, or inorganic salts may be toxic to microorganisms.
- A surface treatment system, such as air stripping or carbon adsorption, may be required to treat extracted groundwater prior to re-injection or disposal.
- The length of time required for treatment can range from 6 months to 5 years and is dependent on many site-specific factors.

G1.3 CAPPING AND CONTAINMENT

The “cap and contain” method employs a risk minimisation approach similar to “ongoing management”, where impacted soils are managed on site so as not to pose an ongoing risk to the environment or human health. Impacted soils are contained by the placement of an impervious barrier or clean fill materials on top of the impacted material to prevent exposure to site occupiers, workers or the environment. The base of this “clean zone” would be clearly marked by a demarcation barrier to indicate that below this depth workers could potentially be exposed to contamination, which would then trigger additional health, safety and environmental controls.

Capping and containment may be an appropriate remedial option for soil containing both organic and inorganic contaminants that contain residual contamination, particularly if the mix of contaminants is not easily treated. The conditions for this remedial action alternative are:

- The contaminant is relatively non-mobile, including low volatility, insoluble and has low migration potential in a soil matrix.
- The primary exposure route to the contaminant and risk to human health is through direct dermal contact, dust inhalation or soil ingestion.
- The primary exposure route for the environment is mitigated through low leaching potential or migration to groundwater.
- The contained area can be monitored and incorporated into any final land-use plans.

In the use of capping and containment, the focus of the response is to prevent contact with, or exposure to the contaminated soils by human receptors and/or eliminate transport by water to off-site receptors.

G1.4 CHEMICAL OXIDATION/INJECTION

Chemical oxidation remedial strategies involve the addition of an oxidising agent to the soil or groundwater. The rate and extent of degradation of a target chemical of concern is dependent on its susceptibility to oxidative degradation as well as the site conditions, such as pH, temperature, the concentration of oxidant, and the concentration of secondary oxidant-consuming substances such as natural organic matter.

Factors which may limit the applicability and effectiveness of chemical oxidation include:

- Requirement for handling large quantities of hazardous oxidizing chemicals due to the oxidant demand of the target organic chemicals and the unproductive oxidant consumption of the formation.

- Some chemicals of concern are resistant to oxidation.
- There is a potential for process-induced detrimental effects.

G1.5 EXCAVATION AND OFF-SITE DISPOSAL

Excavation and disposal of contaminated wastes is a frequently used option, typically used when a rapid site remediation program is required or where significant subsurface contamination exists that is potentially impacting on sensitive off-site receptors. Wastes must be classified in accordance with the NSW EPA Guidelines.

Based on the required disposal of the landfill material, this option would adequately address the remediation goals through the removal of the contaminants from the site. Furthermore, with the removal of any identified contaminated fill soils, the long-term liability associated with soil contamination shall be minimised, along with substantial improvement of subsurface site conditions with regard to contamination of soil and groundwater.

G1.6 LAND FARMING

Ex situ land-farming is a proven treatment for petroleum hydrocarbon impacted soils. In general the higher the molecular weight or number of rings in a compound, the slower the degradation rate.

Factors that may limit the applicability and effectiveness of the land farming include:

- The large amount of space required.
- Conditions affecting biological degradation of contaminants (e.g., temperature, rain fall) are largely uncontrolled, which increases the length of time to complete remediation.
- Only suitable for organic contaminants.
- Volatile contaminants, such as solvents, must be pre-treated because they would volatilise into the atmosphere, causing air pollution.
- Dust control is an important consideration, especially during tilling and other material handling operations.
- Runoff collection facilities must be constructed and monitored.

G2 GROUNDWATER

G2.1 ENHANCED BIOREMEDIATION

Bioremediation is a process in which indigenous micro-organisms (i.e., fungi, bacteria, and other microbes) degrade organic contaminants found in soil and/or ground water.

Enhanced bioremediation attempts to accelerate the natural biodegradation process by providing nutrients, electron acceptors, and competent degrading microorganisms that may otherwise be limiting the rapid conversion of contamination organics to innocuous end products.

Oxygen enhancement can be achieved by either sparging air below the water table or circulating hydrogen peroxide (H_2O_2) throughout the contaminated ground water zone. Under anaerobic conditions, nitrate is circulated throughout the ground water contamination zone to enhance bioremediation. Additionally, solid-phase peroxide products (e.g., oxygen releasing compound (ORC)) can also be used for oxygen enhancement and to increase the rate of biodegradation.

Air sparging below the water table increases ground water oxygen concentration and enhances the rate of biological degradation of organic contaminants by naturally occurring microbes. Air sparging also increases mixing in the saturated zone, which increases the contact between groundwater and soil. Oxygen enhancement with air sparging is typically used in conjunction with SVE or bioventing to enhance removal of the volatile component under consideration.

During hydrogen peroxide enhancement, a dilute solution of hydrogen peroxide is circulated through the contaminated ground water zone to increase the oxygen content of ground water and enhance the rate of aerobic biodegradation of organic contaminants by naturally occurring microbes.

Solubilized nitrate is circulated throughout ground water contamination zones to provide an alternative electron acceptor for biological activity and enhance the rate of degradation of organic contaminants. Development of nitrate enhancement is still at the pilot scale. This technology enhances the anaerobic biodegradation through the addition of nitrate.

Bio-enhanced remediation strategies are slow and may take several years for plume clean-up.

G2.2 AIR SPARGING

In air sparging, air is injected into a contaminated aquifer where it traverses horizontally and vertically in channels through the soil column, creating an underground stripper that removes contaminants by volatilization. This injected air helps to flush (bubble) the contaminants up into the unsaturated zone where a vapour extraction system is used to remove the vapour phase contamination.

In principal the more volatile a contaminant the more appropriate air sparging as a remediation strategy is. Methane can be added to the system to enhance co-metabolism of chlorinated organics.

Factors that may limit the applicability and effectiveness of the process include:

- Preferential air flow pathways reducing the contact between sparged air and the contaminants.
- Air injection wells must be designed for site-specific conditions.
- Soil heterogeneity may cause some zones to be relatively unaffected.

G2.3 CHEMICAL OXIDATION

In a chemical oxidation system oxidants are added to the system in order to oxidise the chemical of concern to less toxic species. The Chemical oxidants most commonly employed include peroxide, ozone, and permanganate. These oxidants cause the rapid and complete

chemical destruction of many toxic organic chemicals while some chemicals are subject to partially degradation and subsequently reduced by bioremediation.

In general, oxidants are capable of achieving high treatment efficiencies (e.g. >90%) for unsaturated aliphatic (e.g., trichloroethylene [TCE]) and aromatic compounds (e.g. benzene), with very fast reaction rates (90% destruction in minutes). Field applications have clearly affirmed that matching the oxidant and in situ delivery system to the contaminants of concern (COCs) and the site conditions is the key to successful implementation and achieving performance goals.

Oxidation using liquid hydrogen peroxide (H_2O_2) in the presence of native or supplemental ferrous iron (Fe^{+2}) produces Fenton's Reagent which yields free hydroxyl radicals ($OH\cdot$). These strong, nonspecific oxidants can rapidly degrade a variety of organic compounds. Fenton's Reagent oxidation is most effective under very acidic pH (e.g. pH 2-4) and becomes ineffective under moderate to strongly alkaline conditions. The reactions are extremely rapid and follow second-order kinetics.

Ozone gas can oxidize contaminants directly or through the formation of hydroxyl radicals. Like peroxide, ozone reactions are most effective in systems with acidic pH. Due to ozone's high reactivity and instability, O_3 is usually produced onsite and requires closely spaced delivery points (e.g. air sparging wells). In situ decomposition of the ozone can lead to beneficial oxygenation and bio-stimulation.

The following factors may limit the applicability and effectiveness of chemical oxidation include:

- Requirement for handling large quantities of hazardous oxidizing chemicals due to the oxidant demand of the target organic chemicals and the unproductive oxidant consumption of the formation.
- Some COCs are resistant to oxidation.
- There is a potential for process-induced detrimental effects. Further research and development is ongoing to advance the science and engineering of *in situ* chemical oxidation and to increase its overall cost effectiveness.

G2.4 REACTIVE BARRIER WALL

Construction of a permeable reactive barrier (PRB) involves the subsurface emplacement of reactive materials through which a dissolved contaminant plume enters on one side of the PRB and treated water exits the other side. This *in situ* method for remediating dissolved-phase contaminants in groundwater combines a passive chemical or biological treatment zone with subsurface fluid flow management.

PRBs can be installed as permanent or semi-permanent units. The most commonly used PRB configuration is that of a continuous trench in which the treatment material is backfilled. The trench is perpendicular to and intersects the groundwater plume.

Alternately low-permeability walls can be used to direct a groundwater plume toward a permeable treatment zone.

G2.5 PUMP AND TREAT

As its name implies, a pump and treat remedial involves the pumping of contaminated of ground water pumping include removal of dissolved contaminants from the subsurface, and containment and treatment the water. The treated groundwater is then either re-introduced into the aquifer or disposed off-site.

The criteria for well design, pumping system and treatment are dependent on the physical site characteristics and contaminant type. While treatment options may include a train of processes such as gravity segregation, air strippers, and activated carbon filters designed to remove specific contaminants.

The first step in determining whether ground water pumping is an appropriate remedial technology is to conduct a site characterization investigation. Site characteristics, such as hydraulic conductivity, will determine the range of remedial options possible. Chemical properties of the site and plume need to be determined to characterize transport of the contaminant and evaluate the feasibility of ground water pumping. To determine if groundwater pumping is appropriate for a site, one needs to know the history of the contamination event, the properties of the subsurface and the biological and chemical contaminant characteristics. Identifying the chemical and physical site characteristics, locating the groundwater contaminant plume in three dimensions and determining aquifer and soil properties are necessary in designing an effective ground water pumping strategy.

The following factors may limit the applicability and effectiveness of ground water pump and treat options as a remedial option:

- The time frame required to achieve the remediation goal;
- The pumping system fail to contain the contaminant plume as predicted;
- Residual saturation of the contaminant in the soil pores cannot be removed by groundwater pumping;
- A pump and treat option is not suitable for contaminants with:
 - high residual saturation;
 - high sorption capabilities; and
 - homogeneous aquifers with hydraulic conductivity less than 10^{-5} cm/sec;
- Potential high operating costs;
- Biofouling of the extraction wells and associated treatment stream may severely affect system performance;
- Subsurface heterogeneities, may severely affect system performance;
- Potential toxic effects of residual surfactants in the subsurface;
- Drawdown pumping generally produces large volumes of water requiring storage and or treatment.

G2.6 EXCAVATION

Excavation and disposal of contaminated wastes is a frequently used option, typically used when a rapid site remediation program is required or where significant subsurface contamination exists that is potentially impacting on sensitive off-site receptors. Excavation can also be used to remove primary sources of any groundwater contamination (such as buried tanks or drums and waste disposal areas) and remove the secondary sources of impact (contaminated fill, residual soils and impacted bedrock and bedrock fractures such as joints and bedding planes).

G3 REMEDIATION OPTIONS

The various remediation options were reviewed in a technology matrix to assess their suitability against the various subsurface materials at the site and whether the option meets the primary objectives of the remediation works program, as discussed in **Section 6.2**.