



Remedial Action Plan, 253-265 Pacific Highway, North Sydney

Legacy Property

Report

68635 | 165 449

13 June 2025



We acknowledge the Traditional Custodians of Country throughout Australia and their connections to land, sea and community.

We pay respect to Elders past and present and in the spirit of reconciliation, we commit to working together for our shared future.



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Abbreviations

Term	Definition
ACM	Asbestos Containing Material
AEC	Areas of Environmental Concern
AF/FA	Friable Asbestos
AHD	Australian Height Datum
ASS	Acid Sulfate Soils
B(a)P	Benzo(a)pyrene
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
COPC	Contaminants of potential concern
CSM	Conceptual Site Model
DCP	Development Control Plan
DQIs	Data Quality Indicators
DQOs	Data Quality Objectives
DSI	Detailed Site Investigation
EIL	Ecological Investigation Levels
EPA	NSW Environment Protection Authority
ESL	Ecological Screening Levels
HIL	Human Health Investigation Levels
HSL	Human Health Screening Levels
JBS&G	JBS&G Australia Pty Ltd
LEP	Local Environmental Plan
LOR	Limit of Reporting
LTEMP	Long Term Environmental Management Plan
NATA	National Association of Testing Authorities
NEPC	National Environment Protection (Assessment of Site Contamination) Measure 1999
OCPs	Organochlorine Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PARCCS	Precision, Accuracy, Representativeness, Comparability, Completeness and Sensitivity
PCBs	Polychlorinated Biphenyls
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance/Quality Control
RAP	Remedial Action Plan
RPD	Relative Percent Difference
SEARs	Secretary's Environmental Assessment Requirements
SSDA	State Significant Development Application
TCLP	Toxicity Characteristic Leaching Procedure
TRH	Total Recoverable Hydrocarbon
USTs	Underground Storage Tanks
VENM	Virgin Excavated Natural Material

Term	Definition
VOCs	Volatile Organic Compounds

Executive Summary

JBS&G Australia Pty Ltd (JBS&G) was engaged by Legacy Property (the client) to prepare a Remedial Action Plan (RAP) associated with the properties located at 253-265 Pacific Highway, North Sydney, NSW (the site). The site is legally identified as SP16134, SP22870, Lot 51 DP714323 and Lot B DP321904 and covers an area of approximately 1,100 m². The site location and layout are present on **Figures 1 and 2 (Appendix A)**, respectively.

It is understood that the site has historically been used for mixed use commercial/industrial and residential. Properties located at 255-259 Pacific Highway were utilised for potentially contaminating land uses (chemical handling and car sales/hire) along with the neighbouring property to the north at 267 Pacific Highway (former service station/garage). However, historic redevelopment of 267 and 255-259 Pacific Highway has likely removed former underground infrastructure and shallow, potentially impacted soils. The site has been subject to previous investigations including a Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI). These investigations identified limited contamination within shallow fill material. The soil contaminants are Polyaromatic Hydrocarbons (PAHs) (specifically Benzo(a)Pyrene (B(a)P)) and heavy metals, in particular lead, copper, nickel and zinc. The site is proposed to be developed for a continue mixed use land use.

Groundwater quality sampling is provided in the DSI to characterise water quality for development dewatering activities during and post construction. The groundwater sampling did not identify risk to human health and/or the environment which required remediation. However, management of the groundwater will be required to meet with discharge acceptance criteria depending on the disposal option selected. As remediation is not require, the management requirements will be outlined in construction and post construction management plans for dewatering activities. Controls provided in the following RAP are in relation to management of water in remedial excavations only.

This RAP has been prepared to support a State Significant Development Application (SSD-84416958) and respond to Planning Secretary's Environmental Assessment Requirements (SEAR's) with reference to Chapter 4 of the State Environmental Planning Policy (Resilience and Hazards) 2021 and relevant guidelines made or endorsed by the NSW Environment Protection Authority (EPA), inclusive of NEPC (2013¹).

The preferred remedial strategy for the site is: Offsite disposal of heavy metals and PAH impacted shallow fill. Additional samples may be required to classify soils for offsite disposal as per the NSW Sampling Design Guidelines based on the volume of materials designated for disposal.

The works are deemed Category 2 and do not require consent under the Remediation of Land requirements under *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP 2021).

It is considered that the proposed actions outlined in this RAP conform to EPA requirements because they are: technically feasible; environmentally justifiable; and consistent with relevant laws, policies and guidelines endorsed by NSW EPA.

Subject to the successful implementation of the measures described in this RAP, it is concluded that the risks posed by identified contamination can be managed in such a way as to be adequately protective of human health such that the site can be made suitable for permissible residential land use.

¹ *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as amended 2013 (ASC NEPM), National Environment Protection Council (NEPC 2013)

1. Introduction

1.1 Background

JBS&G Australia Pty Ltd (JBS&G) was engaged by Legacy Property (the client) to prepare a Remedial Action Plan (RAP) associated with the properties located at 253-265 Pacific Highway, North Sydney, NSW (the site). The site is legally identified as SP16134, SP22870, Lot 51 DP714323 and Lot B DP321904, and covers an area of approximately 1,100 m². The site location and layout are present on **Figures 1 and 2 (Appendix A)**, respectively.

It is understood that the site has historically been used for mixed use commercial/industrial and residential. Properties located at 255-259 Pacific Highway were utilised for potentially contaminating land uses (chemical handling and car sales/hire) along with the neighbouring property to the north at 267 Pacific Highway (former service station/garage). However, historic redevelopment of 267 and 255-259 Pacific Highway has likely removed former underground infrastructure and shallow, potentially impacted soils. The site has been subject to previous investigations including a Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI). These investigations identified limited contamination within shallow fill material. The soil contaminants are Polyaromatic Hydrocarbons (PAHs) (specifically Benzo(a)Pyrene (B(a)P)) and heavy metals, in particular lead, copper, nickel and zinc. The site is proposed to be developed for a continue mixed use land use.

Groundwater quality sampling is provided in the DSI to characterise water quality for development dewatering activities during and post construction. Dewatering is likely required for construction of the proposed basement and potentially for ongoing seepage management as part of a drained basement. The groundwater sampling did not identify risk to human health and/or the environment which required remediation. However, management of the groundwater will be required to meet with discharge acceptance criteria depending on the disposal option selected for the development. As remediation is not required, the management requirements will be outlined in construction and post construction management plans for dewatering activities.

This RAP has been prepared to support a State Significant Development Application (SSD-84416958) and respond to Planning Secretary's Environmental Assessment Requirements (SEAR's) with reference to Chapter 4 of the State Environmental Planning Policy (Resilience and Hazards) 2021 and relevant guidelines made or endorsed by the NSW Environment Protection Authority (EPA), inclusive of NEPC (2013²).

1.2 Objectives

The objectives of this RAP are to:

- Summarise the results of the previous investigations;
- Document an updated Conceptual Site Model (CSM) identifying contamination risks to human health and the environment for the intended land use scenario;
- Map, describe and quantify the extent of contamination requiring remediation;
- Set remediation goals that will ensure the ongoing suitability of the land;
- Assess remediation/management options to achieve the remediation goals and select a preferred approach, giving consideration to ecologically sustainable development (ESD) principles;
- Document the procedures and plans as part of the preferred approach to reduce the contamination risks to acceptable levels for the proposed land use;
- Establish and detail safety and environmental controls that are required to be followed in order to ensure the protection of human health and the environment during remediation;
- Give consideration to contingencies and unexpected find protocols;

² National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 (ASC NEPM), National Environment Protection Council (NEPC 2013)

- Outline appropriate protocols for documentation and tracking of waste and imported soil associated with remediation;
- Detail the validation requirements to identify remediation targets, achieve suitable validation data quality, in order to confirm successful remediation and site suitability; and
- Identify the necessary regulatory approvals and licences for the remediation works.

2. Site Condition, History and Surrounding Environment

2.1 Site Identification

The site location is shown on **Figure 1**. The site layout and associated cadastral boundaries are shown on **Figure 2**. The site details are summarised in **Table 2.1** and described in detail in the following sections.

Table 2.1 Summary of Site Details

Lot/Deposited Plan (DP)	SP16134, SP22870, Lot 51 DP714323, and Lot B DP321904
Address	253-265 Pacific Highway, North Sydney NSW
Local Government Authority	North Sydney Council
Approximate MGA Coordinates (GDA2020- MGA56)	Easting: 333913.42 Northing: 6254799.10
Site Zoning	B4: Mixed Use under <i>North Sydney Local Environmental Plan (LEP) 2013</i>
Current Use	Mixed use (commercial and residential)
Previous Use	Mixed use (commercial and residential)
Site Area	Approximately 1,100 m ²

2.2 Site Description

A detailed site inspection was completed by a JBS&G trained and experienced environmental consultant on 2 March 2023. A photographic log of the site inspection is presented in **Appendix B**.

The site comprised an approximately rectangular portion of land with property surfaces incorporating concrete pathways and basement flooring, asphalt roadways, brick pathways and garden beds bound by the Pacific Highway, McLaren Street and Church Lane. Directly north is 267 Pacific Highway, with West Street beyond. The site was accessed off Church Lane, a back lane on the east side of the site which spanned the entire length of the site. The site consisted of five properties, 253, 255-259, 261, and 265 Pacific Highway which were mainly used as residential, commercial, and retail structures.

253 Pacific Highway was a combined residential and commercial brick building.

255-259 and 261 Pacific Highway were commercial buildings with multiple tenants. The buildings included a concrete basement carpark, with basement access from Church Lane.

265 Pacific Highway contained a dilapidated abandoned terrace and shed. The house contained mould on the walls, a broken brick fireplace with scattered bricks surrounding, paint chips on the ground, rotting floorboards and a rusted metal shelf. The shed contained, rusted sheet metal roof, rotting floorboards, scattered bricks and exposed water pipes. The property was not occupied at the time of the JBS&G site visit in 2023.

2.3 Surrounding Land Use

The current land uses of adjacent properties or properties across adjacent roads are summarised below:

- North – The site was bound by 267 Pacific Highway, with West Street located beyond. Further north are commercial buildings including Union Hotel, North Sydney Police station and multistorey office buildings. Mater Hospital and Cammeray High School are located to the northwest of the site.
- East – The site was immediately bound by Church Lane, with residential buildings, the Stanton Library, North Sydney Oval, St Leonards Park and Warringah Freeway located further east of the site.
- South – The site is bound by residential terraces, thence McLaren Street. Further south are multistorey commercial office buildings with ground floor retail stores and cafes, Pacific Highway, hospitality venues e.g., Greenwood Hotel, and North Sydney train station.

- West – The site was bound by the Pacific Highway, with residential properties found beyond. Further west is the North Sydney Demonstration School (southwest), Brennan Park and the train line between Wollstonecraft and Waverton.

No service stations, waste processing facilities or other industrial type land uses were identified within 500m of the site.

2.4 Natural Site Setting

The environmental setting of the site as outlined in JBS&G (2018) is presented in **Table 2.2**.

Table 2.2 Natural Site Setting Summary

Environmental Aspect	Characteristics
Topography	The sites elevation is approximately 90 to 100 m Australian Height Datum (AHD) sloping downwards from north to south. Regional topography slopes southeast towards Lavender Bay and Neutral Bay of Sydney Harbour.
Hydrology	Rainfall at the site primarily falls onto building rooftops and is captured by gutters/stormwater downpipes prior to discharge into the municipal stormwater system.
Geology	The 1:100,000 Geological Series Sydney Sheet indicates that the site is underlain by Ashfield Shale of the Wianamatta Group which is largely characterised by black to dark grey shale and laminite.
Hydrogeology	Seventeen registered groundwater boreholes were located within 1.5 km radius of the site. Groundwater migration is expected to occur in a southeast direction, towards Sydney Harbour.
Acid Sulfate Soils (ASS)	The site exists in an area of 'no known occurrence of acid sulfate soils'.
Soil Landscape	The site is within the residual Blacktown Soil Landscape Group and it is characterised by gently undulating rises, local relief to 30 m, slopes are usually <5%, broad rounded crests and ridges with gently inclined slopes. Limitations of the Blacktown Soil Landscapes group include moderately reactive, highly plastic subsoil, low soil fertility and poor soil drainage.

2.5 Site History

Available records indicate, the site has been used for residential and commercial purposes since the earliest records. Occupational uses of the site were limited to light commercial and residential, with exception of 255-259 Pacific Highway, which was occupied by Bayer Pharma Pty Ltd, a chemical company. Historical title records indicated 267 Pacific Highway was previously the location of a service station/garage. The EPA searches did not indicate that any other industrial activities occurred at, or within close vicinity of, the site. No dangerous goods storage licences were identified to have been issued at the addresses for which permission to undertake searches were obtained.

3. Previous Site Investigation

The following sections provide a summary of the information and site characterisation data presented within key assessment reports.

Information pertaining to the JBS&G investigation summarised in **Sections 3.1** and **3.2** is presented in **Appendix B** (analytical summary tables), **Appendix C** (field logs) and **Figure 3** (sample locations).

3.1 Preliminary Site Investigation (JBS&G 2018³)

JBS&G Australia Pty Ltd (JBS&G) was engaged by Legacy to provide environmental consulting services associated with the Phase 1 Environmental Site Assessment (ESA) of the properties located at 253, 255-259, 261, 265 and 267 Pacific Highway, North Sydney, NSW. The ESA conducted included a review of the site history, detailed site inspection, development of Conceptual Site Model (CSM) and production of the Preliminary Site Investigation (PSI) report. The detailed site inspection indicated that the site was generally free from overt indicators of gross and/or widespread contamination. No visual or olfactory indicators of contamination were observed and, where present, vegetative health appeared to be good. Buildings at the site did not exhibit signs of significant dilapidation.

Historical title records, aerial photographs and North Sydney Council's online records have indicated that the property located at 267 Pacific Highway (immediately north of the current site boundary) was formerly used as a service station/garage, and 255-259 Pacific Highway was formerly occupied by Bayer Pharma and car dealership/hire companies. Excavation of basements associated with construction of the current buildings at the site and directly north at 267 Pacific Highway is likely to have resulted in the removal of UPSS infrastructure and shallow soil impacts from the historical activities.

The properties at 253, 261 and 265 are understood to have been residential/commercial with a low potential for them to be impacted by historic use. Notwithstanding the aforementioned, there remains the potential for residual contamination of deeper soils at 255-259 and 267 Pacific Highway or contamination of fill/natural materials downgradient.

A limited Phase 2 Environmental Site Assessment was recommended to characterise the nature and extent of potential contamination resultant from the former land uses of the site.

3.2 Detailed Site Investigation (JBS&G 2023⁴)

JBS&G undertook intrusive sampling of the soil at eight locations across the site and soil vapour sampling at two accessible locations at the site. It should be noted since the preparation of JBS&G 2018, 267 Pacific Highway has been removed from the proposed development plans and is considered outside of the site boundary.

The soil fill profile encountered below existing ground levels generally comprised brown/dark brown clay or sandy/gravelly clay to a maximum depth of between 0.3 and 0.5 m below ground surface (bgs). The fill was underlain by natural brown clay. Elevated levels of lead within shallow fill were detected exceeding both the adopted human health⁵ and ecological criteria⁶. Additionally, levels of copper, nickel and zinc within shallow fill were above the adopted ecological criteria. Benzo(a)pyrene TEQ at BH02_0.1-0.2 exceeded the adopted human health residential B criteria. Soil vapour results were all below the limit of reporting.

³ Phase 1 Environmental Site Assessment – 253-267 Pacific Highway, North Sydney, NSW, JBS&G Australia Pty, 54063-110429, 5 September 2018 (JBS&G 2018)

⁴ Detailed Site Investigation – 253-267 Pacific Highway, North Sydney, NSW, JBS&G Australia Pty, 64150-150793, 22 March 2023 (JBS&G 2023)

⁵ HIL/HSL-B residential with minimal access to soil and HIL/HSL-D commercial/industrial land use scenarios.

⁶ EIL/ESL-D commercial/industrial land use scenarios.

It was concluded that the site can be made suitable for the proposed mixed-use commercial/residential development with the implementation of a RAP for the identified shallow impacted fill materials.

4. Conceptual Site Model

4.1 Overview

NEPC (2013) identifies a Conceptual Site Model (CSM) as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The development of a CSM is an essential part of all site assessments.

NEPC (2013) identified the essential elements of a CSM as including:

- Known and potential sources of contamination and contaminants of concern including the mechanism(s) of contamination;
- Potentially affected media (soil, sediment, groundwater, vapours etc.);
- Human and ecological receptors;
- Potential and complete exposure pathways; and
- Any potential preferential pathways for migration.

4.2 Contamination Sources

Based on a review of previous investigations and with consideration to the proposed commercial/residential end land use for the site, Areas of Environmental Concern (AEC) and associated contaminants of potential concern (COPC) have been identified.

Investigation works identified the presence of the following AECs and COPC requiring remediation/management, as presented in **Table 4.1**.

Table 4.1 Areas of Environmental Concern, Media and Contaminants of Concern

AEC	COPC
Heavy metal and PAHs contamination within shallow fill as indicated on Figure 4 .	Heavy Metals and PAHs

4.3 Potential for Migration

Based on the historical assessment activities undertaken within the site, there is minimal potential for migration of contamination from the site.

Given the observations of sealed surface via buildings, concrete, pathways and vegetated garden beds there is limited potential for wind-blown dust migration. There is also limited potential for infiltration of water due to surface water being caught and redirected by gutters.

Given the downward slope of the site to the south, it is considered that where present, contaminants in bare surface soils could have historically migrated south.

Given the depth to groundwater and low permeability soils anticipated, migration to and via groundwater from the site is considered to be a low risk. As mentioned in **Section 1.1**, dewatering activities are proposed for the development. Groundwater sampling did not identify risks to human health and/or the environment which required remediation. However, management of dewatering discharges may be required to meet with acceptance criteria depending on the disposal option adopted. Procedures for managing dewatering discharges will be covered in construction and post construction management plans for the development.

4.4 Potential Exposure Pathways and Receptors

Based on the COPC identified in various media as discussed above, the exposure pathways anticipated for the site include:

- Current and future site users and landowners who may potentially be exposed to COPC through direct contact with or ingestion of impacted soils and/or inhalation of dusts / fibres associated with impacted soils and/or surface water;
- Excavation / construction / maintenance workers conducting activities at the site, who may potentially be exposed to COPC through direct contact with impacted soils present within excavations and/or inhalation of dusts / fibres associated with impacted soils;
- Any flora species to be established on the vegetated areas of the site; and
- Existing and/or future users/occupants of adjoining properties should contamination migrate from the site. This is anticipated to be limited to potential contaminant migration via windblown dusts / airborne fibres and/or surface water.

The site is currently primarily covered by buildings, presenting limited ecological receptors, although no vegetation stress relating to potential contamination from known AECs was observed during site inspection. Flora on site are potential receptors of shallow soil contamination if present.

Controls are provided in **Section 9** to mitigate such risks during remediation.

4.5 Preferential Pathways

For the purpose of this RAP, preferential pathways have been identified as natural and/or man-made pathways that result in the preferential migration of COPC as either solid (sediments, dust, etc) or liquid (surface water). If liberated, preferential pathways, for contact with dust or surface water are anticipated to be largely driven by (but not limited to) the magnitude of disturbance, moisture content of soil and meteorologic conditions (rainfall/wind velocity etc.).

5. Remedial Options

5.1 Extent of Remediation

As discussed in **Section 3** and **Section 4**, the following areas have been identified as requiring remediation to make the land suitable for the proposed end use (commercial and residential land use with minimal access to soils):

- Shallow fill across the site as indicated on **Figure 4**.

Table 5.1 Extent of Remediation

AEC	Area (m ²)	Depth Range (m bgs)	Average Depth of impact (m)	Approximate Volume (m ³)
Heavy Metals and PAHs	250	0.1-0.5	0.3	75

5.2 Remedial Objectives

The remediation objectives are as follows:

- Removal of unacceptable risks to human health associated with heavy metal and PAH impacts within shallow fill;
- Validate that the site is suitable for mixed use commercial and residential land uses (NEPC 2013, Setting B and D) without the requirement for ongoing management, in accordance with the relevant NSW EPA guidelines; and
- Document the validation process.

5.3 Consideration of Possible Remedial Options

NEPC (2013) presents the following hierarchy of options for soil remediation and management approaches, which is followed in NSW EPA (2017):

- *Onsite treatment of the contamination so that it is either destroyed or the associated risk is reduced to an acceptable level; or*
- *Offsite treatment of excavated soil so that the contaminant is destroyed, or the associated risk is reduced to an acceptable level, after which the 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 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.*

Consideration of each of the approaches, is presented in **Table 5.2**.

Remedial Option	Discussion	Conclusion
<p>Option 1: On-site treatment of the soil so that the contaminants are either destroyed or the associated hazards are reduced to an acceptable level.</p>	<p><u>Impacted Fill</u> There are no practical means of destroying/removing heavy metals and PAHs within soils that is commercially available within Australia.</p>	<p>Not a practical option.</p>
<p>Option 2: Off-site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site.</p>	<p><u>Impacted Fill</u> There are no practical means of destroying/removing heavy metals and PAHs within soils.</p>	<p>Not a practical option.</p>
<p>Option 3: Consolidation and isolation of the soil on-site by containment within a properly designed barrier.</p>	<p><u>Impacted Fill</u> This option provides for the retention of impacted soil on-site beneath a physical barrier such that there are no complete exposure pathways available between the contaminated material and sensitive human receptors and/or potential ecological receptors. The barrier would comprise the hardstand surface under the proposed development scheme. Where persistent contaminants are present (i.e. heavy metals and PAHs) this option would result in ongoing requirements for management under the contaminated land management framework.</p> <p>Moreover, this option minimizes the amount of waste produced from the proposed development works and is therefore consistent with ecological sustainable development (ESD) principles.</p> <p>Containment requires long term management and notification on title and planning certificates which can devalue land and impose restrictions on future land use and requires to be legally enforceable.</p> <p>However, should materials be unable to be retained for other reasons (i.e. geotechnical) this option may not be viable.</p>	<p>A potential option. While this is technically feasible and practicable, the requirement for ongoing management does not meet one of the remediation objectives.</p>
<p>Option 4: Removal of contaminated soil to an approved site or facility, followed where necessary by replacement with clean fill</p>	<p><u>Impacted Fill</u> Ideally suited to small volumes, and where sensitive end land use is more achievable with impact being removed from the site entirely. There are currently suitably licensed waste facilities in the Sydney Metropolitan region capable of accepting heavy metal and PAH contaminated soils.</p> <p>However, it results in increased landfill disposal and as such is lower on EPA's waste minimisation hierarchy, as well as their remediation hierarchy. For large volumes it also results in increased traffic and associated resource consumption than onsite treatment for the identified impacts.</p>	<p>The preferred option for the small volume of impacted fill.</p> <p>It is noted additional samples may be required to be collected to classify soil for offsite disposal as per the NSW Sampling Design Guidelines.</p>

5.4 Preferred Remedial Strategy

A number of potential remedial options have been considered in **Table 5.1**. The preferred remedial strategy for the site is:

- Offsite disposal of heavy metals and PAH impacted shallow fill. Additional samples may be required to classify soils for offsite disposal as per the NSW Sampling Design Guidelines based on the volume of materials designated for disposal.

6. Remediation Plan

6.1 Regulatory and Planning Requirements

This RAP has been prepared with reference to the following guidelines and legislation:

- *Remediation of Land requirements under State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP 2021⁷) and associated Planning Guidelines⁸;
- *Sampling design part 1 – application and Sampling design part 2 - interpretation*, NSW EPA 2022 (EPA 2022);
- *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Land*. NSW EPA 2020 (EPA 2020);
- *Contaminated Land Management: Guidelines for NSW Site Auditor Scheme (3rd Edition)*, NSW Environment Protection Authority 2017 (EPA 2017); and
- *National Environment Protection (Assessment of Site Contamination Measure) Measure 1999* (as amended 2013), National Environment Protection Council (NEPC 2013).

6.1.1 Remediation Category and Consent

Under Clauses 4.8 and 4.11 of the Resilience and Hazards SEPP, remediation work documented here is considered Category 2 Remediation Work (i.e., work not needing consent).

Under North Sydney Council DCP 2013⁹ if a RAP proposes to undertake Category 2 Remediation, documentation associated with or in support of the RAP shall be submitted to Council.

6.2 Approvals, Licences and Notifications

Consistent with clauses 4.13 to 4.15 of the Hazards and Resilience SEPP, notice of commencement of remediation works must be given to the local council at least 30 days prior to commencement, and on completion the local council must be notified within 30 days after completion of the works.

6.3 Establishment

The Remediation Contractor shall secure the site to ensure that all safety and environmental controls are implemented. These controls should include, but not be limited to:

- Locate and isolate all required utilities in the proximity of the works;
- Assess need for and implement of any necessary traffic controls;
- Work area security fencing;
- Site signage and contact numbers;
- Sediment controls at established entry/exit gates;
- Appropriate decontamination areas for personnel and plant, if required;
- Sediment fencing (attached to security fencing); and
- Stormwater runoff and sediment controls (e.g. silt fences and hay bales).

⁷ The Resilience and Hazards SEPP commenced on 1 March 2022 at which time *State Environmental Planning Policy 55 – Remediation of Land* was repealed, with *SEPP 55* requirements transferred into *Chapter 4* of the *Resilience and Hazards SEPP*.

⁸ *Managing Land Contamination – Planning Guidelines SEPP55 – Remediation of Land*, Department of Urban Affairs and Planning EPA, 1998 – N.B. these guidelines are under review.

⁹ North Sydney Development Control Plan 2013

6.4 Remedial Works

Areas requiring remediation are discussed in **Section 5** and shown on **Figure 4**. The remedial works are required to be undertaken by a Remediation Contractor with appropriate training, licences and experience, under the supervision of an appropriately experienced environmental consultant.

6.4.1 Heavy Metals and Benzo(a)pyrene impacted Shallow Fill

The shallow fill located at 265 and 253 Pacific Highway, North Sydney will be the extent of remediation required.

The Remediation Contractor shall undertake the following to address impacted material proposed to be disposed from the site:

- In situ contaminated fill within the remedial area (**Figure 4**) should be excavated and disposed offsite to an appropriately licensed waste facility. A Waste Classification prepared by an appropriately experienced environmental consultant would be required to dispose of materials offsite;
- The excavation extent(s) should be documented by an environmental consultant and residual soil validated as per **Section 8**. Should validation fail, the failed base should be excavated a further 0.2 m in the direction of the failure and the validation process repeated until validation is achieved;
- Temporary storage of impacted soil (as required) should be conducted in accordance with **Section 9.3** (i.e. appropriately covered);
- The footprint(s) of all stored material (where placed on unsealed ground) are to be validated by an environmental consultant as per **Section 8**. Should validation fail, the failed base should be excavated a further 0.2 m in the direction of the failure and the validation process repeated until validation is achieved; and
- Materials should be tracked from source, through required remedial activities to the offsite disposal facility, noting remediation undertaken and validation outcome.

6.5 Offsite Disposal

Fill materials requiring removal and disposal shall be classified in accordance with *Waste Classification Guidelines Part 1: Classifying Waste* (EPA 2014) or an appropriate exemption as created under the *Protection of the Environment Operations (Waste) Regulation 2014*.

Should natural soils/bedrock require offsite disposal during remediation works, then these shall also be classified in accordance with EPA (2014).

A waste classification letter should be prepared for each material type that is to be disposed. Additional samples may be required to classify waste for offsite disposal as per the NSW Sampling Design Guidelines. The waste facility must be lawfully licensed to receive the material sent to it for disposal. The Remediation Contractor must be aware of and conduct all waste disposal in accordance with all relevant regulations. All waste tracking documentation including disposal dockets must be maintained by the Remediation Contractor and must be provided to the Environmental Consultant and the client for inclusion in the validation report.

6.6 Materials Importation

Should material need to be imported to the site to reinstate remedial excavations, its suitability for use at the site from a contamination perspective will require verification prior to importation to the site. Virgin Excavated Natural Material (VENM) or material subject to a NSW EPA Resource Recovery Order/Exemption should be used for reinstating excavations. Reference should be made to **Section 8** for imported material characteristics, sampling densities, analytes and compliance with relevant EPA made or endorsed guidelines.

6.7 Validation

Validation of the remedial works should be conducted by an appropriately qualified environmental consultant to demonstrate that the remediation objectives have been achieved. Details of the validation program are provided in **Section 8**.

6.8 Disestablishment

On completion of the remediation works all plant/equipment and safety/environmental controls shall be removed from the site by the appointed Remediation Contractor. All equipment used during remediation works will need to be appropriately decontaminated or disposed of as waste in accordance with relevant waste regulations.

7. Contingency Plan

A review of remediation works has been undertaken to identify potential risks to meeting the specified site validation criteria (**Section 8.4**). Potential risks have been identified. These are presented following in **Section 7.2** with contingencies that should be implemented to ensure that validation criteria are met.

Additionally, the associated remedial works health and environmental risks/hazards and minimisation/mitigation are further discussed in **Section 9**.

7.1 Unexpected Finds Protocol

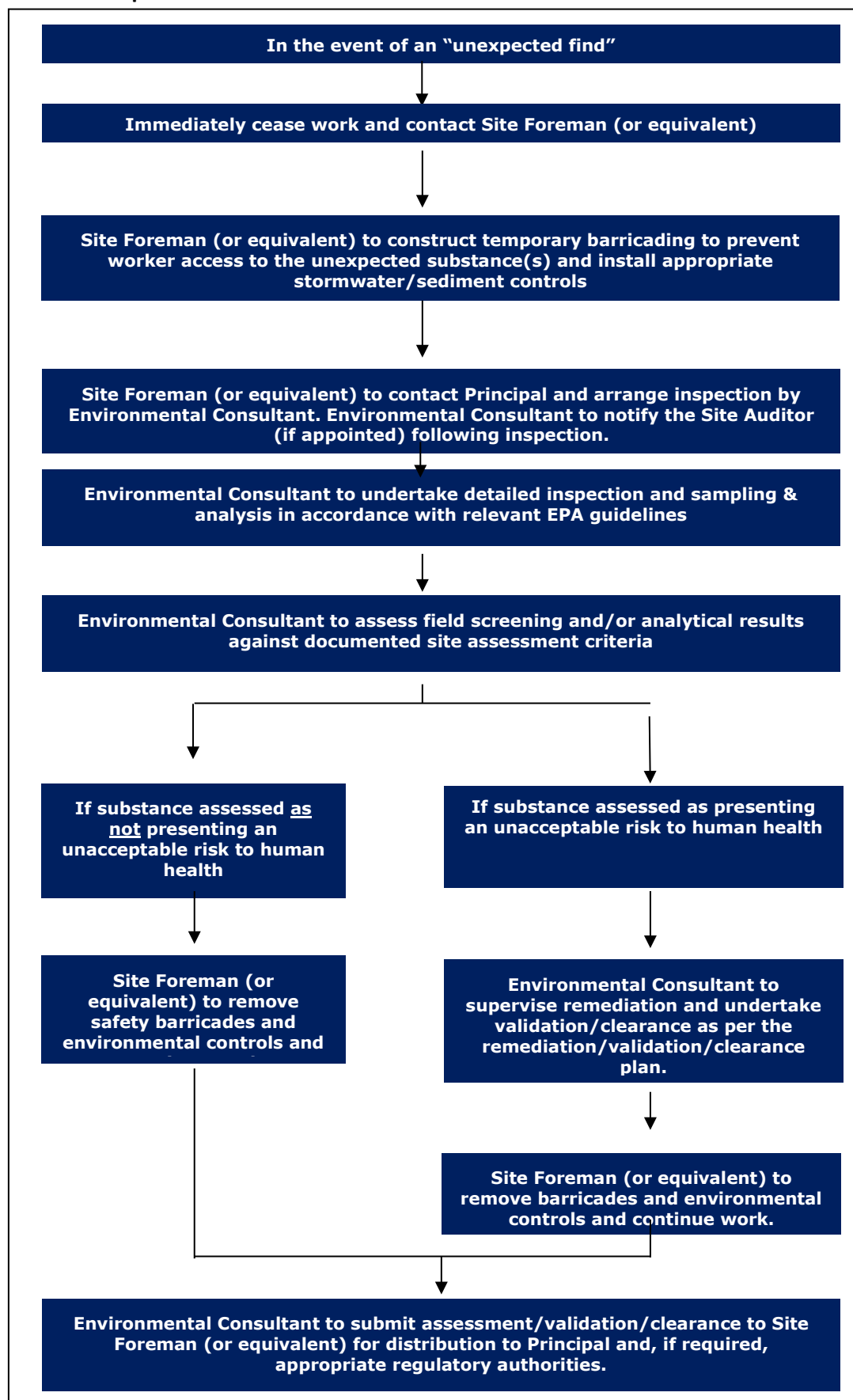
It is acknowledged that previous investigations within the site have been undertaken to assess the identified contaminants of potential concern. However, ground conditions between sampling points may vary, and further hazards may arise from unexpected sources and / or in unexpected locations during remediation. The nature of any residual hazards which may be present within the site are generally detectable through visual or olfactory means, for example:

- Fragments of asbestos impacted materials (ACM);
- AF/FA (friable asbestos);
- Bottles/containers of chemicals (visible);
- Tar contaminated soils/fill materials (visible);
- Chemically impacted soil/fill materials;
- Petroleum contaminated soils (odorous, staining/discolouration visible);
- Soils contaminated volatile organic compounds (VOCs) (odours) and vapours;
- Soil impacted with anthropogenic material; and
- Underground storage tanks (USTs).

As a precautionary measure to ensure the protection of the workforce and surrounding community, should any of the abovementioned substances be identified (or any other unexpected potentially hazardous substance), the procedure summarised in **Flowchart 7.1** is to be followed.

The unexpected finds protocol should be presented and reviewed during the site-specific induction. Unexpected finds will require characterisation and resultant excavations will require validation according to **Table 8.3**.

Flowchart 7.1 – Unexpected Finds Protocol



7.2 Contingency Scenarios

7.2.1 Remedial Strategy Constraints

In the event that the proposed remedial works do not meet the validation criteria, or if the selected remedial strategy is not able to proceed (e.g., surplus contaminated material or a deeper than anticipated fill profile), the following actions should be considered to ensure, firstly, the safety and health of people and the environment and, secondly, that the overall project objectives are achieved:

- Reassessment of remedial and validation options for heavy metal and PAH impacted soils.

A higher volume of impacted material may need to be sent offsite if preferred approaches are no longer suitable.

7.2.2 Complaints

Due to the nature of the activities and type of contaminants identified within the site there is a potential for complaints to be received from members of the public, relating to environmental emissions including:

- Dust emissions arising from soil excavation, material handling, transport, placement and capping; and
- Noise and vibration from excavation.

Monitoring of all potential environmental emissions shall be undertaken as detailed in **Section 9** and appropriate actions taken to further control emissions following receipt of a complaint. Such additional controls may include the following actions:

- Disturbance of soils during meteorologically favourable periods (minimal wind conditions) only; and
- Increasing environmental controls including covering and / or wetting down soils which are generating dust or use of odour suppressants to control odours.

7.2.3 Severe Weather

Weather should be monitored daily via checking an internet-based weather service provider. Should severe weather be forecast, especially high winds, works should stop until safe to re-commence. All site management controls should be implemented to the extent practicable as outlined in **Section 9** prior to any severe weather events.

8. Validation Plan

8.1 Overview

Validation data is required to be collected to verify the effectiveness of the remediation works and document the condition of the site as being suitable for the proposed future use (without the requirement for ongoing management).

Validation activities will be required for the following aspects:

- Collection of appropriate environmental data from excavation faces and from the footprint of any temporarily stockpiled material following the remediation of in-situ impacts;
- Tracking the movement of fill material on site and imported material; and
- Tracking the movement of waste materials requiring offsite disposal.

8.2 Data Quality Objectives

Data Quality Objectives (DQOs) were developed for the validation program, as discussed in the following sections.

8.2.1 State the Problem

Previous investigations have identified heavy metals and PAHs in the shallow fill. The presence of heavy metals and PAH material presents a potentially unacceptable human health risk; therefore, remediation is required for the site to be made suitable for mixed use without ongoing management.

During remediation activities, sufficient validation observations and data is required to demonstrate that the identified health-based risks to future site users and aesthetic issues have been adequately managed to render the site suitable for the proposed land use without the requirement for ongoing management.

8.2.2 Identify the Decision

The decisions which are required to be made for validation of the site are as follows:

- Is visual contamination still present at the surface soils?
- Are contaminant concentrations in remedial excavations above the adopted site remediation criteria?
- Are there any aesthetic issues remaining following remediation works?
- Have the site remediation activities not been undertaken in compliance with the regulatory requirements?
- Is the site considered suitable for the proposed use?

During the remediation activities, sufficient validation of remediation activities is required to demonstrate that the identified environmental and health-based risks to future use(s) of the site have been adequately managed to render the site suitable for the proposed land use.

8.2.3 Identify Inputs to the Decision

The inputs to the decision are:

- Field observations in relation to inspection of all excavation bases, walls and stockpiles for fill material or other indicators of potential contamination;
- Soil validation analysis data collected from the exposed ground surface and from the base and walls of the remedial excavations;
- Waste classification and material characterisation data obtained during assessment of fill material prior to and during remediation works;
- Disposal docket and relevant documents in relation to appropriate disposal of material to be removed from site as part of the remediation works (landfill docket, beneficial reuse / recycling docket, etc.);
- Materials imported to the site are appropriate (appropriate documentation supplied and additional testing as required);
- Relevant guideline criteria for validation and waste classification; and
- Data quality indicators (DQIs), which should be used in a quality assurance / quality control (QA/QC) assessment of the data.

8.2.4 Define the Study Boundaries

The study boundary is the site as identified **Table 2.1**.

The lateral and vertical extents of areas subject to remediation are outlined in **Section 5.1**, and the lateral extents are shown on **Figure 4**. These are based on currently available information and data and are subject to the limitations of previous investigations, in particular constraints in defining the extent of surface impacts where vegetation exists and in subsurface fill.

In practice, the lateral and vertical extent shall be determined by observations and validation samples/data that satisfy the adopted validation criteria (**Section 8.4**).

The temporal boundaries of this investigation will be limited to the period of field validation works.

8.2.5 Decision Rules

The decision rules adopted to answer the decisions identified in **Section 8.2.2** are discussed below (**Table 8.1**).

Table 8.1 Summary of Decision Rules

Decision Required to be Made	Decision Rule
1. Are contaminant concentrations in remedial excavations above the adopted site remediation criteria?	<p>Soil analytical data for chemical COPCs should be compared against the adopted criteria in the RAP.</p> <p>For the validation sample sets, statistical analysis of the data should be undertaken in accordance with relevant guidance documents, as appropriate, to facilitate the decisions. It is noted these are not applicable to asbestos and will only apply where unexpected chemical contamination may be encountered during remediation works.</p> <p>The following statistical criteria should be adopted with respect to soils:</p> <p>Either: the reported concentrations should be below the Site criteria;</p> <p>Or, the 95% Upper Confidence Limit (UCL) of the average concentration for each analyte should be below the adopted health-based Site criterion, no single analyte concentration should exceed 250% of the adopted health based site criterion, and the standard deviation of the results should be less than 50% of the Site health based criterion.</p> <p>Analytical results for asbestos in soils should be directly compared to the site criteria. No statistical assessment for asbestos in soils should be undertaken.</p> <p>If the statistical criteria stated above are satisfied, or asbestos concentrations are less than the validation criteria, the answer to the decision will be No.</p> <p>If the statistical criteria are not satisfied, the answer to the decision will be Yes.</p>
2. Are there any aesthetic issues remaining following remediation works?	<p>If there are any remaining unacceptable odours, soil inclusions or soil discolouration, the answer to the decision will be Yes.</p> <p>Otherwise, the answer to the decision will be No.</p>
3. Have the site remediation activities not been undertaken in compliance with the regulatory requirements?	<p>Qualitative assessment of the works in relation to regulatory approvals and other requirements (e.g., waste classification and disposal) should be undertaken during and following the completion of remediation activities. If this review identifies non-compliance or outstanding issues the answer to the decision will be Yes.</p> <p>Otherwise, the answer to the decision will be No.</p>
4. Is the site considered suitable for the proposed use?	<p>Was the answer to any of the above decisions Yes?</p> <p>If Yes, a management strategy will be required.</p> <p>If No, a management strategy will not be required.</p>

8.2.6 Specify Limits of Decision Error

This step is to establish the decision maker's tolerable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data. Data generated during this project must be appropriate to allow decisions to be made with confidence.

Specific limits for this project have been adopted in accordance with the appropriate guidance from the NSW EPA, NEPC (2013), appropriate indicators of data quality (DQIs used to assess QA/QC) and standard JBS&G procedures for field sampling and handling.

To assess the usability of the data prior to making decisions, the data should be assessed against pre-determined DQIs for precision, accuracy, representativeness, comparability, completeness and sensitivity (PARCCS parameters). The acceptable limit on decision error is 95% compliance with DQIs.

The pre-determined DQIs established for the project are discussed below in relation to the PARCCS parameters, and are expanded in **Table 8.2**.

- **Precision** - measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD) of duplicate samples.
- **Accuracy** - measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.
- **Representativeness** –expresses the degree which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.
- **Comparability** - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; and ensuring analysing laboratories use consistent analysis techniques; and reporting methods.
- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.
- **Sensitivity** – expresses the appropriateness of the chosen laboratory methods, including the limits of reporting, in producing reliable data in relation to the adopted site assessment criteria.

Table 8.2 Summary of Data Quality Indicators

Data Quality Indicators	Frequency	Data Quality Criteria
Precision		
Duplicates (intra laboratory)	1 / 20 samples/media	<50% RPD ¹
Triplicates (Inter laboratory)	1 / 20 samples/media	<50% RPD ¹
Laboratory Duplicates	1 / 20 samples/media	<50% RPD ¹
Accuracy		
Surrogate spikes	All organic samples	70-130% recovery
Laboratory control samples	1 per lab batch	70-130% recovery
Matrix spikes	1 per lab batch	70-130% recovery
Representativeness		
Sampling appropriate for media and analytes	All samples	- ²
Samples extracted and analysed within holding times.	-	Soil: organics (14 days), inorganics (6 months)
Laboratory blanks	1 per lab batch	<LOR
Trip spike	1 per lab batch (soil only)	70-130% recovery
Trip blank	1 per lab batch (soil only)	<LOR
Rinsate blank	1 per sampling event/media	<LOR
Comparability		
Standard operating procedures for sample collection & handling	All Samples	All Samples
Standard analytical methods used for all analyses	All Samples	NATA accreditation
Consistent field conditions, sampling staff and laboratory analysis	All Samples	All samples ²
Limits of reporting appropriate and consistent	All Samples	All samples ²
Completeness		
Sample description and COCs completed and appropriate	All Samples	All samples ²
Appropriate documentation	All Samples	All samples ²
Satisfactory frequency and result for QC samples		95% compliance
Data from critical samples is considered valid	-	Critical samples valid
Sensitivity		
Analytical methods and limits of recovery appropriate for media and adopted site assessment criteria	All samples	LOR ≤ site assessment criteria

¹ If the RPD between duplicates is greater than the pre-determined data quality indicator, a judgment will be made as to whether the excess is critical in relation to the validation of the data set or unacceptable sampling error is occurring in the field.

² A qualitative assessment of compliance with standard procedures and appropriate sample collection methods will be completed during the DQI compliance assessment.

8.2.7 Optimise the Design for Obtaining Data

The purpose of this step is to identify a resource-effective field validation sampling design that generates data that are expected to satisfy the decision performance criteria, as specified in the preceding steps of the DQO process. The output of this step is the sampling design that will guide development of the field sampling and analysis plan. This step provides a general description of the activities necessary to generate and select data collection designs that satisfy decision performance criteria.

The remediation validation and subsequent laboratory analysis program as outlined in the following sections should be implemented during site remediation activities to demonstrate the successful completion of works in compliance with the RAP goals. The validation/characterisation sampling and analytical program for the site is outlined in **Table 8.3** below.

Table 8.3 Validation/Characterisation Sampling and Analytical Program

Item	RAP Sampling Density	Analytical Suite
Source Removal Excavation Validation		
Excavations formed by the removal of contaminated soils (heavy metal and PAH impacts).	<u>Excavation Floors</u> 1 sample per 25 m ² , with a minimum of 2 samples per excavation	Heavy metals PAHs
	<u>Excavation Walls</u> 5 m of excavation wall, with a minimum of 1 sample per wall	
Material Importation		
Imported VENM	Minimum of 3 samples per source site / material type to 500 m ³ then 1 sample per 500 m ³ thereafter	TRH/BTEX PAH Heavy Metals OCP/PCBs Asbestos (500 ml)
Quarry VENM Materials (e.g. blue metal, sandstone, shale)	Confirmation that the material is quarried rock (VENM) prior to importation, and visual confirmation.	Site Inspection required.
Material subject to an NSW EPA Resource Recovery Order/Exemption	Confirmation by the supplier that the material meets the terms of the order. Then environmental consultant sampling at a minimum of 3 samples per source site / material type to 500 m ³ then 1 sample per 500 m ³ thereafter, prior to importation	TRH/BTEX PAH Heavy Metals OCP/PCBs Asbestos (500 ml)
Export of Materials		
Waste materials for offsite disposal are to be classified in accordance with EPA (2014b).	Stockpiled materials for offsite disposal require a minimum of 3 samples (up to 75 m ³) or a sample density of 1/25 m ³ to 200 m ³ (whichever is greater). Decreased sampling frequency to be justified on basis of stockpile homogeneity and risk of contaminants present. Two approaches can be taken for assessing stockpiles of more than 200 m ³ : Samples can be collected at a rate of 1 sample per 25 m ³ or; Samples can be collected at a reduced frequency, subject to a 95% UCL calculated for all applicable analytes, and this value is then compared with the relevant assessment criteria. This method is not	Heavy metals TRH/BTEX PAHs OCP/PCBs Asbestos (presence/absence: 40 g) TCLP (Heavy metals and PAHs) at the Environmental Consultant's discretion.

Item	RAP Sampling Density	Analytical Suite
	appropriate for sampling stockpiles impacted, or potentially impacted, by asbestos.	
Unexpected Finds		
Unexpected Finds	<u>Excavation Floors</u> 1 sample per 25 m ² , with a minimum of 2 samples per excavation <u>Excavation Walls</u> 5 m of excavation wall, with a minimum of 1 sample per wall	As appropriate, depending on the location and characteristics of the unexpected find

The nominated sampling densities and analytical program have considered sample density guidance provided in EPA made and endorsed guidelines.

8.3 Soil Sampling Methodology

8.3.1 Validation of Excavation(s)

Samples should be collected by an appropriately trained and experienced environmental scientist / engineer using a hand trowel or from the bucket of mechanical excavation equipment, at the required densities to meet the project DQOs presented in **Section 8.2**.

Prior to collection of each sample, hand tools should be thoroughly decontaminated using phosphate free detergent and distilled water as per **Section 8.3.4**.

During the collection of soil samples, features such as seepage, discolouration, staining, odours and other indicators of contamination should be noted on the field documentation.

8.3.2 Sample Handling

Collected samples should be immediately transferred to sample containers of appropriate composition (glass jars for chemical analysis). Sample labels recorded: job number; sample identification number; and date of sampling.

Sample containers should be transferred to a chilled ice box for sample preservation prior to and during shipment to the testing laboratory. A chain-of-custody form should be completed and forwarded with the samples to the testing laboratory.

8.3.3 Soil Duplicate and Triplicate Sample Preparation and QA/QC Requirements

Field duplicate and triplicate samples for the characterisation/validation assessment should be obtained during sampling using the procedures outlined at a frequency outlined in **Table 8.2**. The primary sample should be divided laterally into three samples with minimal disturbance to reduce the potential for loss of volatiles and placed in three clean glass jars. All jars should be filled completely with no headspace to reduce the potential for loss of volatiles and separately labelled as the primary, duplicate and triplicate samples before being placed in the same chilled esky for laboratory transport.

Trip spike, storage blank and rinsate samples should be collected as per **Table 8.2**.

8.3.4 Soil Sampling Equipment Decontamination

The following procedure should be used to clean non-disposable equipment, including the trowel, pick etc., prior to the collection of each sample:

- Scrubbing with a wire brush to remove gross contamination;
- Pressure spray with Decon 90 detergent and potable water mix; and
- Pressure spray rinse with potable water.

Rinsate samples should be obtained during the field decontamination procedures at regular intervals during characterisation/validation sampling activities. Each rinsate sample should be obtained by rinsing the sampling trowel, if used, with laboratory grade demineralised water following the decontamination procedure. The water sample should be appropriately preserved and stored with the site samples prior to transport to the laboratory for chemical analysis.

8.3.5 Laboratory Analyses

All laboratories subcontracted for validation sample analyses are to be National Association of Testing Authorities (NATA) registered for the relevant analyses.

8.4 Validation Criteria

The following is a discussion of validation criteria to be adopted during remediation works within the site. No criteria are provided for groundwater or surface water as impact to these receptors from the area is unlikely as outlined in **Section 4**.

8.4.1 Soil Validation Criteria and Rationale

Laboratory results from validation soil samples should be compared against adopted health-based criteria listed in NEPC (2013) for residential with minimal opportunities for soil access land use (Setting B) in alignment with the current zoning and anticipated future land use of the site:

- Human Health Investigation Levels (HIL) – Residential with limited access to Soils (HIL-B);
- Human Health Screening Levels (HSL) – Residential with limited access to Soils (HSL-B);
- Ecological Investigation Levels (EIL) – Commercial Industrial Soils setting; and
- Ecological Screening Levels (ESL) – Commercial Industrial Soils setting.

NEPC (2013) requires consideration of aesthetic issues for all land uses. These can include staining, odours, visible ACM, or substantial anthropogenic materials. Consideration was given herein to NEPC (2013) guidance on aesthetics in the context of residential land use.

8.4.2 Offsite Disposal Criteria

Contaminated soils requiring disposal offsite shall be assessed in accordance with EPA (2014) or an appropriate exemption as created under the *Protection of the Environment Operations (Waste) Regulation 2014* (POEO 2014), refer to **Table 8.3**.

Material will require to be removed to a facility lawfully able to receive it.

8.4.3 Imported Soil Criteria

In accordance with current EPA policy, only material that does not represent an environmental or health risk at the receiving site may be considered for resource recovery. In accordance with this, only VENM or material subject to an NSW EPA Resource Recovery Order/Exemption as defined in the POEO Act (1997) Schedule 1 can be utilised to reinstate remedial excavations at the site. Quarried natural materials will also be accepted where appropriate. Refer to **Table 8.3**.

8.4.4 Validation Report

The validation report shall be prepared by the environmental consultant and written in general accordance with EPA reporting guidelines (EPA 2020). The validation report should be submitted at the completion of remedial works.

This report should contain information including:

- Details of the remediation works conducted;
- Information demonstrating that the objectives of this RAP have been achieved, in particular the validation sample results and assessment of the data against both the pre-defined DQO and the remediation acceptance (validation) criteria;
- Information demonstrating compliance with appropriate regulations and guidelines;
- Any variations to the strategy undertaken during the implementation of the remedial works;
- Results of all environmental monitoring undertaken during the course of the remedial works;
- Details of any environmental incidents occurring during the course of the remedial works and the actions undertaken in response to these incidents;
- Verification of regulatory compliance;
- Details on waste classification, tracking and offsite disposal including landfill docketing; and
- Clear statement of the suitability of the site with respect to permissible land uses.

The report will serve to document the remediation works for future reference.

9. Site Management Plan

This section contains procedures and requirements that are to be implemented as a minimum requirement during the remedial works within the site. These are made with consideration to existing generic *North Sydney Council Development Control Plan* (DCP) requirements.

9.1 Hours of Operation

Hours may vary from typical hours of operation which will be subject to approval and detailed in the development approval instrument.

Typical hours of operation for remedial works are:

- Monday to Friday: 7 am to 5 pm.
- Saturday: 8 am to 1 pm.
- Sunday and public holidays: No work permitted.

9.2 Soil and Water Management

To prevent the migration of impacted soil offsite, silt fences shall be constructed at the down-gradient site boundaries by the Remediation Contractor.

In storm or extended rainfall event, the structures located within the site for sediment control shall be monitored and replaced or altered if necessary, by the Remediation Contractor. Collected material shall be managed in accordance with remediation works by the contractor.

9.3 Stockpile Management

All materials stockpiled onsite should be managed by the Remediation Contractor. Unique numbers should be provided for each stockpile, the source of the stockpile, its volume, material characterisation and its location onsite recorded.

The following procedures should be implemented by the Remediation Contractor:

- No stockpiles of soil or other materials shall be placed on footpaths or nature strips unless prior Council approval has been obtained;
- All stockpiles of soil or other materials shall be placed away from drainage lines gutters or stormwater pits or inlets;
- All stockpiles of soil or other materials likely to generate dust or odours shall be covered (where practical);
- All stockpiles of contaminated soil shall be placed on plastic sheeting to limit cross contamination of the underlying soils and stored in a secure area;
- If left for a period exceeding 24 hours, stockpiles shall be covered, wetted down or be subject to application of stabilising agent to prevent dust generation. Additionally, where rain is forecast (>10 mm/24 hr period), the stockpiles shall be bunded to prevent leachate generation; and
- Stockpiles should be routinely inspected (at least daily) to ensure that containment provisions are adequate. Contingency measures are provided in **Section 7.2**.

9.4 Site Access

All vehicle access to the site shall be stabilised to prevent the tracking of sediment onto the roads and footpaths. All materials must be removed from the roadway on a daily or as required basis.

9.5 Noise

Remediation work shall not give rise to 'offensive noise' as defined in the POEO Act. All equipment and machinery associated with the remediation work shall be operated by the Contractor in accordance with *the* POEO Act and the *Noise Control Regulations 2000*.

All machinery and equipment used during remediation should be in good working order and fitted with appropriate silencers when necessary.

Noise generated should be managed so as not to adversely impact the amenity or residents/business adjoining or nearby the site. Works outside of normal hours of operation (**Section 9.1**) shall be avoided.

9.6 Vibration

The use of plant and machinery by the Remediation Contractor shall not cause vibrations to be felt or capable to be measured at any premises.

9.7 Dust Control

During the remedial works, as necessary, excavation areas should be wetted down using a water spray to minimise the potential for dust to be generated by the Remediation Contractor.

Any soils within the remedial extent must be wetted (but not flooded) prior to and during excavation or any other movement of the soils. Where significant fugitive emissions are observed from specific remedial works areas, these areas shall be wetted and/or covered by the Remediation Contractor.

Meteorological conditions should be monitored by the environmental consultant and remedial contractor. Remedial work should be stopped or modified where meteorological conditions are adverse (i.e., dry conditions and strong winds towards sensitive receptors).

9.8 Transport of Material Offsite

Trucks should be loaded in a designated area. The Remediation Contractor shall ensure that there is no material tracked offsite out onto public roadways and that the load is securely covered. In addition, all site vehicles must leave the site in a forward direction.

The Remediation Contractor shall also log truck movements and approximate volume, via registration number and consignment number (where applicable), into and out of the site.

All appropriate road rules shall be observed, and state roads should be selected as far as practicable over local roads when planning the transport route to the offsite material disposal location.

9.9 Disposal of Contaminated Soil

All soils should be classified, managed and disposed in accordance with the *Waste Classification Guidelines* (EPA 2014). Documentary evidence for all soil disposal, including relevant waste management/tracking controls and records, shall be kept by the Remediation Contractor for inclusion in the Validation Report. Refer to **Section 8.4.2**.

9.10 Imported Fill

Any materials imported onsite must be appropriately managed by the Remediation Contractor and comprise validated, environmentally suitable material, consistent with the definition of VENM (or quarried natural material) or material subject to an NSW EPA Resource Recovery Order/Exemption. Refer to **Section 8.4.3**.

9.11 Groundwater

It is anticipated that no groundwater dewatering will be required to complete the remediation works. No approvals are required under the *Water Management Act 2000* for remediation. Seepage water controls may be required to prevent shallow seepage water accumulation within the remedial excavation areas.

9.12 Site Signage and Contact Numbers

A sign/s shall be displayed adjacent to access point/s to the site throughout the duration of the works with the contact details of the Remediation Contractor and project manager as provided and maintained by the Remediation Contractor.

9.13 Site Security

The remedial areas shall be secured against unauthorised access by means of an appropriate fence or barricade by the Remediation Contractor. The access gates should be locked at all times when remedial works are not occurring.

9.14 Community Consultation

Owners and / or occupants of adjacent premises and across the road from the site should be notified at least seven days prior to the commencement of preparation for the remediation works. As a minimum, the notification shall include the details of an appropriate contact person.

9.15 Health and Safety Management

A Work Health & Safety Management Plan (WHSP) shall be prepared by the Remediation Contractor prior to commencement of remediation works within the site. The Plan shall contain procedures and requirements that are to be implemented as a minimum during the works.

The objectives of the WHSP are:

- Ensure all regulatory requirements for the proposed works are satisfied;
- To apply standard procedures that minimises risks resulting from the works;
- To ensure all employees are provided with appropriate training, equipment and support to consistently perform their duties in a safe manner; and
- To have procedures to protect other site workers and the general public.

These objectives will be achieved by:

- Assignment of responsibilities;
- An evaluation of hazards;
- Establishment of personal protection standards, mandatory safety practices and procedures;
- Monitoring of potential hazards and implementation of corrective measures; and
- Provision for contingencies that may arise while activities are being conducted within the site.

10. Conclusions and Recommendations

With reference to the limitations in **Section 11**, the following conclusions and recommendations are provided.

10.1 Conclusions

It is considered that the proposed actions outlined in this RAP conform to EPA requirements because they are: technically feasible; environmentally justifiable; and consistent with relevant laws, policies and guidelines endorsed by NSW EPA.

The works are deemed Category 2 and do not require consent under the *Remediation of Land requirements under State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP 2021).

Subject to the successful implementation of the measures described in this RAP and the recommendations below, it is concluded that the risks posed by potential direct human contact pathways with contamination can be managed in such a way as to be adequately protective of human health such that the site can be made suitable for the proposed land use.

10.2 Recommendations

Prior to remediation it is recommended a Hazardous Buildings Survey is undertaken at 253 and 265 Pacific Highway due to the age of the buildings. It is recommended that the processes outlined in this RAP be implemented to ensure the risks and impacts during remediation and construction works are controlled in an appropriate manner.

11. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquiries.

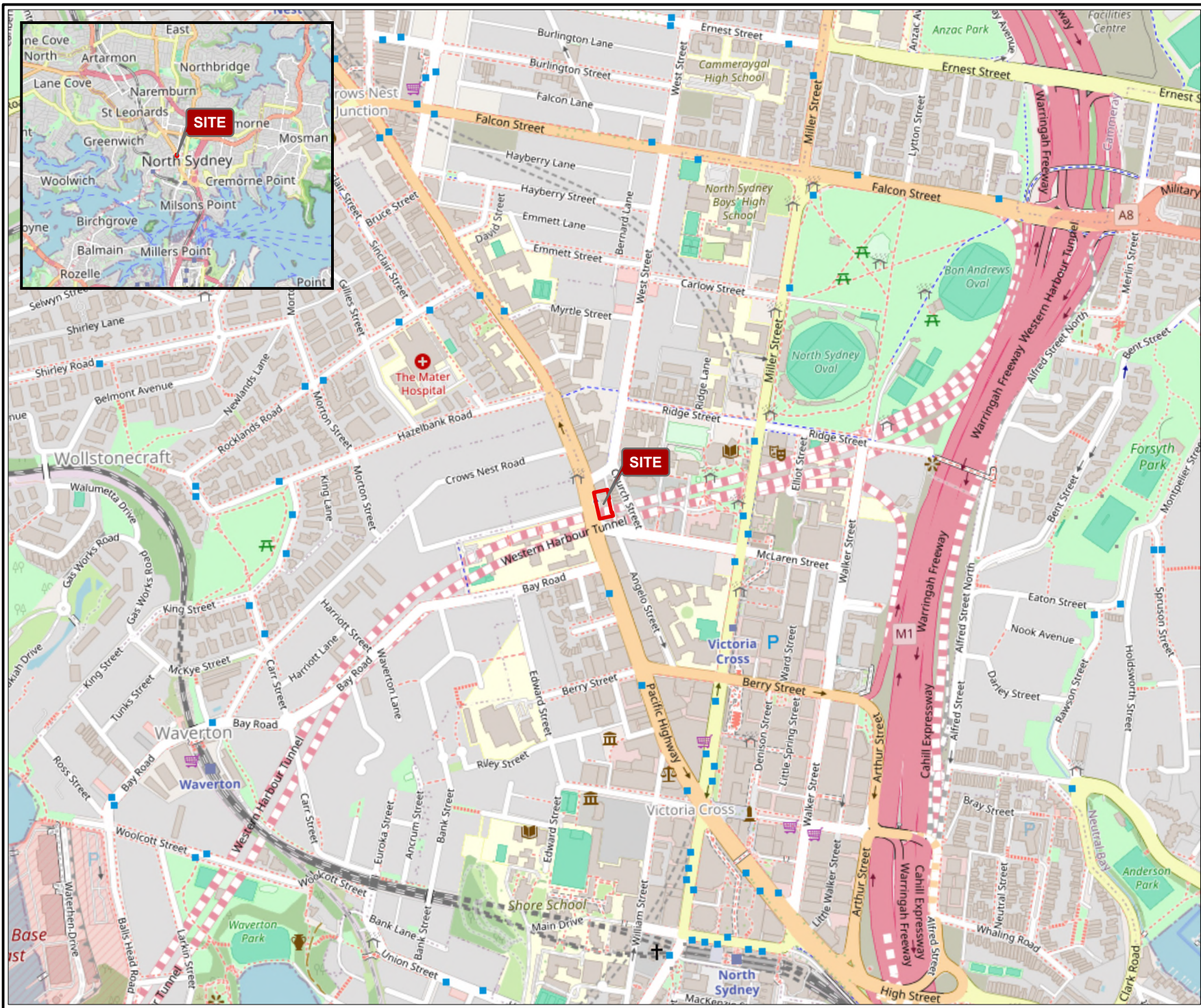
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.


Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.


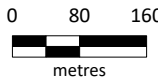
This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Appendix A Figures



Legend
 Approximate Site Boundary



Job No: 68635	
Client: Legacy	
Version: R02 Rev 0	Date 17/02/2025
Drawn By: HW	Checked By: TB
Scale 1:9,000	
	



Coord. Sys. GDA 1994 MGA Zone 56

**253-265 Pacific Highway,
 North Sydney, NSW**

SITE LOCATION

FIGURE 1



- Legend
-  Approximate Site Boundary
 -  NSW Cadastre



Job No: 68635

Client: Legacy

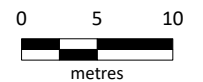
Version: R02 Rev 0

Date 17/02/2025

Drawn By: HW

Checked By: TB

Scale 1:500



Coord. Sys. GDA 1994 MGA Zone 56

253-265 Pacific Highway,
North Sydney, NSW

SITE LAYOUT

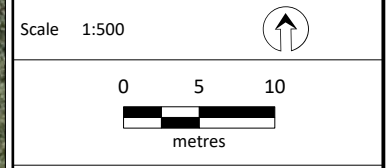
FIGURE 2



- Legend
- Approximate Site Boundary
 - NSW Cadastre
 - Borehole Location
 - ⊕ Borehole/Soil Vapour Location



Job No: 68635
 Client: Legacy
 Version: R02 Rev 0 Date 17/02/2025
 Drawn By: HW Checked By: TB



Coord. Sys. GDA 1994 MGA Zone 56
**253-265 Pacific Highway,
 North Sydney, NSW**

SAMPLE LOCATIONS

FIGURE 3



- Legend
- Approximate Site Boundary
 - NSW Cadastre
 - Remedial extent of shallow fill
 - Sample Locations (JBS&G, 2023)
 - Borehole Location
 - Borehole/Soil Vapour Location



Job No: 68635

Client: Legacy

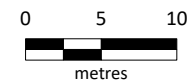
Version: R02 Rev 0

Date 17/02/2025

Drawn By: HW

Checked By: TB

Scale 1:500

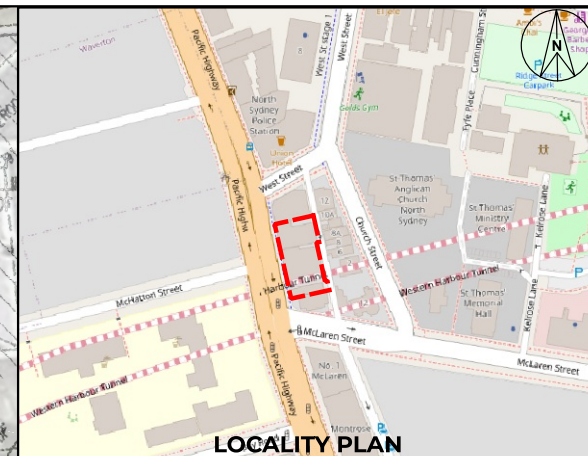
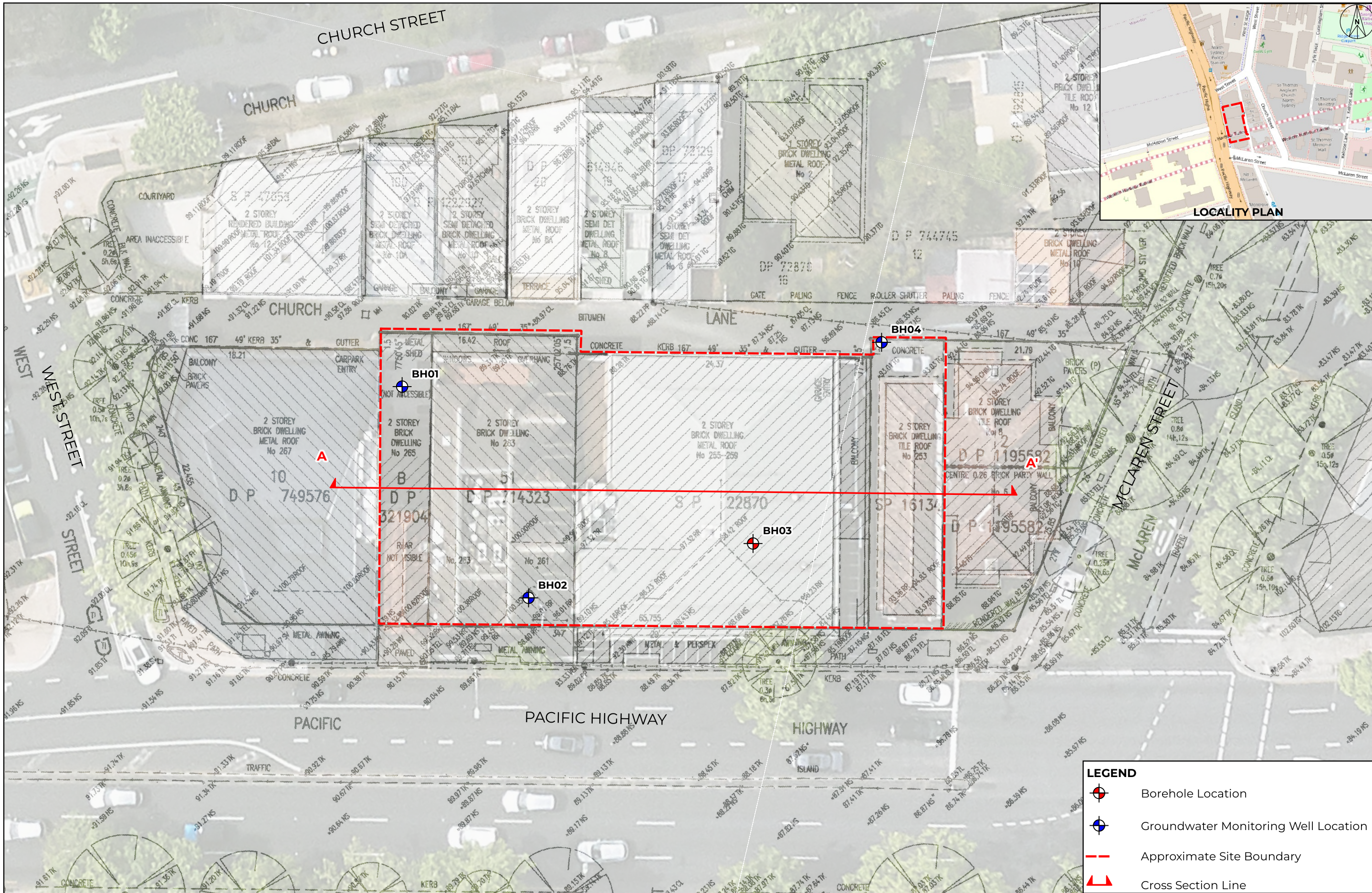


Coord. Sys. GDA 1994 MGA Zone 56

**253-265 Pacific Highway,
North Sydney, NSW**

REMEDIAL EXTENTS

FIGURE 4



LEGEND	
	Borehole Location
	Groundwater Monitoring Well Location
	Approximate Site Boundary
	Cross Section Line

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	Initial Issue	03.02.2025	MN

SCALE: 0 4 8 12 16 m
1:300 @ A3

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

CLIENT:
Legacy Property Pty Ltd

NOTE:
1: Basemap from Metromap (Dated 22.09.2024)
2: Base Survey Plan from Linker surveying, Reference 170713, Issue3 (Dated 14.08.2017)
3: Location of BH01, BH02 and BH03 estimated using measuring tape from lot boundaries.

COORDINATE REFERENCE SYSTEM: GDA2020 / MCA zone 56

PROJECT NAME:
Proposed Mixed Use Development
PROJECT ADDRESS:
253-265 Pacific Highway, North Sydney

DRAWING TITLE:
Test Location Plan

PROJECT NO:
233323.00
DRAWING NO:
1
REVISION:
0

\\dps\dmas02\Projects\233323.00 - NORTH SYDNEY, 253-265 Pacific Highway\70 Drawings\7.3. QGIS\233323.00.dwg

Appendix B Photolog

PHOTO 1: 253 PACIFIC HIGHWAY, FACING WEST



PHOTO 2: 253 PACIFIC HIGHWAY BH10 LOCATION, FACING NORTHWEST



PHOTO 3: 255-259 PACIFIC HIGHWAY, FACING NORTHWEST



PHOTO 4: 261 PACIFIC HIGHWAY, FACING WEST



Job No: 64150

Client: Legacy Properties

Version: R01 Rev 0

Date: 13/03/2023

Drawn By: MS

Checked By: AS

Not to Scale

Coord. Sys n/a

253, 255-259 and 261 Pacific Highway, North Sydney, NSW

PHOTO 5: 265 PACIFIC HIGHWAY, FACING WEST



PHOTO 6: 265 PACIFIC HIGHWAY REAR ENTRY, FACING NORTHWEST



PHOTO 7: 267 PACIFIC HIGHWAY SHOP FRONT, FACING SOUTHWEST



PHOTO 8: 267 PACIFIC HIGHWAY GARAGE, FACING WEST



Job No: 64150

Client: Legacy Properties

Version: R01 Rev 0

Date: 13/03/2023

Drawn By: MS

Checked By: AS

Not to Scale

Coord. Sys n/a

**265 and 267 Pacific Highway,
North Sydney, NSW**

ATTACHMENT A

PHOTO 9: 6-8 MCLAREN STREET, FACING WEST



PHOTO 10: 6-8 MCLAREN STREET AT BH12 LOCATION, FACING WEST



PHOTO 11: 6-8 MCLAREN STREET GARDEN BED, FACING EAST



PHOTO 12: 6-8 MCLAREN STREET PEBBLE AND BRICK PATHWAY, FACING NORTH



Job No: 64150

Client: Legacy Properties

Version: R01 Rev 0

Date: 13/03/2023

Drawn By: MS

Checked By: AS

Not to Scale

Coord. Sys n/a

**6-8 McLaren Street,
North Sydney, NSW**

ATTACHMENT A

PHOTO 13: FILL AT BH12



PHOTO 14: FILL AT BH06



PHOTO 15: NATURAL CLAY AT BH09

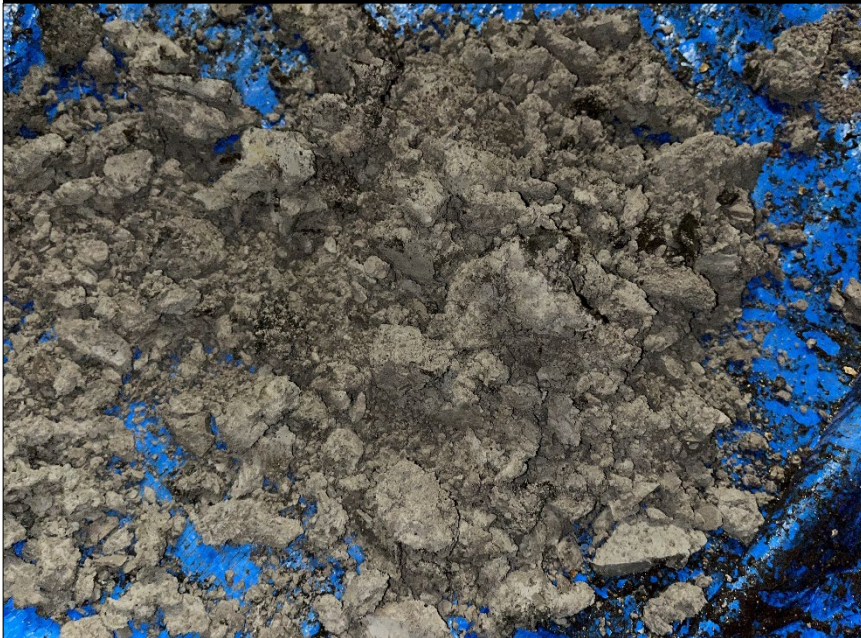


PHOTO 16: NATURAL CLAY AT BH11



Job No: 64150

Client: Legacy Properties

Version: R01 Rev 0

Date: 13/03/2023

Drawn By: MS

Checked By: AS

Not to Scale

Coord. Sys n/a

253-267 Pacific Highway and 6-8 McLaren Street, North Sydney, NSW

Appendix C JBS&G Summary Tables

Table A: Soil Analytical Data Summary

Project Number: 64150

Project Name: North Sydney DSI



	Metals & Metalloids								TPHs (NEPC 1999)					TRHs (NEPC 2013)						BTEXN													
	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum of Total)	C6-C10	C10-C16	C16-C34	C34-C40	C10-C40 (Sum of total)	F1 (C6-C10 minus BTEX)	F2 (C10-C16 less Naphthalene)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Naphthalene_VOC	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQL	2	0.4	5	5	5	0.1	5	5	20	20	50	50	50	20	50	100	100	100	20	50	0.1	0.1	0.1	0.1	0.2	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5
NEPM 2013 Table 1B(1-5) Generic EIL - Comm/Ind	160		310	85	1800		55	110																		370							
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Fine Soil															2500	6600			215	170	95	135	185			95						67	
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil														800	1000	5000	10000																
NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil																																	
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Clay																			50	280	0.7	480	NL			110	5						
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Clay																			310	NL	4	NL	NL			NL	NL						
NEPM 2013 Table 1A(1) HILs Res B Soil	500	150	500	30000	1200	120	1200	60000																									
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil	3000	900	3600	240000	1500	730	6000	400000																									

Sample ID	Lab Report Number	Date	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum of Total)	C6-C10	C10-C16	C16-C34	C34-C40	C10-C40 (Sum of total)	F1 (C6-C10 minus BTEX)	F2 (C10-C16 less Naphthalene)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Naphthalene_VOC	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	
BH01_0-0.1	968779	2/03/2023	6.7	0.5	15	480	2100	0.4	7.5	1100	<20	<20	210	140	350	<20	<50	300	<100	300	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	-	-	-	-	-	
BH02_0.1-0.2	968779	2/03/2023	34	5.5	48	1100	4700	1.3	34	2600	<20	<20	330	250	580	<20	<50	540	190	730	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	1.3	6	6.6	
BH05_0.2-0.3	968779	2/03/2023	3.8	<0.4	120	42	13	<0.1	100	91	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
QA20230302	317874	2/03/2023	<4	<0.4	43	27	10	<0.1	36	29	<25	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25	<50	<0.2	<0.5	<1	<1	<2	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.05	
QC20230302	968779	2/03/2023	3.2	<0.4	140	37	6.3	<0.1	120	93	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
BH06_0.1-0.2	968779	2/03/2023	37	<0.4	25	58	25	<0.1	93	48	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	-	-	-	-	-	
BH09_0.2-0.3	968779	2/03/2023	<2	<0.4	53	65	<5	<0.1	230	88	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
BH10_0.1-0.2	968779	2/03/2023	6.8	0.5	15	62	400	<0.1	32	440	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	-	-	-	-	-	
BH11_0-0.1	968779	2/03/2023	20	0.5	21	80	510	0.2	7.6	550	<20	<20	160	120	280	<20	<50	220	100	320	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5		
BH12_0-0.1	968779	2/03/2023	8.3	1.2	30	62	2200	0.5	10	2800	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	-	-	-	-	-	

Table B: Waste Classification Summary

Project Number: 64150

Project Name: North Sydney DSI



	Metals & Metalloids								TPHs (NEPC 1999)					TRHs (NEPC 2013)						BTEXN													
	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum of Total)	C6-C10	C10-C16	C16-C34	C34-C40	C10-C40 (Sum of total)	F1 (C6-C10 minus BTEX)	F2 (C10-C16 less Naphthalene)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Naphthalene_VOC	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQL	2	0.4	5	5	5	0.1	5	5	20	20	50	50	50	20	50	100	100	100	20	50	0.1	0.1	0.1	0.1	0.2	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5
NSW 2014 General Solid Waste CT1 (Without Leachate)	100	20	100		100	4	40		650				10000							10	288	600			1000								0.8
NSW 2014 General Solid Waste SCC1 (With Leachate)	500	100	1900		1500	50	1050		650				10000							18	518	1080			1800								10
NSW 2014 Restricted Solid Waste CT2 (Without Leachate)	400	80	400		400	16	160		2600				40000							40	1152	2400			4000								3.2
NSW 2014 Restricted Solid Waste SCC2 (With Leachate)	2000	400	7600		6000	200	4200		2600				40000							72	2073	4320			7200								23

Sample ID	Lab Report Number	Date	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum of Total)	C6-C10	C10-C16	C16-C34	C34-C40	C10-C40 (Sum of total)	F1 (C6-C10 minus BTEX)	F2 (C10-C16 less Naphthalene)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Naphthalene_VOC	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	
BH01_0-0.1	968779	2/03/2023	6.7	0.5	15	480	2100	0.4	7.5	1100	<20	<20	210	140	350	<20	<50	300	<100	300	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	-	-	-	-	-	
BH02_0.1-0.2	968779	2/03/2023	34	5.5	48	1100	4700	1.3	34	2600	<20	<20	330	250	580	<20	<50	540	190	730	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	1.3	6	6.6	
BH05_0.2-0.3	968779	2/03/2023	3.8	<0.4	120	42	13	<0.1	100	91	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
QA20230302	317874	2/03/2023	<4	<0.4	43	27	10	<0.1	36	29	<25	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25	<50	<0.2	<0.5	<1	<1	<2	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.05	
QC20230302	968779	2/03/2023	3.2	<0.4	140	37	6.3	<0.1	120	93	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH06_0.1-0.2	968779	2/03/2023	37	<0.4	25	58	25	<0.1	93	48	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	-	-	-	-	-	
BH09_0.2-0.3	968779	2/03/2023	<2	<0.4	53	65	<5	<0.1	230	88	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH10_0.1-0.2	968779	2/03/2023	6.8	0.5	15	62	400	<0.1	32	440	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	-	-	-	-	-	
BH11_0-0.1	968779	2/03/2023	20	0.5	21	80	510	0.2	7.6	550	<20	<20	160	120	280	<20	<50	220	100	320	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
BH12_0-0.1	968779	2/03/2023	8.3	1.2	30	62	2200	0.5	10	2800	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	-	-	-	-	-	

Table C: Leachate Data Summary

Project Number: 64150

Project Name: North Sydney DSI



	Metals & Metalloids			PAH
	Chromium (III+VI)	Lead	Nickel	Benzo(a)pyrene
	mg/L	mg/L	mg/L	mg/L
EQL	0.05	0.01	0.01	0.001
NSW 2014 General Solid Waste TCLP1 (With Leachate)	5	5	2	0.04
NSW 2014 Restricted Solid Waste TCLP2 (with Leachate)	20	20	8	0.16

Sample ID	Date	Lab Report Number				
BH02_0.1-0.2	2/03/2023	971316	-	4	-	<0.001
BH09_0.2-0.3	2/03/2023	971316	-	-	0.12	-
QC20230302	2/03/2023	971316	<0.05	-	-	-

Table D: Soil Vapour Analytical Data Summary

Project Number: 64150

Project Name: North Sydney DSI



	TRHs (NEPC 2013)				BTEXN				PAH					
	C6-C10 mg/m3	C10-C16 mg/m3	F1 (C6-C10 minus BTEX) mg/m3	F2 (C10-C16 less Naphthalene) mg/m3	Benzene mg/m3	Toluene mg/m3	Ethylbenzene mg/m3	Xylene Total mg/m3	Naphthalene mg/m3	1,1,1,2-tetrachloroethane mg/m3	1,1,1-trichloroethane mg/m3	1,1,2,2-tetrachloroethane mg/m3	1,1,2-trichloroethane mg/m3	1,1-dichloroethane mg/m3
EQL	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCC HILs											230			
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Clay			1000	800	5	6500	1800	1200	4					

Sample ID	Date	Lab Report Number	<0.0714285714	<2.857142857	<0.0714285714	<0.0714285714	<0.0714285714	<2.857142857	<1.428571429	<0.0714285714	<0.7142857143	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714
SV01	2/03/2023	968779	<0.0714285714	<2.857142857	<0.0714285714	<0.0714285714	<0.0714285714	<2.857142857	<1.428571429	<0.0714285714	<0.7142857143	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714
SV02	2/03/2023	968779	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.2142857143	<0.0714285714	<0.0714285714	<2.857142857	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714

Table D: Soil Vapour Analytical Data Summary

Project Number: 64150

Project Name: North Sydney DSI



	d Alkenes					MAH								
	cis-1,3-dichloropropene	Tetrachloroethene	trans-1,3-dichloropropene	Trichloroethene	Vinyl Chloride	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	isopropylbenzene
	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
EQL	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCC HILs		8		0.08	0.1									
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Clay														

Sample ID	Date	Lab Report Number															
SV01	2/03/2023	968779	<0.0714285714	<2.857142857	<2.857142857	<0.2142857143	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714
SV02	2/03/2023	968779	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<2.857142857	<2.857142857	<2.857142857	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714

Table D: Soil Vapour Analytical Data Summary

Project Number: 64150

Project Name: North Sydney DSI



	Miscellaneous Hydrocarbons		Chlorinated Benzenes					Trihalomethanes				Organic Alcohols	Chlorinated Hydrocarbons	
	1,2-dibromoethane mg/m3	Dibromomethane mg/m3	1,2,3-trichlorobenzene mg/m3	1,2,4-trichlorobenzene mg/m3	1,2-Dichlorobenzene mg/m3	1,3-dichlorobenzene mg/m3	1,4-dichlorobenzene mg/m3	Chlorobenzene mg/m3	Dibromochloromethane mg/m3	Chloroform mg/m3	Tribromomethane mg/m3	Bromodichloromethane mg/m3	2-Propanol mg/m3	Hexachlorobutadiene mg/m3
EQL	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571	0.071428571
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCC HILs														
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Clay														

Sample ID	Date	Lab Report Number	1,2-dibromoethane	Dibromomethane	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-Dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	Chlorobenzene	Dibromochloromethane	Chloroform	Tribromomethane	Bromodichloromethane	2-Propanol	Hexachlorobutadiene
SV01	2/03/2023	968779	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714
SV02	2/03/2023	968779	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714	<1.428571429	<0.0714285714	<0.0714285714	<0.0714285714	<0.0714285714

Table E: Soil Vapour Parameters

Project Number: 63356

Project Name: Military Rd Neutral Bay



Location	Oxygen (%)	Methane (%)	Carbon Dioxide (%)	PID (ppm)
SV01	19.5	0	0	3.3
SV02	20.5	0	0	1.7



	Metals & Metalloids															TPHs (NEPC 1999)					TRHs (NEPC 2013)					BTEXN																
	Arsenic	Arsenic (filtered)	Cadmium	Cadmium (filtered)	Chromium (III+VI)	Chromium (III+VI) (filtered)	Copper	Copper (filtered)	Lead	Lead (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum of Total)	C6-C10	C10-C16	C16-C34	C34-C40	C10-C40 (Sum of total)	F1 (C6-C10 minus BTEX)	F2 (C10-C16 less Naphthalene)	Benzene	Toluene	Ethylbenzene	Xylylene (o)	Xylylene (m & p)	Xylylene Total	Naphthalene_VOC	2-Methylnaphthalene	3-Methylanthrene	7,12-Dimethylbenz(a)anthracene	Acenaphthene			
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
EQL	0.001	0.001	0.0002	0.0002	0.001	0.001	0.001	0.001	0.001	0.001	0.0001	0.0001	0.001	0.001	0.005	0.005	0.02	0.05	0.1	0.1	0.1	0.02	0.05	0.1	0.1	0.1	0.02	0.05	0.001	0.001	0.001	0.001	0.002	0.003	0.01	0.005	0.005	0.005	0.001			
ADWG (2011) Aesthetic - Updated March-2021	-	-	-	-	-	-	1	1	-	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	0.025	0.003	0.02	0.02	0.02	-	-	-	-	-			
ADWG (2011) Health x 10 (Recreational) - Updated March-2021	0.1	0.1	0.02	0.02	0.5	0.5	20	20	0.1	0.1	0.01	0.01	0.2	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.03	0.16	-	0.15	-	0.12	-	-	-	-			
ANZG (2018) Marine water 80% toxicant DGVs	ID	ID	0.036	0.036	0.085	0.085	0.008	0.008	0.012	0.012	0.0014	0.0014	0.56	0.56	0.021	0.021	-	-	-	-	-	-	-	-	-	-	-	-	1.3	0.33	0.16	-	0.15	-	0.12	-	-	-	-			
ANZG (2018) Marine water 90% toxicant DGVs	ID	ID	0.014	0.014	0.02	0.02	0.003	0.003	0.0066	0.0066	0.0007	0.0007	0.2	0.2	0.012	0.012	-	-	-	-	-	-	-	-	-	-	-	-	0.9	0.23	0.11	-	0.1	-	0.09	-	-	-	-			
ANZG (2018) Marine water 95% toxicant DGVs	ID	ID	0.0055	0.0055	0.0044	0.0044	0.0013	0.0013	0.0044	0.0044	0.0004	0.0004	0.07	0.07	0.008	0.008	-	-	-	-	-	-	-	-	-	-	-	-	0.7	0.18	0.08	-	0.075	-	0.07	-	-	-	-			
ANZG (2018) Marine water 99% toxicant DGVs	ID	ID	0.0007	0.0007	0.00014	0.00014	0.0003	0.0003	0.0022	0.0022	0.0001	0.0001	0.007	0.007	0.0033	0.0033	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0.11	0.05	-	0.05	-	0.05	-	-	-	-			
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
NEPM 2013 Table 1A(4) Res HSL A/B GW for Vapour Intrusion, Sand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Sydney Water Trade Waste Acceptance Criteria (Industrial 2024-2025 Standards)	1	1	1	1	3	3	5	5	2	2	0.03	0.03	3	3	5	5	-	-	-	-	-	-	-	-	-	-	-	1	1	0.8	-	-	-	-	-	-	-	-	-	-		
Field ID	Matrix Type	Date	Lab Report Number																																							
BH01	Water	28 Jan 2025	1181514	-	0.003	-	<0.0002	-	<0.001	-	0.005	-	<0.001	-	<0.001	-	0.043	-	0.16	0.06	0.12	1.4	<0.1	1.52	0.06	0.32	1.2	0.2	1.72	0.06	0.32	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.01	<0.005	<0.005	<0.005	<0.001
BH02	Water	28 Jan 2025	1181514	-	<0.001	-	<0.0002	-	<0.001	-	0.007	-	<0.001	-	<0.001	-	0.091	-	0.27	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.01	<0.005	<0.005	<0.005	<0.001
BH04	Water	28 Jan 2025	1181514	-	0.002	-	<0.0002	-	<0.001	-	0.002	-	<0.001	-	<0.001	-	0.047	-	0.24	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.01	<0.005	<0.005	<0.005	<0.001
QA01	Water	28 Jan 2025	1181514	-	<0.001	-	<0.0002	-	<0.001	-	0.008	-	<0.001	-	<0.001	-	0.10	-	0.27	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.01	<0.005	<0.005	<0.005	<0.001
RINSATE	Water	28 Jan 2025	1181514	<0.001	-	<0.0002	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.005	-	0.032	0.012	0.024	0.280	<0.1	0.304	0.012	0.064	0.240	0.040	0.344	0.012	0.064	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.01	<0.005	<0.005	<0.005	<0.001	
TB	Water	28 Jan 2025	1181514	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.048	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.01	<0.005	<0.005	<0.005	<0.001
TS	Water	28 Jan 2025	1181514	-	-	-	-	-	-	-	-	-	-	-	-	75	-	-	-	-	-	73	-	-	-	-	-	-	-	98	100	97	99	98	98	110	-	-	-	-	-	
BH01	Water	Five times dilution factor		-	0.001	-	<0.0002	-	<0.001	-	0.010	-	<0.001	-	<0.001	-	0.009	-	0.032	0.012	0.024	0.280	<0.1	0.304	0.012	0.064	0.240	0.040	0.344	0.012	0.064	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.01	<0.005	<0.005	<0.005	<0.001
BH02	Water	Five times dilution factor		-	<0.001	-	<0.0002	-	<0.001	-	0.014	-	<0.001	-	<0.001	-	0.018	-	0.054	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.01	<0.005	<0.005	<0.005	<0.001
BH04	Water	Five times dilution factor		-	0.000	-	<0.0002	-	<0.001	-	0.004	-	<0.001	-	<0.001	-	0.009	-	0.048	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.01	<0.005	<0.005	<0.005	<0.001
RPD	Water	-	-	-	-	-	-	-	-	-	-13.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Environmental Standards
 ANZG, 2018, ANZG (2018) Marine water 80% toxicant DGVs
 ANZG, 2018, ANZG (2018) Marine water 90% toxicant DGVs
 ANZG, 2018, ANZG (2018) Marine water 95% toxicant DGVs
 ANZG, 2018, ANZG (2018) Marine water 99% toxicant DGVs




	Chlorinated Benzenes								Trihalomethanes				Herbicides & Fungicides		Phthalates				Nitrobenzenes		Nitrotoluenes	Anilines		Organic Sulfur Compounds	Chlorinated Hydrocarbons			
	1,2,3-trichlorobenzene	1,2,4,5-tetrachlorobenzene	1,2,4-trichlorobenzene	1,2-Dichlorobenzene	1,3,5-trichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	Chlorobenzene	Pentachlorobenzene	Dibromochloromethane	Chloroform	Tribromomethane	Bromodichloromethane	Pronamide	Trifluralin	Bis(2-ethylhexyl) phthalate	Diethylphthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Nitrobenzene	Pentachlorocyclopentadiene	2,4-dinitrotoluene	2-Nitroaniline	Aniline	Carbon disulfide	Hexachlorocyclopentadiene	Heachlorobutadiene
EQL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ADWG (2011) Aesthetic - Updated March-2021	0.005	0.005	0.005	0.001	0.005	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.001	0.005	0.005	
ADWG (2011) Health x 10 (Recreational) - Updated March-2021	-	-	-	0.001	-	0.02	0.0003	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ANZG (2018) Marine water 80% toxicant DGVs	-	0.009	0.24	-	0.03	-	-	0.19	0.005	-	1.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ANZG (2018) Marine water 90% toxicant DGVs	-	0.007	0.14	-	0.02	-	-	0.1	0.0025	-	1.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ANZG (2018) Marine water 95% toxicant DGVs	-	0.005	0.08	-	0.013	-	-	0.055	0.002	-	0.77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ANZG (2018) Marine water 99% toxicant DGVs	-	0.003	0.02	-	0.008	-	-	0.015	0.0015	-	0.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
NEPM 2013 Table 1A(4) Res HSL A/B GW for Vapour Intrusion, Sand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sydney Water Trade Waste Acceptance Criteria (Industrial 2024-2025 Standards)	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Field ID	Matrix Type	Date	Lab Report Number	1,2,3-trichlorobenzene	1,2,4,5-tetrachlorobenzene	1,2,4-trichlorobenzene	1,2-Dichlorobenzene	1,3,5-trichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	Chlorobenzene	Pentachlorobenzene	Dibromochloromethane	Chloroform	Tribromomethane	Bromodichloromethane	Pronamide	Trifluralin	Bis(2-ethylhexyl) phthalate	Diethylphthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Nitrobenzene	Pentachlorocyclopentadiene	2,4-dinitrotoluene	2-Nitroaniline	Aniline	Carbon disulfide	Hexachlorocyclopentadiene	Heachlorobutadiene
BH01	Water	28 Jan 2025	1181514	<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.005	0.001	0.044	<0.001	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
BH02	Water	28 Jan 2025	1181514	<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
BH04	Water	28 Jan 2025	1181514	<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
QA01	Water	28 Jan 2025	1181514	<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
RINSATE	Water	28 Jan 2025	1181514	<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
TB	Water	28 Jan 2025	1181514	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TS	Water	28 Jan 2025	1181514	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	Water	Five times dilution factor		<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	0.000	0.009	<0.001	0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
BH02	Water	Five times dilution factor		<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
BH04	Water	Five times dilution factor		<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
RPD	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Environmental Standards
 ANZG, 2018, ANZG (2018) Marine water 80% toxicant DGVs
 ANZG, 2018, ANZG (2018) Marine water 90% toxicant DGVs
 ANZG, 2018, ANZG (2018) Marine water 95% toxicant DGVs
 ANZG, 2018, ANZG (2018) Marine water 99% toxicant DGVs

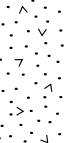

Appendix D JBS&G Bore logs

Project Number 64150 Client Legacy Property Group Project Name North Sydney DSI Address 253-267 Pacific Highway and 6-8 McLaren Street, North Sydney, NSW	Contractor Date 02-Mar-23 Plant N/A Method Hand Auger	Easting N/A Northing N/A Coordinate System GDA94_MGA_zone_56 Logged By AC
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Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
HA		0.05		Fill	Fill - Clay, brown, heterogeneous: dry, non-plastic, soft. Inclusions of timber, gravels, brick fragments.	DR	BH01_0.00-0.10	2.9	No odours, staining or asbestos
		0.1			Refusal Depth at: 0.10 m.				
		0.15							
		0.2							
		0.25							
		0.3							
		0.35							
		0.4							
		0.45							
		0.5							
		0.55							
		0.6							
		0.65							
		0.7							
		0.75							
		0.8							
		0.85							
		0.9							
		0.95							

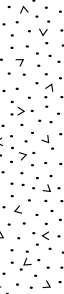

Comments:

Project Number 64150 Client Legacy Property Group Project Name North Sydney DSI Address 253-267 Pacific Highway and 6-8 McLaren Street, North Sydney, NSW	Contractor Date 02-Mar-23 Plant N/A Method Hand Auger	Easting N/A Northing N/A Coordinate System GDA94_MGA_zone_56 Logged By AC
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Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
HA		0.05		Concrete	Fill - CONCRETE				No odours, staining or asbestos
		0.1		Fill	Fill - Clay, dark brown, heterogeneous: damp, medium plasticity, firm. Inclusions of brick fragments, gravels, tree roots, nail.	DP	BH02_0.10-0.20	2.2	No odours, staining or asbestos
		0.2			Refusal Depth on clay pipe at: 0.20 m.				
		0.25							
		0.3							
		0.35							
		0.4							
		0.45							
		0.5							
		0.55							
		0.6							
		0.65							
		0.7							
		0.75							
		0.8							
		0.85							
		0.9							
		0.95							

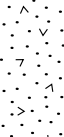



Comments:

Project Number 64150 Client Legacy Property Group Project Name North Sydney DSI Address 253-267 Pacific Highway and 6-8 McLaren Street, North Sydney, NSW	Contractor Date 02-Mar-23 Plant N/A Method Hand Auger	Easting N/A Northing N/A Coordinate System GDA94_MGA_zone_56 Logged By AC
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Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations					
HA		0.05		Concrete	Fill - CONCRETE				No odours, staining or asbestos					
		0.20		Fill						Fill - Sandy gravelly clay, dark brown, heterogeneous, moist, high plasticity, firm	M	BH05_0.20-0.30	4.7	No odours, staining or asbestos
		0.30		CH-GC						Natural - Clay, dark brown, homogeneous, damp, high plasticity, firm	DP			No odours, staining or asbestos
		0.50					BH05_0.50-0.60	3.6						
		0.60		Termination Depth at: 0.60 m.										
		0.65												
		0.70												
		0.75												
		0.80												
		0.85												
		0.90												
		0.95												




Comments:

Project Number 64150 Client Legacy Property Group Project Name North Sydney DSI Address 253-267 Pacific Highway and 6-8 McLaren Street, North Sydney, NSW	Contractor Date 02-Mar-23 Plant N/A Method Hand Auger	Easting N/A Northing N/A Coordinate System GDA94_MGA_zone_56 Logged By AC
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Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations	
HA		0.05		Concrete	Fill - CONCRETE				No odours, staining or asbestos	
		0.1		Fill	Fill - Sandy clay, dark brown, heterogeneous, moist, high plasticity, firm	M	BH06_0.10-0.20	3.1	No odours, staining or asbestos	
		0.2		Fill	Fill - Clay, brown, heterogeneous, damp, high plasticity, firm	DP	BH06_0.20-0.30	2.6	No odours, staining or asbestos	
		0.3		CH	Natural - Clay, brown, homogeneous, damp, high plasticity, stiff	DP				No odours, staining or asbestos
		0.5					BH06_0.50-0.60	2.9		
		0.6			Termination Depth at: 0.60 m.					
		0.65								
		0.7								
		0.75								
		0.8								
		0.85								
		0.9								
		0.95								

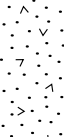

Comments:

Project Number 64150 Client Legacy Property Group Project Name North Sydney DSI Address 253-267 Pacific Highway and 6-8 McLaren Street, North Sydney, NSW	Contractor Date 02-Mar-23 Plant N/A Method Hand Auger	Easting N/A Northing N/A Coordinate System GDA94_MGA_zone_56 Logged By AC
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Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
HA		0.05		Concrete	Fill - CONCRETE				No odours, staining or asbestos
		0.1							
		0.15		Fill	Fill - Clay, dark brown, heterogeneous, moist, high plasticity, firm. Inclusions of trace gravels.	M	BH09_0.20-0.30	2.1	No odours, staining or asbestos
		0.2		Fill	Fill - Clay, brown, heterogeneous, moist, high plasticity, firm. Inclusions of gravels.	M	BH09_0.30-0.40	1.9	No odours, staining or asbestos
0.25		CH	Natural - Clay, brown, homogeneous, damp, high plasticity, firm	DP				No odours, staining or asbestos	
0.3									
0.35									BH09_0.60-0.70
0.4		0.4							
		0.45							
		0.5							
		0.55							
		0.6							
		0.65							
		0.7			Termination Depth at: 0.70 m.				
		0.75							
		0.8							
		0.85							
		0.9							
		0.95							



Comments:

Project Number 64150 Client Legacy Property Group Project Name North Sydney DSI Address 253-267 Pacific Highway and 6-8 McLaren Street, North Sydney, NSW	Contractor Date 02-Mar-23 Plant N/A Method Hand Auger	Easting N/A Northing N/A Coordinate System GDA94_MGA_zone_56 Logged By AC
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Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
HA		0.05		Concrete	Fill - CONCRETE				No odours, staining or asbestos
		0.1		Fill	Fill - Clay, brown/grey, heterogeneous, wet, high plasticity, firm. Inclusions of gravels.	W	BH10_0.10-0.20	3.1	No odours, staining or asbestos
		0.2							
		0.25							
		0.3			Refusal Depth at: 0.30 m.				
		0.35							
		0.4							
		0.45							
		0.5							
		0.55							
		0.6							
		0.65							
		0.7							
		0.75							
		0.8							
		0.85							
		0.9							
		0.95							


Comments:

Project Number 64150 Client Legacy Property Group Project Name North Sydney DSI Address 253-267 Pacific Highway and 6-8 McLaren Street, North Sydney, NSW	Contractor Date 02-Mar-23 Plant N/A Method Hand Auger	Easting N/A Northing N/A Coordinate System GDA94_MGA_zone_56 Logged By AC
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Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
HA		0.05		Fill	Fill - Clay, dark brown, heterogeneous, damp, high plasticity, soft. Inclusions of roots, rootlets.	DP	BH11_0.00-0.10	3.2	No odours, staining or asbestos
		0.2		Fill	Fill - Sand, light brown, heterogeneous, damp, poorly graded, medium sand loose. Inclusions of rootlets	DP	BH11_0.20-0.30	4.1	No odours, staining or asbestos
		0.3		Fill	Fill - Sandy clay, brown, heterogeneous, damp, high plasticity, firm	DP	BH11_0.30-0.40	3.9	No odours, staining or asbestos
		0.4		CH	Natural - Clay, brown, heterogeneous, damp, high plasticity, firm	DP			No odours, staining or asbestos
		0.6					BH11_0.60-0.70	2.9	
		0.7			Termination Depth at: 0.70 m.				
		0.75							
		0.8							
		0.85							
		0.9							
		0.95							

Comments:

Project Number 64150 Client Legacy Property Group Project Name North Sydney DSI Address 253-267 Pacific Highway and 6-8 McLaren Street, North Sydney, NSW	Contractor Date 02-Mar-23 Plant N/A Method Hand Auger	Easting N/A Northing N/A Coordinate System GDA94_MGA_zone_56 Logged By AC
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Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
HA		0.05		Fill	Fill - Clay, dark brown, heterogeneous: damp, low plasticity, firm. Inclusions of roots, leaves, brick & tile fragments.	DP	BH12_0.00-0.10	1.1	No odours, staining or asbestos
		0.1							
		0.2					BH12_0.20-0.30	1.3	
		0.3							
		0.35							
		0.4							
		0.45					BH12_0.40-0.50	1.1	
		0.5			Refusal Depth on rock at: 0.50 m.				
		0.55							
		0.6							
		0.65							
		0.7							
		0.75							
		0.8							
		0.85							
		0.9							
		0.95							

Comments:

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 87.3 AHD
COORDINATE: E:333902.1, N:6254802.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 233323.00
DATE: 21/01/25
SHEET: 1 of 3

GROUNDWATER		CONDITIONS ENCOUNTERED					SAMPLE			TESTING AND REMARKS					
		RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. (%) DENSITY (%)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL
	87	0.15	CONCRETE: 150mm thick; SL62 at 70mm depth		FILL	ND	ND				0.15	IDCP9/150		Flush cover	
	87	0.40	FILL / Sandy GRAVEL: grey; fine to coarse, igneous; trace fines.		RS	H	w=PL		D		0.40				
	87	0.70	CLAY (CI-CH), with gravel: grey; medium to high plasticity; siltstone gravel.						D		0.70				
	86	0.93	SILTSTONE: grey; apparently very low strength								1				
	86		Continued as rock								2				
	85	2	0.60m: increased drill resistance; becoming extremely weathered siltstone with highly weathered; very low strength siltstone								3				
	84	3									4				
	83	4									5				
	82	5									6				
	81	6									7				
	80	7									8				
	79	8									9				
	78	9													

DRAFT
SUBJECT TO CHANGE

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

PLANT: Proline **OPERATOR:** Tightsite **LOGGED:** R.Muller
METHOD: DT to 0.15m, HA to 0.93m, NMLC to 16.0m **CASING:** HQ to 0.94m
REMARKS:



Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Split Soil-Rock Log

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 87.3 AHD
COORDINATE: E:333902.1, N:6254802.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 233323.00
DATE: 21/01/25
SHEET: 2 of 3

CONDITIONS ENCOUNTERED										SAMPLE			TESTING						
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE	
RL (m)	87	Continued from soil												0.40			Flush cover		
	1	SILTSTONE: dark grey; 0-5% fine grained, pale grey sandstone laminations. Ashfield Shale	SW	L	0.93	L	100	94		1.37m: JT, 30°, UN, CN, SM 1.48m: JT, 70°, PR, CN, SM 1.66m: JT, 30°, PR, CN, SM 1.68-1.83m: JT, 60°, PR, CN, SM				1	PLT	PL(A)=0.27MPa			
	1.83		SW	L	1.83	L								2	PLT	PL(A)=0.16MPa			
	1.96		HW	VL	1.96	VL				2.07m: EW, Clay 10mm 2.11m: JT, 70°, UN, CN, SM 2.16-2.19m: EW, Clay 30mm 2.19-2.23m: JT, 80°, IR, CN, SM 2.29m: B, 0°, PR, CT Clay 5mm, SM 2.36m: JT, 45°, PR, CN, SM 2.39m: JT, 70°, PR, CN, SM 2.85m: JT, 70°, PR, CN, SM 3.21-3.31m: B x2, 0°, PR, Fe, SM 3.43-3.53m: JT, 60-90°, CU, CN, SM 3.59m: JT, 85°, UN, CN, SM 3.70m: B, 0°, UN, CN, SM 3.73m: B, 0-10°, ST, CN, SM 4.32m: JT, 30°, PR, CN, SM 4.40m: JT, 20°, PR, CN, SM 4.76m: JT, 70°, UN, CN, SM 5.05m: JT, 45°, PR, CN, SM					2	PLT	PL(A)=0.14MPa		
	2.07		SW	L	2.30	L	92	65						3	PLT	PL(A)=0.11MPa			
	2.30		HW	VL	3.50	VL								4	PLT	PL(A)=0.11MPa			
	3.50		SW	L	3.75	L	92	68						4	PLT	PL(A)=0.11MPa			
	3.75		HW	VL	4.30	VL								5	PLT	PL(A)=0.12MPa			
	4.30		SW	L	4.36	L								5	PLT	PL(A)=0.12MPa			
	4.36		HW	VL	4.79	VL								6	PLT	PL(A)=0.93MPa			
	4.79		SW	L	4.90	L								6	PLT	PL(A)=0.81MPa			
	4.90		HW	VL	5.36	VL	87	0						7	PLT	PL(A)=0.97MPa			
	5.26		XW	SEAM	5.36	SEAM								7	PLT	PL(A)=0.84MPa			
	5.36		FR	M	5.46	M								8	PLT	PL(A)=1.2MPa			
	5.46		FR	M	7.80	M	100	100						8	PLT	PL(A)=0.58MPa			
	7.80	8.36m-8.70m: 10-30% fine grained, pale grey sandstone laminations	FR	M	8.27	M	100	98						9	PLT	PL(A)=0.56MPa			
	8.27		FR	M	8.33	M	100	100						9	PLT	PL(A)=0.43MPa			
	8.33		FR	H	9.25	H	100	100						9	PLT	PL(A)=2.5MPa			
	9.25	SILTSTONE AND SANDSTONE: 70% dark grey siltstone; 30% fine grained, pale grey sandstone. Ashfield Shale	FR	H		H													

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

PLANT: Proline
METHOD: DT to 0.15m, HA to 0.93m, NMLC to 16.0m
REMARKS:

OPERATOR: Tightsite

LOGGED: R.Muller
CASING: HQ to 0.94m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 87.3 AHD
COORDINATE: E:333902.1, N:6254802.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 233323.00
DATE: 21/01/25
SHEET: 3 of 3

CONDITIONS ENCOUNTERED										SAMPLE			TESTING					
GROUNDWATER RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
77	11	SANDSTONE: pale grey, fine to coarse grained, 5-30% dark grey siltstone laminations and beds. Hawkesbury Sandstone					100	100						11	PLT	PL(A)=1.6MPa		
76	12						100	100						12	PLT	PL(A)=1.2MPa		
75	12.92						100	100		12.92m: B, 0°, PR, CN, SM				13	PLT	PL(A)=1.3MPa		
74	14	SILTSTONE AND SANDSTONE: 80% dark grey siltstone; 20% fine grained, pale grey sandstone. Hawkesbury Sandstone		FR			100	100						14	PLT	PL(A)=1.1MPa		
73	14.29						100	100		14.29m: B, 15°, PR, CT Clay 3mm, RF				15	PLT	PL(A)=0.94MPa		
72	15	SANDSTONE: pale grey, medium to coarse grained, 1-5% dark grey siltstone laminations. Hawkesbury Sandstone					100	100						16	PLT	PL(A)=0.95MPa		
71	16	Borehole discontinued at 16.00m depth. Target depth reached.																
70	17																	
69	18																	
68	19																	

DRAFT SUBJECT TO CHANGE

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

PLANT: Proline
METHOD: DT to 0.15m, HA to 0.93m, NMLC to 16.0m
REMARKS:

OPERATOR: Tightsite

LOGGED: R.Muller
CASING: HQ to 0.94m

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 87.3 AHD
COORDINATE: E:333902.1, N:6254802.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 233323.00
DATE: 21/01/25
SHEET: 1 of 2



0.93-5.00 m depth



5.00-10.00 m depth

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 87.3 AHD
COORDINATE: E:333902.1, N:6254802.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 233323.00
DATE: 21/01/25
SHEET: 2 of 2



BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.0 AHD
COORDINATE: E:333910.7, N:6254785.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 233323.00
DATE: 20/01/25
SHEET: 2 of 3

CONDITIONS ENCOUNTERED										SAMPLE			TESTING													
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE								
20/01/25 No free groundwater observed whilst augering	0.25																									
	1																									
	2	Continued from soil																								
	2.15	CORE LOSS																								
	2.15	SILTSTONE: dark grey with orange-brown iron staining, 1-5% fine grained, pale grey sandstone laminations. Ashfield Shale	HW		2.15	VL	83	0		2.29m: JT, 15°, UN, VNR Clay, SM 2.34m: B, 0°, PR, SN, Fe, SM 2.37m: JT, 70°, CU, SN, Fe, SM 2.41m: CS, Clay 30mm 2.44-2.53m: B x4, 0°, PR, Fe, SM 2.68m: CS, 10mm, Fe Clay 2.78m: JT, 45°, UN, Fe, RF 2.88m: JT, 20°, PR, Fe, SM 3.03-3.07m: B x2, 0°, PR, Fe, SM 3.12m: CS, 20mm, Fe Clay 3.21m: B, 0°, PR, CT Clay 5mm, SM 3.25-3.28m: EW, Clay 30mm 3.31m: JT, 0-60°, ST, CT Clay 10mm, SM, Fe 3.36-3.45m: EW, Clay 90mm 3.95-4.10m: JT, 50°, PR, Fe, SM 4.14m: JT, 45°, PR, Fe, SM 4.22-4.42m: JT, 70°, PR, VNR Clay, SM 4.48m: JT, 45-60°, ST, CN, SM 4.54m: JT, 70°, UN, CN, SM 4.59m: JT, 30°, PR, CN, SM 4.63-4.69m: EW, Clay 60mm 4.70m: B, 0°, PR, Fe, SM 4.76m: JT, 60°, PR, Fe, SM 4.84m: JT, 80°, PR, Fe, SM 5.00m: JT, 45°, PR, CN, SM 5.11m: JT, 20°, UN, TI 5.15m: JT, 15°, PR, CN, SM 5.32m: JT, 15-20°, PR, CN, SM 5.40m: JT, 20°, UN, SN, Fe, SM 5.45m: JT, 10-20°, CU, SN, Fe, SM 5.58m: JT, 20°, PR, SN, Fe, SM 5.66m: JT, UN, Fe, SM 5.69m: JT, 10°, UN, Fe, SM 5.78m: JT, 45°, PR, Fe, SM 5.86m: JT, 20°, PR, Fe, SM 6.49m: JT, 70°, UN, CN, SM 6.62-6.72m: JT, 60°, UN, CN, SM 7.08m: JT, 0-15°, UN, CN, SM 7.12m: JT, 0-15°, UN, CN, SM 7.37m: B, 10°, PR, VNR Clay, RF 8.03m: B, 10°, PR, VNR Clay, RF 8.08m: DS, 5mm 9.85m: B, 0°, PR, CT Clay 1mm, RF																
	3		SW		3.15	L																				
	3.45				3.25	VL																				
	3.45				3.36	SEAM																				
	3.95	SILTSTONE: dark grey with occasional orange-brown iron staining. Ashfield Shale	SW		4.63	L	66	0																		
	4.90	SILTSTONE: dark grey; medium bedded to laminated. Ashfield Shale	SW		4.69	L	100	100																		
	6				5.86	M	100	74																		
	6.79	SANDSTONE AND SILTSTONE: 70% fine grained sandstone and 30% dark grey siltstone. Ashfield Shale			7.37	H	100	94																		
	7																									
	7.37	SANDSTONE: pale grey, fine to medium grained, 1-5% siltstone laminations. Hawkesbury Sandstone	FR																							
	8																									
	8.08	SANDSTONE: pale grey, medium to coarse grained, 1-5% siltstone laminations. Hawkesbury Sandstone																								
	9																									
	9.78m-9.85m: fine grained, grey sandstone bed																									

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

PLANT: Proline
METHOD: DT to 0.1m, HA to 1.9m, NMLC to 13.09m
REMARKS:

OPERATOR: Tightsite

LOGGED: R.Muller
CASING: HQ to 1.9m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.0 AHD
COORDINATE: E:333910.7, N:6254785.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 233323.00
DATE: 20/01/25
SHEET: 3 of 3

CONDITIONS ENCOUNTERED										SAMPLE			TESTING						
GROUNDWATER RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS		BACKFILL	WELL PIPE
																PL	PL(A)		
	11.00	[CONT] SANDSTONE: pale grey, medium to coarse grained, 1-5% siltstone laminations. Hawkesbury Sandstone					100	100						11	PLT	PL(A)=2.1MPa			
	12	SANDSTONE AND SILTSTONE: 80% dark grey siltstone and 20% fine grained pale grey sandstone. Hawkesbury Sandstone		FR						11.00m: B, 0°, PR, CN, SM				12	PLT	PL(A)=2.0MPa			
	12.25	SANDSTONE: pale grey, fine to medium grained, 1-5% siltstone laminations. Hawkesbury Sandstone			12.25		100	100		11.73m: B, 0°, PR, CN, SM				12	PLT	PL(A)=2.6MPa			
	13									12.25m: B, 0°, PR, CN, RF				13	PLT	PL(A)=0.90MPa			
	13.09	Borehole discontinued at 13.09m depth. Target depth reached.																	

DRAFT
SUBJECT TO CHANGE

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

PLANT: Proline
METHOD: DT to 0.1m, HA to 1.9m, NMLC to 13.09m
REMARKS:

OPERATOR: Tightsite

LOGGED: R.Muller
CASING: HQ to 1.9m

Generated with CORE-GS by Ceroc - Split Soil-Rock Log

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.0 AHD
COORDINATE: E:333910.7, N:6254785.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 233323.00
DATE: 20/01/25
SHEET: 1 of 2



**DRAFT
SUBJECT TO CHANGE**

1.90-6.00 m depth



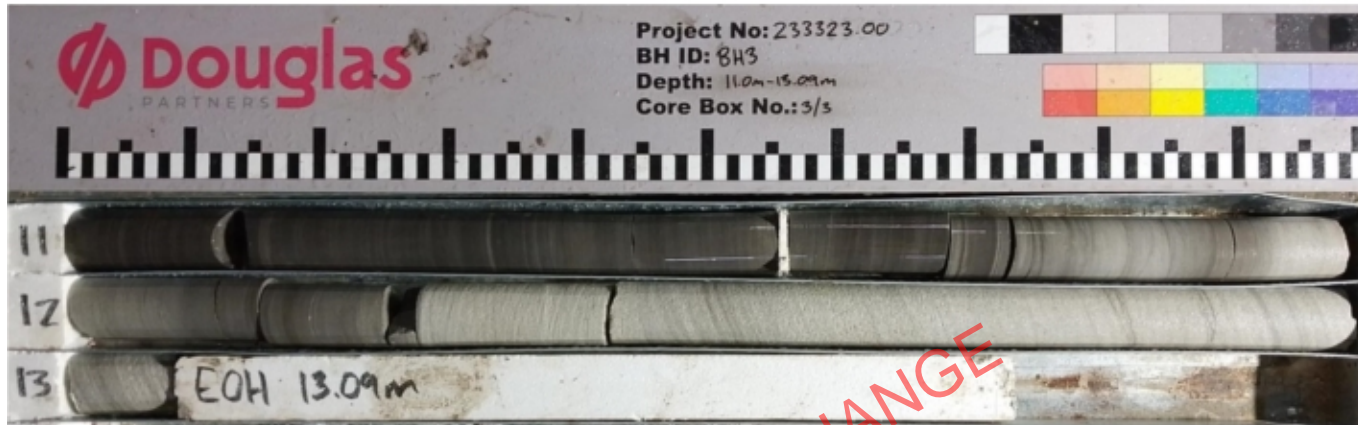
6.00-11.00 m depth

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.0 AHD
COORDINATE: E:333910.7, N:6254785.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 233323.00
DATE: 20/01/25
SHEET: 2 of 2



**DRAFT
SUBJECT TO CHANGE**

11.00-13.09 m depth

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.6 AHD
COORDINATE: E:333929.3, N:6254779.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH04
PROJECT No: 233323.00
DATE: 13/01/25 - 14/01/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED					SAMPLE			TESTING AND REMARKS						
GROUNDWATER RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. (%) DENSITY, (°)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	0.10	CONCRETE: 100mm thick; no reo observed	[Concrete Symbol]					D	0.10 - 0.20					
	0.50	FILL / Gravelly CLAY: grey ; medium plasticity; with brick fragments.	[Fill Symbol]	FILL	ND	ND		D	0.40 - 0.50					
	0.50	CLAY (CH): pale grey; high plasticity.	[Clay CH Symbol]											
	1.00		[Clay CH Symbol]					SPT	1.00 - 1.45			SPT 3,6,7 N=13 400-500kPa		
	2.00	From 2.00m: grey and dark brown, increased drilling resistance	[Clay CH Symbol]	RS	St to VSt	w<PL								
	2.50	CLAY (CI): pale grey; medium plasticity; extremely weathered material.	[Clay CI Symbol]					SPT	2.50 - 2.95			SPT 6,13,18 N=31 >600kPa		
	3.10	Continued as rock	[Rock Symbol]	XWM	H									
	4.00													
	5.00													
	6.00													
	7.00													
	8.00													
	9.00													

DRAFT
SUBJECT TO CHANGE

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

PLANT: Bobcat **OPERATOR:** Ground Test (GM) **LOGGED:** J. Valencic
METHOD: DT to 0.1m, AD/T to 2.5m, WB to 3.1m, NMLC to 19.94m **CASING:** HQ to 3.1m
REMARKS:

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.6 AHD
COORDINATE: E:333929.3, N:6254779.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH04
PROJECT No: 233323.00
DATE: 13/01/25 - 14/01/25
SHEET: 2 of 3

CONDITIONS ENCOUNTERED										SAMPLE			TESTING					
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
RL (m)	86													0.20				
	85													0.50				
	84													1.45				
	83	Continued from soil												2				
	83	SILTSTONE: grey with red-brown staining, with hard clay seams (<25%); fragmented. Ashfield Shale	XW to HW	VL	3.10		100	-		310-395m: numerous B & JT, Fe				2.95				
	82	CLAY (CH): grey and red-brown; high plasticity; with pockets of very low strength rock (<20%); extremely weathered siltstone.	XW		4.00	SOIL								4	PP	500kPa		
	81	SILTSTONE: dark grey; fractured; bedded at 0° with infrequent sandstone laminations (<5%). Ashfield Shale	HW	VL	4.90		100	15		5.02m: B x7, 0-10°, SN Fe				5	PP	550kPa		
	80				5.05					5.53m: B x11, SN Fe				6	PLT	PL(A)=0.29MPa		
	79				5.15					5.65m: JT, 75°, PR, CN				6	PLT	PL(A)=0.42MPa		
	78				5.20					5.92m: JT, 25°, PR, CN				6	PLT	PL(A)=0.25MPa		
	77				6.07		100	35		6.15m: JT, 75°, ST, SN Fe, SM				7				
					6.20					6.08-6.35m Bx4, 0-10°				7				
					6.45					6.49m CS, 90mm				7				
					6.65					6.65-6.86m: B x3, 0°, CT Clay				7	PLT	PL(A)=0.64MPa		
					7.14					7.20m: DS, 110mm				7	PLT	PL(A)=0.75MPa		
					7.38					7.30-7.33m Bx2, 0°, CN, SM				7	PLT	PL(A)=0.47MPa		
		SANDSTONE: pale grey, fine to medium grained, medium bedded. Hawkesbury Sandstone	SW				100	55		7.50m: DS, Clay 8mm				8				
										7.54m: DS, Clay 20mm				8	PLT	PL(A)=1.6MPa		
										8.02-8.14m: B x3, 0°, CN				8				
										8.20m: DS, Clay 20mm				8	PLT	PL(A)=0.68MPa		
										8.44m: B 5°, ST, CN, RF				9				
							100	100						9	PLT	PL(A)=0.79MPa		
										9.63m: B, 0°, PR, CT Clay, RF								

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

PLANT: Bobcat
METHOD: DT to 0.1m, AD/T to 2.5m, WB to 3.1m, NMLC to 19.94m
REMARKS:

OPERATOR: Ground Test (GM)

LOGGED: J. Valencic
CASING: HQ to 3.1m

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.6 AHD
COORDINATE: E:333929.3, N:6254779.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH04
PROJECT No: 233323.00
DATE: 13/01/25 - 14/01/25
SHEET: 3 of 3

CONDITIONS ENCOUNTERED										SAMPLE			TESTING						
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE	
	7.6	(CONT) SANDSTONE: pale grey, fine to medium grained, medium bedded. Hawkesbury Sandstone					100	100							PLT	PL(A)=0.69MPa			
	10.76	SILTSTONE: dark grey, with 10% fine grained interlaminated sandstone. Hawkesbury Sandstone		SW		M								11	PLT	PL(A)=1.8MPa			
	11.60	SANDSTONE: pale grey, medium grained, with discontinuous cross-bedding at 10-15°. Hawkesbury Sandstone			11.48	L	100	90		11.49-11.60m: B x9, 0°, PR, CT Clay									
	12			11.66	M					11.66m: DS, Clay 25mm									
	12			11.89	L					11.87-11.96m CS, 90mm									
	13					M								13	PLT	PL(A)=0.68MPa			
	14				14.50		100	97		13.56m: B, 10°, UN, CT Clay, RF				14	PLT	PL(A)=0.80MPa			
	15									13.92m: B, 0°, UN, CN, RF									
	16			FR			100	100		14.79m: B, 5°, PR, CN, RF				15	PLT	PL(A)=0.99MPa			
	17									14.85m: B, 5°, PR, CN, RF									
	18													16	PLT	PL(A)=1.0MPa			
	19									16.22m: B, 5°, PR, CT Clay, RF				17	PLT	PL(A)=1.0MPa			
	19.94	Borehole discontinued at 19.94m depth. Target depth reached.												18	PLT	PL(A)=1.2MPa			
														19	PLT	PL(A)=1.1MPa			
														19	PLT	PL(A)=1.1MPa			

DRAFT SUBJECT TO CHANGE

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

PLANT: Bobcat

OPERATOR: Ground Test (GM)

LOGGED: J. Valencic

METHOD: DT to 0.1m, AD/T to 2.5m, WB to 3.1m, NMLC to 19.94m

CASING: HQ to 3.1m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

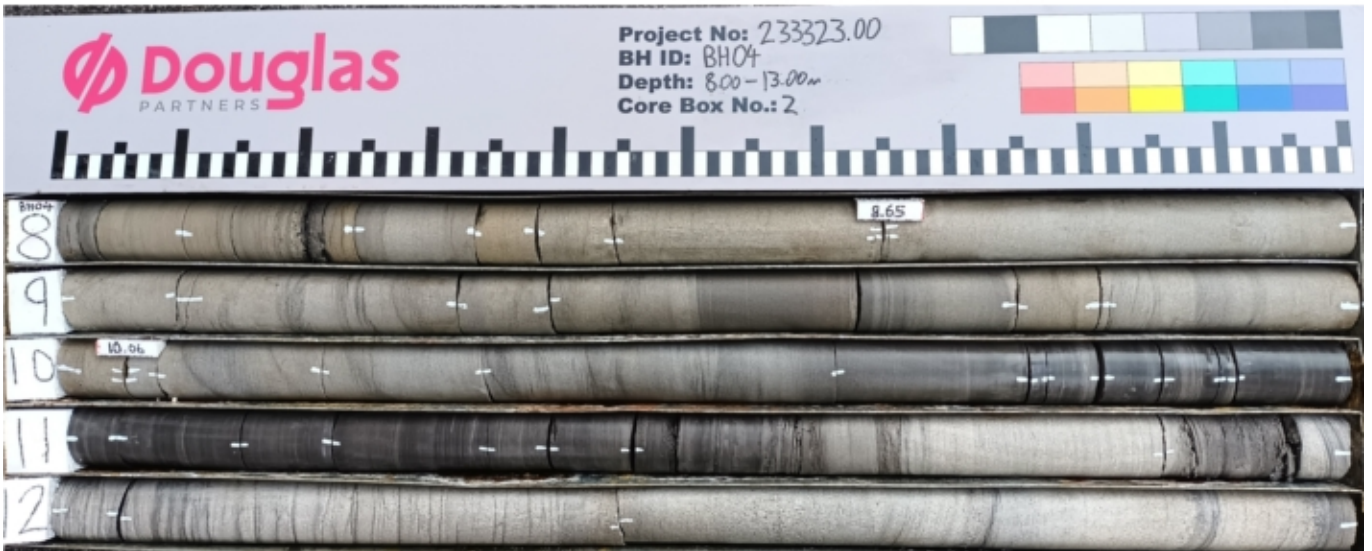
SURFACE LEVEL: 86.6 AHD
COORDINATE: E:333929.3, N:6254779.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH04
PROJECT No: 233323.00
DATE: 13/01/25 - 14/01/25
SHEET: 1 of 2



**DRAFT
SUBJECT TO CHANGE**

3.10-8.00 m depth



8.00-13.00 m depth

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.6 AHD
COORDINATE: E:333929.3, N:6254779.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH04
PROJECT No: 233323.00
DATE: 13/01/25 - 14/01/25
SHEET: 2 of 2






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0	Alison Smith	Seth Molinari	Seth Molinari		23/03/2023
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