

Pre-Construction Minor Works Approval Form

Minor Works are defined as any low impact activities that are undertaken prior to the commencement of ‘construction’ as defined in the project’s applicable planning approval. However if Minor Works affect or potentially affect heritage items, threatened species, populations or endangered ecological communities, these works are defined as ‘construction’ unless otherwise determined by the applicable planning authority.

Minor Works approvals do not remove any obligation to comply with the project’s applicable planning approval conditions (including requirements prior to ‘any works’ commencing) or obtain any other applicable permits, licenses or approvals as necessary.

This application and all supporting information must be submitted to Sydney Metro/the Environmental Representative as one (1) PDF file at least 10 business days prior to the commencement of the proposed Minor Works.

Part 1: Application	
Contractor:	RMA Group
Project:	SMC-23-0952
Application Title: (e.g. Smith St trenching works)	Chatswood Demolition and Remediation Project Remediation Activities
Application Number:	RMA-02
Application Date:	29 February 2024
Planning Approval:	SSI 15_7400
Minor Works Categories: <ul style="list-style-type: none"> Highlight as applicable. If Items 4, 8 or 11 are applicable, this form must be endorsed by an Environmental Representative. 	<ol style="list-style-type: none"> Survey, survey facilitation and investigations works (including road and building dilapidation survey works, drilling and excavation). Treatment of contaminated sites. Establishment of ancillary facilities (excluding demolition), including construction of ancillary facility access roads and providing facility utilities. Operation of ancillary facilities that have minimal impact on the environment and community. Minor clearing and relocation of vegetation (including native). Installation of mitigation measures, including erosion and sediment controls, temporary exclusion fencing for sensitive areas and acoustic treatments. Property acquisition adjustment works, including installation of property fencing and utility relocation and adjustments to properties. Utility relocation and connections. Maintenance of existing buildings and structures. Archaeological testing under the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010) or archaeological monitoring undertaken in association with other Minor Works to ensure there is no impact on heritage items. Any other activities that have minimal environmental impact, including construction of minor access roads, temporary relocation of pedestrian and cycle paths and the provision of property access.
Planning Authority Determination: Will the proposed works affect or have the potential to affect heritage items, threatened species, populations or endangered ecological communities?	Yes - the site consists of a Heritage Item as defined in CSSI7400 in the form of an archaeological site. Please see appendix 8 for Archaeological Method Statement and other relevant documents.

Part 2: Details

<p>Describe the proposed Minor Works: Including work methodologies, site location(s) and site description(s) (e.g. landscape type, waterways, etc.).</p>	<p>Planning Approval:</p> <p>This project fall under the construction and of the operation of the section between Chatswood and the Sydenham dive site known as "CSSI_7400". The works are undertaken as low impact works per the Chatswood to Sydenham Staging Report and are subject to CSSI planning approvals. RMA is required to comply with CSSI_7400, including the modifications to this approval, to the extent required by Sydney Metro</p> <p>Location:</p> <p>These works are proposed to occur within the vicinity of the principal contractor at the Chatswood Dive Demolition site (RMA Group). The site is located within the Willoughby Local Government Area (LGA) and a former Ausgrid property. The eastern boundary is defined by the main north shoreline, with the Pacific Highway to the west, Nelson Street to the north and Mowbray Road to the south. Frank Channon walk shared path runs along the eastern edge of the site. Mowbray House including 10 metre curtilage, Item 96 on the heritage schedule of the Willoughby Local Environmental Plan 2012, is within the site and will be used as a site office. The site is part of a larger property owned by Sydney Metro being utilised for construction activities associated with the Sydney Metro – City and Southwest project. The eastern portion of the property comprises a dive area for the development of the Sydney Metro program and will be retained as an operational part of the Sydney Metro network.</p> <p>Activity description</p> <p>General Activities to be performed under the Remediation Action Plan include the following:</p> <ul style="list-style-type: none"> • Site Establishment • Protection of Roads • Removal of Hardstand • Sampling • UST (Underground Storage Tank) Removal • Excavation of Asbestos and Chemically Impacted Soil • Stockpile Management • Materials Tracking • Site Management <p>See RAP in Appendix 2 for more information.</p> <p>Works Brief</p> <p>The site will predominantly work as an excavation site utilizing excavators and haulage vehicles. CSSI7400 Conditions of approval and mitigation measures to address environmental risks will be managed in accordance with the environment management plan and the following plans:</p> <ul style="list-style-type: none"> • Appendix 1 - Environmental Control Map • Appendix 2 - Remediation Action Plan • Appendix 3 - Community notification • Appendix 4 - Environment Management Plan • Appendix 5 - Waste Management Plan • Appendix 6 -Traffic Management Plan • Appendix 7 - Noise and Vibration Impact Statement • Appendix 8 - Archaeological Method Statement and approvals
<p>Planned Commencement Date:</p>	<p>4 March 2024</p>



Local Sensitivities:

Describe the presence (if any) of local sensitive environmental areas and community receptors

Nil

Part 3: Environmental Risk Assessment and Management

Prepare an Environmental Risk Assessment (in accordance with the Sydney Metro Risk Management Standard) and an Environmental Control Map for the proposed Minor Works and attach as Appendix 1.
If an Environmental Risk Assessment and/or an Environmental Control Map for the proposed Minor Works is/are already contained in existing documentation, attach the relevant section(s) as Appendix 1

<p>Documentation: List any existing documents (including those referenced above) that the proposed Minor Works will be undertaken in accordance with and attach as Appendix 2 (e.g. plans, procedures, procedures, etc.).</p>	<p>Refer to the Plans associated with the Project including the following listed as appendices to this Minor Works Approval as follows:</p> <ul style="list-style-type: none"> • Appendix 1 - Environmental Control Map • Appendix 2 - Remediation Action Plan • Appendix 3 - Community notification • Appendix 4 - Environment Management Plan, including Environmental Risk Assessment • Appendix 5 - Waste Management Plan • Appendix 6 -Traffic Management Plan • Appendix 7 - Noise and Vibration Impact Statement • Appendix 8 - Archaeological Method Statement and approvals
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Part 5: Community Consultation

<p>What community consultation has been undertaken already?</p>	<p>The latest monthly newsletter, March 2024, references these works which will all occur during standard hours (see Appendix 3)</p>
<p>What community consultation is planned to be undertaken?</p>	<p>The monthly newsletter references these works. Given they will be completed within the standard construction hours and listed activities for the site no specific consultation is expected to take place.</p> <p>Further notification will be provided to local residents prior to any excavation of asbestos and chemically impacted soil.</p>



Part 6: Contact Details

Nominate contractor's project manager, environmental and communications contact(s).

Name:	Luke Slechta	Position:	Project Manager	Phone:	[REDACTED]

Part 7: Signature

This signature acknowledges that the proposed Minor Works will be undertaken in accordance with this application, have minimal environmental impact and are not defined as 'construction' in accordance with the applicable planning approval.

Name:	Luke Slechta		
Signature:		Date:	29 February 2024

Determination Page

(Sydney Metro/Environmental Representative Use Only)

12. Endorsement/Approval

These signatures represent formal endorsement/approval for the proposed Minor Works to commence in accordance with this application and the applicable planning approval requirements (subject to any determination from the applicable planning authority as may be required by the planning approval conditions).

	Director Project Communications – Endorsement (required for all applications)	Director Environment, Sustainability & Planning – Approval (required for all applications)	Environmental Representative – Endorsement (required as necessary in accordance with the applicable planning approval, optional for all other circumstances)
Signature:			
Name:	Natalia Kuirintinus	Fil Cerone	Maulik Bapodara
Date:	1 March 2024	1March 2024	1 March 2024
Comments:			Noted and reviewed SM comments, AA review comments, RAP, CEMP, AMBS heritage assessment report, Waste Management Plan, Traffic Management Plan, CJP approval, CNVIS.
Conditions:			Conditionally endorsed based on fulfillment of the following conditions: Final WMP and CNVIS to be added to this MWA once finalised and prior to any excavation or noisy/vibratory works.
<input type="checkbox"/>			
<input type="checkbox"/>	Approved (by Sydney Metro)		
<input checked="" type="checkbox"/>	Endorsed (by Environmental Representative)		

Rejected

Appendix 1: Environmental Control Map.

Chatswood Precinct

Cnr Pacific Hwy & Mowbray Road,
Chatswood NSW 2067

ENVIRONMENTAL CONTROL PLAN

RMA Contracting Pty Ltd
Project Manager: Charlie Dutra 0404 504 282



Key Environmental Risks and Controls

No work is permitted outside the boundary or within protected areas.

Report to Project Manager:

- All incidents, spills and complaints
- Any unusual finds (odours, contaminated soil, suspected artifacts).

SOIL AND WATER:

- The truck commute areas should be kept clean at all times
- Any accumulated water at low points of the site should be pumped to stormwater following inspection and use of RMA Discharge Permit.
- Hazardous substances must be stored correctly, in bunded areas, to prevent spills
- Spill kits to be in place in plant operating areas, refueling and chemical storage areas.
- ERSED controls to be installed and maintained as per this ECP.
- Stockpiles to be stabilised. High risk stockpiles to be covered with geo-fab.
- No mud or sediment to be tracked off the site. Use wheel wash prior to leaving site.
- Regular sweeper truck is to be used on site.
- Clean areas where dirt, mud or sediments have accumulated.

WASTE:

- Re-use or recycle construction materials wherever possible.
- Place all paper & cardboard into recycling bins.
- Place all other waste into the appropriate bins.
- Do not dispose of waste into any drains.
- All waste leaving the site must be waste classified, tracked and recycled or disposed of at a licenced waste facility.

AIR QUALITY:

- Dust suppression measures must be used to prevent or minimise dust.
- Dust management systems to be in place for demolition and excavation works.
- Earthworks to be wetted down to minimise dust.
- Sweeper truck to be regularly used on site.
- All loads leaving the site must be covered.

NOISE AND VIBRATION:

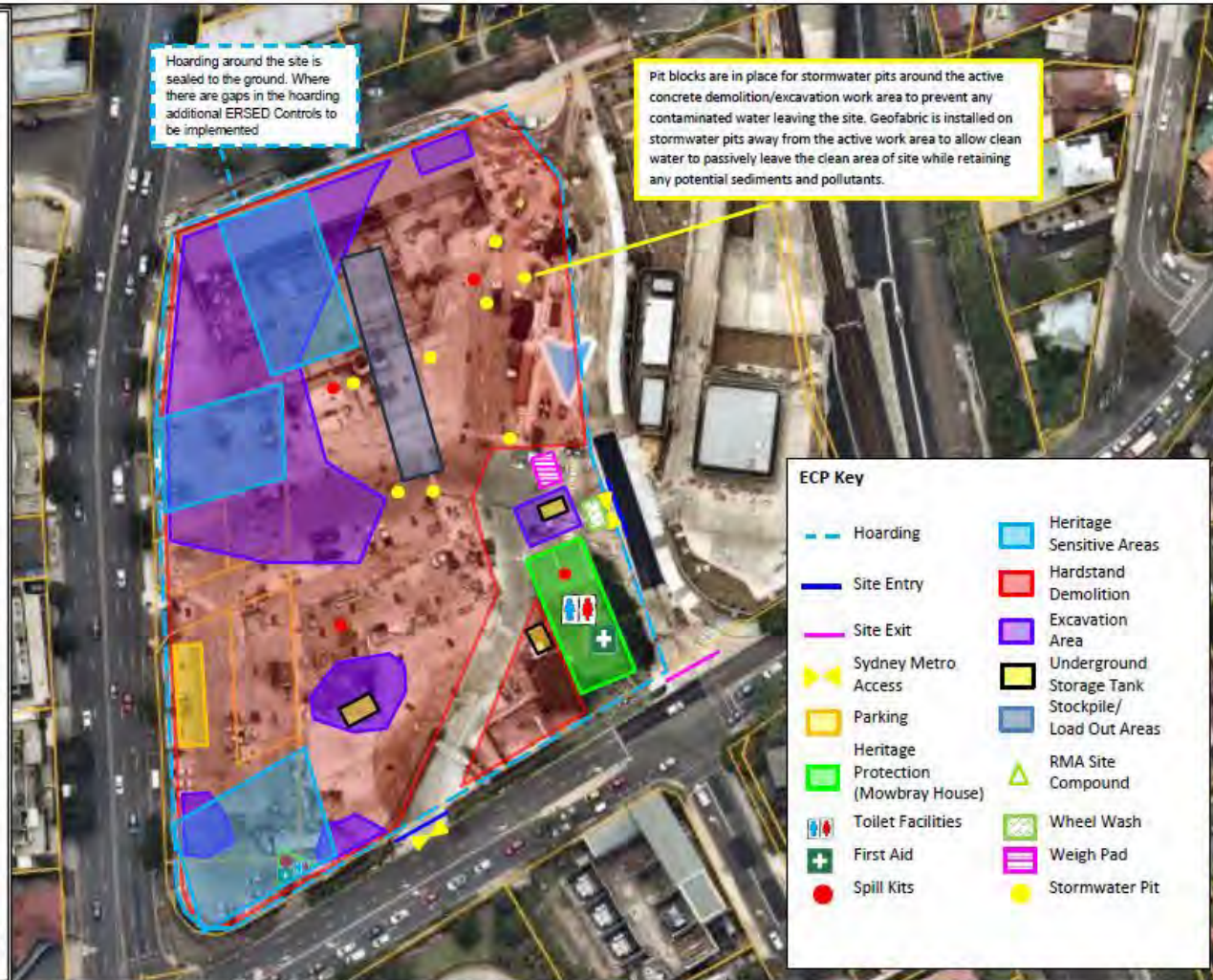
- Approved working hours are:
 - 7am - 6pm Monday - Friday and 8am - 6pm Saturdays
 - No work on Sundays or Public Holidays
- No work outside of these hours without specific approval
- Minimise plant & equipment running times. Turn equipment off when not in used.
- Avoid simultaneous use of noisy equipment.
- High noise impact works only allowed
 - 8am - 5pm Monday - Friday and 8am - 1pm Saturday
 - In blocks not exceeding 3 hrs each with respite of 1 hr between blocks
- Reasonable and feasible noise mitigation to be implemented where required

TRAFFIC:

- Park in designated areas and use approved access & truck routes only
- No heavy vehicle queuing in residential streets before or after hours.

APPROVALS:

Works that require specific Environmental Approvals include work outside of standard hours, work outside the project boundary, clearing land or vegetation and discharge of water.





Appendix 2: Remediation Action Plan



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SOLUTIONS
FOR COMPLEX
PROJECTS

Remediation Action Plan –
Chatswood Site

Sydney Metro

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With expertise in projects in the government, transport, water, property and urban development sectors, we provide a suite of services aptly tailored to each client and project at hand.

Document title
Remediation Action Plan – Chatswood Site

Version
2.0

Date
April 2021

Prepared by
Pascal Nicolas and Liam Gooley

Approved by
Luke Clements

File name
NP19158_Chatswood RAP v2.0

Nation Partners Pty Ltd
ABN 96 166 861 892

Level 3, The Alley, 75-77 Flinders Lane
Melbourne Vic 3000

Suite 306, 50 Holt St
Surry Hills NSW 2010

☎ 1300 876 976

✉ info@nationpartners.com.au

🌐 nationpartners.com.au

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Figure 6: ENM Exceedances
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Revision History

Revision No.	Date	Reviewed By	Approved By	Comment
1.0	18/03/2021	L Gooley	L Clements	Draft for Sydney Metro and Site Auditor review
1.2	19/04/2021	L Gooley	L Clements	Revised draft addressing comments
2.0	27/04/2021	L Gooley	L Clements	Final

Executive Summary

Background

Nation Partners Pty Ltd (Nation Partners) has been engaged by Sydney Metro to prepare a remediation action plan (RAP) for the property known as the Chatswood Metro site, located at the north-east corner of the Pacific Highway and Mowbray Road, Chatswood, New South Wales (NSW) (the site). The location and boundary of the site are shown on the below **Figure 1**. Nation Partners understands Sydney Metro intends to divest the site following completion of the Sydney Metro – City and Southwest (SMCS) project. Nation Partners completed a Data Gap Investigation (Nation Partners, 2021) which has been utilised to prepare this RAP. This RAP has been prepared to inform and guide the remediation and validation required for the potential redevelopment of the Chatswood Metro site.



Figure 1: Site Location

Sydney Metro - Remediation Action Plan
Chatswood Site

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- | | |
|---|---|
|  Site Boundary |  Possible Asbestos Shed |
|  Dive Portion |  Mowbray House Heritage Building |
|  Asbestos PI Location |  Area of Interest |
|  Underground Storage Tanks |  Former Road |



Objectives	Following an evaluation of remediation cost estimate (RCE) (Nation Partners, 2020) options, it is understood that an unrestricted development was the preferred option. This involves the preparation of the site to allow for the most conservative land use in accordance with the National Environment Protection Council (NEPC), <i>National Environmental Protection (Assessment of Site Contamination) Measure, 1999 (2013 amendment)</i> (NEPM, 2013), low-density residential with accessible soils. This would also therefore render the site suitable for any of the other, less conservative, land uses, such a high-density residential or public open space.
Drivers	A number of potentially complete source-pathway-receptor (SPR) linkages were identified in the refined CSM (Nation Partners, 2021) with respect to the preferred redevelopment scheme. These linkages warrant remediation for the site to be suitable for a potential future low-density residential land use.
Strategy	Following a remediation options assessment, an off-site disposal strategy was considered to be an economical, reliable, and risk adverse management measure to address the identified concentrations requiring remediation. It will achieve the objective of an unrestricted land use for divestment, from a contaminated soil perspective. Further, the site will likely require bulk excavation and earthworks for redevelopment, and the removal of surficial fill will likely represent cost and time savings for the prospective developer.
Additional Work	<p>Following the Data Gap Investigation (Nation Partners, 2021), there are several data gaps with respect to remediation which are required to be addressed prior to the remediation works commencing. In particular:</p> <ul style="list-style-type: none"> » There is the potential for shallow groundwater impacted by PFAS to be present. Investigation of the likelihood for shallow groundwater is required, in addition to an assessment on the potential exposure risk to site workers (if present). » Waste classification conducted as part of the Data Gap Investigation is considered to be preliminary only, and does not provide a sufficient sampling density to achieve assurance. Additional in-situ waste classification sampling is required to refine the waste classifications. It is noted that ex-situ classification will also be required prior to off-site disposal. » Asbestos containing material (ACM) has previously been reported to be present in the fill soils at the site, however the entire site has not been investigated in a sufficient manner to determine the potential wide-spread presence of ACM or friable asbestos/asbestos fines (FA/AF). An asbestos in soils investigation of the entire site is required to inform this data gap, and refine the remediation approach. » The footprint of the former energy depot building footprint has not been investigated to date. It is required to be investigated to inform the remediation approach. » Prior to demolition of site buildings, a hazardous building materials assessment is required to be completed by a suitably qualified person. <p>Following completion of the above, a RAP Addendum should be prepared to document deviations from, and improvements to, the approach presented in this RAP.</p>

<p>Remediation Tasks</p>	<p>The proposed remediation methodology generally comprises:</p> <ul style="list-style-type: none"> » Site preparation works, including establishment of the site, protection of off-site roads, and removal of buildings and hardstand with suitable controls for hazardous building materials (if identified). » Additional sampling to address the residual data gaps, define the remediation extent, and refine waste classifications. » Underground storage tank removal, and excavation of asbestos and chemically impacted soil. » Final waste classification of ex-situ waste stockpiles, prior to off-site disposal. » Materials tracking of all waste disposed of off-site, and materials imported to site. » Validation sampling of excavated surfaces, and preparation of a validation report demonstrating site suitability. » Earthworks and installation of erosion and sediment control measures to manage the site whilst vacant.
<p>Remediation Extent</p>	<p>The indicative extent of remediation, prior to refinement following the additional sampling, is defined as:</p> <ul style="list-style-type: none"> » Remediation Area A – former asbestos burial pits, and chemical impacts associated with a former service station. » Remediation Area B – a former asbestos slab. » Remediation Area C – a former underground storage tank associated with a former energy depot. » Remediation Area D – two former USTs, also associated with the former energy depot. » Remediation Areas E and F – exceedances in shallow soils. <p>The above indicative extents are shown on the below Figure C-1.</p>



Appendix C-1: Indicative Extent of Remediation

Sydney Metro - Remediation Action Plan
Chatswood Site

© 2018 NPS
The remediation and asbestos removal will be undertaken on the property of Nation Partners Pty Ltd (as manager of the trust) and a third party, subject to the requirements of the Environmental Protection Authority (EPA) and the Environmental Protection Act 1986 (EPA Act). Nation Partners Pty Ltd does not warrant the accuracy of the information on this map and accepts no liability for any loss or damage resulting from reliance on this information and/or any other data.

- Legend**
- Site Boundary
 - Asbestos PI Location
 - Underground Storage Tanks
 - Possible Asbestos Soil
 - Indicative Extent of Remediation



NSW State Government
Map of New South Wales, 2018
Scale 1:100,000

<p>Post Remediation Considerations</p>	<p>Following completion of the works, it is not currently proposed to import material to replace the balance removed during remediation. It is also recognised that development plans may not be finalised or approved prior to completion of the remediation works. As such, interim site management is required. In particular, the site is to be left secure, and with sufficient grading, land-forming, and erosion and sediment control structures to minimise surface water and sediment run-off and dust generation.</p> <p>Following completion of the works, the groundwater dataset should be reviewed with respect to whether the groundwater monitoring wells require reinstatement and sampling. Site suitability is required to consider the condition of the groundwater, and whether on- or off-site receptors may be exposed to unacceptable risks during and post-redevelopment.</p> <p>A long-term environmental management plan is to be prepared to manage residual groundwater contamination. In particular, potential exposure to groundwater during bulk earthworks for redevelopment, and handling dewatered groundwater during redevelopment and future occupation of the site.</p>
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Acronyms and Abbreviations

ACM	asbestos containing materials
AF	asbestos fines
AHD	Australian Height Datum
ARCP	asbestos removal control plan
BaP	benzo(a)pyrene
BTEX	benzene, toluene, ethylbenzene and xylenes
CEMP	Construction environmental management plan
CSM	conceptual site model
DNAPL	dense non-aqueous phase liquid
EMP	environmental management plan
ENM	excavated natural material
EPA	Environment Protection Authority
ESL	ecological screening level
FA	friable asbestos
GDE	groundwater dependent ecosystem
GWMW	groundwater monitoring well
GSW	general solid waste
HEPA	Heads of EPAs Australia and New Zealand
HIL	health investigation level
HSL	health screening level
IDE	inflow dependant ecosystem
km	kilometre
LAA	licensed asbestos assessor
LNAPL	light non-aqueous phase liquid
LOR	limit of reporting
m	metre
mBGL	metres below ground level
MGA	Map Grid of Australia
MLP	Master Lease Property
NEPC	National Environmental Protection Council
NEPM	National Environment Protection (Assessment of Site Contamination) Measure

NSW	New South Wales
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PFAS	per- and poly-fluoroalkyl substances
PFAS NEMP	PFAS National Environmental Management Plan 2.0
PPE	personal protective equipment
PSV	passive soil vapour
RAP	remediation action plan
RCE	remediation cost estimate
REF	review of environmental factors
RMS	roads and maritime services
ROA	remediation options assessment
SAQP	sampling, analysis and quality plan
SEPP	State Environmental Planning Policy
SMCS	Sydney Metro – City and Southwest
SPR	source-pathway-receptor
SWMS	safe work method statement
TPH	total petroleum hydrocarbons
TRH	total recoverable hydrocarbons
TSE	Sydney Metro tunnel and station excavation contractor
UST	underground storage tank
VCH	volatile chlorinated hydrocarbons
VENM	virgin excavated natural material
WA DoH	Western Australian Department of Health

1. Introduction

Nation Partners Pty Ltd (Nation Partners) has been engaged by Sydney Metro to prepare a remediation action plan (RAP) for the property known as the Chatswood Metro site, located at the north-east corner of the Pacific Highway and Mowbray Road, Chatswood, New South Wales (NSW) (the site). The location and boundary of the site are shown in **Figure 1**.

Nation Partners understands Sydney Metro intends to divest the site following completion of the Sydney Metro – City and Southwest (SMCS) project. Nation Partners completed a Data Gap Investigation (Nation Partners, 2021) which has been utilised to prepare this RAP. This RAP has been prepared to inform and guide the remediation and validation required for the potential redevelopment of the Chatswood Metro site.

It is noted that this RAP is general with respect to the overarching approach to the works. This is a result of residual data gaps from the Data Gap Investigation (Nation Partners, 2021) which are required to be investigated and addressed as part of the RAP implementation. See **Section 6.2.4** for further detail.

Due to the anticipated period of several years between this RAP being issued and the works occurring, prior to implementation of this RAP, a suitably qualified person should review and update it as necessary through the preparation of a RAP Addendum.

1.1 Structure of the RAP

This RAP consists of the following sections:

- » Section 1 – the background of the site and the objectives of the RAP.
- » Section 2 – a description of the site, its location, and the proposed redevelopment.
- » Section 3 – a summary of previous investigations undertaken at the site.
- » Section 4 – the conceptual site model (CSM), which summarises the potential exposure of receptors (human and environmental) to identified contamination, and residual data gaps which remain in the CSM.
- » Section 5 – the remediation options assessment and determination of the preferred strategy.
- » Section 6 – the detail of the remediation strategy, including tasks to be undertaken.
- » Section 7 – relevant environmental planning and approvals processes for the works.
- » Section 8 – site management considerations for undertaking the works.
- » Section 9 – the validation process to demonstrate that the site has been remediated and is considered suitable for the proposed use.
- » Section 10 – a high level overview of the long-term environmental management considerations for the site.

1.2 Background

The site is part of a larger property owned by Sydney Metro being utilised for construction activities associated with the SMCS project. The eastern portion of the property comprises a dive area for the development of the Sydney Metro project as shown in **Figure 1** and will be retained as an operational part of the Sydney Metro network following the completion of the construction works. As such, the dive portion is not considered part of the site in this RAP. The remainder of the property comprises the site and is currently used for construction staging. However, it is understood that Sydney Metro intends to divest the site, and it will likely be redeveloped by the purchaser.

As part of divestment planning, Sydney Metro engaged GHD Pty Ltd (GHD) to prepare a contamination summary report (GHD, 2020a), a remediation option assessment (ROA) (GHD, 2020b), and a remediation

cost estimate (RCE) (GHD, 2020c). The exact future use of the site is unknown, however for the RCE, GHD considered two potential redevelopment scenarios: a high-density residential land use with basement car parking; and a mixed high-density residential with basement car parking and education land use. The contamination summary report provided an at-the-time understanding of the contamination status of the site and outlined outstanding gaps in the understanding of contamination conditions. The ROA and RCE contained conservative assumptions as a result of the current gaps in understanding the contamination status of the site, leading to estimates of remediation costs that were considered high uncertainty and high cost.

Nation Partners was subsequently engaged to undertake a data gap investigation (Nation Partners, 2021) and prepare an updated draft RCE (Nation Partners, 2020). The data gap investigation (**Figure 2**) refined the CSM for the site, and investigated data gaps identified by GHD (2020a). The updated RCE considered the GHD land use scenarios, in addition to an unrestricted land use, and provided refined cost estimates associated with remediation scenarios, utilising results from the Data Gap Investigation.

Following an evaluation of the RCE options, it is understood that the Unrestricted Development Scheme was the preferred option. This scheme involves the preparation of the site to allow for the most conservative land use in accordance with the National Environment Protection Council (NEPC), *National Environmental Protection (Assessment of Site Contamination) Measure, 1999 (2013 amendment)* (NEPM, 2013), low-density residential with accessible soils.

To facilitate the intended divestment and redevelopment, Sydney Metro have engaged Mr Lange Jorstad from Geosyntec Consultants Pty Ltd as a NSW Environment Protection Authority (EPA) accredited site auditor under the *Contaminated Land Management Act 1997* to undertake a non-statutory site audit for the site. Nation Partners understands that this RAP will form part of the non-statutory site audit.

A number of potentially complete source-pathway-receptor (SPR) linkages were identified in the refined CSM (Nation Partners, 2021) with respect to the preferred redevelopment scheme. It was considered that these linkages warrant remediation for the site to be considered suitable for a potential future low-density residential land use. Additionally, there are several residual data gaps which are required to be addressed to inform the remediation approach outlined herein.

1.3 Objectives

The objective of this RAP is to present a plan of the anticipated remediation that will allow the potential redevelopment of the site to proceed in a manner that protects human health and the environment, and also makes the site suitable for the applicable land use.

1.4 Scope of Work

To meet the objectives stated above, the following scope of works were completed for the development of this RAP:

- » Summarised the findings of the Data Gap Investigation, including:
 - The site's location current conditions and use, history and environmental setting (including surrounding areas).
 - The identified contamination, including CSM, critical data gaps, and priority SPR linkages requiring further assessment or management.
- » Assessed applicable remedial technologies and identified a preferred remedial approach.
- » Developed a methodology for the preferred option, including the necessary site management.
- » The necessary remediation site management requirements were identified including:
 - Details of approvals and/or licences that are required by regulatory authorities.

- Environmental management requirements to be implemented during the remedial works.
- Roles and responsible of interested parties during the remedial works, including the likely proponent, the remediation contractor, and the validation consultant.
- » Developed validation requirements and site-specific validation criteria.
- » Developed contingency plans for a range of potential scenarios that could arise during the remedial works.

1.5 Guideline Documents

The RAP was prepared with reference to the following guidance documents:

- » Heads of EPAs Australia and New Zealand (HEPA), 2020, *PFAS¹ National Environmental Plan Version 2.0* (PFAS NEMP, 2020).
- » NEPM, 2013.
- » NSW EPA, 1995, *Sampling design guidelines* (NSW EPA, 1995).
- » NSW EPA, 2014, *Waste Classification Guidelines – Part 1: Classifying Waste* (NSW EPA, 2014).
- » NSW EPA, 2016, *Addendum to the Waste Classification Guidelines (2014) – Part 1: Classifying Waste* (NSW EPA, 2016).
- » NSW EPA, 2017, *Contaminated Land Management, Guidelines for the NSW Site Auditor Scheme (3rd edition)* (NSW EPA, 2017).
- » NSW EPA, 2020, *Consultants reporting on contaminated land: Contaminated land guidelines* (NSW EPA 2020).
- » SafeWork NSW, 2019, *Code of Practice: How to Manage and Control Asbestos in the Workplace* (SafeWork, 2019a).
- » SafeWork NSW, 2019, *Code of Practice: How to Safely Remove Asbestos* (SafeWork, 2019b).
- » WorkCover NSW, 2014, *Managing Asbestos In or On Soil* (WorkCover, 2014).
- » Western Australian Department of Health 2009 *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (WA DoH, 2009).

¹ Per- and poly-fluoroalkyl substances

2. Site Description

The following sections provide information on the site location, investigation area, current and historical land uses and surrounding land uses.

2.1 Site Location and Identification

The site is located on the north-east corner of the Pacific Highway and Mowbray Road, Chatswood, approximately 7 kilometres (km) north of Sydney Central Business District. The site location is shown on **Figure 1**, and additional site identification details are summarised in **Table 1**.

Table 1: Site Identification Details

Current Site Owner:	Sydney Metro
Address:	<p><u>Central Portion</u> (Former Ausgrid depot) 339 Mowbray Road, Chatswood</p> <p><u>Northwest Portion</u> (Former Caltex service and Master Lease Property [MLP] site) 607 Pacific Highway, Chatswood</p> <p><u>Southwest Portion</u> (Former retail area) 589 Pacific Highway, Chatswood</p>
Co-ordinates (Map Grid of Australia [MGA] Zone 56):	331540 metres (m) East; 6258050 m North (approximate centre of the site)
Legal Identification:	<p><u>Central Portion</u> (Former Ausgrid depot) Lot 1 / DP243111; Lot 2 / DP221896; Lot 6 / DP66854; Lot 5 / DP524631; Lot 18 / DP60346; Lot 2 DP537580; Lots 4, 5 & 6 / DP65670</p> <p><u>Northwest Portion</u> (Former Caltex service and MLP site) Lot 1 / DP537580; Lot 1 / DP503447; Lot 2 / DP1223080; Lot 3 / DP961402; Lots 3 & 4 / DP455907</p> <p><u>Southwest Portion</u> (Former retail area) Lot 1 / DP216408; Lot 1 / DP204133; Lot 1 / DP50875; Lot 3 / DP58646; Lot 6 / DP72759</p>
Site Area:	Approximately 18,000 square metres (m ²) excluding the Sydney Metro Dive Site
Location Government Area:	Willoughby City Council
Zoning:	<p>SP2 – Infrastructure, majority of site</p> <p>B2 – Business development, western portion</p> <p>R3 – Medium density residential – boundary with Nelson Street</p>

2.2 Site Features

Observations and comments presented below are reported in previous investigations as summarised in the Data Gap Investigation Report (Nation Partners, 2021):

- » The site is currently owned by Sydney Metro and utilised for construction activities associated with the SMCS project.
- » The site is relatively flat with elevation that ranges from 102 m Australian Height Datum (AHD) in the north to 104 mAHD in the south. It exists on a gentle slope observed to extend toward the north to north-east and north-west from a high point in the south.
- » GHD (2020a) noted that the majority of rainfall across the site is likely to enter the local stormwater system to the north before flowing either east or west. Two likely stormwater discharge points were identified: Scotts Creek, 1.7 km north; or Castle Cove, 3.6 km east of the site.
- » Two permanent structures from prior to Sydney Metro's ownership remain on-site. These are the transformer workshop in the central portion of the site, and the heritage-listed Mowbray House in the south-east corner of the site.
- » The site is entirely covered with concrete hardstand. The SMCS Tunnel and Station Excavation (TSE) contractor established a layer of clean fill over the original hardstand surface of the carpark, and then established additional concrete slabs, buildings and other infrastructure on top of the clean fill.

2.3 Surrounding Land Use

The land adjacent to the site is characterised by:

- » North: Nelson Street, followed by commercial and residential properties.
- » East: Dive portion for SMCS, and then the Northern Railway line.
- » South: Mowbray Road, followed by a telecommunications tower, electricity substations and water tank reservoirs.
- » West: The Pacific Highway, followed by commercial properties, including a Caltex service station and then residential properties.

The surrounding land is characterised primarily by commercial and medium density residential land use.

The nearest water body to the site is Swainess Creek which is approximately 1 km west-northwest of the site. Swainess Creek flows west towards the Lane Cove River, approximately 2 km west of the site.

2.4 Geology and Soils

The site is underlain by Ashfield Shale of the Wianamatta Group from the Triassic period, which is comprised of black to dark grey shale and laminate. Approximately 500 m both east and west of the site is Triassic period Hawkesbury Sandstone, a medium to coarse grained quartz sandstone. Very minor shale and laminate lenses are also present in the surrounding area.

A summary of soils encountered during the Data Gap Investigation (Nation Partners, 2021), is provided in **Table 2**.

Table 2: Site Soil Summary

Approximate Depth Range (mBGL)	Unit/Material	Description
0.0 to 0.2-1.6	Concrete/asphalt	FILL: Concrete was encountered across the entire site. Asphalt was encountered in SRT-PT017, which is located near the former Bryson Road.

Approximate Depth Range (mBGL)	Unit/Material	Description
0.2-1.6 to 0.4-4.5	Fill	FILL: Material generally consisted of road base, dark brown and dark grey gravelly clays and sands, coarse grained. Encountered between concrete slabs across the site.
0.4-4.5 to \geq 4.5	Reworked natural materials	CLAY: Reworked natural clays and clays with sand, ranging from reddish brown to yellowish brown. Generally soft, dry-moist. Sometimes containing gravel.
	Natural	CLAY: Clay, reddish-brown with some grey or red mottling. Stiff to very stiff with trace gravel.
	Natural	CLAY: Grey clay with red mottling. Generally stiff to very stiff, dry with fine-coarse gravel and ironstone, with silt at times.
\geq 11.0	Natural	SHALE: Grey weathered shale

mBGL – metres below ground level

Secondary sub-surface concrete slabs of 0.2-0.4 m thickness were also encountered underneath a layer of fill during the Data Gap Investigation. Concrete was encountered to a depth of 4.5 mBGL in SRT-PT014, though this is not considered to be representative of site conditions, and likely attributed to an old footing or pier. Further details including bore logs are available in the Data Gap Investigation Report (Nation Partners, 2021)

2.5 Hydrogeology

During the Data Gap Investigation, two water-bearing zones were identified, consistent with previous investigations:

- » An intermittent shallow, semi-confined or perched aquifer at approximately 5 mBGL with water levels recorded at approximately 3-4 mBGL. Water in this zone was inferred to be from rainfall recharge that was perched in the low permeability clay profile.
- » A deeper confined or semi-confined aquifer within clay/weathered shale with some gravel and/or silt at approximately 12 – 14.5 mBGL. This water-bearing zone was typically overlain by approximately 6.5 m of low permeability clay.

Groundwater levels were gauged during Stage 1 and Stage 2 groundwater monitoring events. Inferred groundwater contours and flow directions for the deeper aquifer from Stage 1 and Stage 2 are presented on **Figures 3a** and **3b** respectively.

Deeper groundwater levels and flow direction were inferred during both targeted groundwater monitoring events. Observations from Stage 1 indicated that groundwater flow across the site was typically towards the north-east. In contrast, groundwater gauging conducted during Stage 2 indicated that groundwater flow was generally towards the north-west. A number of potential factors behind the change in hydrogeological conditions have been identified in the Data Gap Investigation report, including seasonal changes with significantly higher rainfall levels experienced prior to Stage 1 when compared to Stage 2, and the impact of the tunnel construction, specifically the recovery of groundwater conditions following the completion of tunnel construction/boring.

The hydrogeology on site, according to regional plans in Lotsearch (2020) (within GHD, 2020a), is characterised by extensive, porous aquifers of low to moderate productivity. Groundwater may potentially discharge into Scotts Creek, approximately 1.7 km north east of the site before flowing into Castle Cove, approximately 3.7 km east of the site.

2.6 Sensitive Environmental Receptors

Stormwater and groundwater both potentially discharge into Scotts Creek, approximately 1.7 km north east of the site, and Castle Cove, approximately 3.7km east of the site.

No inflow dependent ecosystems (IDE) or groundwater dependent ecosystems (GDE) exist on the site. Approximately 989 m west of the site is a potential terrestrial GDE, whilst there is a moderate likelihood of an IDE occupying an area within deeply dissected sandstone plateaus, also approximately 989 m west of the site (Lotsearch, 2020).

A search of the NSW BioNet Atlas of the area within 10 km of the site is included in Lotsearch (2020). A number of NSW and federally listed vulnerable and endangered species are identified within the search including birds, mammals, reptiles and plants. It is noted that the site and immediate surrounds are highly disturbed and developed urban land, unlikely to support these species.

2.7 Proposed Land Use

Nation Partners developed a draft RCE (Nation Partners, 2020), which refined assumptions in the GHD RCE (GHD, 2020b) and provided updated cost estimates associated with remediation scenarios developed within the RCE workshops. Incorporated within the draft RCE was an updated ROA which assessed a number of redevelopment schemes and remediation options.

The below (Table 3) redevelopment options were considered as part of the RCE. It is noted that due to the depth to groundwater being approximately 15 mBGL, and driver for remediation being surficial soil impacts, consideration of remediating potentially impacted groundwater was excluded from the RCE.

Table 3: Redevelopment Options

Scheme Name	Scheme Summary	Preferred Option (Y/N)
Metro	Two high-density residential developments with basement car parking, down to 15 mBGL. The heritage listed Mowbray House will be retained, and public open space will be present between the two developments and surrounding Mowbray House	N
Education	One high-density residential development with basement car parking to 15 mBGL, and a high-density education development with no basement car parking. Mowbray House would be retained for an education use, and the remainder of the site would be retained as public open space.	N
Unrestricted	With the exception of retaining Mowbray House and its associated heritage curtilage, the site would be rendered suitable for the most sensitive land use, low-density residential, without the restrictions (from a contaminated land perspective) of the other two scenarios, presented as having mixed land uses across the site.	Y

This RAP has been developed to render the site suitable for the unrestricted redevelopment scheme. It is noted that a number of sub-options per redevelopment scenario were provided. For the unrestricted scheme, the preferred strategy is understood to be combination of Options A and B, namely:

» Option A – Off-site disposal of known health-based exceedances in soil.

» Option B – Off-site disposal of all fill across the entire site, to be refined through additional investigation (**Section 6.2.4**). In particular, the potential presence of wide-spread asbestos in soils is a data gap. If wide-spread asbestos in soils is identified, they will require off-site disposal. If they are not identified, the remediation will focus on areas of health-based exceedances.

3. Contamination Status

The presence of contamination at the site was characterised during the Data Gap Investigation via soil, groundwater, and soil vapour sampling. Additionally, the historical investigations summarised in GHD 2020a were reviewed and consolidated. The findings of the Data Gap Investigation are summarised in this section.

3.1 Previous Investigations

GHD undertook a review of 53 previous environmental reports relating to the wider property, and provided a summary of contamination on the site in the context of the indicative future land uses for the site. The historical sampling locations and diagrammatic CSM prepared by GHD (2020a) are presented in **Attachment A**, and exceedances are summarised on **Figure 4**. Key findings included:

- » A number of historic businesses occupied areas of the site which presented potentially contaminating activities, including: a former Caltex service station; an auto electrician; a carpet retail business; and Ausgrid (and predecessors) occupied the central and northern portion of the site as an electrical depot facility.
- » All known primary sources of contamination, including residual soil impacts, had been removed from the former Caltex in the north-west portion of the site. Total Recoverable Hydrocarbon (TRH) impacted soil from the Caltex was bioremediated and retained in two burial pits (EXC_1 and EXC_MLP). Asbestos Containing Material (ACM) identified during the works was also retained within the two burial pits. During validation works for the Caltex site, the southern, eastern, and western basement walls remained in-situ, so validation of soil behind the walls was not able to be conducted and it is likely that the soil contains residual hydrocarbons. Residual TRH impacts in the soil are thought to be associated with the groundwater smear zone, the basement walls of the former Caltex building, and the bioremediated soil burial pits.
- » The presence of 'froth' was noted during the removal of three underground storage tanks (USTs) (numbers 1, 2 and 3) from the former Ausgrid energy depot site and could indicate the presence of surfactants. No sampling to date had occurred to confirm the presence of surfactants including for PFAS in the area.
- » An additional three decommissioned USTs (numbers 4, 5, and 6) and associated infrastructure remain in-situ in the centre of the site associated with Ausgrid's former occupation, and may be contributing to contamination in the area. UST 4 is located to the north of Mowbray House, while UST 5 and UST 6 are in southern central portion of the site. The decommissioned USTs have been filled with concrete.
- » Historical soil exceedances of the adopted criteria were noted for TRH, benzene, xylene, polycyclic aromatic hydrocarbons (PAHs), lead, and asbestos in the area around the former transformer oil USTs (5 & 6) and associated infrastructure, in the north west portion (former Caltex service station and MLP site), and in one location near the centre of the site (shown on **Figure 4**).
- » The former buildings on the energy depot contained hazardous building materials, including ACM, which potentially could act as a source of soil contamination in this portion of the site.
- » An asbestos slab (potentially removed by the TSE contractor) was located in the central northern area, near Nelson Street.
- » Exceedances of the adopted groundwater investigation levels for TRH and benzene. Light non-aqueous phase liquid (LNAPL) was detected at the former Caltex service station site in 2009. It is noted that dense NAPL (DNAPL) has not previously been detected at the site. Volatile chlorinated hydrocarbons (VCH) have also been detected in groundwater, with one exceedance of the 1,2,3-trichlorobenzene criterion. GHD also noted that all groundwater data was greater than five years old and that some portions of the site had no data.

3.2 Data Gap Investigation

The Data Gap Investigation completed by Nation Partners was undertaken to close out data gaps identified by GHD (2020a). The sampling locations are shown on **Figure 2**, inferred groundwater contours on **Figures 3a and 3b**, soil exceedances on **Figure 4**, and groundwater exceedances on **Figures 5a and 5b**. The investigation comprised:

- » A review of the GHD reports (2020a, 2020b, and 2020c).
- » Installation of 13 deep groundwater monitoring wells (GMMW) and associated soil sampling.
- » Installation of 4 shallow GMMWs.
- » Advancement of 12 soil bores and associated soil sampling.
- » Installation and sampling of 12 passive soil vapour samplers (PSV).
- » Two targeted groundwater monitoring events conducted in July 2020 and October 2020.

The key findings of Data Gap Investigation were:

- » The results of the soil sampling identified:
 - Exceedances of the adopted human health investigation levels for benzo(a)pyrene (BaP), benzene, lead, PAHs, and TRH.
 - Exceedances of the adopted ecological investigation levels for BaP and zinc.
 - The majority of exceedances were reported within fill materials and mainly within the western portion of the site, with only three exceedances recorded in natural soils.
- » The results of the groundwater sampling identified:
 - Exceedances of the adopted human health investigation levels for arsenic, BaP, benzene, lead and PFAS.
 - Exceedances of the adopted ecological investigation levels for copper, lead, mercury, nickel, PFAS, and zinc.
 - Groundwater in the south-west and south-east portions of the site was typically impacted by PFAS, whilst benzene impacted groundwater was encountered near the north-eastern boundary of the site.
- » The results of the PSV sampling identified:
 - Whilst historically elevated levels of tetrachloroethene in soil vapour at former vapour monitoring location 'V01' had been reported, no exceedances of investigation levels were identified.
 - Sampling targeting Mowbray House did not identify any exceedances of investigation levels.
- » Based on the concentrations of PFAS observed, and the inferred groundwater flow direction for the site, the potential for PFAS to be migrating onto the site via groundwater from an off-site source cannot be discounted, although further data is required to identify specific PFAS sources. It was noted that the presence of PFAS in groundwater poses a potential risk to human and ecological receptors during construction and ongoing operation of future basements if the basements are deep enough to interact with groundwater.
- » Potential pathways for the migration and ingress of groundwater and vapour from surrounding in-situ materials into potential future basements were assessed as part of this investigation. Concentrations of TRH and benzene, toluene, ethylbenzene and xylenes (BTEX) were either below the adopted investigation levels for vapour intrusion; or exceedances were located and delineated such that impacted material would be excavated for the construction of the future basements.
- » A preliminary in-situ waste classification was completed for the site, with further details presented in **Section 4.3.3**. Additionally, the refined CSM developed during the investigation is presented in **Section 4.1**.

4. Conceptual Site Model and Data Gaps

This section presents the CSM, developed and refined during the Data Gap Investigation.

4.1 Conceptual Site Model

The CSM shown in **Table 4** includes only SPR linkages that have been assessed to be complete, potentially complete, or currently incomplete that will be addressed in this RAP, in regard to the future redevelopment of the site.

Table 4: Conceptual Site Model

Source	Impacted Media	Pathways	Receptors	Assessment/Rationale	RAP Consideration
Former energy depot (central portion) including transformer workshop area, USTs, vehicle workshop, wash bay and oil storage tanks	Soil impacted by heavy metals, TRH and BTEX	Dermal contact / ingestion of soils	Site workers, contractors, visitors	No exceedances of the health investigation and screening levels were observed in this area during this investigation. Exceedances of lead and PAH were reported in SRT-PT017, though are attributed to the former Bryson Road. Site constraints meant that soils underneath or near the current building footprint in this area could not be assessed nor has assessment occurred historically. Historical exceedances of lead and PAH have been observed near UST 5 and 6. This SPR linkage is considered potentially complete .	The RAP to be developed for the site should include provisions for the sampling of soils in the footprint of the former energy depot buildings. Although not detected to date, given the historical use of the building the future sampling should include analysis for polychlorinated biphenyls (PCBs).
			Future site users		
		Ecological receptors that inhabit or forage in public open space parkland areas proposed for the site	One zinc exceedance of the ecological screening level (ESL) was observed within the footprint of this area during the investigation, and exceedances of TPH have been observed historically in the vicinity of former pipework associated with USTs 5 and 6 (VA1, VA2 and VA3). This SPR linkage is considered to be currently incomplete due to the lack of ecological receptors on the site. There is the potential for the SPR linkage to be potentially complete in the future redevelopment. However, exceedances of the adopted investigation levels presented in this report will likely be excavated or future public open space areas will utilise imported soil.	Validation or further sampling of public open space areas of the site are to consider ecological receptors during the assessment.	
		Dust and fibre inhalation	Site workers, contractors, visitors	Impacted fill and buried asbestos impacted material poses a potential risk to site workers, contractors and visitors if materials are exposed. Historic investigations indicate the presence of chrysotile asbestos (Figure 6) within the footprint of the former energy depot, though currently the site is covered by hardstand. This SPR linkage is considered to be currently incomplete .	The RAP is required to consider the known and potential presence of asbestos in soils.

Source	Impacted Media	Pathways	Receptors	Assessment/Rationale	RAP Consideration
	Groundwater impacted by heavy metals, BTEX and PFAS	Groundwater use or consumption	Nearby groundwater bores, streams / rivers and GDEs	<p>PFAS exceedances, including exceedances of the PFAS NEMP Freshwater 95% and Drinking Water criteria were observed in this area. Froth observed during the removal of USTs 1, 2 and 3 could potentially be linked to the presence PFAS within groundwater (Section 4.3.2), though no PFAS were detected above the limit of reporting (LOR) in soils during the investigation.</p> <p>Should PFAS impacted groundwater be abstracted from this area there is the potential for a complete pathway to exist.</p>	The potentially complete pathway to be considered during remedial planning and future redevelopment.
Former Caltex service station and MLP site including former bulk fuel storage and USTs	Soil impacted by heavy metals, TRH and BTEX	Dermal contact / ingestion of soil	Site workers, contractors, visitors	<p>Exceedances of human health investigation and screening levels were observed in 3 soil samples including exceedances of TRH and lead as part of this investigation, with additional lead, TRH and BTEX exceedances observed historically. Elevated concentrations of TRH were also observed in other soil samples in the area. This SPR linkage is considered to be currently incomplete, as contaminated soils are currently located under hardstand.</p> <p>This SPR linkage could be potentially complete, during the redevelopment of the site.</p>	The RAP is required to consider the presence of TRH and BTEX in soils.
			Future site users	<p>Exceedances of the ESL for total petroleum hydrocarbons (TPH) have been observed in this area in a number of occasions in historical investigations, and two exceedances were observed as part of this investigation (SRT-PT016). The majority of exceedances were reported at depths of 2 mBGL or deeper (with the exception of one sample) at the time of each respective investigation. This SPR linkage is considered potentially complete and should be reassessed based on the design of any proposed public open space areas.</p>	
		Dust and fibre inhalation	Site workers, contractors, visitors	<p>Impacted fill and buried asbestos impacted material (including asbestos pits) poses a potential risk to persons working on the redevelopment of the site if disturbed. This SPR linkage is considered to be currently incomplete.</p>	The RAP is required to consider the known and potential presence of asbestos in soils.

Source	Impacted Media	Pathways	Receptors	Assessment/Rationale	RAP Consideration
	Groundwater impacted by heavy metals, BTEX and PFAS	Groundwater use or consumption	Nearby groundwater bores, streams / rivers and GDEs	PFAS was reported in concentrations above the drinking water and ecological criterion in groundwater in SRT-MW018 and should groundwater be abstracted from this area there is the potential for a complete pathway to exist. The former Caltex service station and MLP site is considered to be an unlikely source of PFAS observed across the site, based on concentrations of PFAS observed and the inferred groundwater flow across the site.	The potentially complete pathway to be considered during remedial planning and future redevelopment.
Former Total Quality Centre where waste solvents, reagents and oils were stored	Soil	Dust and fibre inhalation	Site workers, contractors, visitors	Impacted fill and buried asbestos impacted material (including potential asbestos slab) poses a potential risk to persons working on the redevelopment of the site. This SPR linkage is considered to be currently incomplete , though will require consideration within the RAP, with regard to asbestos.	The RAP is required to consider the known and potential presence of asbestos in soils.
	Groundwater impacted by heavy metals, BTEX and PFAS	Groundwater use or consumption	Nearby groundwater bores, streams / rivers and GDEs	Exceedances of the adopted investigation levels for heavy metals and PFAS were observed in GMMWs located near the area where the Former Total Quality Centre was located, though typically lower than the remainder of the site. PFAS was reported in concentrations above the drinking water and ecological criterion in groundwater in SRT-MW022 and SRT-MW024, and should groundwater be abstracted from this area there is the potential for a complete pathway to exist.	The potentially complete pathway to be considered during remedial planning and future redevelopment.
	Air	Inhalation of soil and groundwater derived vapours in indoor air	Site workers, contractors, visitors Future site users	The exceedance of the health screening level for benzene observed in SRT-PT020 could potentially be linked to historical contamination associated with the Former Total Quality Centre. No other exceedances including historical have been observed. This SPR linkage is considered to be currently incomplete , as the site is currently covered by hardstand.	The pathway is to be considered during remedial planning.

Source	Impacted Media	Pathways	Receptors	Assessment/Rationale	RAP Consideration
Former Retail Area	Soils impacted by heavy metals	Dermal contact / ingestion of soil	Site workers, contractors, visitors Future site users	<p>Exceedances of the health investigation levels were observed in 2 soil samples for lead within fill material in this area. This SPR linkage is considered to be currently incomplete, as contaminated soils are currently located under hardstand.</p> <p>This SPR linkage could be potentially complete, during the redevelopment of the site.</p>	The RAP is required to consider the potential dermal contact / ingestion of soil risk.
	Groundwater impacted by PAH and PFAS	Groundwater use or consumption	Nearby groundwater bores, streams / rivers and GDEs	<p>PFAS was detected in concentrations above the drinking water and ecological freshwater criteria in numerous GMMW, with the highest concentrations observed in the up-gradient south-western portion of site. PFAS is likely from an on-site source, though this is yet to be confirmed.</p> <p>BaP was detected above the drinking water criterion in SRT-MW009S during stage 1 of the investigation only. This was the only detection above LOR for BaP across the site, and was potentially due to leaching from BaP impacted fill within the water column.</p> <p>Should impacted groundwater be abstracted, including for any potential future basement scenario, there is a potentially complete pathway which exists.</p>	The potentially complete pathway to be considered during remedial planning and future redevelopment.
TSE and historically imported fill from unknown sources and unknown contamination within areas not assessed	Soil impacted by TRH, BTEX, PAH and asbestos or other contaminants	Dermal contact / ingestion of soil	Site workers, contractors, visitors. Future site users	This SPR linkage is considered to be currently incomplete , though during the redevelopment of the site, the removal of hardstand could expose previously undetected contaminated fill.	The RAP is required to consider the potential dermal contact / ingestion of soil risk.
		Dust inhalation	Site workers, contractors, visitors. Future site users	Impacted fill material poses a potential risk to persons working on the redevelopment of the site. This SPR linkage is considered to be currently incomplete .	The RAP is required to consider the potential dust inhalation risk.

Source	Impacted Media	Pathways	Receptors	Assessment/Rationale	RAP Consideration
		Inhalation of asbestos fibres	Site workers, contractors, visitors Future site users	No asbestos was detected during the investigation, though, as soil was sampled and assessed via boreholes, only a small proportion of the site was assessed. Large amounts of asbestos have previously been discovered in fill material on the site during the remediation of the former Caltex service station. Currently any potential asbestos impacted fill is covered by hardstand. Therefore, this SPR linkage is considered to be currently incomplete .	The RAP is required to consider the known and potential presence of asbestos in soils.

4.2 Data Gaps

The following data gaps were identified following the Data Gap Investigation (Nation Partners, 2021) in relation to the key SPR linkages discussed in the CSM and the site dataset:

- » Further groundwater data is required to assess groundwater conditions including changes in flow directions and levels, groundwater contamination, and the extent of natural attenuation. Groundwater conditions appeared to have change in a relatively short period of time during the Data Gap Investigation, and may not be indicative of futures conditions. Further information is required to assess the impact this may have on potential future pathways and receptors.
- » The potential for PFAS in shallow groundwater within remediation excavations is unlikely to present a risk to remediation site workers. However, an assessment of the likelihood for shallow groundwater to be generated should be undertaken to provide an additional line of evidence to close out the data gap.
- » Further data is required to identify specific sources of PFAS to understand potential SPR linkages associated with the abstraction of groundwater and future basement scenarios.
- » ACM has previously been reported to be present in the fill soils at the site, however the entire site has not been investigated in a sufficient manner to determine the potential wide-spread presence of ACM or friable asbestos/asbestos fines (FA/AF).
- » The potential for asbestos in soils was identified, based on previous investigations. The potential for widespread asbestos beneath the existing site hardstand requires further investigation.
- » Preliminary waste classifications indicated that the fill across the site is likely general solid waste (GSW), with the underlying soil likely excavated natural material (ENM). Exceptions to these classifications are the historic asbestos burial pits, potential asbestos slab, soil in the vicinity of USTs, potential for wide-spread asbestos, and exceedances of the ENM absolute maximum for TPH C₁₀-C₃₆ and BaP. During site remediation and redevelopment, additional waste classification sampling and analysis is required to confirm waste classifications prior to off-site disposal.

4.3 Summary of Identified Exceedances

Based on available assessment data, identified concentrations of contaminants exceeding adopted criteria are summarised on **Figures 4, 5a, and 5b**, and in the following sections.

4.3.1 Soil

The identified exceedances are predominantly TRH and BTEX compounds in the vicinity of former UST infrastructure, and in shallow fill. In particular, the majority of exceedances are in validation samples from the previous remediation excavations at the former Caltex. Isolated PAH and lead exceedances are also present across the site. A summary table of the identified impacts is presented in **Attachment B**.

4.3.2 Groundwater

Exceedances of the adopted human health investigation criteria for arsenic, BaP, benzene, lead, and PFAS were reported in groundwater in the Data Gap Investigation (Nation Partners, 2021). Groundwater in the south-west and south-east portions of the site were typically impacted by PFAS, whilst benzene impacts were encountered near the north-eastern boundary of the site. Heavy metal concentrations were noted to be generally consistent across the site.

Potential pathways for the migration of and ingress of groundwater and vapour from surrounding in-situ materials into potential future basements were assessed (Nation Partners, 2021). Concentrations of hydrocarbons and BTEX were either below the adopted investigation levels for vapour intrusion, or where exceedances were reported for benzene in soil, they were located and delineated such that impacted material

would be excavated for the construction of the future basements. Hydrocarbons and BTEX were not considered to pose a risk to potential future site users in a basement scenario, however the presence of PFAS in groundwater poses a potential risk to human and ecological receptors during construction and ongoing operation of future basements.

Although PFAS has been detected in the shallow and deep groundwater at the site, a qualitative review identified that it presented a low potential risk to human and ecological receptors. In particular, the concentrations are below the relevant screening level for intrusive workers. Additionally, shallow groundwater is unlikely to be present in significant volumes, however, requires further assessment to confirm this.

The depth to deep groundwater of approximately 15 mBGL means intrusive maintenance workers are unlikely to encounter deep groundwater. Additionally, the presence of reticulated mains water means abstraction of water is very unlikely. Further, there is a lack of off-site receptors in the vicinity of the site. The only realistic pathway for exposure to groundwater is on-site abstraction or contact during deep bulk excavation, which is unlikely under the current land use, and unknown under the proposed future land use.

As a specific source of PFAS in groundwater was unable to be identified during the Data Gap Investigation, targeted source removal is considered unfeasible, and remediation of groundwater has not been considered further. Whilst PFAS in groundwater poses a direct contact risk if encountered during construction or dewatering works, the current uncertainty with respect to the design of future basements means the presence of PFAS in groundwater is required to be considered during redevelopment planning. In particular, the basement design should consider whether groundwater will be intercepted and require ongoing management post-construction.

A suitably qualified environmental practitioner should be consulted with respect to groundwater management or remediation following completion of the additional sampling (see **Section 6.2.4**), and once the approved or issued for construction design documentation for the basements has been issued. If necessary, a specific groundwater remediation action plan should be developed.

4.3.3 Preliminary Waste Classification

Preliminary in-situ waste classification undertaken during the Data Gap Investigation (Nation Partners, 2021) in accordance with the *Waste Classification Guidelines, Part 1 – Classifying Waste* (NSW EPA, 2014), indicated that the fill across the site is preliminarily classified as GSW, with the underlying natural soil preliminarily classified as ENM. The exceptions to these classifications being:

- **Historic asbestos burial pits:** two burial pits are known to be present, based on previous reports (shown on **Figure 2**). The pits are associated with previous remediation works of the Former Caltex service station and MLP site. Petroleum hydrocarbon impacted soil was land-farmed and retained on-site in the pits. During the remediation works, ACM in the form of bonded ACM sheet fragments was observed in soils. These soils were also retained within the burial pits. Therefore, the material within these pits is preliminarily classified as GSW (special-asbestos).
- **Potential asbestos slab:** previous reports indicate the potential presence of an asbestos slab, shown on **Figure 2**. The slab and surrounding soils (nominally 0.2 m) are preliminary classified as GSW (special-asbestos).
- **Soil in the vicinity of USTs:** three of the six known USTs (1, 2 and 3) at the site have been removed and validated, with the other three (UST 4, 5 and 6) decommissioned in-situ by filling with cement. These three USTs require removal should redevelopment of the site occur. It is assumed that potentially TRH impacted soil surrounding the USTs is classified as GSW.
- **Wide-spread asbestos:** ACM has previously been reported to be present in fill soils at the site, however the entire site has not been investigated in a sufficient manner to determine the potential wide-spread presence of ACM. As such, it is assumed that fill in unspecified areas across the site may need to be classified as GSW (special-asbestos).

- **Exceedances of the ENM Absolute Maximum:** Exceedances of TPH C₁₀-C₃₆ and BaP above the allowable ENM Absolute Maximum was reported in five soil samples at depths of 3.4 mBGL, 7.0 mBGL, 9.4 mBGL and 11.7 mBGL across the site, shown on **Figure 6**. The average maximum of all contaminants are below the allowable maximum average. While the majority of natural soil across the site is preliminary classified as ENM, exceedances of the absolute maximum demonstrate that some natural soils at depth are classified as GSW.

Waste classification conducted as part of the Data Gap Investigation are considered to be preliminary only, and do not provide a sufficient sampling density to achieve assurance. Further, the majority of soil sampling undertaken to date has been via borehole, which is generally considered insufficient to detect asbestos in soils.

4.3.4 Extent of Remediation and Volume Estimate

The draft RCE (Nation Partners, 2020) included conservative estimates on the extent and volume of material requiring remediation (exclusive of additional investigation for asbestos in soils), as shown in **Attachment C** and summarised in **Table 5** below. It is noted that the preferred strategy is a combination of Options A and B, outlined below, and that the actual volume will likely be between the two options.

- » Option A – Off-site disposal of known health-based exceedances in soil.
- » Option B – Off-site disposal of the unknown extent of asbestos fill across the entire site, to be refined through additional investigation (**Section 6.2.4**). If asbestos in soils is identified, they will require off-site disposal. If they are not identified, the remediation will focus on areas of health-based exceedances.

Table 5: Remediation Volumes for Off-Site Disposal

Material	Approximate Material Volume (m ³)	
	Option A	Option B
Hardstand	3,450	6,581
GSW	9,834 ^a	30,898 ^b
ENM	1,117	1,117
a – if asbestos in soils are not identified.		
b – Special Waste (asbestos) if widespread asbestos in soils are identified.		

The following assumptions were made in calculating the remediation volumes:

- » The excavation extents, interpolation of data, and associated estimates were modelled in Mudshark™ software, and the estimates are limited by the capability of the software.
- » Where possible, the vertical extent of contamination found in investigation boreholes was applied on a worst-case scenario. Where vertical delineation of contamination was not defined, it was assumed that the vertical extent was 1 m below the detected exceedance.
- » Excavation of asbestos burial pits (EXC 1 and EXCMLP) has been included to a minimum of 1 m below their surveyed depths.
- » Excavation of UST4 (north of Mowbray House) is assumed to be to a depth of 4 mBGL taking into account temporary works on-site by TSE.
- » All hardstand across the site will require removal during remediation. An average surface hardstand thickness of 0.2 m was assumed for the calculation.

- » Second slabs at depth across the site are assumed to be co-mingled with soil and will be disposed of as GSW.
- » Known health-based soil exceedances across the site will be excavated and disposed of as GSW (Special-Asbestos), pending the results of the additional sampling and waste classification works. All fill within the excavation footprints is preliminarily classified as GSW (Special-Asbestos).
- » Natural soils underlying fill are classified as ENM. ENM soils will be excavated and disposed of off-site as part of the over-excavation of known exceedances.

5. Remediation Options Assessment

The remediation options suitable for application to the site were first evaluated by GHD (2020c) and have since been adopted by Nation Partners. The options are driven by the following practical considerations associated with the future use of the site:

- » The presence of asbestos within fill material may present a risk to human health during redevelopment and under future land use scenarios.
- » The presence of minor exceedances of human health and ecological investigation levels in fill material may represent an unacceptable risk to future users of the site.
- » In order to facilitate the proposed land use, identified soil exceedances and unsuitable materials must be managed to reduce the risk of exposure to human and ecological receptors to acceptable levels.

The following sections summarise the remediation options that were considered for the site, with detail on the chosen method provided in **Section 6**.

5.1 Remediation Objectives

The objective of the remedial works detailed in this RAP is to render the site suitable for the proposed land use, low-density residential with-out any restrictions on land use to meet divestment requirements. If required, the site suitability may be achieved through remediation in conjunction with the adherence to an appropriate long-term environmental management plan (EMP).

5.2 Remediation Policy

The remediation hierarchy for this RAP is in accordance with the NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme (3rd Edition)*, which references the preferred hierarchy in s.6(16) Assessment of Site Contamination Policy Framework of Schedules A and B of the NEPM 2013. The preferred order of options for site remediation and management are:

» *Onsite treatment of the contamination so that it is destroyed or the associated risk is reduced to an acceptable level; and*

» *Offsite treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level, after which soil is returned to the site; or,*

If the above are not practicable,

» *Consolidation and isolation of the soil on site by containment with a properly designed barrier; and*

» *Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material;*

or,

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

During option assessment and selection, sustainability (environmental, economic and social) should be considered, in terms of achieving an appropriate balance between the benefits and effects of undertaking the option.

Where there is no readily available, or sustainable, economically feasible method available for remediation, the adoption of appropriate regulatory or institutional controls may be possible.

5.3 Determination of the Preferred Remediation Strategy

A detailed options assessment was undertaken by GHD (2020c) and is presented in **Attachment D**, with Nation Partners' summary in **Table 6** below. In summarising the remediation options, Nation Partners considered whether the results of the Data Gap Investigation have changed or reinforced the options assessment. The assessment considered items including: policy issues; reliability; practicability; capital cost; sustainability; ongoing liabilities; regulatory approvals; human health and ecological risk; complexity; data gaps; and implementation timeframe.

Table 6: Remediation Options Assessment Summary

Option	Summary	Evaluation
Treatment	Applicable to chemical contamination and unsuitable for asbestos.	High capital and operational costs. Range of different contaminants which would be difficult for a single treatment method. Unsuitable for asbestos. Not considered further.
Landfill Disposal	Disposal of impacted materials to a licensed facility.	Feasible but with costs associated with disposal, and additional data will be required. Suitable as it facilitates the proposed future land use.
Physical Barrier	Place visible marker layer over existing fill then lay capping material, or placement of impacted material within an on-site containment cell, with ongoing management according to a long-term EMP.	Feasible and suitable as the physiochemical properties of the impacts are relatively immobile and non-volatile. Unsuitable as it results in restrictions in the proposed land use.
Institutional Controls	Include measures such as land use restriction through zoning and access restrictions.	Not feasible for divestment of the site.

An off-site disposal strategy is still considered to be an economical, reliable, and risk adverse management measure to address the identified concentrations requiring remediation. It will achieve the objective of an unrestricted land use for divestment, from a contaminated soil perspective. Further, the site will likely require bulk excavation and earthworks for redevelopment, and the removal of surficial fill will likely represent cost and time savings for the prospective developer.

The strategy should incorporate additional investigation to refine the extent requiring off-site disposal. Noting the site is proposed to be divested and bulk excavation is likely occur during redevelopment, it is not intended to import material to replace the balance of material removed during remediation. The remediated surface of the site is proposed to be graded with appropriate erosion and sediment controls to manage the site in the interim prior to redevelopment.

6. Remediation Strategy

Based on the remediation objectives and options assessment, excavation and off-site disposal to landfill has been selected as the preferred remediation strategy. The following sections detail the tasks and works methodology based on the selected preferred strategy.

6.1 Objective

The objective of the works detailed in this RAP is to remediate the site in order for it to be considered suitable for a low-density residential land use.

6.2 Remediation Tasks

The physical remediation tasks required are summarised in **Table 7** below, and detailed in **Sections 6.2.1 to 6.2.10**.

Table 7: Remediation Task Summary

Task No.	Description	Details
1	Site establishment	Section 6.2.1
2	Liaison with Roads and Maritime Services (RMS) and Council regarding protection of their assets, and the installation of sheet piling to support excavation adjacent to the Pacific Highway.	Section 6.2.2
3	Removal of buildings and hardstand.	Section 6.2.3
4	Asbestos in soil investigation and additional waste classification.	Section 6.2.4
5	UST and associated infrastructure removal.	Section 6.2.5
6	Removal and disposal of asbestos impacts.	Section 6.2.6
7	Removal and disposal of chemical impacts.	Section 6.2.7
8	Stockpile management	Section 6.2.8
9	Materials tracking	Section 6.2.9
10	Interim site management	Section 6.2.10

Details on site management provisions during remediation works are provided in **Section 8**.

6.2.1 Site Establishment

In order to undertake the remediation works, the following works are to be completed:

- » Preliminaries – preparation and submission of plans for Quality, Environmental, and Work, Health, and Safety (WHSP) (including a Construction Environmental Management Plan [CEMP]) and Safe Work Method Statements (SWMS).
- » Services – location of underground services, termination of redundant services, relocation of services within the remediation area, establishment of temporary construction services.
- » Mobilisation – establishment of site facilities, floating of plant, provision of stabilised site access.

- » Establishment – of site fencing (where necessary), environmental controls, site access routes, and preparation of equipment staging and materials handling areas.
- » Protection – existing groundwater monitoring wells outside of remediation footprints are to be protected and maintained during the works, and repaired and made good on completion of the works. If more practicable, it may be preferred to decommission existing groundwater monitoring wells and reinstall at the conclusion of the works. Decommissioning is to be in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (National Uniform Drillers Licensing Committee, 2020).

6.2.2 Protection of Off-Site Roads

The RCE (Nation Partners, 2020) identified that sheet piling adjacent to Pacific Highway and Nelson Street would be required to be installed to protect the respective RMS and Council assets. The remediation contractor is to liaise with RMS and Council regarding the protection of their assets. Additionally, the remediation contractor is required to design and install appropriate sheet piling with respect to the proposed remediation footprints.

6.2.3 Removal of Buildings and Hardstand

It is assumed that for the divestment of the site Sydney Metro will be handing over a vacant site with a grassed surface. To facilitate this, the remediation contractor is required to demolish and remove all existing aboveground infrastructure, with the exception of heritage listed Mowbray House, and remove existing concrete and bitumen hardstand surfaces. Prior to demolition, a hazardous building materials assessment is required to be completed by a suitably qualified person. The outcomes of the assessment are to inform the controls to be implemented during demolition.

The removal of hardstand surfaces and exposure of fill materials should be appropriately managed with respect to the potential for fill soils across the site to contain asbestos. Some examples of appropriate management could include:

- » Prevent the disturbance of asbestos to the extent practicable (i.e. wetting of surfaces).
- » Air monitoring for asbestos fibres, in accordance with **Sections 8.3.4 and 8.4**
- » Trafficable roadways constructed of crushed concrete (or similar) should be laid to a minimum depth of 10 cm. Concrete sourced from site demolition activities could be used for this purpose. However, its suitability for use should be assessed first.
- » Trafficable roadways constructed from validated soils sourced from the site (e.g., from a borrow pit).
- » Consider leaving hardstand at strategic locations, and removing it in a staged process to minimise/avoid the need for adoption of other measures.

6.2.4 Additional Sampling

The Data Gap Investigation (Nation Partners, 2021) and RCE (Nation Partners, 2020) defined the indicative extent of remediation (shown in **Attachment C**), and assigned preliminary waste classifications of General Solid Waste, with some areas of General Solid Waste (Special Waste-Asbestos). However, residual data gaps remain with respect to: (1) the potential for shallow groundwater to be present in significant quantities; (2) deep groundwater flow directions and levels, groundwater contamination, and the extent of natural attenuation; (3) the potential for fill across the site to be impacted by asbestos; (4) the footprint of the former energy depot buildings not having previously investigated; and (5) the preliminary nature of the waste classifications.

Data Gaps 1 and 2

To address data gap 1, it was previously demonstrated that PFAS concentrations are below the recreational criteria, which presents the most likely exposure scenario for remediation site workers (Nation Partners, 2021). As such, a multiple lines of evidence approach is recommended to close the data gap. In particular, existing

shallow groundwater wells should be purged dry with recovery monitored over a period of 4 weeks, preferably by installing pressure transducers, otherwise by manual dipping. If it is identified that the shallow wells do not recharge it can reasonably be assumed that the shallow groundwater is intermittent and unlikely to be present in significant quantities.

If the wells are observed to recharge, sampling and analysis for PFAS should be undertaken to determine if concentrations remain below the recreational criteria. Pending the results of the sampling (if undertaken), PFAS specific controls for managing accumulated groundwater in shallow excavations would need to be developed and implemented by the remediation contractor.

To address data gap 2, additional groundwater monitoring events over time should be undertaken to better assess pathways and potential impacts on receptors. In particular, pressure transducers should be installed in key wells across the site to assess for temporal changes to groundwater levels and provide greater confidence in the groundwater flow direction. Additionally, monitoring of natural attenuation parameters should be undertaken to determine the extent of potential biodegradation of contaminants.

It is noted that due to the likely need to decommission the groundwater monitoring well network (**Section 6.2.1**), the additional groundwater monitoring may need to take place post-remediation (**Section 6.2.10**).

Data Gaps 3, 4, and 5

To address data gaps 3, 4, and 5, following removal of site hardstand, an asbestos in soils investigation, sampling of the former energy depot building footprint, and refined preliminary waste classification sampling should be undertaken. Indicative investigation areas are shown on **Figure 7**. In particular, the following should be taken into consideration:

- » Excavation of test pits or trenches so that potential buried asbestos can be more readily identified.
- » An appropriate sampling density with reference to WA DoH (2009), NSW EPA (1995), and NEPM (2013). In particular, the following is recommended²:
 - Former Energy Depot Building – systematic grid-based sampling at 6 locations, across the approximately 1,000 m² footprint, with additional judgemental targeted sampling based on field observations for potential contamination.
 - Asbestos in Soils Investigation – systematic grid-based sampling at 50 locations, across the approximately 16,000 m² footprint.
- » Qualitative and quantitative assessment for ACM, AF, and FA. Qualitative presence/absence sampling should be undertaken to inform waste classification, in addition to quantitative sampling to determine land use suitability.
- » Collection and analysis of samples from within the former energy depot building footprint for ACM, AF, FA, TRH, BTEX, PAHs, VCHs, heavy metals, PCBs, and PFAS.
- » Screening of soil samples against investigation levels outlined in the NEPM (2013 amendment) for the appropriate land use scenario (i.e., low-density residential, unless redevelopment plans showing an alternative land use have been finalised and approved).
- » Analysis of samples for waste classification, with reference to the Waste Classification Guidelines (NSW EPA, 2014), to supplement the existing waste classification dataset. The intent of this sampling is to refine

² Whilst it is noted that draft sampling design guidelines have been prepared by NSW EPA circa 2020, they have not been formally issued and endorsed. As such, the recommended sampling densities have been derived from *Contaminated Sites, Sampling Design Guidelines* (NSW EPA, 1995) and *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (WA DoH, 2009). Prior to implementation, the recommended RAP Addendum should assess the sampling design and density.

the preliminary in-situ waste classifications across the site. Ex-situ sampling of excavated stockpiles should be undertaken to finalise the waste classifications prior to off-site disposal.

Following completion of the additional sampling, the environmental consultant should evaluate the need for a RAP Addendum to be prepared. A RAP Addendum should document the revised remediation extent with respect to asbestos in soils (or other unexpected finds), and the in-situ waste classification(s).

6.2.5 UST Removal

Three decommissioned USTs (4 to 6) and associated pipework remain in-situ on site. It is understood that UST 4 was decommissioned in-situ in 1996 by Sydney Electricity being filled with concrete and remaining on site, but no report regarding its decommissioning have been provided (GHD 2020a). UST 5 and UST 6 were decommissioned in-situ in 2014 and filled with concrete.

All decommissioned USTs and associated pipework will require excavation and removal. The environmental consultant should observe the condition of the features after being exposed and prior to excavation/demolition. The observations should focus on the structural integrity and therefore, the potential for each feature to represent a contaminant source.

After removal of each feature, excavation of adjacent soils should be undertaken in the presence of the environmental consultant. Excavation should continue until field observations/screening techniques indicate that potentially contaminated soils have been excavated.

Field screening techniques include:

- » Observations for hydrocarbon odours.
- » Observations for unusual colouration or staining of soils.
- » Collection of soil samples into snaplock plastic bags, followed by screening of the vapour headspace for volatile compounds using a calibrated photoionization detector (PID).

At the completion of excavation, validation sampling should be undertaken, as outlined in **Section 9**. Excavated soils from UST removal works are to be stockpiled separately and sampled for an ex-situ waste classification.

6.2.6 Excavation of Asbestos Impacted Soil

Excavation of asbestos (including asbestos containing soils) from the site will require an appropriate class of asbestos removal licence issued by SafeWork NSW, to be determined following the results of the Additional Sampling (i.e., whether there is AF/FA present). The licensed removalist must develop an Asbestos Removal Control Plan (ARCP) and nominate an asbestos removal supervisor who must be readily available to any worker carrying out asbestos removal work, whenever the work is being carried out. All asbestos workers at the site must be appropriately trained in asbestos works and in the ARCP.

Further details on asbestos management are provided in **Sections 7.6.1** and **8.4**.

6.2.7 Excavation of Chemically Impacted Soil

In general, the excavation strategy will be to remove impacted soil from across the site, as shown in **Attachment C**, or as refined in a RAP Addendum. The extent and depth of excavation will be driven by previously identified exceedances, and guided by visual and olfactory observations, and collection of field screening measurements during the excavation works. The indicative extents identified are:

- » Remediation Area A – targeting the former burial pits and lead, TRH and PAH exceedances – an area of approximately 3,650 m², to depth of up to 4 mBGL at the deepest point.
- » Remediation Area B – targeting the former asbestos slab – an area of approximately 22 m by 12 m, to a depth of 2 mBGL.

- » Remediation Area C – targeting UST 4 – an area of approximately 17 m by 14 m, to a depth of 4 mBGL.
- » Remediation Area D – targeting USTs 5 and 6, and lead, TRH, and PAH exceedances – an area of approximately 22 m by 18 m, to a depth of 4 mBGL.
- » Remediation Area E – targeting lead and PAH exceedances – an area of approximately 22 m by 11 m, to a depth of 0.5 mBGL.
- » Remediation Area F – targeting a lead exceedance – an area of approximately 19 m by 12 m, to a depth of 1 mBGL.

The following points detail the excavation methodology:

- » Material is excavated from the indicative extent shown in **Attachment C**.
- » Excavated material is placed into stockpiles to confirm waste classification, per **Section 6.2.8**.
- » Stockpiled material is loaded into trucks for transport off-site following confirmation of waste classification.
- » Validation samples are collected from the walls and the base of the excavation in accordance with the validation plan presented in **Section 9**.
- » Temporary barricades and signage are installed around the periphery of the excavations in accordance with the *Work Health and Safety Act 2011* (WHS Act) and *Work Health and Safety Regulation 2017* (WHS Regulation).
- » If validation samples indicate failure, continue excavating the validation grid square in 100 mm increments until validation samples indicate validation has been achieved.

6.2.8 Stockpile Management

Excavated soils should be stockpiled and managed in accordance the requirements of *Managing Urban Stormwater: Soils and Construction 4th Edition – Vol. 1* (the 'Blue Book') (Landcom, 2004). In particular: constructed at least 10 m from the edge of open excavations, waterways, or roads; stabilised if they are to be kept in place for more than 10 days; protected from run-on water by installing water diversion structures upslope; installation of downslope sediment filters; and have a maximum slope of 2:1 and maximum height of 2 m.

Stockpiles should be separated according to their preliminary in-situ waste classification or source (such as asbestos impacted fill, UST backfill material, natural soils, or chemically impacted fill).

Stockpiles should be sampled at a density in accordance with Victoria Environment Protection Authority 2009 *Industrial Waste Resource Guideline: Soil Sampling* (IWRG 702), inclusive of the existing dataset for the material. Samples are to be analysed with reference to the Waste Classification Guidelines (NSW EPA, 2014). The purpose of the ex-situ stockpile sampling is to confirm (or otherwise reclassify) the in-situ classifications.

The footprints of excavated stockpiles are required to be sampled and validated in accordance with **Section 9.3**.

6.2.9 Materials Tracking

Given the scope of work to be completed, accurate tracking of excavations, excavated materials, and stockpiled materials will be vital to the remediation process. Further, as a Site Audit requirement per NSW EPA (2017), the volume of material disposed of off-site must be reconciled with the tonnage on the weighbridge dockets at the receiving facility. Each truckload of asbestos waste must have a WasteLocate consignment number documented and included in the reconciliation. There must be a back-up of documentation and it must be clearly summarised by the environmental consultant preparing the validation report, for inclusion in the Site Audit.

Prior to initiation of remediation activities, it is recommended that the environmental consultant and Remediation Contractor discuss and agree on the nomenclature and system to be adopted.

A Materials Tracking System should include the following components:

- » Accurate description of the material.
- » The approximate volume of the material.
- » Date of excavation and/or placement.
- » Contamination status.
- » Date sampled.
- » Date of authorisation to move materials.
- » Name of authoriser.
- » Date materials moved.
- » Destination of materials.

Tracking and record keeping of materials disposed to landfill must be 'cradle-to-grave'. The remediation contractor must dispose of the material to an appropriately licensed facility and retain all weighbridge dockets to validate that materials were disposed of appropriately.

6.2.10 Interim Site Management

Following completion of the works, it is not currently proposed to import material to replace the balance removed during remediation. It is recognised that the development plans may not be finalised or approved prior to completion of the remediation works. As such, the contractor is to develop and implement an erosion and sediment control plan for the interim period prior to redevelopment.

In particular, it is anticipated that the site will be graded so that surface water run-off is minimised and directed towards the centre of the site, or a dedicated retention basin, to encourage infiltration. Swales, berms, and sediment fencing should be used to direct surface water drainage to prevent off-site migration. Further, measures to minimise erosion are to be implemented, in addition to sediment control. Surface soils should be stabilised by treatment (such as spray seeded) or covering (such as by grass or hydromulch) to assist in minimising dust generation and sediment run-off. The site should also be left securely fenced with locked access and egress points. Keys for the locks are to be provided to Sydney Metro.

It is noted that the interim period presents an opportunity for groundwater monitoring wells to be reinstated to facilitate additional groundwater monitoring, if required following the additional sampling outlined in **Section 6.2.4**.

During the interim period, Sydney Metro will be responsible for undertaking periodic inspections of the interim site management controls, and undertaking rectification works, or dewatering of surface water, as required.

7. Environmental Planning and Approvals

A preliminary review of relevant planning approval instruments has been undertaken and is outlined in the following sections. As Sydney Metro is the current site owner, and the owner following divestment is currently unknown, the following section has been prepared on the assumption that Sydney Metro will be the proponent for the remediation works. If the site is divested prior to remediation and an alternate site owner or proponent is undertaking the works, a RAP Addendum should be prepared, including a review of relevant planning and approval controls. This is particularly pertinent as the new site owner or proponent may undertake associated relevant activities such as request for re-zoning of the land, or submit a development consent for the redevelopment of the site.

7.1 Regulatory Framework

It is assumed that Sydney Metro will prepare a Review of Environmental Factors (REF) in accordance with Part 5 of the *Environmental Planning and Assessment Act 1979* to gain regulatory approval for the works, with Sydney Metro being both the proponent and determining authority.

If Sydney Metro are not the proponent, the new proponents RAP Addendum should assess whether they hold a position of determining authority, or whether alternate regulatory approval is required.

7.2 State Environmental Planning Policy 55 – Remediation of Lands

SEPP 55 provided details on whether remediation works require development consent, Category 1 remediation works, as defined in SEPP 55, require consent, while Category 2 works do not require consent.

With respect to the regulatory framework which overrides SEPP 55, development consent is not required, and as such SEPP 55 is not applicable.

If Sydney Metro are not the proponent, the new proponents RAP Addendum should review SEPP 55 in the context of the regulatory requirements and Council approval. It is noted that the works are likely to be Category 1 works which require consent.

7.3 Willoughby City Council

As Sydney Metro is a public authority, they do not need development consent from Council for the project under SEPP (Infrastructure) clauses 109(1) which overrides SEPP 55. Therefore, the work will be assessed by a REF to be prepared by Sydney Metro.

If Sydney Metro are not the proponent, the new proponents RAP Addendum should refer to the Willoughby City Council Willoughby Development Control Plan, and *Willoughby City Council – Management of Contaminated Land Policy, 9 June 2020*. Council is required to consider whether land is contaminated and whether the proposed remediation of any identified contamination on-site will satisfactorily render the land suitable for the intended land use. However, a person may carry out Category 2 remediation work without Council consent. If the remediation is deemed to be Category 2 works, and can be undertaken prior to the submission of a development application, involvement of Council is not required. If a development application is made prior to remediation, Council will likely be involved and issue the consent with relevant remediation requirements.

7.4 NSW EPA

Soil being removed from the site for off-site disposal will need to be classified in accordance with the Waste Classification Guidelines (NSW EPA, 2014). Asbestos waste transported from the site is required to have a NSW EPA WasteLocate consignment number.

No scheduled activities under the *Protection of the Environment Operations Act 1997* are considered relevant to the remediation works. As such, it is not considered necessary to obtain an Environment Protection Licence for the works.

7.5 Roads and Maritime Services

As identified in Section 6.2.2, excavation adjacent to RMS assets, in particular the Pacific Highway, will require protection, such as sheet piling. The remediation contractor should liaise with RMS regarding permits, approvals, and requirements for working adjacent to, and protecting RMS assets.

7.6 SafeWork NSW

7.6.1 Asbestos

Remediation works will include the removal of fill impacted with non-friable asbestos. Whilst FA/AF have not been detected to date, the Additional Sampling may identify it. If AF/FA is identified, the works must be undertaken or supervised by a Class A licence holder. If only non-friable asbestos is identified, then a Class B licence holder will suffice. The Remediation Contractor must notify SafeWork a minimum of five working days prior to the commencement of earthworks.

During non-friable asbestos removal, air monitoring is not mandatory but may be considered. This would comprise air monitoring by a Licensed Asbestos Assessor (LAA) for airborne asbestos fibres at the boundaries of the asbestos work area prior to (for background purposes) and during (to assess adequacy of removal control measures) asbestos removal works. A clearance inspection and clearance certificate, however, must be provided by either a LAA or a competent person prior to re-occupation of the site.

An ARCP should be prepared to detail the controls and requirements during the works, see **Section 8.4**.

7.6.2 Underground Storage Tanks

Based on a review of the *Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019*, removal of the USTs should be undertaken in accordance with Australian Standard AS4976-2008 *The Removal and Disposal of Underground Petroleum Storage Tanks* and AS1940-2004 *Storage and Handling of Flammable and Combustible Liquids*.

The works must be carried out by a duly qualified person as defined in the *Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019*. Additionally, SafeWork must be notified of the UST removal within seven days using the prescribed approval form, so the tanks can be removed from their database.

8. Remediation Site Management

This section provides an overview of the requirements for management of the site during the remediation works. It will be the responsibility of the remediation contractor to ensure that they have the appropriate plans in place.

8.1 Roles and Responsibilities

The primary stakeholders who will be involved in the remediation are provided in **Table 8**.

Table 8: Roles and Responsibilities

Stakeholder	Role and responsibilities
Sydney Metro (or subsequent owner / proponent)	Proponent and site owner, responsible for community liaison, and the appointment of the remediation contractor and environmental consultant.
NSW EPA	Regulatory authority with involvement in the management of the site.
Remediation Contractor	Responsible for obtaining relevant licences and permits for the remedial works, preparation and implementation of a site specific WHSP and CEMP and completion of remediation works in accordance with this RAP.
Environmental Consultant	Responsible for providing remediation oversight and validation on behalf of Sydney Metro to assess compliance with this RAP.
Site Auditor	Responsible for reviewing the deliverables prepared by the validation consultant and providing a site audit statement.

Specific persons and responsibilities with respect to the primary stakeholders are to be identified in a CEMP following award of the roles by Sydney Metro.

8.2 Health and Safety Management

A site-specific WHSP should be prepared by the remediation contractor and environmental consultant and should include all details necessary to identify, assess and manage health and safety risks posed by the remedial works. Details on asbestos management are provided in **Section 8.4**

The WHSP should be prepared in accordance with the WHS Act and WHS Regulation, and any requirements from SafeWork NSW.

The WHSP should include task specific SWMS which should be reviewed each day prior to commencing works and amended as necessary for any changed conditions or if improved controls are deemed necessary.

The WHSP should also detail the names and contact details of key project personnel.

8.3 Environmental Management

A CEMP should be prepared by the remediation contractor to manage risks to the environment posed by the remediation works. The main environmental aspects are presented in the following sections and will summarise the necessary controls that must be addressed. Additional controls may be required by Sydney Metro.

8.3.1 Hours of Operation, Noise and Vibration

Noise will be required to be managed in order to prevent disturbance to the community and site workers. As such, reasonable noise mitigation measures will be implemented during the works to assist in avoiding excessive noise, which may result in complaints. Specific controls include:

- » Remediation work (including haulage and deliveries) shall only be conducted within the following hours:
 - Monday to Friday 7am – 6pm.
 - Saturday 8am – 1pm.
 - No work is permitted on Sundays or Public Holidays (unless it is emergency work).
- » Maintenance checks to be conducted daily on plant and other equipment to ensure noise mitigation measures such as mufflers/acoustic enclosures are installed where necessary.

Work shall comply with appropriate NSW construction noise guidelines. Equipment and machinery shall be operated in an efficient manner to minimise the emission of noise. The use of any plant and/or machinery shall not cause vibrations in excess of the relevant NSW guidelines and Australian Standards.

8.3.2 Erosion and Sediment Controls

The CEMP shall include appropriate soil and water management in accordance with the requirements of the 'Blue Book' (Landcom, 2004).

The following factors should be considered with respect to erosion and sediment control:

- » Sediment and erosion control measures will need to be installed prior to any remedial activities. This may consist of straw bales or silt fences erected around soil stockpiles or site boundary fencing to prevent the migration of soil particles.
- » The area of soil exposure will be minimised as much as possible at any time and land disturbances will occur for the shortest possible time.
- » Any material that requires temporary storage will be stockpiled in a dedicated area and covered by geofabric or high-density polyethylene sheeting.
- » Areas of the site not undergoing remedial works, including Mowbray House, should be segregated to avoid the transport of potentially contaminated soil onto them.

8.3.3 Surface Water Drainage

The surface water management measures to be implemented during the remedial works should include, but not be limited to:

- » Perimeter drainage control measures (which may include straw bales, diversion drains, ditches and slit fences) to prevent clean water from entering the work areas. The diverted water will be directed away (and/or around) the work area, through a series of sediment and erosion control devices.
- » Sediment control mechanisms to be placed over/around all identified existing drainage pits.
- » Spill control equipment to be available in the event of a fuel or oil spill at the site.
- » Drainage in the construction area to be managed to minimise discharge of potentially contaminated surface water from the area.

8.3.4 Air Quality and Dust Controls

The remedial actions shall be performed in such a way to minimise the generation of dust from the site. This may include measures such as: installing dust screens around the perimeter of the work area or site; covering

stockpiles of contaminated soil if remaining in place for more than 24 hours; covering any loads entering or exiting the site; applying water sprays to suppress; and suspension of works during periods of high wind.

As asbestos has been identified at the site, SafeWork (2019a) states that '*a competent person, independent from the person responsible for the removal work, should determine all air monitoring requirements*'. It is recommended that these requirements are developed by a suitably qualified person in accordance with industry standards.

8.3.5 Traffic Management

The CEMP should include a plan for managing traffic associated with the works, in regard to the safety and welfare of the general public and to alleviate the impact of additional traffic volumes on other activities at the site. This includes traffic control measures such as establishment of designated haul routes on- and off-site.

All vehicular movements should follow this route to minimise the potential for collision and dust generation and erosion. If soil accumulates on roads adjacent to the access point it must be regularly removed by sweeping or shovelling.

Haulage routes to and from the site shall be selected to meet the following objectives:

- » Comply with all road traffic rules.
- » Minimise noise, vibration and odour to adjacent premises.
- » Minimise use of local roads.

All truck drivers carting materials from the site should be given a safety instruction briefing. The briefing should detail the procedures to be following by the truck driver should an incident occur. These will include, but not limited to:

- » Vehicle accident.
- » Mechanical breakdown.
- » Rain commencing during transportation.
- » Payload (or other) loss.

8.3.6 Emergency Response

The CEMP should include a plan for emergency response, which will identify possible emergency situations that might occur throughout the remedial works, both on- and off-site. At a minimum, it should address the following:

- » Assignment of responsibilities to nominated key personnel.
- » Assessment of the potential on- and off-site impacts of hazards.
- » Emergency reporting procedures, including on-site reporting lines of communication and procedures for reporting relevant issues to appropriate authorities.
- » Emergency response procedures for the site including:
 - Fires.
 - Spills and leaks of hazardous materials.
 - Traffic accidents involving the transportation of contaminated materials.
 - Rupture of buried services.
 - First aid for injured personnel.

- Evacuation of on-site personnel.
- Incident investigation procedures.

8.4 Asbestos Management

As ACM has been identified at the site, an ARCP prepared by an appropriately qualified person should be prepared for the remedial works. The ARCP must include the following:

- » Exposure monitoring.
- » Methods of control, including personal protective equipment (PPE) and respirators.
- » Training on the hazards of asbestos and control measure.
- » Record keeping requirements.

In accordance with SafeWork NSW 2019b, the required actions for air monitoring are shown in **Table 9**.

Table 9: Asbestos Air Monitoring Required Actions (SafeWork NSW 2019b)

Action Level (airborne asbestos fibres/mL)	Control	Action
Less than 0.01	No new control measures are necessary	Continue with control measures
≥ 0.01 and ≤ 0.02	<ol style="list-style-type: none"> 1. Review 2. Investigate 3. Implement 	<p>Review control measures</p> <p>Investigate the cause</p> <p>Implement controls to eliminate or minimise exposure and prevent further release</p>
> 0.02	<ol style="list-style-type: none"> 1. Stop Work 2. Notify the Regulator 3. Investigate the cause 4. Implement controls to eliminate or minimise potential exposure and prevent further release 5. Do not recommence removal work until further air monitoring is conducted 	<p>Stop removal work</p> <p>Notify by phone followed by fax or written statement that the work has ceased and the results of the air monitoring</p> <p>Conduct thorough inspection of the works area and associated equipment in consultation with all workers involved with the removal work</p> <p>Extend the isolated/barricaded area around the removal area as far as reasonably practicable (until fibre are < 0.01 fibres/mL)</p> <p>Do not recommence until fibre levels are at or below 0.01 fibres/mL</p>

If the air monitoring indicates potential exposure at the action level concentrations, the remediation contractor must ensure that control measures for managing asbestos have been adequately addressed. Other exposure control measures include:

- » Entrance to the work area is not allowed unless training, controls and PPE requirements have been met.
- » Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in exposure areas.
- » Avoid skin and eye contact with asbestos.

- » Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained.
- » Review available regulatory fact sheets as part of ensuring clear awareness and understanding exists among the workforce.
- » Do not disturb waste or other materials labelled 'Danger – Asbestos Fibres'.

Contractors performing asbestos removal works at the site are required to obtain all necessary licences and permits and have a written compliance plan. Contractors are required to provide proof that all asbestos workers are qualified, trained, and are competent to complete their assigned tasks before work begins. The works are to be undertaken in accordance with SafeWork NSW requirements, outlined in **Section 7.6.1**.

8.5 Community Relations

The surrounding properties should be notified of the upcoming remediation works, including the nature of the works, expected duration, and impacts (if any) during works). It is assumed that Sydney Metro will manage issues of perception in relation to remediation workers potentially wearing PPE (e.g., Tyvek suits, respirators etc.).

The remediation contractor must keep a record of all complaints during the works. The protocols for community engagement should be outlined in the WHSP and CEMP, or a separate community engagement plan. It is understood that Sydney Metro will take ownership of community engagement.

8.6 Contingency Plan

The conditions encountered during remedial works can be uncertain, as such, potential contingencies which may be encountered during the works have been identified and are outlined in **Table 10**, below.

Table 10: Remedial Works Contingency Planning

Potential Issues	Proposed Corrective Action
Increased volumes of waste or contaminated volumes	Throughout the remediation works, the remediation contractor will monitor the quantity of waste materials encountered. If evidence suggests that the level and extent of contamination is significantly greater than estimated, further investigation would be performed to determine its extent. In the case of a significant increase in the estimated volume of contaminated material to be excavated, Sydney Metro will be informed immediately, and a review of the remediation strategy will be undertaken.
Different waste classifications to preliminary classifications	Section 6.2.4 outlines that additional sampling prior to off-site disposal of material commences. Throughout the remediation works, the remediation contractor or environmental consultant will monitor the type of waste materials encountered. If evidence suggests that waste is present which is different to what has been classified, further waste classification sampling is to be performed to determine the correct classification, and volume/tonnage of material. In the case of a significant variation to waste classifications, Sydney Metro will be informed immediately, and a review of the remediation extent and strategy will be undertaken.
Unexpected Finds	In the event that in-ground features are identified and are considered to represent potential contamination sources, the following protocol will be adopted: <ul style="list-style-type: none"> • All works within the vicinity (nominally a 10 m radius) will cease, Sydney Metro and the Site Auditor will be contacted, and the area of concern will be appropriately barricaded. • If required, appropriate sampling and analysis will be undertaken by the environmental consultant. • The requirement for any additional remediation works will be assessed by the environmental consultant and undertaken as required.

	<ul style="list-style-type: none"> The above works will be documented in the validation report. <p>Work, health and safety, and environmental protection requirements may need to be reviewed, depending on the type of unexpected finds encountered.</p>
Spills and leaks	<p>Spills and leaks are to be proactively managed by refuelling activities only taking place on hardstand. Controls are to be outlined in the CEMP, however, in the event of a fuel leak or spill, the spill/leak is to be controlled and managed by:</p> <ul style="list-style-type: none"> Shutting off the source. Plugging the spill/leak. Utilise spill kit materials to limit the extent affected. For loss of containment onto exposed soil, earthmoving equipment may be used to create an earthen bund to contain the loss. All spills/leaks are to be cleaned up using appropriate materials, and if necessary, dispose of the contaminated materials in accordance with relevant waste regulations. If required, notify relevant regulatory authorities.
Rain	<p>Daily pre-starts are to include a review of the weather forecast. Erosion and sediment control requirements are detailed in the CEMP. During rain events, erosion and sediment controls are to visually inspected hourly, with corrective actions undertaken as required. Prior to significant rain events, exposed soil surfaces are to be covered to the extent practicable to minimise erosion and sediment generation.</p>
High wind / excessive dust	<p>Controls relating to high wind / excessive dust are to be outlined in the CEMP. Wherever possible, dust generation shall be kept to a minimum by undertaking a staged approach to excavation and emplacement, thereby minimizing the size of the disturbed area. Direct excavation and loading of materials for haulage will also be adopted where possible to minimise materials handling requirements.</p> <p>Dust generation will be controlled through the use of water sprays and mists. If necessary, the area under direct excavation will be wetted with sprays.</p> <p>In the event that additional measures are required, the remediation contractor shall modify potential dust generating operations to achieve acceptable air quality levels. Modifications may include:</p> <ul style="list-style-type: none"> Reduction in the area of disturbed surfaces. Installation of perimeter sprays on the site boundary fencing. Limiting works to more favourable weather conditions. Modifying the manner in which excavation works are conducted.
Excessive stormwater	<p>Minimise active contaminated work area; improve stormwater diversion.</p>
Excessively wet materials	<p>Stockpile and dewater on site or add absorbents</p>
Excessive noise	<p>Noise barrier (hoarding) installation. Augment, muffler systems on excavation machinery or haulage trucks.</p>
Excessive vibration	<p>Reassess vehicle movement routes and speeds. Static roll backfilled areas requiring compaction.</p>
Equipment failures	<p>A proactive approach to equipment maintenance is to be undertaken by the remediation contractor. All equipment is to be maintained and regularly serviced, with maintenance and servicing records maintained, in addition to daily pre-starts. Common spare parts are to be kept on-site, in addition, the remediation contractors work plan is to nominate emergency equipment repair service providers and maintain a list of nearby rental options. In the event equipment cannot be repaired on-site or replaced, works involving the particular equipment are to be rescheduled until repairs are made.</p>

8.7 Remediation Schedule

The remediation contractor will be responsible for preparing and submitting a remediation schedule to Sydney Metro and the environmental consultant. The schedule will involve, but not be limited to, the following:

- » Review and update of this RAP (if necessary).
- » Obtain relevant permits and approvals for the works.
- » Prepare and finalise a WHSP, CEMP and associated subplans, piling design, and relevant work plans and documentation. The work plans should:
 - Include staging methodology to minimise exposed asbestos impacted soils.
 - Include work-flow instructions regarding contaminated materials.
 - Steps to avoid cross-contamination of materials.
- » Undertake the remediation works, in accordance with the RAP, WHSP, CEMP, piling design, and work plans.
- » The environmental consultant to produce a validation report detailing the remediation works as undertaken and conclude on the site's suitability.
- » Prepare a long-term EMP (if required).

Documentation including a RAP Addendum or update (if undertaken), CEMP and associated subplans, validation report, and long-term EMP (if required), are required to be reviewed and endorsed by the Site Auditor prior to implementation.

9. Validation Plan

This section provides a description of the validation methodology to be adopted by the environmental consultant during the remediation works.

The information presented herein is of a summary nature only. If required, specific details are to be documented in a Sampling, Analysis, and Quality Plan (SAQP).

9.1 Project Team

The project team must be from a suitably qualified consultant with expertise working on contaminated sites, and trained in the requirements of this RAP.

9.2 Remedial Goals

The remedial goal at the site is to remove identified contamination sources by excavation and off-site disposal.

9.3 Validation of Excavated Surfaces

Following soil excavation, validation sampling will be conducted to verify that materials have been removed in accordance with the RAP. Sampling will demonstrate that material above the validation criteria has been removed, or provide baseline conditions at boundaries where further excavation is not possible. The validation criteria are presented in **Section 9.4**.

Surface validation soil samples will be collected at the following minimum rates:

- » Excavation walls – 1 sample per 10 m linear distance (minimum of one per wall). If multiple distinct lithologies are observed through the depth or length of walls, collect a wall sample from each lithology, or at a minimum of 1 m vertical intervals.
- » Excavation floors – 1 sample per 100 m² in a grid-based system.
- » Stockpile footprints – 1 sample per 25 m² in a grid-based system.
- » UST infrastructure footprints (such as pipe trenches) – 1 sample per 5 lineal metres.
- » Haul road footprints, at the completion of the works – 1 sample per 100 m² in a grid-based system.

Provided the validation dataset is large enough, statistical assessment in accordance with the NEPM (2013) recommended approaches will be conducted. This will include review of: maximum concentrations against 250% of the validation criteria; 95% upper confidence limit concentrations against validation criteria; and the standard deviation of the dataset against 50% of the validation criteria.

Validation sampling must be completed by appropriately qualified and trained environmental consultants and adopt sampling and quality assurance/quality control techniques in accordance with NSW EPA (1995). For the validation sampling of asbestos impacts, samples are to undergo quantitative analysis with respect to land use suitability validation criteria.

A photographic record of excavations will be made. The extent (lateral and vertical) of any excavation will be accurately measured by the remediation contractor or the validation consultant via survey or other means. The dimensions of excavated areas will be reduced to Map Grid of Australia (MGA) Zone 56 coordinates and mAHD levels so they can be accurately transferred as necessary.

9.4 Validation Criteria

It is understood that the site will be divested as an unrestricted land use, which is broadly considered to align with a low-density residential land use as defined in the NEPM (2013), the most sensitive potential land use in

terms of the potential human receptors (including young children and aged persons) and the potential for exposure (i.e., accessible soil in gardens). Validating the site to such criteria will allow the site soils to be considered suitable for a low-density residential land use from a human health perspective. The site will therefore also be validated for less sensitive uses, including high-density residential, open space, and commercial/industrial. With respect to ecological receptors, the proposed unrestricted land use is broadly considered to align with an urban residential area and public open space scenario. Similar to the rationale for human receptors, validating the site to such criteria will allow the site soils to be considered suitable for urban residential area or public open space from an ecological health perspective.

It is recognised that the NEPM (2013) outlines that health investigation levels (HILs), health screening levels (HSLs), ecological investigation levels (EILs), and ecological screening levels (ESLs) are not clean-up criteria. Therefore, for sites where measured contaminant concentrations exceed the generic screening criteria, a process must be followed to determine appropriate validation criteria.

For this site, a review of the site-specific scenarios has indicated that a number of assumptions incorporated into the HILs, HSLs, EILs, and ESLs which must be retained in the development of validation criteria. In particular: exposure parameters for the future land use; site layout for areas of accessible soil; depth and location of residual impacts; and soil properties for accessible soil. On the basis of these conservative assumptions that must be retained, it is considered that the definition of site-specific criteria as part of a site-specific risk assessment will not be warranted for the site, as the criteria developed using such an approach are likely to remain similar to the screening criteria adopted for a generic low-density residential land use.

Additionally, with respect to the uncertainty regarding the final future development plans, site-specific remediation criteria are currently unable to be derived. Therefore, the HIL-A and HSL-A screening criteria can be adopted for use as the human health validation criteria. These criteria are presented in Schedule B1 of the NEPM (2013). For ecological validation criteria, EILs for an urban residential area and public open space for aged contaminants, within an old suburb with high traffic, are to be adopted. Relevant site-specific criteria were derived in the Data Gap Investigation (Nation Partners, 2021), summarised in **Table 11** below. The generic criteria are presented in Schedule B1 of the NEPM (2013).

Table 11: Site-Specific EILs

Contaminant	Ecological investigation level (mg/kg)
Arsenic	100
Copper	230
Lead	1,260
Chromium (III)	410
Nickel	230
Zinc	540

9.5 Materials Tracking

The remediation contractor will be responsible for tracking all material removed from the site and imported onto the site as outlined in **Section 6.2.9**.

The material tracking documentation will be audited by the environmental consultant as part of the validation activities. Material tracking information will be documented in the validation report as appropriate. It must be reconciled and clearly summarised in the validation report. It is noted that a “data dump” of materials tracking at the completion of the works will likely be rejected by the Site Auditor.

9.6 Imported Material

Due to the likelihood of the site being redeveloped following divestment, including the potential for bulk excavation, it is not anticipated for material to be imported with respect to maintaining the net balance of site levels. Detail on the condition of the site post-remediation is provided in **Section 6.2.10**.

If the remediation contractor determines that imported material is required, such as for constructing stabilised site access or maintaining site roadways, then imported material is to comprise either virgin excavated natural material (VENM), ENM, or certified landscaping material (e.g., for topsoil or mulch) and shall be assessed using the validation criteria and the criteria listed in the Excavated Natural Material Order 2014.

Furthermore, the materials shall be sampled prior to importation (at an appropriate frequency, dependent on the volume imported from a particular source) and assessed as being aesthetically suitable and free of odours, staining, asbestos, demolition rubble or waste and chemically suitable of use on the site.

The remediation contractor must provide documentation from the quarry or other source to certify the origin of the material. The environmental consultant must attend the source of the material and, if the documentation available from the source site is deemed inadequate, collect samples to confirm suitability.

If, during the inspection of the imported material, the validation consultant observes that the material is either different from that observed at the source, has evidence of potential contamination, or if appropriate documentation is not received from the source site, then the material will be rejected, and an alternate source must be obtained.

Imported materials tracking documentation is to be included in the validation report, and will be subject to review by the Site Auditor.

9.7 Validation Report

Following the completion of remedial works, a validation report will be prepared by the environmental consultant in accordance with the requirements of the NSW EPA (2020). The report will contain an overview of the remediation objectives conducted and details of the following:

- » Volumes of excavated material and location of excavations.
- » Tracking of materials disposed off-site, and brought on-site.
- » Validation field methods.
- » Plan of sampling locations.
- » Site photographs.
- » Analytical results of validation and characterisation soil samples and quality assurance and quality control sampling.
- » Landfill disposal and VENM (if required) certificates.
- » Verification of regulatory compliance.
- » An updated CSM taking into account the site condition post-remediation.
- » Demonstration that groundwater quality is suitable (possibly subject to management) for the intended land use(s), and is not and will not foreseeably pose a risk to off-site receptors.
- » A clear statement on whether the site is considered suitable for its intended land use and whether it is considered to present an unacceptable risk to human health and the environment.
- » Any limitations, assumptions and uncertainties relevant to the conclusions of the report.

10. Long-Term Environmental Management Plan

The remediation and validation outlined within this RAP is considered sufficient to manage the identified risks relating to soil impacts at the site in accordance with relevant guidance made or approved by the NSW EPA and to achieve the project objectives. The extent of remediation proposed is such that the Source-Pathway-Receptor risks with respect to soil are addressed via the elimination of the source.

It is noted that residual groundwater contamination is likely to remain post-remediation, and to ensure the ongoing protection of potential receptors during redevelopment and future use, a long-term EMP will be required at the completion of the remediation. The content of the long-term EMP will be dictated by groundwater SPR risks, however as a minimum should include:

- » Controls to be implemented during bulk earthworks intercepting groundwater.
- » Controls on the handling of dewatered groundwater during redevelopment and future occupation of the site.

11. Limitations

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References

- GHD (2020a) *Sydney Metro, Chatswood Metro, Corner of Pacific Highway and Mowbray Road, Chatswood, Contamination Summary Report*. April 2020.
- GHD (2020b) *TfNSW Sydney Metro Chatswood Dive Site – Budget Remediation Cost Estimate – Version 1*. April 2020.
- GHD (2020c) *Sydney Metro, Chatswood Metro, Corner of Pacific Highway and Mowbray Road, Chatswood. Remediation Options Assessment*. May 2020
- Lotsearch (2020) *Lotsearch Enviro Professional Report, 607 Pacific Highway, Chatswood, NSW 2067, LS010925* (within GHD 2020a).
- Nation Partners (2020) *Sydney Metro Chatswood Site – Draft Remediation Cost Estimate*. 10 September 2020.
- Nation Partners (2021) *Data Gap Investigation Report – Chatswood Site, Sydney Metro*. January 2021.
- HEPA (2020) *PFAS National Environmental Management Plan Version 2.0*.
- NEPC (2013) *National Environment Protection (Assessment of Site Contamination) Measure 1999, 2013 Amendment* (NEPM 2013).
- NSW EPA (1995) *Sampling design guidelines*.
- NSW EPA (2014) *Waste Classification Guidelines – Part 1: Classifying Waste*.
- NSW EPA (2016) *Addendum to the Waste Classification Guidelines (2014) – Part 1: Classifying Waste*.
- NSW EPA (2017) *Contaminated Land Management, Guidelines for the NSW Site Auditor Scheme (3rd edition)*.
- NSW EPA (2020) *Consultants reporting on contaminated land: Contaminated land guidelines*.
- Landcom (2004) *Managing Urban Stormwater: Soils and Construction 4th Edition – Vol. 1*.
- SafeWork NSW (2019a) *Code of Practice: How to Manage and Control Asbestos in the Workplace*.
- SafeWork NSW (2019b) *Code of Practice: How to Safely Remove Asbestos*.
- Department of Urban Affairs and Planning (1998) *Managing Land Contamination, Planning Guidelines, SEPP 55 – Remediation of Land*.
- VIC EPA (2009) *Industrial Waste Resource Guideline: Soil Sampling* (IWRG 702).
- WA DoH (2009) *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*.
- Willoughby City Council (2018) *Development Control Plan*.
- Willoughby City Council (2020) *Contaminated Land Policy*.
- WorkCover NSW (2014) *Managing Asbestos In or On Soil*.

Figures



Figure 1: Site Location

Sydney Metro - Remediation Action Plan
Chatswood Site

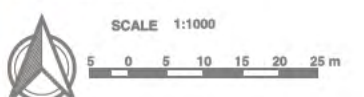
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Legend

- Site Boundary
- Dive Portion
- Asbestos Pit Location
- Underground Storage Tanks
- Possible Asbestos Slab
- Mowbray House Heritage Building
- Areas of Interest
- Former Road



DATA SOURCES
Imagery: Nearmaps, 2020



nation partners



Figure 2: Data Gap Investigation Sampling Locations

Sydney Metro - Remediation Action Plan
Chatswood Site

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Legend

- Site Boundary
- Stage 1 Sampling Areas
- Mowbray House Heritage Building
- Asbestos Pit Location
- Underground Storage Tanks
- Possible Asbestos Slab
- Monitoring Well - Stage 1
- Soil Vapour - Stage 1
- Soil Borehole - Stage 1
- Monitoring Well - Stage 2



DATA SOURCES
Imagery: Nearmaps, 2020

SCALE 1:1000
0 5 10 15 20 25 m





Figure 3a: Stage 1 Inferred Groundwater Levels

Sydney Metro - Remediation Action Plan
Chatswood Site

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Legend

- Site Boundary
- Monitoring Wells
- Inferred Groundwater Level - 2 July 2020 (mAHD)
- Approximate Groundwater Flow Direction
- Underground Storage Tanks



DATA SOURCES
Imagery: Nearmaps, 2020



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Figure 3b: Stage 2 Inferred Groundwater Levels

Sydney Metro - Remediation Action Plan
Chatswood Site

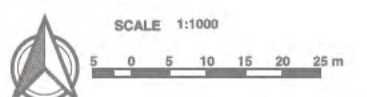
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Legend

- Site Boundary
- Monitoring Wells
- Inferred Groundwater Level - 7 October 2020 (mAHD)
- Approximate Groundwater Flow Direction
- Underground Storage Tanks



DATA SOURCES
Imagery: Nearmaps, 2020



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Figure 4: Soil Exceedances

Sydney Metro - Remediation Action Plan
Chatswood Site

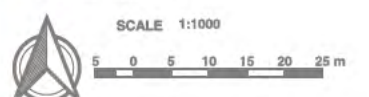
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Legend

- Site Boundary
- Underground Storage Tanks
- Asbestos Pit Location
- Possible Asbestos Slab
- Exceeds NEPM 2013 HIL A
- Exceeds NEPM 2013 HSL A/B
- Exceeds NEPM 2013 ESL for Urban Residential
- Asbestos detected



DATA SOURCES
Imagery: Nearmaps, 2020



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Figure 5a: Stage 1 Groundwater Exceedances

Sydney Metro - Remediation Action Plan
Chatswood Site

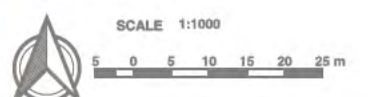
Legend

- Site Boundary
- Groundwater Monitoring Wells

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DATA SOURCES
Imagery: Nearmaps, 2020



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Figure 5b: Stage 2 Groundwater Exceedances

Sydney Metro - Remediation Action Plan
Chatswood Site

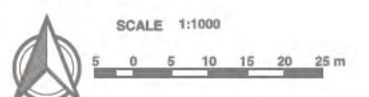
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Legend

- Site Boundary
- Groundwater Monitoring Wells



DATA SOURCES
Imagery: Nearmaps, 2020



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Figure 6: ENM Classification

Sydney Metro - Remediation Action Plan
Chatswood Site

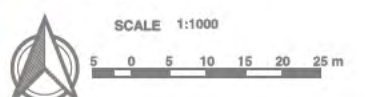
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Legend

-  Site Boundary
-  Possible Asbestos Slab
-  Asbestos Pit Location
-  Soil Borehole Location
-  Underground Storage Tanks



DATA SOURCES
Imagery: Nearmaps, 2020



nation partners







Figure 7: Additional Sampling Areas

Sydney Metro - Remediation Action Plan
Chatswood Site

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Legend

-  Site Boundary
-  Mowbray House Heritage Building
-  Asbestos in soils investigation
-  Footprint of the former energy building



DATA SOURCES
Imagery: Nearmaps, 2020

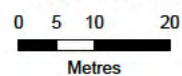


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Attachment A – GHD (2020a) Figures



Paper Size A3



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



LEGEND

- Soil sample location
- Remediation Excavation Footprint
- Soil sample locations SS01 to SS17 (area)
- Site boundary
- Through site road
- Cadastre



Sydney Metro

Historical Soil Sampling
Points and Remediation
Excavation Footprint

Job Number | 21-25273
Revision | -
Date | 26 Mar 2020

Figure 5A



Paper Size A3
 0 5 10 20
 Metres

Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 56

LEGEND

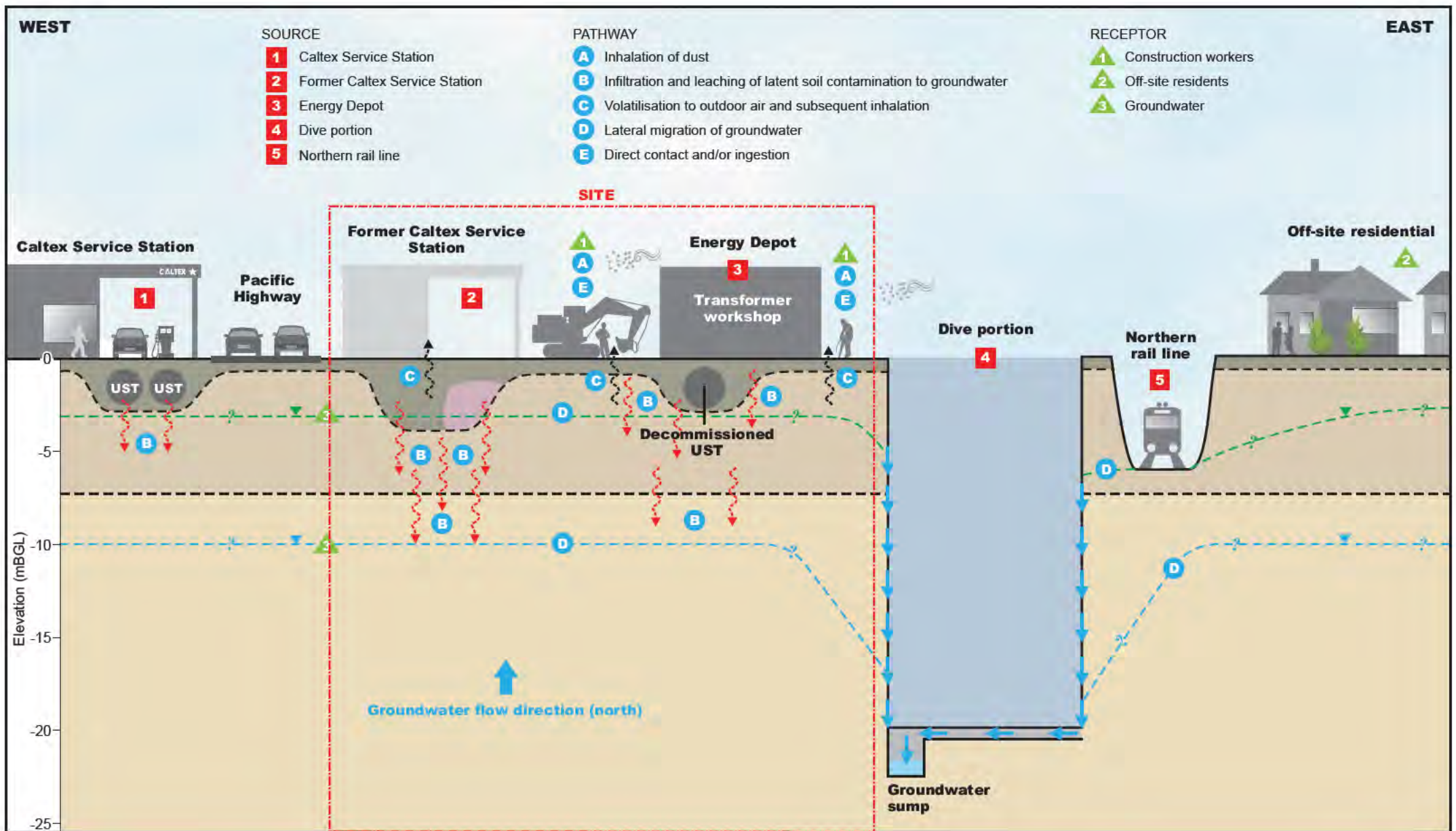
- Monitoring well location
- Soil vapour probe location
- Remediation Excavation Footprint
- Site boundary
- Through site road
- Cadastre



Sydney Metro
 Historical Groundwater
 Monitoring and Soil Vapour
 Points and Remediation
 Excavation Footprint

Job Number 21-25273
 Revision -
 Date 26 Mar 2020

Figure 5B



Conceptual diagram only - scale is approximate

LEGEND

- Fill
- Buried asbestos
- ▲ Volatilisation
- Residual soil
- - - Shallow groundwater table
- Migration
- Ashfield Shale
- - - Deep groundwater table



Sydney Metro Project: Contamination Summary Report
Conceptual Site Model
 Pre-Redevelopment Phase

Job Number 21-25273
 Revision 0
 Date 30 Mar 2020

Figure 7

Attachment B – Soil Impacts Summary

Location	Depth (mBGL)	CoPC	Concentration (mg/kg)	Criterion (mg/kg)	
PT008	0.25	BaP	1.4	ESL	0.7
		Lead	320	HIL-A	300
PT009	0.6	BaP	1.5	ESL	0.7
PT016	3.2	TRH C ₆ -C ₁₀ (F1-BTEX)	120	HSL-A	40
PT016	3.5	TRH C ₆ -C ₁₀ (F1-BTEX)	160	HSL-A	40
PT017	1	BaP-TEQ	73	HIL-A	3
		Lead	560	HIL-A	300
		Total PAHs	554.8	HIL-A	300
		TRH C ₁₆ -C ₃₄ (F3)	2,700	ESL	300
		Zinc	750	EIL	540
PT017	3	Lead	770	HIL-A	300
PT017	3.3	BaP-TEQ	9.6	HIL-A	3
PT020	1	Benzene	2.4	HSL-A	0.6
PT026	0.2	Lead	470	HIL-A	300
PT026	2.7	Lead	480	HIL-A	300
TP1	0.5	BaP-TEQ	3.3	HIL-A	3
TP3	0.5	BaP	1.1	ESL	1
		Lead	390	HIL-A	300
TP4	0.5	BaP-TEQ	9.7	HIL-A	3
		Lead	350	HIL-A	300
TP4	4	TPH C ₆ -C ₉ *	380	HSL-A	40
		TPH C ₁₀ -C ₁₄ *	930	HSL-A	230
TP8	0.5	BaP-TEQ	10.4	HIL-A	3
TP11	0.5	BaP	1.1	ESL	1
		Lead	470	HIL-A	300
TP14	0.6	Benzene	1.4	HSL-A	0.6
TP14	2	Xylenes	68.8	HSL-A	95
TP27	2	Benzene	2.6	HSL-A	0.6
		Xylenes	549	HSL-A	95
TP27	3	Benzene	2.6	HSL-A	0.6

Location	Depth (mBGL)	CoPC	Concentration (mg/kg)	Criterion (mg/kg)	
		Xylenes	91	HSL-A	95
TP28	1	Lead	450	HIL-A	300
TP30	0.5	Lead	1,300	HIL-A	300
TP30	1	Lead	380	HIL-A	300
TP30	2	Benzene	2.7	HSL-A	0.6
BH2	3	TRH C ₆ -C ₁₀ (F1-BTEX)	420	HSL-A	40
BH5	2.8	TRH C ₆ -C ₁₀ (F1-BTEX)	360	HSL-A	40
BH22	0.5	Lead	472	HIL-A	300
BH25	0.3	Lead	460	HIL-A	300
		BaP-TEQ	27.5	HIL-A	3
BH27	0.8	BaP	1	ESL	1
Exc1_VA 4	2.5	TRH C ₆ -C ₁₀ (F1-BTEX)	140	HSL-A	40
Exc1_VA11	2.5	TRH C ₆ -C ₁₀ (F1-BTEX)	230	HSL-A	40
Exc1_VA12	2.5	TRH C ₆ -C ₁₀ (F1-BTEX)	570	HSL-A	40
Exc1_VA17	2.5	TRH C ₆ -C ₁₀ (F1-BTEX)	720	HSL-A	40
Exc1_VA18	2.5	TRH C ₆ -C ₁₀ (F1-BTEX)	210	HSL-A	40
Exc1_VA20	2.0	TRH C ₆ -C ₁₀ (F1-BTEX)	210	HSL-A	40
Exc1_VA23	2.5	TRH C ₆ -C ₁₀ (F1-BTEX)	280	HSL-A	40
Exc1_VA26	1.0	TRH C ₆ -C ₁₀ (F1-BTEX)	210	HSL-A	40
		TRH >C ₁₀ -C ₁₆ (F2-naphthalene)	120	HSL-A	230
ExcMLP_V11	2.5	TRH C ₆ -C ₁₀ (F1-BTEX)	250	HSL-A	40
ExcMLP_V15	2.5	TRH C ₆ -C ₁₀ (F1-BTEX)	110	HSL-A	40
ExcMLP_V28	1.5	TRH C ₆ -C ₁₀ (F1-BTEX)	240	HSL-A	40
ExcMLP_V33	1.5	TRH C ₆ -C ₁₀ (F1-BTEX)	130	HSL-A	40
		Benzene	1	HSL-A	0.6
VA1	**	TRH >C ₁₀ -C ₁₆ (F2-naphthalene)	390	HSL-A	230
VA2	**	TRH >C ₁₀ -C ₁₆ (F2-naphthalene)	830	HSL-A	230
VA3	**	TRH >C ₁₀ -C ₁₆ (F2-naphthalene)	830	HSL-A	230

Location	Depth (mBGL)	CoPC	Concentration (mg/kg)	Criterion (mg/kg)
<p>CoPC – contaminant of potential concern.</p> <p>* Samples were analysed pre-NEPM 2013 and were reported as TPH fractions, TRH fraction criteria have been applied as a conservative measure.</p> <p>** Unknown sample depth.</p>				

Attachment C – RCE (NP, 2020) Outputs



Appendix C-1: Indicative Extent of Remediation

Sydney Metro - Remediation Action Plan
Chatswood Site

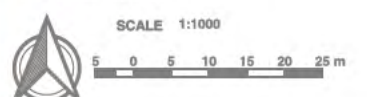
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Legend

- Site Boundary
- Asbestos Pit Location
- Underground Storage Tanks
- Possible Asbestos Slab
- Indicative Extent of Remediation



DATA SOURCES
Imagery: Nearmaps, 2020



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Appendix C-2: Indicative Extent of Remediation

Sydney Metro - Remediation Action Plan
Chatswood Site

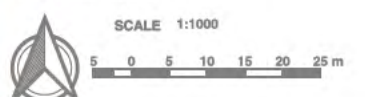
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Legend

- Site Boundary
- Possible Asbestos Slab
- Asbestos Pit Location
- Indicative Extent of Remediation
- Underground Storage Tanks



DATA SOURCES
Imagery: Nearmaps, 2020



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Appendix C-3: Indicative Extent of Remediation

Sydney Metro - Remediation Action Plan
Chatswood Site

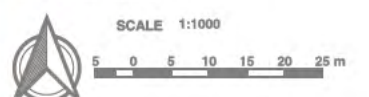
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Legend

- Site Boundary
- Asbestos Pit Location
- Underground Storage Tanks
- Possible Asbestos Slab
- Indicative Extent of Remediation



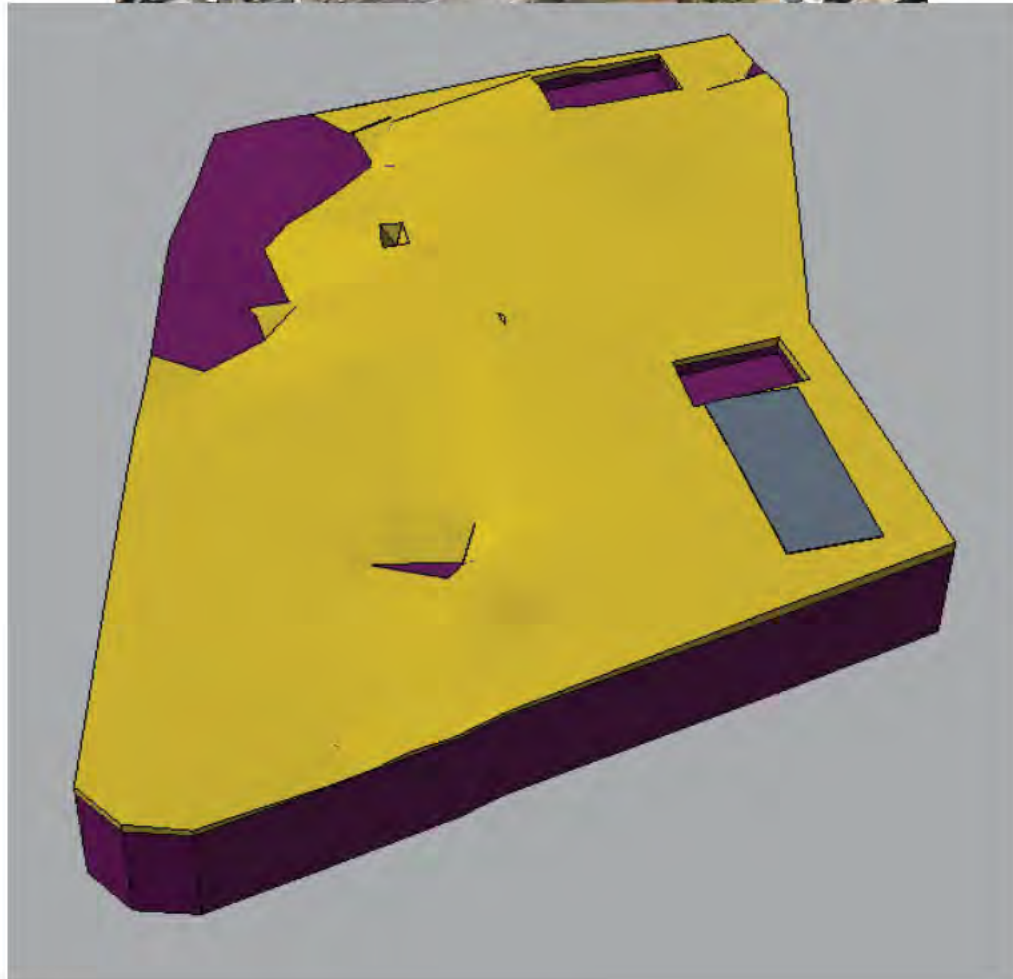
DATA SOURCES
Imagery: Nearmaps, 2020



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Scenario 3 - Unrestricted Redevelopment
Option 3A

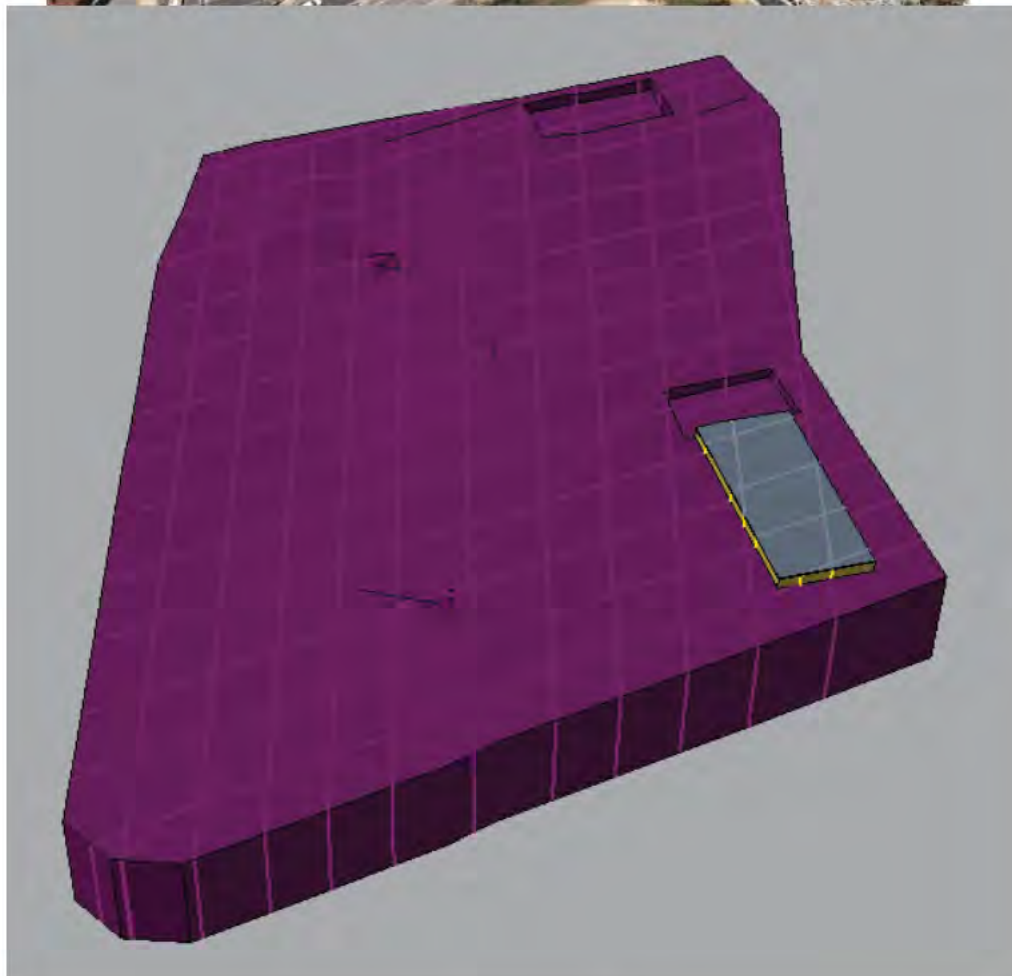
Scenario 3 - Unrestricted Redevelopment		
Option 3A		
Off-Site Disposal of Known Contaminated Fill Across Entire Site		
Excavate and dispose of health-based soil exceedances across entire site to achieve suitability for low density residential land use		
Waste Classification - Offsite Disposal		
Concrete	3450.46	m3
GSW	9834.15	m3
ENM	1116.65	m3
TOTAL	14401.26	m3
Approximate max excavation depth	4.5	mbgl
Approximate excavation area	8282.985	m2



Concrete	Grey
GSW	Light Green
Fill material	Yellow
ENM	Purple

Scenario 3 - Unrestricted Redevelopment
Option 3B

Scenario 3 - Unrestricted Redevelopment		
Option 3B		
Off-Site Disposal of all Fill Across Entire Site		
Excavate and dispose of all fill across entire site to achieve suitability for low density residential land use		
Waste Classification - Offsite Disposal		
Concrete	6580.802	m3
GSW	30897.597	m3
ENM	1116.652	m3
TOTAL	38595.051	m3
Approximate max excavation depth	4.5	mbgl
Approximate excavation area	16023.899	m2



Concrete	Grey
GSW	Green
Fill material	Yellow
ENM	Purple

Attachment D –
GHD (2020c)
Remediation
Options
Assessment

Table 9 – Remedial options assessment – Schemes 1 and 2

	Option 1: Excavate and disposal of contaminated soil including the buried asbestos (off site) and removal of UPSS infrastructure.	Option 2: Excavate and offsite disposal of the majority of known contaminated soil, removal of all UPSS infrastructure and onsite encapsulation of special waste and special GSW, with the preparation of an EMP	Option 3: Option 1 or 2 with leaving UST 4 in-situ and implementation of an EMP	Option 4: Do nothing
Policy issue	Meets the EPA policy requirement by removing the contamination sources.	Meets the EPA policy requirement by removing the contamination sources and by eliminating pathways.	Meets the EPA policy requirement by removing the contamination sources and/or by eliminating pathways.	Would not meet EPA policy.
Reliability	The site would be suitable for use with no ongoing requirement for an EMP (for contamination purposes).	The site would be suitable for use, however, a long-term EMP (for contamination purposes) will be required, and limitations would be placed on the future site use to prevent exposure (for either buried asbestos underneath roadways or open space).	The site would be suitable for use, however, a long-term EMP (for contamination purposes) will be required and limitations would be placed on the future site use to prevent exposure (associated with possible residual contamination).	The site would not be suitable for use.
Practicability	No significant practicability issues have been identified.	Given the extensive excavation of basement areas across Scheme 1, roadways only occupy 1,764 m ² , therefore the encapsulation of 15,041 m ³ of asbestos impacted soil in roadway areas is not considered practical.	No significant practicability issues have been identified.	No significant practicability issues have been identified.
Capital cost	Very significant cost.	Very significant cost (slightly reduced).	Very significant cost (slightly reduced).	No cost.
Sustainability	High consumption of resources (energy, landfill, labour). High impact to surrounding land uses associated with large scale	Moderate to high consumption of resources (energy, landfill, labour).	High consumption of resources (energy, landfill, labour). High impact to surrounding land uses associated with large scale	The economic benefit of the do nothing approach is not considered to outweigh the sustainability disadvantages

	Option 1: Excavate and disposal of contaminated soil including the buried asbestos (off site) and removal of UPSS infrastructure.	Option 2: Excavate and offsite disposal of the majority of known contaminated soil, removal of all UPSS infrastructure and onsite encapsulation of special waste and special GSW, with the preparation of an EMP	Option 3: Option 1 or 2 with leaving UST 4 in-situ and implementation of an EMP	Option 4: Do nothing
	civil works (increased noise and traffic). Moderate risk to environment during excavation and disposal of soils (assuming well controlled civil activities), including possible releases of ground gases and vapours, contaminated dust, asbestos fibres and odour generation.	High impact to surrounding land uses associated with large scale civil works (increased noise and traffic). Moderate risk to environment during excavation and disposal of soils (assuming well controlled civil activities), including possible releases of ground gases and vapours, contaminated dust, asbestos fibres and odour generation.	civil works (increased noise and traffic). Moderate risk to environment during excavation and disposal of soils (assuming well controlled civil activities), including possible releases of ground gases and vapours, contaminated dust, asbestos fibres and odour generation.	associated with not remediating the site.
Ongoing liabilities	No ongoing liabilities as the sources have been removed.	Some ongoing liability associated with on-site containment of asbestos within soils. These risks would require long-term management, which would limit future use of the site and could affect value of property.	Some ongoing liability associated with possible residual contamination associated with a UST remaining insitu at the site. These risks would require long-term management, which would limit future use of the site and could affect value of property.	The site would remain an ongoing liability.
Regulatory approvals	Would be considered a Category 1 remediation and would require a Site Audit Statement and development of an SEE.	Would be considered a Category 1 remediation and would require a Site Audit Statement and development of an SEE.	Would be considered a Category 1 remediation and would require a Site Audit Statement and development of an SEE.	Unlikely to get approvals.
Human health and ecological	Removal of contamination sources.	Some ongoing human health risks and liability associated with encapsulation, leaving a long-	Some ongoing human health risks and liability associated with possible residual contamination	The existing human health and environmental risks associated with site would not be addressed.

	Option 1: Excavate and disposal of contaminated soil including the buried asbestos (off site) and removal of UPSS infrastructure.	Option 2: Excavate and offsite disposal of the majority of known contaminated soil, removal of all UPSS infrastructure and onsite encapsulation of special waste and special GSW, with the preparation of an EMP	Option 3: Option 1 or 2 with leaving UST 4 in-situ and implementation of an EMP	Option 4: Do nothing
risk of exposure to contamination	Long-term benefit to human health and environment.	term liability that must be managed appropriately.	associated with a UST remaining insitu at the site, leaving a long-term liability that must be managed appropriately.	
Human health and ecological risk of remediation activities	Human health: appropriate health and safety protocols would be required to minimise any risk from dust, silt run-off, odour, ground gas/vapours noise etc. No ecological risk during remediation activities.	Human health: appropriate health and safety protocols would be required to minimise any risk from dust, silt run-off, odour, ground gas/vapours, noise etc. No ecological risk during remediation activities.	Human health: appropriate health and safety protocols would be required to minimise any risk from dust, silt run-off, odour, ground gas/vapours, noise etc. No ecological risk during remediation activities.	No impacts.
Complexity	Relatively low technological complexity.	Relatively low technological complexity.	Relatively low technological complexity.	No technological complexity.
Implementation timeframe	Short timeframe.	Short timeframe. Long term EMP.	Short timeframe. Long term EMP.	Not applicable.
Implications of data gaps	Significant data gaps remain onsite relating to soil, groundwater and soil vapour. The major implications relate to unknown degree and extent of contamination across certain areas of the site and associated implications on volumes of different waste classifications of soil for disposal. The requirement for a vapour barrier to underlie the school in Scheme 2 is unknown.	Significant data gaps remain onsite relating to soil, groundwater and soil vapour. The major implications relate to unknown degree and extent of contamination across certain areas of the site and associated implications on volumes of different waste classifications of soil for disposal.	Significant data gaps remain onsite relating to soil, groundwater and soil vapour. The major implications relate to unknown degree and extent of contamination across certain areas of the site and associated implications on volumes of different waste classifications of soil for disposal.	No impacts.

	Option 1: Excavate and disposal of contaminated soil including the buried asbestos (off site) and removal of UPSS infrastructure.	Option 2: Excavate and offsite disposal of the majority of known contaminated soil, removal of all UPSS infrastructure and onsite encapsulation of special waste and special GSW, with the preparation of an EMP	Option 3: Option 1 or 2 with leaving UST 4 in-situ and implementation of an EMP	Option 4: Do nothing
		<p>The requirement for a vapour barrier to underlie the school in Scheme 2 is unknown.</p> <p>The actual amount of asbestos impacted soil is unknown, which will affect how feasible it is to encapsulate the soil onsite.</p>	<p>The requirement for a vapour barrier to underlie the school in Scheme 2 is unknown.</p> <p>The extent of contamination associated with UST 4 is unknown, therefore it is unclear whether leaving the UST insitu, represents a risk to future human health or ecological receptors.</p>	

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SOLUTIONS FOR
COMPLEX PROJECTS





Appendix 3: Community Newsletter

Project update – Northern Connection and Chatswood Dive Site

March 2024

Sydney Metro is Australia’s biggest public transport project.

Services started in May 2019 in the city’s North West with a train every four minutes in the peak. Metro rail will be extended into the CBD in mid-2024, with new metro railway stations at Crows Nest, Victoria Cross, Barangaroo, Martin Place, Gadigal and Waterloo, and new metro platforms at Central, and then onto Bankstown in 2025.

Systems Connect (an unincorporated joint venture between CPB Contractors and UGL Limited) is delivering line-wide work including installing metro rail track, power systems and infrastructure to turn the excavated tunnels into a working railway between Chatswood and Sydenham. Line-wide work also includes the permanent systems, services and buildings required for Sydney Metro operations between Chatswood and Bankstown.

What work are we doing?

Standard project work hours are Monday to Friday, 7am to 6pm and Saturday, 8am to 6pm.

Location	Work during standard hours
Chatswood Dive Site	<ul style="list-style-type: none"> • Material and concrete deliveries • Movement of materials and equipment in and out of the tunnels, including the use of mobile cranes • Services installation inside the dive buildings and the tunnels • Maintenance, clean up and demobilisation activities including demolition of temporary structures and concrete slabs, saw cutting and concrete breaking • Earthworks, geotechnical survey, environmental investigation and remediation work, civil and concreting work • Perimeter fencing installation, drainage and landscaping work
Frank Channon Walk extension work	<ul style="list-style-type: none"> • Minor finishing works on Nelson Street and along the Frank Channon Walk shared path extension between Nelson Street and Mowbray Road

Out-of-hours work (night) work hours – due to the nature of some activities and for the safety of community and workers, some work will occur outside standard construction hours

Location	Out-of-hours work
Chatswood Dive Site – 24/7 activities	<ul style="list-style-type: none"> • Delivery of machinery and movement of materials on the surface and in the tunnels • Light vehicle and workers accessing the site and the tunnels • Mechanical, survey and civil works, concreting and formworks • Maintenance, testing and commissioning activities of mechanical and electrical services, including power, communications and signalling equipment and systems, ventilation systems and dynamic train testing at the dive site and in the tunnels • Cable and services installation, interior building work inside dive site buildings • Monitoring activities inside and outside of the rail corridor • Site demobilisation activities • Services building work including, environmental investigation work, remediation, fit out, excavation and drilling, structural steel installation and concrete slab work • Structural steel and communication cables installation, underground mechanical, trackwork and civil works and tunnel ventilation system work



Northern Connection rail corridor – 24/7 activities	<ul style="list-style-type: none"> Maintenance, testing and commissioning of mechanical and electrical services, including power, communications and signalling equipment and services, ventilation systems and dynamic train testing at the dive site and through the tunnels Train movements in the rail corridor
Northern Connection (pending confirmation)	<ul style="list-style-type: none"> Rectification and maintenance work, drainage and cable work, fencing and signal installation <i>Further details of work will be provided via our email updates; highly impacted properties will be notified separately</i>
Mowbray Road (pending confirmation)	<ul style="list-style-type: none"> Telstra network installation work, including conduit installation, cable pulling and cable connection, involving excavation of the section of the footpath <i>Details of the work including work dates will be provided via our email updates</i>



What to expect


- Some of this work may be noisy. Every effort will be made to reduce the noise and disruption. Respite hours will be implemented in line with the project's approvals. Highly impacted residents will be notified separately.
- Equipment used will include, but not be limited to, excavators (including rock hammering equipment), concrete trucks and pumps, concrete vibrators, mobile cranes, elevated work platforms, loaders, rail tampers, hammer drills, rail grinders, hi-rail vehicles, generators, lighting towers, milling machines, pavers, water carts, light and heavy vehicles, tippers, dump and delivery trucks, hand-held and electric tools, demolition and road saws, jack hammers, power drills, vacuum trucks, asphalt pavers, welding equipment, rail and circular saws and compaction equipment, including a roller.


- The project team will take every step possible to minimise noise impacts. A range of measures are in place to meet the project's approval conditions and reduce noise, including noise barriers, using only the necessary equipment for each task, turning off equipment when not in use and equipping machinery with non-tonal movement alarms.
- Some equipment may be transported outside of standard construction hours in line with Transport for NSW requirements for transporting oversized vehicles.
- Delivery trucks will exit the Chatswood Dive site via Mowbray Road on to Pacific Highway.
- Access to the rail corridor, deliveries and spoil removal will be via our Mowbray Road compound, Drake Street or Chatswood Station.
- Access to buildings and driveways will be maintained. Where temporary footpath or lane closures are required, signage and traffic control will be in place to assist pedestrians and motorists. We will liaise directly with impacted residents.
- Temporary fencing, barricades and access gates will be installed to provide a safe and secure site.

Thank you for your cooperation and understanding while we complete this essential work.

To keep up to date with what is happening in the Chatswood and Artarmon area we encourage you to register for email updates, which provide the latest information about our work, including out-of-hours activities. If you have not already done so, please register for these updates by sending your name, address, email and phone number to linewidemetrol@transport.nsw.gov.au, or call us on 1800 171 386.

Contact us

 24-hour Community Information Line **1800 171 386**

 sydneymetro@transport.nsw.gov.au

 Sydney Metro City & Southwest, PO Box K659, Haymarket NSW 1240



Translating and interpreting service

If you need help understanding this information, please contact the Translating and Interpreting Service on **131 450** and ask them to call us on **1800 171 386**



Appendix 4: Environmental Management Plan



Contracting
an RMA Group Company

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN




Project

*Sydney Metro Chatswood Precinct
Worksite Remediation Works
Chatswood NSW 2067*

Project No
P24001

Contractor & Client Information			
Contractor	RMA Contracting Pty Ltd	Client	Sydney Metro
Address	Unit 12, 6-20 Braidwood St Strathfield South NSW 2136	Address	Level 43, 680 George Street Sydney NSW 2000
Phone	1300 798 808	Phone	1800 684 490
ABN	28 092 116 704	ABN	12 354 063 515
Key Contact		Key Contact	

Consultation			
Document created in consultation with:			
Project Manager	Charlie Dutra	Systems Manager/Environmental	Naomi Marshall
Project Manager	Luke Slechta	Project Administrator	Alesha Gosling
Site Superintendent/Supervisor	Ben Bowerman		

Document Review					
					
Name	Alesha Gosling	Name	Charlie Dutra	Name	Naomi Marshall
Position	Project Administrator	Position	Project Manager	Position	Safety & Environmental Manger
Date	12/01/2024	Date	12/01/2024	Date	25/01/2024

Revision History					
Rev.	Description	Date	Author	Reviewed	Approved
A	Issued for review	25/01/2024	Alesha Gosling Naomi Marshall	Luke Slechta	Charlie Dutra
B	Issued for review	1/2/2024	Naomi Marshall	Luke Slechta	Charlie Dutra
C	Issued for review	21/2/2024	Naomi Marshall	Luke Slechta	Charlie Dutra
D	Issued for Use	29/02/2024	Naomi Marshall	Luke Slechta	Charlie Dutra

ENVIRONMENTAL POLICY

It is the policy of The RMA Group (RMA) to ensure that all activities resulting from its business operations will be carried out in such a manner as to eliminate, control, or minimize their impact on the immediate and wider environment.

It is the policy of RMA to continually improve its environmental management, to prevent pollution and to ensure that all workplaces are free of environmental incidents which impact on air, water, soil, natural resources, flora, fauna, and people.

The objectives of the Environmental Management System are:

- Maintaining certification to ISO 14001:2015.
- Encouraging customers, staff, suppliers, and subcontractors to adhere to the terms of the policy.
- Complying with relevant legislation and regulations.
- Assigning responsibility for overall implementation, audit, review, and improvement of the system to the Systems Manager.
- Providing operational conditions which encourage all interested parties to participate in continual audit, review, and improvement of the system.
- Providing training and resources to staff and subcontractors.

In demonstrating its commitment to RMA's Integrated Management System incorporating Environmental Management, The RMA Group has committed to a program of reduction, avoidance and offsetting of greenhouse gas emissions. RMA is further committed to becoming fully carbon neutral.

Signature:



Andrew Mayes
Director

Dated 01/06/2022

DRUG AND ALCOHOL POLICY

We are a drug and alcohol-free workplace. All employees, regardless of their employing organisation's policy on this matter, are required to be drug and alcohol free whilst working for RMA Group (RMA) or engaged in any work relating to RMA.

A drug and alcohol-free workplace are defined as:

For Alcohol: Less than 0.00% blood alcohol concentration, and
For Drugs: Any level of drug less than the cut off levels stipulated by Australian Standard AS/NZS 4308.

Any person reporting to work or undertaking work for RMA with drug and/or alcohol levels above these standards will be immediately removed from RMA work and their employing organisation advised that they will no longer be allowed to undertake work in any capacity for at least a 12-month period.

Disciplinary action (if any) will be at the discretion of the employee where some serious or ongoing breaches may result in dismissal.

It is an employee's responsibility to ensure that they are drug and alcohol free at work.

There will be a drug and alcohol testing program in place for all employees working for RMA. Any employee may be required, at any time, to undertake a drug and / or alcohol test.

Employees working for RMA Group are not permitted to have or sell alcohol, prohibited drugs, or prohibited plants, or be in possession of any item of equipment for the use or administration of a prohibited drug or plant.

Signature:



Andrew Mayes
Directo

Dated 01/06/2022

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ABBREVIATIONS

Term	Meaning
AA	Acoustics Advisor
AMBS	AMBS Ecology & Heritage, Heritage Consultant and Excavation Director
CEMP	Construction Environmental Management Plan
CNVIS	Construction Noise and Vibration Impact Statement
CSSI	Critical State Significant Infrastructure
CTMP	Construction Traffic Management Plan
EMS	Environmental Monitoring Services, Noise and Vibration Consultant
EPA	NSW Environmental Protection Authority
ER	Environmental Representative
EWMS	Environmental Work Method Statement
Planning Approval	Critical State Significant Infrastructure Planning Approval CSSI_7400
RMA	RMA Group/RMA Contracting Pty Ltd
RMS	Roads and Maritime Services
Secretary	Secretary of the NSW Department of Planning and Environment or nominee
TTLG	Traffic & Transport Liaison Group
UST	Underground Storage Tank
WHS	Work Health & Safety
WMP	Waste Management Plan

COMPLIANCE TRACKING

CSSI_7400 Planning Approval Conditions and Revised Environmental Mitigation Measures

Document & Condition Number	Requirement	RMA Document
CoA A5, A11	General	CEMP Section 5.3
CoA A12, A13	Staging	CEMP Section 5.3
CoA A19, A20	Ancillary Facilities	CEMP Sections 5.17, 5.18, 5.21
CoA A22, A24	Environmental Representative	CEMP Section 5.3
CoA A25, A27	Acoustics Advisor	CEMP Section 5.3

CoA A41-44	Incident Notification	CEMP Section 6.3
CoA B7, B13 & B14	Complaints Management System	CEMP Section 6.2
CoA E2-E3	Utilities and Services	CEMP Section 5.19
CoA E4	Materials Storage	CEMP Section 5.12
CoA E5	Air Quality	CEMP Section 5.18
CoA E10, E17, E18, E19, E20	Heritage	CEMP Section 5.24
CoA E23, E24, E25	Aboriginal Heritage	CEMP Section 5.24
CoA E26, E27	Human Remains	CEMP Section 5.24
CoA E28, E30, E31	Noise and Vibration	CEMP Section 5.21 & 5.24
CoA E32, E33, E34	Construction Noise and Vibration Strategy	CEMP Section 5.21 CNVIS
CoA E36	Standard Hours of Construction	CEMP Section 5.9 CNVIS
CoA E40	Respite for Receivers	CEMP Section 5.21 CNVIS
CoA E41	Mitigation – Non-Residential Zones	CEMP Section 5.21 CNVIS
CoA E42	Mitigation – Residential Receivers in Residential Zones	CEMP Section 5.21 CNVIS
CoA E43	Workplace Health and Safety for Nearby Workers	CEMP Section 5.21
CoA E44, E45	Variation to Standard Construction Hours	CEMP Section 5.9
CoA E47	Out of Hours Work Protocol	CEMP Section 5.9
CoA E58, E59, E60, E62	Building Condition Survey	CEMP Section 5.26
CoA E65	Soils	CEMP Section 5.17
CoA E66, E67	Contaminated Sites	CEMP Section 5.3
CoA E77, E78	Traffic and Transport Liaison Group	CEMP Section 5.22
CoA E79, E80, E81, E82, E83, E85	Construction Transport and Access	CEMP Section 5.22
CoA E88	Construction Transport and Access	CTMP Appendix A
CoA E90, E91	Road Dilapidation	CEMP Sections 5.22 & 5.26
CoA E106	Waste	CEMP Section 5.20 WMP Section 3
CoA E107	Water	CEMP 5.12 & 5.17

REMM T3, T4, T6, T8, T9, T12, T13, T14, T19, T22	Construction Traffic and Transport	CEMP Section 5.22 CTMP
REMM NV1 NV2 NV3 NV4	Construction Noise and Vibration	CEMP Section 5.21 CNVIS
REMM NAH3	Non-Aboriginal Heritage	CEMP Section 5.24
REMM LV1, LV2, LV3, LV5, LV11	Landscape Character and Visual Amenity	CEMP Section 5.27
REMM SCW3	Construction – Soils, Contamination and Water Quality	CEMP Section 5.17
REMM B3	Biodiversity	CEMP Section 5.23
REMM AQ1, AQ2	Air Quality	CEMP Section 5.25 & 5.28
REMM AQ3	Air Quality	CEMP Section 5.28
REMM AQ5, AQ6, AQ7, AQ8	Air Quality	CEMP Section 5.18
REMM HR1	Construction – Hazardous Substances	CEMP Section 5.12
REMM HR2	Construction – Identifying Underground Services	CEMP Section 5.19
REMM WM1	Construction – Waste Management	WMP Section 3.3
REMM WM2	Construction – Waste Management	WMP Section 3.5
REMM WM3	Construction – Waste Management	WMP Section 4
REMM WM4	Construction – Waste Management	WMP Section 3
REMM CU1	Cumulative Impacts	CEMP Section 2.3

1. PROJECT INFORMATION

1.1 THE PROJECT

Sydney Metro Chatswood Precinct Demolition and Remediation Works

SMC-23-0952 Design and Construct of Chatswood Demolition and Remediation for the City and Southwest Metro Project.

This project falls under the construction and operation of the section between Chatswood and the Sydenham dive site known as “CSSI_7400”. The works are undertaken as ‘Low-Impact Works’ per the Chatswood to Sydenham Staging Report and are subject to CSSI Planning Approvals. RMA is required to comply with CSSI_7400, including the modifications to this approval, to the extent required by Sydney Metro.

1.2 PROJECT AND SITE INFORMATION

The site is located within the Willoughby Local Government Area (LGA) and a former Ausgrid property. The eastern boundary is defined by the main north shoreline, with the Pacific Highway to the west, Nelson Street to the north and Mowbray Road to the south.

The site is part of a larger property owned by Sydney Metro being utilised for construction activities associated with the Sydney Metro – City and Southwest project. Sydney Metro - City and Southwest is an extension of metro rail from the end of Sydney Metro Northwest Line at Chatswood, under Sydney Harbour, through new CBD stations and southwest to Bankstown. The eastern portion of the property comprises a dive area for the development of the Sydney Metro program and will be retained as an operational part of the Sydney Metro network.

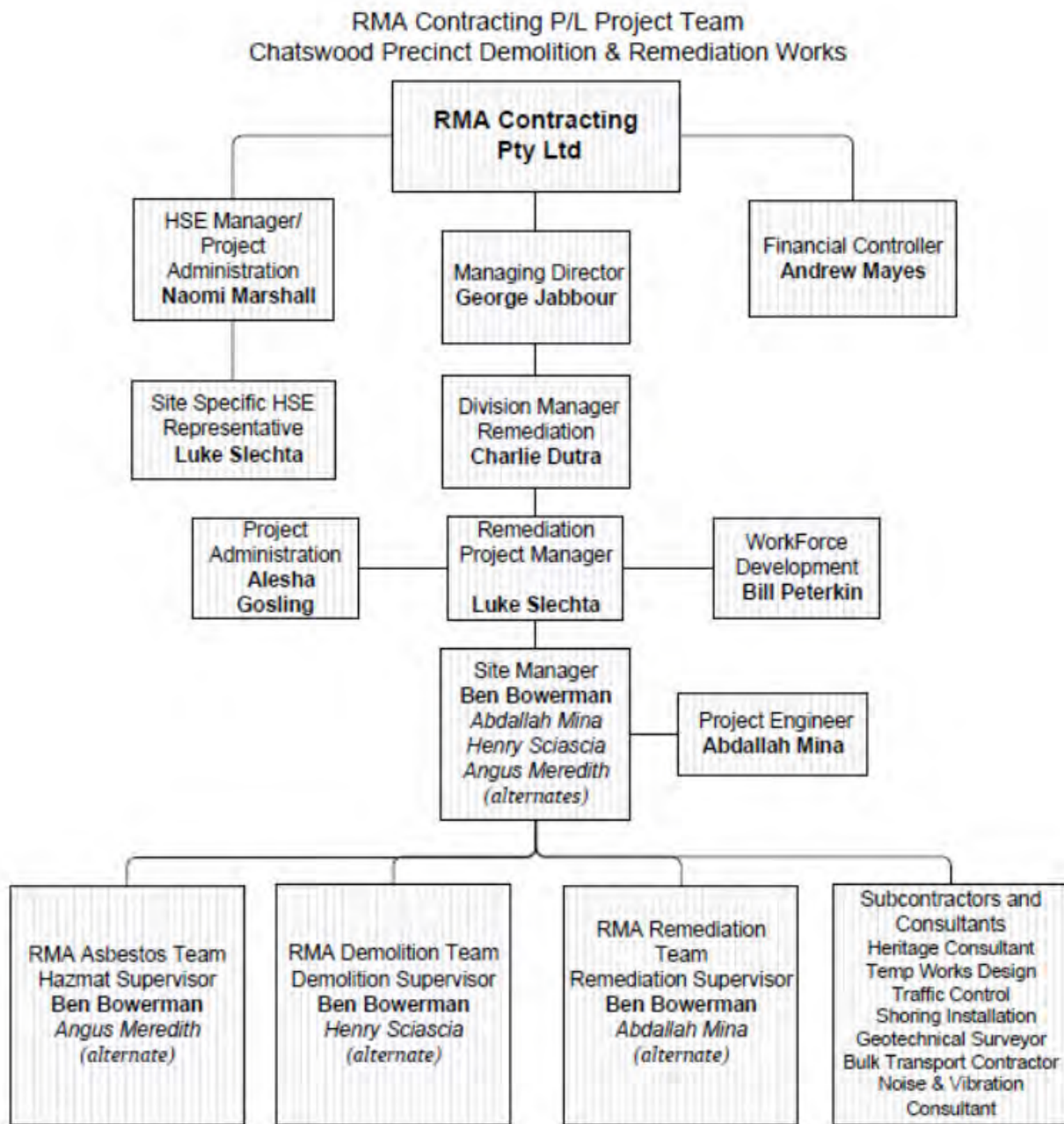
RMA has been engaged by Sydney Metro to remediate legacy contamination that has been identified at the Chatswood site.

The scope involves the demolition and removal of all concrete slabs and hardstand surfaces across the site followed by the decommissioning and demolition of disused underground storage tanks (USTs) and associated remnant fuel, and the excavation of potentially contaminated soil. Offsite disposal of all excavate soil will be carried out after soil testing and validation.

1.3 SUMMARY OF WORKS

- Site establishment including installation of safety and environmental controls.
- Protection of council and RMS assets, including temporary design and installation of any retention structures required to complete excavation works.
- Demolition and removal of concrete slabs and hardstand surfaces.
- Decommission and removal of disused underground storage tanks (USTs).
- Excavation and removal of soil including asbestos contaminated soil.
- Site demobilisation and general rubbish cleanup.

1.4 PROJECT ORGANISATIONAL CHART



1.5 PROJECT CONTACT INFORMATION

Name	Role(s)	Contact Number
RMA Contracting Pty Ltd		
Charlie Dutra	Project Manager	
Luke Slechta	Project Manager	
Naomi Marshall	Environmental Manager	
Ben Bowerman	Site Superintendent/ Supervisor/First Aid Officer	
Alesha Gosling	Project Administration	
Andrew Mayes	Rehabilitation Coordinator	
Sydney Metro		
Gaya Prem Kumar	Project Manager	
Benjamin Schip	Senior Project Manager	
Validation Consultant		
Nation Partners	Validation Consultant	
Liam Gooley	Principal – Environmental Advisory	
Ryan Thomson	Consultant	
Subcontractors and Consultants		
AMBS Ecology & Heritage	Heritage Consultant	
Lian Ramage	Excavation Director	
AMBS Ecology & Heritage		
Bulk Transport Solutions	Haulage and Bulk Transport	
C&A Consulting Group	Temporary Works Design	
AAA Traffic Control	Traffic Control	
EMS Environmental Monitoring Services	Noise & Vibration Consultant	
Occupational Hygiene Consulting P/L	Occupational Hygiene Consultant	
Tetra Tech Coffey	Geotechnical Survey	
Hospital		
Royal North Shore Hospital	General Enquiries & Emergency Department	
Reserve Road St Leonards NSW 2065		
Emergency Contact		
Ambulance, Police, Fire Brigade		000 or 112 mobiles
SafeWork NSW		131 050
AARNet Pty Ltd NSW		1300 275 662
Ausgrid		02 4951 0899
FibreSense Pty Limited (NSW)		1300 947 466
Jemena Gas North		1300 880 906
NBN Co		1800 687 626
Nextgen NCC – NSW		1800 262 663
Optus and or Uecomm NSW		1800 505 777
Sydney Metro		02 8265 9400

Sydney Trains Metro North	02 9848 9578
Sydney Water	13 20 92
Telstra NSW Central	1800 653 935
TPG Telecom (NSW)	1800 786 306
Transport for NSW	02 9983 3030
Verizon Business (NSW)	02 8210 3243
Vocus Communications	1800 262 663
Willoughby City Council	02 9777 1000
EPA	131 555
SES	132 500
Poison Helpline	131 126
Roads and Maritime Services	132 213

2. ENVIRONMENTAL MANAGEMENT

2.1 ACTS & REGULATIONS

There are number of Acts and Regulations which currently impose pollution and environmental controls in NSW. The primary one that will be adhered to is the Protection of the Environment Operations Act 1997.

The Protection of the Environment Operations Act 1997 is generally the main legislation referred to when compiling this CEMP however other relevant Legislative Acts and Regulations include the following.

Note: where a discrepancy exists between requirements, the requirement that provides the highest level of environmental management will take precedence.

Acts

- Aboriginal and Torres Strait Islander Heritage Protection Act, 1984
- Aboriginal Land Rights Act, 1983
- Australian Heritage Council Act, 2003
- Biodiversity Conservation Act 2016
- Biological Control Act, 1985
- Biosecurity Act 2015
- Coastal Management Act 2016
- Contaminated Land Management Act, 1997
- Dangerous Goods (Road and Rail Transport) Act, 2008
- Environmental Planning and Assessment Act, 1979
- Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
- Heritage Act, 1977
- Land and Environment Court Act, 1979
- Local Government Act, 1993
- National Parks and Wildlife Act 1974
- Ozone Protection and Synthetic Greenhouse Gas Management Act, 1989 (Commonwealth)
- Pesticides Act, 1999
- Protection of the Environment Administration Act, 1991
- Protection of the Environment Legislation Miscellaneous Amendments Act 2017
- Protection of the Environment Operations Act 1997
- Soil Conservation Act, 1938
- Waste Avoidance and Recovery Act, 2001 (NSW)
- Water Management Amendment Act 2018
- Water Management Act 2000

Regulations

- Protection of the Environment Operations (Waste) Regulation 2014
- Environmentally Hazardous Chemicals Regulation 2017

2.2 OBJECTIVES

The environmental objectives RMA aim to meet for this project are:

- Minimise the impact on the Environment.
- Reduce the impact of Greenhouse gases on the Environment.
- Reduce the amount of waste sent for landfill by recycling and sending materials for beneficial reuse.
- Minimise exposed and unprotected soils to prevent runoff.
- Comply with all state and federal regulations.
- Minimise generation of dust.
- Minimise generation of noise.
- Minimise air and water contamination.

2.3 CONSULTATION WITH SYDNEY METRO

RMA will maintain open communication with Sydney Metro for the duration of the project. This will be achieved through weekly environmental management meetings, attendance of Traffic & Transport Liaison Group (TTLG) meetings, email correspondence and phone or in person conversations.

To assist Sydney Metro in fulfilling their obligations under the CSSI Planning Approval, RMA will provide to Sydney Metro the required information, documents, details and data as requested. This information will include regular updates of the program, work stages and progress, changes to scope, changes to traffic management including haul routes and unexpected finds including heritage or archaeological finds.

2.4 PROJECT SPECIFIC MANAGEMENT SYSTEM SET-UP CHECKLIST

	Item	Responsibility	NOTES
1	On being informed of a new project starting, a blank copy of the Project Site File shall be produced.	Project Manager Project Administrator	
2	The Project Site File is to be issued to the Site Supervisor.	Project Manager Project Administrator	
3	The Site Supervisor is to ensure that site-specific management plans are housed on site for the complete duration of the project and is made available for inspection by Any person working on this site.	Site Superintendent/ Supervisor	
3a	The Site Supervisor is to ensure that any parts of this plan deemed relevant to a subcontractor is provided to the subcontractor prior to them starting work on this site and A copy of any changes to this plan that are relevant to a subcontractor must be provided to that subcontractor as soon as practicable after the change is made.	Site Superintendent/ Supervisor	
4	The site team shall conduct an Environmental planning meeting, filling out all relevant information contained in the Site File. This includes nominating site personnel to be responsible for the implementation of environmental controls.	Project Manager Site Superintendent/ Supervisor	

5	Set up the Site Notice Board attaching copies of all relevant documents nominated in the CEMP	Site Superintendent/ Supervisor	
6	Ensure that First Aid Kits are available in the locations nominated in the Site Plan and check that the contents are complete as required in the WHS Regulation	Site Superintendent/ Supervisor	
7	Ensure that fire extinguishers have been currently checked and are in the locations nominated in the Site Plan.	Site Superintendent/ Supervisor	
8	As workers come onto site ensure that they receive Site Induction Training. All Induction information must be recorded and filed in the Project Site File	Site Superintendent/ Supervisor	
9	Ensure that the Site Staff have carried out all their responsibilities and the Project Site File has been set up correctly on site.	Project Manager	
10	Ensure that as Sub-contractors commence on site, their employees have been trained, inducted, and are aware of the contents and procedures contained in the CEMP	Site Superintendent/ Supervisor	

3. TRAINING AND DEVELOPMENT

3.1 WORKER TRAINING AND LICENCES, ANALYSIS AND EVALUATION PROCEDURE

Purpose

The purpose of this procedure is to identify the current training level of each Worker and to identify what further training is required. The Training Needs Analysis also provides the organisation with a method of targeting future training requirements.

Definitions

Nil

Standard (including relevant legislation)

Refer to Policies, and Health, Safety and Environment Legislation and Information Sources, for details relating to relevant standards and legislation for each State/Territory, and requirements of ISO 9001:2015, AS/NZS 4801:2001 and ISO 14001:2015.

Procedure

This procedure provides for identification of the functions, tasks, tools, and attitudes/behaviours required for all positions within RMA and will be used when recruiting both new and existing employees into positions with RMA, ensuring the “right fit”. In general,

- Training will be provided to all personnel so as to enable them to perform tasks safely and to assist them to support the existing quality, health, safety, and environmental management system objectives, and including in accordance with their area/s of responsibility.
- Competencies and licences of all employees will be recorded on the Personnel Skills Register, with records kept on the personnel files for the individual employees. This information is to be used when allocating tasks or selecting personnel for new positions or functions. This will include a review of the effectiveness of action taken.
- For those employees who (may) have a need to drive a vehicle for work related purposes, licences will be sighted and checked for validity every six months. A photocopy of all licences will be filed on the individual employee’s personnel file.
- Employee Training Records will be kept in the Training Register.
- Employee Competency, Licence and Training Records are to be updated within two weeks of new information being received.
- For WHS, human resources are made available for specialised skills and technology. In addition, the financial resources necessary as appropriate are also provided.

The process for training needs analysis and verification is:

1 Examine Personnel and Position Profiles: Each person’s training requirements and the requirements of each position are examined on a regular basis. This examination is planned and recorded via a performance review process, which references each person’s current position and their current and future potential.

2 Establish Training Needs: The performance reviews identify the performance and suitability of an employee, and their training needs, taking into account an analysis of their functional duties, responsibilities and verification responsibilities, knowledge, skill, experience, attributes, qualifications, and training requirements of the position.

3 Identification and Agreement of Training Courses: The General Manager maintains a library of training courses relevant to RMA's needs. This (and other training information and course details) are reviewed in light of the training needs identified for personnel. Consideration is also given to the feedback received from courses attended by other personnel. Training services are then sought, on a commercial basis, for the training required.

4 Train Personnel: All personnel are given the opportunity to attend training and reach the objectives of the courses attended. Personnel are to reach their potential at these training courses and register their achievements and competency as appropriate, including participation in tests and examinations as appropriate.

5 Verify Achievements and Competencies: Project Managers, with support from the General Manager, verify and record that training has been completed and results have been recorded, including achievements and feedback, from the participant.

6 Carry Out Work: Upon verification of the completion of suitable training courses and/or achievement of qualifications by participants, in line with their position profiles, the Project Manager permits them to work by completing the relevant authorisation section of their profile. The Systems Manager is authorised to stop work (where appropriate) whenever the training requirements of the personnel are not in line with the position profile requirement. They are treated as non-conformances.

INPUT	STEPS	OUTPUT
<ul style="list-style-type: none"> • RMA personnel • Selection of employment records • Current Organisation Chart and Position Descriptions 	<p style="text-align: center;">1</p> <p style="text-align: center;">Examine personnel and position profiles</p>	<ul style="list-style-type: none"> • Personnel Skills Register • Training plans updated
	<p style="text-align: center;">2</p> <p style="text-align: center;">Establish training needs.</p>	<ul style="list-style-type: none"> • Personnel and position profiles completed. • Position Descriptions versus personnel
<ul style="list-style-type: none"> • Register/library of current courses • Training services 	<p style="text-align: center;">3</p> <p style="text-align: center;">Identification and agreement of training courses</p>	
<ul style="list-style-type: none"> • Training facilities and resources 	<p style="text-align: center;">4</p> <p style="text-align: center;">Train personnel</p>	<ul style="list-style-type: none"> • Attendance list • Training services record • Updated diaries
<ul style="list-style-type: none"> • Test and examination results 	<p style="text-align: center;">5</p> <p style="text-align: center;">Verify achievements and competencies</p>	<ul style="list-style-type: none"> • Update profile of person
	<p style="text-align: center;">6</p> <p style="text-align: center;">Carry out work</p>	

Requirements identified specifically for Health and Safety and Environmental Training within RMA include:

TRAINING COURSE	TARGET GROUP	COURSE LENGTH	TIME OF DELIVERY	REFRESHER
1. Induction	New personnel	1 day	On commencement	Not applicable
	Transferred personnel.	½ day	On commencement	
	Contractors	½ day	Prior to start	
	Visitors	1 hour	Prior to start	
2. First Aid	Nominated workplace First Aid Officers	Level dependant	On commencement	Yearly ½ day
3. Emergency Response Wardens	Nominated Emergency Response Team members	2 days	Within 1 month of commencement	Yearly 2 hours
4. Emergency Procedures	All Workers	1 hour	On commencement and prior to start, as part of Worker Induction and all Site Inductions	Yearly 1 hour
5. Hazard Identification, Environmental Controls, Risk Assessment & Risk Control	All Supervisors	½ day	Within 2 months of appointment/ election	
	All HSE Representatives			
6. Incident Investigation	All Supervisors	½ day	Within 2 months of commencement	
	All Section Managers			

Responsibility
General Manager

Audit Records

- Training Needs Analysis
- Training Registers
- Induction Registers
- Training Schedules
- Personnel Records for Individual Employees
- Personnel Skills Register

Procedure Owner
Managing Director

3.2 ENVIRONMENTAL TRAINING AND INDUCTION

All personnel to receive CEMP Induction Training completed by the RMA's Project Manager or Site Superintendent/Supervisor

In general, Environmental site inductions for each issue will cover the following:

- Overview of Roles and Responsibilities in relation to Environmental Management.
- Legal basis for requirements (legislation, policy etc).
- Explanation of context and importance of individual environmental issues in relation to the site, the region, and the project.
- Explanation of control measures and actions for individual environmental issues in the project area/s.
- Information pertaining to unexpected finds protocols.
- Sign off understanding of relevant issues on induction sign-off sheets.

4. COMMUNICATION AND CONSULTATION

4.1 PROCEDURE

Purpose

This procedure describes the methods for communication and consultation established by RMA to ensure that all internal and external parties are provided with the relevant quality, health, safety, and environment information on a regular basis, when required and/or in response to communications.

Definitions

Persons Conducting a Business or Undertaking (PCBU): includes RMA as the employer and other businesses RMA has dealings with

Worker: includes all employees and any other person who carries out work for RMA.

Standard (including relevant legislation)

Refer to Policies, and Health, Safety and Environment Legislation and Information Sources, for details relating to relevant standards and legislation for each State/Territory, and requirements of ISO 9001:2015, ISO 45001:2018, ISO 14001:2015.

Procedure

RMA has implemented internal communication and consultation processes. Consultation needs to happen when:

- Identifying hazards and assessing risks, from the work carried out or to be carried out.
- Making decisions about ways to eliminate or minimise risks.
- Making decisions about adequacy of facilities for the welfare of Workers.
- Proposing changes that may affect the health or safety of Workers.
- Making decisions about procedures for consulting with Workers.

Consultation can also be beneficial when:

- Formulating and/or changing policies, procedures, or forms.
- Formulating Job Safety Analysis and Safe Work Method Statements.
- Conducting investigations into incidents or near misses.
- Investigating safety or environmental issues or concerns.

Information is conveyed through a number of mechanisms, including:

- Staff memos, emails, and letters.
- Notice boards.
- Company newsletter.
- Management and staff meetings and minutes.
- Toolbox meetings and minutes.
- Internal Training, including Induction.
- Critical incident reports.
- Accident and incident investigation.
- Signs.
- Payslips.
- Verbal instruction.

- Daily Equipment Reports.
- Employee Health & Safety Representatives (HSRs).
- Committees and Committee Meeting Minutes.

Management Meetings

Regular management meetings are held by the senior management team, chaired by the General Manager. The purpose of these meetings is to set the strategic direction for the company, to analyse competitor activity, to review existing and required resource requirements, to set financial budgets and review performance against budget, to set and review IMS objectives and to attend to all other matters that require senior management attention.

Management Reviews

Described in PRC 010 Management Review.

Department Meetings

The Department meetings are held weekly. Management and staff will attend the meeting. These meetings are used as a forum to:

- establish and agree on consultation arrangements and mechanisms.
- review operational activities, including performance against the Integrated Management System Objectives
- facilitate regular communication and consultation between management and staff.

Toolbox/Work group meetings

Where internal information is conveyed verbally at Toolbox/Work Group meetings the superintendent/supervisor shall maintain a record of the items discussed and the employees and subcontractors present at the meeting. These meetings may be used as a forum to:

- establish and agree on consultation arrangements and mechanisms.
- consult with employees on and about proposed changes to the work environment, processes or practices that could have health and safety implications.

New issues raised at Toolbox/Work Group meetings are to be noted and followed up by the superintendent/supervisor or referred on to the appropriate person/s for a response.

A more formal Consultation Process

RMA is committed to the consultation process. The following structures can exist:

- Health and Safety Representatives (HSRs)
- Health and Safety Committee (HSC)
- Environment Committee
- Consultation Committee
- Health and Safety subcommittees
- Direct employee liaison.

If a Worker requests an election for an HSR, the General Manager will:

- facilitate the determination of the work groups.
- reach agreement on the number of work groups and HSRs (and deputy HSRs)
- provide reasonable resources, facilities and assistance as required to conduct the election.
- notify SafeWork of its HSRs and any deputy HSRs.
- provide support, resources, and facilities for the HSR to perform their functions and allow the HSR adequate time at normal pay to carry out their role.
- consult and confer with the HSR on work health and safety issues.

- allow the HSR access to all information relating to hazards, risks, health, and safety of Workers at the workplace (excluding workers' personal medical information without the workers consent)
- allow the HSR to be present at interviews relating to work health and safety issues if a Worker consents.
- allow any person assisting the HSR access to the workplace as necessary.
- permit the HSR to accompany an inspector on an inspection.

An HSC will be established by the General Manager within two months after being requested to do so:

- if requested by the HSR, or
- if requested by five or more workers, or
- on the initiative of RMA Management.

RMA has also implemented external communication and consultation processes, as follows:

- Where there is more than one PCBU involved in a project, each PCBU must work cooperatively together to prevent injury and illnesses, as follows:
 - Consult – share information with Workers and other PCBU's.
 - Cooperate – assist other duty holders to meet their duties if requested, and
 - Coordinate – with other duty holders so each person meets their duty of care, to the extent within which is reasonably practicable.
- Upon request, RMA will provide information to external parties, including members of the public, about its Integrated Management System. The response should be tailored according to the nature of the request and reviewed by the General Manager before sending.
- RMA Quality, Work Health and Safety and Environmental Policies are communicated, during selection processes, to contractors and suppliers to ensure that they understand RMA's commitment and expectations.
- All media correspondence is handled by the Managing Director.
- Complaints and community or public enquiries are handled by the General Manager.
- Responding to external communications will be at the discretion of the Managing Director.
- Documentation of relevant external communications will be kept on file.
- In the event that correspondence is received relating to any significant environmental impacts or OHS issues (see Hazard and Risk Register for these classifications) then this correspondence in the first instance must be referred to the MD for information dissemination, investigation, reporting, legal/specialist advice, response and/or system/procedure review.

Translator Services

RMA is a multicultural workplace and therefore from time-to-time translation services may be required to ensure the communication lines remain open to and from all staff and subcontractors.

It is RMA policy that at least 1 team member at all times is fluent in English in both the written and verbal forms. This team member (usually a supervisor) will be responsible for the translation of instructions / information to any staff member with English as a second language. If a translator is not present than a phone conference call may be necessary to ensure the personnel are aware and completely understand what is being explained to them.

No staff member or subcontractor is to be disadvantaged, made feel uncomfortable or expected to complete any works without ensuring they are fully aware of the instructions and can confidently complete the task in a safe and appropriate manner.

Responsibility

General Manager

Audit Records

- Management Meeting Records
- Management Review Meeting Records
- Department Meeting Records
- Toolbox/Work Group Meeting Records
- Training Records
- Induction Records

Procedure Owner

Managing Director

5. ENVIRONMENTAL CONTROLS

5.1 CONTROLS AND CORRECTIVE ACTIONS

The RMA Site Superintendent/Supervisor is accountable for implementation of all mitigation and environmental control measures as detailed in this plan. He is also responsible to address any complaints that may be brought up by the local community. If any such complaints are made, RMA's Systems Manager is to be informed immediately for direction and appropriate corrective action.

5.2 AUDITING

An internal environmental audit will be conducted by the RMA HSEQ&R/Systems Manager. Audit results will be referred to the RMA Site Superintendent/Supervisor for mitigation measures if necessary. This is to ensure that operations on site are in accordance with this CEMP and that any revisions have been amended to the CEMP. The RMA Site Superintendent/Supervisor will conduct daily checks of environmental mitigation measures to ensure their continuing implementation and effectiveness.

5.3 PLANNING APPROVAL OBLIGATIONS AND CONSULTANTS

Under the CSSI Planning Approval, Sydney Metro have a responsibility to provide the Secretary with all information required under the conditions and to engage Consultants such as an Environmental Representative (ER) and an Acoustic Advisor (AA) who are independent of the design and construction personnel. A Validation Consultant and Site Auditor have also been engaged to prepare the Site Contamination Report and Site Audit Statement and Site Audit Report.

To enable Sydney Metro to fulfill their obligations under the Planning Approval, RMA will provide to Sydney Metro all relevant information, documents, details and data to allow them to meet their functions and obligations.

Staging Report

Sydney Metro have prepared a Staging Report for this project. RMA are required to implement the requirements of this report relating to non-staged Minor Works.

Planning Condition Breaches

RMA, in providing our services to Sydney Metro, are bound by the Planning Approval conditions. We are responsible for any breach of these conditions resulting from the actions of our employees, contractors, subcontractors and site visitors.

5.4 SITE INDUCTION

Prior to commencement on site, RMA will ensure that all persons carrying out the nominated work have participated in the Site-Specific Safety Induction. All personnel must first report to the Site Office located in Mowbray House and be inducted into the site by the Project Manager or Site Superintendent/Supervisor.

Records of the Safety Induction shall be maintained within the Site Office for the duration of the project.

Prior to commencement, RMA will ensure that all persons carrying out the nominated work have relevant training including the General WHS Induction Training for Construction Work in NSW or equivalent, in accordance with NSW WHS Legislation along with any relevant environmental training.

Records of the "General" Construction Industry induction shall be confirmed prior to commencing on site.

All visitors to the site are required to sign in at the Site Office and must be escorted at all times by a fully inducted RMA staff member.

5.5 PRE-START MEETINGS

A Pre-Start meeting shall be held with all workers before any work commences or when work activity changes.

The meeting shall include discussion on immediate work task/issues and environmental information for that group on that shift or task. It is recorded on Form 096 Daily Pre-Start Meeting.

The meeting may cover such issues as:

- Work that is of highest priority.
- Preparation and review of EWMS.
- Environmental work practices to be used.
- Permits required.
- Impact from other contractors or subcontractors.
- Technical procedures to be used.
- Impact of weather on the day.

5.6 SITE NOTICE BOARD

The Site Office (Mowbray House) and or site shed facilities shall have a noticeboard installed to display relevant Environmental information inclusive of:

- Environmental alerts,
- Internal memos,
- Client advisories,
- Company policies,
- Project contact details
- First Aiders

5.7 EMERGENCY RESPONSE

RMA have prepared an Emergency Response Management Plan for this project. This plan will be used to control any Environmental emergencies that may arise. The internal and external reporting duties are explained in Section 6 of this CEMP.

5.7.1 General Site Emergency Procedure

Site Superintendent/Supervisor to notify all personnel and visitors to site of accident and emergency procedures during site induction and will clearly define first aid facilities.

IDENTIFY EMERGENCY

Confirm emergency (Fire/ accident / injury) with another person.

RAISE ALERT

Alert is to be raised by person identifying emergency.

For Fire alert the Site Superintendent/Supervisor.

For Accident alert the First Aid Officer and Site Superintendent/Supervisor.

For injury alert the First Aid Officer.

IN ALL CASES

***Do not put yourself in danger.
Do not move injured personnel except where there is a chance of further danger.***

SERVICES

Where there is a chance of heightening the emergency, turn off Electricity and Gas supply if there is the ability to do so.

FOR FIRE, SELF EXTINGUISH

Extinguish the fire with extinguisher or other means, if the fire is small and it is safe to do so.

Person closest to extinguisher is to bring the extinguisher to the location of the fire if it is safe to do so.

EVACUATE

RMA Site Superintendent/Supervisor shall raise the alarm by sounding the emergency horn continuously.

The RMA Site Superintendent/Supervisor shall call the emergency Services giving clear and precise information about the emergency.

All personnel, if safe to do so, shall evacuate the building/site by the closest exit. Take your bags and valuables with you if it is safe to do so.

All personnel to assemble at the Evacuation Assembly Point as marked on the Site Plan and discussed during the Site Induction.

The senior person from each Sub-Contractor shall account for all personnel under their control and report to the RMA Site Superintendent/Supervisor.

The RMA Site Superintendent/Supervisor shall ascertain from these reports whether all personnel have been evacuated from the site.

Where it is found that personnel are not accounted for, the Site Superintendent/Supervisor shall take appropriate action without exposing anyone to further danger.

5.8 COMMUNITY CONSULTATION

RMA company signage detailing contact information of the contractor (RMA) will be displayed at the site boundary. The contact details must include a 24hr telephone number.

The RMA Project Manager will be responsible for informing Sydney Metro of any concerns raised by members of the public.

Each complaint will be dealt with to ensure it is resolved in accordance with state and federal regulatory requirements.

A register of environmental complaints will be kept on site and will be acknowledged by the complainant and the Site Superintendent/Supervisor. The Site Superintendent/Supervisor will inform the Project Manager of the complaint and mitigating action will be taken. The RMA Project Manager will advise the client's representative of the events.

It is a legislative requirement that neighbours in the immediate vicinity of asbestos removal be notified prior to removal work commencing. RMA have internal processes detailed in our Asbestos Removal Control Plan for the control of neighbour notifications.

5.9 HOURS OF WORK

All works and deliveries will be completed within the nominated working hours.

Nominated working hours for this site are:

Monday – Friday 7am – 6pm

Saturday 8am – 6pm.

No work Sunday or Public Holidays.

These are the standard construction hours as stipulated in Condition E36 of the CSSI Planning Approval.

RMA do not foresee the need for out of hours work, however if this is required RMA will follow the Sydney Metro Out of Hours Work Protocol. Acceptable reasons to perform work outside of the Standard Hours of Work are stipulated in Condition E44 of the CSSI Planning Approval. If out of hours work is to be performed, RMA may only do so if it falls within one of the listed categories.

If emergency work is required out of hours, RMA must notify Sydney Metro immediately to allow sufficient notification to the Environmental Representative (ER), Acoustics Advisor (AA) and all affected sensitive receivers. RMA must notify Sydney Metro in the form of a written email or text message.

As a form of mitigation, community notification is to be undertaken within two hours of the commencement of emergency works. In line with the Sydney Metro Out of Hours Work Strategy Protocol, these notifications will generally be prepared by RMA using a small hand-written Sydney Metro template card for distribution to the immediate surrounding community. These cards will include the following details as a minimum:

- Scope,
- Location,
- Hours,
- Duration,
- Types of equipment to be used, and
- Likely impacts.

Within 24 hours of completion of any emergency works, RMA is to provide a written emergency works report to Sydney Metro. The emergency works report is to include as a minimum:

- Date, time, duration and cause of the emergency,
- Description of emergency works undertaken,
- Mitigation measures implemented to address the impacts of the emergency works, and
- Actions/Measures taken or to be taken to prevent or mitigate recurrence of the emergency. If there are no appropriate actions/measures to be taken, explanation is to be provided as to why.

5.10 SITE ACCESS, SECURITY AND PUBLIC SAFETY

The site will be accessed from the designated driveway off Mowbray Rd. RMA personnel and subcontractors must use designated access/egress routes. Access and egress routes must be kept clean and clear of any obstructions at all times.

Pedestrian pathways will be delineated using crowd control barriers. Where pedestrians need to cross vehicle pathways, a gate will be installed in the crowd control barriers. This acts as a physical barrier between vehicles and pedestrians, and also prompts pedestrians to check for vehicles before opening gates.

Unauthorised access to the site will be controlled through the installation hoardings and temporary perimeter fencing. Temporary fencing must be:

- A suitable height to deter entry, i.e. 1.8 metres high,
- Constructed from dedicated materials,
- Difficult to climb,
- Difficult to gain access underneath, and
- Stable and able to withstand anticipated loads.

This fencing will be locked at all times the site is left unattended. Contact details of applicable site management will be affixed to the fencing in the event of an emergency.

Alternate offsite pedestrian access will be provided where required that safely re-directs the public away from any potential areas of risk. All visitors to the site shall be required to first report to the site office (Mowbray House).

Personnel required to work on site must have completed a site-specific induction. The site induction must detail specific access requirements, security procedures and work areas.

Upon arrival all persons must report to the site office (Mowbray House) and complete a pre-start meeting.

It is a condition of site entry that all persons wear high vis vests or clothing.

Only persons necessary to the project will be permitted to the site.

5.11 SUBCONTRACTORS

All subcontractors are to complete their works in accordance with this CEMP. No subcontractors will be appointed for management of works at the site. All environmental responsibilities will be managed by RMA. An environmental induction of all subcontractors will be undertaken before site works. Subcontractors will be evaluated for engagement using RMA's form 074 – Subcontractor Engagement.

5.12 STORAGE OF FUEL, CHEMICALS OR OTHER HAZARDOUS GOODS

Sufficient supplies of absorbent materials will be kept onsite to recover any liquid spillage. Liquid spills will be cleaned up using dry methods, by placing absorbent material on the spill and sweeping or shovelling the material into a secure bin. Spilt materials will be tested and assessed according to NSW EPA (2014) Waste Classification Guidelines Part 1: Classifying Waste and then disposed of in an odour free manner that does not pollute waters.

Dangerous goods, as defined by the *Australian Dangerous Goods Code*, must be stored and handled strictly in accordance with:

- all relevant Australian Standards
- for liquids, a minimum bund volume requirement of 110% of the volume of the largest single stored volume within the bund,
- Storing and Handling Liquids: Environmental Protection – Participants Manual (Department of Environment and Climate Change, May 2007); and
- the Environmental Compliance Report: Liquid Chemical Storage, Handling and Spill Management – Part B Review of Best Practice and Regulation (Department of Environment and Conservation (NSW), 2005).

In the event of an inconsistency between the requirements listed from (a) to (d) above, the most stringent requirement shall prevail to the extent of the inconsistency.

All hazardous sub that may be required on site will be stored and managed in accordance with the *Storage and Handling of Dangerous Goods Code of Practice* (WorkCover NSW, 2005) and *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (Department of Planning, 2011).

Storage of chemicals or goods other than dangerous goods is to be in a bunded area 110% above the quantity stored.

Copies of Safety Data Sheets (SDS) will be maintained on site for each of the chemicals used and stored on site.

A spill kit will be kept on site in the event of a chemical spill occurring on site. RMA must ensure as best as possible to prevent spills from entering watercourses to maintain NSW Water Quality Objectives.

Plant and equipment will be refuelled offsite where possible, or if onsite refuelling is required this will be performed on hard stand areas of the site.

5.13 HOT WORKS & FIRE PREVENTION

All personnel inclusive of sub-contractors, shall take all reasonable measures to prevent the ignition of flammable materials, this will be achieved through good housekeeping practices such as, but not limited to:

- The continual disposal of wastepaper.
- Rags.
- General waste.
- Clearing of combustible vegetation (maybe subject to Local Council Area approval), and
- Any other flammable materials deemed to be a fire hazard.

All fire extinguishers shall be only of the approved type and selected based on the type and size of fire that is likely to be encountered. These fire extinguishers will be located in easily accessible, designated and sign posted locations and shall:

- Typically, be AB(E) - Powder Fire Extinguisher ABE, distinguished by a white coloured band around the top of the cylinder),
- Be located at site office / lunch facilities,
- Be located on all RMA light vehicles,
- Be located externally on all heavy vehicles and machinery,
- Be tested, tagged and maintained by an external service provider on a 6 monthly basis.

All employees shall be trained in the correct identification and use of firefighting equipment to be used for each firefighting application.

In the event of a fire, the Site-Specific Emergency Response Management Plan shall be implemented and adhered to.

All hot work shall only commence after the Hot Work Permit has been completed and approved by the Project Manager and only carried in pre-determined and dedicated (approved) spaces.

The RMA Project Manager must confirm the status of Total Fire Bans. No hot work is to be completed during bans.

Hot work must be detailed in the SWMS and risks detailed in the Risk Register.

5.14 SPILL RESPONSE

If a spill occurs, immediately alert area occupants and Site Superintendent/Supervisor, and evacuate the area, if necessary.

If the emergency results in a fire, apply fire emergency response procedures. (Emergency Response Management Plan)

Wear personal protective equipment, as appropriate to the hazards. Consider respiratory protection. Refer to the Safety Data Sheet or product packaging for information.

Attend to any people who may be contaminated. Contaminated clothing must be removed immediately, and the skin flushed with water for no less than fifteen minutes.

Use spill kit to contain spill. Following the instructions on spill kits to contain spill.

Protect floor drains or other means for environmental release. Spill socks and absorbent material may be placed around drains, as needed.

If the spill cannot be controlled, Site Superintendent/Supervisor to contact Emergency Services.

5.15 HEAT STRESS & SKIN PROTECTION

As the RMA working environment is predominantly outdoors, exposed to the elements, special consideration shall be given to the management of heat and dehydration which can be triggered by extremes of both hot and cold temperatures.

All employees and sub-contractors will be encouraged to consume effective amounts of fluids throughout the working day to remain hydrated. RMA shall provide drink stations within the site shed and site office to ensure personnel remain hydrated.

RMA shall ensure that appropriate Personal Protective Equipment inclusive of long sleeve cotton shirts, long trousers, broad brim hats, and sunscreen lotion (SPF 30+) is provided for all personnel exposed to the effects of UV radiation and temperature extremes.

RMA site management shall ensure that all long sleeve clothing be kept rolled down the full length of the arm and buttoned up at all times to minimise UV exposure, entanglement hazards and abrasive / scratch injuries.

Long pants will be worn at all times to minimise exposure to UV radiation and abrasive / scratch injuries.

Employees shall be warned of the dangers of exposure to UV rays through pre-start and tool-box meetings, and of the necessity to correctly wear all protective clothing and equipment supplied.

5.16 ASBESTOS REMEDIATION

An Asbestos Removal Control Plan (ARCP) will be developed for this project.

The ARCP details the hazardous materials on site and their locations, thorough site establishment requirements and remediation process, notification requirements, community consultation procedure, PPE and equipment, decontamination procedures and waste classification and disposal.

5.17 EROSION, SEDIMENT, WATER QUALITY CONTROL

It is RMA's aim to ensure erosion, sediment and water quality controls are integrated during hardstand demolition, UST removal and excavation activities, and that operational impacts on the environment are minimised. RMA will prevent sediment moving offsite by:

- Diverting surface runoff away from disturbed soil and stockpiles.
- Installing sediment and erosion controls before remediation starts.
- Reusing topsoil where possible and stockpile separately.
- Inspecting controls at least weekly and immediately after rainfall.
- Rectifying damaged controls immediately.
- Removing controls once surfaces have been stabilised, including removing trapped sediment in drainage lines.

RMA propose to install sediment controls in any areas where material runoff may occur. Erosion and sediment control measures are to be implemented in accordance with *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004) and *Managing Urban Stormwater: Soils and Construction Volume 2* (Department of Environment and Climate Change, 2008a). Control measures are to be designed as a minimum for the 80th percentile; 5-day rainfall event.

Erosion and sediment controls must be installed and appropriately maintained to minimise water pollution. When implementing our controls, RMA will take into consideration the information from the Managing Urban Stormwater guidelines more commonly known as the "Blue Book".

RMA intend to use Coir Logs to boarder our excavations to prevent erosion and sediment run off. The Coir Logs will be repositioned as excavations progress, ensuring we maintain effective controls.

Stockpiled materials considered a high risk of releasing sediment will be covered with geofabric material or plastic and weighted down to prevent wind blowing across the stockpile. Stockpiles will also have Coir Logs positioned where run off may occur as a second line of defence.

An existing timber hoarding has been erected around the site boundary. This hoarding has been installed in line with condition A19 and A20 of the CSSI Planning approval. The hoarding has been constructed in such a way that it minimises visual, noise and air quality impacts on sensitive receivers such as neighbours and the community. RMA will at all times maintain this hoarding to ensure its effectiveness.

The hoarding around the site is sealed to the ground which acts as an effective erosion and sediment control. Where there are gaps in the hoarding, additional controls such as Coir Logs will be added to ensure there is no runoff.

RMA will establish a Wheel Wash Bay for all vehicles to use prior to leaving the site. This will assist in the prevention of offsite sediment release.

Pit blocks will be put in place for stormwater pits around the active concrete demolition/excavation work area to prevent any contaminated water leaving the site. Geofabric is installed on stormwater

pits away from the active work area to allow clean water to passively leave the clean area of site while retaining any potential sediments and pollutants.

Any accumulated water at low points of the site should be pumped to stormwater following inspection and use of RMA Discharge Permit. RMA are required to maintain NSW Water Quality Objectives where our activities involve site water discharge.

Where possible, vehicle movements will be confined to hardstand areas, designated tracks, pathways, and work areas to minimise disturbance to existing ground cover.

Stop work in the immediate vicinity of unexpected contamination. Indicators of contamination include discoloured soil, strong chemical or petrol odours and leachate. Contain disturbed material on an impermeable surface and cordon areas off. The Sydney Metro Project Manager will be notified immediately of any unexpected finds.

In heavy rainfall or waterlogged conditions, site works may need to cease temporarily to prevent the risk of tracking material offsite or creating loose ground material which may then run off site.

Daily weather patterns and weather forecasts are to be closely monitored during the works and scheduled around any heavy rainfall period. All required controls will be checked by the Site Superintendent/Supervisor on a daily basis throughout the project to ensure they are maintained in a fully functional condition. In the event of accumulation of sediment around any controls that may reduce their effectiveness, the sediment will be removed in such a manner as to not disturb or damage the control in any way. Damaged sediment controls will be replaced immediately or as quickly as practicable.

Portable site amenities will be located away from watercourses or drainage lines.

Plant and equipment must be maintained daily whilst on site to ensure items are leak free, and any necessary repairs made immediately upon discovering leaks. Alternatively, if equipment cannot be repaired onsite, remove the item, and replace it with a leak-free item. If washing down of equipment is required, this should be completed within designated washout areas. Plant and equipment will be refuelled offsite where possible, or if onsite refuelling is required this will be performed on hard stand areas of the site.

If sediment or soil is tracked offsite this material will be swept up each day or prior to expected rainfall.

5.18 DUST SUPPRESSION

During the concrete removal, UST removal and excavation activities there is a requirement to manage the generation and potential off-site release of dust.

An existing timber hoarding has been erected around the site boundary. This hoarding has been installed in line with condition A19 and A20 of the CSSI Planning approval. The hoarding has been constructed in such a way that it minimises visual, noise and air quality impacts on sensitive receivers such as neighbours and the community. The hoarding will act as a control measure to minimise dust release from site. RMA will at all times maintain this hoarding to ensure its effectiveness.

Water will be used as a dust suppressant during all site works. This includes during demolition of concrete hardstand, removal of UST's, excavation works, stockpile dust management, and haul route dust management. RMA will ensure the amount of water used on this site is sufficient to suppress dust but will not be enough to generate run off. This will be controlled using equipment such as hand help pump spray bottles, and short bursts from high pressure water sprayers rather than hoses with a continuous water flow.

All waste loads in bins and trucks will be covered prior to being removed from site.

Stockpiled materials considered a high risk of releasing sediment or dust will be covered with geofabric material or plastic and weighted down to prevent wind blowing across the stockpile.

Where possible, vehicle movements will be confined to hardstand areas, designated tracks, pathways, and work areas to minimise disturbance to existing ground cover and generation of dust.

5.19 SERVICES AND ABOVE AND UNDERGROUND STRUCTURES.

Services Within the Work Area

Before the commencement of the remediation demolition activities, any services such as water, sewer, electricity, and telecommunications will be identified and marked. Services will be isolated/terminated and removed prior to work commencing by Sydney Metro.

RMA will perform a DBYD search along with a services search of the work area to confirm Sydney Metro survey details.

If there are any existing services are to remain live within our work area these should be marked or tagged, and locations discussed during the pre-start meetings or toolbox talk. RMA will install protective measures around the service if possible. If there is any doubt about the location of a service, non-destructive digging methods will be employed to identify the presence of the underground service.

Above Ground Structures/Overhead Services

There are overhead powerlines located along the Pacific Highway and Nelson St. These powerlines are located outside of the site boundaries, however safe approach distances will be maintained for the duration of the work.

Safe approach distances will be maintained in line with RMA's procedure PRC037 Safe Approach distances to Overhead Power Lines.

As an added control measure, tiger tails will be fitted to the overhead lines on Pacific Hwy and Nelson St and will be maintained for the duration of the project.

Underground Services or Structures

RMA will review Sydney Metro survey plans if available to locate known services.

A Dial Before You Dig enquiry will be lodged and the RMA Project Manager will review the plans and perform underground services searches if required.

If existing services are to remain live these should be marked or tagged, and locations discussed during the pre-start meetings or toolbox talk. Install protective measures around the service if possible.

RMA is aware of the Underground Storage Tanks and their locations and will be removing these tanks as part of our scope of works.

RMS Road Infrastructure

All excavations adjacent to RMS road infrastructure must meet the requirements of RMS Technical Direction (GTD 2012/0001) Excavation adjacent to RMS infrastructure.

5.20 WASTE MANAGEMENT

RMA have prepared a Waste Management Plan for this project. This plan details the key points of Waste Minimisation, Preparation of Waste, Waste Streams, Classification, and Waste Tracking. The key waste streams and our preparation and disposal methods are listed below.

Waste Minimisation and Recycling

In order to maximise the amount of waste being recycled and minimise the amount of waste going to landfill, all waste will be separated into the various waste streams at the source during the duration of the works. The various waste streams and their final destination are shown below.

Asbestos	Landfill
GSW	Landfill
Steel	Recycle
Liquid Waste	Landfill
Concrete	Recycle
General waste	Landfill

Preparation Prior to Disposal

Prior to disposal of all materials there is some preparation required to ensure the materials are suitable for recycling or, in the case of hazardous materials are packaged in a form that will prevent spillage and possible contamination of other areas along the transport route.

Waste Streams:

General waste

General waste generated throughout the project will be placed into a receptacle with a closable lid. General waste may contain food scraps etc. generated by on-site workers. General waste will be removed from the work area as necessary and will not be left to overflow or become odorous.

General waste will be transported to and disposed of at a licensed landfill.

Asbestos

The asbestos waste expected on this site is mixed with concrete or soil.

Asbestos contaminated soil will be temporarily stockpiled for sampling and a Waste Classification. Once a waste classification is received, the soil will be loaded into trucks using an excavator to be disposed of offsite. Asbestos waste must be kept damp, this will be done using a hose or from water mist generated using a high-pressure water sprayer.

Concrete containing asbestos will be stockpiled or loaded directly into trucks for offsite disposal as asbestos waste.

Where stockpiled material will remain onsite overnight, the material stockpiled will be covered with 200µm thick plastic and labelled as containing asbestos waste. The site must be made secure, with perimeter and temporary fencing checked for security and the gates must be fitted with a chain and lock and must be locked when the site is unattended.

All ACM waste is to be transported to and disposed of at a landfill licensed to receive asbestos waste.

Each load of asbestos over 10m² or 100kgs must be accompanied by an EPA Waste Tracking consignment and each load must be secured and covered.

All asbestos waste bags are to be labelled:

CAUTION ASBESTOS
DO NOT INHALE DUST
DO NOT OPEN OR DAMAGE BAG

Soil (Non-Asbestos)

Excavated soil will be stockpiled waiting for sampling and a Waste Classification. Once a waste classification is received, the soil will be loaded into trucks using an excavator and transported to a landfill in accordance with its Classification.

Decommissioned USTs

Washed and uncontaminated USTs will be separated from general waste, broken into manageable pieces, or loaded directly onto a truck to be transported to a metal recycling facility.

Liquid Waste – Residual Fuel

All liquid waste will be treated as flammable F100 NEPM classification. DG rated vacuum tankers will be utilised to remove liquid waste, as well as conduct tank washing. Liquid waste will be transported by the DG rated tanker to a suitably licensed disposal facility.

Demolition Waste

Demolition waste will consist of concrete and steel. Demolition waste will be separated to maximise reuse and recycling.

The waste will be broken down into small manageable pieces by an excavator and stockpiled. The waste will then be loaded into trucks according to their waste stream using the excavator.

Smaller hand sorted and collected demolition waste may be placed into small bins/containers. Bins should have wheels for easy transportation. The bins/containers will be transported to the general waste skip bin or stockpile and the waste will be transferred from the bins into the skip bin/stockpile.

Recyclable material will be transported to the appropriate recycling facility. Demolition waste that cannot be recycled will be transported to and disposed of at a licensed landfill.

Disposal Dockets

All disposal docket will be kept, and copies issued to Sydney Metro once received and recorded.

5.21 NOISE & VIBRATION MANAGEMENT

A Noise and Vibration Impact Statement will be prepared for this project by Consultant EMS.

This plan will detail the noise and vibration limits and controls required for this site. Vibration from construction activities must not exceed the vibration limits set out in the British Standard BS 73852:1993 *Evaluation and measurement for vibration in buildings. Guide to damage levels from ground borne vibration*.

In general RMA will:

- RMA will ensure all works are completed within allowable work hours. If a need arises to work outside of the nominated hours, approval will be sought from the client's representative.
- Equipment will be selected for the project on the basis of its noise performance. All equipment shall be operated in an efficient manner to minimise the emission of background noise around the site.
- Inform workers of project specific noise issues and mitigation measures during RMA site induction.
- Machinery will be checked daily and will be maintained in good working order.
- Review and implement any complaints and where reasonable implement additional mitigation measures. Maintain a record of any complaints.

Workplace Health and Safety for Nearby Workers

At no time can noise generated by construction exceed the National Standard for exposure to noise in the occupational environment of an eight-hour equivalent continuous A-weighted sound pressure level of LAeq,8h, of 85dB(A) for any employee working at this site.

Noise Mitigation – Residential and Non-Residential Receivers

Sydney Metro are required to provide additional mitigation to residential and non-residential receivers in accordance with the Sydney Metro City and South West Noise and Vibration Strategy. RMA will provide Sydney Metro with all information, documents, details and data relating to our on-site activities that may contribute to noise exceedance. The Noise and Vibration Impact Statement prepared for this project has been issued to Sydney Metro and details the predicted noise levels for each aspect of our work.

RMA must ensure all works are coordinated in accordance with the Sydney Metro Noise and Vibration Strategy and the Noise and Vibration Impact Statement prepared by EMS to provide the required respite periods.

An existing timber hoarding has been erected around the site boundary. This hoarding has been installed in line with condition A19 and A20 of the CSSI Planning approval. The hoarding has been constructed in such a way that it minimises visual, noise and air quality impacts on sensitive receivers such as neighbours and the community. RMA will at all times maintain this hoarding to ensure its effectiveness.

Vibration Monitoring Near Heritage Items

RMA will seek the advice of a Heritage specialist on the methods and locations for installation of vibration, movement and noise monitoring equipment for heritage listed structures such as Mowbray House.

Vibration testing must be carried out before and during vibration generating activities that have the potential to impact on heritage items to identify minimum working distances to prevent cosmetic damage. In the event that the vibration testing and monitoring shows that the preferred values for vibration are likely to be exceeded, RMA must review the construction methodology and, if necessary, implement additional mitigation measures.

5.22 TRAFFIC MANAGEMENT & LOCAL ROAD CONDITION

Only RMA employees and subcontractors with a current driver's licence will be able to operate vehicles to, from and on site.

Traffic in and around the work face shall be minimised by:

- Restricting movement to those vehicles involved in immediate work activities.
- Designating, sign posting and demarcating specific traffic flow areas.

Sydney Metro have prepared a Construction Traffic Management Framework. RMA have read this document, and it has been used in the preparation of a Construction Traffic Management Plan (CTMP) for this project.

RMA have engaged AAA Traffic Control to prepare the Site-Specific CTMP for this project. This plan will be submitted to the RMS for approval, following Sydney Coordination Office endorsement. In preparation of this plan, the relevant road authorities will be consulted with regarding the use of any weight restricted roads by heavy vehicles. Heavy vehicle haulage must not use local roads unless no feasible alternatives are available.

RMA will engage a Traffic Control company to implement this plan.

Vehicle access to and from the site is to be managed in the CTMP to ensure pedestrian, cyclist and motorist safety. Directional signage and line marking will be used to direct and guide drivers and pedestrians past the site. This may be supplemented by Variable Message Signs to advise drivers of potential delays, traffic diversions, speed restrictions, or alternate routes if the CTMP deems this is necessary.

Where existing footpath routes used by pedestrians and / or cyclists are affected by construction, a condition survey will be carried out to confirm they are suitable for use (eg suitably paved and lit), with any necessary modifications to be carried out in consultation with the local council.

In the event of a traffic related incident, co-ordination would be carried out with the CBD Coordination Office and / or the Transport Management Centre's Operations Manager.

RMA must not block or obstruct access to existing properties surrounding our site. Onsite parking will be available for RMA employees and subcontractors to prevent the need to park on the surrounding streets. The site is also in close proximity to public transport and RMA will encourage personnel to use public transport where feasible.

Sydney Metro have established a Traffic and Transport Liaison Group (TTLG) for this project. This liaison group is comprised of representatives from the RMS, Council, emergency services, Sydney Metro and contractors such as RMA. RMA will attend the relevant TTLG meetings and will present our CTMP and any other relevant information, documents or data relating to traffic management for this project.

If through the course of the project, or consultation with the TTLG, it is identified our work has a negative impact on the roads or the community as a whole, the CTMP may need to be updated to include additional traffic controls, route changes etc. Any changes to the CTMP must be resubmitted for Sydney Coordination Office endorsement and RMS approval.

Daily on-site traffic movements and protection of pedestrians will be managed by RMA in accordance with the Vehicle Movement Plan prepared daily during the pre-start meeting.

The vehicle movement plan will direct site traffic and pedestrians in a way that provides maximum safety and minimal disruption.

A spotter will be used to direct traffic flow during deliveries to/from site, or during loading of trucks.

Vehicles will enter the site from the designated entry point off Mowbray Rd. Vehicles will then leave the site via the Sydney Metro Dive Site driveway. This allows vehicles to enter in a forward direction, and to exit the site in a forward direction turning onto Mowbray Rd at a set of traffic lights preventing interruption of traffic flow to Mowbray Rd. RMA will minimise truck movements during peak periods within commercial centres and around school zones during pick and drop off times. Peak periods are 7am to 10am and 4pm to 7pm Monday to Friday. School zone times are between 8:00am – 9:30am and 2:30pm – 4:00pm.

To maintain pedestrian safety, RMA will delineate pedestrian walkways using crowd control barriers. Where pedestrians need to cross vehicle pathways, a gate will be installed in the crowd control barriers. This acts as a physical barrier between vehicles and pedestrians, and also prompts pedestrians to check for vehicles before opening gates.

Road Dilapidation

RMA will prepare a road dilapidation report for roads to be used by heavy vehicles for the duration of this project. The dilapidation report will be prepared prior to the commencement of heavy vehicles on the site. A copy of the report will be issued to Sydney Metro once completed.

If any damage to the roads occur as a result of works completed at the site, RMA will discuss an appropriate course of action. This may include rectification of damage or compensation for the damage caused.

5.23 FLORA & FAUNA

Flora and fauna are unlikely to be encountered during this project. Flora is limited to minor vegetation around the site which will not impact RMA's work. All existing trees within our work are as to be maintained and left undisturbed. Trees and vegetation are present at the front of Mowbray House and are effectively outside of our work area.

To prevent the spread of weeds, all equipment and in particular personnel boots will be cleaned prior to entering or leaving the site. All vehicles will be required to exit the site via the wheel wash bay. Tyres are to be cleaned of mud, soil or plant matter.

Any plant material removed during this process must be bagged and disposed of at a licenced landfill.

Prior to commencing works, the site including any vegetation will be inspected for the presence of Fauna. If native fauna is encountered on site work will cease and the fauna will be allowed to move away from the area. If any wildlife are encountered, including injured wildlife and it can not safely move from the site itself, the project Site Superintendent/Supervisor should contact the nearest wildlife rescue organisation (WIRES) to assist with its relocation. In the case of injured fauna, RMA will contact the local WIRES and or Veterinarian to assist in capture and or relocation.

All native fauna is protected by law direct contact with wildlife should be avoided wherever possible.

5.24 HERITAGE, ARCHAEOLOGICAL AND ABORIGINAL ARTEFACTS

RMA have engaged AMBS Ecology & Heritage to act as our Heritage Consultant.

AMBS Ecology and Heritage have developed an Archaeological Method Statement for this project. In line with Condition E17 of the CSSI Planning Approval, this document was prepared in consultation with the Heritage Council of NSW. The document has been reviewed and endorsed by Heritage NSW, Delegate of the Heritage Council of NSW.

The work is to be carried out in close proximity to Mowbray House heritage site and there is a high potential for further archaeological deposits across the site. Work will be carried out under supervision of a heritage consultant. All work must proceed with caution and excavation works in particular must be completed in strict accordance with the Scope of Works.

Any excavation works in Heritage or Archaeological Sensitive areas must be directly supervised by the Excavation Director appointed by AMBS. The nominated Excavation Director for this project is Lian Ramage. Heritage NSW have reviewed her experience and have found she meets the requirements of Condition E17 of the CSSI Planning Approval.

Where archaeological excavation is required, the Excavation Director must be present to oversee excavation and advise on archaeological issues. The Excavation Director must be given the authority to advise on the duration and extent of oversight required.

RMA must not destroy, modify or otherwise physically affect any Heritage item not identified in documents referred to in Condition A1 of the CSSI Planning Approval.

With reference to Mowbray House, advice regarding vibration has been given by an Acoustic Consultant. The direct advice given in the Endorsement Letter reads:

“My endorsement is therefore subject to a precautionary approach, with an interim vibration criterion of 2.5mm/s (consistent with section 3.1.9.2 of the Noise and Vibration Technical Paper in the EIS) and attended vibration monitoring during site trials of any high vibration activity (such as hammering) to determine safe working distances. After a structural engineering assessment of Mowbray House has taken place, there will be an opportunity to review and potentially increase the applicable vibration limit at this location.”

RMA will seek the advice of a Heritage specialist on the methods and locations for installation of vibration, movement and noise monitoring equipment for heritage listed structures such as Mowbray House.

Vibration testing must be carried out before and during vibration generating activities that have the potential to impact on heritage items to identify minimum working distances to prevent cosmetic damage. In the event that the vibration testing and monitoring shows that the preferred values for vibration are likely to be exceeded, RMA must review the construction methodology and, if necessary, implement additional mitigation measures.

The confidentiality of any heritage, archaeological and or Aboriginal information/artefacts will be maintained at all times. Information about such items will not be made public in any form.

A final archaeological report must be submitted to the Heritage Council of NSW within two (2) years of the completion of archaeological excavation on the project. The report must include information on the entire historical archaeological program relating to the CSSI.

Unexpected Finds

In the event of an unexpected find, RMA will cease work and contact Heritage Consultant AMBS and Sydney Metro immediately. The site will be made safe with an exclusion zone implemented until such time as a consultant is arranged to inspect the work site or we are cleared by Sydney Metro to proceed with our works.

A formal Unexpected Finds Procedure and Exhumation Management Procedure have been developed by Sydney Metro and forms part of the AMBS Archaeological Method Statement. RMA will defer to these procedures in the event of a heritage or archaeological unexpected find.

In the event that a potential relic/s is/are discovered, work in the area must cease and the Excavation Director must be notified and assess the significance level of the find/s and provide mitigation advice according to the significance level and the impact proposed. The Excavation Director must attend the site in accordance with Condition E18 of the CSSI Planning Approval to oversee the excavation where relics of State significance are found.

An Archaeological Relic Management Plan specific to the relic of State significance must be prepared in consultation with the Heritage Council of NSW (or its delegate) to outline measures to be implemented to avoid and/or minimise harm to and/or salvage the relic of State significance.

Construction in the vicinity of the discovery must not recommence until the requirements of the ARMP have been implemented, in consultation with the Excavation Director.

Aboriginal Heritage

In the case of Aboriginal objects being identified, the Aboriginal Cultural Heritage Assessment must be implemented. Excavation and or salvage must be undertaken by a qualified archaeologist in consultation with the Registered Aboriginal Parties. Where items were previously unidentified all works must cease in the affected area and a suitably qualified and experienced Aboriginal heritage expert must be contacted to provide specialist heritage advice before works recommence.

Human Remains

In the event Human Remains are discovered, RMA must not harm, modify, or otherwise impact those found during the course of our work. An Exhumation Management Plan must be prepared by Sydney Metro and implemented to guide the relocation of recovered human remains.

RMA will provide Sydney Metro with the required information to allow the appropriate notifications as per the CSSI Planning Approval.

5.25 PLANT & EQUIPMENT

Plant or machinery that is not in use must be stored so that it does not create a risk to workers or the general public. Mobile plant must be parked on a firm level surface with the handbrake applied, the motor switched off and rendered inoperable by removing any keys. All machinery and equipment will be switched off when not in use for an extended period of time to reduce emissions.

Only personnel holding relevant high risk work licences or proof of competency are permitted to operate plant and machinery.

All plant and machinery used on RMA projects must have up-to-date servicing records this includes machines that are hired. RMA Site Superintendent/Supervisor to ensure purchase/hire and deliveries of plant comply with WHS specifications. Site Superintendent/Supervisor to obtain WHS information from suppliers of plant & machinery.

Plant and machinery must be inspected daily by the operator using the RMA Plant inspection booklet or the logbook provided with hire machines. Plant & equipment must be leak free, and any minor defects are to be repaired by the operator before use. If major problems are found the machine must be repaired by a qualified person before its use on site. Emissions from items of machinery or equipment will also be checked during the daily inspection.

Plant and equipment will be refuelled offsite where possible, or if onsite refuelling is required this will be performed on hard stand areas of the site.

Plant and Equipment must be well maintained and serviced to minimise emissions. RMA will perform a daily pre-start check on all machinery used on site.

5.26 THIRD PARTY PROPERTY AND INFRASTRUCTURE CONDITION SURVEY

RMA are required to minimise impacts to and interference with third party property and infrastructure. RMA will implement controls through the course of the project to protect these assets to the best of our ability.

Prior to commencement of work on site, RMA are required to complete a condition or dilapidation survey of the assets surrounding the site. This survey will capture the condition of assets prior to our work to understand the state of existing damage/conditions.

Conditions E59 and E60 of the CSSI Planning approval stipulate property identified as being at risk of damage must be offered a pre and post building condition survey. Sydney Metro have identified Mowbray House as falling under this requirement. The building survey must be completed by a Structural Engineer. RMA will arrange for pre and post dilapidation surveys to be conducted for Mowbray House with a copy of the reports issued to Sydney Metro.

In addition to the survey for Mowbray House, RMA will also complete dilapidation surveys of Council, RMS, and Sydney Metro assets. These will include items such as footpaths, kerb & gutter, roads, driveway laybacks, signs, light poles and the internal Sydney Metro road, driveway, kerb and gutter on the eastern boundary of the site.

Road Dilapidation

RMA will prepare a road dilapidation report for roads to be used by heavy vehicles for the duration of this project. The dilapidation report will be prepared prior to the commencement of heavy vehicles on the site. A copy of the report will be issued to Sydney Metro once completed.

If any damage to the roads occurs as a result of works completed at the site, RMA will discuss an appropriate course of action. This may include rectification of damage or compensation for the damage caused.

Sydney Metro are required to establish an Independent Property Impact Assessment Panel. RMA must provide Sydney Metro with all required information, documents, details and data required to allow the panel to perform its function.

5.27 VISUAL AMENITY

RMA will aim to minimise impacts on the existing landscape features as far as feasible and to reduce visual impact of the works to the surrounding community.

All existing trees within our work are as to be maintained and left undisturbed. Trees and vegetation are present at the front of Mowbray House and are effectively outside of our work area. RMA will maintain this area ensuring it is kept neat and tidy.

All elements of our work will be completed behind the existing timber hoarding, this hoarding will be maintained for the duration of the project and assist greatly in the presentation of the site to the community. Where temporary fencing is required, this will be lined with shade cloth. All vehicles and machinery will be stored behind the hoarded area.

RMA's work will unlikely require the use of lighting as all works are planned to be completed during daylight hours, however where lighting is required on site it will be oriented to minimise glare and light spill to adjacent properties. Cut off and direct light fittings will be used to minimise glare and light spill.

5.28 ODOUR CONTROL

The scope and location of this project minimises the likelihood of odour generation on this site.

Plant and Equipment must be well maintained and serviced to minimise emissions. RMA will perform a daily pre-start check on all machinery used on site. Emissions from items of machinery or equipment will form part of this check. All machinery and equipment will be switched off when not in use for an extended period of time to reduce emissions.

The placement of plant and equipment onsite must be considered to minimise air quality impacts to nearby receivers.

In the unlikely event of odours being omitted during excavation activities the following procedure will apply:

- Cease work and notify the client's representative.
- Find the source of the odour.
- Remove the source of the odour and use an odour suppressant as required.
- Return to work once approvals granted by Sydney Metro.

5.29 PERSONAL PROTECTION EQUIPMENT (PPE)

Appropriate PPE will be issued to all employees at the time of employment as defined by the individual's employment conditions.

The PPE listed below is available for issue to RMA personnel:

Mandatory	Task Specific/When Required
Steel Cap Safety Footwear	Gloves
Safety Helmets	Eye Protection
Hi-Vis Safety Vest or Clothing	Ear Protection
Long sleeve shirt and long pants	Sun Block
	P2/P3 mask or half face respirator
	Face shield with respirator
	Disposable overalls

5.30 SITE CLEAN UP

Upon completion of all works RMA will demobilise from site, ensuring all machinery, equipment and vehicles are removed from site. All safety and environmental controls implemented throughout the course of the works will be removed also.

The site will be left clean and tidy and will in no way pose any danger to Sydney Metro staff or visitors.

6. ENVIRONMENTAL NON-CONFORMANCE, COMPLAINTS, INCIDENTS

6.1 ENVIRONMENTAL NON-CONFORMANCE ACTION

The project Site Superintendent/Supervisor is responsible for ensuring compliance to the requirements of the CEMP at all times. Non-compliance will be noted in a Non-Conformance Report (FRM 035) and issued to the HSE/Systems Manager who will then be responsible for addressing the issue.

The non-conformance report and details of corrective actions will be kept for five years. All details regarding further mitigation measures will be recorded on the corrective or preventative actions on the non-conformance report.

Any non-conformance issues arising from regulatory requirements will be immediately reported to the HSEQ/Systems Manager. The project Site Superintendent/Supervisor will take immediate steps on site to rectify the situation.

After addressing an environmental non-conformance and rectifying the situation, the report will be closed out. A review of the action will be undertaken to determine if the action was appropriate and/or adequate.

RMA are required to report environmental non-conformances in line with the Sydney Metro Environmental Incident and Non-Compliance Reporting Procedure. Incidents and non-compliances are to be recorded using [SM-17-00000105 Environmental Incident and Non-compliance Notification Report Form](#) and Environmental Issues are recorded through environmental inspection reports using [SM-17-00000107 Environmental Inspection Report Template](#).

An Incident Notification Report must be provided with all available information and submitted to Sydney Metro within 48 hours.

6.2 ENVIRONMENTAL COMPLAINT ACTION

The project Site Superintendent/Supervisor is responsible for noting environmental complaints relating to site activities. Mitigation measures taken to resolve the complaint will be noted in the Environmental Incident Report (FRM 133) issued to the HSEQ/Systems Manager. The project Site Superintendent/Supervisor is responsible for putting in place the initial mitigation measures. The HSEQ/Systems Manager will note any further actions that may need to be taken in consultation with the client as soon as practicable.

The Environmental Incident Report and details of corrective actions will be kept for five years. All details regarding further mitigation measures will be recorded on the corrective or preventative measures on the Environmental Incident Report.

A register of environmental complaints will be kept on site and will be acknowledged by the complainant and the Site Superintendent/Supervisor. The Site Superintendent/Supervisor will inform the Project Manager of the complaint and mitigating action will be taken. The RMA Project Manager will advise the client's representative of the events. The register must be completed and maintained in line with Condition B7 of the CSSI Planning Approval.

RMA will provide to Sydney Metro, any and all required information regarding community complaints to enable the Community Complaints Mediator to perform their duties as per Condition B13 & B14 of the CSSI Planning Approval.

6.3 ENVIRONMENTAL INCIDENT ACTION

The project Site Superintendent/Supervisor is responsible for noting potential and actual environmental incidents relating to site activities. Mitigation measures taken will be noted in the Environmental Incident Report (FRM 133) issued to the HSEQ/Systems Manager. The project Site Superintendent/Supervisor is responsible for putting in place the initial mitigation measures. The HSEQ/Systems Manager will note any further actions that may need to be taken. Ensure all environmental incidents are reported directly to the client's representative.

The Environmental Incident Report and details of corrective actions will be kept for five years. All details regarding further mitigation measures will be recorded on the corrective or preventative measures on the Environmental Incident Report.

To ensure compliance with Section 148(3) of the Protection of the Environment Operations Act 1997 refer to section 6.3.1 'Emergency Planning, Response and Incident Reporting' of this CEMP.

RMA are required to report environmental non-conformances in line with the Sydney Metro Environmental Incident and Non-Compliance Reporting Procedure. Incidents and non-compliances are to be recorded using [SM-17-00000105 Environmental Incident and Non-compliance Notification Report Form](#) and Environmental Issues are recorded through environmental inspection reports using [SM-17-00000107 Environmental Inspection Report Template](#).

An Incident Notification Report must be provided with all available information and submitted to Sydney Metro within 48 hours.

To ensure Sydney Metro fulfill their reporting requirements under the CSSI Planning Approval, RMA will be required to report any incident to Sydney Metro as soon as possible and within 24-48 hrs. RMA will ensure we provide all the relevant information to Sydney Metro as stipulated in Conditions A41 – A44.

6.3.1 Emergency Planning, Response, and Incident Reporting

Pollution Incident

Pollution incident means an incident or set of circumstances during or as a consequence of which there is, has been or is likely to be a leak, spill, or other escape of a substance, as a result of which pollution has occurred, is occurring or is likely to occur. It includes an incident or set of circumstances in which waste has been placed or disposed of on premises unlawfully, but it does not include an incident or set of circumstances involving only the emission of any noise or odour. However, odour pollutants are to be reported. 'Material harm to the environment' is also to be reported. Material harm includes on-site harm, as well as harm to the environment beyond the premises where the pollution incident occurred.

Emergency Response

If a pollution incident does occur, all necessary actions will be taken to minimise the size and any adverse effects of the release. If adequate resources are not available to contain the release and if it threatens public health, property or the environment, the NSW Fire Brigades shall be contacted for emergency assistance - phone 000.

In addition, if advice is required on cleaning-up the incident or on the disposal of any resulting waste materials, EPA staff can be contacted 24 – hours / day via the Pollution Hotline on 131 555.

If the NSW Fire Brigades are called, they may notify the EPA if they consider the environment or public health to be threatened. Notification by the NSW Fire Brigades does not negate the need for the RMA Project Manager to notify the EPA or other relevant authorities.

Internal Notification

All pollution incidents will be immediately reported to the RMA Project Manager / HSEQ/Systems Manager. This person is then responsible for notifying the client's representative immediately. Should the authorities or extended parties need to be notified the client representative and RMA Project Manager will do so, and in consultation with RMA's HSEQ/Systems Manager, notify external authorities where appropriate.

All environmental incidents or potential incidents will be reported to the RMA Project Manager with an Environmental Incident Report (FRM 133). This person will then delegate to the project Site Superintendent/Supervisor what mitigation measures need to be put in place.

External Notification

Pollution incidents posing material harm to the environment should be notified to the Project Manager and the appropriate regulatory authority. In most cases this will be the local council. However, if the OEHL licenses the activity or if a State or public authority carries on the activity, the OEHL is the appropriate regulatory authority.

If in doubt as to whom to notify, ring OEHL Pollution Hotline 131 555.

Under the Protection of the Environment Operations Act, the following people have a duty to notify a pollution incident occurring in the course of an activity that causes or threatens material harm to the environment:

- a. the person carrying out the activity;
- b. an employee or agent carrying out the activity;
- c. an employer carrying out the activity; and
- d. the occupier of the premises where the incident occurs.

'Material harm to the environment' is defined in section 147 of the POEO Act 1997. Material harm includes on-site harm, as well as harm to the environment beyond the premises where the pollution incident occurred.

External Notification procedure will also include the client representative. Notification must be given to Sydney Metro within 24hrs of the occurrence of each incident. Only persons engaged in the activity resulting in the pollution incident, and occupiers of the land where the incident occurs, have a duty to report the incident.

Relevant Notification Information

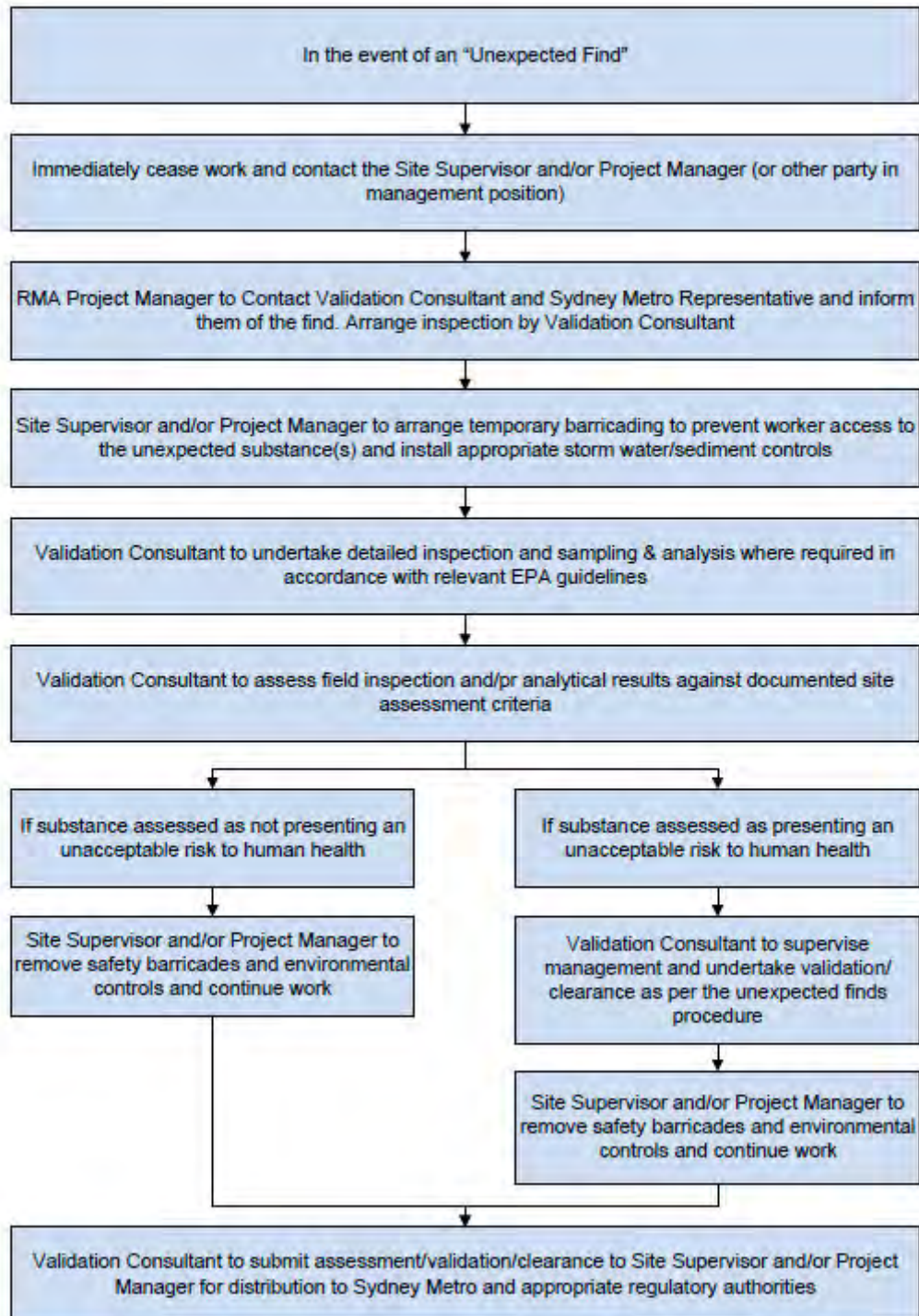
The relevant information about a pollution incident as required by the PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997 - SECTION 150:

- a. the time, date, nature, duration, and location of the incident,
- b. the location of the place where pollution is occurring or is likely to occur,
- c. the nature, the estimated quantity or volume and the concentration of any pollutants involved,
- d. the circumstances in which the incident occurred (including the cause of the incident, if known),
- e. the action taken or proposed to be taken to deal with the incident and any resulting pollution or threatened pollution, and
- f. other information prescribed by the regulations.

7. UNEXPECTED FINDS PROTOCOL

In the event of an unexpected find or release of hazardous building material RMA will defer to our Unexpected Finds Protocol.

Unexpected Finds Protocol Flowchart





8.2 PERSONNEL DETAILS

Job Name: _____

NAME:.....	
Address:.....	
.....Postcode.....	
Home Phone No.()	Date of Birth.....
EMPLOYER.....	OCCUPATION.....

Next of Kin in Case of Emergency	
Name.....	Relationship to You
Address:.....	Contact Phone No.....
.....Postcode:.....	

Have you undertaken General Construction Industry Induction? Yes / No
(White Card) Certificate No.....

Do you hold a current First Aid certificate? Yes / No

Will you be operating equipment or performing a process requiring SafeWork Certification?	Yes / No
Type of Equipment/process	Certificate Held
.....
.....
.....
.....

Has Safety Equipment been issued by your employer?	Boots	Yes / No
	Hard Hat	Yes / No
	Ear Muffs	Yes / No
	Orange Safety Vest.	Yes/No
	Other.....	

- As part of this site induction the following must be read.
- Induction Information
 - Site safety rules
 - Site emergency procedures
 - Evacuation plan
 - Orientation
 - Tool Box Talks

I have received the site induction and agree to work by the safety rules and procedures for this site

Signed.....Date..... Witnessed.....Date.....

8.3 INDUCTION INFORMATION

Job Name:	Sydney Metro Chatswood Precinct Demolition and Remediation Works SMC-23-0952 Design and Construct of Chatswood Demolition and Remediation for the City and Southwest Metro Project.			
Project information	Demolition and removal of all hardstand surfaces, decommission and removal of USTs, and excavation and disposal of both asbestos contaminated and non-asbestos contaminated soil.			
Induction trainer	Your site-specific induction trainer is Ben Bowerman . Ben will conduct the site-specific induction prior to you commencing any work on site. If you are unsure of any information provided to you during the site induction, please discuss this with your induction trainer prior to starting work.			
Purpose	All workers are required to undertake this site-specific induction prior to commencing any work on the project. Visitors are also required to undertake the induction or must be in the presence of an inducted person at all times. The purpose of the site-specific induction is to provide you with the relevant information to keep yourself and others safe and informed during your time on the site.			
Information provided	You will be provided with the following information as a part of this site induction: <ul style="list-style-type: none"> • Induction information and site orientation • Scope of work (scope of work/specifications will differ depending on trade) • Project and emergency contacts • Site safety rules • Emergency procedures • Emergency site plan • Directions to the nearest hospital/medical centre • Environmental information • Site induction form/personnel details form 			
Project staff	<ul style="list-style-type: none"> • Project Manager 	Charlie Dutra Luke Slechta	<ul style="list-style-type: none"> • Site Superintendent / Supervisor 	Ben Bowerman
	<ul style="list-style-type: none"> • First Aid 	Ben Bowerman	<ul style="list-style-type: none"> • Safety Manager 	Naomi Marshall
Records retained	<ul style="list-style-type: none"> • RMA will keep a register of site inductions performed for this project. • RMA will keep the completed and signed induction form/personnel details forms 			

Orientation;	
Site Plan	<ul style="list-style-type: none"> • A site plan is located in the project management plan, and on the site notice board. Please take the time to familiarise yourself with the site plan and the locations of emergency evacuation locations, and the site amenities.
Safe Access	<ul style="list-style-type: none"> • All means of entry and/or egress from the workplace or amenity areas must be kept clearly marked, clean and free from debris. • Only designated entry and egress routes are to be used. • All personnel must present to the RMA site office upon first entry to the site.
Amenities	<ul style="list-style-type: none"> • Amenities are to be kept clean at all times. • Amenity locations are marked on the site plan.
First Aid	<ul style="list-style-type: none"> • The first aid kits are located in the RMA site shed and Mowbray House/Site Office. • All Injuries no matter how small must be reported and registered with the First Aider. • If the first aid station is unattended, the method of contacting the First Aider will be posted adjacent to the first aid station.
Consultation Arrangements	<ul style="list-style-type: none"> • All personnel to be familiar with RMA's Communication and Consultation Procedure, with acknowledging agreement to these arrangements and mechanisms by signing of the Induction form. • Other forms of consultation include the daily pre-start meeting, toolbox talks and SWMS.
Hazard Assessment	<ul style="list-style-type: none"> • An initial hazard and risk assessment has been completed for this project. Additional hazards identified whilst conducting work on site are to be reported immediately to the site superintendent/supervisor. • A Hazard and Risk Assessment must be conducted for all processes carried out on this site. These assessments will identify, calculate the magnitude, and assess the risk of any hazards associated with a particular work process. • Hazards, Risks and Controls are documented in the Risk Register and SWMS. • Hazard Identification Forms are available within Mowbray House/site office
Codes of Practice	<ul style="list-style-type: none"> • Where Codes of Practice or other regulatory requirements are relevant to any identified hazards, these shall be used when formulating work method statements.
Emergencies	<ul style="list-style-type: none"> • All personnel to familiarise themselves with the site emergency procedures. These procedures have been talked through during the in-person site induction.
Evacuation procedure	<ul style="list-style-type: none"> • In the event of an emergency evacuation, the designated evacuation route is to be followed to the assembly point. • The emergency assembly point is identified on the site plan. The assembly point was discussed during the in-person site induction. • If the site is to be evacuated, all personnel will follow the designated routes to the evacuation point. • Personnel are to wait here until they are accounted for by their supervisors. • All sub-contractor supervisors are to then report to Company Management.

<p>Accidents</p>	<ul style="list-style-type: none"> • Render help/first aid if needed without exposing yourself to danger. • DO NOT MOVE injured persons unless they are in immediate DANGER. • Report the accident as soon as practicable to your supervisor or the Site Safety Manager or First Aider. • Render any assistance when help arrives.
<p>Site Safety Rules</p>	<ul style="list-style-type: none"> • Site Safety rules are located in the project management plan and within Mowbray House/Site Office. Please take time to familiarise yourselves with the rules on site.
<p>PPE</p>	<ul style="list-style-type: none"> • Mandatory PPE requirements consist of the following: Long sleeves, long pants, high vis clothing or vest, and steel toe safety boots. • Other PPE will be required as per task specific SWMS's
<p>Live Services</p>	<ul style="list-style-type: none"> • Obtain written confirmation of disconnections prior to commencing works. • Confirmations will be made available and located within the Project Management Plan. • If at any time you come across unidentified cables / services. Work must cease in this area. Immediately contact the site superintendent/supervisor who is to establish if this is a live / isolated service. • As a worker you have a duty of care to keep yourself and others safe.... Remember, If in Doubt.... DON'T.

9. ENVIRONMENTAL CONTROL PLAN

Chatswood-Precinct
 Cnr-Pacific-Hwy-&-Mowbray-Road,
 Chatswood-NSW-2067

ENVIRONMENTAL-CONTROL-PLAN
 RMA-Contracting-Pty-Ltd
 Project-Manager:-Charlie-Dutra-0404-504-282

Key-Environmental-Risks-and-Controls

No work is permitted outside the boundary or within protected areas.

Report-to-Project-Manager

- All-Incidents,spills-and-complaints
- Any-unusual-finds-odours-contaminated-soil-suspected-artifacts.

SOIL-AND-WATER

- The-truck-commute-areas-should-be-kept-clean-at-all-times
- Any-accumulated-water-at-low-points-of-the-site-should-be-pumped-to-stormwater-following-inspection-and-use-of-RMA-Discharge-Permit
- Hazardous-substances-must-be-stored-correctly-in-bunded-areas-to-prevent-spills
- Soil-kits-to-be-in-place-in-plant-operating-areas,spills-and-chemical-storage-areas
- ERSED-controls-to-be-installed-and-maintained-as-per-this-ECP
- Stockpiles-to-be-stabilised-High-risk-stockpiles-to-be-covered-with-geo-fab
- No-mud-or-sediment-to-be-tracked-off-the-site-Use-wheel-wash-prior-to-leaving-site
- Regular-sweeper-truck-is-to-be-used-on-site
- Clean-areas-where-dirt-mud-or-sediments-have-accumulated

WASTE

- Re-use-or-recycle-construction-materials-wherever-possible
- Place-all-paper-&-cardboard-into-recycling-bins
- Place-all-other-waste-into-the-appropriate-bins
- Do-not-dispose-of-waste-into-any-drains
- All-waste-leaving-the-site-must-be-waste-classified,tracked-and-recycled-or-disposed-of-at-a-licensed-waste-facility

AIR-QUALITY

- Dust-suppression-measures-must-be-used-to-prevent-or-minimise-dust
- Dust-management-systems-to-be-in-place-for-demolition-and-excavation-works
- Earthworks-to-be-wetted-down-to-minimise-dust
- Sweeper-truck-to-be-regularly-used-on-site
- All-loads-leaving-the-site-must-be-covered

NOISE-AND-VIBRATION

- Approved-working-hours-are
 - 7am-6pm-Monday-Friday-and-8am-6pm-Saturdays
 - No-work-on-Sundays-or-Public-Holidays
- No-work-outside-of-these-hours-without-specific-approval
- Minimise-plant-&-equipment-running-times-Turn-equipment-off-when-not-in-used
- Avoid-simultaneous-use-of-noisy-equipment
- High-noise-impact-works-only-allowed
 - 8am-6pm-Monday-Friday-and-8am-1pm-Saturday
 - In-blocks-not-exceeding-3-hrs-each-with-1-hr-between-blocks
- Reasonable-and-feasible-noise-mitigation-to-be-implemented-where-possible

TRAFFIC

- Park-in-designated-areas-and-use-approved-access-&-truck-routes
- No-heavy-vehicle-queuing-in-residential-streets-before-or-after-hours

APPROVALS

Works-that-require-specific-Environmental-Approvals-include-work-outside-of-standard-hours-work-outside-the-project-boundary-clearing-and-or-vegetation-and-discharge-of-water



Hoardings around the site is sealed to the ground. Where there are gaps in the hoarding additional ERSED Controls to be implemented

Pit blocks are in place for stormwater pits around the active concrete demolition/excavation work area to prevent any contaminated water leaving the site. Geofabric is installed on stormwater pits away from the active work area to allow clean water to passively leave the clean area of site while retaining any potential sediments and pollutants

ECP-Key	
	Hoardings
	Site-Entry
	Site-Exit
	Sydney-Metro Access
	Parkings
	Heritage-Protection (Mowbray-House)
	Toilet-Facilities
	First-Aid
	Spill-Kits
	Heritage Sensitive-Areas
	Hardstand Demolition
	Excavation Area
	Underground Storage-Tanks
	Stockpile
	Load-Out-Areas
	RMA-Site-Compounds
	Wheel-Wash
	Weigh-Pads
	Stormwater-Pits



10. REGISTERS & FORMS



10.1 ENVIRONMENTAL INCIDENT AND REPORT FORM

PROJECT INFORMATION

Project Name:	Name of Person Involved:
Project Number:	Name of Person Completing Report:
Date of Incident/Accident:	Date of Report:
Time of Incident/Accident:	Time of Report:

OUTCOME OF THE INCIDENT/ACCIDENT/NEAR MISS (circle)

Complaint	Report to Authorities	Property Damage	Near Miss
Media Report	Other		

NATURE OF INCIDENT OR NEAR MISS (brief description required)

DESCRIPTION OF AND SEQUENCE OF EVENTS THAT LED TO THE INCIDENT/NEAR MISS (if more space is required, attach the description to this form)

DESCRIPTION OF RESPONSE TO THE INCIDENT/NEAR MISS (if more space is required, attach the description to this form)



NATURE OF IMPACT TO ENVIRONMENTAL RECEPTORS/SURROUNDING PROPERTY/LOCAL AREA (please list type of equipment & damage)

WITNESSES TO THE INCIDENT/NEAR MISS

Name:	Signature:
Name:	Signature:

CORRECTIVE ACTIONS (if more space is required, attach the description to this form)

Corrective Action	By Whom	Date to be Completed

CORRECTIVE ACTIONS WITNESS & SIGN OFF (corrective actions implemented, approved and signed off by the Site Safety Officer and Operations Manager)

Name:	Signature:
Name:	Signature:

STATUTORY AUTHORITY NOTIFICATION (if required)

Date Notified:	Notified by Whom:
Agency Notified:	Time of Notification:
Person Notified:	Type of Notification:

REPORT SIGN OFF

Compiled by:	Signature:
Date:	



Environmental Complaint Report Register			
Date of Complaint	Nature of Complaint	Reported by	Complaint Report Number

DAILY INSPECTION CHECKLIST

Site Name: _____ Site Manager: _____ Date: ___/___/___

The Checklist is to be completed weekly by the Site Manager and stored in the site specific project folder. The Checklist is a guide only, and any other safety issues must be addressed.

SITE SAFETY REPRESENTATIVES ARE TO COMPLETE THIS FORM ON SITES THEY ARE DIRECTLY SUPERVISING

All defects must be rectified immediately and action documented.

(Please place your initials in the boxes do NOT use ticks or crosses)

SITE AREA	Mon		Tue		Wed		Thur		Fri		Sat		Sun		COMMENTS & ACTIONS
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	
a) Is the floor area clear of rubbish, or scattered materials, etc?															
b) Is there a rubbish / waste container on site?															
c) Are barricades / fences along / around trenches and hazardous work areas?															
d) Are there Construction warning signs displayed?															
e) Are there suitable extinguishers on site?															
f) Is an emergency / serious accident procedure displayed on site?															
g) Where is the nearest telephone in case of an emergency?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Location
h) Is there an evacuation plan displayed on site and are all personnel aware of the plan?															
i) Site fencing / Temp fencing complete and secure?															

LADDERS & SCAFFOLDING	Mon		Tue		Wed		Thur		Fri		Sat		Sun		COMMENTS & ACTIONS
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	
a) Is the scaffolding secured against tipping?															
b) Are handrails and toe boards in place along the full length of the scaffold?															
c) Are the planks secure?															
d) Is proper ladder access provided to get to scaffold working decks?															
e) If the scaffold is under erection, have safety barriers been set up near the scaffolding base?															
f) Are only platform ladders available / in use on site?															
g) Was written confirmation provided by a competent person prior to use that the scaffold is complete?															
h) Is the scaffold secured to prevent unauthorised access?															
HAZARDOUS SUBSTANCES	Mon		Tue		Wed		Thur		Fri		Sat		Sun		COMMENTS & ACTIONS
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	
a) Does the site have a Hazardous Substances Register listing the chemical used on site?															
b) Have Safety Data sheets (SDS's) been obtained for all chemicals on site and are copies of the SDS's available?															
c) Are all containers of chemicals adequately labelled (including decanted ones)?															
d) Have site workers using chemicals been trained in how to use the site chemicals safely?															If yes who conducted the training?



TOOLS	Mon		Tue		Wed		Thur		Fri		Sat		Sun		COMMENTS & ACTIONS
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	
a) Do the machines / tools on site have guards fitted?															
b) Are the leads and plugs in good condition?															
c) Are the extension leads off the ground?															
d) Is there any electrical equipment overdue for inspection?															
e) Do all leads and electrical tools have current tags indicating they have been tested as required?															
f) Are there explosive tools on site?															
g) Are warning signs for explosive powered tools displayed?															
SAFETY DOCUMENTS	Mon		Tue		Wed		Thur		Fri		Sat		Sun		COMMENTS & ACTIONS
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	
a) Have Safe Work Method Statements (SWMS) been provided for all trades?															
b) Have all SWMS been checked and are site specific?															
c) If YES to (a) where are they?															
d) If NO to (a) has the activity commencement been deferred until the SWMS are provided?															



General Safety	Mon		Tue		Wed		Thur		Fri		Sat		Sun		COMMENTS & ACTIONS
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	
a) Are Safety Helmets being worn by all personnel?															
b) List group(s) not wearing helmets and action taken?															
c) Are safety boots being worn?															
d) Are site workers wearing hearing protection whilst doing and/or working near noisy work?															
e) Are supervisors and site workers wearing UV protective equipment and clothing?															Eg. Hand, eyes, skin, respiratory
f) What is the level of compliance?															
g) Is there a fully stocked 1 st Aid box on site?															
h) Is there a qualified 1 st aid person on site?															Name/s

SAFEWORK VISITS	Mon		Tue		Wed		Thur		Fri		Sat		Sun		COMMENTS & ACTIONS
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	
a) Have any NSW SafeWork representative(s) attended the site since the last inspection?															* Systems Manager to be advised immediately
b) If Yes to (a) when did they attend?															
c) Did SafeWork issue any Prohibition and Improvement Notices (PINs)?															
d) Did SafeWork issue any on-the-spot fine to the Contractor and/or Sub-Contractors and/or employees?															



Environmental controls	Mon		Tue		Wed		Thur		Fri		Sat		Sun		COMMENTS & ACTIONS
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	
a) Are access and traffic management controls in place?															
b) Are Erosion and sediment controls in place and effective?															
c) Are siltation control measures in place around external drains and are they working effectively?															
d) Are the roads clear of dust/mud tracked from the work site?															
e) Is there a broom or suction sweeper available for clearing roads?															
f) Are dust control measures in place and are they effective?															
g) Is the site minimising noise & complying with noise level criteria?															
h) Does the equipment on site appear to be in appropriate working order (e.g. noise, exhaust fumes, leakage)?															
i) Are spillage prevention and containment measures in place?															
j) Does the storage, transport and disposal of litter, debris, waste materials and effluent from amenities comply with Regulations?															
k) Are warning and emergency contact signs in place?															
l) Are personnel working to defined construction hours?															
m) Are all truck loads covered and tailgates sealed when travelling from site?															
n) Is material stockpiled in designated temporary stockpile areas only? Is															

Integrated Project Management Plan

sediment fencing in place around stockpiles?															
o) Is there a spill kit on-site? Have personnel been trained in use of spill kit?															
p) Is site tidy and rubbish/obstructions removed?															
q) Are Waste docket records being maintained?															
r) Have all new starters on site been given full site and environmental induction?															

WASTE MANAGEMENT CONTROLS	Mon		Tue		Wed		Thur		Fri		Sat		Sun		COMMENTS & ACTIONS
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	
a) Is there a designated area on site for storage of materials for recycling?															
b) Has waste been disposed of in a legal manner?															
c) Has the waste been transferred to a waste disposal depot for recycling?															
d) Are there any salvageable materials?															
e) Were any heritage salvageable materials identified?															
f) Have the heritage materials been logged in the register, labelled and photographed and stored appropriately?															
g) Have written instructions been issued as a result of this inspection?															How Many – To Whom –

SWMS Observation & compliance	Mon		Tue		Wed		Thur		Fri		Sat		Sun		Compliance Comments
Is work being carried out as per the SWMS on site	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	
a) Task observation undertaken <small>(once per week)</small> Trade _____															
b) Was work being carried out as per the SWMS? If No stop work and take corrective measures															
c) What measures were taken?	<hr/>														

Additional HAZARDS IDENTIFIED	Mon		Tue		Wed		Thur		Fri		Sat		Sun		Risk Control Measures
Have these hazards been eliminated / minimised	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	
a)															
b)															
c)															
d)															
e)															

Have SWMS been amended to include newly identified Hazards / Control Measures? Yes No

If NO, please explain why this has not been done: _____



General comments about this site (including rectification action)

Has Previous Required Follow up Action been completed?	Mon		Tue		Wed		Thur		Fri		Sat		Sun		COMMENTS & ACTIONS
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	

If no reason, to be recorded urgent and Instruction given.

SITE MANAGER (signature) _____ DATE ____/____/____



11. ENVIRONMENTAL RISK REGISTER



Sydney Metro - Chatswood Remediation Site

Review Date 3 Months

Risk Register

RMA GROUP ENVIRONMENTAL RISK REGISTER		IMS Reference: RSK-001			Inherent risk (No Control)			Target Baseline Risk (Maximum Control)			Residual Risk (Current Level Control)			Current Risk Status	Accept Treatment
DATE		Thursday, 22 February 2024			Risk Matrix			Risk Appetite			Current Assessment				
Construction Phase	RISK I.D.	Risk Description	Risk Owner	Risk Controls	Likelihood	Consequence	Risk Level	Likelihood	Consequence	Risk Level	Likelihood	Consequence	Risk Level	Within Appetite	Treatment Options
Public	4	Complaints	PM	*RMA will maintain a record of all complaints. Records to be kept in the form of complaint form and register. *Copies of complaint reports to be submitted to Sydney Metro.	3	3	High	3	5	Medium	3	5	Medium	Yes	Accept with Active Monitoring
	6	Degradation of Public Roads	PM SS	*Implement and follow CoR Management Plan * Ensure all trucks and vehicles remain on hardstand areas (where possible) to ensure no loose material on vehicle tyres and bodies. * Ensure all required and all appropriate covers are used and secure on trucks. * Vehicles to pass through wheel wash prior to exiting site. * Public roads to be cleaned regularly to prevent build up of mud/soil. * Use licensed drivers and registered vehicles only. * Follow general road rules whilst using public roads. *Refer to CEMP section 5.22 Traffic Management and Local Road Condition	2	4	High	3	6	Low	3	6	Low	Yes	Accept
	44	Negative Media Publicity Event	PM	*RMA personnel to be polite to all media but must refer all complaints, questions etc to Sydney Metro for comment	5	3	Medium	5	4	Low	5	4	Low	Yes	Accept
	47	Protest Event	PM	*RMA will contact Sydney Metro immediately in the event of a protest or threat of protest. *RMA personnel and subcontractors not to interact with protesting parties.	6	3	Low	6	4	Low	6	4	Low	Yes	Accept

Human Resources/Workforce Development	3	Biological Hazards	PM	<ul style="list-style-type: none"> *No personnel to present to work if sick. *Ensure RPE is cleaned sufficiently at the end of each shift, do not share RPE under any circumstances *No sharing of food *Maintain good hygiene practices - hand and face washing prior to eating or drinking. *Avoid touching the face unless hands have been washed or sanitised. *If a biological hazard is identified onsite that was not identified prior to commencing work onsite, cease work and toolbox talk the hazard and controls. *Wear PPE i.e. gloves, safety glasses, RPE and disposable coveralls if handling or working in an area where it is possible to come into contact with a biological hazard. *Follow controls for Needle Stick Injury 	2	3	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
	7	Drugs & Alcohol	GM PM SM	<ul style="list-style-type: none"> *Follow RMA Durg & Alcohol Policy. *No drug and alcohol to be brought or consumed on site. *Random drug and alcohol testing may be undertaken 	3	1	Very High	5	4	Low	5	4	Low	Yes	Accept
	11	Employee Health & Wellbeing	GM	Follow Workplace Relations and Wellbeing Management Plan	3	3	High	5	5	Low	5	5	Low	Yes	Accept
	59	Subcontractor Management	PM SS SM	<ul style="list-style-type: none"> *Follow Subcontractor Management Procedure. *Review subcontractor management plans and WHS documentation prior to commencement on site *Perform regular task observations to ensure tasks are being performed in line with documentation. *Maintain open lines of communication with subcontractors and Project Manager to keep abreast of suncontractors progress. 	3	3	High	4	5	Low	4	5	Low	Yes	Accept

Equipment	22	Equipment Failure	PM	<p>*Project Manager to locate plant & equipment and allocate to the project. Include dates required and how equipment to be collected e.g. float, personnel pick up. If equipment not available Project Manager to procure items using hire partners.</p> <p>*In the event of equipment or machine breakdown, RMA Project Manager to locate alternative equipment/machines. If no RMA items available contact Hire partner to source the items.</p> <p>*Refer to CEMP section 5.25 Plant & Equipment</p>	3	3	High	5	5	Low	5	5	Low	Yes	Accept
Sydney Metro Access	46	Sydney Metro Access Through Site	PM	<p>*Access through RMA's site will be maintained for Sydney Metro and their contractors for the duration of the project.</p> <p>*Access to be gained from the gates off Mowbray Rd. Trucks are to drive through the site and exit through the gates on the eastern boundary allowing access to the Sydney Metro Dive Site.</p> <p>*Access required during site hours should be coordinated with the RMA Project Manager.</p> <p>*Access required outside of work hours to be gained by using RMA and Sydney Metro padlocks in a daisy chain formation. This will allow each respective party to access the site whilst still maintaining site security.</p> <p>*In the event of an emergency the project Project Managers can be contacted to gain access to the site.</p> <p>*Refer to CEMP section 5.22 Traffic Management and Local Road Condition</p> <p>*Refer to CTMP</p>	2	2	Very High	2	6	Medium	2	6	Medium	Yes	Accept with Active Monitoring
	60	Traffic/Vehicles Onsite Vehicle or Pedestrian Interaction	PM	<p>*A Construction Traffic Management Plan (CTMP) must be developed and implemented to control vehicle movements within the site. Follow procedures and instructions within CTMP.</p> <p>*Refer to CEMP section 5.22 Traffic Management and Local Road Condition</p> <p>*Refer to CTMP</p>	2	2	Very High	2	5	Medium	2	5	Medium	Yes	Accept with Active Monitoring

Site Security	1	Access & Egress	PM SS	<p>*Access to the site will only be from Mowbray Rd entry gates.</p> <p>*Heavy vehicles will be required to exit the site via the gates on the eastern site boundary, via the Sydney Metro Dive Site driveway. This will allow heavy vehicles to safely enter Mowbray Rd without disrupting traffic flow.</p> <p>*Entry gates must be locked at the end of the day or when the last person leaves the site. Gates must be locked when the site is unmanned or if there is no spotter at the entry gate off Mowbray Rd.</p> <p>*Delivery vehicles shall be met at the entry gate and escorted to the work area where possible.</p> <p>*No queuing of vehicles on Mowbray Rd.</p> <p>*Personnel must first attend the Site Office (Mowbray House) to sign in and perform pre-start meetings.</p> <p>*All personnel working on the site must complete the site specific induction prior to commencement on site.</p> <p>*Visitors must be escorted by an inducted RMA employee.</p>	3	3	High	5	4	Low	5	4	Low	Yes	Accept
	2	Adverse Weather	PM SS	<p>*RMA project manager and supervisor to monitor the weather conditions closely.</p> <p>*Cease work in heavy rain and during storms.</p>	3	3	High	3	5	Medium	3	5	Medium	Yes	Accept with Active Monitoring
	48	Risk to Public	PM SS	<p>*Existing hoardings must be maintained for the duration of the project.</p> <p>*Temporary and existing chainwire fencing must be maintained in good working order for the duration of</p>	3	2	High	4	5	Low	4	5	Low	Yes	Accept

			<p>the project.</p> <p>*Entry gates must be locked at the end of the day or when the last person leaves the site. Gates must be locked when the site is unmanned or if there is no spotter at the entry gate off Mowbray Rd.</p> <p>*No queuing of vehicles on Mowbray Rd.</p> <p>*Site supervisor must conduct a daily safety and environmental check of each site. This check must include a check of perimeter fencing and hoardings. Any issues found involving the hoarding or perimeter fencing must be rectified immediately or if not possible, the appropriate safety measures implemented to prevent access to the site.</p> <p>*A Construction Traffic Management Plan will be developed and implemented to control vehicle movements into and out of the site. This will also include the safe management of pedestrians moving past the site.</p> <p>*Neighbours must be notified prior to asbestos removal work commencing. Notifications must detail what works are expected to occur on site and the commencement dates.</p>											
53	Site Security - Bomb Threat	PM SS	Follow Emergency Response Management Plan	4	1	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
54	Site Security - Fire	PM SS	<p>Follow Emergency Response Management Plan</p> <p>*RMA to confirm the status of Total Fire Bans. No hot works to be completed during Total Fire Bans.</p> <p>*Fire extinguishers located in an appropriate storage area.</p> <p>*Ensure any hot works activity is documented in Method Statement.</p> <p>*A hot works permit must be completed prior to any hot works activities.</p> <p>*All hot works to have fire extinguisher within reach of the work zone.</p>	3	1	Very High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring

55	Site Security - Robbery event	PM SS	<ul style="list-style-type: none"> *Follow Emergency Response Management Plan *Follow Site Security Management Plan *Security Management company to perform site security *CCTV cameras to be installed to monitor the site including access points 	3	3	High	5	4	Low	5	4	Low	Yes	Accept
56	Site Security - Site Boundary/Unauthorized Access	PM SS	<ul style="list-style-type: none"> *Follow Site Security Management Plan *Security Management company to perform site security *CCTV cameras to be installed to monitor the site including access points. *Existing hoardings must be maintained for the duration of the project. *Temporary and existing chainwire fencing must be maintained in good working order for the duration of the project. *Entry gates must be locked at the end of the day or when the last person leaves the site. Gates must be locked when the site is unmanned or if there is no spotter at the entry gate off Mowbray Rd. *A spotter will be used to monitor vehicle and pedestrian access to the site. *Legislative signage must be installed at entry points to the site. RMA Company signage including the site contact details must be displayed at the entry point to the site. *Personnel must first attend the Site Office (Mowbray House) to sign in and perform pre-start meetings. *All personnel working on the site must complete the site specific induction prior to commencement on site. *Visitors must be escorted by an inducted RMA employee. *Site supervisor must conduct a daily safety and environmental check of each site. This check must include a check of perimeter fencing and hoardings. Any issues found during the daily checks must be rectified immediately or if not possible, the appropriate safety measures implemented to make the site safe. 	2	1	Very High	5	5	Low	5	5	Low	Yes	Accept

Waste Management	6	Degradation of Public Roads	PM SS	<ul style="list-style-type: none"> *Implement and follow CoR Management Plan * Ensure all required and all appropriate covers are used and secure on trucks. * Vehicles to pass through wheel wash prior to exiting site. * Public roads to be cleaned regularly to prevent build up of mud/soil. * Use licensed drivers and registered vehicles only. * Follow general road rules whilst using public roads. *Refer to CEMP section 5.22 Traffic Management and Local Road Condition 	2	4	High	3	6	Low	3	6	Low	Yes	Accept
	8	Dust	PM SS	<ul style="list-style-type: none"> *Temporary fencing to have shade cloth installed to minimise off-site dust release. * Use targeted water spray to help suppress dust during waste load out. Water spray devices such as handheld pump spray bottles and high-pressure water sprayers will be used on this site. *Monitor wind levels daily. It may be necessary to halt work temporarily during high wind occasions. *Truck driver to remain in cabin during loading. *Operator performing waste loadout must have cabin door closed with air conditioning running. *Truck loads must be covered prior to leaving site. *Personnel to wear P2 dust mask during truck load out. P3 respirator to be worn if the waste being loaded out is contaminated in nature. *Refer to CEMP section 5.18 Dust Suppression 	2	4	High	4	5	Low	4	5	Low	Yes	Accept
	18	Environment - Noxious Weed propagation	PM SS	<ul style="list-style-type: none"> * Ensure all trucks and vehicles remain on hardstand areas (where possible) to minimise interaction with weeds or plants * Vehicles to pass through wheel wash prior to exiting site. *Refer to CEMP section 5.23 Flora & Fauna 	3	4	Medium	6	4	Low	6	4	Low	Yes	Accept

20	Environment - Release of Asbestos or other Hazardous Substances	PM SS	<p>*Truck loads must be covered prior to leaving site.</p> <p>*Do not overload trucks to minimise the risk of truck tip over or material falling from trailers.</p> <p>*Refer to ARCP</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p> <p>*Refer to CEMP section 5.14 Spill Response</p>	2	3	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
24	Exposure to Asbestos	PM SS	<p>*Truck driver to remain in cabin during loading of asbestos or contaminated materials</p> <p>*Maintain dust suppression during loading of waste stockpiles</p> <p>*Establish exclusion zones around load out areas where the material contains asbestos.</p> <p>*Only the required personnel to be within the load out area.</p> <p>*Personnel required to be within the load out area must wear the appropriate asbestos PPE including P3 respirator, disposable coveralls, safety glasses, gloves and safety boots.</p> <p>*Refer to ARCP</p>	3	3	High	5	5	Low	5	5	Low	Yes	Accept
25	Exposure to Other Hazardous Substances	PM SS	<p>*Truck driver to remain in cabin during loading of asbestos or contaminated materials</p> <p>*Maintain dust suppression during loading of waste stockpiles</p> <p>*Establish exclusion zones around load out areas where the material contains contaminated materials.</p> <p>*Only the required personnel to be within the load out area.</p> <p>*Personnel required to be within the load out area must wear the appropriate PPE. The required PPE will be determined based on the Waste Classification of the material being loaded out.</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p> <p>*Refer to CEMP section 5.14 Spill Response</p>	3	3	High	5	5	Low	5	5	Low	Yes	Accept

	60	Traffic/Vehicles Onsite Vehicle or Pedestrian Interaction	PM	*A Construction Traffic Management Plan (CTMP) must be developed and implemented to control vehicle movements within the site. Follow procedures and instructions within CTMP. *Refer to CEMP section 5.22 Traffic Management and Local Road Condition *Refer to CTMP	2	1	Very High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
	61	Traffic/Vehicles Offsite Vehicle or Pedestrian Interaction	PM SS	*A Construction Traffic Management Plan will be developed and implemented to control vehicle movements into and out of the site. This will also include the safe management of pedestrians moving past the site. Follow procedures and instructions within CTMP. *Refer to CEMP section 5.22 Traffic Management and Local Road Condition *Refer to CTMP	2	1	Very High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
	63	Waste Management Uncontrolled Waste	PM	*All waste must be classified in line with the NSW EPA Waste Classification Guidelines. *All loads of soil must not leave site without a waste classification. *All waste must be sorted into appropriate streams to maximise recycling. *Waste to be disposed of at a licensed landfill or recycling facility. *Waste dockets must be kept, recorded and a copy issued to Sydney Metro. *Waste Tracking must be performed by RMA's Project Manager. *Refer to CEMP section 5.20 Waste Management *Refer to WMP	3	2	High	6	4	Low	6	4	Low	Yes	Accept
Site Establishment	2	Adverse Weather	PM	*RMA project manager and supervisor to monitor the weather conditions closely. *Cease work in heavy rain and during storms.	3	3	High	4	5	Low	4	5	Low	Yes	Accept

5	Dangerous Goods	PM	<p>*Identify dangerous goods by checking the label and source an SDS*Dangerous goods must be stored in accordance with their SDS.</p> <p>*Dangerous goods may only be transported by persons who have been trained in the handling and transportation of dangerous goods. Licence to transport required for the driver and the vehicle. Transport documents required for transport and must be carried in the vehicles cabin.</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p>	3	3	High	4	5	Low	4	5	Low	Yes	Accept
6	Degradation of Public Roads	PM	<p>* Ensure all required and all appropriate covers are used and secure on trucks.</p> <p>* Use licensed drivers and registered vehicles only.</p> <p>* Follow general road rules whilst using public roads.</p> <p>*Refer to CEMP section 5.22 Traffic Management and Local Road Condition</p>	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept
8	Dust	PM SS	<p>*Temporary fencing to have shade cloth installed to minimise off-site dust release.</p> <p>*Monitor wind levels daily. It may be necessary to halt work temporarily during high wind occasions.</p> <p>*Personnel to wear P2 dust mask in dusty conditions.</p> <p>*Refer to CEMP section 5.18 Dust Supression</p>	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept
13	Environment - Archaeological/Heritage	PM	<p>*Areas of Heritage Significance should be marked out on site by the Heritage Consultant</p> <p>*Archaeological/Heritage Method Statement to be prepared by Heritage Consultant.</p> <p>*Site induction to include the location of significant areas and what controls will be in place whilst performing work in these areas.</p> <p>*Refer to CEMP section 5.24 Heritage, Archaeological and Aboriginal Artefacts</p>	4	4	Medium	5	6	Low	5	6	Low	Yes	Accept

14	Environment - Chemical/Hazardous/ Non-Hazardous Substance Spills	PM SS	<p>*Ensure all substances (hazardous and non-hazardous) are stored correctly in line with the SDS.</p> <p>*Ensure a spill kit is located on site. Multiple spill kits will be used for this site due to the large size of the site.</p> <p>*Follow Spill Response Procedure noted in the CEMP</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p> <p>*Refer to CEMP section 5.14 Spill Response</p>	3	3	High	4	5	Low	4	5	Low	Yes	Accept
15	Environment - Fauna/Flora	PM SS	<p>*To prevent the spread of weeds, all equipment and in particular personnel boots will be cleaned prior to entering or leaving the site. Any plant material removed during this process must be bagged and disposed of at a licenced landfill.</p> <p>*Prior to commencing works, the site including any vegetation will be inspected for the presence of Fauna. If native fauna is encountered on site work will cease and the fauna will be allowed to move away from the area. If fauna is required to be removed from site, RMA will contact the client representative and request advice and or assistance in its removal. All native fauna is protected by law direct contact with wildlife should be avoided wherever possible.</p> <p>*If injured wildlife is encountered, the project site supervisor should contact the nearest wildlife rescue organisation to assist with its relocation.</p> <p>*In the event personnel are bitten or scratched report to the First Aid Officer.</p> <p>*Refer to CEMP section 5.23 Flora & Fauna</p>	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept

17	Environment - Heat Stress	PM SS	<p>*Ensure no one works alone. By implementing a buddy system workers are more aware to lookout for each other.</p> <p>*RMA must provide adequate drinking water and hydration should be maintained during the day.</p> <p>*Encourage workers to take more beaks throughout the shift and stay hydrated.</p> <p>*Provide sunscreen and encourage personnel to regularly apply it.</p> <p>*Wear light weight long sleeve shirts and long pants to protect against burns.</p> <p>*Attach brims to hard hats for sun protection.</p> <p>*Refer to CEMP section 5.15 Heat Stress & Skin Protection</p>	2	3	High	4	5	Low	4	5	Low	Yes	Accept
32	Hazardous/Non-Hazardous Substances	PM SS	<p>*Any substances to be used or stored on the site must have a current SDS immediately available.</p> <p>*Identify all substances on site and refer to the SDS for transport, storage, use and disposal methods. Refer to SDS for PPE requirements when using the product.</p> <p>*Substances must be stored in a designated area. This will be discussed in the site induction.</p> <p>*A spill kit will be kept on site in the event of a spill occurring on site. Spill kits to be located in the site shed and site office.</p> <p>*Follow Spill Response Procedure in the event of a spill/leak of chemicals, dangerous goods, or hazardous/non-hazardous substance.</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p> <p>*Refer to CEMP section 5.14 Spill Response</p>	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept

43	Needle Stick Injury	PM SS	<p>*Site induction to cover the potential of finding needles during works and what to do if they are found (correct disposal).</p> <p>*Perform an inspection of the work area for needles/syringes.</p> <p>*Carefully lift rubbish etc. and look for needles.</p> <p>*Sharps container must be available on site to dispose of any needles found.</p> <p>*Only handle sharps by the syringe. Do not touch the needle. Keep the sharp end away from the body and do not walk towards other people holding the needle.</p> <p>*Use tongs to pick up the needle if it is unsafe to hold it or if the tube/syringe is not present or broken.</p> <p>*Wear safety boots, gloves and long pants and sleeves during site activities.</p>	3	2	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
45	Noise & Vibration	PM SS	<p>* Follow procedures and instructions in the Noise and Vibration Management Plan</p> <p>*Any noise creating activity must be minimised where possible and is to be completed during hours approved by Sydney Metro (Mon-Fri 7am to 6pm & Sat 8am to 6pm)</p> <p>*All equipment and machinery shall be operated in an efficient manner to minimise the emission of background noise around the site.</p> <p>*Equipment will be selected for the project on the basis of its noise performance and will be fitted with noise attenuation mufflers to meet Australian Standards for noise generation.</p> <p>*Perform noise/vibration monitoring when directed by the Noise and Vibration Management Plan.</p> <p>*Personnel to wear ear protection when advised by the site supervisor.</p> <p>*Refer to CEMP section 5.21 Noise & Vibration Management</p>	1	3	Very High	3	5	Medium	3	5	Medium	Yes	Accept with Active Monitoring

49	Services Aboveground/Overhead	PM SS	<p>*When working within 3m of aboveground/overhead powerlines or structures RMA to utilise Above Ground Service Work Permit.</p> <p>*Inspect the site for any unknown overhead services or structures.</p> <p>*Overhead powerlines are situated along the Pacific Highway. These powerlines are located outside of the site boundaries, however safe approach distances will be maintained.</p> <p>*Tiger tails to be placed on overhead powerlines on Pacific Hwy and Nelson St.</p> <p>*When working within 2m of an Ausgrid asset RMA are to contact Ausgrid. Ausgrid to determine if an Ausgrid representative needs to be present to supervise the work.</p> <p>*If necessary, install physical barriers to prevent machinery from exceeding safe approach distance.</p> <p>*Refer to CEMP section 5.19 Services and Above and Undergrond Structures</p>	3	2	High	5	5	Low	5	5	Low	Yes	Accept
58	Snakes, Spiders, Insects etc.	PM SS	<p>*Perform a visual inspection of the work area prior to commencing any work.</p> <p>*All RMA personnel and subcontractors must be on the lookout for snakes, spiders etc. at all times.</p> <p>*Avoid lifting or moving debris or onsite objects unless necessary.</p> <p>*Avoid accessing suspect areas unless necessary.</p> <p>*A qualified first aider must be present on site at all times. The first aider must be identified during the site induction and must be contactable and available at all times.</p> <p>*First aid facilities will be located in the site shed and site office.</p> <p>*If a snake is found work is to cease and the site supervisor is to be notified immediately.</p> <p>*RMA personnel, subcontractors or visitors must wear the appropriate PPE i.e. Steel toe shoes, long sleeve shirt and long pants and gloves when required.</p>	3	3	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring

	60	Traffic/Vehicles Onsite Vehicle or Pedestrian Interaction	PM	*A Construction Traffic Management Plan (CTMP) must be developed and implemented to control vehicle movements within the site. Follow procedures and instructions within CTMP. *Refer to CEMP section 5.22 Traffic Management and Local Road Condition *Refer to CTMP	2	1	Very High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
	61	Traffic/Vehicles Offsite Vehicle or Pedestrian Interaction	PM SS	*A Construction Traffic Management Plan will be developed and implemented to control vehicle movements into and out of the site. This will also include the safe management of pedestrians moving past the site. Follow procedures and instructions within CTMP. *Refer to CEMP section 5.22 Traffic Management and Local Road Condition *Refer to CTMP	2	1	Very High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
	62	Unexpected Finds	PM	*Follow Unexpected Finds Procedure *Follow Unexpected Finds Procedure for Archaeological finds as per the Archaeological Method Statement *Refer to CEMP section 7 Unexpected Finds Protocol *Refer to CEMP section 5.24 Heritage, Archaeological and Aboriginal Artefacts	3	4	Medium	5	5	Low	5	5	Low	Yes	Accept
Demolition Works - Removal of Hardstand	2	Adverse Weather	PM	*RMA project manager and supervisor to monitor the weather conditions closely. *Cease work in heavy rain and during storms. *Where possible heavy machinery to remain on hardstand areas to prevent creation of mud or slurry.	3	3	High	4	5	Low	4	5	Low	Yes	Accept
	5	Dangerous Goods	PM	*Identify dangerous goods by checking the label and source an SDS*Dangerous goods must be stored in accordance with their SDS. *Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods	3	3	High	4	5	Low	4	5	Low	Yes	Accept

8	Dust	PM SS	<p>*Temporary fencing to have shade cloth installed to minimise off-site dust release.</p> <p>* Use targeted water spray to help suppress dust during concrete cutting and demolition. Water spray devices such as handheld pump spray bottles and high-pressure water sprayers will be used on this site.</p> <p>*Monitor wind levels daily. It may be necessary to halt work temporarily during high wind occasions.</p> <p>*Operators performing demolition of hardstand areas must have cabin door closed with air conditioning running.</p> <p>*Personnel to wear P2 dust mask during concrete cutting or removal. P3 respirator to be worn if the concrete being removed contains asbestos.</p> <p>*Refer to CEMP section 5.18 Dust Suppression</p>	1	3	Very High	3	5	Medium	3	5	Medium	Yes	Accept with Active Monitoring
12	Environment - Air Pollution	PM SS	<p>*Machinery and equipment must be serviced and maintained to ensure they are running correctly and are not producing excessive emissions.</p> <p>*Maintain erosion and sediment controls to prevent dust being released from stockpiles and excavations.</p> <p>*Follow controls for Dust</p> <p>*Refer to CEMP section 5.18 Dust Suppression</p> <p>*Refer to CEMP section 5.25 Plant & Equipment</p> <p>*Refer to CEMP section 5.28 Odour Control</p>	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept
13	Environment - Archaeological/Heritage	PM	<p>*Areas of Heritage Significance should be marked out on site by the Heritage Consultant</p> <p>*Archaeological/Heritage Method Statement to be prepared by Heritage Consultant.</p> <p>*Site induction to include the location of significant areas and what controls will be in place whilst performing work in these areas.</p> <p>*Excavation Director provided by the Heritage Consultant is to supervise any excavation work within Heritage significant/sensitive areas.</p> <p>*Refer to CEMP section 5.24 Heritage, Archaeological and Aboriginal Artefacts</p>	3	3	High	4	5	Low	4	5	Low	Yes	Accept

14	Environment - Chemical/Hazardous/ Non-Hazardous Substance Spills	PM SS	<p>*Ensure all substances (hazardous and non-hazardous) are stored correctly in line with the SDS.</p> <p>*Ensure a spill kit is located on site. Multiple spill kits will be used for this site due to the large size of the site.</p> <p>*Follow Spill Response Procedure noted in the CEMP</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p> <p>*Refer to CEMP section 5.14 Spill Response</p>	3	3	High	4	5	Low	4	5	Low	Yes	Accept
15	Environment - Fauna/Flora	PM SS	<p>*To prevent the spread of weeds, all equipment and in particular personnel boots will be cleaned prior to entering or leaving the site. Any plant material removed during this process must be bagged and disposed of at a licenced landfill.</p> <p>*Prior to commencing works, the site including any vegetation will be inspected for the presence of Fauna. If native fauna is encountered on site work will cease and the fauna will be allowed to move away from the area. If fauna is required to be removed from site, RMA will contact the client representative and request advice and or assistance in its removal. All native fauna is protected by law direct contact with wildlife should be avoided wherever possible.</p> <p>*If injured wildlife is encountered, the project site supervisor should contact the nearest wildlife rescue organisation to assist with its relocation.</p> <p>*In the event personnel are bitten or scratched report to the First Aid Officer.</p> <p>*Refer to CEMP section 5.23 Flora & Fauna</p>	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept
16	Environment - Groundwater Contamination	PM SS	<p>*Maintain erosion and sediment controls to prevent contaminated material being released from stockpiles and excavations and leaching or running into groundwater.</p> <p>*Refer to CEMP section 5.17 Erosion, Sediment, Water Quality Control</p>	3	4	Medium	5	5	Low	5	5	Low	Yes	Accept

17	Environment - Heat Stress	PM SS	<ul style="list-style-type: none"> *Ensure no one works alone. By implementing a buddy system workers are more aware to lookout for each other. *Operators of machinery to ensure air conditioning is turned on during operations. *RMA must provide adequate drinking water and hydration should be maintained during the day. *Encourage workers to take more beaks throughout the shift and stay hydrated. *Provide sunscreen and encourage personnel to regularly apply it. *Wear light weight long sleeve shirts and long pants to protect against burns. *Attach brims to hard hats for sun protection. *Refer to CEMP section 5.15 Heat Stress & Skin Protection 	2	3	High	4	5	Low	4	5	Low	Yes	Accept
18	Environment - Noxious Weed propagation	PM SS	<ul style="list-style-type: none"> * Ensure all trucks and vehicles remain on hardstand areas (where possible) to minimise interaction with weeds or plants * Vehicles to pass through wheel wash priro to exiting site. *Refer to CEMP section 5.23 Flora & Fauna 	3	4	Medium	6	4	Low	6	4	Low	Yes	Accept
19	Environment - Odour Event	PM SS	<ul style="list-style-type: none"> *Cease work and notify Sydney Metro. *Find the source of the odour. *Remove the source of the odour and use an odour suppressant as required. *Return to work once approvals granted by Sydney Metro. *Refer to CEMP section 5.28 Odour Control 	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept
20	Environment - Release of Asbestos or other Hazardous Substances	PM SS	<ul style="list-style-type: none"> *Ensure air monitoring is conducted during excavation or removal of asbestos. *Cease work and follow Unexpected Finds Procedure if asbestos or other substances identified in unknown locations. *Follow Controls for Exposure Asbestos *Refer to ARCP *Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods *Refer to CEMP section 5.14 Spill Response 	3	4	Medium	5	5	Low	5	5	Low	Yes	Accept

21	Environment - Stormwater Contamination	PM SS	<p>*Maintain erosion and sediment controls to prevent contaminated and uncontaminated material being released from stockpiles and excavations and running into stormwater.</p> <p>*Refer to CEMP section 5.17 Erosion, Sediment, Water Quality Control</p>	3	4	Medium	5	5	Low	5	5	Low	Yes	Accept
24	Exposure to Asbestos	PM SS ASBS	<p>*Notify SafeWork NSW 5 days prior to commencing asbestos removal.</p> <p>*Asbestos Removal Control Plan to be developed.</p> <p>*SWMS to be provided for asbestos removal and all staff must be trained in the SWMS prior to any asbestos removal works commencing.</p> <p>*Set up asbestos exclusion zones delineated with barricades, hazard tape, flags etc. with regulatory signage clearly visible.</p> <p>*Wear appropriate PPE, i.e. disposable overalls, P3 RPE, gloves, safety glasses and rubber soled safety boots during asbestos removal.</p> <p>*Set up a decontamination area in accordance with the ARCP. The decontamination area must be located on the exclusion zone boundary and act as the entry/exit point to the asbestos area.</p> <p>*Only personnel trained in the removal of asbestos are able to perform asbestos removal activities.</p> <p>*Only H Class HEPA filtered asbestos vacuums can be used during asbestos removal.</p> <p>*DO NOT wear contaminated PPE outside the asbestos exclusion zones.</p> <p>*Maintain dust suppression methods – targeted water spray during remediation from pump spray bottles and high-pressure water sprayer.</p>	2	2	Very High	5	5	Low	5	5	Low	Yes	Accept

			<p>*All asbestos waste is to be double bagged/wrapped and must pass through the decontamination area before being transported to the designated waste vehicle or skip bin.</p> <p>*Air monitoring to be performed by Occupational Hygienist.</p> <p>*Asbestos air monitoring results from the previous day to be made available at the beginning of each new day. If the reporting limit of >0.02 fibres/mL is detected, works will cease immediately, and asbestos work controls will be investigated and reassessed. Works may only recommence once the removal contractor, licensed asbestos assessor and the client are satisfied that the revised control methods are adequate and further air monitoring returns results <0.01 fibres/mL. SafeWork NSW need to be notified in the event of reaching or exceeding the reporting limit of >0.02 fibres/mL.</p> <p>*Refer to ARCP</p>										
25	Exposure to Other Hazardous Substances	PM SS	<p>*Maintain dust suppression during concrete cutting or demolition</p> <p>*Establish exclusion zones around work areas where the material contains contaminated materials.</p> <p>*Only the required personnel to be within the work area.</p> <p>*Follow Unexpected Finds Procedure if unexpected material encountered.</p> <p>*Personnel required to be within the work area must wear the appropriate PPE. The required PPE will be determined based on the Waste Classification of the material being worked with.</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p> <p>*Refer to CEMP section 5.14 Spill Response</p>	2	3 High	5	5 Low	5	5 Low	Yes	Accept		

32	Hazardous/Non-Hazardous Substances	PM SS	<p>*Any substances to be used or stored on the site must have a current SDS immediately available.</p> <p>*Identify all substances on site and refer to the SDS for transport, storage, use and disposal methods. Refer to SDS for PPE requirements when using the product.</p> <p>*Substances must be stored in a designated area. This will be discussed in the site induction.</p> <p>*A spill kit will be kept on site in the event of a spill occurring on site. Spill kits to be located in the site shed and site office.</p> <p>*Follow Spill Response Procedure in the event of a spill/leak of chemicals, dangerous goods, or hazardous/non-hazardous substance.</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p>	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept
33	Hot Works/Fire/Explosion	PM SS	<p>*RMA to confirm the status of Total Fire Bans. No hot works to be completed during Total Fire Bans.</p> <p>*Fire extinguishers located in an appropriate storage area.</p> <p>*Ensure any hot works activity is documented in Method Statement.</p> <p>*A hot works permit must be completed prior to any hot works activities.</p> <p>*All hot works to have fire extinguisher within reach of the work zone.</p> <p>*Refer to CEMP section 5.13 Hot Works & Fire Prevention</p>	2	3	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring

43	Needle Stick Injury	PM SS	<p>*Site induction to cover the potential of finding needles during works and what to do if they are found (correct disposal).</p> <p>*Perform an inspection of the work area for needles/syringes.</p> <p>*Carefully lift rubbish etc. and look for needles.</p> <p>*Sharps container must be available on site to dispose of any needles found.</p> <p>*Only handle sharps by the syringe. Do not touch the needle. Keep the sharp end away from the body and do not walk towards other people holding the needle.</p> <p>*Use tongs to pick up the needle if it is unsafe to hold it or if the tube/syringe is not present or broken.</p> <p>*Wear safety boots, gloves and long pants and sleeves during site activities.</p>	3	2	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
45	Noise & Vibration	PM SS	<p>* Follow procedures and instructions in the Noise and Vibration Management Plan</p> <p>*Any noise creating activity must be minimised where possible and is to be completed during hours approved by Sydney Metro (Mon-Fri 7am to 6pm & Sat 8am to 6pm)</p> <p>*All equipment and machinery shall be operated in an efficient manner to minimise the emission of background noise around the site.</p> <p>*Equipment will be selected for the project on the basis of its noise performance and will be fitted with noise attenuation mufflers to meet Australian Standards for noise generation.</p> <p>*Perform noise/vibration monitoring when directed by the Noise and Vibration Management Plan.</p> <p>*Minimise vibration by using the smallest/lightest possible piece of machinery to perform the tasks.</p> <p>*Personnel to wear ear protection when advised by the site supervisor.</p> <p>*Refer to CEMP section 5.21 Noise & Vibration Management</p>	1	3	Very High	3	5	Medium	3	5	Medium	Yes	Accept with Active Monitoring

46	Sydney Metro Access Through Site	PM SS	<p>*Where hardstand is being removed in the vicinity of the Sydney Metro thoroughfare / haul road, ensure the work area is clearly demarcated.</p> <p>*Use additional temporary fencing to create separation between the removal area and the haul road.</p> <p>*Request notice of access from Sydney Metro prior to vehicles attending site.</p> <p>*The location of Sydney Metro thoroughfare to be discussed during site inductions.</p> <p>*Refer to CEMP section 5.22 Traffic Management and Local Road Condition</p> <p>*Refer to CTMP</p>	2	2	Very High	2	6	Medium	2	6	Medium	Yes	Accept with Active Monitoring
49	Services Aboveground/Overhead	PM SS	<p>*Inspect the site for any unknown overhead services or structures.</p> <p>*When working within 3m of aboveground/overhead powerlines or structures RMA to utilise Above Ground Service Work Permit.</p> <p>*Overhead powerlines are situated along the Pacific Highway. These powerlines are located outside of the site boundaries, however safe approach distances will be maintained.</p> <p>*Tiger tails to be placed on overhead powerlines on Pacific Hwy and Nelson St.</p> <p>*When working within 2m of an Ausgrid asset RMA are to contact Ausgrid. Ausgrid to determine if an Ausgrid representative needs to be present to supervise the work.</p> <p>*If necessary, install physical barriers to prevent machinery from exceeding safe approach distance.</p> <p>*Refer to CEMP section 5.19 Services and Above and Undergrond Structures</p>	3	2	High	5	5	Low	5	5	Low	Yes	Accept

50	Services Underground	PM SS	<p>*Conduct a Dial Before You Dig enquiry, consult plans and perform underground services searches if required.</p> <p>* Ground penetration permit to be completed</p> <p>*Confirm service isolations and terminations of underground services.</p> <p>*If existing services are to remain live these should be marked or tagged and locations discussed during the pre-start meetings or toolbox talk. Install protective measures around the service if possible.</p> <p>*Excavations around known underground services should be completed using pot holing or non-destructive digging methods.</p> <p>*All electrical, telecommunications and plumbing isolation and termination works to be completed by a qualified/licenced tradesperson.</p> <p>*If at any time you come across unidentified cables / services. Work must cease to this area. Immediately contact the site supervisor who is to establish if this is a live / isolated service.</p> <p>*Refer to CEMP section 5.19 Services and Above and Undergrond Structures</p>	2	1	Very High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
52	Silica Dust	PM SS	<p>*Where there is a risk of creating or coming into exposure of silica dust:</p> <ul style="list-style-type: none"> - Wet or dampen surfaces before working - Apply water to the cutting face during work - Capture slurry and dispose of slurry in sealed containers - Use a dust mask during works and clean up. <p>*Follow Exposure Control Plan and Respiratory Protection Control Plan. Personnel must wear P2 half face mask. Mask must be fit tested. Personnel must be clean shaven.</p>	3	3	High	4	5	Low	4	5	Low	Yes	Accept

58	Snakes, Spiders, Insects etc.	PM SS	<p>*Perform a visual inspection of the work area prior to commencing any work.</p> <p>*All RMA personnel and subcontractors must be on the lookout for snakes, spiders etc. at all times.</p> <p>*Avoid lifting or moving debris or onsite objects unless necessary.</p> <p>*Avoid accessing suspect areas unless necessary.</p> <p>*A qualified first aider must be present on site at all times. The first aider must be identified during the site induction and must be contactable and available at all times.</p> <p>*First aid facilities will be located in the site shed and site office.</p> <p>*If a snake is found work is to cease and the site supervisor is to be notified immediately.</p> <p>*RMA personnel, subcontractors or visitors must wear the appropriate PPE i.e. Steel toe shoes, long sleeve shirt and long pants and gloves when required.</p>	3	3	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
60	Traffic/Vehicles Onsite Vehicle or Pedestrian Interaction	PM	<p>*A Construction Traffic Management Plan (CTMP) must be developed and implemented to control vehicle movements within the site. Follow procedures and instructions within CTMP.</p> <p>*Refer to CEMP section 5.22 Traffic Management and Local Road Condition</p> <p>*Refer to CTMP</p>	2	1	Very High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
62	Unexpected Finds	PM	<p>*Follow Unexpected Finds Procedure</p> <p>*Follow Unexpected Finds Procedure for Archaeological finds as per the Archaeological Method Statement</p> <p>*Refer to CEMP section 7 Unexpected Finds Protocol</p> <p>*Refer to CEMP section 5.24 Heritage, Archaeological and Aboriginal Artefacts</p>	2	4	High	3	5	Medium	3	5	Medium	Yes	Accept with Active Monitoring
63	Waste Management Uncontrolled Waste	PM SS	<p>*All waste must be sorted into appropriate streams to maximise recycling.</p> <p>*Waste will be stockpiled ready for loadout and removal from site.</p> <p>*Refer to CEMP section 5.20 Waste Management</p> <p>*Refer to WMP</p>	3	3	High	5	5	Low	5	5	Low	Yes	Accept

Removal of UST's	2	Adverse Weather	PM	*RMA project manager and supervisor to monitor the weather conditions closely. *Cease work in heavy rain and during storms. *Where possible heavy machinery to remain on hardstand areas to prevent creation of mud or slurry.	3	3	High	4	5	Low	4	5	Low	Yes	Accept
	5	Dangerous Goods	PM	*Identify dangerous goods by checking the label and source an SDS*Dangerous goods must be stored in accordance with their SDS. *Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods	3	3	High	4	5	Low	4	5	Low	Yes	Accept
	8	Dust	PM SS	*Temporary fencing to have shade cloth installed to minimise off-site dust release. * Use targeted water spray to help suppress dust during UST removals. Water spray devices such as handheld pump spray bottles and high-pressure water sprayers will be used on this site. *Monitor wind levels daily. It may be necessary to halt work temporarily during high wind occasions. *Operators performing excavations and tank removal must have cabin door closed with air conditioning running. *Personnel to wear P2 dust mask during dusty conditions. P3 respirator to be worn if the ground around the tank is suspected to contain contaminants. *Refer to CEMP section 5.18 Dust Suppression	1	3	Very High	3	5	Medium	3	5	Medium	Yes	Accept with Active Monitoring
	12	Environment - Air Pollution	PM SS	*Machinery and equipment must be serviced and maintained to ensure they are running correctly and are not producing excessive emissions. *Maintain erosion and sediment controls to prevent dust being released from stockpiles and excavations. *Follow controls for Dust *Refer to CEMP section 5.18 Dust Suppression *Refer to CEMP section 5.25 Plant & Equipment *Refer to CEMP section 5.28 Odour Control	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept

13	Environment - Archaeological/Heritage	PM	<p>*Areas of Heritage Significance should be marked out on site by the Heritage Consultant</p> <p>*Archaeological/Heritage Method Statement to be prepared by Heritage Consultant.</p> <p>*Site induction to include the location of significant areas and what controls will be in place whilst performing work in these areas.</p> <p>*Excavation Director provided by the Heritage Consultant is to supervise any excavation work within Heritage significant/sensitive areas.</p> <p>*Refer to CEMP section 5.24 Heritage, Archaeological and Aboriginal Artefacts</p>	3	3	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
14	Environment - Chemical/Hazardous/Non-Hazardous Substance Spills	PM SS	<p>*Ensure all substances (hazardous and non-hazardous) are stored correctly in line with the SDS.</p> <p>*Ensure a spill kit is located on site. Multiple spill kits will be used for this site due to the large size of the site.</p> <p>*Follow Spill Response Procedure noted in the CEMP</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p> <p>*Refer to CEMP section 5.14 Spill Response</p>	3	3	High	4	5	Low	4	5	Low	Yes	Accept

15	Environment - Fauna/Flora	PM SS	<p>*To prevent the spread of weeds, all equipment and in particular personnel boots will be cleaned prior to entering or leaving the site. Any plant material removed during this process must be bagged and disposed of at a licenced landfill.</p> <p>*Prior to commencing works, the site including any vegetation will be inspected for the presence of Fauna. If native fauna is encountered on site work will cease and the fauna will be allowed to move away from the area. If fauna is required to be removed from site, RMA will contact the client representative and request advice and or assistance in its removal. All native fauna is protected by law direct contact with wildlife should be avoided wherever possible.</p> <p>*If injured wildlife is encountered, the project site supervisor should contact the nearest wildlife rescue organisation to assist with its relocation.</p> <p>*In the event personnel are bitten or scratched report to the First Aid Officer.</p> <p>*Refer to CEMP section 5.23 Flora & Fauna</p>	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept
16	Environment - Groundwater Contamination	PM SS	<p>*Maintain erosion and sediment controls to prevent contaminated material being released from stockpiles and excavations and leaching or running into groundwater.</p> <p>*Install controls such as bunding to prevent residual fuel being released from tanks or fuel lines and leaching or running into the ground.</p> <p>*Spill kit to be in the immediate area incase of spill during removal of UST's and fuel lines.</p> <p>*Refer to CEMP section 5.17 Erosion, Sediment, Water Quality Control</p>	3	4	Medium	5	5	Low	5	5	Low	Yes	Accept

17	Environment - Heat Stress	PM SS	<ul style="list-style-type: none"> *Ensure no one works alone. By implementing a buddy system workers are more aware to lookout for each other. *Operators of machinery to ensure air conditioning is turned on during operations. *RMA must provide adequate drinking water and hydration should be maintained during the day. *Encourage workers to take more beaks throughout the shift and stay hydrated. *Provide sunscreen and encourage personnel to regularly apply it. *Wear light weight long sleeve shirts and long pants to protect against burns. *Attach brims to hard hats for sun protection. *Refer to CEMP section 5.15 Heat Stress & Skin Protection 	2	3	High	4	5	Low	4	5	Low	Yes	Accept
18	Environment - Noxious Weed propagation	PM SS	<ul style="list-style-type: none"> * Ensure all trucks and vehicles remain on hardstand areas (where possible) to minimise interaction with weeds or plants * Vehicles to pass through wheel wash priro to exiting site. *Refer to CEMP section 5.23 Flora & Fauna 	3	4	Medium	6	4	Low	6	4	Low	Yes	Accept
19	Environment - Odour Event	PM SS	<ul style="list-style-type: none"> *Cease work and notify Sydney Metro. *Find the source of the odour. *Remove the source of the odour and use an odour suppressant as required. *Return to work once approvals granted by Sydney Metro. *Refer to CEMP section 5.28 Odour Control 	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept

20	Environment - Release of Asbestos or other Hazardous Substances	PM SS	<p>*Ensure air monitoring is conducted during excavation or removal of asbestos.</p> <p>*Any soil to be removed from around tanks must be stockpiled and sampled to determine Waste Classification.</p> <p>*Do not remove soil associated with tank removal from site without Waste Classification.</p> <p>*Follow Unexpected Finds Procedure in the event of encountering Asbestos or other Hazardous Substances.</p> <p>*Follow controls for Dust</p> <p>*Follow controls for Waste Management</p> <p>*Refer to ARCP</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p> <p>*Refer to CEMP section 5.14 Spill Response</p>	3	4	Medium	5	5	Low	5	5	Low	Yes	Accept
21	Environment - Stormwater Contamination	PM SS	<p>*Maintain erosion and sediment controls to prevent contaminated and uncontaminated material being released from stockpiles and excavations and running into stormwater.</p> <p>*Install controls such as bunding to prevent residual fuel being released from tanks or fuel lines and leaching or running into the ground.</p> <p>*Spill kit to be in the immediate area incase of spill during removal of UST's and fuel lines.</p> <p>*Refer to CEMP section 5.17 Erosion, Sediment, Water Quality Control</p>	3	4	Medium	5	5	Low	5	5	Low	Yes	Accept

	24	Exposure to Asbestos	PM SS ASBS	<p>*Notify SafeWork NSW 5 days prior to commencing asbestos removal.</p> <p>*Asbestos Removal Control Plan to be developed.</p> <p>*SWMS to be provided for asbestos removal and all staff must be trained in the SWMS prior to any asbestos removal works commencing.</p> <p>*Set up asbestos exclusion zones delineated with barricades, hazard tape, flags etc. with regulatory signage clearly visible.</p> <p>*Wear appropriate PPE, i.e. disposable overalls, P3 RPE, gloves, safety glasses and rubber soled safety boots during asbestos removal.</p> <p>*Set up a decontamination area in accordance with the ARCP. The decontamination area must be located on the exclusion zone boundary and act as the entry/exit point to the asbestos area.</p> <p>*Only personnel trained in the removal of asbestos are able to perform asbestos removal activities.</p> <p>*Only H Class HEPA filtered asbestos vacuums can be used during asbestos removal.</p> <p>*DO NOT wear contaminated PPE outside the asbestos exclusion zones.</p> <p>*Maintain dust suppression methods – targeted water spray during remediation from pump spray bottles and high-pressure water sprayer.</p>	2	2	Very High	5	5	Low	5	5	Low	Yes	Accept
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			<p>*All asbestos waste is to be double bagged/wrapped and must pass through the decontamination area before being transported to the designated waste vehicle or skip bin.</p> <p>*Air monitoring to be performed by Occupational Hygienist.</p> <p>*Asbestos air monitoring results from the previous day to be made available at the beginning of each new day. If the reporting limit of >0.02 fibres/mL is detected, works will cease immediately, and asbestos work controls will be investigated and reassessed. Works may only recommence once the removal contractor, licensed asbestos assessor and the client are satisfied that the revised control methods are adequate and further air monitoring returns results <0.01 fibres/mL. SafeWork NSW need to be notified in the event of reaching or exceeding the reporting limit of >0.02 fibres/mL.</p> <p>*Refer to ARCP</p>										
25	Exposure to Other Hazardous Substances	PM SS	<p>*Maintain dust suppression during UST removal</p> <p>*Establis exclusion zones around work areas where the mateiral contains contaminated materials.</p> <p>*Only the required personnel to be within the work area.</p> <p>*Follow Unexpected Finds Procedure if unexpected material encountered.</p> <p>*Personnel required to be within the workt area must wear the appropriate PPE. The required PPE will be determined based on the Waste Classification of the material being worked with.</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p> <p>*Refer to CEMP section 5.14 Spill Response</p>	2	3 High	5	5 Low	5	5 Low	Yes	Accept		

32	Hazardous/Non-Hazardous Substances	PM SS	<p>*Any substances to be used or stored on the site must have a current SDS immediately available.</p> <p>*Identify all substances on site and refer to the SDS for transport, storage, use and disposal methods. Refer to SDS for PPE requirements when using the product.</p> <p>*Substances must be stored in a designated area. This will be discussed in the site induction.</p> <p>*A spill kit will be kept on site in the event of a spill occurring on site. Spill kits to be located in the site shed and site office.</p> <p>*Follow Spill Response Procedure in the event of a spill/leak of chemicals, dangerous goods, or hazardous/non-hazardous substance.</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p> <p>*Refer to CEMP section 5.14 Spill Response</p>	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept
33	Hot Works/Fire/Explosion	PM SS	<p>*RMA to confirm the status of Total Fire Bans. No hot works to be completed during Total Fire Bans.</p> <p>*Fire extinguishers located in an appropriate storage area.</p> <p>*Ensure any hot works activity is documented in Method Statement.</p> <p>*A hot works permit must be completed prior to any hot works activities.</p> <p>*All hot works to have fire extinguisher within reach of the work zone.</p> <p>*Refer to CEMP section 5.17 Erosion, Sediment, Water Quality Control</p>	2	3	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring

43	Needle Stick Injury	PM SS	<p>*Site induction to cover the potential of finding needles during works and what to do if they are found (correct disposal).</p> <p>*Perform an inspection of the work area for needles/syringes.</p> <p>*Carefully lift rubbish etc. and look for needles.</p> <p>*Sharps container must be available on site to dispose of any needles found.</p> <p>*Only handle sharps by the syringe. Do not touch the needle. Keep the sharp end away from the body and do not walk towards other people holding the needle.</p> <p>*Use tongs to pick up the needle if it is unsafe to hold it or if the tube/syringe is not present or broken.</p> <p>*Wear safety boots, gloves and long pants and sleeves during site activities.</p>	3	2	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
45	Noise & Vibration	PM SS	<p>* Follow procedures and instructions in the Noise and Vibration Management Plan</p> <p>*Any noise creating activity must be minimised where possible and is to be completed during hours approved by Sydney Metro (Mon-Fri 7am to 6pm & Sat 8am to 6pm)</p> <p>*All equipment and machinery shall be operated in an efficient manner to minimise the emission of background noise around the site.</p> <p>*Equipment will be selected for the project on the basis of its noise performance and will be fitted with noise attenuation mufflers to meet Australian Standards for noise generation.</p> <p>*Perform noise/vibration monitoring when directed by the Noise and Vibration Management Plan.</p> <p>*Minimise vibration by using the smallest/lightest possible piece of machinery to perform the tasks.</p> <p>*Personnel to wear ear protection when advised by the site supervisor.</p> <p>*Refer to CEMP section 5.21 Noise & Vibration Management</p>	1	3	Very High	3	5	Medium	3	5	Medium	Yes	Accept with Active Monitoring

46	Sydney Metro Access Through Site	PM SS	<p>*Where UST's are being removed in the vicinity of the Sydney Metro thoroughfare / haul road, ensure the work area is clearly demarcated.</p> <p>*Use additional temporary fencing to create separation between the removal area and the haul road.</p> <p>*Request notice of access from Sydney Metro prior to vehicles attending site.</p> <p>*The location of Sydney Metro thoroughfare to be discussed during site inductions.</p> <p>*Refer to CEMP section 5.22 Traffic Management and Local Road Condition</p> <p>*Refer to CTMP</p>	2	2	Very High	2	6	Medium	2	6	Medium	Yes	Accept with Active Monitoring
49	Services Aboveground/Overhead	PM SS	<p>*When working within 3m of aboveground/overhead powerlines or structures RMA to utilise Above Ground Service Work Permit.</p> <p>*Inspect the site for any unknown overhead services or structures.</p> <p>*Overhead powerlines are situated along the Pacific Highway. These powerlines are located outside of the site boundaries, however safe approach distances will be maintained.</p> <p>*Tiger tails to be placed on overhead powerlines on Pacific Hwy and Nelson St.</p> <p>*When working within 2m of an Ausgrid asset RMA are to contact Ausgrid. Ausgrid to determine if an Ausgrid representative needs to be present to supervise the work.</p> <p>*If necessary, install physical barriers to prevent machinery from exceeding safe approach distance.</p> <p>*Refer to CEMP section 5.19 Services and Above and Undergrond Structures</p>	3	2	High	5	5	Low	5	5	Low	Yes	Accept

50	Services Underground	PM SS	<p>*Conduct a Dial Before You Dig enquiry, consult plans and perform underground services searches if required.</p> <p>* Ground penetration permit to be completed</p> <p>*Confirm service isolations and terminations of underground services.</p> <p>*If existing services are to remain live these should be marked or tagged and locations discussed during the pre-start meetings or toolbox talk. Install protective measures around the service if possible.</p> <p>*Excavations around known underground services should be completed using pot holing or non-destructive digging methods.</p> <p>*All electrical, telecommunications and plumbing isolation and termination works to be completed by a qualified/licenced tradesperson.</p> <p>*If at any time you come across unidentified cables / services. Work must cease to this area. Immediately contact the site supervisor who is to establish if this is a live / isolated service.</p> <p>*Refer to CEMP section 5.19 Services and Above and Undergrond Structures</p>	2	1	Very High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
52	Silica Dust	PM SS	<p>*Where there is a risk of creating or coming into exposure of silica dust:</p> <ul style="list-style-type: none"> - Wet or dampen surfaces before working - Apply water to the cutting face during work - Capture slurry and dispose of slurry in sealed containers - Use a dust mask during works and clean up. <p>*Follow Exposure Control Plan and Respiratory Protection Control Plan. Personnel must wear P2 half face mask. Mask must be fit tested. Personnel must be clean shaven.</p>	3	3	High	4	5	Low	4	5	Low	Yes	Accept

58	Snakes, Spiders, Insects etc.	PM SS	<p>*Perform a visual inspection of the work area prior to commencing any work.</p> <p>*All RMA personnel and subcontractors must be on the lookout for snakes, spiders etc. at all times.</p> <p>*Avoid lifting or moving debris or onsite objects unless necessary.</p> <p>*Avoid accessing suspect areas unless necessary.</p> <p>*A qualified first aider must be present on site at all times. The first aider must be identified during the site induction and must be contactable and available at all times.</p> <p>*First aid facilities will be located in the site shed and site office.</p> <p>*If a snake is found work is to cease and the site supervisor is to be notified immediately.</p> <p>*RMA personnel, subcontractors or visitors must wear the appropriate PPE i.e. Steel toe shoes, long sleeve shirt and long pants and gloves when required.</p>	3	3	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
60	Traffic/Vehicles Onsite Vehicle or Pedestrian Interaction	PM	<p>*A Construction Traffic Management Plan (CTMP) must be developed and implemented to control vehicle movements within the site. Follow procedures and instructions within CTMP.</p> <p>*Refer to CEMP section 5.22 Traffic Management and Local Road Condition</p> <p>*Refer to CTMP</p>	2	1	Very High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
62	Unexpected Finds	PM	<p>*Follow Unexpected Finds Procedure</p> <p>*Follow Unexpected Finds Procedure for Archaeological finds as per the Archaeological Method Statement</p> <p>*Refer to CEMP section 7 Unexpected Finds Protocol</p> <p>*Refer to CEMP section 5.24 Heritage, Archaeological and Aboriginal Artefacts</p>	2	4	High	3	5	Medium	3	5	Medium	Yes	Accept with Active Monitoring
63	Waste Management Uncontrolled Waste	PM SS	<p>*All waste must be sorted into appropriate streams to maximise recycling.</p> <p>*Waste will be stockpiled ready for loadout and removal from site.</p> <p>*Refer to CEMP section 5.20 Waste Management</p> <p>*Refer to WMP</p>	3	3	High	5	5	Low	5	5	Low	Yes	Accept

Excavation Works/Shoring Installation	2	Adverse Weather	PM	*RMA project manager and supervisor to monitor the weather conditions closely. *Cease work in heavy rain and during storms. *Where possible heavy machinery to remain on hardstand areas to prevent creation of mud or slurry.	3	3	High	4	5	Low	4	5	Low	Yes	Accept
	5	Dangerous Goods	PM	*Identify dangerous goods by checking the label and source an SDS*Dangerous goods must be stored in accordance with their SDS. *Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods	3	3	High	4	5	Low	4	5	Low	Yes	Accept
	8	Dust	PM SS	*Follow controls for Exposure to Asbestos *Follow controls for Exposure to Other Hazardous Substances *Temporary fencing to have shade cloth installed to minimise off-site dust release. * Use targeted water spray to help suppress dust during excavation work. Water spray devices such as handheld pump spray bottles and high-pressure water sprayers will be used on this site. *Monitor wind levels daily. It may be necessary to halt work temporarily during high wind occasions. *Operators performing excavations must have cabin door closed with air conditioning running. *Personnel to wear P2 dust mask during dusty conditions. P3 respirator to be worn if the ground is known or suspected to contain contaminants such as asbestos. *Refer to CEMP section 5.18 Dust Suppression	1	3	Very High	3	5	Medium	3	5	Medium	Yes	Accept with Active Monitoring
	12	Environment - Air Pollution	PM SS	*Machinery and equipment must be serviced and maintained to ensure they are running correctly and are not producing excessive emissions. *Maintain erosion and sediment controls to prevent dust being released from stockpiles and excavations. *Follow controls for Dust *Refer to CEMP section 5.18 Dust Suppression *Refer to CEMP section 5.25 Plant & Equipment *Refer to CEMP section 5.28 Odour Control	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept

13	Environment - Archaeological/Heritage	PM	<p>*Areas of Heritage Significance should be marked out on site by the Heritage Consultant</p> <p>*Archaeological/Heritage Method Statement to be prepared by Heritage Consultant.</p> <p>*Site induction to include the location of significant areas and what controls will be in place whilst performing work in these areas.</p> <p>*Excavation Director provided by the Heritage Consultant is to supervise any excavation work within Heritage significant/sensitive areas.</p> <p>*Refer to CEMP section 5.24 Heritage, Archaeological and Aboriginal Artefacts</p>	3	3	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
14	Environment - Chemical/Hazardous/Non-Hazardous Substance Spills	PM SS	<p>*Ensure all substances (hazardous and non-hazardous) are stored correctly in line with the SDS.</p> <p>*Ensure a spill kit is located on site. Multiple spill kits will be used for this site due to the large size of the site.</p> <p>*Follow Spill Response Procedure noted in the CEMP</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p> <p>*Refer to CEMP section 5.14 Spill Response</p>	3	3	High	4	5	Low	4	5	Low	Yes	Accept
15	Environment - Fauna/Flora	PM SS	<p>*To prevent the spread of weeds, all equipment and in particular personnel boots will be cleaned prior to entering or leaving the site. Any plant material removed during this process must be bagged and disposed of at a licenced landfill.</p> <p>*Prior to commencing works, the site including any vegetation will be inspected for the presence of Fauna. If native fauna is encountered on site work will cease and the fauna will be allowed to move away from the area. If fauna is required to be removed from site, RMA will contact the client representative and request advice and or assistance in its removal. All native fauna is protected by law direct contact with wildlife should be avoided wherever possible.</p> <p>*If injured wildlife is encountered, the project site supervisor should contact the nearest wildlife rescue organisation to assist with its relocation.</p> <p>*In the event personnel are bitten or scratched report to the First Aid Officer.</p> <p>*Refer to CEMP section 5.23 Flora & Fauna</p>	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept

16	Environment - Groundwater Contamination	PM SS	*Maintain erosion and sediment controls to prevent contaminated material being released from stockpiles and excavations and leaching or running into groundwater. *Refer to CEMP section 5.17 Erosion, Sediment, Water Quality Control	3	4	Medium	5	5	Low	5	5	Low	Yes	Accept
17	Environment - Heat Stress	PM SS	*Ensure no one works alone. By implementing a buddy system workers are more aware to lookout for each other. *Operators of machinery to ensure air conditioning is turned on during operations. *RMA must provide adequate drinking water and hydration should be maintained during the day. *Encourage workers to take more breaks throughout the shift and stay hydrated. *Provide sunscreen and encourage personnel to regularly apply it. *Wear light weight long sleeve shirts and long pants to protect against burns. *Attach brims to hard hats for sun protection. *Refer to CEMP section 5.15 Heat Stress & Skin Protection	2	3	High	4	5	Low	4	5	Low	Yes	Accept
18	Environment - Noxious Weed propagation	PM SS	* Ensure all trucks and vehicles remain on hardstand areas (where possible) to minimise interaction with weeds or plants * Vehicles to pass through wheel wash prior to exiting site. *Refer to CEMP section 5.23 Flora & Fauna	3	4	Medium	6	4	Low	6	4	Low	Yes	Accept
19	Environment - Odour Event	PM SS	*Cease work and notify Sydney Metro. *Find the source of the odour. *Remove the source of the odour and use an odour suppressant as required. *Return to work once approvals granted by Sydney Metro. *Refer to CEMP section 5.28 Odour Control	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept

20	Environment - Release of Asbestos or other Hazardous Substances	PM SS	<ul style="list-style-type: none"> *Ensure air monitoring is conducted during excavation or removal of asbestos. *Cease work and follow Unexpected Finds Procedure if asbestos or other substances identified in unknown locations. *Follow Controls for Exposure Asbestos *Refer to ARCP *Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods *Refer to CEMP section 5.14 Spill Response 	3	4	Medium	5	5	Low	5	5	Low	Yes	Accept
21	Environment - Stormwater Contamination	PM SS	<ul style="list-style-type: none"> *Maintain erosion and sediment controls to prevent contaminated and uncontaminated material being released from stockpiles and excavations and running into stormwater. *Refer to CEMP section 5.17 Erosion, Sediment, Water Quality Control 	3	4	Medium	5	5	Low	5	5	Low	Yes	Accept
24	Exposure to Asbestos	PM SS ASBS	<ul style="list-style-type: none"> *Notify SafeWork NSW 5 days prior to commencing asbestos removal. *Asbestos Removal Control Plan to be developed. *SWMS to be provided for asbestos removal and all staff must be trained in the SWMS prior to any asbestos removal works commencing. *Set up asbestos exclusion zones delineated with barricades, hazard tape, flags etc. with regulatory signage clearly visible. *Wear appropriate PPE, i.e. disposable overalls, P3 RPE, gloves, safety glasses and rubber soled safety boots during asbestos removal. *Set up a decontamination area in accordance with the ARCP. The decontamination area must be located on the exclusion zone boundary and act as the entry/exit point to the asbestos area. *Only personnel trained in the removal of asbestos are able to perform asbestos removal activities. *Only H Class HEPA filtered asbestos vacuums can be used during asbestos removal. *DO NOT wear contaminated PPE outside the asbestos exclusion zones. *Maintain dust suppression methods – targeted water sprays during remediation from pump sprays bottles and 	2	2	Very High	5	5	Low	5	5	Low	Yes	Accept

			<p>high-pressure water sprayer.</p> <p>*All asbestos waste is to be double bagged/wrapped and must pass through the decontamination area before being transported to the designated waste vehicle or skip bin.</p> <p>*Air monitoring to be performed by Occupational Hygienist.</p> <p>*Asbestos air monitoring results from the previous day to be made available at the beginning of each new day. If the reporting limit of >0.02 fibres/mL is detected, works will cease immediately, and asbestos work controls will be investigated and reassessed. Works may only recommence once the removal contractor, licensed asbestos assessor and the client are satisfied that the revised control methods are adequate and further air monitoring returns results <0.01 fibres/mL. SafeWork NSW need to be notified in the event of reaching or exceeding the reporting limit of >0.02 fibres/mL.</p> <p>*Refer to ARCP</p>								
25	Exposure to Other Hazardous Substances	PM SS	<p>*Maintain dust suppression during excavations</p> <p>*Establish exclusion zones around work areas where the material contains contaminated materials.</p> <p>*Only the required personnel to be within the work area.</p> <p>*Follow Unexpected Finds Procedure if unexpected material encountered.</p> <p>*Personnel required to be within the work area must wear the appropriate PPE. The required PPE will be determined based on the Waste Classification of the material being worked with.</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p> <p>*Refer to CEMP section 5.14 Spill Response</p>	2	3 High	5	5 Low	5	5 Low	Yes	Accept

32	Hazardous/Non-Hazardous Substances	PM SS	<p>*Any substances to be used or stored on the site must have a current SDS immediately available.</p> <p>*Identify all substances on site and refer to the SDS for transport, storage, use and disposal methods. Refer to SDS for PPE requirements when using the product.</p> <p>*Substances must be stored in a designated area. This will be discussed in the site induction.</p> <p>*A spill kit will be kept on site in the event of a spill occurring on site. Spill kits to be located in the site shed and site office.</p> <p>*Follow Spill Response Procedure in the event of a spill/leak of chemicals, dangerous goods, or hazardous/non-hazardous substance.</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p> <p>*Refer to CEMP section 5.14 Spill Response</p>	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept
33	Hot Works/Fire/Explosion	PM SS	<p>*RMA to confirm the status of Total Fire Bans. No hot works to be completed during Total Fire Bans.</p> <p>*Fire extinguishers located in an appropriate storage area.</p> <p>*Ensure any hot works activity is documented in Method Statement.</p> <p>*A hot works permit must be completed prior to any hot works activities.</p> <p>*All hot works to have fire extinguisher within reach of the work zone.</p> <p>*Refer to CEMP section 5.17 Erosion, Sediment, Water Quality Control</p>	2	3	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring

43	Needle Stick Injury	PM SS	<p>*Site induction to cover the potential of finding needles during works and what to do if they are found (correct disposal).</p> <p>*Perform an inspection of the work area for needles/syringes.</p> <p>*Carefully lift rubbish etc. and look for needles.</p> <p>*Sharps container must be available on site to dispose of any needles found.</p> <p>*Only handle sharps by the syringe. Do not touch the needle. Keep the sharp end away from the body and do not walk towards other people holding the needle.</p> <p>*Use tongs to pick up the needle if it is unsafe to hold it or if the tube/syringe is not present or broken.</p> <p>*Wear safety boots, gloves and long pants and sleeves during site activities.</p>	3	2	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
45	Noise & Vibration	PM SS	<p>* Follow procedures and instructions in the Noise and Vibration Management Plan</p> <p>*Any noise creating activity must be minimised where possible and is to be completed during hours approved by Sydney Metro (Mon-Fri 7am to 6pm & Sat 8am to 6pm)</p> <p>*All equipment and machinery shall be operated in an efficient manner to minimise the emission of background noise around the site.</p> <p>*Equipment will be selected for the project on the basis of its noise performance and will be fitted with noise attenuation mufflers to meet Australian Standards for noise generation.</p> <p>*Perform noise/vibration monitoring when directed by the Noise and Vibration Management Plan.</p> <p>*Minimise vibration by using the smallest/lightest possible piece of machinery to perform the tasks.</p> <p>*Personnel to wear ear protection when advised by the site supervisor.</p> <p>*Refer to CEMP section 5.21 Noise & Vibration Management</p>	1	3	Very High	3	5	Medium	3	5	Medium	Yes	Accept with Active Monitoring

46	Sydney Metro Access Through Site	PM SS	<p>*Where excavation work is being performed in the vicinity of the Sydney Metro thoroughfare / haul road, ensure the work area is clearly demarcated.</p> <p>*Use additional temporary fencing to create separation between the removal area and the haul road.</p> <p>*Request notice of access from Sydney Metro prior to vehicles attending site.</p> <p>*The location of Sydney Metro thoroughfare to be discussed during site inductions.</p> <p>*Refer to CEMP section 5.22 Traffic Management and Local Road Condition</p> <p>*Refer to CTMP</p>	2	2	Very High	2	6	Medium	2	6	Medium	Yes	Accept with Active Monitoring
49	Services Aboveground/Overhead	PM SS	<p>*When working within 3m of aboveground/overhead powerlines or structures RMA to utilise Above Ground Service Work Permit.</p> <p>*Inspect the site for any unknown overhead services or structures.</p> <p>*Overhead powerlines are situated along the Pacific Highway. These powerlines are located outside of the site boundaries, however safe approach distances will be maintained.</p> <p>*Tiger tails to be placed on overhead powerlines on Pacific Hwy and Nelson St.</p> <p>*When working within 2m of an Ausgrid asset RMA are to contact Ausgrid. Ausgrid to determine if an Ausgrid representative needs to be present to supervise the work.</p> <p>*If necessary, install physical barriers to prevent machinery from exceeding safe approach distance.</p> <p>*Refer to CEMP section 5.19 Services and Above and Undergrond Structures</p>	3	2	High	5	5	Low	5	5	Low	Yes	Accept

50	Services Underground	PM SS	<p>*Conduct a Dial Before You Dig enquiry, consult plans and perform underground services searches if required.</p> <p>* Ground penetration permit to be completed</p> <p>*Confirm service isolations and terminations of underground services.</p> <p>*If existing services are to remain live these should be marked or tagged and locations discussed during the pre-start meetings or toolbox talk. Install protective measures around the service if possible.</p> <p>*Excavations around known underground services should be completed using pot holing or non-destructive digging methods.</p> <p>*All electrical, telecommunications and plumbing isolation and termination works to be completed by a qualified/licenced tradesperson.</p> <p>*If at any time you come across unidentified cables / services. Work must cease to this area. Immediately contact the site supervisor who is to establish if this is a live / isolated service.</p> <p>*Refer to CEMP section 5.19 Services and Above and Undergrond Structures</p>	2	1	Very High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
52	Silica Dust	PM SS	<p>*Where there is a risk of creating or coming into exposure of silica dust:</p> <ul style="list-style-type: none"> - Wet or dampen surfaces before working - Apply water to the cutting face during work - Capture slurry and dispose of slurry in sealed containers - Use a dust mask during works and clean up. <p>*Follow Exposure Control Plan and Respiratory Protection Control Plan. Personnel must wear P2 half face mask. Mask must be fit tested. Personnel must be clean shaven.</p>	3	3	High	4	5	Low	4	5	Low	Yes	Accept

58	Snakes, Spiders, Insects etc.	PM SS	<p>*Perform a visual inspection of the work area prior to commencing any work.</p> <p>*All RMA personnel and subcontractors must be on the lookout for snakes, spiders etc. at all times.</p> <p>*Avoid lifting or moving debris or onsite objects unless necessary.</p> <p>*Avoid accessing suspect areas unless necessary.</p> <p>*A qualified first aider must be present on site at all times. The first aider must be identified during the site induction and must be contactable and available at all times.</p> <p>*First aid facilities will be located in the site shed and site office.</p> <p>*If a snake is found work is to cease and the site supervisor is to be notified immediately.</p> <p>*RMA personnel, subcontractors or visitors must wear the appropriate PPE i.e. Steel toe shoes, long sleeve shirt and long pants and gloves when required.</p>	3	3	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
60	Traffic/Vehicles Onsite Vehicle or Pedestrian Interaction	PM	<p>*A Construction Traffic Management Plan (CTMP) must be developed and implemented to control vehicle movements within the site. Follow procedures and instructions within CTMP.</p> <p>*Refer to CEMP section 5.22 Traffic Management and Local Road Condition</p> <p>*Refer to CTMP</p>	2	1	Very High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
62	Unexpected Finds	PM	<p>*Follow Unexpected Finds Procedure</p> <p>*Follow Unexpected Finds Procedure for Archaeological finds as per the Archaeological Method Statement</p> <p>*Refer to CEMP section 7 Unexpected Finds Protocol</p> <p>*Refer to CEMP section 5.24 Heritage, Archaeological and Aboriginal Artefacts</p>	2	4	High	3	5	Medium	3	5	Medium	Yes	Accept with Active Monitoring
63	Waste Management Uncontrolled Waste	PM SS	<p>*All waste must be sorted into appropriate streams to maximise recycling.</p> <p>*Waste will be stockpiled ready for loadout and removal from site.</p> <p>*Refer to CEMP section 5.20 Waste Management</p> <p>*Refer to WMP</p>	3	3	High	5	5	Low	5	5	Low	Yes	Accept

Demobilisation	2	Adverse Weather	PM	*RMA project manager and supervisor to monitor the weather conditions closely. *Cease work in heavy rain and during storms.	3	3	High	4	5	Low	4	5	Low	Yes	Accept
	5	Dangerous Goods	PM SS	*Identify dangerous goods by checking the label and source an SDS. *Transport and dispose of substances in line with SDS *Dangerous goods may only be transported by persons who have been trained in the handling and transportation of dangerous goods. Licence to transport required for the driver and the vehicle. Transport documents required for transport and must be carried in the vehicles cabin. *Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods	3	3	High	4	5	Low	4	5	Low	Yes	Accept
	6	Degradation of Public Roads	PM	* Ensure all required and all appropriate covers are used and secure on trucks. * Vehicles to pass through wheel wash prior to exiting site. * Public roads to be cleaned regularly to prevent build up of mud/soil. * Use licensed drivers and registered vehicles only. * Follow general road rules whilst using public roads. *Refer to CEMP section 5.22 Traffic Management and Local Road Condition	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept
	8	Dust	PM SS	*Monitor wind levels daily. It may be necessary to halt work temporarily during high wind occasions. *The removal of dust control measures such as shade cloth should be left until the end of demobilisation. *Personnel to wear P2 dust mask in dusty conditions. *Refer to CEMP section 5.18 Dust Supression	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept
	14	Environment - Chemical/Hazardous/ Non-Hazardous Substance Spills	PM SS	Transport and dispose of substances in line with SDS *Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods *Refer to CEMP section 5.14 Spill Response	3	3	High	4	5	Low	4	5	Low	Yes	Accept

15	Environment - Fauna/Flora	PM SS	<p>*To prevent the spread of weeds, all equipment and in particular personnel boots will be cleaned prior to entering or leaving the site. Any plant material removed during this process must be bagged and disposed of at a licenced landfill.</p> <p>*Prior to commencing works, the site including any vegetation will be inspected for the presence of Fauna. If native fauna is encountered on site work will cease and the fauna will be allowed to move away from the area. If fauna is required to be removed from site, RMA will contact the client representative and request advice and or assistance in its removal. All native fauna is protected by law direct contact with wildlife should be avoided wherever possible.</p> <p>*If injured wildlife is encountered, the project site supervisor should contact the nearest wildlife rescue organisation to assist with its relocation.</p> <p>*In the event personnel are bitten or scratched report to the First Aid Officer.</p> <p>*Refer to CEMP section 5.23 Flora & Fauna</p>	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept
17	Environment - Heat Stress	PM SS	<p>*Ensure no one works alone. By implementing a buddy system workers are more aware to lookout for each other.</p> <p>*RMA must provide adequate drinking water and hydration should be maintained during the day.</p> <p>*Encourage workers to take more breaks throughout the shift and stay hydrated.</p> <p>*Provide sunscreen and encourage personnel to regularly apply it.</p> <p>*Wear light weight long sleeve shirts and long pants to protect against burns.</p> <p>*Attach brims to hard hats for sun protection.</p> <p>*Refer to CEMP section 5.15 Heat Stress & Skin Protection</p>	2	3	High	4	5	Low	4	5	Low	Yes	Accept
18	Environment - Noxious Weed propagation	PM SS	<p>* Ensure all trucks and vehicles remain on hardstand areas (where possible) to minimise interaction with weeds or plants</p> <p>* Vehicles to pass through wheel wash priro to exiting site.</p> <p>*Refer to CEMP section 5.23 Flora & Fauna</p>	3	4	Medium	6	4	Low	6	4	Low	Yes	Accept

32	Hazardous/Non-Hazardous Substances	PM SS	<p>*Identify all substances on site and refer to the SDS for transport and disposal methods.</p> <p>*Ensure all hazardous and non-hazardous materials are removed from site.</p> <p>*Refer to CEMP section 5.12 Storage of Fuel, Chemicals or other Hazardous Goods</p>	3	4	Medium	4	5	Low	4	5	Low	Yes	Accept
45	Noise & Vibration	PM SS	<p>* Follow procedures and instructions in the Noise and Vibration Management Plan</p> <p>*Any noise creating activity must be minimised where possible and is to be completed during hours approved by Sydney Metro (Mon-Fri 7am to 6pm & Sat 8am to 6pm)</p> <p>*All equipment and machinery shall be operated in an efficient manner to minimise the emission of background noise around the site.</p> <p>*Equipment will be selected for the project on the basis of its noise performance and will be fitted with noise attenuation mufflers to meet Australian Standards for noise generation.</p> <p>*Perform noise/vibration monitoring when directed by the Noise and Vibration Management Plan.</p> <p>*Personnel to wear ear protection when advised by the site supervisor.</p> <p>*Refer to CEMP section 5.21 Noise & Vibration Management</p>	1	3	Very High	3	5	Medium	3	5	Medium	Yes	Accept with Active Monitoring

58	Snakes, Spiders, Insects etc.	PM SS	<p>*Perform a visual inspection of the work area prior to commencing any work.</p> <p>*All RMA personnel and subcontractors must be on the lookout for snakes, spiders etc. at all times.</p> <p>*Avoid lifting or moving debris or onsite objects unless necessary.</p> <p>*Avoid accessing suspect areas unless necessary.</p> <p>*A qualified first aider must be present on site at all times. The first aider must be identified during the site induction and must be contactable and available at all times.</p> <p>*First aid facilities will be located in the site shed and site office.</p> <p>*If a snake is found work is to cease and the site supervisor is to be notified immediately.</p> <p>*RMA personnel, subcontractors or visitors must wear the appropriate PPE i.e. Steel toe shoes, long sleeve shirt and long pants and gloves when required.</p>	3	3	High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
60	Traffic/Vehicles Onsite Vehicle or Pedestrian Interaction	PM	<p>*A Construction Traffic Management Plan (CTMP) must be developed and implemented to control vehicle movements within the site. Follow procedures and instructions within CTMP.</p> <p>*Refer to CEMP section 5.22 Traffic Management and Local Road Condition</p> <p>*Refer to CTMP</p>	2	1	Very High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring
61	Traffic/Vehicles Offsite Vehicle or Pedestrian Interaction	PM SS	<p>*A Construction Traffic Management Plan will be developed and implemented to control vehicle movements into and out of the site. This will also include the safe management of pedestrians moving past the site. Follow procedures and instructions within CTMP.</p> <p>*Refer to CEMP section 5.22 Traffic Management and Local Road Condition</p> <p>*Refer to CTMP</p>	2	1	Very High	4	4	Medium	4	4	Medium	Yes	Accept with Active Monitoring



Appendix 5: Waste Management Plan



Appendix 6: Traffic Management Plan

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ASSURANCE

AAA TRAFFIC — CONTROL —

Construction Traffic Management Plan



Transport
for NSW



WWW.JAS-ANZ.ORG/REGISTER



(creditor)watch
member

AAA Traffic Control Pty Ltd

ABN 53 648 829 994

10 Coventry Pl, Mount Druitt NSW 2770

(02) 9675 7731

info@aaatraficcontrol.com.au

Construction Traffic Management Plan

Development at:
355 Mowbray Rd, Chatswood

Prepared For:
RMA Group

Document Number:
CTMP313KR017

Prepared by:
Codey Bullock

RMS Prepare a Work Zone Traffic Management Plan Certificate#:
TCT1011792

Date:
Wednesday, 14th of February 2024



ABN 53 648 829 994
p 02 9675 7731 | f 02 9675 7744
e info@aaatraficcontrol.com.au | w www.aaatraficcontrol.com.au
a 10 Coventry Place | Mount Druitt NSW 2770
p PO Box 1113 | St Marys NSW 1790

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ACCREDITED BY:



Transport
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1.0 Introduction

1.1 Site Description:

355 Mowbray Rd, Chatswood, is located within the council jurisdiction of Willoughby Council and North Shore Police Area Command.

The closest major road to the development site is Pacific Highway, the site is on the corner of Pacific Hwy and Mowbray Rd. Pacific Highway is a state road is governed by Transport for NSW and further approvals will be required if the roadway is impacted by works, along with potential council approvals as Mowbray Rd is classified as a regional road. See 4.0 Approvals for more information.

1.2 Road(s) Condition:

The corner of Pacific Hwy and Mowbray Rd is a major arterial intersection consisting off up to 3 lanes of traffic in each direction with additional turning lanes. Based on recorded data from 2018 taken from, <https://maps.transport.nsw.gov.au/egeomaps/traffic-volumes>, the intersection received on average approximately 30,000 vehicles per day for both southbound and northbound traffic.

1.3 Major features of the area:

The site is located within a mostly residential area mixed with a few public areas/businesses around the site location.

Several facilities are located within the vicinity of the site which are used by public, which may be impacted by construction vehicles, trucks or the use of different construction equipment such as a concrete pump or crane. Construction vehicles are to follow the guidelines in this document to minimise the impact on local communities and the required permits are to be obtained from all involved authorities for use of any construction equipment on TfNSW/Council land.

1.4 Public transport facilities:

Public transport facilities should remain unaffected if work is maintained inside the site. All truck/construction vehicle movement should maintain forward ingress and egress as per TGS CB399 shown in Appendix A of this document.

2.0 Project Details

2.1 Project Summary:

Project: Development of Sydney Metro City & Chatswood to Sydenham

Hours of Operation: Monday – Friday 7:00AM – 6:00PM

Saturday 8:00AM – 1:00PM

Sunday & Public Holidays No Work

For works within the public road reserve, contact council's Transport Management Section for approval of alternative working hours, if required.

2.3 Revisions

Rev	Date	Description
0	15/02/2024	Initial Submission

2.2 Staging:

This traffic management plan covers the stage(s) listed below, subsequent stages (if any) may require amendments and additional plans to be prepared along with relevant permits/approval/concurrences based on impact to nearby residents, businesses, public transport etc.

Stage/Phase of Works	Duration (Approx)	Largest Truck Size	Most Avg. Daily Movements
Demolition	3 Weeks	Up to 40 tonnes	40
Excavation	10 Weeks	Up to 40 tonnes	40
Construction	N/A	N/A	N/A
Fit Out	N/A	N/A	N/A

3.0 Proposed Traffic Management

Traffic Guidance Schemes located in appendix A will outline the traffic management being used on site. All plans are to be designed by a qualified PWZ (Prepare Work Zone) ticket holder. Any updates or alterations must be completed by PWZ ticket holder. All Traffic Guidance Schemes (TGS) associated with this CTMP will comply with relevant Australian Standards and Transport for NSW Traffic control at Worksites Manual.

3.1 Site Vehicles

- Site Vehicles are to enter and exit the site in a forward-facing direction as shown in Appendix A, TGS – CB399.
- Any reverse movements should be avoided, any reverse movements that are unavoidable, must be made inside the site with a traffic controller present. If a reverse movement is required on a roadway, a TGS must be designed and used in conjunction with an approved ROL (Road Occupancy Licence) from the TMC (Traffic Management Centre).
- All drivers will be made aware of the approved routes prior to commencing work at the site as part of the site induction, these routes are also included in Appendix A of this Construction Traffic Management Plan.
- Vehicles will be scheduled in such manner as to not require queuing on the road network surrounding the site to avoid congestion. Drivers to follow to the driver's code of conduct (appendix B).
- All vehicle unloading to be contained within the site or designated work zone where required. TGS must be used if work zone is outside of the site boundary and any relevant approvals to be obtained.
- There is to be a vehicle wash bay within the site compound to prevent mud tracking within the road network.

3.2 Road Occupancy

- If occupation of the roadway is required, a TGS must be designed and used in conjunction with an ROL/Council permit where necessary.
- During occupation of the roadway, all emergency service vehicles along with transport service must be given priority. All traffic controllers on-site must assist these vehicles where necessary. See Appendix A – CB399 for further information.

3.3 Parking for Site Workers:

- The use of public transport or car-pooling will be strongly encouraged for all workers and contractors.
- Work vehicles parked on streets close to the work site, should be in accordance with the sign posted parking restrictions and NSW road rules.
- Any vehicles parked on the street should not obstruct local resident's access.
- Any TGS designed to show parking and routes to be added into **Appendix A** for future reference.

3.4 Site Entry & Exit Routes:

Entry – Mowbray Rd

Vehicles approaching the site from Pacific Hwy southbound or northbound are to follow the road until reaching Pacific Hwy and Mowbray Rd intersection, from here vehicle are to turn onto Mowbray Rd heading eastbound to approach the site (see Appendix A - TGS CB399). Once vehicles have reached the site entry, they are to enter site in a forward manner. Please refer to **Appendix A - TGS CB399(A)** for routes to M1 motorway and M4 motorway.

Exit – Mowbray Rd

Vehicles exiting the site, are to proceed to exit outlined in **Appendix A - TGS CB399**. Please refer to **Appendix A - TGS CB399(A)** for routes to M1 motorway and M4 motorway.

3.5 Pedestrian & Cyclists Management:

Pedestrian & cyclist management during the works will be under traffic control supervision where required and must be shown on a TGS in compliance with the most recent Traffic Control at Worksites Manual. Cyclists may be required to dismount when moving past the site, if hazards are present because of work taking place.

Any signage placed on a footway must not obstruct pedestrians/cyclists from using the footpath safely, must leave 1.5m of footpath for foot traffic and not obstruct commuters line of sight. If the footpath is being closed due to obstructions, relevant signage must be erected, and detours must be put in place with a supporting TGS and relevant approvals.

4.0 Approvals

4.1 Council Approvals (Willoughby Council):

Council approval times for each permit may vary. Processing time is also based on the accuracy of the application and magnitude of the works and its impact. Council permits as well as the fees and charges can be found on their website. Please note, the submission of an application to council is **NOT** approval for the works. An official approval will be issued by council once the application has been reviewed and processed by a traffic engineer, a copy of this approval must be always available onsite.

4.1.1 Road Occupancy Permit:

A 'Road Occupancy Permit' from Willoughby Council is required if machinery such as cranes, concrete pumps, knuckle booms, scissor lifts and etc, is needed to occupy roadway or footpath under Willoughby council jurisdiction. All council applications for 'Road Occupancy Permit' will require a TGS to accompany the application, additional documents may be required such as notification letters to nearby residents, crane lifting plans, third party approvals.

4.1.2 Road Opening Permit:

A 'Road Opening Permit' from Willoughby Council must be obtained if any roadway/footway is to require adjustments, this can include connections being made to underground services. This will require a TGS to show management of both traffic and pedestrians.

4.2 Transport for NSW ROL (Road Occupancy Licence):

A Road Occupancy Licence must be obtained from the TMC when occupying a state/regional roadway or a roadway within 100m of a set of traffic lights. These approvals can take up to 10 business days and may require more when adjusting TfNSW assets.

4.3 Public Transport Authorities:

If any stage of work affects public transport services, approval from the relevant bus authorities must be obtained.

5.0 Project Conclusion & Impact

5.1 Surrounding Residents/Property

Residential/business driveway access will be maintained throughout the project. If works may impact businesses and/or residents. A notification letter must be delivered to all surrounding properties, leading up to the works.

5.2 Public Transport

Impact will be minimal as public transport routes will be unaffected by these works.

5.3 Local Traffic

Access along Mowbray, Pacific Hwy and all surrounding road networks will remain as per normal conditions. Construction traffic to be scheduled as per ANZS12, outside of peak times such as school zone hours to minimise the impact to existing traffic. Delays or adverse impact to road network particularly during/school peak period will not be always accepted during the construction work.



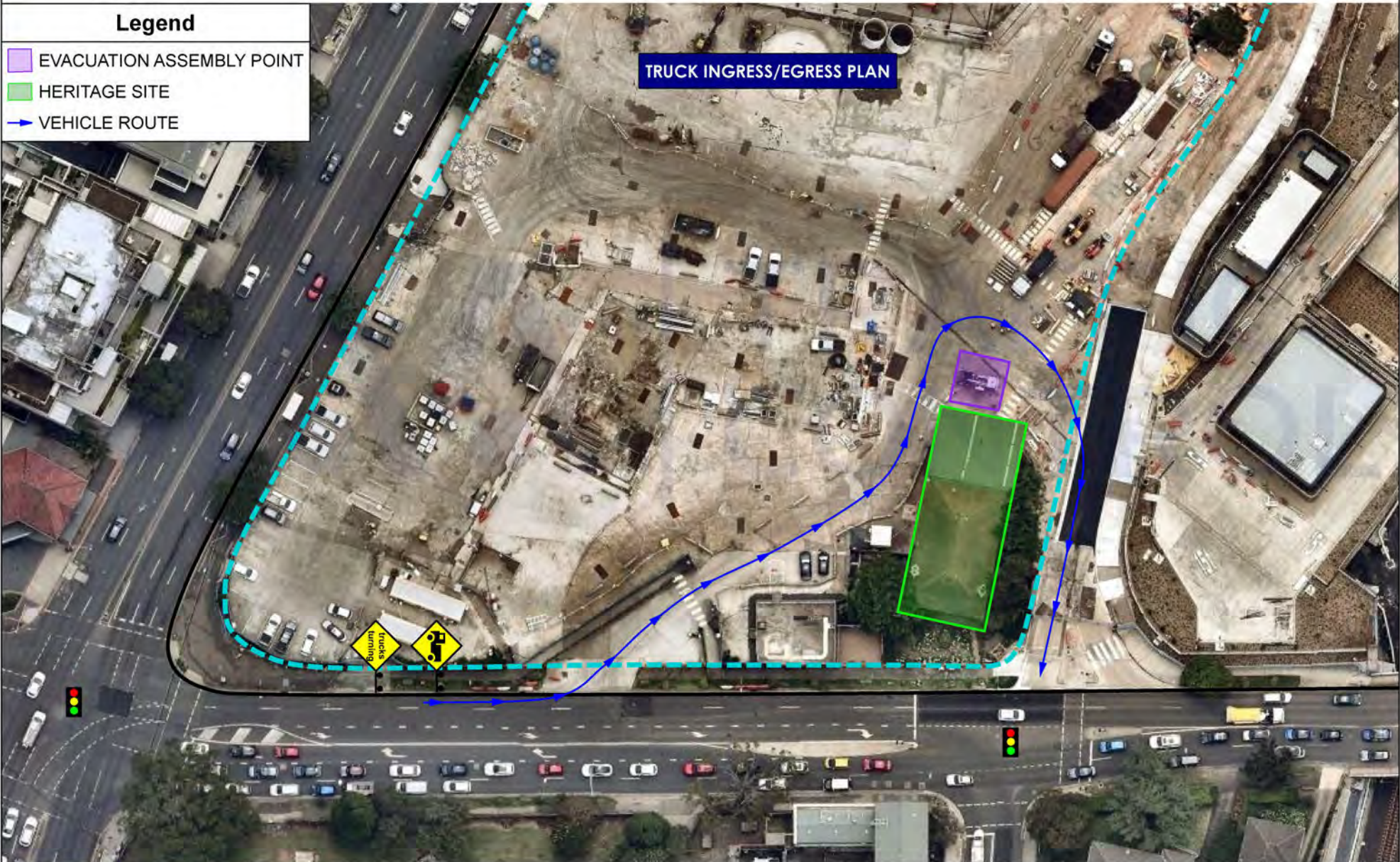
AAA | TRAFFIC CONTROL

Appendix A – Traffic Guidance Schemes: TGS's
CB399 – CB399(A)

Legend

- EVACUATION ASSEMBLY POINT
- HERITAGE SITE
- VEHICLE ROUTE

TRUCK INGRESS/EGRESS PLAN



Email: info@aatc.com.au
Website: www.aatc.com.au
A.B.N: 53 648 829 994
Address: 10 Coventry Pl, Mount Druitt
Phone: 02 9675 7731



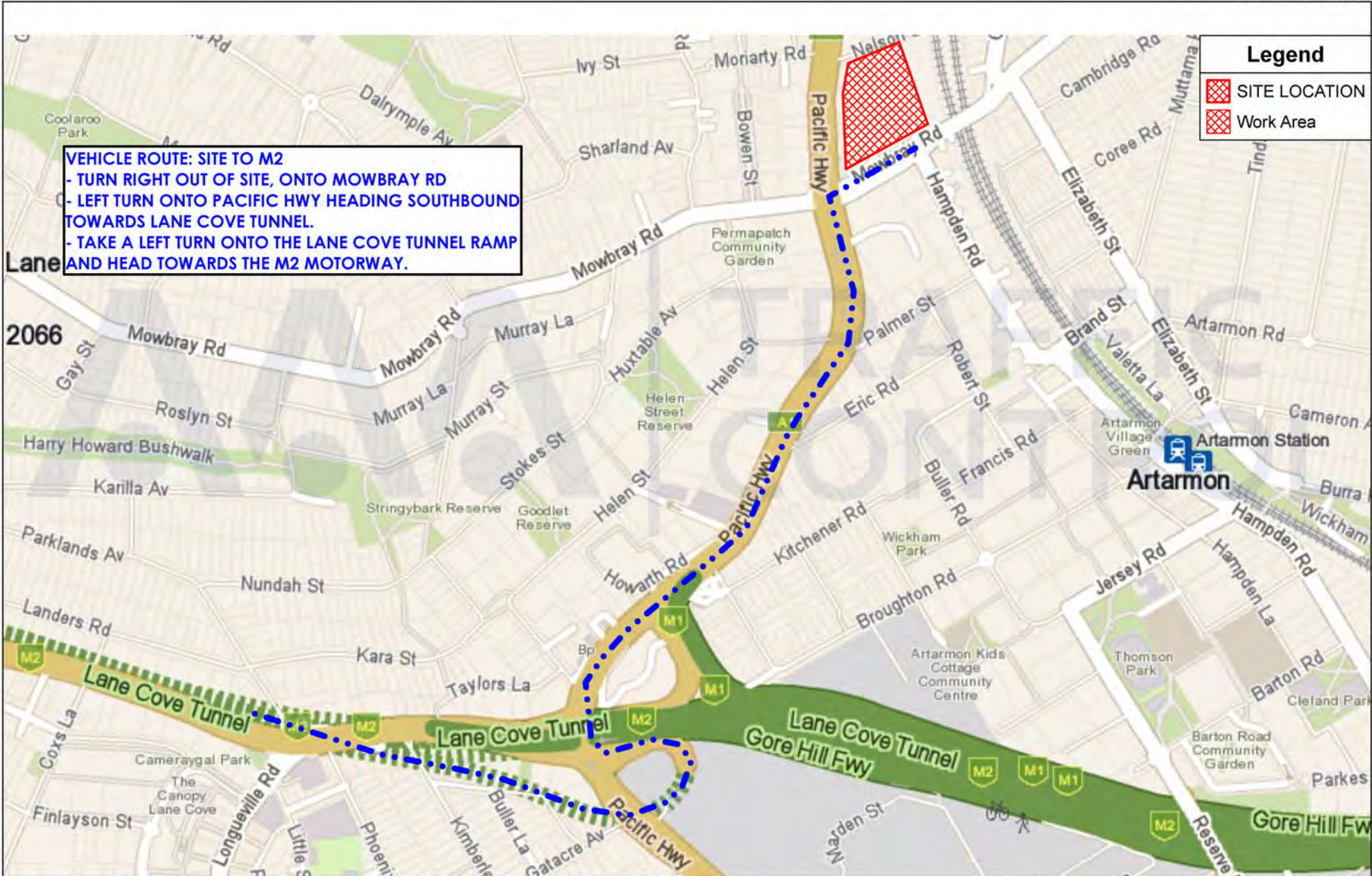
CLIENT:	RMA GROUP
CONTACT:	CHARLIE PH: 0404 504 282
PROJECT:	METRO DEVELOPMENT - TRUCK INGRESS/EGRESS
PO:	PIA INV 9432
LOCATION:	SYDNEY METRO CITY & SOUTHWEST CHATSWOOD TO SYDENHAM

- MANAGEMENT:**
- INGRESS / EGRESS
 - LANE MERGE
 - CONTRA FLOW
 - DETOUR
 - ROAD CLOSURE
 - SHOULDER WORKS



- PEDESTRIAN MGMT.
 - INTERMITTENT
- ROAD CLASSIFICATION:**
- STATE (RTA/RMS)
 - REGIONAL (COUNCIL & RTA/RMS)
 - LOCAL (COUNCIL)

JOB NO.:	12181	PLAN NO.:	CB399
DATE:	09/02/2024		
AUTHOR:	Codey Bullock	CHECKED BY:	Tyrone Pritchard
	TCT1011792		TCT1028313









Legend

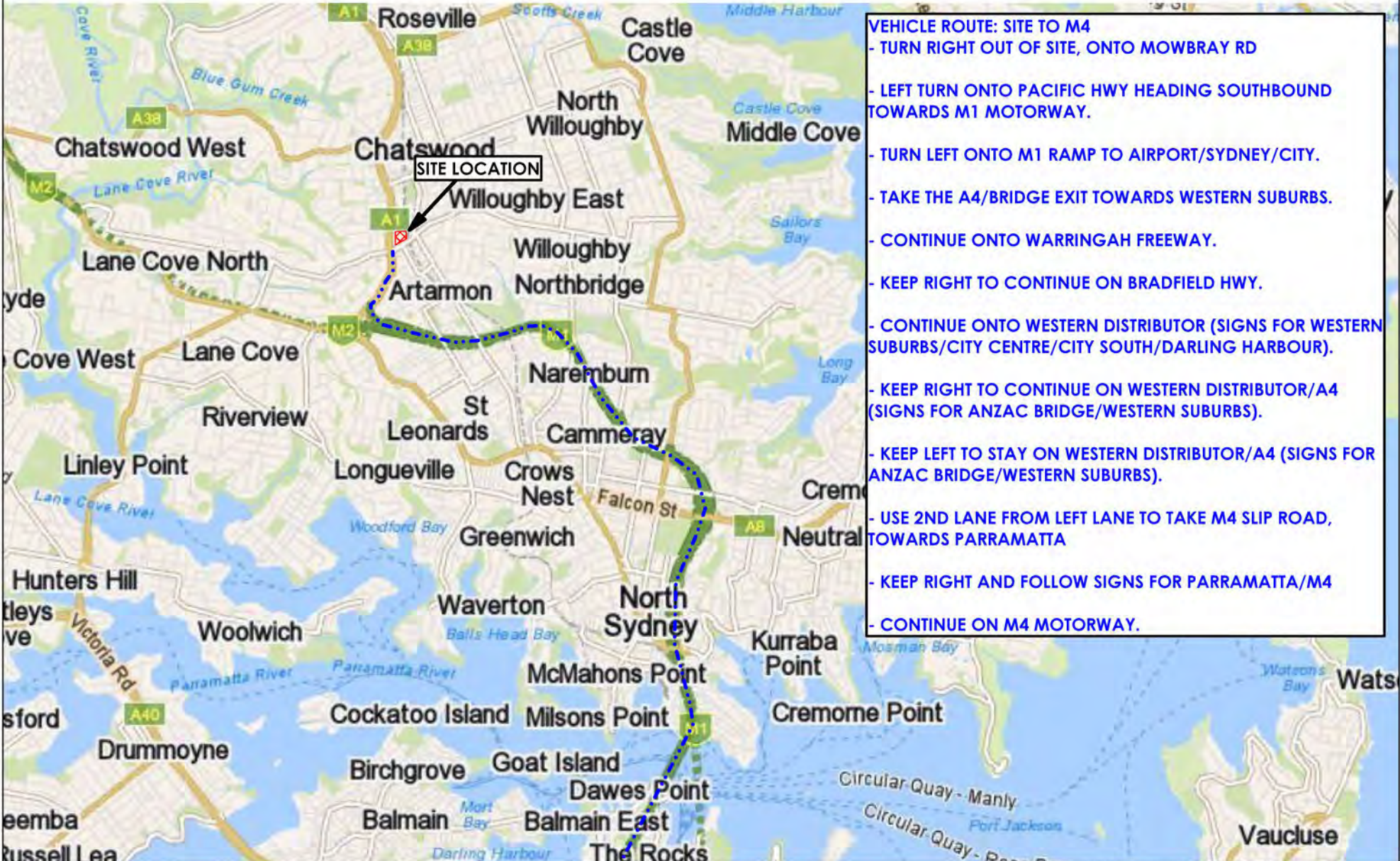
-  SITE LOCATION
-  Work Area

VEHICLE ROUTE: SITE TO M2
 - TURN RIGHT OUT OF SITE, ONTO MOWBRAY RD
 - LEFT TURN ONTO PACIFIC HWY HEADING SOUTHBOUND TOWARDS LANE COVE TUNNEL.
 - TAKE A LEFT TURN ONTO THE LANE COVE TUNNEL RAMP AND HEAD TOWARDS THE M2 MOTORWAY.










Lane

2066

 TRAFFIC CONTROL EST. 2003 Email: info@aaatc.com.au Website: www.aaatc.com.au A.B.N: 53 648 829 994 Address: 10 Coventry Pl, Mount Druitt Phone: 02 9675 7731	 	CLIENT: RMA GROUP	MANAGEMENT: <ul style="list-style-type: none"> <input type="radio"/> STOP / SLOW <input type="radio"/> LANE MERGE <input type="radio"/> CONTRA FLOW <input type="radio"/> DETOUR <input type="radio"/> ROAD CLOSURE <input checked="" type="radio"/> VEHICLE ROUTES 	<input type="radio"/> PEDESTRIAN MGMT. <input type="radio"/> INTERMITTENT	ROAD CLASSIFICATION: <ul style="list-style-type: none"> <input checked="" type="radio"/> STATE (RTA/RMS) <input type="radio"/> REGIONAL (COUNCIL & RTA/RMS) <input type="radio"/> LOCAL (COUNCIL) 	JOB NO.: 12181 PLAN NO.: CB399(A) DATE: 12/02/2024	
		PROJECT: TRUCK ROUTE - SITE TO M2 PO: PIA INV 9432 LOCATION: SITE ADDRESS	<input type="radio"/> STOP / SLOW <input type="radio"/> LANE MERGE <input type="radio"/> CONTRA FLOW <input type="radio"/> DETOUR <input type="radio"/> ROAD CLOSURE <input checked="" type="radio"/> VEHICLE ROUTES	AUTHOR: Codey Bullock TCT1011792	CHECKED BY: Tyrone Pritchard TCT1028313		



- VEHICLE ROUTE: SITE TO M4**
- TURN RIGHT OUT OF SITE, ONTO MOWBRAY RD
 - LEFT TURN ONTO PACIFIC HWY HEADING SOUTHBOUND TOWARDS M1 MOTORWAY.
 - TURN LEFT ONTO M1 RAMP TO AIRPORT/SYDNEY/CITY.
 - TAKE THE A4/BRIDGE EXIT TOWARDS WESTERN SUBURBS.
 - CONTINUE ONTO WARRINGAH FREEWAY.
 - KEEP RIGHT TO CONTINUE ON BRADFIELD HWY.
 - CONTINUE ONTO WESTERN DISTRIBUTOR (SIGNS FOR WESTERN SUBURBS/CITY CENTRE/CITY SOUTH/DARLING HARBOUR).
 - KEEP RIGHT TO CONTINUE ON WESTERN DISTRIBUTOR/A4 (SIGNS FOR ANZAC BRIDGE/WESTERN SUBURBS).
 - KEEP LEFT TO STAY ON WESTERN DISTRIBUTOR/A4 (SIGNS FOR ANZAC BRIDGE/WESTERN SUBURBS).
 - USE 2ND LANE FROM LEFT LANE TO TAKE M4 SLIP ROAD, TOWARDS PARRAMATTA
 - KEEP RIGHT AND FOLLOW SIGNS FOR PARRAMATTA/M4
 - CONTINUE ON M4 MOTORWAY.

 TRAFFIC CONTROL EST. 2003 Email: info@aaafc.com.au Website: www.aaatraficcontrol.com.au A.B.N.: 53 648 829 994 Address: 10 Coventry Pl, Mount Druitt Phone: 02 9675 7731	 	CLIENT: RMA GROUP CONTACT: CHARLIE PH: 0404 504 282 PROJECT: TRUCK ROUTE - SITE TO M4 PO: PIA INV 9432 LOCATION: SITE ADDRESS	MANAGEMENT: <input type="checkbox"/> STOP / SLOW <input type="checkbox"/> LANE MERGE <input type="checkbox"/> CONTRA FLOW <input type="checkbox"/> DETOUR <input type="checkbox"/> ROAD CLOSURE <input checked="" type="checkbox"/> VEHICLE ROUTES	<input type="checkbox"/> PEDESTRIAN MGMT. <input type="checkbox"/> INTERMITTENT ROAD CLASSIFICATION: <input checked="" type="checkbox"/> STATE (RTA/RMS) <input type="checkbox"/> REGIONAL (COUNCIL & RTA/RMS) <input type="checkbox"/> LOCAL (COUNCIL)	JOB NO.: 12181 PLAN NO.: CB399(B) DATE: 12/02/2024 AUTHOR: Codey Bullock TCT1011792 	CHECKED BY: Tyrone Pritchard TCT1028313 	
		  					



Appendix B – Drivers Code of Conduct

- Driver Code of Conduct -

Objectives of the Drivers Code of conduct

- To minimise the impact of the construction on the local and regional road network;
- Minimise conflict with other road users;
- Minimise road traffic noise; and
- Ensure truck drivers use specified routes

Code of Conduct

All vehicle drivers must:

- Take care for his or her own personal health and safety.
- Consider the impact on the health and safety of other persons.
- Notify their employer if they are not fit for work prior to commencing their shift.
- Obey all applicable road rules and laws at all times.
- In the event an emergency vehicle behind your vehicle, pull over and allow the emergency vehicle to pass immediately.
- Obey the applicable driving hours in accordance with legislation and take all reasonable steps to manage their fatigue and not drive with high levels of drowsiness.
- Obey all on-site signposted speed limits and comply with directions of traffic control supervisors in relation to movements in and around temporary or fixed work areas.
- Ensure all loads are safely restrained, as necessary.
- Operate their vehicles in a safe and professional manner, with consideration for all other road users.
- Hold a current Australian State or Territory issued driver's licence.
- Notify their employer or operator immediately should the status or conditions of their driver's license change in any way.
- Comply with other applicable workplace policies, including a zero tolerance of driving while under the influence of alcohol and/or illicit drugs.
- Not use mobile phones when driving a vehicle or operating equipment.
- Drinking or eating is not allowed while operating the vehicle.
- Advise management of any situations in which you know, or think may, present a threat to workplace health and safety.
- Drive according to prevailing conditions (such as during inclement weather) and reduce speed, if necessary.
- Have necessary identification documentation at hand and ready to present to security staff on entry and departure from the site.

Crash or incident Procedure

- Stop your vehicle as close to it as possible to the scene, making sure you are not hindering traffic. Ensure your own safety first, then help any injured people and seek assistance immediately if required.
- Ensure the following information is noted:
 - Details of the other vehicles and registration numbers
 - Names and addresses of the other vehicle drivers
 - Names and addresses of witnesses
 - Insurers details
- Give the following information to the involved parties:
 - Name, address and company details
 - If the damaged vehicle is not occupied, provide a note with your contact details for the owner to contact the company.
- Ensure that the police are contacted should the following circumstances occur:
 - If there is a disagreement over the cause of the crash.
 - If there are injuries.
 - If you damage property other than your own.
- As soon as reasonably practical, report all details gathered to your manager.

LWC General Correspondence

Reference No: SMCSWLWC-SCO-LWC-GEN-000015
Project Title: Sydney Metro City & Southwest - LWC, TSOM
Contract No: LWC - Line Wide Contracts
Sub Contract: -
Orig Ref No:
DLM:

Date: 28 February 2024, 01:59 PM **Response required by:**
From: Daniel Ngo (Customer Journey Planning)
To: Julia Diamond (Sydney Metro) ; Ahsanul AMIN (Sydney Metro) ; Transmittal SM OpenAccess (Sydney Metro) ; Gaya Prem Kumar (Sydney Metro) ; Ben Chen (Sydney Metro) ; Benjamin Schipp (Sydney Metro) ; Katherine Free (Sydney Metro) ; Daniel Ngo (Customer Journey Planning) ; Jake Coles (Customer Journey Planning)
Cc:
Subject: **Approval - CRW Construction Traffic Management Plan - Chatswood Demolition and Remediation Project Rev 1**

Dear All,

This approval is in response to the transmittal SMCSWCRW-SMD-TX-000015 (dated 16/02/2024)

In accordance with Schedule C1 Appendix A.9 Section 2.1 (c) and 2.2 (c) of the Principal's General Specifications G10 – Traffic and Transport Management and Minister's Condition of Approval E82 for the Sydney Metro City & South West, Transport for NSW - Greater Sydney - Planning & Programs, and Customer Journey Planning approve the **CRW Construction Traffic Management Plan - Chatswood Demolition and Remediation Project Rev 1** (SMCSWCRW-RMA-DCH-EM-PLN-000011) for the Sydney Metro City & South West project subject to the following requirements:

- Addressing any issues raised by Council, STA, Taxi Council, residents/businesses or Emergency Services in the CTMP approval process;
- Addressing the requirements arising as an outcome of the Local Traffic Committee meeting;
- Obtaining Road Occupancy Licenses (ROLs) from the Transport Management Centre as required;
- Promptly addressing any CJP and/or TMC and/or TfNSW issue that eventuates during the works.
- An RSA is to be submitted post implementation with all items closed and addressed by the project.
- Any changes to program or TMP detail must be presented to all stakeholders for acceptance. Advanced notice for implementation must be applied.

Regards,
Daniel Ngo

Precinct Project Manager - CBD Approaches
Customer Journey Planning
Greater Sydney
Transport for NSW

Design Series:

Discipline:

Design Lots:

Location:



Appendix 7: Noise & Vibration Impact Statement

APPROVAL
CITY & SOUTHWEST ACOUSTICS ADVISOR

Review of:	Sydney Metro City – CNVIS – Chatswood Remediation Site	Document reference:	EMS24 1233-R1 Revision 1
Prepared by:	Carl Fokkema Alternate Acoustics Advisor		Prepared by Environmental Monitoring Services Pty Ltd
Date of issue:	12 March 2024		12 March 2024

As approved Alternate Acoustics Advisor for the Sydney Metro City & Southwest project, and as required under A27 (d) of the project approval conditions (SSI 15-7400), I have reviewed and provided comment on the Construction Noise and Vibration Impact Statement (CNVIS) for the Chatswood Remediation Site EMS24 1233-R1 Revision 1 dated 12 March 2024.

I am satisfied that the CNVIS Report is technically valid and includes appropriate noise and vibration mitigation and management. On this basis, I endorse the CNVIS Report referenced herein.



Carl Fokkema, City & Southwest Alternate Acoustics Advisor



CONSTRUCTION NOISE & VIBRATION IMPACT STATEMENT

SYDNEY METRO CHATSWOOD REMEDIATION SITE
CHATSWOOD NSW 2170

PREPARED FOR

Charlie Dutra

RMA Contracting Pty Ltd
12/6-20 Braidwood Street
Strathfield South NSW 2136

CONTRACT NO. C24 9170
REPORT NO. EMS24 1233-R1

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PREPARED FOR:	PREPARED BY:
RMA Contracting Pty Ltd	Environmental Monitoring Services Pty Ltd
12/6-20 Braidwood Street Strathfield South NSW 2136	First Floor, 935 Botany Road Mascot NSW 2020
Name: Charlie Dutra	ABN 13 050 039 177
Phone No.: 1300 798 808	Phone No: (02) 9317 0100
E-mail: charlie@rmagroup.com.au	

AUTHOR:	<i>Sean Hook</i>	Sean Hook MArchSci (Audio and Acoustics) Acoustic Consultant MAAS	Date: 12.03.2024
CHECKED BY:	<i>M Bain</i>	Matt Bain MDesSci (Audio and Acoustics) Acoustic Consultant	Date: 12.03.2024
APPROVED FOR RELEASE BY:	<i>Mark Wagner</i>	Mark Wagner Director	Date: 12.03.2024

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DOCUMENT CONTROL

COPY No: 1

DOCUMENT HISTORY

Revision No	Date Issued	Reason/ Comments
0	13.02.2024	Original Version
1	12.03.2024	Response to Sydney Metro comments

DISTRIBUTION

Copy No	Revision No	Destination
1	1	RMA Contracting Pty Ltd
2	1	Environmental Monitoring Services Pty Ltd

1 INTRODUCTION

1.1 Project Description

Environmental Monitoring Services (EMS) was engaged by RMA Contracting Pty Ltd to prepare a Construction Noise & Vibration Impact Statement (CNVIS) for the Sydney Metro Chatswood Remediation Site (the site) as part Sydney Metro City & Southwest Project.

The remediation works are an NSW Government Planning & Environment Critical State Significant Infrastructure (CSSI) project and are subject to the Conditions of Approval (Application No.: SSI 15_7400). The remediation project works include the following:

- Demolition of surface concrete slabs (this will take place over entire site),
- Removal of 3 x Underground Storage Tanks (UST),
- Excavation to a depth of approximately 3 metres and load out contaminated materials,
- Sheet piling to be installed where excavation goes up to the boundary of the site.

Figure 1.1 below displays the extent of the remediation works at the site and the locations of the excavation, UST removal and piling works.

Figure 1.2 below displays the onsite ingress and egress plans for trucks and the modelled load out point.

Figure 1.3 below displays the Noise Catchment Areas (NCA) used for the site, background noise monitoring locations and receiver locations.

Figure 1.1 – Extent of Remediation (Excavator for Excavation and UST Removal, Piling and Moxy Truck Locations)

Map taken from Remediation Action Plan – Chatswood Site (Nation Partners, NP19158_Chatswood RAP v2.0, April 2021)




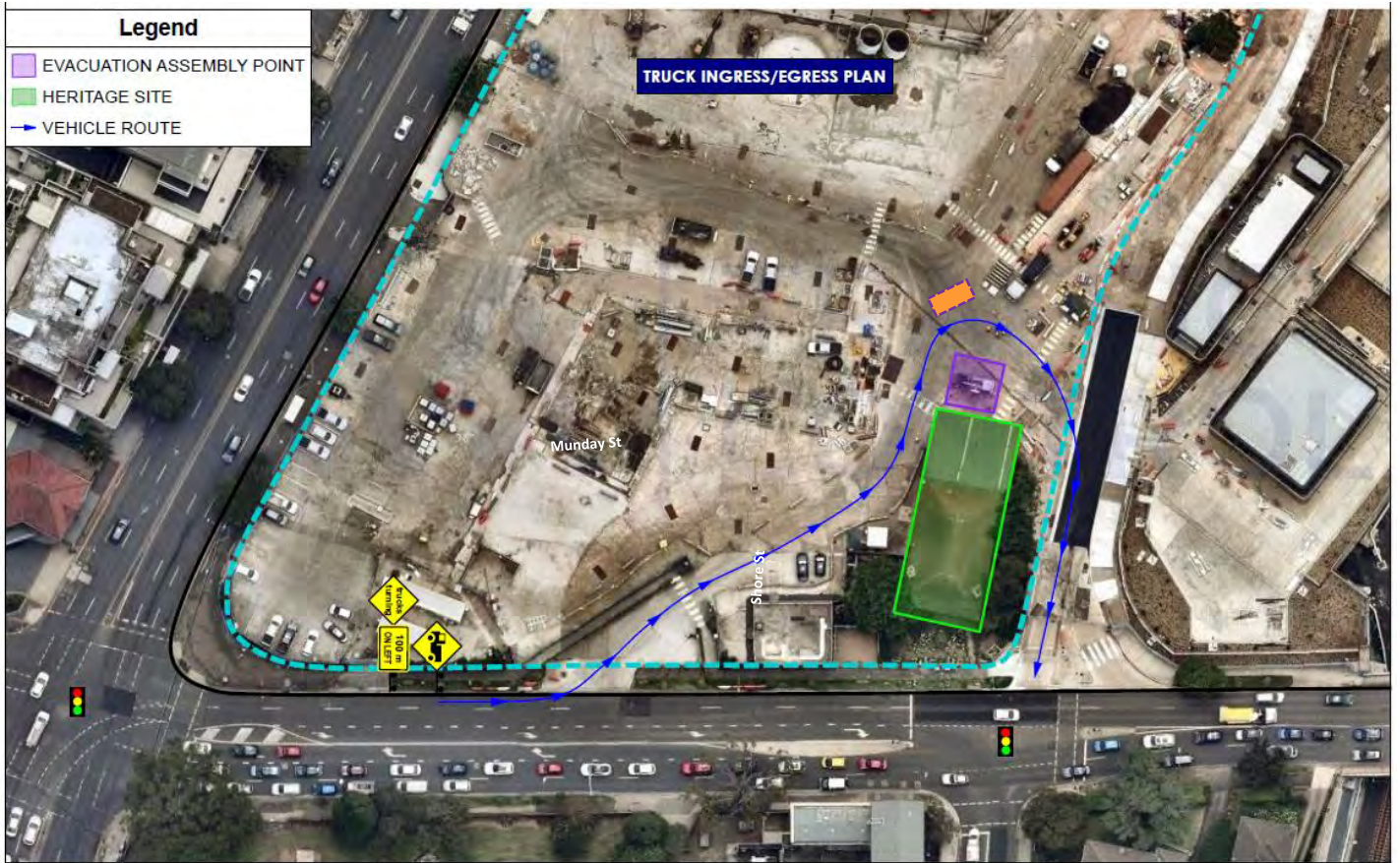
	<p>Legends</p> <ul style="list-style-type: none"> Chatswood Remediation Site (the site) Excavator Excavation Location Approx. 3m Depth Moxy Dump Truck Locations Excavator UST Removal Locations Sheet Piling Locations (Slab demo covers the entire site) 	<p>Site Address: Sydney Metro Chatswood Remediation Site, Chatswood</p> <p>Contract No.: C24 9170</p> <p>Report No.: EMS24 1233-R1</p>
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Figure 1.2 – Truck Ingress/Egress Plan

Map taken from Truck Ingress/Egress – (Invarion, Job No.: 12181 09/02/2024)




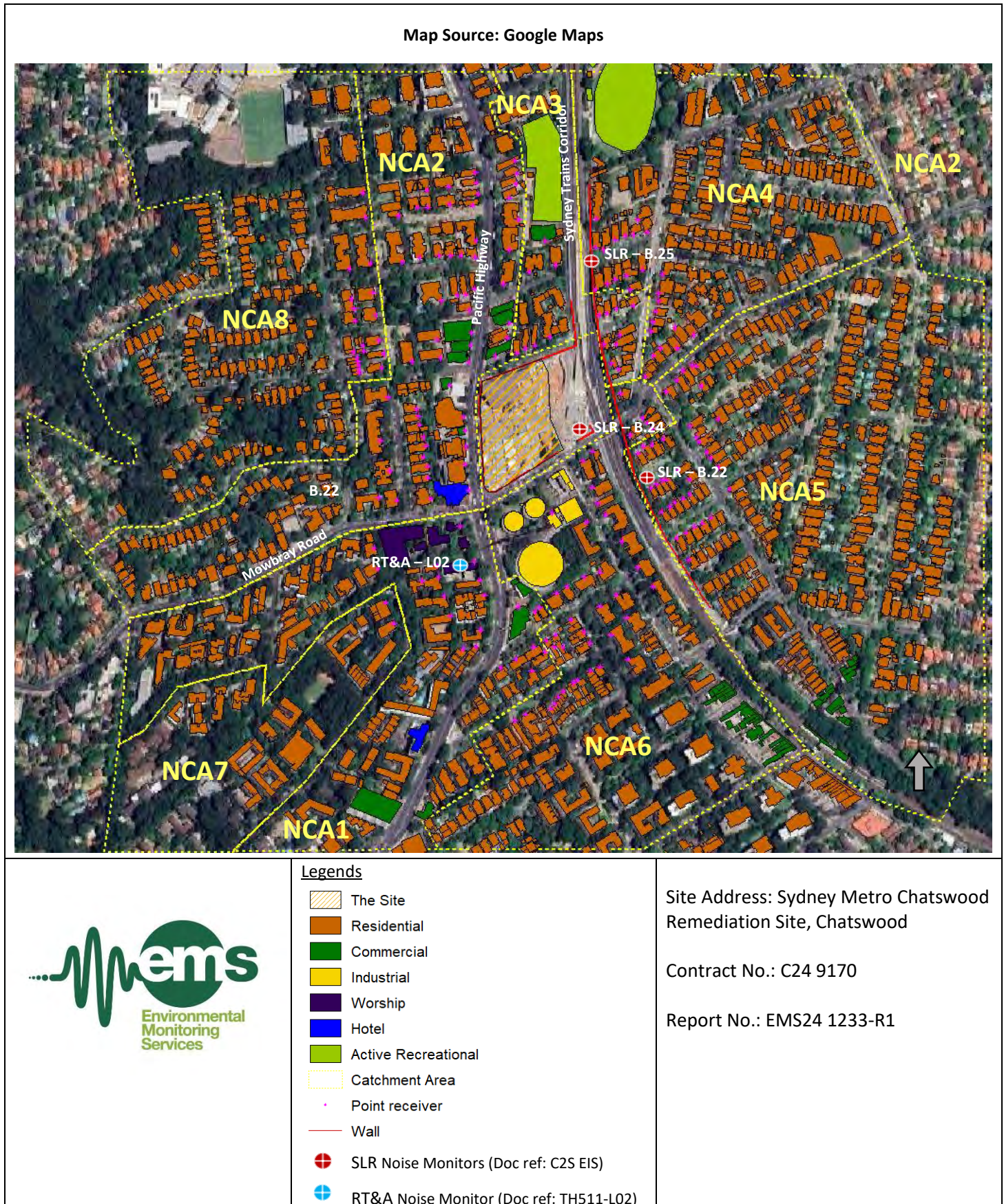
	<p>Legends</p> <ul style="list-style-type: none"> - - - Chatswood Remediation Site (the site) → Truck Ingress/Egress Route ■ Truck Load Position (will likely change throughout project, modelled location shown) 	<p>Site Address: Sydney Metro Chatswood Remediation Site, Chatswood</p> <p>Contract No.: C24 9170</p> <p>Report No.: EMS24 1233-R1</p>
---	---	--

Figure 1.3 – Noise Catchment Areas and Receiver Locations



2 CONSTRUCTION HOURS, DURATION AND SCHEDULE

2.1 Construction Hours

EMS was informed by RMA Contracting that the remediation works will be carried out during standard construction hours only during 2024, with no Out of Hours Works taking place, and therefore the relevant conditions from the CSSI 7400 approval are E36, E39, E40 regarding construction hours.

The standard construction hours defined by CSSI 7400 MOD9 Work in Condition E36 and are summarised below:

E36 Construction, except as allowed by Condition E48 (excluding cut and cover tunnelling), must only be undertaken during the following standard construction hours:

- a) 7:00am to 6:00pm Mondays to Fridays, inclusive;*
- b) 8:00am to 6:00pm Saturdays; and*
- c) At no time on Sundays or public holidays.*

If Out of Hours (OOH) work is required, Condition E44 and E47 apply, the SM C&SW OOH works protocol is to be implemented, including the submission of an OOH work application form approved by SM Communications Team including the Acoustic Advisor and Environmental Representative.

2.2 Duration and Schedule

EMS was informed by Remediation & Civil Remediation Divisions Manager Charlie Dutra from RMA Contracting Pty Ltd that the remediation works will take approximately 24 weeks from the 19th March 2024 to the 28th August.

The individual duration and schedule for the activities undertaken in the remediation works are as follows with some overlap expected for the removal of the USTs and excavation:

- Slab Demolition 7 weeks (19th March to 9th May)
- Removal of UST 1 week (1st May to 9th May)
- Sheet Piling 3 weeks (10th May to 30th May)
- Excavation and load out of contaminated materials 15 weeks (10th May to 28th August)

EMS was informed via email from RMA Group Division Manager Charlie Dutra that the works program will be revised on an ongoing basis to identify efficiencies associated with overlapping tasks.

3 BACKGROUND NOISE MONITORING

3.1 Background Noise Measurement

The NSW *Interim Construction Noise Guideline* (ICNG, EPA 2009) uses the Rating Background Level (RBL) to establish the Noise Management Level (NML) for the surrounding residential receivers to the site. The RBL is defined in the NSW EPA Noise Policy for Industry (2017), and superseded Industrial Noise Policy (2000), to be measured in the absence of extraneous noise. One of the definitions of extraneous noise as per the EPA policies is construction noise.

At the time EMS was engaged to carry out this assessment report the onsite gantry crane shed for the Chatswood dive site was being demolished. These onsite works are considered extraneous noise and therefore no background monitoring was undertaken for this assessment.

EMS adopts the background noise measurement levels measured by SLR and presented in *Sydney Metro Chatswood to Sydenham Technical Paper 2: Noise and Vibration* (Report Number 610.14718R1, dated 28 April 2016) which was compiled for Transport for NSW (TfNSW) Environment Impact Statement (EIS).

Additional pre-construction noise monitoring was carried out prior to the Tunnels and Stations Excavation (TSE) works to establish more accurate noise goals. This additional long-term, unattended noise monitoring was carried out in July 2017 by Renzo Tonin & Associates (RT&A) following a review of the EIS noise monitoring and has been incorporated into the CNVIS.

3.2 Rating Background Level

Table 3.1 outlines the Rating Background Level (RBL) and Existing L_{Aeq} measurement results collected by SLR and RT&A.

Table 3.1 – Summary of the SLR and RT&A RBL (L_{A90}) and Existing Noise Level (L_{Aeq}) in dB

NCA	Monitoring Location	Address	RBL $L_{A90}(15 \text{ minute})$			Existing $L_{Aeq}(15 \text{ minute})$		
			Daytime	Evening	Night	Daytime	Evening	Night
NCA01	L02 RT&A	516 Pacific Highway, Chatswood	55	54	42	– ¹	– ¹	– ¹
NCA02	L02 RT&A	516 Pacific Highway, Chatswood	55	54	42	– ¹	– ¹	– ¹
NCA03	B.24 SLR	14 Nelson Street, Chatswood (Ausgrid)	50	47	39	59	58	55
NCA04	B.25 SLR	13 Hopetoun Avenue, Chatswood	41	40	35	54	53	49
NCA05	B.22 SLR	14 Raleigh Street, Artarmon	42	41	34	55	50	48
NCA06	B.24 SLR	14 Nelson Street, Chatswood (Ausgrid)	50	47	39	59	58	55
NCA07	B.22 SLR	14 Raleigh Street, Artarmon	42	41	34	55	50	48
NCA08	B.25 SLR	13 Hopetoun Avenue, Chatswood	41	40	35	54	53	49

- EMS does not have a copy of the Renzo Tonin & Associates (RT&A) report which has the existing ambient noise levels from noise monitor L02.

4 RELEVANT NOISE CRITERIA

4.1 Sydney Metro City & Southwest Construction Noise and Vibration Strategy (CNVS)

As stated in the Sydney Metro *City & Southwest Construction Noise and Vibration Strategy* August 2016 the construction noise and vibration emissions associated with a large infrastructure project such as Sydney Metro will cause disturbance to adjacent communities. This is of particular relevance in urban areas, such as in the Sydney CBD, where many sensitive receivers (not just residential) are present.

Noise and vibration impacts for this project are generally expected to have a duration of several years. It is therefore important that reasonable and feasible mitigation measures (as defined in the ICNG) are identified and implemented to ensure that construction noise and vibration impacts are reduced to a minimum.

Generally the strategy is intended to provide a single interface for the large number of policies, guidelines, standards and regulations that apply to a large infrastructure project such as Sydney Metro. Where possible the strategy consolidates these information sources e.g. vibration criteria from numerous sources are collated into one section of this strategy for ease of reference. Further, the strategy aims to provide interpretation of the reference documents which are specific to the Metro project. Where the reference documents are found to have insufficient detail the strategy provides additional assessment criteria and methodologies. The specific objectives of this Construction Noise and Vibration Strategy are as follows:

- Applying the strategy during the different construction phases of the project
- Environmental Protection Licence (EPL) conditions
- Construction noise and vibration guidelines to apply to the project (additional guidance to complement the ICNG)
- Construction noise and vibration assessment methodology
- Standard noise and vibration mitigation measures for the project
- Additional noise and vibration mitigation measures for the project
- Out of hours (OOH) Work
- Monitoring, auditing and reporting
- Construction noise and vibration documentation requirements

4.2 TfNSW Construction Noise and Vibration Guideline (CNVG)

The TfNSW *Construction Noise and Vibration Guideline (Roads) 2023* (CNVG) provides methods for assessing construction noise including standard and additional mitigation measures. The CNVG determines the type of assessment required to be undertaken based on two factors:

- Duration of impact to affected receivers
- Number of affected receivers.

The proposed remediation works are anticipated to occur for a duration of more than three weeks and the number of receivers potentially affected by the construction noise impacts would be many, in accordance with the CNVG.

Based on the proposed duration of works and many affected receivers, a quantitative assessment in accordance with the noise objectives of the NSW *Interim Construction Noise Guideline* (ICNG, EPA 2009) is to be undertaken.

4.3 NSW DECC Interim Construction Noise Guideline (ICNG) 2009

The Noise Criteria will be in accordance with the NSW Department of Environment and Climate Change's (DECC) *Interim Construction Noise Guideline* is aimed to manage noise from construction work. The main objectives of the guidelines are:

- To protect the majority of residences and other sensitive land uses from noise pollution most of the time;
- Identify and minimise noise from construction works;
- Applying 'feasible' and 'reasonable' work practices to minimise construction noise; and
- Encouraging construction to be undertaken only during least sensitive noise periods.

Table 4.1 below outlines the Noise Management Levels (NML) for the residential properties near the construction site based on the Rating Background Level.

Below this Table 4.3 displays the internal and external NMLs for sensitive land use properties. Table 4.4, further down, outlines the noise criteria for commercial and educational premises.

4.3.1 Residential Premises

Table 4.1 – Applicable Noise Criteria – Residents Surrounding Work Site

Time of Day	Noise Management Level (NML) <i>L</i> _{Aeq, 15 mins}	How to Apply
<p>Recommended standard hours:</p> <p>Monday to Friday 7:00 am to 6:00 pm</p> <p>Saturday 8am to 6pm</p> <p>No work on Sundays or public holidays</p>	<p>Noise Affected RBL + 10 dB</p> <p>Daytime NML: 7:00 – 18:00</p>	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <ol style="list-style-type: none"> Where the predicted or measured <i>L</i>_{Aeq (15 min)} is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
<p>Outside recommended hours of construction:</p>	<p>Noise Affected RBL + 5dB</p> <p>Evening NML: 18:00 – 22:00</p> <p>Night NML: 22:00 – 07:00</p>	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account:</p> <ol style="list-style-type: none"> Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times. <ul style="list-style-type: none"> A strong justification would typically be required for works outside the recommended standard hours The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dB (A) above the noise affected level, the proponent should negotiate with the community.

4.4 Residential Noise Management Levels (NMLs) and Noise Catchment Areas (NCAs)

To assess construction noise at the receivers the following Noise Catchment Areas have been used, taken from the Renzo Tonin & Associates (RT&A) *Sydney Metro City and South West – Line-Wide Works Construction Noise and Vibration Impact Statement Portion 3 - Chatswood* (Doc reference: TK685-03-17F01 CNVIS C2S_P3 CHW(r2), 8th April 2021)

Table 4.2 – Description of Noise Catchment Areas

NCA	Noise Monitor	Receiver Area	Residential NMLs based on ICNG (external) $L_{Aeq(15minute)}$		
			Daytime	Evening	Night
NCA01	L02 RT&A	Residential buildings on Pacific Hwy and along Mowbray Road, south of Mowbray Rd. Traffic noise affected.	65	59	47
NCA02	L02 RT&A	Residential apartments on Pacific Highway opposite site and along Mowbray Road, north of Mowbray Rd. Traffic noise affected.	65	59	47
NCA03	B.24 SLR	Residential apartments north of Nelson St and west of rail line	60	52	44
NCA04	B.25 SLR	Residential buildings north of Mowbray Rd, east of railway line (behind rail barrier)	51	45	40
NCA05	B.22 SLR	Residential buildings south of Mowbray Rd, <u>east</u> of railway line (behind rail barrier)	52	46	39
NCA06	B.24 SLR	Residential apartments south of Mowbray Rd and <u>west</u> of rail line	60	52	44
NCA07	B.22 SLR	Residential buildings west of Pacific Hwy and south of Mowbray Road, shielded by NCA01	52	46	39
NCA08	B.25 - SLR	Residential buildings west of Pacific Hwy and north of Mowbray Road, shielded by NCA02	51	45	40

4.4.1 Sensitive Land Use Premises

Table 4.3 displays the internal and external Noise Management Levels (NML) for sensitive land use properties taken from the NSW DECC ICNG.

Table 4.3 – Noise Criteria at Sensitive Land Use Premises

Land Use	Noise Management Level (NML) $L_{Aeq(15\text{ minute})}$
Classrooms at schools and other educational institutions (including childcare centres)	Internal Noise Level 45 dB(A) External Noise Level 65 dB(A) ¹
Hospital wards and operating theatres	Internal Noise Level 45 dB(A) External Noise Level 65 dB(A) ¹
Place of Worship	Internal Noise Level 45 dB(A) External Noise Level 65 dB(A)¹
Active recreation areas (characterised by sporting activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External Noise Level 65 dB(A)
Passive recreation area (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation etc.)	External Noise Level 60 dB(A)

1. EMS assumes a noise reduction of 20 dB(A) across the closed façade for educational institutions, hospitals and religious receivers.

4.4.2 Commercial and industrial premises

Due to the broad range of sensitivities that commercial or industrial land can have to noise from construction, the process of defining management levels is separated into three categories, outlined below in Table 4.4 and taken from the NSW DECC ICNG. The external noise levels should be assessed at the most-affected point within 50 m of the area boundary.

Table 4.4 – Noise Criteria at Commercial Premises

Land Use	Noise Management Level (NML) $L_{Aeq}(15 \text{ minute})$
Industrial premises	External Noise Level 75dB (A)
Offices, retail outlets	External Noise Level 70dB (A)
Other businesses that may be very sensitive to noise. Where the noise level is project specific the proponent should undertake a special investigation to determine suitable noise levels on a project-by-project basis; the recommended 'maximum' internal noise levels in AS 2107 Acoustics – <i>Recommended design sound levels and reverberation times for building interiors</i> may assist in determining relevant noise levels.	

The Great Northern Hotel and Royal Pacific are within 500m from the remediation site. The Australian Standard 2107:2016 gives the following recommended maximum internal levels for hotels outlined below in Table 4.5.

Table 4.5 – Internal Noise Criteria at Sensitive Business Use – AS2107:2016

Time Period	Land Use	Recommended Maximum Internal L_{Aeq} dB(A)
Daytime & Evening	Bars and Lounges	Internal Noise Level 50 dB(A) External Noise Level 70 dB(A) ¹
Night-time	Dining rooms	Internal Noise Level 40 dB(A) External Noise Level 60 dB(A) ¹

1. EMS assumes a noise reduction of 20 dB(A) across the closed façade for hotel receivers.

4.5 NSW Road Noise Policy

To assess the vehicular noise impact of the construction activities upon the surrounding environment, we refer to the criteria defined by the NSW Road Noise Policy (RNP).

Table 4.6 displays the noise criteria given in the RNP for land use developments with potential to create additional traffic on existing roads.

Table 4.6 – Applicable Noise Criteria – Residents surrounding work site in dB(A)

Road Category	Type of project/land	Assessment criteria – dB(A)	
		Day (7am – 10:00pm)	Night (10:00pm – 7am)
Local Roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq, (15 \text{ hour})}$ 60 (external)	$L_{Aeq, (9 \text{ hour})}$ 55 (external)

For cases where the Traffic Noise exceeds the criteria, the RNP states the following:

- For **existing residences** and **other sensitive land uses** affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to **2 dB** above that of the corresponding ‘no build option’.

5 PREDICTED NOISE LEVELS

5.1 Construction Noise Sources

This section will outline the proposed noise sources found in the proposed works on site and outlines the sound power level from each noise source. The Sound Power levels for each noise source was gathered from the Australian Standard 2436-2010 (R2016) – *Guide to Noise Control on Construction, maintenance and Demolition sites*, Sydney Metro Construction Noise and Vibration Strategy (CNVS) August 2016 and TfNSW Construction Noise and Vibration Guideline (Roads) 2023.

The works are proposed to be conducted with the following plant and maximum operating times as advised by RMA Contracting Pty Ltd, listed below in Table 5.1.

Table 5.1 – Typical Noise Sources and their Sound Power Levels

Construction Equipment List			
Noise Source	Sound Power Level dB(A)	Data Source	% Assumed Time Operated during the 15-minute period
Concrete/Road saw	117 ¹	AS2436–2010 (R2016)	15 %
5T to 15T Excavator	105	AS2436–2010 (R2016)	60 %
35T Excavator (tracked)	110	CNVG (Roads) TfNSW 2023	60 %
Excavator w/hydraulic hammer	118 ¹	AS2436–2010 (R2016)	80 %
Tipper/Dump truck driving (Moxy truck)	110	CNVG TfNSW 2016	60 %
Truck (dump) being load or unloaded	117	AS2436–2010 (R2016)	3 %
Road truck driving	108	CNVG (Roads) TfNSW 2023	85 %
Truck-road /truck and dog driving	108	CNVG (Public Transport Infrastructure) TfNSW 2023	85 %
Piling rig - driven	116	CNVG (Roads) TfNSW 2023	75 %

1. A 5 dB(A) penalty is added to the SWL shown of these sources within the model in accordance with the NSW DECC *Interim Construction Noise Guideline* (2009)

5.2 Noise Levels for Activities

Table 5.2 gives the site-specific construction activities and scenarios with their total SWL.

Table 5.2 – Typical Activities and Sound Power Levels, dB(A) re. 10⁻¹²W

Construction Activity	Activity Total L _{Aeq} SWL	Plant/Equipment
Slab demolition		
Demolition of surface concrete slabs covering site	122 + 5dB ¹ = 127	Concrete/road saw
		20T to 50T Excavator x 3 w/ hydraulic hammers
		Truck and dog being loaded (4 per hour)
		Truck and dog (4 per hour)
Underground fuel storage tank removal		
Removal of 3 x underground fuel storage tanks	110	5T to 15T Excavator (x 2)
		Truck and dog being loaded (4 per hour) ²
		Truck and dog (4 per hour) ²
Sheet piling		
Sheet piling at the boundary of the site where the excavation area meets the boundary	115 + 5dB ¹ = 120	Sheet piling rig
Excavation		
Excavation up to depth of approximately 3 metres and load out of contaminated soil	116	5T to 50T Excavator (x 4)
		2 x Moxy dumpster trucks onsite being loaded
		2 x Moxy dump trucks onsite
		Truck and dog being loaded (4 per hour)
		Truck and dog (4 per hour)

1. A 5 dB(A) penalty has been added to the SWL of these sources in accordance with the NSW DECC *Interim Construction Noise Guideline* (2009)
2. The removal of the underground storage tanks will take place during the excavation of contaminated materials and therefore the loading of the truck and dogs was included in the model.

5.3 Construction Activity Locations

The location of the construction activities was modelled based on the Appendix C-1: Indicative Extent of Remediation from the *Remediation Action Plan* – Chatswood Site (Nation Partners, NP19158_Chatswood RAP v2.0, April 2021) shown in Figure 1.1.

5.4 Construction Noise Impact Prediction

These impact noise predictions are all conducted on the “worst case” assumption using the scenarios from Section 5.2.

The noise calculations were carried out using the Acoustic Software SoundPLAN (version 9.0) under the following conditions:

- Façade assessment locations on residences were 1.5 metres above the floor level(s) of the building.
- Ground absorption at the site, roads surrounding the site (Pacific Highway, Mowbray Road and Nelson St), adjacent rail corridor/infrastructure and commercial properties on the western side of the Pacific Highway from No. 522 to No. 586 as well as the commercial receivers on the eastern side of the Pacific Highway between Nelson St and Gordon Ave were modelled as reflective (0.05). The remaining areas were modelled as absorptive (0.9).
- The noise sources were modelled at the following heights above ground level and noise source types:
 - Excavator w/ hydraulic hammer attachment – 1m (*logarithmic sum of 3 area sources that collectively cover the site with maximum L_{Aeq} SWL located at one point*)
 - Dump truck & T+D being loaded – 2m (*areas source, SWL spread over entire area*)
 - Truck & dog being loaded – 2m (*point source, 8 movements total arriving/egressing per hour*)
 - Road truck driving – 2m (*line source, 8 movements total arriving/egressing per hour*)
 - Piling rigs were modelled – 2.5m (*line source, maximum L_{Aeq} SWL located at one point*)
 - Tracked excavator excavating – 1.5m (*areas source, SWL spread over entire area*)
 - Tracked excavator UST removal – 1.5m (*areas source with maximum L_{Aeq} SWL located at one point*)
- The site hoarding was modelled at a height of 3 metres above ground on the northern, western and southern boundaries of the site, and the eastern boundary was modelled as open. The Sydney Trains noise barriers were modelled at the eastern boundary of the rail corridor.
- The SoundPLAN model included the building structures from the area surrounding the site in order to include the sound reflections from neighbouring buildings. The building data was provided by Geoscape from 2016, 2018, 2019, 2020 to 2022.
- Receiver locations were at the building façade closest to and facing the remediation site. It was observed the majority of the residential receivers do not have front or backyards yards predominantly the residential buildings surrounding the site are flats.
- All buildings from a minimum 250 metres from the remediation site had point receivers snapped to them with some receivers up to 500 metres from the site.

The construction noise predictions per receiver, per construction activity are found in Appendix B.

5.5 NCA Predictions

Table 5.3 gives the highest exceedances above the Noise Management Levels during Standard Hours per NCA per construction activity/stage for the $L_{Aeq, 15\text{minute}}$ construction levels.

5.5.1 $L_{Aeq, 15\text{minute}}$ Construction Noise Predictions

Table 5.3 – Highest Exceedances per Catchment Areas per Construction Activity

NCA	Slab Demo	dB(A) above NML	Receiver perception	UST Removal	dB(A) above NML	Receiver perception	Piling	dB(A) above NML	Receiver perception	Excavation	dB(A) above NML	Receiver perception
NCA1	70	5	CA	48	0	–	65	0	–	57	0	–
NCA2	85	20	MI	63	0	–	83	18	MI	71	6	CA
NCA3	85	25	HI	57	0	–	83	23	HI	69	9	CA
NCA4	74	23	HI	52	1	CA	66	15	MI	58	7	CA
NCA5	72	20	HI	53	1	CA	66	14	MI	56	4	CA
NCA6	83	23	HI	61	1	CA	72	12	MI	64	4	CA
NCA7	61	9	CA	40	0	–	50	0	–	44	0	
NCA8	67	16	MI	48	0	–	65	14	MI	53	2	CA

CA = Clearly audible
 MI = Moderately intrusive
 HI = Highly intrusive

The definition of receiver perception is taken from Table 9 of the TfNSW *Construction Noise and Vibration Guideline (Public Transport Infrastructure)* September 2023. The Saturday hours have been amended to extend to 6pm as per the CSSI 7400 MOD9.

Construction hours	Receiver perception	dB(A) above RBL*	dB(A) above ANML
STANDARD HOURS	Noticeable	5 to 10	0
Monday-Friday 7am-6pm Saturday 8am-6pm	Clearly Audible	> 10 to 20	≤ 10
	Moderately intrusive	> 20 to 30	> 10 to 20
	Highly intrusive	> 30	> 20
	75dBA or greater	N/A	N/A

5.5.2 NCA & Other Sensitive Receiver Predicted Noise Level Discussion

The levels at the surrounding NCAs will be most impactful during the Slab Demolition and Piling activities with levels at the nearest receivers to the site and unshielded receivers within the catchment areas being either Moderately Intrusive (>10 to 20 dB above NML) or Highly Intrusive (> 30 dB above NML) in accordance with the TfNSW CNVG (Public Transport Infrastructure) 2023, apart from NCA1 and NCA7 where the highest receiver exceedances are predicted to be Clearly Audible (≤ 10 dB above NML) during Slab Demolition works and within the NML during Sheet Piling works respectively.

The Highly Intrusive level of 75 dB(A) is predicted to be exceeded at NCA2, NCA3 and NCA6 during Slab Demolition works and at NCA2 and NCA3 during Sheet Piling for the nearby and unshielded receivers. The majority of receivers within the above mentioned NCAs that are located behind the closest row of houses to the site have predicted levels well below 75 dB(A). Both the sheet piling rig and excavator hammering sources had the 5 dB penalty added to them in accordance with the NSW DECC ICNG. The Sheet Piling will be of a shorter duration than the Slab Demolition works which covers the entire site and therefore likely less annoying.

The UST Removal is predicted to be less impactful with the levels no more than 1 dB above the NML throughout the NCAs and likewise for Excavation where the exceedance above the NML within all the NCAs is predicted to be from 0 to 9 dB.

The majority of the other sensitive receivers (non residential) are predicted to exceed their NMLs during Slab Demolition and Sheet Piling works whereas no other sensitive receivers are predicted to be above the NML during UST Removal and Excavation.

See Section 6 Noise Control for mitigation measures. The fitting of the acoustic jackets on the hydraulic hammers (see Section 6.4) and the use of acoustic screening around the concrete saw cutting will result in construction noise levels lower than those seen in Table 5.3 and Appendix B. Respite periods should be followed as per Table 6.1 for Slab Demolition and Sheet Piling.

5.6 Truck Noise Assessment

Heavy vehicle movements would be required for the duration of the remediation works with vehicles over 12 metres accessing and egressing the site via the Pacific Highway either northbound or southbound in accordance with the Construction Traffic Management Plan by Systems Connect (Document number: SMCSWLWC-SYC-DCH-TF-PLN-002505 from the 18th October 2023). EMS was informed by RMA Contracting Pty Ltd that there will be the following truck movements occurring during the remediation works:

- Slab demolition works – Up to 40 trucks per day (truck and dog)
- UST removal – Up to 40 trucks per day (truck and dog)
- Excavation – Up to 40 trucks per day (truck and dog)

The Average Annual Daily Traffic (AADT) data from the RMS traffic count station (station Id: 33014, 80m South of Mowbray Road) was 60,525 vehicles (both directions) with 30,814 vehicles (north bound) and 29,711 (south bound) for the year of 2018.

The percentage of heavy vehicle AADT for 2018 was 6.9% which equates to 4176 heavy vehicles and during standard construction hours the heavy vehicle AADT was 2996. Assuming the worst-case scenario of 40 heavy

vehicles arriving and egressing the site per day Table 5.4 shows the 2 dB allowable noise limit won't be exceeded.

Table 5.4 – Heavy Vehicle NSW RNP Assessment

Road	Period	Existing Heavy Vehicle Traffic Flow 2018 (vph)	Truck Flow Generation (per day)	Noise Increase dB(A)	RNP Allowable Increase in Noise Limit dB(A)	Complies
Pacific Highway	Standard Construction Hours 7am – 6pm	2996	40	0.058	2	Yes

6 NOISE CONTROL

6.1 Standard Mitigation Measures (Sydney Metro CNVS)

Table 6.1 displays standard mitigation measures for construction noise taken from Table 9 from the Sydney Metro City & Southwest Construction Noise and Vibration Strategy August 2016.

Table 6.1 – Standard Mitigation Measures

Action required	Details
Management Measures	
Implementation of any project specific mitigation measures required	In addition to the measures set out in this table, <i>project specific</i> measures identified measures required vibration in the environmental assessment documentation (e.g. EA, REF, submissions or representations report) or approval or licence conditions must be implemented.
Implement community consultation or notification measures	Periodic Notification (monthly letterbox drop) ¹ Website Project information and construction response telephone line Email distribution list Place Managers
Register of Noise Sensitive Receivers	A register of all noise and vibration sensitive receivers (NSRs) would be kept on site. The register would include the following details for each NSR: <ul style="list-style-type: none"> • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number
Site inductions	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: <ul style="list-style-type: none"> • All relevant project specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Any limitations on high noise generating activities • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures

Action required	Details
	<ul style="list-style-type: none"> • Site opening/closing times (including deliveries) • Environmental incident procedures
Behavioural practices	No swearing or unnecessary shouting or loud stereos/radios; on site. No dropping of materials from height; throwing of metal items; and slamming of doors. No excessive revving of plant and vehicle engines Controlled release of compressed air.
Monitoring	A noise monitoring program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Source Controls	
Construction hours and scheduling.	Where feasible and reasonable, construction would be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels would be scheduled during less sensitive time periods.
Construction respite period	High noise and vibration generating activities ² may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block ³ .
Equipment selection	<p>Use quieter and less vibration emitting construction methods where feasible and reasonable.</p> <p>For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits.</p>
Maximum noise levels	The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in Table 6.3.
Rental plant and equipment	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 6.3.
Plan worksites and activities to minimise noise and vibration.	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Non-tonal and ambient sensitive reversing alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Minimise disturbance arising from delivery of goods to construction sites	Loading and unloading of materials/deliveries is to occur as far as possible from NSRs Select site access points and roads as far as possible away from NSRs Dedicated loading/unloading areas to be shielded if close to NSRs Delivery vehicles to be fitted with straps rather than chains for unloading, wherever feasible and reasonable.
Path Controls	
Shield stationary noise sources such as pumps, compressors, fans etc.	Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained. Appendix F of AS 2436: 1981 lists materials suitable for shielding.

Action required	Details
Shield sensitive receivers from noisy activities	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when siting plant. Utilise the cabin and body of the excavator for localised shielding to closest or most exposed sensitive receivers.

1. Detailing all upcoming construction activities at least 14 days prior to commencement of relevant works.
2. Includes jack and rock hammering, sheet and pile driving, rock breaking and vibratory rolling.
3. "Continuous" includes any period during which there is less than a 60 minutes respite between ceasing and recommencing any of the work.

Table 10 from the SM CNVS is reproduced below in Table 6.2 including only the relevant noise sources to this assessment report.

Table 6.2 – Minimum Requirements for Construction Methods

Action required	Details
Excavator	Ensure that the Sound Power Levels given in Table 6.3 have been met.
Truck	Ensure that the Sound Power Levels given in Table 6.3 have been met.
Rock breakers and jackhammers	Ensure that the Sound Power Levels given in Table 6.3 have been met. Noise and vibration monitoring would be conducted at the nearest identified NSR where exceedances of the criteria have been predicted.

As stated in the SM CNVS plant or equipment operating on Sydney Metro project construction sites shall have an operating Sound Power Level (SWL) which is no higher than the corresponding SWL presented in Table 6.3 (taken from Table 11 of the CNVS). The SWLs presented in Table 6.3 have been compiled from a selection of field measurements conducted between 2004 and 2008 of plant and equipment operating on large construction projects throughout NSW and are therefore considered to be representative of plant and equipment SWLs which are readily achieved by current plant and equipment normally used in the construction industry.

Plant and equipment with SWLs higher than those presented in Table 6.3 would be deemed to be emitting an excessive level of noise and would not be permitted to operate Sydney Metro project construction sites.

Table 6.3 – Maximum Allowable Sound Power Levels for Construction Equipment

Noise Source	Maximum Allowable Sound Power Level (dB)	Maximum Allowable Sound Pressure Level (dB)
	L_{Amax}	L_{Amax} at 7 m
Excavator Hammer	118	93
Excavator (approx. 3 tonne)	90	65
Excavator (approx. 6 tonne)	95	70
Excavator (approx. 10 tonne)	100	75
Excavator (approx. 20 tonne)	105	80
Excavator (approx. 30 tonne)	110	85
Excavator (approx. 40 tonne)	115	90
Skidsteer Loaders (approx. 1/2 tonne)	107	82
Skidsteer Loaders (approx. 1 tonne)	110	85
Dozer (tracking) - equiv. CAT D8	118	93
Dozer (tracking) - equiv. CAT D9	120	95
Dozer (tracking) - equiv. CAT D10	121	96
Backhoe/FE Loader	111	86
Dump Truck (approx. 15 tonne)	108	83
Concrete Truck	112	87
Concrete Pump	109	84
Concrete Vibrator	105	80
Bored Piling Rig	110	85
Scraper	110	85
Grader	110	85
Vibratory Roller (approx. 10 tonne)	114	89
Vibratory Pile Driver	121	96
Impact Piling Rig	134	109
Compressor (approx. 600 CFM)	100	75
Compressor (approx. 1500 CFM)	105	80
Concrete Saw	118	93
Jackhammer	113	88

6.2 Applying Additional Mitigation Measures

Table 6.4 displays the additional mitigation measures for construction noise taken from Table 14 from the Sydney Metro *City & Southwest Construction Noise and Vibration Strategy* August 2016.

Table 6.4 – Additional Mitigation Measures – Airborne Construction Noise

Time Period		Mitigation Measures			
		Predicted LAeq(15minute) Noise Level Above Background (RBL)			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard	Mon-Fri (7.00 am - 6.00 pm)	-	-	M, LB,	M, LB
	Sat (8.00 am - 1.00 pm)✦				
	Sun/Pub Hol (Nil)				

✦ Note: In accordance with CSSI 7400 MOD9 Saturday hours have been extended from 8am to 6pm

Table 6.5 below outline the additional management measures applicable for standard construction hours.

Table 6.5 – Description of Additional Management Measures

Measure	Description	Abbreviation
Monitoring	Where it has been identified that specific construction activities are likely to exceed the relevant noise or vibration goals, noise or vibration monitoring may be conducted at the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver have been identified). Monitoring can be in the form of either unattended logging or operator attended surveys. The purpose of monitoring is to inform the relevant personnel when the noise or vibration goal has been exceeded so that additional management measures may be implemented.	M
Letter box drops	For each Sydney Metro project, a newsletter is produced and distributed to the local community via letterbox drop and the project mailing list. These newsletters provide an overview of current and upcoming works across the project and other topics of interest. The objective is to engage and inform and provide project-specific messages. Advanced warning of potential disruptions (e.g. traffic changes or noisy works) can assist in reducing the impact on the community. Content and newsletter length is determined on a project-by-project basis. Most projects distribute notifications on a monthly basis. Each newsletter is graphically designed within a branded template.	LB

6.3 Acoustic Screens and Tents

Acoustic screens or barriers can be an effective way to reduce noise emissions from the site. Barriers can be installed at either the location of the noise source or the location of the noise receiver. The reduction provided by the acoustic screen is determined by how much of the line of sight between the source and receiver is blocked. If the noise source is fully shielded a noise reduction of up to 15 dB(A) can be achieved. When the line of sight is only partially blocked the noise reduction can be up to 5-8 dB(A). Acoustic screens are more effective for stationary plant.

The site's 3 metre hoarding provides effective screening to the north, south and west, especially for noise sources near the site boundary hoarding.

For the road/concrete sawing EMS recommends the usage of moveable solid barriers or moveable absorptive barriers such as Echo Barrier H4 or similar acoustic fencing with minimum height of 1.8m to 2m to be situated to block the line of site from noise sources to receiver buildings, where possible, as works progress.

An absorptive barrier minimum 2m x 2m length and breadth on 4 sides is recommended to provide shielding for the following noise sources:

- Road/concrete sawing

The barrier should have the following properties:

- Echo Barrier H4 acoustic fencing or similar for absorptive barriers and solid barriers to have a surface density of at least 10 kg/m² which can be set up on movable frames with wheels for ease of use.
- There should be no gaps or openings at joints or at the bottom of the barrier material.
- Should be located as close as practical to the noise source.

Note, barrier mitigation measures for the road/concrete saw are not included in the modelled results from Table 5.3, Appendix B and Appendix C.

Image 6.1 below is an example of an absorptive barrier.

Image 6.1 – Absorptive barrier



6.3.1 *At-Receiver Treatment*

As mentioned in the TfNSW CNVG during long term works or at fixed sites the additional mitigation measures above may become less effective. In these situations, at-receiver noise mitigation will be considered if options for at source noise mitigation and management measures have been exhausted.

At receiver mitigation may include temporary window and door screens, temporary localised shielding or permanent forms of mitigation.

Considerations for providing at-receiver treatments should include:

- time of day of the noise increase and exceedance of criteria
- time of use of affected receivers
- how many decibels the noise levels are to increase
- how long the mitigation will provide benefit to the receiver during the project
- optimal design of acoustic sheds and noise barriers/hoardings

6.4 Acoustic Jacket for Hydraulic Hammers

All excavator hydraulic hammers shall be fitted with acoustic jackets such as the Hushtec RW27.

Note, the acoustic jackets mitigation measures for the hydraulic hammers are not included in the modelled results from Table 5.3, Appendix B and Appendix C.

6.5 Construction Related Traffic Noise

As per the TfNSW CNG 2023 the management of construction related traffic or traffic reroutes noise should as a minimum include the following controls:

- Scheduling and routing of vehicle movements
- Speed of vehicles
- Driver behaviour and avoidance of the use of engine compression brakes
- Ensuring vehicles are adequately silenced before allowing them to access the site.

Consideration must be given to the following measures:

- Temporary noise barriers
- At-receiver noise mitigation

The considerations should also include:

- Time of day of the noise increase and how far above the criteria the noise is expected to be
- Time of use of affected receivers
- How many decibels the noise levels are expected to increase above the existing traffic noise
- How long the mitigation will provide benefit to the receiver during the project

6.6 Communication and Consultation

6.6.1 *Response to complaints and work variations*

Complaint based monitoring or investigative actions should be conducted in accordance with the procedure as detailed in Section 7.1. Monitoring results would be communicated to the Sydney Metro Communications and Stakeholder Team including the Environmental Representative (ER) and Acoustic Advisor (AA) to convey the outcomes as required. Corrective actions (if required) would follow in a timely manner where reasonable and practicable. This shall be in the form of a verbal response within 2 hours for complaints in highly affected zones near the site and for less affected zones all enquiries require a verbal response within 24 hours during standard construction hours, or on the next working day.

As a standard response, complaints regarding construction noise shall be responded to by verifying noise levels are within noise predictions as soon as reasonably practical.

Where emergency works are required, the contractors must notify the appropriate site representative of the reasons for the need to undertake work in an emergency case. The proposed emergency works must be made aware to all affected noise sensitive receivers of the likely impacts and the duration of these emergency works as soon as possible.

Similarly, out of hours works should also be made aware to all affected noise sensitive receivers of the out of hours works schedule, a description of the work, location and duration as well as the mitigation and management measures considered to be implemented. Community consultation should be undertaken to identify and define suitable changes to construction schedule and/or mitigation and management measures.

Both residential and non-residential sensitive receivers must be considered in the assessment of noise impacts. Where works result in noise and vibration management levels would be exceeded for non-residential sensitive receivers, works must not be scheduled within sensitive periods, unless other reasonable arrangements with the affected receivers can be made at no cost to the affected receivers.

6.6.2 *Training and Awareness*

The Project workforce personnel are to be provided with relevant environmental and sustainability information and training where applicable to ensure that they are aware of their responsibilities and are competent to carry out the work in a compliant and environmentally responsible and sustainable manner.

These responsibilities are to be communicated to workforce personnel during site induction and regularly highlighted through ongoing training via tool box meetings, briefings and notifications. The following must be covered in the training as a minimum:

Purpose, objectives and key issues

- Applicable policies and procedures for managing the environment and sustainability aspects and associated key performance indicators
- Due diligence, duty of care and responsibilities
- Relevant conditions of any environmental licence and/or the relevant conditions of approval
- Site specific issues and controls including those described in the environmental documentation
- Communication protocols
- Tool box talks will be held on a regular basis in order to provide a project or site wide update, including any key or recurring environmental issues
- Topic specific environmental training should be based upon issue specific sub-plans which in this case are noise and vibration aspects covered within this plan.

All personnel working on the site will undertake a site induction, which will provide initial training on various environmental aspects including noise and vibration. Further to this, noise and vibration management requirements are to be regularly highlighted. Project Induction will include noise and vibration information on:

- Normal working hours
- OOHW
- Unavoidable works
- Sensitive receivers
- Noise and vibration mitigation and management measures
- Areas predicted to exceed noise and/or vibration criteria
- Construction practices to avoid unnecessary noise and vibration

6.6.3 Complaint Management

The DECC ICNG 2009 give the following Consultation and Notification strategies that shall be implemented for this project:

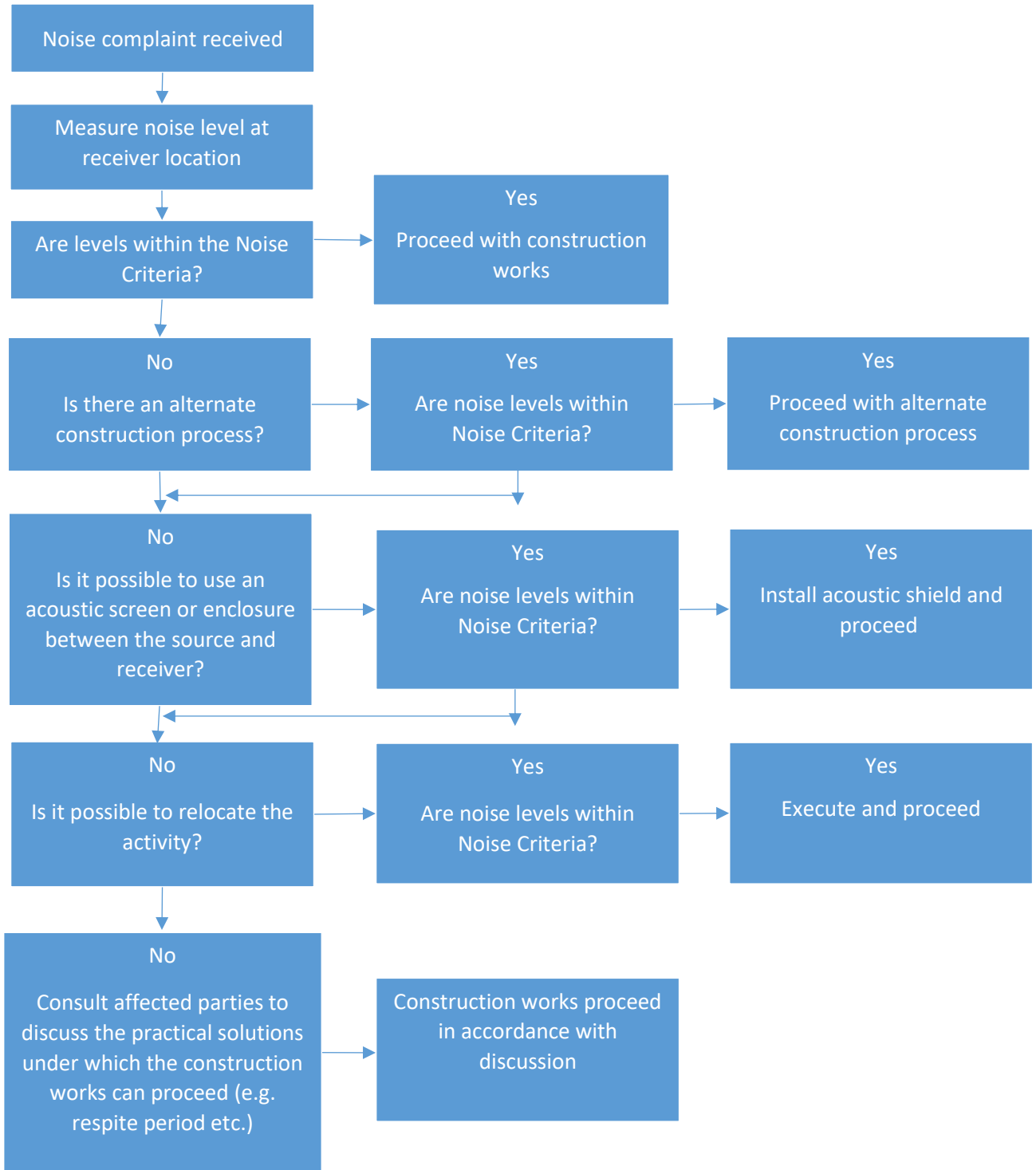
- Provide, reasonably ahead of time, information such as total building time, what works are expected to be noisy, their duration, what is being done to minimise noise and when respite periods will occur. If works outside standard hours were to occur, inform affected residents and other sensitive land use occupants between five and 14 days before commencement.
- Provide information to neighbours before and during construction through media such as letterbox drops, meetings or individual contact. In some areas, the proponent will need to provide notification in languages other than English.
- Use a site information board at the front of the site with the name of the organisation responsible for the site and their contact details, hours of operation and regular information updates. This signage shall be clearly visible from the outside and include afterhours emergency contact details.
- Communication should be upheld between the surrounding residential and commercial receivers.

Facilitate contact with people to ensure that everyone can see that the Site Manager understands potential issues, that a planned approach is in place and that there is an ongoing commitment to minimise noise.

A readily accessible contact point shall be established for compliant handling through for example a 24-hour toll-free information and complaint line. If a complaint were to arise the proponent shall implement the following measures taken from the ICNG:

- Give complaints a fair hearing.
- Have a documented complaints process, including an escalation procedure so that if a complainant is not satisfied there is a clear path to follow.
- Call back as soon as possible to keep people informed of action to be taken to address noise problems. Call back at night-time only if requested by the complainant to avoid further disturbance.
- Provide a quick response to complaints, with complaints handling staff having both a good knowledge of the project and ready access to information.
- Keep a register of any complaints, including details such as date, time, person receiving complaint, complainant's phone number, person referred to, description of the complaint, work area (for larger projects), time of verbal response and timeframe for written response where appropriate.

The flow chart that follows illustrates the process to assess any potential complaints and should be considered prior to construction works and implemented throughout the project in the advent of a complaint.



7 NOISE MONITORING

7.1 Noise Monitoring Program

Verification noise monitoring shall be conducted at noise affected receiver(s) or an equivalent representative location in accordance with the construction noise criteria in Section 4.3. The purpose of verification monitoring is to confirm that construction noise from the project is consistent with the predictions in the noise assessment and that the mitigation and management of construction noise is suitable for receivers affected by the works. Verification monitoring shall take place when construction works exceed the noise objectives of Section 4.3, in response to complaints or verification requests.

Due to the length of the works noise monitoring shall be conducted at the start of each new construction activity/phase or throughout the project. For the unattended noise monitoring, noise monitors should be installed at a **minimum of 3** of the affected receiver locations (listed below) with 2 monitors being directly adjacent to site and the 1 monitor being further back with no line of sight to the site. The monitoring should be conducted for a minimum 2 weeks or for the entirety of the activity, whichever comes first.

2 noise monitoring locations directly adjacent to the site:

- Verification Noise Monitoring Location 1 – NCA2: 552-554 Pacific Highway, Chatswood
- Verification Noise Monitoring Location 2 – NCA3: 19 Nelson Street, Chatswood
- Verification Noise Monitoring Location 3 – NCA5: 7 Raleigh Street, Artarmon

1 noise monitoring location with no line of sight to site:

- Verification Noise Monitoring Location 4 – NCA2: 29 Bowen Street, Chatswood
- Verification Noise Monitoring Location 5 – NCA3: 10 Gordon Ave, Chatswood

The most affected receiver locations will vary throughout the project due to size of the site and due to the different construction phases/activities. The unattended noise monitoring shall take place at residential noise receivers during works at premises directly adjacent to site across Pacific Highway, Nelson Street or Mowbray Road, closest to where works (such as excavator hammering or sheet piling) will be occurring.

The unattended noise monitoring locations are dependent on a number of factors including property access and the security of the noise monitors. If complaints are made the monitoring shall be carried out at the premises of the complainant whether it be a residence or other sensitive receiver such as a business or school.

Alternatively attended noise monitoring could be conducted with the noise levels measured at the most affected receivers at a minimum of 4 receiver locations closest to construction works.

EMS notes the 5 dB penalty mentioned in the DECC ICNG was added to the corresponding plant items within the noise model, as stated in Table 5.1, and therefore this penalty would need to be added to the measured construction levels to see correlation with measured Sound Pressure Levels.

The noise monitoring in response to community reactions or impacts investigations, noise monitoring may include:

- Ambient noise monitoring (in the absence of construction noise) to confirm the construction NMLs data collected during the background noise monitoring is representative of the affected residential receiver.
- Compliance monitoring to check compliance with the NMLs in any period.
- Noise monitoring due to complaints/communication from stakeholders.
- Unattended Noise monitoring in areas where predicted exceedances of the NMLs have been assessed.
- Attended noise monitoring for construction scenarios that have been predicted to exceed the NMLs as required by the SM CNVS (see Table 6.4 and Table 6.5).
- Noise monitoring to assist in the investigation of noise impacts to determine appropriate design of mitigation.
- Detailed site note outlining instantaneous noise levels from construction activities and steady state construction noise during breaks in traffic where relevant.

The suitability of unattended and attended monitoring will be determined on a case-by-case basis in order to provide the most effective evaluation of the surrounding environment and its correlation to the measured data. The duration and frequency of noise monitoring shall be undertaken to an extent that is reasonable and practicable to achieve the required outcomes of noise impact investigations and compliance of the NMLs.

Complaint based monitoring should be at a suitable location to best capture the noise source triggering the complaint, to be determined by a suitably qualified Acoustic Engineer conducting measurements. Commentary should be added to the reports which evaluates the performance and effectiveness of management measures during that monitoring period and provides recommendations for any improvements deemed necessary.

7.2 Noise Monitoring Requirements

All construction noise monitoring will be conducted in compliance with AS1055.1-1997 *Acoustics – Description and measurement of environmental noise Part 1: General Procedures*. Results and observations of noise monitoring are to be recorded.

- Noise measurements would be undertaken by personnel trained in undertaking noise measurements.
- Use of Type 1 or Type 2 sound level meters which have been NATA calibrated within the last 2 years.
- The microphone of the sound level meter should be located between a height of 1.2 and 1.5 metres above the ground or floor level.
- The sound level meter is to be calibrated before and after each set of noise monitoring.
- For compliance measurements for sleep disturbance the measurement point should be no less than 3.5 metres from any reflective surface, such as walls or buildings, other than the ground. Where the distance of 3.5 metres away from the façade cannot be achieved, the measurement location should be 1 metre away and a façade correction of -2.5 dB should be made to the measured Sound Pressure Level (SPL) unless assessing the SPL for outdoor occupants.
- Noise measurements that are affected by rain and/or the wind speed which exceeds 5m/s identified and excluded from the noise data set.
- The measurement is to be a 15-minute L_{Aeq} with extraneous noise such as road traffic excluded where possible for measurement. The L_{A90} , L_{A10} and L_{Amax} should also be recorded. In circumstances where the noise source is constant it may be determined that a noise measurement shorter than 15-minutes is appropriate.

8 CONSTRUCTION GROUND VIBRATION ASSESSMENT

As outlined in the Sydney Metro *Construction Noise and Vibration Strategy* August 2016 the effects of vibration in buildings can be divided into three main categories; those in which the occupants or users of the building are inconvenienced or possibly disturbed, those where the building contents may be affected and those in which the integrity of the building or the structure itself may be prejudiced.

No highly sensitive building occupancies have been identified near the site such as recording studios and occupancies which use scientific and/or medical equipment.

8.1 Conditions of Approval SSI 15_7400

As per the NSW Government Planning & Environment – *Critical State Significant Infrastructure (CSSI) Conditions of Approval* (Application No.: SSI 15_7400) the following vibration Conditions apply:

- **E28** – The proponent must ensure that vibration from the construction activities does not exceed the vibration limits set out in the British Standard BS 7385-2: 1993 *Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration*.
- **E29** – Owners of properties at risk of exceeding the criteria for cosmetic damage must be notified before construction that generates vibration commences in the vicinity of those properties. The management of construction works in the vicinity of properties at risk of exceeding the screening criteria for cosmetic damage must be considered in the Noise and Vibration management sub plan required by Condition C3.
- **E30** – The Proponent must conduct vibration testing before and during vibration generating activities that have the potential to impact on heritage items to identify minimum working distances to prevent cosmetic damage. In the event that the vibration testing and monitoring shows that the preferred values for vibration are likely to be exceeded, the Proponent must review the construction methodology and, if necessary, implement additional mitigation measures.
- **E31** – The Proponent must seek the advice of a heritage specialist on methods and locations for installing equipment used for vibration, movement and noise monitoring of heritage-listed structures.

8.2 Vibration Criteria for Residential & Commercial Structures

The Sydney Metro *Construction Noise and Vibration Strategy* August 2016 recommends the vibration limits from the British Standard BS 7385 Part 2 (1993) to reduce the potential for structural damage to buildings (other than sensitive/heritage-listed buildings) on adjacent properties.

Table 1 of BS 7385 Part 2 (1993) sets limits for the protection of buildings against cosmetic damage (refer to Table 8.1 below). The values in this table are the maximum vibration criteria for assessing potential ground vibration impacts to buildings on adjacent properties (other than sensitive/heritage-listed buildings which are addressed in Section 8.3).

Table 8.1 - Transient vibration guide values for cosmetic damage -BS 7385 Part 2 (1993)

Type of building		Peak component particle velocity in frequency range of predominant pulse	
4 Hz to 15 Hz		15 Hz and above	
1	Reinforced or framed building structures industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed building structures residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above
NOTE 1: Values referred to are at the base of the building			
NOTE 2: For Group 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded			

The British Standard states that the guide values for minimal risk of cosmetic damage relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings.

Where the dynamic loading caused by continuous vibration may give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values may need to be reduced by up to 50%. It should be noted that vibratory rollers and excavator hammering are considered to have the potential to cause dynamic loading in some structures (e.g. residences) and therefore it is appropriate to reduce the transient values by 50%.

Therefore, for most construction activities involving intermittent vibration sources such as rock breakers, piling rigs, excavators and the like, the predominant vibration energy occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). For vibratory rollers, the frequency of the drum will determine the dominant frequency measured, which in the experience of EMS is usually above 15 Hz. On the basis that vibratory rolling and excavator hammering will be carried out, a conservative vibration damage screening level per receiver type is given below:

- **Reinforced or framed structures: 25.0 mm/s; and**
- **Unreinforced or light framed structures: 7.5 mm/s.**

8.3 Vibration Criteria for Sensitive and Heritage-Listed Structures

The following five heritage receivers have been identified close to the works area, listed below in Table 8.2.

Table 8.2 – Heritage Receivers

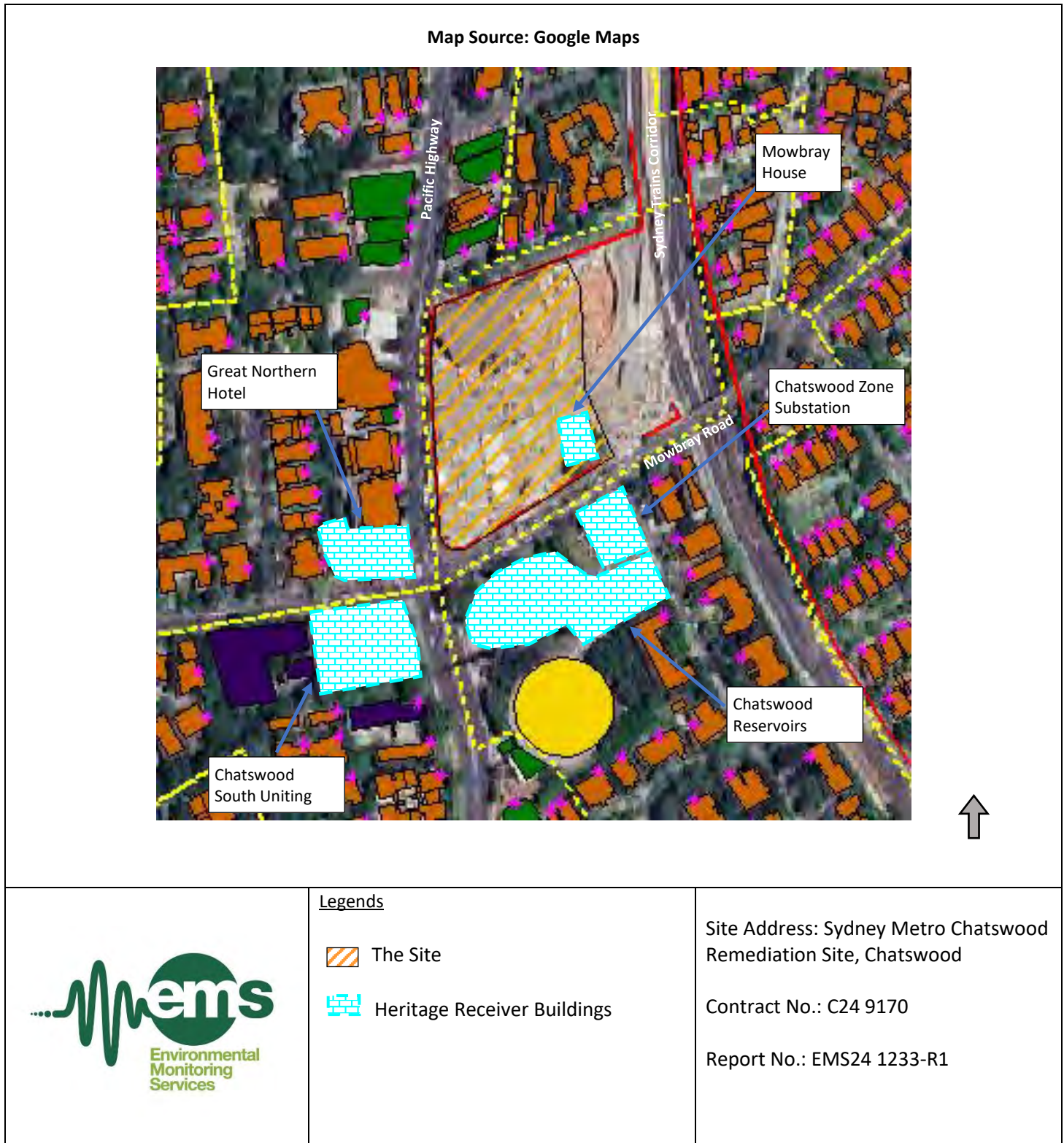
Name	Address/Location	Significance	Distance to Works
Mowbray House	357 Mowbray Rd	Local	^{1.} (slab demo)
Chatswood Zone Substation	348 Mowbray Rd	Local	27m (slab demo)
Chatswood Reservoirs	366 Mowbray Rd	Local	39m (slab demo)
Great Northern Hotel	367 Mowbray Rd	Local	30m (slab demo and piling)
Chatswood South Uniting	372-374 Mowbray Rd	Local	66m (slab demo and piling)

1. The slab to be demolished surrounds Mowbray House. The vibration monitoring trial will determine the minimum safe working distance to Mowbray House for the slab demolition works.

Heritage buildings and structures would be assessed as per the screening criteria in Section 8.2 as they should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. If a heritage building or structure is found to be structurally unsound (following inspection) a more conservative cosmetic damage objectives of **2.5 mm/s peak component particle velocity** (from DIN 4150-3: *Structural Vibration – effects of vibration on structures*) would be considered.

Figure 8.1 below displays the heritage receiver buildings in relation to the remediation site.

Figure 8.1 – Heritage Receiver Locations



8.4 Other Vibration Sensitive Structures and Utilities

Where structures and utilities are encountered which may be considered to be particularly sensitive to vibration, a vibration goal which is more stringent than structural damage goals presented in Table 8.1 may need to be adopted. Examples of such structures and utilities include:

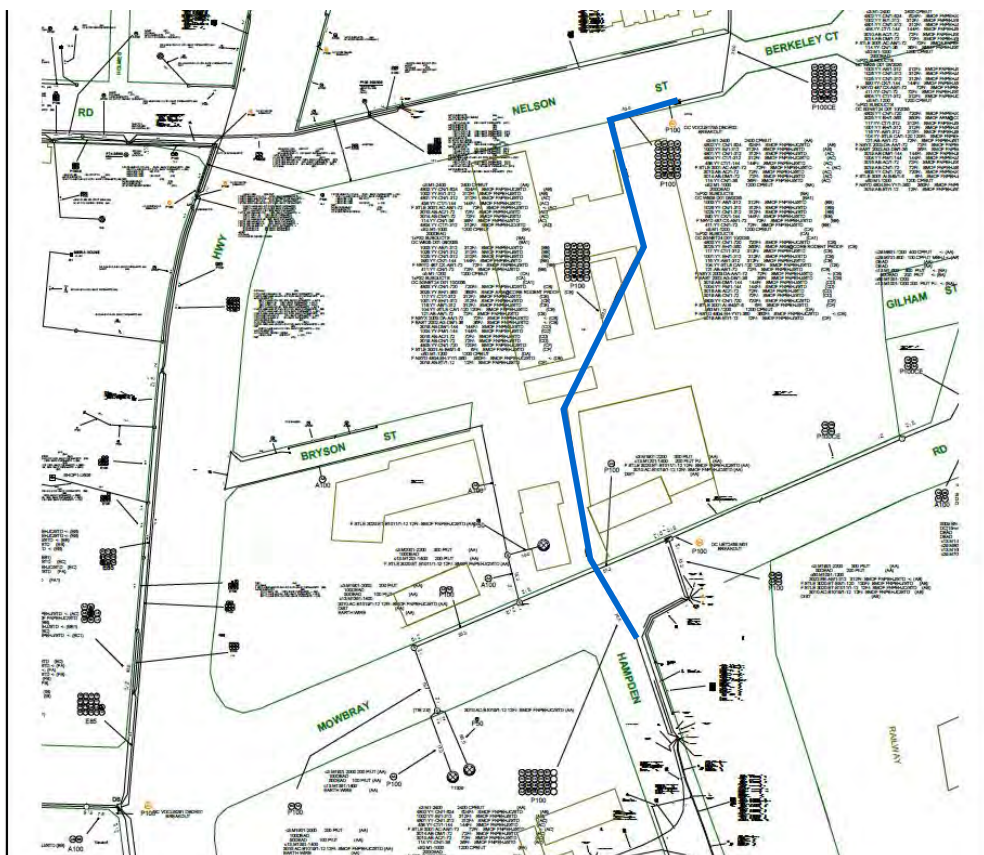
- Tunnels
- Gas pipelines
- Fibre optic cables

Specific vibration objectives should be determined on a case-by-case basis. An acoustic consultant should be engaged by the construction contractor to liaise with the structure or utility's owner to determine acceptable vibration levels.

8.4.1 Conduit Bank

EMS was informed that a conduit bank full of service provider comms is located adjacent to the site at the eastern boundary as per the Telstra Dial Before You Dig Mains Cable plan shown below in in blue in Figure 8.2.

Figure 8.2 Mains Cable Plan (Telstra DBYD – Sequence Number 233977482 from 11/01/2024)



— Conduit bank

Section 5.3 of DIN 4150: Part 3 sets out guideline values for vibration velocity to be used when evaluating the effects of vibration on buried pipework. These values are reproduced and presented in Table 8.3 below.

Table 8.3 – Guideline value $v_{i, \max}$ for evaluating the effects of short-term vibration on buried pipework

Line	Pipe Material	Guideline value $v_{i, \max}$ in mm/s at the pipe
1	Steel, welded	100
2	Vitrified clay, concrete, reinforced concrete, prestressed concrete, metal (with or without flange)	80
3	Masonry, plastics	50

8.4.2 Sydney Metro Train Tunnel

The Sydney Metro Train Tunnel is adjacent to the site. EMS has not been provided with the exact location and depth details of the tunnel.

The below excerpt is taken from Section 9.4.1 of the NSW Government Transport Asset Standards Authority *Development Near Rail Tunnels* Version 2.0 (Issue date: 15 November 2018) which is applicable to the Sydney Metro Tunnel:

Any development that occurs within a distance of 25 m horizontally from first reserve shall assess the vibration on the rail tunnels. The assessment criteria shall be a maximum peak particle velocity (PPV) of 15 mm/s at the tunnel lining for brick or mass concrete in good condition or a maximum PPV of 20 mm/s at the tunnel lining for cast iron, steel or concrete segment lining.

8.5 Minimum Working Distances for Vibration Intensive Activities

Table 20 of the *Construction Noise and Vibration Guidelines* (RMS, 2023) outlines recommended minimum working distances for vibration intensive plant from normal buildings (**not including sensitive or heritage items**) to prevent cosmetic damage, refer to Table 8.4 below.

Table 8.4 – Recommended Safe Working Distances for Cosmetic Damage from Vibration Intensive Plant

Plant Item	Rating/Description	Minimum Working Distance	
		Cosmetic Damage BS7385	Human Response NSW EPA Vibration Guideline
Vibratory Roller	< 50 kN (Typically 1-2 tonnes)	5 m	15 m to 20 m
	< 100 kN (Typically 2-4 tonnes)	6 m	20 m
	< 200 kN (Typically 4-6 tonnes)	12 m	40 m
	< 300 kN (Typically 7-13 tonnes)	15 m	100 m
	> 300 kN (Typically 13-18 tonnes)	20 m	100 m
	> 300 kN (> 18 tonnes)	25 m	100 m
Small Hydraulic Hammer	(300 kg – 5 to 12t excavator)	2 m	7 m
Medium Hydraulic Hammer	(900 kg – 12 to 18t excavator)	7 m	23 m
Large Hydraulic Hammer	(1600 kg – 18 to 34t excavator)	22 m	73 m
Vibratory Pile Driver	Sheet piles	2 m to 20 m	20 m
Pile Boring	≤ 800 mm	2 m (nominal)	4 m
Jackhammer	Handheld	1 m (nominal)	2 m

These minimum working distances are not applicable to sensitive structures, although conservative, site specific minimum working distances would need to be determined via vibration monitoring trials.

8.6 Human Comfort Criteria

The human annoyance vibration assessment should be undertaken using the NSW DECC publication *Interim Construction Noise Guideline* which states that human comfort vibration is to be measured and assessed in accordance with the NSW EPA *Assessing Vibration: a technical Guideline*, based on the BS 6472 Standard.

This Guideline covers the appropriate methods and criteria for the assessment of the intrusive vibration on living and working space. The guideline describes the following:

- The characteristics of vibration and associated effects that can cause community disturbance and concern to people, in particular the occupants of buildings.
- Criteria defining values of vibration to protect amenity.
- Procedures for the measurement and evaluation of vibration values and other associated emissions.

The preferred assessment method is the Vibration Dose Value (VDV). A summary of the VDV criteria for human comfort limits are adopted from the EPA's publication *Assessing Vibration: a technical Guideline* and are presented in Table 8.5 below.

Table 8.5 – Acceptable vibration dose values for intermittent vibration ($m/s^{1.75}$)

Location	Daytime		Night Time	
	Preferred Value	Maximum Value	Preferred Value	Maximum Value
Critical Areas	0.10	0.20	0.10	0.20
Residents	0.20	0.40	0.13	0.26
Offices, Schools, Educational, institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

The EPA's vibration publication also gives the preferred and maximum vibration limits for continuous (e.g. continuous construction or maintenance activity) and impulsive (e.g. occasional loading and unloading, or dropping of heavy equipment) types of vibration, seen below in Table 8.6.

Table 8.6 – Acceptable continuous and impulsive vibration

Location	Vibration Type	Time	RMS Acceleration (m/s ²)		RMS Velocity (mm/s)		Peak Velocity (mm/s)	
			Preferred Value	Maximum Value	Preferred Value	Maximum Value	Preferred Value	Maximum Value
Critical Areas	Continuous	Day- or night-time	0.005	0.01	0.10	0.20	0.14	0.28
	Impulsive							
Residents	Continuous	Daytime	0.01	0.02	0.2	0.4	0.28	0.56
		Night-time	0.007	0.014	0.14	0.28	0.2	0.4
	Impulsive	Daytime	0.3	0.6	6.0	12.0	8.6	17.0
		Night-time	0.1	0.2	2.0	4.0	2.8	5.6
Offices	Continuous	Day- or night-time	0.02	0.04	0.4	0.80	0.56	1.1
	Impulsive		0.64	1.28	13.0	26.0	18.0	36.0
Workshops	Continuous	Day- or night-time	0.04	0.08	0.8	1.6	1.1	2.2
	Impulsive		0.64	1.28	13.0	26.0	18.0	36.0

8.7 Vibration Mitigation Control

Work that is anticipated to cause elevated vibration levels is excavator hammering and sheet piling as well as heavy plant movement and potentially handheld jack hammering (if undertaken).

It should be noted that vibrations that are below threshold levels for structural damage may be experienced by the surrounding receivers causing annoyance. During excavator hammering and sheet piling further mitigation measures may need to be explored and employed should levels increase to such a point that complaints arise due to annoyance.

EMS notes the NSW DECC publication *Assessing Vibration: a technical guide* states “*The criteria (for human comfort) are non-mandatory: they are goals that should be sought to be achieved through the application of all feasible and reasonable mitigation measures.*”

The following practices should be implemented to reduce any potential vibrations affecting the surrounding structures:

- Place as much distance, where possible, between the excavator hammering / piling works and the surrounding properties. Distance is one of the most effective mitigation measures against vibration.
- Organise high impacting operations so they do not occur at the same time (e.g. excavator hammering and piling doesn't take place simultaneously).
- Conduct lower impact methods wherever possible, including the following:
 - Orientation of the hammer away from property boundaries and into the centre of the site; and
 - Operate excavator hammering in short bursts only, to reduce amplification of vibrations and the rise of noise.

8.8 Standard Mitigation Measures (Sydney Metro CNVS)

Table 8.7 displays standard mitigation measures for construction vibration taken from Table 9 from the Sydney Metro *City & Southwest Construction Noise and Vibration Strategy* August 2016 specific to this project.

Table 8.7 – General mitigation measures to manage vibration

Action required	Details
Management Measures	
Implementation of any project specific mitigation measures required	In addition to the measures set out in this table, <i>project specific</i> measures identified measures required vibration in the environmental assessment documentation (e.g. EA, REF, submissions or representations report) or approval or licence conditions must be implemented.
Implement community consultation or notification measures	Periodic Notification (monthly letterbox drop) ¹ Website Project information and construction response telephone line Email distribution list Place Managers
Register of Noise Sensitive Receivers	A register of all noise and vibration sensitive receivers (NSRs) would be kept on site. The register would include the following details for each NSR: <ul style="list-style-type: none"> • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number
Site inductions	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: <ul style="list-style-type: none"> • All relevant project specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Any limitations on high noise generating activities • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures
Monitoring	A noise monitoring program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Attended vibration measurements are required at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity. Where there is potential for exceedances of the criteria further vibration site law investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the applicable safe-working distances.

Action required	Details
Source Controls	
Construction hours and scheduling.	Where feasible and reasonable, construction would be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels would be scheduled during less sensitive time periods.
Construction respite period	High noise and vibration generating activities ² may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block ³ .
Equipment selection	<p>Use quieter and less vibration emitting construction methods where feasible and reasonable.</p> <p>For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits.</p>
Plan worksites and activities to minimise noise and vibration.	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.

8.9 Vibration Trials, Unattended Monitoring and Reporting

In accordance with the Sydney Metro CNVS, attended vibration measurements are required at the commencement of vibration generating activities (i.e. hydraulic hammering and sheet piling) to confirm that vibration levels satisfy the criteria for that vibration generating activity.

Attended vibration monitoring trial shall be undertaken at the Mowbray House during excavator hydraulic hammering for the slab demolition activities and at the Great Northern Hotel whilst sheet piling is being undertaken at the south western boundary of the site to establish minimum working distances.

As per Condition E31 from the CoA *“The Proponent must seek the advice of a heritage specialist on methods and locations for installing equipment used for vibration, movement and noise monitoring of heritage-listed structures.”*

Continuous vibration monitoring shall be employed during the slab demolition and UST removal.

Where there is potential for exceedances of the criteria further vibration site investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the calculated safe-working distances.

Continuous vibration monitoring is recommended at the Mowbray House (357 Mowbray Rd) during the slab demolition works and UST removal. Should hydraulic hammering be undertaken during the excavation works continuous vibration monitoring should be undertaken at the Mowbray House.

A dilapidation report is recommended for adjacent structures to the subject site, particularly the heritage listed items.

The transducer of the vibration monitors should be affixed at the founding level of the structures on a solid building element. These may either be affixed via drilling into the wall or slab or affixed via beeswax or two-part epoxy. Vibration monitoring should be undertaken at any residence or heritage structures surrounding the site should complaints arise.

The vibration monitors should be equipped with the ability to send SMS alerts to the plant operator(s) and appropriate staff and supervisors if the BS 7385 Part 2 (1993) or German Standard DIN4150-3 heritage vibration limit is exceeded. The vibration limit used for the assessment depends on the type and condition of the building determined on a case-by-case basis, however, it is likely most structures for this project will fall under the BS 7385 Part 2 (1993) criteria.

The vibration monitor should have warning lights to that flash at 0.5 to 1 mm/s below the vibration limit to indicate that the limit is being approached. These lights should be in a location easily visible to the operators of the vibration generating equipment and machinery.

Vibration Alarm Procedure

Should the vibration warning alerts be activated the following procedure should be implemented by the site foreman/supervisor:

1. Stop all work immediately and make a note of all work activities that are currently taking place at the vibration alerts. The project geotechnical engineer and/or structural engineers should be informed immediately.
2. Alternative excavation methods should be sought in conjunction with the machine operator, geotechnical engineer and/or structural engineer and details of the new procedures documented.
3. The vibration monitors shall be downloaded at weekly intervals by the acoustic consultant and prepare weekly reports that shall be distributed to the geotechnical and/or structural engineer.

Results of the preliminary trial monitoring to be provided to SM, ER and AA within 48 hours of completion of monitoring. During the trial at the onsite heritage structure, if exceedance is identified, works to cease and/or modified and additional mitigation measures are to be applied in accordance with CoA E30. The minimum working distances are to be presented in a report and follow up unattended monitoring shall be conducted at the heritage structure in consultation with a heritage consultant accordance with CoA E31. A dilapidation report shall also be provided in consultation with a heritage consultant.

9 CONCLUSIONS

A CNVIS was prepared for RMA Contracting Pty Ltd prior to the commencement of the Sydney Metro Chatswood Remediation Site works.

The purpose of this assessment is to provide methods to prevent noise and vibration from the site works causing unreasonable loss of amenity to nearby receivers.

Section 3 provided the Background Noise Levels surrounding the site which were used to establish the Noise Management Levels for the remediation works.

The noise predictions from the site are based on the information listed in Section 5 and the predictions from each construction scenario/activity at the surrounding noise receivers are shown in Appendix B.

The predictions outline that the noise levels will at times be exceeding the Noise Management Level (NML) at the nearby residential receivers during all phases of remediation works apart from the UST removal where minimal exceedances are expected. Residential receivers adjacent to the slab demolition and piling works may be highly noise affected at times.

Section 6 outlines the noise mitigation controls to be implemented on site.

The Vibration Assessment is found in Section 8 of this report. An attended vibration monitoring trial shall be undertaken at the Mowbray House during excavator hydraulic hammering for the slab demolition activities and at the Great Northern Hotel whilst sheet piling is being undertaken at the south western boundary of the site to establish minimum working distances. Continuous vibration monitoring shall be employed during the slab demolition and UST removal.

Noise contour maps are found in Appendix C for $L_{Aeq, 15\text{minute}}$ during each of the remediation activities.

10 REFERENCES

Australian Standard AS 2436-2050 (R2016) – *Guide to Noise Control on Construction, Maintenance and Demolition Sites*

Australian Standard 2107-2000 – *Recommended design sound levels and reverberation times for building interiors.*

British Standard (BS 6472–1992) – *Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)*

British Standard (BS7385: Part 2-1993) - *Evaluation and Measurement for Vibration in Buildings – Part 2 – Guide to Damage Levels from Ground-borne Vibration*

DECC NSW *Interim Construction Noise Guideline* (2009)

NSW EPA *Noise Policy for Industry* (2017)

Sydney Metro *City & Southwest Construction Noise and Vibration Strategy* August 2016

TfNSW *Construction Noise and Vibration Guideline (Roads)* 2023

TfNSW *Construction Noise and Vibration Guideline (Public Transport Infrastructure)* 2023

British Standard BS 7385-2 - 1993 *Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration*

German Standard DIN 4150-3:2016-12 *Vibrations in Buildings – Part 3: Effects on structures*

DEC NSW *Assessing Vibration: a technical guideline*, February 2006

Renzo Tonin & Associates *Sydney Metro City and South West – Line-Wide Works Construction Noise and Vibration Impact Statement Portion 3 - Chatswood* (Doc reference: TK685-03-17F01 CNVIS C2S_P3 CHW(r2), 8th April 2021)

NSW Government Planning & Environment – *Critical State Significant Infrastructure (CSSI) Conditions of Approval* (Application No.: SSI 15_7400).

SLR *Sydney Metro Chatswood to Sydenham Technical Paper 2: Noise and Vibration* (Report Number 610.14718R1, dated 28 April 2016)

Remediation Action Plan – Chatswood Site (Nation Partners, NP19158_Chatswood RAP v2.0, April 2021)

APPENDIX A

Complaint Form Content Template

RMA Contracting Pty Ltd to Detail:

Project Title: _____ Date: _____
Site Contractor: _____ Phone: _____
Site Contact: _____ Email: _____

Complainant to Detail:

Received by: Phone / Email / In Person / Other: _____

Complainant's Name: _____ Home Phone: _____

Complainant's Address: _____ Work Phone: _____

Complainant's Contact Details: _____ Mobile Phone: _____

Describe when (date and time) the noise/vibration problem began, what equipment caused the complaint (if seen/known), which location is the problem noticeable/audible etc:

Following approval from the Project Manager email this form to EMS Pty Ltd. Option to contact Acoustic Consultants to provide attended monitoring or weekly unattended monitoring at complainant's address.

APPENDIX B

Predicted Construction Noise Levels (pg 57)

- **Legend (pg 57)**
- **$L_{Aeq, 15\text{minute}}$ noise predictions (pg 58)**

APPENDIX C

$L_{Aeq, 15\text{minute}}$ Noise Map Contours Predicted Noise Levels (pg 63)

SYDNEY METRO CHATSWOOD REMEDIATION SITE

Predicted Noise Levels: $L_{Aeq, 15\text{minute}}$

Triggers for Additional Mitigation Measures as per Table C.1 from TfNSW CNVG (Public Transport Infrastructure) 2023

Perception	dB(A) above		Additional mitigation measures type
	RBL	dB(A) above ANML type:	
All hours			
Standard Hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)			
Noticeable	5 to 10	0	-
Clearly Audible	> 10 to 20	≤ 10	-
Moderately intrusive	>20 to 30	>10 to 20	N, V
Highly intrusive	> 30	> 20	N, V
75dBA or greater	N/A	N/A	N, V, SN

V = Verification

N = Notifications

SN = Specific notifications

LAeq Predicted Levels - page 1

Receiver	NCA/ Usage	NML Criteria	Slab Demolition		UST Removal		Piling		Excavation	
		Standard Hours LAeq15min	SPL (Laeq15m)	Exceeds NML by	SPL (Laeq15m)	Exceeds NML by	SPL (Laeq15m)	Exceeds NML by	SPL (Laeq15m)	Exceeds NML by
3/7 ERIC RD, ARTARMON	NCA1	65	49		28		43		35	
2110/9 ERIC RD, ARTARMON	NCA1	65	63		35		58		49	
11/12-14 HELEN ST, LANE COVE NORTH	NCA1	65	66	1	47		57		53	
15/1-3 HELEN ST, LANE COVE NORTH	NCA1	65	60		42		51		42	
3/4-6 HELEN ST, LANE COVE NORTH	NCA1	65	66	1	48		61		51	
11/8-10 HELEN ST, LANE COVE NORTH	NCA1	65	57		38		49		42	
12/8-10 HELEN ST, LANE COVE NORTH	NCA1	65	59		37		53		44	
8/16-22 HELEN ST, LANE COVE NORTH	NCA1	65	64		42		56		50	
29/24-28 HELEN ST, LANE COVE NORTH	NCA1	65	66	1	47		57		53	
2/30-36 HELEN ST, LANE COVE NORTH	NCA1	65	61		41		52		48	
8/42-50 HELEN ST, LANE COVE NORTH	NCA1	65	49		28		38		33	
1/380 MOWBRAY RD WEST, LANE COVE NORTH	NCA1	65	63		42		60		43	
14/504 PACIFIC HWY, LANE COVE NORTH	NCA1	65	55		38		50		40	
506 PACIFIC HWY, LANE COVE NORTH	NCA1	65	70	5	47		64		57	
2/514 PACIFIC HWY, LANE COVE NORTH	NCA1	65	69	4	48		65		55	
32/482-492 PACIFIC HWY, LANE COVE NORTH	NCA1	65	65		44		57		52	
1/494-502 PACIFIC HWY, LANE COVE NORTH	NCA1	65	59		34		53		45	
17/494-502 PACIFIC HWY, LANE COVE NORTH	NCA1	65	54		34		46		40	
4 PALMER ST, ARTARMON	NCA1	65	53		32		50		40	
4/4 PALMER ST, ARTARMON	NCA1	65	54		31		49		39	
9/4 PALMER ST, ARTARMON	NCA1	65	58		31		51		42	
13 PALMER ST, ARTARMON	NCA1	65	48		29		43		35	
15 PALMER ST, ARTARMON	NCA1	65	50		32		46		37	
11/1 BOWEN ST, CHATSWOOD	NCA2	65	67	2	45		63		53	
5 BOWEN ST, CHATSWOOD	NCA2	65	57		35		52		42	
7 BOWEN ST, CHATSWOOD	NCA2	65	60		42		54		44	
11 BOWEN ST, CHATSWOOD	NCA2	65	68	3	47		62		52	
15 BOWEN ST, CHATSWOOD	NCA2	65	68	3	41		63		50	
19 BOWEN ST, CHATSWOOD	NCA2	65	68	3	49		62		54	
29 BOWEN ST, CHATSWOOD	NCA2	65	68	3	47		64		52	
16/8-14 BOWEN ST, CHATSWOOD	NCA2	65	66	1	44		58		51	
14/2-6 BOWEN ST, CHATSWOOD	NCA2	65	60		40		53		44	
1B BOWEN ST, CHATSWOOD	NCA2	65	60		34		57		46	
23-25 BOWEN ST, CHATSWOOD	NCA2	65	66	1	44		61		51	
10/6 EDDY RD, CHATSWOOD	NCA2	65	56		35		49		40	
12/6 EDDY RD, CHATSWOOD	NCA2	65	60		40		55		46	
20/6 EDDY RD, CHATSWOOD	NCA2	65	60		40		52		46	
19/8-10 EDDY RD, CHATSWOOD	NCA2	65	53		37		51		39	
12/2-2A EDDY RD, CHATSWOOD	NCA2	65	61		34		56		43	
15/2-2A EDDY RD, CHATSWOOD	NCA2	65	63		41		56		47	
1 MORIARTY RD, CHATSWOOD	NCA2	65	78	13	55		73	8	64	
8/1 MORIARTY RD, CHATSWOOD	NCA2	65	70	5	49		63		57	
7/20 MORIARTY RD, CHATSWOOD	NCA2	65	70	5	49		66	1	55	
8/377 MOWBRAY RD WEST, CHATSWOOD	NCA2	65	62		42		58		47	

LAEq Predicted Levels - page 2

Receiver	NCA/ Usage	NML Criteria	Slab Demolition		UST Removal		Piling		Excavation	
		Standard Hours LAEq15min	SPL (Laeq15m)	Exceeds NML by	SPL (Laeq15m)	Exceeds NML by	SPL (Laeq15m)	Exceeds NML by	SPL (Laeq15m)	Exceeds NML by
18/381 MOWBRAY RD WEST, CHATSWOOD	NCA2	65	57		39		49		41	
303/544 PACIFIC HWY, CHATSWOOD	NCA2	65	81	16	60		77	12	67	2
592 PACIFIC HWY, CHATSWOOD	NCA2	65	68	3	44		64		54	
3/596 PACIFIC HWY, CHATSWOOD	NCA2	65	70	5	43		65		54	
598 PACIFIC HWY, CHATSWOOD	NCA2	65	67	2	38		60		49	
598 PACIFIC HWY, CHATSWOOD	NCA2	65	65		43		59		48	
925/614 PACIFIC HWY, CHATSWOOD	NCA2	65	63		42		56		46	
1/628 PACIFIC HWY, CHATSWOOD	NCA2	65	60		42		50		42	
4/630 PACIFIC HWY, CHATSWOOD	NCA2	65	60		38		51		39	
632 PACIFIC HWY, CHATSWOOD	NCA2	65	61		40		54		43	
3/689 PACIFIC HWY, CHATSWOOD	NCA2	65	45		25		41		33	
691 PACIFIC HWY, CHATSWOOD	NCA2	65	47		27		44		35	
22/524-542 PACIFIC HWY, CHATSWOOD	NCA2	65	85	20	63		82	17	69	4
28/552-554 PACIFIC HWY, CHATSWOOD	NCA2	65	85	20	60		83	18	71	6
11/621-627 PACIFIC HWY, CHATSWOOD	NCA2	65	79	14	55		77	12	67	2
8/641-653 PACIFIC HWY, CHATSWOOD	NCA2	65	69	4	48		65		54	
3/655A PACIFIC HWY, CHATSWOOD	NCA2	65	62		43		52		44	
30/655A PACIFIC HWY, CHATSWOOD	NCA2	65	58		37		50		43	
5/1 SUTHERLAND RD, CHATSWOOD	NCA2	65	64		42		58		50	
3 SUTHERLAND RD, CHATSWOOD	NCA2	65	58		37		53		44	
4 SUTHERLAND RD, CHATSWOOD	NCA2	65	64		40		57		49	
5/6 SUTHERLAND RD, CHATSWOOD	NCA2	65	62		42		55		47	
9/5-7 SUTHERLAND RD, CHATSWOOD	NCA2	65	62		32		57		37	
5B/8-12 SUTHERLAND RD, CHATSWOOD	NCA2	65	73	8	52		68	3	60	
13/11 WHITTON RD, CHATSWOOD	NCA2	65	56		25		52		35	
2A/1-7 WHITTON RD, CHATSWOOD	NCA2	65	71	6	51		70	5	58	
1 BERKELEY CT, CHATSWOOD	NCA3	60	73	13	51		67	7	58	
2 BERKELEY CT, CHATSWOOD	NCA3	60	77	17	54		67	7	60	
3 BERKELEY CT, CHATSWOOD	NCA3	60	74	14	52		67	7	59	
5 BERKELEY CT, CHATSWOOD	NCA3	60	75	15	53		66	6	58	
2/10 GORDON AV, CHATSWOOD	NCA3	60	75	15	48		71	11	59	
8/1-3 GORDON AV, CHATSWOOD	NCA3	60	66	6	44		64	4	49	
7/5-9 GORDON AV, CHATSWOOD	NCA3	60	72	12	44		59		53	
4/15 NELSON ST, CHATSWOOD	NCA3	60	85	25	56		77	17	67	7
17 NELSON ST, CHATSWOOD	NCA3	60	83	23	57		81	21	68	8
19 NELSON ST, CHATSWOOD	NCA3	60	84	24	56		83	23	69	9
39/9-11 NELSON ST, CHATSWOOD	NCA3	60	81	21	56		71	11	62	2
6 ORCHARD RD, CHATSWOOD	NCA3	60	76	16	54		68	8	60	
8 ORCHARD RD, CHATSWOOD	NCA3	60	77	17	56		67	7	60	
12 ORCHARD RD, CHATSWOOD	NCA3	60	75	15	52		66	6	59	
14 ORCHARD RD, CHATSWOOD	NCA3	60	69	9	48		65	5	52	
1/16 ORCHARD RD, CHATSWOOD	NCA3	60	72	12	36		66	6	57	
11/6 CHAPMAN AV, CHATSWOOD	NCA4	51	64	13	46		59	8	49	
2 HOPETOUN AV, CHATSWOOD	NCA4	51	65	14	41		60	9	50	
3 HOPETOUN AV, CHATSWOOD	NCA4	51	61	10	40		57	6	46	
4 HOPETOUN AV, CHATSWOOD	NCA4	51	65	14	41		58	7	48	
6 HOPETOUN AV, CHATSWOOD	NCA4	51	67	16	43		58	7	50	

LAeq Predicted Levels - page 3

Receiver	NCA/ Usage	NML Criteria	Slab Demolition		UST Removal		Piling		Excavation	
		Standard Hours LAeq15min	SPL (LAeq15m)	Exceeds NML by	SPL (LAeq15m)	Exceeds NML by	SPL (LAeq15m)	Exceeds NML by	SPL (LAeq15m)	Exceeds NML by
7 HOPETOUN AV, CHATSWOOD	NCA4	51	64	13	43		60	9	48	
9 HOPETOUN AV, CHATSWOOD	NCA4	51	68	17	45		58	7	48	
10 HOPETOUN AV, CHATSWOOD	NCA4	51	70	19	44		61	10	52	1
11 HOPETOUN AV, CHATSWOOD	NCA4	51	67	16	48		54	3	49	
12 HOPETOUN AV, CHATSWOOD	NCA4	51	70	19	52	1	62	11	53	2
1A HOPETOUN AV, CHATSWOOD	NCA4	51	61	10	40		57	6	45	
325 MOWBRAY RD, CHATSWOOD	NCA4	51	53	2	28		42		36	
327 MOWBRAY RD, CHATSWOOD	NCA4	51	67	16	41		60	9	53	2
329 MOWBRAY RD, CHATSWOOD	NCA4	51	59	8	30		49		38	
331 MOWBRAY RD, CHATSWOOD	NCA4	51	67	16	33		63	12	51	
333 MOWBRAY RD, CHATSWOOD	NCA4	51	69	18	38		62	11	53	2
2/335 MOWBRAY RD, CHATSWOOD	NCA4	51	74	23	47		66	15	58	7
3 ORCHARD RD, CHATSWOOD	NCA4	51	64	13	43		58	7	49	
5 ORCHARD RD, CHATSWOOD	NCA4	51	68	17	43		63	12	51	
7 ORCHARD RD, CHATSWOOD	NCA4	51	66	15	37		63	12	51	
11 ORCHARD RD, CHATSWOOD	NCA4	51	63	12	39		58	7	48	
18 ORCHARD RD, CHATSWOOD	NCA4	51	67	16	46		61	10	51	
20 ORCHARD RD, CHATSWOOD	NCA4	51	61	10	37		54	3	45	
22 ORCHARD RD, CHATSWOOD	NCA4	51	54	3	36		50		38	
1A ORCHARD RD, CHATSWOOD	NCA4	51	66	15	44		59	8	51	
9A ORCHARD RD, CHATSWOOD	NCA4	51	67	16	38		63	12	53	2
19 CAMBRIDGE RD, ARTARMON	NCA5	52	50		30		43		36	
32 CAMBRIDGE RD, ARTARMON	NCA5	52	56	4	30		52		41	
4 DRAKE ST, ARTARMON	NCA5	52	58	6	31		53	1	42	
5 DRAKE ST, ARTARMON	NCA5	52	55	3	34		48		39	
6 DRAKE ST, ARTARMON	NCA5	52	54	2	31		51		38	
7 DRAKE ST, ARTARMON	NCA5	52	55	3	31		51		39	
8 DRAKE ST, ARTARMON	NCA5	52	57	5	31		50		39	
9 DRAKE ST, ARTARMON	NCA5	52	56	4	32		55	3	39	
10 DRAKE ST, ARTARMON	NCA5	52	55	3	30		48		38	
11 DRAKE ST, ARTARMON	NCA5	52	55	3	32		54	2	39	
12 DRAKE ST, ARTARMON	NCA5	52	53	1	33		44		38	
13 DRAKE ST, ARTARMON	NCA5	52	60	8	32		55	3	39	
46 ELIZABETH ST, ARTARMON	NCA5	52	63	11	42		57	5	46	
53 ELIZABETH ST, ARTARMON	NCA5	52	54	2	34		50		40	
55 ELIZABETH ST, ARTARMON	NCA5	52	57	5	35		53	1	42	
57 ELIZABETH ST, ARTARMON	NCA5	52	59	7	36		53	1	44	
59 ELIZABETH ST, ARTARMON	NCA5	52	59	7	36		53	1	44	
61 ELIZABETH ST, ARTARMON	NCA5	52	61	9	39		53	1	45	
63 ELIZABETH ST, ARTARMON	NCA5	52	61	9	39		53	1	45	
65 ELIZABETH ST, ARTARMON	NCA5	52	61	9	38		57	5	46	
44A ELIZABETH ST, ARTARMON	NCA5	52	59	7	38		54	2	44	
11 HAWKINS ST, ARTARMON	NCA5	52	52		31		45		36	
330 MOWBRAY RD, ARTARMON	NCA5	52	55	3	31		48		41	
332 MOWBRAY RD, ARTARMON	NCA5	52	66	14	37		59	7	51	
334 MOWBRAY RD, ARTARMON	NCA5	52	68	16	39		62	10	51	
336 MOWBRAY RD, ARTARMON	NCA5	52	69	17	42		63	11	55	3
338 MOWBRAY RD, ARTARMON	NCA5	52	71	19	42		64	12	54	2

LAeq Predicted Levels - page 4

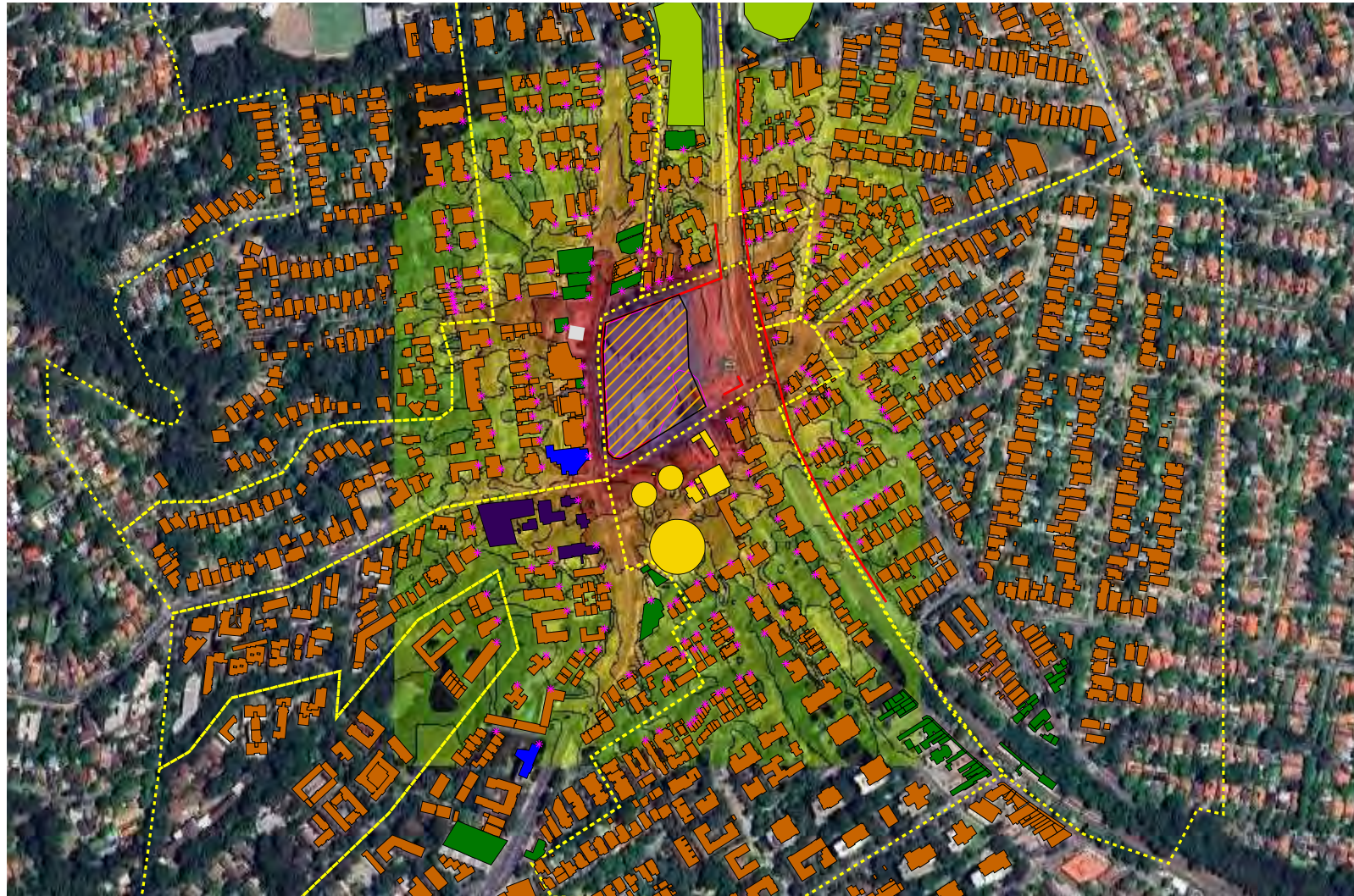
Receiver	NCA/ Usage	NML Criteria	Slab Demolition		UST Removal		Piling		Excavation	
		Standard Hours LAeq15min	SPL (Laeq15m)	Exceeds NML by	SPL (Laeq15m)	Exceeds NML by	SPL (Laeq15m)	Exceeds NML by	SPL (Laeq15m)	Exceeds NML by
1 RALEIGH ST, ARTARMON	NCA5	52	63	11	46		62	10	45	
3 RALEIGH ST, ARTARMON	NCA5	52	72	20	51		65	13	54	2
5 RALEIGH ST, ARTARMON	NCA5	52	72	20	53	1	66	14	56	4
7 RALEIGH ST, ARTARMON	NCA5	52	71	19	52		65	13	55	3
8 RALEIGH ST, ARTARMON	NCA5	52	65	13	44		60	8	49	
10 RALEIGH ST, ARTARMON	NCA5	52	65	13	35		58	6	47	
10 RALEIGH ST, ARTARMON	NCA5	52	65	13	42		60	8	49	
12 RALEIGH ST, ARTARMON	NCA5	52	65	13	35		57	5	43	
3 BENTON AV, ARTARMON	NCA6	60	47		26		40		34	
4/3 BENTON AV, ARTARMON	NCA6	60	47		29		42		34	
1/5-11 BENTON AV, ARTARMON	NCA6	60	49		29		43		36	
2/5-11 BENTON AV, ARTARMON	NCA6	60	50		29		45		36	
7/5-11 BENTON AV, ARTARMON	NCA6	60	49		29		45		35	
12/5-11 BENTON AV, ARTARMON	NCA6	60	50		29		46		37	
48 ELIZABETH ST, ARTARMON	NCA6	60	69	9	42		60		51	
50 ELIZABETH ST, ARTARMON	NCA6	60	71	11	51		64	4	55	
52 ELIZABETH ST, ARTARMON	NCA6	60	74	14	54		66	6	58	
1/8 ERIC RD, ARTARMON	NCA6	60	60		31		54		44	
5/4-6 ERIC RD, ARTARMON	NCA6	60	61	1	37		56		47	
1A ERIC RD, ARTARMON	NCA6	60	52		33		47		35	
12/99 HAMPDEN RD, ARTARMON	NCA6	60	60		43		54		39	
8/111 HAMPDEN RD, ARTARMON	NCA6	60	73	13	54		66	6	53	
3/115 HAMPDEN RD, ARTARMON	NCA6	60	75	15	55		66	6	57	
5/164 HAMPDEN RD, ARTARMON	NCA6	60	62	2	33		55		43	
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301/182-190 HAMPDEN RD, ARTARMON	NCA6	60	68	8	41		48		42	
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93-97 HAMPDEN RD, ARTARMON	NCA6	60	54		35		46		36	
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12/344 MOWBRAY RD, ARTARMON	NCA6	60	83	23	61	1	72	12	64	4
2 ORCHARD RD, CHATSWOOD	NCA6	60	77	17	45		69	9	61	1
4/1 PALMER ST, ARTARMON	NCA6	60	69	9	44		60		51	
2 PALMER ST, ARTARMON	NCA6	60	48		30		43		35	
2/2 PALMER ST, ARTARMON	NCA6	60	50		32		47		38	
12/2 PALMER ST, ARTARMON	NCA6	60	46		28		41		34	
13/2 PALMER ST, ARTARMON	NCA6	60	49		29		42		37	
1/7 PALMER ST, ARTARMON	NCA6	60	63	3	46		59		41	
8/9-11 PALMER ST, ARTARMON	NCA6	60	50		31		44		37	
1 ROBERT ST, ARTARMON	NCA6	60	49		26		40		34	
5/3 ROBERT ST, ARTARMON	NCA6	60	48		27		42		33	
3/5 ROBERT ST, ARTARMON	NCA6	60	58		35		49		42	
6/8 ROBERT ST, ARTARMON	NCA6	60	52		35		47		36	
8/8 ROBERT ST, ARTARMON	NCA6	60	54		32		49		37	
22 ROBERT ST, ARTARMON	NCA6	60	53		35		47		36	
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LAeq Predicted Levels - page 5

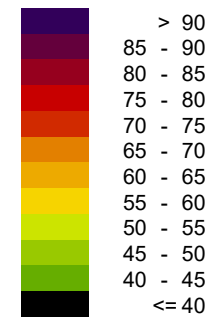
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4/11-13 HELEN ST, LANE COVE NORTH	NCA7	52	61	9	40		50		44	
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3/15-25 HELEN ST, LANE COVE NORTH	NCA7	52	49		30		41		36	
12/19 GOODCHAP RD, CHATSWOOD	NCA8	51	57	6	31		51		38	
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21/11-15 GOODCHAP RD, CHATSWOOD	NCA8	51	55	4	32		47		38	
23/11-15 GOODCHAP RD, CHATSWOOD	NCA8	51	51		31		44		37	
1/7-9 GOODCHAP RD, CHATSWOOD	NCA8	51	64	13	36		58	7	47	
3/7-9 GOODCHAP RD, CHATSWOOD	NCA8	51	53	2	33		45		39	
5/7-9 GOODCHAP RD, CHATSWOOD	NCA8	51	65	14	44		64	13	51	
7-9 GOODCHAP RD, CHATSWOOD	NCA8	51	59	8	37		53	2	44	
7-9 GOODCHAP RD, CHATSWOOD	NCA8	51	64	13	36		62	11	50	
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12/7-9 GOODCHAP RD, CHATSWOOD	NCA8	51	65	14	38		61	10	51	
12/7-9 GOODCHAP RD, CHATSWOOD	NCA8	51	65	14	45		58	7	48	
5/21-23 GOODCHAP RD, CHATSWOOD	NCA8	51	50		29		41		34	
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16 WHITTON RD, CHATSWOOD	NCA8	51	55	4	34		47		40	
12/22 WHITTON RD, CHATSWOOD	NCA8	51	63	12	44		57	6	47	
472 PACIFIC HWY, LANE COVE NORTH	HOT	70	49		29		40		36	
GREAT NORTHERN HOTEL : 522 PACIFIC HWY, CHATSWOOD	HOT	70	79	9	58		78	8	64	
546 PACIFIC HWY, CHATSWOOD	COM	70	83	13	61		81	11	70	
572 PACIFIC HWY, CHATSWOOD	COM	70	76	6	53		73	3	63	
574 PACIFIC HWY, CHATSWOOD	COM	70	81	11	58		79	9	68	
582 PACIFIC HWY, CHATSWOOD	COM	70	77	7	56		76	6	64	
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613 PACIFIC HWY, CHATSWOOD	COM	70	81	11	56		82	12	68	
629 PACIFIC HWY, CHATSWOOD	COM	70	73	3	48		71	1	57	
655 PACIFIC HWY, CHATSWOOD	COM	70	55		34		48		40	
551-559 PACIFIC HWY, ARTARMON	COM	70	66		34		61		46	
516 PACIFIC HWY, LANE COVE NORTH	WOR	65	72	7	54		65		58	
518 PACIFIC HWY, LANE COVE NORTH	WOR	65	73	8	52		71	6	59	
366 MOWBRAY RD, ARTARMON	IND	75	77	2	60		68		63	

Sydney Metro Chatswood Remediation Site

Slab Demolition



Noise levels dB(A)



Signs and symbols

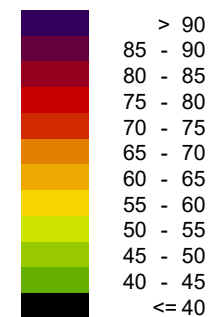
- The Site
- Residential
- Commercial
- Industrial
- Worship
- Hotel
- Active Recreational
- Catchment Area
- Point receiver
- Noise Wall

Sydney Metro Chatswood Remediation Site

UST Removal



Noise levels dB(A)



Signs and symbols

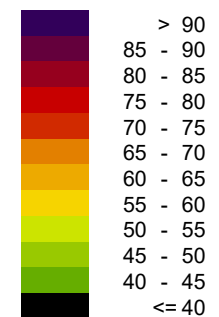
- The Site
- Residential
- Commercial
- Industrial
- Worship
- Hotel
- Active Recreational
- Catchment Area
- Point receiver
- Noise Wall

Sydney Metro Chatswood Remediation Site

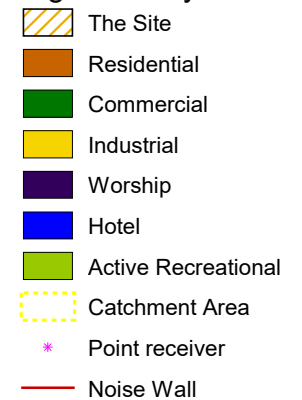
Piling



Noise levels dB(A)



Signs and symbols

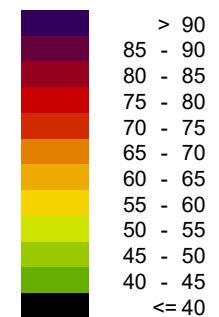


Sydney Metro Chatswood Remediation Site

Excavation



Noise levels dB(A)



Signs and symbols

- The Site
- Residential
- Commercial
- Industrial
- Worship
- Hotel
- Active Recreational
- Catchment Area
- Point receiver
- Noise Wall



Appendix 8: Archaeological Method Statement & Approvals



Sydney Metro City and Southwest Chatswood Site Remediation Works Archaeological Method Statement

Prepared by AMBS Ecology & Heritage
for RMA Group on behalf of Sydney Metro

Draft report

February 2024

AMBS Reference: 24443

Document Information

Citation	AMBS Ecology & Heritage 2024, <i>Sydney Metro City and Southwest Chatswood Site Remediation Works Archaeological Method Statement</i> . Consultancy report to RMA Group on behalf of Sydney Metro.
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Author	James Cole Senior Heritage Consultant Unit 14, 1 Hordern Place Camperdown NSW 2050 (02) 9518 4489 james@ambs.com.au
Reviewer	Lian Ramage Heritage Team Leader Unit 14, 1 Hordern Place Camperdown NSW 2050 (02) 9518 4489 lian@ambs.com.au
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1 Introduction

AMBS Ecology & Heritage (AMBS) has been engaged by RMA Group on behalf of Sydney Metro to complete an Archaeological Method Statement (AMS) for the proposed remediation works at the Sydney Metro Chatswood site. Sydney Metro propose to remediate the site of potential contamination prior to sale following the completion of Metro works at the site. This report has been prepared to provide a methodology for the management of the potential archaeological resource during works in accordance with the conditions of the State Significant Infrastructure approval (SSI-7400) for the project.

1.1 Study area

The Chatswood Metro Site (study area) is located at 569 to 607 Pacific Highway and 339 Mowbray Road in the suburb of Chatswood in the Willoughby Local Government Area (LGA) (Figure 1.1). It is located within the Parish of Willoughby, County of Cumberland. The site is bounded by Nelson Street to the north, the Pacific Highway to the west, Mowbray Road to the south, and by the North Shore railway line to the east.



Figure 1.1 Study area detail.

1.2 Project approvals

The proposed works are being undertaken in accordance with the conditions of approval for the Sydney Metro City & Southwest project (SSI-7400). Conditions relating to archaeology are outlined in Table 1.1, along with a brief description of how they have been addressed by this AMS.

Table 1.1 Response to conditions of approval for SSI-7400.

Number	Condition	Response
E17	<p>The Archaeological Assessment Research Design Report (AARD) in the documents listed in A1 must be implemented. Final Archaeological Method Statements must be prepared in consultation with the Heritage Council of NSW (or its delegate) before commencement of archaeological excavation works. The final methodology must:</p> <ul style="list-style-type: none"> (a) provide for the detailed analysis of any heritage items discovered during the investigations; (b) include detailed site specific archaeological management and artefact management strategies; (c) include cored soil samples for soil and pollen for the Pitt Street site within the Tank Stream Valley; and (d) provide for a sieving strategy. 	<p>This AMS fulfils the requirements of Condition E17 in relation to remediation works at the Chatswood Metro Site. Section 6.2 provides a detailed methodology for the excavation and management of the site, with the exception of Condition E17(c), which is not applicable to the Chatswood Metro Site.</p>
E18	<p>Before excavation of archaeological management sites, the Proponent must nominate a suitably qualified Excavation Director who complies with the Heritage Council of NSW's Criteria for Assessment of Excavation Directors (July 2011) to oversee and advise on matters associated with historic archaeology and advise the Department and OEH.</p> <p>Where archaeological excavation is required, the Excavation Director must be present to oversee excavation and advise on archaeological issues. The Excavation Director must be given the authority to advise on the duration and extent of oversight required as informed by the provisions of the approved AARD and Excavation Methodology.</p> <p>A final archaeological report must be submitted to the Heritage Council of NSW within two (2) years of the completion of archaeological excavation on the project. The report must include information on the entire historical archaeological program relating to the CSSI.</p>	<p>AMBS nominated Excavation Director for the proposed remediation works at the Chatswood Metro Site is Lian Ramage (Heritage Team Leader). Documentation has been provided separately to this AMS demonstrating Lian's compliance with relevant guidelines.</p>
E19	<p>An Unexpected Heritage Finds Procedure must be prepared:</p> <ul style="list-style-type: none"> (a) to manage unexpected heritage finds in accordance with any guidelines and standards prepared by the Heritage Council of NSW or OEH; and (b) by a suitably qualified and experienced heritage specialist. <p>The procedure must be included in the AARD and must be implemented for the life of the project.</p>	<p>Where any archaeological finds are made in areas identified as having low archaeological potential, these will be managed in accordance with the Sydney Metro <i>Unexpected Heritage Finds Procedure SM-20-00099497</i> (Sydney Metro, 2023b) (Appendix B) and <i>Exhumation Management Procedure SM-20-00099495</i> (Sydney Metro, 2023a) (Appendix C) as appropriate.</p>
E20	<p>In the event that a potential relic/s is/are discovered, relevant construction must cease in the affected area and the Excavation Director must be notified and assess the significance level of the find/s and provide mitigation advice according to the significance level and the impact proposed. The Excavation Director must attend the site in accordance with E18 to oversee the excavation where relics of State significance are found.</p> <p>The Secretary must be notified at the same time as the Heritage Council of NSW (or its delegate) of any relic of State significance found.</p> <p>An Archaeological Relic Management Plan specific to the relic of State significance must be prepared in consultation with the Heritage Council of NSW (or its delegate) to outline measures to be implemented to avoid and/or minimise harm to and/or salvage the relic of State significance.</p> <p>Construction in the vicinity of the discovery must not recommence until the requirements of the ARMP have been implemented, in consultation with the Excavation Director. The Proponent must notify the Secretary in writing of the outcome of consultation on the Archaeological Relic Management Plan with the Heritage Council of NSW.</p>	<p>Where any archaeological finds are made in areas identified as having low archaeological potential, these will be managed in accordance with the Sydney Metro <i>Unexpected Heritage Finds Procedure SM-20-00099497</i> (Sydney Metro, 2023b) (Appendix B) and <i>Exhumation Management Procedure SM-20-00099495</i> (Sydney Metro, 2023a) (Appendix C) as appropriate.</p> <p>A standard methodology for the completion of an ARMP is provided in Section 6.3.1.</p>

1.3 Methodology

This report is consistent with the principles and guidelines of the *Burra Charter: The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance 2013* (Burra Charter) (Australia ICOMOS, 2013). The report has been prepared in accordance with current best practice guidelines as identified in the *NSW Heritage Manual* (Heritage Office and DUAP, 1996b) and associated publications including:

- *Archaeological Assessments Guidelines* (Heritage Office and DUAP, 1996a).
- *Assessing heritage significance* (Department of Planning and Environment, 2023).
- *Assessing Significance for Historical Archaeological Sites and 'Relics'* (Heritage Branch, 2009).

1.4 Authorship

This report has been prepared by James Cole, Senior Heritage Consultant. Lian Ramage, Heritage Team Leader and nominated Excavation Director for the project, has provided technical input and reviewed this assessment.

1.5 Limitations

No site inspection of the study area was undertaken as a part of the preparation of this AMS.

1.6 Terms & abbreviations

The definitions of any abbreviations or specific terms used in the body of this report are provided in Table 1.2.

Table 1.2 Terms and abbreviations.

Term / abbreviation	Term
AARD	Archaeological Assessment Research Design
AMBS	AMBS Ecology & Heritage
AMS	Archaeological Method Statement
ARMP	Archaeological Relics Management Plan
Burra Charter	<i>The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance 2013</i>
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
Heritage Act	<i>Heritage Act 1977</i>
Heritage Council	Heritage Council of New South Wales
Heritage NSW	Heritage NSW, Environment and Heritage Group, Department of Planning and Environment
ICOMOS	International Council on Monuments and Sites
LGA	Local Government Area
NSOOS	Northern Suburbs Ocean Outfall Sewer
NSW	New South Wales
SSI	State Significant Infrastructure
UST	Underground Storage Tank

2 Historic context

The information in this section is largely reproduced from the *Sydney Metro, City & Southwest Archaeological Method Statement for Chatswood Dive* completed by AMBS (2017).

2.1 Settlement in Chatswood

The land to the north of the harbour remained isolated to all but water transport with few roads providing access beyond the coastal areas until around the mid-century. In 1847, George Peat, who owned land on both sides of the Hawkesbury River, marked out a road, Peat's Ferry Road, which extended from the river through to Hornsby at Pearce's corner. In 1845, Lane Cove Road had been proclaimed *in connexion with the road from Billy Blue's point to St Leonards* (Deputy Surveyor-General Samuel Augustus Perry cited in Russell, 1970, p. 84). By 1852, the road, which was 66 feet wide, had been identified as a parish road and was seen as the logical extension of the Great Northern Road with the Government taking responsibility for its upkeep (Russell, 1970, pp. 84-87). In 1890, the Lane Cove Road was renamed Gordon Road and in 1931 it became the Pacific Highway.

In 1809, Isaac Nichols, a convict who would later become the first colonial postmaster, was granted a 380-acre lot of land to the south of his original 200-acre grant called King's Plain (Figure 2.1), (Russell, 1970, p. 22). The grant is bounded in the southwest by a 25-acre lot granted to John Flemming. By 1836, the grant had apparently been purchased by C Webb, later passing to John Bryson (Artefact, 2016b, p. 35). Before the 1860s, the land was used mainly for farming and timber-getting (Willoughby City Council, n.d.). The beginnings of a township appear at the intersection of Lane Cove Road and Mowbray Road, where a small commercial centre began to thrive (Futurepast, 2012, p. 9). By 1864, a small chapel was opened by the Bush Mission Society on the south-eastern corner of the intersection on Bryson's land. By the early 1870s, the Great Northern Hotel had been built by Henry Russell, and the Methodist Church along with a number of general stores and John Bryson's timber yard had been established (Artefact, 2016a, p. 24; Warne, 1987, p. 6).

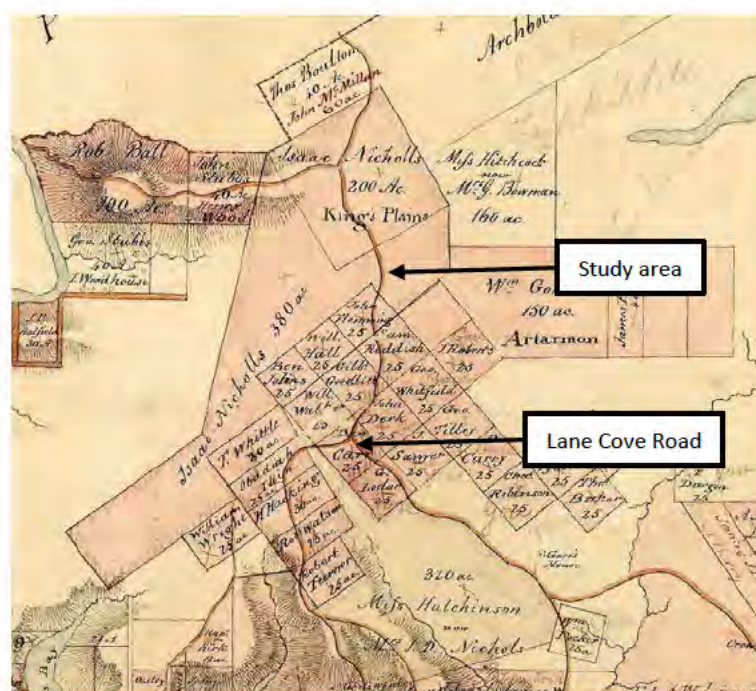


Figure 2.1 Pre-1860s Willoughby parish map, showing Isaac Nichols' 380-acre grant and the approximate location of the study area (Source: NSW Historic Land Records Viewer).

2.2 Development of the new township

The North Shore Line from Hornsby to St Leonards opened in 1890, with the extension to Milson's Point opening in 1893. The new railway station opened on 1 January 1890 on land owned by Richard Hayes Harnett, who had purchased the land from Isaac Nichols (Artefact, 2016a, p. 24). Opening the station to the north of the small township centred on the Lane Cove and Mowbray Roads halted development of the townships. A new township of Chatswood focused around the new station at Victoria Avenue. The suburb of Chatswood has a long association with Harnett, who was one of the largest landowners in Willoughby and surrounding areas. He subdivided his 1,200 acres, known as the Railway Station Estate, naming one of these lots after his second wife Charlotte, affectionately called 'Chat' or 'Chattie' (Thorne, 1983, p. 129).

Improvements in transportation providing a focus for development put increased pressure on the provision of essential services. In 1888, the Upper Nepean Scheme was completed and by 1895 a trunk main connected Potts Hill with a balance reservoir near Ryde Railway Station and on to the water tanks on the south side of Mowbray Road, at Chatswood. Water from the Chatswood tanks supplied the areas south of Mowbray Road: Willoughby, North Sydney and Mosman (Aird, 1961, pp. 67-78). It was not until the opening of the railway and the increase in population that there was pressure to supply the areas to the north of Mowbray Road from Chatswood to Hornsby with water. A pumping station was erected in 1895 at the Chatswood reservoir to facilitate reticulation to the north of Mowbray Road, and in 1897 another pump was added (Aird 1961:68). Waste disposal, however, was not provided until later. In 1899 the Willoughby–Chatswood System had been built servicing the areas north of Mowbray Road and east of Lane Cove Road, now Gordon Road, draining into the mains sewerage system. Following completion of the Northern Suburbs Ocean Outfall Sewer (NSOOS; 1916-1933) in 1927, the system was abandoned and the area was served by the NSOOS (Aird, 1961, p. 159). Gas lighting was introduced to the area in 1896, and in 1908 the tramway was extended from Penshurst Street to the railway station.

By the 1920s, the Chatswood district had become a flourishing residential and business hub, easily accessible by public transport (Warne, 1987, p. 70). The area around the Mowbray Road intersection with the Pacific Highway had developed more slowly but was now busy with shops along Lane Cove Road and the Mowbray House School on the north side of Mowbray Road (Figure 2.2). With the opening of the Sydney Harbour Bridge in 1932, the North Shore of Sydney underwent a rapid, albeit short-lived, period of expansion, curtailed by the 1930s Depression followed by World War II (Services, 2013, p. 2).

By 1939 the Chatswood town centre had a thriving population with the construction of cottages, shops, three cinemas, libraries, blacksmiths, and even a café (Warne, 1987, pp. 37, 70). In 1959 the focus was on the eastern side of the railway, away from the original retail centre at the western end of Victoria Avenue. The opening of Waltons and Grace Bros (now Myer) was crucial to changing the direction of the urban centre. Throughout the late 1980s-early 1990s new shopping centres defined the mercantile development of the area, particularly when part of Victoria Avenue was closed for the Chatswood Mall in 1989. With the increase in the population across the overall municipality, Chatswood became a town centre in 1983, with Willoughby declared a city in 1989.



Figure 2.2 Sharland Estate 1925, showing shops along the Pacific Highway and Mowbray School within the study area (Source: State Library of NSW FL10454608).

2.3 Bryson Estate

The earliest uses of the land bounded by the railway, Pacific Highway, Nelson Street and Mowbray Road; the study area, had been agricultural, dominated by orchards and farming (Figure 2.3). The land remained undeveloped until the mid-nineteenth century when John Bryson purchased the land and constructed a number of buildings. Part of the study area was therefore known as Bryson’s Estate, while the area along Nelson Street was part of the Great Northern Estate.



Figure 2.3 Undated plan of Orangeries and Strawberry Gardens, Chatswood (Source: Picture Willoughby, File No: 0010/0010884).

2.3.1 Lane Cove Road from Mowbray Road to Bryson Street

In the 1860s John Bryson bought land encompassing the north-eastern corner block of the Lane Cove Road / Mowbray Road intersection, on which he built his home, and managed a timber yard and store (Figure 2.4). In 1865, council meetings were first held in a room in John Bryson's home, 'Belrose' or 'Bryson' (Fogarty, 2016). A small school was also set up in a cottage on Mrs Bryson's land and operated by Mrs McGilvray, before the establishment in 1869 of the North Sydney Public School (Fogarty, 2016). A room of Bryson's cottage was also used by the first School of Arts in the early 1870s, until the later construction of a permanent home for the School.

The land seems to have remained largely undeveloped until 1882, when the Bryson Estate was subdivided into relatively small Lots for auction. The auction poster shows John Bryson's cottage, as well as a number of land plots to its east, which have been sold (Figure 2.5). Bryson's home appears to be the only structure indicated and all the lots along Mowbray Road had been sold, while the School of Arts and the eastern part of the site are not shown to the east of Lot 13. The sale of the land in 1882, followed Bryson's death. His widow, Mrs Mary A Bryson, however, continued to own and live in the house until her death in 1897, when the land is recorded as being sold in the Rate and Valuation books for Willoughby. Mrs Bryson is also recorded as the owner of more land and a shop next to the cottage, which was also sold after her death in 1897, while the land remained part of an orchard until 1889. The shop was larger than the house and was of weatherboard with a small front verandah and a covered way to the brick kitchen with a small attached structure and a convenient nearby well. The double cesspit was shared with Bryson's cottage. Following Mrs Bryson's death in 1897, the Bryson property was subdivided and sold.

The 1899 Sydney Water plan identifies Bryson's house as 'Sarina', with another house immediately to its east (Figure 2.6). Sarina is a brick building with front and rear verandahs, and a verandah or covered way to a smaller brick building with verandahs along its southern and western sides. It is likely that the smaller building is the kitchen, built separately to protect the main house from fire. That it is the kitchen is also indicated by the well, which is conveniently close. A double cesspit, perhaps housed in a brick structure, is shared with the house immediately adjacent. The appearance of the name Sarina is consistent with the sale of the land and house following Mrs Bryson's death in 1897 (Fogarty, 2016). The shop next to Sarina was acquired from Mrs Bryson by a Jos. A Hammond in 1897 and Abner Hammond owned the shop from the following year onwards.

The Rate and Valuation books record a number of owners and occupants of the Bryson's cottage/land: James Forsyth (1897-1898), Thomas Pugh (1899-1903), Miss Elizabeth Springett (1903 to 1918), and Elizabeth Mary Dew (from 1918). The Assessments and the Sands Directory records Whitehead & Co.'s smithy between 1905 and 1908. William Dew, a carter, is in occupancy from 1911 and in 1914, the name for the house becomes 'Dursley' until 1922 (Sands Directory 1922), though William Dew continues to occupy the property after this date. It is evident in the Sydney Water Blackwattle plan that Bryson's original cottage, but not the shop, was redeveloped with a terrace row of three standing on the site; however, the date of the construction of the terrace row is uncertain (Figure 2.7).

In 1911, Abner Hammond acquired the adjacent property to his shop and a timber cottage known as 'Kia Ora' was constructed, which he owned until at least 1933 when the Sands Directory ends. HM Reid occupied the shop for his grocery business in 1904, with Reid also owning two vacant properties further to the north from 1912, and it is possible that he relocated his business to one of these buildings, where it continues until at least 1949 (Figure 2.8 and Figure 2.9). The photograph indicates that the shop had been renovated in the Federation Arts and Crafts style in the early twentieth century (Apperley, Irving and Reynolds, 1994, pp. 144-147).

The land along Gordon Road to Bryson Street remained undeveloped, other than the properties noted above, until the early 1910s. These undeveloped properties largely become shop fronts lining Lane Cove Road (Figure 2.2), with the occasional house or dwelling combined with the shops.



Figure 2.4 'Belrose' cottage, home of the Bryson family, ca. 1870s (Source: Picture Willoughby, File No: 003/003989).



Figure 2.5 Auction notice for Bryson's Estate Saturday, 14th October 1882, with Bryson's cottage on the south-west corner of the estate (arrowed) (Source: Picture Willoughby, File No: 0010\0010187).

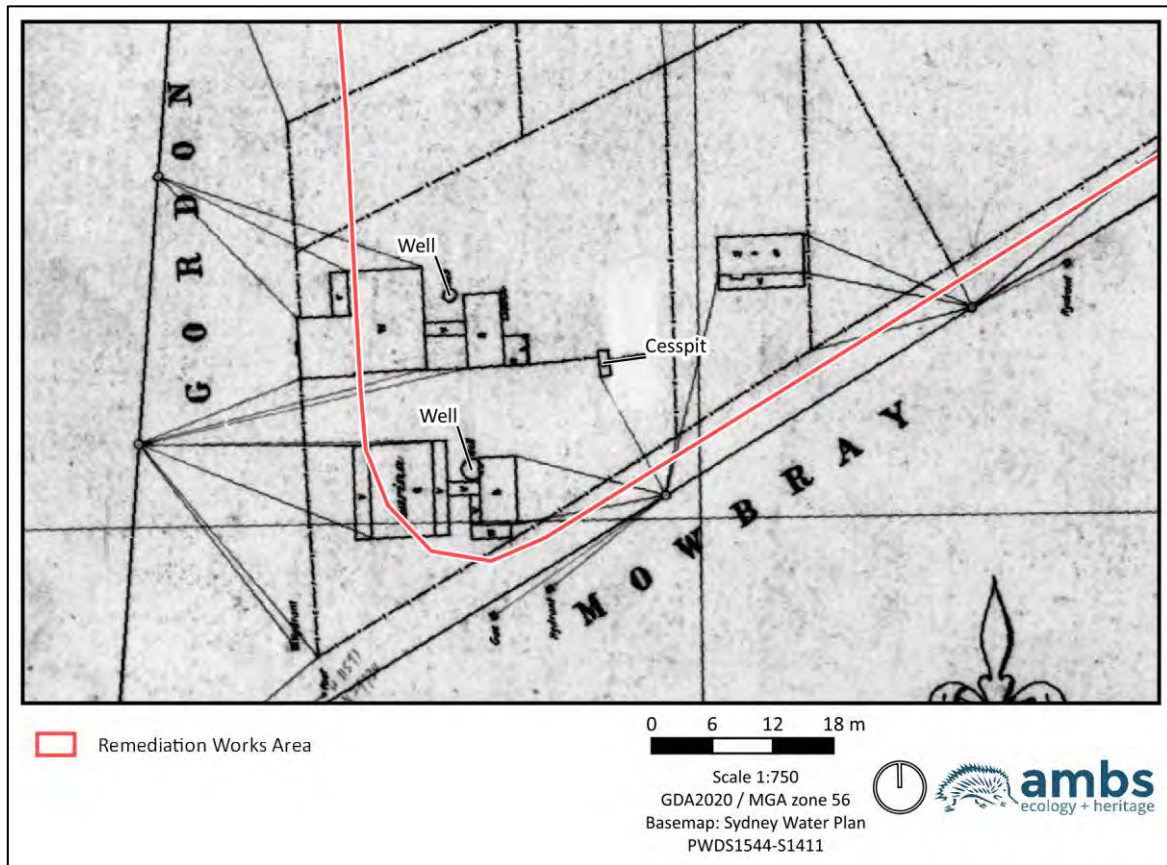


Figure 2.6 Detail from the 1899 Sydney Water plan showing Bryson's cottage, Sarina on the corner of Gordon Road and Mowbray Road, with the shop immediately adjacent.



Figure 2.7 Detail from the 1917-1930 Sydney Water plan showing terraces on the site of Bryson's cottage.



Figure 2.8 Reid's Stores, Chatswood in 1949 (Source: State Library of NSW FL2044904).



Figure 2.9 Shops along Pacific Highway, between Bryson Street and Mowbray Road, showing Reid's store in foreground, 1949 (Source: State Library of NSW FL2048208).

2.3.2 South side of Bryson Street

Bryson Street is more heavily occupied into the early twentieth century than other areas within the study area. The Rate and Valuation books record that a fence defined the property boundaries (Appendix A).

The property on the southeast corner of Gordon Road and Bryson Street had a similar history as the amalgamated land owned by the Dawsons and later D. Neely on Gordon Road (Section 2.3.1). However, this land is not subdivided like the corner block and the ownership passed to Joseph Hammond Senior in 1912, with a brick cottage, named 'Dulcie', appearing in the records from 1915.

The four lots to the east of Dulcie remain undeveloped until 1901. According to the Rate and Valuation books, the first property to the east of the Dawson property on the corner was first owned by F.J. Barker (1888-1896). From 1897 the property is owned by the City Bank of Sydney, until 1914 when Lancelot Bavin acquires the property for his school. In 1901 the property was subdivided and bought by R. Vince with a house or wood cottage and laundry built on the new land. Neely also owned the property for a short time, before becoming part of the Estate of H. Hensby until 1918, when it was also purchased by Bavin for the school.

In 1888, J Hawksford is recorded as the owner of the next lot to the east until 1900 when it is purchased by Robert Symes (or Lymes). This property too passes to Bavin in 1914. Mrs Bryson was in possession of some land along Bryson Street as well until her death in 1897, when Abner Hammond acquired the estate. Hammond sold the property to T Gorman in 1903, who later sold the property to Bavin in 1908.

The easternmost property was owned by H Kirby and sold to Loxton & Bullock in 1889 or 1890. The ownership of the land becomes uncertain until 1899 when it is acquired by the Bank of New Zealand, followed by the Willoughby Council in 1900. The land disappears from the records after 1901, suggesting that the land was amalgamated with the Council Chambers property owned by Willoughby Council on Mowbray Road, though it could also have become part of the school as much of the surrounding area had already.

2.4 The Great Northern Estate (part of)

2.4.1 Lane Cove Road from Bryson Street to Nelson Street

The north-western corner of the study area was within the Great Northern Estate, while the remainder of the property was within Bryson's Estate until the land was acquired by Lancelot Bavin

for the Mowbray House School (Figure 2.10, Section 2.5). The records indicate that the Great Northern Estate extends to the north and south on the northern side of Nelson Street.

John Thompson is recorded as owning land on the north-eastern corner of Bryson Street and Gordon Road in 1886, and by 1888 the property comprises a house, shop and land. Thompson acquired more land which he amalgamated with this other property and retained until 1892 when he sold the property to Mrs Hammond. Mrs Hammond is also identified as owning land with a dwelling from 1893. In 1900, the two properties comprising a house and shop were merged, but in 1904, the properties were separated but remained in Mrs Hammond's possession until 1905-6 when Joseph T Hammond owns the property. The property is subdivided again in 1910, when there are two timber shops, one housing a refreshment shop run by Mrs Clune and the other a hairdresser operated by C Currie. The ownership eventually falls to Mrs Hammond Senior.

The Dolan family owned a timber cottage and blacksmith's shop at what is now 593 Pacific Highway from the 1880s. Peter Dolan, a blacksmith, is recorded in the Sands Directory as living on Lane Cove Road from 1883, but it isn't until 1888 that the shop is recorded in the Rate and Valuation books. The Sands Directory also records Patrick Dolan & Sons Veterinary Surgeons in 1881 as a hospital for pets, including dogs and cats, as well as boarding facilities for dogs and horses. The surgery continues into the 1930s at No. 593, perhaps until the death of Patrick Dolan in 1938 (The Sydney Morning Herald 1938:9). In 1898, when the land was subdivided, Patrick Dolan owned a house on part of the land, subsequently acquiring the adjacent house and shop. The house on the newly subdivided property was occupied by J Gillam, perhaps the eponym of Gillam Street, from 1900 to 1903 but remained in the hands of Patrick Dolan throughout the records.

Two allotments to the north of the Dolan family property were owned by Loxton & Bullock, one of which was vacant while the other was occupied by a house and shop leased by DE Eldridge ca.1888–1893 and an adjacent vacant allotment. The land is recorded as being on Nelson Street from 1894. The house and shop remain the property of Loxton and Bullock until 1902, when it is purchased by Joseph Hammond Senior. In 1904, George Hammond is the owner of the property, which remained vacant throughout this time.

2.4.2 North side of Bryson Street

From 1888 the records indicate that a number of Lots along the north side of Bryson Street were privately owned, with one lot also owned by Mrs Bryson; however, the land remained undeveloped other than by an unfinished house owned by John Thompson. Although the house is not recorded in 1889, John Thompson's house is recorded in 1891, remaining in his ownership until the following year when it passes to Mrs Hammond in 1892 and to Joseph Hammond Senior in 1897.

In 1907 the property is subdivided into two blocks with a further subdivision in 1908 when there are three separate properties. The Thompson's brick cottage was known as 'Manila' when Mrs Hammond acquired it. Two semi-detached brick cottages, 'Lakefield' and 'Loubet', were built to the east of Manila, both passing from Joseph Hammond to Mrs J Hammond Senior in 1911. By 1918, when the Rate and Valuation records end, Mrs Hammond owned all the property on the north side of Bryson Street. The Sands records that two more houses appeared after 1918, 'Dorisville' and 'Weeroona'.

2.4.3 Nelson Street South

The south side of Nelson Street, known as Carlotta Street until 1891, is occupied from 1888. The properties from west to east:

- DE Eldridge and his wife owned land on the corner of Nelson Street and Lane Cove Road from 1888, with a new house by 1894. The Sands Directory records that they remained at the property until 1920. It is possible that the Eldridges were in the area as early as 1880, as the Rate and Valuation books locate them on Lane Cove Road from this date, perhaps already at the corner property.
- In 1892/3, G Gerard became the executor of land owned by Sutherland, which in 1902, was owned by LH Gerard, until Joseph Dangerfield Taylor purchased the property in approximately 1908. R Moore acquired the property in 1913, and by 1915 a single brick cottage had been built on the land and occupied by Cummins and Dudfield. In 1917 the property was again subdivided with separate houses on each lot with Cummins and Dudfield each occupying a house.
- JJ Forsyth appeared as an executor for the Seldons Estate, with an NF Giblin acquiring part of the property in 1897. It is possible the land was further subdivided in 1902, with James Green and NF Giblin owning land that had formerly been a single large block. This land appears to be part of Lancelot Bavin's extensive property purchases for his school in 1907.
- A large portion of land along this road was acquired by Lancelot Bavin to become part of the Mowbray House School grounds from 1917 (Section 2.5).
- A portion of the same property appears to be on the east side of the North Shore Line before Orchard Street and occupied by a Joseph Woodvine from 1896/7 until 1920. Woodvine built a cottage, later referred to as Moorlands. The land appears to be a part of the Seldons Estate.



Figure 2.10 The 1917-1930 Blackwattle Plan with the area of the Great Northern Estate outlined.



Figure 2.11 Detail from Figure 2.10 of the Great Northern Estate.

2.5 Mowbray Road & the Mowbray House School

2.5.1 School of Arts and Council Chambers

During the 1870s, Bryson leased a room in his cottage to be used by the School of Arts; however, the Mechanics Institute constructed a new School of Arts building to the east of the cottage, which opened in 1874 or 1875 (Futurepast, 2012, p. 10). The School of Arts building was of stone and was later rented to the Willoughby Council as its Council Chambers from 1879 until 1903 (Futurepast, 2012, p. 10).

By 1906, Lancelot Bavin, a New Zealand-born educator, founded the Chatswood Preparatory School in the former School of Arts building, which he leased and within a year had purchased the land (Futurepast, 2012, p. 10). Following construction of Mowbray House, the former School of Arts building served as the school chapel until 1957 (Figure 2.12 and Figure 2.13). The Victorian Gothic school chapel was dismantled, moved and re-erected on the corner of Beaconsfield Road and Dalrymple Avenue, becoming the Mowbray House Memorial Chapel, and now known as the Holy Trinity Anglican Church, Chatswood West (Figure 2.14) (Futurepast, 2012, p. 10).



Figure 2.12 Chatswood Preparatory School, ca.1910. Later it would become the school chapel (Source: Picture Willoughby, File No: 003/003316).



Figure 2.13 Mowbray House School Chapel, 1950s, before it was moved to Beaconsfield Road (Source: Picture Willoughby, File No: 003/003320).



Figure 2.14 Holy Trinity Anglican Church, Chatswood West, 2003 (Source: Picture Willoughby, File No: 001/001101).

2.5.2 Mowbray House

Mowbray House is a two-storey Federation Arts and Crafts school building constructed in 1906 to house the Chatswood Preparatory School, with an initial enrolment of 32 students (Futurepast, 2012, p. 10). As the school grew and expanded, the name of the building was changed to The School in 1914 (Figure 2.15). Changes in the standard of schooling offered followed the school's promotion to Intermediate Certificate, becoming in 1916 the Mowbray House School. By 1917 the number of boarders at the school had increased exponentially and this required the school to expand its facilities by purchasing several surrounding Lots (Figure 2.16). Modifications were made to the Mowbray House building with the addition of a dining / recreation hall to the rear, and improvements were made to the eastern façade and kitchen (Futurepast, 2012, p. 10). A tennis court was located to the west, and a large field to the rear of the property, which encompassed the greater part of the area to the rear of Nelson Street, bounded to the west by Bryson Street and east by the railway line (Figure 2.17). One of the most prominent alumni of the school was former Prime Minister Gough Whitlam. The school remained open until 1954 when Lancelot Bavin, the school's founder, fell ill and the property was acquired by the Sydney County Council (Figure 2.18) (Futurepast, 2012, p. 10).



Figure 2.15 Main entry to the Mowbray House School building, n.d. (Source: Picture Willoughby, File No: 6536/6536552).



Figure 2.16 Playing fields behind Mowbray House School, c.1900-10 (Source: Picture Willoughby, File No: 6537/6537997).



Figure 2.17 Undated photograph of the tennis courts on west side of Mowbray House School (Source: Picture Willoughby, File No: 6537/6537992).



Figure 2.18 1950s view of Mowbray House School after purchase by Sydney County Council (Source: Picture Willoughby, File No: 003/003321).

2.5.3 'Penzance'

Although the building later called 'Penzance' is first mentioned in the Sands Directory in 1903 and in the Rate and Valuation books in 1907 (Appendix A), a building is present prior to this date. John Alford is identified as owning a house and land which was later known as Penzance, which is built by 1887. There is a change of ownership in 1890 and by 1891 the National Mutual Life Association of Australia owns the property, until 1900. The 1899 Sydney Water plan shows the property 'Penzance' between the Council Chambers and the Main North Shore Line, although little is known about it at this time. The house is identified as brick with bay window and verandah along the front and east side (Figure 2.19 and Figure 2.20). There is a large irregular verandah at the back, separating a north-eastern wing from a small room to the south, which may be the kitchen. There is a rectangular brick building in the north-eastern corner and two clearly identified wells.

In 1900, the property was owned by George Devonshire and in the following year it is acquired by RH Johnson and occupied by Charles Stanley Allen until it is amalgamated as part of Lancelot Bavin's school in 1911, when it serves as Bavin's mother's residence (Fogarty, 2016). When the school becomes the Mowbray House School, the house is modified to a residence for the expanding number of boarders (Artefact, 2016b). The existence of the building once merged with the school grounds is unknown but it was likely demolished to make way for the electricity depot.

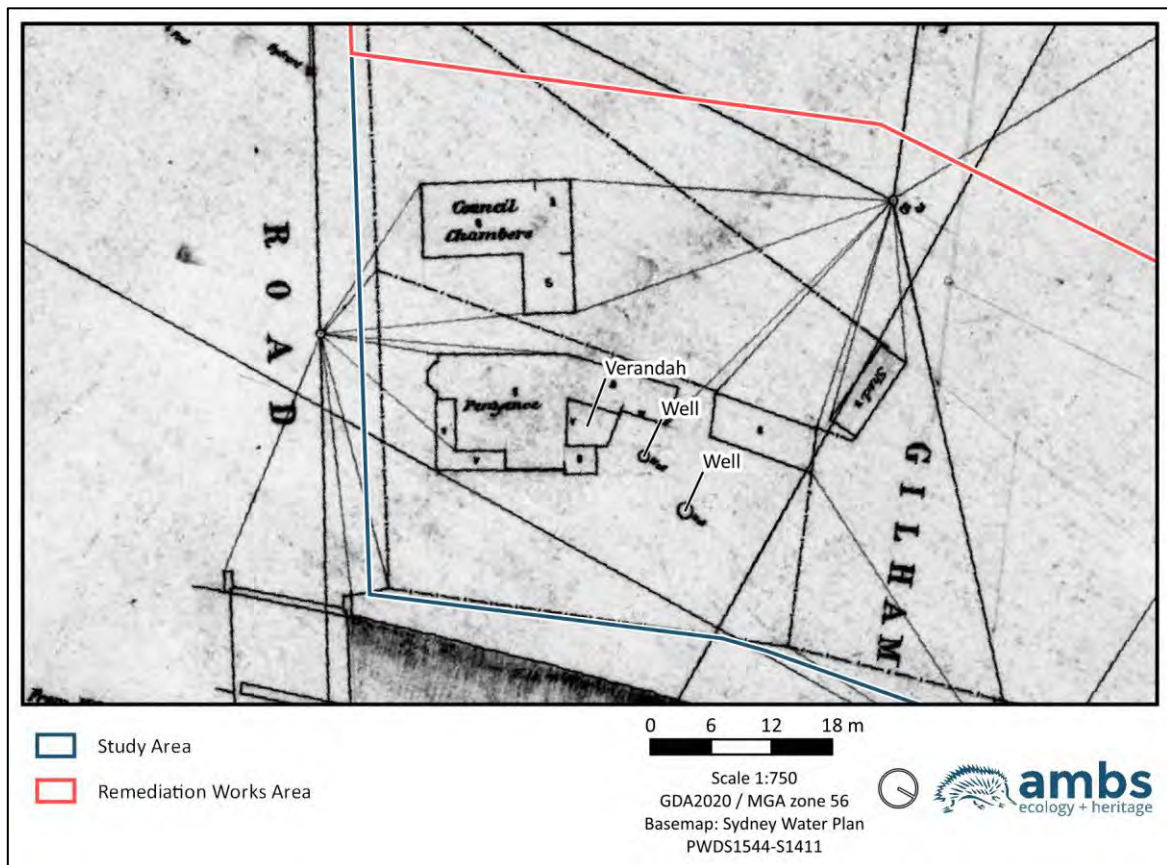


Figure 2.19 Detail from the 1899 Sydney Water plan showing Penzance to the south of the Council Chambers. The irregular verandah and wells are indicated.



Figure 2.20 Undated photograph of 'Penzance' (Source: Picture Willoughby, File No: 6536/6536528).

2.5.4 'The Lodge'

A building occupied by Lancelot Bavin from 1925 and known as the 'The Lodge' is clearly a part of the extensive school grounds; however, its location is uncertain. It may have been the cottage named 'Penzance'. An undated Sydney Water plan shows an increase in the building density on the site since 1899 (Figure 2.21). The Lodge may be any of the more recently constructed buildings indicated on a pre-1916 plan of the Mowbray House School. This shows Penzance and the Chamber of Commerce and a smaller building behind the tennis courts identified as 'Cottage' and two

buildings to its west. One may be identified as Master's Cottage and the other as a residence, though this is by no means certain as the image resolution is poor (Futurepast, 2012, p. 13). The form and location of 'The Lodge' is uncertain and the name does not appear in the Rate and Valuation books; however, a photograph of a weatherboard cottage, identified as the Master's Residence, may be the Lodge (Figure 2.22). Although only a view of the verandah, it displays hallmarks of the Federation-era bungalow of the late nineteenth / early twentieth century with timber decorative detailing of the verandah posts (Apperley, Irving and Reynolds, 1994, pp. 144-147).

2.5.5 'Tasma'

To the east of Bryson's cottage stood a wood and brick cottage named 'Tasma', owned by Richard Russell, whose occupancy is first noted in the Rate and Valuation books in 1898 (Appendix A). It is possible that the cottage pre-dates this time, as its assessment number notes a previous number for the year before. Russell owned and occupied the house until 1906, after which the occupant's name frequently changed. Most notable was H Neilson, a coal lamper, who occupies the cottage between 1908 and 1913. In 1914 ownership transfers to John Russell, and a Miss Parker becomes the main tenant of Tasma. The Sands Directory identifies Robert Parker as the occupant from 1915 until 1920, after which it is occupied by Peter White. The name Tasma disappears from the Sands Directory after 1922, though Peter White remains at 355 Mowbray Road until 1927. From 1927, Harry Fullagar is noted as the occupant until the end of the Sands Directory in 1932/33.

The record is ambiguous and the cottage is likely to have been subsumed into the school in 1917 when Lancelot Bavin expanded the school grounds by purchasing the land east of Bryson's property.

Two lots located close to the house identified as 'Tasma' between the Council Chambers and Bryson's Cottage, to the east of Bryson's cottage on the corner of Mowbray Road and Pacific Highway, were owned by a Mrs Mary Johnson and a Mrs Emma McMahon (nee Kelsey), until their amalgamation by Lancelot Bavin into the school. This was potentially the land where 'The Lodge' was located, as it seems to fit with the history of the site.

2.6 Sydney County Council

Following closure of the Mowbray House School, the property was purchased in 1957 by the Sydney County Council. The site became an administration centre and electricity depot for the Sydney County Council, which gradually extended its property by acquiring surrounding properties (Futurepast, 2012, p. 10). The acquisition of properties included the Bryson's cottage site and shops and businesses, including Nick Scali along the Pacific Highway. Mowbray House was also modified with the addition of a first floor to the dining hall and a carport. In 1965 and 1977, the property and house were altered again in major renovation projects by the Sydney County Council (Futurepast, 2012, p. 10) (Figure 2.23).

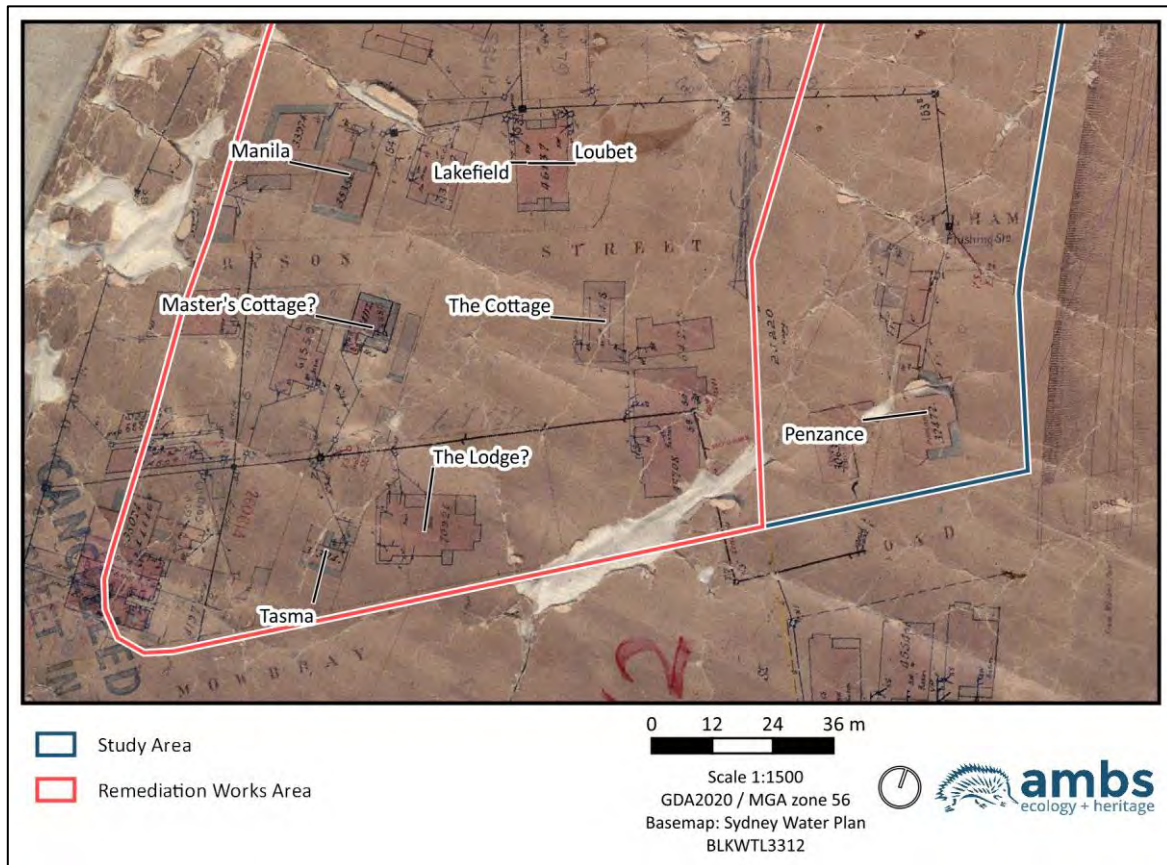


Figure 2.21 Detail from Sydney Water Blackwattle Series plan dated 1917-1935 of the study area with a greater density of housing than indicated in the 1899 plan.



Figure 2.22 Early building re-used for dormitories identified as the 'Masters cottage' by Picture Willoughby, date unknown (Source: Picture Willoughby, File No: 6536/6536532).



Figure 2.23 1986 view of Mowbray House now owned by Sydney County Council (Source: Picture Willoughby, File No: 6539\6539215).

3 Archaeological assessment

The archaeological resources of any site are finite but have the potential to provide insights into everyday life that are not available from any other resource. Archaeological resources may provide evidence that will enhance the historical record and, as such, make a contribution to an understanding of the history and settlement of a local region. In view of the substantial costs involved in archaeological excavation of a site, a clear justification for any assessment of archaeological potential needs to include the following considerations:

- What is the likely integrity of the archaeological resource? Is it likely that largely intact physical evidence would be exposed during excavations such as structural features, artefacts from underfloor deposits, rubbish- or cesspits, wells, or other features with an ability to contribute meaningfully to an understanding of the development of the site as part of the wider development of the study area?
- What is the research potential of the archaeological resource? Is it likely that the results of the excavation make a significant or important contribution to an understanding of wider research issues regarding the early settlement and development of the study area?

3.1 Previous archaeological investigations

The Chatswood site has been subject to a number of previous archaeological assessments and investigations as a part of the Sydney Metro City & Southwest project as outlined below.

3.1.1 Sydney Metro City & Southwest Chatswood to Sydenham, Historical Archaeological Assessment & Research Design (Artefact, 2016a)

The analysis of the archaeological potential within the footprint of the Chatswood Metro Site included in the Archaeological Assessment and Research Design (AARD) prepared by Artefact Heritage for the Sydney Metro City & Southwest Environmental Impact Statement (EIS) included historical research, which focused on the early use of the site for farming by William Nichol and C Webb and the later occupation of the site by Bryson, the cottages along Mowbray, Lane Cove Road and Bryson Street, and the construction of the railway.

The AARD noted that no archaeological excavations had been undertaken on sites within the local area. It was noted, however, that Wendy Thorp prepared a heritage study for the Sydney Electricity Headquarters in 1996. The study provides a brief archaeological assessment of the site, stating that although it is likely that archaeological remains would be located at the site, their significance may not meet the threshold of local significance. Thorp proposed that *'due to the continuity of use of the adjacent Mowbray House as a school, archaeological remains from the School of Arts are not likely to add significant information'* (Artefact, 2016a, p. 44).

The archaeological potential of the Chatswood Metro Site is summarised in the AARD (Table 3.1 and Figure 3.1).

Table 3.1 Summary of archaeological potential (Artefact, 2016a, pp. 50-51).

Site code	Phase	Likely archaeological remains	Potential
NC 1	1 (1788 – 1860)	Archaeological deposits associated with William Nicholl's and Webb's early farming land grants could include fence postholes, tree boles, field drains and isolated artefact deposits.	Nil – Low
	2 (1860 – 1905)	Construction of North Shore Railway Line throughout the majority of the land parcel. Excavation of rail corridor for grade changes through study area. Potential archaeological remains of former rail infrastructure.	Low
	3 (1905 – 1960)	Duplication and electrification of railway line. Potential archaeological remains of former rail infrastructure.	Low

Site code	Phase	Likely archaeological remains	Potential
NC 2	1 (1788 – 1860)	Archaeological deposits associated with William Nicholl’s and Webb’s early farming land grants could include fence postholes, tree boles, field drains and isolated artefact deposits.	Nil – Low
	2 (1860 – 1905)	Construction of North Shore Railway Line throughout the majority of the land parcel. Excavation of rail corridor for grade changes through study area. Potential archaeological remains of former rail infrastructure.	Low
	3 (1905 – 1960)	Duplication and electrification of railway line. Potential archaeological remains of former rail infrastructure.	Low
NC 3	1 (1788 – 1860)	Archaeological deposits associated with William Nicholl’s and Webb’s early farming land grants could include fence postholes, tree boles, field drains and isolated artefact deposits.	Nil – Low
	2 (1860 – 1905)	Archaeological remains associated with the brick cottage and shed, and wooden cottage and shed on the corner of Gordon Road and Nelson Street. Brick and stone footings, chimney base, timber base plates, postholes, yard and path surfaces, cesspits and wells, artefact bearing deposits and outbuildings. Archaeological remains associated with the complex of buildings at the corner of Bryson Street and Gordon Roads, and the brick cottage facing Bryson Street. Brick and stone footings, chimney base, timber base plates, postholes, yard and path surfaces, cesspits and wells, artefact bearing deposits and outbuildings.	Moderate
	3 (1905 – 1960)	Potential archaeological remains relating to former 20th century bakery on site: brick and concrete footings, ash and fire waste fills, isolated artefact deposits. Potential archaeological remains relating to Hammond cottages and Federation and Inter-War residential houses, with timber postholes, brick and concrete footings, terra cotta and copper pipes and drains, outbuildings and isolated artefact deposits.	Low – Moderate
	4 (1960 – Present)	Remains of post-war commercial buildings: brick and concrete footings, terra cotta services and drains, isolated artefact deposits.	Moderate – High
NC 4	1 (1788 – 1860)	Archaeological deposits associated with William Nicholl’s and Webb’s early farming land grants could deposits (sic) fence postholes, tree boles, field drains and isolated artefact deposits.	Nil – Low
	2 (1860 – 1905)	Archaeological potential for structures related to former timber yard: postholes, isolated artefact deposits.	Low
	3 (1905 – 1960)	Potential for archaeological deposits associated with use of land as cricket pitch and sports ground for Chatswood Preparatory School: isolated artefact scatters, field drains, postholes.	Nil – Low
NC 5	1 (1788 – 1860)	Archaeological deposits associated with William Nicholl’s and Webb’s early farming land grants could include fence postholes, tree boles, field drains and isolated artefact deposits.	Nil – Low
	2 (1860 – 1905)	Archaeological remains relating to c1860s Bryson’s cottage, Bryson’s store and commercial livery stables. By late 19th century another house and outbuildings to the north. Brick and stone footings, chimney base, timber base plates, postholes, yard and path surfaces, cesspits and wells, artefact bearing deposits.	Moderate
	3 (1905 – 1960)	Potential archaeological remains relating to Federation and Inter- War residential / commercial buildings, with brick and concrete footings, terra cotta and copper pipes and drains, outbuildings and isolated artefact scatters.	Moderate
NC 6	1 (1788 – 1860)	Archaeological deposits associated with William Nicholl’s and Webb’s early farming land grants could include fence postholes, tree boles, field drains and isolated artefact deposits.	Nil - Low
	2 (1860 – 1905)	School of Arts (also Council Chambers) building present on this site 1874-1957. Archaeological remains could include: brick and stone footings, yard surfaces, cesspits and well, artefact bearing deposits. Archaeological remains associated with two cottage sites (including Penzance to the east of the School of Arts building) including brick and stone footings, chimney base, timber base plates, postholes, yard and path surfaces, cesspits and wells, artefact bearing deposits.	Low – Moderate

Site code	Phase	Likely archaeological remains	Potential
	3 (1905 – 1960)	Potential archaeological remains relating to school buildings associated with the Chatswood Preparatory School (former School of Arts building and Penzance cottage complex). Potential for brick and concrete footings, services and drains, outbuildings and artefact scatters.	Moderate

The AARD assessed the heritage significance of the potential archaeological remains within the six identified archaeological areas (NC1 – NC6) of the Chatswood Metro Site (Table 3.2). The Statement of Archaeological Significance contained in the AARD was:

The majority of the Chatswood Dive Site is unlikely to contain significant archaeological remains. However, Sites NC 3, NC 5 and NC 6 have potential for locally significant archaeology (Table 2-3 [Table 3.2]).

A complex of outbuildings, including a shop and cottage, were constructed on the corner of Bryson Street and Gordon Road in the late nineteenth-century (NC 3). Archaeological remains would be associated with the development and increasing commercialisation of Chatswood, at a time when the area was dominated by small-scale agricultural development. The archaeological remains have the potential to inform knowledge of the daily domestic and working life of residents and employees, and provide insight into commercial trade in a semi-rural outpost. The archaeological remains would be representative of a pattern of rural to suburban development.

Bryson's Cottage (NC 5) was built in the mid nineteenth-century at a time when the surrounding area was relatively undeveloped. The archaeological remains are associated with the development of Chatswood from a rural to suburban area of Sydney. The remains could provide evidence concerning John Bryson, a local pioneer and influential early Chatswood resident. Investigation of the site would inform knowledge regarding daily life and trade in a semi-rural outpost and how this changed with the arrival of the railway. The potential remains could also contribute to knowledge about construction techniques and availability of resources. The archaeological remains would be representative of a pattern of suburban development in the area.

Archaeological resources related to the School of Arts site (NC 6) are associated with the development and provision of education in Chatswood. The remains are also associated with the first local government council in the area as the former School of Arts building served as a chambers in the late nineteenth to early twentieth century. They have the potential to provide information about the original construction of the building and the use and adaptation of the structure for Willoughby Council's first council chamber, and then the preparatory school (Artefact, 2016a, pp. 56-57).

Table 3.2 Summary of archaeological significance (Artefact, 2016a, p. 57).

Site code	Phase	Potential	Archaeological resource	Significance
NC 3	2 (1860 – 1905)	Moderate	Archaeological remains relating to the store, outbuildings and cottages. Including brick and stone footings, timber base plates and postholes, cess pits and wells, path and yard surfaces, artefact bearing deposits.	Local
NC 5	2 (1860 – 1905)	Moderate	Archaeological remains relating to Bryson's cottage, Bryson's store and commercial livery stables, and another late nineteenth-century residential/commercial development. Brick and stone footings, timber base plates and postholes, cess pits and wells, path and yard surfaces, artefact bearing deposits.	Local

Site code	Phase	Potential	Archaeological resource	Significance
NC 6	2 (1860 – 1905) 3 (1905 – 1960)	Low - Moderate	Archaeological remains associated with the former School of Arts site, sub-surface features such as brick or stone footings, wells, cesspits containing artefacts. Likely truncated.	Local

The AARD identified that there was generally low-moderate archaeological potential within the station footprint, as tabulated in Table 3.3.

Table 3.3 Summary of archaeological impact mitigation for the Chatswood Metro Site (Artefact, 2016a, p. 61).

Site code	Potential archaeology	Mitigation
NC 3	Moderate potential for locally significant remains of mid-late nineteenth-century residences, stores and outbuildings including wells and WCs.	<ul style="list-style-type: none"> AMS Monitoring or Test/Salvage
NC 5	Moderate potential for locally significant remains of Bryson’s cottage and store (1860s) and residential/commercial buildings (late 19th).	<ul style="list-style-type: none"> AMS Monitoring or Test/Salvage
NC 6	Low-Moderate potential for locally significant remains of the former School of Arts (1870s), residential and school-related remains (late 19th and early 20th).	<ul style="list-style-type: none"> AMS Test/Salvage
NC 1 NC 2 NC 4	Nil-Low potential for archaeological remains, unlikely to meet the significance threshold.	<ul style="list-style-type: none"> Unexpected Finds Procedure



Figure 3.1 Areas of archaeological potential and significance within the Chatswood Metro Site (Artefact, 2016a, p. 60).

3.1.2 Sydney Metro, City & Southwest Archaeological Method Statement for Chatswood Dive (AMBS, 2017)

Following the completion of the AARD, AMBS completed post-approval works for the project, including a final AMS for the proposed works at the Chatswood site. The works were largely confined to the eastern portion of the site, around the location of the Chatswood Dive. The AMS included methodologies to manage the historical archaeology and ensure compliance with relevant Heritage Council guidelines and their submission on the EIS.

The archaeological strategy identified for the Chatswood Dive site was that removal of concrete slabs and overburden would be monitored by the Secondary Excavation Director (ED), followed by open area salvage excavation of extant archaeological features and deposits.

The integrity of the archaeological evidence of the Dive location (NC6), which encompasses a part of the Mowbray House School; Penzance and the School of Arts / Council Chambers, were identified in the AMS as having moderate research potential. Similarly, the areas along Pacific Highway and Bryson Street (NC5 and NC3), were also identified as having moderate research potential (AMBS, 2017, p. 32).

The AMS identified that where the archaeological resource is found to be present with good integrity within the Chatswood Metro Site, it would have moderate research potential (Figure 3.2). The Statement of Archaeological Significance for the Chatswood Metro Site was:

The archaeological resource associated with the Chatswood Dive site, if present with good integrity, has the potential to provide information regarding the later nineteenth-century development of housing and industry within a semi-rural community.

Physical evidence of houses, outbuildings, wells, cesspits and underfloor deposits, if present with good integrity, have historic, archaeological and representative values. It has the potential provide information regarding the later nineteenth-century development of housing, services and industry within the local area. Physical evidence of houses, outbuildings, wells, cesspits, underfloor deposits and pollen has the potential to make a contribution to an understanding of the area's initial rural settlement and the subsequent changing nature of its land-use as it became more urbanised. Information gained from the archaeological resource of the Chatswood Dive site, such as personal and domestic artefacts, and refuse associated with semi-rural life, has the potential to be compared with artefact assemblages from similar sites within and beyond the primary urban environments and assist with addressing research questions relating to suburban and urbanisation, material culture, consumerism, and the lives of women and children.

The archaeological resource associated with the Chatswood Dive site, if present with good integrity, would have local significance (AMBS, 2017, p. 38).

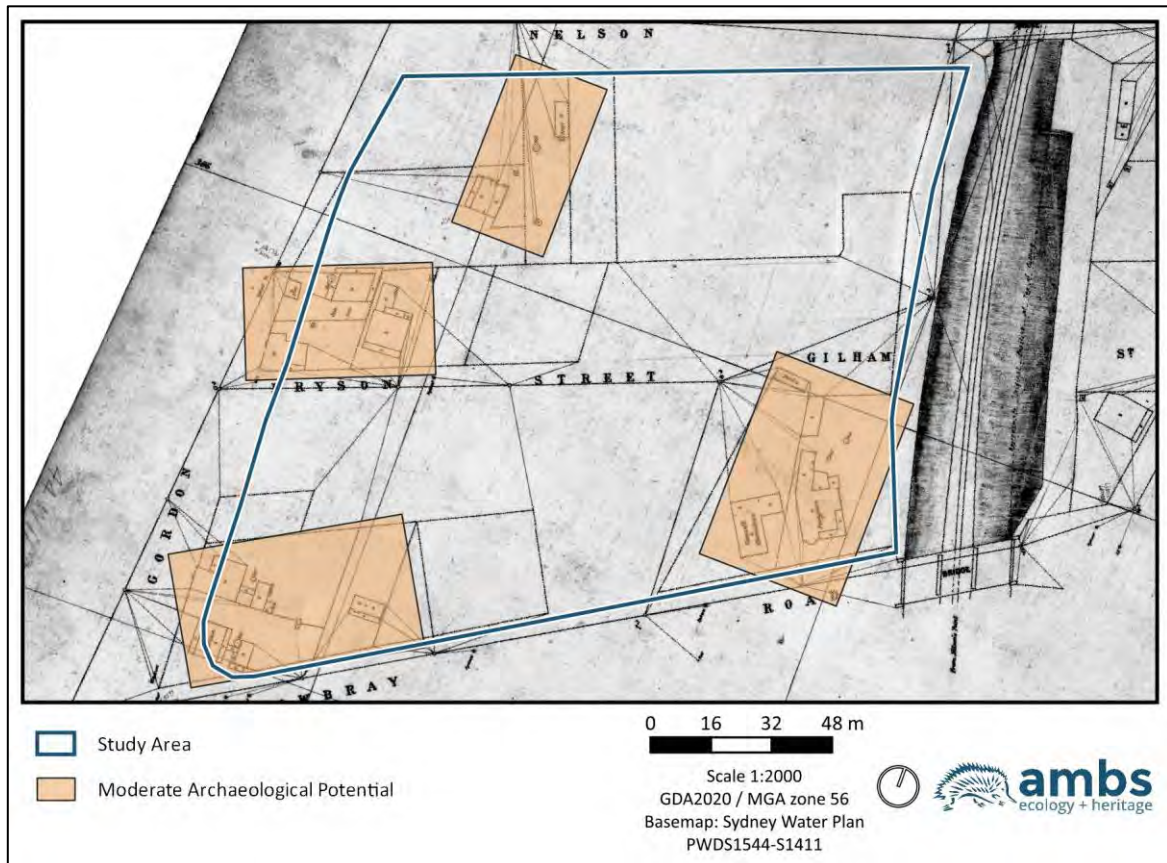


Figure 3.2 Areas of archaeological potential as identified in AMBS' 2017 AMS for the site.

3.1.3 Excavation Directors Report Sydney Metro, City & Southwest Chatswood Dive (AMBS, 2021)

AMBS undertook archaeological excavations at the Chatswood Dive site in 2017 and 2018 in advance of works on site. Investigations were targeted at the area to be occupied by the dive in the eastern portion of the site, and outside of the current remediation area.

Archaeological excavations at the Chatswood Dive site revealed archaeological evidence relating primarily to Penzance (built c1887) (Figure 3.3), its outbuilding (built c1887-1899) (Figure 3.4), and related drainage features including ceramic pipes and a brick cistern (Figure 3.5, Figure 3.6), as well as the remnants of a well. An intact rubbish pit was also identified to the east of the outbuilding. Remnant features of the bay window at the front of 'Penzance' were also identified; however, any other archaeological deposits which may have been associated with the house were removed by later twentieth century development.

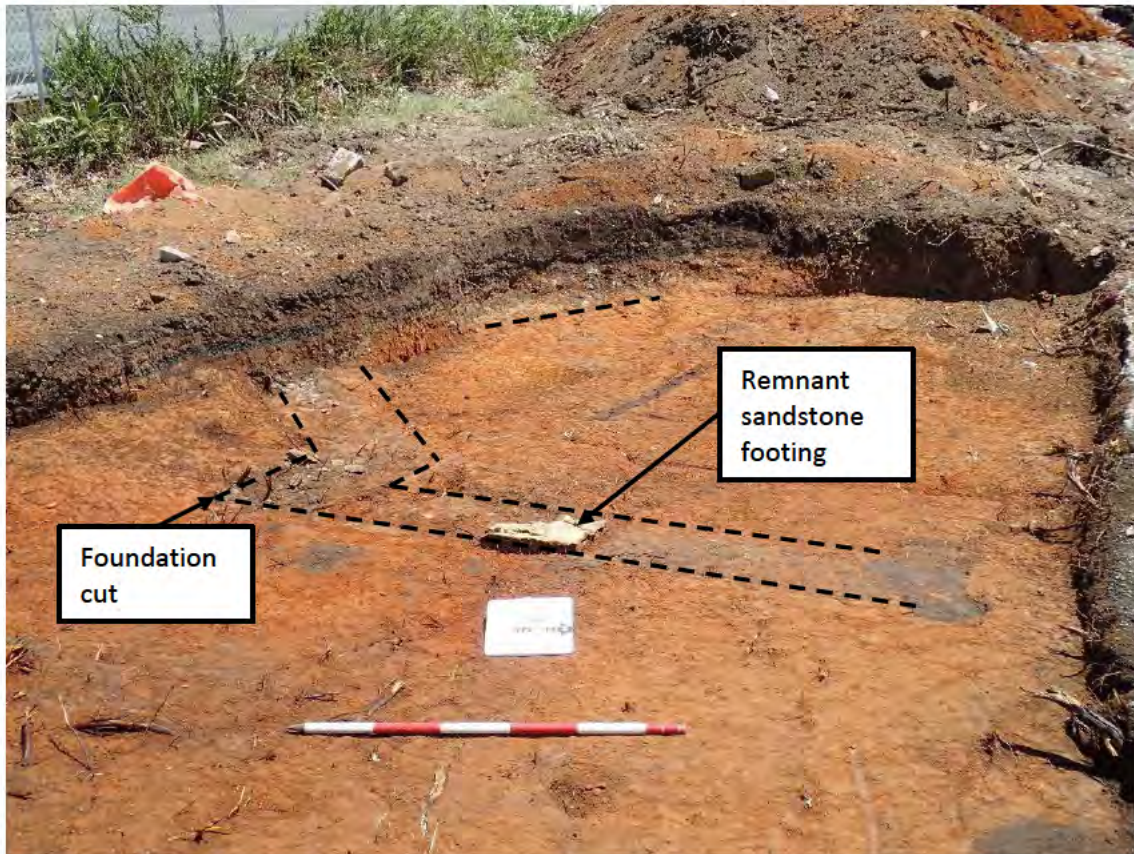


Figure 3.3 Remains of foundation trench for Penzance, approximate extent outlined in black and location of sandstone footing indicated by black arrow.



Figure 3.4 General view of outbuilding footings.



Figure 3.5 Drainage features in the eastern portion of the investigation area.



Figure 3.6 Beehive cistern, post excavation.

In relation to the School of the Arts, archaeological remains were insubstantial in nature, consisting primarily of two brick piers which probably relate to an extension that was built c1917-1943 during its time as a school chapel (Figure 3.7). A small sandstone feature, recorded on site as a possible cesspit was also identified in the vicinity of the School of Arts building, however there was not enough evidence available to confirm this (Figure 3.8).

Across the remainder of the site, the only other substantial archaeological evidence consisted of a number of post holes in yard areas (Figure 3.9). These post holes do not align well with known structures or property boundaries and are not located consistently enough to allow their function to be determined.



Figure 3.7 Brick piers in south-western portion of the investigation area, post excavation.



Figure 3.8 Possible cesspit, post excavation.



Figure 3.9 Representative example of the postholes found on site.

Figure 3.10 Rubbish pit, post excavation.

Based on the results of the archaeological investigations, the significance of the identified archaeological resource at the Chatswood Dive site was reassessed and the following statement of significance given:

The archaeological remains identified in the Chatswood Dive site are representative of late-nineteenth and early-twentieth century use of the study area, with any previous remains (including deposits associated with the School of Arts and Penzance) having been removed by later development. The artefact assemblage consists of a mix of artefacts dating loosely from the 1880s to the 1930s. While this site is not considered to be particularly rare, it may provide a useful comparison to other sites locally to better understand the development of Chatswood over time from a relatively isolated, semi-rural community to one better serviced and connected with Sydney. The Chatswood Dive artefact assemblage would be more representative of the latter part of this process, with artefact deposits showing continued use of items manufactured in the nineteenth century well into the twentieth century.

The remains at the Chatswood Dive site do provide an insight into the provision of water in a semi-rural context in the nineteenth century. A large cistern and extensive drainage system was identified on site, demonstrating that the most effective method of supplying water on site prior to the introduction of municipal water from 1895 onwards was the capture and storage of rainwater. Only one rubbish pit was identified on site containing a significant number of artefacts and appears to have been filled at a similar time to the cistern, in the 1930s. No archaeological remains were identified on site as predating the construction of Penzance in the 1880s.

The remains present within the Chatswood Dive site are representative of domestic and school usage of the study area in the late-nineteenth and early-twentieth centuries, with structural remains dating from the 1880s associated archaeological deposits dating up to the 1930s. While not rare in the context of the Sydney region, limited archaeological works has previously been undertaken in the Chatswood area, and the assemblage identified would have the potential to be compared with other similar sites to form a more complete area of how Chatswood developed over time.

The archaeological remains identified at the Chatswood Dive site have historical, research, and representative significance at a local level (AMBS, 2021, pp. 68-69).

3.2 Potential archaeological resource

The development of the wider Chatswood Metro Site is characterised by early farming and industry. From the 1860s John Bryson had a house, later named Sarina, timber yard and shop at the corner of Mowbray and Lane Cove Roads (Figure 3.11), and from early 1883 Peter Dolan had a smithy on Lane Cove Road, possibly indicated as an open shed in Figure 3.12.

To the north, along Nelson Street, two houses are recorded in 1899 near to its intersection with Lane Cove Road (Figure 3.13), including a rough timber structure, and a brick and wood building. Two cesspits and a well are also recorded in the vicinity of the buildings.

Urban development in the Chatswood area was centred around the main road and rail transport routes. The North Shore Line from Hornsby to St Leonards opened in 1890, with the extension to Milson’s Point opening in 1893, at which time Lane Cove Road had been formed and renamed Gordon Road, making the local area more accessible to development. As population increased further government services were added. In 1895 the lands to the north of Mowbray Road were connected to water and in 1899 they had been sewered.

The late arrival of sewerage and water reticulation is indicated on the 1899 Sydney Water plan, which shows buildings with clearly identified wells and some cesspits also visible. The 1899 plan indicates that some of the houses have a separate kitchen and an associated collection of outbuildings, which may have served as places of work, stabling or outhouses. In many instances, cesspits and wells may contain a wide variety of artefacts which have fallen in by accident or been dumped as a means of discarding unwanted or damaged household rubbish.



Figure 3.11 Detail of structures present in 1899 near the intersection of Lane Cove Road and Mowbray Road.

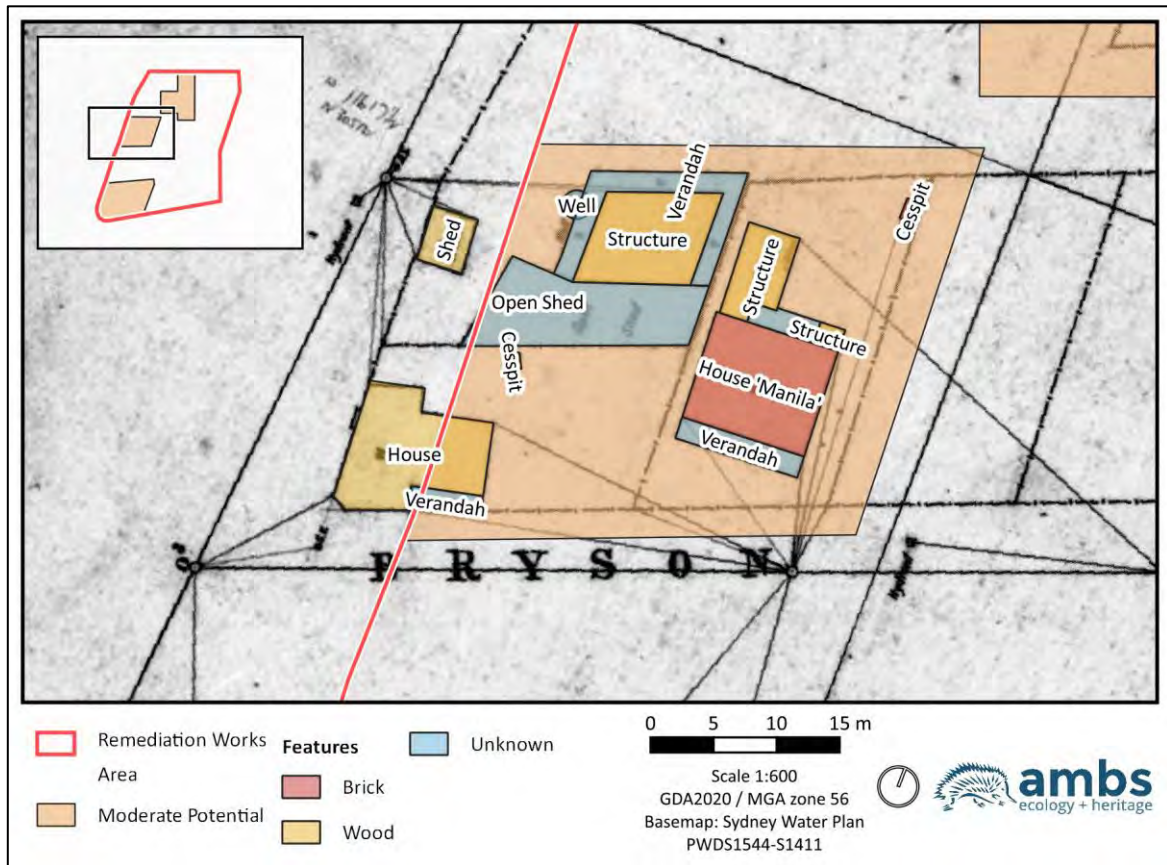


Figure 3.12 Detail of structures present in 1899 near along Lane Cove Road, near its intersection with Bryson Street.

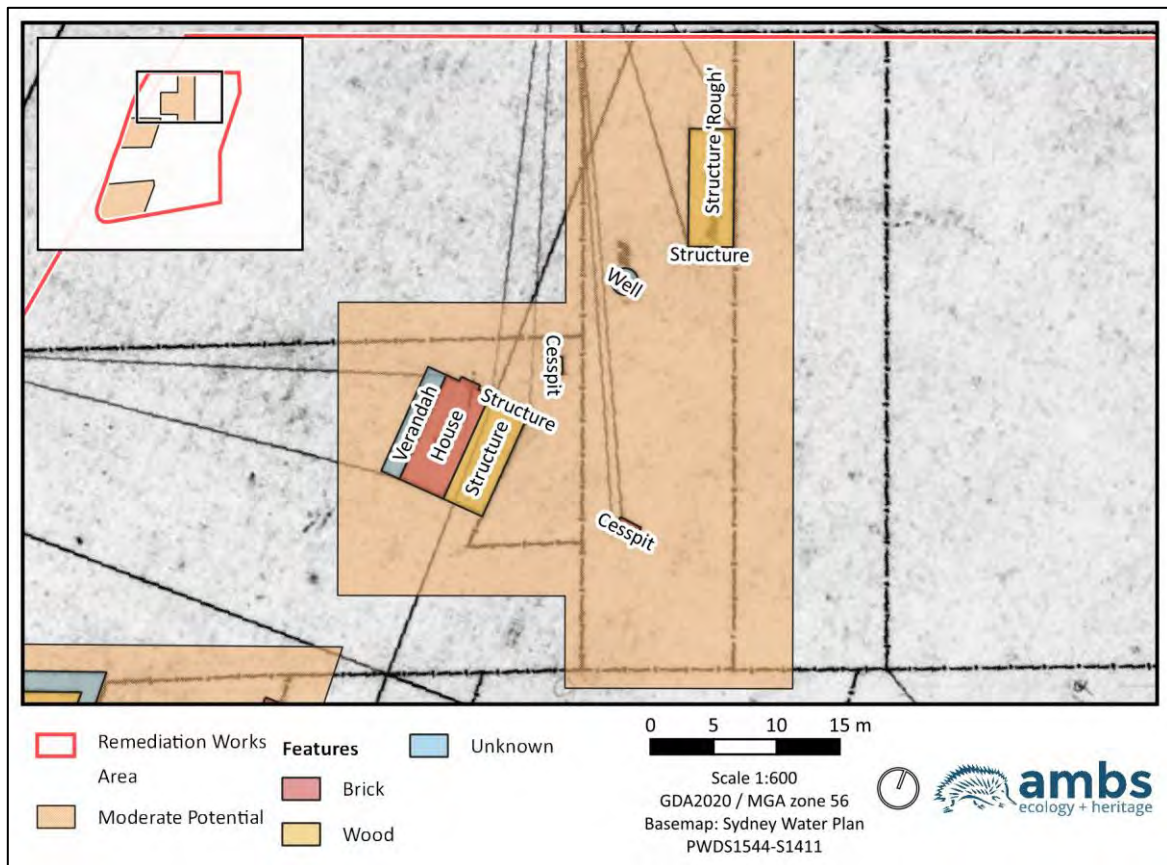


Figure 3.13 Detail of structures present in 1899 along Nelson Street.

By 1882, when Bryson subdivided his estate for sale, the lots along Mowbray Road had been sold and the School of Arts had been built in 1874. It was not until the late 1880s that a scatter of housing was constructed within the land defined by the railway, Nelson Street, Pacific Highway and Mowbray Road, including the house Penzance, built by 1887. The earliest development of the site centres on discrete groups of house complexes with associated outbuildings, possibly including stables, work areas, kitchens and cesspits, and wells. The site's full development potential, however, was unrealised until Lancelot Bavin established his school in 1906 and proceeded to acquire adjacent properties to accommodate the growing school (Figure 3.14).



Figure 3.14 The Chatswood site in 1943 with the footprint of the Mowbray House School outlined. Much of the earliest housing is still extant.

To the east of the remediation area, within the footprint of the Dive are part of the School of Arts / Council Chambers, built in 1874, and Penzance, built in 1887. All archaeological evidence of these structures and their occupation has been removed by excavations for the Dive. Archaeological excavations for these works revealed largely intact structural remains associated with an outbuilding of Penzance, however the foundations of the house itself had largely been removed by later development in the area. The investigations also identified an intact beehive cistern at one of the marked well locations, suggesting that the historic plans may not have differentiated between the different structure types. While the archaeological remains of Penzance were truncated, the presence of associated outbuilding footings, cistern, drainage features, post holes and artefact bearing deposits do demonstrate the potential for archaeological deposits to survive in a similar context.

While temporary structures were constructed over the concrete hardstand within the remediation area, there is no evidence to suggest that these areas have been disturbed as a part of the Sydney Metro project.

3.2.1 Research potential

Intact cesspits, wells, cisterns, underfloor occupation deposits and any associated rubbish pits that may be present associated with the housing illustrated on the 1899 Sydney Water plan may contain artefacts that could provide an insight into the nineteenth settlement and occupation of the Chatswood area. In addition, palynological analysis of cesspits and the fossil pollen in the soil profile may provide information regarding diet, crops or local gardens as well as the original flora of the locality. Such evidence would give an insight into the natural environment.

Information concerning early settlement patterns, the layout and form of residential housing, outbuildings and yards, the survival mechanisms of semi-rural communities and the availability of goods beyond urban centres are research questions relating to the archaeology and history of the local and wider communities. Information gained from the archaeological remains of the houses in the Chatswood Metro Site may make a contribution to an understanding of later nineteenth-century settlement patterns in the local area. Personal items, trade goods and tools associated with semi-rural living have the potential to contribute to an understanding of domestic practices and the distribution patterns of artefacts of small communities, which could be evaluated and compared with artefact assemblages from similar early suburban sites.

The research potential of late nineteenth-century housing rarely reaches the threshold for local or State significance. However, the distance of Chatswood from the major urban centres of Sydney, North Sydney and Parramatta, combined with the lack of previous archaeological excavations in the area, means that this site has some potential to provide good comparative archaeological evidence for the local area.

Where the archaeological resource is found to be present with good integrity within the Chatswood Metro Site, it would have moderate research potential (Figure 3.15 to Figure 3.17).

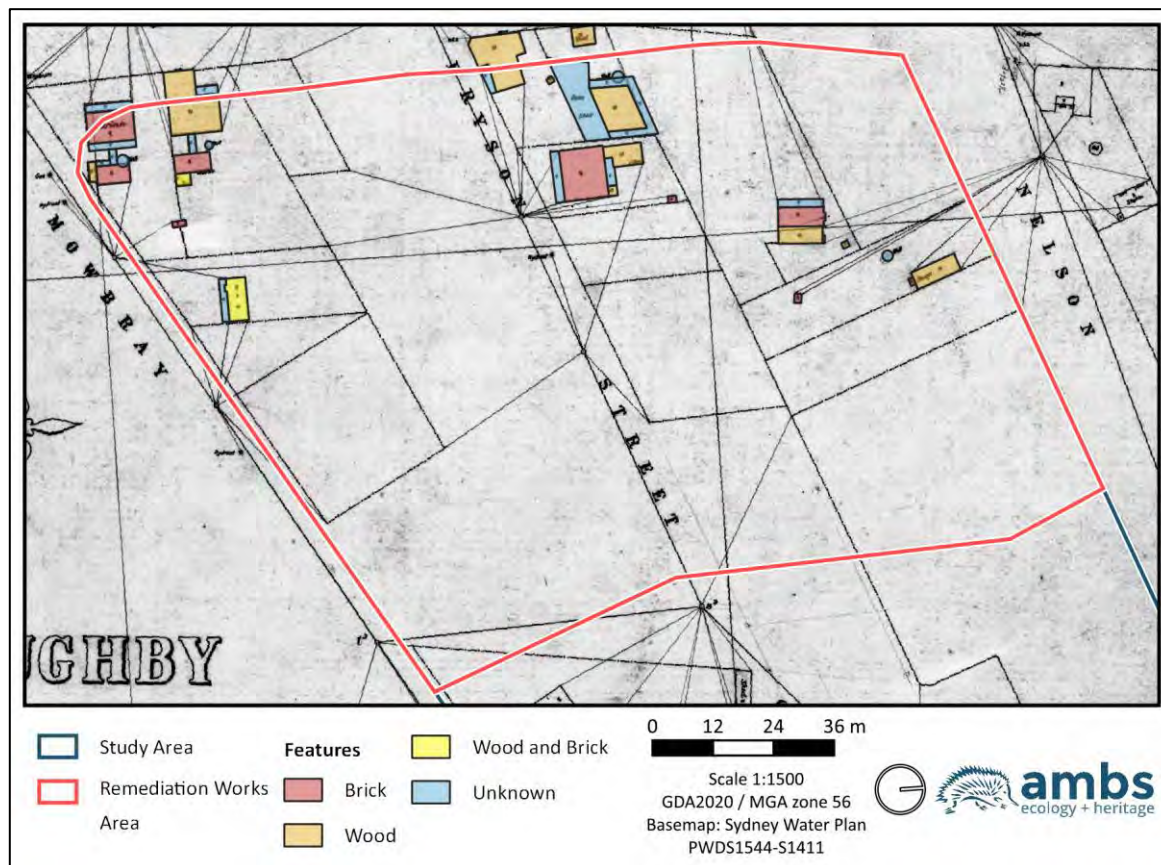


Figure 3.15 1899 Sydney Water plan, with features inside the remediation works area marked.



Figure 3.16 Identified archaeological features in the remediation works area.



Figure 3.17 Areas of archaeological potential within the remediation works area.

4 Assessment of significance

The physical evidence of past activities is a valuable resource that is embodied in the fabric, setting, history and broader environment of an item, place or archaeological site. The value of this resource to a community can be evaluated by assessing its cultural and natural heritage values. *Cultural significance* and *heritage value* are terms used to express the intangible and tangible values of an item, place or archaeological site, and the response that it evokes in the community. Assessment of significance provides the framework for the development of management strategies to protect an item or place for future generations.

An item, place or archaeological site is considered to be of State or local heritage significance if it meets one or more of the seven criteria for assessing heritage significance in NSW provided in the guideline *Assessing heritage significance* (Table 4.1).

Table 4.1 Criteria for assessing heritage significance in NSW (Department of Planning and Environment, 2023, p. 21).

Criterion	Significance	Definition
(a)	Historic significance	An item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).
(b)	Historical association	An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area).
(c)	Aesthetic/creative/technical achievement	An item is important in demonstrating aesthetic characteristics and/ or a high degree of creative or technical achievement in NSW (or the local area).
(d)	Social, cultural, and spiritual	An item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural, or spiritual reasons.
(e)	Research potential	An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area).
(f)	Rare	An item possesses uncommon, rare, or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).
(g)	Representative	An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places; or cultural or natural environments (or a class of the local area's cultural or natural places; or cultural or natural environments).

The archaeological significance of the site has previously been assessed by AMBS (2017). This assessment has been reproduced below with minor amendments to account for the revised scope of works. A statement of heritage significance provided in Section 4.1.

a) *Historic significance*

If present with good integrity, the archaeological resource can provide information regarding the suburban development of the Chatswood area. The archaeological evidence may provide information on the layout of subdivisions and the form of the houses, outbuildings and yards. Information regarding later nineteenth-century life in a semi-rural community and responses to the local environment prior to the provision of reticulated water, sewerage and municipal waste collection may be compared with settlement patterns of other similar nineteenth-century places and should contribute to an understanding of the shifting changes between rural and urbanisation of such places.

The archaeological remains associated with early farming, housing and industry along the Pacific Highway, Mowbray Road and Bryson Street, and the Bryson and the Great Northern Estates, also have the potential to demonstrate daily life and responses to the local environment.

The archaeological resource in the Chatswood Metro Site may have the potential to demonstrate the past and would have local significance.

b) Historical association

There is no evidence to indicate that the archaeological resource within the footprint of the Chatswood Metro Site have an association with historically important individuals, events or groups.

The threshold for significance against this criterion has not been met.

c) Aesthetic/creative/technical achievement

If present with good integrity, physical remains associated with the housing complexes would have the potential to demonstrate particular aspects of domestic and commercial life within a semi-rural community and would have local significance.

d) Social, cultural, and spiritual

While no consultation has been undertaken with the local community in relation to the values of the archaeology, it is acknowledged that local communities are interested in the archaeology of their community and its development. It is possible that if substantial and intact archaeology is found it may have value to the local community or specific community groups.

The threshold for significance against this criterion has not been met at this time.

e) Research potential

The archaeological resource that may be present within the Chatswood Metro Site has moderate research potential. If present with good integrity, the resource may have the potential to make a contribution to an understanding of the development of later nineteenth-century housing and commercial activity within a semi-rural community. Evidence may assist with understanding the changes made to the pre-1788 environment by settlement of this site and early agriculture and the nature of food production. The archaeological remains may make a contribution to an understanding of trade and distribution patterns and assemblages of artefacts, which includes the contents of wells, cesspits and possibly underfloor deposits which could provide information regarding diet, purchasing patterns, personal and gender identity and the artefacts of everyday life. Personal items associated with the early urban development of the Chatswood area have the potential to contribute to an understanding of the domestic practices which could be evaluated and compared with artefact assemblages from similar early urban sites.

The research potential of archaeological resource with good integrity would have local significance.

f) Rare

If present with good integrity, physical remains of houses, outbuildings, wells, cesspits and underfloor deposits would be representative, but unlikely to be rare examples, of similar assemblages recovered from excavations across the broader Sydney region.

The archaeology of the Chatswood site would have local significance.

g) Representative

If present with good integrity, physical remains of houses, outbuildings, wells, cesspits and underfloor deposits would be representative, but unlikely to be rare examples, of similar assemblages recovered from excavations across the broader Sydney region.

The archaeology of the Chatswood site would have local significance.

4.1 Statement of Significance

The archaeological resource associated with the Chatswood site, if present with good integrity, has the potential to provide information regarding the later nineteenth-century development of housing and industry within a semi- rural community.

Physical evidence of houses, outbuildings, wells, cesspits and underfloor deposits, if present with good integrity, have historic, archaeological and representative values. It has the potential to provide information regarding the later nineteenth-century development of housing, services and industry within the local area. Physical evidence of houses, outbuildings, wells, cesspits, underfloor deposits and pollen has the potential to make a contribution to an understanding of the area's initial rural settlement and the subsequent changing nature of its land-use as it became more urbanised. Information gained from the archaeological resource of the Chatswood Metro Site, such as personal and domestic artefacts, and refuse associated with semi-rural life, has the potential to be compared with artefact assemblages from similar sites within and beyond the primary urban environments and assist with addressing research questions relating to suburban and urbanisation, material culture, consumerism, and the lives of women and children.

The archaeological resource associated with the Chatswood Metro Site, if present with good integrity, would have local significance.

5 Proposed works

The proposed works largely consist of the remediation of asbestos-affected material and the removal of underground storage tanks, and includes:

- Removal of concrete hardstand across the entirety of the study area.
- Identification and removal of three underground storage tanks (USTs) and associated infrastructure.
- Remediation of asbestos-affected fill to a depth of up to 4m.
- Geotechnical investigations as required.

The proposed works will be taking place across the entirety of the remediation works area, with excavation for UST removal and asbestos-affected fill targeted to the proposed works areas shown in Figure 5.1. These areas are indicative only and may be subject to change based on the identification of contaminated material.



Figure 5.1 Areas of archaeological potential in relation to the proposed works.

Following the completion of works, the site will be made safe and handed over to Sydney Metro.

6 Archaeological Method Statement

Archaeological remains can enhance the historical record and as such make a contribution to an understanding of the history and settlement of a local region. As identified in this report, the archaeological resource within the project footprint, if present with good integrity, have moderate research potential and local significance. In view of the substantial costs involved in archaeological excavation of a site, the research design should be problem-oriented; however, allowance should always be made for new questions to respond to unexpected archaeological evidence. Archaeological research questions provide a framework for an archaeological investigation and for the analysis of the results of the excavation and artefacts recovered during excavations.

6.1 Research questions

To ensure that the research potential and significance is realised, archaeological investigations should aim to address substantive research themes. The following research questions form the foundation of the archaeological investigations within the footprint of the Chatswood Metro Site. The research questions in Table 6.1 are taken from those provided in the previous AMS (AMBS, 2017) to allow for consistency in the analysis of archaeological remains on site.

Table 6.1 Research questions for the Chatswood Metro Site.

Theme	Research questions
Landscape & Environmental Archaeology	Is there surviving evidence of the early local environment, such as early soils, and fossil pollen? Is there surviving evidence of early land-use practices and what can this evidence tell us about the modification of the original landscape after European colonisation?
Residential Housing, Commercial Premises and Material Culture	What can the construction techniques, size, layout and form of the houses and outbuildings tell us regarding areas of activity and use? What insights are provided in the locations and associations of kitchens, outbuildings, wells, cesspits and other features?
	Are there intact domestic deposits and what can these tell us about settlement patterns, the survival mechanisms of a mid-nineteenth-century semi-rural community and the availability of goods beyond the urban centres? What are the patterns of subsistence and self-reliance and how do they inform us about this environment and adaptation to it?
	What can the contents of underfloors, wells, rubbish and/or cesspits tell us about the daily lives and domestic practices of this relatively isolated rural community, which could be evaluated and compared with artefact assemblages from similar sites within primary urban environments, that may not be available from other sources?
	What can the artefacts tell us about the minutiae of everyday life of the people working and living within this <i>relatively isolated early urban environment</i> ?

The above questions should allow for responding to larger research themes relating to: consumerism, material culture, urbanisation, and personal and social identity. The research questions will inform the procedure for recording the archaeological resource uncovered during excavation, the recovery and storage of artefacts and provide a framework for the excavation. In addition, new questions are likely to arise during excavation and / or during the post-excavation analysis, which may provide additional insights into different aspects of the site that may not have been previously considered.

6.2 Archaeological management

The day-to-day management of the archaeological investigations at the Chatswood Metro Site will be undertaken by the AMBS heritage team under the direction of AMBS' nominated Excavation Director for the project, Lian Ramage, AMBS Heritage Team Leader.

The archaeological investigations program will comprise:

- Monitoring of excavations to an archaeologically sterile layer to determine the presence, extent, integrity and potential significance of the underlying archaeology (Section 6.2.2).
- If archaeological remains are present with good integrity open area salvage excavation would proceed (Section 6.2.3).

The significance and research potential of the archaeological resource associated with the residences and commercial buildings on site means that these building complexes will be excavated using a mixture of mechanical and manual techniques. The following methodology addresses all potential instances where archaeological investigations will be required within this site.

6.2.1 *Heritage induction*

AMBS will prepare a document that addresses the project scope, identifying the sensitivities of the site and the relevant heritage requirements of the project and will be presented to all on-site personnel. The induction will be approved by the Primary Excavation Director (ED) and presented by an AMBS archaeologist prior to the commencement of work on site. The induction/toolbox will include an illustrated easy to understand hard copy to assist staff in understanding the heritage significance of the anticipated archaeological resource, including:

- The nature of the archaeological resource.
- Maps showing location of anticipated archaeological features.
- Understanding the unexpected finds procedures.
- Photographs of the types of anticipated archaeological features.
- Repercussions of any breaches to the approved archaeological strategy.

Additional toolbox meetings will be given as required, to provide an overview and management of the anticipated archaeological resource for that day and in the event of unanticipated relics or features being exposed.

6.2.2 *Archaeological monitoring*

Mechanical removal of the extant concrete slabs across the site and underlying deposits will be monitored by the AMBS heritage team. The archaeological monitoring will be undertaken in those areas assessed as having moderate potential to verify the presence of archaeological resources with good integrity and significance (Figure 6.1).

If there are no underlying archaeological relics, features or deposits in any of the areas under investigation, the Excavation Director will attend the site to verify and a Clearance Certificate will be prepared by the Excavation Director to inform the project team and Proponent in writing.

Where significant archaeological remains with good integrity are exposed, open area excavation will proceed following removal of the overburden and once the area has been made safe.



Figure 6.1 Archaeological management of the proposed works.

6.2.3 Open area salvage excavation

Open area excavation will proceed once the area of archaeological sensitivity with intact archaeological remains has been made safe. Excavation will be undertaken under the supervision of the Excavation Director in accordance with the following methodology to ensure that all significant archaeological relics, features and deposits are appropriately managed and recorded:

- Establish a site datum and lay out a grid, relevant to the size of the site; 10m, 20m or 50m, across the site in order to record the levels of extant deposits, features and relics.
- Significant features will be recorded in detail and excavated manually under the supervision of the excavation director:
 - All underfloor areas will be excavated within a 500mm grid, using 50mm spits, and wet sieved.
 - Cesspits and rubbish pits will be excavated along tip lines (if identifiable).
- All significant archaeological deposits, features and relics that are exposed during the excavations will be recorded in accordance with heritage best practice standards. Recording will include:
 - Cleaning features to facilitate photographic recording.
 - Scale plans.
 - Elevations of features, if relevant.
 - Digital photographs (in JPG and RAW format).
 - Photogrammetry.
 - Site survey.
 - Detailed description of the feature, deposit or relic to ensure that a clear and comprehensive record of the archaeological resource of the site is preserved for the future.

- Sequential numbering of features and deposits to facilitate preparation of a Harris Matrix and artefact labelling.
- Preparation and development of a Harris matrix, to show stratigraphic relationships between all recorded archaeological features and deposits.
- All information regarding the location, dimensions and characteristics of all recorded archaeological features and deposits will be recorded on pro-forma context sheets.
- Collection of all significant artefacts for analysis, except from non-significant unstratified fill. Samples of bricks and mortar will be collected from each structure, as relevant.

Soil samples will be taken for relevant deposits at the discretion of the Excavation Director for analysis by a palynologist. The results of the analysis should provide an insight into the food growing practices and diet, farming and vegetable crops, and the indigenous flora of the locality.

Artefacts will be cleaned, bagged, labelled in accordance with the archaeological context, and appropriately stored for analysis so that any information that can contribute to the understanding of the site and its historical development is not lost.

A Clearance Certificate will be issued by the Historic Excavation Director for each site requiring archaeological testing or excavation and recording after investigations are completed at that particular location.

6.2.4 Sieving strategy

Evidence of past activities is provided by artefacts recovered during archaeological excavation, in particular from occupation deposits. Occupation deposits with potential to allow for conclusions to be drawn as to standards of living and access to goods occur beneath floors, within cesspits, rubbish pits, wells or cisterns, and yard deposits. Occupation deposits would be wet or dry sieved, in accordance with the density of the soil matrix and the likely improved retrieval of significant artefacts.

Where relevant, sample sieving of deposits will be done to determine whether a deposit warrants sieving and if so, this should be wet or dry sieving. Dense deposits from structures or features such as cesspits and wells or cisterns will be sieved, if this is deemed to be the best strategy for retrieving all possible artefacts.

6.2.5 Artefact management

Artefacts will be cleaned, bagged, and labelled in accordance with archaeological context, and appropriately stored for analysis so that any information that can contribute to the understanding of the site and its historical development is not lost. Artefact processing and analysis will be in accordance with the system developed by AMBS. The database for the site will be included in the Excavation Report for that site.

Processing, analysis and storage of the artefacts for the duration of the project will be conducted at AMBS premises. However, Sydney Metro will be required to provide a repository for the long-term storage of the artefacts from the Chatswood Metro Site.

6.2.6 Final excavation report

At completion of the archaeological investigation program a report will be prepared detailing the results of the fieldwork and post-excavation analysis. The report will be prepared in accordance with current heritage best practice and the requirements of a standard excavation permit and will include:

- An executive summary of the archaeological program.
- Due credit to the client paying for the excavation, on the title page.
- An accurate site location and site plan (with scale and north arrow).
- Historical research, references and bibliography.
- Detailed information on the excavation, including the aim, the context for the excavation, procedures, treatment of artefacts (cleaning, conserving, sorting, cataloguing, labelling, scale photographs and/or drawings, location of repository) and analysis of the information retrieved.
- Nominated repository for the items.
- Detailed response to research questions (at minimum those stated in this AMS).
- Conclusions from the archaeological program. The information must include a reassessment of the site's heritage significance, statement(s) on how archaeological investigations at this site have contributed to the community's understanding of the site and other comparable archaeological sites in the local area and recommendations for the future management of the site.

6.3 Unexpected heritage finds

Where any archaeological finds are made in areas identified as having low archaeological potential (Figure 6.1), these will be managed in accordance with the Sydney Metro *Unexpected Heritage Finds Procedure SM-20-00099497* (Sydney Metro, 2023b) (Appendix B) and *Exhumation Management Procedure SM-20-00099495* (Sydney Metro, 2023a) (Appendix C) as appropriate.

6.3.1 Archaeological Relics Management Plan

In accordance with Condition E20, an Archaeological Relics Management Plan will be prepared, in consultation with the Heritage Council of NSW, if the unexpected heritage find is assessed by the Excavation Director as having significance.

Significant archaeological relics and features will generally, though not always, provide evidence of the beginnings of European colonisation in a particular area. Evidence of early colonial land management and occupation contribute to and enhance an understanding of the development and growth of the colony. The evidence may include, but not be limited to:

- Evidence of the pre-settlement environment.
- Evidence of early land management practices.
- Evidence of early landscape modifications including land clearance practices.
- Agricultural practices and plantings.
- Evidence of early housing and associated cesspits / wells / cisterns / rubbish pits / outbuildings.
- Information regarding construction techniques of the settlement / farm / house.
- Artefact assemblages that provide an insight into daily life, conditions, tools of trade and mechanisms of exchange.
- Early burials.

Should unexpected significant archaeological relics or features be identified, work would cease in the vicinity and Sydney Metro, the Department of Planning and Environment, and the Heritage Council of NSW would be informed in writing concerning the find as specified in the Sydney Metro *Unexpected Heritage Finds Procedure SM-20-00099497* (Sydney Metro, 2023b) and required by Condition E20. The Excavation Director would consult with the relevant parties to determine the appropriate management for the find. This may include manual excavation to determine the full extent of the find and recorded in accordance with the methodology identified in Section 6.2.3.

The Excavation Director will provide Sydney Metro and the Department of Planning and Environment, and the Heritage Council of NSW with a brief summary of the investigations on completion and application of the relic/feature to the relevant research themes and questions.

Following completion of the appropriate management of the archaeological relic, the Excavation Director will provide written advice that all archaeological investigations within an area have been completed and issue a Clearance Certificate to allow works to commence or resume.

Bibliography

- Aird, W. (1961) *The Water Supply, Sewerage and Drainage of Sydney*, Kingsgrove: Halstead Press.
- AMBS (2017) *Sydney Metro, City & Southwest Archaeological Method Statement for Chatswood Dive*: Report to John Holland CPB Ghella Joint Venture.
- AMBS (2021) *Excavation Directors Report Sydney Metro, City & Southwest Chatswood Dive*: Report to Sydney Metro.
- Apperley, R., Irving, R. and Reynolds, P. (1994) *A Pictorial Guide to Identifying Australian Architecture: Styles and Terms from 1788 to the Present*. Sydney: Angus & Robertson.
- Artefact (2016a) *Sydney Metro City & Southwest Chatswood to Sydenham, Historical Archaeological Assessment & Research Design*: Report to Arcadis / RPS / Jacobs.
- Artefact (2016b) *Sydney Metro City & Southwest – Chatswood to Sydenham Non-Aboriginal Heritage – Heritage Impact Assessment*: Report to Arcadis / RPS / Jacobs.
- Australia ICOMOS (2013) *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, 2013*, Burwood, Vic: Australia ICOMOS Incorporated. Available at: <https://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf>.
- Department of Planning and Environment (2023) *Assessing heritage significance*. Available at: <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Heritage/assessing-heritage-significance-guidelines-assessing-places-objects-against-criteria-230167.pdf>.
- Fogarty, T. (2016) *Mowbray House School*. Available at: <https://abc17603.wordpress.com/history/workplaces/education/mowbray-house-school/>.
- Futurepast (2012) *Chatswood Depot Mowbray House Heritage Assessment*: Report to Ausgrid.
- Heritage Branch (2009) *Assessing Significance for Historical Archaeological Sites and 'Relics'*: Heritage Branch, Department of Planning. Available at: <https://www.heritage.nsw.gov.au/assets/Uploads/a-z-publications/a-c/Assessing-Significance-A-Historical-Archaeological-Sites-and-Relics.pdf>.
- Heritage Office and DUAP (1996a) *Archaeological Assessments Guidelines*: NSW Heritage Office. Available at: <https://www.heritage.nsw.gov.au/assets/Uploads/files/archaeological-assessments-guidelines.pdf>.
- Heritage Office and DUAP (1996b) *NSW Heritage Manual*: NSW Heritage Office. Available at: <https://heritagensw.intersearch.com.au/heritagenswjsui/retrieve/305238ad-702b-4ed1-b04e-6b1a7b6a6d89/000030943%20-%20NSWH.pdf>.
- Russell, E. (1970) *Lane Cove 1788, 1895, 1970: A North Shore History*. Lane Cove, Sydney: The Council of the Municipality of Lane Cove.
- Services, W. C. L. 2013. Chatswood CBD: Fact Sheet no. 4.
- Sydney Metro (2023a) *Exhumation Management Procedure SM-20-00099495*.

Sydney Metro (2023b) *Unexpected Heritage Finds Procedure SM-20-00099497*.

Thorne, L. (1983) *A History of North Shore Sydney: From 1788 to Today*. Sydney: Angus and Robertson Publishers.

Warne, C. (1987) *Pictorial Memories: Lower North Shore*. Sydney: Atrand Pty Ltd.

Willoughby City Council (n.d.) *Chatswood*. Available at:
<http://www.visit chatswood.com.au/history/chatswood/> (Accessed: 6 September 2017).

Appendix A Rates assessment information

Pacific Highway east between Mowbray Road and Nelson Street

Year	Mowbray Road →						Bryson Street	Bryson Street →							Carlotta/ Nelson
1872 & 1874	No: 14 Owner: John Bryson Property: House & Land Capital Value: £30														
1882 - 1885	No: 55 Owner: Mrs Bryson Property: House & Lots of Land Capital Value: £36 (1882-3) / £33 (1885)														
1886	No: 102 Owner: Mrs Mary Bryson Property: House & Land Capital Value: £33			No: 79 Owner: Thomas E. Bray Brysons Estate Capital Value: £4	No: 197			No: 708 Owner: J. Thompson Estate: Bryson's Capital Value: £8							
1887	No: 112 Owner: Mrs Mary Bryson Property: House & Land			No: 91 Owner: Thomas E. Bray Brysons Estate Capital Value: £4	No: 42 Owner: Dawson Lessee: Sun Sam Wak Property: Land Capital Value: £52			No: 765 Owner: J. Thompson							
1888	No: 25 Owner: Mrs Bryson Occupier: Mrs Bryson Property: House & Land	No: 26 Owner: Mrs Bryson Occupier: J.B. Paton Property: House & Shop		No: 27 Owner: Thos E Bray Property: Land Brysons Estate Capital Value: £120	No: 28 Owner: John Dawson Property: Land Brysons Estate Capital Value: £120		No: 29 Owner: John Dawson Property: Land Brysons Estate Capital Value: £140	No: 30 Owner: John Thompson Occupier: Henry Jenkins Property: House, Shop & Land Brysons Estate	No: 31 Owner: John Thompson Occupier: Property: House, Shop & Land Brysons Estate	No: 32 Owner & Occupier: P. Dolan Black-smiths Shop Brysons Estate		No: 33 Owner: Loxton & Bullock Occupier: D.E. Eldridge Property: House & Shop Estate: Gt Northern	No: 34 Owner: Loxton & Bullock Property: Land Estate: Gt Northern Capital Value: £140		
1889	No: 1 Owner: Mrs Bryson Occupier: Mrs Bryson Property: House & Land	No: 2 Owner: Mrs Bryson Occupier: J.B. Paton Property: House & Shop		No: 3 Owner: Thos E. Bray Property: Land Brysons Estate Capital Value: £120	No: 4 Owner: now Sarah Elizabeth Dawson Property: Land Brysons Estate Capital Value: £120		No: 5 Owner: now Sarah Elizabeth Dawson Property: Land Brysons Estate Capital Value: £140	No: 6 - (previously 30 & 31) merged Owner: John Thompson Occupie: Henry Jenkins Propert: House, Shops & Land Brysons Estate	No: 6 - (previously 30 & 31 merged)	No: 7 Owner: P. Dolan Occupier: P. Dolan Property: Blacksmith's shop Brysons Estate		No: 8 Owner: Loxton & Bullock Occupier: D.E. Eldridge Property: House & Shop Estate: Great Northern	No: 9 Owner: Loxton & Bullock Property: Land Estate: Great Northern Capital Value: £140		
1890 – Carlotta St now Nelson St	No: 1 Owner: Mrs Bryson Occupier: Mrs Bryson Property: House & Land	No: 2 Owner: Mrs Bryson Occupier: R. Cameron Lessee: Clark & McIntyre Property: House & Shop Estate: Bryson's		No: 3 Owner: Thos. E. Bray Property: Land Estate: Bryson's Capital Value: £120	No: 4 Owner: Sarah E. Dawson Property: Land Estate: Bryson's Capital Value: £120		No: 5 Owner: Sarah E. Dawson Property: Land Estate: Bryson's Capital Value: £140	No: 6 Owner: John Thompson Occupier: left Property: House, Shop & Land Brysons Estate		No: 7 Owner: P. Dolan Occupier: P. Dolan Property: Blacksmith shop Brysons Estate		No: 8 Owner: Loxton & Bullock Occupier: D.E. Eldridge Property: House & Shop Estate: Great Northern	No: 9 Owner: Loxton & Bullock Property: Land Estate: Great Northern Capital Value: £140		

Year	Mowbray Road →					Bryson Street	Bryson Street →						Carlotta/ Nelson	
1891 – Lane Cove Road now Gordon Road	No: 1 Owner: Mrs Mary Bryson Occupier: Mrs Bryson Property: House & Land	No: 2 Owner: Mrs Mary Bryson Lessee: Clark & McIntyre Occupier: R. Cameron Property: Brysons Estate Property: House, Shop & Land		No: 3 Owner: Thos. E. Bray Property: Land Brysons Estate Capital Value: £120	No: 4 Owner: Mrs Sarah Russon Property: Land Brysons Estate Capital Value: £120		No: 5 Owner: Mrs Sarah Russon Property: Land Brysons Estate Capital Value: £140	No: 6 Owner: John Thompson Property: Shop & Land Brysons Estate				No: 7 Owner: Peter Dolan Occupier: P. Dolan Property: House & Blacksmith Shop & Dwelling Brysons Estate	No: 8 Owner: Loxton & Bullock Lessee: D.E. Eldridge Occupier: D.E. Eldridge Property: House & Shop Estate: Great Northern	No: 9 Owner: Loxton & Bullock Property: Land Estate: Great Northern Capital Value: £150
1892	No: 1 Owner: Mrs Mary Bryson Occupier: Mrs Bryson Property: House & Land	No: 2 Owner: Mrs Mary Bryson Lessee: Clark & McIntyre Occupier: R. Cameron Estate: Bryson's Property: House, Shop & Land		No: 3 Owner: Thos. E. Bray Property: Land Estate: Bryson's Capital Value: £120	No: 4 Owner: Mrs Sarah Russon Property: Land Estate: Bryson's Capital Value: £120		No: 5 Owner: Mrs Sarah Russon Property: Land Estate: Bryson's Capital Value: £140	No: 6 Owner: Mrs Hammond Property: Shop & Land Estate: Bryson's				No: 7 Owner: Peter Dolan Occupier: P. Dolan Property: Blacksmith Shop & Dwelling Estate: Bryson's	No: 8 Owner: Loxton & Bullock Lessee: D.E. Eldridge Occupier: D.E. Eldridge Property: House & Shop Estate: Gt Northern	No: 9 Owner: Loxton & Bullock Property: Land Estate: Gt Northern Capital Value: £150
1893	No: 49 Owner: Mrs Mary Bryson Occupier: Mrs Bryson Estate: Bryson's Property: House & Land	No: 50 Owner: Mrs Mary Bryson Occupier: Jos. Oag Estate: Bryson's Property: House, Shop & Land		No: 51 Owner: Ths. E. Bray Property: Land Estate: Bryson's Capital Value: £120	No: 52 Owner: John Dawson Property: Land Estate: Bryson's Capital Value: £120		No: 53 Owner: John Dawson Property: Land Estate: Bryson's Capital Value: £120	No: 54 Owner: Mrs Hammond Occupier: N. Northrop Estate: Gt Northern Property: Shop			No: 55 Owner: Mrs Hammond Occupier: Jos. Laurie Estate: Gt Northern Property: Dwelling	No: 56 Owner: Peter Dolan Occupier: Peter Dolan Estate: Gt Northern Property: Blacksmiths Shop & House	No: 57 Owner: Loxton & Bullock Lessee: D.E. Eldridge Occupier: vacant Estate: Gt Northern Property: House & Shop	No: 58 Owner: D.E. Eldridge Occupier: Jos. Woodbine Estate: Gt Northern Property: House
1894	No: 49 Owner: Mrs Mary Bryson Occupier: Mrs Bryson Estate: Bryson's Property: House & Land	No: 50 Owner: Mrs Mary Bryson Occupier: A.J. Graus Estate: Bryson's Property: House, Shop & Land		No: 51 Owner: T.H. Bray sold M. Powell Property: Land Estate: Bryson's	No: 52 Owner: Frederick Dawson Property: Land Estate: Bryson's		No: 53 Owner: Frederick Dawson Property: Land Estate: Bryson's	No: 54 Owner: Mrs Hammond Occupier: Arthur Potts Estate: Gt Northern Property: Shop			No: 55 Owner: Mrs Hammond Lessee: Maltow Occupier: C. Fugel Estate: Gt Northern Property: House & Shop	No: 56 Owner: Patrick Dolan Occupier: Patrick Dolan Estate: Gt Northern Property: Blacksmiths Shop & House	No: 57 Owner: Loxton & Bullock Occupier: vacant Estate: Gt Northern Property: House & Shop	On Nelson Street
1895	No: 55 Owner: Mrs Mary Bryson Occupier: Mrs Bryson Estate: Bryson's Property: House & Land Capital Value: £364	No: 56 Owner: Mrs Mary Bryson Occupier: -left Estate: Bryson's Property: House, Shop & Land Capital Value: £100		No: 57 Owner: M. Powell Property: Land Estate: Bryson's	No: 58 Owner: -Fredk Dawson Property: Land Estate: Bryson's		No: 59 Owner: -Fredk Dawson Property: Land Estate: Bryson's	No: 60 Owner: Mrs Hammond Occupier: Arthur Potts Estate: Bryson's Property: Shop Capital Value: £75			No: 61 Owner: Mrs Hammond Occupier: H.C. Fugill Estate: Bryson's Property: House & Shop Capital Value: £75	No: 62 Owner: Patrick Dolan Occupier: Patrick Dolan Estate: Bryson's Property: House & Blacksmiths Shop Capital Value: £240	No: 63 Owner: Loxton & Bullock Occupier: George Hicks Property: House & Shop Capital Value: £400	
1896	No: 55 Owner: Mrs M Bryson Occupier: Mrs Bryson Estate: Bryson's Property: House & Land	No: 56 Owner: Mrs M Bryson Occupier: Mrs L. Osborne Estate: Bryson's Property: House & Shop		No: 57 Owner: M. Powell Property: Land Estate: Bryson's	No: 58 Owner: -Fred. Dawson Property: Land Estate: Bryson's		No: 59 Owner: -Fred. Dawson Property: Land Estate: Bryson's	No: 60 Owner: Mrs Hammond Occupier: Arthur Potts Estate: Bryson's Property: Shop			No: 61 Owner: Mrs Hammond Occupier: H.C. Fugill Estate: Bryson's Property: House & Shop	No: 62 Owner: Patk Dolan Occupier: Patk Dolan Estate: Bryson's Property: House & Blacksmiths	No: 63 Owner: Loxton & Bullock Estate: Great Northern Property: House & Shop	

Year	Mowbray Road →					Bryson Street	Bryson Street →							Carlotta/ Nelson	
1897	No: 59 Owner: James Forsyth Occupier: Miss E. Bryson Estate: Bryson's Property: House & Land	No: 60 Owner: Jos. A. Hammond Occupier: Mrs L. Osborne Estate: Bryson's Property: Shop & Land		No: 61 Owner: M. Powell Property: Land Estate: Bryson's Capital Value: £90	No: 62 Owner: —Fred Dawson Property: Land Estate: Bryson's Capital Value: £90		No: 63 Owner: —Fred Dawson Property: Land Estate: Bryson's Capital Value: £90	No: 64 Owner: Mrs Hammond Occupier: A. Potts Estate: Bryson's Property: Shop			No: 65 Owner: Mrs Hammond Occupier: H.C. Fugill Estate: Bryson's Property: Shop & House	No: 66 Owner: Patk Dolan Occupier: Patk Dolan Estate: Bryson's Property: House, Land & Smithers		No: 67 Owner: Loxton & Bullock Estate: Great Northern Property: House & Shop	
1898	No: 60 Owner: Jas. Forsyth Occupier: Mrs Pugh Estate: Bryson Property: House	No: 61 Owner: Abner Hammond Occupier: B. Molony Estate: Bryson Property: House & Shop		No: 62 Owner: W.N. Powell Property: Land Estate: Bryson Capital Value: £90	No: 63 Owner: —Fred Dawson Property: Land Estate: Bryson Capital Value: £90		No: 64 Owner: —Fred Dawson Property: Land Estate: Bryson Capital Value: £90	No: 65 Owner: Mrs Hammond Occupier: Arthur Potts Estate: Bryson Property: Shop			No: 66 Owner: Mrs Hammond Occupier: Mrs Surridge Estate: Bryson Property: House & Shop	No: 67 – (was 66 split) Owner: Patk Dolan Occupier: Patk Dolan Estate: Bryson Property: House & Shop	No: 68 – (was 66 split) Owner: Patk Dolan Occupier: Jo. Sutton Estate: Bryson Property: House	No: 69 Owner: Loxton & Bullock Estate: Great Northern Property: Land Capital Value: £200	
1899	No: 310 Owner: Thos. Pugh Occupier: Thos. Pugh Estate: Bryson Property: House	No: 311 Owner: Abner Hammond Occupier: B. Moloney Estate: Bryson Property: House & Shop		No: 312 Owner: W.N. Powell Property: Land Estate: Bryson Capital Value: £90	No: 313 Owner: Fred Dawson Property: Land Estate: Bryson Capital Value: £90		No: 314 Owner: Fred Dawson Property: Land Estate: Bryson Capital Value: £90	No: 315 Owner: Mrs Hammond Occupier: Arthur Potts Estate: Bryson Property: Shop			No: 316 Owner: Mrs Hammond Occupier: Thos. Surridge Estate: Bryson Property: Shop	No: 317 Owner: Patk Dolan Occupier: Patk Dolan Estate: Gt Northern Property: House & Smithey	No: 318 Owner: Patk Dolan Occupier: Jo. Sutton Estate: Bryson Property: House	No: 319 Owner: Loxton & Bullock Estate: Gt Northern Property: Land Capital Value: £200	
1900	No: 350 Owner: Thos. Pugh Occupier: Thos. Pugh Brysons Estate Property: House	No: 351 Owner: Abner Hammond Occupier: B. Moloney Brysons Estate Property: House & Shop		No: 352 Owner: W.N. Powell Brysons Estate Property: Land Capital Value: £90	No: 353 Owner: Jos. Dawson Brysons Estate Property: Land Capital Value: £80		No: 354 Owner: Jos. Dawson Brysons Estate Property: Land Capital Value: £80	No: 355 – (315 & 316 combined) Owner: Mrs Hammond Occupier: F. Dickens Brysons Estate Property: House & Shop			No: 355 – (315 & 316 combined)	No: 356 Owner: P. Dolan Occupier: P. Dolan Estate: Gt Northern Property: House & Shop	No: 357 Owner: Patk Dolan Occupier: J.J. Gillam Estate: Gt Northern Property: House	No: 358 Owner: Loxton & Bullock Estate: Gt Northern Property: Land Capital Value: £200	
1901	No: 167 Owner: Tom Pugh Occupier: Tom Pugh Estate: Bryson's Property: House	No: 168 Owner: Abner Hammond Occupier: Thos. Vokes Estate: Bryson's Property: House & Shop		No: 169 Owner: Alex Turnbull Estate: Bryson's Property: Land Capital Value: £90	No: 170 Owner: A.N. Russon Estate: Bryson's Property: Land Capital Value: £70		No: 171 Owner: A.N. Russon Estate: Bryson's Property: Land Capital Value: £70	No: 172 Owner: Mrs Hammond Occupier: F. Dickens Estate: Bryson's Property: House & Shop			No: 173 Owner: P. Dolan Occupier: P. Dolan Property: House & Shop	No: 174 Owner: P. Dolan Occupier: J.J. Gillam Property: House	No: 175 Owner: Loxton & Bullock Property: Land Capital Value: £200		
1902	No: 170 Owner: Tom Pugh Occupier: David Welch Estate: Bryson's Property: House	No: 171 Owner: Abner Hammond Occupier: Thos. Vokes Estate: Bryson's Property: House & Shop		No: 172 Owner: Alex Turnbull Estate: Bryson's Property: Land Capital Value: £90	No: 173 Owner: A.H. Russon Estate: Bryson's Property: Land Capital Value: £70		No: 174 Owner: A.H. Russon Estate: Bryson's Property: Land Capital Value: £70	No: 175 Owner: Mrs Hammond Occupier: F. Dickens Estate: Bryson's Property: House & Shop			No: 176 Owner: P. Dolan Occupier: P. Dolan Estate: Gt Northern Property: House & Shop	No: 177 Owner: P. Dolan Occupier: J.J. Gillam Estate: Gt Northern Property: House	No: 178 Owner: Jos. Hammond Sr. Estate: Gt Northern Property: Land Capital Value: £160		
1903	No: 189 Owner: Miss Springett Occupier: David Welch Estate: Bryson's Property: House & Smithy	No: 190 Owner: Abner Hammond Occupier: Thos. Vokes Estate: Bryson's Property: House & Shop		No: 191 Owner: Alex Turnbull Estate: Bryson's Property: Land Capital Value: £90	No: 192 Owner: A.H. Russon Estate: Bryson's Property: Land Capital Value: £90		No: 193 Owner: A.H. Russon Estate: Bryson's Property: Land Capital Value: £90	No: 194 Owner: Mrs Hammond Occupier: Thos. Higgins Estate: Bryson's Property: House & Shop			No: 195 Owner: P. Dolan Occupier: P. Dolan Estate: Great Northern Property: House & Shop	No: 196 Owner: P. Dolan Occupier: J.J. Gillam Estate: Great Northern Property: House	No: 197 Owner: Jos. Hammond Sr. Estate: Gt Northern Property: Land Capital Value: £160		

Year	Mowbray Road →					Bryson Street	Bryson Street →						Carlotta/ Nelson	
1904	No: 207 Owner: Miss Springgett Occupier: David Welch Estate: Bryson's Property: House & Smithy	No: 208 Owner: J. Smith Hammond Occupier: H.M. Reid Estate: Bryson's Property: House & Shop		No: 209 Owner: Alex Turnbull Estate: Bryson's Property: Land Capital Value: £100	No: 210 – (192 & 193 combined) Owner: Mrs H. Vince Estate: Bryson's Property: Land Capital Value: £200		No: 211 – (previously 194 split) Owner: Mrs Hammond Occupier: Jno. Potts Estate: Bryson's Property: Shop	No: 212 – (previously 194 split) Owner: Mrs Hammond Occupier: Isaac Jackson Estate: Bryson's Property: House & Shop			No: 213 Owner: P. Dolan Occupier: P. Dolan Property: House, Shop & Smithy	No: 214 Owner: P. Dolan Occupier: John Doig Property: House & Shop	No: 215 Owner: Jos. Geo. Hammond Property: Land Capital Value: £160	
1905	No: 211 Owner: Miss Springgett Occupier: Thos. Whitehead (D. Eldridge) Estate: Bryson's Property: House	No: 212 Owner: Abner Hammond Occupier: H.M. Reid Estate: Bryson's Property: House & Shop		No: 213 Owner: Alex Turnbull Estate: Bryson's Property: Land Capital Value: £75	No: 214 Owner: Mrs H. Vince Estate: Bryson's Property: Land Capital Value: £150		No: 215 Owner: Thos. Hammond Occupier: E. Smith Estate: Bryson's Property: Shop	No: 216 Owner: Mrs Hammond Occupier: Geo. Webb Estate: Bryson's Property: House & Shop			No: 217 Owner: P. Dolan Occupier: P. Dolan Estate: Great Northern Property: House & Smithy	No: 218 Owner: P. Dolan Occupier: John Doig Estate: Great Northern Property: House	No: 219 Owner: Geo. Hammond Estate: Great Northern Property: Land Capital Value: £160	
1906	No: 215 Owner: Miss Springgett Occupier: Whitehead & Co. (Chas. Jeffries) Estate: Bryson Property: House	No: 216 Owner: Abner Hammond Occupier: H.M. Reid Estate: Bryson Property: House & Shop		No: 217 Owner: Alex Turnbull Estate: Bryson Property: Land Capital Value: £75	No: 218 Owner: D. Neely Estate: Bryson Property: Land Capital Value: £150		No: 219 Owner: Jos. T. Hammond Snr Occupier: E. Smith Estate: Bryson Property: Shop	No: 220 Owner: Jos. T. Hammond Snr Estate: Bryson Property: House & Shop			No: 221 Owner: P. Dolan Occupier: P. Dolan Estate: Great Northern Property: House & Smithy	No: 222 Owner: P. Dolan Occupier: John Doig Estate: Great Northern Property: House & Stables	No: 223 Owner: Geo. Hammond Estate: Great Northern Property: Land Capital Value: £160	
1907	No: 235 Owner: Miss Springgett Occupier: Whitehead & Co. (C. Higgins) Brysons Estate Property: House	No: 236 Owner: Abner Hammond Occupier: H.M. Reid Brysons Estate Property: House & Shop		No: 237 Owner: Alex Turnbull Brysons Estate Property: Land Capital Value: £75	No: 238 Owner: D. Neely Brysons Estate Property: Land Capital Value: £150		No: 239 No: 219 Owner: Jos. T. Hammond Occupier: E. Smith Brysons Estate Property: Shop	No: 240 Owner: Jos. T. Hammond Occupier: Wm. Wicks Brysons Estate Property: House & Shop			No: 241 Owner: P. Dolan Occupier: P. Dolan Estate: Great Northern Property: House & Smithy	No: 242 Owner: P. Dolan Occupier: Whitehead & Co. (Wm. Browning) Estate: Great Northern Property: House & Stables	No: 243 Owner: Geo. Hammond Estate: Great Northern Property: Land Capital Value: £160	
1908	No: 238 Owner: Miss Springgett Occupier: Whitehead & Co. C. Liggins, carter Property: Cottage Brysons Estate Capital Value: £180	No: 239 Owner: Abner Hammond Occupier: H.M. Reid, grocer Brysons Estate Capital Value: £126		No: 240 Owner: Alex Turnbull Brysons Estate Capital Value: £126	No: 241 Owner: Dd Neely Brysons Estate Capital Value: £225		No: 242 Owner: Jos. T. Hammond Occupier: E. Smith, store Property: Wd. Shop Brysons Estate Capital Value: £112	No: 243 Owner: Jos. T. Hammond Occupier: C. Currie, tobacconist Property: Wd. Shop Brysons Estate			No: 244 Owner: P. Dolan Occupier: P. Dolan, blk. Smith Property: Wd. H. & Smithy Brysons Estate Capital Value: £112	No: 245 Owner: P. Dolan Occupier: Whitehead & Co. W. Browning, carter Property: Brk H & Wd Stable Estate: Great Northern Capital Value: £230	No: 246 Owner: Geo. Hammond Property: Land Estate: Great Northern Capital Value: £220	
1909	No: 245 Owner: Miss Springgett Capital Value: £180	No: 246 Owner: Abner Hammond Capital Value: £126		No: 247 Owner: Alex Turnbull Capital Value: £126	No: 248 Owner: D. Neely Capital Value: £225		No: 249 Owner: Jos. T. Hammond Capital Value: £112	No: 250 Owner: Jos. T. Hammond Capital Value: £112			No: 251 Owner: P. Dolan Capital Value: £112	No: 252 Owner: P. Dolan Capital Value: £230	No: 253 Owner: Geo. Hammond Capital Value: £220	
1910	No: 251 Owner: Miss Springgett Capital Value: £180	No: 252 Owner: A. Hammond Capital Value: £126		No: 253 Owner: A. Turnbull Capital Value: £126	No: 254 Owner: D. Neely Capital Value: £225		No: 255 – (249 & 250 combined) Owner: J.T. Hammond Capital Value: £112	No: 255 – (249 & 250 combined)			No: 256 Owner: P. Dolan Capital Value: £112	No: 257 Owner: P. Dolan Capital Value: £230	No: 258 Owner: G. Hammond Capital Value: £220	

Year	Mowbray Road →						Bryson Street	Bryson Street →						Carlotta/ Nelson	
1911	No: 327 Owner: Mrs Eliza A. Springett Occupier: H-Wm. Dew, carter Property: B.C. Estate: Bryson Capital Value: £210	No: 328 Owner: A. Hammond Occupier: H.M. Reid, grocer Property: Shop Estate: Bryson Capital Value: £60	No: 329 - new Owner: Abner Hammond Occupier: A. Hammond Property: Wd. C. Estate: Bryson Capital Value: £66	No: 330 Owner: Alex Turnbull Property: Vacant Estate: Bryson Capital Value: £105	No: 331 Owner: D. Neely Property: Vacant Estate: Bryson Capital Value: £100	No: 332 – new Owner: D. Neely Property: Vacant Estate: Bryson Capital Value: £100		No: 333 Owner: Jos. J. Hammond Occupier: Mrs Clune, refreshment shop & C. Currie, hairdresser Property: 2 Wd. Shops Estate: Bryson Capital Value: £112				No: 334 Owner: P. Dolan, blacksmith Occupier: P. Dolan, blacksmith Property: House & Smithy Estate: Bryson Capital Value: £112	No: 335 Owner: P. Dolan, blacksmith Occupier: T. Cody Property: B.H. & Stables Estate: Great Northern Capital Value: £230	No: 336 Owner: Geo. Hammond Property: Vacant Estate: Great Northern Capital Value: £225	
1912	No: 334 Owner: Mrs Elizh Springett Occupier: Wm. Dew, carter Property: B.C. Estate: Bryson	No: 335 Owner: Abner Hammond Occupier: H.M. Reid, grocer Property: Shop Estate: Bryson	No: 336 Owner: Abner Hammond Occupier: Abner Hammond Property: Wd. C. Estate: Bryson	No: 337 Owner: Alex Turnbull Property: Vacant Estate: Bryson	No: 338 Owner: H.M. Reid Property: Vacant Estate: Bryson	No: 339 Owner: H.M. Reid Property: Vacant Estate: Bryson		No: 340 Owner: Mrs Jos. Hammond Sen. Occupier: Mrs Clune, refresht. shop & C. Currie, hairdresser Property: 2 Wd. Shops Estate: Bryson				No: 341 Owner: P. Dolan, blacksmith Occupier: P. Dolan, blacksmith Property: House & Smithy Estate: Bryson	No: 342 Owner: P. Dolan, blacksmith Occupier: T. Cody, carrier Property: B.H. & Stable Estate: Gt. Northern	No: 343 Owner: Geo. Hammond Property: Vacant Estate: Gt. Northern	
1913	No: 378 Owner: Mrs. Eliz Springett Occupier: W. Dew Property: B.C. Estate: Bryson Capital Value: £210	No: 379 Owner: Abner Hammond Occupier: H.M. Reid Property: Shop Estate: Bryson Capital Value: £60	No: 380 Owner: A. Hammond Occupier: A. Hammond Property: Wd. C. Estate: Bryson Capital Value: £66	No: 381 Owner: C. Currey Property: Vacant Estate: Bryson Capital Value: £105	No: 382 Owner: H.M. Reid Property: Vacant Estate: Bryson Capital Value: £80	No: 383 Owner: H.M. Reid Property: Vacant Estate: Bryson Capital Value: £80		No: 384 Owner: W. Hammond Senr. Occupier: Clune & Currie Property: 2 Wd. Shops Estate: Bryson Capital Value: £110				No: 385 Owner: P. Dolan Occupier: P. Dolan Property: Smithy & Dwg Estate: Bryson Capital Value: £110	No: 386 Owner: P. Dolan Occupier: T. Cody Property: B.C. Estate: Great Northern Capital Value: £230	No: 387 Owner: Geo. Hammond Property: Vacant Estate: Great Northern Capital Value: £225	
1914	No: 396 Owner: Mrs Eliz Springett Occupier: W. Dew Property: B.C. Estate: Bryson House Name: Dursley Capital Value: £210	No: 397 Owner: Abner Hammond Occupier: H.M. Reid Property: Shop Estate: Bryson Capital Value: £60	No: 398 Owner: A. Hammond Occupier: A. Hammond Property: Wd. C. Estate: Bryson Capital Value: £66	No: 399 Owner: C. Currey Occupier: C. Currey Property: B. Shop Estate: Bryson Capital Value: £105	No: 400 Owner: H.M. Reid Property: Vac Estate: Bryson Capital Value: £80	No: 401 Owner: H.M. Reid Property: Vac Estate: Bryson Capital Value: £80		No: 402 Owner: Mrs Hammond Snr. Occupier: Clune & Currie Property: 2 Wd. Shops Estate: Bryson Capital Value: £110				No: 403 Owner: P. Dolan Occupier: P. Dolan Property: Smithy & Wd. C. Estate: Bryson Capital Value: £110	No: 404 Owner: P. Dolan Occupier: Mrs Betts Property: B.C. Estate: Great Northern Capital Value: £276	No: 405 Owner: G. Hammond Property: Vacant Estate: Great Northern Capital Value: £270	
1915	No: 416 Owner: Mrs Eliz Springett Occupier: W. Dew Property: B.C. Estate: Bryson House Name: Dursley	No: 417 Owner: Abner Hammond Occupier: H.M. Reid Property: Shop Estate: Bryson	No: 418 Owner: A. Hammond Occupier: Ogden Property: Wd. C. Estate: Bryson	No: 419 Owner: C. Currey Occupier: C. Currey Property: B. Shop Estate: Bryson	No: 420 Owner: H.M. Reid Property: Vac Estate: Bryson	No: 421 Owner: H.M. Reid Property: Vac Estate: Bryson		No: 422 Owner: Mrs Hammond Senr. Occupier: Clune & vac Property: 2 Wd. Shops Estate: Bryson				No: 423 Owner: P. Dolan Occupier: P. Dolan Property: Smithy & Wd. C. Estate: Bryson	No: 423a Owner: P. Dolan Occupier: Mrs Betts Property: B.C. Estate: Great Northern	No: 424 Owner: G. Hammond Property: Vacant Estate: Great Northern	
1916	No: 546 Owner: Mrs Eliz Springett Occupier: W. Dew Property: B.C. Estate: Bryson House Name: Dursley	No: 547 Owner: Abner Hammond Occupier: H.M. Reid Property: Shop Estate: Bryson	No: 548 Owner: A. Hammond Occupier: Ogden Property: Wd. C. Estate: Bryson	No: 549 Owner: C. Currey Occupier: C. Currey Property: B. Shop Estate: Bryson	No: 550 Owner: H.M. Reid Property: Vac Estate: Bryson	No: 551 Owner: H.M. Reid Property: Vac Estate: Bryson		No: 552 Owner: Mrs Hammond Snr. Occupier: Clune & Property: 2 Wd. Shops Estate: Bryson				No: 553 Owner: P. Dolan Occupier: P. Dolan Property: Smithy & Wd. C. Estate: Bryson	No: 554 Owner: P. Dolan Occupier: Mrs Betts Property: B.C. Estate: Great Northern	No: 555 Owner: Geo. Hammond Property: Vac Estate: Great Northern	

Year	Mowbray Road →						Bryson Street	Bryson Street →						Carlotta/ Nelson	
1917 – Gordon Rd becomes Lane Cove Rd	No: 561 Mrs Elizth. Springett Occupier: William Dew Property: B.C. Estate: Bryson House Name: Dursley Capital Value: £210	No: 562 – (547 & 548 combined) Owner: Abner Hammond Occupier: Abner Hammond Property: Shop Estate: Bryson Capital Value: £155	No: 562 – (547 & 548 combined)	No: 563 Owner: Charles Currey Occupier: Charles Currey Property: B. Shop Estate: Bryson Capital Value: £105	No: 564 – (550 & 551 combined) Owner: H.M. Reid Occupier: H.M. Reid Property: B. Shop & Dwelling Estate: Bryson Capital Value: £180	No: 564 – (550 & 551 combined)		No: 565 Owner: Mrs Hammond Senr. Occupier: Thomas Clune Property: 2 Wd. Shops Estate: Bryson Capital Value: £112				No: 566 Owner: Patrick Dolan Occupier: Patrick Dolan Property: Smithy & Wd. C. Estate: Bryson Capital Value: £112	No: 567 Owner: P. Dolan Occupier: Frank Smith Property: B.C. Estate: Great Northern Capital Value: £276	No: 568 Owner: George Hammond Property: Vac Estate: Great Northern Capital Value: £270	
1918	No: 680 Elizabeth Mary Dew Occupier: Wm. Dew Property: B.C. Estate: Bryson House Name: Dursley Capital Value: £210	No: 681 Owner: Abner Hammond Occupier: A. Hammond Property: Shop Estate: Bryson Capital Value: £155	No: 682 – combined in the previous year, but likely the same as before Owner: Abner Hammond Occupier: A. Hammond Property: Wd. C. Estate: Bryson Capital Value: £155	No: 683 Owner: Charles Currey Occupier: C. Currey Property: B. Shop Estate: Bryson Capital Value: £105	No: 684 Owner: H.M. Reid Occupier: H.M. Reid Property: B. Shop & Dwelling Estate: Bryson Capital Value: £180	No: 685 – combined in the previous year, but likely the same as before Owner: H.M. Reid Estate: Bryson Capital Value: £180		No: 686 Owner: Mrs Hammond Senr. Occupier: Thos. Clune Property: 2 Wd. Shops Estate: Bryson Capital Value: £112				No: 687 Owner: Patrick Dolan Occupier: P. Dolan Property: Smithy & Wd. C. Estate: Bryson Capital Value: £112	No: 688 Owner: Patrick Dolan Occupier: Frank Smith Property: B.C. Estate: Great Northern Capital Value: £276	No: 689 Owner: George Hammond Property: Vac Estate: Great Northern Capital Value: £270	

Mowbray Road between Pacific Highway and the Main North Shore Line

Year	Between Railway Line and Council Chambers	Council Chambers	→				Lane Cove Road
1887	No: 3 Mowbray Road Owner: John Alford Property: House & Land Capital Value: £52	No: 467 Owner: Henry Kirby Brysons Estate (sold) Capital Value: £12		No: 462 Owner: Mrs Emma Kelsey Kelso Brysons Estate Capital Value: £8			
1888	No: 112 Owner: John Alford Occupier: John Alford Property: House & Land	No: 113 Owner: Henry Kirby Brysons Estate Property: Land Capital Value: £300	No: 114 Owner: Mrs Johnson Brysons Estate Property: Land Capital Value: £150	No: 115 Owner: Mrs Emma Kelsey Brysons Estate Property: Land Capital Value: £300	No: 116 Owner: Leslie Herring Brysons Estate Property: Land Capital Value: £150	No: 117 Owner: J. Hawbley Estate: Willoughby Heights Property: Land Capital Value: £150	
1889	No: 92 Owner: John Alford Occupier: Vacant Property: House & Land	No: 93 Owner: Henry Kirby Lessee: Loxton Bullock was Henry Kirby Brysons Estate Property: Land	No: 94 Owner: Mrs Johnson Brysons Estate Property: Land	No: 95 Owner: Mrs Emma Kelsey Brysons Estate Property: Land	No: 96 Owner: Leslie Herring Occupier: Mrs Bryson Brysons Estate Property: Land		
1890	No: 92 Owner: Bank Cr. North Shore on Blizzard Occupier: J. Hedges Property: House & Land	No: 93 Owner: Henry Kirby Brysons Estate Property: Land Capital Value: £300	No: 94 Owner: Mrs Johnson Brysons Estate Property: Land Capital Value: £150	No: 95 Owner: Mrs Emma Kelsey Brysons Estate Property: Land Capital Value: £300	No: 96 Owner: In with Mrs Brysons House Lessee: Mrs B Brysons Estate		
1891	No: 91 Owner: National Mutual Life Association of Aus Property: House & Land	No: 92 Owner: Loxton + Bullock Lessee: Sold Loxton + Bullock Brysons Estate Property: Land Capital Value: £300	No: 94 Owner: Mrs Mary Anna Johnson Brysons Estate Property: Land Capital Value: £150	No: 93 Owner: Mrs Emma Kelsey Brysons Estate Property: Land Capital Value: £310			
1892	No: 90 Owner: National Mutual Life Ass. of Aus Property: House & Land	No: 91 Owner: Loxton & Bullock Brysons Estate Property: Land Capital Value: £300	No: 93 Owner: Mrs Mary Ann Johnson Brysons Estate Property: Land Capital Value: £150	No: 92 Owner: Mrs Emma Kelsey Brysons Estate Property: Land Capital Value: £310			
1893	No: 29 Owner: Nat. Mut. Life. Assoc. of Aust. Property: House & Land	No: 30 Owner: Loxton & Bullock Brysons Estate Property: Land Capital Value: £300	No: 32 Owner: Mrs M.A. Johnson Brysons Estate Property: Land Capital Value: £150	No: 31 Owner: Mrs Emma Kelsey Brysons Estate Property: Land Capital Value: £310			

Year	Between Railway Line and Council Chambers	Council Chambers	→			Lane Cove Road
1894	No: 29 Nat. Mut. Life Ass. of A Property: House & Land Occupier: Richd Dalrymple-Hay	No: 30 Owner: Loxton & Bullock Brysons Estate Property: Land Capital Value: £300	No: 32 Owner: Mrs M. A. Johnson Brysons Estate Property: Land Capital Value: £150	No: 31 Owner: Mrs Emma Kelsey Brysons Estate Property: Land Capital Value: £310		
1895	No: 29 Owner: Nat. Mut. Life Assoc. of A. Occupier: H. Ekensteen Property: House & Land Capital Value: £150	No: 30 Owner: Loxton & Bullock Brysons Estate Property: Land Capital Value: £300	No: 32 Owner: Mrs M.A. Johnson Brysons Estate Property: Land Capital Value: £150	No: 31 Owner: Mrs Emma Kelsey Brysons Estate Property: Land Capital Value: £310		
1896	No: 29 Owner: Nat. Mut. Life Assoc. of A. Occupier: F.L. Jon Borgheim Property: House & Land	No: 30 Owner: Loxton & Bullock Brysons Estate Property: Land Capital Value: £200	No: 32 Owner: Mrs M.A. Johnson Brysons Estate Property: Land Capital Value: £150	No: 31 Owner: Mrs Emma Kelsey Brysons Estate Property: Land Capital Value: £250		
1897	No: 30 Owner: Natl Mut. Life Asscn. Occupier: George Devonshire Property: House & Land	No: 31 Owner: Loxton & Bullock Brysons Estate Property: Land Capital Value: £200	No: 33 Owner: Mrs M.A. Johnson Brysons Estate Property: Land Capital Value: £150	No: 32 Owner: Mrs Emma Kelsey Brysons Estate Property: Land Capital Value: £250		
1898	No: 30 Owner: National Mut Life Association Occupier: Geo Devonshire Property: House	No: 31 Owner: Loxton & Bullock Brysons Estate Property: Land Capital Value: £200	No: 33 Owner: Mrs M.A. Johnson Brysons Estate Property: Land Capital Value: 150	No: 32 Owner: Mrs Emma Kelsey Brysons Estate Property: Land Capital Value: £250	No: 34 – previously 55 Owner: Richd. Russell Occupier: Richd. Russell Property: House	
1899	No: 575 Owner: Natl. Mutl. Life Asscn Occupier: Geo Devonshire Property: House	No: 576 Owner: Loxton & Bullock Brysons Estate Property: Land Capital Value: £200	No: 578 Owner: Mrs M.A. Johnson Brysons Estate Property: Land Capital Value: £150	No: 577 Owner: Mrs Emma Kelsey Brysons Estate Property: Land Capital Value: £250	No: 579 Owner: Richd. Russell Occupier: Richd. Russell Property: House	
1900	No: 615 Owner: GH Devonshire Occupier: Geo Devonshire Property: House	No: 616 Owner: Willby Council Estate: Bryson	No: 618 Owner: Mrs M.A. Johnson Estate: Bryson Property: Land Capital Value: £150	No: 617 Owner: Mrs Emma Kelsey Estate: Bryson Property: Land Capital Value: £250	No: 619 Owner: Richd Russell Occupier: R. Russell Estate: Bryson Property: House	
1901	No: 301 Owner: R.H. Johnson Occupier: Vacant Property: House	No: 302 Owner: Willby Council Estate: Bryson Property: Land	No: 304 Owner: Mrs M.A. Johnson Estate: Bryson Property: Land Capital Value: £150	No: 303 Owner: Mrs Emma McMahan Estate: Bryson Property: Land Capital Value: £250	No: 305 Owner: R. Russell Occupier: Richd Russell Estate: Bryson Property: House	
1902	No: 307 Owner: R.H. Johnson Occupier: C.S. Allen Property: House		No: 309 Owner: Mrs M.A. Johnson Estate: Bryson Property: Land Capital Value: £150	No: 308 Owner: Mrs Emma McMahan Estate: Bryson Property: Land Capital Value: £250	No: 310 Owner: Richd Russell Occupier: R. Russell Estate: Bryson Property: House	
1903	No: 342 Owner: Mrs McNamee Occupier: C.S. Allen Property: House Estate: Bryson's		No: 345 Owner: Mrs M.A. Johnson Estate: Bryson's Property: Land Capital Value: £150	No: 344 Owner: Mrs Emma McMahan Estate: Bryson's Property: Land Capital Value: £250	No: 346 Owner: Richd Russell Occupier: R. Russell Estate: Bryson's Property: House	No: 343 Owner: Griffiths Jhr Occupier: Willoughby W.C. Property: Council Chambers, Offices & Pound Estate: Bryson's
1904	No: 372 Owner: Mrs McNamee Occupier: C.S. Allen Property: House Estate: Bryson's		No: 375 Owner: Mrs M.A. Johnson Estate: Bryson's Property: Land Capital Value: £150	No: 374 Owner: Mrs Emma McMahan Estate: Bryson's Property: Land Capital Value: £250	No: 376 Owner: Richd Russell Occupier: R. Russell Estate: Bryson's Property: House	No: 373 Owner: Griffiths Jhr Occupier: School of Arts Property: Hall, tc
1905	No: 387 Owner: R.H. Est. Johnson Occupier: C.S. Allen Property: House		No: 390 Owner: Mrs M.A. Johnson Estate: Bryson's Property: Land Capital Value: £150	No: 389 Owner: Mrs Emma McMahan Estate: Bryson's Property: Land Capital Value: £250	No: 391 Owner: Richd Russell Occupier: R. Russell Estate: Bryson's Property: House	No: 388 Owner: Griffiths Jhr Occupier: School of Arts Estate: Bryson's Property: Hall, tc
1906	No: 386 Owner: Est R.H. Johnston Occupier: C.S. Allen Property: House Brysons Estate		No: 389 Owner: Mrs M.A. Johnston Brysons Estate Property: Land Capital Value: £150	No: 388 Owner: Mrs Emma McMahan Brysons Estate Property: Land Capital Value: £250	No: 390 Owner: Richard Russell Brysons Estate Property: House	No: 387 Owner: L.R. Bavin Occupier: School of Arts (C.A. Blackburn) Property: Hall, tc Brysons Estate

Year	Between Railway Line and Council Chambers	Council Chambers	→				Lane Cove Road
1907	No: 413 Owner: Est R.H. Johnston Occupier: C.S. Allen Brysons Estate Property: House House Name: Penzance		No: 416 Owner: Mrs M.A. Johnston Brysons Estate Property: Land Capital Value: £150	No: 415 Owner: Mrs Emma McMahon Brysons Estate Property: Land Capital Value: £250	No: 417 Owner: Richard Russell Occupier: Mrs Leach Brysons Estate Property: House	No: 414 Owner: L. Bavin Occupier: L. Bavin Property: School and Land Brysons Estate	
1908	No: 428 Owner: Est of R.N. Johnston Occupier: C.S. Allen, acct Property: Brk Cot Estate: Bryson House Name: Penzance Capital Value: £318		No: 431 Owner: Mrs M.A. Johnston Property: Land Capital Value: £75	No: 430 Owner: Mrs P. McMahon Property: Land Capital Value: £200	No: 432 Owner: Richd Russell Occupier: H. Neilsen, coal lamper Property: Brk Cot Capital Value: £150	No: 429 Owner: L. Bavin Occupier: L. Bavin Property: House, Grounds & School Capital Value: £900	
1909	No: 441 Owner: Est of R.N. Johnston Capital Value: £318		No: 444 Owner: Mrs M.A. Johnston Capital Value: £75	No: 443 Owner: Mrs P.C. McMahon Capital Value: £200	No: 445 Owner: Rd Russell Capital Value: £150	No: 442 Owner: L. Bavin Capital Value: £900	
1910	No: 444 Owner: Est of R.H. Johnston Capital Value: £318		No: 447 Owner: Mrs M.A. Johnston Capital Value: £75	No: 446 – appears the land splits with 446a Owner: Mrs E. McMahon Capital Value: £100	No: 448 Owner: Rd. Russell Capital Value: £150	No: 445 Owner: L. Bavin Capital Value: £900	No: 446a Owner: L. Bavin Capital Value: £100
1911	Becomes 556		No: 558 Owner: Mrs M.A. Johnston Estate: Bryson Capital Value: £100	No: 557 Owner: Mrs Emma McMahon Estate: Bryson Capital Value: £100	No: 559 Owner: Richd Russell Occupier: H Neilson, coal lamper Property: B.C. House Name: Tasma Estate: Bryson Capital Value: £100	No: 556 Owner: Lancelot Bavin Occupier: Lancelot Bavin Property: B. School & 2 B.C.s Estate: Bryson Capital Value: £1396	Becomes 556
1912			No: 568 Owner: Mrs M.A. Johnston Estate: Bryson Capital Value: £100	No: 567 Owner: Mrs M.E. Kelley Estate: Bryson Capital Value: £100	No: 569 Owner: Richd Russell Occupier: H. Neilson, coal lamper Property: B.C. House name: Tasma Estate: Bryson Capital Value: £100	No: 566 Owner: Lancelot Bavin Occupier: L. Bavin Property: B. School & 2 B.C.s Estate: Bryson Capital Value: £1376	
1913			No: 611 Owner: L. Bavin Estate: Bryson Capital Value: £100	No: 610 Owner: L. Bavin Estate: Bryson Capital Value: £100	No: 612 Owner: Richd Russell Occupier: H. Neilson, coal lamper Property: B.C. House Name: Tasma Estate: Bryson Capital Value: £100	No: 609 Owner: Lancelot Bavin Occupier: L. Bavin Property: B. School & 2 B.C.s Estate: Bryson Capital Value: £1376	
1914			Becomes joint with previous 610	No: 638 – becomes joint with previous 611 Owner: L. Bavin Property: Vac Estate: Bryson Capital Value: £100 100	No: 639 Owner: John Russell Occupier: Parker Property: B.C. House Name: Tasma Estate: Bryson Capital Value: £100	No: 637 Owner: L. Bavin Occupier: L. Bavin Property: B. School & oval gs Estate: Bryson Capital Value: 1568 £1468	
1915				No: 661 Owner: L. Bavin Occupier: L. Bavin Property: B.C. Estate: Bryson Capital Value: £100	No: 662 Owner: John Russell Occupier: Miss Parker Property: B.C. Estate: Bryson House Name: Tasma Capital Value: £100	No: 660 Owner: Lancelot Bavin Occupier: L. Bavin Property: B. School & Dwelling Estate: Bryson Capital Value: £1568	
1916				No: 815 Owner: L. Bavin Occupier: L. Bavin Property: B.C. Estate: Bryson Capital Value: £100	No: 816 Owner: John Russell Occupier: Miss Parker Property: B.C. Estate: Bryson House Name: Tasma Capital Value: £100	No: 814 Owner: Lancelot Bavin Occupier: L. Bavin Property: B. School & dwelling Estate: Bryson Capital Value: £1568	

Year	Between Railway Line and Council Chambers	Council Chambers	→				Lane Cove Road
1917				No: 820 Owner: L. Bavin Property: B.C. Estate: Bryson Capital Value: £1350	No: 821 Owner: John Russell Occupier: Miss Parker Property: B.C. House Name: Tasman Estate: Bryson Capital Value: £120	No: 819 Owner: Lancelot Bavin Occupier: Lancelot Bavin Property: B. School & Dwelling Estate: Bryson	
1918				No: 897 Owner: Lancelot Bavin Occupier: L. Bavin Property: B.C. Estate: Bryson Capital Value: £1350	No: 898 Owner: John Russell Occupier: Miss Parker Property: B.C. Estate: Bryson House Name: Tasman Capital Value: £120	No: 896 Owner: Lancelot Bavin Occupier: L. Bavin Property: B. School & Dwelling Estate: Bryson	

Nelson Street south between the Pacific Highway and the Main North Shore Line

Year	Eldridge family					"Moorlands" – between Railway Line and Orchard Rd or North part of Nelson Street	R.E. Moore	School Playgrounds
1888 – Carlotta Street	No: 476 Owner: David Eldridge Estate: Gt. Northern Property: Land Capital Value: £80	No: 477 Owner: Sutherland Estate: Gt. Northern Property: Land Capital Value: £80	No: 478 Owner: J.J. Forsyth ex for Seldon's Estate Estate: Gt. Northern Property: Land Capital Value: £500					
1889	No: 123 Owner: David Eldridge Estate: Great Northern Property: Land Capital Value: £80	No: 124 Owner: Sutherland Estate: Great Northern Property: Land Capital Value: £80	No: 125 Owner: Seldons Estate Occupier: J.J. Forsyth ex for Estate: Great Northern Property: Land Capital Value: £500					
1890	No: 123 Owner: W. Eldridge Estate: Great Northern Property: Land Capital Value: £80	No: 124 Owner: Sutherland Estate: Great Northern Property: Land Capital Value: £80	No: 125 Owner: Seldon Estate Occupier: J.J. Forsyth Ex for Estate: Great Northern Property: Land Capital Value: £480					
1891 – Nelson Street	No: 119 Owner: D. Eldridge Estate: Great Northern Property: Land Capital Value: £80	No: 120 Owner: Sutherland Estate: Great Northern Property: Land Capital Value: £80	No: 121 Owner: Seldon Occupier: J.J. Forsyth Exso for Estate: Great Northern Property: Land Capital Value: £480					
1892	No: 119 Owner: D. Eldridge Estate: Gt. Northern Property: Land Capital Value: £80	No: 120 Owner: Sutherland Occupier: now owned by Fructus of late G. Gerard Estate: Gt. Northern Property: Land Capital Value: £80	No: 121 Owner: Seldon Exots Occupier: J.J. Forsyth Exso for Estate: Gt. Northern Property: Land Capital Value: £480			No: 122 Owner: Seldon Exots Occupier: J.J. Forsyth Exso for Estate: Gt. Northern Property: Land Capital Value: £40		
1893	No: 120 Owner: D. Eldridge Estate: Gt. Northern Property: Land Capital Value: £80	No: 121 Owner: Gerard Estate: Gt. Northern Property: Land Capital Value: £80	No: 122 Owner: Seldons Estate Estate: Gt. Northern Property: Land Capital Value: £480			No: 123 Owner: Seldons Estate Estate: Gt. Northern Property: Land Capital Value: £40		
1894	No: 124 Owner: D.E. Eldridge Estate: Gt Northern Property: Land & House new Capital Value: £80	No: 125 Owner: Gerards Exso Estate: Gt Northern Property: Land Capital Value: £80	No: 126 Owner: Seldons Estate J.J. Forsyth Estate: Gt. Northern Property: Land Capital Value: £480	No: 123 Owner: D.E. Eldridge Occupier: Joseph Woodvine Estate: Gt Northern Property: House & Land		No: 127 Owner: Seldons Estate Estate: Gt. Northern Property: Land Capital Value: £40		
1895	No: 131 Owner: D.E. Eldridge Estate: Gt. Northern Property: House & Land	No: 132 Owner: Gerards Exso Estate: Gt. Northern Property: Land Capital Value: £80	No: 133 - In north section Owner: Seldons Estate Estate: Gt. Northern Property: Land Capital Value: £480	No: 130 Owner: D.E. Eldridge Occupier: Joseph Woodvine Estate: Gt. Northern Property: House & Land		No: 134 Owner: Seldons Estate Estate: Gt. Northern Property: Land Capital Value: £40		

Year	Eldridge family					"Moorlands" – between Railway Line and Orchard Rd or North part of Nelson Street	R.E. Moore	School Playgrounds
1896	No: 138 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Gt. Northern Property: House & Land			No: 137 Owner: D.E. Eldridge Occupier: Joseph Woodvine Estate: Gt. Northern Property: House & Land				
1897	No: 143 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Gt Northern Property: House & Land	No: 144 Owner: Gerards Exos Estate: Gt Northern Property: Land Capital Value: £80	No: 145 Owner: N.F. Giblin Estate: Gt Northern Property: Land fenced Capital Value: £350			No: 146 – previously 141 Owner: Jos Woodvine Occupier: Jos Woodvine Estate: Gt Northern Property: House & Land		
1898	No: 148 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: House	No: 149 Owner: Gerards Exoso Estate: Great Northern Property: Land Capital Value: £80	No: 150 Owner: N.F. Giblin Estate: Great Northern Property: Land fenced Capital Value: £350			No: 151 Owner: Jos Woodvine Occupier: Jos Woodvine Estate: Great Northern Property: House		
1899	No: 612 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Gt Northern Property: House	No: 613 Owner: Gerards Exos Estate: Gt Northern Property: Land Capital Value: £80	No: 614 Owner: N.F. Giblin Estate: Gt Northern Property: Land fenced Capital Value: £350			No: 615 Owner: J. Woodvine Occupier: J. Woodvine Estate: Gt Northern Property: House		
1900	No: 652 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: House	No: 653 Owner: Gerards Exos Estate: Great Northern Property: Land Capital Value: £80	No: 654 Owner: N.F. Giblin Estate: Great Northern Property: Land fenced Capital Value: £350			No: 655 Owner: Jos Woodvine Occupier: J. Woodvine Property: House		
1901	No: 331 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Gt. Northern Property: House	No: 332 Owner: Gerards Exos Estate: Gt. Northern Property: Land Capital Value: £80	No: 333 Owner: N.F. Giblin Estate: Gt. Northern Property: Land fenced Capital Value: £350			No: 334 Owner: Jos. Woodvine Occupier: J. Woodvine Property: House Estate: Gt Northern		
1902	No: 336 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: House	No: 337 Owner: L.H. Gerard Estate: Great Northern Property: Land Capital Value: £80	No: 338 Owner: N.F. Giblin Estate: Great Northern Property: Land fenced Capital Value: £300		No: 339 – past year also 333 Owner: Jas. Green Estate: Great Northern Property: Land Capital Value: £140	No: 340 Owner: Jos. Woodvine Occupier: Jos. Woodvine Property: House Estate: Great Northern		
1903	No: 345 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: House	No: 346 Owner: L.H. Gerard Estate: Great Northern Property: Land Capital Value: £80	No: 347 Owner: N.F. Giblin Estate: Great Northern Property: Land fenced Capital Value: £300		No: 348 Owner: James Green Estate: Great Northern Property: Land Capital Value: £140	No: 349 – past railway, between Orchard Rd and Railway Line Owner: J. Woodvine Occupier: J. Woodvine Estate: Great Northern Property: House		
1904	No: 405 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: House	No: 406 Owner: L.H. Gerard Estate: Great Northern Property: Land Capital Value: £80	No: 407 Owner: N.F. Giblin Estate: Great Northern Property: Land fenced Capital Value: £300		No: 408 Owner: James Green Estate: Great Northern Property: Land Capital Value: £140	No: 409 Owner: J Woodvine Occupier: J. Woodvine Estate: Great Northern Property: House		
1905	No: 423 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: House	No: 424 Owner: L.H. Gerard Estate: Great Northern Property: Land Capital Value: £80	No: 425 Owner: N.F. Giblin Estate: Great Northern Property: Land fenced Capital Value: £300		No: 426 Owner: Ja's Green Estate: Great Northern Property: Land Capital Value: £140	No: 427 Owner: Jas Woodvine Occupier: J. Woodvine Estate: Great Northern Property: House		
1906	No: 425 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: House	No: 426 Owner: L.H. Gerard Estate: Great Northern Property: Land Capital Value: £80	No: 427 Owner: Est N.F. Giblin Estate: Great Northern Property: Land fenced Capital Value: £300		No: 428 Owner: Jas Green Estate: Great Northern Property: Land Capital Value: £140	No: 429 Owner: Jos. Woodvine Occupier: J. Woodvine Estate: Great Northern Property: House		
1907	No: 453 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: House	No: 454 Owner: L.H. Gerard Estate: Great Northern Property: Land Capital Value: £80	No: 455 Owner: L. Bavin Estate: Great Northern Property: Land fenced Capital Value: £300		No: 456 Owner: Jas Green Estate: Great Northern Property: Land Capital Value: £140	No: 457 Owner: J. Woodvine Occupier: J. Woodvine Estate: Great Northern Property: House		
1908	No: 468 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: Humpty	No: 469 Owner: Joseph Dangerfield Taylor Estate: Great Northern Property: Land				No: 470 Owner: J. Woodvine Occupier: J. Woodvine, labourer Estate: Great Northern Property: Wd. Cot		

Year	Eldridge family					"Moorlands" – between Railway Line and Orchard Rd or North part of Nelson Street	R.E. Moore	School Playgrounds
1909	No: 483 Owner: D.E. Eldridge Capital Value: £60	No: 484 Owner: L.H. Gerard Capital Value: £60				No: 485 Owner: J. Woodvine Capital Value: £60		
1910	No: 486 Owner: D.E. Eldridge Capital Value: £60	No: 487 Owner: J.D. Taylor Capital Value: £50				No: 488 Owner: J. Woodvine Capital Value: £50		
1911	No: 602 Owner: David E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: Hut	No: 603 Owner: Joseph Dangerfield Taylor Estate: Great Northern				No: 604 Owner: Joseph Woodvine, labourer Occupier: Wd C		
1912	No: 612 Owner: David E. Eldridge Occupier: D.E. Eldridge Estate: Gt. Northern Property: Hut	No: 613 Owner: Joseph D. Taylor Estate: Gt. Northern Property: Vac				No: 614 Owner: Joseph Woodvine, labourer Occupier: J. Woodvine Estate: Gt Northern Property: Wd C		
1913	No: 659 Owner: Mrs E. Eldridge Occupier: D.E. Eldridge Estate: Grt Northern Property: Hut	No: 660 Owner: R.G. Moore Estate: Grt Northern Property: Vac				No: 661 Owner: Joseph Woodvine, labourer Occupier: J. Woodvine Estate: Grt Northern Property: Wd C.		
1914	No: 695 Owner: Mrs E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: Hut	No: 696 Owner: R. Moore Estate: Great Northern Property: vacant				No: 697 Owner: Joseph Woodvine Occupier: J. Woodvine Estate: Great Northern Property: Wd C.		
1915	No: 720 Owner: Mrs E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: Hut	No: 721 Owner: R.E. Moore Occupier: Dudfield Cummins – Pr SDBC Estate: Great Northern				No: 722 Owner: Joseph Woodvine Occupier: J. Woodvine Estate: Great Northern Property: Wd C.		
1916	No: 882 Owner: Mrs E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: Hut	No: 883 Owner: R.E. Moore Occupier: Cummins Dudfield Estate: Great Northern Property: Pr SD BCs				No: 884 Owner: Jos. Woodvine Occupier: J. Woodvine Estate: Great Northern Property: Wd C.		
1917	No: 889 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: Hut	No: 890 Owner: R.E. Moore Occupier: George Dadfield Estate: Great Northern Property: SD. B.C.				No: 893 Owner: Joseph Woodvine Occupier: Joseph Woodvine Property: Wd. C. Estate: Great Northern House Name: Moorlands	No: 891 – previously also 883 Owner: R.E. Moore Occupier: John Cummins Estate: Great Northern Property: SD. B.C.	No. 892 - on Gillam Rd Owner: Lancelot Bavin Property: School Playgrounds Estate: Great Northern
1918	No: 968 Owner: D.E. Eldridge Occupier: D.E. Eldridge Estate: Great Northern Property: Hut	No: 969 Owner: R.E. Moore Occupier: Geo. Dudfield Estate: Great Northern Property: S.D. B.C.				No: 972 Owner: Joseph Woodvine Occupier: J. Woodvine Estate: Great Northern Property: Wd. C. House Name: Moorlands	No: 970 Owner: R.E. Moore Occupier: John Cummins Estate: Great Northern Property: S.D. B.C.	No: 971 Owner: Lancelot Bavin Estate: Great Northern Property: School Playgrounds Fronts Gillam Rd

Bryson and Gillam Streets

Year	South – from Gordon Rd					North – from Gordon Rd							
1886					No: 429 Owner: Henry Kirby Estate: Bryson Property: Land Capital Value: £5	No: 708 Owner: J. Thompson Capital Value: £8							

Year	South – from Gordon Rd						North – from Gordon Rd								
1888	No: 464 Owner: Bryson Estate: Bryson Property: Land Capital Value: £100	No: 465 Owner: F.J. Barker Estate: Bryson Property: Land Capital Value: £200		No: 466 Owner: J. Hawksford Estate: Bryson Property: Land Capital Value: £100	No: 467 Owner: Mrs Bryson Estate: Bryson Property: Land Capital Value: £100	No: 468 Owner: H Kirby script Estate: Bryson Property: Land Capital Value: £120	No: 475 Owner: John Thompson Estate: Bryson Property: Unfd House				No: 469 Owner: Mrs Bryson Estate: Bryson Property: Land Capital Value: £80	No: 470 Owner: W.J. Giuse Estate: Bryson Property: Land Capital Value: £100	No: 471 Owner: J.N. Scott Estate: Bryson Property: Land Capital Value: £200	No: 473 Owner: John Thompson? Estate: Bryson Property: Land Capital Value: £100	No: 474 Owner: John Thompson? Estate: Bryson Property: Land Capital Value: £100
1889	No: 115 Owner: Sarah Elizabeth Dawson Estate: Bryson's Property: Land Capital Value: £120	No: 116 Owner: F.J. Barker Estate: Bryson's Property: Land Capital Value: £200		No: 117 Owner: J. Hawksford Estate: Bryson's Property: Land Capital Value: £100	No: 118 Owner: Mrs Bryson Estate: Bryson's Property: Land Capital Value: £100	No: 119 Owner: H. Kirby script Lessee: sold Loxton & B. Estate: Bryson's Property: Land Capital Value: £120					No: 120 Owner: Mrs Bryson Estate: Bryson Property: Land Capital Value: £80	No: 121 Owner: W.J. Giuse Estate: Bryson Property: Land Capital Value: £100	No: 122 Owner: J.W. Eaton Lessee: Geo. Leafe Estate: Bryson Property: Land Capital Value: 200		
1890	No: 115 Owner: Sarah E. Dawson Estate: Bryson Property: Land Capital Value: £120	No: 116 Owner: F.J. Barker Estate: Bryson Property: Land Capital Value: £200		No: 117 Owner: J. Hawksford Estate: Bryson Property: Land Capital Value: £100	No: 118 Owner: Mrs Bryson Estate: Bryson Property: Land Capital Value: £100	No: 119 Owner: Kirby script, sold Loxton & Bullock Estate: Bryson Property: Land Capital Value: £120					No: 120 Owner: Mrs Bryson Estate: Bryson Property: Land Capital Value: £80	No: 121 Owner: W.J. Guise Estate: Bryson Property: Land Capital Value: £100	No: 122 Owner: Geo. Leafe Estate: Bryson Property: Land Capital Value: £200		
1891	No: 110 Owner: Mrs Sarah Russon Estate: Bryson's Property: Land Capital Value: £120	No: 111 Owner: F.J. Barker Estate: Bryson's Property: Land Capital Value: £200		No: 112 Owner: J. Hawksford Estate: Bryson's Property: Land Capital Value: £100	No: 113 Owner: Mrs Bryson Estate: Bryson's Property: Land Capital Value: £100	No: 114 Owner: Loxton & Bullock Estate: Bryson's Property: Land Capital Value: £120	No: 118 – new? Owner: John Thompson Occupier: John Hutchinson Estate: Bryson's Property: House & Land				No: 115 Owner: Mrs Bryson Estate: Bryson's Property: Land Capital Value: £80	No: 116 Owner: W.J. Guise Estate: Bryson's Property: Land Capital Value: £100	No: 117 Owner: Geo. Leafe Estate: Bryson's Property: Land Capital Value: £200		
1892	No: 110 Owner: Mrs Sarah Russon Estate: Bryson's Property: Land Capital Value: £120	No: 111 Owner: F.J. Barker Estate: Bryson's Property: Land Capital Value: £200		No: 112 Owner: J. Hawksford or owner – Estate: Bryson's Property: Land Capital Value: £100	No: 113 Owner: Mrs Bryson Estate: Bryson's Property: Land Capital Value: £100	No: 114 Owner: Loxton & Bullock Estate: Bryson's Property: Land Capital Value: £120	No: 118 Owner: Mrs Hammond Occupier: John Hutchinson Estate: Bryson's Property: House & Land				No: 115 Owner: Mrs Bryson Estate: Bryson's Property: Land Capital Value: £80	No: 116 Owner: W.J. Guise Estate: Bryson's Property: Land Capital Value: £100	No: 117 Owner: Geo. Leafe Estate: Bryson's Property: Land Capital Value: £200		
1893	No: 111 Owner: John Dawson Estate: Bryson's Property: Land Capital Value: £120	No: 112 Owner: F.J. Barker Estate: Bryson's Property: Land Capital Value: £200		No: 113 Owner: J. Hawksford Estate: Bryson's Property: Land Capital Value: £100	No: 114 Owner: Mrs Bryson Estate: Bryson's Property: Land Capital Value: £100	No: 115 Owner: Loxton & Bullock Estate: Bryson's Property: Land Capital Value: £120	No: 119 Owner: Mrs Hammond Occupier: P.C. Miller Estate: Bryson's Property: House & Land				No: 116 Owner: Mrs Bryson Estate: Bryson's Property: Land Capital Value: £80	No: 117 Owner: W.J. Guise Estate: Bryson's Property: Land Capital Value: £100	No: 118 Owner: Geo. Leafe Estate: Bryson's Property: Land Capital Value: £200		
1894	No: 114 Owner: Frederick Dawson Estate: Bryson's Property: Land Capital Value: £120	No: 115 Owner: F.J. Barker Estate: Bryson's Property: Land Capital Value: £200		No: 116 Owner: J. Hawksford Estate: Bryson's Property: Land Capital Value: £100	No: 117 Owner: Mrs Bryson Estate: Bryson's Property: Land Capital Value: £100	No: 118 Owner: Loxton & Bullock Estate: Bryson's Property: Land Capital Value: £120	No: 122 Owner: Mrs Hammond Occupier: P.C. Miller Estate: Bryson's Property: House & Land				No: 119 Owner: Mrs Bryson Estate: Bryson's Property: Land Capital Value: £80	No: 120 Owner: W.J. Guise Estate: Bryson's Property: Land Capital Value: £100	No: 121 Owner: Geo. Leafe Estate: Bryson's Property: Land Capital Value: £200		
1895	No: 121 Owner: Fredk. Dawson Estate: Bryson's Property: Land	No: 122 Owner: F.J. Barker Estate: Bryson's Property: Land		No: 123 Owner: J. Hawksford Estate: Bryson's Property: Land	No: 124 Owner: Mrs Bryson Estate: Bryson's Property: Land	No: 125 Owner: Loxton & Bullock Estate: Bryson's Property: Land	No: 129 Owner: Mrs Hammond Occupier: Wilkie Estate: Bryson's Property: House & Land				No: 126 Owner: Mrs Bryson Estate: Bryson's Property: Land	No: 127 Owner: W.J. Guise Estate: Bryson's Property: Land	No: 128 Owner: Geo. Leafe Estate: Bryson's Property: Land		

Year	South – from Gordon Rd						North – from Gordon Rd								
1896	No: 128 Owner: Fred. Dawson Estate: Bryson's Property: Land Capital Value: £90	No: 129 Owner: F.J. Barker Estate: Bryson's Property: Land Capital Value: £200		No: 130 Owner: J. Hawksford Estate: Bryson's Property: Land Capital Value: £100	No: 131 Owner: Mrs Bryson Estate: Bryson's Property: Land Capital Value: £60	No: 132 Owner: Loxton & Bullock Estate: Bryson's Property: Land Capital Value: £120	No: 136 Owner: Mrs Hammond Occupier: W. Wilkie Estate: Bryson's Property: House & Land				No: 133 Owner: Mrs Bryson Estate: Bryson's Property: Land Capital Value: £80	No: 134 Owner: W.J. Guise Estate: Bryson's Property: Land Capital Value: £100	No: 135 Owner: Geo. Leafe Estate: Bryson's Property: Land Capital Value: £200		
1897	No: 134 Owner: Fred Dawson Estate: Bryson's Property: Land Capital Value: £90	No: 135 Owner: City Bank Estate: Bryson's Property: Land Capital Value: £200		No: 136 Owner: J. Hawksford Estate: Bryson's Property: Land Capital Value: £100	No: 137 Owner: Abner Hammond Estate: Bryson's Property: Land Capital Value: £60	No: 138 Occupier: C.C. & Bullock Estate: Bryson's Property: Land Capital Value: £120	No: 142 Owner: Jos. Senr Hammond Occupier: W. Wilkie Estate: Bryson's Property: House & Land			No: 139 Owner: Mrs Bryson (decd) Estate: Bryson's Property: Land Capital Value: £80	No: 140 Owner: W.J. Guise Estate: Bryson's Property: Land Capital Value: £100	No: 141 Owner: Geo. Leafe Estate: Bryson's Property: Land Capital Value: £200			
1898	No: 139 Owner: Fred Dawson Brysons Estate Property: Land Capital Value: £90	No: 140 Owner: City Bank Brysons Estate Property: Land Capital Value: £200		No: 141 Owner: J. Hawksford Brysons Estate Property: Land Capital Value: £100	No: 142 Owner: Abner Hammond Brysons Estate Property: Land Capital Value: £60	No: 143 Owner: C.C. Bullock Brysons Estate Property: Land Capital Value: £120	No: 147 Owner: Jos. Senr Hammond Occupier: W. Wilkie Brysons Estate Property: House			No: 144 Owner: Jon Jr Forsyth Brysons Estate Property: Land Capital Value: £80	No: 145 Owner: W.J. Guise Brysons Estate Property: Land Capital Value: £100	No: 146 Owner: Geo. Leafe Brysons Estate Property: Land Capital Value: £200			
1899	No: 158 Owner: Fred Dawson Estate: Bryson's Property: Land Capital Value: £90	No: 159 Owner: City Bank Estate: Bryson's Property: Land Capital Value: £200		No: 160 Owner: J. Hawksford Estate: Bryson's Property: Land Capital Value: £100	No: 161 Owner: Abner Hammond Estate: Bryson's Property: Land Capital Value: £60	No: 162 Owner: Bank of New Zealand Estate: Bryson's Property: Land Capital Value: £120	No: 166 Owner: Jos. Hammond Sr Occupier: W. Wilkie Estate: Bryson's Property: House			No: 163 Owner: James Forsyth Jr Estate: Bryson's Property: Land Capital Value: £80	No: 164 Owner: W.J. Guise Estate: Bryson's Property: Land Capital Value: £100	No: 165 Owner: Geo. Leafe Estate: Bryson's Property: Land Capital Value: £200			
1900	No: 191 Owner: Jno. Dawson Brysons Estate Property: Land Capital Value: £80	No: 192 Owner: City Bank Brysons Estate Property: Land Capital Value: £200		No: 193 Owner: Robt. Lymes Brysons Estate Property: Land Capital Value: £100	No: 194 Owner: Abner Hammond Brysons Estate Property: Land Capital Value: £60	No: 195 Owner: Willoughby Council Brysons Estate	No: 199 Owner: Jos. Hammond Sr. Occupier: Refd Bellman Brysons Estate Property: House			No: 196 Owner: Jas Forsyth Jr. Brysons Estate Property: Land Capital Value: £80	No: 197 Owner: W.J. Guise Brysons Estate Property: Land Capital Value: £100	No: 198 Owner: Geo. Leafe Brysons Estate Property: Land Capital Value: £200			
1901	No: 65 Owner: Jno. Dawson Estate: Bryson's Property: Land Capital Value: £60	No: 67 – previously 192 split Owner: City Bank Estate: Bryson's Property: Land Capital Value: £80	No: 66 – previously 192 split Owner: R. Vince Occupier: R. Vince Estate: Bryson's Property: House	No: 68 Owner: Robt Lymes Estate: Bryson's Property: Land Capital Value: £80	No: 69 Owner: Abner Hammond Estate: Bryson's Property: Land Capital Value: £60	No: 70 Owner: Willby Council Estate: Bryson's Property: Land	No: 74 Owner: Jas. Hammond Sr. Occupier: Refd. Bellman Estate: Bryson's Property: House			No: 71 Owner: Jas. Forsyth Jr. Estate: Bryson's Property: Land Capital Value: £80	No: 72 Owner: W.J. Guise Estate: Bryson's Property: Land Capital Value: £100	No: 73 Owner: Geo. Leafe Estate: Bryson's Property: Land Capital Value: £100			
1902	No: 64 Owner: A.A. Russon Estate: Bryson's Property: Land Capital Value: £60	No: 66 Owner: City Bank Estate: Bryson's Property: Land Capital Value: £80	No: 65 Owner: R. Vince Occupier: R. Vince Estate: Bryson's Property: House	No: 67 Owner: Robt. Lymes Estate: Bryson's Property: Land Capital Value: £80	No: 68 Owner: Abner Hammond Estate: Bryson's Property: Land Capital Value: £60		No: 72 Owner: Jos. Hammond Sr. Occupier: Mrs Walsham Estate: Bryson's Property: House			No: 69 Owner: Thos. P. Gorman Estate: Bryson's Property: Land Capital Value: £80	No: 70 Owner: W.J. Guise Estate: Bryson's Property: Land Capital Value: £100	No: 71 Owner: Geo. Leafe Estate: Bryson's Property: Land Capital Value: £100			
1903	No: 62 Owner: A.A. Russon Estate: Bryson's Property: Land Capital Value: £60	No: 64 Owner: City Bank of Sydney Estate: Bryson's Property: Land Capital Value: £60	No: 63 Owner: R. Vince Occupier: R. Vince Estate: Bryson's Property: House + Laundry	No: 65 Owner: Robt. Lymes Estate: Bryson's Property: Land Capital Value: £60	No: 66 Owner: T. Gorman Estate: Bryson's Property: Land Capital Value: £60		No: 70 Owner: Jos. Hammond Sr. Occupier: Miss Wright? Estate: Bryson's Property: House			No: 67 Owner: T. Gorman Estate: Bryson's Property: Land Capital Value: £60	No: 68 Owner: W.J. Guise Estate: Bryson's Property: Land Capital Value: £60	No: 69 Owner: Geo. Leafe Estate: Bryson's Property: Land Capital Value: £120			
1904	No: 73 Owner: A.H. Russon Estate: Bryson's Property: Land Capital Value: £60	No: 75 Owner: City Bank of Sydney Estate: Bryson's Property: Land Capital Value: £60	No: 74 Owner: R. Vince Occupier: R. Vince Estate: Bryson's Property: House + Laundry	No: 76 Owner: Robt. Lymes Estate: Bryson's Property: Land Capital Value: £60	No: 77 Owner: T. Gorman Estate: Bryson's Property: Land Capital Value: £60		No: 81 Owner: Jos. Hammond Sr. Occupier: Miss Wright Estate: Bryson's Property: House			No: 78 Owner: Abner Hammond Estate: Bryson's Property: Land Capital Value: £60	No: 79 Owner: W.J. Guise Estate: Bryson's Property: Land Capital Value: £60	No: 80 Owner: Geo. Leafe Estate: Bryson's Property: Land Capital Value: £120			

Year	South – from Gordon Rd						North – from Gordon Rd								
1905	No: 76 Owner: Mrs A. A. Vince Estate: Bryson's Property: Land Capital Value: £50	No: 78 Owner: City Bank of Sydney Estate: Bryson's Property: Land Capital Value: £50	No: 77 Owner: R. Vince Occupier: Vac Estate: Bryson's Property: House & Laundry	No: 79 Owner: Robt. Lymes Estate: Bryson's Property: Land Capital Value: £50	No: 80 Owner: T. Gorman Estate: Bryson's Property: Land Capital Value: £50		No: 84 Owner: J.S. Hammond Occupier: Jo. Hammond Jr. Estate: Bryson's Property: House				No: 81 Owner: Abner Hammond Estate: Bryson's Property: Land Capital Value: £50	No: 82 Owner: W.J. Guise Estate: Bryson's Property: Land Capital Value: £50	No: 83 Owner: Geo. Leafe Estate: Bryson's Property: Land Capital Value: £100		
1906	No: 79 Owner: D. Keely Estate: Bryson Property: Land Capital Value: £50	No: 81 Owner: City Bank of Sydney Estate: Bryson Property: Land Capital Value: £50	No: 80 Owner: D. Neely Estate: Bryson Property: House & Laundry	No: 82 Owner: Robert Symes Estate: Bryson Property: Land Capital Value: £50	No: 83 Owner: Thos. Gorman Estate: Bryson Property: Land Capital Value: £50		No: 87 Owner: Jos. J. Hammond Jnr Occupier: Jos. J. Hammond Jnr Estate: Bryson Property: House				No: 84 Owner: Abner Hammond Estate: Bryson Property: Land Capital Value: £50	No: 85 Owner: N.F. Guise Estate: Bryson Property: Land Capital Value: £50	No: 86 Owner: Thos. Leafe Estate: Bryson Property: Land Capital Value: £100		
1907	No: 90 Owner: D. Neely Brysons Estate Property: Land Capital Value: £50	No: 92 Owner: City Bank of Sydney Brysons Estate Property: Land Capital Value: £50	No: 91 Owner: D. Neely House Name: Albury Brysons Estate Property: House	No: 93 Owner: Robt Symes Brysons Estate Property: Land Capital Value: £50	No: 94 Thos. Gorman Brysons Estate Property: Land Capital Value: £50		No: 98 – previously 87 split Owner: Jos. Hammond Brysons Estate Property: Land Shops & House Capital Value: £100		No: 99 – previously 87 split Owner: Mrs Hammond Occupier: J. Hammond Jnr Brysons Estate Property: House Capital Value: £100		No: 95 Owner: L.R. Bavin Brysons Estate Property: Land Capital Value: £50	No: 96 Owner: Est N.F. Guise Brysons Estate Property: Land Capital Value: £50	No: 97 Owner: Thos. Leafe Brysons Estate Property: Land Capital Value: £100		
1908	No: 95 Owner: D. Neely Brysons Estate Est Property: Land	No: 97 Owner: City Bank Property: Land	No: 96 Owner: H. Hewsby Occupier: J. H. Horne, carter Property: Wd. Cottage	No: 98 Owner: Robert Symes	No: 99 Owner: L. Bavin, School master		No: 100 – previously 98 & 99 split – new? Owner: Jos Hammond Occupier: W.E. Jackson, accountant Property: SD Bk Cot	No: 101 – previously 98 & 99 split new Owner: Jos Hammond Occupier: Jos Hammond, butcher	No: 102 – previously 98 & 99 split Owner: Mrs Hammond Occupier: Jos Smith, butcher Property: Brick Cot						
1909	No: 97 Owner: D. Neely Capital Value: £50	No: 99 Owner: City Bank Capital Value: £50	No: 98 Owner: D. Neely Capital Value: £50	No: 100 Owner: Robt Symes Capital Value: £50	No: 101 Owner: L. Bavin Capital Value: £50		No: 102 Owner: Jos Hammond Capital Value: £40	No: 103 Owner: Jos Hammond Capital Value: £60	No: 104 Mrs Hammond Capital Value: £54						
1910	No: 96 Owner: D. Neely Capital Value: £50	No: 98 Owner: City Bank Capital Value: £50	No: 97 Owner: H. Hensby Capital Value: £50	No: 99 Owner: R. Symes Capital Value: £50	No: 100 Owner: L. Bavin Capital Value: £50		No: 101 Owner: J. Hammond Capital Value: £40	No: 102 Owner: J. Hammond Capital Value: £60	No: 103 Owner: Mrs Hammond Capital Value: £54						
1911	No: 118 Owner: D. Neely Property: Vacant Estate: Bryson	No: 120 Owner: City Bank of Sydney Property: Vacant	No: 119 Owner: H. Hensby Occupier: Edward Smith, carrier Property: Wd. C	No: 121 Owner: Robt Symes Property: Vacant			No: 122 Owner: Mrs J. Hammond Snr Occupier: Frank Stelfox, masseur Property: S.D. B.C.	No: 123 Owner: Mrs J. Hammond Snr Occupier: Jos. J. Hammond, butcher Property: S B.C.	No: 124 Owner: Mrs J. Hammond Snr Occupier: Mrs Hammond, butcher Property: B.C. House Name: Manila						
1912	No: 120 Owner: Joseph Hammond Snr Property: Vacant Estate: Bryson	No: 122 Owner: City bank of Sydney Property: Vacant	No: 121 Owner: H. Hensby (Est of) Occupier: Mrs Hensby Property: Wd. C	No: 123 Owner: Robt Symes			No: 124 Owner: Mrs Hammond Snr. Occupier: Frank Stelfox, masseur Property: S.D. B.C.	No: 125 Owner: Mrs Hammond Snr. Occupier: Jno Hammond, butcher Property: SD B.C.	No: 126 Owner: Mrs J. Hammond Snr. Occupier: Mrs Hammond Property: B.C. House Name: Manila						

Year	South – from Gordon Rd						North – from Gordon Rd							
1913	No: 160 Owner: Joseph J. Hammond Occupier: J. Hammond Property: B.C. Vac Estate: Bryson	No: 162 Owner: City Bank of Sydney Property: Vac Estate: Bryson	No: 161 Owner: Estate of H. Hensby Property: Wd. C Estate: Bryson	No: 163 Owner: Ms M.E. Green Property: Vac Estate: Bryson			No: 164 Owner: Mrs T. Hammond Snr. Occupier: F. Stelfox Property: S.D.B.C.	No: 165 Owner: Mrs Hammond Snr. Occupier: Excell Property: S.D.B.C.	No: 166 Owner: W. Hammond Snr. Occupier: W. Hammond Property: B.C. House Name: Manila					
1914	No: 160 Owner: Joseph Hammond Snr Occupier: J. Hammond Property: B.C. Estate: Bryson	No: 162 Owner: L. Bavin Property: Vac Estate: Bryson	No: 161 Owner: Estate of H. Hensby Occupier: Mrs Hensby Property: Wd C Estate: Bryson	No: 163 Owner: Mrs M.E. Green L. Bavin Property: Vac Estate: Bryson			No: 164 Owner: Mrs J. Hammond Senr Occupier: Arthur Fairbrothers Property: S.D.B.C.	No: 165 Owner: Mrs J. Hammond Senr Occupier: Leonard Hammond Property: S.D.B.C.	No: 166 Owner: Mrs J. Hammond Senr Property: B.C. House Name: Manila					
1915	No: 165 Owner: Joseph S. Hammond Occupier: J.S. Hammond Property: B.C. Estate: Bryson House Name: Dulcie	No: 167 Owner: L. Bavin Property: Vac Estate: Bryson	No: 166 Owner: Estate of H. Hensby Occupier: W. Hensby Property: W.C. Estate: Bryson	No: 168 Owner: L. Bavin & Phillips Property: Vac Estate: Bryson			No: 169 Owner: Mrs J. Hammon Senr Occupier: Farebrother Property: S.D.B.C. House Name: Lakefield	No: 170 Owner: Mrs Hammond Occupier: L. Hammond Property: S.D.B.C. House Name: Loubet	No: 171 – previously 166 split Owner: Mrs Hammond Occupier: Derrick Property: B.C. House Name: Manila					
1916	No: 201 Owner: Jos. S. Hammond Occupier: J.S. Hammond Property: B.C. Estate: Bryson House Name: Dulcie	No: 203 Owner: L. Bavin Property: Vac Estate: Bryson	No: 202 Owner: Estate of H. Hensby Occupier: Mrs Hensby Property: Wd. C. Estate: Bryson	No: 204 Owner: Bavin & Phillips Property: Vac Estate: Bryson			No: 205 Owner: Mrs J. Hammond Senr Occupier: Farebrother Property: S.D.B.C. House Name: Lakefield	No: 206 Owner: Mrs J. Hammond Senr Occupier: L. Hammond Property: S.D.B.C. House Name: Loubet	No: 207 Owner: Mrs J. Hammond Senr Property: B.C.	No: 208 Owner: Mrs J. Hammond Senr Occupier: Derrick Property: B.C. House Name: Manila				
1917	No: 200 Owner: Joseph Smith Hammond Property: B.C. Brysons Estate House Name: Dulcie	No: 202 Owner: Lancelot Bavin Property: Vac Brysons Estate	No: 201 Owner: Estate of H. Hensby Occupier: Mrs Lucy Marie Hensby Property: Wd. C. Brysons Estate	No: 203 Owner: Bavin & Phillips Property: Vac Brysons Estate			No: 204 Owner: Mrs J. Hammond Senr Occupier: Wm. Ed. Russell Property: S.D.B.C. House Name: Lakefield	No: 205 Owner: Mrs J. Hammond Senr Occupier: Govenor James Page Property: S.D.B.C. House Name: Loubet	No: 206 Owner: Mrs J. Hammond Senr Occupier: Leonard Hammond Property: B.C.	No: 207 Owner: Mrs J. Hammond Senr Occupier: Frederick Harwood Property: B.C. House Name: Manila				
1918	No: 217 Owner: Joseph Smith Hammond Occupier: J.S. Hammond Property: B.C. Estate: Bryson's House Name: Dulcie	No: 219 Owner: Lancelot Bavin Property: Vac Estate: Bryson's	No: 218 Owner: Lancelot Bavin & Phillips Occupier: Mrs Lucy Marie Hensby Property: Wd. C. Estate: Bryson's	No: 220 Owner: Bavin & Phillips Property: Vac Estate: Bryson's			No: 221 Owner: Mrs J. Hammond Senr Occupier: William Edward Russell Property: S.D.B.C. House Name: Lakefield	No: 222 Owner: Mrs J. Hammond Senr Occupier: Governor Scott Jas. Page Property: S.D.B.C. House Name: Loubet	No: 223 Owner: Mrs J. Hammond Senr Occupier: Leonard Hammond Property: B.C.	No: 224 Owner: Mrs J. Hammond Senr Occupier: Fredk. Harwood Property: B.C. House Name: Manila				

Appendix B Sydney Metro Unexpected Heritage Finds Procedure



Unexpected Heritage Finds Procedure

SM-20-00099497

Metro Body of Knowledge (MBoK)

Applicable to:	Sydney Metro
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1. Introduction

1.1. Purpose

This Procedure has been prepared to provide a consistent approach to the management of unexpected Aboriginal and historic heritage uncovered during Sydney Metro activities. It applies to all Sydney Metro activities, both the pre-construction (prior to the Construction Heritage Management Plan approval) and construction phase (post Construction Heritage Management Plan approval) and pre or post-approval activities that are subject to the NSW *Heritage Act (1977)* (Heritage Act) and the *National Parks and Wildlife Act 1974* (NPW Act).

In NSW, there are strict laws to protect and manage both Aboriginal and historic heritage. As a result, appropriate management measures need to be implemented to avoid or minimise impacts, ensure compliance with statutory requirements, and to minimise the risk of penalties to individuals, Sydney Metro, and its contractors. This Procedure outlines Sydney Metro's obligations under the Heritage Act, NPW Act and the *Coroner's Act 2009* and State Significant Infrastructure (SSI) or State Significant Development (SSD) approvals issued by NSW Department of Planning and Environment where applicable.

Note that a Contractor must not amend this Procedure or use a different procedure without the prior approval of Sydney Metro.

This Procedure must be read in conjunction with the relevant approval conditions, contract documents and other plans and procedures including [SM-20-00099495 Exhumation Management Procedure](#), in addition to any other relevant documents as developed by the contractor for the delivery of Sydney Metro activities.

1.2. Scope

This Procedure applies to the discovery of any unexpected heritage item, where the find is not anticipated in an approved Archaeological Research Design (ARD) or Archaeological Method Statement (AMS) or other project specific document related to heritage. It applies to all Sydney Metro activities.

This Procedure must be followed by all Sydney Metro staff, contractors, subcontractors or any person undertaking work for Sydney Metro. It includes references to some of the relevant legislative and regulatory requirements but is not intended to replace them.

This Procedure *does not apply* to the discovery and disturbance of a heritage item:

- As a result of investigations being undertaken in accordance with the *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW 4376 2010*; an Aboriginal Heritage Impact Permit (AHIP) issued under the NPW Act; or a permit approval issued under the Heritage Act; or
- As a result of construction related activities, where the disturbance is permissible in accordance with an AHIP, or an approval issued under the Heritage Act or State SSI or SSD planning approval; or
- Of local significance, where the find is identified and anticipated to occur in an AMS or ARD.

Construction Environment Management Plans (CEMPs), which are reviewed by the Sydney Metro Heritage team, should reference or include this Procedure. Where there is an approved CEMP, it must be followed in the first instance. Where there is a difference between approved

CEMPs and this Procedure, the approved CEMP must be followed. Where an approved CEMP does not provide sufficient detail on particular issues, this Procedure should be used as a reference.

1.3. Definitions and abbreviations

1.3.1. What is an unexpected heritage find?

An 'unexpected heritage find' can be defined as a:

- Unanticipated discovery of an Aboriginal object or archaeological work or relic, which Sydney Metro does not have approval to disturb and/or is not covered under an existing management process or plan
- Find that has not been identified or assessed in a project assessment or document related to heritage
- Find that is not referenced in an archaeological research design (ARD) or archaeological method statement (AMS)
- Find that is not covered by an existing approval under the NPW Act or Heritage Act.

1.3.2. Abbreviations

All terminology in this Procedure is taken to mean the generally accepted or dictionary definition. Acronyms and terms specific to this document are listed below.

Other terms and jargon are defined within the [SM-17-00000203 Sydney Metro Glossary](#).

Table 1: Terms/acronyms and definitions

	Definitions
Aboriginal object	An Aboriginal object is any deposit, object or material evidence (not being a handcraft made for sale) relating to the Aboriginal habitation of the area, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.
AHIP	Aboriginal Heritage Impact Permit.
AMS	Archaeological Method Statement.
ARD	Archaeological Research Design.
CEMP	Construction Environmental Management Plan.
CoA	Conditions of Approval.
CSSI	Critical State Significant Infrastructure.
Disturbance	Disturbance is considered to be any physical interference to an item that results in it being destroyed, defaced, damaged, harmed, impacted or altered in any way (this includes archaeological investigation activities).
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i> .
Excavation Director	A person that has been determined by the Heritage Council of NSW or its delegate to meet the <i>Criteria for Assessment of Excavation Directors</i> (4 September 2019 and as updated) and can therefore competently archaeologically investigate a site of either local and/or state significance.
Heritage Act	NSW <i>Heritage Act 1977</i> .
Heritage NSW	Formerly Office of Environment and Heritage (OEH). Now Heritage NSW .

	Definitions
NPW Act	NSW <i>National Parks and Wildlife Act 1974</i> .
Relic	A relic means any deposit, artefact, object or material evidence that: <ol style="list-style-type: none"> relates to the settlement of the area that comprises NSW, not being Aboriginal settlement; and is of State or local significance.
SSD	State Significant Development.
SSI	State Significant Infrastructure.

1.4. Accountabilities

The Executive Director, Environment, Sustainability & Planning is accountable for this Procedure including approving the document, monitoring its effectiveness and performing a formal document review.

Direct Reports to the Chief Executive are accountable for ensuring the requirements of this Procedure are implemented within their area of responsibility.

Direct Reports to the Chief Executive who are accountable for specific projects/programs are accountable for ensuring associated contractors comply with the requirements of this Procedure.

2. Types of unexpected heritage finds and their statutory protections

Project, field and environmental personnel (including construction contractors) are critical to the early identification and protection of unexpected heritage finds.

[Appendix A: Examples of unexpected heritage finds](#) illustrates the wide range of heritage items uncovered to date during Transport for NSW projects and provides an understanding of what unexpected finds may look like.

Unexpected heritage finds are categorised as either:

- Aboriginal objects;
- Historic (non-Aboriginal) heritage items; or
- Human skeletal remains.

The relevant legislation that applies to each of these categories is described below.

2.1. Aboriginal objects

The NPW Act provides the basis for the care, protection and management of Aboriginal objects and places in NSW.

An Aboriginal object is defined as: *any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction and includes Aboriginal remains.*

An 'Aboriginal place' is an area declared by the Minister administering the Act to be of special significance with respect to Aboriginal culture. An Aboriginal place does not have to contain physical evidence of occupation (such as Aboriginal objects).

Under section 87 of the Act, it is an offence to harm or desecrate an Aboriginal object or place. There are strict liability offences. An offence cannot be upheld where the harm or desecration was authorised by an AHIP and the permit's conditions were not contravened. Defences and exemptions to the offence of harming an Aboriginal object or Aboriginal place are provided in section 87, 87A and 87B of the Act. A person must notify Heritage NSW if a person is aware of the location of an Aboriginal object.

Penalties for some of the offences can include two years imprisonment and/or up to \$550,000 (for individuals), and a maximum penalty of \$1.1 million (for corporations).

Examples of Aboriginal objects include stone artefacts, shell middens, axe grinding grooves, pigment or engraved rock art, burials and scarred trees.

IMPORTANT!

All Aboriginal objects, regardless of significance, are protected under law.

If any impact is expected to an Aboriginal object, an AHIP is usually required from Heritage NSW. When a person becomes aware of an Aboriginal object, they must notify Heritage NSW about its location. Assistance on how to do this is provided in section 4 (Step 5).

2.2. Historic heritage items

The Heritage Act provides for the care, protection and management of heritage items in NSW. Historic heritage include:

- Archaeological 'relics' as defined under the Heritage Act; and
- Other historic heritage such as works, buildings or movable objects, which are not considered 'relics' under the Act.

2.2.1. Archaeological relics

Under section 139, it is an offence to disturb or excavate any land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed, unless the disturbance or excavation is carried out in accordance with an excavation permit issued by Heritage NSW under the Act.

A relic is defined as: *'any deposit, artefact, object or material evidence that: (a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and (b) is of State or local heritage significance.'*

A person must notify Heritage NSW, if a person is aware or believes that they have discovered or located a relic (section 146). Penalties for offences under the Heritage Act can include six months imprisonment and/or a fine of up to \$1.1million.

IMPORTANT!

All relics are subject to statutory controls and protection.

If a relic is likely to be disturbed, an approval is usually required from the Heritage Council of NSW. When a person discovers a relic, they must notify the Heritage Council of NSW of its location.

2.2.2. Other historic heritage

Some historic heritage items are not considered to be 'relics', but are instead referred to as works, buildings, or movable objects. Examples of these items include culverts, former road surfaces, retaining walls, tramlines, rail track or sleepers, cisterns, fences, buildings and conduits.

Usually archaeological relics are uncovered via a process of excavation or soil removal. When an unexpected find is uncovered, an archaeological excavation permit under section 140 or section 60 of the Heritage Act may be required to further investigate or remove it if investigation is not covered by an existing approval. In contrast, 'other historic items' either exist above the ground surface (for example a shed), or they are designed to operate and exist beneath the ground surface (for example a culvert). They may also need a permit to alter, disturb or remove them if there is not an approval already in place.

2.3. Human skeletal remains

[SM-20-00099495 Exhumation Management Procedure](#) provides a more detailed explanation of the approval processes related to human skeletal remains.

Human skeletal remains can be classified as:

- Reportable deaths;
- Aboriginal objects; or
- Relics.

Where it is suspected that less than 100 years has elapsed since death, human skeletal remains come under the jurisdiction of the State Coroner and the *Coroners Act 2009* (NSW). Under s35(2) of the Act, a person must report a death to a police officer, a coroner or an assistant coroner as soon as possible. This applies to all human remains less than 100 years old regardless of ancestry. Public health controls may also apply.

Where the remains are suspected of being more than 100 years old, they are considered to be either Aboriginal objects or non-Aboriginal relics, depending on the ancestry of the individual. Aboriginal human remains are protected under the NPW Act, while non-Aboriginal heritage remains are protected under the Heritage Act.

The approval and notification requirements of these Acts are described above in Sections 2.1 and 2.2. The discovery of Aboriginal human remains also triggers notification requirements to the Commonwealth Minister for the Environment under s20 (1) of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.

IMPORTANT!

All human skeletal remains are subject to statutory controls and protections.

All bones must be treated as potential human skeletal remains and work around them must stop while they are protected and investigated urgently.

3. Unexpected heritage finds procedure

On discovering something that could be an unexpected heritage item on a Sydney Metro project, the following procedure must be followed. There are seven steps in the procedure.

IMPORTANT!

Sydney Metro may have approval to impact certain heritage items during construction. If you think that you may have discovered a heritage item and you are unsure whether an approval is in place or not, **STOP** work and follow this Procedure.

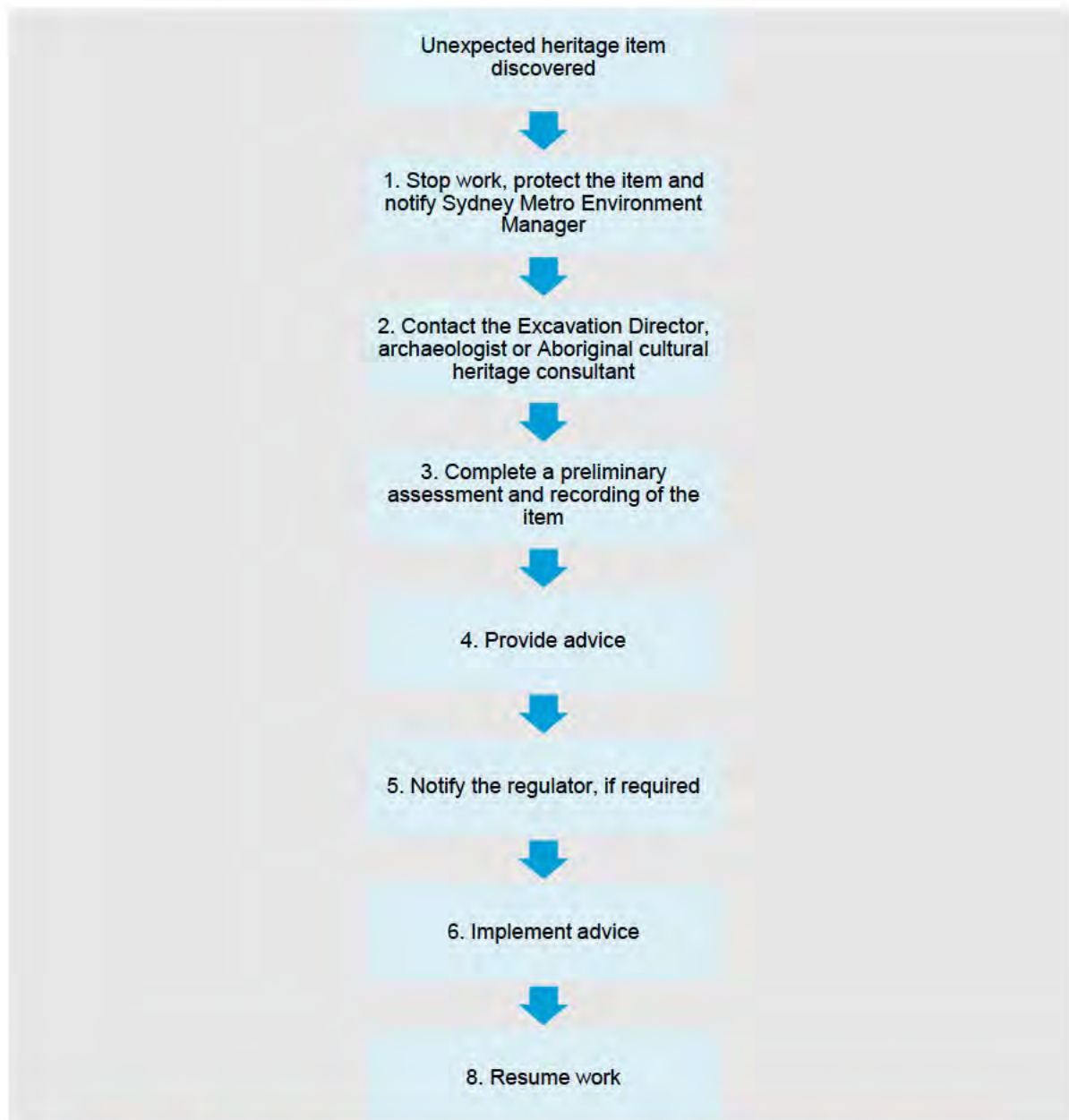


Figure 1: Summary of steps to be taken on the discovery of an unexpected heritage item

Table 2: Specific tasks to be implemented following the discovery of an unexpected heritage item

Step	Task	Responsibility	Guidance and tools
1	Stop work and protect the item		
1.1	Stop all work in the immediate area of the item and notify the Project Manager	Contractor/ Supervisor	Appendix A: Examples of unexpected heritage finds
1.2	Establish a 'no-go zone' around the item. Use high visibility fencing, where practical. No ground disturbing work is to be undertaken within this zone until further archaeological investigations are completed, and if required, appropriate approvals are obtained. Inform all on-site personnel about the no-go zone.	Contractor's Project Manager or Supervisor	
2	Engage an archaeologist		
2.1	Contact the nominated Excavation Director, archaeologist or Aboriginal cultural heritage consultant to discuss the location and nature of the item and arrange an inspection. The project CEMP should contain the contact details of the archaeologist. Provide as much information as possible to the Excavation Director, archaeologist or Aboriginal cultural heritage consultant, including photographs of the item. Inform the Sydney Metro Environment Manager and keep them involved in the process. The Environment Manager will inform the Sydney Metro Senior Heritage Advisor.	Contractor's Project Manager	
2.2	Where there is no project Excavation Director, archaeologist or Aboriginal cultural heritage consultant engaged for the work, engage a suitably qualified consultant to assess the find. If the find is likely to be an Aboriginal object, engage a suitably qualified and experienced Aboriginal cultural heritage consultant. If the find is a historic heritage item, engage a suitably qualified and experienced historical archaeologist.	Contractor's Project Manager	
3	Preliminary assessment and recording		
3.1	Occasionally, the Excavation Director, archaeologist or Aboriginal cultural heritage consultant may determine from the photographs provided at Step 2.1 that it is not necessary to inspect the item because no heritage constraint exists for the project (for example the item is not an Aboriginal object or archaeological relic). This advice should be provided in writing (for example via email or letter with the consultant's name and company clearly identifiable) to the Sydney Metro Project Manager, Environment Manager and Senior Heritage Advisor.	Excavation Director, archaeologist or Aboriginal cultural heritage consultant	Proceed to Step 7
3.2	Arrange access for the Excavation Director, archaeologist or Aboriginal cultural heritage consultant to inspect the item as soon as practicable. In most cases, a site inspection is required to conduct a preliminary assessment.	Contractor's Project Manager/ Excavation Director	

Step	Task	Responsibility	Guidance and tools
3.3	<p>Subject to the Excavation Director, archaeologist or Aboriginal cultural heritage consultant's assessment, work may recommence at a set distance from the item.</p> <p>This is to protect any other archaeological evidence that may exist in the vicinity, which may have not yet been uncovered.</p> <p>The 'no-go zone' established in Step 1.2 may need to be adjusted to reflect the area of archaeological potential, as determined by the Excavation Director, archaeologist or Aboriginal cultural heritage consultant.</p>	Excavation Director, archaeologist or Aboriginal cultural heritage consultant/ Contractor's Project Manager	
3.4	<p>Has the item been damaged or harmed?</p> <p>If yes, record the incident in the Incident Management System. Implement any additional reporting requirements related to the planning approval and CEMP where relevant.</p>	Contractor's Project Manager/ Excavation Director, archaeologist or Aboriginal cultural heritage consultant	
3.5	<p>Can the work avoid further impact to the item?</p> <p>Project Manager to confirm with Sydney Metro Environment Manager.</p>	Contractor's Project Manager	
3.6	<p>Record the item and complete the Unexpected Heritage Item Recording Form.</p>	Excavation Director, archaeologist or Aboriginal cultural heritage consultant	<p>Appendix B: Unexpected heritage find recording form</p> <p>Appendix C: Photographing unexpected heritage items</p>
3.7	<p>Is the item likely to be bone?</p> <p>If yes, follow the steps in Appendix D 'Uncovering bones'.</p> <p>Where it is obvious that the bones are human remains, you must notify the local police by telephone immediately.</p> <p>They may take command of all or part of the site.</p> <p>Also refer to SM-20-00099495 Exhumation Management Procedure.</p> <p>If no, proceed to the next step.</p>	Excavation Director, archaeologist or Aboriginal cultural heritage consultant	
3.8	<p>The Excavation Director, archaeologist or Aboriginal cultural heritage consultant may provide advice after the inspection and preliminary assessment that no heritage constraint exists for the project (for example the item is not an Aboriginal object or relic).</p> <p>This advice should be provided in writing (for example via email or letter with the consultant's name and company clearly identifiable) to the Sydney Metro Project Manager, Environment Manager and Senior Heritage Advisor.</p>	Excavation Director, archaeologist or Aboriginal cultural heritage consultant	Proceed to Step 7
3.9	<p>Where required, seek additional specialist technical advice (such as a forensic or physical anthropologist to identify skeletal remains).</p> <p>The Excavation Director, archaeologist or Aboriginal cultural heritage consultant can provide contacts for such specialist consultants.</p>	Excavation Director, archaeologist or Aboriginal cultural heritage consultant	

Step	Task	Responsibility	Guidance and tools
4	Provide advice		
4.1	The Excavation Director, archaeologist or Aboriginal cultural heritage consultant should provide written advice with input from Registered Aboriginal Parties where appropriate. The plan should include as a minimum a) a description of the item, b) an assessment of the significance of the item, c) approval or statutory notification requirements, d) reporting requirements, e) consultation requirements, and f) relevance to other project approvals or management plans.	Excavation Director, archaeologist or Aboriginal cultural heritage consultant	Appendix D: Archaeological/heritage advice checklist Other references DECCW 2010, Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 DECCW 2010, Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW Heritage Branch 2009, Assessing Significance for Historical Archaeological Sites and 'Relics'
4.2	In preparing the advice, the Excavation Director, archaeologist or Aboriginal cultural heritage consultant must review the CEMP, heritage sub-plans, conditions of project approval and associated heritage assessment documentation (for example an Environmental Impact Statement Technical Paper). The Excavation Director, archaeologist or Aboriginal cultural heritage consultant must determine if the item is consistent with previous heritage or project approvals or management plans. The Project Manager must provide all relevant documents to the Excavation Director to assist with this.	Excavation Director, archaeologist or Aboriginal cultural heritage consultant/ Contractor's Project Manager	
4.3	The Excavation Director, archaeologist or Aboriginal cultural heritage consultant must submit this advice as a report, letter or email to the Project Manager as soon as practicable.	Excavation Director, archaeologist or Aboriginal cultural heritage consultant	
4.4	The Project Manager, Sydney Metro Environment Manager and Sydney Metro Senior Heritage Advisor should review the advice to ensure that all requirements are addressed and can be reasonably implemented.	Consultant's Project Manager/ Sydney Metro Environment Manager/ Sydney Metro Senior Heritage Advisor	
5	Notify the regulator, if required		
5.1	Based on the advice and any statutory requirements, is notification to Heritage NSW and the Secretary required? If no, proceed directly to Step 6. If yes, proceed to next step.	Sydney Metro Environment Manager/ Sydney Metro Senior Heritage Advisor	

Step	Task	Responsibility	Guidance and tools
5.2	<p>If notification is required, provide the required information for a section 146 notification on the Heritage NSW Heritage Management System (HMS). The Environment Manager will provide the information to the Sydney Metro Senior Heritage Advisor who will lodge the notification via HMS.</p> <p>If the relic is uncovered when a section 139 (4) exception is being used, the section 146 notification must be sent to the Heritage Council of NSW via email.</p>	Sydney Metro Environment Manager and Senior Heritage Advisor	Heritage NSW notification requirements
5.3	A copy of the final supporting information and Unexpected Heritage Item Recording Form must be kept on file and a copy sent to the Sydney Metro Project Manager.	Sydney Metro Environment Manager/ Contractor's Project Manager	
6	Implement advice		
6.1	The advice should be modified to take into account any additional advice resulting from notification and discussions with the regulator if required.	Excavation Director, archaeologist or Aboriginal cultural heritage consultant/ Contractor's Project Manager	
6.2	Implement advice. Where impact cannot be avoided, this could include a formal assessment of heritage significance and impact assessment, preparation of excavation or recording methodologies, consultation with Registered Aboriginal Parties and obtaining heritage approvals if required.	Excavation Director, archaeologist or Aboriginal cultural heritage consultant/ Contractor's Project Manager	DECCW 2010, Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 DECCW 2010, Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW
6.3	Where heritage approvals are required, contact the Sydney Metro Environment Manager for further advice and support. Please note there are time constraints associated with heritage approval preparation and processing.	Excavation Director, archaeologist or Aboriginal cultural heritage consultant/ Contractor's Project Manager	
6.4	For SSI or SSD projects, or projects approved under Part 5 of the EP&A Act, assess whether the heritage impact is consistent with the project approval or if project approval modification is required from the Department of Planning, Industry and Environment or the relevant consent authority.	Excavation Director, archaeologist or Aboriginal cultural heritage consultant/ Contractor's Project Manager	
6.5	Where statutory approvals (or project modifications) are required, impact upon Aboriginal objects or relics must not occur until heritage and planning approvals have been issued by the appropriate regulator.	Excavation Director, archaeologist or Aboriginal cultural heritage consultant/ Contractor's Project Manager	

Step	Task	Responsibility	Guidance and tools
6.6	Where statutory approval is not required but where recording is recommended by the Excavation Director, archaeologist or Aboriginal cultural heritage consultant, sufficient time and resources must be allowed for this to occur.	Excavation Director, archaeologist or Aboriginal cultural heritage consultant/ Contractor's Project Manager	
6.7	Ensure short term and permanent storage locations are identified for archaeological material or other heritage material recovered from site, where required. Interested third parties (for example local Aboriginal land councils, local councils or museums) should be consulted on this issue. Contact the Excavation Director, archaeologist or Aboriginal cultural heritage consultant for advice on this issue.	Excavation Director, archaeologist or Aboriginal cultural heritage consultant/ Contractor's Project Manager	
7	Resume work		
7.1	Seek written clearance to resume project work from the Excavation Director, archaeologist or Aboriginal cultural heritage consultant. Clearance would only be given once all archaeological excavation or heritage recommendations and approvals (where required) are complete. Resumption of project work must be in accordance with all the relevant project and heritage approvals/determinations.	Contractor's Project Manager	
7.2	If required, ensure archaeological excavation/heritage reporting and other heritage approval conditions are completed in the required timeframes. This includes artefact retention repositories, conservation and/or disposal strategies.	Excavation Director, archaeologist or Aboriginal cultural heritage consultant/ Contractor's Project Manager	
7.3	If additional unexpected heritage items are discovered, this procedure must begin again from Step 1.	All	

4. Responsibilities

Table 3: Roles and responsibilities

Role	Responsibility
Contractor/Supervisor	<ul style="list-style-type: none"> Stop work immediately when an unexpected heritage item is encountered. Cordon off area until Contractor Environmental Manager/Excavation Director, archaeologist or Aboriginal cultural heritage consultant advises that work can recommence. Manage the process of the identification, protection and mitigation of impacts on the heritage item. Liaise with the Sydney Metro Project Manager, Environment Manager and Senior Heritage Advisor. Assist the Excavation Director, archaeologist or Aboriginal cultural heritage consultant with mitigation and statutory requirements. Complete Incident Report and review CEMP for any changes that may be required. Proposed amendments to the CEMP if any changes are required.
Contractor's Project Manager	Ensure all aspects of this Procedure are implemented. Advise the Contractor/Supervisor to recommence work if all applicable requirements have been satisfied and the Contractor Environmental Manager/ Excavation Director, archaeologist or aboriginal cultural heritage consultant has approved commencement of work.
Contractor's Excavation Director/ archaeologist or Aboriginal cultural heritage consultant	Provide expert advice to the Contractor and Sydney Metro Environment Manager on find identification, significance, mitigation, legislative procedures and requirements.
Environmental Representative	Ensure compliance with relevant approvals (new and existing) and the Construction Environment Management Plan.
Sydney Metro Environment Manager	Notify the Director Project Environment, Sustainability & Planning of find and help support Contractor with managing Incident Reporting.
Sydney Metro Director Project Environment, Sustainability & Planning	Notify the Executive Director Environment, Sustainability & Planning of the find and management actions.
Sydney Metro Senior Heritage Advisor	Provide expert advice to Sydney Metro Environment Manager and project as required.

5. Seeking advice

Advice on this Procedure should be sought from the Sydney Metro Environment Manager in the first instance. Contractors and delivery partners should ensure their own project environment managers are aware of and understand this Procedure.

Technical archaeological or heritage advice regarding an unexpected heritage item should be sought from a suitably qualified and experienced archaeologist/Aboriginal heritage consultant.

6. Related documents and references

Related documents and references

- [SM-20-00099495 Exhumation Management Procedure](#)
- [SM-17-00000096 Environmental Incident Classification and Reporting Procedure](#)
- [SM-21-00280658 Unexpected Heritage Find Recording Form](#)
- [SM-21-00280680 Archaeological Heritage Advice Checklist](#)
- [SM-21-00280708 Unexpected Heritage Discovery Notification Letter Template](#)
- 3TP-SD-015/7.0 Transport for NSW Guide to Environmental Control Map
- Roads and Maritime Services, November 2015, Unexpected Heritage Items Heritage Procedure 02
- [SM-17-00000203 Sydney Metro Glossary](#)
- Department of Environment, Climate Change and Water 2010, Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010
- Department of Environment, Climate Change and Water 2010, Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW
- Heritage Branch Department of Planning 2009, Assessing Significance for Historical Archaeological Sites and 'Relics'
- Heritage NSW 2022, [Notify discovery of a relic](#), <
<https://www.environment.nsw.gov.au/topics/heritage/apply-for-heritage-approvals-and-permits/historical-archaeology/notify-discovery-of-a-relic#:~:text=Under%20Section%20146%20of%20the,section%2060%20approval%20in%20place>>.

7. Superseded documents

Superseded documents

There are no documents superseded as a result of this document.

8. Document history

Version	Date of approval	Notes
1.1	June 2017	Incorporates Environmental Representative comments
1.2	-	Amends p13 step 8 reference to s146
1.3	-	Incorporates Planning Mods 1-4 including amended CoA E20
1.4	March 2018	Incorporates Environmental Representative comments
2.0	-	Removes SSI 15-7400 COA reference
3.0	-	Revises definitions
3.1	-	Revises procedure
3.2	-	Revises roles and responsibilities
3.3	-	Minor edits and corrections
4.0	16 August 2021	Revises definitions and procedure; references the Sydney Metro Exhumation Management Procedure v5 with amendments throughout for consistency with that document. Updates to related documents and references.
5.0	24 April 2023	Minor clarifications and updates to the process for the notification of the discovery of a relic under section 146 of the <i>Heritage Act 1977</i> to address a change in Heritage NSW's process.

Appendix A: Examples of unexpected heritage finds

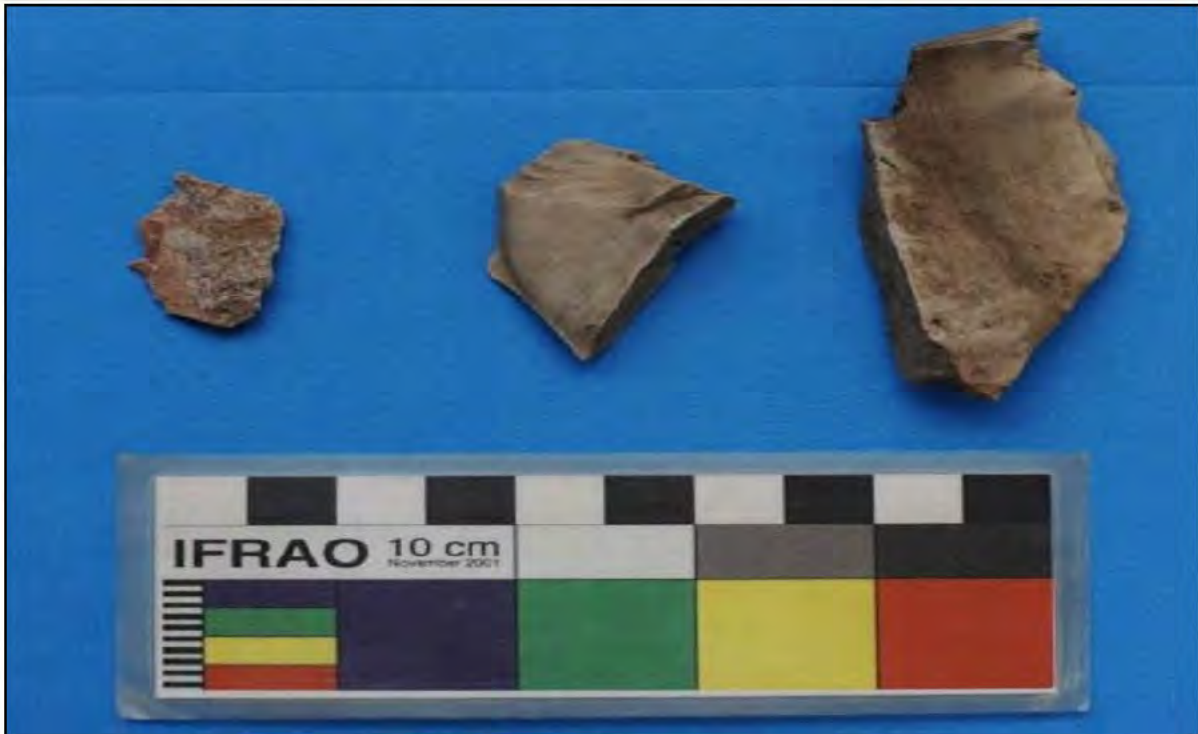


Figure 2: Aboriginal stone artefacts found at the Wickham Transport Interchange, 2015



Figure 3: Aboriginal artefacts (shell material) found at the Wickham Transport Interchange, 2015



Figure 4: 1840s seawall and 1880s retaining wall uncovered at Balmain East, 2016



Figure 5: Sandstone pavers uncovered at Balmain East, 2016



Figure 6: Platform at Hamilton Station classified as a 'work' by the project archaeologist, Wickham Transport Interchange project, 2015



Figure 7: Sandstone flagging and cesspit, Wynyard Walk project, 2014



Figure 8: Chinese Ming Dynasty pottery and English porcelain/pottery dating back to the early nineteenth century, Wynyard Walk project, 2014



Figure 9: Pottery made by convict potter Thomas Ball during the early settlement period, Wynyard Walk project, 2014



Figure 10: Top left hand picture continuing clockwise: Stock camp remnants (Hume Highway Bypass at Tarcutta); linear archaeological feature with post holes (Hume Highway Duplication), animal bones (Hume Highway Bypass at Woomargama); cut wooden stake; glass jars, bottles, spoon and fork recovered from refuse pit associated with a Newcastle Hotel (Pacific Highway, Adamstown Heights, Newcastle area)



Figure 11: Culturally modified stone discovered on Main Road 92, about two kilometres west of Sassafras. The remaining images shown a selection of stone artefacts retrieved from test and salvage archaeological excavations during the Hume Highway Duplication and Bypass projects from 2006-2010

Appendix B: Unexpected heritage find recording form

Refer to [SM-21-00280658 Unexpected Heritage Find Recording Form](#).

Appendix C: Photographing unexpected heritage items

Photographs of unexpected finds in their current context (*in situ*) may assist archaeologists/Aboriginal heritage consultants to better identify the heritage values of the item. Emailing good quality photographs to specialists can allow for better quality and faster heritage advice. The key elements that must be captured in photographs of the item include its position, the item itself and any distinguishing features. All photographs must have a scale (ruler, scale bar, mobile phone, coin etc.) and a note describing the direction of the photograph.

C1: Context and detailed photographs

It is important to take a general photograph (below left) to convey the location and setting of the item. This will add value to the subsequent detailed photographs also required (below right – labelled Figure 2).

Removal of the item from its context (e.g. excavating from the ground) for photographic purposes is not permitted.

C2: Photographing distinguishing features



Figure 2: Close up detail of the sandstone surface showing material type, formation and construction detail. This is essential for establishing date of the feature.

Where unexpected items have a distinguishing feature, close up detailed photographs must be taken of these features, where practicable. In the case of a building or bridge, this may include diagnostic details architectural or technical features. See images next page, labelled Figures 3 and 4 for examples.



Figure 3: Ceramic bottle artefact with stamp.



Figure 4: Detail of the stamp allows 'Tooth & Co Limited' to be made out. This is helpful to a specialist in gauging the artefact's origin, manufacturing date and likely significance.

C3: Photographing bones

The majority of bones found on site will be animal bones often requiring no further assessment (unless they are in archaeological context). However, if bones are human, the police must be contacted immediately (see [Appendix E](#) for detailed guidance). Taking quality photographs of the bones can often resolve this issue quickly. The project archaeologist can confirm if bones are human or non-human if provided with appropriate photographs.

Ensure that photographs of bones are not concealed by foliage (example below left, labelled Figure 5) as this makes it difficult to identify. Minor hand removal of foliage can be undertaken as long as disturbance of the bone does not occur. Excavation of the ground to remove bone(s) should not occur, nor should they be pulled out of the ground if partially exposed.

Where sediment (adhering to a bone found on the ground surface) conceals portions of a bone (example below right, labelled Figure 6) ensure the photograph is taken of the bone (if any) that is not concealed by sediment.



Figure 5: Bone concealed by foliage.



Figure 6: Bone covered in sediment

Ensure that all close up photographs include the whole bone and then specific details of the bone (especially the ends of long bones, the *epiphysis*, which is critical for species identification). The images below (labelled Figure 7, left and Figure 8, right) are examples of good photographs of bones that can easily be identified from the photograph alone. They show sufficient detail of the complete bone and the epiphysis.



Figure 7: Photograph showing complete bone.



Figure 8: Close up of a long bone's epiphysis.

Appendix D: Archaeological/heritage advice checklist

Refer to [SM-21-00280680 Archaeological Heritage Advice Checklist](#)

Appendix C Sydney Metro Exhumation Management Procedure



Exhumation Management Procedure

SM-20-00099495 (formerly SM ES-PW-315)

Metro Body of Knowledge (MBoK)

Applicable to:	Sydney Metro
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1. Introduction

Sydney Metro has developed this Exhumation Management Procedure (ExMP) to provide guidance for managing the discovery of human skeletal remains during the course of works. The procedure is applicable to both unexpected skeletal finds and controlled archaeological investigations where human remains are anticipated.

The procedure is applicable to all stages of any Sydney Metro project and to all staff and contractors.

Sydney Metro is Australia's biggest public transport project. By 2030, Sydney will have a network of four metro lines, 46 stations and 113km of new metro rail.

Sydney Metro is revolutionising how Australia's biggest city travels, connecting Sydney's north west, west, south west and greater west to fast, reliable turn-up-and-go metro services with fully accessible stations.

The metro program includes the operational Metro North West Line and three projects under construction:

- City & Southwest
- West
- Western Sydney Airport

The purpose of this ExMP is to provide a clear and concise process to follow in the event of the discovery of potential human remains during Sydney Metro activities.

This ExMP will be reviewed as required and prior to any future Sydney Metro project that has potential to impact on known burials, graves, cemeteries or burial grounds. A review may require amending the ExMP to tailor additional controls or management procedures that are specific to the impacted cemetery or burial ground. In addition, the requirements of the relevant Planning Approval will be assessed during the review of this ExMP prior to its implementation.

This ExMP should be read in conjunction with [SM-20-00099497 Unexpected Heritage Finds Procedure](#).

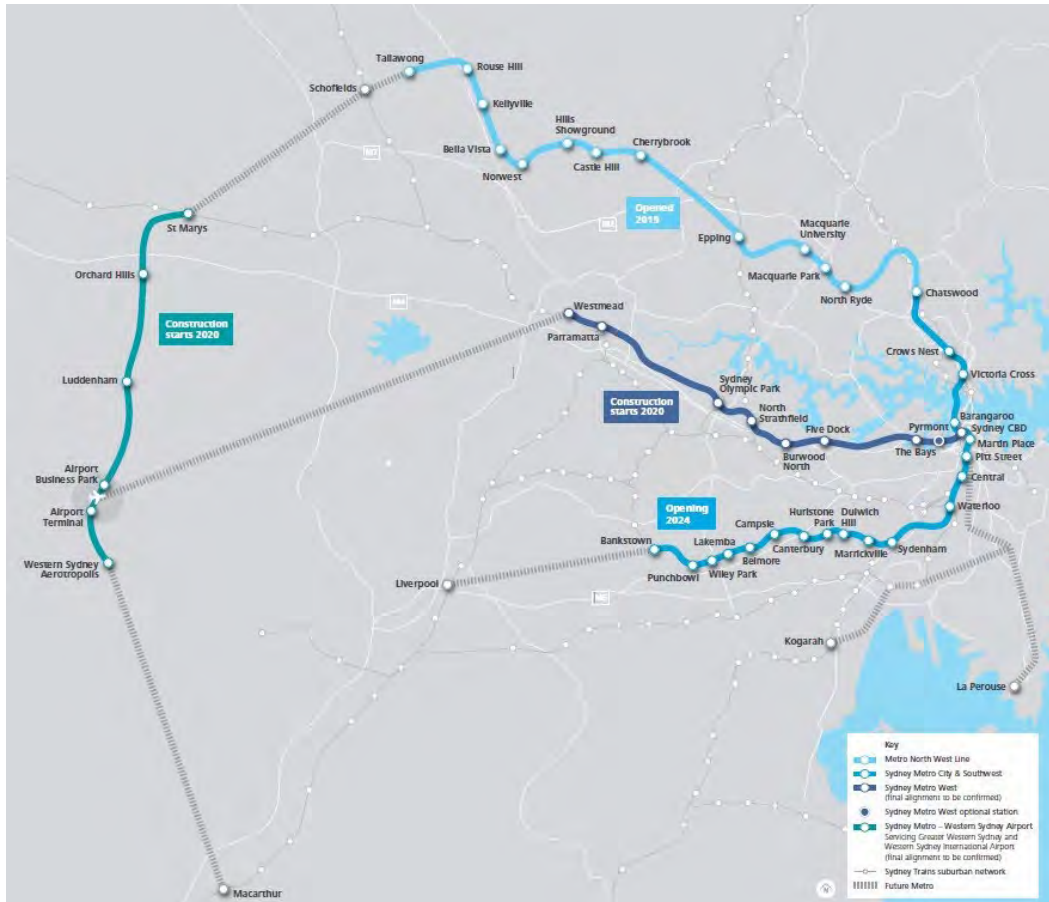


Figure 1: Sydney Metro overview and station locations

1.1. Purpose and scope

This ExMP outlines the procedure for the management of the discovery of human remains within the Sydney Metro program. It includes:

- Overview of legislative requirements for dealing with human remains (e.g. *Coroners Act 2009*, *Heritage Act 1977*, *Guidelines for the Management of Human Skeletal Remains 1988*, and the *Public Health Regulations 2022*).
- A flow chart process to be followed when human remains are uncovered.
- An archaeological methodology for the excavation of remains including processes for appropriately handling remains in accordance with the relevant guidelines (see section 2.3 and 2.4 below).
- Post-exhumation management processes including relocation, processing and long-term arrangements.
- Process for nomination of a physical anthropologist and temporary storage location.
- Process for additional analysis including DNA testing, isotope analysis and environmental sampling, and discussion on requirements for public involvement.

2. Overview of legislative requirements for dealing with human remains

The following section provides an overview of the legislation that would apply to the discovery, management and relocation of human remains. A discovery of suspected human remains may be subject to different Acts and requirements, thereby triggering different notification pathways based on the specific circumstances involved.

The first step will always be to notify the NSW Police. Confirmation of the age (antiquity) and nature of the skeletal remains as well as the reasons for the disturbance will dictate which Act and provisions will be applicable.

2.1. Discovery of human remains and forensic cases: *NSW Coroners Act 2009*

For a discovery of suspected human remains less than 100 years old, the remains would come under the jurisdiction of the State Coroner and the *NSW Coroners Act 2009*. Such a case would be considered a 'reportable death' and, under legal notification obligations set out in s35 (2); a person must report the death to a police officer, a coroner or an assistant coroner as soon as possible. This applies to all human remains less than 100 years old, regardless of ancestry (i.e. both Aboriginal and non-Aboriginal remains).

35 Obligation to report death or suspected death

- (1) *This section applies to any person who has reasonable grounds to believe that a death or suspected death of another person:*
 - (a) *is a reportable death or occurred in circumstances that would be examinable under Division 2 of Part 3.2, and*
 - (b) *has not been reported in accordance with subsection (2).*
- (2) *A person to whom this section applies must report the death or suspected death concerned to a police officer, a coroner or an assistant coroner as soon as possible after becoming aware of the grounds referred to in subsection (1).*

Maximum penalty (subsection (2)): 10 penalty units.
- (3) *A police officer to whom a death or suspected death is reported under this section is required to report the death or suspected death to a coroner or assistant coroner as soon as possible after the report is made.*
- (4) *An assistant coroner to whom a death or suspected death is reported under this section is required to report the death or suspected death to a coroner as soon as possible after the report is made.*
- (5) *A coroner to whom a death or suspected death is reported under this section is required to inform the State Coroner of the report as soon as practicable after the report is made.*

2.2. Historic human remains: *Heritage Act 1977 and Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977*

The *Heritage Act 1977* (Heritage Act) and *Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977*¹ (the Guidelines) apply to historic burials in New South Wales. It should be noted that the Guidelines are outdated in terms of the current statutory framework.

A relic is defined as an archaeological deposit or artefact that has heritage significance at a local or State level. The guidelines, *Assessing Significance for Historical Archaeological Sites and 'Relics'*², have been endorsed by the Heritage Council of NSW and should be used to assess the level of heritage or archaeological significance of the remains. With reference to burial grounds, objects such as headstones, grave enclosures and grave goods, as well as buried human remains, may be 'relics' under the Heritage Act.

Approval under the Heritage Act and the *National Parks and Wildlife Act 1974* (NPW Act) is not required if human remains are uncovered during a Critical State Significant Infrastructure (CSSI) project. However, notification to the Heritage Council under s146 of the Heritage Act, and notification of an Aboriginal object under the NPW Act is required if human remains are uncovered during archaeological or other project related investigations.

2.3. Aboriginal human remains: *National Parks and Wildlife Act 1974*

The NPW Act, administered by Heritage NSW, provides statutory protection for all Aboriginal 'objects' (consisting of any material evidence of the Aboriginal occupation of NSW) under Section 90 of the Act, and for 'Aboriginal Places' (areas of cultural significance to the Aboriginal community) under Section 84.

Discovery of Aboriginal burials and/or human remains would be addressed in the projects Aboriginal Cultural Heritage Assessment Report (ACHAR). ACHARs would be prepared in accordance with the following Heritage NSW guidelines:

- *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation*³;
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*⁴;
- *Aboriginal cultural heritage consultation requirements for proponents 2010*⁵,
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*⁶.

If suspected human skeletal remains are uncovered at any time during the archaeological management program, the process outlined in this ExMP and detailed in the flow chart is to

¹ NSW Heritage Office, 1998.

² Heritage Branch of the Department of Planning, 2009.

³ NSW Department of Environment and Conservation, 2005.

⁴ Office of Environment and Heritage, 2011.

⁵ Department of Environment, Climate Change and Water, 2010.

⁶ Office of Environment and Heritage, 2010.

be followed. Management of the remains would be guided by consultation with the nominated Registered Aboriginal Parties (RAPs) for the project, in adherence to the ACHAR.

2.4. Exhumation of human remains: *Public Health Regulation 2022 (NSW)*

The *Public Health Regulation 2022* provides specific regulation for the exhumation of human remains in NSW.

Under Clause 95 of the Regulation, an application for approval to exhume the remains of a dead person may be made to the Secretary via an approved form to the Local Public Health Unit delegated to act on behalf of the Secretary.

Refer to Appendix 1 for a copy of the approved form.

2.5. *Work Health and Safety Act 2011*

The *Work Health and Safety Act 2011* provisions apply to protect personnel involved in the exhumation procedure by creating and maintaining safe and healthy work practices and are enforced by WorkCover NSW. Graves, crypts and vaults could be considered to be confined spaces in some circumstances under health and safety legislation. More information on safe work practices is available at or by contacting SafeWork NSW via their website or directly.

Health and safety aspects of working with human remains should be considered. Generally, working with archaeological human skeletal remains requires no extra precautions to be taken beyond normal health and safety regulations. Once any necessary site health and safety precautions have been taken, the exhumation of human remains can proceed.

3. Procedure for the discovery and management of human remains

This procedure provides project managers, principal contractors and the Project Excavation Director with advice on the steps to follow when suspected human remains are uncovered. Information on the potential for burials and human remains where known would be included in the general project induction for all personnel. The general project induction would also include the procedure to manage human remains set out in this ExMP.

3.1. Initial discovery of bones: What do we do?

To avoid doubt, all suspected bone items must be treated as potential human skeletal remains, and work in the immediate vicinity must stop while they are protected and investigated as a matter of urgency.

3.1.1. Stop Work and preliminary notification

If bone is uncovered, all work in the vicinity of the find must stop to allow for a positive identification as either human or non-human bone.

The Project Excavation Director must be notified.

Where required, preliminary notification must be made to the NSW Police in compliance with Section 35 of the *Coroners Act 2009* (also refer to special conditions for Central Station noted in section 4).

What?	When bones are uncovered at a site, all work in the area of the find must stop immediately and the site must be secured.
Who?	The discoverer will immediately notify machinery operators so that no further disturbance of the remains will occur, as well as notifying the foreman/site supervisor, principal contractor, project archaeologist/Excavation Director and Sydney Metro Environmental Manager. Where required, preliminary notification to the NSW Police will be undertaken by the Sydney Metro Environment Manager in consultation with the Sydney Metro Senior Heritage Advisor and Excavation Director. Notification should provide verbal description of the remains and inform the police that consultation with technical specialists is being undertaken to confirm that the remains are human, as well as the burial context (archaeological or less than 100 years old, refer Step 2).
How?	Inform all site personnel of restricted access to the area of the discovery and no work to proceed until further notice. Area must be fenced off (flagging or temporary exclusion fencing).
Actions	Notify site supervisor, principal contractor, project archaeologist/Excavation Director and Sydney Metro Environmental Manger and Senior Heritage Advisor of the find and protect the suspected remains until an initial assessment can be undertaken by a technical specialist. Preliminary notification to NSW Police by Sydney Metro Environmental Manager.

3.1.2. Confirm the remains are human

Skeletal remains could either be articulated and in a recognisable form of burial such as a coffin or common burial position of the body (e.g. supine, prone or flexed), or they could be disarticulated or fragmented remains. Within the boundaries of a known historic burial ground, there is a high probability of the remains being human. In a suspected forensic case (less than 100 years old), the remains may have clothing and/or human tissue. Disarticulated or fragmented bones are often uncovered, and these may require specialist assessment to determine legal jurisdiction.

If suspected human remains are identified during the project, preliminary notification must be made to the NSW Police in compliance with Section 35 of the *Coroners Act 1999* (refer Step 1). NSW Police would be contacted immediately upon receipt of confirmation of human provenance.

What?	Confirmation that the remains are human, their burial context - whether they are forensic (less than 100 years) or archaeological (older than 100 years) and suspected ancestry (Aboriginal or non-Aboriginal).
Who?	Excavation Director and or Forensic or physical anthropologist, or archaeologist with specialist skills such as an osteoarchaeologist. Notification to the NSW Police will be undertaken by the Sydney Metro Environmental Manager.
How?	Consultation could be undertaken as either an on-site inspection or via good quality photos sent to the nominated technical specialist of 1) the remains; and 2) the site general site location of the discovery.

Actions	<p>Contact nominated technical specialists to confirm that the remains are: a) human, b) burial context (archaeological or forensic), and c) suspected ancestry (Aboriginal or non-Aboriginal).</p> <p>For the duration of the Sydney Metro project, the nominated technical specialists are:</p> <ul style="list-style-type: none"> • Forensic Anthropologist – TBC by contractor for project area. • Nominated Excavation Director – TBC by contractor for project area. • Sydney Metro Environmental Manager to conduct and or oversee liaison with NSW Police. <p>The archaeologist may be able to identify the nature of remains without input from the Forensic Anthropologist. The Forensic Anthropologist should be contacted as required.</p>
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3.1.3. Notification based on jurisdiction (forensic or archaeological)

Once confirmation is received from the technical specialist that the remains are of human origin, there are three possible statutory pathways to follow based on the assessment.

What?	Forensic case: remains are less than 100 years old
Who?	If it is determined by specialist assessment (Step 2) that the remains are forensic, the remains come under the jurisdiction of the State Coroner and the Coroners Act 2009.
How?	The NSW Police would likely secure the site and will advise on the procedure to be followed.
Actions	Environmental Manager to liaise with NSW Police

What?	Archaeological – non-Aboriginal human remains – more than 100 years old.
Who?	Follow the Archaeology Exhumation Methodology as set out in Step 4 below
How?	Follow the Archaeology Exhumation Methodology as set out in Step 4 below
Actions	Follow the Archaeology Exhumation Methodology as set out in Step 4 below

What?	Archaeological – suspected Aboriginal human remains – more than 100 years old.
Who?	Recording of Aboriginal ancestral remains must be undertaken by, or conducted under the direct supervision of a specialist with registered Aboriginal parties (RAPs) present.
How?	The RAPs must be present where it is reasonably suspected that Aboriginal burials or human remains have been encountered.
Actions	Notify RAPs and Heritage NSW and follow the Aboriginal cultural heritage assessment report (ACHAR). Follow the Archaeology Exhumation Methodology as set out in Step 4.

3.2. Archaeological exhumation methodology

The following section provides a broadly accepted archaeological methodology for exhumation and the appropriate handling of human remains.

3.2.1. Securing the site

The strategy for the excavation and removal of human remains must be sensitive to public opinion and ethics and exhumation activities should not be visible to the general public. The site may need to be screened off from public areas, not only with hoarding but also in some cases with a roof to screen the site off from overlooking buildings. At all times, human remains should be treated respectfully. The perimeter of the excavation site should be demarcated by

plastic tape or flagging, with only technical staff allowed within this area for the duration of exhumation activities.

The site should be protected from the elements including flooding, contamination with dust or debris, and other disturbance. These measures would be formulated by the Excavation Director in consultation with the contractor and Sydney Metro where required and may differ from site to site.

3.2.2. Excavation Director

Archaeological investigations are to be managed by a suitably qualified Excavation Director with experience in the excavation and management of human remains. For sites with potential for locally significant remains, the Excavation Director should meet the NSW Heritage Council criteria for experience with locally significant archaeological sites. For sites with potential for State significant archaeology the Excavation Director should meet the Heritage Council of NSW criteria for experience with State significant archaeological sites.

3.2.3. Excavation and recording

Exhumation and recording are to be undertaken in accordance with best practice forensic and Heritage Council of NSW guidelines. Prior to removal, the remains should be fully recorded in situ to understand their surrounding archaeological context. This will include recording any disturbances to the burial and the identification of bones present. In some cases, the deposit of bones may be a mixture of articulated and disarticulated remains. Care should be taken to distinguish articulated remains and to assess if they represent commingled individuals or disturbed remains belonging to one individual, and to record them accordingly.

3.2.4. Recording

- A standard context recording system is to be employed.
- Detailed survey and/or measured drawings are to be prepared and include location of remains within the overall site (position of the body, the direction of the burial, noting any stratigraphic relationships with other archaeological features).
- Any associated artefacts (potential grave goods, burial furniture) are to be recorded and collected by context for later analysis.
- Photographic record of all phases of work in accordance with 'Photographic Recording of Heritage Items Using Film and Digital Capture'. Photographs are to be in RAW format, using photographic scales and photo boards where appropriate.
- Registers of contexts, photos, samples and drawings are to be kept.

3.2.5. Excavation

- Detection of the extent of the grave/remains (if disarticulated).
- Surface soils removed in excavation units of 100mm (site dependent) using small hand tools.
- Expose remains with soft paint brushes and pedestal the remains.

- Record position and depth of remains.
- Soil removed is to be sieved through 3mm mesh to examine for teeth and bone fragments.

Soil samples may be taken from the abdominal and/or chest areas of the body (articulated remains) to retrieve further evidence.

- Exhumation must be under the control of the Excavation Director, with the assistance of a Forensic Anthropologist if required. Exhumation permit/s, provided by NSW Ministry of Health may also require the presence of an authorised officer or a member of staff of the Ministry of Health.
- Further excavation of the bottom of the pit (grave) following removal to confirm the absence of further remains.

3.2.6. Relocation of bones

Removal and collection of skeletal remains is to follow the standard forensic practice of labelling as follows:

- Remove remains from the ground systematically and place in plastic bags according to anatomical areas of the body.
- Bags should not be air-tight and should have ventilation holes to prevent deterioration of fragile skeletal material. Each bag should contain labels and the separate bags should then be placed in a large plastic bag, crate or box, labelled with the context information.
- The remains should be placed in a sturdy, large cardboard box (approximately 600 x 300 x 200 mm) for relocation to off-site processing location.

3.3. Resume work

Construction work may only recommence upon receipt of clearance certificate from the Excavation Director and may require additional NSW Ministry of Health approval. If a forensic case, written authorisation from the NSW Police is required.

3.4. Reporting

A report would be prepared following the completion of the program of exhumation works, separate to the archaeological excavation report for the project. This report would include skeletal analysis catalogue, comprehensively describe the process of exhumation, detail the recording of the remains and synthesise the results of any further laboratory testing. An assessment of significance for the remains would be provided and interpreted within the context of the archaeological research design (response to research questions).

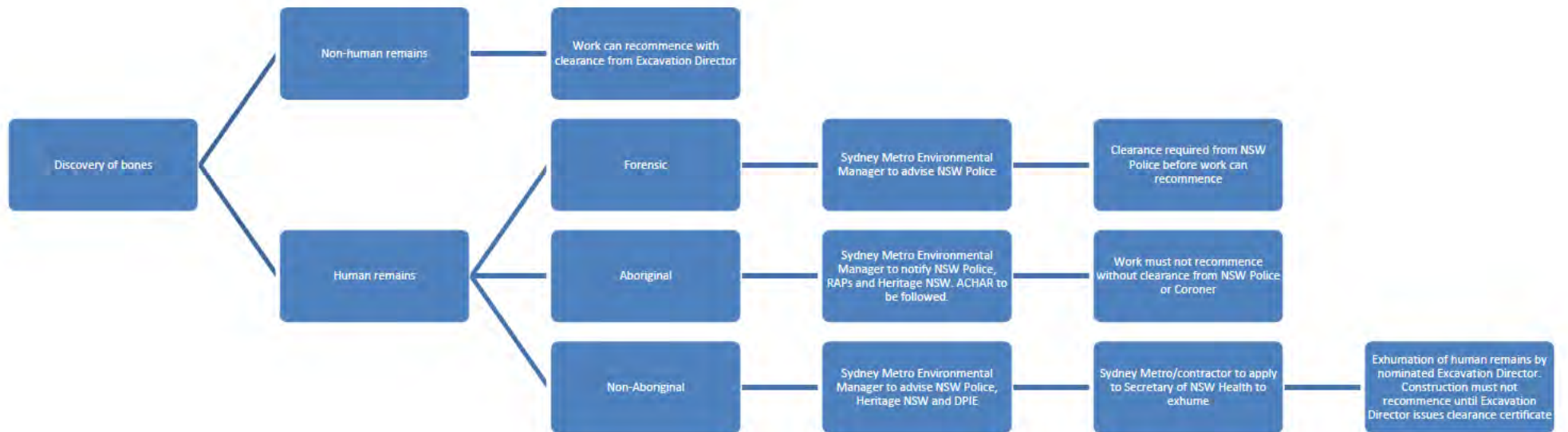


Figure 2: Exhumation procedure flow chart

4. Excavation and post-excavation tasks

All on-site management should be in accordance with the archaeological research design (ARD) and relevant archaeological method statement (AMS), and be overseen by the Excavation Director. The Excavation Director would nominate a Forensic Anthropologist where required.

4.1. Research questions

Research questions should be specific to the site and the site history. The research questions in the archaeological research design can be revised as new information emerges and new research questions can be investigated.

The following general research questions can be used to guide exhumations, should intact burials, disarticulated remain, burial cuttings or associated material culture be uncovered during work.

4.1.1. Social history and burial practices

- Does the location of the burial/burial cutting correspond with historic plans/descriptions?
- Is there evidence of exhumation?
- Do graves cut into older ones? What can this tell us about nineteenth century burial practices, and how does this compare to other excavated cemetery sites in the region?
- What is the distance between burials (if multiple burials uncovered)? Does this conform to known nineteenth century burial practices?
- What type of fill was used within grave cuttings? What can this tell us about the surrounding environment and burial practices at the time?
- What materials/tree species were used in the coffin manufacture? Can coffin manufacturing techniques or fastening methods (use of mortar, screws, nails, tacks) be identified? Does this match known burial practices of the time? If alternative methods are identified, what can this tell us about the manufacturer or economic/social landscape?
- Can the class or rank of the individual be identified via coffin materials, grave goods or clothing/shrouds?
- Which direction is the burial orientated? How does this correspond with the known/hypothesised location of denomination areas?
- If the burial is associated with more than one individual, can a familial relationship be assessed through DNA or other genetic markers identifiable within the skeletal remains?

4.1.2. Environmental factors and scientific analysis

- What is the condition of the bones? How does their condition compare to known or nearby burials of the same age? What environmental or human factors may have influenced the decomposition process?
- Can the health, nutrition, sex, race, stature or age be identified through the skeletal remains? Is there evidence of trauma on the bones? Is there evidence of pathology on the bones (e.g. syphilis, tuberculosis, tumours)?
- Can stable isotope analysis address any questions regarding diet, country of origin and nutrition?
- Can DNA testing address any questions not answerable by the skeletal remains themselves, such as sex, familial relationships (if buried with another individual/s) or race?
- Is there potential for DNA to be tested against any individuals who may come forward as a descendant of the deceased?

4.2. Process for DNA testing, isotope analysis and environmental sampling

4.2.1. Pre-excavation

The Excavation Director, in consultation with the Forensic Anthropologist, will nominate a suitable laboratory prior to works commencing. Requirements for DNA testing, isotope analysis and environmental sampling will be identified in the archaeological research design and archaeological method statement.

4.2.2. Excavation

To prevent cross-contamination, the following sample collection and excavation process should be followed:

- The location, quantity and material (bone, teeth, hair, soil, wood) of samples will be determined by the Excavation Director or Forensic Anthropologist prior to its collection.
- Samples would be stored in a safe, secure and climate controlled location while excavations are in progress. This would be chosen by the Excavation Director or Forensic Anthropologist on site.
- Each collected sample would be given a unique catalogue number and a sample register would be recorded throughout the excavation.

- 'Clean excavation' procedures would be followed during the excavation of burials and during the sample collection process⁷. This would include:
 - Latex gloves would be worn by individuals excavating and/or handling bone or soil samples. Gloves would be changed for each bone and/or individual to prevent cross-contamination;
 - Excavation tools/brushes would be cleaned prior to and after the collection of each sample to prevent cross-contamination;
 - In some cases, a face mask would be worn when samples for DNA analysis are being collected;
 - Bone samples for DNA testing would be collected with surrounding in situ soil and should not be cleaned prior to bagging;
 - It may be necessary for individuals involved in sample collection to submit DNA for comparison in the event of cross-contamination; and
 - All bags containing samples for analysis would be bagged and labelled appropriately to prevent cross contamination and ensure they are handled and stored correctly.

4.2.3. Post-Excavation

On completion of excavations, samples will be transported to nominated laboratories for analysis. A record of their location will be kept.

4.3. Reporting

The results of the investigation of human remains and the exhumation will be included in the archaeological reporting for the project in accordance with the project ARD.

Once finalised, and where it is appropriate to do so as determined in consultation with RAPs and/or as may be required by the relevant planning approval obligations, archaeological and associated specialist reports should be submitted to:

- The relevant local council and library;
- Heritage NSW library;
- The State Library of NSW; and
- Made available online for public access and educational purposes.

Further, if significant remains are identified during excavations, the results and findings would be published in academic journals and conference papers where feasible.

⁷ Guidelines for 'clean excavation' are based on procedures outlined in: Yang, D. Y. & Watt, K. 2005. Contamination controls when preparing archaeological remains for ancient DNA analysis. *Journal of Archaeological Science*, vol. 32, pp. 331–336 and *Society for Historical Archaeology*, 2015-2017. Research and Analysis of Artefacts. Accessed online at: <https://sha.org/conservation-facts/faq/analysis/#C> on 25/5/2017.

4.4. Public involvement

Archaeological excavations may uncover remains directly associated with early settlement and burial practices. Such remains are likely to generate public interest.

Public involvement may include:

- Seeking descendants of identified individuals to consult on appropriate actions and reburial proposals
- Media releases;
- Public Open Days;
- Preparation of brochures detailing the archaeological excavations;
- Interpretive signage and online blog posts or site diaries while excavations are taking place; and
- The preparation of a Heritage Interpretation Plan designed to provide interpretation of the site within the new development upon the completion of works.

Due to sensitive nature of human skeletal remains, these recommendations would be adapted and modified as appropriate under the direction of Sydney Metro and the Excavation Director.

Such recommendations would also be considered and require approval from relevant stakeholder groups such as known or potential descendants of the deceased, Heritage NSW/Heritage Council of NSW, local Council and interest groups.

4.5. Temporary storage and permanent repository or resting place for remains

4.5.1. Temporary storage

Upon the completion of archaeological excavations, skeletal remains should be boxed separately and temporarily stored within a safe, secure controlled environment to allow for further analysis of the remains. This location would be chosen by the Excavation Director and the Forensic Anthropologist and would comply with NSW legislative requirements.

4.5.2. Permanent repository or resting place for remains

A permanent repository or resting place for remains is dependent on the nature and volume of skeletal remains. Final arrangements would be dictated by Sydney Metro, the Excavation Director, Forensic Anthropologist, identified descendants of the deceased, RAPs (if applicable) and/or other stakeholders upon the completion of excavations and subsequent analysis.

5. Definitions

All terminology in this Procedure is taken to mean the generally accepted or dictionary definition. Acronyms and terms specific to this document are listed below.

Other terms and jargon are defined within the [SM-17-00000203 Sydney Metro Glossary](#).

	Definitions
IMS	Integrated Management System (IMS)
TfNSW	Transport for New South Wales
RAP	Registered Aboriginal party
ACHAR	Aboriginal cultural heritage assessment report
ARD	Archaeological research design
AMS	Archaeological method statement
OEH	Office of Environment and Heritage (now Heritage NSW)
PHU	Public Health Unit
ExMP	Exhumation Management Procedure (this Procedure)
ER	Environmental Representative (independent)

6. Accountabilities

The Executive Director, Environment, Sustainability & Planning is accountable for this Procedure including approving the document and monitoring its effectiveness. The Senior Advisor Heritage is responsible for overseeing the implementation of this Procedure, and performing a formal review of the document.

Direct Reports to the Chief Executive are accountable for ensuring the requirements of this Procedure are implemented within their area of responsibility.

Direct Reports to the Chief Executive who are accountable for specific projects/programs are accountable for ensuring associated contractors comply with the requirements of this Procedure.

7. Related documents and references

Related documents and references

- [SM-20-00099497 Unexpected Heritage Finds Procedure](#)
- [NSW Health Application to Exhume Human Remains](#)
- Department of Environment, Climate Change and Water 2010, Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010
- Department of Environment, Climate Change and Water 2010, Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW

8. Superseded documents

Superseded documents

There are no documents superseded as a result of this document.

9. Document history

Version	Date of approval	Notes
1.1	May 2017	New IMS document.
2.0	July 2017	Incorporates Stage 2 (section 3)
2.1	February 2019	Extended for Metro Program wide application, includes changes specific Central Station management, and incorporates comments received from the State Coroner's Office, NSW Police, NSW Health, and Sydney Metro Environmental, Environmental Representatives engaged on the Central site and the Office of Environment and Heritage (OEH).
2.2	February 2019	Incorporates comments received from Artefact Heritage and Dr Denise Donlon issued to Health and OEH Heritage Division for consultation.
3.0	May 2019	Incorporates Health, Coroner and OEH comments.
4.0	April 2020	Updates to remove specific references to City and South West and Central Station. Change of title to "Procedure". Update to references.
5.0	16 August 2021	Updates to related documents and references.
6.0	December 2022	Minor clarifications to the procedure.


Appendix A: NSW Health Application Form to Exhume Human Remains

For a copy of the form see [NSW Health Application to Exhume Remains](#).

NSW Health Form

Application to Exhume Remains

Public Health Regulation, 2022 Section 95



In accordance with the requirements of Section 95(2) of the Public Health Regulation 2022,

I, _____
(Full name of applicant)

of _____
(Address) hereby

apply for permission to exhume the remains of the late _____
(Name of deceased)

from Grave No: _____, Section _____, being a single
interment within the _____ Cemetery,
for the purpose of _____

I seek permission to exhume for the following reason/s:

The deceased:

was not known to be infected with a prescribed infectious disease as defined in Section 79 of the Public Health Regulation 2022. **OR**

was known to be infected with a prescribed infectious disease as defined in Section 79 of the Public Health Regulation 2022

I am entitled to make this application because I am: (tick one)

The executor of the estate of the deceased; **OR**

The nearest surviving relative of the deceased; **OR**

If there is no executor or relative available to make the application, a proper person can make the application for the reasons set out below:

(Full reasons for proper person to make application)

1/2

NSW Health **Application to Exhume Remains** Form
Public Health Regulation 2022 Section 95

Attached are:

- A certified copy of the death certificate of the deceased issued under the Births Deaths and Marriages Registration Act 1995.
- A statutory declaration as to:
 - My relationship to the deceased; and
 - the wishes of the deceased regarding the disposal of the body (if known);
 - the reasons why the Secretary may consider me the proper person in all circumstances to make the application (if applicable)
- The application fee of \$ _____

The exhumation is to be supervised in strict accordance with the attached Plan of Management

by _____

employed with _____
(Funeral Director/Cemetery)

in the capacity of _____

Signature of applicant: _____

Date: _____

Our ref: SSI-7400-PA-492

Fill Cerone
Director of Sustainability, Environment and Planning
Sydney Metro
PO Box K659
Haymarket, NSW, 1240

Attention: Sam Fard – A/Senior Manager Environment

22 February 2024

Subject: Sydney Metro City and Southwest – Chatswood – Excavation Director Nomination and Archaeological Method Statement

Dear Mr. Cerone,

Thank you for submitting, for information, the documents relating to the nomination of Lian Ramage as Excavation Director for Chatswood.

I also note the submission of the Chatswood - Archaeological Method Statement for information.

We have received and filed the documents.

If there are any inconsistencies between the document and the conditions of approval, the conditions prevail.

If you have any enquiries please contact Lincoln de Haas at Lincoln.deHaas@dpi.nsw.gov.au

Yours sincerely,

Infrastructure Management

Note: We have not conducted an assessment of the document and this letter does not imply our satisfaction that it meets any statutory or approval requirements.

Ms Georgia Wright
A/Senior Heritage Advisor – Customer, Operations and Outcomes
Sydney Metro
Level 43
680 George Street
SYDNEY NSW 2000
By email: georgiawright@transport.nsw.gov.au

Subject: SSI 7400: Sydney Metro City & Southwest – Chatswood to Sydenham – Conditions E17 and E18: endorsement of Archaeological Method Statement and nominated Excavation Director for archaeological program

Dear Ms Wright

Thank you for your correspondence dated 13 February 2024 requesting HNSW endorsement for the Archaeological Method Statement and endorsement of the proposed Excavation Director, Lian Ramage from for the archaeological program prepared in accordance with Condition E17 and E18 of the SSI 7400 approval. In support of this you have submitted:

- 'Sydney Metro City and Southwest Chatswood Site Remediation Works Archaeological Method Statement' draft report by AMBS Ecology & Heritage, dated February 2024;
- Lian Ramage Excavation Director Application 2024; and
- Lian Ramage CV 2024.

Condition E17 and E8 of the approval require:

E17 The Archaeological Assessment Research Design Report (AARD) in the documents listed in A1 must be implemented. Final Archaeological Method Statements must be prepared in consultation with the Heritage Council of NSW (or its delegate) before commencement of archaeological excavation works. The final methodology must:

- a) provide for the detailed analysis of any heritage items discovered during the investigations;
- (b) include detailed site-specific archaeological management and artefact management strategies;
- (c) include cored soil samples for soil and pollen for the Pitt Street site within the Tank Stream Valley; and

(d) provide for a sieving strategy.

E18 Before excavation of archaeological management sites, the Proponent must nominate a suitably qualified Excavation Director who complies with the Heritage Council of NSW's Criteria for Assessment of Excavation Directors (July 2011) to oversee and advise on matters associated with historic archaeology and advise the Department and OEH.

Where archaeological excavation is required, the Excavation Director must be present to oversee excavation and advise on archaeological issues. The Excavation Director must be given the authority to advise on the duration and extent of oversight required as informed by the provisions of the approved AARD and Excavation Methodology.

A final archaeological report must be submitted to the Heritage Council of NSW within two (2) years of the completion of archaeological excavation on the project. The report must include information on the entire historical archaeological program relating to the CSSI.

Based on the information submitted by TNSW, Heritage NSW considers that the proposed archaeological methodology statement meets the requirements of Condition E17, noting that Condition E17(c) has not been addressed as it is not applicable to the Chatswood Metro site (the Tank Stream Valley not being in this area).

Heritage NSW has also reviewed the information provided regarding the nominated Excavation Director, Lian Ramage, and considers that she has the appropriate experience and knowledge to be able to lead the archaeological management program on site and ensure that the Archaeological Method Statement is adhered to. Accordingly, the requirements of Condition E18 have been met.

If you have any questions, please contact me at Katrina.stankowski@environment.nsw.gov.au or on (02) 9873 8503.

Yours sincerely

Katrina Stankowski

Katrina Stankowski
Manager Assessments, Major Projects
Heritage NSW
Department of Climate Change, Energy, the Environment and Water
As Delegate of the Heritage Council of NSW

15 February 2024

MEMO



DATE: 02 October 2020

AMBS Ref: 16314M2

TO: Robert Muir, Senior Environment Manager Sydney Metro JHCPBG JV

FROM: Jennie Lindbergh AMBS Director Historic Heritage

SUBJECT: Mowbray House post fit-out inspection

The Sydney Metro City & Southwest Chatswood to Sydenham Metro (Metro) was approved as a State Significant Development (SSD) on 7 January 2017 and the John Holland CPB Ghella Joint Venture was commissioned to complete the Tunnels and Stations Excavations (TSE) for the project. The Joint Venture commissioned AMBS Ecology & Heritage (AMBS) to manage all heritage aspects of the project. The Minister's Condition of Approval (CoA) that is relevant to the protection of heritage is:

E10 The Proponent must not destroy, modify or otherwise physically affect any Heritage item not identified in documents referred to in Condition A1.

The Chatswood Dive site is bounded by Mowbray Road (south), Pacific Highway (west), Nelson Street (north) and the Main North Shore Line (east) and the Dive is in the south-eastern sector of the site. Mowbray House, which is roughly centrally located between the Pacific Highway and the Main North Shore Line at 339 Mowbray Road, Chatswood is Item 96 on the heritage schedule of the Willoughby Local Environmental Plan 2012. The House is a typical Federation Arts and Crafts school building built in 1906 having historical, associative, aesthetic and rarity significance with moderate integrity (Figure 11). The listing also identifies a 10m curtilage for the House which was modified from late 1950s, for use as an administration office for the Sydney County Council until 2012. The building was renovated in the late 1950s for use as offices, when the first-floor extension was added to the rear of the building, and modified again in the 1970s. It came into the ownership of now Ausgrid in 2012 when it was again used for offices.

Before the building was modified in early 2018 for use as offices by the TSE Metro team it was inspected by Jennie Lindbergh, AMBS Director Historic Heritage, who provided written heritage advice on 6 December 2017. In 2012, Futurepast Heritage Consulting (Futurepast) prepared the *Chatswood Depot Mowbray House Heritage Assessment*, for Ausgrid, which includes a survey of the condition of the house at that time, which informed to 2017 assessment.

As the building had been previously modified for use as offices, the TSE Metro teams' modifications have been superficial only (Figure 2 and Figure 3). Where required there has been some re-painting of walls, windows and doors, and existing electrical cables, conduits and fittings have been re-used (Figure 4). The layout of the building has not been altered, other than erection of a temporary wall in the Mail Room to separate and protect the server (Figure 5). The third leaf of the folding three-leaf folding door between Reception and the Mail Room had been removed prior to the TSE Metro team's use of the house and was temporarily replaced by a secure door. (Figure 6). The missing leaf is retained within the house and will be re-hung and the door restored to its original configuration. Old termite damage in the architrave and skirtings has been protected behind Perspex to protect from further damage (Figure 7). Where white boards have been fixed to walls, fixing points will be made-good when

the white boards are removed (Figure 8). One room has never been used or accessed as it was mould-infested, and as such the door has been kept closed (Figure 9). Provision of potable water is via large diameter pipes adjacent to external walls which will be removed (Figure 10).

At the time of the assessment, Mowbray House was surrounded by mature plantings; however, during its period of use as a school it remained relatively open to view with sparse plantings of low scale hedges and gardens (Figure 11 and compare with Figure 1). It had been recommended that the original scheme of low-scale plantings of gardens and hedges should be re-instated to ensure that the house can be appreciated in views from Mowbray Road. Large trees that were overshadowing the house have been removed and hedges and gardens established in accordance with the original planting regime (Figure 12 and Figure 13).

The modifications of the house for use as offices by JGHCPBG, have not destroyed, modified or otherwise physically affected Mowbray House, in accordance with the requirements of Condition E10. In addition, all recommendations made in 2017 have been fulfilled to protect the fabric and significance of the house; however, the following recommendations are relevant before the house is vacated:

- The secure door should be removed and the third leaf of the folding door between Reception and the Mail Room should be reinstated.
- Following removal of white boards and other elements fixed to walls, all fixing holes should be made good.



Figure 1 Early, though undated photograph of Mowbray House (left), and photo taken in the 1930s (right). Note that the porte cochère is not present



Figure 2 The Meeting Room in 2020. Note continued use of electrical conduit, cabling and fixtures.



Figure 3 A new refrigerator and dish washer have been introduced to the kitchen, which is otherwise unchanged.



Figure 4 Existing conduit, power cable trays and sockets have been retained and painted. The windows and doors have been retained in good order and some have been re-painted.

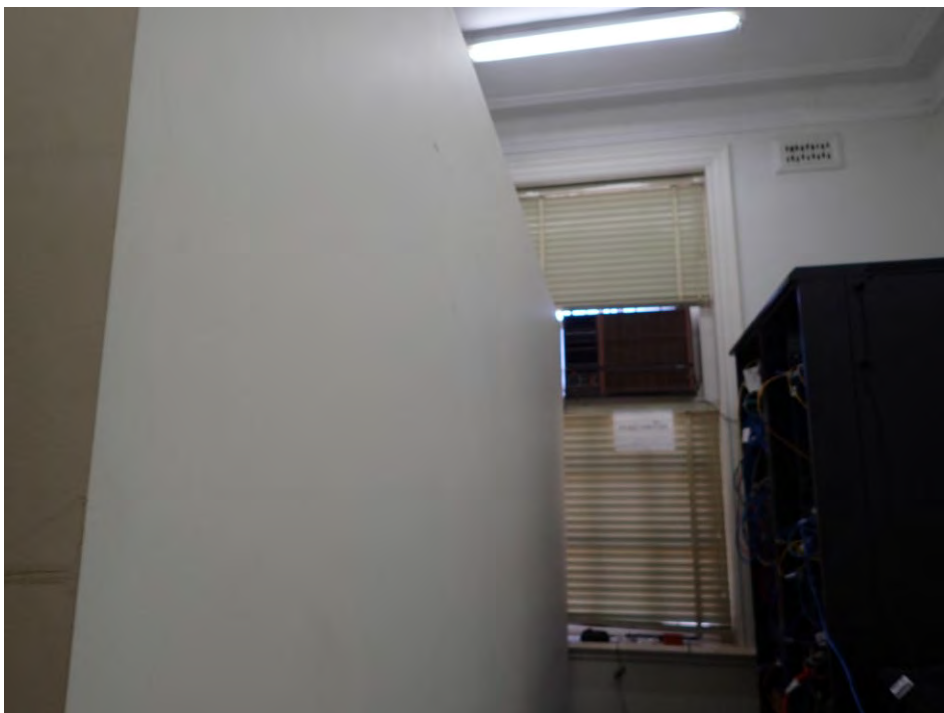


Figure 5 A temporary wall has been inserted into the Mail Room to separate and secure the server.



Figure 6 The missing leaf (door) from the folding door between Reception and the Mail Room has been replaced by a secure (lockable) door, which will be replaced by the original door.



Figure 7 Evidence of past termite activity in an architrave has been protected by Perspex, as recommended



Figure 8 where white boards and other facilities have been screw fixed to walls, fixing holes in walls will be made good.



Figure 9 One room has not been used or modified as it had serious mould problems when the TSE team arrived to site.



Figure 10 External cabling is fixed to the external wall and will remain in situ (left). Potable water is protected in large diameter pipes which are not fixed to the wall and will be removed (right).



Figure 11 Two views of the southern elevation of Mowbray House in 2017. Note the intrusive porte cochère.



Figure 12 The porte cochère over the Mowbray House entry and overshadowing trees have been removed. Hedges and garden beds help to open up the house to views.



Figure 13 Mowbray House on Mowbray Road.