Prepared for
John Holland CPB Ghella Joint Venture
Prepared by
Ramboll Australia Pty Ltd
Date
26 November 2020
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318000323-003
Audit Number
TO 024-5

SITE AUDIT REPORT
SYDNEY METRO VICTORIA CROSS NORTH ACCESS SHAFT, 52 MCLAREN STREET, NORTH SYDNEY NSW

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26 November 2020

John Holland CPB Ghella Joint Venture
Attn.: Krissy Vajda
Level 9, 50 Bridge Street
Sydney NSW 2000

By email: krissy.vajda@sydneymetro2.com.au

Dear Krissy

SITE AUDIT REPORT - SYDNEY METRO VICTORIA CROSS NORTH ACCESS SHAFT, 52 MCLAREN STREET, NORTH SYDNEY NSW

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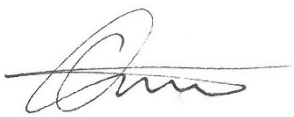
Ref 318000323-003

I have pleasure in submitting the Site Audit Report for the subject site. The Site Audit Statement, produced in accordance with the NSW *Contaminated Land Management Act 1997*, is included as Appendix B of the Site Audit Report. The Audit was commissioned by John Holland CPB Ghella Joint Venture to assess the suitability of the site for its intended use as a Metro train access shaft (commercial/industrial land use).

The Audit was initiated to comply with requirements of *Condition E67 of Infrastructure Approval, application SSI 15_7400,* approved by the Minister for Planning on 9 January 2017, and is therefore a statutory audit.

Thank you for giving me the opportunity to conduct this Audit. Please call me on 9954 8100 if you have any questions.

Yours faithfully,
Ramboll Australia Pty Ltd



Tom Onus
EPA Accredited Site Auditor 1505

cc: NSW EPA – Statement only
North Sydney Council

Ramboll Australia Pty Ltd
ACN 095 437 442
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LIST OF ABBREVIATIONS

Measures

%	per cent
µg/L	Micrograms per Litre
ha	Hectare
km	Kilometres
m	Metre
mAHD	Metres Australian Height Datum
mbgl	Metres below ground level
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
mm	Millimetre
ppm	Parts Per Million

General

ACM	Asbestos Containing Material
ADE	ADE Consulting Group Pty Ltd
ADWG	Australian Drinking Water Guidelines
AHD	Australian Height Datum
ANZG	Australian & New Zealand Guidelines
ASS	Acid Sulphate Soil
AST	Aboveground Storage Tank
ANZECC	Australian and New Zealand Environment and Conservation Council
BaP	Benzo(a)pyrene
BGL	Below Ground Level
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes & Naphthalene
CLM Act	NSW Contaminated Land Management Act 1997
COC	Chain of Custody
Council	North Sydney Council
CSM	Conceptual Site Model
DGV	Default Guideline Value
Douglas	Douglas Partners Pty Ltd
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
DSI	Detailed Site Investigation
ENM	Excavated Natural Material
EPA	Environment Protection Authority (NSW)
EPL	Environment Protection Licence
GIL	Groundwater Investigation Level
GSW	General Solid Waste
HIL	Health Investigation Level
HSL	Health Screening Level
HW	Hazardous Waste
IAA	Interim Audit Advice
JHCPBG JV	John Holland CPB Ghella Joint Venture
LCS	Laboratory Control Sample
LEP	Local Environment Plan
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Ni: Nickel, Pb: Lead, Zn: Zinc, Hg: Mercury
ML	Management Limits
MS	Matrix Spike
NATA	National Association of Testing Authorities
NC	Not Calculated
ND	Not Detected
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NL	Non-Limiting
n	Number of Samples
OCPs	Organochlorine Pesticides

OEH	Office of Environment and Heritage
OPPs	Organophosphorus Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PFAS	Per- and Poly-fluoroalkyl substances
pH	A measure of acidity, hydrogen ion activity
PID	Photoionisation Detector
PQL	Practical Quantitation Limit
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance/Quality Control
Ramboll	Ramboll Australia Pty Ltd – previously Ramboll Environ Australia Pty Ltd and ENVIRON Australia Pty Ltd
RAP	Remediation Action Plan
RPD	Relative Percent Difference
RRE	Resource Recovery Exemption
RRO	Resource Recovery Order
RSL	Regional Screening Level
SAR	Site Audit Report
SAS	Site Audit Statement
SPR	Source-pathway-receptor
SSI	State Significant Infrastructure
TEQ	Toxic Equivalence Quotient
TPHs	Total Petroleum Hydrocarbons
TRHs	Total Recoverable Hydrocarbons
TV	Trigger Value
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VENM	Virgin Excavated Natural Material
VOCs	Volatile Organic Compounds
-	On tables is "not calculated", "no criteria" or "not applicable"

1. INTRODUCTION

1.1 Audit Details

A site contamination audit has been conducted in relation to the Victoria Cross North Access Shaft site of the Sydney Metro City and South West, which is located at 52 McLaren Street, North Sydney NSW.

The Audit was conducted to provide an independent review by an EPA Accredited Auditor of whether the land is suitable for any specified use or range of uses i.e. a "Site Audit" as defined in Section 4 (1) (b) (iii) of the NSW *Contaminated Land Management Act 1997* (the CLM Act).

A State Significant Infrastructure (SSI) development application (SSI 15_7400) was approved by the NSW Minister for Planning on 9 January 2017 for the construction and operation of a metro rail line, approximately 16.5 km long (of which approximately 15.5 km is located in underground rail tunnels) between Chatswood and Sydenham, including the construction of a tunnel under Sydney Harbour, links with the existing rail network, seven metro stations, and associated ancillary infrastructure. Condition E67 of the SSI development approval relates to contamination and requires a site audit as follows:

> *"If a Site Contamination Report prepared under Condition E66 finds such land contains contamination, a site audit is required to determine the suitability of a site for a specified use. If a site audit is required, a Site Audit Statement and Site Audit Report must be prepared by a NSW EPA Accredited Site Auditor. Contaminated land must not be used for the purpose approved under the terms of this approval until a Site Audit Statement is obtained that declares the land is suitable for that purpose and any conditions on the Site Audit Statement have been complied with."*

The Audit was initiated to comply with condition E67 of the SSI approval and is therefore a statutory audit. The site audit is also a requirement of Clause 10.14B of the Sydney Metro City & Southwest Tunnel and Station Excavation Works Design and Construction Deed (Contract No: 00013/11200).

Details of the Audit are:

Requested by:	Caitlin Richards on behalf of John Holland CPB Ghella Joint Venture (JHCPBG JV)
Request/Commencement Date:	5 October 2017
Auditor:	Tom Onus
Accreditation No.:	1505

1.2 Project Background

As part of the Sydney Metro City and South West (Sydney Metro) Tunnel and Station Excavation (TSE) Works Package, a Remediation Action Plan (RAP) was developed to detail the work required to remediate impacted fill material during construction of the access shaft. The RAP was reviewed by the Auditor (see Section 1.3 for details) prior to remediation commencing.

The site comprises the 'excavation footprint' shown in blue on Attachment 1 (Appendix A). The surrounding 'Worksite Area' shown in red is not part of the site. Remediation was undertaken by excavation and off-site disposal of all fill material and natural soil/bedrock to an average depth of approximately 39 to 45 metres below ground level (mbgl) (RL 35 m). The base of the structure comprises an approximately 200 mm thick concrete slab. The walls comprise 600 mm diameter bored piles with shotcrete between the piles to a depth of approximately 7 m, then exposed rock to the base. The shaft comprises a service facility, building and substation.

1.3 Interim Audit Advice

Interim Audit Advice (IAA) was prepared by the Auditor in 2018 which provided an initial review of the suitability and appropriateness of a RAP, as well as a review of the previous investigations undertaken at the site. The reports reviewed for the IAA are listed in Section 1.4 below.

The IAA concluded that the proposed process for remediation of fill material was practical and that the site could be made suitable for the proposed land use if remediated in accordance with the RAP. The IAA noted that *"At the completion of remediation of the site, a Section A Site Audit Statement and supporting Site Audit Report certifying suitability for the proposed use should be prepared."*

The IAA is attached in Appendix C and is referenced throughout this Site Audit Report (SAR) where required, however, full details of the IAA are not repeated.

1.4 Scope of the Audit

The scope of work undertaken for the IAA included:

- Review of the following reports:
  - 'Report on Preliminary Site Investigation, Sydney Metro City and South West, Tunnel and Station Excavation Works Package, Proposed Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney, prepared for John Holland CPB Ghella JV, Project 85608.05, March 2018', report reference: Revision 0, dated 20 March 2018, prepared by Douglas Partners Pty Ltd (Douglas) (*the PSI*).
  - 'Report on Detailed Site Investigation, Sydney Metro City and South West, Tunnel and Station Excavation Works Package, Proposed Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney, prepared for John Holland CPB Ghella JV, Project 85608.05, April 2018', report reference: Revision 0, dated 20 April 2018, prepared by Douglas (*the DSI*).
  - 'Remediation Action Plan, Sydney Metro City and South West - Tunnel and Station Excavation Works Package, Proposed Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney, prepared for John Holland CPB Ghella JV, Project 85608.05, April 2018', report reference: Revision 1, dated 24 April 2018, prepared by Douglas (*the RAP*).
- A site visit by the Auditor on 18 April 2018.
- Discussions with JHCPBG JV and with Douglas who undertook the investigations and prepared the RAP.

The PSI and DSI make reference to a previous report prepared by SLR Consulting Australia Pty Ltd (SLR) (Reference 610.13533.01800-L02-v1.1-CLR.docx). The report was not provided to the Auditor for review, however a summary of relevant information from this report was included in the Douglas reports.

The scope of work undertaken in competing the SAR included:

- Review of the following report:
  - 'Waste Classification – Excavations for Piling Platform and Capping Beam Sydney Metro City and South West, Tunnel and Station Excavation Works Package Proposed Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney', dated 20 February 2020, prepared by Douglas
  - 'Waste Analysis & Classification Report, Victoria Cross Station Site, Miller Street and McLaren Street, North Sydney NSW', dated 6 May 2018, prepared by ADE Consulting Group Pty Ltd (ADE)

  - 'VENM Assessment, Sydney Metro City and South West, Tunnel and Station Excavation Works Package, Proposed Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney', dated 28 May 2020, prepared by Douglas
  - 'Report on Validation of Remediation, Sydney Metro & City SW - Tunnel and Station Excavation Works Package, Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney', report reference: Revision 0, dated 12 November 2020, prepared by Douglas (*the Validation Report*).
- Discussions with JHCPBG JV and with Douglas who undertook the remediation and validation works.

2. SITE DETAILS

2.1 Location

The site is identified as the '*Excavation Area'* (the site) for the access shaft shown on Attachment 1, Appendix A. The '*Worksite Area*' shown on Attachment 1 surrounding the '*Excavation Area'* has been excluded from the DP investigations and is not part of the site audit area.

The site details are as follows:

Street address:	52 McLaren Street, North Sydney, NSW 2060
Identifier:	Part of Lot 1 DP536008
Local Government:	North Sydney Council
Owner:	Transport for New South Wales
Site Area:	Approximately 0.05 ha

The boundaries of the site comprise the walls of the excavation. The Worksite Area is bound by the McLaren Street to the south, Miller Street to the west, a hotel and commercial office buildings to the east and commercial buildings and a high school to the north.

A survey plan of the site has been provided in Attachment 2 (Appendix A) and identifies the Site Audit boundary as the 'Shaft Excavation Area'.

2.2 Zoning

The current zoning of the site is B4 Mixed Use under North Sydney Local Environment Plan (LEP) 2013.

2.3 Adjacent Uses

The site is located within an area of commercial and high-density residential land use. The surrounding site use includes:

North: The Worksite Area then a commercial building and high school.

East: The Worksite Area then a hotel and commercial buildings (offices).

South: The Worksite Area then McLaren Street, then high-rise residential buildings with ground floor commercial.

West: The Worksite Area then Miller Street, then commercial buildings (Council).

Douglas identified the closest sensitive ecological receptor for groundwater to be Neutral Bay located approximately 950 m to the southeast.

The PSI did not identify nearby land uses with the potential to impact the site.

A search of the NSW EPA public records did not identify any sites listed as contaminated in the immediate vicinity of the subject site.

2.4 Site Condition

Douglas inspected the site for the PSI on 9 November 2017 and noted the following:

- The site was largely occupied by an asphalt surface car park with surrounding landscaping. A portable site shed and skip bin were located in the car park.
- A monitoring well of unknown construction was present in the north of the site.
- The site was surrounded by residential and commercial land use.

During the Auditor's site visit on 18 April 2018, the site was an active construction site, with the following features noted:

- Crushed sandstone was present across the entire site, which had been imported for use as a piling platform. The material did not contain obvious anthropogenic material or staining. The site representative reported that pavements, vegetation and fill material were removed prior to placement of the material.
- Piling was underway along the western site boundary. Piling returns appeared to comprise natural clay.
- Some construction equipment (steel reinforcement) was stored on the site surface.

Douglas indicated that at the time of preparation of the Validation Report the site was as described in Section 2.5.

2.5 Proposed Development

The development comprises a vertical shaft to RL 35 m, approximately 39 to 45 m below ground level (bgl). Walls of the shaft comprise 600 mm bored piles with mesh and 200 mm thick shotcrete infill to a depth of 7 m from the surface then spot bolts and exposed rock to the base. The floor of the shaft comprises 200 mm thick concrete.

For the purposes of this audit, the 'commercial/industrial' land use scenario will be assumed.

3. SITE HISTORY

The IAA provided a summary of the site history from the PSI, including a review of historical title deeds, aerial photographs, NSW EPA records and Section 149 (now termed Section 10.7) certificates. Douglas reviewed NSW SafeWork records as part of the DSI. The site history from the IAA is summarised as follows.

From aerial photographs, it appeared that the site was occupied by a residential property in 1930. The property was demolished sometime between 1951 and 1970 and the site was then used as an at grade car park up until 2017 where the site was cleared in preparation for the construction of the access shaft.

The PSI noted an asbestos clearance certificate prepared for a larger area including the site for the removal of asbestos containing material (ACM) from the surface and impacted stockpiles in 2016.

A review of the NSW EPA public records did not identify the site.

3.1 Auditor's Opinion

In the Auditor's opinion, the site history indicates past activities have a low potential for significant contamination. Sources of contamination appear to be limited to hazardous building materials from residential building demolition, fill material imported to level the site and car park construction, and minor spills of fuel and oil from vehicles.

The Auditor considers that the site history is broadly understood and adequate for identification of contaminants of concern (Section 4) and remediation of the site (Section 11).

4. CONTAMINANTS OF CONCERN

As outlined in the IAA, the PSI and DSI provided a list of contaminants of concern and potentially contaminating activities. These have been tabulated in Table 4.1.

Table 4.1: Contaminants of Concern

Area	Activity	Potential Contaminants
Entire site	Fill and surface soil imported from unknown sources to level the site	Metals, total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, xylenes & naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphorus pesticides (OPPs), polychlorinated biphenyls (PCBs), phenols and asbestos
Entire site	Hazardous building material from former structures	Asbestos, lead and PCB
Car park	Spills and leaks from vehicles Coal tar in asphalt	TRH, BTEX, PAHs and phenols

4.1 Auditor's Opinion

The Auditor considers that the analyte list used by Douglas is generally adequate to assess the potential sources of contamination. Samples of asphalt were not assessed for coal tar, however it is noted that all asphalt was removed from the site during remediation. This data gap is therefore not considered significant.

There has been no assessment by the consultants for the presence of per- and poly-fluoroalkyl substances (PFAS) but in the Auditor's opinion there are no indications in the site history that they would be potential contaminants of concern.

5. STRATIGRAPHY AND HYDROGEOLOGY

5.1 Stratigraphy

Douglas reviewed geological maps and reported that the site is underlain by Ashfield Shale which comprises black to dark grey shale and laminite.

The sub-surface profile of the site encountered during the DSI prior to remediation is summarised by the Auditor in Table 5.1.

Table 5.1: Stratigraphy

Depth (mbgl)	Subsurface Profile
0.0 – 0.15	Asphalt pavements underlain by gravel roadbase (present at 3 locations).
0.0 – 0.4 (west) / 1.0 (east)	Fill material comprising sand with inclusions of demolition rubble (glass, brick) and sandstone. Layers of fly ash and charcoal were noted at some locations.
0.4 (west) / 1.0 (east) – 1.6	Natural clay.
1.6 to termination depth (10)	Sandstone bedrock encountered at one location MW05.

mbgl – metres below ground level

The subsurface profile comprised relatively shallow fill underlain by natural clay soil and sandstone bedrock.

Douglas indicated that the site is located within an area of no known occurrence of acid sulfate soils (ASS) and is not close to an area of associated risk of ASS.

Following remediation of the site (discussed in Section 11), fill material and natural soil/rock were removed from the entire site area to depths of up to approximately 39 to 45 mbgl.

5.2 Hydrogeology

The PSI undertook a search of the groundwater information database maintained by the NSW Government and did not identify any registered groundwater bores within a 0.5 km radius of the site. The PSI concluded that based on the topography, groundwater is anticipated to flow to the southeast. Douglas identified the closest sensitive ecological receptor for groundwater to be Neutral Bay, located approximately 950 m to the southeast. Excess surface water run-off is anticipated to flow into the local stormwater network.

As part of the DSI, one groundwater monitoring well (MW05) was installed on the site (Attachment 3, Appendix A). Groundwater seepage was not noted during drilling. Groundwater observations and sampling was undertaken as part of the DSI on 24 January 2018. Depth to groundwater in the monitoring well was recorded at 8.24 mbgl. The DSI stated that groundwater is anticipated to flow to the southeast based on site topography, however an accurate flow direction was not able to be estimated based on one well.

The DSI included field records of groundwater parameters recorded during sampling. They indicated that the pH was 4.2, dissolved oxygen (DO) was 4.2 mg/L, redox was 245 mV, and electrical conductivity (EC) was 691 mS/cm.

5.3 Auditor's Opinion

The Auditor considers that the site stratigraphy and hydrogeology are sufficiently well known for the purpose of the Audit.

6. EVALUATION OF QUALITY ASSURANCE AND QUALITY CONTROL

An evaluation of the overall quality of the data obtained in previous investigations (DSI) at the site was presented in the IAA (Appendix C). In considering the data as a whole the Auditor concluded in the IAA that:

- The data are likely to be representative of the overall site conditions, including fill, natural soil and groundwater. Results for volatile organics in soil samples collected by solid stem auger may underestimate actual concentrations, however in the absence of a source of volatile contaminants this is not considered significant.
- The investigation data are considered to be complete.
- There is a high degree of confidence that the data are comparable for each sampling and analytical event.
- The laboratories provided adequate information to conclude that the data are of sufficient precision.
- There is a high degree of confidence that the data are accurate.

7. ENVIRONMENTAL QUALITY CRITERIA

The Auditor has assessed the results against Tier 1 criteria from National Environmental Protection Council (NEPC) National Environmental Protection (Assessment of Site Contamination) Measure 1999, as Amended 2013 (NEPM, 2013). Other guidance has been adopted where NEPM (2013) is not applicable or criteria are not provided. Based on the proposed development (excavation and construction of an access shaft), the human health criteria for 'commercial/industrial' and ecological criteria appropriate for 'commercial/industrial' were adopted. This was considered to be most relevant during remediation and ongoing operation of the site, however, is likely to be conservative for short term exposure by construction workers.

7.1 Soil Assessment Criteria

7.1.1 Human Health Assessment Criteria

The Auditor has adopted human health assessment criteria from the following sources:

- NEPM (2013) Health Investigation Levels (HILs) for 'Commercial/Industrial' (HIL D) land use.
- NEPM (2013) Health Screening Levels (HSLs) for 'Commercial/Industrial' (HSL D) land use. The HSLs assumed a sand soil type. Depth to source adopted was <1 m as an initial screen.
- NEPM (2013) Management Limits (MLs) for petroleum hydrocarbons for 'Commercial/Industrial' land use and assuming coarse soil texture.
- The presence/absence of asbestos.
- Friebel & Nadebaum (2011) HSLs for direct contact for all land use categories, and vapour inhalation/direct contact pathways for intrusive maintenance workers.

7.1.2 Ecological Assessment Criteria

The Auditor has not adopted ecological soil assessment criteria as soil from the site was excavated to a depth of between 39 and 45 mbgl and disposed off-site during development of the access shaft. Ecological soil criteria are applicable to depths of up to 2 mbgl and are therefore not applicable for the remaining natural soil.

7.1.3 Soil Aesthetic Considerations

The Auditor has considered the need for soil remediation based on 'aesthetic' contamination as outlined in *Section 3.6 Aesthetic Considerations* of NEPM (2013) Schedule B1, which acknowledges that there are no chemical-specific numerical aesthetic guidelines. Instead, site assessment requires a balanced consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity.

7.1.4 Imported Fill

Imported fill has been assessed in relation to attributes expected of virgin excavated natural material (VENM). The NSW EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste* defines VENM as "*…natural material (such as clay, gravel, sand, soil or rock fines):*

- *'that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities*
- *'that does not contain sulphidic ores or soils, or any other waste, and includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice in the NSW Government Gazette."*

On this basis, the Auditor considers that for soil to be classified as VENM, the following criteria generally apply:

- Organic compounds (including petroleum hydrocarbons, PAHs, OCPs, PCBs and phenols) should be less than the PQLs.
- Inorganic compounds should be consistent with background concentrations.
- The material should not contain or comprise actual or potential acid sulphate soil.

Imported material, such as excavated natural material (ENM) or non-VENM construction materials, were assessed against the requirements of the applicable resource recovery order (RRO) and resource recovery exemption (RRE) issued by the EPA under clause 93 of the *Protection of the Environment Operations (Waste) Regulation 2014*.

7.2 Groundwater Assessment Criteria

7.2.1 Human Health Assessment Criteria

NEPM (2013) HSLs are not appropriate for assessing risks from groundwater to human health at the site due to the potential for direct contact. The Auditor has adopted human health assessment criteria from the following sources to assess risk from direct contact, inhalation and incidental ingestion:

- NHMRC (2011) *National Water Quality Management Strategy, Australian Drinking-Water Guidelines* (ADWG), Version 3.5 Updated August 2018.
- USEPA Regional Screening Levels (RSLs) Residential Tap Water Criteria. Online database of assessment criteria that are current as of November2020. Tap water assessment criteria derived for carcinogenic compounds were multiplied by a factor of 10 to adjust the target cancer risk level from 1:1,000,000 to 1:100,000 to be consistent with Australia's recommended target cancer risk level. For some chemicals, where a criteria has been derived using both non-cancer and cancer toxicity data, the lower criteria was adopted.
- WHO (2017) Guidelines for Drinking-water Quality, Fourth Edition, incorporating the 1st addendum.
- WHO (2008) *Petroleum Products in Drinking-water. Background document of WHO Guidelines for Drinking-water Quality* (adopted in absence of health-based criteria in WHO (2017) because the taste and odour of petroleum products will in most cases be detectable at concentrations below those of health concern).

7.2.2 Ecological Assessment Criteria

The Auditor has adopted ecological groundwater assessment criteria from the following sources:

- ANZG (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia (www.waterquality.gov.au/anz-guidelines). Criteria for marine water and 95% level of protection were adopted.

7.3 Auditor's Opinion

The water bearing zone was not identified during well installation, however the standing water level was recorded at 8.24 mbgl and is therefore within sandstone bedrock. Given the absence of bores for beneficial groundwater use and presence of a reticulated water supply for the area, extraction and use of groundwater as a resource is unlikely. Direct contact with groundwater may occur at the site during construction based on the proposed depth of excavation and SWL.

The environmental quality criteria referenced by the Auditor are consistent with those adopted by Douglas, with the exception of the following:

- The DSI does not mention assessment of 'aesthetic' contamination as outlined in the NEPM (2013). However, the report discusses anthropogenic inclusions within fill material during sampling.

- For groundwater contamination, the DSI adopted the PQL as a screening level for assessment of risks to human health. Results above the PQL would trigger a review for the risk and need for further investigation or assessment.
- The IAA adopted GILs listed in NEPM (2013) for protection of aquatic ecosystems referenced in ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. The 95% marine water level of protection was adopted. The ANZG (2018) DGVs for marine water and 95% level of protection adopted by the Auditor are largely based on trigger values (TVs) from ANZECC (2000).
- The DSI did not adopt CRC CARE HSLs for intrusive maintenance workers or USEPA RSLs, however these were adopted as part of the IAA and this SAR.

Given the results obtained, the Auditor considers that these discrepancies do not affect the overall conclusions reached by Douglas and the Auditor.

8. EVALUATION OF SOIL RESULTS

The soil analytical results from the investigations (DSI) undertaken prior to the preparation of the RAP were reviewed by the Auditor and presented in the IAA (Appendix C). Soil sample locations are shown on Attachment 3, Appendix A. In assessing the results reviewed in the IAA, the Auditor made the following observations:

- Asbestos was not observed during the site inspection or investigation and was not detected in samples of fill material scheduled for analysis. It is noted that asbestos was previously present on the site as fragments of cement sheeting. SLR undertook an asbestos clearance in October 2016, which removed ACM from the ground surface and removed stockpiles containing ACM. Subsurface clearance did not appear to have been undertaken. The source of the ACM was not reported by Douglas in their summary of the SLR report, however, may have been from fly-tipping, demolition of former structures, or imported fill material.
- Concentrations of lead exceeding the human health screening criteria were reported in fill samples from TP03 (0.2-0.3 m) and TP04 (0.2-0.3 m). The samples represented sand fill material with trace of demolition rubble.
- Elevated concentrations of PAHs were reported in fill samples from TP02 (0.2-0.3 mbgl), TP03 (0.2-0.3 m) and MW05 (0.4-0.5 m) however concentrations were less than the adopted screening criteria.
- Other organic analytes were less than the adopted screening criteria, and typically less than the PQL. Detectable concentrations of TRH coincided with elevated PAH concentrations.
- Natural clay contained concentrations of metals considered typical of background concentrations. Organics were not detected in natural clay. Clay was not analysed for asbestos.
- Sandstone was not analysed. Groundwater results discussed in Section 9 did not identify contamination, therefore contamination within sandstone is not expected.

8.1 Auditor's Opinion

The soil analytical results obtained during the DSI are consistent with the site history and field observations. The results indicate the fill to be locally impacted by lead and PAHs. There was considered to be high potential for ACM contamination in fill material given it has previously been removed from the site surface and based on the fill composition and site history. Narrow layers of ash or charcoal within the fill material were not assessed, however were removed as part of remediation and development of the site.

In the Auditor's opinion, the soil analytical results reviewed in the IAA indicate that contamination was present at the site and remediation was required. Remediation of fill material was undertaken and is discussed further in Section 11.

9. EVALUATION OF GROUNDWATER RESULTS

Groundwater monitoring was undertaken during the DSI. Douglas installed one monitoring well (MW05) at the site (Attachment 3, Appendix A) and undertook one groundwater monitoring event as part of the DSI. The groundwater analytical results from the DSI, undertaken prior to the preparation of the RAP, were reviewed by the Auditor in preparation of the IAA (Appendix C). In assessing the results reviewed in the IAA, the Auditor made the following observations:

- Metals were detected at low concentrations, with copper and zinc exceeding the ecological criteria. The DSI concluded that the concentrations of heavy metals can be attributed to diffuse urban-sourced background levels and are not from a site-specific source. Concentrations were less than the human health screening criteria.
- Organic contaminants were not detected above the PQL.

The IAA concluded that *"the analytical results indicate an absence of groundwater contamination at the site. Marginal exceedances of ecological screening criteria reported for metals (copper and zinc) are considered representative of background concentrations. Ecological receptors will not be present onsite and the closest surface water receptor was 950 m to the southeast. Groundwater is not considered to present a risk human health and ecological receptors."*.

9.1 Auditor's Opinion

Groundwater assessments undertaken at the site have not identified significant groundwater contamination. The Auditor is satisfied that further investigation or remediation of groundwater is not required to demonstrate suitability of the site for the proposed use.

10. EVALUATION OF CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is a representation of the source, pathway and receptor linkages at a site. Douglas developed a CSM and used it iteratively throughout the site assessment to inform decisions around investigation and remediation requirements. The CSM was initially developed following the preliminary investigations and included in the RAP and was reviewed by the Auditor in the IAA. Table 10.1 provides the Auditors review of the CSM based on the PSI and DSI (presented in the IAA).

Table 10.1: Review of the Conceptual Site Model

Element of CSM	Consultant	Auditor Opinion
Contaminant source and mechanism	Contaminated fill material containing lead. ACM was not identified however may be present. Unexpected contamination finds during excavation.	The source and mechanism for soil is considered appropriate.
Affected media	Fill material	Fill material is considered to be the primary affected media. Groundwater contamination was identified, however concentrations were less than the primary human health screening criteria and is therefore not considered affected media for the purposes of remedial planning.
Receptor identification	Construction workers, adjacent land users, surface water (off site), groundwater, future site workers and users and maintenance workers.	The receptors have been adequately identified.
Exposure pathways	Ingestion and dermal contact with soil, inhalation of dust, surface water runoff, leaching and vertical migration to groundwater, and lateral migration of groundwater.	The CSM identified all potential exposure pathways. Complete exposure pathways are considered to be inhalation, direct contact and incidental ingestion during construction. No complete pathways are considered likely to be present following construction of the access shaft.
Presence of preferential pathways for contaminant movement	Not discussed	Not considered relevant for fill material removed during remediation. Preferential pathways for groundwater and vapour migration are likely to be present on the site, however are not considered relevant as contamination representing a risk to human health has not been identified and is unlikely to be present.
Potentially complete source-pathway-receptor (SPR) linkages requiring remediation or management	The pre-remediation CSM did not clearly specify potentially complete SPR linkages.	Potentially complete SPR linkages were to be addressed during excavation of the access shaft.
Evaluation of data gaps	The RAP states that the contaminants in groundwater will require treatment prior to disposal. However, treatment options have not been addressed in the RAP.	No potentially significant data gaps were identified during review of the PSI, DSI and RAP. Layers of fly ash and charcoal in fill material were not sampled and analysed during the DSI. These layers will be removed along with all fill material during remediation and development of the site. The data gap is therefore not

Element of CSM	Consultant	Auditor Opinion
		considered significant with respect to site remediation. The layers may have a different waste classification so may require further assessment prior to disposal.

The Auditor concluded in the IAA that the CSM presented was an adequate representation for assessing remedial requirements.

10.1 Auditor's Opinion

The Auditor is of the opinion that the CSM was a reasonable representation of the contamination at the site prior to remediation during the access shaft excavation.

11. EVALUATION OF REMEDIATION

11.1 Remediation Required

Douglas determined remedial requirements based on review of investigation results against screening criteria and consideration of aesthetic issues. The RAP considered the horizontal extent of the remediation to be the excavation footprint, and the vertical extent to be the depth of contaminated or potentially contaminated soils, or the base of the excavation (whichever occurs first). Douglas anticipated that all contaminated or potentially contaminated soils within the excavation footprint will be removed as part of the bulk excavation works required for the development. Excavation and off-site reuse or disposal of the soil was therefore considered in the RAP by Douglas to be the only practicable remediation strategy.

An evaluation of the RAP was undertaken by the Auditor as part of the IAA (Appendix C), which included a comparison with the requirements of OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites (current at the time of the IAA). The RAP was found to address the required information, and the Auditor concluded that the remediation approach was adequate to address contaminated fill material during redevelopment of the site through excavation and off-site disposal of contaminated fill material and natural soil and successful validation.

11.2 Remedial Works Undertaken

General excavation was carried out by JHCPBG JV with the asbestos remediation works carried out by Liberty Industrial Pty Ltd (Liberty) (Licence number: AD211444) as the licensed asbestos removal contractor with Hibbs & Associates Pty Ltd (Hibbs) providing occupational hygiene services (air monitoring and surface clearances). Environmental consulting was provided by Douglas between January and March 2018.

Following the demolition of site buildings and structures, the following sequence of remediation/validation works were noted by Douglas in the Validation Report:

- Excavation and stockpiling works commenced in January 2018.
- Asbestos contaminated soils were disposed offsite between February and March 2018.
- Clearance for asbestos removal was obtained in March 2018.
- Materials to be temporarily used during construction were imported in March 2018. Imported materials were subsequently classified for off-site disposal purposes by Douglas and others and, following completion of use on site, were disposed of off-site in May 2018.
- Natural materials were excavated and removed from the site from July 2018 to July 2019.

11.3 Validation Activities

11.3.1 Validation of Lead Human Health Exceedances TP03 and TP04

Douglas indicated in the Validation Report that a VENM assessment was undertaken at the top of the VENM horizon over the entire access shaft excavation area which included the previously identified lead impacted locations. Douglas indicated that validation samples were not obtained from excavation walls to confirm the lateral extent of lead impacted material however the extent of the impacted material was defined by, and extended to, the nearest DSI location which was not elevated.

The Validation Report indicated that the VENM assessment included ten primary samples (VCNV1 to VCNV10) which were collected from the surface of the area. Samples were analysed for metals, TRH, BTEX, PAHs, OCPs, OPPs, PCBs, total phenols, and asbestos. Concentrations of organic analytes were less than the laboratory practical quantitation limits (PQL), asbestos was

not detected, and metals concentrations were within background concentration ranges. Concentrations of lead were below the adopted human health criteria.

11.3.2 Unexpected Finds of Asbestos

The Validation Report indicates that asbestos was encountered within the fill materials during excavation works in the vicinity of DSI sample locations TP01 and TP04. The excavated material was stockpiled prior to offsite disposal. The Validation Report indicates that an asbestos clearance was provided by Hibbs following removal of the stockpiled fill materials containing asbestos. Douglas indicated that the Hibbs report noted further excavation works may uncover additional asbestos containing materials. On this basis the remaining fill materials at the site were assumed to contain asbestos.

The Validation Report indicates that an asbestos clearance was provided by Hibbs following the excavation and removal of remaining fill. The Hibbs report indicated that the site had been excavated to natural soils. As discussed in Section 11.3.1, Douglas obtained samples from the exposed natural surface during the VENM assessment. The VENM assessment included laboratory analysis of 10 samples for asbestos. Asbestos was not detected in the samples analysed.

Documentation provided in the Validation Report included asbestos clearance and asbestos air monitoring documentation prepared by Hibbs.

11.3.3 Evaluation of Validation QA/QC

Validation data generally included walkover inspections and observations including clearance documentation. Analytical validation data for natural soils was also obtained for VENM assessments undertaken following removal of fill material. The Auditor has assessed the overall quality of the data presented in the Validation Report based on the criteria outlined in the QA/QC tables (Table 6.1 and 6.2 in IAA). In considering the data as a whole, the Auditor concludes that:

- The data from the validation are likely to be representative of the overall soil conditions.
- The data is considered to be adequately complete.
- There is a high degree of confidence that data is comparable for each sampling and analytical event.
- The laboratories provided sufficient information to conclude that data is of sufficient precision.
- There is a high degree of confidence that data is accurate.

11.3.4 Imported Material

The Validation Report indicates that approximately 351.17 tonnes (t) of material was imported to site for a temporary piling platform. The Validation Report includes an import register prepared by JHCPBG JV which indicates that the imported material comprised tunnel spoil (sandstone) from the WestConnex tunnelling project, Arncliffe, classified under *The WestConnex Stage 2 tunnel spoil exemption 2017*.

Following completion of use on site, the Validation Report indicated that the imported material was subsequently classified by ADE and disposed of off-site as excavated natural material (ENM). The off-site disposal of this imported material is discussed in Section 14.4.

11.3.5 Material Disposed Off-Site

Waste materials generated on-site were sampled and classified in accordance with the EPA (2014) *Waste Classification Guidelines*. Sampling from stockpiles of excavated soils and in-situ material was undertaken to characterise and classify the waste materials prior to off-site disposal. The Validation Report reports that 97,900.25 tonnes (t) of material was disposed off-site including the following waste types:

- General Solid Waste (non-putrescible) (GSW) - Special Waste (Asbestos)

- Restricted Solid Waste (non-putrescible) (RSW) - Special Waste (Asbestos)
- Excavated Natural Material (ENM)
- Virgin Excavated Natural Material (VENM)

Waste materials were disposed from the site between February 2018 and July 2019. Douglas included supporting documentation from the contractors including waste disposal dockets, tipping information and registers for receival sites.

The Auditor has reviewed the documentation provided and is of the opinion that it is consistent with the remedial works described. Further assessment of the waste classifications and disposal quantities is provided in Section 14.4.

11.4 Auditor's Opinion

In the Auditors' opinion, the excavation works were appropriate to remediate onsite contamination.

12. CONTAMINATION MIGRATION POTENTIAL

Based on the remediation/excavation works outlined in the Validation Report, it is considered that all on-site sources of contamination have been removed during remediation/excavation works. Contaminants detected prior to remediation within the soil at the site have not adversely affected the groundwater quality except possibly locally. As localised soil impacts were removed during remediation works, ongoing impacts to groundwater are unlikely. In the Auditors opinion, the site in its remediated condition has a negligible potential for migration of contamination, including to groundwater.

13. ASSESSMENT OF RISK

Based on assessment of results against relevant guidelines and consideration of the overall investigations and remediation performed, the Auditor considers that contaminant concentrations remaining onsite do not pose a risk to site users or the environment under the proposed land use scenario.

Contaminants within groundwater are not likely to pose a risk to human health as the impacts are mostly localised and representative of diffuse urban-sourced background levels and are not from a site-specific source. It is also noted that abstraction and use on-site is not expected as a viable aquifer is not readily accessible.

14. COMPLIANCE WITH REGULATORY GUIDELINES AND DIRECTIONS

14.1 General

The Auditor has used guidelines currently made and approved by the EPA under section 105 of the NSW *Contaminated Land Management Act 1997*.

The investigation was generally conducted in accordance with SEPP 55 Planning Guidelines and reported in accordance with the OEH (2011) *Guidelines for Consultants Reporting on Contaminated Sites* (which was applicable at the time the reports were prepared). The Validation Report was generally prepared in accordance with the NSW EPA (2020) *Consultants Reporting on Contaminated Land*.

14.2 Development Approvals

A statutory site audit is required for the proposed Victoria Cross North Access Shaft site, part of the Sydney Metro rail project between Chatswood and Sydenham, to address the requirements of Condition E67 of Infrastructure Approval, application SSI 15_7400, approved by the NSW Minister for Planning on 9 January 2017. Condition E67 relates to contamination and requires a site audit as follows:

> *"If a Site Contamination Report prepared under Condition E66 finds such land contains contamination, a site audit is required to determine the suitability of a site for a specified use. If a site audit is required, a Site Audit Statement and Site Audit Report must be prepared by a NSW EPA Accredited Site Auditor. Contaminated land must not be used for the purpose approved under the terms of this approval until a Site Audit Statement is obtained that declares the land is suitable for that purpose and any conditions on the Site Audit Statement have been complied with."*

This SAR and accompanying Site Audit Statement (SAS) were prepared to comply with this condition.

14.3 Duty to Report

Consideration has been given to the requirements of the EPA (2015) *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*. Based on the findings of this SAR, the Auditor considers that the site is not required to be notified under the Duty to Report requirements.

14.4 Waste Management

In accordance with Section 4.3.7 of the NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme (3rd Edition),* the Auditor has checked the following aspects relating to waste disposal.

14.4.1 Waste Classification

Two waste classification letters were prepared by Douglas along with one letter prepared by ADE which were included within the Validation Report. It was reported that wastes were classified in accordance with the NSW EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste*. The adopted waste classification strategy included sampling generally from in-situ material however sampling was also undertaken from stockpiles of excavated soils.

Waste classification reports were prepared for the following soils at the site:

- GSW (non-putrescible) - Special waste (asbestos waste) for Stockpile 4.
- RSW (non - putrescible) - Special waste (asbestos waste) for in-situ fill and Stockpile 3.
- ENM for the piling pad stockpile

- VENM for in-situ natural soils and bedrock following fill removal.

14.4.2 Waste Volumes, Disposal Receipts and Disposal Facilities

The Validation Report provides disposal dockets for the off-site disposal of different wastes which occurred between February 2018 and July 2019. The Validation Report also includes a waste receiving site register and a waste tracking register prepared by JHCPBG JV.

Douglas and the JHCPBG JV records provided in Appendix J of the Validation Report report that a total of 74,521.10 t of material (including ENM and VENM) was removed off-site. The Auditor has assessed the volumes presented and calculates a similar quantity to those provided by Douglas and JHCPBG JV.

Table 14.1 summarises the waste disposal information for soil disposed off-site (excluding ENM and VENM) to several waste management facilities that are licensed to receive the specified waste under their Environmental Protection Licence (EPL).

Table 14.1: Summary of Waste Disposal

Waste Classification	Tonnage (t)	Disposal Facility	EPL No.
GSW (non-putrescible) and Special waste (Asbestos)	77.4	Genesis Dial A Dump (Eastern Creek)	13426
RSW (non-putrescible) and Special waste (Asbestos)	1,318.78	Suez (Kemps Creek)	4068

14.4.3 Auditor's Opinion

The Auditor considers that the waste management assessed as part of the remedial works was undertaken in accordance with the relevant guidelines and regulations.

14.5 VENM and Other Imported Materials

As detailed in Section 11.3.4, other materials were imported to the site temporarily to allow for construction activities. The Auditor is of the opinion that the materials imported were fit for purpose. The Validation Report indicated that these materials were excavated, waste classified and disposed off-site and therefore are no longer present at the site.

14.6 Licenses

Excavation, onsite remediation and offsite removal of ACM contaminated soils was required to be conducted by at least a Class B licensed contractor.

Douglas confirmed that the asbestos remediation works were completed by Liberty who hold a Class B Asbestos removal licence. Copies of the appropriate licences were not provided to the Auditor, however the Auditor undertook a search of the SafeWork NSW asbestos licence database on 30 October 2020 which indicates that Liberty are licenced for non-friable asbestos removal works (Licence number: AD211444).

14.7 Conflict of Interest

The Auditor has considered the potential for a conflict of interest in accordance with the requirements of section 3.2.3 of the NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme*.

The Auditor considers that there are no conflicts of interest, given that:

1. The Auditor is not related to a person by whom any part of the land is owned or occupied.
2. The Auditor does not have a pecuniary interest in any part of the land or any activity carried out on any part of the land.
3. The Auditor has not reviewed any aspect of work carried out by, or a report written by, the site auditor or a person to whom the site auditor is related.

15. CONCLUSIONS AND RECOMMENDATIONS

Based on the results documented in the Validation Report, Douglas concluded that "*all on-site sources of contamination have been removed and the site suitably validated. Accordingly, it is considered that the site has been made suitable for the proposed access shaft usage*".

Based on the information presented in reports listed in Section 1 and observations made on site, and following the Decision-making process for assessing urban redevelopment sites in NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme (3rd Edition)*, the Auditor concludes that the site is suitable for the purposes of 'commercial/industrial' land use (proposed rail access shaft).

Groundwater has not been assessed for any beneficial re-use. Any future use of groundwater would require appropriate assessment and regulatory approval from the NSW Office of Water.

16. OTHER RELEVANT INFORMATION

This Audit was conducted on behalf of JHCPBG JV for the purpose of assessing whether the land is suitable for the proposed commercial/industrial uses, i.e. a "Site Audit" as defined in Section 4 (definition of a 'site audit' (b)(iii)) of the CLM Act.

This summary report may not be suitable for other uses. Douglas and ADE included limitations in their reports. The Audit must also be subject to those limitations. The Auditor has prepared this document in good faith, but is unable to provide certification outside of areas over which the Auditor had some control or is reasonably able to check.

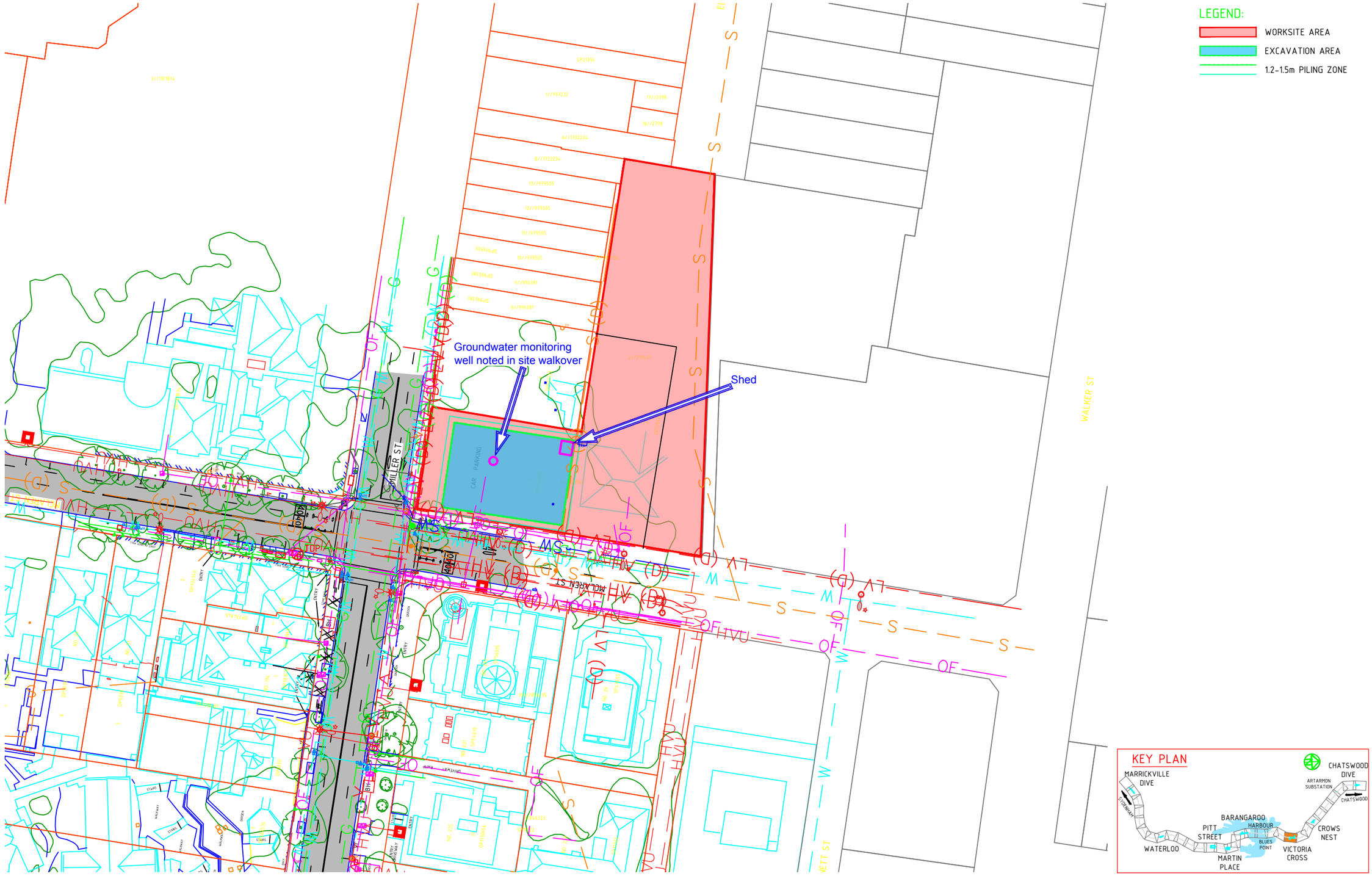
The Auditor has relied on the documents referenced in Section 1 of the Site Audit Report in preparing the Auditors' opinion. If the Auditor is unable to rely on any of those documents, the conclusions of the audit could change.

It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

APPENDIX A
ATTACHMENTS

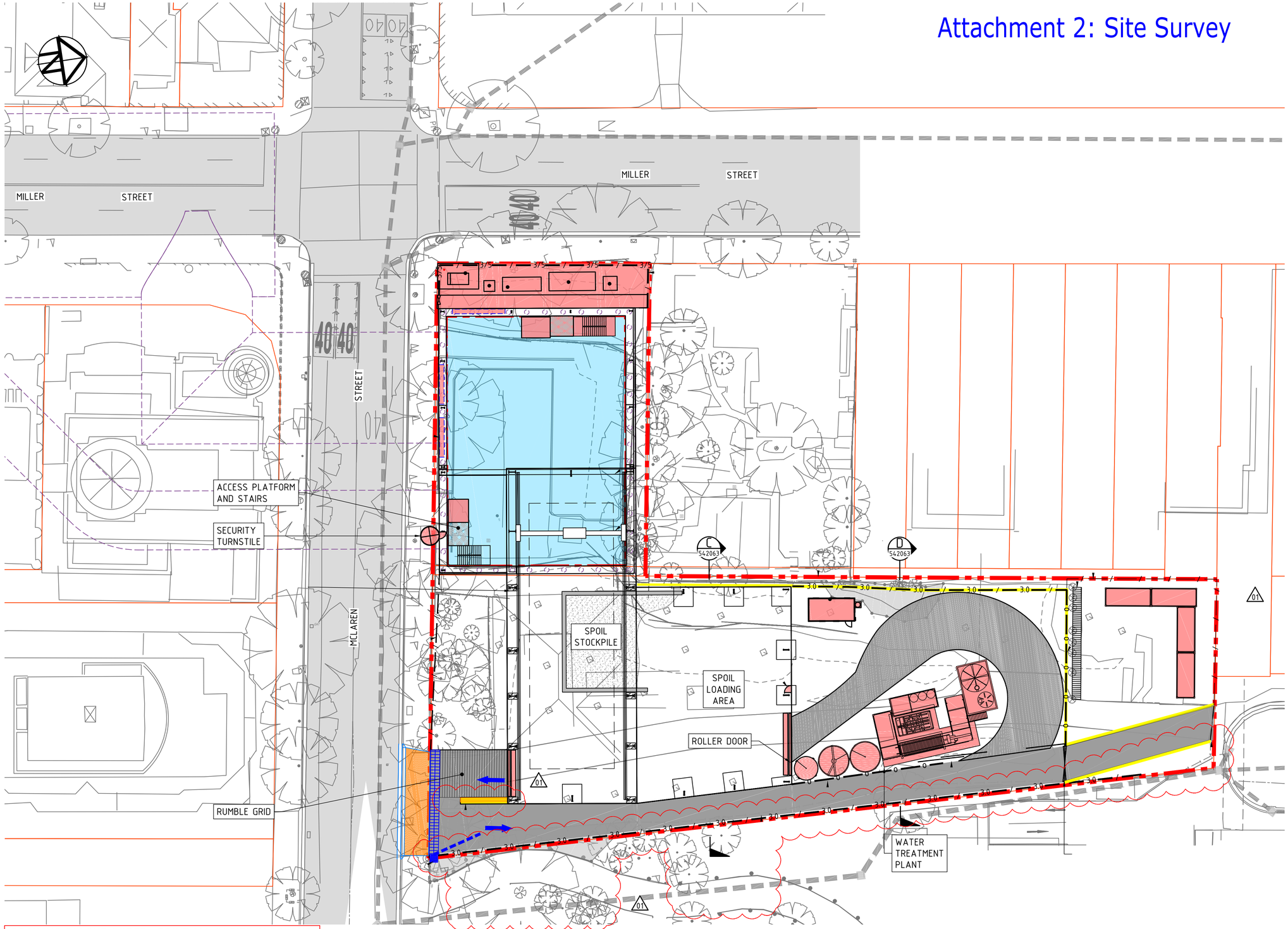
Attachment 1: Site Location
Attachment 2: Site Survey
Attachment 3: Douglas Sample Locations

Attachment 1: Site Location



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: John Holland CPB Ghella JV	TITLE: **Site Location & Features, Sydney Metro City & South West, Tunnel and Station Works Package, Proposed Victoria Cross North Acces Site, McLaren Street, NORTH SYDNEY**	PROJECT No: 85608.05
	OFFICE: Sydney / DRAWN BY: PSCH		DRAWING No: 1
	SCALE: 1:1000 @ A3 / DATE: 26.10.2017		REVISION: 0

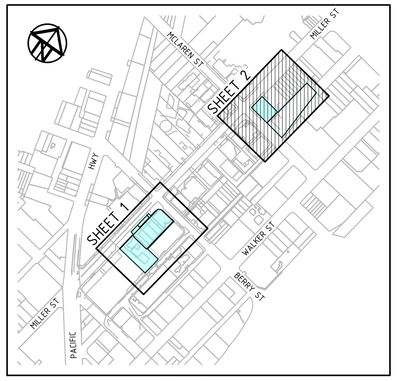
Attachment 2: Site Survey



LEGEND

GENERAL

- CADASTRAL BOUNDARY
- STATION MCO
- TSE AREAS
- SHAFT EXCAVATION AERA



KEY PLAN

NOT TO SCALE

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

AMD	DESCRIPTION	DESIGNER SIGN./DATE	VERIFIED SIGN./DATE	APPROVED SIGN./DATE
01	RETAINING WALL AND INTERNAL SITE ROAD AMENDED	CH/21.03.18	DT/21.03.18	DR/21.03.18
00	ASSURED FOR CONSTRUCTION	CH/19.02.18	DT/19.02.18	DR/19.02.18

CO-ORDINATE SYSTEM: MGA | HEIGHT DATUM: AHD | SCALE: 1:250

SCALES

0 2.5 5.0 7.5 10 12.5 15m

SCALE 1:250 AT A1 SIZE

IC CERTIFIED - IC CERTIFICATE

CLIENT

NSW GOVERNMENT Transport for NSW

SERVICE PROVIDERS: Metro city&southwest, AECOM, CBS, Ghella, ARCADIS, BG&E, NOMA CONSULTING, HOCHTIEF, PSM, McMILLEN JACOBS ASSOCIATES

DRAWN	F. BATHAN	21.03.18
DESIGNED	C. HIGGIN	21.03.18
DRG CHECK	D. THOMSON	21.03.18
DESIGN CHECK	T. THEIVENDRAN	21.03.18
APPROVED	D. ROBERTSON	21.03.18

SYDNEY METRO CITY & SOUTHWEST

VICTORIA CROSS STATION AND PRECINCT

CIVIL WORKS (STATIONS & SURROUNDS)

GENERAL ARRANGEMENT PLAN

SHEET 2

FILE No.	SHEET: OF	A1
STATUS:		©
DRG No. 01	EDMS No.	

DF 801*554

File Plotted C:\SMCSW-TSE-Export\

Plot Date & Time 3/21/2018 3:47 PM

Plotted by DAVID.THOMSON

Attachment 3: Douglas Sample Locations

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: John Holland CPB Ghella JV	**Proposed Piling Alignment and Test Locations**	PROJECT No: 85608.05
	OFFICE: Sydney	**Sydney Metro City & South West, Tunnel & Station Works Package**	DWG No: 2
	DATE: 15 Feb 2018	**52 McLaren Street, North Sydney**	REVISION: 1

APPENDIX B
SITE AUDIT STATEMENT

NSW Site Auditor Scheme

Site Audit Statement

A site audit statement summarises the findings of a site audit. For full details of the site auditor's findings, evaluations and conclusions, refer to the associated site audit report.

This form was approved under the *Contaminated Land Management Act 1997* on 12 October 2017.

For information about completing this form, go to Part IV.

Part I: Site audit identification

Site audit statement no. TO-024-5

This site audit is a:

☒ statutory audit

☐ non-statutory audit

within the meaning of the *Contaminated Land Management Act 1997*.

Site auditor details

(As accredited under the *Contaminated Land Management Act 1997*)

Name: Tom Onus

Company: Ramboll Australia Pty Ltd

Address: Level 3

100 Pacific Highway, North Sydney

Postcode: 2060

Phone: 02 9954 8133

Email: tonus@ramboll.com

Site details

Address: 52 McLaren Street, North Sydney, NSW

Postcode: 2060

Property description

Part of Lot 1 DP536008 (shown in blue in the figure at end of Part I of this statement)

Local government area: North Sydney Council

Area of site (include units, e.g. hectares): Approximately 0.05 hectares

Current zoning: B4 Mixed Use under North Sydney Local Environment Plan 2013

Regulation and notification

To the best of my knowledge:

☐ **the site is** the subject of a declaration, order, agreement, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985,* as follows: (provide the no. if applicable)

- ☐ Declaration no.
- ☐ Order no.
- ☐ Proposal no.
- ☐ Notice no.

☒ **the site is not** the subject of a declaration, order, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*.

To the best of my knowledge:

☐ the site **has** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*

☒ the site **has not** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*.

Site audit commissioned by

Name: Caitlin Richards

Company: John Holland CPB Ghella Joint Venture

Address: Level 9, 50 Bridge Street, Sydney, NSW

Postcode: 2000

Phone: 0407 176 672

Email: caitlin.richards@sydneymetro2.com.au

Contact details for contact person (if different from above)

Name: Krissy Vajda

Phone: 0439 477 649

Email: krissy.vajda@sydneymetro2.com.au

Nature of statutory requirements (not applicable for non-statutory audits)

☐ Requirements under the *Contaminated Land Management Act* 1997 (e.g. management order; please specify, including date of issue)

☒ Requirements imposed by an environmental planning instrument (please specify, including date of issue)

Condition E67 of Infrastructure Approval, application SSI 15_7400, approved by the Minister for Planning on 9 January 2017

☐ Development consent requirements under the *Environmental Planning and Assessment Act 1979* (please specify consent authority and date of issue)

☐ Requirements under other legislation (please specify, including date of issue)

Purpose of site audit

☒ **A1** To determine land use suitability

Intended uses of the land: Access shaft for below ground train network

OR

☐ **A2** To determine land use suitability subject to compliance with either an active or passive environmental management plan

Intended uses of the land:

OR

(Tick all that apply)

☐ **B1** To determine the nature and extent of contamination

☐ **B2** To determine the appropriateness of:

- ☐ an investigation plan
- ☐ a remediation plan
- ☐ a management plan

☐ **B3** To determine the appropriateness of a **site testing plan** to determine if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*

☐ **B4** To determine the compliance with an approved:

- ☐ **voluntary management proposal** or
- ☐ **management order** under the *Contaminated Land Management Act 1997*

☐ **B5** To determine if the land can be made suitable for a particular use (or uses) if the site is remediated or managed in accordance with a specified plan.

Intended uses of the land:

Information sources for site audit

Consultancies which conducted the site investigations and/or remediation:

Douglas Partners Pty Ltd (Douglas)

ADE Consulting Group Pty Ltd (ADE)

Titles of reports reviewed:

'Report on Preliminary Site Investigation, Sydney Metro City and South West, Tunnel and Station Excavation Works Package, Proposed Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney, prepared for John Holland CPB Ghella JV, Project 85608.05, March 2018', report reference: Revision 0, dated 20 March 2018, prepared by Douglas

'Report on Detailed Site Investigation, Sydney Metro City and South West, Tunnel and Station Excavation Works Package, Proposed Victoria Cross North Access Shaft, 52

McClaren Street, North Sydney, prepared for John Holland CPB Ghella JV, Project 85608.05, April 2018', report reference: Revision 0, dated 20 April 2018, prepared by Douglas

'Remediation Action Plan, Sydney Metro City and South West - Tunnel and Station Excavation Works Package, Proposed Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney, prepared for John Holland CPB Ghella JV, Project 85608.05, April 2018', report reference: Revision 1, dated 24 April 2018, prepared by Douglas

'Waste Classification – Excavations for Piling Platform and Capping Beam Sydney Metro City and South West, Tunnel and Station Excavation Works Package Proposed Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney', dated 20 February 2020, prepared by Douglas

'Waste Analysis & Classification Report, Victoria Cross Station Site, Miller Street and McLaren Street, North Sydney NSW', dated 6 May 2018, prepared by ADE

'VENM Assessment, Sydney Metro City and South West, Tunnel and Station Excavation Works Package, Proposed Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney', dated 28 May 2020, prepared by Douglas

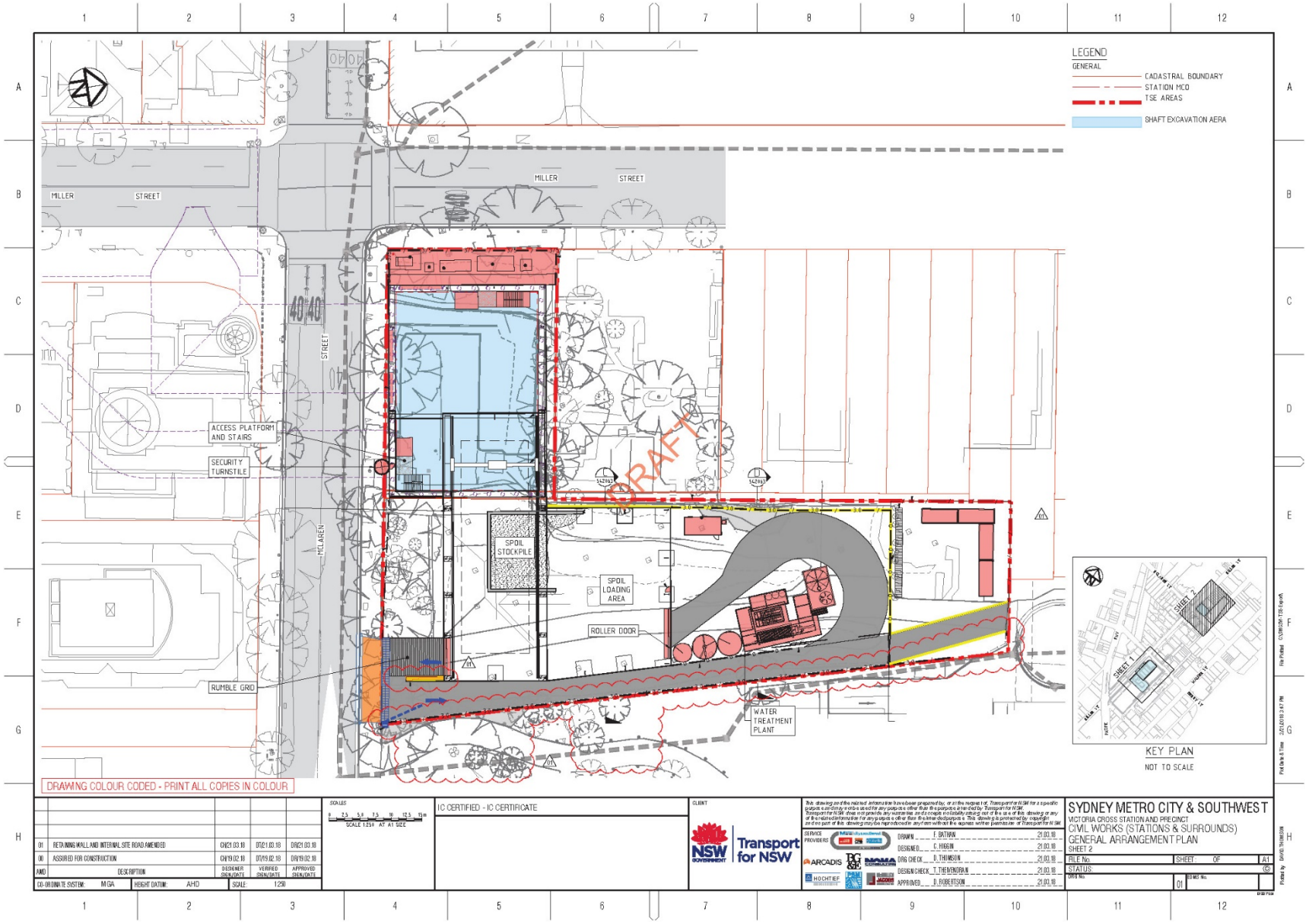
'Report on Validation of Remediation, Sydney Metro & City SW - Tunnel and Station Excavation Works Package, Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney', report reference: Revision 0, dated 12 November 2020, prepared by Douglas

Other information reviewed, including previous site audit reports and statements relating to the site:

Site audit report details

Title: Site Audit Report – Sydney Metro Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney NSW

Report no.: TO-024-5 (Ramboll Ref: 318000323-003) Date: 26 November 2020


LEGEND
GENERAL
CADASTRAL BOUNDARY
STATION MCO
TSE AREAS
SHAFT EXCAVATION AERA
MILLER STREET
MILLER STREET
STREET
MCLAREN
ACCESS PLATFORM AND STAIRS
SECURITY TURNSTILE
SPOIL STOCKPILE
SPOIL LOADING AREA
ROLLER DOOR
RUMBLE GRID
WATER TREATMENT PLANT
DRAFT
KEY PLAN
NOT TO SCALE
DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR
IC CERTIFIED - IC CERTIFICATE
Transport for NSW
SYDNEY METRO CITY & SOUTHWEST
VICTORIA CROSS STATION AND PRECINCT
CIVIL WORKS (STATIONS & SURROUNDS)
GENERAL ARRANGEMENT PLAN
SHEET 2

Part II: Auditor's findings

Please complete either Section A1, Section A2 or Section B, not more than one section. (Strike out the irrelevant sections.)

- Use **Section A1** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **without the implementation** of an environmental management plan.

- Use **Section A2** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **with the implementation** of an active or passive environmental management plan.

- Use **Section B** where the audit is to determine:
    - (B1) the nature and extent of contamination, and/or
    - (B2) the appropriateness of an investigation, remediation or management plan[1], and/or
    - (B3) the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or
    - (B4) whether the terms of the approved voluntary management proposal or management order have been complied with, and/or
    - (B5) whether the site can be made suitable for a specified land use (or uses) if the site is remediated or managed in accordance with the implementation of a specified plan.

[1] For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

Section A1

I certify that, in my opinion:

The **site is suitable** for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

☐ ~~Residential, including substantial vegetable garden and poultry~~

☐ ~~Residential, including substantial vegetable garden, excluding poultry~~

☐ ~~Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry~~

☐ ~~Day care centre, preschool, primary school~~

☐ ~~Residential with minimal opportunity for soil access, including units~~

☐ ~~Secondary school~~

☐ ~~Park, recreational open space, playing field~~

☒ Commercial/industrial

☐ ~~Other (please specify):~~

~~OR~~

☐ ~~I certify that, in my opinion, the **site is not suitable** for any use due to the risk of harm from contamination.~~

Overall comments:

Historical investigations at the site identified lead contamination in fill soils. Although asbestos contamination in fill soils was not previously identified, there was considered to be a high potential for the fill material to be impacted by asbestos based on the historical demolition of buildings at the site. Low concentrations of metals (copper and zinc) were detected in groundwater samples above the ecological assessment criteria. The metal concentrations were considered to be representative of diffuse urban-sourced background levels and were not related to a current or historical on-site source. The development (access shaft) required excavation to a maximum depth of between 39 and 45 m. Excavated soils and rock were classified and disposed offsite. Asbestos was encountered during excavation works and based on the site history the extent was considered to be the entire site. The excavation works successfully removed the onsite sources of contamination.

Section A2

I certify that, in my opinion:

Subject to compliance with the **attached** environmental management plan[2] (EMP), the site is suitable for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry

☐ Day care centre, preschool, primary school

☐ Residential with minimal opportunity for soil access, including units

☐ Secondary school

☐ Park, recreational open space, playing field

☐ Commercial/industrial

☐ Other (please specify):

EMP details

Title:

Author:

Date: No. of pages:

EMP summary

This EMP (attached) is required to be implemented to address residual contamination on the site.

The EMP: (Tick appropriate box and strike out the other option.)

☐ requires operation and/or maintenance of **active** control systems[3]

☐ requires maintenance of **passive** control systems only[3].

[2] Refer to Part IV for an explanation of an environmental management plan.
[3] Refer to Part IV for definitions of active and passive control systems.

~~Purpose of the EMP:~~

~~Description of the nature of the residual contamination:~~

~~Summary of the actions required by the EMP:~~

~~How the EMP can reasonably be made to be legally enforceable:~~

~~How there will be appropriate public notification:~~

~~Overall comments:~~

Section B

Purpose of the plan[4] which is the subject of this audit:

_____

_____

_____

I certify that, in my opinion:

(B1)

☐ The nature and extent of the contamination **has** been appropriately determined

☐ The nature and extent of the contamination **has not** been appropriately determined

AND/OR (B2)

☐ The investigation, remediation or management plan **is** appropriate for the purpose stated above

☐ The investigation, remediation or management plan **is not** appropriate for the purpose stated above

AND/OR (B3)

☐ The site testing plan:

☐ **is** appropriate to determine

☐ **is not** appropriate to determine

if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*

AND/OR (B4)

☐ The terms of the approved voluntary management proposal* or management order** (strike out as appropriate):

☐ **have** been complied with

☐ **have not** been complied with.

*voluntary management proposal no. _____

**management order no. _____

AND/OR (B5)

☐ The site **can be made suitable** for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

[4] For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

- ☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- ☐ Day care centre, preschool, primary school
- ☐ Residential with minimal opportunity for soil access, including units
- ☐ Secondary school
- ☐ Park, recreational open space, playing field
- ☐ Commercial/industrial
- ☐ Other (please specify):

IF the site is remediated/managed* in accordance with the following plan (**attached**):

*Strike out as appropriate

Plan title

Plan author

Plan date No. of pages

SUBJECT to compliance with the following condition(s):

Overall comments:

Part III: Auditor's declaration

I am accredited as a site auditor by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997.*

Accreditation no. 1505

I certify that:

- I have completed the site audit free of any conflicts of interest as defined in the *Contaminated Land Management Act 1997,* and
- with due regard to relevant laws and guidelines, I have examined and am familiar with the reports and information referred to in Part I of this site audit, and
- on the basis of inquiries I have made of those individuals immediately responsible for making those reports and obtaining the information referred to in this statement, those reports and that information are, to the best of my knowledge, true, accurate and complete, and
- this statement is, to the best of my knowledge, true, accurate and complete.

I am aware that there are penalties under the *Contaminated Land Management Act 1997* for wilfully making false or misleading statements.

Signed 

Date 26 November 2020

Part IV: Explanatory notes

To be complete, a site audit statement form must be issued with all four parts.

How to complete this form

Part I

Part I identifies the auditor, the site, the purpose of the audit and the information used by the auditor in making the site audit findings.

Part II

Part II contains the auditor's opinion of the suitability of the site for specified uses or of the appropriateness of an investigation, or remediation plan or management plan which may enable a particular use. It sets out succinct and definitive information to assist decision-making about the use or uses of the site or a plan or proposal to manage or remediate the site.

The auditor is to complete either Section A1 or Section A2 or Section B of Part II, **not** more than one section.

Section A1

In Section A1 the auditor may conclude that the land is *suitable* for a specified use or uses OR *not suitable* for any beneficial use due to the risk of harm from contamination.

By certifying that the site is *suitable*, an auditor declares that, at the time of completion of the site audit, no further investigation or remediation or management of the site was needed to render the site fit for the specified use(s). **Conditions must not be** imposed on a Section A1 site audit statement. Auditors may include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section A2

In Section A2 the auditor may conclude that the land is *suitable* for a specified use(s) subject to a condition for implementation of an environmental management plan (EMP).

Environmental management plan

Within the context of contaminated sites management, an EMP (sometimes also called a 'site management plan') means a plan which addresses the integration of environmental mitigation and monitoring measures for soil, groundwater and/or hazardous ground gases throughout an existing or proposed land use. An EMP succinctly describes the nature and location of contamination remaining on site and states what the objectives of the plan are, how contaminants will be managed, who will be responsible for the plan's implementation and over what time frame actions specified in the plan will take place.

By certifying that the site is suitable subject to implementation of an EMP, an auditor declares that, at the time of completion of the site audit, there was sufficient information satisfying guidelines made or approved under the *Contaminated Land Management Act 1997*

(CLM Act) to determine that implementation of the EMP was feasible and would enable the specified use(s) of the site and no further investigation or remediation of the site was needed to render the site fit for the specified use(s).

Implementation of an EMP is required to ensure the site remains suitable for the specified use(s). The plan should be legally enforceable: for example, a requirement of a notice under the CLM Act or a development consent condition issued by a planning authority. There should also be appropriate public notification of the plan, e.g. on a certificate issued under s.149 of *the Environmental Planning and Assessment Act 1979*.

Active or passive control systems

Auditors must specify whether the EMP requires operation and/or maintenance of active control systems or requires maintenance of passive control systems only. Active management systems usually incorporate mechanical components and/or require monitoring and, because of this, regular maintenance and inspection are necessary. Most active management systems are applied at sites where if the systems are not implemented an unacceptable risk may occur. Passive management systems usually require minimal management and maintenance and do not usually incorporate mechanical components.

Auditor's comments

Auditors may also include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section B

In Section B the auditor draws conclusions on the nature and extent of contamination, and/or suitability of plans relating to the investigation, remediation or management of the land, and/or the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or whether the terms of an approved voluntary management proposal or management order made under the CLM Act have been complied with, and/or whether the site can be made suitable for a specified land use or uses if the site is remediated or managed in accordance with the implementation of a specified plan.

By certifying that a site *can be made suitable* for a use or uses if remediated or managed in accordance with a specified plan, the auditor declares that, at the time the audit was completed, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the plan was feasible and would enable the specified use(s) of the site in the future.

For a site that *can be made suitable*, any **conditions** specified by the auditor in Section B should be limited to minor modifications or additions to the specified plan. However, if the auditor considers that further audits of the site (e.g. to validate remediation) are required, the auditor must note this as a condition in the site audit statement. The condition must not specify an individual auditor, only that further audits are required.

Auditors may also include **comments** which are observations in light of the audit which provide a more complete understanding of the environmental context to aid decision-making in relation to the site.

Part III

In **Part III** the auditor certifies their standing as an accredited auditor under the CLM Act and makes other relevant declarations.

Where to send completed forms

In addition to furnishing a copy of the audit statement to the person(s) who commissioned the site audit, statutory site audit statements must be sent to

- the **NSW Environment Protection Authority**: nswauditors@epa.nsw.gov.au or as specified by the EPA

  AND

- the **local council** for the land which is the subject of the audit.

APPENDIX C
INTERIM AUDIT ADVICE

2 May 2018

John Holland CPB Ghella Joint Venture
Attn: Robert Muir
Senior Environment Coordinator
Sydney Metro City & Southwest
Level 3, 140 Sussex Street, Sydney NSW 2000

By email: Robert.Muir@sydneymetro2.com.au

Dear Robert

RE: INTERIM AUDIT ADVICE LETTER NO. 4 - REMEDIATION ACTION PLAN, VICTORIA CROSS NORTH ACCESS SHAFT, 52 MCLAREN STREET, NORTH SYDNEY, NSW

1. INTRODUCTION

Ramboll Australia Pty Ltd

Level 3, 100 Pacific Highway
PO Box 560
North Sydney NSW 2060

T +61 2 9954 8100

www.ramboll.com

Ref 318000323-003

As a NSW Environment Protection Authority (EPA) accredited Contaminated Sites Auditor, I am conducting an Audit in relation to the subject site. This initial review has been undertaken to provide an independent review of the suitability and appropriateness of a Remediation Action Plan (RAP).

A statutory site audit is required for the Victoria Cross North access shaft, part of the Sydney Metro rail project between Chatswood and Sydenham, to address the requirements of *Condition E67 of Infrastructure Approval, application SSI 15_7400, approved by the Minister for Planning on 9 January 2017*. This Interim Audit Advice (IAA) letter was also prepared to satisfy conditions of the deed agreed between Transport for NSW and John Holland CPB Ghella Joint Venture (JHCPBG JV).

This IAA letter is based on a review of the documents listed below and observations made on a site visit on 18 April 2018, as well as discussions with JHCPBG JV and Douglas Partners Pty Ltd (DP) who undertook the investigations.

The reports reviewed were:

- *'Report on Preliminary Site Investigation, Sydney Metro City and South West, Tunnel and Station Excavation Works Package, Proposed Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney, prepared for John Holland CPB Ghella JV, Project 85608.05, March 2018'*, report reference: Revision 0, dated 20 March 2018, prepared by DP (the PSI).
- *'Report on Detailed Site Investigation, Sydney Metro City and South West, Tunnel and Station Excavation Works Package, Proposed Victoria Cross North Access Shaft, 52 McClaren Street, North Sydney, prepared for John Holland CPB Ghella JV, Project 85608.05, April 2018'*, report reference: Revision 0, dated 20 April 2018, prepared by DP (the DSI).

- *'Remediation Action Plan, Sydney Metro City and South West - Tunnel and Station Excavation Works Package, Proposed Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney, prepared for John Holland CPB Ghella JV, Project 85608.05, April 2018'*, report reference: Revision 1, dated 24 April 2018, prepared by DP (the RAP).

A draft version of the PSI, DSI and RAP reports were issued for audit review. Review comments (issued by the Auditor by email) were incorporated into the final DP reports (listed above). The PSI and DSI make reference to a previous report by SLR Consulting Australia Pty Ltd (SLR) (Reference 610.13533.01800-L02-v1.1-CLR.docx). The report was not provided to the Auditor for review, however a summary of relevant information from this report was included in the DP reports.

2. SITE DETAILS

2.1 Location

The site is identified as the '*excavation footprint'* (the site) for the access shaft shown on Attachment 1. The '*Worksite Area*' shown on Attachment 1 surrounding the '*excavation footprint'* has been excluded from the DP investigations and is not part of the site audit area.

The site details are as follows:

Street address:	52 McLaren Street, North Sydney, NSW 2060
Identifier:	Part of Lot 1 DP536008
Local Government:	North Sydney
Owner:	Transport for New South Wales
Site Area:	Approximately 0.05 ha
Zoning:	B4 – Mixed Use

2.2 Site Condition

DP inspected the site for the PSI on 9 November 2017 and noted the following:

- The site was largely occupied by an asphalt surface car park with surrounding landscaping. A portable site shed and skip bin were located in the car park.
- A monitoring well of unknown construction was present in the north of the site.
- The site was surrounded by residential and commercial land use.

During the Auditor's site visit on 18 April 2018, the site was an active construction site, with the following features noted:

- Crushed sandstone was present across the entire site, which had been imported for use as a piling platform. Review of the suitability of the material will be undertaken in the site audit report (SAR) prepared following remediation of the site. The material did not contain obvious anthropogenic material or staining. The site representative reported that pavements, vegetation and fill material were removed prior to placement of the material.
- Piling was underway along the western site boundary. Piling returns appeared to comprise natural clay.
- Some construction equipment (steel reinforcement) was stored on the site surface.

2.3 Adjacent Uses

The site is located within an area of commercial and high density residential land use. The surrounding site use includes:

North: A commercial building and high school.

East: A hotel and commercial buildings (offices).

South: McLaren Street, then high rise residential buildings with ground floor commercial.

West: Miller Street, then commercial buildings (Council).

DP identified the closest sensitive ecological receptor for groundwater to be Neutral Bay located approximately 950 m to the southeast.

The PSI did not identify nearby land uses with the potential to impact the site.

A search of the NSW EPA public records did not identify any sites listed as contaminated in the immediate vicinity of the subject site.

2.4 Proposed Development

The proposed development comprises an access shaft to a depth of approximately 39 to 45 metres below ground level (mbgl) (RL 35 m). The base of the structure will comprise an approximately 200 mm thick concrete slab. The walls will comprise 600 mm diameter bored piles with shotcrete between the piles to a depth of approximately 7 m, then exposed rock to the base. The shaft will comprise a service facility, building and substation.

For the purposes of this audit, the 'commercial/ industrial' land use scenario will be assumed.

3. SITE HISTORY

The PSI site history assessment included a review of historical title deeds, historical aerial photographs, NSW EPA records and Section 149 (2&5) certificates. DP reviewed SafeWork NSW records as part of the DSI. The site history is summarised in Table 3.1.

Table 3.1: Site History

Date	Activity
1895 – 1963	The site was owned by individuals and appeared to be used for residential purposes.
1963 - 2017	The residential building was demolished and the site appeared to comprise a car park. The site was owned initially by Inner City Motels, then The Mutual Life and Citizens' Assurance Company, then the Methodist Church, and then the Uniting Church.
2016	SLR provided an asbestos clearance certificate for a larger area that included the site. ACM was reportedly removed from the ground surface and impacted stockpiles by Beasy Pty Ltd, and SLR inspected the site on 24 October 2016.
2017 to date	The site is currently owned and occupied by Transport for NSW. The site was cleared in 2017 in preparation for construction of the access shaft.

A review of the NSW EPA public records did not identify the site.

3.1 Auditor's Opinion

In the Auditor's opinion, the site history indicates past activities have a low potential for significant contamination. Sources of contamination appear to be limited to hazardous building materials from residential building demolition, fill material imported to level the site and construct the car park, and minor spills of fuel and oil from vehicles.

The Auditor considers that the site history is broadly understood and adequate for identification of contaminants of concern (Section 4) and remedial planning (Section 10).

4. CONTAMINANTS OF CONCERN

The PSI and DSI provided a list of the contaminants of concern and potentially contaminating activities. These have been tabulated in Table 4.1.

Table 4.1: Contaminants of Concern

Area	Activity	Potential Contaminants
Entire site	Fill and surface soil imported from unknown sources to level the site	Metals, total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, xylenes & naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphorus pesticides (OPPs), polychlorinated biphenyls (PCBs), phenols and asbestos
Entire site	Hazardous building material from former structures	Asbestos, lead and PCB
Car park	Spills and leaks from vehicles Coal tar in asphalt	TRH, BTEX, PAHs and phenols

4.1 Auditor's Opinion

The Auditor considers that the analyte list used by DP is generally adequate to assess the potential sources of contamination. Samples of asphalt were not assessed for coal tar, however it is noted that all asphalt is to be removed from the site during remediation. This data gap is therefore not considered significant.

5. STRATIGRAPHY AND HYDROGEOLOGY

Following a review of the DP reports, a summary of the site stratigraphy and hydrogeology conditions at the site are compiled below.

5.1 Topography, Geology and Stratigraphy

The PSI states that the site is at an elevation of approximately 78 m to 80 m Australian Height Datum (AHD) with slopes to the south and east. DP report that the western boundary of the Worksite Area is approximately 1 m lower than Miller Street. The Auditor noted during the site inspection that the retaining wall ranged between approximately 1 to 2 m in height.

The site is located within the Blacktown soil landscape underlain by residual soils and by deeper Ashfield Shale bedrock. The NSW Acid Sulfate Soil (ASS) Risk Map shows that the site is located in an area of no known occurrences of ASS.

The sub-surface profile detailed by DP in the DSI is summarised in Table 5.1.

Table 5.1: Stratigraphy

Depth (mbgl)	Subsurface Profile
0.0 – 0.15	Asphalt pavements underlain by gravel roadbase (present at 3 locations).
0.0 – 0.4 (west) / 1.0 (east)	Fill material comprising sand with inclusions of demolition rubble (glass, brick) and sandstone. Layers of fly ash and charcoal were noted at some locations.
0.4 (west) / 1.0 (east) – 1.6	Natural clay.
1.6 to termination depth (10)	Sandstone bedrock.

mbgl – metres below ground level

The subsurface profile comprised relatively shallow fill underlain by natural clay soil and sandstone bedrock.

5.2 Hydrogeology

The PSI undertook a search of the groundwater information database maintained by the NSW Government and did not identify any registered groundwater bores within a 0.5 km radius of the site. The PSI concluded that based on the topography, groundwater is anticipated to flow to the southeast. DP identified the closest sensitive ecological receptor for groundwater to be Neutral Bay, located approximately 950 m to the southeast. Excess surface water run-off is anticipated to flow into the local stormwater network.

As part of the DSI, one groundwater monitoring well was installed on the site (Attachment 2). Groundwater seepage was not noted during drilling. Groundwater observations and sampling was undertaken as part of the DSI on 24 January 2018. Depth to groundwater in the monitoring well was recorded at 8.24 mbgl. The DSI stated that groundwater is anticipated to flow to the southeast based on site topography, however an accurate flow direction was not able to be estimated based on one well.

The DSI included field records of groundwater parameters recorded during sampling. They indicated that the pH was 4.2, dissolved oxygen (DO) was 4.2 mg/L, redox was 245 mV, and electrical conductivity (EC) was 691 mS/cm.

5.3 Auditor's Opinion

The Auditor considers that the site stratigraphy and hydrogeology conditions detailed by DP adequately reflect the site conditions and are sufficient for remediation planning.

6. EVALUATION OF QUALITY ASSURANCE AND QUALITY CONTROL

The Auditor has assessed the overall quality of the data by review of the information presented in the referenced reports, supplemented by field observations. The Auditor's assessment follows in Tables 6.1 and 6.2.

Table 6.1: QA/QC – Sampling and Analysis Methodology Assessment

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Data Quality Objectives (DQO) The PSI and DSI defined specific DQOs in accordance with the seven step process outlined in Schedule B2 of NEPM (2013).	These were considered appropriate for the investigations conducted.
Sampling pattern and locations *Soil:* The DSI reports that a grid sampling pattern was adopted. Investigation locations were spaced to gain coverage of the majority of the site. The fill materials at the site were targeted for sampling. *Groundwater:* One monitoring well (VCMW05) was installed at the site. The well was located in the south eastern corner of the site, which was assumed to be down-gradient. The well identified during the site inspection was being used by others for data logging and was therefore not sampled.	Grid based sampling is considered appropriate given that the potential source of contamination is heterogeneous fill material and demolition of historical buildings.
Sampling density *Soil:* The DSI included a sampling density of 5 locations (Attachment 2) over approximately 0.05 ha, which meets the minimum recommended by EPA (1995) *Sampling Design Guidelines*. The coverage provides a 95% confidence of detecting a residual hot spot of approximately 12 m diameter. Samples analysed for asbestos were not collected in accordance with the density outlined in NEPM (2013). *Groundwater:* One groundwater sample was obtained from the site.	In the Auditor's opinion the sampling density was adequate to give an indication of the presence/ absence of asbestos, and for general site characterisation. Further ex situ sampling may be required for waste classification purposes.
Sample depths *Soil:* Samples were collected and analysed from a range of depths targeting the fill and natural clay. Sandstone bedrock was not sampled. Layers of ash and charcoal observed in fill material were not targeted by sampling and analysis. Crushed sandstone was imported subsequent to the DSI and therefore was not sampled. Sampling will be reported in the validation report. *Groundwater*: Groundwater samples were obtained from 9 mbgl, approximately midway between the standing water level (SWL) (8.24 mbgl) and the base of the well (10 mbgl).	In the Auditor's opinion, this sampling strategy was adequate to characterise the primary material types present on site. Further targeted sampling of layers within fill material would be required for appropriate waste classification.

Table 6.1: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling and Analysis Plan and Sampling Methodology	**Auditor's Opinion**
Well construction The well was installed to a depth of 10 mbgl, and was constructed of 50 mm diameter acid washed, class 18, PVC casing and machine slotted well screen intervals. The screened interval was from 4-10 mbgl, and therefore the screen of the well extends above the groundwater table.	The Auditor notes that, whilst it is preferable for monitoring wells to be screened over a discrete short vertical interval, the wells are sufficient to provide an indication of the groundwater conditions. Deeper groundwater was not assessed. The proposed excavation will extend to a depth of 39 to 45 mbgl (RL 35 m) and may therefore intercept deeper groundwater.
Sample collection method *Soil*: Sample collection was by test pit (4 locations) and drilling (solid stem auger) (1 location). Test pit samples were obtained directly from the excavator bucket. Drilling samples were collected from the auger flights. *Groundwater*: Wells were installed by solid flight augers, developed with a pump and samples were collected by low flow peristaltic pump with dedicated sample tubing.	Sample collection from the auger flights is not ideal as it can result in loss of volatiles and sample cross contamination. Results for samples collected from solid flight augers may underestimate concentrations of volatile contaminants. Considering that the majority of samples were collected by test pit, the overall sample collection method was found to be acceptable. The groundwater sample collection methodology is considered acceptable.
Decontamination procedures *Soil:* Sampling equipment was cleaned with detergent (3% Decon 90 solution), tap water and then de-ionised water prior to sampling and between sampling events to prevent cross contamination. DP do not report what equipment was decontaminated. *Groundwater*: Dedicated sampling equipment was used for sampling.	Acceptable.
Sample handling and containers Samples were placed into prepared and preserved sampling bottles provided by the laboratory and chilled during storage and subsequent transport to the laboratories. DP report that sub-samples were placed in plastic snap lock bags, however the laboratory reports indicate that asbestos analysis was undertaken on sub-samples from soil jars. Groundwater samples to be analysed for heavy metals were field filtered.	Acceptable.

Table 6.1: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling and Analysis Plan and Sampling Methodology	**Auditor's Opinion**
Chain of Custody (COC) Completed chain of custody forms were provided in the report.	Acceptable.
Detailed description of field screening protocols Field screening for volatiles was undertaken using a calibrated hand held PID unit. The PID screening procedure was provided and involved placing the samples in ziplock plastic bags and measuring VOCs in the headspace after allowing time for equilibration. PID readings are provided on the borehole log. PID screening was not undertaken on samples collected by test pit. The DSI reported groundwater quality parameters measured during well sampling in field logs for each well.	Overall, the field screening protocols were acceptable to assess site contamination in the context of the proposed development.
Calibration of field equipment DP report that the PID was calibrated prior to use in the field. Calibration information for the field equipment (PID and groundwater meters) was included in the DSI.	Acceptable.
Sampling logs Soil logs were provided within the DSI, indicating sample depth, PID readings and lithology. Groundwater field sampling records were included in the DSI with well development and sampling details.	Acceptable.

Table 6.2: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**Auditor's Opinion**
Field quality control samples Field quality control samples including trip blanks (1 per field batch), trip spikes (1 per field batch), rinsate blanks (1 during soil sampling), field intra-laboratory and inter-laboratory duplicates (5% of primary samples) were undertaken by DP during the DSI. Rinsate blanks were only collected during soil sampling, as no re-useable equipment came into contact with the groundwater samples.	Acceptable.
Field quality control results The results of field quality control samples were generally within appropriate limits. The trip blank results were below the laboratory PQL. The trip spike recovery was acceptable. The	Overall, the field quality control results were found to be acceptable. RPD exceedances were infrequent and minor and do not impact the overall dataset. DP assessed the

Table 6.2: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**Auditor's Opinion**
rinsate blank reported an elevated TRH C_6-C_{10} concentration 47 µg/L), which DP report was from the demineralised water used. Relative Percent Difference calculations (RPDs) for the intra-laboratory soil duplicate sample were elevated for copper (81%). RPDs for the inter-laboratory groundwater duplicate samples were within acceptable limits. The DSI has assessed field duplicate results along with the primary sample results against the site acceptance criteria.	results for primary samples and field duplicates against the site acceptance criteria which is considered appropriate. The Auditor has adopted the highest concentration from field duplicate and triplicate results. Detections of TRH in the rinsate blank are not considered to be significant given there was no source identified in the site history, it was not detected in soil and groundwater samples, no odours or staining were observed and PID readings were <1 ppm.
NATA registered laboratory and NATA endorsed methods Laboratories used included: Envirolab Services Pty Ltd (primary) and ALS (secondary). Laboratory certificates were NATA stamped.	Acceptable.
Analytical methods Analytical methods were included in the laboratory test certificates. Both Envirolab and ALS provided brief method summaries of in-house NATA accredited methods used based on USEPA and/or APHA methods (excluding asbestos) for extraction and analysis in accordance with the NEPM (2013). Asbestos analysis was based on AS4964-2004.	Acceptable.
Holding times Review of the COCs and laboratory certificates indicate that the holding times had been met. DP also reported that holding times have been met.	Acceptable.
Practical Quantitation Limits (PQLs) *Soil:* PQLs for individual PCBs were slightly raised in some soil samples due to interference from analytes other than those being tested. The raised PQLs were below the quality criteria. *Groundwater:* PQLs for groundwater were sufficiently low in the majority of the analytes and acceptable for the DSI. The PQL for some OCP and OPP compounds was above the screening criteria.	Overall the PQLs are acceptable. The elevated OCP and OPP PQLs in groundwater were typically marginally above the trigger value and in the context of the results reported, this discrepancy does not materially affect the outcome of the audit.

Table 6.2: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**Auditor's Opinion**
Laboratory quality control samples Laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks, internal standards and duplicates were undertaken by the laboratory.	Acceptable.
Laboratory quality control results The results of laboratory quality control samples were generally within appropriate limits, with the following exceptions: • PAH matrix spike recovery not reported due to elevated concentration of analytes in sample. • The laboratory RPD acceptance criteria were exceeded for individual metals and PAHs. The laboratory reported that this was attributed to the non-homogenous nature of the samples.	In the context of the dataset reported, the laboratory quality control results are acceptable for remediation planning purposes.
Data Quality Indicators (DQI) and Data Evaluation (completeness, comparability, representativeness, precision, accuracy) The DSI assessed the field and laboratory results against predetermined data quality indicators (DQIs) and internal standards. These were discussed with regard to the five category areas. DP did not provide an overall conclusion regarding the data quality, however significant data quality issues were not identified.	An assessment of the data quality with respect to the five category areas has been undertaken by the Auditor and is summarised below.

In considering the data as a whole the Auditor concludes that:

- The laboratories provided adequate information to conclude that the data are of sufficient precision.
- There is a high degree of confidence that the data are accurate.
- The data are likely to be representative of the overall site conditions, including fill, natural soil and groundwater. Results for volatile organics in soil samples collected by solid stem auger may underestimate actual concentrations, however in the absence of a source of volatile contaminants this is not considered significant.
- The investigation data are considered to be complete.
- There is a high degree of confidence that the data are comparable for each sampling and analytical event.

7. ENVIRONMENTAL QUALITY CRITERIA

The Auditor has assessed **soil** data provided with reference to criteria from National Environmental Protection Council (NEPC) *National Environmental Protection (Assessment of Site Contamination) Measure 1999*, as Amended 2013 (NEPM, 2013). Based on the proposed development (access shaft,

service facility and substation), the Tier 1 (screening) criteria for a 'commercial/ industrial' setting were referred. This was considered to be most relevant during remediation and ongoing operation of the site, however is likely to be conservative for short term exposure by construction workers.

- Human Health Assessment:
  - Health Based Investigation Levels (HIL D).
  - Soil Health Screening Levels (HSL D) for Vapour Intrusion. The most conservative criteria were adopted i.e. assumed depth to source <1 m and sand.
  - Asbestos presence/absence.
  - CRC CARE HSLs for direct contact and vapour inhalation for intrusive maintenance workers.
  - USEPA RSL (on-line) Composite Worker Soil criteria.
- Terrestrial Ecological Assessment (TEA): The soil data has not been assessed against the TEA as soil from the site will be excavated to a maximum depth of 39 to 45 mbgl and disposed off-site during development of the site. The TEA is applicable to depths of 2 mbgl, and is therefore not applicable for the remaining natural soil.
- Management Limits (ML commercial/industrial) assuming coarse soil.
- Aesthetics
  - The Auditor has considered the need for remediation based on 'aesthetic' contamination as outlined in the NEPM (2013).

The Auditor has assessed the **groundwater** data provided with reference to Tier 1 (screening) criteria for 'commercial/ industrial' from the following:

- Human Health Assessment:
  - NEPM HSLs are not applicable as groundwater will be intercepted during excavation.
  - NHMRC and NRMMC (2011) *Australian Drinking Water Guidelines* (ADWG) where HSLs are not applicable.
  - USEPA RSL (on-line) Residential Tap Water Criteria for use where HSLs are not applicable or where local guidelines are not available for individual contaminants.
  - WHO (2008) Petroleum Products in Drinking-water guidelines where HSLs are not applicable.
  - ADWG (2011) criteria with a factor of 10 for incidental direct contact (for non-volatiles).
- Ecological Assessment:
  - Groundwater Investigation Levels (GILs) listed in NEPM (2013) for protection of aquatic ecosystems referenced in ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Trigger values (TVs) provided are concentrations that, if exceeded, indicate a potential environmental problem at the point of use and 'trigger' further investigation. The 95% marine water level of protection was adopted.

The water bearing zone was not identified during well installation, however the standing water level was recorded at 8.24 mbgl and is therefore within sandstone bedrock. Given the absence of bores for beneficial groundwater use and presence of a reticulated water supply for the area, extraction and use of groundwater as a resource is unlikely. Direct contact with groundwater may occur at the site during construction based on the proposed depth of excavation and SWL.

The environmental quality criteria referenced by the Auditor are consistent with those adopted by DP, with the exception of the following:

- The DSI does not mention assessment of 'aesthetic' contamination as outlined in the NEPM (2013). However, the report results discuss potential aesthetic issues detected during sampling.
- The DSI did not adopt CRC CARE HSLs for intrusive maintenance workers or USEPA RSLs.
- For groundwater contamination, the DSI adopted the PQL as a screening level for assessment of risks to human health. Results above the PQL would trigger a review for the risk and need for further investigation or assessment.

8. EVALUATION OF SOIL ANALYTICAL RESULTS

Soil samples were analysed for a variety of contaminants detailed in Tables 8.1 (fill) and 8.2 (natural). The results have been assessed against the environmental quality criteria and summarised below. Soil sampling locations are presented in Attachment 2.

Table 8.1: Evaluation of Fill Soil Analytical Results – Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)
Asbestos in soil (presence/ absence)	6	0	<PQL	-
Arsenic	6	4	14	0 above HIL D 3,000 mg/kg
Cadmium	6	1	0.9	0 above HIL D 900 mg/kg
Total Chromium	6	6	33	0 above HIL D 3,600 mg/kg
Copper	6	5	95	0 above HIL D 240,000 mg/kg
Lead	6	6	**2300**	**2 above HIL D 1,500 mg/kg**
Mercury (inorganic)	6	2	0.5	0 above HIL D 730 mg/kg
Nickel	6	6	18	0 above HIL D 6,000 mg/kg
Zinc	6	6	750	0 above HIL D 400,000 mg/kg
TRH (C_6-C_{10} minus BTEX)	6	0	<PQL	0 above HSL D (sand 0-1 m) 260 mg/kg 0 above ML 700 mg/kg
TRH (>C_{10}-C_{16} minus naphthalene)	6	0	<PQL	0 above HSL D (sand 0-1 m) NL 0 above ML 1,000 mg/kg
TRH (>C_{16}-C_{34})	6	2	660	0 above ML 3,500 mg/kg
TRH (>C_{34}-C_{40})	6	2	160	0 above ML 10,000 mg/kg
BTEX	6	0	<PQL	0 above HSL D (sand 0-1 m)
Total PAHs	6	3	97	0 above HIL D 4,000 mg/kg
Carcinogenic PAHs (BaP TEQ)	6	3	12	0 above HIL D 40 mg/kg
Benzo(a)pyrene	6	3	8.5	-

Table 8.1: Evaluation of Fill Soil Analytical Results – Summary Table (mg/kg)				
Analyte	**n**	**Detections**	**Maximum**	**n > Human Health Screening Criteria (NEPM, 2013)**
Naphthalene	6	2	0.2	0 above HSL D (sand 0-1 m) NL
Total Phenols	4	0	<PQL	0 above HIL D 240,000 mg/kg
PCBs	4	0	<PQL	0 above HIL D 7 mg/kg
OPPs	4	0	<PQL	0 above HIL D
OCPs	4	0	<PQL	0 above HIL D

n number of samples
- No criteria available/used
NL Non limiting
TEQ Toxicity equivalent quotient

Table 8.2: Evaluation of Natural Soil Analytical Results – Summary Table (mg/kg)				
Analyte	**n**	**Detections**	**Maximum**	**n > Human Health Screening Criteria (NEPM, 2013)**
Arsenic	5	5	13	0 above HIL D 3,000 mg/kg
Cadmium	5	0	<PQL	0 above HIL D 900 mg/kg
Total Chromium	5	5	57	0 above HIL D 3,600 mg/kg
Copper	5	0	<PQL	0 above HIL D 240,000 mg/kg
Lead	5	5	15	0 above HIL D of 1,500 mg/kg
Mercury (inorganic)	5	0	<PQL	0 above HIL D 730 mg/kg
Nickel	5	5	2	0 above HIL D 6,000 mg/kg
Zinc	5	4	5	0 above HIL D 400,000 mg/kg
TRH (C_6-C_{40})	5	0	<PQL	0 above HIL D or ML
BTEXN	5	0	<PQL	0 above HSL D (sand 0-1 m)
PAHs	5	0	<PQL	0 above HIL D 4,000 mg/kg
Total Phenols	5	0	<PQL	0 above HIL D 240,000 mg/kg
PCBs	5	0	<PQL	0 above HIL D 7 mg/kg
OPPs	5	0	<PQL	0 above HIL D
OCPs	5	0	<PQL	0 above HIL D

n number of samples
- No criteria available/used
NL Non limiting

In assessing the results, the Auditor makes the following observations:

- Asbestos was not observed during the site inspection or investigation, and was not detected in samples of fill material scheduled for analysis. It is noted that asbestos was previously present on the site as fragments of cement sheeting. SLR undertook an asbestos clearance in October 2016, which removed ACM from the ground surface and removed stockpiles containing ACM. Subsurface clearance did not appear to have been undertaken. The source of the ACM was not reported by DP in their summary of the SLR report, however may have been from fly-tipping, demolition of former structures, or imported fill material.
- Concentrations of lead exceeding the human health screening criteria were reported in fill material from VCTP03 (0.2-0.3 mbgl) and VCTP04 (0.2-0.3 mbgl). The samples represented sand fill material with trace demolition rubble.
- Elevated PAH concentrations were reported in samples of fill material from VCTP02 (0.2-0.3 mbgl), VCTP03 (0.2-0.3 mbgl) and VNMW05 (0.4-0.5 mbgl). Concentrations were less than the adopted screening criteria.
- Other organics were less than the adopted screening criteria, and typically less than the PQL. The detected TRH concentrations coincided with elevated PAH concentrations.
- Natural clay contained concentrations of metals considered typical of background concentrations. Organics were not detected in natural clay. Clay was not analysed for asbestos.
- Sandstone was not analysed. Groundwater results discussed in Section 9 did not identify contamination, therefore contamination within sandstone is not expected. Further sampling is proposed during remediation.

8.1 Auditor's Opinion

In the Auditor's opinion, the soil analytical results are consistent with the site history and field observations. The results indicate the fill to be locally impacted by lead and PAHs. There is considered to be high potential for ACM contamination in fill material given it has previously been removed from the site surface and based on the fill composition and site history. Narrow layers of ash or charcoal within the fill material were not assessed, however will be removed as part of remediation and development of the site. The remedial strategy outlined in the RAP is reviewed and summarised in Section 10.

9. EVALUATION OF GROUNDWATER ANALYTICAL RESULTS

Groundwater samples were collected from monitoring well VCMW05 by DP as part of the DSI. The analytical results are summarised below in Table 9.1. Sampling locations are presented in Attachment 2.

Table 9.1: Evaluation of Groundwater Analytical Results – Summary Table (µg/L)

Analyte	VCMW05	ANZECC Marine (2000)	Human Health Screening Criteria
Arsenic	<1	2.3	10
Cadmium	<0.1	0.7	2
Calcium	19	-	-
Total Chromium	<1	27	50
Copper	**4**	1.3	2,000

Table 9.1: Evaluation of Groundwater Analytical Results – Summary Table (µg/L)			
Analyte	**VCMW05**	**ANZECC Marine (2000)**	**Human Health Screening Criteria**
Lead	1	4.4	10
Magnesium	17	-	-
Manganese	37	80	500
Mercury	<0.05	0.1	1
Nickel	7	7	20
Zinc	**33**	15	-
TRH (C_6-C_{10} minus BTEX)	<10	-	15,000
TRH (>C_{10}-C_{16} minus naphthalene)	<50	-	-
TRH (>C_{16}-C_{34})	<100	-	-
TRH (>C_{34}-C_{40})	<100	-	-
BTEXN	<1	500/180/5/75/50	1/800/300/600/-
PAHs	<PQL	-	-
OCPs	<PQL	-	-
OPPs	<PQL	-	-
Total PCBs	<PQL	-	-
Total Phenols	<50L	400	-

- No criteria available/used
Bold Values exceed criteria
<PQL Less than the practical quantitation limit

In assessing the results, the Auditor makes the following observations:

- Metals were detected at low concentrations, with copper and zinc exceeding the ecological criteria. The DSI concluded that the heavy metals can be attributed to diffuse urban-sourced background levels and are not from a site specific source. Metals concentrations were less than the human health screening criteria.
- Organic contaminants were not detected above the PQL.

9.1 Auditor's Opinion

In the Auditor's opinion, the analytical results indicate an absence of groundwater contamination at the site. Marginal exceedances of ecological screening criteria reported for metals (copper and zinc) are considered representative of background concentrations. Ecological receptors will not be present onsite and the closest surface water receptor was 950 m to the southeast. Groundwater is not considered to present a risk human health and ecological receptors. Further investigation or remediation of groundwater is therefore not considered to be required.

10. EVALUATION OF PROPOSED REMEDIATION

10.1 Conceptual Site Model

A conceptual site model (CSM) is a representation of the source, pathway and receptor linkages at a site. DP has developed a CSM based on the PSI and DSI. Table 10.1 provides the Auditor's review of the CSM used by DP to inform remediation of the site.

Table 10.1: Review of the Conceptual Site Model

Element of CSM	Consultant	Auditor Opinion
Contaminant source and mechanism	Contaminated fill material containing lead. ACM was not identified however may be present. Unexpected contamination finds during excavation.	Source and mechanism for soil considered appropriate.
Affected media	Fill material	Agree fill is the primary affected media.
Receptor identification	Construction workers, adjacent land users, surface water, groundwater, and future site workers and users.	The receptors have been appropriately identified.
Exposure pathways	Ingestion and dermal contact with soil, inhalation of dust, surface water runoff, leaching and vertical migration to groundwater, and lateral migration of groundwater.	The exposure pathways have been appropriately identified.
Presence of preferential pathways for contaminant movement	Not discussed in the CSM	Preferential pathways are considered unlikely based on the contaminants of concern.
Evaluation of data gaps	The RAP states that the contaminants in groundwater will require treatment prior to disposal. However, treatment options have not been addressed in the RAP.	No potentially significant data gaps were identified during review of the PSI, DSI and RAP. Layers of fly ash and charcoal in fill material were not sampled and analysed during the DSI. These layers will be removed along with all fill material during remediation and development of the site. The data gap is therefore not considered significant with respect to site remediation. The layers may have a different waste classification so may require

Table 10.1: Review of the Conceptual Site Model		
Element of CSM	**Consultant**	**Auditor Opinion**
		further assessment prior to disposal.

In the Auditor's opinion, the CSM developed is considered an adequate basis for assessing remedial requirements.

10.2 Remediation Required

The Auditor has assessed the RAP by comparison with the checklist included in OEH (2011) *Guidelines for Consultants Reporting on Contaminated Sites*. The RAP was found to address the required information, as detailed in Table 10.2, below.

Table 10.2: Evaluation of Remedial Action Plan	
Remedial Action Plan	**Auditor Comments**
Remedial Goal The RAP stated four remediation goals as outlined below: *'render the site suitable for the proposed land use; maintain records of the remediation and earthworks undertaken including validation as required; mitigate adverse impacts on surrounding land and waterways during the remediation by the management of dust, water and noise emissions; and maximise the protection of workers involved with remediation and earthworks'.*	In the Auditor's opinion, the goals are appropriate considering the proposed development of the site.
Discussion of the extent of remediation required DP identified the entire excavation footprint (Attachment 2) as the lateral remediation extent and the vertical extent to be the depth of contaminated soil or the base of the excavation. Due to the nature of the development, bulk excavation will require removal of site soil to the desired levels (39 to 45 mbgl). The base and walls of the excavation will be validated.	The proposed extent of remediation is considered adequate. Further excavation of fill material would be undertaken in the event of validation failure.
Remedial Options The RAP stated that due to the bulk excavation requirement for the proposed development, excavation and off-site disposal was the only viable option.	Acceptable.
Selected Preferred Option Excavation and off-site disposal of contaminated fill.	Acceptable.
Rationale Development of the site will involve bulk excavation from the surface to a depth of up to 39 to 45 mbgl. The impacted soil will be excavated and disposed off-site.	Acceptable.
Waste Characterisation and Disposal The DSI has identified the following waste streams based on *in situ* testing of fill material: restricted solid waste (RSW); general solid waste (GSW); and virgin excavated natural material (VENM). DP note that further assessment is required to segregate fill between the two waste classifications and confirm the presence/absence of	Acceptable. The Auditor will review the final waste classifications in the validation report.

Table 10.2: Evaluation of Remedial Action Plan	
Remedial Action Plan	**Auditor Comments**
asbestos. Roadbase material will require further assessment for classification under the resource recovery order. DP are to provide documented waste classifications in accordance with EPA (2014) *Waste Classification Guidelines* based on an inspection of the material and available analytical data. Further *ex situ* waste characterisation will be undertaken if considered necessary. Waste material is to be removed by a licensed contractor. Each load will be documented, including weighbridge slips, trip tickets and consignment disposal confirmation. Waste will be disposed of at a facility legally able to accept the material. The RAP includes a plan for the classification, handling, characterisation, treatment and disposal of hazardous waste in the event that it is identified on the site.	
Containment No requirement at this stage.	Acceptable.
Proposed Validation Testing Validation samples are to be collected following removal of waste with higher classification and fill material, as well as the footprint of stockpile areas. *Excavations (base <500 m^2):* Base – one sample per 25-50 m^2 with a minimum of 3 samples. Walls – one sample per 10 m length exposed with additional samples collected at depths based on observations. *Excavations (base ≥500 m^2):* Base – grid based sampling to meet the density recommended in the NSW EPA *Sampling Design Guidelines* (minimum of 10 samples). Walls – one sample per 20 m length exposed with additional samples collected at depths based on observations. *Stockpiles:* If <250 m^3; one sample per 25 m^3 or a minimum of 3 samples. If >250 m^3; one sample per 50-250 m^3 or a minimum of 10 samples. The RAP states that samples collected will be analysed for the contaminants of concern, however, it does not list the contaminants. Imported material is expected for temporary works such as construction of piling platforms. The RAP includes a material importation protocol and criteria for implementation. The protocol requires review and approval of documentation by the environmental consultant, inspection of the material at the source site, inspection during importation and additional testing (testing details not provided in the RAP).	The Auditor considers the validation sampling densities to be acceptable. Contaminants of concern for validation of fill material removal are considered to include metals, PAHs, TRHs and asbestos. The density of testing for imported material would need to be commensurate with the documentation provided, source, observations and the consistency of the results. VENM certificates based on the template available on the NSW EPA website should be provided.

Table 10.2: Evaluation of Remedial Action Plan	
Remedial Action Plan	**Auditor Comments**
Interim Site Management Plan (before remediation) No requirement for interim site management was identified in the RAP.	Acceptable. No interim management is considered necessary given the site is sealed with asphalt, fenced and occupied by JHCPBG JV.
Unexpected Finds The RAP includes a contingency plan for unexpected finds, including stopping work and assessment of the find by an environmental consultant. An asbestos assessor and contractor are to be engaged should asbestos be identified on the site.	The unexpected finds procedure (UFP) is considered acceptable. Validation of unexpected finds should be undertaken in accordance with the procedures in the RAP.
Site Management Plan (operation phase) including stormwater, soil, noise, dust, odour and OH&S The RAP includes a site management plan for implementation during remediation and validation that covers specific requirements for asbestos (including notification, air monitoring), specific requirements for chemical contaminants, fencing and signage, security and restriction of access, PPE, decontamination, disposal of water, clearance inspection and certificates.	The site management plan is considered acceptable for remedial planning.
Contingency Plan if Selected Remedial Strategy Fails The RAP states that in the event of validation failure, the remediation contractor will undertake further 'chase out' excavation and disposal, followed by validation sampling.	The remedial strategy has a low risk of failure, as validation failure would lead to further excavation which is required for the development.
Contingency Plans to Respond to site Incidents The RAP includes a contingency plan for unexpected finds, UST removal, unexpected groundwater and/or hazardous ground gas.	Acceptable.
Remediation Schedule and Hours of Operation Not provided in the RAP.	The hours of operation are to be governed by consent conditions.
Licence and Approvals Waste is to be tracked, and the receiving facility is to be licensed to accept the material in accordance with the *Protection of the Environment Operations Act 1997*. Asbestos removal contractors are to be appropriately licensed. Air monitoring for asbestos is to be conducted during remediation. The development is approved as critical State significant infrastructure under the *Environmental Planning and Assessment Act 1997* (EP&A Act). SEPP55 does not apply to the development.	Acceptable
Contacts/ Community Relations Contacts were not provided in the RAP. Direct community consultation is not proposed.	Acceptable.

Table 10.2: Evaluation of Remedial Action Plan	
Remedial Action Plan	**Auditor Comments**
Long-term environmental management plan No requirement based on the proposed remedial strategy.	Acceptable.
Validation Reporting The RAP included a validation plan which addresses the validation DQOs, QA/QC and DQIs in accordance with NEPM (2013). The validation requirements include: site inspections, sampling, documentation and reporting.	Acceptable.

It is considered that the remediation approach recommended by DP is largely appropriate. Staged remediation of the different waste streams would be feasible and considered appropriate for this site.

10.3 Auditor's Opinion

In the Auditors' opinion, the proposed remediation works should ensure that the site is suitable for the proposed land uses through: excavation and off-site disposal of contaminated fill material and natural soil; implementation of the UFP; and successful validation.

11. CONCLUSIONS AND RECOMMENDATIONS

The RAP concluded *"… that the site can be rendered suitable for the proposed development subject to implementation of this RAP"*.

Based on the information presented in the referenced reports and observations made on site, the Auditor concludes that the proposed process of remediation is practical and that the site can be made suitable for the proposed land use if remediated in accordance with the following RAP:

> *'Remediation Action Plan, Sydney Metro City and South West - Tunnel and Station Excavation Works Package, Proposed Victoria Cross North Access Shaft, 52 McLaren Street, North Sydney, prepared for John Holland CPB Ghella JV, Project 85608.05, April 2018'*, report reference: Revision 1, dated 24 April 2018, prepared by Douglas Partners Pty Ltd.

At the completion of remediation of the site, a Section A Site Audit Statement and supporting Site Audit Report certifying suitability for the proposed use should be prepared.

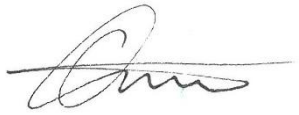
Remediation and reporting can be conducted in stages provided suitable provisions are made to avoid cross-contamination.

* * *

Consistent with the NSW EPA requirement for staged 'signoff' of sites that are the subject of progressive assessment, remediation and validation, I advise that:

- This advice letter does not constitute a Site Audit Report or Site Audit Statement.
- At the completion of the remediation and validation I will provide a Site Audit Statement and supporting documentation.
- This interim advice will be documented in the Site Audit Report.

Yours faithfully
Ramboll Australia Pty Ltd



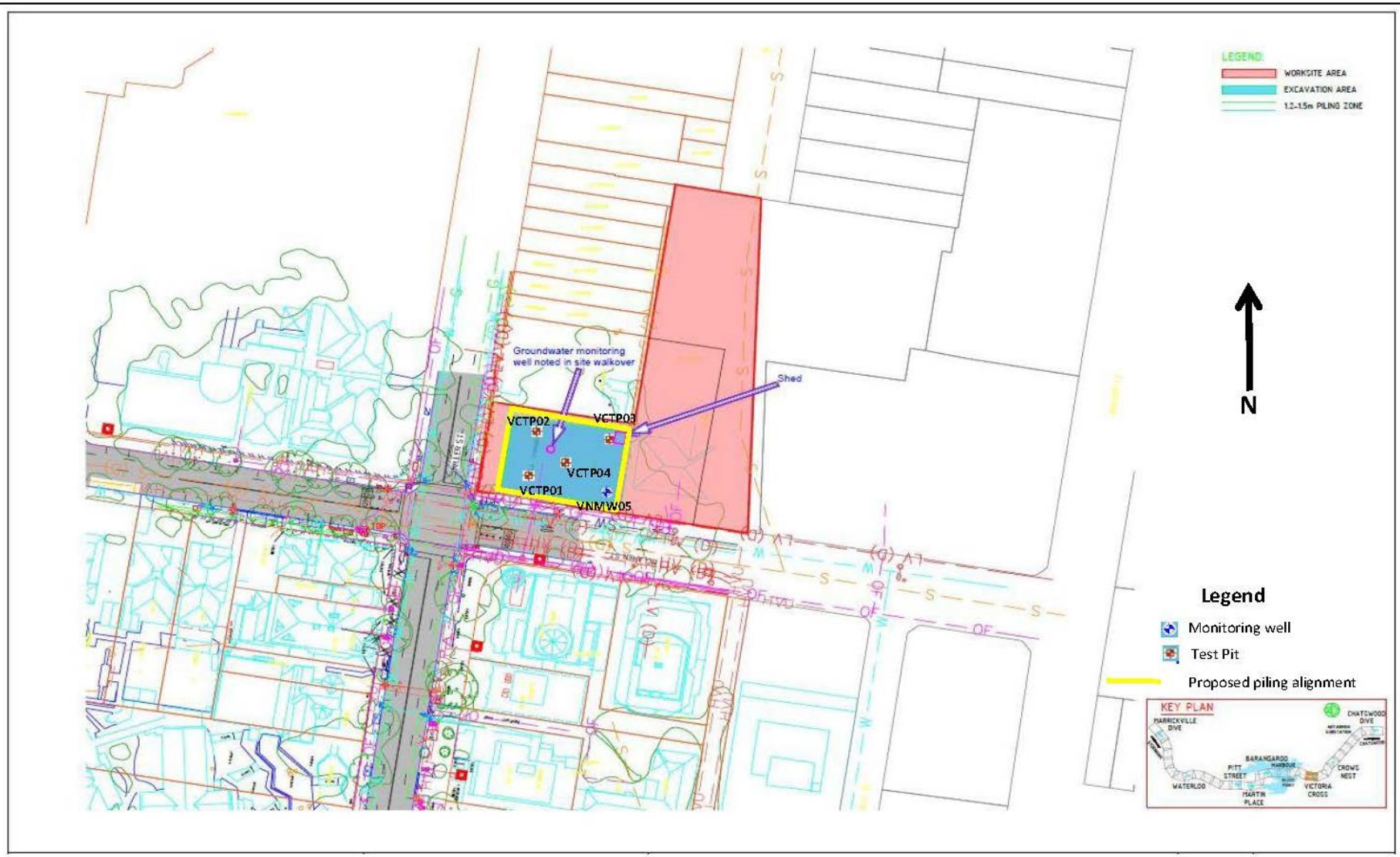
Tom Onus
EPA Accredited Site Auditor 1505

Attachments: 1 Site Locality

2 The DSI Sampling Location Plan

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: John Holland CPB Ghella JV	TITLE: Site Location & Features, Sydney Metro City & South West, Tunnel and Station Works Package, Proposed Victoria Cross North Acces Site, McLaren Street, NORTH SYDNEY	PROJECT No: 85608.05
	OFFICE: Sydney / DRAWN BY: PSCH		DRAWING No: 1
	SCALE: 1:1000 @ A3 / DATE: 26.10.2017		REVISION: 0

Attachment 1: Site Locality Plan



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: John Holland CPB Ghella JV	**Proposed Piling Alignment and Test Locations**	PROJECT No:	85608.05
	OFFICE: Sydney	**Sydney Metro City & South West, Tunnel & Station Works Package**	DWG No:	2
	DATE: 15 Feb 2018	**52 McLaren Street, North Sydney**	REVISION:	1

Attachment 2: The DSI Sampling Location Plan

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