St Marys Site Audit Report and Site Audit Statement for Validation Report

Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works

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Document approval

Rev	Date	Prepared by	Reviewed by	Approved by
0	15/09/2023	Ramboll	Ramboll	Ramboll
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Details of Revision Amendments

Document Control

The Project Director is responsible for ensuring that this Report is reviewed and approved. The Project Director is responsible for updating this plan to reflect changes to construction, legal and other requirements, as required.

Amendments

Any revisions or amendments must be approved by the Project Director and/or client before being distributed/implemented.

Revision Details

Revision	Details
0	Issued for comment
1	This SAR and SAS were updated to reflect the updated RAP and updated Section B SAS and SAR.

Prepared for

CPB Contractors Pty Ltd and Ghella Pty Ltd

Prepared by

Ramboll Australia Pty Ltd

Date

16 February 2024

Project Number

318001447-001

Audit Number

TO-095-B2R

SITE AUDIT REPORT

ST MARYS STATION BOX REMEDIATION AND CONSTRUCTION PHASE GROUNDWATER MANAGEMENT, SYDNEY METRO WESTERN SYDNEY AIRPORT

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16 February 2024

CPB Contractors Pty Ltd and Ghella Pty Ltd
[redacted]
Level 2, 177 Pacific Highway
North Sydney NSW 2060

By email: [redacted]

Dear [redacted]

SITE AUDIT REPORT - ST MARYS STATION BOX REMEDIATION AND CONSTRUCTION PHASE GROUNDWATER MANAGEMENT, SYDNEY METRO WESTERN SYDNEY AIRPORT

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Ref 318001447-001
Audit No. TO-095-B2R

I have pleasure in submitting the Site Audit Report (SAR) for the subject site. The Site Audit Statement (SAS), 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 CPB Contractors Pty Ltd and Ghella Pty Ltd (CPBG) to assess what management remains necessary before the land is suitable for any specified use or range of uses.

The Audit was initiated to comply with requirements of Critical State Significant Infrastructure (CSSI) approval 10051, issued on 23 July 2021 by the Minister for Planning and Public Spaces and is therefore a statutory audit.

The SAR and SAS were initially finalised on 15 September 2023. The RAP was subsequently updated to include some minor amendments, which resulted in preparation of an updated Section B SAS and SAR (TO-095-B1R dated 16 February 2024). This SAR and SAS were updated to reflect the updated RAP and updated Section B SAS and SAR.

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

[redacted]

[redacted]
EPA Accredited Site Auditor 1505

cc: NSW EPA – Statement only
Penrith City Council

Ramboll Australia Pty Ltd
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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
mg/m^3	Milligrams per Cubic Metre
mm	Millimetre
ppm	Parts Per Million

General

ABC	Ambient Background Concentration
AC	Activated Carbon
ACC	Asbestos Clearance Certificate
ACL	Added Contaminant Limit
ACM	Asbestos Containing Material
ADWG	Australian Drinking Water Guidelines
AEC	Area of Environmental Concern
AF	Asbestos Fines
AHD	Australian Height Datum
ALS	Australian Laboratory Services
ANZG	Australian & New Zealand Guidelines
ASS	Acid Sulphate Soil
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CCME	Canadian Council of Ministers of the Environment
CLM Act	NSW Contaminated Land Management Act 1997
COC	Chain of Custody
Council	Penrith City Council
CPBG	CPB Contractors Pty Ltd and Ghella Pty Ltd
CSM	Conceptual Site Model
CSSI	Critical State Significant Infrastructure
Cis-1,2-DCE	cis-1,2-Dichloroethene
DGV	Default Guideline Value
DNAPL	Dense Non-Aqueous Phase Liquids
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
DSI	Detailed Site Investigation
EIL	Ecological Investigation Level
EMP	Environmental Management Plan
ENM	Excavated Natural Material
EPA	Environment Protection Authority (NSW)
EPL	Environment Protection Licence
ES	Environmental Strategies
ESL	Ecological Screening Level
FA	Fibrous Asbestos
GIL	Groundwater Investigation Level
HDPE	High Density Polyethylene
HEPA	Heads of EPAs Australia and New Zealand
HHRA	Human Health Risk Assessment
HI	Hazard Indices
HIL	Health Investigation Level
HQ	Hazard Quotients
HSL	Health Screening Level
IAA	Interim Audit Advice

ILCR	Incremental Lifetime Cancer Risk
LCS	Laboratory Control Sample
LDPE	Low Density Polyethylene
LEP	Local Environment Plan
LNAPL	Light Non-Aqueous Phase Liquids
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Ni: Nickel, Pb: Lead, Zn: Zinc, Hg: Mercury
MIP	Membrane-Interface and Hydraulic Profiling Tool
ML	Management Limits
MS	Matrix Spike
NAPL	Non-Aqueous Phase Liquids
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
OH&S	Occupational Health & Safety
OPPs	Organophosphorus Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PFAS	Per- and Poly-fluoroalkyl substances
PFHxS	Perfluorohexane sulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
pH	A measure of acidity, hydrogen ion activity
PID	Photoionisation Detector
PQL	Practical Quantitation Limit
PRB	Permeable Reactive Barrier
QA/QC	Quality Assurance/Quality Control
Ramboll	Ramboll Australia Pty Ltd
RAP	Remediation Action Plan
RL	Relative Level
RPD	Relative Percent Difference
RRE	Resource Recovery Exemption
RRO	Resource Recovery Order
RSL	Regional Screening Level
SAQP	Sampling Analysis and Quality Plan
SAR	Site Audit Report
SAS	Site Audit Statement
SBT	Station Boxes and Tunnelling
SMWSA	Sydney Metro - Western Sydney Airport
SPR	Source, Pathway and Receptor
SQG	Soil Quality Guidelines
SSTOM	Stations Systems Trains and Operations and Maintenance
STEL	Short-Term Exposure Limit
SVOCs	Semi Volatile Organic Compounds
SWL	Standing Water Level
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalence Quotient
TPHs	Total Petroleum Hydrocarbons
TRHs	Total Recoverable Hydrocarbons
TTMP	Tetra Tech Major Projects Pty Ltd
TV	Trigger Value
TWA	Time Weighted Average
USEPA	United States Environmental Protection Agency

UST	Underground Storage Tank
VC	Vinyl Chloride
VENM	Virgin Excavated Natural Material
VOCs	Volatile Organic Compounds
WHO	World Health Organisation
XSD	Halogen specific detector
-	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 Station Boxes and Tunnelling Works (SBT Works) for the proposed St Marys Station, which forms part of the Sydney Metro – Western Sydney Airport (SMWSA) rail project, located at Station Street, St Marys NSW. The site/Audit boundary is defined by the construction site boundary illustrated by the yellow outline in Attachment 1, Appendix A.

The Audit was conducted to provide an independent review by an EPA Accredited Auditor of what management remains necessary before the land is suitable for any specified use or range of uses, i.e. a "Site Audit" as defined in Section 4 (1) (definition of a 'site audit' (b) (iv)) of the NSW *Contaminated Land Management Act 1997* (the CLM Act).

The Audit was initiated to comply with requirements of Critical State Significant Infrastructure (CSSI) approval 10051, issued on 23 July 2021 by the Minister for Planning and Public Spaces for construction of new stations, tunnels, bridges, viaducts, and rail and associated ancillary infrastructure along the SMWSA rail alignment from the existing Sydney Trains suburban T1 Western Line (at St Marys) in the north and the Aerotropolis (at Bringelly) in the south. Condition E96 of the CSSI requires a site audit as follows:

> *"A Section A1 or Section A2 Site Audit Statement (accompanied by an Environmental Management Plan) and its accompanying Site Audit Report, which state that the contaminated land disturbed by the work has been made suitable for the intended land use, must be submitted to the Planning Secretary and the Relevant Council(s) after remediation and before the commencement of operation of the CSSI."*

The Audit was initiated to comply with condition E96 of the CSSI approval and is therefore a statutory audit.

This site audit report (SAR) and accompanying site audit statement (SAS, provided in Appendix B) have been prepared to partly comply with this condition. SBT Works have been completed, including preparation of the station box and surrounding areas. An off-site source of groundwater contamination has the potential to impact the site as a result of ongoing dewatering required during development of the station. Further groundwater monitoring is required to demonstrate that the risk is low and acceptable. Evaluation of the CSSI conditions of consent is summarised in Section 11.3.

Details of the Audit are:

Requested by:	[redacted] on behalf of CPB Contractors Pty Limited and Ghella Pty Ltd (CPBG)
Request/Commencement Date:	4 July 2022
Auditor:	[redacted]
Accreditation No.:	1505

This SAR and Site Audit Statement (SAS) were initially finalised on 15 September 2023. The RAP was subsequently updated, which resulted in preparation of an updated Section B SAS and SAR (TO-095-B1R dated 16 February 2024). This SAR and SAS were updated to reflect the updated RAP and updated Section B SAS and SAR.

1.2 Project Background

The SMWSA railway project involves the construction and operation of a new 23 km metro rail line from the existing Sydney Trains suburban T1 Western Line (at St Marys) in the north and the

Aerotropolis (at Bringelly) in the south. The project includes tunnels and civil structures, including a viaduct, bridges, and surface and open-cut troughs between the two tunnel sections.

Sydney Metro has engaged the joint venture of CPB Contractors Pty Limited and Ghella Pty Ltd (CPBG) for the design and construction of the Station Boxes and Tunnelling Works (SBT Works) of the project.

Key elements on the SBT Works include:

- Two sections of twin tunnels with a combined length of approximately 9.8 km, plus associated portal structures. This includes one section from St Marys to Orchard Hills and the other under Western Sydney International airport to the new Aerotropolis Station.
- Excavations at either end to enable trains to turn back, and stub tunnels to enable future extensions.
- Station box excavations with temporary ground support for four new Metro stations at St Marys, Orchard Hills, Airport Terminal and Aerotropolis.
- Excavations for two intermediate services facilities, one in each of the tunnel sections at Claremont Meadows and Bringelly.

The St Marys site (the audit site) comprises the station box and surrounding areas that are disturbed during construction works, including parts of Station Street, the former bus interchange, Bus Driver Rest Compound, former St Marys Station Plaza and vacant land adjacent to the rail corridor (yellow outline in Attachment 1, Appendix A).

Fit-out of the St Marys Sydney Metro Station is outside the scope of the SBT Works and it is understood will be completed under a Stations Systems Trains and Operations and Maintenance (SSTOM) works package. It is understood that the final land use for the St Marys Station site will be analogous with a commercial/industrial land use with hardstand and minimum soft landscaping.

The site and surrounding area have been subject to previous intrusive investigations of soil, groundwater and soil vapour. More recently a detailed site investigation (DSI) and a DSI Addendum were undertaken by Tetra Tech Major Projects Pty Ltd (TTMP). Based on the findings of the DSI, construction activities that did not result in groundwater drawdown were considered by TTMP to be low risk and these works would not be considered as ‘remediation’. TTMP noted that remediation was defined as a management measure which is required to make the site suitable for commercial/industrial use. Construction activities which were considered low risk and not ‘remediation’ by TTMP included: preparatory works (site levelling (cut and fill), importation of fill for a piling platform and piling) and bulk excavation above the groundwater table. An Interim Remedial Action Plan (RAP) was prepared to document the controls to be implemented during these works.

Chlorinated hydrocarbon contamination was identified in soil and groundwater during previous investigations at a former dry cleaner located at 1-7 Queen Street. Development works are not proposed at the former dry cleaner (located off-site and ~100-120 m west, down-gradient of the station box), however groundwater travel time modelling indicated that dewatering of the station box excavation would reverse the local groundwater flow direction, drawing contamination towards the station box excavation. TTMP prepared a site-specific human health risk assessment (HHRA) to assess the risks to human health and develop site-specific trigger values, as well as a RAP to present the remedial strategy for excavation below the groundwater table.

Construction activities including preparatory works and bulk excavation above and below the groundwater table have been completed. This included installation of a permeable reactive barrier (PRB) to abate the migration of contaminated groundwater from 1-7 Queen Street towards the station box.

The HHRA and RAP identified the requirement for on-going monitoring following the commencement of bulk excavation beneath the groundwater table, and the potential requirement for mitigation measures for the management of groundwater if monitoring indicated that concentrations have, or will likely, become unacceptable.

1.3 Interim Audit Advice and Previous Site Audits

The Auditor previously undertook independent reviews of the DSI and DSI Addendum that were documented in interim audit advice (IAA) letters IAA3 (dated 5 September 2022) and IAA10 (dated 17 October 2022), respectively, along with an Interim RAP as documented in IAA11 (dated 24 October 2022) and the HHRA and RAP as documented in IAA14 (dated 7 February 2023). Preparation of the IAAs was undertaken to satisfy a requirement of the deed between Transport for NSW and CPBG. Relevant information from the IAAs has been included in this Site Audit Report (SAR). The IAAs are attached as Appendix C to this SAR.

The Auditor also documented the independent review of the following previous investigations, HHRA and RAP in a Section B site audit statement (SAS) (TO-095-B1R dated 16 February 2024) and supporting site audit report (SAR) to satisfy CSSI planning consent condition E94:

- 'Sydney Metro – Western Sydney Airport Technical Paper 8 Contamination*',* dated October 2020, prepared by M2A (*the Technical Paper*)
- 'Contamination at 1-7 Queen Street, St Marys', dated 8 July 2021, Tetra Tech Major Projects Pty Ltd (TTMP) (*the Contamination Memo*)
- 'Technical Memorandum: Preliminary Soil Results Eastern Portion St Marys', dated 15 July 2022, TTMP (*the Tech Memo*)
- 'St Marys, Sampling Analysis Quality Plan, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 22 July 2022, TTMP (*the SAQP*)
- 'St Marys Station, Detailed Site Investigation, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 27 September 2022, TTMP (*the DSI*)
- 'St Marys Station Remedial Action Plan (Interim) Preparatory Works and Initial Bulk Excavation', dated 21 October 2022, TTMP (*the Interim RAP*)
- 'Detailed Site Investigation Addendum St Marys Station', dated 13 October 2022, TTMP (*the DSI Addendum*)
- 'Detailed Site Investigation Addendum St Marys Groundwater Monitoring Data', dated 23 November 2022, TTMP (*the Groundwater DSI Addendum*)
- 'Hydrogeological Report (Project-wide), Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 23 February 2023, TTMP (*the Hydrogeological Report*)
- 'St Marys Station, Former Dry Cleaner, 1-7 Queen St – Assessment of Human Health Risk and Mitigation Options, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 26 April 2023, TTMP (*the HHRA*)
- 'St Marys Station, Remedial Action Plan, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 23 May 2023, TTMP (*the RAP*)

1.4 Scope of the Audit

The scope of the Audit included:

- Review of the following reports:
  - 'St Marys Station Validation Report, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 7 September 2023, TTMP (*the Validation Report*)

- 'St Marys Station – Implementation of Permeable Reactive Barrier, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 14 September 2023, TTMP (*the PRB Report*)
- 'St Marys Station Environmental Management Plan - Construction phase groundwater monitoring from contamination at 1-7 Queen St, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 15 February 2024, TTMP (*the EMP*)

- A site visit by the Auditor on 11 October 2022.
- Discussions with CPBG, and with TTMP who undertook the investigations, prepared the HHRA and RAP, and implemented the RAP and prepared the EMP.

Draft versions of the above reports were issued for audit review and review comments were issued by the Auditor (by email) which were incorporated into the final TTMP reports (listed above). The Technical Paper was prepared prior to the Auditor's engagement and was reviewed for factual content, however the Auditor has relied upon summaries provided by TTMP in the above listed reports. Technical Paper 8 is understood to be a supporting document to the Sydney Metro – Western Sydney Airport Environmental Impact Statement (EIS), which was not provided. The Technical Paper included a Preliminary Site Investigation (PSI) of the Project footprint, and a detailed summary of the site history and existing data available when the EIS was prepared.

TTMP reported in the SAQP and DSI that previous investigations had been undertaken at the site including two contamination assessments undertaken by Cardno in 2021 and a factual contamination report prepared by a joint venture of Golder Associates Pty Ltd and Douglas Partners Pty Ltd (Golder-Douglas Partners) in 2021. Summaries of these reports were included in the various TTMP reports and the data was included as an appendix to the DSI. The majority of the original reports were not provided for Auditor review, however, where provided, the reports were reviewed for factual information.

The Auditor has relied on the report summaries presented by TTMP for consideration in the site audit where relevant.

I have reviewed the key documents against the requirements of guidelines made or approved under Section 105 of the CLM Act, including the following:

- National Environment Protection Council (NEPC) '*National Environment Protection (Assessment of Site Contamination) Measure 1999',* as Amended 2013 (NEPM, 2013)
- NSW EPA (2017) '*Guidelines for the NSW Site Auditor Scheme (3rd Edition)'*
- NSW EPA (2020) '*Contaminated Land Guidelines, Consultants Reporting on Contaminated Land'*
- Australia and New Zealand Heads of EPAs (HEPA 2020) *'PFAS National Environmental Management Plan, Version 2.0'* (NEMP)
- Chapter 4 Remediation of Land in the Resilience and Hazards State Environment Planning Policy (SEPP) 2021 (formerly known as SEPP 55) and NSW Department of Urban Affairs and Planning and NSW EPA (1998) '*Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land*'
- NSW EPA (2022) *'Sampling design part 1 – application'* and *'Sampling design part 2 – interpretation'.*

2. SITE DETAILS

2.1 Location

The site locality and the site/Audit boundary is defined by the site boundary illustrated by the yellow outline in Attachment 1, Appendix A.

The site details are as follows:

Street address:	Station Street, St Marys, NSW 2760
Identifier:	Lot 1 DP1001735 (1 Station Street), Lot 7 DP734738 (33-43 Phillip Street), Lot 8 DP734738 (8 Station Street), part Lot 9 DP840717 (part 45 Phillip Street), Part Lot 6201 DP1284283, Lot 6202 DP1284283, Lot 6203 DP1284283 and part of Station Street (no Lot and DP)
Local Government:	Penrith City Council
Owner:	Transport for NSW
Site Area:	Approximately 3.9 ha

Site boundaries were typically defined by temporary fencing/timber hoarding and permanent fencing with the existing rail corridor.

A survey plan of the site has not been provided, however, TTMP included geocentric datum for various points of the site boundary as shown in Attachment 1, Appendix A.

2.2 Zoning

The current zoning of the site is SP2 (Railway), MU1 (Mixed Use) and R4 (High Density Residential) under the Penrith Local Environmental Plan 2010.

2.3 Adjacent Uses

The site is located within an area of mixed residential and commercial/industrial land uses (Attachment 1, Appendix A). The surrounding site use includes:

North: St Marys Train Station and Railway corridor. North of the rail corridor is the St Marys Commuter Carpark and various commercial/industrial land uses.

East: Glossop Street. East of Glossop Street is a low-density residential area south of the rail corridor, and a commercial/industrial area north of the rail corridor.

South: Residential land uses (low to medium density) to the southeast and commercial/industrial to the southwest.

West: Commercial (including the former dry cleaner), then car parking and residential land use

2.4 Site Condition

2.4.1 Pre-Remediation

TTMP undertook a limited walkover inspection of the site in March 2022 for the DSI prior to site establishment by CPBG. Observations recorded by TTMP were limited to the St Marys Station Plaza area and areas located north of Station Street and Chesham Street.

St Marys Station Plaza

- St Marys Station Plaza was a vacant, commercial shopping centre comprising one above-ground level and single level basement car park that was accessed from Station Street.

- The below-ground car park was surfaced with hardstand pavement in good condition with some minor oil staining on the hardstand from motor vehicles. A small area used for the storage of cleaning chemicals and a car wash with an oil separator and sub-surface drainage was present in the car park.
- There was the potential for some fill to be present in the exterior portions of this area of the site, most notably in the northern portion of the site along Station Street.

1 to 2 Station Street and 11-13 Chesham Street

- At the time of the inspection, the area was being used as a stockpiling area and the ground surface could not be inspected.
- Anecdotal information provided by Sydney Metro staff indicated that a building had previously been located in this area but had been removed to facilitate usage of the area for stockpiling and placement of some portable site offices.
- Sydney Metro personnel indicated that they were not aware that an underground storage tank (UST) noted in the EIS may have existed on this property, and no records or anecdotal reporting were provided to Sydney Metro that a UST had been found or removed when the building was demolished.
- Sydney Metro provided a photograph of a gatic, or lid, shown within the interior of the former building which may have been indicative of a possible UST, however the photograph was inconclusive. This portion of the alignment was elevated approximately 10 m above the existing track line.
- Within 2 Station Street, the land sloped up towards the intersection with Chesham Street.
- On the northern side of Chesham Street (east of the intersection with Station Street), the area was being used as a construction compound. The compound was surrounded by a chain-link fence and was surfaced with either gravel or bare soil. Several portable site offices and amenities were situated in this area.

The following was noted by the Auditor during the site visit on 11 October 2022:

- The site was an existing construction site with excavation/preparatory works underway in the eastern portions of the site.
- A large, excavated batter was observed in the eastern portion of the site with site sheds located to the southeast. Material excavated from this portion was observed to be transported within the site to the former St Marys Station Plaza, which had been cleared prior to material placement.
- Preparatory works appear to have commenced on the eastern portions and were moving towards the west with fill materials and construction debris observed in the central and western portions of the site.

2.4.2 Post-Remediation

TTMP undertook a site inspection on 19 July 2023 for the Validation Report and noted the following key observations:

- Cut/Fill Earthworks around the station box were complete.
- A temporary earthen access ramp had been constructed adjacent to the south-western corner of the station box (between the railway easement boundary and station box). A relatively small volume of existing soil between the railway easement boundary and the station box appeared to have been excavated to form the ramp. Some soil and vegetation remained undisturbed around a power pole. No visual and/or olfactory evidence of contamination, foreign material (including suspected ACM) was apparent within the exposed soil. Some

station box spoil (crushed Bringelly Shale) had also been transported to the area and used to form the ramp.

- The excavation of the station box was in progress. CPBG indicated to TTMP personnel that completion of the station box excavation was scheduled for the end of August 2023.
- Stockpiles were observed within the former St Marys Plaza area comprising two relatively large stockpiles of mixed clays and shales sourced from the station box. This material was being transported from the station box in Moxy Earthmovers to the lay down area where it was being loaded into trucks and transported off-site.
- One relatively small stub tunnel stockpile was located at the south-eastern corner of the former St Marys Plaza area.
- A segregated stockpile of imported crushed sandstone was located along the eastern boundary of the former St Marys Plaza area. A relatively small, segregated stockpile of concrete waste (including rubble and washout waste) was located in the south-western portion of the former St Marys Plaza area.
- Areas surrounding the former St Marys Plaza area to the west and north-west comprised remnant roadways/kerbing and paving that had remained undisturbed.
- The site appeared well organised with machinery, tools and equipment being stored and/or operating within designated areas. Chemical storage appeared to be contained, with portable bunds in use under bulk containers, and bunded areas being utilised where potential spills may occur (i.e., grout batching plant at western portion of former St Marys Plaza area). No evidence of uncontrolled waste or spills were apparent. No evidence of the presence of suspected ACM was observed.

2.5 Proposed Development

The site is to be redeveloped as a future Metro Train Station. TTMP did not specify the details for the future use, however provided an outline of the construction works involved with the SBT works, which include:

- Demolition of existing commercial/industrial premises including St Marys Station Plaza.
- Establishment of temporary offices, amenities, car parking and access roads for construction purposes.
- Bulk excavation up to 6 metres below ground level (mbgl) within land south of the station box and west of St Mary Station Plaza, and the use of excavated material as fill within the St Marys Station Plaza, where such material is assessed to be suitable from a contamination and geotechnical perspective.
- Piling and station box excavation using rippers and rock hammers. The station box will be excavated to approximately 20 mbgl (i.e., 19 m Australian Height Datum (mAHD)). Excavation of the station box is expected to generate approximately 172,000 m^3 (as an in-situ volume) of spoil.
- Stub tunnel excavation east of the station box using road headers.
- Tunnel boring west of the station box, and retrieval of the Tunnel Boring Machine (TBM) within the station box.

TTMP noted that fit out of the St Marys Sydney Metro Station is outside the scope of the SBT Works and will be completed under a separate works package (i.e. SSTOM). TTMP understood that the final land use for the site will be analogous with a commercial/industrial land use with hardstand and minimum soft landscaping.

For the purposes of this audit, the ‘commercial/industrial’ land use scenario has been assumed.

3. SITE HISTORY

TTMP reported in the SAQP and DSI that the history of the site was described in *Sydney Metro – Western Sydney Airport Technical Paper 8 Contamination.* The SAQP and DSI included a summary of the site history, which noted the following:

- The 1943 historical aerial imagery noted that the site comprised St Marys Station, a rail line/siding, and low-density residential housing surrounding the station. A rail siding was present south of the station (what is now the St Marys Bus Interchange) and the siding appears to have been in place through to the 1990s when it was redeveloped into the bus interchange.
- Land between the rail siding and Station Street appeared to have been cleared in 1943 and appeared to be disturbed and used for the stockpiling of materials. In the 1980s additional buildings were added (now the Bus Driver Rest Compound) with the configuration of these buildings changing between the 1980s through to 2013. A single building and shed used as a rest area for bus drivers remained in this area from 2013 until construction works began.
- A former Girl Guides building was constructed in the 1970s at the eastern end of the site between the rail line and Chesham Street. The building was demolished between 2009 and 2011. Anecdotal information indicates that remediation works were completed, which included excavation and off-site disposal of asbestos impacted soils, and reinstatement of the remedial excavation with clean fill.
- From 1943 to the present-day, units/apartments were constructed and the density of residential housing increased in the area to the south of Station Street and east of Gidley Street. St Marys Station Plaza was developed in the late 1980s. During this time period, land west of Gidley Street and south of the rail line was developed for commercial use. Several service stations, motor vehicle service centres and dry cleaners were also located in this area between the 1950s and 1990s. From 2012 the site was cleared vacant land and remained in this configuration until approximately 2015.
- Land north of the rail line was progressively redeveloped into commercial/industrial use between 1943 and 1965. The commuter car parks for the rail line were developed in the late 1970s and early 1980s, and the multi-storey carpark was developed between 2009 and 2010.

TTMP undertook a search of the List of NSW Contaminated Sites Notified to NSW EPA under Section 60 of the CLM Act on 8 March 2022 which identified two nearby properties, comprising: 1-7 Queen Street (former dry cleaner located off-site ~100-120 m west of the station box excavation) and 76 Glossop Street (service station located ~300 m north of the site). TTMP did not specify the EPA management class for these sites, however, the Auditor observed in January 2023 that 1-7 Queen Street remained on the list and was noted to be “under assessment”.

In April 2022, TTMP undertook a search of the NSW EPA Contaminated Land Public Record for declaration notices and orders made by the EPA under the CLM Act, voluntary management proposals approved under the CLM Act, and site audit statements relating to significantly contaminated land. The search of the database did not identify any listings for the site, or for properties within 250 m of the site.

The SAQP and DSI identified potentially contaminated sites nearby, as illustrated in Attachment 1, Appendix A, including:

- The Harris Street commuter car park (north of the station) which was previously used as a wreckers and associated workshop, a plastics manufacturing site, and bus depot and associated fuel storage.
- A commercial area around Queen Street and Phillip Street (south of the station) where current and former business activities may have resulted in groundwater contamination. The businesses include a former service station (47 Phillip Street, approximately 100 m south of

station box), a former dry cleaner (51 Phillip Street, approximately 100 m south of station box) and a Waterproofer (43 Queen Street, approximately 125 m southeast of station box).

- St Marys Station Plaza on Station Street (south of the station) included chemical storage areas and a car wash. There was limited information on previous site use before the development of the Plaza in 1994.
- A former depot with the potential for a UST was located within the station box excavation. Previous investigations did not confirm the presence of a UST and contamination associated with a potential UST was not identified.
- A former dry cleaner located at 1-7 Queen Street, which is approximately 100-120 m west of the station box.

3.1 Auditor's Opinion

The site history provides an adequate indication of past activities. Previous site uses with the most significant potential to cause contamination include potential storage of fuels in USTs, uncontrolled filling of the site, demolition of former buildings and structures which contained hazardous building materials and current/former onsite and offsite commercial/industrial land uses (including dry cleaner). The duration of operation for the dry cleaner is not known, however it was reported that a commercial premisses occupied this area since 1955.

4. CONTAMINANTS OF CONCERN

TTMP noted in the SAQP and DSI that historical activities with the potential for contamination (referred to as Areas of Environmental Concern (AEC)) were identified in the EIS. Fifteen AECs were identified and the location of the AECs are shown in Attachment 2, Appendix A. The summary provided by TTMP for these AECs is provided as Attachment 3, Appendix A.

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

Table 4.1: Contaminants of Concern

Activity	Potential Contaminants
Uncontrolled fill material	Total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and total xylenes (BTEX), heavy metals, polycyclic aromatic hydrocarbons (PAH), organophosphorus pesticides (OPP), organochlorine pesticides (OCPs), polychlorinated biphenyls (PCB) and asbestos
Demolition materials from previous buildings and structures	Asbestos and lead (lead-based paint)
Existing commercial/industrial land use onsite and previous commercial/industrial land use businesses in the surrounding area (dry cleaners, service stations, depots containing USTs, wreckers, vehicle workshops, and manufacturing/industrial facilities).	TRH, BTEX, heavy metals, PAH, pesticides (OCP/OPP), PCB, chlorinated hydrocarbons, perfluoroalkyl and polyfluoroalkyl substances (PFAS) and asbestos

TTMP determined that significant contamination was not identified in the soil materials to be excavated as part of the SBT works and therefore remediation was not required during excavation of the soil/rock materials above the groundwater table. Remediation of the site was required for bulk excavation works beneath the groundwater table due to the potential unacceptable risk to human health as a result of drawdown of groundwater contaminated with volatile chlorinated hydrocarbons, PFAS and ammonia from the former dry cleaner located off-site at 1-7 Queen Street, west of the station box.

4.1 Auditor's Opinion

The Auditor considers that the contaminants of concern identified by TTMP adequately reflect the site history and site condition.

5. STRATIGRAPHY AND HYDROGEOLOGY

5.1 Stratigraphy

TTMP reviewed geological maps and reported that the site is underlain by Bringelly Shale of the Wianamatta Group which was deposited in a deep marine environment of the Middle Triassic. Bringelly Shale is described as shale, carbonaceous claystone, laminite, lithic sandstone, with rare coal.

TTMP provided a summary of the previous investigations undertaken at the site and noted that a review of the borehole logs indicated fill material was observed in all previous investigation locations to depths of between 0.2 m and 1.2 mbgl. TTMP undertook a total of 47 boreholes and test pits during the DSI and DSI Addendum (Attachments 4a to 4c, Appendix A). The sub-surface profile of the site prior to remediation/development works summarised by the Auditor in TO-095-B1R is presented in Table 5.1.

Table 5.1: Stratigraphy

Subsurface Profile	Description and Depths (mbgl)
Pavement/Hardstand	Hardstand pavements including concrete, asphalt and brick at the surface of nine locations (SBT-BH-1007, SBT-CM-1022, SBT-BH-1200, SBT-BH-1202, SBT-BH-1215, SBT-BH-1220 to SBT-BH-1222 and SBT-BH-1232).
Fill	Fill materials, including topsoil, were typically present to depths of between 0.2 m and 1.5 m. Deeper fill was encountered in SBT-BH-1200 (St Marys Bus Interchange) to a depth of 2.5 m. Brick, terracotta tiles and potential asbestos-containing material (ACM) as fibre cement debris was identified in fill at 1-7 Queen Street (SBT-GW-1018 and SBT-GW-1019). Brick fragments were also observed in shallow fill at SBT-BH-1215 (St Marys Bus Interchange)
Natural soils and Bedrock	Residual soils were encountered beneath the fill and were generally described as silty clay with sandy clay, encountered from approximately 6.5 mbgl with increasing sand content from 14 to 16 mbgl. An approximately 3-metre-thick band of weathered siltstone with clay was encountered at approximately 16 mbgl, with bedrock (siltstone) from 19 mbgl.

mbgl – metres below ground level

TTMP reported that the Atlas of Australian Acid Sulfate Soil (ASS) compiled by CSIRO was reviewed during the SAQP and DSI to assess the probability of occurrence of ASS within the site. It was reported by TTMP that the ASS risk plan indicates that the site is located in an area with Extremely Low Probability of Occurrence of ASS.

During remediation and development works at the site (discussed in Section 7.3), cut and fill earthworks were undertaken in areas within and surrounding the station box altering the site stratigraphy. The station box has required excavation to depths of approximately 20 mbgl.

5.2 Hydrogeology

TTMP undertook a search for registered bores during the SAQP and DSI. Three bores were identified within a 1,000 m radius of the site. The bores were installed to 6 mbgl, registered for monitoring purposes and located approximately 750 m northwest of the site. The Auditor undertook a search in February 2023 and identified the same bores.

Based on the information presented in the DSI, HHRA and the Groundwater DSI Addendum, TTMP reported in the RAP that groundwater flows in a westerly direction towards South Creek (Attachment 5, Appendix A). Groundwater elevations were recorded within the Bringelly Shale (siltstone) and ranged between approximately 30 mAHD and 40 mAHD. TTMP noted that perched water may be present at the soil/rock interface.

TTMP noted that electrical conductivity ranged from fresh to brackish, pH ranged from acidic to mildly alkaline, and had low to moderate levels of dissolved oxygen given the temperature ranges reported.

The HHRA reported that the range of hydraulic conductivities reported in the residual soils in the vicinity of the chlorinated hydrocarbon impact (around 1-7 Queen Street) ranged from 1.2×10^{-8} m/s to 3×10^{-6} m/s, which is similar to the range of 7.4×10^{-8} m/s to 2.2×10^{-6} m/s reported in the EIS. Testing indicated that the highest hydraulic conductivities are in residual soils in the suspected dry cleaner source area (3×10^{-6} m/s) and to the east toward the station box excavation (1.1×10^{-6} m/s). Based on groundwater levels and the lithology between the former dry cleaner and the station box, the testing indicated that impacted groundwater drawn toward the excavation is likely to predominantly flow in the residual soils, which appear to be of high permeability along this flow path.

5.3 Auditor's Opinion

The Auditor considers that the stratigraphy and hydrogeology detailed by TTMP adequately reflect the site conditions and are sufficient for the purpose of the audit.

6. SUMMARY OF TO-095-B1R PRE-DEVEOPMENT INVESTIGATION RESULTS

6.1 Soil Results

TO-095-B1R evaluated soil results based on samples which were analysed for a variety of contaminants in numerous previous investigations, including three previous investigations undertaken prior to TTMP and Auditor engagement along with the TTMP investigations (DSI and DSI Addendum). In reviewing the analytical results tabulated by TTMP, the Auditor noted the following:

- Reported concentrations of analytes (potential contaminants) in both the fill and natural materials were below the adopted commercial/industrial human health guidelines.
- An elevated concentration of TRH F1 was identified above the initial screening criteria adopted for human health and the adopted ecological criteria in one natural sample obtained from location SBT-GW-1019 at a depth of 2-2.1 m (adjacent the former dry cleaner). The TRH F1 concentration is below the HSL for the most applicable sample depth (NL at >2 m to <4 m) and ecological criteria are only applicable for depth <2 m.
- Concentrations of chlorinated hydrocarbons (PCE and TCE) were detected in both fill and natural samples at two sample locations adjacent to the former dry cleaner (SBT-GW-1019 and SBT-GW-1019). Concentrations appeared to be increasing with depth with the deepest sample analysed from 2-2.1 m. TTMP noted that the depth of impact was not delineated. PCE concentrations exceeded the USEPA RSL in the SBT-GW-1019 (2-2.1 m) natural sample.
- Although ACM was identified in fill material at three locations (BH-A321S, SBT-GW-1018 and SBT-GW-1019), the presence of asbestos was not detected in the soil samples analysed. Laboratory analysis was not undertaken to confirm the presence of asbestos in the fragments observed in fill at SBT-GW-1018 and SBT-GW-1019 directly adjacent to the former dry cleaner (off-site) and it was assumed that these fragments contained asbestos. As the material was observed from a borehole and boreholes are less conducive to identifying ACM in soil, TTMP noted that there remains some uncertainty regarding the extent of potential asbestos impacts. However, the project does not propose to disturb fill materials in this off-site area, therefore the risk associated with ACM in fill at this location was assessed by TTMP to be low.
- Trace concentrations of PFAS were reported in both fill and natural materials. Maximum concentrations of PFOS (0.0197 mg/kg) and PFOA (0.0008 mg/kg) were below the adopted human health and direct exposure ecological criteria. Concentrations of PFOS in SBT-GW-1018 (0.1-0.2 m) and duplicate sample QC46 (duplicate of primary sample SBT-GW-1019 (0.1-0.2m)) were reported above the adopted indirect ecological criteria. Concentrations reported for the underlying samples analysed were below the indirect criteria indicating that impacts may be limited to the upper fill profiles in the vicinity of the former dry cleaner.
- Elevated concentrations of metals (copper, nickel and zinc) were identified in both fill and natural soils above the most conservative ACL outlined in NEPM (2013). Elevated concentrations of arsenic were identified in two fill samples above the generic EIL for ecological receptors. Following application of the TTMP site specific EILs, only zinc exceeded the site-specific EIL (1,100 mg/kg) in the shallow fill sample SBT-GW-1019 (0.1-0.2 m) and associated duplicate sample (QC45). TTMP noted that SBT-GW-1019 was located adjacent to the former dry cleaner and likely that this off-site area will remain undisturbed and likely paved which will restrict terrestrial ecology interacting with impacted soil. As such, TTMP considered that the ecological exceedance does not require further consideration.

TO-095-B1R concluded that "*The soil analytical results are consistent with the site history and field observations. The results indicate that contamination is present outside the proposed areas of excavation in the vicinity of the former dry cleaner located off-site ~100-120 m west of the station box. Contamination comprises surficial impact by metals, PFAS and asbestos, and deeper impact by TRH and chlorinated hydrocarbons. Development works are not proposed at the former dry cleaner, therefore further assessment or management of surficial contamination is not required.*

Elevated concentrations of TRH and chlorinated hydrocarbons identified in deeper soil at the former dry cleaners (outside the proposed area of excavation) may pose unacceptable risks to future site users and subsurface construction workers as a result of migration of contamination in groundwater during dewatering of excavations. A HHRA (discussed in Section 11) was prepared to assess the potential health risk to workers in the tunnel and station. The RAP (discussed in Section 12) was prepared to mitigate potentially unacceptable risks.

The assessment of asbestos was not undertaken in accordance with NEPM (2013) and there is potential to encounter fill materials containing asbestos during construction. The RAP includes measures/management actions to ensure any contamination identified (including asbestos) during the works are dealt with appropriately to minimise risks to human health and the environment. A competent person should also be present during disturbance of topsoil/fill materials to visually monitor for signs of potential contamination and potential asbestos.".

6.2 Groundwater Results

TO-095-B1R evaluated groundwater results based on samples which were analysed for a variety of contaminants in numerous previous investigations, including three previous investigations undertaken prior to TTMP and Auditor engagement along with the TTMP investigations (DSI and Groundwater DSI Addendum). In reviewing the analytical results tabulated by TTMP, the Auditor noted the following:

- Metals were generally reported at background levels with the exception of arsenic, nickel and zinc. Significant metal contamination was not identified in the soils sampled and TTMP attributed the concentrations detected in groundwater to a combination of natural and/or diffuse urban/industrial area sources.
- Elevated concentrations of TRH F1 were identified above the WHO (2017) human health criteria during two monitoring events (July and August 2022) at SBT-GW-1018 (vicinity of former dry cleaner). Elevated concentrations of TRH F2 were also identified above the WHO (2017) human health criteria during the 17 August 2022 monitoring event at SBT-GW-1019 (vicinity of former dry cleaner), the 4 August 2022 sampling event at SBT-GW-1232 and 21 October 2022 sampling event at SBT-GW-1017. Subsequent sampling events also detected concentrations of TRH F2 below the adopted criteria. Detections of hydrocarbons were reported in other sample locations in the vicinity of SBT-GW-1232, located near a potential former UST. TTMP noted that review of the chromatograms by the laboratory advised that the source of detections in SBT-GW-1232 was carbocyclic acid, which can be naturally occurring or anthropogenic in origin. A low concentration of toluene was also reported in SBT-GW-1232. SBT-GW-1017 is located offsite near a former garage and potential service station with low concentrations marginally above the ADWG criteria reported during the two sampling events in October 2022. Concentrations of benzene were reported as <PQL in the vicinity of the former dry cleaner, however, it is noted that the PQL was raised and greater than the adopted human health criteria (ADWG).
- Elevated concentrations of chlorinated hydrocarbons (mainly TCE and PCE) were reported above the adopted human health criteria in most wells located in the vicinity of the former dry cleaner (1-7 Queen Street). The highest concentration of PCE was reported at SBT-GW-1018 while the highest concentration of TCE was reported at BH1/MW1.

- Elevated concentrations of PFHxS + PFOS were identified above the adopted human health criteria at SBT-GW-1021 during three sampling events. Elevated concentrations were also identified in the vicinity of the former dry cleaner at locations BH1/MW1 (between 2 and 6 mbgl), GW02 (2 mbgl) and SBT-BH-1019 (15.4 and 17.4 mbgl). Elevated concentrations of PFOS were also identified in most of the wells above the HEPA (2020) 99% species protection freshwater criteria. The highest concentration of PFOS was identified at GW02 at a depth of 2 mbgl, located in the vicinity of the former dry cleaner.
- Elevated concentrations of ammonia above the 95% freshwater DGV for ecological receptors were identified at SBT-GW-1021 and SBT-GW-1234. TTMP noted sulfurous odours in several wells and that ammonia could be derived from biological process and leakage from a sewer. Ammonia may have also been used historically at the dry cleaners but was considered by TTMP unlikely to be the cause of ammonia reported in groundwater. Elevated concentrations of ammonia were reported in the vicinity of the former dry cleaner at SBT-GW-1019.

TO-095-B1R concluded that "*In the Auditor's opinion, the groundwater analytical results indicate that groundwater at the site has been impacted from historical onsite and off-site land uses. Groundwater in off-site areas (former dry cleaner) is impacted by hydrocarbons, volatile chlorinated hydrocarbons and PFAS. Dewatering activities have the potential to alter groundwater flow and there is potential for the identified offsite impacts to migrate towards the station box excavation and present potential risks to construction workers during station box excavation. Remediation/mitigation measures to be implemented during dewatering to prevent the migration of contaminants to the station box excavation are presented in the RAP.*".

6.3 Assessment of Risk

The HHRA assessed potential health risks to workers in the tunnel and station associated with exposure to chlorinated hydrocarbon impacts in soil and groundwater from the former dry cleaner located off-site at 1-7 Queen Street. The HHRA also considered community impact through odorous vapours associated with the identified impacts.

The site was previously used for dry cleaning purposes and is currently not operational. The site is listed in the register of NSW Contaminated Sites Notified to NSW EPA. Previous investigations confirmed chlorinated hydrocarbon impacts in soil and groundwater, with the suspected source area located directly on the tunnel alignment and approximately 100-120 m west of the station box excavation.

The HHRA was used to inform the site RAP prepared for the SBT works at St Marys. The purpose of the HHRA was to assess whether the contamination could pose a potentially unacceptable risk to worker health. Objectives of the overall assessment were to:

- *"Laterally and vertically assess the extent of chlorinated hydrocarbon impact in soil and groundwater at the rear of 5 Queen St, St Marys;*
- *Refine the range of hydraulic conductivity in residual soils in the vicinity of the source area, and between the source and the future station excavation;*
- *Review the preliminary analytical groundwater model developed in tender based on site-specific hydraulic conductivity data and a reasonable estimate of aquifer porosity;*
- *Assess potential vapour intrusion risk to the station and worker health during tunnel construction; and*
- *Outline mitigation options to reduce potential adverse risk associated with mobilisation of chlorinated hydrocarbon impact in groundwater due to construction activities."*

The scope of works relating to the HHRA included:

- HHRA to consider potential vapour intrusion risk to station workers (based on modelled groundwater concentrations) and worker health during tunnel construction.
- Preparation of a report on the above including a refined CSM, model results, HHRA, and options for mitigation (if required).

The HHRA concluded that there may potentially be some exposure risks to tunnel workers and station box workers, while no exposure risks were predicted for spoil workers. The HHRA report did not assess risks to public but expected inhalation exposure risks to be low and acceptable, based on assessment of risks to workers. For receptors potentially at risk, the HHRA noted the following:

- Tunnel workers:
    - There may be unacceptable inhalation risks either working within the TBM or cross-passage behind the TBM
    - There may be odour issues due to PCE air concentrations
- Station box workers:
    - Chlorinated hydrocarbon impacted groundwater may be drawn towards the station excavation in approximately 5.5 to 9 months after commencement of dewatering
    - There may be unacceptable inhalation and direct contact risks

For tunnel workers, the HHRA recommended having an air monitoring program during the time that the TBM passes through the impacted areas to assess concentrations of contaminants of potential concern against pre-determined trigger levels. The program would identify the need for implementation of required protective measures should unacceptable concentrations be detected. A similar program of monitoring is also recommended for protection of station box workers. The program will be designed to provide early warning and allow for mitigation to be implemented to prevent high concentrations reaching the station box.

TO-095-B1R concluded that "*Overall, the conclusions of the updated HHRA are supported. The conclusions are dependent on soil and groundwater concentration data collected so far and a number of site and receptor specific assumptions. The report has discussed uncertainties associated with adopted parameters including associated sensitivities towards risk determinations. Where data or information was lacking, conservative assumptions have been adopted. Where unacceptable risks were identified, the HHRA report recommended mitigation and monitoring measures to prevent unacceptable exposures. Details of the measures are provided in the RAP, which is reviewed in Section 12.*".

7. EVALUATION OF REMEDIATION AND SBT WORKS

7.1 Pre-Remediation Conceptual Site Model

A conceptual site model (CSM) is a representation of the source, pathway and receptor linkages at a site. TTMP developed a CSM and used it iteratively throughout the site assessment to inform decisions around investigation and management requirements. The CSM was initially developed following the preliminary investigations and has been updated as new information became available. Figure 7.1 provides a summary of the pre-remediation CSM used by TTMP in the Validation Report.

Figure 7.1: Summary of Pre-Remediation CSM (Source: Validation Report)

Identified Contamination Sources	Potential Transport Mechanisms & Plausible Exposure Pathways	Potential Receptors
VCH Contaminated Groundwater at 1-7 Queen Street, St Marys	Potential migration of the groundwater plume during construction. Associated with excavation of the station box which will including groundwater drawdown and dewatering. Volatilisation of seepage water in an unlined excavation (station box structure).	Station box workers from inhalation of VCHs should groundwater impact reach the excavation.
	Groundwater inflow (minor seepage) into the station during operational and maintenance phases following waterproofing of the station box as part of the SSTOM Works Package.	Future site users from inhalation of VCHs should groundwater impact reach the station.

7.2 Remediation Required and Evaluation of RAP

An evaluation of the remediation required and the RAP was undertaken during TO-095-B1R. TTMP determined that significant contamination was not identified in the materials to be excavated as part of the SBT works and therefore remediation was not required during excavation of the soil/rock materials above the groundwater table. The Interim RAP (reviewed for IAA11) was prepared for construction activities and includes controls/management options to be implemented during bulk excavation within the station box above the groundwater table.

Remediation of the site was required for bulk excavation works beneath the groundwater table due to the potential unacceptable risk to human health as a result of drawdown of groundwater contaminated with volatile chlorinated hydrocarbons, PFAS and ammonia from the former dry cleaner located off-site at 1-7 Queen Street, west of the station box.

The HHRA identified the requirement for on-going monitoring following the commencement of bulk excavation beneath the groundwater table, and the potential requirement for mitigation measures for the management of groundwater monitoring indicate that concentrations have, or will likely, become unacceptable.

The RAP reported that TTMP and CPBG had considered the contingency mitigation options and advised that the preferred mitigation option during the construction phase of the project is the implementation of the permeable reactive barrier (PRB) based on its technical feasibility, ease of deployment, cost and program requirements. In-conjunction with the installation of the PRB, a monitoring and contingency plan will be implemented which was outlined in the RAP.

The RAP noted potential management measures which could be considered for the operational stage of the site (if required), including:

- Water proofing of the metro station such that post-construction groundwater flow from 1-7 Queen Street into the metro station is negligible.
- Provision of drainage to collect and channel seepage that enters the station box and tunnel towards a water management system.
- Design the station ventilation system such that sufficient air exchange occurs to mitigate risks associated with vapour ingress.

These would need to be documented in an addendum to the RAP and considered in a future Audit.

An evaluation of the RAP was undertaken by the Auditor as part of TO-095-B1R, which included a comparison with the checklist included in NSW EPA (2020) *Consultants Reporting on Contaminated Land*. The RAP was found to address the required information, and the Auditor concluded that "*…the proposed remediation works are appropriate. If adequately implemented, the RAP should be able to ensure that the site is suitable for subsequent construction of the station at the completion of SBT works (construction phase works). Successful validation will be required to confirm this. An Addendum RAP and further site audit may be required if remediation is required to confirm suitability for the SSTOM (operational phase) works.*".

7.3 Remedial/SBT Works Undertaken

Remedial works were undertaken at the site in conjunction with redevelopment/SBT works between November 2022 and July 2023. Figure 7.2 below provides a summary of the parties involved in the remedial and validation works.

Figure 7.2: Summary of Parties Involved in Remediation and Validation (Source: Validation Report)

Party	Role
CPBG	Principal Contractor / Developer. CPBG were responsible for implementing the RAP.
Airsafe Laboratories Pty Ltd	Occupational Hygienist / Licenced Asbestos Assessor: Asbestos fibre air monitoring and clearance certificates
ADE Consulting Group Pty Ltd (ADE)	Environmental Consultant: Preparation of material classification assessments.
Auswide Operations Pty Ltd Trading as Mann Group NSW (Auswide)	Demolition Contractor & Earthworks Subcontractor SafeWork NSW Class A Licenced Asbestos Removal Contractor (SafeWork Licence AD212715)[10] / Supervisor
United Infrastructure Pty Ltd	Site Establishment Earthworks Subcontractor
Cono Services Pty Ltd	Bulk Excavations of Station Box
Spoil Haulage Contractors	Bakers Group, Mann Group, and Burtons
TTMP	Validation consultant. TTMP carried out the following scope: • Preparation of material classification assessments. • Groundwater monitoring associated with PRB installation. • Site visit at the completion of remedial works. • Review of documentation provided by CPBG relating to remedial works carried out. • Preparation of this Validation Report.

TTMP reported that remediation of the site included installation of the PRB to abate the migration of contaminated groundwater from 1-7 Queen Street towards the station box. In addition, TTMP also reported in the Validation Report that the requirements outlined in the RAP, including inspection of materials during development works, assessment and management of surplus materials, assessment of imported materials and management of unexpected finds were also undertaken and CPBG confirmed no deviations from the RAP. The following subsections provide a summary of the PRB installation, material handling and the unexpected finds identified during development works.

7.3.1 Installation of PRB

The PRB Report noted that the PRB was installed in Queen Street in early May 2023 prior to commencement of bulk excavation of the station box below the groundwater table in June 2023. The PRB was installed through the injection of a colloidal activated carbon (AC) product at three 100 mm diameters bores (SBT-GW-1800 to SBT-GW-1802 shown as orange bores on Attachment 6, Appendix A) installed approximately 5 m apart (centre to centre) in Queen Street to approximately 20 mAHD (approximately 3 m below the estimated base of the plume to allow for vertical migration due to drawdown). In addition to the PRB injection wells, monitoring wells were installed to the east and west of the PRB to supplement the existing contingency and mitigation monitoring wells (SBT-GW-0001, SBT-GW-1012, SBT-GW-1013 and SBT-1014).

Hydraulic conductivity testing was undertaken on the three injection wells which informed the required rate and volume of injection, and also identified that the northern portion of the PRB was of relatively high permeability. Based on a conservative estimated flux of chlorinated hydrocarbons, 180 kg of colloidal activated carbon (Plumestop™) was estimated to be required to form an effective barrier to reduce the mass flux of chlorinated hydrocarbons by over an order of magnitude for more than two years. The injection of 200 kg of Plumestop™ was completed over four days from 16 May to 19 May 2023. A significant proportion (75%) was injected into the northern most injection well in the high permeability zone where contaminant mobilisation was expected to be greatest.

The Validation Report noted that weekly monitoring of groundwater between the source area and the PRB, and between the PRB and station box, commenced on 30 June 2023. Where contamination is detected, concentrations will be compared to predictions and risk-based triggers to identify whether contingency mitigation is required as outlined in the RAP and EMP.

Weekly groundwater monitoring results were not included within the Validation Report, however, it is understood these will be reported separately as the data is obtained and collated. The Validation Report notes that results shall be presented to the Site Auditor and Sydney Metro at the monthly frequency nominated in the RAP.

7.3.2 Bulk Excavation Works

Whilst bulk excavation was not considered to be remediation in the RAP, the Validation Report presented information documenting the volume of soil disposed, exported, and reused during the SBT Works at the site.

Several construction related features, including excavation zones/areas (STM-1 to STM-8), were identified/adopted for the bulk earthworks (Attachment 7, Appendix A).

A Cut/Fill Plan, dated 24 January 2023, was prepared following preparatory works including the importation of materials to site to prepare for construction, off-site disposal/export of spoil, and reuse of spoil onsite. TTMP reported that the survey indicated approximately 50,669 m^3 of cut and 13,083 m^3 of fill had occurred. These areas of cut/fill are also shown on Attachment 7, Appendix A.

TTMP understood that CPBG carried out periodic visual inspections of fill material during excavation. Unexpected finds reported by CPBG were discussed in the Validation Report and have been included in Section 7.3.3 below.

Numerous material classification reports were prepared by TTMP and ADE Consulting Pty Ltd (ADE) to assist development works and facilitate offsite disposal and the potential onsite re-use of fill material excavated from the site. These reports were summarised and appended to the Validation Report. A discussion on spoil reused at the site is provided in Section 7.3.4 below.

TMP documented in the Validation Report that, at the time of the final site visit (19 July 2023), the site was an active construction site associated with the SBT Works. Cut/fill works appeared to have been completed in areas surrounding the station box. Excavation of the station box was in progress and was understood to be scheduled for completion at the end of August 2023.

7.3.3 Unexpected Finds

The Validation Report documents nine unexpected finds (UFs) of contamination that were identified during development works by CPBG, UFP01 to UFP09, which related to finds of asbestos as ACM impacted soils, ACM pipes and surface ACM. Based on the information provided by CPBG, TTMP provided a summary of each UF in the Validation Report including how the UF was managed. A summary of each UF including inferred locations is provided in Attachment 8, Appendix A.

Based on the summary documented by TTMP, it is understood that the extent of asbestos impact associated with the UFs was inferred/guided by visual observations made by CPBG and the licenced asbestos removal contractor Mann Group. All UFs were emu picked then subsequently excavated with both the emu picked materials and excavated spoils disposed offsite. Asbestos clearance certificates (ACC) were provided in the Validation Report documenting the removal of impacted materials. Additionally, it was reported by TTMP that CPBG provided time lapse photographs documenting the removal of any excavated materials which may have been stockpiled prior to offsite disposal.

TTMP reported in the Validation Report that some records for UFs did not necessarily demonstrate 'cradle to grave' tracking, and there was some ambiguity in relation to the validity of clearance reports for some of the UFs. However, TTMP considered that CPBG had systems in place to manage UFs and asbestos waste generated was segregated from other materials and disposed of at licenced landfill facilities. The segregation of ACM fragments, ACM impacted soil, and ACM conduits were segregated from other soils in-situ as guided by visual observations by CPGB personnel and the licenced asbestos assessor from Mann Group. An occupational hygienist was also present on site during the project. As such, TTMP did not consider that the uncertainty around clearances materially affected the outcome of the assessment with regards to site validation.

7.3.4 Reuse of Site Won Spoil

TTMP reported that a review of the CPBG spoil tracking register indicated that approximately 17,088 tonnes (approximately 8,550 m^3) of site won soil was reused within the southern portion of the site (former St Marys Plaza area) comprising approximately 16,491 tonnes (approximately 8,250 m^3) of VENM and 597 tonnes (300 m^3) of fill. No unexpected finds were reportedly observed by CPBG in this spoil during excavation and handling.

Based on the information provided in the Validation Report, in addition to the data obtained during previous investigations, it is understood that ADE prepared an in-situ material classification report for portions of the site to facilitate the beneficial reuse of fill. The ADE assessment was originally undertaken to facilitate off-site disposal. The ADE assessment report was appended to the Validation Report and was based on data collected from 46 test pits (TP1 to TP46) from an approximate 2.7 hectare area as shown in Attachment 9, Appendix A. The sample locations were placed generally on an approximate grid. The sampling density adopted exceeded the minimum number of sampling locations recommended (40 for a 3.0 ha site) in the NSW EPA (2022) *Sampling design part 1 – application*. ADE also carried out a high-level review of the DSI report (reviewed by the Auditor during TO-095-B1R).

ADE collected and analysed 90 samples from the 46 test pit locations for metals, TRH, BTEX, PAHs, OCP, OPP, PCBs and PFAS, while 63 samples were analysed for asbestos (presence/absence). Screening 10L soil samples for ACM was not undertaken, however, ADE collected 1 kg soil samples for asbestos laboratory analysis. When assessing the results against the soil environmental quality criteria outlined in Section 7 of TO-095-B1R (human health and ecological criteria outlined in NEPM (2013)) the Auditor noted that all results were generally below criteria for commercial/industrial land uses. ACM was identified in fill materials at TP18 while a concentration of arsenic was also identified in fill material at TP21 (0.3-0.4 m) above the generic ecological investigation level (EIL) outlined in NEPM (2013).

Based on the results ADE concluded that fill covering the area of investigation was suitable for beneficial re-use within the SMWSA project (commercial//industrial land use) including the site with the exception of soil materials surrounding sample locations TP18 and TP21.

Based on the information presented in the Validation Report, the asbestos impacted material at TP18 was managed as an UF (UFP03), which was excavated and disposed offsite. An ACC was issued following removal to demonstrate asbestos was not present in the removal area.

TTMP noted in the Validation Report that fill impacted with arsenic above an EIL at TP21 was located in the vicinity of construction area STM-8 (Attachment 7, Appendix A). TTMP noted that a statistical appraisal of results was not caried out by ADE as part of the investigation. TTMP carried out a statistical appraisal of arsenic results presented in the ADE report and noted that the highest reported concentration of arsenic was less than 2.5 times the EIL, the standard deviation was less than 50% of the EIL and the 95% upper confidence limit (UCL) value (45.51 mg/kg) was less than the EIL. The impacted material at TP21 was not removed, however, based on the statistical appraisal of result, TTMP did not consider that the concentrations of arsenic detected would pose an unacceptable risk to ecological receptors (terrestrial flora and fauna).

TTMP noted that CPBG were not able to provide photographs showing the fill reused on site, however, noted no unexpected finds including suspected ACM were reportedly observed by CPBG in the spoil reused during excavation and handling. TTMP made the following conclusions with regards to re-use of site won spoil "*Based on the assessments carried out by ADE and TTMP above, the management of unexpected finds by CPBG, and visual observations made by CPBG, TTMP considers that the site-won soil used as fill within St Marys Plaza is suitable for use at the site from a contamination perspective.*".

7.3.5 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. 17,537.75 tonnes (t) of waste material were disposed off-site to licenced landfill facilities including the following waste types:

- General Solid Waste (non-putrescible) (GSW)
- GSW (non-putrescible) - Special waste (asbestos)

Waste materials were disposed from the site between August 2022 and November 2022. TTMP included supporting documentation provided by CPBG including waste disposal dockets, consignment records and a spoil tracking register.

In addition, the Validation Report documented 242,965.05 t of spoil was exported for re-use at four different sites including the following:

- Virgin Excavated Natural Material (VENM)
- Great River Excavated Material (GREM)
- Excavated Public Road Material (EPRM)

The Auditor has reviewed the documentation provided and is of the opinion that the supplied documentation is consistent with the remedial/development works described. Further assessment of the waste classifications and disposal quantities is provided in Section 11.5.

7.3.6 Imported Material

The Validation Report documents approximately 1,975.34 t of material were imported to the site during site establishment and this material is proposed to remain at the site at completion of SBT works. A Materials Import Register, Supplier Documentation, and Delivery Dockets/Summary Report were compiled by CPBG, which were appended to the Validation Report.

TTMP understood that the following process was implemented by CPBG during import for each of these materials.

- Supplier documentation was reviewed by a CPBG Environmental Coordinator (EC) prior to import to confirm that the material was sourced from a quarry with an appropriate EPL, classified as either VENM or ENM, or supplied in accordance with a NSW EPA Resource Recovery Order/Resource Recovery Exemption (RRO/RRE).
- CPBG visually inspected the materials (including quarried VENM) during import and placement to confirm that the material was commensurate with that described in the supplier documentation. TTMP understands that no unexpected finds were reported (including suspected ACM, staining or malodours) during importation of each of the materials, and the materials were visually commensurate with the documentation provided.

TTMP noted that this process was not strictly in accordance with the procedure outlined in the RAP as the Contaminated Land Consultant/Professional was not provided opportunity to review supplier documentation or carry out further assessment (if required) of imported materials prior to import.

Table 7.1 below provides a summary of the materials imported to the site, including quantities and supporting documentation reviewed by the Auditor in assessing the suitability of imported material for use at the site.

Table 7.1: Assessment of Imported Materials

Source Site	Volume Imported (t)	Material Type	Summary of Documentation	Auditor Comments
Boral Recycling Widemere Road, Wetherill Park	660.66	Recovered Aggregate (DGB20)	Supporting documentation provided in the Validation Report included delivery dockets, laboratory test results and a Resource Recovery Order Compliance Letter from Boral. TTMP noted that the delivery dockets and Boral's website stated that *"Boral Recycling complies with 'The recovered aggregate order 2014' outlined in part 9, clause 93 of POEO Regulation 2014 (Waste)".* The Compliance Letter from Boral dated 11 August 2023 indicated that: Boral's recycled products are manufactured from construction and demolition (C&D) waste materials such as concrete and brick; and Boral implement strict inspection and receival protocol for incoming materials which includes an inspection and testing regime to comply with the testing	The source operates under an EPL and scheduled activities under the EPL include resource recovery. On this basis, the Auditor considers that the imported product is likely to be produced under an applicable RRO/RRE. Sampling in accordance with the RAP was not undertaken, however based on the information provided by CPBG including visual observations and the conclusions made by TTMP, the Auditor is of the opinion that these materials are suitable for use on the site from a contamination perspective.

Source Site	Volume Imported (t)	Material Type	Summary of Documentation	Auditor Comments
			requirements and frequencies of "*The Recovered Aggregate Order 2014*". Laboratory test reports were also provided for samples collected in June 2023 however the material was imported to the site approximately nine months earlier in August 2022. TTMP noted that the results in the test certificates were less than the human health and ecological criteria relevant to commercial/industrial land uses outlined in NEPM (2013) and although the results are not likely to be representative of actual materials imported, they demonstrate that Boral implement testing to meet the Recovered Aggregate Order 2014. Although the material was not assessed during importation (as required by the RAP), based on the information provided and visual observations made by CPBG, TTMP considered "*that the DGB20 imported from Boral is suitable (from a contamination perspective) for use at the site given that:* • *The material was imported from a commercial supplier which maintains an EPL (EPL No. 11815) to provide such material, and who undertake regular and required sampling of the material for maintenance of their EPL.* • *The final land use (commercial/industrial) of the site is non-sensitive.* • *No unexpected finds were reported by CPBG during import of the material.*"	
Eco Resource Recovery (ECORR), 155 Newton Rd, Wetherill Park	260.34	Recovered Aggregate (DGB20)	Supporting documentation provided in the Validation Report included delivery dockets, laboratory test results and a letter from ECORR. TTMP noted that the delivery dockets stated that *"Eco Resource Recovery complies with the EPA recovered aggregate order 2014'* and a letter provided by ECORR indicates that ECORR operates under Environmental Protection Licence 10699 and conducts recovered aggregate testing in accordance with The Recovered Aggregate Order 2014. A Materials testing report (recovered aggregate) for	The source operates under an EPL and scheduled activities under the EPL include resource recovery. On this basis, the Auditor considers that the imported product is likely to be produced under an applicable RRO/RRE. Sampling in accordance with the RAP was not undertaken, however based on the information provided by CPBG including visual observations and the conclusions made by

Source Site	Volume Imported (t)	Material Type	Summary of Documentation	Auditor Comments
			chemical and other attributes was provided which indicates that four (4) samples of recovered aggregate (crushed concrete/brick) collected on 21 July 2022. TTMP noted that the results reported were less than the limit of reporting, the maximum average and/or the absolute maximum concentrations for characterisation of recovered aggregate presented in Column 2, Table 1 of The NSW EPA RAO 2014. In addition, no asbestos was detected in the samples at the reporting limit of 0.1 g/kg or by trace analysis. TTMP also noted that the results in the test certificates were less than the human health and ecological criteria relevant to commercial/industrial land uses outlined in NEPM (2013). Although the material was not assessed during importation (as required by the RAP), based on the information provided and visual observations made by CPBG, TTMP considered "*that the DGB20 imported from ECORR is suitable (from a contamination perspective) for use at the site given that:* • *The material was imported from a commercial supplier which maintains an EPL to provide such material, and who undertake regular and required sampling of the material for maintenance of their EPL.* • *The final land use (commercial/industrial) of the site is non-sensitive.* • *No unexpected finds were reported by CPBG during import of the material.*"	TTMP, the Auditor is of the opinion that these materials are suitable for use on the site from a contamination perspective.
Dunmore Quarry – 33-38 Tabbita Road, Dunmore	35.32	Quarried Rail Ballast Rock	TTMP reported that Boral Dunmore Quarry at this premise has an EPL for extractive purposes (EPL 77). Based on this information and visual inspections carried out by CPBG during import, TTMP considered that "*the quarried rail ballast supplied by Dunmore is suitable (from a contamination perspective) for use at the site.*".	The source operates under an EPL and scheduled activities under the EPL include extractive purposes. On this basis, the Auditor considers that the imported product is likely to be a quarried product and therefore VENM. Sampling in accordance with the RAP was not undertaken, however based on the information provided by CPBG,

Source Site	Volume Imported (t)	Material Type	Summary of Documentation	Auditor Comments
				including visual observations and the conclusions made by TTMP, the Auditor is of the opinion that these materials are suitable for use on the site from a contamination perspective.
Gosford Quarries – Wisemans Ferry Road, Cattai	864.18	VENM Crushed Sandstone	TTMP noted that Gosford Quarries has an EPL for extractive purposes (EPL 12023). Based on this information and visual inspections carried out by CPBG during import, TTMP considered that "*the crushed sandstone supplied by Gosford Quarries is suitable (from a contamination perspective) for use at the site.*".	The source operates under an EPL and scheduled activities under the EPL include extractive purposes. On this basis, the Auditor considers that the imported product is likely to be a quarried product and therefore VENM. Sampling in accordance with the RAP was not undertaken, however based on the information provided by CPBG including visual observations and the conclusions made by TTMP, the Auditor is of the opinion that these materials are suitable for use on the site from a contamination perspective.
Elford Group Pty Ltd (Elfords) – 320-400, Badgerys Creek Road, Badgerys Creek	154.84	Sandstone	TTMP undertook a search of readily available information online which indicated that Elfords are the owner and operator of the Badgerys Creek Quarry and Resource Recovery Facility, who are the licensee of an EPL (20498) for extractive activities, resource recovery and waste storage. The licence does not permit the acceptance of materials other than VENM, ENM or Tunnel Spoil meeting project specific Tunnel Spoil Resource Recovery Orders. CPBG provided TTMP with an in-situ Waste Analysis and Classification Assessment report relating to sandstone prior to being excavated as part of the WestConnex Stage 3B – Rozelle Interchange tunnelling and excavation works and the Western Harbour Tunnel (WHT) enabling works package. Although the sandstone was not assessed during importation (as required by the RAP), based on the information provided and visual observations made by CPBG, TTMP considers that "*the sandstone imported from Elfords*	The source operates under an EPL and scheduled activities under the EPL include resource recovery. On this basis, the Auditor considers that the imported product is likely to be produced under an applicable RRO/RRE. Sampling in accordance with the RAP was not undertaken, however based on the information provided by CPBG including visual observations and the conclusions made by TTMP, the Auditor is of the opinion that these materials are suitable for use on the site from a contamination perspective.

Source Site	Volume Imported (t)	Material Type	Summary of Documentation	Auditor Comments
			is suitable (from a contamination perspective) for use at the site given that: • *The sandstone was classified as VENM prior to excavation at its source (Rozelle Interchange Project) and would be required to be exported to Elfords as VENM or tested to comply with the Rozelle Interchange Tunnel Spoil Resource Recovery Order 2019, which states that the spoil must be naturally occurring soil or rock which has not been contaminated with manufactured chemicals or process residues (except for shotcrete) and contains no more than 0.4% w/w shotcrete.* • *The sandstone was imported from a resource recovery facility which maintains an EPL to provide such material.* • *The final land use (commercial/industrial) of the site is non-sensitive.* • *No unexpected finds were reported by CPBG during import of the material.*".	

7.4 Auditor's Opinion

In the Auditor's opinion, the pre-remediation CSM was an appropriate representation of the potential SPR linkages at the site. The PRB was installed generally in accordance with the RAP. UFs identified during development works were adequately managed/remediated via offsite disposal. Material disposal during the course of development works was undertaken in accordance with the relevant guidelines and regulations.

Imported materials were not assessed in accordance with the RAP, however, based on the supporting documentation provided by the suppliers and observations made by CPBG these materials are considered acceptable for use on the site from a contamination perspective.

The ongoing groundwater monitoring program, which was proposed in the RAP (reviewed in TO-095-B1R) and outlined in the EMP (discussed in Section 10 of this SAR), if appropriately implemented should ensure any potential unacceptable risks to human health as a result of drawdown and migration to the site of groundwater contaminated with volatile chlorinated hydrocarbons, PFAS and ammonia from the former dry cleaner located off-site at 1-7 Queen Street, west of the station box are mitigated.

An Addendum RAP and further site audit may be required if remediation is required to confirm suitability for the SSTOM (operational phase) works.

8. CONTAMINATION MIGRATION POTENTIAL

8.1 Auditor's Opinion

No significant levels of contaminants were detected over the site during previous investigations. However, during development works finds of asbestos were encountered within fill material. The finds of asbestos were excavated and disposed offsite and therefore there is little or no potential for migration of asbestos from the site or vertically to groundwater.

Construction dewatering activities have the potential to alter groundwater flow and there is potential for the identified offsite groundwater contaminated with volatile chlorinated hydrocarbons, PFAS and ammonia from the former dry cleaner located off-site at 1-7 Queen Street, west of the station box to migrate towards the station box excavation and present potential risks to construction workers during station box excavation.

The HHRA and RAP identified the requirement for on-going monitoring following the commencement of bulk excavation beneath the groundwater table, and the potential requirement for mitigation measures for the management of groundwater if monitoring indicated that concentrations have, or will likely, become unacceptable. Remediation/mitigation measures included the installation of a PRB and ongoing management is required, and outlined in the EMP, to monitor groundwater and demonstrate that off-site impact is not migrating onto the site and posing an unacceptable risk to site receptors.

9. ASSESSMENT OF RISK

9.1 Post-Remediation CSM

Based on the nature of contamination identified off-site (VCH impacted groundwater), TTMP considered that the residual contamination may pose unacceptable risks to human health without management. The post-remediation CSM was consistent with the pre-remediation CSM presented in Figure 7.1.

9.2 Auditor's Opinion

Based on assessment of results against relevant guidelines and consideration of the overall investigations reviewed in TO-095-B1R and earthworks/development works performed, the Auditor considers that contaminant concentrations remaining in soil are not considered to pose a risk to site users or the environment under the proposed land use scenario. There is potential for asbestos in the form of bonded ACM to remain in areas where site fill materials were re-used due to the investigation methods adopted, however, any observed asbestos during development works (UFs) were managed and disposed offsite. Therefore, ACM is not considered to pose a risk to human receptors under the proposed land use scenario.

Groundwater results indicate that groundwater at the site has been impacted from historical off-site land uses. Groundwater in off-site areas (former dry cleaner) is impacted by hydrocarbons, volatile chlorinated hydrocarbons and PFAS. Dewatering activities have the potential to alter groundwater flow and there is potential for the identified offsite impacts to migrate towards the station box excavation and present potential risks to construction workers during station box excavation. Remediation/mitigation measures included the installation of a PRB and ongoing management is required to monitor groundwater to prevent unacceptable exposures and to demonstrate that off-site impact is not migrating onto the site and posing an unacceptable risk to site receptors.

10. ONGOING SITE MANAGEMENT

During construction, activities which require dewatering in the station box and tunnel are expected to result in the reversal of groundwater flow direction to an easterly direction towards the station box. As per the requirements of the RAP, a PRB was installed at the northern end of Queen Street to mitigate the potential migration of chlorinated hydrocarbons to the site from a former dry cleaner located at 1-7 Queen Street during construction of the metro station.

Through implementation of the following EMP (attached to the SAS in Appendix B), TTMP propose an ongoing groundwater monitoring and mitigation program during the SSTOM works to demonstrate the PRB remains effective until the station box is tanked and the groundwater flow direction returns to pre-construction direction:

> 'St Marys Station Environmental Management Plan – Construction phase groundwater monitoring from contamination at 1-7 Queen St, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works' dated 15 February 2024 by Tetra Tech Major Projects Pty Ltd.

Table 10.1 presents the Auditor's review of the EMP.

Table 10.1: Assessment of the EMP

Item	Auditor Comments
Objectives and Purpose of the EMP The EMP has been prepared to address Section 12.1 of the RAP. Section 12.1 of the RAP required the implementation of an EMP which describes the scope of groundwater monitoring which is to be undertaken during the SSTOM works. The EMP describes the groundwater monitoring and mitigation program which is to be undertaken during the SSTOM works to demonstrate the PRB remains effective until the station box is tanked and the groundwater flow direction returns to pre-construction direction. Groundwater monitoring is also required to identify if an adverse change in risk profile is likely which requires contingency mitigation measures to be implemented.	The Auditor considers that the EMP is an appropriate standalone document with a specific purpose that is relevant for the site.
The Nature and Location of Contamination Remaining Elevated concentrations of chlorinated hydrocarbons (PCE, TCE, DCE and vinyl chloride) were identified in soil, groundwater and soil vapour at 1-7 Queen Street (offsite former dry cleaners) with the highest concentrations reported close to the building on this property. During construction of the St Marys metro station and tunnel(s) there is potential for groundwater containing chlorinated hydrocarbons to migrate to the station box as a result of groundwater drawdown and dewatering. Chlorinated hydrocarbon contamination in groundwater has the potential to pose unacceptable risks to construction workers and future users of the site.	The nature and location of offsite contamination has been adequately identified. The Auditor notes that the monitoring program within the EMP will assist with identification of any migration towards the site.
Management Activities, Inspections, Maintenance, Sampling, Analysis and Reporting Section 4 of the EMP outlines the groundwater monitoring and contingency plan to be implemented by the SSTOM Contractor until completion of the construction of the metro station. The groundwater monitoring program included frequency, methodology, quality control/assurance, reporting, trigger values and a contingency plan. Completion of the construction of the metro station is expected to occur in 2026. Cessation of the groundwater	The Auditor notes that management activities reported in the EMP are the same as documented in the RAP reviewed and approved as part of the previous SAS TO-095-B1R. In the Auditors opinion the management activities outlined in the EMP appear adequate for the potential migration of contamination towards the site as a result of construction dewatering. Ongoing monitoring is not likely to be required once dewatering/construction is

Item	Auditor Comments
monitoring under the EMP can occur when the following has been completed under the SSTOM work package: • Waterproofing of the station has been completed such that the flow of groundwater has returned to its pre-construction direction. • A Validation Report and Long Term EMP (if required) has been prepared and approved by the Site Auditor. A summary of the groundwater monitoring program to be implemented during the construction works is summarised in Figure 10.1 below. Monitoring well locations are illustrated in Attachment 6, Appendix A. Groundwater samples from all monitoring wells are to be collected using a HDPE Hydrasleeve. Field parameters (pH, EC, Eh, DO and temperature) are to be recorded using a calibrated water quality meter. Prior to retrieval of the Hydrasleeve, the wells are to be dipped with a dual-phase interface probe to record the SWL and presence/absence of NAPL. Assessment of groundwater data from the monitoring wells and the predicted concentration of contamination in groundwater at the station box is to be undertaken on a weekly basis and the assessment undertaken is to be reported monthly. Where contaminant(s) are predicted to reach the station box at concentration(s) exceeding the Trigger Values in Figure 10.2, the result is to be reported to Sydney Metro and the Site Auditor within 7 days of receipt of the laboratory result. The EMP includes a contingency plan which will be initiated if predicted concentrations, based on concentrations reported and travel time to the key sentinel monitoring wells, indicates groundwater concentrations exceeding the risk-based trigger values in Figure 10.2 may reach the station box. The EMP included a flow chart (provided in Attachment 10, Appendix A) illustrating how groundwater data from the monitoring wells will be assessed during construction to determine if implementation of the contingency plan is required. The contingency plan included in the EMP comprised: • Evaluate the need to re-inject colloidal AC product into the injection bores installed on Queen Street and/or inject the product into the sentinel monitoring wells SBT-GW-1012, SBT-GW-1013 and SBT-GW-1014 (Attachment 6, Appendix A). • Consider if an active capture system based on extraction from SBT-GW-1012, SBT-GW-1013 and SBT-GW-1014 is required. • Collect groundwater samples from sentinel monitoring wells and groundwater pumped from the western end of the station box on a weekly basis or at another frequency agreed with the Site Auditor. • Completion of a report which summarises work completed. • Fortnightly reporting of groundwater data to Sydney Metro and the Auditor. If, following implementation of the contingency plan, chlorinated hydrocarbons are predicted to reach the station box at concentrations exceeding the trigger values in Figure 10.2, a review by a Certified Environmental Practitioner Site Contamination will be undertaken, including: • Evaluation of whether subsequent re-injection events are required, and	completed and the flow of groundwater returns to the pre-construction direction.

Item	Auditor Comments
• Assessment of appropriate monitoring and mitigation measures for construction workers in the station box. The EMP notes that if the contingency plan is triggered, a supplementary risk assessment will be required for the properties between the source area and the station box to assess whether there is a potential for unacceptable risk to human health and ecological receptors, and potential risk to building services and sub-surface infrastructure.	
EMP Review The EMP is to be reviewed on a quarterly basis by the SSTOM Contractor. The review is to include but not limited to consideration of the following: • Changes in site conditions • Changes in any assumptions that underlie the scope of the EMP • Changes to construction activities • Legislative changes • Changes to sampling frequency, scope and reporting requirements • Trigger values and contingency plans • Reporting. Any changes to the EMP are to be reviewed and approved by the Site Auditor and Sydney Metro prior to taking affect.	The EMP review process is considered appropriate.
Responsibilities This EMP is to be implemented by the SSTOM Work Contractor engaged by Sydney Metro. The SSTOM Works Contractor is to engage a Certified Environmental Practitioner Site Contamination Specialist to undertake the monitoring and reporting described in Section 4 of this EMP. The implementation of this EMP is to be overseen by a NSW Accredited Site Auditor. If requested by the SSTOM Contractor to facilitate the implementation of this EMP, the SBT Contactor and its environmental consultant TTMP is to undertake a handover with the SSTOM Contractor and its environmental consultant.	The EMP provides a clear indication of those responsible for environmental management.
How will the EMP be made legally enforceable? Not discussed.	Ongoing monitoring is not likely to be required once dewatering/construction is completed and the flow of groundwater returns to the pre-construction direction and therefore an EMP is not likely to be required during ongoing use of the site. Should monitoring or management of groundwater contamination be required at the completion of construction and for the operational phase of the station, an EMP would be required and would be enforceable under the current CSSI conditions.
Public notification mechanisms to ensure potential purchasers or other interested parties are aware of contamination and EMP Not discussed	Ongoing monitoring is not likely to be required once dewatering/construction is completed and the flow of groundwater returns to the pre-construction direction and therefore an EMP is not likely to be required. Should monitoring or management of groundwater contamination be required during the operational phase of the station, an EMP would be required and a copy of the SAS endorsing the final EMP would be submitted to Council so that it can be recorded on the Planning Certificate issued under Section 10.7

Item	Auditor Comments
	of the *Environmental Planning & Assessment Act 1979*.
Are the Council in agreement with the EMP? Not discussed	Ongoing monitoring is not likely to be required once dewatering/construction is completed and the flow of groundwater returns to the pre-construction direction and therefore an EMP is not likely to be required during the operational phase. Should an EMP be required at the completion of construction and for the operational phase of the station, it would be submitted to Council as an attachment to the SAS and to be recorded on the 10.7 Planning Certificate. Following completion of construction and prior to the operation of the station, Condition E96 of the CSSI requires the SAS/SAR along with the EMP to be provided to the Planning Secretary and the Certifier.

Figure 10.1: Summary of EMP Groundwater Monitoring (Source: the EMP)

Monitoring Well	Frequency	Analytes	Purpose	Trigger Value and Contingency Plan
SBT-GW-0001a **SBT-GW-0001b**	Weekly	Volatile Chlorinated Hydrocarbons (VCH)	Monitor migration of chlorinated hydrocarbons from source area at 1-7 Queen Street	Trigger Value: refer to Section 4.5 Contingency Plan: Refer to Section 4.6
SBT-GW-1012 * **SBT-GW-1013 *** **SBT-GW-1014 ***	Weekly			
SBT-GW-1347a * **SBT-GW-1347b *** **SBT-GW-1347c *** **SBT-GW-1348a *** **SBT-GW-1348b *** **SBT-GW-1348c ***	Primary mitigation: Weekly for 'c' interval wells (at ~18mAHD) *If contingency mitigation implemented, then all multi-level wells monitored weekly*			

* Sentinel Monitoring Well

Figure 10.2: EMP Groundwater Monitoring Trigger Values (Source: the EMP)

Compound	Trigger value
PCE	0.3 mg/L
TCE	0.055 mg/L
Cis 1,2 DCE	0.25 mg/L
VC	0.2 mg/L

10.1 Auditor's Opinion

Based on the above, the Auditor considers that the EMP will provide an adequate framework for the monitoring of groundwater and the potential migration of contamination from the offsite former dry cleaner towards the site due to groundwater drawdown during construction dewatering. Ongoing groundwater monitoring is not likely to be required once dewatering/construction is completed and the flow of groundwater returns to the pre-construction direction. If ongoing monitoring and/or management of contamination is required, the EMP would be revised to document long term management requirements for the operational (day to day) use of the site. The revised EMP would be reviewed during preparation of the future Section A SAS (required by the CSSI) considering the suitability of the site for use as a metro station following completion of construction.

11. COMPLIANCE WITH REGULATORY GUIDELINES AND DIRECTIONS

11.1 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 investigations were generally conducted in accordance with SEPP 55 Planning Guidelines and reported in accordance with the NSW EPA (2020) *Contaminated Land Guidelines, Consultants Reporting on Contaminated Land*.

11.2 Resilience and Hazards State Environment Planning Policy (SEPP) (2021)

The investigations, remediation and validation were generally conducted in accordance with Chapter 4 Remediation of Land in the Resilience and Hazards State Environment Planning Policy (SEPP) (2021) (SEPP R&H, formerly known as SEPP 55) and NSW Department of Urban Affairs and Planning and NSW EPA (1998) *'Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land'*.

11.3 Development Approvals

The Audit was initiated to comply with requirements of Critical State Significant Infrastructure (CSSI) approval 10051, issued on 23 July 2021 by the Minister for Planning and Public Spaces.

Condition E96 of the CSSI relates to contamination and requires a site audit as follows:

> *"A Section A1 or Section A2 Site Audit Statement (accompanied by an Environmental Management Plan) and its accompanying Site Audit Report, which state that the contaminated land disturbed by the work has been made suitable for the intended land use, must be submitted to the Planning Secretary and the Relevant Council(s) after remediation and before the commencement of operation of the CSSI."*

The SAR and accompanying site audit statement (SAS, provided in Appendix B) has been prepared to partly comply with this condition. Although SBT Works have been completed, an off-site source of contamination has the potential to impact the site and further monitoring is required to demonstrate that the risk is low and acceptable. Evaluation of the CSSI conditions of consent is summarised in Table 11.1.

Table 11.1: Evaluation of CSSI Conditions

Condition	Auditor Comments
Condition E92 Before commencement of any construction that would result in the disturbance of moderate to high risk contaminated sites as identified in the documents identified in **Condition A1, Detailed Site Investigations** (for contamination) must be conducted to determine the full nature and extent of the contamination. The **Detailed Site Investigation Report(s)** and the subsequent report(s), must be prepared, or reviewed and approved, by consultants certified under either the Environment Institute of Australia and New Zealand's Certified Environmental Practitioner (Site Contamination) scheme (CEnvP(SC)) or the Soil Science Australia Certified Professional Soil Scientist Contaminated Site Assessment and Management (CPSS CSAM) scheme. The **Detailed Site Investigations** must be undertaken in accordance with guidelines made or approved under section 105 of *Contaminated Land Management Act 1997* (NSW).	The DSI, DSI Addendum and Groundwater DSI Addendum were undertaken to determine the nature and extent of contamination. The reports were reviewed by Matthew Locke CEnvP-SC and adequately met the requirements of guidelines made or approved under the CLM Act.

Condition	Auditor Comments
Condition E93 Should remediation be required to make land suitable for the final intended land use, a **Remedial Action Plan** must be prepared, or reviewed and approved, by consultants certified under either the Environment Institute of Australia and New Zealand's Certified Environmental Practitioner (Site Contamination) scheme (CEnvP(SC)) or the Soil Science Australia Certified Professional Soil Scientist Contaminated Site Assessment and Management (CPSS CSAM) scheme. The **Remedial Action Plan** must be prepared in accordance with relevant guidelines made or approved by the EPA under section 105 of the *Contaminated Land Management Act 1997* (NSW) and must include measures to remediate the contamination at the site to ensure the site will be suitable for the proposed use when the **Remedial Action Plan** is implemented.	The RAP was prepared to address this condition. The RAP was reviewed by Matthew Locke CEnvP-SC and adequately met the requirements of guidelines made or approved under the CLM Act.
Condition E94 Before commencing remediation, a **Section B Site Audit Statement(s)** must be prepared by an NSW EPA-accredited Site Auditor that certifies that the **Remedial Action Plan(s)** is/are appropriate and that the site can be made suitable for the proposed use. The **Remedial Action Plan(s)** must be implemented and any changes to the **Remedial Action Plan(s)** must be approved in writing by the NSW EPA-accredited Site Auditor.	The previous SAR and SAS (TO-095-B1R) were prepared to comply with this condition. If an addendum to the RAP is required, it must be provided for Auditor review and approval.
Condition E95 **Validation Report(s)** must be prepared in accordance with *Consultants Reporting on Contaminated Land: Contaminated Land Guidelines* (EPA, 2020) and relevant guidelines made or approved under section 105 of the *Contaminated Land Management Act 1997* (NSW).	The Validation Report has been prepared following installation of the PRB. Ongoing monitoring of groundwater is required until construction of the metro station is complete. Additional validation reporting will be required to demonstrate the identified off-site source of contamination has not migrated to the site and the risk is low and acceptable.
Condition E96 A **Section A1 or Section A2 Site Audit Statement** (accompanied by an **Environmental Management Plan**) and its accompanying **Site Audit Report**, which state that the contaminated land disturbed by the work has been made suitable for the intended land use, must be submitted to the Planning Secretary and the Relevant Council(s) after remediation and before the commencement of operation of the CSSI.	This SAR and accompanying Section B SAS (provided in Appendix B) have been prepared to partly comply with this condition. A Section A SAS will be prepared by the Auditor at completion of construction works and review of groundwater monitoring required under the EMP.
Condition E97 A copy of **Detailed Site Investigation Report(s)**, **Remedial Action Plan(s)**, **Validation Report(s)**, **Site Audit Report(s)** and **Site Audit Statement(s)** must be submitted to the Planning Secretary and the Relevant Council(s) for information.	To be undertaken by others
Condition E98 An **Unexpected Contaminated Land and Asbestos Finds Procedure** must be prepared before the commencement of construction and must be followed should unexpected contaminated land or asbestos (or suspected contaminated land or	Provided in the Interim RAP (Appendix 6) and RAP (Appendix 8).

Condition	Auditor Comments
asbestos) be excavated or otherwise discovered during construction.	
Condition E99 The **Unexpected Contaminated Land and Asbestos Finds Procedure** must be implemented throughout construction.	Provided in the Interim RAP (Appendix 6) and RAP (Appendix 8). Implementation is to be undertaken by CPBG and subcontractors during SBT works.

11.4 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*. TTMP noted in the DSI that *"given the known contamination status of the groundwater quality within the Project corridor and the proposed dewatering, CBPG should give consideration on whether these conditions trigger the need to notify the NSW EPA, under the Duty to Report requirements set out under section 60 of the Contaminated land Management Act 1997*".

Based on the findings in this SAR, the Auditor considers that the site is not required to be notified under the Duty to Report requirements. Consideration may be warranted should contamination migrate to the site as a result of dewatering activities.

1-7 Queen Street (former dry cleaner located off-site ~100-120 m west of the station box excavation) has been notified to the EPA and is identified (September 2023) to be "under assessment".

11.5 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.

11.5.1 Waste Classification

Eight waste classification letters prepared by TTMP and ADE were appended to 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 from stockpiles of excavated soils and in-situ material.

The following waste classification letter reports were reviewed by the Auditor:

- 'Material Classification Assessment: Preliminary Works, St Marys', dated 29 July 2022, TTMP. In-situ classification report for soil proposed to be excavated during preliminary works within the eastern portion of the site. Soil which was proposed to be excavated during the proposed preliminary works met the classification of GSW – Non-Putrescible. Natural, residual soil within the Preliminary Works site below a depth of 1 mbgl was classified as VENM.
- 'Material Classification Assessment: Natural Material from St Marys Station Box', dated 2 December 2022, TTMP. In-situ classification report for natural soil and rock materials to be excavated during the construction of the station box at the site. VENM – natural soil and rock materials which do not contain PFAS. GSW non-putrescible – natural soil and rock materials which contain PFAS in two (2) areas (Area A: Approximately 350 m^3 – assumed an area of 350 m^2 between the top of natural material (1 mbgl to 2mbgl) and Area B: Approximately 400 m^3 – assumed an area of 2000m^2 between the top of natural material (1 mbgl) to 3 mbgl).
- 'Materials Analysis & Classification Report - Fill Materials - 11 Station Street St Marys, NSW 2760', dated 3 November 2022, ADE. In-situ material classification report to facilitate off-site disposal and reuse of fill from the site. Approximately 12,266 m^3 of fill covering an area of

approximately 24,532 m^2 and to an average depth of 0.5m as Great River Excavated Material Order 2021, GSW (non-putrescible) for approximately 1,634 m^3 of fill covering an area of approximately 3,268 m^2 and to an average depth of 0.5 m and Special Waste (Asbestos) with GSW for asbestos impacted fill at TP18.

- 'Material Analysis & Classification Report - Natural Material - 11 Station Street St Marys, NSW 2760', dated 11 November 2022, ADE. In-situ material classification report for natural soil and rock within the station box (approximate in-situ volume of 172,000 m^3). GSW (non-putrescible) for natural materials between 0 to 2.0 mbgl in the north section of the station box and VENM for other natural materials.
- 'Materials Analysis & Classification Report - Natural Material - 11 Station Street St Marys, NSW 2760' dated 10 November 2022, ADE. In-situ material classification report to facilitate the off-site beneficial reuse of natural soil (approximately 6,200 m^3 of sandy clay/silty sand, with an excavation depth of 1 mbgl) as ENM.
- 'Site Inspection and Waste Classification Letter - 2 Station Street, St Mary's, New South Wales (NSW)' dated 26 August 2022, ADE. Special Waste (Asbestos) with GSW for stockpile (approximately 1,000 m^3).
- 'Waste Analysis & Classification Report - ENV UIJV, Western SYD Airport, St Marys', dated 10 August 2022, ADE. Special Waste (Asbestos) with GSW for a stockpile (approximately 360 m^3).
- 'Material Classification Assessment: St Marys Stockpile Eastern Stub Tunnels', dated 23 June 2023. GSW (non-putrescible) for the off-site disposal of a stockpile of spoil (approximately 400 m^3) generated during excavation of stub tunnels in the Bringelly Shale (natural rock) at the eastern end of the station box.
- 'Materials Analysis & Classification Report - St Marys Station, Station Street St Marys, NSW, 2760' dated 3 July 2023, ADE. GSW (non-putrescible) for approximately 1,500 m^3 of spoil (predominantly shale with some foreign materials including shotcrete, plastic fibres and steel) sourced from stub tunnel excavations extending from the eastern side of the station box excavation.
- 'Supply of Excavated Public Road Material under The Excavated Public Road Material Order 2014' dated 1 August 2023, CPBG. Stub tunnel spoil (classified as GSW met the criteria for Excavated Public Road Material (EPRM) under The Excavated Public Road Material Order 2014.

11.5.2 Waste Volumes, Disposal Receipts and Disposal Facilities

Waste disposal dockets were included in the Validation Report for the period of August 2022 and November 2022. The Validation Report also included a waste tracking register prepared by CPBG. The Auditor reviewed a selection of the documents including the EPLs of the waste disposal facilities to confirm compliance.

Figure 11.1 provides the TTMP summary of the waste disposal information for soil disposed offsite to several waste management facilities that are licensed to receive the specified waste under their EPLs. A total of 17,537.75 tonnes of waste were removed and disposed offsite to licenced facilities.

Figure 11.1: Summary of Waste Disposal to Waste Facilities (Source: the Validation Report)

Facility	Licence Holder*	Facility[NOTE1]	POEO Licence Number [NOTE1]	Classification of Material Disposed	Mass Disposed (tonnes)	Approximate Volume disposed (m^3) [30]
Spoil Tracking Register Information						
Bingo Eastern Creek Landfill	Dial-A-Dump (EC) PTY LTD	1 Kangaroo Avenue, Eastern Creek, NSW 2766	13426	GSW-Asbestos	725.08 [NOTE3, NOTE4]	365
Erskine Park Landfill (Cleanaway)	Enviroguard PTY Limited	4 Quarry Road, Erskine Park, NSW 2759	4865	GSW-Asbestos	3,539.48 [NOTE2, NOTE3]	1,770
Brandown, Kemps Creek	Brandown PTY. Limited	Lot 90 Elizabeth Drive, Kemps Creek, NSW 2178	5186	GSW (non-putrescible)	13,261.95	6,630
Additional Docket (GEN1513630-2) not included in the Spoil Tracking Register, relating to UPF08 and UPF09 (ACM Conduits and ACM Fragment)						
Bingo Eastern Creek Landfill	Dial-A-Dump (EC) PTY LTD	1 Kangaroo Avenue, Eastern Creek, NSW 2766	13426	Asbestos Soils	11.24	5
				Total Disposed	17,537.75	8,770

NOTES

NOTE1: Details obtained from NSW EPA POEO Public Register online at https://apps.epa.nsw.gov.au/prpoeoapp/, 3 August 2023.
NOTE2: This mass includes 144.26 tonnes of ACM impacted soil returned to site from Brandown (refer to Table 7).
NOTE3: Mass presented here is a sum of the mass presented in the waste disposal dockets (TTMP notes that incorrect and missing values are presented on the Spoil Tracking Register and WasteLocate Consignment Dockets for some of the disposal dockets issued by Cleanaway and Bingo).
NOTE4: Docket GEN1468523-1 not included as TTMP considers this docket likely relates to demolition waste rather than soil/spoil management.
GSW – Asbestos: General Solid Waste (non-putrescible) mixed with Special (Asbestos) Waste (shown on the tracker as ASBESTOS)
GSW: General Solid Waste (non-putrescible) (shown on the tracker as GSW and GSW-NP)

In addition, the Validation Report documented 238,172.85 t of soil was exported for beneficial reuse at properties outlined in Figure 11.2.

Figure 11.2: Summary of Waste Disposal to Waste Facilities (Source: the Validation Report)

Development	Property Location	Resource Recovery Order / Exemption	Classification of Material Exported	Mass Exported (tonnes)	Approximate Volume Exported (m^3) [30]
Great River NSW - Nepean Business Park (NBP)	Lot 1, 2 and 3 DP1263486 (14-98 Old Castlereagh Road, Penrith NSW).	The Great River excavated material (GREM) Order / Exemption 2021[31]	GREM (GSW suitable for reuse under the GREM Order/Exemption.	20,230.66	10,115
			VENM	165,232.06	82,615
Orchard Hills	34-38 Landsdowne Road, Orchard Hills, NSW 2748#	N/A	VENM	19,910.24	9,955
Caddens	89-115 O'Connell St, Caddens	N/A	VENM	32,779.89	16,390
AJW (The Yards Kemps Creek)	AWJ Earthmoving 657-769 Mamre Road, Kemps Creek NSW 2178	The Excavated Public Road Material Order / Exemption 2014	EPRM	4,812.20	2,405
			Total Spoil Exported for Off-Site Reuse	**242,965.05**	**121,480.00**

NOTES

 # Other property associated with the SBT Works (POEO EPL 20986).

11.5.3 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.

11.6 VENM and Other Imported Materials

Based on the information in Section 7.3.6, the Auditor is of the opinion that the VENM and commercially available materials imported to the site are suitable for onsite use (from a contamination perspective) and generally have been imported in accordance with relevant legislation.

11.7 Licences

TTMP reported that excavation and removal of asbestos fibre contaminated soils were conducted by Auswide Operations Pty Ltd Trading as Mann Group NSW, who hold a Class A Asbestos Removal Licence (SafeWork Licence AD212715). An occupational hygienist/Licenced Asbestos Assessor (LAA) from Airsafe Laboratories Pty Ltd (Airsafe) undertook inspections following removal works, asbestos air monitoring and issued a surface clearance inspection certificate confirming the areas were free from visual asbestos contamination on the ground surface. Copies of the appropriate licences were appended to the Validation Reports. In addition, the Auditor checked the Service NSW 'Verify a Licence' register (https://verify.licence.nsw.gov.au/home) on 7 September 2023 and notes that Auswide Operations Pty Ltd Trading as Mann Group NSW are a current licensed asbestos removal contractor.

11.8 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 (3rd Edition)*.

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.

12. CONCLUSIONS AND RECOMMENDATIONS

TTMP conclude the following in the Validation Report:

> "*Overall, TTMP considers that contamination has been appropriately managed during the SBT Works, and the site is suitable for the proposed development subject to:*
>
> - *Ongoing groundwater monitoring and management/maintenance of the PRB as per the requirements of the RAP and the EMP, until water proofing (tanking) of the station box has been completed and post construction groundwater flow from 1-7 Queen Street into the metro station is negligible.*
> - *Preparation of an Addendum to the RAP as part of the SSTOM works package, which describes how potential impacts to future users of the site from VCH in groundwater will be managed as part of the operational phase of the project and incorporated into the design of the metro station.*".

Based on the information presented in TTMP reports 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 can be made suitable for construction of the proposed underground train station, subject to compliance with the following environmental management plan:

- 'St Marys Station Environmental Management Plan - Construction phase groundwater monitoring from contamination at 1-7 Queen St, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 15 February 2024, TTMP

and subject to compliance with the following conditions:

- Preparation of an addendum to the RAP and further site audit if ongoing dewatering of the structure is required and migration of contamination presents a risk to future site users after completion of station box and Tunnelling Works. The addendum to the RAP would be implemented as part of later works packages to describe measures that may be incorporated into the design of the station or implemented as part of the operational phase of the project.
- If an addendum to the RAP is not required, preparation of a Validation Report prepared by a qualified environmental consultant confirming the suitability of the site for use as an underground train station.
- Preparation of a Section A Site Audit Statement by a NSW EPA Accredited Site Auditor reviewing the above information and confirming the suitability of the site for use as an underground train station.

13. OTHER RELEVANT INFORMATION

This Audit was conducted on the behalf of CPBG for the purpose of assessing what management remains necessary before the land is suitable for any specified use or range of uses, i.e. a “Site Audit” as defined in Section 4 (definition of a ‘site audit’ (b) (iv)) of the CLM Act.

This summary report may not be suitable for other uses. TTMP 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.

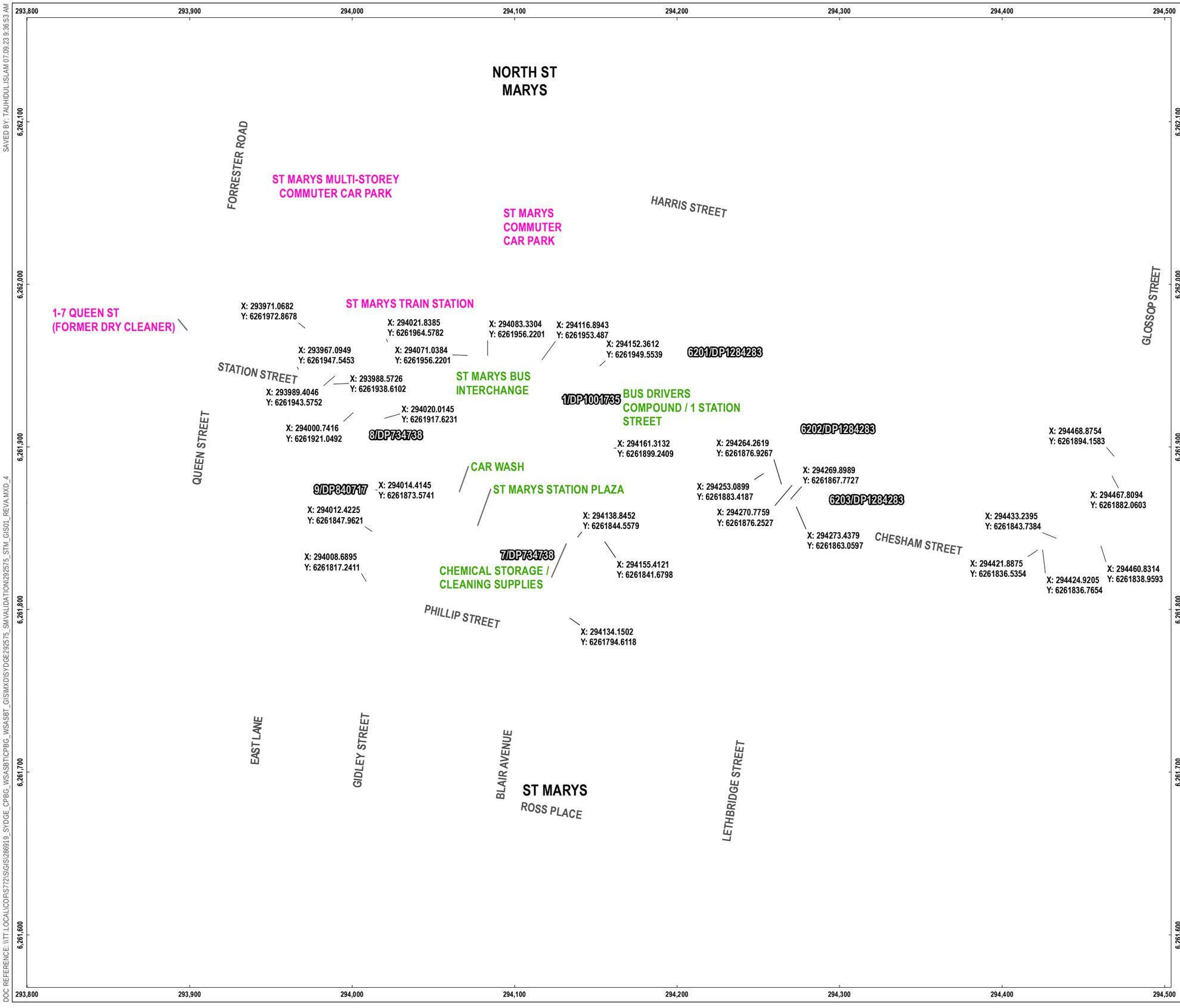
The Auditor has relied on the documents referenced in Section 1 of the Site Audit Report in preparing the Auditor’s opinion. If the Auditor is unable to rely on any of those documents, the conclusions of the audit could change.

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: EIS AECs
Attachment 3: Summary of EIS AECs
Attachment 4a to 4c: DSI and DSI Addendum Sample Locations
Attachment 5: Inferred Groundwater Flow
Attachment 6: PRB Injection Wells and Ongoing Groundwater Monitoring Locations
Attachment 7: Construction Zones and Cut/Fill Plan
Attachment 8: Unexpected Finds Locations
Attachment 9: ADE Sample Locations
Attachment 10: Assessment of Trigger Values and Contingency Plan

Attachment 1: Site Location



CPB CONTRACTORS

Ghella 1894 5 Generations of Tunnelers

LEGEND

- Current Site Features
- Former Site Features
- STM Site Boundary
- Railway
- Cadastral Boundary

SOURCE
Existing site features, site layout and boundary from Tetra Tech Coffey.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 30-03-2023).

N

0 30 60 m

SCALE **1:2,250**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

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WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 1

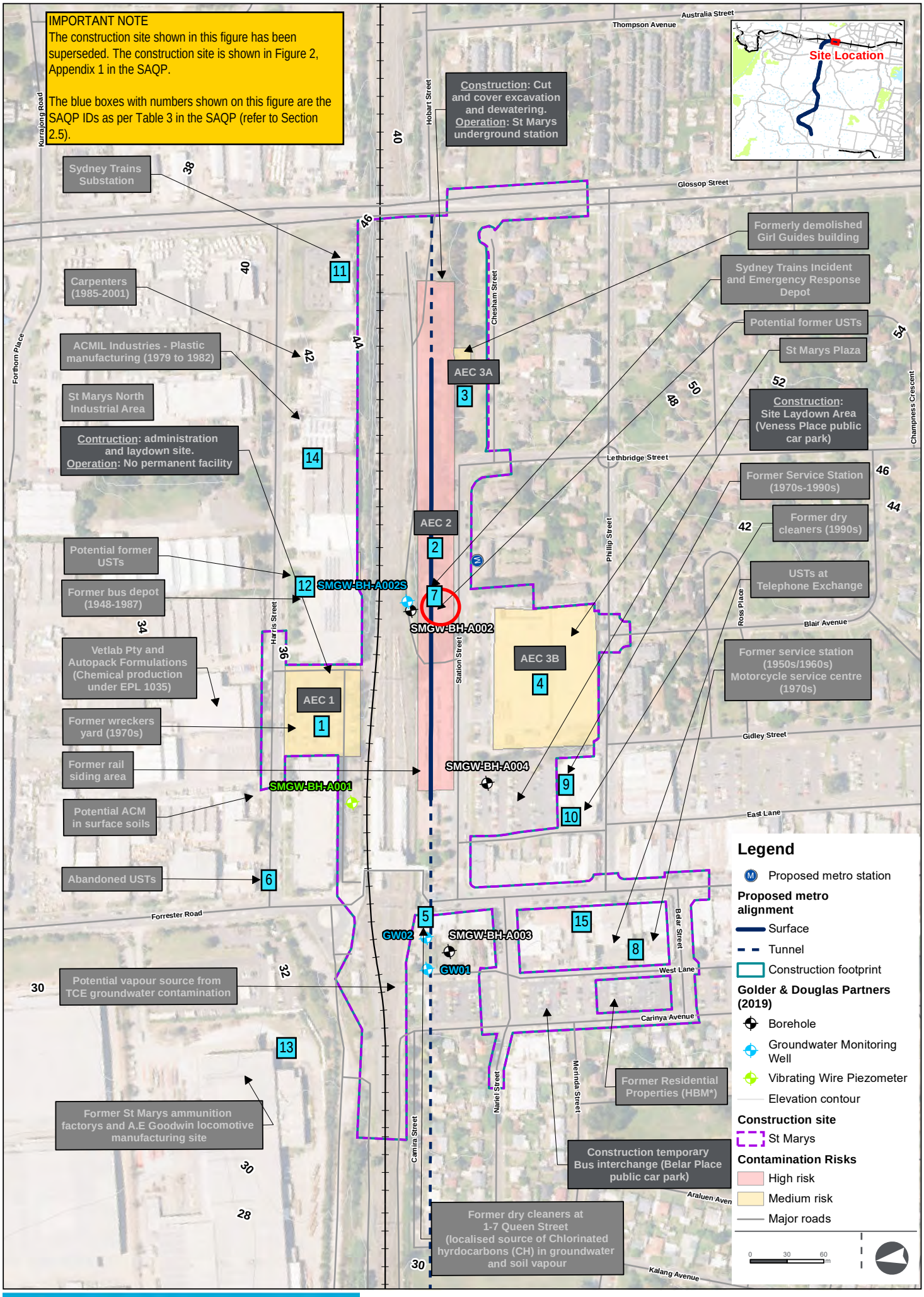
Site Location Plan
St Marys Station

TETRA TECH COFFEY

DATE: **07.09.23** PROJECT: **754-SYDGE292575** FILE: **292575_STM_F01_GIS**

SAVED BY: TAUHIDUL.ISLAM 07.09.23 9:36:53 AM
DOC REFERENCE: \\TT.LOCAL\COPRS772\SIGIS\286919_SYDGE_CPBG_WSASBT\CPBG_WSASBT_GIS\MXD\SYDGE292575_SM\VALIDATION\292575_STM_GIS01_REVA.MXD_4

Attachment 2: EIS AECs



St Marys contamination sources and risk ranking

*HBM - Potential hazardous building materials
Indicative only, subject to design development

Figure A1

Attachment 3: Summary of EIS AECs

DSI ID	EIS Reference	Activity Description
01	AEC1	Site Summary • AEC1 is located at the St Marys Station Commuter Car Park. This area includes the potential for former fuel, oil and chemical storage and use associated with historical industrial land use including wreckers' yard within the 1970s and adjacent former bus depot. Previous Investigation Summary • No previous investigation data is available.
02	AEC2	Site Summary • AEC 2 includes the St Marys rail corridor and bus interchange area. • Potential former fuel storage within Sydney Trains Emergency Response Depot (now bus driver rest compound), former railway siding activities (spills, stockpiling, and filling) and up-gradient sources of groundwater contamination (dry cleaners and service station). Previous Investigation Summary • AEC2 is within the footprint of the station box which have been subject to previous investigations (refer to section 4). Potential UST located in the area.
03	AEC3A	Site Summary • Former Girl Guides Hall with potential for contamination (asbestos and lead) associated with the demolition of this building. Previous Investigation Summary • No previous investigation data is available.
04	AEC3B	Site Summary • The EIS Technical Report that the St Marys Station Plaza may contain chemical storage for back-up generators and air conditioning units. Back up generators were not observed during site walkover however a chemical storage area and car wash facility was observed. There is also potential for contamination in association Historical demolition of former buildings containing hazardous building materials. Previous Investigation Summary • No previous investigation data available

Attachment 3: Summary of EIS AECs

DSI ID	EIS Reference	Activity Description
05	1-7 Queen St (Dry Cleaner)	Site Summary • Environmental Strategies (2015) reported that Argus undertook a preliminary site investigation (PSI) of the site in 2015. The PSI found that there were vent pipes and vent stacks above the tailoring shop. There was no other evidence that dry cleaning had occurred based on historical titles, dangerous goods records, anecdotal information, and observations from the site. Previous Investigation Summary • This site has been subject to previous investigations which are summarised in **Section 4.3**.
06	Corner of Harris Street and Forrester Road	Site Summary • The EIS Technical reports former UST are present on the corner of Harris Street and Forrester Road. The subject land appears to be located topographically down-gradient and therefore unlikely to be a potential contamination source to the St Marys construction footprint Previous Investigation Summary • No previous investigation data is available.
07	1 Station Street (Bus Driver Compound)	Site Summary • Former Sydney Trains Incident and Emergency Response Depot. The EIS Technical reports notes that this site formally had hazmat signage for petroleum hydrocarbon storage, and the site may had either USTs or Aboveground Storage Tanks (AST). Previous Investigation Summary • No previous investigation data is available.
08	59 Queen St (corner of Belar St and Queen Street)	Site Summary • The site was potentially used as a workshop/service station from the 1950s to the 1970s. Previous Investigation Summary • No previous investigation data is available.
09	47 Phillip St	Site Summary • The site was potentially used as a service station in the 1980s. Previous Investigation Summary • No previous investigation data is available.
10	51 Phillip St	Site Summary • The site was potentially used as a dry cleaners in the 1990s. Previous Investigation Summary • No previous investigation data is available.
11	Sydney Trains Substation	Site Summary • The site is an existing substation. Previous Investigation Summary • No previous investigation data is available.

Attachment 3: Summary of EIS AECs

DSI ID	EIS Reference	Activity Description
12	Former Bus Depot	Site Summary • The site is a former bus depot (1940s to 1980s) with the potential for USTs. Previous Investigation Summary • No previous investigation data is available.
13	Former Ammunition and Locomotive Factory	Site Summary • The EIS reports the site was formerly used for the manufacturing of munitions, and then locomotives. Previous Investigation Summary • No previous investigation data is available.
14	Industrial Area North of railway	Site summary • The EIS reports hundreds of historical businesses associated with industrial activities north of the rail line such as chemical and industrial manufacturing, mechanical repairs, textile manufacturing, depots, and yards. Previous Investigation Summary • No previous investigation data is available.
15	43 Queen Street	Site summary • The EIS reports this site was previously used for waterproofing. Previous Investigation Summary • No previous investigation data is available.

Attachment 4a: DSI and DSI Addendum Sample Locations

LEGEND

Additional Contaminated Land Location
- Borehole

Additional Geotechnical/Hydrogeological Location
- Borehole

Existing Investigation Location
- Borehole
- Tunnel Alignment
- Tunnel Alignment - Chainage
- Tunnel Alignment - Cross Passage
- Railway
- Cadastral Boundary
- STM Site Boundary
- Station Box / Shaft

SOURCE
Contaminated land locations, additional investigations, site boundary, and hand samples from Tetra Tech Coffey.
Existing investigations, site layout, station box and alignment supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 30-03-2023).

N

0 20 40 m

SCALE **1:1,100**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

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WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 3A

DSI Investigation Locations
St Marys Station

TETRA TECH COFFEY

DATE: **19.07.23** PROJECT: **754-SYDGE292575** FILE: **292575_STM_F03A_GIS**

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Attachment 4b: DSI and DSI Addendum Sample Locations

CPB CONTRACTORS

Ghella 1894 5 Generations of Tunnelers

LEGEND

Additional Contaminated Land Location
- Borehole

Additional Geotechnical/Hydrogeological Location
- Borehole

Existing Investigation Location
- Borehole
- Tunnel Alignment
- Tunnel Alignment - Chainage
- Tunnel Alignment - Cross Passage
- Railway
- Cadastral Boundary
- STM Site Boundary
- Station Box / Shaft

SOURCE
Contaminated land locations, additional investigations, site boundary, and hand samples from Tetra Tech Coffey.
Existing investigations, site layout, station box and alignment supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 30-03-2023).

N

0 20 40 m

SCALE **1:1,000**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 3B

DSI Investigation Locations
St Marys Station

TETRA TECH COFFEY

DATE: **19.07.23** PROJECT: **754-SYDGE292575** FILE: **292575_STM_F03B_GIS**

Attachment 4c: DSI and DSI Addendum Sample Locations

LEGEND

- Additional Contaminated Land Location
  - Borehole
- Additional Geotechnical/Hydrogeological Location
  - Borehole
- Existing Investigation Location
  - Borehole
  - Test Pit
- Tunnel Alignment
- Tunnel Alignment - Chainage
- Railway
- Cadastral Boundary
- Former AEC3A Buffer Area
- STM Site Boundary
- Station Box / Shaft

SOURCE
Contaminated land locations, additional investigations, site boundary, and hand samples from Tetra Tech Coffey.
Existing investigations, site layout, station box and alignment supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 30-03-2023).

N

0 20 40 m

SCALE **1:1,000**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 3C

DSI Investigation Locations
St Marys Station

TETRA TECH COFFEY

DATE: **19.07.23** PROJECT: **754-SYDGE292575** FILE: **292575_STM_F03C_GIS**

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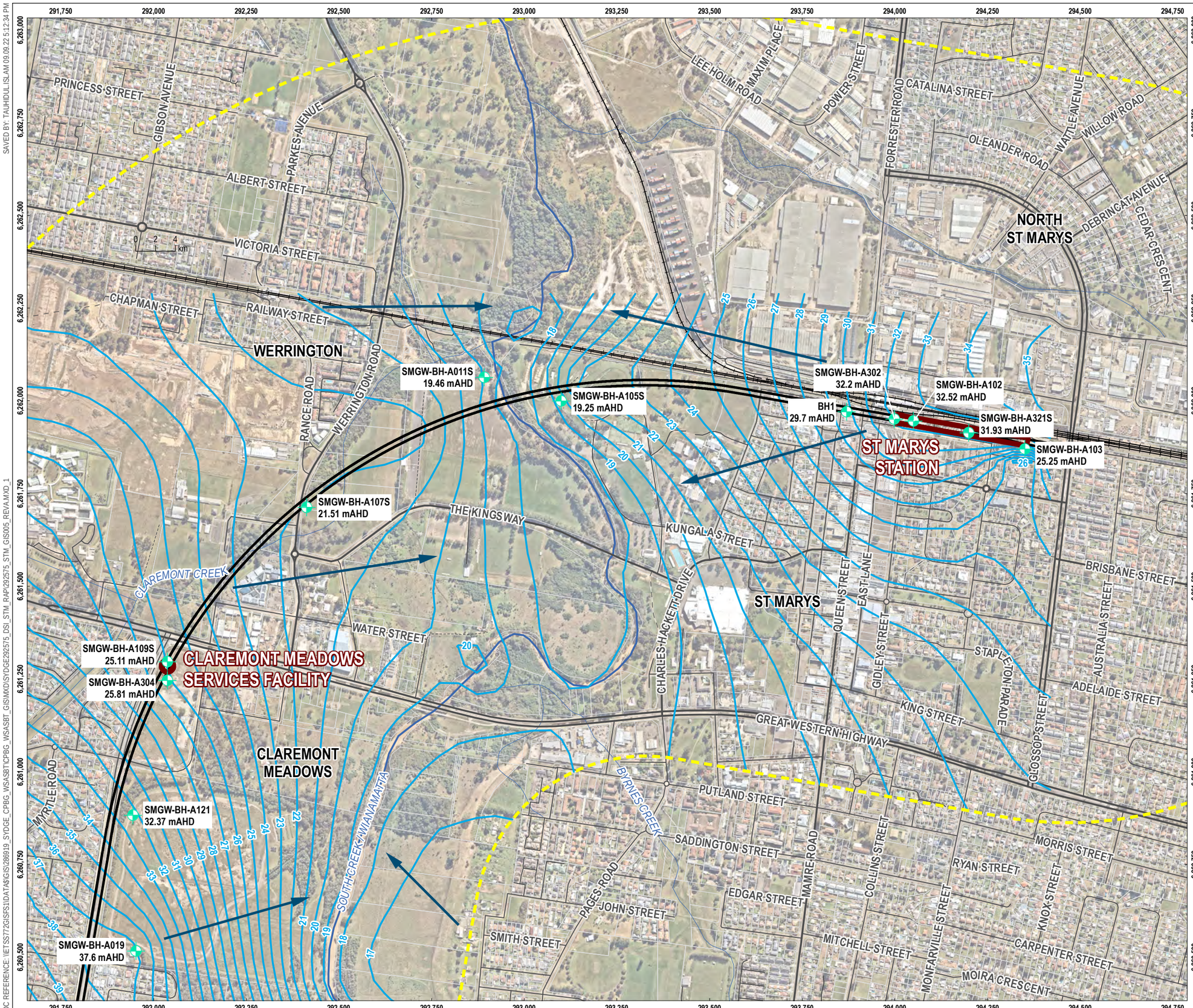
Attachment 5: Inferred Groundwater Flow



LEGEND

- Selected Groundwater Monitoring Well
- Project Alignment
- Project Alignment - Structure
- Railway
- Major Road
- Minor Road
- Track
- Path
- Perennial Watercourse
- Non-perennial Watercourse
- Groundwater Elevation Contour (mAHD)
- Groundwater Flow Direction
- Cadastral Boundary
- Project Alignment Buffer (1 km)

SOURCE
Groundwater monitoring wells compiled by Tetra Tech Coffey.
Groundwater contours, groundwater flow direction, and alignment buffer from Tetra Tech Coffey.
Alignment supplied by CPBG.
Cadastre, roads, rail, and watercourses from DFSI.
Aerial imagery from Nearmap (capture date April, 2022).

0 200 400 m

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PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 5

DSI Groundwater Level Contours

DATE: **09.09.22** PROJECT: **754-SYDGE292575** FILE: **292575_STM_F005_GIS_REVA**

Attachment 6: PRB Injection Wells and Ongoing Groundwater Monitoring Locations

LEGEND

- Contingency and Mitigation Monitoring Well
- Mitigation Monitoring Well
- Multi-Level Mitigation Monitoring Well
- Permeable Reactive Barrier Well

Previous Investigation Locations

- Monitoring Well
- Tunnel Alignment
- Tunnel Alignment - Chainage
- Railway
- STM Site Boundary
- Cadastral Boundary

SOURCE
Mitigation Monitoring Wells, PRB Wells and boundary from Tetra Tech Coffey.
Existing investigations, site layout, station box and alignment supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 30-03-2023).

N

0 5 10 m

SCALE **1:300**
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PROJECTION: **GDA2020 MGA Zone 56**

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WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 1

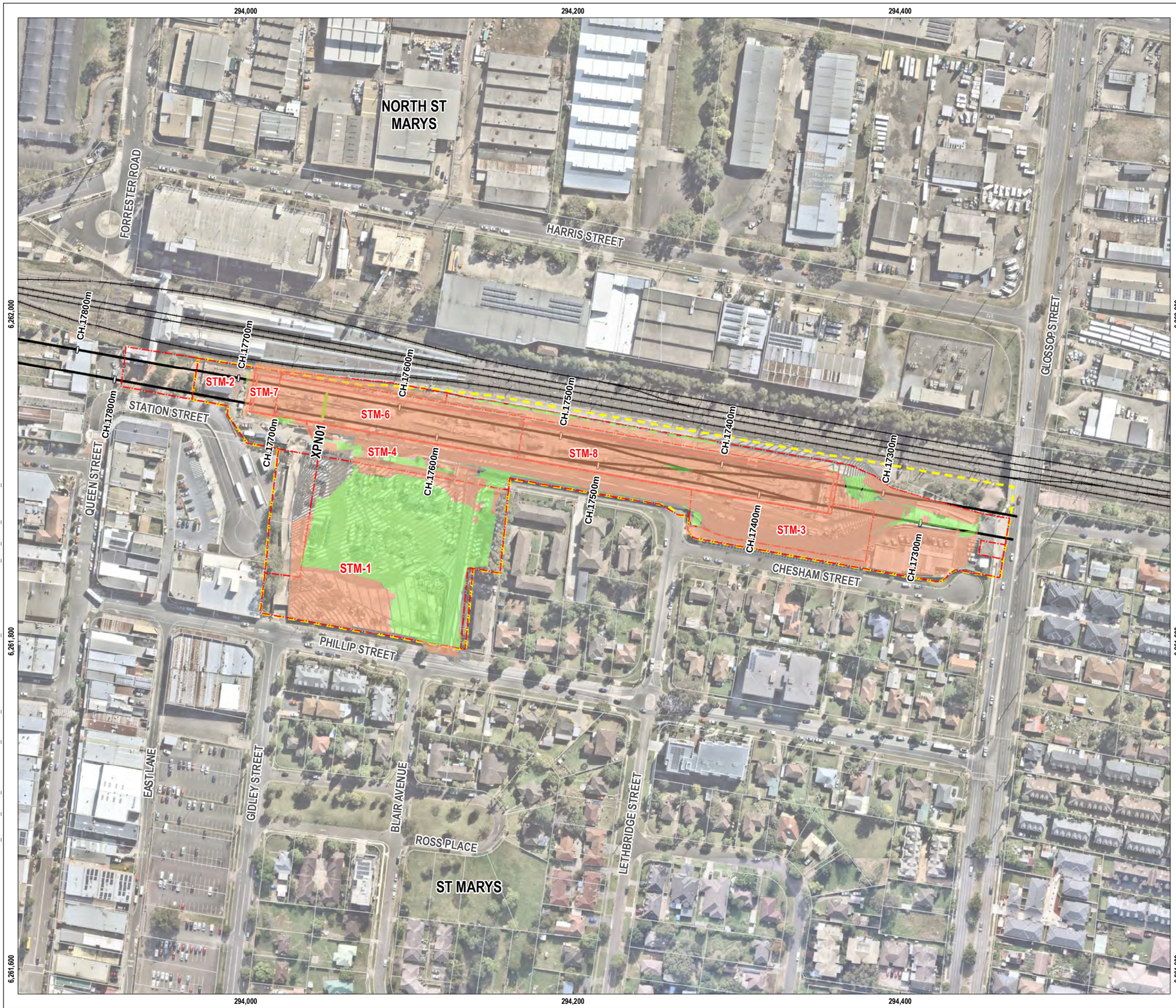
PRB Injection Wells and Associated Groundwater Monitoring Locations

TETRA TECH COFFEY

DATE: **21.07.23** PROJECT: **754-SYDGE292575** FILE: **292575_STM_F006_GIS**

SAVED BY: MYLES.BURT 21.07.23 11:33:54 AM
DOC REFERENCE: \\TT.LOCAL\COPS72\SIG\SIG\286919_SYDGE_CPBG_WSASBT\CPBG_WSASBT_GIS\MXD\SYDGE292575_SMVALIDATION\292575_STM_GIS006_REVA.MXD_1

Attachment 7: Construction Zones and Cut/Fill Plan



CPB CONTRACTORS

Ghella 1894 5 Generations of Tunnelers

LEGEND

- Tunnel Alignment
- Tunnel Alignment - Chainage
- Tunnel Alignment - Cross Passage
- St Marys Station Site Layout
- Railway
- STM Bulk Excavation Areas
- Cadastral Boundary
- Surface Works Cut Area
- Surface Works Fill Area
- STM Site Boundary
- St Marys Station Box

SOURCE
Existing site features, site layout and boundary from Tetra Tech Coffey.
Alignment and cut and fill areas (approxiamtely digitized from dwg files) supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 30-03-2023).

N

0 30 60 m

SCALE **1:2,250**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 2

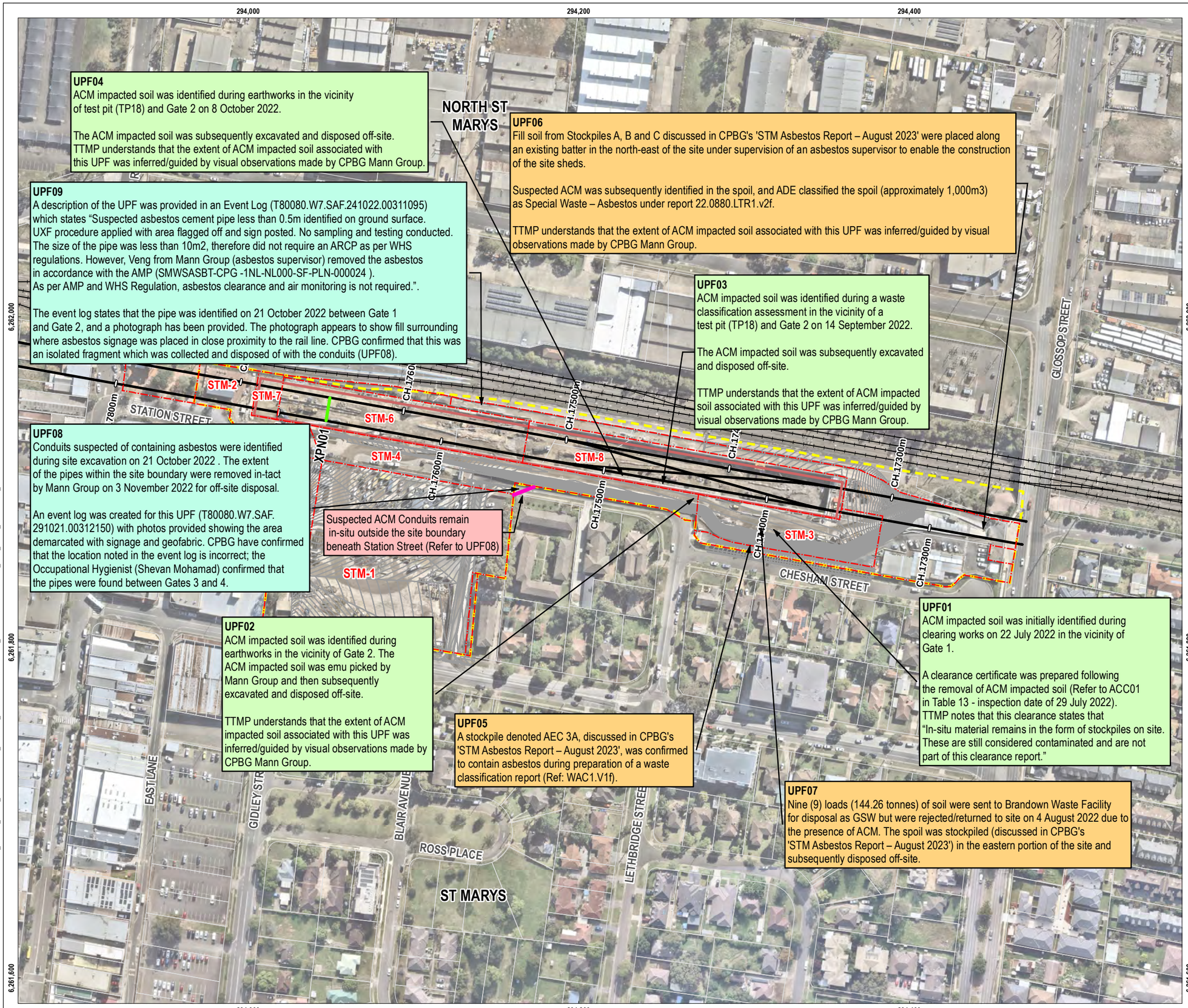
Project Footprint
St Marys Station

TETRA TECH COFFEY

DATE: **16.08.23** PROJECT: **754-SYDGE292575** FILE: **292575_STM_F02_GIS**

SAVED BY: GEORGE.YOUNG 16.08.23 11:27:12 AM
DOC REFERENCE: \\TT.LOCAL\COR\S772\SIG\S286919_SYDGE_CPBG_WSASBTCPBG_WSASBT_GIS\MXD\SYDGE292575_SMVALIDATION292575_STM_GIS02_REVA.MXD_4

Attachment 8: Unexpected Finds Locations



CPB CONTRACTORS | Ghella 1894 5 Generations of Tunnelers

LEGEND

- Tunnel Alignment
- Tunnel Alignment - Chainage
- Tunnel Alignment - Cross Passage
- St Marys Station Site Layout
- Railway
- STM Bulk Excavation Areas
- Cadastral Boundary
- STM Site Boundary
- St Marys Station Box

SOURCE
Existing site features, site layout and boundary from Tetra Tech Coffey.
Alignment supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 30-03-2023).

N

0 30 60 m

SCALE **1:2,250**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 6

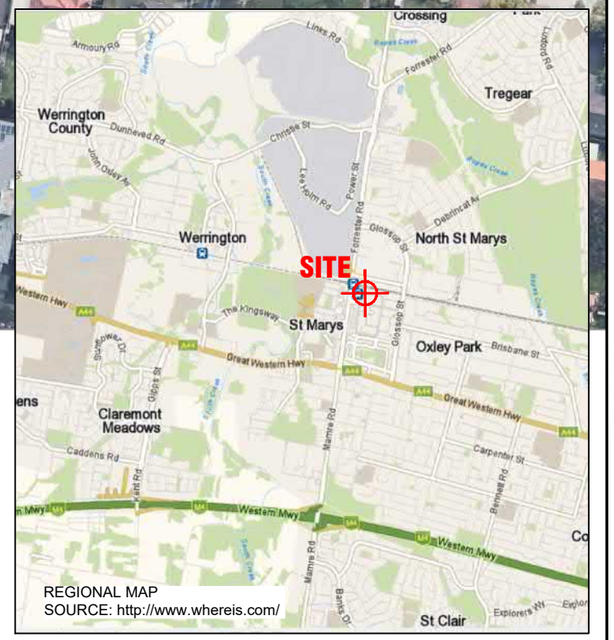
Unexpected Finds
St Marys Station

TETRA TECH COFFEY

DATE: **31.08.23** PROJECT: **754-SYDGE292575** FILE: **292575_STM_F06_GIS**

SAVED BY: TAUHIDUL.ISLAM 31.08.23 11:25:39 AM
DOC REFERENCE: \\TT.LOCAL\COFS\772\SIG\S286919_SYDGE_CPBG_WSASBT\CPBG_WSASBT_GIS\MXD\SYDGE292575_SMVALIDATION292575_STM_GIS06_REVA.MXD_4

Attachment 9: ADE Sample Locations



LEGEND

- SUBJECT AREA - MAC7
- TP — ADDITIONAL TEST PIT LOCATION (19/09/2022)
- TP — PREVIOUS TEST PIT LOCATION (02/09/2022-06/09/2022)

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION

SOIL CONTAMINATION ABOVE SAC NEPM GENERIC EIL (mg/kg)

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM, 11 SEP 2022.

revision	no.	description	drawn	approved	date
	A	FIRST ISSUE	MC	MT	05/10/22

0 12.5 25 37.5 50 62.5
SCALE 1:1250 @A3 METRES

drawn	MC
approved	MT
date	05/10/2022
scale	AS SHOWN
original size	A3

client: CPBG

project: MATERIALS CLASSIFICATION
WESTERN SYDNEY AIRPORT STATION BOX & TUNNELING
11 STATION STREET, ST MARYS, NSW

title: SAMPLE LOCATION AND ANALYTICAL RESULTS PLAN

project no: 22.0967.00_MAC7 | figure no: FIGURE 1 | rev: A

ADE CONSULTING GROUP
Sydney Office
ADE Consulting Group Pty Ltd
Unit 6 / 7 Millennium Court, Silverwater, NSW 2128
www.ADE.group | info@ade.group | 1300 976 922

PLOT DATE: 7/10/2022 12:13:43 PM DWG FILE: W:_NEW DELTEK PROJECTS ENV\22.0967 CPB-GHELLA WSA SBT\A1\10\22.0967.00 WSA SBT (ST MARY'S WAC)\5 WORKING DOCUMENTS\2.4 CAD (MC)\22.0967_MAC7.DWG

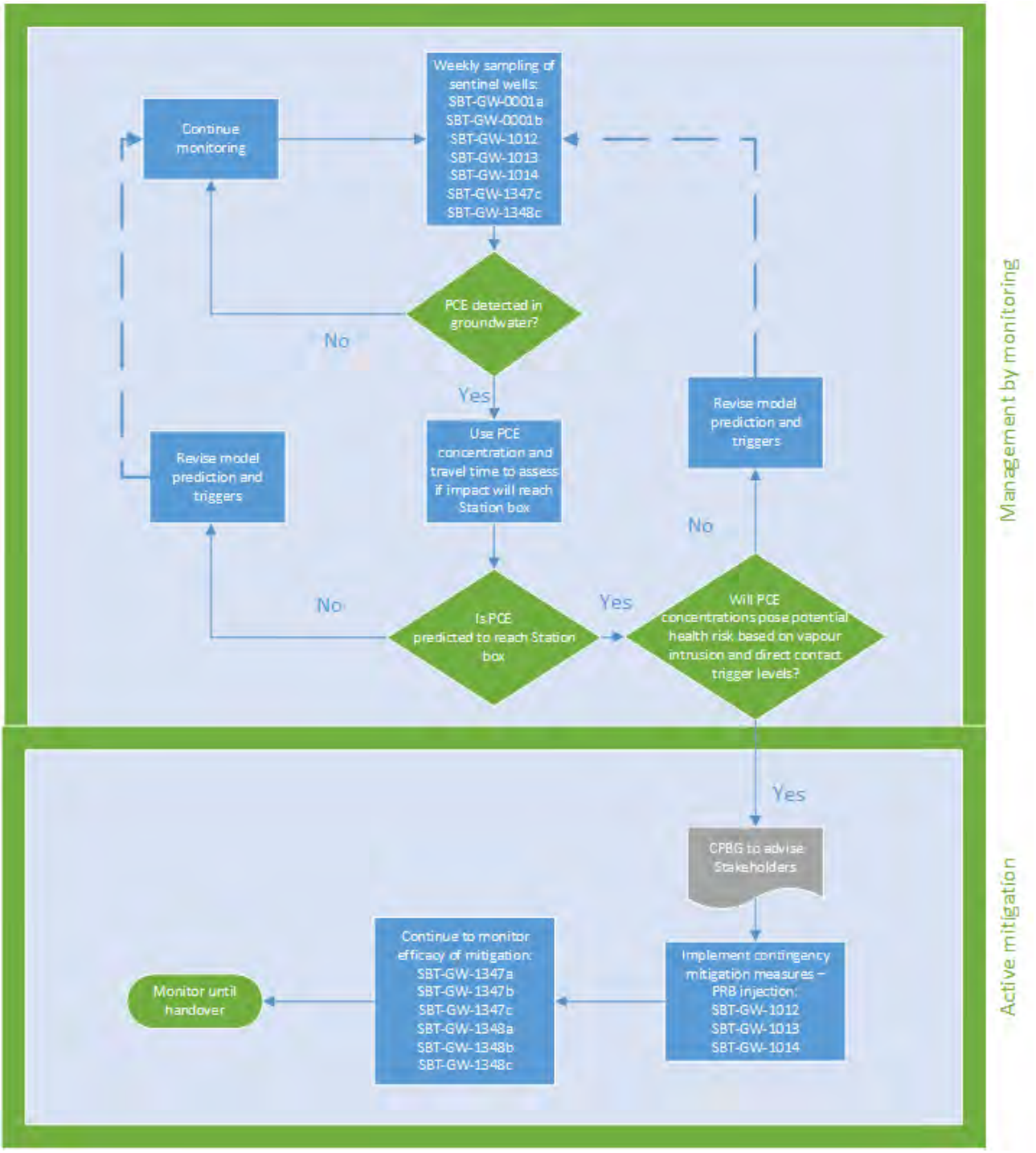


Figure B: Assessment of Trigger Values and Implementation of Contingency Plan

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-095-B2R

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: [redacted]

Company: Ramboll Australia Pty Ltd

Address: Level 3, 100 Pacific Highway, North Sydney

Postcode: 2060

Phone: [redacted]

Email: [redacted]

Site details

Address: St Marys Station (Sydney Metro Western Sydney Airport), Station Street, St Marys NSW

Postcode: 2760

Property description

(Attach a separate list if several properties are included in the site audit.)

Lot 1 DP1001735 (1 Station Street), Lot 7 DP734738 (33-43 Phillip Street), Lot 8 DP734738 (8 Station Street), part Lot 9 DP840717 (part 45 Phillip Street), Part Lot 6201 DP1284283, Lot 6202 DP1284283, Lot 6203 DP1284283 and part of Station Street (no Lot and DP) (see attachment at the end of Part I of this SAS)

Local government area: Penrith City Council

Area of site (include units, e.g. hectares): Approximately 3.9 hectares

Current zoning: SP2 (Railway), MU1 (Mixed Use) and R4 (High Density Residential) under the Penrith Local Environmental Plan 2010

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: [redacted]

Company: CPB Contractors and Ghella Joint Venture

Address: Level 2, 177 Pacific Highway, North Sydney

Postcode: 2060

[redacted]

[redacted]

Contact details for contact person (if different from above)

[redacted]

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)

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

Critical State Significant Infrastructure approval 10051, issued 23 July 2021 by the Minister for Planning and Public Spaces

☐ 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:

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: Construction of a future underground train station

Information sources for site audit

Consultancies which conducted the site investigations and/or remediation:

Tetra Tech Major Projects Pty Ltd (TTMP)

Titles of reports reviewed:

‘St Marys Station Validation Report, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works’, dated 7 September 2023, TTMP

‘St Marys Station – Implementation of Permeable Reactive Barrier, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works’, dated 14 September 2023, TTMP

‘St Marys Station Environmental Management Plan – Construction phase groundwater monitoring from contamination at 1-7 Queen St, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works’, dated 15 February 2024, TTMP

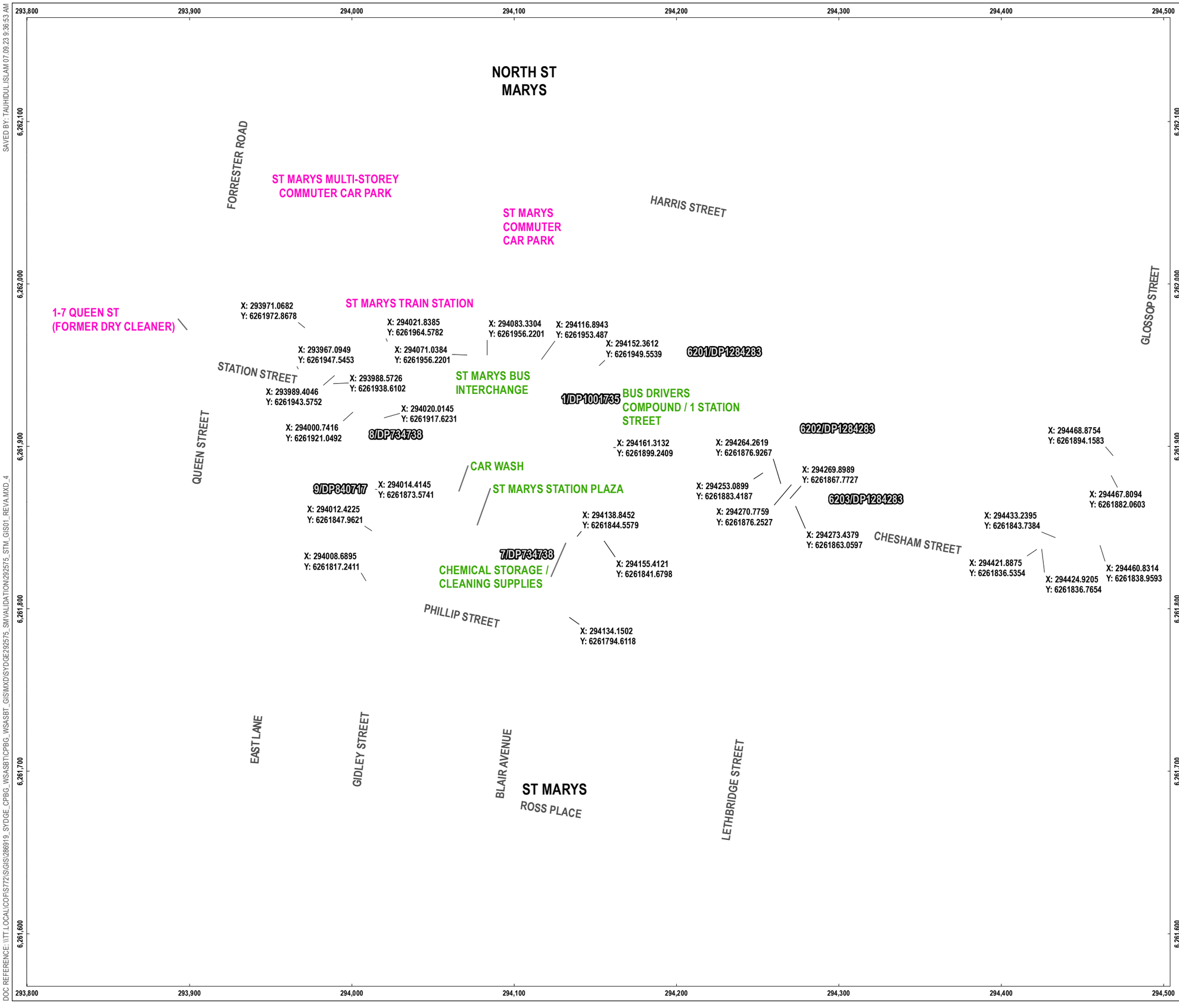
Other information reviewed, including previous site audit reports and statements relating to the site:

Site Audit Statement TO-095-B1R and ‘Site Audit Report – Remedial Action Plan, St Marys Station Box and Tunnelling Works, Sydney Metro Western Sydney Airport’, 16 February 2024 and the reports reviewed during preparation of the Site Audit Report, in particular the following.
‘St Marys Station, Remedial Action Plan, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works’, dated 23 May 2023, TTMP

Site audit report details

Title:	Site Audit Report – St Marys Station Box Remediation and Construction Phase Groundwater Management, Sydney Metro Western Sydney Airport	
Report no.:	TO-095-B2R (Ramboll Ref: 318001447-001)	Date: 16 February 2024

Attachment: Site Location



CPB CONTRACTORS

Ghella 1894 5 Generations of Tunnelers

LEGEND

- Current Site Features
- Former Site Features
- STM Site Boundary
- Railway
- Cadastral Boundary

SOURCE
Existing site features, site layout and boundary from Tetra Tech Coffey.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 30-03-2023).

N

0 30 60 m

SCALE **1:2,250**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 1

Site Location Plan
St Marys Station

TETRA TECH COFFEY

DATE: **07.09.23** PROJECT: **754-SYDGE292575** FILE: **292575_STM_F01_GIS**

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:

_____

_____

_____

_____

_____

_____

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:

Environmental Management Plan for construction phase groundwater monitoring to monitor potential migration of groundwater contaminated with volatile chlorinated hydrocarbons from an offsite source (1-7 Queen Street) as a result of construction dewatering and resulting drawdown, which may pose an unacceptable risk to construction workers of the St Marys Sydney Metro station box.

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.)

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

- ☐ ~~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):~~

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

*Strike out as appropriate

Plan title: St Marys Station Environmental Management Plan - Construction phase groundwater monitoring from contamination at 1-7 Queen St,

Plan author: Tetra Tech Major Projects Pty Ltd

Plan date: 15 February 2024 No. of pages: 34

SUBJECT to compliance with the following condition(s):

- Preparation of an addendum to the remedial action plan (RAP) and further site audit if ongoing dewatering of the structure is required or migration of contamination presents a risk to future site users after completion of Station Box and Tunnelling Works. The addendum to the RAP would be implemented as part of later works packages to describe measures that may be incorporated into the design of the station or implemented as part of the operational phase of the project.
- If an addendum to the RAP is not required, preparation of a Validation Report prepared by a qualified environmental consultant confirming the suitability of the site for an underground train station.
- Preparation of a Section A Site Audit Statement (SAS) by a NSW EPA Accredited Site Auditor reviewing the above information and confirming the suitability of the site for an underground train station.

Overall comments:

The site history identified previous site uses with potential to cause contamination, including potential storage of fuels in USTs, uncontrolled filling of the site, demolition of former buildings and structures which contained hazardous building materials and current/former

onsite and offsite commercial/industrial land uses (including an off-site dry cleaner that overlies the tunnel alignment).

Investigations at the site did not identify significant contamination requiring remediation in areas proposed to be disturbed as part of the Station Box and Tunnelling Works (SBT Works). However, a former dry cleaner located off-site at 1-7 Queen Street, St Marys was identified as a potential source of chlorinated hydrocarbon contaminants that may present an unacceptable risk to construction workers and future users of the site. The offsite dry cleaner has been notified to the NSW EPA under Section 60 of the *Contaminated Land Management Act 1997* as a potentially contaminated site due to chlorinated hydrocarbon impacts in soil and groundwater. The suspected source area is located directly over the tunnel alignment and approximately 100-120 m west of the station box excavation. Bulk excavation works beneath the groundwater table within the station box are likely to result in drawdown of impacted groundwater and migration of contamination towards the site.

A human health risk assessment (HHRA) prepared by TTMP concluded that chlorinated hydrocarbon contamination at the former dry cleaner at 1-7 Queen Street could pose a potentially unacceptable risk to worker health within the station box. The HHRA identified the requirement for on-going groundwater monitoring following the commencement of bulk excavation beneath the groundwater table, and the potential requirement for mitigation measures for the management of groundwater should monitoring indicate that concentrations have, or will likely, become unacceptable.

A RAP prepared by TTMP proposed the establishment of a permeable reactive barrier (PRB), such as injected activated carbon, between the site and former dry cleaner to retard contaminated groundwater migration towards the station during the construction phase of the project (i.e. during dewatering of the excavation), as well as implementation of a monitoring and contingency plan.

The PRB was recently installed during development works. An ongoing groundwater monitoring program, which was proposed in the RAP (reviewed in TO-095-B1R), is included in the environmental management plan (EMP) prepared for the site. The EMP provides an adequate framework for the monitoring of groundwater and the potential migration of contamination from the offsite former dry cleaner towards the site as a result of groundwater drawdown during construction dewatering. Ongoing monitoring is not likely to be required once dewatering/construction is completed and the flow of groundwater returns to the pre-construction direction.

Unexpected finds of asbestos were identified during development works which were adequately managed/remediated via offsite disposal. Material disposal during the course of development works was undertaken in accordance with relevant guidelines and regulations.

Imported materials were not assessed in accordance with the RAP. However, based on the documentation provided by the suppliers and observations made by CPBG, imported materials were considered suitable for use on the site from a contamination perspective.

If a potential risk to the future users of the site (station staff and public) are identified during the ongoing groundwater monitoring outlined in the EMP, an addendum to the RAP will be required as part of later works packages to describe measures that may be incorporated into the design of the station or implemented as part of the operational phase of the project.

A Site Audit Statement by a NSW EPA Accredited Site Auditor is required as a condition of Critical State Significant Infrastructure approval to confirm the suitability of the site for the intended use.

This SAS and accompanying Site Audit Report (SAR) were initially finalised on 15 September 2023. The RAP was subsequently updated, which resulted in preparation of an updated Section B SAS and SAR (TO-095-B1R dated 16 February 2024). This SAR and SAS were updated to reflect the updated RAP and updated Section B SAS and SAR.

Part III: Auditor's declaration

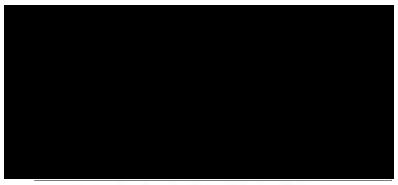
I am accredited as a site auditor by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997.*

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 16 February 2024

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.

SYDNEY METRO - WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

St Marys Station

Environmental Management Plan - Construction phase groundwater monitoring from contamination at 1-7 Queen St

Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works

Project number	WSA-200-SBT
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Rev	Date	Prepared by	Reviewed by	Remarks
Rev A01	21 /07/2023	[redacted]	[redacted]	-
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Rev B01	11/09/2023	[redacted]	[redacted]	Revision to address Site Auditor comments
Rev C01	15/02/2024	[redacted]	[redacted]	Revision to address Site Metro comments

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Abbreviations

Abbreviation	Definition
ACM	Asbestos-Containing Material
AEC	Area of Environmental Concern
AHD	Australian Height Datum
AMP	Asbestos Management Plan
ARC	Australian Reinforcing Company
ASS	Acid Sulfate Soils
ATM	Airport Terminal Station
BTEXN	Benzene, toluene, ethylbenzene, xylene and napthalene
BSF	Bringelly Services Facility
CEMP	Construction Environmental Management Plan
CMF	Claremont Meadows Services Facility
CPBG	CPB Ghella Joint Venture
DCE	Dichloroethene
DGB	Densely Graded Base
DP	Deposited Plan
DSI	Detailed Site Investigation
EIS	Environmental Impact Statement
ENM	Excavated Natural Materials
EPA	Environment Protection Authority
EPL	Environment Protection Licence
ESCP	Erosion and Sediment Control Plan
GMP	Groundwater Monitoring Plan
LNAPL	Light Non-Aqueous Phase Liquid
LOR	Limit of Reporting
MIP	Membrane Interface Probe
NATA	National Association of Testing Authorities
OCP/OCP	Organochlorine / organophosphate pesticides
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyls
PCE	Tetrachloroethene

Abbreviation	Definition
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
PID	Photo-Ionisation Detector
POEO	Protection of the Environment Operations
RAP	Remedial Action Plan
RL	Reduced Level
SGAR	Supplementary Groundwater Assessment Report
SSRA	Site-Specific Risk Assessment
SSTOM	Stations Systems Trains and Operations and Maintenance
STM	St Marys Station Site (the STM site)
SWMP	Soil and Water Management Plan
TCE	Trichloroethene
TRH	Total Recoverable Hydrocarbons
TTMP	Tetra Tech Major Projects Pty Ltd
UST	Underground Storage Tank
VENM	Virgin Excavated Natural Materials
VC	Vinyl Chloride
WHS	Work Health and Safety
WSI	Western Sydney International

1. Introduction

Sydney Metro has engaged the CPB Ghella Joint Venture (CPBG) for the design and construction of the Station Boxes and Tunnelling Works (SBT Works) of the Sydney Metro Western Sydney Airport project (the Project).

The St Marys Metro station site (STM site) shown in Figure A is located off Station St and Chesham St adjacent to the existing St Marys Railway Station on the T1 Western Line in St Marys, NSW (the STM site). The location of the STM site is outlined in Table 1 in Section 3 is shown on Figure 1, Appendix 1.

The SBT Works at the STM Site were undertaken in general accordance with the TTMP (2023) *St Marys Station - Remedial Action Plan - Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works*, *SMWSASBT-CPG-SWD-SW000-GE-RPT-040521, Rev A08, 23 May 2023* (the RAP).

Remediation undertaken at the STM site as part of the SBT Works is documented in the *St Marys Station – Validation Report - Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works*, *SMWSASBT-CPG-SWD-SW000-GE-RPT-040558, Rev A02, 7 August 2023* (STM Validation Report).

During construction, activities which require dewatering in the STM site station box and tunnel are expected to result in the reversal of groundwater flow direction to an easterly direction towards the station box.

As per the requirements of the RAP a Permeable Reactive Barrier (PRB) was installed at the northern end of Queen Street to mitigate the potential migration of chlorinated hydrocarbons from a former dry cleaner located at 1-7 Queen Street to STM site during construction of the metro station. Information on the installation of the PRB is included Section 3.4 and the STM Validation Report.

Section 12.1 of the RAP requires the implementation of an Environmental Management Plan (EMP) which describes the scope of groundwater monitoring which is to be undertaken during the Stations, Systems, Trains, Operations and Maintenance (SSTOM) works[1].

1.1. Purpose of EMP

This EMP has been prepared to address Section 12.1 of the RAP. This EMP describes the groundwater monitoring and mitigation program which is to be undertaken during the SSTOM works to demonstrate the PRB remains effective until the station box is tanked and the groundwater flow direction returns to pre-construction direction. Groundwater monitoring is also identified to identify if an adverse change in risk profile is likely which requires contingency mitigation measures to be implemented.

This EMP has been prepared in general accordance with the NSW EPA *(2022) Preparing environmental management plans for contaminated land – practice note.*

This EMP is not to be considered as the Construction Environmental Management Plan (CEMP) as required under the *Sydney Metro Western Sydney Airport – Conditions of Approval (SSI 10051)*.

[1] Note groundwater monitoring as described in this EMP is currently being undertaken by the SBT Contactor under the RAP. Groundwater monitoring as required under the RAP will continue to be undertaken by the SBT Contactor until the STM Site is handed over to the SSTOM Contractor.

1.2. Roles and Responsibilities

This EMP is to be implemented by the SSTOM Work Contractor engaged by Sydney Metro.

The SSTOM Works Contractor is to engage a Certified Environmental Practitioner Site Contamination Specialist[2] to undertake the monitoring and reporting described in Section 4 of this EMP. The implementation of this EMP is to be overseen by a NSW Accredited Site Auditor.

[2] Accredited under the Environment Institute of Australia and New Zealand (EIANZ) association

Figure A: STM Site

2. Technical and Regulatory Framework

This EMP has been prepared in general accordance with the following legislation, industry standards, codes of practice, and guidance documents, where relevant:

- NSW EPA *(2022) Preparing environmental management plans for contaminated land – practice note.*
- NSW Work Health and Safety (WHS) Act 2011 (WHS Act 2011)
- NSW WHS Regulation 2017 (WHS Regulation 2017)
- Contaminated Land Management (CLM) Act, 1997 (CLM Act 1997).
- Protection of the Environment Operations (POEO) Act 1997 (POEO Act 1997)
- POEO (Waste) Regulation 2014 (POEO Waste Regulation 2014)
- National Environment Protection Council, National Environment Protection (Assessment of Site Contamination) Measure, 1999 (amended April 2013) (ASC NEPM)
- NSW EPA Contaminated Land Guidelines: Consultants Reporting on Contaminated Land, 2020 (NSW EPA 2020)
- NSW EPA Sampling Design Guidelines for Contaminated Land (Part 1 and Part 2), 2020 (NSW Sampling Design Guidelines)
- NSW EPA Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition), 2017 (NSW EPA 2017)
- Per- and polyfluoroalkyl substances (PFAS) National Environmental Management Plan (HEPA, 2020; Version 2.0) (PFAS NEMP)
- CRC Care Technical Report No. 10, Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater, 2011 (CRC CARE 2011).

3. Background

3.1. Site Identification

The STM site is located in St Marys and is shown in Figure 1 in Appendix 1. Key attributes of the site are summarised in Table 1.

Table 1: Site Information

Attribute	Description
Address (centre of STM site)	63 Station Street, North St Marys NSW 2760
STM Site Area	Approximately 3.9 hectares (Ha).
Title Identification Details	Part Lot 4101 DP1282852 Lot 1 and Lot 2 DP1001735 Lot 1 DP1267484 Lot 7 and Lot 8 DP734738 Part Lot 9 DP840717 Road and Road Reserve for part of Station Street
Current Land Use	**Station Box and Surface Works Construction Area:** • Active construction site for the construction of the STM metro station
Pre-Construction Land Use	**Station Box and Surface Works Construction Area:** • St Marys Bus Interchange • Sydney Trains Emergency Response Depot (Bus Driver Rest Compound east of bus interchange) – 1 Station Street • Cleared land within the rail corridor • Station Street • St Marys Station Plaza (commercial/retail centre) including a portion of the adjacent Car Park • Construction site for the SBT Works **Tunnel Section from the Station Box to Chainage 17,900m (refer to Figure 2 in Appendix 1):** • Commercial land use between Queen Street and West Lane (Tattoo parlour, and vacant buildings) • Public car park and residential house between West Lane and Carinya Avenue
Local Government Area	Penrith City Council
Current Land Zoning	Land zones SP2 (Infrastructure – Railway), R4 (High Density Residential) and MU1 (Mixed Use) under the Penrith Local Environment Plan 2010.
Adjoining Land Uses	**North:** St Marys Train Station and Railway corridor. North of the rail corridor is the St Marys Commuter Carpark (surface and multistorey carpark) in the north-east, and commercial/light industrial (warehouse) activities in the northwest (Showerama, Evolution Windows System, Wilkins Windows). In the far north-western corner (and north of the rail corridor) is a substation. In the far north-eastern corner is the Australian

Attribute	Description
	Reinforcing Company (ARC) manufacturing facility (west of Forrester Road) who supply steel reinforcement to the construction industry. Land use along the northern side of Harris Street includes a range of commercial / light industrial activities (smash repairs, automotive mechanic, veterinary laboratory, agricultural chemical warehouse, timber yard, commercial cleaning, driving school, vehicle inspection service, motorhome yard). The EIS technical report indicates that two of the facilities (Vetlab and Autopak Formulations) are licenced under the POEO Act to undertake activities including: chemical production, storage, and waste generation; pesticide production, waste storage, pharmaceutical and veterinary product production, and non-thermal treatment of hazardous and other waste. **South**: South of site and east of Gidley Street is a residential area with a mixture of single detached houses and units / apartments. South of site and west of Gidley Street are commercial / retail activities and the car park for St Marys Station Plaza, and other public car park facilities. **East:** Glossop Street. East of Glossop Street is a residential area south of the rail corridor, and a commercial / industrial area north of the rail corridor. **West:** West of the site include the car park for the St Marys Station Plaza, commercial / retail premises between Gidley Street and Carinya Avenue, and a residential area west of Carinya Avenue. Approximately 100 m west north west of the site is a former dry cleaner located at 1-7 Queen St.

3.2. Environmental Site Setting Summary

The following has been summarised from the Detailed Site Investigation (refer to Section 3.3) .

Table 2: Site Environmental Setting

Aspect	Description
Topography	A review of the topographic map of NSW indicates the site is situated at an elevation of approximately 36 m to 50 m AHD. The land slopes down in a westerly direction towards South Creek located approximately 900 m west of the site.
Geology	A review of the Penrith 1:100 000 scale geology map indicates that the site is underlain by Bringelly Shale of the Wianamatta Group which was deposited in a deep marine environment of the Middle Triassic. The Bringelly Shale is described as shale, carbonaceous claystone, laminite, lithic sandstone, with rare coal. A geotechnical cross-section of the site is included in Appendix 2.
Hydrology and Hydrogeology	There are no surface water bodies within the site. The nearest surface watercourses to the site include a minor, unnamed tributary of South Creek present approximately 420m to the north, and South Creek which is located approximately 900m to the southwest (at its nearest point). Pre-construction groundwater level at the site within the Bringelly Shale was assessed in the St Marys DSI in 2022 to be approximately 34 m AHD. Pre-construction groundwater flowed in a westerly direction towards South Creek (refer to Figure 3, Appendix 1).
Registered Groundwater Bores	The nearest licensed groundwater bores (GW112625, GW112626 and GW112627) are located approximately 750 m northwest of the site and are located on residential properties (previously a service station). All three bores were installed as monitoring wells to 6 m below ground surface (bgs).
Salinity	A review of the [Salinity Potential of Western Sydney] map indicates that the site is mapped as having moderate salinity.
Acid Sulfate Soils (ASS)	ASS risk mapping indicates that the site is located in an area with Extremely Low Probability of Occurrence of ASS.
List of Contaminated Sites Notified to the EPA	A search of the List of NSW Contaminated Sites Notified to NSW EPA (as of 8 March 2022) was carried out on 13 April 2022. Two properties were recorded on the register comprising the following: • NS1513: 1 to 7 Queen Street (Former dry cleaner that is now vacant). This site is located above the Tunnel from approximately Chainage 17,800 to 17,850. • NS1189: 76 Glossop Street (Service station) located approximately 300 m north of the site.
NSW EPA Contaminated Land Public Record	A search of the NSW EPA Contaminated Land Public Record was carried out on 13 April 2022 for declaration notices, orders made by the EPA under the CLM Act 1997, voluntary management proposals approved under the CLM Act 1997, and site audit statements relating to significantly contaminated land. The search of the database revealed that the site, or properties within 250 m of the site, are not listed on the contaminated land public record.

3.3. Detailed Site Investigation

The St Marys Detailed Site Investigation (DSI) included an assessment of soil and groundwater conditions at the site with a focus on the redevelopment of the STM site as a Station Box and Tunnel for the Project. Reports prepared by Tetra Tech Major Projects Pty Ltd (TTMP) as part of the undertaking of the DSI and to inform the RAP are summarised in the following table.

Table 3: Previous Reports

Report	Reference
DSI (St Marys DSI)	St Marys Station - Detailed Site Investigation - Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works. Prepared for CPBG. Ref: SMWSASBT-CPG-SWD-SW000-GE-RPT-040513. Revision: A03. Dated 27 September 2022
DSI Addendum (St Marys Groundwater Addendum)	St Marys Station - Detailed Site Investigation Addendum Groundwater Monitoring Data - Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works. Prepared for CPBG. Ref: SMWSASBT-CPG-SWD-SW000-GE-RPT-040518. Revision: A01. Dated 23 November 2022
DSI Addendum (St Marys Plaza Addendum)	Detailed Site Investigation Addendum St Marys Station. Prepared for CPBG. Ref: SMWSASBT-CPG-SWD-SW000-GE-RPT-040516. Revision: A02. Dated 13 October 2022
Human Health Risk Assessment (Queen St HHRA)	St Marys Station - Former Dry Cleaner, 1-7 Queen St – Assessment of Human Health Risk and Mitigation Options - Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works. Prepared for CPBG. Ref: SMWSASBT-CPG-SWD-SW000-GE-RPT-040540. Revision: A05. Dated 26 April 2023. ("the HHRA Report")

The following provides a summary of the findings of previous reports which relate to the former dry cleaner at 1-7 Queens Street. Contamination is present at this property which requires management during construction through the implementation of this EMP.

3.3.1. Summary of Contamination

Elevated concentrations of hydrocarbons in the F1 (C6-10) fractions were reported in groundwater samples collected from 1-7 Queen St (former dry cleaners). The hydrocarbons reported were predominately made up of the chlorinated hydrocarbon PCE and to a lesser extent DCE, vinyl chloride, and TCE[3,4]. The maximum concentration of PCE reported was 24.5 mg/l from SBT-BH-1018. The maximum concentration of vinyl chloride reported was 0.32 mg/l from BH1/MW1.

The maximum concentrations of chlorinated hydrocarbons reported were higher than those reported in previous investigations and was considered by TTMP at the time to be the result of the installation and sampling of deeper groundwater monitoring wells at this property, and the location of monitoring wells which targeted areas which reported highest levels of impact from a member interface probe (MIP) survey.

Phenolic compounds were also detected in SBT-BH-1019.

[3] Chlorinated hydrocarbons reported include tetrachloroethene (PCE) and trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2 DCE), trans-1,2-dichloroethene (trans-1,2-DCE) and vinyl chloride
[4] TCE, DCE and vinyl chloride are breakdown products of PCE.

In comparison to the project area excluding 1-7 Queen St, concentrations of PFAS[5] were reported in monitoring wells from the former dry cleaners 1-7 Queen St. The highest concentration of PFOS[6] reported from groundwater monitoring wells was 1.07 µg/l which exceeded the Freshwater Guidelines with 95% species protection[7]. Dry cleaners are known potential sources of PFAS.

Elevated concentrations of ammonia were also reported in monitoring wells at 1-7 Queen Street.

3.3.2. Queen Street HHRA Findings

Further investigation and the undertaking of a site-specific risk assessment (SSRA) was undertaken at the former dry cleaner located at 1-7 Queen Street, St Marys. The location of the former dry clean is shown in Figure 1, Appendix 1 and is located approximately 100 m west north-west of the station box.

The SSRA including the Human Health Risk Assessment (HHRA) undertaken is documented in the HHRA Report. The HHRA Report includes further information which describes the known extent and concentration of contamination in association with the former dry cleaner in soil and groundwater at the time the HHRA was carried out. The following provides a summary of key findings of the SSRA/HHRA.

Groundwater data showed that chlorinated hydrocarbon concentrations indicative of the presence of free-phase (NAPL) solvents occurred at the top of the tunnel alignment, with lower concentrations at deeper levels within the tunnel section. This suggests that concentrations in some soil or rock encountered in the contaminated zone may be at saturation limits. Direct testing of soils in the area did not verify saturation concentrations at that depth, indicating that the contaminant pathways and concentrations down the profile are not uniform. Testing indicated that the hydraulic conductivity was higher than previously assumed in the source area at tunnel depth and between the source and station box excavation.

The time that groundwater would take to flow from the contaminated zone at 1-7 Queen Street to the Station box excavation, due to construction related drawdown and flow towards the station, was estimated between 6 and 8 months.

The HHRA based on modelled and inferred soil and groundwater concentrations indicated:

- Potential unacceptable risk to station workers from vapour intrusion and direct contact from contaminated groundwater drawn into the station box (6 to 8 months after dewatering was proposed to commence).
- Potential unacceptable risk to tunnel workers via direct contact and vapour inhalation during TBM and cross passage construction through the contaminated zone, based on 2 days' exposure. Vapour concentrations were also estimated to be above odour thresholds.
- Acceptable risk associated with vapour inhalation around spoil from the contaminated zone, in the spoil holding area.

[5] Per- and polyfluoroalkyl substances
[6] Perfluorooctane sulfonate
[7] LDPE hydrasleeves were used in the monitoring wells at 1-7 Queen St and HDPE sleeves were used in all other monitoring wells. LDPE hydrasleeves have the potential to absorb PFAS however it is considered unlikely that the deployment of these hydasleeves would have changed findings which have reported elevated concentrations of PFAS at this site. HDPE hydraleelves will be deployed in future sampling events.

- Vapour concentrations released from the station box to the surrounding area, where the public may be exposed, was estimated to be below odour thresholds and below levels that would pose a health risk.

Given the potential for unacceptable inhalation or direct contact ris,k management measures were recommended once construction commenced beneath the groundwater table including:

- on-going groundwater monitoring
- contingency mitigation measures if monitoring indicates that concentrations have, or will likely, become unacceptable.

3.3.3. Summary of Key Findings

The DSI (including Addendums to the DSI) and the Queen St HHRA identified the following key contamination issues:

- At 1-7 Queen Street chlorinated hydrocarbons (PCE, TCE, DCE and vinyl chloride) were identified in soil and groundwater and soil vapour at the 1-7 Queen Street Property (former dry cleaners) with highest concentrations reported close to the building. The concentrations reported were considered to pose potentially unacceptable risks to occupants of the property and subsurface construction workers during construction of the station box and tunnel. In addition to posing a potential unacceptable risk to human health, contaminated groundwater migrating towards the station box has the potential to impact on the classification of soil/rock materials requiring excavation and disposal for construction of the tunnel and station box.
- Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS), heavy metals and nutrients (ammonia) were identified in groundwater which are derived from diffuse sources in the project area and were considered unlikely to pose an unacceptable risk to construction workers and future users of the site. Groundwater intercepted by the project containing these COPC would be treated to comply with Planning Condition E129 or an Environmental Protection License (EPL) approved by the NSW EPA.

3.4. Summary of Remediation Works

The remedial works undertaken at the STM site as part of the SBT Works was generally consistent with that outlined in the RAP and comprised:

- Installation of a PRB to abate the migration of contaminated groundwater from 1-7 Queen Street towards the station box.
- Groundwater monitoring and implementation of a contingency plan for active mitigation of the VCH groundwater plume as per the RAP.

The PRB was installed through the injection of water mixed with Regenesis Product PlumeStop™ in three 50 mm diameters bores (refer to Figure 2A, Appendix 1) located in Queens Street to approximately 20 m AHD. This product was considered suitable to adsorb chlorinated hydrocarbons detected in groundwater. The PRB was installed to adsorb and abate the migration of hydrocarbons (including chlorinated hydrocarbons) towards station box. The injection well methodology is described in detail in the PRB Installation Report.

In conjunction with the installation of the PRB, a monitoring and contingency plan was implemented in accordance with Section 11 of the RAP. This monitoring and contingency plan has been reproduced as Section 4 of this document is to be implemented during the undertaking of the SSTOM Works until water proofing of the metro station has been completed and post construction groundwater flow from 1-7 Queen Street into the metro station is negligible. The monitoring and contingency plan is described in Section 4 of this EMP.

4. Management Plan

This section describes the groundwater monitoring and contingency plan to be implemented by the SSTOM Contractor.

4.1. Handover from SBT Contactor to SSTOM Contractor

If requested by the SSTOM Contractor to facilitate the implementation of this EMP, the SBT Contactor and its environmental consultant Tetra Tech Major Projects Pty Ltd (TTMP) is to undertake a handover with the SSTOM Contractor and its environmental consultant.

4.2. Site Access

The SSTOM Contractor shall coordinate with Sydney Metro to enable access to the groundwater monitoring wells.

4.3. Groundwater Monitoring

The groundwater monitoring program described in the following table is to be implemented.

Table 4: Construction Phase Groundwater Monitoring

Monitoring Well	Frequency	Analytes	Purpose	Trigger Value and Contingency Plan
SBT-GW-0001a **SBT-GW-0001b**	Weekly	Volatile Chlorinated Hydrocarbons (VCH)	Monitor migration of chlorinated hydrocarbons from source area at 1-7 Queen Street	Trigger Value: refer to Section 4.5 Contingency Plan: Refer to Section 4.6
SBT-GW-1012 * **SBT-GW-1013 *** **SBT-GW-1014 ***	Weekly			
SBT-GW-1347a * **SBT-GW-1347b *** **SBT-GW-1347c *** **SBT-GW-1348a *** **SBT-GW-1348b *** **SBT-GW-1348c ***	Primary mitigation: Weekly for 'c' interval wells (at ~18mAHD) *If contingency mitigation implemented, then all multi-level wells monitored weekly*			

* Sentinel Monitoring Well

Installation details for these monitoring wells is provided in Table 5.

Table 5: Multi-Level Well Installation Details

Existing monitoring well ID	Screen top	Screen bottom	Screened lithology	Comment
SBT-GW-1000a	4.8 m bgs	7.5 m bgs	Alluvium	Well expected to become dry due to construction related drawdown
SBT-GW-1000b	10 m bgs	14 m bgs	Siltstone	-
SBT-GW-1012	3.5 m bgs	15.5 m bgs	Residual/ Bedrock	-
SBT-GW-1013	3.5 m bgs	15.5 m bgs	Residual/ Bedrock	-
SBT-GW-1014	3.5 m bgs	15.5 m bgs	Residual/ Bedrock	-
SBT-GW-1347-a	4 m bgs (33mAHD)	7 m bgs (30mAHD)	Alluvium	Well expected to become dry due to construction related drawdown
SBT-GW-1347-b	11 m bgs (26mAHD)	14 m bgs (23mAHD)	Siltstone	-
SBT-GW-1347-c	17 m bgs (20mAHD)	20 m bgs (17mAHD)	Siltstone (or sandstone if intersected)	-
SBT-GW-1348-a	4 m bgs (33mAHD)	7 m bgs (30mAHD)	Alluvium	Well expected to become dry due to construction related drawdown
SBT-GW-1348-b	11 m bgs (26mAHD)	14 m bgs (23mAHD)	Siltstone	-
SBT-GW-1348-c	17 m bgs (20mAHD)	20 m bgs (17mAHD)	Siltstone (or sandstone if intersected)	-

4.3.1. Groundwater Sampling Methodology

Groundwater samples and field quality control samples are to be collect based on the methodology in the following table.

Table 6: Groundwater Sampling Procedure

Activity	Detail / Comments
Sampling Methods	Groundwater samples from all monitoring wells are to collected using HDPE hydrasleeves. Field parameters (pH, electrical conductivity (EC), redox potential (Eh), dissolved oxygen (DO) and temperature) are to be recorded from the sample using a calibrated water quality meter. Prior to retrieval of the hydrasleeve, the sentinel wells are to be dipped with a dual-phase interface probe (IP) to record the standing water level (SWL) and presence / absence of NAPL. Groundwater samples collected are to include QA/QC samples as described in Section 4.5. Sampling field records include the following: • Unique sample location identifier • Weather conditions

Activity	Detail / Comments
	• Water colour, turbidity, odour, present of surface layer • Other observations as considered relevant for the location Field measurements will include: • Time and date • Gauged depth prior to sampling • Water Quality parameters: pH, ORP, EC, DO and temperature • Depth of water sample Samples will be collected in laboratory provided sample containers and placed in an ice filled cooler and transported to the laboratories under chain of custody protocol. All samples are required to be documented as received by the laboratory chilled and intact.
Decontamination	Where applicable, the following procedures will be applied for decontamination of sampling equipment. • Re-useable equipment (e.g. Interface Probe) shall be decontaminated prior to first use each day at each site, and between each sampling location. • Disposable (single use) equipment such as nitrile gloves will be disposed of appropriately following each use. This equipment is not to be re-used between sampling locations to avoid cross-contamination of sampling equipment and therefore does not require decontamination. • Care will be taken at all times to handle the cleaned equipment and samples only with clean disposable nitrile gloves. Equipment will be stored after decontamination and prior to use, in clean polypropylene bags, to prevent the cleaned equipment does not come into contact with anything that may introduce contamination to the equipment. • Care will be taken to ensure that the decontamination process does not contribute to the spread of contamination of the site, stormwater or off site locations. The procedure noted below will be followed as a minimum when decontaminating reusable equipment. • Wash the equipment in a bucket of potable water with Liquinox. • Rinse the equipment thoroughly in a second bucket containing potable water. • Dry the decontaminated equipment with disposable towels or air dry on a surface that will not result in the re-contamination of the equipment. • Where equipment is being temporarily stored between sample locations (i.e. where another round of decontamination washing is not being undertaken) the equipment is to be stored in clean polypropylene bags, to prevent re-contamination prior to its next use.
Equipment Calibration	Equipment shall be calibrated as per the manufacturer's instructions. Calibration certificates shall be retained and provided in the Monthly Reports.
Field Quality Control Samples	The following types of field quality control samples shall be collected: • Intra-laboratory and inter-laboratory duplicates at a minimum rate of 5% (i.e. 1 duplicate per 20 primary samples) (approximately 1 set of samples each month) • Rinsate blanks, where non-disposable sampling equipment is used (1 per sampling event). • Trip blank and trip spike samples prepared by the laboratory (1 per week). Rinsate blanks shall consist of pre-preserved bottles filled with laboratory prepared water that is passed over decontaminated field equipment and then collected in containers used for the sampling process. Rinsate blanks shall be preserved in a similar manner to the original samples. All field quality control samples are to be analysed for VCH.

4.3.2. Quality Assurance and Control

Project specific quality assurance/quality control (QA/QC) procedures shall be implemented to improve transparency, consistency, comparability, completeness, and confidence in the data collected.

The following data quality indicators (DQIs) shall be adopted.

Table 7:DQIs for Assessment of Groundwater Samples

Item	Acceptable Limit
Analysis of blind (intra-laboratory) duplicates and split (inter-laboratory) duplicates.	Rate of 1:20 (5%) primary soil samples for the same analysis of primary samples; Calculation of relative percentage differences between primary and duplicate samples. RPD results for soil samples: • No Limit (where the average concentration is 0-10 x laboratory limit of reporting (LOR); • 50% (where the average concentration is 10-20 x laboratory LOR); and • 30% (where the average concentration is > 20 x laboratory LOR). RPDs will be considered where a concentration is greater than 10 times the LOR.
Analysis of rinsate blanks	Where non-disposable equipment is used, at least one sample per sampling event; and Results less than the laboratory LOR.
Analysis of laboratory prepared trip blanks	At least one (1) sample per week; and Results less than the laboratory LOR.
Analysis of laboratory prepared trip spikes	At least one (1) sample per week; and Results within 60-120% recovery.
Analysis of laboratory blanks, surrogates, reference and control samples	The laboratories will be required to conduct their own internal quality program for assessment of the repeatability of the analytical procedures and instrument accuracy under their NATA accreditation. This will include analysis of laboratory blank samples, duplicate samples, spike samples, control samples and surrogate spikes. The laboratory QA/QC procedures and results will be described within the laboratory reports. The laboratory internal QA/QC sample results will be reviewed for comparison with the laboratory's NATA guidelines and Schedule B3 of the ASC NEPM 2013.
Laboratories and methods used	National Association of Testing Authorities accredited for the method. Methods should be in accordance with amended ASC NEPM 2013.
Holding times	Samples should be analysed within recommended holding times.
Sample LORs and turn around time.	Primary samples are to be analysed with a 3-day laboratory turn around time. QA/QC samples to be analysed within standard laboratory turn around times (5 days).

4.3.3. Reporting

Groundwater data from the monitoring wells is to be reported by the SSTM Contactor to the Site Auditor and Sydney Metro on a monthly basis. Reporting will include the assessment of groundwater data and trigger values described in Section 4.5.

The SSTOM Contractor Leadership Team, Sydney Metro and the Site Auditor are to be notified within 5 business days if the assessment of groundwater data shows that the Trigger Values in Table 8 may be exceeded and contingency mitigation measures in Section 4.6 need to be implemented.

4.3.4. Cessation of Groundwater Monitoring

Completion of the construction of the metro station is expected to occur in 2026[8]. Cessation of the groundwater monitoring under this EMP can occur when the following has been completed under the SSTOM work package:

- Waterproofing of the station has been completed such that the flow of groundwater has returned to its pre-construction direction.
- A Validation Report and Long Term Environmental Management Plan (if required) has been prepared and approved by the Site Auditor.

4.4. Health and Safety

The SSTOM Contractor is to prepare a Project Health and Safety Management Plan (PHSMP) with consideration to the findings of the Queen Street HHRA.

Construction phase occupational exposures are to be risk assessed with reference to the requirements of the Sydney Metro Principal Contractor Health and Safety Standard Version 6 under the governance of the project nominated Certified Occupational Hygienist (COH) ®. The Level 2 Health Risk Assessment and Exposure Controls Plan should be reviewed and updated to incorporate risk of exposure to chlorinated hydrocarbons. Exposures shall be quantitatively assessed through monthly Level 3 Health Risk Assessments.

The PHSMP is to describe monitoring and mitigation measures required to protect construction workers and could include but not limited to:

- events which trigger the requirement to implement controls
- air quality monitoring at fixed and mobile locations
- personal gas monitoring
- increase ventilation in work areas
- personal protective equipment

[8] https://infrastructurepipeline.org/project/sydney-metro-western-sydney-airport-stations-systems-trains-operations-and-maintenance

4.5. Trigger Values

Where detectable concentrations of chlorinated hydrocarbons are reported in the nominated monitoring wells between the station box and the PRB, model predictions as outlined in the HHRA (TTMP, 2023) shall be reviewed to assess whether concentrations exceeding trigger values in Table 8 are likely to reach the excavation before sealing occurs. These trigger levels are time and concentration-based trigger levels which shall be used to identify unacceptable contaminant concentrations during construction. Further information regarding the derivation of these time and concentration-based trigger levels is presented in the HHRA Report.

The contingency plan outlined in Section 4.6 will be initiated if predicted concentrations of VCHs, based on concentrations reported from groundwater monitoring and travel time[9] to the key sentinel monitoring wells[10] as detailed in Table 4, indicates predicted groundwater concentrations exceeding the risk-based trigger values in Table 8 may reach the station box. Figure B provides a diagram which shows how groundwater data from the monitoring wells will be assessed during construction to determine if the implementation of the Contingency Plan is required.

Assessment of groundwater data from the monitoring wells and the predicted concentration of contamination in groundwater at the Station Box is to be undertaken on a weekly basis as per Figure B once the compounds detected[11] in Table 8 are detected in the sentinel monitoring wells. The assessment undertaken is to be reported monthly as per the requirements in Section 4.4.

Where concentration(s) of contaminant(s) are predicted to reach the station box which exceed the Trigger Values in Table 8, the result is to be reported to Sydney Metro and the Site Auditor within 7 days of receipt of the laboratory result.

Table 8:Trigger Values[12]

Compound	Trigger value
PCE	0.3 mg/L
TCE	0.055 mg/L
Cis 1,2 DCE	0.25 mg/L
VC	0.2 mg/L

[9] Estimated groundwater travel times are described in Section 5 of the HHRA Report
[10] SBT-GW-0001a, SBT-GW-0001b, SBT-GW-1012 (multi-level), SBT-GW-1013 (multi-level), SBT-GW-1014 (multi-level), SBT-GW-1347c, SBT-GW-1348c
[11] Note at the time of preparing this EMP (21/7/23) compounds in Table 8 had not been detected in the sentinel monitoring wells since weekly monitoring began (30 June 2023).
[12] Refer to the TTMP Queen St HHRA for the determination of the trigger values

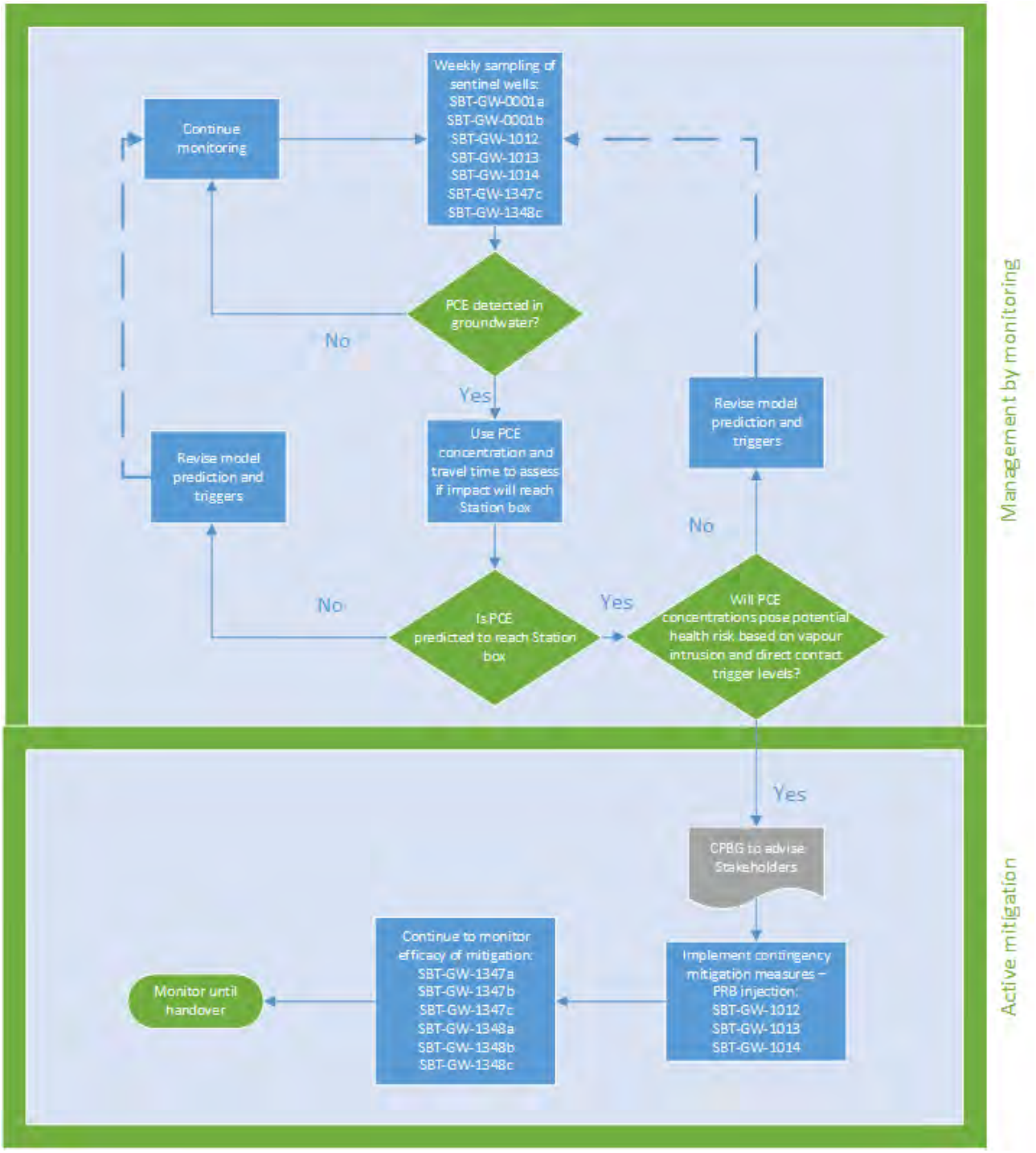


Figure B: Assessment of Trigger Values and Implementation of Contingency Plan

4.6. Contingency Plan

The following Contingency Plan is to be implemented if triggered under Section 4.5.

1) Briefing of the site workforce on the Contingency Plan and requirements of the PHSMP
2) Implementation of the required actions as per the PHSMP
3) Evaluate the need for additional mitigation which may include:
    - re-inject colloidal AC product into the injection bores installed on Queen Street and/or the injection of the product into the wells SBT-GW-1012, SBT-GW-1013, and SBT-GW-1014[13]. This measure will either reinforce the existing reactive barrier located on Queen Street or create a second PRB to further decrease the flux of chlorinated hydrocarbons being drawn toward the station excavation.
    - an active capture system based on extraction from 1012 and 1014 (or possibly the primary PRB wells).
4) Implement additional mitigation (if required) based on evaluation of available data.
5) Collection of groundwater samples from the multi-level sentinel wells and groundwater pumped from the western end of station box[14] on a weekly basis or at another frequency agreed with the Site Auditor.
6) Completion of a report summarising continency mitigations works as outlined in 1) to 4) by a Certified Environmental Practitioner Site Contamination for submission to the Site Auditor and Sydney Metro.
7) Fortnightly reporting of groundwater data from 1-7 Queen Street to Sydney Metro and the Site Auditor.

If following implementation of the contingency plan chlorinated hydrocarbons continue to be detected in the multi-level monitoring wells at concentrations of contaminant(s) predicted to reach the station box exceeding the Trigger Values in Table 8, a review by a Certified Environmental Practitioner Site Contamination shall be undertaken including:

- evaluation of whether subsequent re-injection events are required, and
- assessment of appropriate monitoring and mitigation measures for construction workers in the station box.

4.6.1. Supplementary Risk Assessment

If hydrocarbons / chlorinated hydrocarbons are drawn towards the station box there is potential for the plume to migrate beneath the existing buildings between the source area and the station box, and impact building services.

If the Contingency Plan is triggered as detailed in Section 4.6 a Supplementary Risk Assessment is to be completed for the properties between the source area and the station box to assess whether there is a potential for unacceptable risk to human health and ecological receptors, and potential risk to building services and sub-surface infrastructure.

[13] SBT-GW-1012, SBT-GW-1013, and SBT-GW-1014 have been installed to a depth of 20 m AHD and were screened from 3.5 m bgs to 15.5m bgs (base of screen at ~20 m AHD).
[14] The sample from the station box is considered to represent groundwater flowing into the station box at its western end.

Baseline indoor air quality monitoring of occupied premise(s) between the former dry cleaner and the station box is being undertaken by the SBT Contractor at the time of writing for the purpose of assessing potential human health risks to users of the building and establish baseline conditions. The report on the baseline indoor air quality monitoring is to be provided to the SSTOM Contractor.

4.7. EMP Review

This EMP is to be reviewed on a quarterly basis by the SSTOM Contractor. The review is to include but not limited to consideration of the following:

- changes in site conditions
- changes in any assumptions that underlie the scope of the EMP
- changes to construction activities
- legislative changes
- changes to sampling frequency, scope and reporting requirements
- trigger values and contingency plans
- reporting.

Any changes to the EMP are to be reviewed and approved by the Site Auditor and Sydney Metro prior to taking affect.

5. Conclusion

During construction of the St Marys metro station and tunnel(s) there is potential for groundwater containing chlorinated hydrocarbons to migrate from a former dry cleaner offsite at 1-7 Queen St to the station box as a result of groundwater drawdown and dewatering. Chlorinated hydrocarbon contamination in groundwater has the potential to pose unacceptable risks to construction workers and future users of the site.

Subject to the successful implementation of the measures described in this EMP, it is concluded that the risks associated with the ingress of contaminated groundwater into the station box can been managed to mitigate the potential risks to construction workers involved in the SSTOM Works.

TTMP considers that potential risks from chlorinated hydrocarbons can be adequately mitigated to make the site suitable for commercial/industrial use as defined in the NSW EPA Guidelines through water proofing of the station box and the implementation of other engineering controls (if required) by the SSTOM Contactor.

Practical completion of remediation and the cessation of the implementation of this EMP would be considered to have occurred when the following has been completed under the SSTOM work package:

- Waterproofing of the station has been completed such that the flow of groundwater has returned to its pre-construction direction.
- A Validation Report and Long Term Environmental Management Plan (if required) has been prepared and approved by the Site Auditor.

APPENDIX 1 Figures

293,800 293,900 294,000 294,100 294,200 294,300 294,400 294,500

6,262,100 6,262,000 6,261,900 6,261,800 6,261,700 6,261,600

NORTH ST MARYS

FORRESTER ROAD

ST MARYS MULTI-STOREY COMMUTER CAR PARK

ST MARYS COMMUTER CAR PARK

HARRIS STREET

GLOSSOP STREET

1-7 QUEEN ST (FORMER DRY CLEANER)

ST MARYS TRAIN STATION

X: 293971.0682
Y: 6261972.8678

X: 294021.8385
Y: 6261964.5782

X: 294083.3304
Y: 6261956.2201

X: 294116.8943
Y: 6261953.487

X: 294152.3612
Y: 6261949.5539

1/DP1040178

X: 293967.0949
Y: 6261947.5453

X: 294071.0384
Y: 6261956.2201

STATION STREET

X: 293988.5726
Y: 6261938.6102

X: 293989.4046
Y: 6261943.5752

ST MARYS BUS INTERCHANGE

1/DP1001735

BUS DRIVERS COMPOUND / 1 STATION STREET

2/DP1001735

QUEEN STREET

X: 294020.0145
Y: 6261917.6231

X: 294000.7416
Y: 6261921.0492

8/DP734738

X: 294161.3132
Y: 6261899.2409

X: 294264.2619
Y: 6261876.9267

X: 294468.8754
Y: 6261894.1583

CAR WASH

X: 294269.8989
Y: 6261867.7727

9/DP840717

X: 294014.4145
Y: 6261873.5741

ST MARYS STATION PLAZA

X: 294253.0899
Y: 6261883.4187

1/DP1267434

X: 294467.8094
Y: 6261882.0603

X: 294012.4225
Y: 6261847.9621

X: 294138.8452
Y: 6261844.5579

X: 294270.7759
Y: 6261876.2527

X: 294433.2395
Y: 6261843.7384

X: 294273.4379
Y: 6261863.0597

CHESHAM STREET

X: 294008.6895
Y: 6261817.2411

7/DP734738

CHEMICAL STORAGE / CLEANING SUPPLIES

X: 294155.4121
Y: 6261841.6798

X: 294421.8875
Y: 6261836.5354

X: 294424.9205
Y: 6261836.7654

X: 294460.8314
Y: 6261838.9593

PHILLIP STREET

X: 294134.1502
Y: 6261794.6118

EAST LANE

GIDLEY STREET

BLAIR AVENUE

ST MARYS

ROSS PLACE

LETHBRIDGE STREET

LEGEND

- Current Site Features
- Former Site Features
- STM Site Boundary
- Railway
- Cadastral Boundary

SOURCE
Existing site features, site layout and boundary from Tetra Tech Coffey.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 30-03-2023).

N

0 30 60 m

SCALE **1:2,250**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

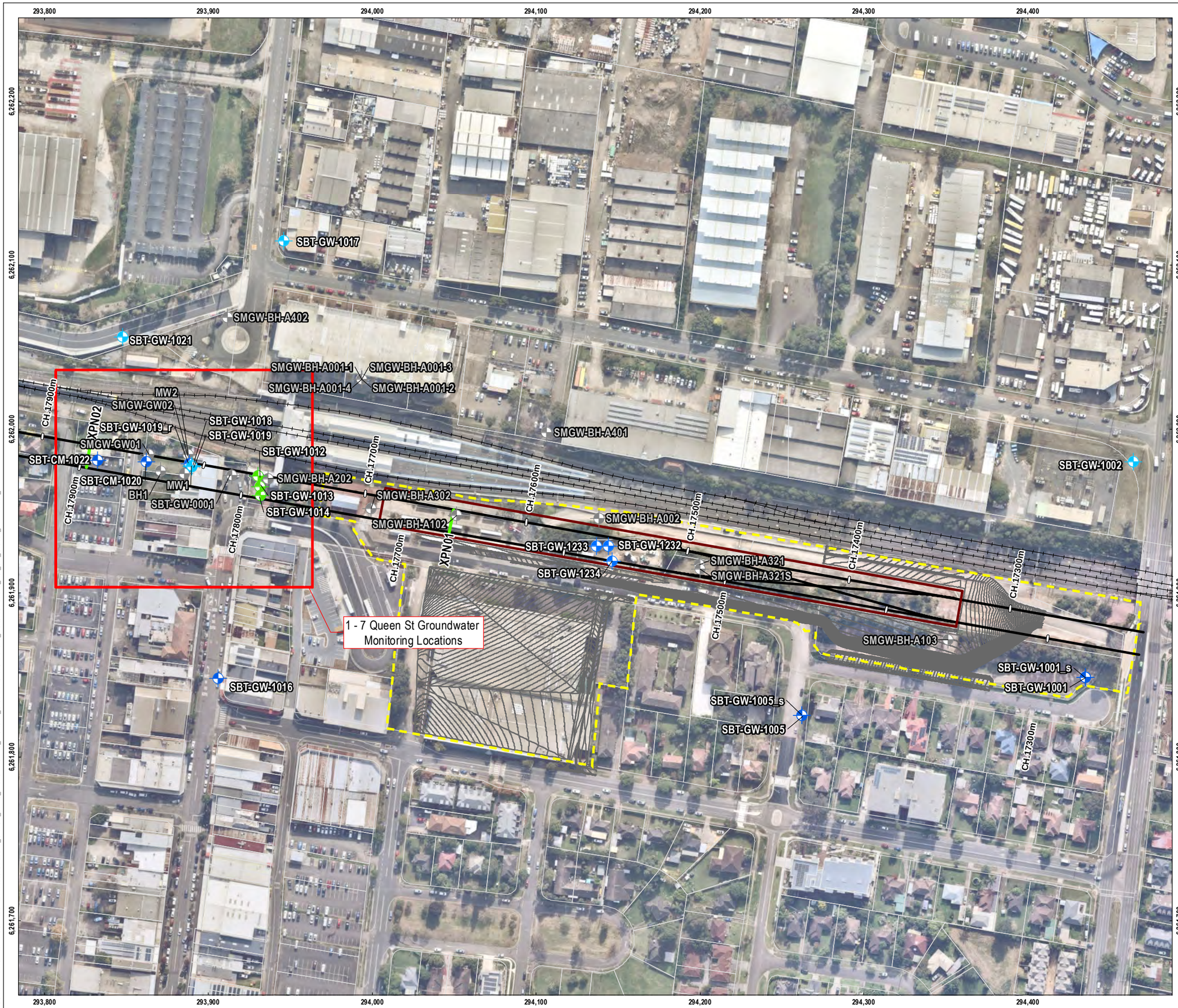
WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 1

Site Location Plan
St Marys Station

TETRA TECH COFFEY

DATE: 15.08.23 PROJECT: 754-SYDGE292575 FILE: 292575_STM_F01_GIS



LEGEND

DSI Investigation Locations

- Groundwater Quality Well
- Monitoring Well
- Sentinel and Contingency Mitigation Well - to be installed

Previous Investigation Locations

- Monitoring Well
- Tunnel Alignment
- Tunnel Alignment - Chainage
- Tunnel Alignment - Cross Passage
- St Marys Station Site Layout
- Railway
- Cadastral Boundary
- STM Site Boundary
- Station Box / Shaft

SOURCE
Investigation locations and boundary from Tetra Tech Coffey. Existing investigations, site layout, station box and alignment supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 14-06-2022).

0 50 100 m

SCALE **1:2,250**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 2

Groundwater Investigation Locations St Marys Station

TETRA TECH COFFEY

DATE: **18.11.22** PROJECT: **754-SYDGE292575** FILE: **292575_DSI_SM_F004_GIS**

CPB CONTRACTORS

Ghella 1894 5 Generations of Tunnelers

LEGEND

DSI Investigation Locations

- Groundwater Quality Well
- Monitoring Well
- Sentinel and Contingency Mitigation Well - to be installed

Previous Investigation Locations

- Monitoring Well
- Tunnel
- Tunnel Alignment - Chainage
- Tunnel Alignment - Cross Passage
- Railway
- Cadastral Boundary

Permeable Reactive Barrier

- Injection Bore

Monitoring Well

- Monitoring Well

SOURCE
Investigation locations and boundary from Tetra Tech Coffey.
Existing investigations, site layout, station box and alignment supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 14-06-2022).

N

0 10 20 m

SCALE **1:500**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

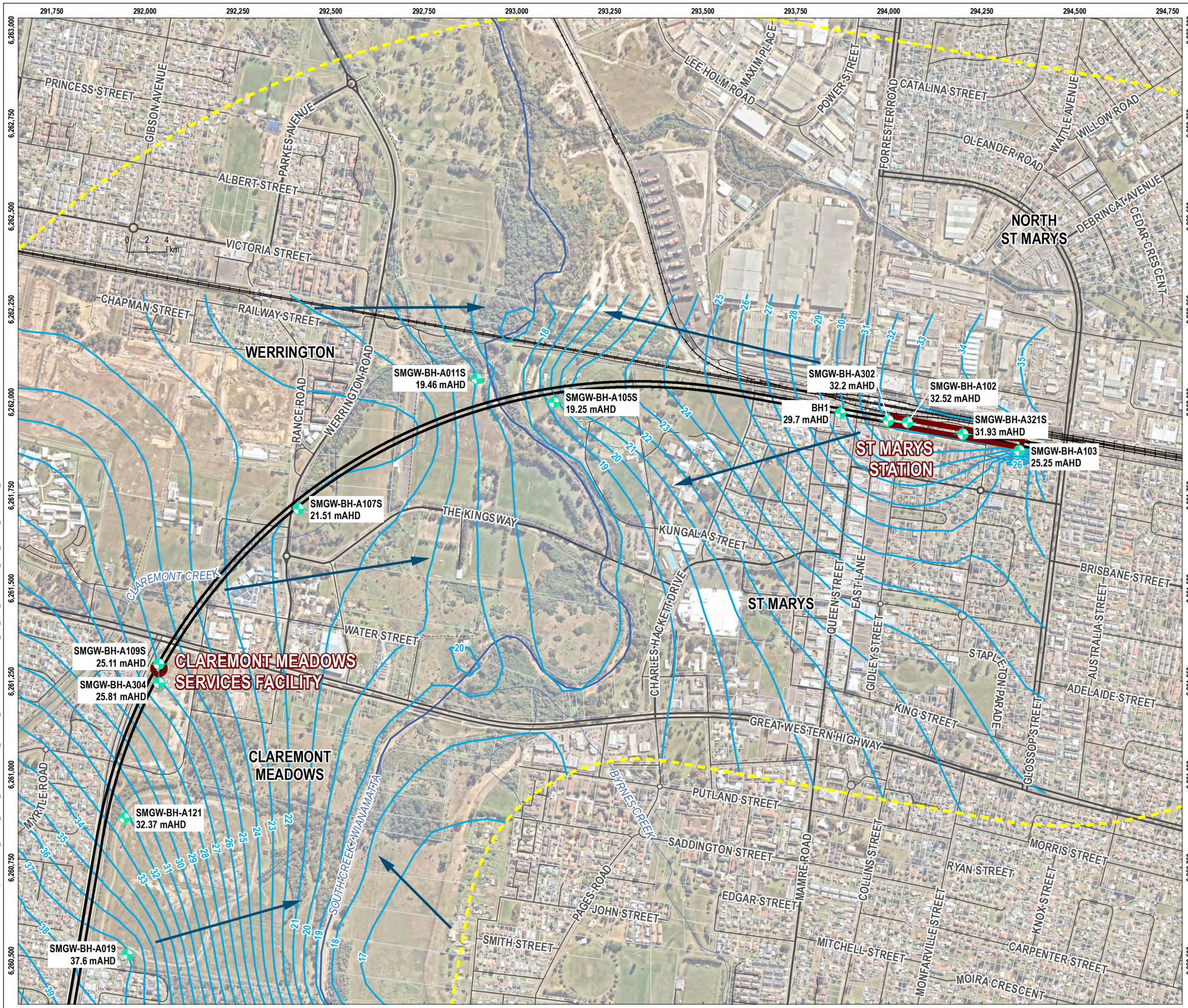
WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 2A

Groundwater Investigation Locations 1-7 Queens St, St Marys Station

TETRA TECH COFFEY

DATE: **18.11.22** PROJECT: **754-SYDGE292575** FILE: **292575_DSI_SM_F004A_GIS**



CPB CONTRACTORS

Ghella 1894 5 Generations of Tunnelers

LEGEND

- Selected Groundwater Monitoring Well
- Project Alignment
- Project Alignment - Structure
- Railway
- Major Road
- Minor Road
- Track
- Path
- Perennial Watercourse
- Non-perennial Watercourse
- Groundwater Elevation Contour (mAHD)
- Groundwater Flow Direction
- Cadastral Boundary
- Project Alignment Buffer (1 km)

SOURCE
Groundwater monitoring wells compiled by Tetra Tech Coffey.
Groundwater contours, groundwater flow direction, and alignment buffer from Tetra Tech Coffey.
Alignment supplied by CPBG.
Cadastre, roads, rail, and watercourses from DFSI.
Aerial imagery from Nearmap (capture date April, 2022).

N

0 200 400 m

SCALE **1:375,000**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 3

DSI Groundwater Level Contours

TETRA TECH COFFEY

DATE: **09.09.22** PROJECT: **754-SYDGE292575** FILE: **292575_STM_F005_GIS_REVA**

APPENDIX 2 Geological Long-Section

LEGEND

- CORE LOSS
- ASPHALT
- CH - High Plasticity CLAY
- CH-MH - High Plasticity CLAY to High Plasticity SILT
- CI - Medium Plasticity CLAY
- CI-CH - Medium to High Plasticity CLAY
- CL - Low Plasticity CLAY
- CL-CI - Low to Medium Plasticity CLAY
- CL-ML - Low Plasticity CLAY to Low Plasticity SILT
- CLAYSTONE
- CONCRETE
- CONGLOMERATE
- FILL
- GW - Well Graded GRAVEL
- INTERBEDDED SILTSTONE & SANDSTONE
- MH - High Plasticity SILT
- ML - Low Plasticity SILT
- Organic
- OL - Low Plasticity ORGANIC CLAYS and SILTS
- SANDSTONE
- SC - Clayey SAND
- SHALE
- SILTSTONE
- SILTSTONE & SANDSTONE
- SM - Silty SAND
- SP - Poorly Graded SAND
- SP-SC - Poorly Graded SAND to Clayey SAND
- SW - Well Graded SAND
- SW-SC - Well Graded SAND to Clayey SAND
- SP - Poorly Graded SAND
- GP - Poorly Graded GRAVEL

SOIL CONSISTENCY/RELATIVE DENSITY

VS	-	VERY SOFT
S	-	SOFT
F	-	FIRM
St	-	STIFF
Vst	-	VERY STIFF
H	-	HARD
Fb	-	FRIABLE
VL	-	VERY LOOSE
L	-	LOOSE
MD	-	MEDIUM DENSE
D	-	DENSE
VD	-	VERY DENSE

PROJECT UNITS

T	-	TOPSOIL
T/F	-	TOPSOIL/FILL
F	-	FILL
A	-	ALLUVIUM
R	-	RESIDUAL SOIL
SS & SHS (Class #)	-	LOCAL SANDSTONE CLASSIFICATION
SH (Class #)	-	LOCAL SHALE CLASSIFICATION

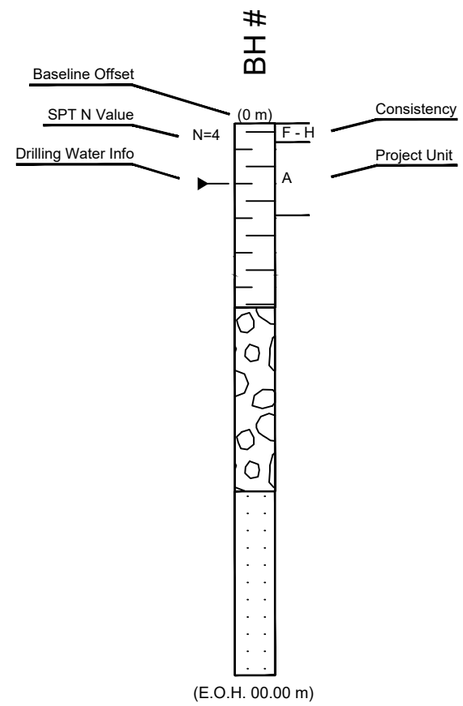
SOIL LEGEND

- S1 - FILL
- S2 - ALLUVIUM
- S3 - RESIDUAL SOILS

ROCK LEGEND

- R1 - TYPICALLY CLASS V/IV BRINGELLY SHALE
- R2 - TYPICALLY CLASS III BRINGELLY SHALE
- R3 - TYPICALLY CLASS II OR BETTER BRINGELLY SHALE

POST LEGEND



LEGEND

- EXISTING GROUND SURFACE
- INFERRED GEOLOGICAL BOUNDARY
- APPROXIMATE INTERFACE BETWEEN SH-V & SH-IV

1. SITE-SPECIFIC INVESTIGATION DATA IS INCOMPLETE AND PROVIDED IN DRAFT FORMAT FOR SOME LOCATIONS.
2. NO GUARANTEE CAN BE GIVEN AS TO THE VALIDITY, NATURE AND CONTINUITY OF THE VARIOUS SUBSURFACE FEATURES SHOWN.
3. INFERRED SUBSURFACE CONDITIONS BETWEEN BOREHOLES HAVE BEEN CREATED FROM 3D INTERPOLATION AND/OR EXTRAPOLATION OF DISCRETE TEST HOLE DATA. AS SUCH THE CONDITIONS SHOWN ARE AN INTERPRETATION AND MUST BE CONSIDERED AS A GUIDE ONLY.
4. LOCAL VARIATIONS OR ANOMALIES IN GROUND CONDITION CAN OCCUR IN THE NATURAL ENVIRONMENT, PARTICULARLY BETWEEN DISCRETE TEST HOLE LOCATIONS.
5. FOR DETAILS AND PRECISE LOCATIONS OF PARTICULAR BOREHOLES, REFERENCE SHOULD BE MADE TO THE ORIGINAL LOGS FROM SOURCE DOCUMENTS.
6. GROUND SURFACE SHOWN IS BASED ON THE LIDAR PROVIDED ON FOUNDATION SPATIAL DATA (ELVIS) FROM GEOSCIENCE AUSTRALIA (2019) WITH THE EXCEPTION OF THE WSI AREA WHICH IS BASED ON CLIENT PROVIDED DATA.
7. THE BEDROCK HAS GENERALLY BEEN CATEGORISED BASED ON A SIMPLIFIED VERSION OF THE PELLS (2019) METHOD. HERE CLASS V AND IV HAVE BEEN COMBINED IN A SINGLE ROCK UNIT AND CLASS I AND II HAVE ALSO BEEN COMBINED AS A SINGLE UNIT.
8. ROCK ZONES ARE DENOTED AS "TYPICALLY CONTAINING...". DESIGNERS SHOULD NOTE THAT EACH ROCK ZONE MAY CONTAIN AREAS OF HIGHER AND LOWER ROCK CLASSIFICATION AND ACCOUNT FOR SUCH VARIATION IN THEIR DESIGN.
9. POSITIONS OF TUNNELS, STATION BOXES, DIVE STRUCTURES AND SERVICE SHAFTS ARE INDICATIVE ONLY.
10. FOR GEOTECHNICAL CROSS-SECTIONS, POSITION “0” ON THE X-AXIS REFERS TO DISTANCE FROM THE SOUTHBOUND TUNNEL ALIGNMENT.
11. DISTANCE BELOW BOREHOLE INDICATES APPROXIMATE OFFSET FROM SECTION LOCATION IN METRES.

REV.	BY	DATE	DESCRIPTION	APPD.
A	AW	25/03/2022	DEVELOPED CONCEPT DESIGN	VN

SCALES

NOTE:
PLEASE REFER TO NOTES ON THE LEGEND PAGE.

CLIENT

SERVICE PROVIDERS

DRAWN	Annette Wilson	25 Feb 2022
DESIGNED	Viet Nguyen	25 Feb 2022
DRG CHECK	Troy Credlin	25 Feb 2022
DESIGN CHECK	Ching Dai	25 Feb 2022
APPROVED	Troy Credlin	25 Feb 2022

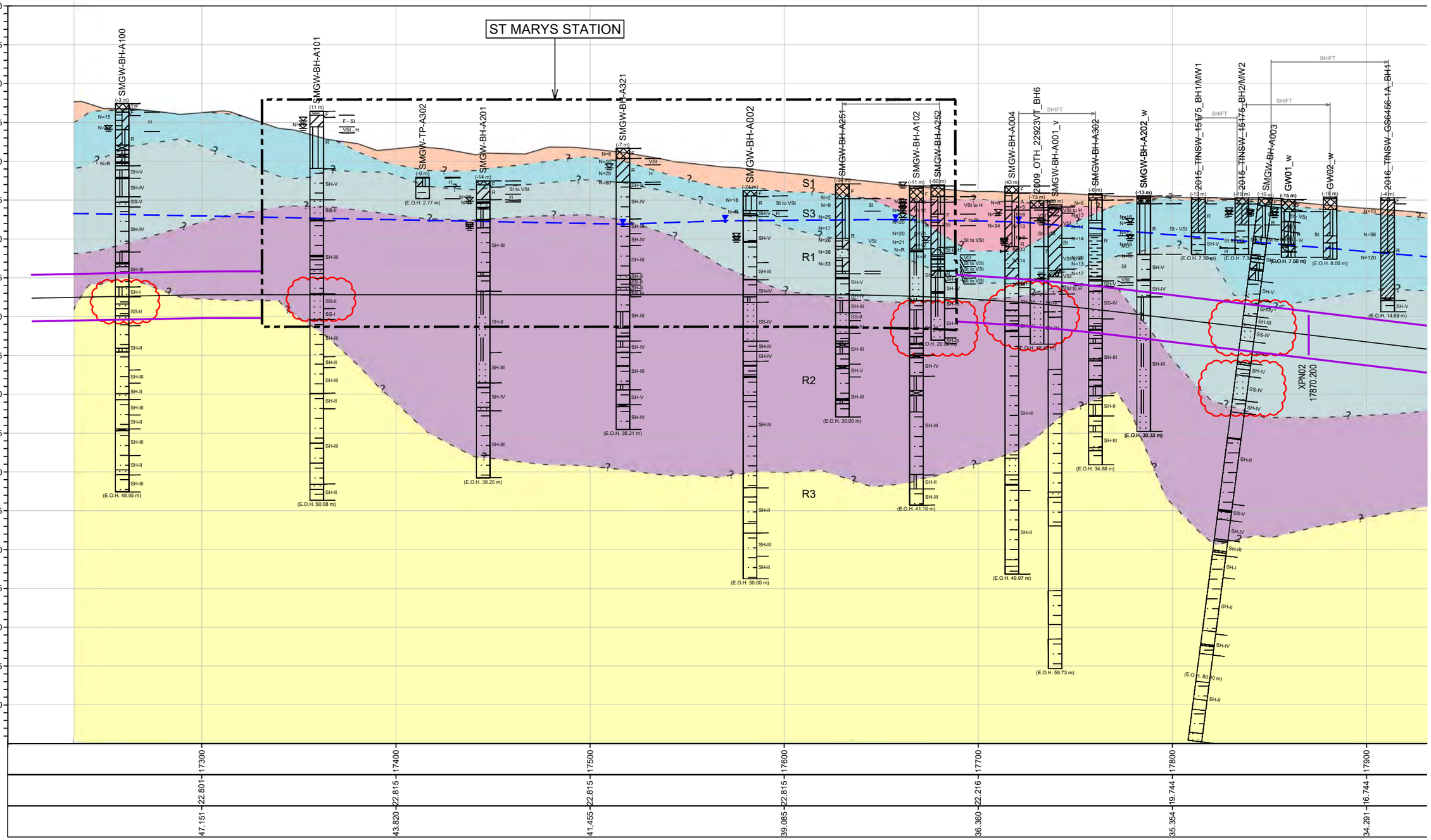
Sydney Metro Western Sydney Airport SBT

SBT North and SBT South
GEOTECHNICAL
GENERAL NOTES AND LEGEND
PROJECT WIDE

STATUS: FOR INFORMATION | SHEET 01 OF 01 | ©

DRG No. SMWSASBT-CPG-SWD-SW000-GE-DRG-040305 | REV. A

A3 Original | Co-ordinate System: Zone 56 | Height Datum: A.H.D. | This sheet may be prepared using colour and may be incomplete if copied | NOTE: Do not scale from this drawing. | ALT. DRG No. Alternate Document Number



ESTIMATED PERCENTAGE OF ROCK CLASS AT TUNNEL LEVEL		50% CLASS III, 50% CLASS >II	NOT APPLICABLE	80% CLASS IV/V, 20% RS	
APPROXIMATE RQD AT TUNNEL LEVEL		80 - 100%	NOT APPLICABLE	0 - 100%	
APPROXIMATE UCS RANGE AT TUNNEL LEVEL		17 - 9 MPa	NOT APPLICABLE	2.5 MPa	
ESTIMATED ABBRASIVITY AT TUNNEL LEVEL		MEDIUM	NOT APPLICABLE	LOW TO VERY LOW	

100mm AT FULL SIZE

REV.	BY	DATE	DESCRIPTION	APPD.
T	AW	29/07/2021	FOR REVT SUBMISSION	TC
B	AW	5/07/2021	FOR REVB SUBMISSION	TC

SCALES

0 10 20 30 40 50 60m
SCALE 1:2000 AT A3 SIZE

0 2.5 5.0 7.5 10 12.5 15m
SCALE 1:500 AT A3 SIZE

NOTES:
REFER TO NOTES ON THE LEGEND PAGE.

CLIENT

SERVICE PROVIDERS

DRAWN	Annette Wilson	5 July 2021
DESIGNED	Wendy Weng	5 July 2021
DRG CHECK	Troy Credlin	7 July 2021
DESIGN CHECK	Ching Dai	7 July 2021
APPROVED	Troy Credlin	7 July 2021

Sydney Metro Western Sydney Airport SBT

SBT North
GEOTECHNICAL
NORTHERN LONG SECTION
CH17243 - CH22500

STATUS: FOR TENDER SUBMISSION | SHEET 01 OF 09 | ©

DRG No. WSASBTT-0111-006-DRG-COFF-GE-0002 | REV. RevT

A3 Original | Co-ordinate System: Zone 56 | Height Datum: A.H.D. | This sheet may be prepared using colour and may be incomplete if copied | NOTE: Do not scale from this drawing. | ALT. DRG No. Alternate Document Number

APPENDIX C
INTERIM AUDIT ADVICE

RAMBOLL

ENVIRONMENT
& HEALTH

5 September 2022

CPB Contractors Pty Ltd and Ghella Pty Ltd
Attn: [redacted]
Level 2, 177 Pacific Highway
North Sydney NSW 2060

By email: [redacted]

Dear Stuart

RE: INTERIM AUDIT ADVICE LETTER NO.3 - REVIEW OF DETAILED SITE INVESTIGATION, PROPOSED SYDNEY METRO WESTERN SYDNEY AIRPORT ST MARYS STATION, STATION STREET, ST MARYS NSW

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: 318001447-001

Audit Number: TO-095

1. INTRODUCTION AND OBJECTIVE

As a NSW Environment Protection Authority (EPA) accredited Contaminated Sites Auditor, on behalf of CPB Contractors Pty Ltd and Ghella Pty Ltd (CPBG), I am conducting an Audit (TO-095) under the NSW *Contaminated Land Management Act 1997* (CLM Act) in relation to the proposed St Marys Station located at Station Street, St Marys NSW (Part Lot 1 Deposited Plan (DP) 1040178, Lot 1 and Lot 2 DP1001735, Lot 1 DP1267484, Lot 7 and Part Lot 8 DP734738, Part Lot 9 DP840717, Lot 175, 176, Part 177 and Part 210 DP26908, Lots 4, 5 and Part 6 DP18072, Lot 3A DP397002, Part Lot SP12965) which forms part of the Sydney Metro - Western Sydney Airport (SMWSA) rail project. The site occupies an area of approximately 3.9 hectares (ha) and the locality is shown on Attachment 1.

The SMWSA railway project includes construction of new stations, a train stabling and maintenance facility, rail infrastructure facilities, tunnels, bridges, viaducts and associated ancillary infrastructure. It is understood that construction activities at the St Marys Station site will include demolition of existing buildings/structures, establishment of temporary offices, amenities, car parking and access roads, bulk excavation to approximately 9 m and reuse of excavated material, piling and station box excavation to approximately 18.5 m RL.

The audit is required under Conditions E94, E96 and E97 of Critical State Significant Infrastructure (CSSI) approval 10051, issued on 23 July 2021 by the Minister for Planning and Public Spaces. The audit is therefore statutory. The overall objective of the audit is to enable a Section A1 or A2 site audit statement (SAS) and supporting site audit report (SAR) to be prepared that confirms the site is suitable for the proposed development. I previously prepared an Interim Audit Advice (IAA) letter (IAA2) dated 31 August 2022 confirming that preparatory construction related works can commence at the site, subject to identified controls. This review has been undertaken to provide

Ramboll Australia Pty Ltd
ACN 095 437 442
ABN 49 095 437 442

an independent review of the detailed site investigation (DSI) of the site. The review is documented in this IAA3, which was prepared to satisfy Conditions 12.9 (c) (vi and vii) of the deed agreed between Transport for NSW and CPBG.

2. SCOPE OF WORK

The following reports were reviewed:

- 'St Marys, Sampling Analysis Quality Plan, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 22 July 2022, Tetra Tech Major Projects Pty Ltd (TTMP) (*the SAQP*)
- 'St Marys Station, Detailed Site Investigation, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 28 August 2022, TTMP (*the DSI*)

The SAQP for the DSI prepared by TTMP (dated 14 June 2022) was reviewed by the Auditor and an updated version of the SAQP was prepared by TTMP dated 22 July 2022. The SAQP was specific to the construction activities and did not consider the post-construction use of the site.

The DSI was undertaken by TTMP for the proposed St Marys Station between May to August 2022. I provided review comments on a previous version of the DSI (dated 10 August 2022) by email on 23 August 2022 and received responses from TTMP by email, as well as a revised report (dated 28 August 2022) on 29 August 2022. The DSI acknowledged that it is not complete. The DSI notes that soil and groundwater data for portions of the site was not included and will be reported at a later stage.

I reviewed the SAQP and DSI against the requirements of the following:

- NSW EPA (2017) '*Guidelines for the NSW Site Auditor Scheme (3rd Edition)'*
- NSW EPA (2020) '*Contaminated Land Guidelines, Consultants Reporting on Contaminated Land'*
- National Environment Protection Council (NEPC) '*National Environment Protection (Assessment of Site Contamination) Measure 1999',* as Amended 2013 (NEPM, 2013)
- Western Australia Department of Health (WA DoH) (2021) '*Guidelines for Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*'
- Chapter 4 Remediation of Land in the *Resilience and Hazards State Environment Planning Policy (SEPP) 2021* (formerly known as SEPP 55) and NSW Department of Urban Affairs and Planning and NSW EPA (1998) *'Managing Land Contamination, Planning Guidelines SEPP 55 - Remediation of Land'*
- HEPA (2020) *'PFAS National Environmental Management Plan, Version 2.0 – January 2020'*

3. BACKGROUND

The site has been subject to previous preliminary intrusive investigations of soil, groundwater and soil vapour. The SAQP and DSI included a summary of the site history, which noted the following:

- The 1943 historical aerial imagery noted that the site comprised St Marys Station, a rail line/siding, and low-density residential housing surrounding the station. A rail siding was present south of the station (what is now the St Marys Bus Interchange) and the siding appears to have been in place through to the 1990s when it was redeveloped into the bus interchange.
- Land between the rail siding and Station Street appeared to have been cleared in 1943 and appeared to be disturbed and used for the stockpiling of materials. In the 1980s additional buildings were added (now the Bus Driver Rest Compound) with the configuration of these buildings changing

between the 1980s through to 2013. A single building and shed remained in this area from 2013 to the present day. It is understood that this area is currently used as a rest area for bus drivers.

- A former Girl Guides building was constructed in the 1970s at the eastern end of the site between the rail line and Chesham Street. The building was demolished between 2009 and 2011. Anecdotal records indicate that remediation works were completed, which included excavation and off-site disposal of asbestos impacted soils, and reinstatement of the remedial excavation with clean fill.
- From 1943 to the present-day, units/apartments were constructed and the density of residential housing increased in the area to the south of Station Street and east of Gidley Street. St Marys Station Plaza was developed in the late 1980s. During this time period, land west of Gidley Street and south of the rail line was developed for commercial use. Several service stations, motor vehicle service centres and dry-cleaning facilities were also located in this area between the 1950s and 1990s. From 2012 the site was cleared vacant land and remained in this configuration until approximately 2015.
- Land north of the rail line was progressively redeveloped into commercial/industrial use between 1943 and 1965. The commuter car parks for the rail line were developed in the late 1970s and early 1980s, and the multi-storey carpark was developed between 2009 and 2010.

The SAQP and DSI identified potentially contaminated sites nearby, including:

- The Harris Street commuter car park (north of the station) which was previously used as a wreckers and associated workshop, a plastics manufacturing site, and bus depot and associated fuel storage.
- A commercial area around Queen Street and Phillip Street (south of the station) where current and former business activities may have resulted in groundwater contamination. The businesses include a former service station (47 Phillip Street), a former dry-cleaner (51 Phillips Street) and a Waterproofer (43 Queen Street).
- St Marys Plaza on Station Street (south of the station) included chemical storage areas and a car wash. There was limited information on previous site use before the development of the Plaza in 1994.
- A former depot with the potential for an underground storage tank (UST) was located within the station box excavation. Previous investigations did not confirm the presence of a UST and contamination associated with a potential UST was not identified.
- A former dry-cleaner located at 1-7 Queen Street, which is shown as on-site on Attachment 1, however is located approximately 100 m west of the station box (Attachment 2).

The SAQP and DSI provided a summary of the previous investigations including any contamination above human health criteria for a commercial/industrial land use. The summaries noted the following:

- Fill material was observed in all previous investigation locations over the site. Review of the borehole logs indicates the depth of fill ranged between 0.2 m and 1.2 m below ground level (bgl). Visual/olfactory signs of contamination, such as soil staining and hydrocarbon odours, were not reported.
- Samples of fill and natural material reported analytes (potential contaminants) with concentrations below the adopted commercial/industrial health guidelines. Trace concentrations of perfluoroalkyl and polyfluoroalkyl substances (PFAS) were reported in both fill and natural materials over the site. Suspected asbestos containing materials (ACM) were observed in fill at one location, however, no positive detections of asbestos were reported in the soil samples analysed. It is not clear whether the suspected ACM observed was analysed to confirm the presence of asbestos.
- Groundwater monitoring detected a range of contaminants including metals, ammonia, PFAS, petroleum hydrocarbons, chlorinated hydrocarbons, polycyclic aromatic hydrocarbons (PAH) and

organo-chlorine pesticides (OCPs). Metals, ammonia and chlorinated hydrocarbons were the only contaminants reported at concentrations exceeding the adopted criteria.

- Chlorinated hydrocarbons including tetrachloroethene (PCE) were detected in monitoring well locations MW01 and MW02 in the vicinity of the former dry-cleaner located at 1-7 Queen Street to the west of the site. The PCE concentrations exceeded the 95% criteria for freshwater ecosystems and the adopted USEPA Regional Screening Level (RSL) for tap water, which is protective of children exposed via direct contact and inhalation pathways. The DSI noted that the maximum concentration of PCE in groundwater at the site was unknown, however noted that the reported concentrations indicate that PCE may be present as dense non-aqueous phase liquid (DNAPL).
- PCE was identified in both soil and soil vapour samples collected from the vicinity of the former dry-cleaner at 1-7 Queen Street. One or more soil vapour samples exceeded the health investigation levels for commercial/industrial land use for PCE breakdown products trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC).

4. REVIEW OF DSI

4.1. DSI Scope of Work

TTMP undertook the DSI over 39 days during May to August 2022, including sampling of in-situ soil and groundwater. Sample locations are shown in Attachments 2 to 5. The soil sampling was undertaken from 40 boreholes (SBT-GW-1001, SPT-BH-1003 to SPT-BH-1011, SPT-GW-1018, SPT-GW-1019, SPT-CM-1020, SPT-CM-1022, SPT-BH-1200 to SPT-BH-1222, SPT-BH-1232, SPT-GW-1233, SPT-GW-1234 and SPT-BH-1345) drilled across the site to between 1 m and 45.18 mbgl. The groundwater assessment included the installation and sampling of five new groundwater wells (SBT-GW-1232, SBT-GW-1234, SBT-BH-1018, SBT-BH-1019 and SBT-CM-1020), along with sampling from eight existing wells (SMGW-BH-A302, SMGW-BH-A321, SMGW-BH-A321-S, SMGW-BH-A401, SMGW-BH-A402, GW01, GW02 and MW1 (EMW1)).

Soil samples collected from boreholes were generally collected at pre-determined intervals within the soil profile (0-0.2 mbgl, then 0.5 m intervals in fill material, and natural materials at the interface with fill materials, and then 1 m intervals in natural to the target depth) or where changes in the soil profile were noted. Soils were field screened using a calibrated photoionisation detector (PID) device to provide a semi-quantitative assessment of volatile organic compounds (VOC) within soil pore spaces that may indicate potential contamination. A Membrane-Interface and Hydraulic Profiling Tool (MIP) survey was completed at eight locations in the vicinity of the former dry-cleaner to depths of approximately 4 to 9 mbgl.

The new groundwater monitoring wells were constructed of class 18 uPVC screen and casing to the target depth of the location with a 3-6 m screen placed in 2 mm graded sand used to create a filter to 0.5 m above the top of the screen section. Above the sand a bentonite clay plug was installed to prevent groundwater from overlying water bearing zones entering the screen along with top-down water ingress through the bore annulus. The bore annulus was then grouted to the surface and finished with a steel gatic cover. Following installation, the groundwater monitoring wells along with previously installed wells were developed using either a dedicated PVC bailer or pump to remove water introduced through drilling. Groundwater samples were collected using a Hydrasleeve passive sampler approximately one week following development and deployment of the Hydrasleeve. High Density Polyethylene (HDPE) sleeves were used in all monitoring wells with the exception of the wells in the vicinity of the former dry-cleaner where Low Density Polyethylene (LDPE) sleeves were used.

Generally, multiple samples of fill and natural material per borehole were submitted for laboratory analysis for various combinations of metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and total xylenes (BTEX), PAH, OCP, organophosphorus pesticides (OPP), phenolic compounds, polychlorinated biphenyls (PCB), PFAS, VOCs and semi-volatile organic compounds

(SVOCs) and asbestos (presence/absence). Groundwater samples were generally analysed for the same analytes (except asbestos).

Auditor's Opinion: The scope of work undertaken for the DSI was generally adequate to provide an assessment of contamination at the site for construction purposes and was generally in accordance with the SAQP. My review comments on the SAQP recommended that the DSI scope should include 500 mL and 10 Litre bulk sampling for the assessment of asbestos in accordance with NEPM (2013), however this was generally not undertaken.

4.2. DSI Results

Soil

Suspected ACM was noted in samples of fill collected from SBT-GW-1018 and SBT-GW-1019 directly adjacent to the former dry-cleaning facility. As the material was observed from a borehole and boreholes are less conducive to identifying ACM in soil, TTMP noted that there remains some uncertainty regarding the extent of potential asbestos impacts. However, the project does not propose to disturb fill materials in this area, therefore the risk associated with ACM in fill at this location was assessed by TTMP to be low.

TTMP noted exceedances of ecological criteria for zinc in the primary and duplicate sample of upper fill at SBT-GW-1019. Given that this soil will remain undisturbed and paved, the risk to terrestrial ecological receptors is low.

The reported concentrations of contaminants in soil were generally below the adopted human health and ecological criteria considering a commercial/industrial land-use scenario. Samples collected from boreholes directly adjacent to the former dry-cleaning facility detected PCE and TCE in samples from near surface to 2.0-2.1 mbgl. TTMP noted that the base depth of the soil impacts was not delineated. Analysis of a soil leachate sample from BH-SBT-GW-1019 at 1.0-1.1 mbgl reported a PCE concentration of 145 µg/L. The MIP survey suggested the presence of chlorinated hydrocarbons and the highest readings were reported closest to the former dry-cleaning building in MIP-06 at 0.95 mbgl. The survey did not identify signs of DNAPL within the strata investigated (approximately 9 mbgl).

Groundwater

Concentrations of metals in groundwater were generally within the background ranges reported in groundwater monitoring from previous sampling events, except for arsenic, nickel and zinc from monitoring wells located in the vicinity of the former dry-cleaner. TTMP noted that elevated metals concentrations were not identified in soil and the groundwater data is likely to be representative of natural and urban/industrial sources in the area.

Elevated concentrations of F1 (C_6-C_{10}) hydrocarbons were reported in groundwater samples collected from the former dry-cleaners. TTMP noted that the F1 hydrocarbons predominately comprised PCE and to a lesser extent cis-1,2-DCE, VC and TCE. The area is located approximately 120 m west of the station box and within the predicted drawdown zone influenced by dewatering during construction of the station box (it is understood that the station box will be tanked, so dewatering will cease at completion of development). The former dry-cleaner is located directly above the proposed tunnel alignment. Vertical migration of impacted groundwater and DNAPL has the potential to enter the tunnel dive immediately west of the station box. The DSI noted that the lateral migration of impacted groundwater has the potential to result in an extensive plume although some attenuation would occur, limiting its potential to impact aquatic receptors within South Creek (800 m west).

F2 (C_{10}-C_{16}) and/or F3 (C_{16}-C_{34}) hydrocarbons were reported in groundwater samples from SBT-GW-1232, SBT-GW-1234, and SMGW-BH-A321. A low concentration of toluene was also reported in SBT-GW-1232. SBT-GW-1232 and SBT-GW-1234 are located in the vicinity of a potential former UST, and SMGW-BH-A321 is located approximately 50 m further east. The laboratory advised that the source of impact in SBT-GW-1234 is potentially weathered diesel and heavy oil, and SBT-GW-1232 is 'carbocyclic

acid' based on the chromatograms (these were not provided in the DSI). Hydrocarbon odours were not observed during the installation or sampling of these monitoring wells. TTMP recommended an additional sampling event for these wells, including analysis of TRH with silica gel clean-up and GCFID12 fingerprint analysis to check for false positives and/or assist with the identification of the source of hydrocarbons.

Positive detections of PFAS were reported in the majority of samples collected. Higher concentrations of PFAS were reported in monitoring wells in the vicinity of the former dry-cleaner. Due to the high migration potential of PFAS, impacted groundwater has the potential to migrate to South Creek (800 m west). The impacted groundwater is within the predicted drawdown zone influenced by dewatering during construction of the station box. TTMP considered that further investigation is warranted.

Elevated concentrations of nitrate and ammonia were identified in groundwater in the vicinity of the former dry-cleaner. TTMP noted that high concentrations of ammonia can be toxic to aquatic organisms and an irritant to humans. Based on the distance to South Creek (800 m west), it is considered unlikely that the ammonia would pose an unacceptable risk to aquatic receptors. However, the impacted groundwater is within the predicted drawdown zone influenced by dewatering during construction of the station box.

Remaining organic compounds were reported below the limit of reporting (LOR) in the groundwater samples submitted.

4.3. DSI Conclusions and Recommendations

Based on the results of the DSI, "*TTMP conclude that the site can be made suitable as per the requirements of State Environmental Planning Policy (Hazards and Resilience) 2021. The investigation has identified areas within the site that are affected by contamination that warrant further assessment to determine the need for and scope of remediation*".

TTMP provided recommendations for spoil management during construction, further assessment in the vicinity of the former dry-cleaner, re-sampling of groundwater in the vicinity of the former UST, investigation of St Marys Plaza and completion of soil and groundwater sampling required by the SAQP (partially completed to date).

TTMP recommendations for spoil management included:

- *"CPG engage a competent person during disturbance of topsoil/fill materials to visually monitor for signs of potential contamination and potential ACM. If evidence of potential ACM or other indications of potential contamination are noted (e.g., stained or odorous soils, buried wastes, etc) work should cease pending further investigation of this material by TTMP. The competent person must be experienced in the undertaking excavation/remediation works and have the necessary experience to identify soil materials containing ACM and unforeseen contamination.*
- *Topsoil (fill) materials are stockpiled separately to natural soils, and stockpiles are managed in accordance with the requirements of the CEMP.*
- *Fill material excavated from AEC 3A and a surrounding buffer area (as shown in Figure 3C in Appendix 1 [of the DSI]) be segregated from fill materials won from elsewhere during the Preliminary Works.*
- *No soil materials shall be removed from the site without a Waste Classification Report and/or a Material Classification Report."*

For the further assessment recommended in the vicinity of the former dry-cleaner, TTMP recommended that a *"Site Specific Risk Assessment (SSRA) is completed for the purpose of assessing potential risks associated with the drawdown of groundwater from 1-7 Queen Street during construction, and potential implications for operational and maintenance phases of the Project. The SSRA will include the following main tasks:*

- *additional sampling at SBT-GW-1018, SBT-GW-1019, MW1 at multiple depths to confirm chlorinated concentrations and groundwater chemistry*
- *drilling an additional borehole near SBT-GW-1019 to refine vertical extent of chlorinated hydrocarbon and PFAS impact in soil and rock. This will include soil headspace screening and collection of soil samples at approximately 0.5 m intervals to characterise chlorinated hydrocarbon and PFAS contamination along the soil profile to the base of the tunnel depth.*
- *aquifer testing for estimating transmissivity*
- *preparation of an analytical model to model time for contaminated groundwater from 1-7 Queen St to migrate to the station box during excavation*
- *if the analytical model predicts that contaminated groundwater will be drawn into the station box during construction, completion of human health risk assessment to consider potential vapour intrusion risk to station (based on modelled groundwater concentrations) and worker health during tunnel construction*
- *preparation of a report on the above including a refined CSM, model results, HHRA, and mitigation options assessments".*

TTMP noted that following completion of all soil and groundwater sampling required by the SAQP (partially completed to date), as well as re-sampling of monitoring wells where positive detections of hydrocarbons have been reported, a supplementary groundwater assessment report will be prepared summarising the groundwater data collected for the DSI, and mitigation measures for construction and operational maintenance phases.

It is understood that DSI investigation locations could not be undertaken within the St Marys Plaza area of the site, however, are proposed to be completed within the footprint of the plaza site following demolition. At the completion of demolition, the remaining locations will be completed and the findings reported to the Auditor in an addendum letter report prior to the commencement of filling of the plaza site (proposed to be backfilled with natural material sourced from the eastern end of the site).

Auditor's Opinion: The scope of work undertaken for the DSI was generally adequate to assess contamination likely to be disturbed during construction activities (above the groundwater table), however further assessment is required.

The assessment of asbestos was not undertaken in accordance with NEPM (2013) and TTMP considered that there was the potential to uncover fill materials containing asbestos during construction. TTMP recommended that CPBG engage a competent person during disturbance of topsoil/fill materials to visually monitor for signs of potential contamination and potential ACM. The procedures within the SMWSA asbestos management plan (AMP) (Rev A dated 2 February 2022) should be implemented in the event asbestos is identified.

The Auditor agrees that further assessment of chlorinated hydrocarbons is required in order to delineate impact (vertically and laterally), determine the fate and transport of contamination under existing conditions and during dewatering, and preparation of a SSRA if there is a potential for receptors to be impacted. The Auditor notes that preparation of a remedial action plan (RAP) will be required to mitigate potentially unacceptable risks.

The Auditor agrees that re-sampling of groundwater in the vicinity of the former UST, investigation of St Marys Plaza and completion of soil and groundwater sampling required by the SAQP (partially completed to date) is required.

5. CONCLUSION AND RECOMMENDATIONS

In the Auditor's opinion, the scope of the DSI was adequate to assess contamination likely to be disturbed during construction activities (above the groundwater table).

The following recommendation are made regarding further assessment of the site:

1. The DSI identified chlorinated hydrocarbons in soil and in groundwater along with elevated concentrations of PFAS and ammonia in groundwater in the vicinity of the former dry-cleaner located at 1-7 Queen Street, located to the west of the site. Further assessment of chlorinated hydrocarbons is required along with preparation of a SSRA. Should there be potential for receptors to be impacted, preparation of a RAP will be required to mitigate the potentially unacceptable risks to future commercial/industrial land use and for works to proceed below the groundwater table. The SSRA and RAP (if required) should be provided to the Auditor for review.
2. Resampling of groundwater monitoring wells within the site where positive detections of hydrocarbons have been reported is required. If hydrocarbon contamination is confirmed, further investigation of the source and extent of impact and management during excavation will be required.
3. Asbestos in the form of ACM and zinc above ecological criteria were identified in fill materials in the vicinity of the former dry-cleaner, however no soil disturbance is proposed in this area during construction. There was a limitation in the DSI with the use of boreholes rather than test pits so there is the potential to uncover fill materials containing asbestos during construction based on the depth of fill and location of the site within an urban area/rail corridor. It is recommended that CPBG engage a competent person during disturbance of topsoil/fill materials to visually monitor for signs of potential contamination and potential ACM. The procedures within the AMP should be implemented in the event asbestos is identified.
4. Some groundwater and soil data proposed in the SAQP has not been completed to date. The DSI notes that these works are underway and/or will be undertaken following demolition and reported at a later date. These works and the proposed further assessment activities are located outside the area to be disturbed during construction activities, and therefore construction works above the groundwater table can commence prior to the works being completed. It is recommended that reports documenting the results of additional soil and groundwater assessment are provided to the Auditor for review.
5. Soil materials excavated during the works which are to be reused at the site (e.g. at St Marys Plaza) or in the larger Airport site will need to be assessed in accordance with the Materials Reused and Importation Procedure to ensure suitability for reuse. Alternatively, material should be classified and disposed offsite in accordance with EPA (2014) *Waste Classification Guidelines* and the Waste and Recycling Management Procedure.
6. Due to the groundwater data gaps identified, bulk excavation works proposed below the groundwater table should not commence until groundwater has been adequately characterised and the SSRA and RAP process are complete and approved by the Auditor. Dewatering management should consider the potential for extracted groundwater to be impacted by heavy metals, chlorinated hydrocarbons, PFAS, ammonia and nitrate.

6. LIMITATIONS

This interim audit advice was conducted on behalf of CPBG for the purpose of assessing the suitability and appropriateness of a DSI. This summary report may not be suitable for other uses.

The Auditor has relied on the documents referenced in Section 2 in preparing the Auditor's opinion. The consultants included limitations in their reports. This interim audit advice 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. If the Auditor is unable to rely on any of those documents, the conclusions of this interim audit advice could change.

It is not possible to present all data which could be of interest to all readers of this interim audit advice. 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.

* * *

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

[redacted]

[redacted]
EPA Accredited Site Auditor 1505

[redacted]

Attachments: 1 Site Location
2 to 5 DSI Sample Locations

Attachment 1: Site Location

CPB CONTRACTORS

Ghella 1894 5 Generations of Tunnelers

LEGEND

- Existing Site Feature
- Railway
- Cadastral Boundary
- SMS Site Boundary

SOURCE
Existing site features, site layout and boundary from Tetra Tech Coffey.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 18-02-2022).

N

0 30 60 m

SCALE **1:2,250**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 1

Site Location Plan
St Marys Station

TETRA TECH COFFEY

DATE: **23.08.22** PROJECT: **754-SYDGE292575** FILE: **292575_SAQP_SM_F001_GIS**

SAVED BY: EAMMON.MARHA 23.08.22 12:40:46 PM
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Attachment 2: DSI Sample Locations

LEGEND

Additional Contaminated Land Location
- Borehole

Additional Geotechnical/Hydrogeological Location
- Borehole

Existing Investigation Location
- Borehole
- Tunnel Alignment
- Tunnel Alignment - Chainage
- Tunnel Alignment - Cross Passage
- St Marys Station Site Layout
- Railway
- Cadastral Boundary
- SMS Site Boundary
- Station Box / Shaft

SOURCE
Contaminated land locations, additional investigations, site boundary, and hand samples from Tetra Tech Coffey.
Existing investigations, site layout, station box and alignment supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 14-06-2022).

N

0 20 40 m

SCALE **1:1,100**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

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WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 3A

Investigation Locations
St Marys Station

TETRA TECH COFFEY

DATE: **10.08.22** PROJECT: **754-SYDGE292575** FILE: **292575_DSI_SM_F003A_GIS**

SAVED BY: EAMMON.MARHA 10.08.22 10:55:25 AM
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Attachment 3: DSI Sample Locations

LEGEND

Additional Contaminated Land Location
- Borehole

Additional Geotechnical/Hydrogeological Location
- Borehole

Existing Investigation Location
- Borehole
- Tunnel Alignment
- Tunnel Alignment - Chainage
- Tunnel Alignment - Cross Passage
- St Marys Station Site Layout
- Railway
- Cadastral Boundary
- SMS Site Boundary
- Station Box / Shaft

SOURCE
Contaminated land locations, additional investigations, site boundary, and hand samples from Tetra Tech Coffey.
Existing investigations, site layout, station box and alignment supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 14-06-2022).

N

0 20 40 m

SCALE **1:1,000**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

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WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 3B

Contaminated Land Locations
St Marys Station

DATE: **08.08.22** PROJECT: **754-SYDGE292575** FILE: **292575_DSI_SM_F003B_GIS**

Attachment 4: DSI Sample Locations

LEGEND

Additional Contaminated Land Location
- Borehole

Additional Geotechnical/Hydrogeological Location
- Borehole

Existing Investigation Location
- Borehole
- Test Pit
- Tunnel Alignment
- Tunnel Alignment - Chainage
- St Marys Station Site Layout
- Railway
- Cadastral Boundary
- SMS Site Boundary
- Station Box / Shaft

SOURCE
Contaminated land locations, additional investigations, site boundary, and hand samples from Tetra Tech Coffey.
Existing investigations, site layout, station box and alignment supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 14-06-2022).

N

0 20 40 m

SCALE **1:1,000**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

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WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

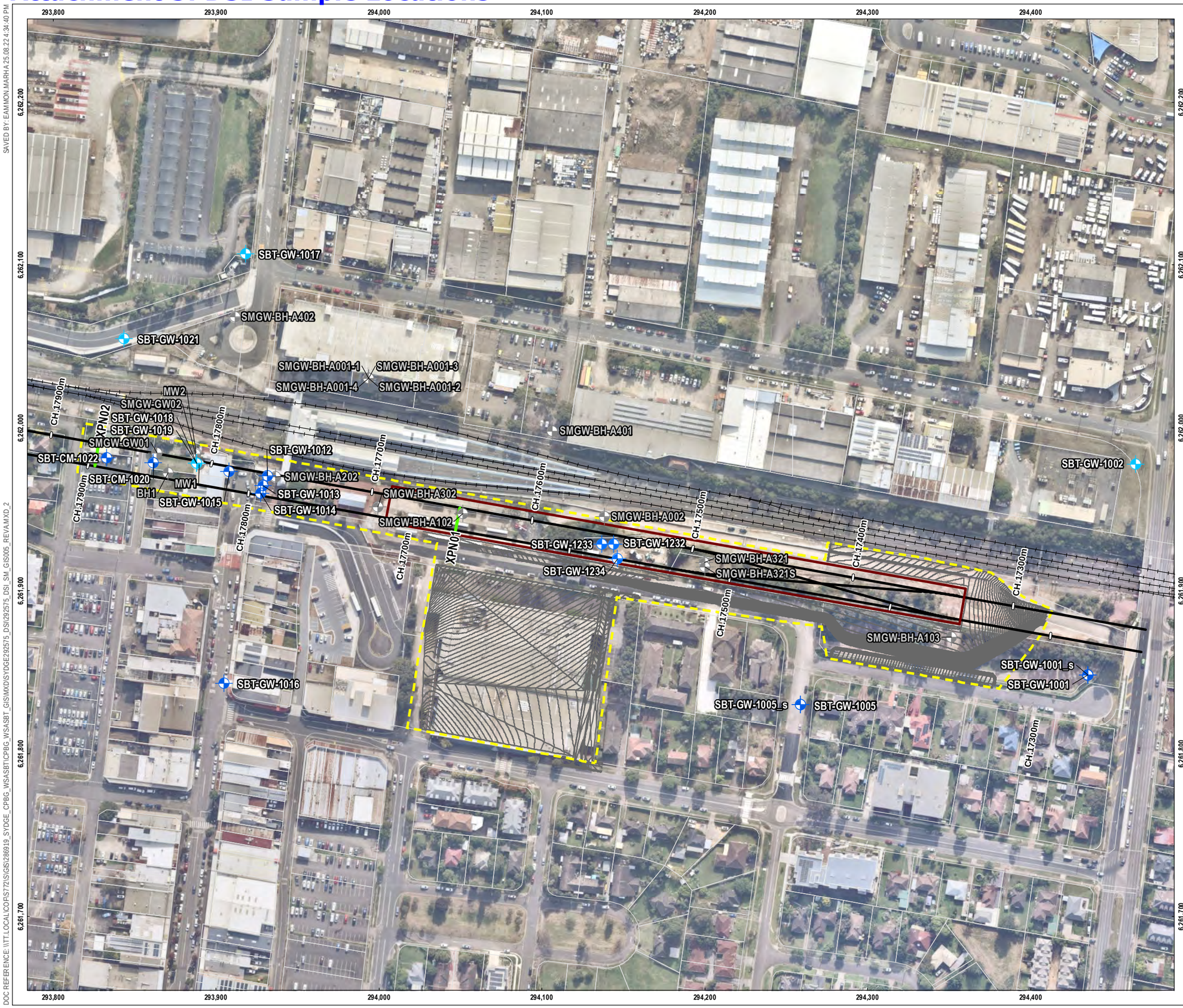
FIGURE 3C

Contaminated Land Locations
St Marys Station

TETRA TECH COFFEY

DATE: **08.08.22** PROJECT: **754-SYDGE292575** FILE: **292575_DSI_SM_F003C_GIS**

Attachment 5: DSI Sample Locations



CPB CONTRACTORS

Ghella 1894 5 Generations of Tunnelers

LEGEND

DSI Investigation Locations
- Groundwater Quality Well
- Monitoring Well

Previous Investigation Locations
- Monitoring Well
- Tunnel Alignment
- Tunnel Alignment - Chainage
- Tunnel Alignment - Cross Passage
- St Marys Station Site Layout
- Railway
- Cadastral Boundary
- SMS Site Boundary
- Station Box / Shaft

SOURCE
Investigation locations and boundary from Tetra Tech Coffey. Existing investigations, site layout, station box and alignment supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 14-06-2022).

N

0 50 100 m

SCALE **1:2,250**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

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WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 4

Groundwater Investigation Locations St Marys Station

TETRA TECH COFFEY

DATE: **25.08.22** PROJECT: **754-SYDGE292575** FILE: **292575_DSI_SM_F004_GIS**

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RAMBOLL

ENVIRONMENT
& HEALTH

17 October 2022

CPB Contractors Pty Ltd and Ghella Pty Ltd
Attn: [redacted]
Level 2, 177 Pacific Highway
North Sydney NSW 2060

By email: [redacted]

Dear [redacted]

RE: INTERIM AUDIT ADVICE LETTER NO.10 - REVIEW OF DETAILED SITE INVESTIGATION ADDENDUM, SYDNEY METRO WESTERN SYDNEY AIRPORT, ST MARYS STATION, STATION STREET, ST MARYS NSW

Ramboll Australia Pty Ltd
Level 3, 100 Pacific Highway
PO Box 560
North Sydney NSW 2060

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Ref: 318001447-001

Audit Number: TO-095

1. INTRODUCTION AND OBJECTIVE

As a NSW Environment Protection Authority (EPA) accredited Contaminated Sites Auditor, on behalf of CPB Contractors Pty Ltd and Ghella Pty Ltd (CPBG), I am conducting an Audit (TO-095) under the NSW *Contaminated Land Management Act 1997* (CLM Act) in relation to the proposed St Marys Station located at Station Street, St Marys NSW (Part Lot 1 Deposited Plan (DP) 1040178, Lot 1 and Lot 2 DP1001735, Lot 1 DP1267484, Lot 7 and Part Lot 8 DP734738, Part Lot 9 DP840717, Lot 175, 176, Part 177 and Part 210 DP26908, Lots 4, 5 and Part 6 DP18072, Lot 3A DP397002, Part Lot SP12965) which forms part of the Sydney Metro - Western Sydney Airport (SMWSA) rail project. The proposed St Marys Station site occupies an area of approximately 3.9 hectares (ha) and the locality is shown on Attachment 1.

The audit is required under Conditions E94, E96 and E97 of Critical State Significant Infrastructure (CSSI) approval 10051, issued on 23 July 2021 by the Minister for Planning and Public Spaces. The audit is therefore statutory. The overall objective of the audit is to enable a Section A1 or A2 site audit statement (SAS) and supporting site audit report (SAR) to be prepared that confirms the site is suitable for the proposed development.

The objective of this Interim Audit Advice (IAA) letter (IAA10) is to provide an independent review of an addendum to a detailed site investigation (DSI Addendum) completed for the former St Marys Plaza area of the site. IAA10 has been prepared to satisfy Conditions 12.19 (c) (vi and vii) of the deed agreed between Transport for NSW and CPBG. It relates to a portion of the St Marys Station site comprising approximately 5,000 m^2, located within the former St Marys Station Plaza (Part Lot 7 DP734738). The location and extent of this area is shown on Attachment 2.

I previously prepared an IAA letter (IAA3) dated 5 September 2022 documenting an independent review of the DSI undertaken for the site. It is understood that a subsequent version of the DSI has been prepared (dated 27

Ramboll Australia Pty Ltd
ACN 095 437 442
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September 2022) which has not been reviewed by the Auditor. CPBG have noted that the DSI was amended after issue of IAA3 to address minor feedback from Sydney Metro.

The SMWSA railway project includes construction of new stations, a train stabling and maintenance facility, rail infrastructure facilities, tunnels, bridges, viaducts and associated ancillary infrastructure. It is understood that construction activities at the St Marys Station site will include demolition of existing buildings/structures, establishment of temporary offices, amenities, car parking and access roads, bulk excavation to approximately 9 metres (m) and reuse of excavated material, piling and station box excavation to approximately 18.5 m RL.

2. SCOPE OF WORK

The following reports were reviewed:

- 'St Marys, Sampling Analysis Quality Plan, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 22 July 2022, Tetra Tech Major Projects Pty Ltd (TTMP) (*the SAQP*)
- 'Detailed Site Investigation Addendum St Marys Station', dated 13 October 2022, TTMP (*the DSI Addendum*)

The SAQP for the DSI prepared by TTMP was reviewed by the Auditor and subsequently updated by TTMP. The SAQP was specific to the construction activities and did not consider the post-construction use of the site. The DSI reviewed previous investigation reports by other consultants that were not provided to the Auditor. The DSI was undertaken by TTMP for the proposed St Marys Station between May to August 2022 and IAA3 documented the review of the DSI. The DSI noted that proposed sample locations could not be undertaken within the St Marys Plaza area of the site at the time, however, were proposed to be completed following demolition.

The DSI Addendum was undertaken by TTMP, targeting the footprint of the St Marys Plaza area in September 2022. I provided review comments on a previous version of the DSI Addendum (dated 30 September 2022) and received responses from TTMP by email, as well as a revised report (dated 13 October 2022).

I reviewed the DSI Addendum against the requirements of the following:

- Chapter 4 Remediation of Land in the *Resilience and Hazards State Environment Planning Policy (SEPP) 2021* (formerly known as SEPP 55) and NSW Department of Urban Affairs and Planning and NSW EPA (1998) *'Managing Land Contamination, Planning Guidelines SEPP 55 - Remediation of Land'*
- HEPA (2020) *'PFAS National Environmental Management Plan, Version 2.0 – January 2020'*
- National Environment Protection Council (NEPC) '*National Environment Protection (Assessment of Site Contamination) Measure 1999',* as Amended 2013 (NEPM, 2013)
- NSW EPA (2017) '*Guidelines for the NSW Site Auditor Scheme (3rd Edition)'*
- NSW EPA (2020) '*Contaminated Land Guidelines, Consultants Reporting on Contaminated Land'*
- Western Australia Department of Health (WA DoH) (2021) '*Guidelines for Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*'

3. BACKGROUND

IAA3 reported that the site has been subject to previous preliminary intrusive investigations of soil, groundwater and soil vapour. IAA3 included a summary of the site history presented in the SAQP and DSI. The following is noted for the St Marys Plaza area:

- The 1943 historical aerial imagery noted that the site comprised low-density residential housing. St Marys Station Plaza was developed in the late 1980s. There was limited information on previous site use before the development of the Plaza.
- St Marys Plaza included a below ground car park with chemical storage areas and a car wash with an oil/water separator.

The SAQP proposed 14 sample locations within the St Marys Plaza area, however only seven could be completed prior to demolition during the DSI. Based on the results of samples undertaken during the DSI, concentrations of contaminants were not identified above the the adopted human health and ecological investigations levels for commercial/industrial land use.

4. REVIEW OF DSI ADDENDUM

4.1 DSI Addendum Scope of Work

The purpose of the DSI Addendum was to document the investigation methodology and the findings for seven intrusive investigation locations within the St Marys Plaza area of the site that could not be undertaken during the DSI.

The DSI Addendum included test pitting from seven locations (SBT-BH-1224 to SBT-BH-1227, SBT-BH-1229, SBT-BH-1230 and SBT-BH-1342) to depths of approximately 1 metre below ground level (mbgl). The DSI Addendum sample locations are shown in Attachment 2. Sample location SBT-BH-1342 targeted the approximate location of the former car wash.

Soil samples were generally collected at pre-determined intervals within the soil profile (0-0.2 mbgl for fill, then 0.5 and 1 mbgl for natural soils) or where changes in the soil profile were noted. Soils samples were screened in the field for the presence of ionisable volatile organic compounds (VOCs) using a calibrated photo-ionisation detector (PID).

Generally, all fill and natural samples obtained were submitted for laboratory analysis for various combinations of metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and total xylenes (BTEX), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCP), organophosphorus pesticides (OPP), phenolic compounds, polychlorinated biphenyls (PCB), perfluoroalkyl and polyfluoroalkyl substances (PFAS), VOCs and semi-volatile organic compounds (SVOCs) and asbestos (presence/absence).

Auditor's Opinion: The scope of work undertaken for the DSI Addendum was generally adequate to provide an assessment of contamination at the site for construction purposes and was generally in accordance with the SAQP. My review comments on the SAQP recommended that the DSI scope include 500 mL and 10 Litre bulk sampling for the assessment of asbestos in accordance with NEPM (2013), however this was not undertaken for the DSI Addendum.

4.2 DSI Addendum Results

Key findings from the soil investigation, as reported in the DSI Addendum, are as follows:

- Ground conditions comprised limited fill (gravelly sandy clays up to 0.45 mbgl). A thin layer of concrete debris was encountered at the surface at one location (SBT-BH-1226). Fill materials were underlain by residual clay to the termination depths of the test pit (1 mbgl). No anthropogenic

material, asbestos containing materials (ACM) or visual/olfactory indicators of contamination were noted.

- Soil headspace PID readings were typically below 3 parts of per million (ppm), indicating a low likelihood for significant VOC contamination in the sampled soils.
- The reported contaminant concentrations were below the laboratory detection limits and/or the adopted human health and ecological criteria, however trace concentrations of PFAS were reported in fill samples. Asbestos was not detected in the samples analysed.

4.3 DSI Addendum Conclusions and Recommendations

Based on the results of the DSI Addendum, TTMP conclude:

> *"…that the area of land subject to this addendum is suitable for commercial/industrial use as per the requirements of State Environmental Planning Policy (Hazards and Resilience) 2021. Accordingly no remediation of the St Marys Station Plaza site, as defined in Figure 1, is considered to be required to make the site suitable for commercial/industrial use. Filling of the St Marys Station Plaza site is to be undertaken in accordance with the TTMP (2022) St Marys Station Remedial Action Plan (Interim) Preparatory Works and Initial Bulk Excavation, 14 September 2022.*
>
> *During construction unexpected contamination can be managed through implementation of an Unexpected Contaminated Finds Protocol included in the Project construction environmental management plan (CEMP).*
>
> *The conclusions in this addendum have assumed that the Project will be a commercial site which is predominately covered in hard landscaping with minimal soft landscaping (e.g. garden bed in a car park). The conclusions and recommendations are specific to this generic land use and development scenario*".

Auditor's Opinion: The scope of work undertaken for the DSI Addendum was adequate and the findings were consistent with previous investigations at the St Marys Station site.

Contamination has not been identified in the St Marys Plaza area and the Auditor agrees with the TTMP conclusions that no remediation of the St Marys Station Plaza site is necessary to make the site suitable for the proposed future commercial/industrial use.

5. CONCLUSION AND RECOMMENDATIONS

Overall, in the Auditor's opinion, the DSI Addendum was adequate to assess contamination in the St Marys Plaza area. Contamination has not been identified and remediation is not required. Soil disturbance is not proposed in this portion of the site, however, the area will require filling. TTMP have noted that an interim RAP has been prepared for preparatory works at the St Marys Station site and this is currently being reviewed by the Auditor.

The following recommendations are made regarding filling of the St Marys Plaza area:

1. IAA3 noted that there was a limitation in the original DSI due to the use of boreholes rather than test pits to assess fill material, hence there is the potential to uncover fill materials containing asbestos during construction based on the depth of fill and location of the site within an urban area/rail corridor. It is recommended that CPBG engage a competent person during disturbance of topsoil/fill materials to visually monitor for signs of potential contamination and potential ACM during disturbance of fill material proposed to be re-used within the St Marys Plaza area. The procedures within the asbestos management plan (AMP), prepared for the development works, should be implemented in the event asbestos is identified.

2. Soil materials excavated from elsewhere in the St Marys site that are to be reused at St Marys Plaza will need to be assessed in accordance with the Materials Reuse and Importation Procedure to ensure suitability for reuse. Alternatively, material should be classified and disposed offsite in accordance with EPA (2014) *Waste Classification Guidelines* and the WSA project Waste and Recycling Management Procedure (Attachment 3).

6. LIMITATIONS

This interim audit advice was conducted on behalf of CPBG for the purpose of assessing the suitability and appropriateness of a DSI Addendum to provide an assessment of contamination at the site for construction purposes. This summary report may not be suitable for other uses.

The Auditor has relied on the documents referenced in Section 2 in preparing the Auditor's opinion. The consultants included limitations in their reports. This interim audit advice 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. If the Auditor is unable to rely on any of those documents, the conclusions of this interim audit advice could change.

It is not possible to present all data which could be of interest to all readers of this interim audit advice. 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.

* * *

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

[redacted]

[redacted]
EPA Accredited Site Auditor 1505

[redacted]

Attachments: 1 Proposed St Marys Station Site Location

2 DSI Addendum Site Location and Sample Locations

3 Waste and Recycling Management Procedure

Attachment 1: Proposed St Marys Station Site Location

CPB CONTRACTORS

Ghella 1894 5 Generations of Tunnelers

LEGEND

- Existing Site Feature
- Railway
- Cadastral Boundary
- SMS Site Boundary

SOURCE
Existing site features, site layout and boundary from Tetra Tech Coffey.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 18-02-2022).

N

0 30 60 m

SCALE **1:2,250**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 1

Site Location Plan
St Marys Station

TETRA TECH COFFEY

DATE: **23.08.22** PROJECT: **754-SYDGE292575** FILE: **292575_SAQP_SM_F001_GIS**

SAVED BY: EAMMON.MARHA 23.08.22 12:40:46 PM
DOC REFERENCE: \\TT-LOCAL\COFS772\SIG\S\286919_SYDGE_CPBG_WSASBT\CPBG_WSASBT_GIS\MXDS\SYDGE292575_SAQP\REVB\292575_SAQP_SM_GIS001_REVB.MXD_2

Attachment 2: DSI Addendum Site Location and Sample Locations

LEGEND

Additional Contaminated Land Location
- Borehole

Additional Geotechnical/Hydrogeological Location
- Borehole

Existing Investigation Location
- Borehole
- Tunnel Alignment
- Tunnel Alignment - Chainage
- Tunnel Alignment - Cross Passage
- St Marys Station Site Layout
- Railway
- Cadastral Boundary
- SMS Site Boundary
- Station Box / Shaft

SOURCE
Contaminated land locations, additional investigations, site boundary, and hand samples from Tetra Tech Coffey.
Existing investigations, site layout, station box and alignment supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 14-06-2022).

N

0 20 40 m

SCALE **1:1,000**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 1

Contaminated Land Locations
St Marys Station

TETRA TECH COFFEY

DATE: **08.08.22** PROJECT: **754-SYDGE292575** FILE: **292575_DSI_SM_F003B_GIS**

WASTE AND RECYCLING MANAGEMENT PROCEDURE

MANAGEMENT AND RESPONSIBILITY

WASTE CLASSIFICATION
All waste (as defined in the POEO Act), including waste spoil, must be classified in accordance with the NSW Waste Classification Guidelines (EPA 2014). Waste that is not pre-classified must be sampled, analytically tested and a waste classification report prepared.

Environmental Coordinator
Environmental Consultant

HOLD POINT
Wastes that are unable to be reused or recycled will be exported to a site licenced by the EPA to accept the waste or in accordance with a valid Resource Recovery Exemption or Order, or to any other site that can lawfully accept such waste.

All Personnel

RECEIVAL LOCATION SITE CHECKS
Prior to spoil being transported off site to a location which does not hold an EPL, the receiving site landowner must confirm in writing that the site can legally accept the material and provide documentation as required by the respective Resource Recovery Exemption or Order.
Ensure the haulage contractor has written confirmation from the receival site that the spoil classification report is accepted, and this record has been provided to CPBG.

Spoil Manager
Site Engineer
Site Supervisor

MATERIAL MANAGEMENT
Potential sources of cross contamination will be identified and appropriate spoil management measures including segregation, stockpiling and direct loadout and waste tracking will be implemented in accordance with the associated Waste Classification Report and Remediation Action Plan (where relevant).

All Personnel

REJECTED LOADS
Waste that is rejected/returned due to contamination must be segregated and re-classified in accordance with the NSW Waste Classification Guidelines (EPA 2014).

Spoil Manager
Environmental Consultant

WASTE RECORDS

- A register of spoil receipt sites will be maintained, including the site or project name, location, capacity, site owner and which tier the site is classified as under the spoil reuse hierarchy.
- All waste movements must be allocated by the haulage contractor and submitted to the site as a minimum the day before the intended waste movement.
- Each waste movement must be accompanied by a waste transfer docket which details as a minimum; the waste producer, the waste receival site, the waste classification, details of stockpiles or excavation location, the time and date of transfer, vehicle registration, quantity of material transferred and acceptance of the material at the receival site. Material tracking forms must be completed for material transferred between construction sites.
- For hazardous waste movements (if required), a consignment authorisation will be obtained from the facility which is receiving the waste, a transport certificate will be completed for each load of waste and the site will ensure the transporter is licensed or legally permitted to transport the waste.
- Waste dockets will be reviewed for content and maintained electronically on-site. The waste transfer information will be documented within the site Waste Tracking Register.
- All dockets for hazardous waste movements will be maintained for a minimum of four years.

Spoil Manager
Spoil Haulage Contractor
Site Supervisor
Site Engineer

REQUIREMENTS

Targets

- 100% beneficial reuse of useable spoil
- 95% beneficial reuse of inert and non-hazardous construction/demolition waste, excluding spoil
- 60% of office waste is recycled or alternatively beneficially reused
- Maximise water re-use and use of non-potable water
- Accurately calculate materials brought to site, limit packaging and prioritise products made from recycled content

Management

- Design development process will seek to minimise the generation of spoil and maximise beneficial reuse of spoil
- All waste generated will be assessed, classified and managed in accordance with NSW Waste Classification Guidelines (EPA 2014).
- Where waste has been classified as VENM/ENM, on-site re-use options are to be investigated prior to off-site reuse
- Spoil storage locations (including VENM, contamination and unsuitable material) are to be nominated on Environmental Control Maps as approved by the Environmental Representative. Storage locations will selected to minimise noise and traffic impacts associated with spoil transport.
- Waste generated outside the premises will not be received at the premises for use, storage, treatment, processing, reprocessing, or disposal unless expressly permitted under the Environmental Protection License (EPL) or relevant Resource Exemption.
- Contaminated material is to be managed in accordance with the Contamination and Acid Sulfate Soils Management Procedure. Asbestos is to be managed in accordance with the Project WHS Management Plan.

Monitoring and Recording

- Monitoring of all waste, disposal locations and associated volumes will be carried out for the duration of the Preparatory Works

WASTE STREAM	CLASSIFICATION
Spoil	Determined through chemical assessment
Rubble, rock, sand, asphalt, road base, concrete	General Solid Waste (Non-Putrescible)
Green waste	General Solid Waste (Non-Putrescible)
Timber waste/Off cuts	General Solid Waste (Non-Putrescible)
General recyclables	General Solid Waste (Non-Putrescible)
Metal waste/offcuts	General Solid Waste (Non-Putrescible)
Electrical wire waste/off cuts	General Solid Waste (Non-Putrescible)
Waste oil	Liquid Waste
Non-destructive digging waste	Liquid Waste
Potentially contaminated water	Liquid Waste or Hazardous Liquid Waste
Asbestos	Special Waste
Food Waste, sanitary products	General Solid Waste (Putrescible)
General mixed waste	General Solid Waste (Non-Putrescible)

RAMBOLL

ENVIRONMENT
& HEALTH

24 October 2022

CPB Contractors Pty Ltd and Ghella Pty Ltd
Attn: [redacted]
Level 2, 177 Pacific Highway
North Sydney NSW 2060

[redacted]

Dear [redacted]

RE: INTERIM AUDIT ADVICE LETTER NO.11 - REVIEW OF REMEDIATION ACTION PLAN (INTERIM) PREPARATORY WORKS AND INITAL BULK EXCAVATION, SYDNEY METRO WESTERN SYDNEY AIRPORT ST MARYS STATION, STATION STREET, ST MARYS NSW

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Ref: 318001447-001

Audit Number: TO-095

1. Introduction and Objective

As a NSW Environment Protection Authority (EPA) accredited Contaminated Sites Auditor, on behalf of CPB Contractors Pty Ltd and Ghella Pty Ltd (CPBG), I am conducting an Audit (TO-095) under the NSW *Contaminated Land Management Act 1997* (CLM Act) in relation to the proposed St Marys Station located at Station Street, St Marys NSW (Part Lot 1 Deposited Plan (DP) 1040178, Lot 1 and Lot 2 DP1001735, Lot 1 DP1267484, Lot 7 and Part Lot 8 DP734738, Part Lot 9 DP840717, Lot 175, 176, Part 177 and Part 210 DP26908, Lots 4, 5 and Part 6 DP18072, Lot 3A DP397002, Part Lot SP12965) which forms part of the Sydney Metro - Western Sydney Airport (SMWSA) rail project. The proposed St Marys Station site occupies an area of approximately 3.9 hectares (ha) and is located in the City of Penrith local government area. The current zoning of the site is SP2 (Railway), B4 (Mixed Use), R4 (High Density Residential) and IN1 (General Industrial) under the Penrith Local Environmental Plan 2010. The site layout is shown on Attachment 1.

The SMWSA railway project includes construction of new stations, a train stabling and maintenance facility, rail infrastructure facilities, tunnels, bridges, viaducts and associated ancillary infrastructure. It is understood that construction activities at the St Marys Station site will include demolition of existing buildings/structures, establishment of temporary offices, amenities, car parking and access roads, bulk excavation to approximately 9 metres (m) and reuse of excavated material, piling and station box excavation to approximately 18.5 m RL.

This interim auditor advice (IAA) letter (IAA11) was prepared to document an independent review of an interim remediation action plan (Interim RAP) prepared for the site. The review and preparation of the IAA were a requirement of Clause 12.20(c)(ix) of the deed between Transport for NSW and CPBG (discussed in Section 4).

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Based on the findings of the DSI, construction activities that do not result in groundwater drawdown were considered by Tetra Tech Major Projects Pty Ltd (TTMP) to be low risk and these works would not be considered as 'remediation'. TTMP noted that remediation was defined as a management measure which is required to make the site suitable for commercial/industrial use. Construction activities which were considered low risk and not 'remediation' by TTMP included: preparatory works (site levelling (cut and fill), importation of fill for a piling platform, and piling) and bulk excavation above the groundwater table.

An Interim RAP has been prepared by TTMP to satisfy the requirements of the Deed and document the controls to be implemented with regard to the management of spoil during preparatory and bulk excavation works above the groundwater table, and the importation of material.

The audit requirements of Critical State Significant Infrastructure (CSSI) approval 10051, issued on 23 July 2021 by the Minister for Planning and Public Spaces are therefore not considered to be triggered for the preparatory works and bulk excavation above the groundwater table. Contamination was identified in groundwater, therefore it is anticipated that a site-specific risk assessment and RAP will be required for excavation below the groundwater table. It is anticipated that a Section B SAS and SAR will be prepared reviewing the RAP to satisfy Condition E94 of the CSSI.

2. Background

The Auditor previously undertook independent reviews of a detailed site investigation (DSI) and DSI Addendum that were documented in IAA3 (dated 5 September 2022) and IAA10 (dated 17 October 2022), respectively. The DSI and DSI Addendum were prepared by TTMP.

The site and surrounding area have been subject to previous intrusive investigations of soil, groundwater and soil vapour. The DSI was undertaken over periods in May to August 2022 and included sampling of in-situ soil and groundwater. Additional soil sampling was undertaken in the St Marys Plaza site area in September 2022, with results presented in the DSI Addendum. Generally, the reported concentrations of contaminants in soil were below the laboratory's limit of reporting (LOR) and the adopted criteria considering a commercial/industrial land-use scenario. The following contamination was noted:

- Suspected fragments of asbestos containing material (ACM) in two samples of fill collected directly adjacent to the former dry-cleaning facility in the west of the site (outside the proposed area of excavation).
- Chlorinated hydrocarbons, including tetrachloroethene (PCE) and breakdown product trichloroethene (TCE), in soil samples collected from the near surface to 2.0-2.1 mbgl at the former dry-cleaning facility in the west of the site (outside the proposed area of excavation).
- Elevated concentrations of chlorinated hydrocarbons were identified in groundwater and soil vapour at the former dry cleaners (outside the proposed area of excavation). The concentrations reported were considered to pose potentially unacceptable risks to future occupants of the property and subsurface construction workers during construction of the station box and tunnel as a result of migration of contamination in groundwater during dewatering of excavations.
- Petroleum hydrocarbons were identified in three groundwater wells located in the centre of the proposed station box in the vicinity of a potential former underground storage tank (UST). TTMP recommended supplementary groundwater assessment prior to bulk excavation below groundwater.
- Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) and nutrients (ammonia) were identified in groundwater which would require management during dewatering.
- Additional waste classification assessments identified the presence of asbestos and an elevated concentration of arsenic above NEPM (2013) ecological criteria in the central portion of the proposed station box.

IAA3 concluded that the following:

> "*The scope of work undertaken for the DSI was generally adequate to assess contamination likely to be disturbed during construction activities (above the groundwater table), however further assessment is required*.
>
> *The assessment of asbestos was not undertaken in accordance with NEPM (2013) and TTMP considered that there was the potential to uncover fill materials containing asbestos during construction. TTMP recommended that CPBG engage a competent person during disturbance of topsoil/fill materials to visually monitor for signs of potential contamination and potential ACM. The procedures within the SMWSA asbestos management plan (AMP) (Rev A dated 2 February 2022) should be implemented in the event asbestos is identified.*
>
> *The Auditor agrees that further assessment of chlorinated hydrocarbons was required in order to delineate impact (vertically and laterally), determine the fate and transport of contamination under existing conditions and during dewatering, and preparation of a site-specific risk assessment (SSRA) if there is a potential for receptors to be impacted.*
>
> *The Auditor agrees that re-sampling of groundwater in the vicinity of the former UST, investigation of St Marys Plaza* [addressed by DSI Addendum and IAA10] *and completion of soil and groundwater sampling required by the SAQP (partially completed to date) is required."*

The dry cleaner and associated chlorinated hydrocarbon contamination is located outside of the proposed station box excavation area, however contamination may migrate to the station box during dewatering of the excavation. Semi-volatile to non-volatile hydrocarbons identified in groundwater in the centre of the proposed station box were unlikely to present a risk to human health or the environment, however warranted further investigation to confirm the previous results.

3. Scope of Work

The following report was reviewed for this IAA:

- 'St Marys Station Remedial Action Plan (Interim) Preparatory Works and Initial Bulk Excavation', dated 21 October 2022, TTMP (*the Interim RAP*)

I provided review comments on a previous version of the Interim RAP (dated 14 September 2022) by email and received the above revised report.

I reviewed the Interim RAP against the requirements of the following:

- Chapter 4 Remediation of Land in the *Resilience and Hazards State Environment Planning Policy (SEPP) 2021* (formerly known as SEPP 55) and NSW Department of Urban Affairs and Planning and NSW EPA (1998) *'Managing Land Contamination, Planning Guidelines SEPP 55 - Remediation of Land'*
- National Environment Protection Council (NEPC) '*National Environment Protection (Assessment of Site Contamination) Measure 1999',* as Amended 2013 (NEPM, 2013)
- NSW EPA (2017) '*Guidelines for the NSW Site Auditor Scheme (3rd Edition)'*
- NSW EPA (2020) '*Contaminated Land Guidelines, Consultants Reporting on Contaminated Land'*
- NSW EPA (2022) '*Contaminated Land Guidelines, Sampling design Part 1- application*' and '*Sampling design Part 2- interpretation*'

4. Review of Interim RAP

As noted in Section 1, construction activities that do not result in groundwater drawdown were considered by TTMP to be low risk and would not be considered as 'remediation'. An Interim RAP was prepared to document the controls to be implemented with regard to the management of spoil during

preparatory and bulk excavation works above the groundwater table, and the importation of material. TTMP noted that the "*RAP has been prepared to:*

- *Summarise the contamination findings to date.*
- *Facilitate the management, reuse (e.g., within the former St Marys Station Plaza, or in the larger Airport site) and/or disposal of spoil which is anticipated to be generated during the Preparatory Works.*
- *Provide a plan which can be updated or amended if contamination is identified during additional groundwater assessments, so the site can be made suitable for a commercial/industrial land use with hardstand and minimum soft landscaping, if required.*
- *Outline the procedure to assess/validate imported material associated with the Preparatory Works (i.e., material for construction of the piling platform) as suitable for use (from a contamination perspective)*".

Preparatory works covered by the Interim RAP are outlined in Figure 4.1.

Figure 4.1: Summary of Preparatory Works covered by the Interim RAP (Source: The Interim RAP)

Construction Activity	Comment
Site levelling (cut and fill)	A portion of the STM site will be subject to cut and fill to support construction activities including: • Removal of a batter down to the original rail alignment elevation, approximately 9m below existing ground surface (mbgs). • Levelling works in the Station Box to allow construction of a piling pad. • Fill (up to 4mbgs) within the former St Marys Station Plaza) property. A copy of the cut to fill plan is provided in Appendix 2.
Importation of fill for a piling platform	A piling pad using imported fill (sandstone) will be constructed within the footprint of the station box to facilitate piling.
Piling	Bored piles will be constructed around the perimeter of the station box. A capping beam will be constructed at the top of the constructed piles to provide additional structural support. Piling will commence in the eastern portion of the station box and progress towards the west as shown on a staging plan in Appendix 3.
Bulk Excavation	Bulk excavation within the station box above the groundwater table.

A remedial options assessment and remediation strategy was not considered to be required for the preparatory works. However, the Interim RAP included spoil management measures and assessment requirements for imported materials during preparatory works. The DSI and Interim RAP noted that fill and/or topsoil shall be visually inspected for potential ACM during excavation by a competent person.

The Interim RAP also noted that spoil management shall be carried out in accordance with the project construction environmental management plan (CEMP) and applicable subplans including but not limited to the Project Soil and Water Management Sub-Plan, Project Waste and Recycling Management Sub-Plan, Project Spoil Management Sub-Plan and AMP. The Interim RAP also includes an unexpected finds procedure if observations during earthworks indicate the presence of potential contamination.

4.1. Deed Compliance Summary

Table 4.1 below has been prepared to document compliance with Condition 12.20 of the deed agreed between Transport for NSW and CPBG. It is noted that a copy of the Deed has not been provided and the Auditor has only been provided with a snippet.

Table 4.1: Clause 12.20 Remediation Action Plan Deed Compliance

Deed Clause	Deed Item	Comments
12.20(a)	The SBT Contractor must prepare and submit to the Principal's Representative and Independent Certifier a RAP in respect of the DSI performed in accordance with clause 12.19 prior to commencing any excavation activities (except in relation to Preliminary Works)	Outside Auditor scope however it is noted that both a DSI and Interim RAP have been prepared.
12.20(b)	Except in relation to the RAP in respect of Orchard Hills East Station, the SBT Contractor may not submit a RAP unless and until the DSI report for the relevant area has been submitted to the Principal's Representative and has not been the subject of notice under clause 12.19(f)(ii) within the time period specified in clause 12.19(f)(ii) (or clause 12.19(g)) as applicable	Outside Auditor scope however it is noted that both a DSI and Interim RAP have been prepared.
12.20(c)(i)	Each RAP must describe the nature and extent of contamination based on the DSI, the Information Documents and any other relevant information which is necessary to characterise risk to the construction, operation and maintenance of Sydney Metro – Western Sydney Airport	Section 7 of the Interim RAP includes a summary of previous site investigations, including the DSI and DSI Addendum. The Interim RAP only applies to bulk earthworks completed above the water table for preparatory works and does not address groundwater contamination which is to be the subject of additional investigation and risk assessment and a separate RAP, if required.
12.20(c)(ii)	Each RAP must describe the manner in which the SBT Contractor will remediate contamination within the proposed areas of excavation and/or disturbance	The Interim RAP applies to works undertaken during preparatory works above the groundwater table. Section 9 of the Interim RAP outlines actions required for spoil management while Section 10 outlines imported materials requirements.
12.20(c)(iii)	Each RAP must include a detailed risk assessment to determine and describe the requirements for remediation of contamination of land (including soil, groundwater, ground gas and vapour) within the construction site or extra land surrounding areas of proposed excavation or disturbance with respect to potential exposure scenarios, including but not limited to migration of contamination via groundwater, ground gas and odour into areas of excavation or disturbance	Section 8 of the Interim RAP notes that, based on the findings of the DSI and nature of the Project, a remedial options assessment and remediation strategy is not considered to be required for the preparatory works (including bulk excavation above the groundwater table). Further assessment of groundwater contamination and potential risks from groundwater and soils vapour is to be completed and will be subject to independent review under the Audit. A separate RAP will be prepared to address contamination outside of the scope of the preparatory works.
12.20(c)(iv)	Each RAP must present a preferred remediation option based on: A. Whole of life costs B. To the extent practicable, maintaining the overall D&C program C. Benefits (as far as is practicable based on available infrastructure design information) D. Compliance with this deed	Section 8 of the Interim RAP notes that based on the findings of the DSI and nature of the Project, a remedial options assessment and remediation strategy is not considered to be required for the preparatory works. This is considered acceptable based on the

Deed Clause	Deed Item	Comments
		nature of the works covered by the Interim RAP.
12.20(c)(v)	Each RAP must define what will constitute Remediation Practical Completion of the Remediation	Not explicitly stated however Section 11 of the Interim RAP notes that a validation report is to be completed documenting the preparatory works completed within the site.
12.20(c)(vi)	Each RAP must be prepared in accordance with law, approvals, applicable codes and standards, the lawful requirement of any authority, good industry practice, all guidelines made or approved by the EPA, the national remediation framework, the human health and environmental risk assessment and any other requirement of this deed	Section 3 of the Interim RAP outlines legislation, guidelines, codes of practice and standards which were considered to be applicable.
12.20(c)(vii)	Each RAP must be reviewed and approved by a certified contaminated land consultant	The document approval table located on the front page of the Interim RAP indicates that the TTMP reviewer is a certified contaminated land consultant
12.20(c)(viii)	Each RAP must be reviewed and endorsed by an Accredited Site Auditor	The Interim RAP has been reviewed and endorsed as documented in this IAA
12.20(c)(ix)	Each RAP must be accompanied by an interim site audit advice prepared by the accredited Site Auditor when submitted to the Principal's Representative and the Independent Certifier in accordance with clause 12.20(a)	The Interim RAP has been reviewed and endorsed as documented in this IAA. Submission is outside Auditor scope of works

Auditor's Opinion: As indicated in Table 4.1, the contents of the Interim RAP have generally satisfied the relevant Deed requirements.

5. Conclusions and Recommendations

Overall, in the Auditor's opinion, the investigations undertaken have not identified the need for remediation of soil during preparatory works and bulk excavation above the groundwater table.

The Interim RAP presents measures/management actions required to ensure any contamination identified during the works are dealt with appropriately to minimise risks to human health and the environment. The management approach recommended in the Interim RAP is considered adequate to manage spoil and the process for material handling (i.e. waste disposal, importation of material) is appropriately documented. If adequately implemented, the Interim RAP should ensure the site remains suitable for the proposed construction activities and any contamination identified during the works is dealt with appropriately, however, successful validation of preparatory works undertaken will be required to confirm this.

Further investigation, and potentially remediation, of groundwater is required to assess hydrocarbon contamination and potential risks to human health. This is to be addressed during the development process and reviewed by the Auditor. It is expected that a subsequent RAP will be prepared to address groundwater contamination outside of the scope of the preparatory works, which will be reviewed in a Section B SAS and SAR.

6. Limitations

This interim audit advice (IAA11) was conducted on behalf of CPBG for the purpose of assessing the suitability and appropriateness of a remedial action plan (RAP). This summary report may not be suitable for other uses.

The Auditor has relied on the documents referenced in Section 2 in preparing the Auditor's opinion. The consultants included limitations in their reports. This interim audit advice 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. If the Auditor is unable to rely on any of those documents, the conclusions of this interim audit advice could change.

It is not possible to present all data which could be of interest to all readers of this interim audit advice. 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.

* * *

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

[redacted]

[redacted]
EPA Accredited Site Auditor 1505

[redacted]

Attachments: 1 Site Location

Attachment 1: Proposed St Marys Station Site Location

CPB CONTRACTORS

Ghella 1894 5 Generations of Tunnelers

LEGEND

- Existing Site Feature
- Railway
- Cadastral Boundary
- SMS Site Boundary

SOURCE
Existing site features, site layout and boundary from Tetra Tech Coffey.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 18-02-2022).

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0 30 60 m

SCALE **1:2,250**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

CPB - GHELLA

WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 1

Site Location Plan
St Marys Station

TETRA TECH COFFEY

DATE: **23.08.22** PROJECT: **754-SYDGE292575** FILE: **292575_SAQP_SM_F001_GIS**

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RAMBOLL

ENVIRONMENT
& HEALTH

7 February 2023

CPB Contractors Pty Ltd and Ghella Pty Ltd
[redacted]
Level 2, 177 Pacific Highway
North Sydney NSW 2060

[redacted]

Dear [redacted]

RE: INTERIM AUDIT ADVICE LETTER NO.14 - REVIEW OF REMEDIAL ACTION PLAN AND HUMAN HEALTH RISK ASSESSMENT, SYDNEY METRO WESTERN SYDNEY AIRPORT ST MARYS STATION, STATION STREET, ST MARYS NSW

Ramboll Australia Pty Ltd
Level 3, 100 Pacific Highway
PO Box 560
North Sydney NSW 2060

T +61 2 9954 8100
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Ref: 318001447-001

Audit Number: TO-095

1. Introduction

As a NSW Environment Protection Authority (EPA) accredited Contaminated Sites Auditor, on behalf of CPB Contractors Pty Ltd and Ghella Pty Ltd (CPBG), I am conducting an Audit (TO-095) under the NSW *Contaminated Land Management Act 1997* (CLM Act) in relation to the proposed St Marys Station located at Station Street, St Marys NSW. The site forms part of the Sydney Metro - Western Sydney Airport (SMWSA) rail project. The audit is a requirement of Critical State Significant Infrastructure (CSSI) approval 10051, issued on 23 July 2021 by the Minister for Planning and Public Spaces.

The site details are as follows:

- Site address: Station Street, St Marys NSW (Attachment 1)
- Identifications details: Part Lot 1 Deposited Plan (DP) 1040178, Lot 1 and Lot 2 DP1001735, Lot 1 DP1267484, Lot 7 and Part Lot 8 DP734738, Part Lot 9 DP840717, Lot 175, 176, Part 177 and Part 210 DP26908, Lots 4, 5 and Part 6 DP18072, Lot 3A DP397002 and Part Lot SP12965)
- Site area: approximately 3.9 hectares (ha)
- Current zoning: SP2 (Railway), B4 (Mixed Use), R4 (High Density Residential) and IN1 (General Industrial) under the Penrith Local Environmental Plan 2010

It is understood that construction activities at the St Marys Station site will include demolition of existing buildings/structures, establishment of temporary offices, amenities, car parking and access roads, bulk excavation to approximately 9 metres (m) and reuse of excavated material, piling and station box excavation to approximately 18.5 m RL.

2. Objective

This interim auditor advice (IAA) letter (IAA14) was prepared to summarise an independent review of a remedial action plan (RAP) and human health risk

Ramboll Australia Pty Ltd
ACN 095 437 442
ABN 49 095 437 442

assessment (HHRA). The review and preparation of the IAA were a requirement of the deed between Transport for NSW and CPBG (discussed in Section 4).

A detailed review of the RAP and HHRA will be documented in a Section B site audit statement (SAS) and site audit report (SAR), which is currently being prepared to satisfy Condition E94 of the CSSI.

3. Background

The Auditor previously undertook independent reviews of a detailed site investigation (DSI) report and DSI Addendum that were documented in IAA3 (dated 5 September 2022) and IAA10 (dated 17 October 2022), respectively. Based on the findings of the DSI, construction activities that did not result in groundwater drawdown were considered by Tetra Tech Major Projects Pty Ltd (TTMP) to be low risk and these works would not be considered as 'remediation'. TTMP noted that remediation was defined as a management measure which is required to make the site suitable for commercial/industrial use. Construction activities which were considered low risk and not 'remediation' by TTMP included: preparatory works (site levelling (cut and fill), importation of fill for a piling platform, and piling) and bulk excavation above the groundwater table. An Interim RAP was prepared to document the controls to be implemented during these works. The Auditor previously undertook an independent review of the Interim RAP as documented in IAA11 (dated 24 October 2022).

Site investigations identified chlorinated hydrocarbon contamination in groundwater beneath a former dry cleaner located at 1-7 Queen Street (Attachment 1). Development works are not proposed at the former dry cleaner (located ~100-120 m down-gradient of the station box), however groundwater travel time modelling indicated that dewatering of the station box excavation would reverse the groundwater flow direction drawing contamination towards the station box excavation. TTMP prepared a site-specific HHRA to assess the risks to human health and develop site-specific trigger values, as well as a RAP to present the remedial strategy for excavation below the groundwater table. The HHRA and RAP are discussed further below.

4. Scope of Work

The following reports were reviewed for this IAA:

- 'St Marys Station, Remedial Action Plan, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 2 February 2023, TTMP (*the RAP*)
- 'St Marys Station, Former Dry Cleaner, 1-7 Queen St – Assessment of Human Health Risk and Mitigation Options, Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works', dated 2 February 2023, TTMP (*the HHRA*)

I provided review comments on previous versions of the RAP and HHRA by email and received the above revised report, which addressed my comments. The RAP supersedes the Interim RAP which was reviewed in IAA11.

I reviewed the HHRA and RAP against the requirements of the following:

- Chapter 4 Remediation of Land in the *Resilience and Hazards State Environment Planning Policy (SEPP) 2021* (formerly known as SEPP 55) and NSW Department of Urban Affairs and Planning and NSW EPA (1998) *'Managing Land Contamination, Planning Guidelines SEPP 55 - Remediation of Land'*
- enHealth (2012) *'Guidelines for Assessing Human Health Risks from Environmental Hazards'*
- National Environment Protection Council (NEPC) '*National Environment Protection (Assessment of Site Contamination) Measure 1999',* as Amended 2013 (NEPM, 2013)
- NSW EPA (2017) '*Guidelines for the NSW Site Auditor Scheme (3rd Edition)'*

- NSW EPA (2020) '*Contaminated Land Guidelines, Consultants Reporting on Contaminated Land'*
- NSW EPA (2022) '*Contaminated Land Guidelines, Sampling design Part 1- application*' and '*Sampling design Part 2- interpretation*'

4.1. Review of the HHRA

TTMP undertook an assessment of human health risk and mitigation options for the former dry cleaner located at 1-7 Queen Street in the HHRA. The HHRA described the testing and sampling undertaken to assess identified chlorinated hydrocarbon impact in soil and groundwater at 1-7 Queen Street and assessed the potential health risk to workers in the tunnel and station associated with exposure to the contamination. TTMP noted the HHRA was to inform the RAP for the site.

The HHRA included a transport model to estimate the time contaminated groundwater would take to reach the station box once excavation below the groundwater table and dewatering induced drawdown. The time that groundwater would take to flow from the contaminated zone at 1-7 Queen Street to the Station box excavation was estimated to be between approximately 5.5 and 9 months. The HHRA identified the potential for unacceptable inhalation or direct contact risks for workers within the site from migration of groundwater contaminated by chlorinated hydrocarbons.

Based on the risks identified, TTMP recommended that mitigation measures be implemented (discussed in Section 4.2) along with routine monitoring of groundwater in sentinel monitoring wells. The HHRA also developed site-specific trigger values for chlorinated hydrocarbons in groundwater to be protective of inhalation and direct contact exposure if contamination reached the station box. The exposure scenarios and risk assessment methodology adopted in the HHRA were appropriate and the findings of the HHRA were sufficiently reliable for assessing required risk mitigation measures and preparing the RAP.

Full documentation of the review of the HHRA will be provided in the Section B SAS and SAR currently being prepared to satisfy Condition E94 of the CSSI.

4.2. Review of RAP

The RAP has been prepared to address the relevant Deed and Planning Approval requirements. The review documented in this IAA is to satisfy the Deed requirements only. A Section B SAS and SAR is currently being prepared reviewing the RAP to satisfy Condition E94 of the CSSI. The RAP is a superseded/updated version of the Interim RAP prepared for construction activities, reviewed for IAA11, and includes controls/management options to be implemented during bulk excavation within the station box above and beneath the groundwater table.

Remediation of the site is required to mitigate the potential for unacceptable risk to human health (construction workers and future users of the site) as a result of drawdown of groundwater contaminated with volatile chlorinated hydrocarbons from 1-7 Queen Street. A remediation strategy to manage potential risks from chlorinated hydrocarbons is required for both construction and operational phases of the project. During the construction phase of the project, the RAP proposes to establish a permeable reactive barrier (PRB) of injected reactive carbon to the west of the Station box site to retard contaminated groundwater migration towards the station. An addendum to the RAP will be required as part of later works packages to describe how potential impacts to future users of the site will be managed as part of the operational phase of the project and incorporated into the design of the station (if required).

The PRB is to be installed in Queen Street within 6-8 weeks of commencement of bulk excavation of the station box. The PRB is to be installed to abate the migration of contaminated groundwater from 1-7 Queen Street to the station box. The PRB will be installed through the injection of a colloidal activated carbon (AC) product at three bores spaced 5 m apart (orange bores shown on Attachment 2) to approximately 20 metres Australian height Datum (mAHD) in Queen Street.

In-conjunction with the installation of the PRB, a monitoring and contingency plan will be implemented which is presented in Figure 4.1 below.

Figure 4.1: Construction Phase Groundwater Monitoring (Source: the RAP)

Monitoring Well	Frequency	Analytes	Purpose	Trigger Value and Contingency Plan
SBT-GW-0001a [1] **SBT-GW-0001b** [1]	Weekly	VHC	Monitor migration of chlorinated hydrocarbons from source area at 1-7 Queen Street	Trigger Value: refer to Section 11.6 Contingency Plan: Refer to Section 11.6
SBT-GW-1012 [2] **SBT-GW-1013** [2] **SBT-GW-1014** [2]	Weekly			
SBT-GW-1347a [3] **SBT-GW-1347b** [3] **SBT-GW-1347c** [3] **SBT-GW-1348a** [3] **SBT-GW-1348b** [3] **SBT-GW-1348c** [3]	Primary mitigation: Weekly for 'c' interval wells (at ~18mAHD) *If contingency mitigation implemented, then all multi-level wells monitored weekly*			

Notes:

1. An additional deeper monitoring well will be installed next to the existing monitoring well SBT-GW-0001. The additional monitoring well will have a screened interval of 10-14 m bgs. The existing well is to be called SBT-GW-0001a, and new deeper adjacent well will be SBT-GW-0001b. The deeper well will be close to tunnel depth and may need to be decommissioned prior to TBM passing through this area
2. SBT-GW-1012, SBT-GW-1013 and SBT-GW-1014 are screened from the pre-construction water table to 20mAHD with a saturated interval of 12m, although this is expected to decrease to 7m during construction. These wells will be used to monitor the effectiveness of the primary PRB, with hydrasleeves will be placed at 30mAHD, 27mAHD, 24mAHD and 21mAHD.

3. SBT-GW-1347a, SBT-GW-1347b, SBT-GW-1347c, SBT-GW-1348a, SBT-GW-1348b, SBT-GW-1348c are multi-level groundwater wells which are to be installed prior to the commencement of bulk excavation beneath the groundwater table. The location of these wells is shown in Figure 4A, Appendix 1. Proposed installation details for these wells are summarised in Table 11.

The RAP includes a contingency plan to be implemented if groundwater monitoring identifies contaminant concentrations exceeding trigger values. The contingency plan includes:

- Evaluate the need to re-inject colloidal AC product into the injection bores installed on Queen Street and/or inject the product into the sentinel monitoring wells SBT-GW-1012, SBT-GW-1013 and SBT-GW-1014 (Attachment 2).
- Consider if an active capture system based on extraction from SBT-GW-1012, SBT-GW-1013 and SBT-GW-1014 is required.
- Collect groundwater samples from sentinel monitoring wells and groundwater pumped from the western end of station box on a weekly basis or at another frequency agreed with the Site Auditor.
- Completion of a report which summarises work completed.
- Fortnightly reporting of groundwater data from 1-7 Queen Street to Sydney Metro and the Auditor.

If chlorinated hydrocarbons are detected in the additional monitoring wells, the requirement for further mitigation measures is to be considered. If the contingency plan is triggered, a supplementary risk assessment is to be completed for the properties between the source area and the station box to assess whether there is a potential for unacceptable risk to human health and ecological receptors, and potential risk to building services and sub-surface infrastructure.

The RAP noted potential management measures which could be considered for the operational stage of the site, including:

- Water proofing of the metro station such that post-construction groundwater flow from 1-7 Queen Street into the metro station is negligible.
- Provision of drainage to collect and channel seepage that enters the station box and tunnel towards a water management system.
- Design the station ventilation system such that sufficient air exchange occurs to mitigate risks associated with vapour ingress.

The proposed remediation approach presented in the RAP is considered feasible and acceptable. Full documentation of the review of the RAP will be provided in the Section B SAS and SAR currently being prepared to satisfy Condition E94 of the CSSI.

4.3. Deed Compliance Summary

Table 3 of the RAP includes a summary of the Deed requirements and relevant sections of the RAP where these are addressed. I have reviewed the RAP against these requirements and note that they have generally been satisfied (where relevant).

5. Conclusions and Recommendations

Overall, in the Auditor's opinion, the investigations undertaken have not identified the need for remediation of soil during preparatory works and bulk excavation above the groundwater table. During bulk excavation beneath the groundwater table there is potential for chlorinated hydrocarbons to migrate from the former dry cleaner at 1-7 Queen Street to the Station box as a result of groundwater drawdown and dewatering, which has the potential to pose an unacceptable risk to construction workers and future users of the site, triggering the need for remediation.

The RAP presents a preferred mitigation option which includes ongoing monitoring and installation of a PRB to abate the migration of contaminated groundwater from 1-7 Queen Street to the station box. If adequately implemented, the mitigation measures outlined in the RAP should ensure the ingress of contaminated groundwater into the station box excavation can been managed to mitigate the potential risks to construction workers, however, successful monitoring/validation will be required to confirm this.

Completion of the St Marys Metro Station is outside the scope of the construction works and will be completed under a separate works package. An Addendum to the RAP will need to be prepared describing how potential impacts to future users of the site will be managed as part of the operational phase of the project and incorporated into the design of the metro station.

6. Limitations

This interim audit advice (IAA14) was conducted on behalf of CPBG for the purpose of assessing the suitability and appropriateness of a human health risk assessment (HHRA) and remedial action plan (RAP). This summary report may not be suitable for other uses.

The Auditor has relied on the documents referenced in Section 4 in preparing the Auditor's opinion. The consultants included limitations in their reports. This interim audit advice 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. If the Auditor is unable to rely on any of those documents, the conclusions of this interim audit advice could change.

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* * *

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Yours faithfully
Ramboll Australia Pty Ltd

[redacted]

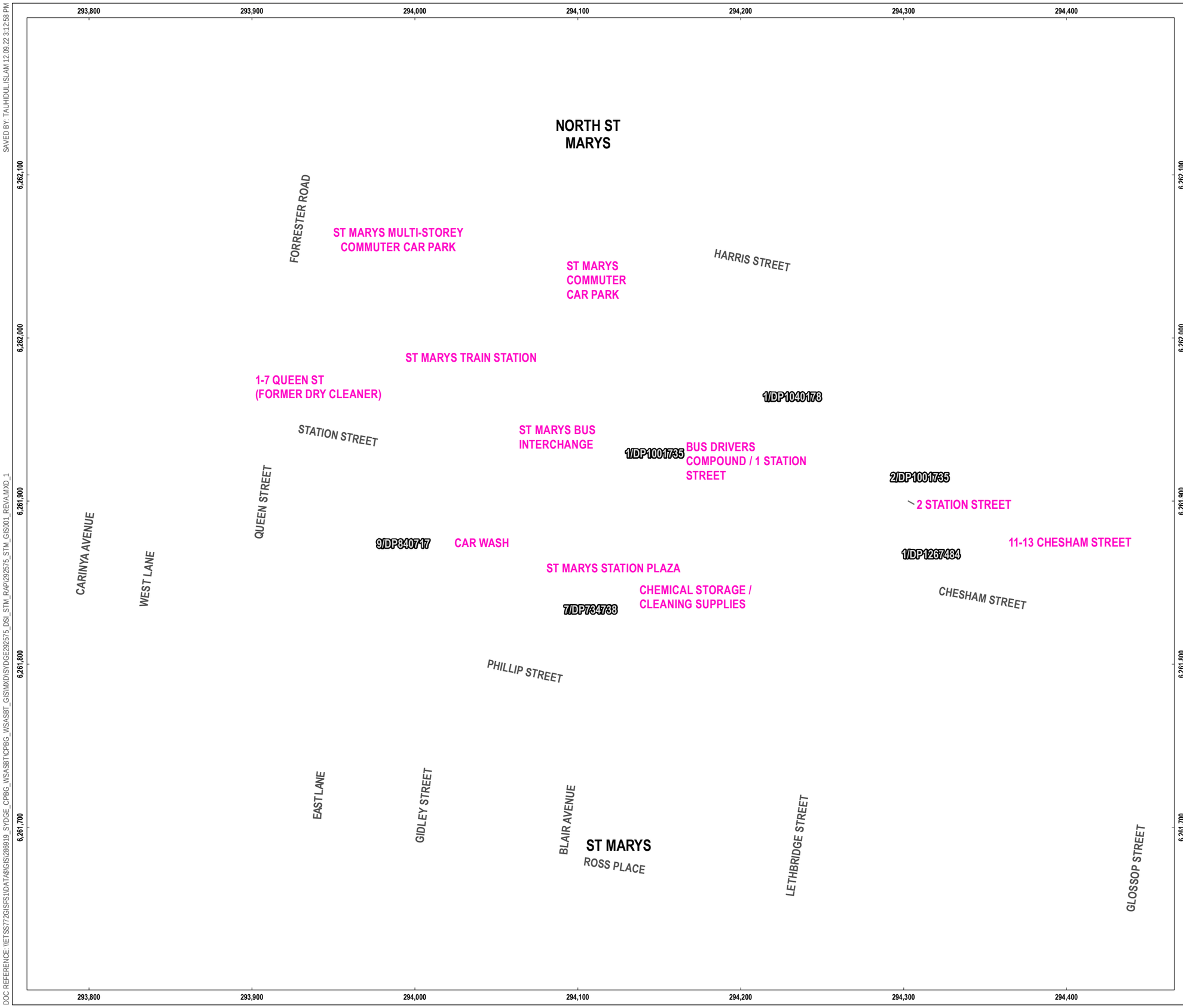
[redacted]
EPA Accredited Site Auditor 1505

[redacted]

Attachments: 1 Site Location

2 Groundwater Investigation and Remediation Locations

Attachment 1: Site Location



CPB CONTRACTORS

Ghella 1894 5 Generations of Tunnelers

LEGEND

- Site Feature
- Railway
- Cadastral Boundary
- STM Site Boundary

SOURCE
Existing site features, site layout and boundary from Tetra Tech Coffey.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 14-06-2022).

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0 30 60 m

SCALE **1:2,250**
PAGE SIZE: **A3**
PROJECTION: **GDA2020 MGA Zone 56**

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WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 1

Site Location Plan
St Marys Station

TETRA TECH COFFEY

DATE: **12.09.22** PROJECT: **754-SYDGE292575** FILE: **292575_STM_F001_GIS**

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Attachment 2: Groundwater Investigation and Remediation Locations

LEGEND

DSI Investigation Locations
- Groundwater Quality Well
- Monitoring Well
- Sentinel and Contingency Mitigation Well

Previous Investigation Locations
- Monitoring Well
- Tunnel
- Tunnel Alignment -
- Tunnel Alignment - Cross
- Railway
- Cadastral Boundary
- SMS Site Boundary

Permeable Reactive Barrier
- Injection Bore

New Monitoring Well
- Monitoring Well

SOURCE
Investigation locations and boundary from Tetra Tech Coffey.
Existing investigations, site layout, station box and alignment supplied by CPBG.
Cadastre from DFSI.
Aerial imagery from Nearmap (capture date 14-06-2022).

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WESTERN SYDNEY AIRPORT
STATION BOXES AND TUNNELLING WORKS

FIGURE 4A

Groundwater Investigation Locations St Marys Station

DATE: **25.08.22** PROJECT: **754-SYDGE292575** FILE: **292575_DSI_SM_F004A_GIS**

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