



Site Audit Report

Portion 1B and 1C, Sydney Metro West: The Bays Station, Rozelle, NSW

Prepared for

**Acciona Construction Pty Ltd and Ferrovial
Construction Pty Ltd**

James Davis

NSW EPA Accredited Contaminated Land Site Auditor

Accreditation Number: 0301

Final Report

September 2024

Report Reference: 600199_0301-2206-2

Report Title

Site Audit Report

Portion 1B and 1C, Sydney Metro West: The Bays Station
Rozelle, NSW

Report Reference: Ref: 600199_0301-2206-2

Site Audit Details:

Enviroview Project Reference: 600199

Site Auditor: James Davis

Site Auditor Accreditation Number: 0301

Date Audit Commenced: 8 November 2022

List of Site Audit Statements that this report relates to:

0301-2206-2

Client Details:

Site Audit Commissioned By: Acciona Construction Pty Ltd and
Ferrovial Construction Pty Ltd

Client Contact: Jared Lipton

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Notes: SAS – Site Audit Statement only; SAR – Site Audit Report (and Site Audit Statement)
(e) – electronic copy; (h) – hard copy and number of copies

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Executive Summary

This Site Audit Report and subsequent Site Audit Statement have been produced to document the findings of a Site Audit, conducted by James Davis of Enviroview Pty Ltd, a New South Wales Environmental Protection Authority (NSW EPA) Contaminated Land Accredited Site Auditor on the subject site identified as Portion 1B and 1C of Sydney Metro West, The Bays Station located at Robert Street, Rozelle, NSW.

The Site Audit has been conducted following a request from Acciona Construction Pty Ltd and Ferrovial Construction Pty Ltd (the AFJV) to independently review the assessment, remediation and validation works and determine whether the site is considered suitable for the proposed development.

The Site Audit requirements on this site is twofold, initially the engagement of a Site Auditor was due to an agreement between the NSW State Government (Transport for NSW) and the AFJV to review a Detailed Investigation Report and Remedial Action Plan (RAP), this was overlaid by the requirements of the project State Significant Infrastructure planning consent (SSI 10038) that should remediation be required to make land suitable for the final intended land use a Site Auditor was to provide a 'Section B' Site Audit Statement that certifies that the RAP is appropriate and that the site can be made suitable for the proposed use.

Then following that remediation and review of the related validation and long-term environmental management plan, a Site Audit Statement 'Section A' was required to certify the site is suitable for the proposed use. This Site Audit has the objective of determining if a part of the Sydney Metro West: The Bays Station site, identified as Portion 1B and 1C, where remediation has been completed is suitable for the proposed use subject to a long-term management. The Portion 1A of the wider The Bays Station construction site has previously been subject to a separate Site Audit (0301-2206-1) completed in July 2023.

The proposed land use is defined as commercial and industrial use, based on the Site Auditor's understanding of the proposed Sydney Metro West: The Bays Station construction site and the final land use as a Metro Station.

To achieve the objective, the Site Auditor has reviewed the work undertaken as reported by the various consultants and assessed whether the consultant's work complied with relevant procedures and guidelines and provides a robust basis for determining whether the land is suitable for the proposed use.

The outcome of the Site Audit is this Site Audit Report and subsequent Site Audit Statement, (number 0301-2206-2), which will be attached to the back of this report following the appendices when issued.

The Site Auditor has undertaken an independent review of the relevant reports prepared by the contaminated land consultants relating to the site and the reports relating to the assessment, remediation, and validation and ongoing management have been reviewed in relation to the objectives of the Site Audit.

The documents provided by the consultant generally meet the requirements of the Site Audit in relation to the guidelines for consultants reporting on contaminated sites (NSW EPA, 2020) and other relevant guidelines. Based on the work undertaken, as described in the reports

reviewed, the Site Auditor is satisfied that the assessment, remediation, and validation and management requirements have appropriately addressed contamination issues at the site.

The NSW EPA *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd edition)* (NSW EPA, 2017) require that during an assessment of the suitability of a site for an existing or proposed land use in an urban context, Site Auditors should follow the decision-making process for assessing urban redevelopment sites provided in the guidelines. The investigation, remediation and remediation validation, and ongoing management have been reviewed and the decision-making process prescribed has been followed by the Auditor and the site is suitable for commercial and industrial land use with specific control measures to manage the potential risks arising from the residual contamination contained on-site and the ongoing management of the capping layers.

These measures are contained within a Long-term Environmental Management Plan (LTEMP) which provides specific information for owners, managers, contractors, and workers at the site regarding the location of the contained contaminated soil and the necessary controls for both planned and unplanned in-ground intrusive works that have the potential to disturb contaminated soil.

The primary objective of this LTEMP is to protect the health of site users by ensuring maintenance of the capping and barrier layers to prevent exposure to contaminants in the soil. General usage of Portion 1B and 1C by the public or workers is unlikely to pose a risk to integrity of the capping layer due to the nature and depth of the capping material. The LTEMP has requirements for the monitoring and maintenance of the cap. Works requiring excavation into the capping layer should be avoided where possible to minimise cap disturbance. In the case that intrusive works within the cap are unavoidable, the LTEMP requires a task-specific Construction Environmental Management Plan to be prepared prior to the commencement of works. For intrusive works that are below the cap and marker layer requirements are specified for the management of excavated material and reinstatement of the marker layer and cap and documentation. Further the LTEMP provides requirements relating to Work Health and Safety in the event of intrusive works.

The implementation of the RAP (and therefore the LTEMP) and the issuing of a Site Audit Statement, which is subject to the implementation of the LTEMP, is a condition of the State Significant Infrastructure conditions of approval. The responsibility for maintaining the site in accordance with the LTEMP will be that of the landowner. That task may be delegated to third parties (a contractor, licence holder or a lessee) as applicable; however, the contamination will remain the liability of the landowner – being the State Government of NSW, who has the capacity to require compliance with the LTEMP through contractual arrangements with those third parties.

Appropriate public notification will be possible with the Site Audit Statement which has the LTEMP attached being provided to Inner West Council and the requirement for Council under s 59(2)(e) of the *Contaminated Land Management Act 1997* to record on the Planning Certificate issued pursuant to s 10.7 the *Environmental Planning and Assessment Act 1979* that a Site Audit Statement has been received by Council.

Any future Development Application or development proposed should have consideration to any items recorded on the Planning Certificate and relevant Environmental Planning Instruments including the Resilience and Hazards SEPP 2021.

The Site Auditor considers that the implementation of the LTEMP is practical and not so onerous that it cannot be easily implemented. If the LTEMP is not referred to or implemented, as it should it is noted that the contaminated soil is located below a hardstand surface and a geofabric demarcation layer was installed across a majority of the site, where capping layers were newly installed.

In conclusion, the Site Audit Statement will be issued certifying that, in the opinion of the Site Auditor, the area identified as Portion 1B and 1C of The Bays Station, Sydney Metro West is suitable for the proposed development being commensurate with commercial and industrial land use, subject to the implementation of the LTEMP.

Acronyms and Abbreviations

ACM	asbestos containing material
AEC	areas of environmental concern
AF/FA	Asbestos Fines / Friable Asbestos
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
BTEX	benzene, toluene, ethylbenzene, and xylenes
BGL	below ground level
COC	chain of custody (can also be contaminants of concern)
COPC	contaminants of potential concern
DA	Development Application
DQO	Data Quality Objectives
DEC	Department of Environment and Conservation (NSW)
DECC	Department of Environment and Climate Change (NSW)
DECCW	Department of Environment, Climate Change and Water (NSW)
DP	Deposited Plan
HILs	health-based investigation levels
IA	interim advice
LOR	limit of reporting
m	metre
MW	monitoring well
NATA	National Association of Testing Authorities
NEHF	National Environmental Health Forum
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NRMMC	Natural Resource Management Ministerial Council
NSW	New South Wales
OCPs	organochlorine pesticides
OEH	The NSW Office of Environment and Heritage
OPPs	organophosphorus pesticides
PAH	polycyclic aromatic hydrocarbons
PID	photoionisation detector
RAP	Remediation Action Plan
RL	relative level
RPD	relative per cent difference
SAR	Site Audit Report
SAS	Site Audit Statement
TPH	total petroleum hydrocarbons
TRH	total recoverable hydrocarbons
VOCs	volatile organic compounds
WHS	work health safety

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1 Introduction

1.1 Overview

This Site Audit Report and subsequent Site Audit Statement have been produced to document the findings of a Site Audit, conducted by James Davis of Enviroview Pty Ltd, a New South Wales Environment Protection Authority¹ (NSW EPA) Contaminated Land Accredited Site Auditor accredited under Part 4 of the *Contaminated Land Management Act 1997* as a Site Auditor.

The Site Audit has been conducted in accordance with the requirements of the *Contaminated Land Management Act 1997* (the 'Act'). The Act defines the Site Audit as follows:

"site audit" means a review:

- (a) that relates to management (whether under this Act or otherwise) of the actual or possible contamination of land, and
- (b) that is conducted for the purpose of determining any one or more of the following matters:

the nature and extent of any contamination of the land,

the nature and extent of any management of actual or possible contamination of the land,

whether the land is suitable for any specified use or range of uses,

what management remains necessary before the land is suitable for any specified use or range of uses,

the suitability and appropriateness of a plan of management, long-term management plan or a voluntary management proposal.

Furthermore, the Act provides the following definitions:

"Site Audit Report" means a site audit report prepared by a site auditor in accordance with Part 4 [of the Act].

"site audit statement" means a site audit statement prepared by a site auditor in accordance with Part 4 [of the Act].

The *Contaminated Sites: Guidelines for the NSW Auditor Scheme (3rd edition)*, (NSW EPA, 2017) describes the site assessment and Site Audit process where the consultant is commissioned to assess the contamination and the Site Auditor reviews the consultant's work.

The Site Auditor inspected the site and reviewed relevant documents prepared by the consultants relating to the investigation works and remedial planning for the site.

The Site Auditor inspected the site and reviewed relevant documents prepared by the consultants relating to the investigation works and remedial planning for the site.

¹ The NSW EPA has undergone several name changes in the past; however certain statutory functions and powers have always and continue to be exercised in the name of the Environmental Protection Authority (NSW EPA). The NSW EPA is responsible for environmental regulation and associated activities throughout NSW including those activities regulated under the *Contaminated Land Management Act 1997*. The use of the names NSW Department of Environment and Conservation (NSW DEC), NSW Department of Environment and Climate Change (NSW DECC), NSW Department of Environment, Climate Change and Water (NSW DECCW), NSW Office of Environment and Heritage (NSW OEH) and NSW EPA in this report are used regarding the name relevant at the time and context of the reference but are considered generally interchangeable and can be interpreted as one and the same.

1.2 Guideline Documents

Guidelines made or approved by the NSW EPA under s.105 of the Act at the time of the completion of the Site Audit include:

- Contaminated Land Guidelines: Assessment and Management of Hazardous Ground Gases, NSW EPA, 2019 (NSW EPA, 2019)
- Contaminated Sites: Guidelines for the vertical mixing of soil on former broad-acre agricultural land, NSW EPA, 1995 (NSW EPA, 1995)
- Contaminated Sites: Sampling Design Guidelines, NSW EPA, 1995 (NSW EPA, 1995)²
- Contaminated Sites: Guidelines for Assessing Banana Plantation Sites, NSW EPA, 1997 (NSW EPA, 1997a)
- Contaminated Land Guidelines: Consultants Reporting on Contaminated Land, NSW EPA, 2020 (NSW EPA, 2020)
- Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens, NSW DEC, 2005 (NSW DEC, 2005)
- Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd edition), NSW EPA, 2017, (NSW EPA, 2017)
- Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination, NSW DEC, 2007 (NSW DEC, 2007)
- Contaminated Sites: Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997, NSW DECC, 2015 (NSW EPA, 2015)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, August 2018), (ANZG, 2018) (except for the water quality for primary industries component, which still refer to the ANZECC & ARMICANZ 2000 guidelines)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Paper No 4, 2000 (ANZECC/ARMICANZ, 2000) (primary industries only)
- Composite Sampling. Lock, W. H., National Environmental Health Forum Monographs, Soil Series No.3, 1996, SA Health Commission, Adelaide (NEHF, 1996)
- Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards. Department of Health and Ageing and EnHealth Council, Commonwealth of Australia, 2012 (EnHealth, 2012)
- National Environment Protection (Assessment of Site Contamination) Measure, National Environment Protection Council, 1999 (Amended May 2013) (NEPC, 1999, Amended 2013)

² The NSW EPA Contaminated Land Guidelines: Sampling Design Guidelines (NSW EPA 2022) were gazetted as guidelines made or approved by the NSW EPA under s 105 of the Contaminated Land Management Act (1997) on the 12 August 2022. Site assessment works included in this Site Audit were conducted prior to the guidelines being in effect.

- Guidelines for the Assessment and Clean Up of Cattle Tick Dip Sites for Residential Purposes, NSW Agriculture and CMPS&F Environmental, February 1996 (NSW Agr., 1996)
- Australian Drinking Water Guidelines. National Health and Medical Research Council and Natural Resource Management Ministerial Council, 2011 (NHRMC/NRMMC, 2011)

From time to time the NSW EPA may amend the guidelines made or approved under s.105 of the Act.

Several additional technical notes and guidance is also provided by the NSW EPA that may not be made or approved under the *Contaminated Land Management Act 1997* that may be relevant to the site contamination management, where relevant these have been considered and include the following:

- Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation. NSW DECCW, 2009. (NSW DECCW, 2009)
- Technical Note: Investigation of Service Station Sites (NSW EPA, 2014a).
- Waste Classification Guidelines Parts 1-4 (Classifying Waste, Immobilisation of Waste, Waste Containing Radioactive Material, and Acid Sulfate Soils). NSW Environment Protection Authority, 2014 (NSW EPA, 2014).

1.3 Site Auditor

James Davis of Enviroview Pty Ltd, is a NSW EPA Contaminated Land Accredited Site Auditor (NSW EPA Accreditation Number 0301) and conducted the Site Audit.

The Site Audit was initiated by a request from representatives of Acciona Construction Pty Ltd and Ferrovial Construction Pty Ltd (the AFJV) who engaged the Site Auditor in November 2022.

1.4 Objective and Scope of the Site Audit

The Site Audit requirements on this site is twofold, initially the engagement of a Site Auditor was due to an agreement between the NSW State Government (Transport for NSW) and the AFJV to review a Detailed Investigation Report and Remedial Action Plan (RAP), this was overlaid by the requirements of the project State Significant Infrastructure planning consent (SSI 10038) that should remediation be required to make land suitable for the final intended land use a Site Auditor was to provide a 'Section B' Site Audit Statement that certifies that the RAP is appropriate and that the site can be made suitable for the proposed use.

Then following that remediation and review of the related validation and long-term environmental management plan, a Site Audit Statement 'Section A' required to certify the site is suitable for the proposed use. The first Site Audit was completed in September 2022 (0301-2117). This Site Audit has the objective of determining if a part of the Sydney Metro West: The Bays Station site, identified as Portion 1B and 1C, where remediation has been completed is suitable for the proposed use subject to a long-term management.

Therefore, the objective and scope of the Site Audit was to independently review the site assessment, remediation, and validation works as reported by the environmental consultants, and determine whether the site is suitable for the proposed land use.

To achieve this objective, the Site Auditor has reviewed the work undertaken as reported by the various consultants and assessed whether the consultant's work complied with relevant procedures and guidelines and provides a robust basis for determining whether the land is suitable for the proposed land use.

The outcome of the Site Audit is this Site Audit Report and subsequent Site Audit Statement, (number 0301-2206-2) a copy of which is attached to the back of this report.

1.5 Type of Site Audit

The Site Audit is a requirement of the Minister for Planning and Public Spaces of NSW Department of Planning, Industry and Environment Development Consent for the State Significant Infrastructure application (SSI 10038) that was determined on 11 March 2021.

As the Site Audit was conducted to meet conditions of a Development Consent, the Site Audit has been conducted as a Statutory Site Audit as defined by s 47(c) of the *Contaminated Land Management Act 1997*. As such a copy of the Site Audit Statement will be provided to the NSW EPA and the related local Council at the same time it is issued to the AFJV who commissioned the Site Audit.

1.6 Documents Reviewed

The following documents were reviewed as part of this Site Audit:

Environmental Resources Management Australia Pty Ltd (ERM). Sampling and Analysis Quality Plan, The Bays Construction Site, Sydney Metro West; Central Tunnelling Package. Report Reference: 0577577 V2.0, dated 8 September 2021. (ERM, September 2021)

Environmental Resources Management Australia Pty Ltd (ERM). Detailed Site Investigation, The Bays Construction Site, Sydney Metro West; Central Tunnelling Package. Report Reference: 0577577_R03, dated 14 January 2022. (ERM, January 2022)

Environmental Resources Management Australia Pty Ltd (ERM). Station Box Detailed Site Investigation, The Bays Construction Site. Report Reference: 0577577_R04, dated 27 June 2022. (ERM, June 2022)

Environmental Resources Management Australia Pty Ltd (ERM). Detailed Site Investigation Addendum – Outside Station Box, The Bays Construction Site, Sydney Metro West, Central Tunneling [sic] Package. Project No.: 0577577_R04, dated 27 June 2022. (ERM, June 2022)

Environmental Resources Management Australia Pty Ltd (ERM). Remediation Action Plan, Remediation Action Plan, The Bays Construction Site, Sydney Metro West: Central Tunnelling Package. Report Reference: 0577577 Final Version 03 Revision 02, dated 25 August 2022. (ERM, August 2022)

Environmental Resources Management Australia Pty Ltd (ERM). Validation Report, The Bays Construction Site – Portion 1B & 1C, Sydney Metro West: Central Tunnelling Package. Report Reference: 0628507 Rev 02 Final, dated 9 September 2024. (ERM, September 2024).

Environmental Resources Management Australia Pty Ltd (ERM). Long Term Environmental Management Plan, The Bays Construction Site – Portion 1B and 1C, Sydney Metro West: Central Tunnelling Package. Report Reference: 0628507 Rev 02 Final, dated 30 August 2024. (ERM, August 2024)

The following report or excerpts of the following reports were provided to or obtained by the Site Auditor and were referred to in the review of the reports by the Site Auditor.

JBS&G (2017) Detailed Site Investigation White Bay Power Station Proposed Lot 1 (JBS&G, 2017)

JBS&G (2017) Detailed Site Investigation White Bay Power Station Proposed Lot 2

Golder–Douglas (2018) Groundwater Monitoring Report – Sydney Metro West Geotechnical Investigation

Golder–Douglas (2020) Geotechnical Investigation Factual Report – White Bay Pavement Investigation

Golder–Douglas (May 2021) Groundwater Monitoring Report – Stage 2 Locations – Sydney Metro West Geotechnical Investigation

Golder–Douglas (June 2021) Sydney Metro West- Groundwater Monitoring Report – Stage 3 Locations

Senversa (2021) Factual Contamination Investigation Report – The Bays, Sydney Metro West, White Bay Site Investigation. Report Reference 000013/11868, dated 21 May 2021 (Senversa, May 2021)

Environmental Resources Management Australia Pty Ltd. Station Box Waste Classification – W01 – ‘Fill’, The Bays Construction Site. Report Reference: 0577577_R02, dated 21 January 2022.

The following Site Audit Report and related Site Audit Statement was prepared by the Site Auditor following the review of the assessment reports and RAP.

Enviroview [Site Auditor – James Davis]. *Site Audit Report, Sydney Metro West: The Bays Station Report*, Ref: 600199_0301-2117 dated 7 September 2022 – Site Audit Statement 0301-2117 – Certifying that the Site can be made suitable with the implementation of the RAP. (Enviroview [Site Auditor - James Davis], September 2022)

1.7 Audit Correspondence

Correspondence in the form of Site Audit interim advice was issued regarding the Site Audit to clarify and request additional information and to provide guidance on the Site Audit requirements. Site Audit interim advice is provided in **Appendix A**.

1.8 Chronology of Site Assessment and Site Audit Works

The chronology of events of site assessment, Site Auditor review and preparation of final audit statement and report undertaken at the site has been summarised in the following table.

Table 1-1 Chronology of Site Assessment and Site Audit Works

Date	Action
6 May 2021	Engagement of James Davis of Enviroview Pty Ltd to conduct a Section B site audit for the site. Commencement of Statutory Site Audit 0301-2106 (Review of assessment reports and Remediation Action Plan regarding whether the site can be made suitable)
8 September 2021	Issue of The Bays <i>Detailed Site Investigation Sampling, Analysis and Quality Plan</i> by ERM
27 October 2021	Engagement of James Davis of Enviroview Pty Ltd to conduct a non-Statutory Site Audit for the site in relation to the agreement (Deed) between AFJV and TfNSW to review the DSI
3 December 2021	Issue of draft <i>The Bays Construction Site DSI Rev_01</i> by ERM
9 December 2021	Preparation of Interim Audit Advice 0301-2117_01 by Site Auditor James Davis following review of the draft <i>The Bay Construction Site DSI</i> prepared by ERM
14 January 2022	Issue of draft <i>The Bays Construction Site DSI Rev_03</i> by ERM
16 January 2022	Preparation of Interim Audit Advice 0301-2117_02 by Site Auditor James Davis following review of the draft <i>The Bay Station Box DSI</i> prepared by ERM – this was revised and reissued on 21 February 2022 due to typographical error in report reference
28 January 2022	Issue of draft <i>The Bays Station Box DSI</i> by ERM

Date	Action
8 February 2022	Preparation of Interim Audit Advice 0301-2117_03 by Site Auditor James Davis following review of the draft <i>The Bay Station Box DSI</i> prepared by ERM
11 February 2022	Issue of draft <i>The Bays Construction Site EMP</i> by ERM
14 February 2022	Advised of requirement for Statutory Site Audit (Section B - review of Remediation Action Plan regarding whether the site can be made suitable) per conditions of consent for the project
21 February 2022	Notification by Site Auditor of the commencement of a Statutory Site Audit to NSW EPA for the review of a Remediation Action Plan regarding whether the site can be made suitable (per Section B5 Site Audit Statement)
5 March 2022	Issue of draft <i>The Bays Construction Site RAP</i> by ERM
5 April 2022	Preparation of Interim Audit Advice 0301-2117_04 by Site Auditor James Davis following review of the draft <i>The Bay Construction Site DSI, RAP and EMP</i> prepared by ERM
13 May 2022	ERM issue <i>The Bays Station Box final draft RAP</i> by ERM
27 June 2022	ERM issue <i>The Bays Station Box DSI</i> Finalised
27 June 2022	ERM issue <i>The Bays Station Box DSI Addendum</i>
28 June 2022	Preparation of Interim Audit Advice 0301-2117_05 by Site Auditor James Davis following review of <i>The Bays Station Box DSI</i> prepared by ERM
28 June 2022	Preparation of Interim Audit Advice 0301-2117_06 by Site Auditor James Davis following review of <i>The Bays Station Box DSI Addendum</i> prepared by ERM
7 July 2022	Preparation of the Construction Area RAP by ERM
18 July 2022	Preparation of Interim Audit Advice 0301-2117_07 by Site Auditor James Davis following review of the revised Remedial Action Plan prepared by ERM
25 August 2022	Final <i>The Bays Remedial Action Plan</i> issued by ERM (ERM, August 2022)
7 September 2022	Preparation of Site Audit Report and the Site Audit Statement 0301-2117 for the Site Audit conducted by James Davis of Enviroview Pty Ltd regarding the site assessment, remedial action plan whether the site can be made suitable for the proposed use with the implementation of the remedial action plan and a long-term management plan
8 November 2022	Engagement of James Davis of Enviroview Pty Ltd to conduct a Section A site audit for the site (Portion 1B and 1C). Commencement of Statutory Site Audit 0301-2206
5 June 2023	Preparation of Site Audit Report and the Site Audit Statement 0301-2206_1 for the Site Audit conducted by James Davis of Enviroview Pty Ltd regarding the site assessment, remediation and validation works conducted at Portion 1A of The Bays site and its suitability for the proposed use.
7 June 2024	Preparation of Interim Audit Advice 0301-2206_04 by Site Auditor James Davis following review of the draft Validation Report and draft Environmental Management Plan for Portion 1B and 1C prepared by ERM
30 August 2024	Final <i>Long Term Environmental Management Plan</i> for Portion 1B and 1C issued by ERM
9 September 2024	Final <i>Validation Report</i> for Portion 1B and 1C issued by ERM
30 September 2024	Preparation of Site Audit Report and the Site Audit Statement 0301-2206-2 for the Site Audit conducted by James Davis of Enviroview Pty Ltd regarding the site assessment, remediation and validation works conducted at Portion 1B and 1C of The Bays site and its suitability for the proposed use.

2 Site Description

2.1 Site Identification

Street Address:	Portion 1B and 1C, Sydney Metro West: The Bays Station, Robert Street, Rozelle, NSW 2038
Property Description:	Part Lot 10 DP 1288503 Part Lots 381 and 382 DP 1277236 Part Lot 2 DP 879549
Zoning:	Port and Employment - State Environmental Planning Policy (Precincts-Eastern Harbour City 2021, Sydney Regional Environmental Plan No 26.)
Local Government Area:	Inner West Council
Property Size:	2.06 Hectares

Located within **Appendix B** is a figure that depicts the site and proposed development layout.

The Site Audit area and proposed development area comprise a portion of a larger property located within the White Bay industrial area, adjacent to the former White Bay Power Station in Rozelle. Sydney Metro is licensing approximately 5.6 hectares of the site from the Port Authority of NSW (PANSW), and a smaller portion of land (around 0.7 ha) from Place Management NSW (PMNSW), for the construction of The Bays Station of the Sydney Metro West.

The site is an irregular shape and divided into two main portions. There is the broader site area that will be used as a construction support zone during the station construction, and the station box area where spoil will be excavated for the construction of the Sydney Metro West: The Bays Station.

The Site Audit area is identified as Portion 1B and 1C which comprises the northern section of The Bays construction site and excludes the Station Box. The Portion 1A of the wider The Bays Station construction site has previously been subject to a separate Site Audit (0301-2206-1) completed in July 2023.

2.2 Site Condition and Surrounding Environment

At the time the Validation Report (ERM, September 2024) was in preparation, the site was under preparation works for the construction activities which have progressed to full construction activities.

The site is in an area of former commercial/industrial land uses with residential housing located beyond the industrial areas to the north and west of the site.

The consultant reported (ERM, September 2024) that the surrounding land uses to the Portion 1B and 1C site include the following:

- North – White Bay, and other commercial and light industrial premises beyond.
- East – Glebe container terminal and Industrial port uses immediately adjacent, with the natural waterways of White Bay beyond.
- South – the Station Box and Portion 1A of The Bays construction site, Victoria Road, then light industrial and commercial marine uses with Rozelle Bay beyond.

- West – the former White Bay Power Station and general commercial and residential land uses beyond.

2.3 Topography and Hydrology

The site is described as predominately level with minor modifications associated with construction features on-site. The western portion of the site lies at an elevation of approximately 10m AHD and falls towards White Bay to an elevation of approximately 5m AHD. Substantial filling of low-lying and estuarine areas occurred during the construction of Anzac Bridge. Drainage infrastructure associated with the historical use as a power station is present in some portions of the site.

Surface water is expected to move across the site until it enters drainage infrastructure and discharges into White Bay.

2.4 Geology and Hydrogeology

It has been previously reported that the 1:100000 Department of Mineral Resources Sydney Geological Series Sheet 9130 (1983) indicates the site is underlain by three geological types:

- Man-made fill comprising dredged and estuarine sand and mud, demolition rubble, industrial and household waste.
- Quaternary silty to peaty quartz sand, silt and clay, ferruginous and humic cementation in places with common shell layers.
- Wianamatta group medium to coarse-grained quartz Hawkesbury Sandstone, very minor shale, and laminate lenses.

The 1:100000 Department of Natural Resources Sydney Soil Landscape Series Sheet 9130 (1983) is reported as describing the site as primarily lying within a disturbed soil landscape.

The consultant JBS&G (JBS&G, 2017) reported fill material thicknesses generally between 0.5m and 4.2m, noting that the base of the fill was not able to be identified in some locations. Golder–Douglas (2020) noted that the area has been extensively filled and interpreted fill to extend to 10 m in one location (SMW_BH405). The consultant Senversa (Senversa, May 2021) interpreted fill being of variable depth (generally 0m-7m) across the site, with fill reported to extend to 11m in one location. Greater fill depth was logged in bores completed in the central area of the site. Reported depth of fill was much shallower in the south-eastern portion of the site where shallow bedrock was encountered at around 1m bgl.

Natural soil underlying the fill material was described by Senversa (Senversa, May 2021) as clayey sands, silty sands, sandy silts, and sandy clays. The natural soils had been identified to comprise potential acid sulfate soils in areas of alluvial/marine soils underlying portions of the site.

Groundwater monitoring wells have been installed on-site during previous investigation works. Those investigations reported no beneficial reuse of groundwater in proximity to the site. Groundwater is reported as being shallow with hydraulic levels just above sea level, for example, 0.5 m AHD, and tidal influence has been observed. The groundwater flow direction has been reported to vary slightly, flowing east towards White Bay in the eastern portion of the site and south towards Blackwattle Bay in the central and southern portions of the site.

White Bay is directly to the east of the site, while Blackwattle Bay is located approximately 170m south of the site.

It was also reported by JBS&G (JBS&G, 2017) that potential groundwater mounding was occurring in the north-western portion of the site and a dyke had been identified which is likely to also impact the local groundwater flow regime.

2.5 Audit Discussion of Site Description

The information provided by the consultants regarding the site condition and surrounding environment has been checked against and meets the requirements of NSW EPA guidelines (NSW EPA, 2020). The information provided is also consistent with the observations made by the Site Auditor during the site inspection.

The consultant has provided the information required regarding topography and hydrology, geology, and hydrogeology.

Overall, the information provided by the consultant in relation to site condition and the surrounding environment is considered adequate for the purposes of assessing the suitability of the site for the intended purposes. As such, in the Site Auditor's opinion the information provided meets the requirements of the Site Audit.

3 Site History

A review of historical information and previous investigations undertaken has indicated that the site has primarily been used for commercial/industrial purposes including use as a dock, coal storage and processing, railways, ash handling and storage. Substantial filling of the site has been reported including prior to the construction of the White Bay Power Station, during the construction of the Anzac Bridge, and for land reclamation. Depths of fill reported in previous investigations range from 4.2m bgl to 11m bgl.

A more detailed chronology of the history of the White Bay Power Station precinct is provided in the reports prepared JBS&G in 2017.

To summarise that chronology the following points are made relevant to the potential contamination of the site:

- In the 1800s the site comprised a mud flat bound by high ground to the north, west and south of the site prior to the commencement of reclamation activities that commenced in the 1840s to create a causeway at the southeast of the site joining Rozelle to the sandstone outcrop known as Glebe Island. Prior to this, the island could only be accessed across mud flats at low tide. In the 1860s the site was still to be fully reclaimed, but roads had been constructed extending from Balmain/Rozelle via Glebe Island to Pyrmont.
- In the 1880s maps prepared during this period indicated a small gas works was located to the north of White Bay in line with Rumsay St, Rozelle to the north of the subject site.
- In the 1890s William Lever purchased land to the northeast of the site on a portion of the foreshore that was reclaimed in the construction of a soap and coconut oil factory. These works were run as a subsidiary of the British soap manufacturer Lever Brothers (later Unilever). While the factory site is situated to the northeast of the site, the reclamation works done at that time would have filled most of the area to the northeast of the site and perhaps the site itself.
- In 1910 the Royal Commission on Sydney Improvement Plan No 55 indicated that the low-lying reclaimed part of the site, that would eventually become the White Bay Power Station to the north of the site comprised a recreation reserve indicating that reclamation works associated with the former bay had resulted in new land to the approximate extent apparent today. At around this time the private properties within the power station area to the north of the site was reportedly resumed from owners and initial power station construction works commenced, including construction of the water-cooling conduit beneath the main turbine house to the north of the power station and outside the subject site. Ash and coal rail sidings and the Glebe Island railway sidings were constructed during this period in conjunction with infrastructure in the Rozelle Rail Yards precinct and wharfage in the adjoining Glebe Island and White Bay. The power station was reported to have become operational in approximately 1917. The construction of additional power station infrastructure was completed by 1928.
- In the 1930s additional wharf infrastructure had been developed at the eastern extent of the precinct. In the 1940s an upgrade of the power station was reported to have been undertaken, including the installation of large oil/fuel storage tanks increasing the power generation capacity of the plant. It is understood that these were located north of the

subject site. Large warehouses had also been constructed to the east of the power station rail sidings northeast of the subject site.

- In the 1970s the operation of the White Bay Power Station was wound back with generation of power becoming a part-time occurrence by the end of the 1970s. In the 1980s the power station ceased operation, following which the boiler house was demolished and the above ground storage tanks were removed from the site. Upgrades to the road approaching Glebe Island Bridge at the south extent of the precinct included the widening of the road reserve likely across the subject site.
- In the 1990s the former coal loader was demolished and the area to the east of the subject site was replaced with a large hardstand yard and the White Bay container wharf infrastructure upgraded. Further roadworks close to the south of the subject site resulted in the construction of the underpass below the intersection of Victoria Road and the City West Link.

3.1 Audit Discussion of Site History

The information required by NSW EPA (1997), regarding the documentation of the site history, has been provided and generally meets the requirements of the Site Audit regarding the objectives of the Site Audit. More information of the activities that occurred within the subject site would have provided better understanding of the potential contamination risk, however, it seems apparent that the subject site formed land associated with the rail infrastructure to the power station and wharf, coal handling facilities and roads, built upon land substantially filled during the land reclamation activities of the late 1800's and early 1900's, and substantially used as land ancillary to the power station.

The site history information provided by the consultant has been checked against and generally meets the requirements of the guidelines made or approved by the NSW EPA.

The consultant did not include a review of the Planning Certificate issued by Council (if one has even been prepared by Council) nor did they review the historical title documentation relating to ownership of the property. With consideration to the known historic uses of the site, it is unlikely that the information garnered from the land title documentation would impact the findings of the site history review.

The extent of site history information presented by the consultant is considered adequate for the purposes of identifying potential contamination issues at the site.

4 Summary of Investigations

There has been several reasonably extensive investigations that have been recently undertaken across The Bays and White Bay Power Station precincts and encompassing the subject Site Audit site.

The following summary of investigations have by and large been lifted directly from the detailed investigation report prepared by ERM (ERM, January 2022).

JBS&G (2015) - Site Wide Remedial Concept Plan

JBS&G was engaged to undertake site contamination condition and prepare a site wide remedial concept plan (SWRCP) for the properties that comprise The Bays Precinct Urban Transformation Area. The site was comprised of precincts adjoining Rozelle, Blackwattle, and White Bays. The current Sydney Metro site comprises the south-eastern portion of the White Bay Power Station precinct, as well as a small portion of the adjoining White Bay precinct.

The objectives of the SWRCP were to summarise historical investigation works across The Bays precinct and characterise the proposed potential future land uses from an environmental perspective. This was completed to evaluate available remedial strategies in accordance with the principles of ecologically sustainable development and overall development objectives.

The SWRCP found several areas of potential environmental concern and constituents of potential concern within White Bay Power Station and White Bay area. The areas of potential environmental concern identified within the boundaries of the current Sydney Metro construction site consisted of coal storage and processing areas, railway sidings, ash handling yard, storage, and maintenance of mechanical equipment. They reported that historical filling occurred including prior to the construction of the power station with fill materials reported to be impacted with benzo(a)pyrene [B(a)P], other polycyclic aromatic hydrocarbons (PAHs), lead, heavy fraction total recoverable hydrocarbons (TRH) (C10-C36) and asbestos in soil. Fill material including ballast and dredged material was also used to reclaim land in the vicinity of the current shoreline.

Groundwater within the north-west portion underlying the former transformer yard area of the power station was noted to be impacted by free product transformer oil. Assessment of potential off-site migration indicated that the extent of the groundwater impact was constrained to the north-west portion of the site, to the north of the subject site. Concentrations of heavy metals such as arsenic, zinc, mercury, nickel, and copper had been reported to exceed the ANZECC (2000) marine ecosystem values, however, most of these results were considered representative of background concentrations. In some instances, where elevated concentrations were reported to be higher than background concentrations, these were attributed to impacted fill materials as the contaminant source.

JBS&G (2017) - Detailed Site Investigation White Bay Power Station, Proposed Lot 1

JBS&G were engaged to complete a DSI for the proposed redevelopment of Lot 1 of the former White Bay Power Station. Only the eastern portion of Lot 1 is incorporated within The Bays Station construction site, and so only a small portion of the data was relevant. The

objectives of this assessment were to address data gaps and provide additional information to support the preparation of an on-site human health and environmental risk assessment to inform the preparation of site remediation plans.

A total of 69 sample locations were advanced across the site through either test pits or boreholes. Additionally, five groundwater monitoring wells, nine sub-slab vapour probes and three soil vapour probes were assessed.

Generally surface fill soils were found to be impacted with elevated levels of heavy metals (copper, lead and zinc), TRH, PAH, asbestos, and localised areas of pesticides.

Light non-aqueous phase liquid (LNAPL) consisting of heavy weathered oil was reported in two monitoring wells in the north-west portion of the site and was associated with the historical use of this area, to the north-west of the subject site, as a transformer yard. Slightly elevated heavy metals and localised detections of semi and non-volatile TRH fractions and chlorinated ethenes were reported to marginally exceed detection limits.

Gas monitoring results indicated no evidence of landfill gases with soil and sub-slab vapours generally well oxygenated. Chlorinated ethenes were reported at elevated concentrations in soil vapour at two well locations in the central north-west of the Lot 1 site, outside the subject site area.

JBS&G (2017) Detailed Site Investigation White Bay Power Station, Proposed Lot 2

The Lot 2 area corresponds with most of the current The Bays Sydney Metro Station construction site area. The objectives of the DSI were to address data gaps and provide additional information to support the preparation of an on-site human health and environmental risk assessment to inform the preparation of site remediation plans. A total of 69 soil sample locations were advanced either through test pits or hand auger with soil samples collected for analysis of a range of analytes including, eight heavy metals, TRH, benzene, ethylbenzene, toluene, and xylene (BTEX), PAH, volatile organic compounds (VOCs), phenols, organo-chlorine pesticides (OCPs), polychlorinated biphenyls (PCBs), asbestos and suspension peroxide oxidation combined acidity and sulfur (SPOCAS) suite analysis.

Additionally, seven groundwater monitoring wells were installed at borehole locations, with groundwater samples analysed for contaminants of potential concern including heavy metals, PAHs, TRH, BTEX, VOCs, pH, electrical conductivity (EC) and cation and anion balance. Soil vapour assessment was also undertaken through eight sub-slab vapour probes.

Surface fill soils were generally found to be impacted with elevated levels of heavy metals (copper, lead and zinc), TRH, PAH, and asbestos. Natural estuarine/alluvial soils were observed underlying fill material and were typically classified as actual or potential acid sulfate soils.

Groundwater was typically found to report a neutral pH with evidence of marine water intrusion to the aquifer observed in the north-east portion of the site. Slightly elevated concentrations of heavy metals and localised areas of elevated ammonia (as nitrogen) were observed. No evidence of landfill gases was observed with soil and sub-slab vapours generally well oxygenated.

Golder–Douglas Partners (2018) - Groundwater Monitoring Report

This report presented the first round of monthly groundwater monitoring events. The objectives of this investigation were to document and collect groundwater information on levels and quality for use in the design of the tunnel and associated infrastructure.

A total of 55 groundwater wells were installed and monitored during this investigation with four of these located within The Bays (SMW_BH066, SMW_BH066s, SMW_BH067 and SMW_BH067s). A combination of hydrasleeve® and low flow sampling techniques were utilised for the collection of groundwater samples. Groundwater samples were collected from monitoring wells and analysed by NATA accredited laboratories for a broad suite of environmental parameters including EC, total dissolved solids (TDS), pH, major cations, metals, TPH, BTEX, PAH, nutrients, VOCs, (semi-volatile organic compounds - sVOCs), hexavalent chromium (Cr^{VI}), poly-fluorinated alkyl substances (PFAS), speciated phenols, OCP, organo-phosphate pesticides (OPP) and tributyl tin (TBT).

Results were compared against the following criteria for this investigation:

- NHMRC (2011) – Drinking water
- NHMRC (2008) – Recreational/Direct Contact
- ANZG (2018) – 95% Protection of species
- ANZECC (2000) – Long-Term Irrigation
- NEPM (2013) and CRC (2013) – Commercial/Industrial - Health Screening Levels (HSL-D) for 2-4m

Results indicated exceedances for total phosphorus, PFOS, ammonia, total nitrogen, and cobalt at monitoring locations within The Bays area.

Golder–Douglas Partners (2020) Addendum to the Final Geotechnical Data Report – White Bay Pavement Investigation

Golder–Douglas was engaged to conduct a geotechnical pavement investigation for the site. The scope of works for this investigation included the advancement of 14 boreholes to depths of 0.32 to 11.69m bgl. Soil samples were tested for both geotechnical and environmental assessment.

Environmental testing of soils included the analysis of soil samples for TRH, BTEX, PAHs, metals, PCBs, VOC, TBT, per- and PFAS, field acid sulfate soil parameters, and phenolics.

A total of 12 samples from nine borehole locations reported exceedances of the adopted ecological criteria. Additionally, one sample from location BH412 at a depth of 1.1m bgl reported an exceedance of B(a)P toxic equivalency quotient (TEQ) exceeding the adopted health screening criteria.

Golder–Douglas Partners (2020) - Factual Contamination Assessment Report– Geotechnical Investigation

The objectives of this report were to collect contamination information for the design of the tunnel and associated infrastructure to present the factual data obtained during the

investigation. It is noted that this investigation is an assessment comprising multiple locations outside The Bays Construction Site for the wider Sydney Metro Development. A total of 96 soil sampling locations for environmental and geotechnical (where required) testing were drilled across the wider development area with 72 groundwater wells installed.

Analytical results of soil samples indicated multiple samples exceeding the adopted ecological criteria for heavy metals zinc, copper, nickel, chromium and lead, and B(a)P. There were exceedances of the human health criteria for asbestos, B(a)P TEQ and TRH reported at a range of depths between surface and 3.2m bgl within boreholes ENV020-ENV037 within the site.

PFAS analysis of samples was also undertaken with subsequent leach Australia standard leaching procedure (ASLP) testing undertaken. A total of 10 samples were reported to exceed the PFAS ASLP waste classification criteria for an unlined landfill.

A total of three samples indicated soils exceeding the action criteria for acid sulfate soils. These detections were all reported at depths greater than 4.0m bgl and below the water table in this area.

Golder–Douglas (2020) - Contamination Assessment Report-The Bays Precinct, Stage 1 Early Works Package

Golder – Douglas was engaged to complete a contamination assessment of the site to present the baseline conditions and discuss the suitability of the site for the proposed commercial/industrial land use. The report nominates that the uppermost 2.0m of the soil profile will be used for the purpose of establishing baseline conditions due to the maximum soil disturbance associated with the construction of new roads, parking facility and installation of drainage and services.

The findings of the report were based on sampling undertaken from previous investigations at the site from sample locations both within the boundaries of the site and near the site. A summary of results was provided in the report and indicated no detections of tributyltin, BTEXN, total phenolics, PCBs or VOC above the laboratory limit of reporting (LOR). Elevated concentrations of heavy metals exceeding the adopted ecological criteria were reported in one location on-site and several locations near the site. Additionally, B(a)P exceeding the ecological criteria was also reported to be present in several locations near the site. As much of the site is covered in hardstand the risk posed to ecological receptors was considered low.

Bonded asbestos containing material (ACM) as a fragment of fibre cement sheet was observed in one location (BH415) at a depth of 0.5m bgl. This result was not considered to be significant exposure risk given the proposed land use and construction works. However, it was noted that the presence of ACM should be monitored and documented during site trenching and civil works.

The report concluded that based on the limited data and proposed ongoing land use of the site that remediation or treatment of contaminated soils or groundwater is not warranted. Additionally, it was recommended a factual report be provided detailing the outcomes of any contamination observations and sampling during construction delivery.

Golder–Douglas Partners (2021) - Groundwater Monitoring Report- Stage 2 Locations – Sydney Metro West Geotechnical Investigation

Golder –Douglas was engaged to undertake geotechnical site investigations for the Sydney Metro West project between April 2019 and February 2021. This included a groundwater investigation across the Sydney Metro West project between Westmead and Pyrmont. A total of 46 groundwater monitoring wells were installed across locations nominated by TfNSW along the proposed metro rail line. Of the 46 locations a total of seven were located at The Bays (SMW_ENV020, SMW_ENV020_s, SMW_ENV021, SMW_ENV021_s, SMW_ENV026, SMW_ENV027, SMW-ENV034).

The objectives of this investigation were to collect groundwater information for use in the design of the SMW project and present the factual data obtained during the investigation.

Geotechnical parameters of groundwater were collected over the course of the investigation which included groundwater pressure, temperature, and hydraulic testing. Additionally, groundwater samples were collected from monitoring wells and analysed by NATA accredited laboratories for a broad suite of environmental parameters including EC, TDS, pH, Major cations, heavy metals, TPH, BTEX, PAH, Nutrients, VOCs, sVOCs, hexavalent chromium, PFAS and TBT.

Groundwater samples were compared against the following criteria:

- NHMRC (2011) – Drinking water
- NHMRC (2008) – Recreational/Direct Contact
- ANZG (2018) – 95% Protection of species
- ANZECC (2000) – Long-Term Irrigation
- NEPM (2013) and CRC (2013) – Commercial/Industrial – HSL - D for 2-4m

Results of the groundwater sampling indicated multiple exceedances of heavy metals, nutrients, PFAS and TRH for samples collected at The Bays. Furthermore, it was reported that no LNAPLs or dense –non-aqueous phase liquids (DNAPLs) were detected during sampling.

Golder–Douglas Partners (2021) - Groundwater Monitoring Report- Stage 3 Locations – Sydney Metro West Groundwater Monitoring Report

Golder–Douglas carried out additional groundwater investigations between The Bays and Westmead as part of the SMW project. Groundwater monitoring was conducted between August 2020 and March 2021. The stage 3 investigation works included the installation and development of 36 groundwater monitoring wells of which two were located within The Bays (SMW-BH724 and SMW-BH725).

Samples were analysed for a similar suite of analytes in line with previous groundwater investigations undertaken by Golder–Douglas.

Analytical results of groundwater monitoring indicated exceedances of the adopted criteria for EC, pH, sodium, chloride, manganese, and cobalt for the two sampling locations at The Bays.

Senversa (2021) - Factual Contamination Investigation Report – The Bays, Sydney Metro West, White Bay Site Investigation

Senversa Pty Ltd was engaged to undertake a site contamination investigation and groundwater monitoring at the site (Senversa, May 2021). The objective of this assessment was to establish baseline conditions of the site to provide a basis for the identification of new contamination that may occur during the occupation by Sydney Metro. Furthermore, a network of groundwater monitoring wells was installed and monitored during the contracted period for the same purpose of tracking contamination.

The investigation involved excavation of 14 test pits to a depth of 3.1 m bgl, advancing 56 boreholes to a maximum depth of 30.7 m bgl, installation and gauging of 31 groundwater monitoring wells and sampling of 27 of them.

Based on the information obtained as part of the investigation, fill materials were estimated to extend to a depth of approximately 6m bgl in the central portion of the PANSW licence area which includes the western portion of the station box. Shallower fill materials contained a high proportion of anthropogenic materials (ash, slag, coal wash, concrete, and ACM as fragments of cement sheet) with deeper fill materials typically comprising estuarine sediments with few anthropogenic materials.

PFAS was reported in 25 of the 170 primary samples from soil or rock. Four rock samples collected from two core holes reported low concentrations of PFAS within the station box area at depths between 15m and 29m bgl. The source of these detections in natural rock samples was not conclusive and attributed to either false positive results due to potential cross-contamination or from the influence of PFAS in groundwater. Further assessment of PFAS in rock was recommended to provide a conclusion.

ERM (January 2022) Detailed Site Investigation, The Bays - Construction Site, Sydney Metro West

ERM were engaged by the AFJV to conduct a Detailed Site Investigation (DSI) as required by an agreement between the AFJV and NSW State Government (TfNSW). The objectives of the investigation were to address spatial coverage data gaps and consolidate historical data to define areas requiring remediation or management.

A total of five boreholes were advanced to address the spatial data gaps in the construction site, but not including the station box. Results from the investigation supplemented the existing data.

Soil logging was conducted, and samples were logged, and the following information was recorded in the field: soil/rock type, colour, grain size, sorting, angularity, inclusions, moisture condition, structure, visual signs of contamination (including staining and the presence of anthropogenic material including fragments of fibre cement sheeting). The consultant's bore logs were presented in an appendix to the report.

Filed screening for VOCs was conducted using a photoionisation detector (PID) at several depths within each borehole, by placing soils in a zip lock bag and sampling the headspace with the PID. The sensor bulb used in the PID had an ionisation potential of 10.6 eV.

Soil sampling in the five locations was by hand augur up to completion of non-destructive digging (NDD) to 1.5m and after push-tube drilling. NDD was by high-pressure water and vacuum extraction.

The potential for cross-contamination during sampling was minimised during NDD by stopping NDD 0.1m before target sampling depth and commencing hand auguring through to target depth. The hand augur was decontaminated between samples. Samples from the push-tube were selected directly from the cores by hand-grab utilising nitrile disposable gloves for each sample and decontamination of the down hole drilling equipment (casing, augers, and sampler) was conducted for each location using high-pressure water, then applying some Liquinox® solution, and then rinsing with the high-pressure water.

Two samples per location were selected for analysis based on field observations and screening.

The selected soil samples, including intra-laboratory duplicate samples, were analysed by ALS laboratory and inter-laboratory samples were analysed at Eurofins, both NATA accredited for the analyses performed.

Soil samples were submitted for laboratory analysis for TRH, BTEXN, metals, PAH and PCBs. At least one sample from each borehole was also selected to be analysed for OCP and OPP, VOCs and PFAS.

Additional samples were collected in the shallow fill (top metre) for in situ waste classification purposes. These results were included in this DSI report to enhance the understanding of site conditions and if remediation required off-site disposal, the relevant likely waste classification.

Based on the proposed future land use, ERM assessed the previous and current soil data against the commercial/industrial land use criteria as defined in NEPM (NEPC, 1999, Amended 2013).

Due to the prevalent sands and gravels previously reported within fill materials on-site (Senversa, 2021) the screening levels for sand (coarse) soils have been adopted. Additionally, since future green space planting above existing fill is potentially possible, the ecological investigation and screening levels for commercial/industrial land use (coarse soils) were adopted.

The combined dataset reported benzene in two locations and TRH C6-C10 fraction less BTEX in one location exceeding the health screening levels (HSLs); lead in one sample exceeding the health investigation level; and B(a)P TEQ in three samples exceeding the HSL. All analytes reported a 95% upper confidence limit below the relevant criteria. Asbestos was reported to exceed the health investigation level in three locations as both bonded ACM (fragment of fibre cement) and friable asbestos (identified fibres).

A figure showing the locations of where samples were obtained across the site is provided in **Appendix C**.

The fill material encountered near the surface was variable but included coarse sand and gravel, crushed sandstone, basalt 'road-base' gravels and 'rail ballast' cobbles.

Grey and grey/brown silty clays, sandy silty clays and clayey sands were encountered below the coarse fill material. The PID readings ranged from 0.1 ppm to 0.8 ppm.

Analytical results for soil samples are summarised below:

- Asbestos was not detected in any of the samples submitted for analysis.
- PFAS were not detected in any of the samples submitted for analysis.
- OCPs and OPPs were not detected in any of the samples submitted for analysis.
- PCBs were not detected in any of the samples submitted for analysis.
- BTEX were not detected in any of the samples submitted for analysis.

Total Recoverable Hydrocarbons were not detected in all but one of the samples analysed - ERM_BH05_1.7 contained hydrocarbons in the C16-C40 range. The detected concentrations were below screening criteria.

PAHs were detected in four of the five samples collected from ERM_BH05. The concentrations of PAHs were highest at the sample collected at 1.7 m, and the sum of carcinogenic PAHs value as B(a)P TEQ exceeded the commercial industrial health investigation level (HIL D) at this sample depth. The commercial /industrial ecological screening level (ESL) was also exceeded at ERM_BH05_1.7, along with the samples collected at ERM_BH05_0.8 and ERM_BH05_3.0. PAHs were not detected from samples from in any other borehole location.

The chlorinated VOC 1,1,2-trichloroethane was detected at ERM_BH03_1.8m. No other chlorinated solvents or VOCs were detected in any other sample.

Metals concentrations more than the commercial/industrial EILs were observed in the following samples (ERM_BH02_0.1 (zinc), ERM_BH03_0.4 (zinc), ERM_BH04_0.6 (copper), ERM_BH05_0.3 (copper and nickel) and ERM_BH05_1.7 (copper, lead and zinc). Metals were detected in substantially higher concentrations than at other samples at ERM_BH05_1.7.

The consultant prepared a table consolidating the previous investigation data and the current investigation for comparison against the criteria and to support their assessment findings. The consultant's tables are presented in **Appendix D**.

The consultant utilised a conceptual site model (CSM) and identified the remediation action (further assessment, remediation, or management) was required to manage risk at the site from contamination for the following:

- Potential risks to Sydney Metro and future development construction and intrusive maintenance workforces via direct contact with soil and/or groundwater, inhalation of dust (potentially including asbestos fibres), inhalation of vapours from impacted soil in excavations.
- Potential risks to the public and passers-by from dust generated by construction activity on the site.
- Potential risks to future users / workforce of Sydney Metro station via direct contact or dust inhalation if soil is exposed.
- Potential risks to future users of the development land outside the Sydney Metro station land via direct contact with soil, inhalation of dust from exposed soil or indoor / outdoor inhalation of vapours from soil.
- Potential risks to terrestrial ecology via direct contact with soils on the development land only (future landscaping extent and design unknown).

- Potential risks to aquatic organisms in White Bay / Rozelle Bay from discharge of impacted groundwater.
- Potential risks to recreational users of White Bay / Rozelle Bay from discharge of impacted groundwater.

Based on the results of the combined investigations undertaken on-site to date, the report concluded that the site was suitable for the Sydney Metro station use, subject to appropriate waste management during construction, appropriate management, and treatment of groundwater, and 100% hard cover or limited landscaping using imported soils.

ERM (June 2022) - Detailed Site Investigation - The Bays Station Box, Sydney Metro West

Environmental Resources Management Australia Pty Ltd (ERM) was commissioned by the AFJV to conduct a DSI within the 'station box' portion of The Bays Construction Site. The detailed investigation of this portion of the site was undertaken so that if contamination was identified within the station box that did not require remediation to render the site suitable, then this portion of the site project area could proceed to excavation of the station box separately from the works required within the construction area. This report also included as waste classification for the classification of spoil that was to be removed for the project excavation.

The scope of works included the following tasks:

- Excavation of three borehole locations inside the station box area and collection of samples to address data gaps.
- Laboratory analysis of soil samples for relevant contaminants of potential concern.
- Preparation of a report that summarises the results of the investigation along with the data from previous site investigations. The report is to include comparison of analytical results against relevant human health and ecological screening levels.

The investigation design was to supplement the previous investigations where it was noted that some 60 sample points with sample collection of soil and fill had previously been completed within the 0.707 ha station box area, considered to be well in excess of what would be required under the NSW EPA guidelines (NSW EPA, 1995).

Of relevance to this Site Audit was the recent environmental data from Senversa (Senvessa, May 2021) that reported the detection of PFAS in rock samples in two boreholes within the station box, at depths between 15 and 29 m below ground level (bgl). While if present not an issue from the site suitability, the PFAS detection creates a potential issue for the rock spoil classification as VENM as well as possible indication of a sources of PFAS either off-site in groundwater or to groundwater that could migrate off-site. The consultant, Senversa, considered the results were potentially due to cross-contamination, a reasonable supposition considering the very low detection limits and potential for contamination of samples during drilling and sample collection. This investigation sought to assess whether the PFAS detections were representative of the rock, or whether cross-contamination is a more likely origin for the concentrations detected in the Senversa results.

Based on the proposed future land use of the station box, ERM assessed the previous and current soil data against the commercial/industrial land use criteria as defined in NEPM (NEPC, 1999, Amended 2013).

The assessment found that the site soils comprised of fill materials including concrete, bitumen, road-base (basalt), with sandstone gravels and reworked marine sediments with some anthropogenic inclusions. Natural soils below the fill consisted of marine/estuarine sands and clay, with Hawkesbury Sandstone underlying the sands and clays.

The fill material encountered near the surface was between 1 and 3.5m deep and consisted of hardstand and gravel with bitumen and sandstone. A sandy clay fill was present at ERM_BH08. Dark grey sands, sandy clays, and clayey sands (marine sediments) were encountered below the coarse fill material. Sandstone was encountered at 20.8m at ERM_BH07, at 14 m at ERM_BH08 and at 18 m at ERM_BH09A.

The soil profile was reported as being substantially different across the length of the station box, (e.g., depth of the estuarine sediments is substantially deeper in the western portion of the station box, when compared to the eastern portion, the station box), the station box was divided into grids to aid in waste classification. The classification of soils by grid area was to enable specification of the differing depths of the spoil/waste types across the station box, and to define clear spatial extents for the spoil types referred to within the insitu waste classification reports.

A figure showing the locations of where samples were obtained across the site is provided in **Appendix C**.

PFAS was not detected in rock samples collected from the target depths sampled to replicate the locations where low level PFAS had been detected in the Senversa (2021) report. These samples were ERM_BH08 at 15m, 25m and 29m, BH07 at 25m and BH09A at 25m. Duplicate and triplicate samples collected from these locations and depths also had no PFAS detected.

PFAS compounds (PFPeA/PFOS) were detected in shallow samples ERM_BH07_1.0 and ERM_BH09A_0.5, indicating cross-contamination from shallower material could have occurred during the Senversa investigation.

Asbestos was not detected in the one sample analysed for asbestos (ERM_BH09A_0.5).

The consultant prepared a table consolidating the previous investigation data and the current investigation for comparison against the criteria and to support their assessment findings. The consultant's tables are presented in **Appendix D**.

In summary the report found that the human health criteria (commercial/industrial – direct contact) were exceeded at one location (E66 at 1.7-2m) for TRH C16-C34 fraction. TRH Management Limits were also exceeded at three locations (E66 at 1.7-2m, ENV026 at 3m, and S64 at 4-4.1m).

The station box soils exceeded the health screening level for vapour intrusion (HSL-D) for F1 TRH (C6-C10 less BTEX) in four of the 345 samples analysed for TRH. This guideline, while not directly applicable to station box soil as it will be removed, was applied to assess potential vapour intrusion should the soil contamination identified extend to the areas immediately outside of the station box area.

Human health criteria (commercial/industrial – direct contact) for lead was exceeded in one sample (ENV024_2.0). No other metals concentrations exceeded the adopted human HSL.

PAHs were detected at numerous locations across the site. Carcinogenic PAHs as benzo(a)pyrene TEQ exceeded the adopted human health screening criteria at two sample locations (ENV022, 1.2 m, and ENV024, 2 m).

PCBs were detected in one sample location (S62-0-0.1) at a concentration below the adopted screening criteria.

Pesticides were detected at one sample location (dieldrin and aldrin C27, 1-1.1m). All pesticide results were below the adopted screening criteria.

PFAS analysis was conducted during the Senversa, Golder–Douglas and ERM investigations and while PFAS compounds were detected in some soil samples, concentrations were below the adopted human health criteria. PFAS was not detected in rock samples collected by ERM. Data collected by ERM supports the hypothesis that previous detections of PFAS in rock were due to cross-contamination, and rock can therefore be classified as VENM.

HIL D asbestos criterion was exceeded for fibrous asbestos and asbestos fines in two locations (S59_0.05 and S19_0.45). ERM is also aware that fragments of ACM have been identified in nearby fill material during geotechnical drilling at the Site.

The historical data for groundwater within the station box reports metals (cobalt and manganese) and isopropylbenzene in groundwater at concentrations exceeding ecological criteria at some locations. Several other substituted benzenes were also detected, and all are likely related to petroleum hydrocarbons which were detected in the same samples.

The historical data from wells across the wider construction site area was also evaluated as groundwater ingress may occur during dewatering. Metals (cadmium, cobalt, copper, lead, manganese, mercury, nickel, and zinc), PFAS and TRH in groundwater were present at concentrations exceeding the adopted ecological criteria at some locations. TDS and iron concentrations exceeded the recreational guideline value at some locations. PFAS concentrations were reported above the human health recreational guideline criteria in one groundwater sample (C64, located in the south-western corner of the site).

The groundwater data from the construction site and station box wells are screened against the adopted screening criteria in the consultant's tables 8b 9b 10b and 11b presented in **Appendix E**.

Soil vapour was sampled at four station box locations by JBS&G (JBS&G, 2017) and no contaminants of potential concern were detected within the soil vapour. Soil Vapour results from this assessment are presented in the consultant's tables in **Appendix F**.

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The soils analysis results from the assessment of the construction site had exceeded the health screening level for vapour intrusion (HSL-D) for F1 TRH (C6-C10 less BTEX) in four of the 345 samples analysed for TRH. Further assessment in this regard is dealt with in an addendum to the DSI prepared by ERM (ERM, June 2022).

The addendum is focused on further assessment of the potential vapour intrusion risks from the residual soil impact to future potential indoor commercial workers.

The identified impacted locations are presented in the figure provided in **Appendix G** and are at location E25 (2 – 2.1 mBGL) with benzene reported at a concentration of <0.1 – 4.6 mg/kg, above the HSL of 3mg/kg and S31 (1.8 – 2.2 mBGL) with benzene reported at a concentration of 2.9 – 3.4 mg/kg, above the HSL of 3mg/kg. Location S31 also reported TRH (C6 – C10 less BTEX) at a concentration of 463 mg/kg, slightly above the HSL of 370 mg/kg.

The risk assessment used the methodology consistent with the development of the National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM) HSLs by Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE; Friebel and Nadebaum 2011). The CRC CARE model guidance and model is directly relevant to the vapour intrusion exposure pathways identified for the site and are the most recent Australian guidance on the risk assessment of petroleum hydrocarbons.

The risk assessment used the CRC CARE quantitative excel based model (Friebel and Nadebaum 2011).

The CRC CARE (Friebel and Nadebaum 2011) default physicochemical and toxicity chemical inputs and exposure inputs for commercial land use (HSL-D) was applied in the model. The site-specific data used/consider for inputs to the model are detailed below:

- source concentrations and thickness
- lithology
- commercial / Industrial with slab-on-grade building Parameters
- toxicity criteria
- degradation

The input data were presented as an appendix to the consultant's report.

The identified impact was not considered to be a primary source, however, since they were isolated occurrences, they were considered the source for the purpose of this assessment. Based on the nature of the petroleum impact in the subject locations consisting of BTEX and the volatile TRH fractions, the primary source is presumed to be a historical petroleum fuel source and the CRC CARE (Friebel and Nadebaum 2011) default chemicals of potential concern TRH fractions and per cent makeup were applied. The contaminants of potential concern assessed were:

- benzene
- TRH C6-C10 (minus BTEX); consisting of TPH >C6-C8 aliphatic, TPH >C8-C10 aliphatic, and TPH >C8-C10 aromatic

Vertical delineation of both locations indicate that the impact is localised to a depth range of approximately 2m. Based on the vertical delineation a finite source of impact was assumed with a thickness source of 200cm. Based on the depths of soil impacts, the depth of source was at 2 m bgl.

The model's inputs were based on one fill soil layer overlying the impacted soil layer, between the ground surface and the depth of the identified contamination. Given the heterogeneity of the fill material the most conservative CRC CARE (Friebel and Nadebaum 2011) default sand soil properties were applied.

Risks associated with non-carcinogenic (threshold) contaminants was characterised by Hazard Quotients (HQs). The HQs for multiple exposure pathways and a combination of chemicals will be summed to calculate an overall risk level, or Hazard Index (HI). The threshold HI approach is based on the toxicological principal that there is a level of exposure below which it is unlikely for sensitive populations to experience health effects. If the HI does not exceed 1, then it is reasonable to conclude that no adverse health effects are likely to be realised. If the HI is greater than 1 then further consideration is necessary (NEPC, 1999, Amended 2013). An HI greater than 1 does not automatically imply that an unacceptable risk is present but does indicate that further action(s) (investigation or risk management) is warranted (NEPC, 1999, Amended 2013).

Risks associated with carcinogenic (non-threshold) contaminants were characterised by Incremental Lifetime Cancer Risk (ILCRs). The ILCR for multiple exposure pathways and a combination of chemicals will be summed to calculate an overall risk level, or ILCR. The ILCR approach for carcinogens is based on the toxicological approach to assessing carcinogenic chemicals that if there is exposure then probability for a cancer risk also exists. Establishing a “negligible risk” or “acceptable risk” is a complex policy issue. The NEPM has recommended an acceptable ILCR arising from exposure to single or multiple carcinogens of 1 in 100,000 (1×10^{-5}) or less.

The risk characterisation results are summarised in the below.

COPC	Commercial / Industrial with slab-on-ground		
	Cancer Risk	Hazard Index Vapour limited	Volatilisation Depletion Time (Years)
Benzene	1E-05	NA	<u>15.4</u>
TPH >C ₆ -C ₈ aliphatic	NA	0.12	<u>1.9</u>
TPH >C ₈ -C ₁₀ aliphatic	NA	0.16	<u>5.7</u>
TPH >C ₈ -C ₁₀ aromatic	NA	0.25	63
Sum	1E-05	0.54	

Underlined results indicate complete depletion of source within the vapour model concentration averaging time; seven (7) years for non-cancer Hazard Index and within 30 years for cancer risk.

With HIs ≤ 1.0 and ILCRs $\leq 1 \times 10^{-5}$, the results indicate potential non-carcinogenic risks are unlikely and carcinogenic risks are within acceptable levels for future occupants under commercial / industrial slab on-grade scenario.

The consultant’s table also provides the model estimated time for source depletion to occur based on volatilisation only. Based on the source depletion times, several key contaminants of potential concern, benzene (for potential cancer risks) and, TPH >C₆-C₈ aliphatic, and TPH >C₈-C₁₀ aliphatic (for potential non-cancer risks) were fully depleted via volatilisation during the modelled worker exposure duration. The depletion results indicate the source mass is limited such that the risk assessment results are effectively based on the full amount of the residual impact of those contaminants of potential concern volatilisation into one indoor space without any further losses (vapour degradation, losses to atmosphere) does not present a potential unacceptable risk. This is the most conservative scenario and indicates the changes to the volatilisation model inputs cannot result in higher risks. Also, given the site is not yet developed, the depletion times also indicate that volatilisation would result in

reduction of risks prior to commercial building occupation, which would likely take on the scale of year(s) to occur.

The consultant concluded that the risk assessment had assessed the potential vapour intrusion risks from the residual soil impact to future potential indoor workers within future premises. The results indicated that the potential non-carcinogenic risks and carcinogenic risks are unlikely for future commercial/industrial users. The results support that no further remediation or management of the soil impacts are warranted relative to future potential exposures from the volatilisation of the residual impacts identified in the ERM DSI (ERM, January 2022).

4.1 Audit Evaluation of Assessment Reports

The following sections provide discussion of the Site Audit findings of the fieldwork component of intrusive investigations undertaken at the site as reported by the consultants working for the AFJV (ERM, January 2022), (ERM, June 2022) and (ERM, June 2022) and their incorporation of the previous body of site assessment reports.

The information relating to the site description, condition, surrounding environment and site history has been reviewed and included where relevant in earlier sections of this report.

4.1.1 Desktop Assessment

The desktop assessment completed by the consultant as part of the Detailed Site Investigations (ERM, January 2022) and (ERM, June 2022), was somewhat limited and dependent on the work done by the previous consultants – mainly that done by JBS&G, however, that report did include a reasonable review of the historical use of the site.

Overall, the desktop assessment and site history review completed for the site by the various consultants is considered reasonably robust and adequate for the purpose of the Site Audit and assessment of the investigation requirements.

4.1.2 Investigation Sampling Design

There were many rounds of intrusive investigations that have been completed at the site. The sampling investigation design that was presented in the SAQP was based on targeting specific data gaps that remained from those investigations. While the design as such comprised targeted sampling to infill or replicate (depending on the purpose of the sampling locations) of the identified areas of concern based on the previous investigations.

In total across all the recent investigations, a more than reasonable number of investigation locations were advanced within each area during the most recent intrusive investigations at the site to form a representative dataset.

The suite of laboratory analysis across all stages of work was suitable based upon the site history and review of the investigation conducted.

4.1.3 Quality Assurance/Quality Control

The consultants (ERM) utilised the seven-step DQO process as required by the NSW EPA guidelines for Site Auditors (NSW EPA, 2017) during the assessment of the site.

Data Quality Objectives are a planning tool that is an independent process from the Quality Assurance/Quality Control processes that are standard in both investigation and validation

reports. The DQOs are specific to each investigation and should be completed prior to any fieldwork to assist in development of an optimal sampling analytical and quality plan to reach the projects objectives most effectively.

DQOs were developed for the DSI and are also detailed in the RAP. The details of the DQOs conducted across the investigations and remedial planning are sufficient and meet the objectives of this Site Audit.

Both detailed investigation reports (ERM, January 2022), (ERM, June 2022) also provided a discussion on the adopted field and laboratory Quality Assurance/Quality Control (QA/QC) program adopted as part of the investigation works.

The following table provides a review of the QA/QC employed by the consultant across both investigations carried out on the site. The following table summarises the QA/QC in relation to what are termed the Precision, Accuracy Representativeness, Comparability and Completeness (PARCC) parameters, which are a useful tool for evaluating the quality control techniques used.

Table 4-1 Investigation QA/QC Summary

Quality Indicator	Frequency & Acceptable Quality Parameter	Auditor Review of Quality Parameter Acceptance
Precision		
Intra-laboratory duplicates	Greater than 5% for COPC analytes Results <30-50% RPD	Yes, and RPDs acceptable
Inter-laboratory duplicates	Greater than 5% for COPC analytes Results <30-50% RPD	Yes
Laboratory duplicates	1 in first 5-10, then 1 every 10 samples, <50% RPD (>10xEQL), <75% RPD (5-10xEQL), <100% RPD (<5xEQL)	RPDs – acceptable
Accuracy		
Matrix spikes	70-130%	Acceptable
Certified reference material or Laboratory Control Sample	70-130%	Acceptable
Surrogate Spikes	70-130%	Acceptable
Representativeness		
Sampling appropriate for media and analytes	As per NEPM and AS 4482.1	Yes
Rinsate blanks	1 per sample batch <LOR	Not collected or reported
Trip spikes/trip blanks	1 per sample batch 70-130%/<LOR	Not collected or reported
Laboratory blanks	1 per 20 or 1 per batch <LOR	<LOR – Yes
Samples extracted and analysed within holding times	Extracted within holding times	Yes
Comparability		
Standard operating procedures used for sample collection and handling	Suitable description of sampling procedures	Yes
Standard analytical methods used for all analyses	Analytical methods are referenced and NATA Accredited	Yes

Quality Indicator	Frequency & Acceptable Quality Parameter	Auditor Review of Quality Parameter Acceptance
Consistent field conditions, sampling staff and laboratory analysis	Consistent fieldwork team, single primary laboratory used	Yes
Limits of reporting appropriate and consistent	Reporting limits less than the appropriate site criteria	Yes
Completeness		
Appropriate and complete COC documentation	Supplied in reports	Yes
Satisfactory frequency and result for QC samples	As per NEPM and AS 4482.1	Yes
Data from critical samples is considered valid	COC	Yes

Table Notes: * specifically discussed in Auditor comments

The QA/QC assessment and interpretation was found to be limited for the reporting of both detailed site investigations. Sufficient intra-laboratory duplicate samples were collected and analysed as part of the DSI (ERM, January 2022).

There was no evidence of trip blank, trip spike or rinsate samples being collected for either investigation.

Chain of custody documentation was provided with the investigation reports. Appropriate review of the laboratory QA/QC results was conducted and reported acceptable results.

The laboratory analytical program is considered to have achieved adequate levels of precision and accuracy during the time when samples from the site were being analysed. As such, the sampling, analytical and quality protocols undertaken by the consultant were satisfactory and the data is adequately reliable for the purpose of assessing the contamination status of the site for the proposed commercial/industrial use.

Overall, the Auditors review of the QA/QC measures employed by the consultant and the laboratory was found to provide adequate information for the purpose of characterising the site.

A summary review of the QA/QC measures employed for the previous reports by the Site Auditor indicated that sufficient attention to the collection and interpretation of QA/QC parameters had been undertaken. The investigation report prepared by ERM (ERM, January 2022) included a relatively comprehensive review of the QA/QC measures and issues presented in the previous investigations as part of their reference, incorporation, and use of that data in their report.

4.1.4 Site Criteria

The assessment criteria utilised for the assessment for the site were derived from the NEPM (NEPC, 1999, Amended 2013). Consideration was given to HILs and HSLs in the assessment of soils. Ecological criteria, namely EILs and ESLs were also considered during the works where relevant.

Ground water was compared to a number of different criteria sources including; NHMRC (2011) – Drinking water, NHMRC (2008) – Recreational/Direct Contact, ANZECC (2000) – Long-Term Irrigation and importantly the ANZG (2018) – 95% Protection of species.

4.1.5 Investigation Results

Analytical summary tables were provided for the ERM reports, and these consolidated the results of the previous investigations that had been conducted. The concentrations of contaminants reported by the consultant were reviewed and found to be consistent with those reported by the laboratory. The laboratory procedures were appropriate for the identified potential contaminants of concern.

The site plans provided by the consultants adequately identified the sampling locations relevant to the main site features such as the existing buildings, boundaries, and roads. The north arrow appears to be correctly orientated in the sample location plan provided in the report.

In summary, the ground investigations identified the presence of soil/fill contamination impacts at the site and recommendations were made in relation to remediation of the associated soil/fill impacts. The conclusions reached by the consultant regarding the site assessment are considered appropriate given the data obtained from the site.

5 Conceptual Site Model

A site-specific CSM was developed by the consultant. This was to assess the potential for risk from potentially complete or complete exposure pathways to human health and the environment.

The development of the CSM is the fundamental step that describes the exposure pathway between the source of contamination, the receptor and exposure route or pathway (SPR). As part of the CSM, the linkages between these elements examines if a complete, potential, or incomplete exposure pathway exists. The status of the exposure pathway determines the presence of risk to environment and/or human health. The consultants defined the exposure pathway categories in relation to whether they were complete, partially complete or were incomplete depending on whether all elements or linkages existed, some linkages may not exist or there was not sufficient information on whether they exist or if one more linkage did not exist.

The consultant provided a summary table of potential contaminants of concern identified from the review of available investigations and their more recent DSI that need to be considered in the CSM.

Table 5-1 Potential Contaminants of Concern

Sample ID	Sample Depth (m bgl)	Contaminant of Potential Concern (COPC)	Concentration (mg/kg unless stated otherwise)	Exceeded Guideline
WB4_1.9-2.0	1.9 - 2.4	Lead	1500	HIL-D
C29-0.0-0.1	0.0 - 0.1	Asbestos (ACM) (bonded)	0.0983 *	HIL-D
E20_1.8-1.9	1.8 - 1.9	Benzo(a)pyrene TEQ	99	HSL-D
		TRH C16-C34	6100	Management Limit (commercial / industrial)
E25_2.0-2.1	2.0 - 2.1	Benzene	4.6	HSL-D
E49_0.5-0.6	0.5 - 0.6	Asbestos (AF / FA)	0.0186 *	HIL-D
E51_0.9-1.0	0.9 - 1.0	Asbestos (AF / FA)	0.0015 *	HIL-D
E64_3.0-3.1	3.0 - 3.1	Benzo(a)pyrene TEQ	150	HSL-D
S31_1.8-2.2	1.8 - 2.2	Benzene	3.4	HSL-D
		TRH less BTEX	463	HSL-D
ERM_BH05_1.7	1.7 - 1.8	Benzo(a)pyrene TEQ	44.8	HSL-D

* concentration in %w/w

HIL: Health Investigation Level

HSL: Health Screening Level

TEQ: Toxic Equivalency Quotient

AF / FA: Asbestos fines / friable asbestos

Contaminants of concern associated with the site include lead, TRH, PAHs (benzo(a)pyrene), benzene, PFAS, and asbestos.

In summary the potentially viable CSM source, pathway, receptor linkages that require remediation action (further assessment, remediation, or management) were reported to comprise:

- Potential risks to development construction and intrusive maintenance workforces via direct contact with soil and/or groundwater, inhalation of dust (potentially including asbestos fibres).
- Potential risks to the public passers-by from dust generated by construction activity on-site.
- Potential risks to terrestrial ecology via direct contact with soils on the development land only (future landscaping extent and design unknown).
- Potential risks to aquatic organisms and human health (recreational users) in White Bay / Rozelle Bay from discharge of impacted groundwater.

ERM stated that it understood that:

- Appropriate water treatment is being conducted and is proposed to continue.
A wastewater treatment plant is already operational, with the discharge limits developed within a Water Pollution Impact Assessment, which was reviewed by the NSW EPA. Discharge is to be in accordance with the requirements of an Environmental Protection Licence.
- The risk of completed exposure pathways via direct contact and dust inhalation to AFJV's construction workforce is being managed via the procedures within the construction management plans in place.

Further measures and remediation were however, identified to render the site suitable for future users of the site, and to address potentially complete source, pathway, receptor, linkages associated with dust inhalation and direct contact with soil and groundwater.

5.1 Audit Discussion of the CSM

The consultants identified potential contamination issues at the site based on the findings of desktop studies, site inspections and site assessment conducted. The potential contaminants identified are considered to have been suitably comprehensive noting the site location and history. Therefore, the Site Auditor is satisfied that the potential contaminants of concern identified were appropriate for the assessment of the site. The potential contaminants of concern were considered acceptable to enable assessing the suitability of the site for the intended land use and have met the objectives of the Site Audit.

6 Remedial Action Plan

Environmental Resources Management Australia Pty Ltd (ERM) was engaged by the AFJV to prepare a Remediation Action Plan (RAP) for The Bays Station construction site.

The RAP provided information on the works proposed to manage and remediate contamination previously identified at the site.

The objective of the RAP is to document all necessary actions to be undertaken at the site to address identified soil contamination and render the site suitable for the proposed future land use. The RAP included the following:

- A summary of the site layout and environmental setting, including the site history.
- A summary of previous environmental investigations undertaken on-site.
- A summary of the contamination identified on-site that requires remediation.
- An evaluation of available remediation options and a summary of the preferred remedial strategy that will render the site suitable for the proposed land use/s from a contamination perspective.
- A summary of the validation criteria to be adopted and design of a validation plan to confirm that the remediation strategy was successful in the context of the remediation objective.
- Appropriate safeguards to perform the remediation works in an environmentally acceptable manner, having regard to best-practice work, health, and safety procedures.
- Roles and responsibilities.

Those remediation works outlined in the RAP do not include the footprint of the Metro Station Box and tunnel sections which do not require remediation to make the site suitable as the excavation works within these locations will remove all potentially contaminated soils and materials.

Potential exposure of workers to contaminated soils during construction activities will be managed separately as part of the construction phase of works and various management plans prepared for the purpose of spoil management.

The RAP also provides groundwater management and disposal options in line with the project Groundwater Management Plan (AFJV, 2022a) and Groundwater Monitoring Program (AFJV, 2022b). However, remediation of groundwater is not required to render the site suitable or for the protection of off-site receptors.

6.1 Remediation Objectives

The RAP stated that the objective of the remediation is to render the site suitable for the proposed land use. The proposed future land use is consistent with commercial/industrial as described in the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC, 1999, Amended 2013).

Based on the data from the combined investigations, contaminant exceedances in soil considered to present a potential human health risk under the proposed future land use were summarised by the consultant in the following table.

Table 6-1 Contaminants of Concern that Exceeded the Land Use-based Criteria

Sample ID	Sample Depth (mbgl)	Contaminant of Potential Concern (COPC)	Concentration (mg/kg)	Exceeded Guideline
WB4_1.9-2.0	1.9 - 2.4	Lead	1500	HIL-D
C29-0.0-0.1	0.0 - 0.1	Asbestos (ACM)	0.0983 *	HIL-D
E20_1.8-1.9	1.8 - 1.9	Benzo(a)pyrene TEQ	99	HSL-D
		TRH C16-C34	6100	Management Limit (commercial / industrial)
E25_2.0-2.1	2.0 - 2.1	Benzene	4.6	HSL-D
E49_0.5-0.6	0.5 - 0.6	Asbestos (AF / FA)	0.0186 *	HIL-D
E51_0.9-1.0	0.9 - 1.0	Asbestos (AF / FA)	0.0015 *	HIL-D
E64_3.0-3.1	3.0 - 3.1	Benzo(a)pyrene TEQ	150	HIL-D
S31_1.8-2.2	1.8 - 2.2	Benzene	3.4	HSL-D
		TRH less BTEX	463	HSL-D
ERM_BH05_1.7	1.7 - 1.8	Benzo(a)pyrene TEQ	44.8	HSL-D

* concentration in %w/w

HIL: Health Investigation Level

HSL: Health Screening Level

It was noted that several soil samples reported contaminants of potential concern at concentrations exceeding the adopted ecological investigation and screening levels. However, given that much of the site is to be covered in hardstand, the risk posed to ecological receptors is considered low and remediation and management of the impacts are not considered necessary under the proposed redevelopment scenario.

6.2 Remediation Options and Proposed Approach

In accordance with the Site Auditor Guidelines (NSW EPA, 2017), soil remediation and management should be implemented in the following preferred order:

1. on-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level
2. off-site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level
3. removal of contaminated soil to an appropriate site or facility, followed where necessary by replacement with clean fill
4. consolidation and isolation of the soil on-site by containment within a properly designed barrier

ERM (ERM, August 2022) went through the various options discussing the rationale behind the selection of the preferred remediation options being narrowed down to excavation and removal off-site or consolidation and isolation by on-site containment.

ERM explained that the first two options were not feasible on the site due to nature the contaminants of concern. Landfill disposal was discussed as often being the simplest of all remediation methods, and involving the excavation of the contaminated materials, and disposal off-site a NSW EPA licensed waste facility. The validated excavation void is then backfilled using clean, validated fill materials.

The selection of an appropriate landfill will normally depend largely upon the results of classification of the wastes. It is sometimes necessary for heavily contaminated soils to be

pre-treated prior to disposal, to reduce the concentrations or minimise the mobility of the contaminants.

This option was considered potentially suitable for implementation at the site given the type of contamination identified on-site and the proposed future land use, however, given the presence of PASS in fill in some areas of the site, some on-site treatment would also be required and the large volume of contaminated soil that requires this option was also considered not to be feasible.

On-site capping and containment involves the installation of a physical barrier around the contaminated area to prevent potential migration pathways of contaminants.

A site management plan must be implemented for capping to ensure that future excavation work is minimised and where necessary, carried out in strict accordance with appropriate occupational health and safety procedures.

The on-site capping and containment option was considered suitable for implementation at the site as it does not require off-site disposal of the asbestos contaminated fill materials and the surface of the containment area will be entirely sealed and inaccessible to site users. Long-term management of the containment measures would be required to ensure contaminants are not released to the environment. This approach also minimises the likelihood for migration of shallow soil contamination to groundwater or surface water, as the impervious capping will result in reduced infiltration through contaminated soils.

Based on the analysis undertaken by ERM the preferred remediation strategy is:

- Cap and Contain and Management of Soil Impact with a Long-term Environmental Management Plan (LTEMP).
- Dewatering of excavations and on-site water treatment prior to controlled discharge.

This remediation strategy would reduce the potential for exposure to human health receptors via the direct contact, inhalation and exposure to flammable material pathways that were assessed as being potentially complete. Potential for exposure to terrestrial ecology is also reduced via this remediation strategy.

It is noted that there are some areas on-site that need to be levelled, and for relatively small volumes of soil such as stockpiles and excess soil from land forming works, management of soil impact will include off-site disposal and beneficial reuse of excess soils where appropriate (beneath the capping layer for example).

ERM noted that there is the potential for migration of contamination from on-site soils to groundwater, and to off-site receptors associated with this remediation option while soils are exposed during the remediation preparation works (land forming and stockpile removal). This phase, however, is expected to be of short duration, and will be managed under the CEMP. Once the capping layer is in place, the likelihood for migration of shallow soil contamination to groundwater or surface water is significantly reduced.

6.3 Remediation Scope of Works

The remediation scope is the installation of a capping layer over the full extent of the site, with the exclusion of the station box.

The installation of the capping layer will be carried out following the completion of land forming works and required cut and fill.

ERM proposed the capping layer will consist of the installation of a high visibility non-woven geotextile marker layer to be installed over the footprint of the site, extending to all site boundaries, and sufficient to cover all potentially contaminated material. Where joins in the marker layer occur, an overlap of at least 200 mm is recommended.

Following installation of the marker layer, an impervious concrete pavement with a thickness of no less than 100 mm will be placed over the top of the marker layer.

In the case that trenches are to be created for the installation of new services, the marker layer will cover the walls and base along the length and breadth of each trench.

The minimum capping layer design specifications presented in the following table.

Table 6-2 Minimum Capping Layer Design Specifications

Location	Capping Layer Specification
Permanent paved areas	Permanent paving with a minimum thickness of 100 mm overlying a high visibility non-woven geotextile marker layer. Chemical and asbestos impacted soil is present immediately below the marker layer.
New services	Where services interact with the capping layers, a minimum soil cover thickness of 100 mm must be maintained below the total depth of the services. A high visibility non-woven geotextile marker layer will be placed within the trenches prior to installation of the services and backfilling with 'clean' materials. A minimum capping thickness of 100 mm is required. Chemical and asbestos impacted soil is present immediately below the marker layer.
Site levelling (filling)	If filling of the site to raise surface elevation is required, clean fill (VENM) should be placed on top of the marker layer. If site sourced (potentially contaminated) materials are to be reused on-site to raise surface elevations, the marker layer must be placed over the site sourced material. In the case that the marker layer is not placed below clean fill (VENM), a conservative approach should be adopted whereby a marker layer is placed over the clean fill to indicate the presence of potentially contaminated materials below. Future excavations into the material below the marker layer will need to be managed assuming direct contact and dust inhalation hazards are present.
Asphalt/concrete as a marker layer	Where asphalt/concrete is in place and fill/capping is placed above, the original asphalt/capping is considered to be an appropriate barrier and can act as a marker layer (i.e no additional marker layer is required). In this scenario, the LTEMP must be updated following validation with the type of marker layer and approximate profile within the different areas of the site.

It is noted that excavations created for the construction of station box and the tunnel alignment are excluded from the marker layer and capping strategy as it effectively forms a void in the site vertical profile with a sufficient barrier created in the lining and shoring of that infrastructure.

The installation will be subject to Construction Quality Assurance measures that will be undertaken and reported in the validation of the remediation.

A key component of the remediation strategy is the long-term management to ensure the ongoing competency and function of the capping layer.

The RAP details that a LTEMP is to be prepared and implemented to ensure the capping is maintained to a standard that continues to protect human health.

6.4 Validation Plan

The RAP presented a validation plan to be implemented with the objective of providing sufficient demonstration that the remediation had been completed as planned and that the site was suitable for the proposed use.

The consultant ERM stated that the validation would be required to confirm that:

- the capping layer has been installed in accordance with the requirements of the RAP
- conditions below the capping installation can be managed to an appropriate standard that ensures there is no ongoing risk to human health or the environment.

The validation plan was stepped as follows:

Marker Layer Validation:

- A visual inspection will be carried out by a suitably qualified and experienced environmental consultant to document, via photographic evidence, the lateral extent of the marker layer following installation. A copy of the photographic record will be included in the validation report.
- A survey will be carried out by a suitably qualified and experienced subcontractor following the installation of the marker layer to document the lateral extent of the layer. A copy of the survey figure will be included in the validation report.

Capping Layer Validation:

- A visual inspection will be carried out by a suitably qualified and experienced environmental consultant to document, via photographic evidence, the lateral extent of the capping layer (pavement) following installation. A copy of the photographic record will be included in the validation report.
- A survey will be carried out by a suitably qualified and experienced subcontractor following the installation of the capping layer to document the lateral extent and elevation (thickness) of the layer. A copy of the survey figure will be included in the validation report.

During construction works, groundwater monitoring will be carried out by a suitably qualified person monthly for the first three months of construction, and quarterly thereafter, or as necessary based on expert advice. Groundwater monitoring will be carried out in accordance with the Groundwater Monitoring Program (AFJV, 2022b).

The final levels and locations of all cut and fill activities and associated materials movements should be recorded and included in the validation report, including the originating location of the fill and where it was moved to on-site.

At the completion of the remediation activities, a validation report will be prepared by an environmental consultant engaged to validate the remedial works with reference to the Contaminated Land Guidelines: Consultants Reporting on Contaminated Sites, (NSW EPA, 2020) and to comply with the agreement between AFJV and the State Government of NSW (TfNSW).

6.5 Remediation Contingency Plan

ERM provided a contingency plan if there are events or discoveries made at the site which would prevent the proposed works conforming to the validation criteria, or if the selected remediation strategy is unable to proceed or is unsuccessful. The following contingencies would be considered and discussed with relevant stakeholders prior to implementation:

SCENARIO 1: Capping design is insufficient to contain contaminants:

Option A: Re-assessment of remedial options including the feasibility of redesigning the capping system.

Option B: Controlled excavation until non-compliant material is removed and validation is achieved.

SCENARIO 2: Treatment is required to facilitate disposal of excavated soil to landfill:

Option A: Identify and implement appropriate treatment strategy in consultation with relevant stakeholders to facilitate off-site disposal of excavated soil to landfill.

Option B: Re-assessment of remedial options.

6.6 Unexpected Finds

An unexpected finds procedure was developed by AFJV as part of the construction planning for implementation during site works, primarily associated with excavation and civil activities. The unexpected finds procedure forms part of the Soil and Groundwater Management Plan (AFJV, 2021c). The consultant stated that the unexpected finds procedure should be implemented if contamination not considered as part of the RAP is encountered to ensure appropriate management of natural soils or fill.

6.7 Long-term Environmental Management Plan

Given that the preferred remediation strategy to be implemented on-site comprises capping of contaminated fill materials, it will be necessary to prepare and implement a LTEMP which documents management and mitigation measures.

6.8 Environmental Management of Remediation Works

6.8.1 Waste Management

Considering the preferred remediation strategy is capping, containment and management of soils on-site, large volumes of waste soil are not anticipated to be generated. There will, however, be some spoil that will require off-site disposal such as minor stockpiles, and excess soil because of land forming activities, however, these may not be a direct outcome of the remediation, but rather because of the construction work.

The consultant stated that all waste disposal activities will be undertaken in accordance with the Waste Classification Guidelines (NSW EPA, 2014), the Waste Avoidance and Resource Recovery Act 2001 (NSW), the Protection of the Environment Operations Act 1997 (NSW) and other relevant legislation.

The project has established under the Construction Environment Management Plan (CEMP), with sub-plans related to spoil management and waste.

The RAP details that where soils do require disposal related to the remediation, they will require classification for off-site disposal.

All soils that require off-site disposal as part of the remediation works will be disposed to an appropriately licensed landfill facility.

Copies of dockets pertaining to disposal of soils will be provided by the principal contractor to confirm the source, type, and quantities of materials. These will be included in the validation report.

6.8.2 Classification of Soil for Beneficial On-site Reuse

Where fill is sourced from within the site (i.e., soils excavated to for land forming works or similar), and the material has not been previously assessed, the RAP required that the material must be assessed for its suitability for beneficial on-site reuse from a contamination perspective.

Representative soil samples will be collected at a rate of at least one sample per 200 m³ of material, with a minimum of two samples collected for analysis and assessed against soil validation criteria for commercial/industrial land use as published in the NEPM (NEPC, 1999, Amended 2013).

6.9 Remedial Action Plan Conclusion

The consultant concluded that regarding the potentially complete direct contact and dust inhalation pathways identified, the site can be made suitable for the intended land use, subject to appropriate remediation in accordance with this RAP.

The actions outlined within this RAP are to manage and remediate contamination previously identified at the site, excluding the footprint of the Station Box and tunnel sections which do not require remediation to ensure the site is suitable for future site users.

The remediation will be carried out during the site establishment phase (following the completion of any required land forming works) and will entail placement of an impervious capping layer across the entire site area excluding the station box footprint. Post-remediation validation will be carried out to confirm that the remediation objective has been achieved.

The consultant highlighted that it is expected that a LTEMP will be implemented on-site which restricts uncontrolled excavation of the subsurface.

6.10 Audit Discussion of the Remedial Action Plan

Based on the information contained in the consultant's RAP (ERM, August 2022), the Site Auditor finds that the proposed remediation:

- is technically feasible
- is environmentally justifiable given the proposed construction and development activities
- the proposed validation of the installation of the cap is considered adequate
- contingency plans are suitably comprehensive to ensure contamination above the remediation criteria is appropriately removed and treated

- the proposed long-term management is achievable, not overly onerous and is reasonably expected can include public notification and be reasonably made lawfully enforced

It is the Site Auditor's opinion that the proposed remediation works as detailed in the RAP are appropriate for the proposed commercial/industrial use of the site.

7 Remediation Activities and Validation

The remediation works within Portion 1B and 1C of The Bays Construction Site comprised the capping and containment of contaminated soils in situ in order to render the site suitable for the proposed use. The remediation works conducted within Portion 1B and 1C excluded the Station Box footprint.

Preliminary construction and civil works, including achieving design levels and installation of underground services, were also undertaken, and reported as part of the remedial works. These works included minor excavation, relocation, and off-site disposal of material.

The remediation of Portion 1B and 1C was undertaken between December 2021 and August 2023. Dates for specific activities were provided by the consultant as detailed following:

- Excavation works commenced in late May 2022, with Portion 1B and 1C in July 2022
- The marker layer was placed in areas which did not have existing hard standing between December 2021 and August 2022
- The capping layer was completed in areas which did not have existing hard standing between December 2021 and August 2022

The following sections describe the remediation and validation works as reported by ERM in the Validation Report (ERM, September 2024) for Portion 1B and 1C.

7.1 Site Remediation Validation Criteria

Validation of the site comprised confirmation of appropriate cap installation and assessment of groundwater conditions prior to, and following the remediation works.

Where criteria was utilised to assess the suitability of material for beneficial reuse on the site, consideration was given to HILs and HSLs for commercial and industrial land use as derived from the NEPM (NEPC, 1999, Amended 2013).

The assessment of groundwater comprised comparison to historical and baseline data collected prior to the remediation works. The consultant did provide comparison against various criteria sources including; NHMReC (2011) – Drinking water, NHMRC (2008) – Recreational/Direct Contact, ANZECC (2000) – Long-Term Irrigation and importantly the ANZG (2018) – 95% Protection of species.

7.2 Remediation Works

7.2.1 Capping Layer Installation

The consultant reported that a non-woven geotextile marker layer was installed across the majority of Portion 1B and 1C in all areas which did not have existing hardstand, and extended to the site boundaries, with the exception of:

- The area surrounding historical investigation location C29, which exceeded HIL-D for asbestos (bonded ACM)
- The area surrounding historical investigation location E64, which exceeded HIL-D for benzo(a)pyrene

These areas are discussed further below.

Where joins in the marker layer occurred, an overlap of at least 200 mm was utilised. It was noted that although the RAP required a “high visibility” marker layer which was anticipated to be orange in colour, a white geotextile was instead installed by the contractor. Aside from the colour, the technical specifications of the white geotextile marker layer installed within Portion 1B and 1C were consistent with the RAP requirements.

Following installation of the marker layer, an impervious concrete pavement or stabilised 20mm Densely Graded Base (DGB20) (with 3-4% cement or Stabilment added) with a thickness of no less than 100 mm was placed over the top of the marker layer. Where additional material was required above the marker layer to achieve the required design levels, the concrete pavement was installed above the additional material. Additional imported engineered material (i.e., DGB20) was placed as part of the concrete pavement construction. The extents of the marker layer installation and capping layer types are presented on the consultants Figure 3b in **Appendix H**.

Although the RAP did not anticipate the use of stabilised DGB20 in place of concrete for capping purposes, the contractor and consultant considered that as cured, stabilised DGB20 is unable to be reworked, it provides a physical barrier similar to concrete.

Capping was not installed in some areas within Portion 1B and 1C, including the three carpark areas of Portion 1B, limited areas in the north/west of Portion 1B and eastern portion of Portion 1C. The majority of these areas already comprised concrete or bitumen surfaces. Where the ground surface was unsealed, a clearance check was conducted and a layer of DGB20 was placed in some areas. The following table was provided by the consultants detailing the status of areas where capping was not installed.

Table 7-1 Areas where capping not installed

Portion	Area ID ¹	Area Description	Historical Investigation	Current Ground Surface Conditions	Comments
Portion 1B	1B-1	White Bay Foreshore – South-Southeast (non-Exclusive Use Areas)	Partial – there was no access to the area closest to foreshore (active cargo wharf)	Concrete and bitumen	This area is owned and managed by the Port Authority of NSW and was not accessible for AFJV works without consent.
	1B-2	Northwest of Port Access Road	Yes	Bitumen and unsealed (DGB20)	DGB20 layer was placed in some areas in mid-late 2022, prior to AFJV occupation
	1B-3	Western Site Boundary (Historical Investigation Location C29 Area)	Yes	Unsealed	No works were conducted by AFJV. Surface clearance was completed by ADE in August 2024 as discussed below.
Portion 1C	1C-1	White Bay Foreshore – West/Northwest (including historical investigation location E64 area)	Yes	Concrete and bitumen	Access to this area was subject to approval from the Port Authority of NSW with only above ground placement of offices allowed.
	1C-2	East of Port Access Road	No, but three historical investigation locations within approximately 2-5 metres of this limited area	Concrete	AFJV work in this area was limited to above ground works (concrete on top of existing ground level).
N/A	Port Access Road	Port Access Road (Intersects parts of Portions 1B and 1C)	Partial – active public roadway, however a number of historical investigation locations within 5 metres	Bitumen and engineered subgrade (permanent)	Public roadway under control of the Port Authority of NSW.

Where trenches were excavated for the installation of new services, the marker layer covered the walls and base along the length and breadth of the trench.

The capping installation details were summarised by the consultant in the following table.

Table 7-2 Capping Installation Methodology

Location	Capping Layer Specification
Permanent paved areas	Permanent paving with a minimum thickness of 100 mm overlying a white non-woven geotextile marker layer. Chemical and asbestos impacted soil is present immediately below the marker layer.
New services	Where services interact with the capping layers, a minimum soil cover thickness of 100 mm was maintained below the total depth of the services. A white non-woven geotextile marker layer was placed within the trenches prior to installation of the services and backfilling with 'clean' materials. A minimum capping thickness of 100 mm was installed. Chemical and asbestos impacted soil is present immediately below the marker layer.
Site levelling (filling)	Where filling of Portion 1B & 1C was required to raise surface elevation, Virgin Excavated Natural Material (VENM) or validated tunneling spoil was placed on top of the marker layer.
Asphalt/concrete as a marker layer	Where asphalt/concrete was in place and fill/capping is placed above, the original asphalt/capping was considered to be an appropriate barrier and acted as a marker layer (i.e. no additional marker layer was required). In this scenario, the LTEMP will be updated following validation with the type of marker layer and approximate profile within the different areas of Portion 1B & 1C.

Photographs of the marker layer and capping placement were included in the Validation Report.

7.3 Groundwater Monitoring

Baseline groundwater monitoring was completed at The Bays Construction Site, including Portion 1B and 1C, prior to the commencement of the remediation program by ERM in January 2022 (round 1), February 2022 (round 2) and March 2022 (round 3) in accordance with Groundwater Management Plan (AFJV, 2022a) and Groundwater Monitoring Program (AFJV, 2022b) implemented for the development. Groundwater monitoring was also conducted during the remediation of Portion 1B and 1C to assess any changes in groundwater conditions as a result of the works. Well locations are provided on the consultant's figures included in **Appendix I**.

The consultant noted accessibility issues to some wells were reported during various sampling events, however, the data collected was considered sufficient to provide adequate information for the purposes of monitoring potential impacts from the remedial works in Portion 1B and 1C.

At the time of sample collection and reporting, groundwater triggers had not been set by the contractor for the groundwater monitoring program.

The groundwater monitoring results reported for The Bays Construction Site prior to commencement of the remediation program in Portion 1B and 1C, including the results of the baseline monitoring program in January to March 2023, indicated the presence of existing contamination, primarily various metals, PFAS, isopropylbenzene and TRH which exceeded ecological and/or recreational screening criteria.

Comparison with the groundwater results reported during the remediation program (May to December 2022) indicated that groundwater conditions prior to commencement of the remediation program were comparable to conditions during the remediation program and

there was no evidence of migration of contaminated groundwater to adjacent off-site areas as a result of the remediation program.

Tabulated groundwater analytical results are provided in **Appendix J**.

7.4 Validation Program

The validation program conducted at the site was generally consistent with the proposed strategy outlined in the RAP. Owing to the implementation of the capping and containment strategy, sampling and validation of remedial excavations or residual materials was not required.

The validation program comprised confirmation of the appropriate installation of the capping layers, validation of material for beneficial reuse on the site, and validation of imported materials to be utilised for the capping layers.

The validation program is discussed following.

7.4.1 Validation of Capping Layer

Field visual inspections were completed by AFJV environmental personnel during the remediation program and were documented photographically. In addition, ERM environmental scientists also visited and inspected the Portion 1B and 1C site in January 2023 following the completion of remediation works.

A survey was undertaken in each area where the marker layer and capping layer was installed. The lateral extents of the marker layer and capping layer installation are shown on the consultant's figures 3a and 3b included in **Appendix H**.

Aside from the colour, the technical specifications of the white geotextile marker layer installed within Portion 1B and 1C were consistent with the RAP requirements.

Based on the survey data and photographic evidence provided by the contractor and confirmed by the environmental consultant, it is considered that validation of the capping layer has been successfully completed in accordance with the requirements of the RAP.

Areas where existing hard standing was present and not disturbed during the remediation works did not require a new marker layer and capping layer to be installed.

7.4.2 Soil Validation for Beneficial Reuse

As part of the land forming works at the site, and as required by the RAP, assessment, classification and excavation of the area identified as the 'spoil shed piling pad' was undertaken in the central area of Portion 1C.

Approximately 750m³ of soils were assessed and classified in situ within the spoil shed piling pad. The material was classified as suitable for reuse on the site, however was subsequently not re-used on the site, and disposed off-site to a suitably licensed waste facility as general solid waste.

7.5 Imported Materials

The consultant (ERM) reported that the following materials were imported to the site as part of the remediation and preliminary construction works:

- Tunnel Spoil (from WestConnex Rozelle)
- Engineered materials – DGB20, some with 3-4% cement or Stabliment for stabilisation

ERM provided the following table summarising the materials imported to the site.

Table 7-3 Imported Materials Summary

Imported Material Type	Imported Material Source Site	Total Material Imported (T) ¹	Comments
Tunnel Spoil	WestConnex construction site, Rozelle Interchange	2323	Refer to imported materials tracking register, Resource Recovery Order and Exemption and classification reports in Appendix D .
DGB20	Boral – Widemere Recycling Facility, 9a Widemere Rd, Wetherill Park, NSW	2714.42	Refer to imported materials tracking register, Resource Recovery Order and Exemption and supply dockets in Appendix D . All DGB20, including stabilised 4% and engineered fill have been included.
DBG20	Boral	6767.41	Refer to imported materials tracking register, Resource Recovery Order and Exemption and supply dockets in Appendix D . All DGB20, including that with 4% have been included.
DGB20	Hi Quality – Elizabeth Drive, Kemps Creek, NSW	266.66	Refer to imported materials tracking register, Resource Recovery Order and Exemption and supply dockets in Appendix D . All DGB20, including stabilised DBG 4%, has been included.
DGB20	Concrete Recyclers - 14 Thackeray Street Camellia, NSW	758.09	Refer to imported materials tracking register, Resource Recovery Order and Exemption and supply dockets in Appendix D . All DGB20, including that with 3-4% cement amendment, has been included.

Notes:

1. Tonnage was estimated by AFJV due to truck weigh bridges not being available.

Although the RAP did not anticipate the use of tunnel spoil within The Bays Construction Site, the classification report for this material confirmed that the material was consistent with the Resource Recovery Order and Resource Recovery Exemption and imported from the source site (WestConnex Rozelle) to Portion 1B and 1C lawfully.

All material was inspected at the time of importation to confirm suitability and compatibility with the relevant classification documentation.

An imported materials tracking register, classification reports, Resource Recovery Orders and Exemptions (where applicable) and supply/delivery dockets were appended to the Validation Report.

All imported material was considered suitable for importation to the site.

7.6 Validation Quality Assurance and Quality Control

Owing to the remediation approach, field QA/QC measures were very limited.

Field quality programs were implemented as part of the assessments of material for beneficial reuse, waste classification, and where data was utilised from previous assessments.

Overall, the consultant concluded that the data was suitable for the purposes of the validation assessment.

7.7 Waste Management

Excess material from the excavations undertaken across Portion 1B and 1C to achieve design levels, geotechnical requirements and for the installation of services was classified and disposed off-site.

Waste was classified in accordance with the RAP and Waste Classification Guidelines (NSW EPA, 2014). The consultant provided the following table summarising the classification and off-site disposal of waste from the site.

Table 7-4 Summary of Off-site Disposal

Classification Reference	Material Classification	In Situ / Ex Situ	Estimated Volume Classified (m3) ¹	Estimated Mass Classified (T) ¹	Mass Disposed (T) ²	Disposal Location	Comments
WAC10	GSW CT1	Ex Situ / Stockpile	150.0	Not estimated by ADE	316.14	MET Recycling – Silverwater	-
WAC13	GSW CT1	Ex Situ / Stockpile	150.0	Not estimated by ADE	323.36	MET Recycling – Silverwater	-
WAC23	GSW CT1	In-situ	520.0	1040 (as advised by client)	452.16	MET Recycling – Silverwater	-
WAC39	GSW CT1	Ex Situ / Stockpile	36.0	Not estimated by ADE	20.62	MET Recycling – Silverwater	-
WAC45	GSW CT1	Ex situ / 2 x stockpiles	240.0	480 total	360.58	MET Recycling – Silverwater	-
WAC34	Classified as 'Recovered Aggregate RRO'	Ex Situ / Stockpile	36.0	72	144	Nepean Business Park - Penrith	Material was noted to be DGB
WAC27	Fill material PASS, special waste asbestos (GSW) Natural soils PASS GSW	In situ	5,017	201,600 T (as advised by AFJV)	9031.56	Djurwa / Bingo Waste Services – Eastern Creek Ecology Park	WAC27 (ADE, 2022b) presented an in-situ classification of an area of approximately 4,200 m2 with an approximate volume of 108,800 m3. Only 9,031.56 T was excavated and disposed off-site; the remaining material was not excavated.

Table 7.4 Continued

Classification Reference	Material Classification	In Situ / Ex Situ	Estimated Volume Classified (m3) ¹	Estimated Mass Classified (T) ¹	Mass Disposed (T) ²	Disposal Location	Comments
							The original volume classified in situ (108,800 m3) was significantly greater than the actual quantity disposed off-site, so was not considered appropriate for calculating sampling density. The quantity disposed off-site (9031.56T) was converted to m3 classified (5017 m3) using an assumed average density of 1.8T/m3.
WAC43	GSW	Ex Situ / Stockpile	100	Not estimated by ADE	274.22	Djurwa / Bingo Waste Services – Eastern Creek Ecology Park	-
SCA4	GSW and/or deemed suitable for onsite reuse	In-situ	975	1950	4185.18	Djurwa / Bingo Waste Services – Eastern Creek Ecology Park	The estimated volume and estimated mass classified have been amended based on the addendum to the ADE (2022a) issued by ADE on 30 April 2024. ADE (2022a) and addendum have been included in Appendix C .

Waste classification certificates provided to the consultant reported that approximately 8,098 m³ of material was classified by the consultant ADE for off-site disposal from Portion 1B and 1C. Waste tracking documentation indicated 16,270 tonnes was disposed off-site to appropriately licensed waste facilities. Utilising an expected average density range of 1.6 to 2 T/m³, the volume of classified material is comparable to the volume (weight) disposed.

Waste classification reports and disposal documentation were appended to the Validation Report. All material were disposed to appropriately licensed facilities.

7.8 Ongoing Management

Given that contaminated soils remain on the site beneath a layer of cover soil or hardstand, there is a requirement for a LTEMP to be implemented for the site to ensure the integrity of the capping layer(s) are maintained, assign responsibilities, and provide procedures to be followed in the event intrusive works are required in future.

The EMP prepared for the site is discussed in **Section 8**.

7.9 Consultant's Conclusions of the Remediation Activities and Validation

The consultant concluded that sufficient works have been undertaken to reduce the risk of residual contamination impacting human health and the environment, and ensure the site is suitable for the commercial and industrial land use, subject to the implementation of an EMP.

7.10 Audit Evaluation of Validation Report

The following sections provide discussion of the Site Audit findings of the remediation and validation works reported.

7.10.1 Remediation and Validation Work Program

The remediation work program, as documented in the RAP (ERM, August 2022) and described in the *Validation Report* (ERM, September 2024) prepared by ERM was appropriate for the site.

The remediation works comprised the installation of a capping layer across the site to prevent exposure to the residual contamination present at the site. The capping works were appropriately documented. Survey data and photographs from the installation of the demarcation layer and capping materials were provided with the validation report, demonstrating the installation process and capping thickness.

The consultant's actions to address the remediation areas was appropriate, thorough, and met the objectives of the remediation and validation program.

7.10.2 Validation Data Quality Assurance and Quality Control

The field QA/QC program implemented by the consultant was very limited, but considered adequate for the validation program conducted considering the remedial approach.

The collection and analysis of duplicate field samples was undertaken as part of the assessment for beneficial reuse of materials on the site and waste classifications. These results were reviewed by the auditor and found to be acceptable.

The QA/QC program undertaken during the remediation and validation works as reported by the consultant has been reviewed by the Site Auditor in reference to the parameters of precision, accuracy, representativeness, comparability, and completeness (the PARCC parameters) which are a useful tool for evaluating the quality control techniques used.

The following table summarises the QA/QC in relation to the PARCC parameters.

Table 7-5 Validation QA/QC Summary

Quality Indicator	Frequency & Acceptable Quality Parameter	Auditor Review of Quality Parameter Acceptance
Precision		
Intra-laboratory duplicates	Greater than 10% for COPC analytes Results <30-50% RPD	No – acceptable*
Inter-laboratory duplicates	Greater than 10% for COPC analytes Results <30-50% RPD	No – acceptable*
Laboratory duplicates	1 in 20 samples, <50% RPD (>10xEQL), <75% RPD (5-10xEQL), <100% RPD (<5xEQL)	RPDs – acceptable
Accuracy		
Matrix spikes	70-130%	Acceptable*
Certified reference material or Laboratory Control Sample	70-130%	Acceptable*
Surrogate Spikes	70-130%	Acceptable*
Representativeness		
Sampling appropriate for media and analytes	As per NEPM and AS 4482.1	Yes
Rinsate blanks	1 per sample batch <LOR	N/A
Trip spikes/trip blanks	1 per sample batch 70-130% / <LOR	N/A
Laboratory blanks	1 per 20 or 1 per batch <LOR	<LOR – Yes*
Samples extracted and analysed within holding times	Extracted within holding times	Yes
Comparability		
Standard operating procedures used for sample collection and handling	Suitable description of sampling procedures	Yes
Standard analytical methods used for all analyses	Analytical methods are referenced and NATA Accredited	Yes
Consistent field conditions, sampling staff and laboratory analysis	Consistent fieldwork team, single primary laboratory used	Yes
Limits of reporting appropriate and consistent	Reporting limits less than the appropriate site criteria	Yes
Completeness		
Appropriate and complete COC documentation	Supplied in report	No*
Satisfactory frequency and result for QC samples	As per NEPM and AS 4482.1	Yes*
Data from critical samples is considered valid	COC	Yes

Table Notes: * specifically discussed in Auditor comments

Overall, in the context of the scope of remediation, the quality measures reviewed were found to be adequate and deemed acceptable for the scope of work performed.

7.10.3 Site Validation Criteria

Where utilised, the site remediation validation criteria have been derived from sources approved by the NSW DECCW under s.105 of the *Contaminated Land Management Act 1997* and are considered appropriate for the protection of human health and the environment at the site with consideration to the site land use.

It is noted the NEPM is an endorsed guidance for the *assessment* of contamination and the investigation criteria contained within are not intended for use as remediation criteria. However, with the lack of appropriate alternative remediation criteria the NEPM is often utilised for remediation applications.

The criteria adopted by the consultant are appropriate in the context of the primary contaminants of concern.

7.10.4 Validation Results

Survey of the capping layers and inspection by the consultant confirmed the appropriate installation of the capping layers at the site.

Where sampling was conducted, the consultant discussed the analytical results and provided tables that adequately presented the analytical results from the laboratory reports. Check of the concentrations of contaminants reported by the consultant was undertaken and found to be consistent with those reported by the laboratory. The laboratory procedures were appropriate for the identified contaminants of concern and the adopted remediation criteria against which the results were compared.

The remediation plans and sample location records provided by the consultant were detailed and adequately identified the validation sampling locations in relation to the remediation area.

The conclusions reached by the consultant in relation to the validation of the remediation conducted and required to render the site suitable for the proposed land use are considered appropriate.

8 Environmental Management Plan

A Long-term Environmental Management Plan (LTEMP) was prepared by ERM for the Site Audit site. The content of the EMP is summarised in this section, with the audit evaluation following in **Section 8.6**. A complete copy of the EMP is provided in **Appendix K**.

The consultant explained the objective of the LTEMP (ERM, August 2024) was to provide a framework for the ongoing management of capping and barrier layers at the site and minimise potential risks to site users, workers, and contractors.

8.1 Environmental Management Plan Content

In summary, the LTEMP contains the following information:

- a summary of the site history, previous works conducted at the site and a description of the nature and extent of residual contamination on the site
- explanation of the site management procedures to be implemented
- procedures for monitoring, review, and record keeping

8.2 Nature and Extent of Contamination

The LTEMP (ERM, August 2024) includes a description of the nature and location of the contamination present within the capped areas of the site, summarises the remediation works completed and provides the construction specifications of the demarcation layer and capping layers. The consultant provided diagrams of the location of the capped areas which are subject to the EMP (ERM, August 2024).

8.3 Site Management Procedures

The LTEMP (ERM, August 2024) provides procedures to be followed in the event intrusive works are required on the site.

Corrective and preventative actions were also provided for unplanned breaches of the surface or capping layer.

8.4 Roles and Responsibilities

The consultant indicated that the site owner will primarily be responsible for the ongoing implementation of the LTEMP. This responsibility will transfer to any future purchaser of the site. Contractors or site users will be responsible for ensuring all works are conducted in accordance with the LTEMP.

8.5 EMP Notification and Enforcement

The LTEMP will be referenced on the Site Audit Statement and attached to the Site Audit Statement, to be issued as part of this Site Audit.

The implementation of the RAP (and therefore the LTEMP) and the issuing of a Site Audit Statement which is subject to the implementation of the LTEMP is a condition of the State Significant Infrastructure conditions of approval. The responsibility for maintaining the site in accordance with the LTEMP will be that of the landowner. That task may be delegated to third parties (a contractor, licence holder or a lessee) as applicable; however, the contamination

will remain the liability of the landowner – being the State Government of NSW, who has the capacity to require compliance with the LTEMP through contractual arrangements with those third parties.

Appropriate public notification will be possible with the Site Audit Statement which has the LTEMP attached being provided to Inner West Council and the requirement for Council under s 59(2)(e) of the *Contaminated Land Management Act 1997* to record on the Planning Certificate issued pursuant to s 10.7 the *Environmental Planning and Assessment Act 1979* that a Site Audit Statement has been received by Council.

Any future Development Application or development proposed should have consideration to any items recorded on the Planning Certificate and relevant Environmental Planning Instruments including the Resilience and Hazards SEPP 2021.

The Site Auditor considers that the implementation of the LTEMP is practical and not so onerous that it cannot be easily implemented. If the LTEMP is not referred to or implemented, as it should it is noted that the contaminated soil is located below a hardstand surface and a geofabric demarcation layer was installed across a majority of the site, where capping layers were newly installed.

8.6 Audit Evaluation of the Environmental Management Plans

Based on the information contained within the LTEMP, the Site Auditor finds that the site description and accompanying procedures are suitably comprehensive to ensure that responsible parties are aware of the residual contamination present at the site and that this contamination is appropriately managed.

The primary objective of this LTEMP is to protect the health of site users by ensuring maintenance of the capping and barrier layers to prevent exposure to contaminants in the soil. General usage of Portion 1B and 1C by the public or workers is unlikely to pose a risk to integrity of the capping layer due to the nature and depth of the capping material. The LTEMP has requirements for the monitoring and maintenance of the cap. Works requiring excavation into the capping layer should be avoided where possible to minimise cap disturbance. In the case that intrusive works within the cap are unavoidable, the LTEMP requires a task-specific Construction Environmental Management Plan to be prepared prior to the commencement of works. For intrusive works that are below the cap and marker layer requirements are specified for the management of excavated material and reinstatement of the marker layer and cap and documentation. Further the LTEMP provides requirements relating to Work Health and Safety in the event of intrusive works.

There is adequate notification of the LTEMP achieved with registration on Title and notification of the Site Audit on the Planning Certificate.

9 Evaluation of Potential Site Land Use Suitability with Remediation

The NSW EPA *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd edition)* prescribe that during an assessment of the suitability of a site for an existing or proposed land use in an urban context, Site Auditors must follow the decision process and checklist for assessing urban redevelopment sites of the Site Audit Guidelines. While the purpose of this Site Audit is not to determine the suitability of the site for an existing or proposed land use the checklist has been utilised by the Site Auditor in forming the opinion of whether the site can be made suitable for the proposed land use with the implementation of the RAP.

For the purposes of this Site Audit the objective is to determine whether the site is suitable for **commercial/industrial use** commensurate with the construction and use of the land as the Sydney Metro West: The Bay Station.

The summary findings of the Site Audit are presented for each requirement of the decision process:

All site assessment, remediation and validation reports follow applicable guidelines.

The documents provided by the consultants and reviewed generally meet the requirements of the Site Audit in relation to the guidelines for consultants reporting on contaminated sites (NSW EPA, 2020).

Any aesthetic issues relating to site soils have been adequately addressed.

Aesthetic issues have been considered in the works undertaken at the site with the consultant confirming the capping of impacted material at the site. Validation has included detailed visual inspection; no evidence of staining and odours was identified during the works undertaken as part of the remediation works program.

Soils have been assessed against relevant health-based investigation levels and potential for migration of contamination from soils to groundwater has been considered.

Soils were typically assessed against the appropriate and equivalent health-based investigation levels during the assessment works. The validation criteria proposed uses suitable and relevant guidelines as prescribed by the NEPM (NEPC, 1999, Amended 2013).

Evidence of gross contamination with the potential to impact groundwater has not been identified. Given the reported analytical results for the site across the various programs of work, historical site uses and on-site activities, the potential for migration of contamination from soils to groundwater is considered to be low.

Groundwater (where relevant) has been assessed against relevant health-based investigation levels and, if required, any potential impacts to buildings and structures from the presence of contaminants considered.

Assessment of the site included the investigation of groundwater conditions and groundwater monitoring was conducted throughout the remedial works. Groundwater analytical results were assessed against relevant investigation levels.

Ongoing monitoring of groundwater during the construction period is being conducted separately from the remediation activities. Any impact of groundwater quality on the construction and structures is managed under the various plans that exist in the project for this purpose.

Hazardous ground gases (where relevant) have been assessed against relevant health-based investigation levels and screening values.

Assessment of the site has not identified the presence of volatile contaminants such as VOCs as being contaminants of concern at the site. Volatile contaminants such as TRH and BTEX, which may represent a potential vapour migration risk, were assessed as part of the site investigations, and were found to not present a risk to site users or during construction and has not indicated the need for further vapour assessment.

Any issues relating to local area background soil concentrations that exceed relevant investigation levels have been adequately addressed in the site assessments report(s).

No local background soil concentrations above the appropriate criteria were identified as an issue.

The impacts of chemical mixtures have been assessed.

No issues relating to chemical mixtures in relation to the identified contaminants of concern are expected.

Any potential ecological risk has been assessed.

Soils were assessed against the appropriate and equivalent ecological investigation levels during assessment works. Typically, the investigation results did not exceed the adopted ecological investigation levels, apart from PAHs and some metals. Given the proposed use and remediation works being conducted, at the site the exceedances were not considered to be relevant or require any additional management.

Any evidence of, or potential for, migration of contaminants from the site has been appropriately addressed, including potential risks to off-site receptors, and reported to the site owner or occupier.

There is not considered to be any evidence of, or potential for, off-site migration of contaminants identified at the site.

The site management strategy (where relevant) is appropriate including post-remediation environmental plans.

A Long-term Environmental Management Plan will be implemented to ensure the ongoing management and maintenance of the capping layers. The existence of the LTEMP will be available as an attachment to the Site Audit Statement which will be referred to on the s 10.7 Planning Certificate. The responsibility for maintaining the site in accordance with the LTEMP will be that of the landowner, that task may be delegated to third parties as applicable; however, remains the liability of the landowner – currently being the State Government of NSW.

10 Conclusions

The investigation works, remediation, and ongoing management reported and reviewed are considered to have met the requirements of NSW DEC (2017) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd edition)* and other guidelines endorsed under s.105 of the *Contaminated Land Management Act 1997* and the objectives of the Site Audit.

The NSW DEC (2017) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd edition)* prescribe that during an assessment of the suitability of a site for an existing or proposed land use in an urban context, Site Auditors should follow the decision-making process for assessing urban redevelopment sites provided in the guidelines. The investigation, remediation, and ongoing management approach have been reviewed and the decision-making process prescribed has been followed by the Auditor and the site is considered suitable for commercial and industrial land use subject to specific control measures to manage the potential risks arising from residual contamination contained on-site and the ongoing management capping layers.

These measures are contained within an LTEMP which provides specific information for owners, managers, contractors, and workers at the site regarding the nature and location of the contamination present within the capped areas of the site and provides the construction specifications of the demarcation layer and capping layers.

The Site Auditor considers that the implementation of the LTEMP is practical and not so onerous that it cannot be easily implemented.

The implementation of the RAP (and therefore the LTEMP) and the issuing of a Site Audit Statement which is subject to the implementation of the LTEMP is a condition of the State Significant Infrastructure conditions of approval. The responsibility for maintaining the site in accordance with the LTEMP will be that of the landowner. That task may be delegated to third parties (a contractor, licence holder or a lessee) as applicable; however, the contamination will remain the liability of the landowner – being the State Government of NSW, who has the capacity to require compliance with the LTEMP through contractual arrangements with those third parties.

Appropriate public notification will be possible with the Site Audit Statement which has the LTEMP attached being provided to the Inner West Council and the requirement for Council under s 59(2)(e) of the *Contaminated Land Management Act 1997* to record on the Planning Certificate issued pursuant to s 10.7 the *Environmental Planning and Assessment Act 1979* that a Site Audit Statement has been received by Council.

Any future Development Application or development proposed under as comply and exempt development should have consideration to any items recorded on the Planning Certificate and relevant Environmental Planning Instruments including the Resilience and Hazards SEPP 2021.

In conclusion, the Site Audit Statement will be issued certifying that, in the opinion of the Site Auditor, the area identified as Portion 1B and 1C of The Bays Construction Site is suitable for commercial and industrial use commensurate with the proposed use subject to the implementation of the LTEMP.

11 Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only and has been based in part on information obtained from the client and other parties. Enviroview Pty Ltd or the Site Auditor accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client or amended in any way without prior approval by the Site Auditor, and should not be relied upon by other parties, who should make their own enquires other than regulatory and planning authorities as required under the *Contaminated Land Management Act 1997* and the Resilience and Hazards SEPP (2021).

The data used to support the conclusions reached in this report have been obtained by other consultants and have been audited with a reasonable level of scrutiny, care, and diligence. Every reasonable effort has been made to identify and obtain all relevant data, reports and other information that provide evidence about the condition of the site, and those that were held by the client and the client's consultants, or that were readily available. No liability can be accepted for unreported omissions, alterations or errors in the data collected and presented by other consultants. Accordingly, the data and information presented by others are taken and interpreted in good faith.

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

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

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

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

12 References

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- NSW EPA. (1995). *Contaminated Sites: Sampling Design Guidelines*.
- NSW EPA. (1997a). *Contaminated Sites: Guidelines for Assessing Banana Plantation Sites*.
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Appendix A: Audit Interim Advice



Ref: 0301-2206_04

7 June 2024

Jared Lipton
Acciona Ferrovia Joint Venture
Sydney Metro West – Central Tunnelling Package

Via email only: jared.lipton@ctp-afjv.com.au

Dear Mr Lipton,

RE: Interim Site Audit Advice – Review of Validation Report and Long Term Environmental Management Plan for Portion 1B and 1C, The Bays Construction Site, Sydney Metro West.

James Davis of Enviroview Pty Ltd has been engaged to provide the services of a NSW EPA Contaminated Land Accredited Site Auditor, to conduct a Site Audit in accordance with the *Contaminated Land Management Act 1997* and relevant guidelines made or approved under s.105 of that Act in relation to the site identified as The Bays Site, Sydney Metro West Central Tunnelling Package (the 'Site').

The objective of the Site Audit is to provide a Site Audit Report and Site Audit Statement to certify, in relation to contaminated land, the Site Auditor's opinion of whether the site is suitable for the proposed use.

A Site Audit Interim Advice is provided to assist in the management of contamination issues at a Site regarding requirements of the Site Audit at a particular stage of the Audit. An interim advice does not constitute a Site Audit Statement or a Site Audit Report and does not pre-empt the final Site Audit conclusions. A Site Audit Report and Site Audit Statement will be prepared at the conclusion of the Site Audit.

The purpose of this interim advice is to provide comments by the Auditor regarding the site audit objectives and a review of the following report:

ERM. *Validation Report, The Bays Construction Site - Portion 1B & 1C, Sydney Metro West: Central Tunnelling Package*. Report Reference: 0628507 Version 02 (Final Draft), dated 24 May 2024.

ERM. *Long Term Environmental Management Plan, The Bays Construction Site - Portion 1B and 1C, Sydney Metro West: Central Tunnelling Package*. Report Reference: 0628507_Long Term Environmental Management Plan (Final Draft), dated 24 May 2024.

The following comments are provided regarding the reports.

Review Comments - Validation Report

- 1) Table 5-2.
 - a) To aid in the review and to confirm appropriate disposal of waste material, it would be beneficial to add the disposal locations of the material to Table 5-2.
 - b) The *Comments* provided for SCA4 refer to the identification of asbestos fragments in this area during earthworks, and subsequent disposal of the material as asbestos waste. This unexpected find is not discussed elsewhere in the report. Please clarify if the area SCA4 is located within Portion 1B or 1C (review of the figures indicates this area may be outside the subject validation area), and if so, provide reference to the clearance report and confirm the capping material installed in this area.
- 2) Figures
 - a) Figure F3. Review of the figures shows considerable portions of the site where no marker layer or capping was installed, and no existing cap was present. Please clarify the status of these portions of the site.
 - b) Figure F5. The legend/key is blank.
 - c) Figures 6 and 7. Please clarify what the *Non-exclusive Use Areas* are and why they have not been included in the capping program.

Review Comments - Long Term Environmental Management Plan

- 3) Section 2.2 Contamination Status. The discussion of the contamination status of the site could be simplified and should consider the potential audience of the document being a non-technical reader. References to guidelines and contaminant concentrations should be simplified. Please clarify the type of asbestos identified at the site (bonded and/or asbestos fines).
- 4) Section 3 Surface Conditions. It should be clarified the benzo(a)pyrene exceedance was identified at depth at E64.
- 5) Section 5.1 Overview. It is stated that *"it must be assumed that all fill materials have the potential to contain asbestos"*. This information should be included in the contamination summary.
- 6) Section 5.2 Inspection.
 - a) Please clarify the inspection requirements. Is the *Initial inspection* to be conducted following capping installation, or any intrusive works completed?
 - b) Remove reference to the *containment cell*.
- 7) Section 5.3.1 Soil Management. Paragraph #4 states *"At the completion of earthworks, highly visible brightly coloured non-woven polyester continuous filament or PET such as nonwoven geotextiles will be placed over the top of the contaminated fill soils, commensurate with the existing marker layer."* The existing marker layer was reportedly white in colour. To avoid confusion, please clearly define the existing capping conditions and reinstatement requirements.
- 8) Section 5.4 Reinstatement of Capping Layer. The reinstatement requirements for all areas needs to be specified, including hardstand installation and thickness. It is not appropriate to

state “consideration should be given to establishment of control measures at the completion of work...” - the requirements must be clearly defined.

- 9) Section 6 Decontamination. It is assumed this information would form part of the Construction Environmental Management Plan required for any works below the cap and within areas C29 and E64 at the site, therefore it is not necessary to be included here. Alternatively, this information could be moved to an appendix of the LTEMP for reference.
- 10) Section 8.1 Hierarchy and Responsibility.
 - a) Please be specific about the type of contractor that would be required for asbestos works at the site (Class A or Class B) and the associated monitoring requirements.
 - b) It is not currently possible to include a Long-term Management Plan on Dial Before You Dig. The association requires asset owners to be members of the association in order to register their underground assets. It may be possible for council if it is a member to this on their behalf however it is not possible for the applicant to do this so is not a workable condition.
- 11) General Comment - Management Controls around C29 and E64. The *Validation Report* (Section 5.4.1) states that management controls in the vicinity of C29 and E64 will include (as a minimum) asbestos signage and restricted access. Specific management controls for the C29 and E64 areas are not provided or discussed within the LTEMP. Please clarify if these management controls will be implemented and provided appropriate description and requirements.

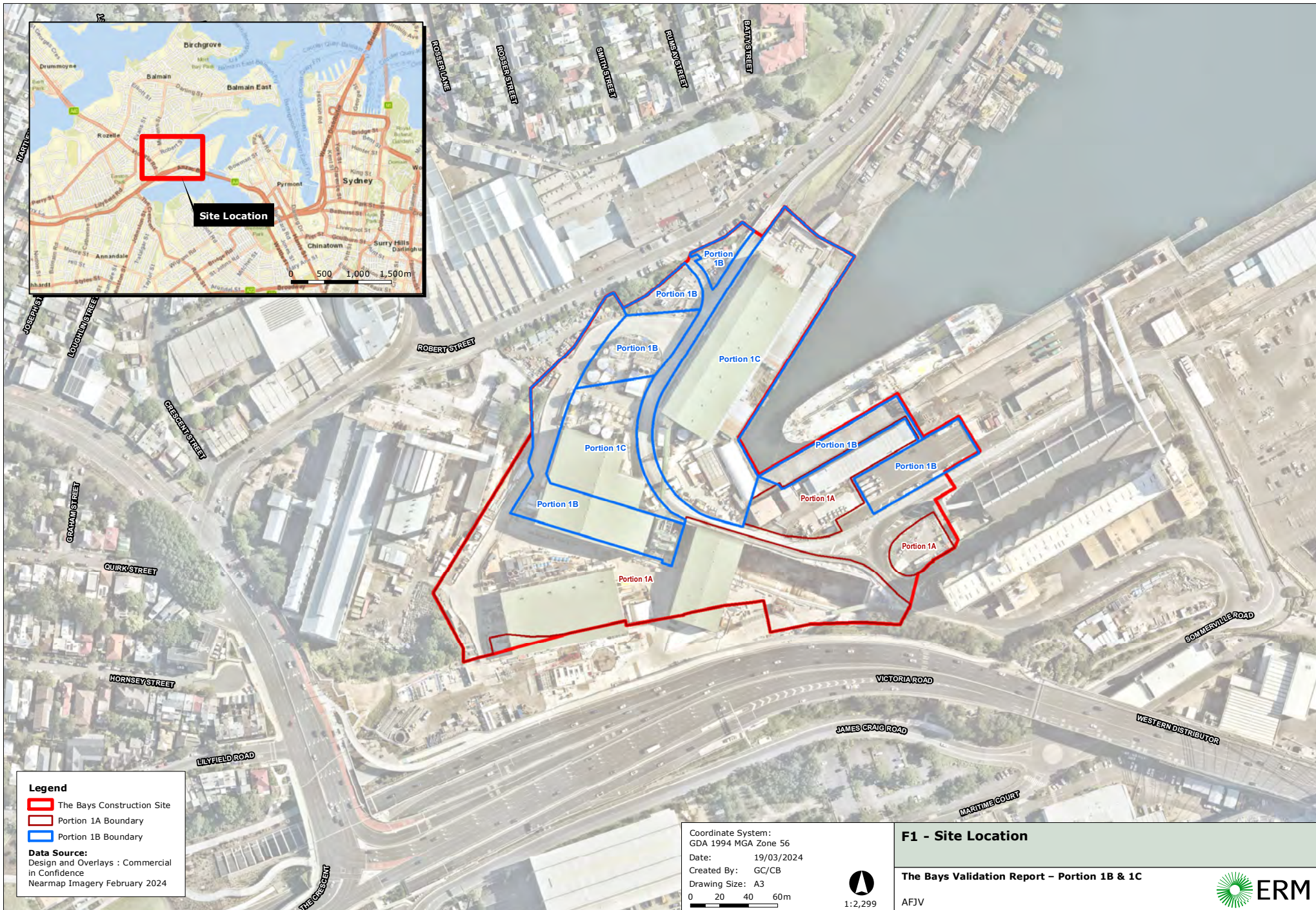
Thank you for your time regarding this matter. I am available to discuss any of these issues identified with yourself or your consultant if required. If you require additional information or clarification, please do not hesitate to contact me.

Yours sincerely

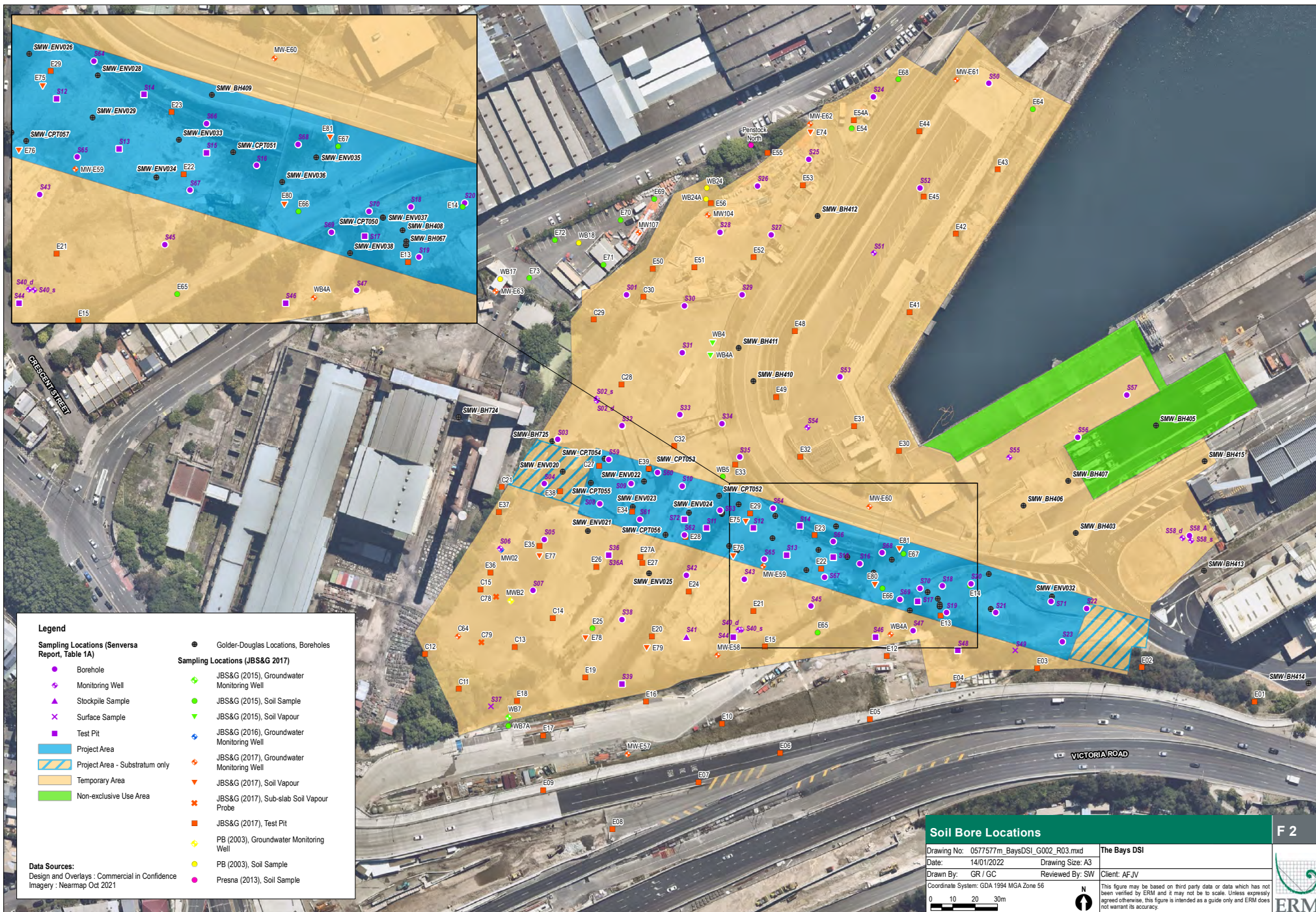


James Davis
NSW EPA Contaminated Land Site Auditor
Enviroview Pty Ltd

Appendix B: Site Plans



Appendix C:
Detailed Site Investigation Sample Locations
(ERM, January 2022)



Soil Bore Locations

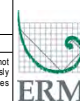
Drawing No: 0577577m_BaysDSI_G002_R03.mxd
 Date: 14/01/2022
 Drawn By: GR / GC
 Coordinate System: GDA 1994 MGA Zone 56

The Bays DSI
 Drawing Size: A3
 Reviewed By: SW
 Client: AFJV

0 10 20 30m



This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.



F 2

Appendix D:
Detailed Site Investigation Data Summary Tables
(ERM, January 2022)

	Physical Parameters				Metals							
	Moisture Content	pH (after HCL)	pH (Initial)	pH (Final)	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
	%	pH Units	pH Units	pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	1	0.1	0.1	0.1	2	0.4	2	5	5	0.1	2	5
NEPM (1999) EIL - Commercial/Industrial					160		540	260	1800		190	670
NEPM (1999) HIL D - Commercial/Industrial					3000	900	3600	240000	1500	730	6000	400000

LocCode	Sample_Depth	Field_ID	Sampled_Date-Time												
ERM_BH02	0.2	ERM_BH02_0.2	16/11/2021	14.8	5.5	9.4	6.5	<5	<1	16	34	29	<0.1	17	88
ERM_BH02	0.5	ERM_BH02_0.5	16/11/2021	14.6	2.7	9.3	6.2	<5	<1	14	23	57	<0.1	16	92
ERM_BH02	0.8	ERM_BH02_0.8	16/11/2021	15.8	3.1	9.3	6.2	5	<1	15	34	74	<0.1	16	219
ERM_BH02	1.6	ERM_BH02_1.6	16/11/2021	12	-	-	-	<5	<1	7	11	25	<0.1	4	27
ERM_BH02	3	ERM_BH02_3.0	16/11/2021	25	-	-	-	<5	<1	<2	<5	<5	<0.1	<2	<5
ERM_BH03	0.4	ERM_BH03_0.4	17/11/2021	19.6	1.6	8.8	5	5	3	9	39	74	0.1	21	627
ERM_BH03	1.8	DUP01_211117	17/11/2021	22	-	-	-	11	<1	16	33	86	0.4	6	66
ERM_BH03	1.8	ERM_BH03_1.8	17/11/2021	20.4	-	-	-	10	<1	10	12	29	0.2	3	31
ERM_BH03	1.8	TRIP01_211117	17/11/2021	22	-	-	-	11	<0.4	19	34	97	0.7	6.2	80
ERM_BH03	1.8	TRIP01_211117	17/11/2021	22.8	-	-	-	12	<1	16	28	62	0.4	5	59
ERM_BH03	3.5	ERM_BH03_3.5	17/11/2021	26.2	-	-	-	18	<1	12	44	69	0.2	7	90
ERM_BH04	0.6	ERM_BH04_0.6	18/11/2021	15.7	1.1	9.2	5	<5	<1	5	85	12	<0.1	6	23
ERM_BH05	0.3	ERM_BH05_0.3	16/11/2021	6.7	2.1	9.3	5.1	<5	<1	12	89	<5	<0.1	67	60
ERM_BH05	0.5	ERM_BH05_0.5	16/11/2021	15.8	1.8	9.3	5.1	<5	<1	12	39	21	<0.1	41	46
ERM_BH05	0.8	ERM_BH05_0.8	17/11/2021	7.8	1.7	9.5	5.1	<5	<1	9	25	23	<0.1	18	39
ERM_BH05	1.7	ERM_BH05_1.7	17/11/2021	47.4	-	-	-	39	<1	40	411	3140	9	23	1270
ERM_BH05	3	ERM_BH05_3.0	17/11/2021	20.1	-	-	-	22	<1	17	11	37	0.2	4	39
ERM_BH06	0.3	ERM_BH06_0.3	18/11/2021	9.4	1.6	9.8	5	<5	<1	6	36	7	<0.1	4	<5

Statistical Summary

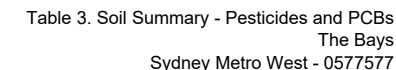
Number of Results	18	9	9	9	18	18	18	18	18	18	18	18	18	18	18
Number of Detects	18	9	9	9	9	1	17	17	16	8	17	16	16	16	16
Minimum Concentration	6.7	1.1	8.8	5	<5	<0.4	<2	<5	<5	<0.1	<2	<5	<5	<5	<5
Maximum Concentration	47.4	5.5	9.8	6.5	39	3	40	411	3140	9	67	1270	1270	1270	1270
Average Concentration	19	2.4	9.3	5.5	8.6	0.62	13	55	214	0.65	15	159	159	159	159
Standard Deviation	9.1	1.3	0.26	0.63	9.6	0.6	8.2	92	731	2.1	16	311	311	311	311
Number of Guideline Exceedances	0	0	0	0	0	0	0	3	1	0	1	3	3	3	3
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	3	1	0	1	3	3	3	3



Table 2. Soil Summary - Hydrocarbons and Organotin
The Bays
Sydney Metro West - 0577577

[illegible]

Env Stds Comments
#1:High reliability ecological guideline for fresh B(a)P



Env Stds Comments



Table 3. Soil Summary - Pesticides and PCBs
The Bays
Sydney Metro West - 0577577

EQI			
NEPM (1999) EIL - Commercial/Industrial			
NEPM (1999) HIL D - Commercial/Industrial			
LocCode	Sample_Depth_Range	Field_ID	Sampled_Date-Time
ERM_BH02	0.2	ERM_BH02_0.2	16/11/2021
ERM_BH02	0.5	ERM_BH02_0.5	16/11/2021
ERM_BH02	0.8	ERM_BH02_0.8	16/11/2021
ERM_BH02	1.6	ERM_BH02_1.6	16/11/2021
ERM_BH02	3	ERM_BH02_3.0	16/11/2021
ERM_BH03	0.4	ERM_BH03_0.4	17/11/2021
ERM_BH03	1.8	DUP01_211117	17/11/2021
ERM_BH03	1.8	ERM_BH03_1.8	17/11/2021
ERM_BH03	1.8	TRIP01_211117	17/11/2021
ERM_BH03	1.8	TRIP01_211117	17/11/2021
ERM_BH03	3.5	ERM_BH03_3.5	17/11/2021
ERM_BH04	0.6	ERM_BH04_0.6	18/11/2021
ERM_BH05	0.3	ERM_BH05_0.3	16/11/2021
ERM_BH05	0.5	ERM_BH05_0.5	16/11/2021
ERM_BH05	0.8	ERM_BH05_0.8	17/11/2021
ERM_BH05	1.7	ERM_BH05_1.7	17/11/2021
ERM_BH05	3	ERM_BH05_3.0	17/11/2021
ERM_BH06	0.3	ERM_BH06_0.3	18/11/2021
Statistical Summary			
Number of Results			
Number of Detects			
Minimum Concentration			
Maximum Concentration			
Average Concentration			
Standard Deviation			
Number of Guideline Exceedances			
Number of Guideline Exceedances(Detects Only)			
Env Stds Comments			

[illegible][illegible][illegible]

Env Stds Comments



	Asbestos						
	Approved Identifier	Asbestos Type	weight of sample	Description	Organic Fibre	Synthetic Mineral Fibre	Asbestos fibres
	-	-	g	-	g/kg	g/kg	Fibres
EQL			0.01		0.1	0.1	0.1
							5

LocCode	Field_ID	Sample_Depth_Range	Sampled_Date-Time								
ERM_BH02	ERM_BH02_0.2	0.2	16/11/2021	1 ^{#2}	1	16.2	1 ^{#1}	0 ^{#3}	0 ^{#3}	0 ^{#3}	0 ^{#3}
ERM_BH03	ERM_BH03_0.4	0.4	17/11/2021	1 ^{#2}	1	22.7	1 ^{#1}	0 ^{#3}	0 ^{#3}	0 ^{#3}	0 ^{#3}
ERM_BH05	ERM_BH05_0.3	0.3	16/11/2021	1 ^{#2}	1	29.8	1 ^{#1}	0 ^{#3}	0 ^{#3}	0 ^{#3}	0 ^{#3}
ERM_BH06	ERM_BH06_0.3	0.3	18/11/2021	1 ^{#2}	1	18.2	1 ^{#1}	0 ^{#3}	0 ^{#3}	0 ^{#3}	0 ^{#3}

Statistical Summary

Number of Results	4	4	4	4	4	4	4	4
Number of Detects	4	4	4	4	4	4	4	4
Minimum Concentration	1	1	16.2	1	<0	<0	<0	<0
Maximum Concentration	1	1	29.8	1	0	0	0	0
Average Concentration	1	1	22	1	0	0	0	0
Standard Deviation	0	0	6	0	0	0	0	0
Number of Guideline Exceedances	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0

Env Stds Comments

Data Comments

- #1 Soil sample.
- #2 A. SMYLIE
- #3 No

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[illegible]

	Major Ions		Particle Size		Physical Parameters										Inorganics																		
	Chloride	Sulfate (as SO4)	<2mm Fraction	>2mm Fraction	Analysed Material	Extraneous Material	Moisture Content	Electrical Conductivity	pH (after HCL)	pH (Initial)	pH (aqueous extract)	pH (Final)	pH of Leaching Fluid	pH (Lab)	Organic Matter	Cyanide (Weak Acid Dissociable)	Cyanide (as CN)	Cyanide (Total)	Total Organic Carbon	Ammonia (as N)	Nitrate (as N)	Nitrite (as N)	Total Oxidised Nitrogen (as N)	Total Kjeldahl Nitrogen	Total Nitrogen (as N)	Phosphorus (as P)	Moisture Content (dried @ 103°C)	Exchangeable Calcium	Exchangeable Magnesium	Exchangeable Potassium	Exchangeable Sodium	Exchangeable Sodium Percent	Cation Exchange Capacity
	mg/kg	mg/kg	G	G	%	%	%	µS/cm	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	meq/100g	meq/100g	meq/100g	meq/100g	%
EOL	10	10	0.01	0.01	0.1	0.1	0.1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.01	1	0.5	0.5	0.02	20	0.1	0.1	0.1	20	20	2		0.2	0.2	0.2	0.2	0.2	0.05
NEPM (1999) EIL - Commercial/Industrial																																	
NEPM (1999) HIL D - Commercial/Industrial																																	
Statistical Summary																																	
Number of Results	48	48	27	27	27	27	205	52	9	9	4	9	2	61	13	1	26	2	7	4	4	4	4	4	4	1	4	4	4	4	4	8	
Number of Detects	37	41	27	21	27	21	205	51	9	9	4	9	2	61	12	0	3	0	7	0	3	0	3	4	4	1	4	3	3	2	2	8	
Minimum Concentration	<10	<10	62	<0.005	58	<0.1	1.7	<10	1.1	8.8	4.9	5	4.9	5.1	<0.5	<1	<1	<0.5	0.14	<20	<0.1	<0.1	<0.1	90	90	50	22	0.8	<0.2	<0.2	<0.2	<0.2	2.2
Maximum Concentration	4060	620	370	96	100	42	47.4	1340	5.5	9.8	4.9	6.5	4.9	11.9	15	<1	5.5	<1	10	<20	0.6	<0.1	0.6	550	550	297	22	4.1	1.4	0.4	1.2	38	17
Average Concentration	315	95	160	13	93	7.3	16	263	2.4	9.3	4.9	5.5		8	6		1.1		2.9	10	0.34	0.05	0.34	345	345	187		2.2	0.7	0.25	0.45	12	8.4
Standard Deviation	793	126	66	20	9.5	9.4	7.3	315	1.3	0.26	0	0.63		1.2	4.8		1.2		4.1	0	0.3	0	0.3	210	210	121		1.4	0.57	0.13	0.52	18	6.6
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95% UCL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<50% Standard deviation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>250% guideline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	Metals																	
	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium(III)	Chromium(VI)	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	1	10	1	50	0.1	0.3	2	0.5	2	0.5	20	1	5	0.01	0.5	5	5	1
NEPM (1999) EIL - Commercial/Industrial	160					540	540			260		1800			190			670
NEPM (1999) HIL D - Commercial/Industrial	3000				900	3600				240000		1500		730	6000	10000		400000
Statistical Summary																		
Number of Results	313	140	140	140	313	312	12	3	140	314	7	313	140	316	313	140	140	313
Number of Detects	184	111	12	0	34	288	11	0	98	256	7	275	129	134	262	4	126	281
Minimum Concentration	<2	<10	<1	<50	<0.4	<2	<2	<0.5	<2	1	5200	2	<5	<0.1	1	<5	<5	<0.05
Maximum Concentration	360	510	4	<50	7	53	16	<0.5	127	2100	23000	5200	2060	61	150	8	90	7700
Average Concentration	10	89	0.61	25	0.5	12	8.2	0.25	7.9	65	12843	165	236	0.56	20	2.6	23	188
Standard Deviation	27	98	0.44	0	0.59	8.6	5	0	13	159	7654	534	326	2.5	24	0.72	17	523
Number of Guideline Exceedances	2	0	0	0	0	0	0	0	0	11	0	7	0	0	0	0	0	14
Number of Guideline Exceedances (Detects Only)	2	0	0	0	0	0	0	0	0	11	0	7	0	0	0	0	0	14
95% UCL	-	-	-	-	-	-	-	-	-	-	-	298.6	-	-	-	-	-	-
<50% Standard deviation	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-	-	-	-
>250% guideline	-	-	-	-	-	-	-	-	-	-	-	N	-	-	-	-	-	-

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#1: High reliability ecological guideline for fresh B(a)P

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Table 2. Soil Summary (Previous Investigations Data) - Hydrocarbons and Organotins
The Bays
Sydney Metro West - 0577577

[illegible]

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[illegible]

Table 3. Soil Summary (Previous Investigation Data) - Pesticides, Herbicides and PCBs
The Bays
Sydney Metro West - 0577577

[illegible]

[illegible]

[illegible]

Table 3. Soil Summary (Previous Investigation Data) - Pesticides, Herbicides and PCBs
The Bays
Sydney Metro West - 0577577

[illegible]

[illegible]

[illegible]

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[illegible]Env Stds Comments

				Asbestos																			
Sample mass tested	Total Asbestos g/kg*	APPROVED IDENTIFIER:				Fibrous Asbestos >7mm	Asbestos from ACM in Soil	Asbestos (Fines and Fibrous <7mm)	Weight of sample	Asbestos from FA & AF in Soil	Description	Mass ACM	Mass AF	Mass Asbestos in ACM	Mass asbestos in AF	Organic Fibre	Mass Asbestos in FA	Synthetic Mineral Fibre	Mass Asbestos in FA & AF	Mass FA	Weight Used for % Calculation	Asbestos fibres	Asbestos (Trace)
		g	mg/kg	g	g																		
EQ1				NEPM (1999) HSL D Comm/Indust - Asbestos																			
				0.00040.050.00040.010.001																			
LocCode	Field_ID	Sample_Depth_Range	Sampled_Date/Time																				
E55	E55_1.0-2.0	1-2	9/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	-
E55	E55_2.0-2.9	2-2.9	9/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	-	0	-	-	-	-	-	-	-
E55	E55_3.0-3.1	3-3.1	9/03/2017	-	-	-	745	-	0	-	-	0	-	0	0	0	-	0	-	0	0	-	-
E56	E56_0.1-0.2	0.1-0.2	8/03/2017	-	-	-	1063	-	0	-	-	0	-	0	0	0	-	0	-	0	0	-	-
E56	E56_0.1-0	0-1	8/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-	-	-	-	-
E56	E56_1.0-2.0	1-2	8/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-	-	-	-	-
E56	E56_1.9-2.0	1.9-2	8/03/2017	-	-	-	491	-	0	-	-	0	-	0	0	0	-	0	-	0	0	-	-
E56	E56_2.0-3.0	2-3	8/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-	-	-	-	-
E56	E56_3.0-3.3	3-3.3	8/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-	-	-	-	-
E58	E58 0-0.1	0-0.1	3/03/2017	-	-	-	692	-	0	-	-	0	-	0	0	0	-	0	-	0	0	-	-
E58	E58_0.1-0	0-1	3/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-	-	-	-	-
E58	E58_1.0-1.8	1-1.8	3/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	0	0	-	0	-	0	0	-	-
E60	E60 0.4-0.5	0.4-0.5	3/03/2017	-	-	-	805	-	0	-	-	0	-	0	0	0	-	0	-	0	0	-	-
E60	E60 2.0-2.1	2-2.1	3/03/2017	-	-	-	644	-	0	-	-	0	-	0	0	0	-	0	-	0	0	-	-
E60	E60_0.1-0	0-1	3/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-	-	-	-	-
E60	E60_1.0-2.0	1-2	3/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-	-	-	-	-
E60	E60_2.0-3.0	2-3	3/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-	-	-	-	-
E60	E60_3.0-3.3	3-3.3	3/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-	-	-	-	-
E61	E61 0.4-0.5	0.4-0.5	3/03/2017	-	-	-	821	-	0	-	-	0	-	0	0	0	-	0	-	0	0	-	-
E61	E61 2.0-2.1	2-2.1	3/03/2017	-	-	-	711	-	0	-	-	0.0001	-	0	0.0004	0	0.0004	-	0	-	0.0004	0	-
E61	E61_0.1-0	0-1	3/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-	-	-	-	-
E61	E61_1.0-2.0	1-2	3/03/2017	16,300	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-	-	-	-	-

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Data Comments

Asbestos																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Sample mass tested		Total Asbestos g/kg*		APPROVED IDENTIFIER:		Approximate Sample Mass		Asbestos Type		Fibrous Asbestos >7mm		Asbestos from ACM in Soil		Asbestos (fines and fibrous <7mm)		weight of sample		Asbestos from FA & AF in Soil		Description		Mass ACM		Mass AF		Mass Asbestos in ACM		Mass asbestos in AF		Organic Fibre		Mass Asbestos in FA		Synthetic Mineral Fibre		Mass Asbestos in FA & AF		Mass FA		Weight Used for % Calculation		Asbestos fibres		Asbestos (Trace)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
g	mg/kg	-	g	-	g	%w/w	g	%w/w	-	g	g	g	%w/w	-	g	g	g	g	g	g	g/kg	g	g/kg	g	g	g	g	g/kg	g	g/kg	g	g	g	g	g	g	g	kg	g/kg	Fibre	g	g																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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LocCode Field_ID Sample_Depth_Range Sampled_Date-Time

- #1 Mid brown soil containing two loose asbestos fibre bundles.
 #2 Mid brown soil containing many asbestos fibre bundles.
 #3 Mid grey rocky soil.
 #4 Light-grey soil.
 #5 Mid-brown soil.
 #6 Mid brown soil.
 #7 Mid grey soil.
 #8 Soil sample.
 #9 Black soil.
 #10 B.SCHRADER
 #11 A. SMYLYE
 #12 Yes
 #13 No*
 #14 No
 #15 Ch

[illegible]

Environmental Resources Management Australia Pty Ltd

					Dioxins and Furans																																		
					Hepta-Furans	Hexa-Furans	Octa-Furan	Penta-Furans	Tetra-Furans	Total TEQ 1-TEQ1 (zero)	Total TEQ 1-TEQ2 (0.5 LOR)	Total TEQ 1-TEQ3 (LOR)	Total TEQ WHO-TEQ1 (zero)	Total TEQ WHO-TEQ2 (0.5 LOR)	Total TEQ WHO-TEQ3 (LOR)	Tetra-Dioxins	Penta-Dioxins	Hexa-Dioxins	Hepta-Dioxins	Octa-Dioxin	2,3,7,8-Tetrachlorodibenzofuran	1,2,3,7,8-Pentachlorodibenzofuran	2,3,4,7,8-Pentachlorodibenzofuran	1,2,3,7,8-Pentachlorodioxanthrene	1,2,3,6,7,8-Hexachlorodibenzofuran	1,2,3,7,8,9-Hexachlorodibenzofuran	1,2,3,4,7,8-Hexachlorodibenzofuran	1,2,3,6,7,8-Hexachlorodioxanthrene	2,3,4,6,7,8-Hexachlorodibenzofuran	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1,2,3,4,7,8-Hexachlorodioxanthrene	1,2,3,4,6,7,8-Hepachlorooxanthene	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	1,2,3,4,6,7,8,9-Octachlorooxanthrene	1,2,3,7,8,9-Hexachlorooxanthrene	2,3,7,8-Tetrachlorooxanthrene		
					pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g		
EQL																																							
LocCode	Sample_Depth_Avg	Sample_Depth_Range	Sampled_Date	Field_ID																																			
S12	0.55	0.5-0.6	16/03/2021	S12_0.5-0.6	<9.8	<2.5	6.7	<2.5	<0.5	3.5	5.93	8.37	1.32	4.1	6.88	<0.5	<2.5	<22.1	69.8	3100	<0.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	3.4	<2.5	35.8	<2.5	6.7	3100	<2.5	<0.5
S16	0.55	0.5-0.6	12/03/2021	S16_0.5-0.6	<9.9	<2.5	<4.9	<2.5	10.4	12.21	14.66	17.1	4.02	6.81	9.6	7.1	<2.5	25.7	91.3	11,700	<0.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	4.4	<2.5	46.9	<2.5	<4.9	11,700	<2.5	<0.5
S59	2.7	2.6-2.8	24/03/2021	S59_2.6-2.8	<2.5	<2.5	<5	<2.5	<8.4	18.9	21.13	23.35	7.98	10.55	13.13	36.6	79.1	490	883	15,600	<0.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	4.7	<2.5	<2.5	<2.5	197	<2.5	<5	15,600	8.6	<0.5		
S62	0.05	0-0.1	9/03/2021	S62_0.0-0.1	<5	<2.5	<5	<42.4	<8.5	2.31	4.79	7.28	0.9	3.73	6.56	<0.5	<19.9	<19.9	59.3	2010	<0.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	30.1	<2.5	<5	2010	<2.5	<0.5		
S62	2.35	2.2-2.5	8/04/2021	S62_2.2-2.5	16.9	<32.3	8.9	<42.2	36.6	12.5	14.81	17.12	4.72	7.38	10.04	14.3	<24.8	48.3	133	11,100	3.6	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	2.9	<2.5	11.3	<2.5	62.7	<2.5	8.9	11,100	<2.5	<0.5		
S64	2.05	2-2.1	31/03/2021	S64_2.0-2.1	<9.9	<27.3	<5	<39.8	33.2	22.08	23.52	24.97	14.13	15.3	16.47	77.3	92.6	497	958	14,500	1	<2.5	<2.5	4.4	<2.5	<2.5	<2.5	7.9	<2.5	3	5.4	256	<2.5	<5	14,500	13.6	<0.5		
Statistical Summary																																							
Number of Results					6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6			
Number of Detects					1	0	2	0	3	6	6	6	6	6	6	4	2	4	6	6	2	0	0	1	0	0	0	3	0	4	1	6	0	2	6	2	0		
Minimum Concentration					<2.5	<2.5	<4.9	<2.5	<0.5	2.31	4.79	7.28	0.9	3.73	6.56	<0.5	<2.5	<19.9	59.3	2010	<0.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	30.1	<2.5	<4.9	2010	<2.5	<0.5	
Maximum Concentration					16.9	<32.3	8.9	<42.4	36.6	22.08	23.52	24.97	14.13	15.3	16.47	77.3	92.6	497	958	15600	3.6	<2.5	<2.5	4.4	<2.5	<2.5	<2.5	7.9	<2.5	11.3	5.4	256	<2.5	8.9	15600	13.6	<0.5		
Average Concentration					5.9	5.8	4.3	11	15	12	14	16	5.5	8	10	23	33	180	366	9668	0.93	1.3	1.3	1.8	1.3	1.3	1.3	3.2	1.3	4.1	1.9	105	1.3	4.3	9668	4.5	0.25		
Standard Deviation					5.6	7.1	2.8	11	16	7.9	7.6	7.4	4.9	4.4	3.8	30	42	243	431	5771	1.3	0	0	1.3	0	0	0	2.7	0	3.7	1.7	97	0	2.8	5771	5.3	0		
Number of Guideline Exceedances					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Number of Guideline Exceedances(Detects Only)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

Appendix E: Groundwater Data Tables

	Alkalinity				Major Ions													Physical Parameters			In					
	Bicarbonate Alkalinity (as CaCO3)	Carbonate Alkalinity (as CaCO3)	Hydroxide Alkalinity (as CaCO3)	Total Alkalinity (as CaCO3)	Calcium	Calcium (Filtered)	Chloride	Magnesium	Magnesium (Filtered)	Potassium	Potassium (Filtered)	Sulfate (as SO4)	Sulfate (as SO4) (Filtered)	Sulfate (as S)	Sodium	Sodium (Filtered)	Anions Total	Cations Total	Ionic Balance	Electrical Conductivity	Total Dissolved Solids	pH (Lab)	Ammonia (as N)	Nitrate (as N)	Nitrite (as N)	Total Oxidised Nitrogen (as N)
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	µS/cm	mg/L	pH Units	mg/L	mg/L	mg/L	mg/L	
EQL	1	1	1	1	0.5	0.5	1	0.5	0.5	0.5	0.5	1	1	2	0.5	0.5	0.01	0.01	0.01	1	5	0.01	0.01	0.01	0.01	
ANZG (2018) Marine Water - Slightly to moderately disturbed ecosystems																										
NHMRC (2008) Recommended Recreational Guidelines - Aesthetic							2500 ^{#4}					2500 ^{#4}	2500 ^{#4}		1800 ^{#4}	1800 ^{#4}					6000 ^{#4}	85 ^{#4}				
NHMRC (2008) Recommended Recreational Guidelines - Health							2500 ^{#5}					5000 ^{#5}	5000 ^{#5}													

LocCode	Field_ID	Sampled_Date																										
E59	E59	15/03/2017	320	<5	-	-	190	-	820	110	-	38	-	-	-	110	590	-	-	-	-	2900	-	-	2.1	1.4	-	-
SMW_BH066	SMW_BH066	23/04/2020	60	<1	<1	60	-	109	977	-	88	-	7	26	-	-	-	265	29.3	29.2	0.18	3280	2680	6.24	0.57	<0.01	<0.01	<0.01
SMW_BH067	SMW_BH067	23/04/2020	155	<1	<1	155	-	99	170	-	29	-	5	414	-	-	-	164	16.5	16.1	1.15	1620	1010	6.56	0.03	<0.01	<0.01	<0.01
SMW_ENV026	SMW_ENV026	22/01/2019	722	<1	<1	722	-	88	426	-	81	-	36	<1	-	-	-	290	26.4	24.6	3.62	2510	1330	7.64	7.7	0.02	<0.01	0.02
SMW_ENV026	SMW_ENV026	4/05/2021	706	<1	<1	706	-	125	355	-	63	-	31	-	3	-	-	281	24.2	24.4	0.53	-	1300	-	-	-	-	-
SMW_ENV027	SMW_ENV027	22/01/2019	622	<1	<1	622	-	171	28	-	21	-	14	10	-	-	-	41	13.4	12.4	3.96	1160	698	7.18	4.24	0.03	<0.01	0.03
SMW_ENV034	SMW_ENV034	22/01/2019	698	<1	<1	698	-	52	3110	-	165	-	92	372	-	-	-	1880	109	100	4.35	11,100	6440	7.8	3.56	0.03	<0.01	0.03
SMW_ENV034	SMW_ENV034	10/05/2021	728	<1	<1	728	-	81	4060	-	218	-	110	-	690	-	-	2640	143	140	1.34	-	8640	-	2.04	<0.01	-	-

Statistical Summary

Number of Results	8	8	7	7	1	7	8	1	7	1	7	5	2	1	1	7	7	7	7	6	7	5	7	7	5	5
Number of Detects	8	0	0	7	1	7	8	1	7	1	7	4	2	1	1	7	7	7	7	6	7	5	7	4	0	3
Minimum Concentration	60	<1	<1	60	190	52	28	110	21	38	5	<1	3	110	590	41	13.4	12.4	0.18	1160	698	6.24	0.03	<0.01	<0.01	<0.01
Maximum Concentration	728	<5	<1	728	190	171	4060	110	218	38	110	414	690	110	590	2640	143	140	4.35	11100	8640	7.8	7.7	1.4	<0.01	0.03
Average Concentration	501	0.75	0.5	527		104	1243		95	42	165					794	52	50	2.2	3762	3157	7.1	2.9	0.21	0.005	0.018
Standard Deviation	278	0.71	0	290		38	1500		72		42	209				1029	52	50	1.8	3681	3123	0.67	2.6	0.52	0	0.013
Number of Guideline Exceedances	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0
Number of Guideline Exceedances (Detects Only)	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0

Env Stds Comments

- #1: Apply LOSP 99
- #2: Apply LOSP 95
- #3: Apply LOSP Unknown
- #4: NHMRC (2011) Drinking Water Guidelines [2016] Aesthetic
- #5: Health Canada (2014) Guidelines for Canadian Drinking Water Quality
- #6: NHMRC (2011) Drinking Water Guidelines [2016] Health
- #7: WHO (2011) Drinking Water Quality

	Organics					Metals																
	Total Kjeldahl Nitrogen	Total Nitrogen (as N)	Phosphorus (as P)	Ortho-phosphate (as P)	Fluoride	Arsenic (Filtered)	Barium (Filtered)	Beryllium (Filtered)	Boron (Filtered)	Cadmium (Filtered)	Chromium (Filtered)	Chromium(VI) (Filtered)	Cobalt (Filtered)	Copper (Filtered)	Iron (Filtered)	Lead (Filtered)	Manganese (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Selenium (Filtered)	Vanadium (Filtered)	Zinc (Filtered)
	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.2	0.2	0.01	0.01	0.1	1	1	1	50	0.1	1	10	1	1	50	1	1	0.1	1	10	10	1
ANZG (2018) Marine Water - Slightly to moderately disturbed ecosystems										0.7 ^{#1}	4.4 ^{#2}	27 ^{#2}	1 ^{#2}	1.3 ^{#2}		4.4 ^{#2}	80 ^{#3}	0.1 ^{#1}	7 ^{#1}		100 ^{#2}	15 ^{#2}
NHMRC (2008) Recommended Recreational Guidelines - Aesthetic															3000 ^{#4}							30000 ^{#4}
NHMRC (2008) Recommended Recreational Guidelines - Health					15 ^{#6}	100 ^{#6}	20000 ^{#6}	600 ^{#6}	40000 ^{#6}	20 ^{#6}	500 ^{#7}	500 ^{#6}		20000 ^{#6}		100 ^{#6}	5000 ^{#6}	10 ^{#6}	200 ^{#6}	100 ^{#6}		

LocCode	Field_ID	Sampled_Date	-	-	-	-	-	10	-	-	-	<0.2	4	-	-	<1	-	2	-	<0.1	<1	-	-	<5
E59	E59	15/03/2017	-	-	-	-	-	10	-	-	-	<0.2	4	-	-	<1	-	2	-	<0.1	<1	-	-	<5
SMW_BH066	SMW_BH066	23/04/2020	<0.1	<0.1	<0.05	<0.05	0.1	<1	-	-	-	<0.1	<1	-	<1	<1	89,500	<1	2120	<0.1	<1	-	-	<5
SMW_BH067	SMW_BH067	23/04/2020	<0.1	<0.1	<0.01	<0.01	0.1	<1	-	-	-	<0.1	<1	-	3	<1	28,900	<1	1060	<0.1	2	-	-	<5
SMW_ENV026	SMW_ENV026	22/01/2019	7.5	7.5	0.42	0.04	1	9	-	-	-	<0.1	<1	<10	<1	<1	1500	<1	39	<0.1	<1	-	-	6
SMW_ENV026	SMW_ENV026	4/05/2021	-	-	-	-	-	4	148	<1	1340	<0.1	<1	-	<1	<1	-	<1	273	<0.1	<1	<10	<10	<5
SMW_ENV027	SMW_ENV027	22/01/2019	4.2	4.2	1	<0.01	0.4	7	-	-	-	<0.1	<1	<10	<1	<1	9560	<1	394	<0.1	<1	-	-	10
SMW_ENV034	SMW_ENV034	22/01/2019	3.4	3.4	<0.01	<0.01	1.5	6	-	-	-	<0.1	<1	<10	<1	<1	1950	<1	79	<0.1	<1	-	-	<5
SMW_ENV034	SMW_ENV034	10/05/2021	-	-	-	-	-	7	39	<1	3540	<0.1	<1	-	<1	<1	-	<1	139	<0.1	<1	<10	<10	<5

Statistical Summary

Number of Results	5	5	5	5	5	8	2	2	2	8	8	3	7	8	5	8	7	8	8	2	2	8
Number of Detects	3	3	2	1	5	6	2	0	2	0	1	0	1	0	5	1	7	0	1	0	0	2
Minimum Concentration	<0.1	<0.1	<0.01	<0.01	0.1	<1	39	<1	1340	<0.1	<1	<10	<1	<1	1500	<1	39	<0.1	<1	<10	<10	<5
Maximum Concentration	7.5	7.5	1	<0.05	1.5	10	148	<1	3540	<0.2	4	<10	3	<1	89500	2	2120	<0.1	2	<10	<10	10
Average Concentration	3	3	0.29	0.016	0.62	5.5				0.056	0.94	5	0.86	0.5	26282	0.69	586	0.05	0.69			3.9
Standard Deviation	3.1	3.1	0.43	0.016	0.61	3.6				0.018	1.2	0	0.94	0	37045	0.53	760	0	0.53			2.8
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	5	0	0	0	0	0
Number of Guideline Exceedances (Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	5	0	0	0	0	0

Env Stds Comments

- #1: Apply LOSP 99
- #2: Apply LOSP 95
- #3: Apply LOSP Unknown
- #4: NHMRC (2011) Drinking Water Guidelines [2016] Aesthetic
- #5: Health Canada (2014) Guidelines for Canadian Drinking Water Quality
- #6: NHMRC (2011) Drinking Water Guidelines [2016] Health
- #7: WHO (2011) Drinking Water Quality

	Alkalinity								Metals																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	Bicarbonate Alkalinity (as CaCO3)		Carbonate Alkalinity (as CaCO3)		Hydroxide Alkalinity (as CaCO3)		Total Alkalinity (as CaCO3)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
									Arsenic		Arsenic (Filtered)		Barium (Filtered)		Beryllium (Filtered)		Boron (Filtered)		Cadmium		Cadmium (Filtered)		Chromium		Chromium (Filtered)		Chromium(VI) (Filtered)		Cobalt (Filtered)		Copper		Copper (Filtered)		Iron (Filtered)		Lead		Lead (Filtered)		Manganese (Filtered)		Mercury		Mercury (Filtered)		Nickel		Nickel (Filtered)		Selenium (Filtered)		Vanadium (Filtered)		Zinc		Zinc (Filtered)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L

LocCode	Field_ID	Sampled_Date																														
C64	C64	27/02/2017	290	<5	<5	290	-	<1	80	-	-	-	<0.2	-	<1	-	-	-	<1	-	-	<1	1500	-	<0.1	-	<1	-	-	-	<5	
C64	C64	4/05/2021	428	<1	<1	428	-	<1	107	<1	530	-	<0.1	-	<1	-	<1	-	<1	-	<1	-	1220	-	<0.1	-	<1	<10	<10	-	<5	
E58	E58	15/03/2017	400	<5	-	-	-	1	-	-	-	-	<0.2	-	<1	-	-	-	3	-	<1	-	-	-	<0.1	-	<1	<10	-	-	8	
E60	E60	15/03/2017	400	<5	-	-	-	7	-	-	-	-	<0.1	-	<1	-	-	-	2	-	<1	-	-	-	<0.1	-	2	-	-	-	40	
E60	E60	7/05/2021	484	<1	<1	484	-	2	47	<1	1560	-	<0.1	-	<1	-	<1	-	<1	-	<1	-	150	-	<0.1	-	2	<10	<10	-	<5	
E61	E61	15/03/2017	290	<5	-	-	-	2	-	-	-	-	<0.2	-	<1	-	-	-	5	-	<1	-	5	-	<0.1	-	2	-	-	-	30	
E62	E62	15/03/2017	280	<5	-	-	-	1	-	-	-	-	0.5	-	<1	-	-	-	2	-	<1	-	-	-	<0.1	-	2	-	-	-	180	
E62	E62	5/05/2021	438	<1	<1	438	-	<1	137	<1	290	-	0.1	-	<1	-	<1	-	<1	-	<1	-	48	-	<0.1	-	<1	<10	<10	-	60	
MW02	MW02	23/01/2012	-	-	-	-	-	3	-	-	-	-	0.4	-	<1	-	-	-	2	-	<1	-	5	-	<0.05	-	4	-	-	-	88	
MW02	MW02	15/05/2012	-	-	-	-	-	3	-	-	-	-	0.3	-	<1	-	-	-	<1	-	<1	-	-	-	<0.05	-	1	-	-	-	34	
MW02	MW02	1/07/2012	-	-	-	-	57	-	-	-	-	<0.1	<1	-	-	-	-	1	-	-	<1	-	-	<0.05	-	3	-	-	-	24	-	
MW02	MW02	4/05/2021	604	<1	<1	604	-	62	241	<1	660	-	<0.1	-	<1	-	<1	-	<1	-	<1	-	286	-	<0.1	-	<1	<10	<10	-	11	
MW02	MW102	1/07/2015	-	-	-	-	-	49	-	-	-	-	<0.2	-	<1	-	-	-	<1	-	<1	-	-	-	<0.1	-	<1	-	-	-	-	
MW104	MW104	1/07/2015	-	-	-	-	-	2	-	-	-	-	<0.2	-	<1	-	-	-	<1	-	<1	-	-	-	<0.1	-	-	-	-	-	-	
MWB2	MWB2	27/02/2017	430	<5	<5	430	-	10	140	-	-	-	<0.1	-	<1	-	-	-	<1	-	<1	-	230	-	<0.1	-	<1	-	-	-	22	
MWB2	MWB2 (PB, 2002)	1/02/2003	-	-	-	-	3	-	-	-	-	<1	2	-	-	-	1	-	-	-	1	-	-	<0.1	-	10	-	-	-	-	42	-
S02	S02_D	4/05/2021	286	<1	<1	286	-	<1	16	<1	1450	-	<0.1	-	<1	-	<1	-	<1	-	<1	-	29	-	<0.1	-	<1	<10	<10	-	<5	
S02_S	S02_S	3/05/2021	411	<1	<1	411	-	21	65	<1	140	-	<0.1	-	<1	-	<1	-	<1	-	<1	-	345	-	<0.1	-	<1	<10	<10	-	<5	
S06	S06	3/05/2021	457	<1	<1	457	-	<1	103	<1	1180	-	<0.1	-	<1	-	<1															

Statistical Summary																															
Number of Results	28	28	24	24	2	33	22	19	19	2	33	2	33	1	20	2	33	1	2	33	23	2	33	2	33	19	19	2	32		
Number of Detects	28	0	0	24	2	23	22	0	18	0	5	1	2	0	6	2	8	1	1	3	22	0	1	2	14	0	0	2	20		
Minimum Concentration	48	<1	<1	48	3	<1	16	<1	50	<0.1	<0.1	<1	<1	<10	<1	1	<1	12900	<1	<1	5	<0.05	<0.05	3	<1	<10	<10	24	<5		
Maximum Concentration	800	<5	<5	800	57	91	430	<10	4370	<1	<1	2	<10	<10	35	1	<10	12900	1	<10	3410	<0.1	0.2	10	33	<100	<100	42	368		
Average Concentration	395	1.1	0.83	404	12	117	0.74	982	1.2	0.67	9.3	0.67	9.3	1.2	0.67	9.3	1.2	0.92	0.78	0.652	3.4	7.4	7.4	9.4	9.4	9.4	9.4	96			
Standard Deviation	207	0.92	0.76	222	20	96	1	1174	2	0.12	1	0.79	9.1	1.1	1.6	0.1	813	0.028	0.1	0.052	1.6	6.8	10	10	10	10	10	72			
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	8	1	0	3	19	0	1	1	5	0	2	14			
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	7	1	0	2	19	0	1	1	4	0	0	2	14		

Env Stds Comments

#1: Apply LOSP 99
#2: Apply LOSP 95
#3: Apply LOSP Unknown
#4: NHMRC (2011) Drinking Water Guidelines [2016] Aesthetic
#5: Health Canada (2014) Guidelines for Canadian Drinking Water Quality
#6: NHMRC (2011) Drinking Water Guidelines [2016] Health
#7: WHO (2011) Drinking Water Quality

Data Comments

#1 Reported Analyte LOR is higher than Requested Analyte LOR

	Organophosphorus Pesticides												Herbicides		Organochlorine Pesticides																		Pesticides		PCBs
	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenthion	Malathion	Phosphorothioic acid	Prothiofos	Pronamide	Alachlor	2,4-D	2,4-DDE	DDD	DDT+DDE+DDD	Hexachlorobenzene	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Chlordane (cis)	Chlordane (trans)	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Methoxychlor	DDE	Chlorobenzilate	PCBs (sum of total)			
EQI	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	
ANZG (2018) Marine Water - Slightly to moderately disturbed ecosystems		0.009 ⁹¹		0.01 ⁹²		0.15 ⁹²			0.05 ⁹²				0.01 ⁹³			0.007 ⁹⁴	0.003 ⁹⁴	0.001 ⁹⁴	0.0004 ⁹⁴		0.05 ⁹⁵		0.004 ⁹⁵			0.0004 ⁹⁴		0.04 ⁹⁴							
NHMRC (2008) Recommended Recreational Guidelines - Aesthetic																																			
NHMRC (2008) Recommended Recreational Guidelines - Health	20 ⁹⁵	100 ⁹⁵	100 ⁹⁷	40 ⁹⁵	50 ⁹⁵	70 ⁹⁵	40 ⁹⁵	70 ⁹⁵	700 ⁹⁵	5 ⁹⁵		700 ⁹⁵	0.2 ⁹³		200 ⁹⁷	100 ⁹⁵	200 ⁹⁷	0.2 ⁹³	3 ⁹⁵	2 ⁹⁵	120 ⁹⁵	90 ⁹⁵	200 ⁹⁷			300 ⁹⁷	6 ⁹⁵			3 ⁹⁵	0.4 ⁹⁴	200 ⁹⁵	10 ⁹⁸		

LocCode	Field_ID	Sampled_Date	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<4	-	<4	-	<2	<4	<4	<2	<2	<2	<2	<2	-	-	-	-	<2	<2	-	<2	<2	-
SMW_ENV026	SMW_ENV026	22/01/2019	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<4	-	<4	-	<2	<4	<4	<2	<2	<2	<2	<2	-	-	-	-	<2	<2	-	<2	<2	-
SMW_ENV027	SMW_ENV027	22/01/2019	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<4	-	<4	-	<2	<4	<4	<2	<2	<2	<2	<2	-	-	-	-	<2	<2	-	<2	<2	-
SMW_ENV034	SMW_ENV034	22/01/2019	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<4	-	<4	-	<2	<4	<4	<2	<2	<2	<2	<2	-	-	-	-	<2	<2	-	<2	<2	-
SMW_ENV034	SMW_ENV034	10/05/2021	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	<1	

Statistical Summary

Number of Results	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	1	4	1	4	4	4	4	4	4	1	1	1	1	4	4	1	3	3	1
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Minimum Concentration	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<2	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<2	<2	<1	
Maximum Concentration	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<4	<0.5	<4	<0.5	<2	<4	<4	<2	<2	<2	<2	<0.5	<0.5	<0.5	<0.5	<2	<2	<2	<2	<1	
Average Concentration	1	1	1	1	1	1	1	1	1	1	1	1	0.81	0.81	0.81	0.81	0.81	0.81	1.6	1.8	0.81	1.6	1.6	0.81	0.81	0.81	0.81				0.81	0.81	1	1			
Standard Deviation	0	0	0	0	0	0	0	0	0	0	0	0	0.38	0.38	0.38	0.38	0.38	0.38	0.88	0.5	0.38	0.88	0.88	0.38	0.38	0.38	0.38				0.38	0.38	0	0			
Number of Guideline Exceedances	0	3	0	3	0	3	0	0	3	0	0	0	4	0	0	4	0	4	3	1	4	0	0	0	4	0	0	4	0	0	0	4	4	1	0	0	
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

Env Stds Comments

- #1: Apply LOSP 95
#2: Apply Freshwater DGV (LOSP Unknown)
#3: Apply Freshwater LOSP Unknown
#4: Apply LOSP Unknown
#5: Apply LOSP 99
#6: NHMRC (2011) Drinking Water Guidelines [2016] Health
#7: EPHC (2008) Australian Guidelines for Water Recycling - Drinking Water
#8: US EPA (2012) Health Advisories for Drinking Water Contaminants
#9: WHO (2011) Drinking Water Quality

			Organophosphorus Pesticides										Herbicides		Organochlorine Pesticides									
	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenthion	Malathion	Pirimphos-ethyl	Prothiofos	Pronamide	Dieldrin	d-BHC	b-BHC	g-BHC (Lindane)	a-BHC	Aldrin	Aldrin + Dieldrin	chlordane	DDT	4,4'-DDE	DDD	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
EQL	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2	0.2	0.2	0.2	0.2	0.2	0.2	0.5	0.5	0.2	0.2	0.2	
ANZG (2018) Marine Water - Slightly to moderately disturbed ecosystems		0.009 ^{#1}		0.01 ^{#2}		0.15 ^{#2}			0.05 ^{#2}				0.01 ^{#3}			0.007 ^{#4}		0.003 ^{#4}		0.001 ^{#4}	0.0004 ^{#4}			
NHMRC (2008) Recommended Recreational Guidelines - Health	20 ^{#6}	100 ^{#6}	100 ^{#7}	40 ^{#6}	50 ^{#6}	70 ^{#6}	40 ^{#6}	70 ^{#6}	700 ^{#6}	5 ^{#6}		700 ^{#6}	0.2 ^{#8}		200 ^{#7}	100 ^{#6}	200 ^{#7}	0.2 ^{#8}	3 ^{#6}	2 ^{#9}	120 ^{#6}	90 ^{#6}	200 ^{#7}	
LocCode	Field_ID	Sampled_Date-Time																						
C64	C64	4/05/2021	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	
E62	E62	5/05/2021	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	
S02	S02_D	4/05/2021	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	
S02_S	S02_S	3/05/2021	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	
S06	S06	3/05/2021	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	
S40_D	S40_D	6/05/2021	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	
S40_S	S40_S	6/05/2021	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	
S51	S51	7/05/2021	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	
S54	QC221	5/05/2021	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	
S54	S54	5/05/2021	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	
S55	S55	5/05/2021	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	
S58_D	S58_D	7/05/2021	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	
SMW_ENV020_D	SMW_ENV020_W	4/05/2021	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	
SMW_ENV021_S	SMW_ENV021_S	22/01/2019	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<4	-	<4	-	<2	
WB4	WB4	10/05/2021	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	
Statistical Summary																								
Number of Results	1	1	1	1	1	1	1	1	1	1	1	1	15	15	15	15	15	15	14	13	15	14	15	
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Minimum Concentration	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.2	<0.2	<0.2	
Maximum Concentration	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<4	<0.5	<4	<0.5	<2	
Average Concentration													0.29	0.29	0.29	0.29	0.29	0.29	0.38	0.25	1	0.24	0.29	
Standard Deviation													0.2	0.2	0.2	0.2	0.2	0.2	0.47	0	0.36	0.04	0.2	
Number of Guideline Exceedances	0	1	0	1	0	1	0	0	1	0	0	0	15	0	0	15	0	15	1	13	15	0	0	
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Env Stds Comments

- #1:Apply LOSP 95
- #2:Apply Freshwater DGV (LOSP Unknown)
- #3:Apply Freshwater LOSP Unknown
- #4:Apply LOSP Unknown
- #5:Apply LOSP 99
- #6:NHMRC (2011) Drinking Water Guidelines [2016] Health
- #7:EPHC (2008) Australian Guidelines for Water Recycling - Drinking Water
- #8:US EPA (2012) Health Advisories for Drinking Water Contaminants
- #9:WHO (2011) Drinking Water Quality

	nochlorine Pesticides														Pesticides	Polychlorinated Biphenyls							
	DDT+DDE+DDD	Hexachlorobenzene	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Chlordane (cis)	Chlordane (trans)	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Methoxychlor	DDE	Chlorobenzilate	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	PCBs (Sum of total)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5	0.2	0.2	0.2	0.5	2								1
ANZG (2018) Marine Water - Slightly to moderately disturbed ecosystems		0.05 ^{#5}				0.004 ^{#5}					0.0004 ^{#4}		0.04 ^{#4}						0.3 ^{#2}		0.01 ^{#2}		
NHMRC (2008) Recommended Recreational Guidelines - Health		2 ^{#8}			300 ^{#7}	6 ^{#9}					3 ^{#6}	0.4 ^{#8}	200 ^{#9}										10 ^{#8}

LocCode	Field_ID	Sampled_Date-Time																					
C64	C64	4/05/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	-	-	-	-	-	-	<1
E62	E62	5/05/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	-	-	-	-	-	-	<1
S02	S02_D	4/05/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	-	-	-	-	-	-	<1
S02_S	S02_S	3/05/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	-	-	-	-	-	-	<1
S06	S06	3/05/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	-	-	-	-	-	-	<1
S40_D	S40_D	6/05/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	-	-	-	-	-	-	<1
S40_S	S40_S	6/05/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	-	-	-	-	-	-	<1
S51	S51	7/05/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	-	-	-	-	-	-	<1
S54	QC221	5/05/2021	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	-	-	<2	<2	<2	<2	<2	<2	<2	-
S54	S54	5/05/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	-	-	-	-	-	-	<1
S55	S55	5/05/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	-	-	-	-	-	-	<1
S58_D	S58_D	7/05/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	-	-	-	-	-	-	<1
SMW_ENV020_D	SMW_ENV020_W	4/05/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	-	-	-	-	-	-	<1
SMW_ENV021_S	SMW_ENV021_S	22/01/2019	<4	<4	<2	<2	<2	<2	-	-	<2	<2	-	<2	<2	-	-	-	-	-	-	-	-
WB4	WB4	10/05/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	-	-	-	-	-	-	-	-	<1

Statistical Summary

Number of Results	14	15	15	15	15	15	14	14	14	13	15	15	14	1	1	1	1	1	1	1	1	13	
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Minimum Concentration	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<2	<2	<2	<2	<2	<2	<2	<2	<1	
Maximum Concentration	<4	<4	<2	<2	<2	<2	<0.5	<0.5	<0.5	<0.5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1	
Average Concentration	0.38	0.36	0.29	0.29	0.29	0.29	0.24	0.24	0.24	0.25	0.29	0.29	0.94									0.5	
Standard Deviation	0.47	0.46	0.2	0.2	0.2	0.2	0.04	0.04	0.04	0	0.2	0.2	0.24									0	
Number of Guideline Exceedances	0	15	0	0	0	15	0	0	0	0	15	14	14	0	0	0	0	0	1	0	1	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

- #1:Apply LOSP 95
- #2:Apply Freshwater DGV (LOSP Unknown)
- #3:Apply Freshwater LOSP Unknown
- #4:Apply LOSP Unknown
- #5:Apply LOSP 99
- #6:NHMRC (2011) Drinking Water Guidelines [2016] Health
- #7:EPHC (2008) Australian Guidelines for Water Recycling - Drinking Water
- #8:US EPA (2012) Health Advisories for Drinking Water Contaminants
- #9:WHO (2011) Drinking Water Quality

			PAHs																						
			2-chloronaphthalene	Benz[a]anthracene	Acetophenone	Anthracene	Benz[a]pyrene	Acenaphthylene	Acenaphthene	Benz[b,j]fluoranthene	Benz[k,g,h,i]perylene	Benzok[fluoranthene	Chrysene	7,12-dimethylbenz[a]anthracene	Dibenz[a,h]anthracene	Fluoranthene	Fluorene	3-methylcholanthrene	Indeno[1,2,3-c,d]pyrene	Naphthalene	Phenanthrene	Pyrene	Benz[a]pyrene TEQ (Zero)	Sum of Polycyclic aromatic hydrocarbons (PAH)	
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
EQL			2	0.05	2	0.05	0.01 ^{#1}	0.1 ^{#2}	0.05	0.05	0.05	0.05	0.05	2	0.05	1 ^{#1}	0.05	0.05	2	0.05	0.05	50 ^{#1}	0.6 ^{#2}	0.05	0.05
ANZG (2018) Marine Water - Slightly to moderately disturbed ecosystems																									
NEPM (1999) Groundwater HSLs for vapour intrusion																									
NHMRC (2008) Recommended Recreational Guidelines - Aesthetic																									
NHMRC (2008) Recommended Recreational Guidelines - Health					4000 ^{#7}	1500 ^{#7}	0.1 ^{#8}		20000 ^{#9}								100000 ^{#9}			700 ^{#7}	1500 ^{#7}	1500 ^{#7}			
LocCode	Field_ID	Sampled_Date	-	<0.05	-	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	0.1	<0.05	-	<0.05	<0.05	<0.05	0.1	-	0.2		
ES9	ES9	15/03/2017	-	<1	-	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<1	<0.5	<0.5		
SMW_BH066	SMW_BH066	23/04/2020	-	<1	-	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<1	<0.5	<0.5		
SMW_BH067	SMW_BH067	23/04/2020	-	<1	-	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<1	<0.5	<0.5		
SMW_ENV026	SMW_ENV026	22/01/2019	<2	<1	<2	<1	<0.5	<1	<1	<1	<1	<1	<2	<1	<1	<1	<2	<1	<5 - 2.3	<1	<1	<0.5	2.3		
SMW_ENV026	SMW_ENV026	24/04/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SMW_ENV026	SMW_ENV026	4/05/2021	-	<1	-	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<1	<0.5	<0.5		
SMW_ENV027	SMW_ENV027	22/01/2019	<2	<1	<2	<1	<0.5	<1	<1	<1	<1	<2	<1	<1	<1	<2	<1	<1	<5 - 1.7	<1	<1	<0.5	1.7		
SMW_ENV027	SMW_ENV027	24/04/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SMW_ENV034	SMW_ENV034	22/01/2019	<2	<1	<2	<1	<0.5	<1	<1	<1	<1	<1	<2	<1	<1	<1	<2	<1	<1	<1	<1	<0.5	<0.5		
SMW_ENV034	SMW_ENV034	24/04/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SMW_ENV034	SMW_ENV034	10/05/2021	-	<1	-	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<0.5	<0.5		
Statistical Summary			3	8	3	8	8	8	8	8	8	8	3	8	8	8	3	8	8	8	8	8	7	8	
Number of Results			0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0	3		
Number of Detects			<2	<0.05	<2	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<2	<0.05	0.1	<0.05	<2	<0.05	<0.05	<0.05	0.1	<0.5	0.2		
Minimum Concentration			<2	<1	<2	<1	<0.5	<1	<1	<1	<1	<1	<2	<1	<1	<1	<2.3	<1	<1	<1	<1	<0.5	2.3		
Maximum Concentration			1	0.44	1	0.44	0.22	0.44	0.44	0.44	0.44	0.44	0.44	1	0.44	0.45	0.44	1	0.44	0.88	0.44	0.45	0.25	0.68	
Average Concentration			0	0.17	0	0.17	0.087	0.17	0.17	0.17	0.17	0.17	0.17	0	0.17	0.14	0.17	0	0.17	0.87	0.17	0.14	0	0.83	
Standard Deviation			0	0	0	0	8	7	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

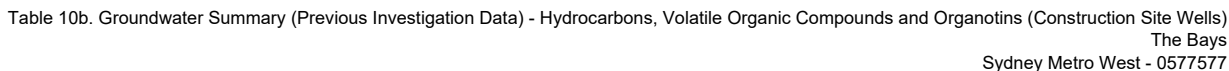
Env Stds Comments

- #1: Apply LOSP 99
- #2: Apply Freshwater LOSP Unknown
- #3: Apply LOSP 95
- #4: Apply Freshwater DGV (LOSP Unknown)
- #5: Apply LOSP Unknown
- #6: NHMRC (2011) Drinking Water Guidelines [2016] Aesthetic
- #7: EPHC (2008) Australian Guidelines for Water Recycling - Drinking Water
- #8: NHMRC (2011) Drinking Water Guidelines [2016] Health
- #9: US EPA (2012) Health Advisories for Drinking Water Contaminants
- #10: California EPA (2014) Public Health Goals for Drinking Water
- #11: WHO (2011) Drinking Water Quality
- #12: WHO (2020) Trichloroethene in drinking-water: Background document for development of WHO Guidelines for drinking-water quality. WHO/HEP/ECH/WSH/2020.10

				SVOCs																	
				2-(4-ethylamino) fluorene	2,3-Dichlorobenzidine	4-(dimethylamino) acetobenzene	4-bromophenyl phenyl ether	4-chlorophenyl phenyl ether	4-Nitroquinoline-N-oxide	Acetobenzene	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl)ether	Carbazole	Dibenzofuran	Hexachloropropene	Methapyrene	N-nitrosomorpholine	N-nitrosopiperidine	N-nitrosopyrrolidine	Phenacetin	
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	2
ANZG (2018) Marine Water - Slightly to moderately disturbed ecosystems																					
NEPM (1999) Groundwater HSLs for vapour intrusion																					
NHMRC (2008) Recommended Recreational Guidelines - Aesthetic																					
NHMRC (2008) Recommended Recreational Guidelines - Health																	0.01 ¹⁷				
LocCode	Field_ID	Sampled_Date																			
ES9	ES9	15/03/2017		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SMW_BH066	SMW_BH066	23/04/2020		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SMW_BH067	SMW_BH067	23/04/2020		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SMW_ENV026	SMW_ENV026	22/01/2019		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<4	<2	
SMW_ENV026	SMW_ENV026	24/04/2020		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SMW_ENV026	SMW_ENV026	4/05/2021		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SMW_ENV027	SMW_ENV027	22/01/2019		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<4	<2	
SMW_ENV027	SMW_ENV027	24/04/2020		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SMW_ENV034	SMW_ENV034	22/01/2019		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<4	<2	
SMW_ENV034	SMW_ENV034	24/04/2020		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SMW_ENV034	SMW_ENV034	10/05/2021		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Statistical Summary																					
Number of Results				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<4	<2
Maximum Concentration				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<4	<2
Average Concentration				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1
Standard Deviation				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances				0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
Number of Guideline Exceedances(Detects Only)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

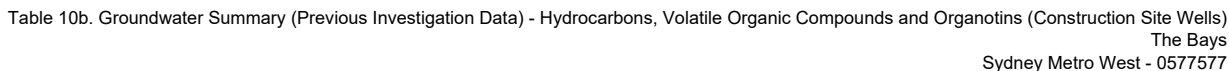
- #1: Apply LOSP 99
 #2: Apply Freshwater LOSP Unknown
 #3: Apply LOSP 95
 #4: Apply Freshwater DGV (LOSP Unknown)
 #5: Apply LOSP Unknown
 #6: NHMRC (2011) Drinking Water Guidelines [2016] Aesthetic
 #7: EPHC (2008) Australian Guidelines for Water Recycling - Drinking Water
 #8: NHMRC (2011) Drinking Water Guidelines [2016] Health
 #9: US EPA (2012) Health Advisories for Drinking Water Contaminants
 #10: California EPA (2014) Public Health Goals for Drinking Water
 #11: WHO (2011) Drinking Water Quality
 #12: WHO (2020) Trichloroethene in drinking-water: Background document for development of WHO Guidelines for drinking-water quality. WHO/HEP/ECH/WSH/2020.10



AccCode	Field_ID	Sampled_Date																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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Env Stds Comments
#1:Apply LOSP 99
#2:Apply Freshwater LOSP Unknown
#3:Apply LOSP 95
#4:Apply Freshwater DGV (LOSP Unknown)
#5:Apply LOSP Unknown
#6:NHMRc (2011) Drinking Water Guidelines [2016] Aesthetic
#7:EPHC (2008) Australian Guidelines for Water Recycling - Drinking Water
#8:NHMRc (2011) Drinking Water Guidelines [2016] Health
#9-US EPA (2012) Health Advisories for Drinking Water Contaminants
#10:California EPA (2014) Public Health Goals for Drinking Water
#11:WHO (2011) Drinking Water Quality
#12:WHO (2020) Trichloroethene in drinking-water: Background document for development of WHO Guidelines for drinking-water quality. WHO/HQP/ECH/WSH/2020.10

#1 NIL (+)VE



CocCode	Field_ID	Sampled_Date
C64	C64	27/02/2017
C64	C64	4/05/2021
E58	E58	15/03/2017
E60	E60	15/03/2017
E60	E60	7/05/2021
E61	E61	15/03/2017
E62	E62	15/03/2017
E62	E62	5/05/2021
MW02	MW02	23/01/2012
MW02	MW02	15/05/2012
MW02	MW02	1/07/2012
MW02	MW102	1/07/2015
MW02	MW02	4/05/2021
MW104	MW104	1/07/2015
MWB2	MWB2 (PB, 2002)	1/02/2003
MWB2	MWB2	27/02/2017
S02	S02_D	4/05/2021
S02_S	S02_S	3/05/2021
S06	S06	3/05/2021
S40_D	S40_D	6/05/2021
S40_S	S40_S	6/05/2021
S51	S51	7/05/2021
S54	QC221	5/05/2021
S54	S54	5/05/2021
S55	S55	5/05/2021
S58_D	S58_D	7/05/2021
S58_S	S58_S	6/05/2021
SMW_ENV020_D	SMW_ENV020_W	4/05/2021
SMW_ENV020_S	SMW_ENV020_S	4/05/2021
SMW_ENV021_S	SMW_ENV021_S	22/01/2019
SMW_ENV021_S	SMW_ENV021_S	27/04/2020
SMW_ENV021_S	SMW_ENV021_S	10/05/2021
SMW_ENV021_W	SMW_ENV021_W	10/05/2021
WB4	WB4	1/07/2015
WB4	WB4	27/02/2017
WB4	WB4	10/05/2021

Env Sids	Comments
#1:Apply	LOSP 99
#2:Apply	Freshwater LOSP Unknown
#3:Apply	LOSP 95
#4:Apply	Freshwater DGV (LOSP Unknown)
#5:Apply	LOSP Unknown
#6:NHMRC	(2011) Drinking Water Guidelines [2016] Aesthetic
#7:EPHC	(2008) Australian Guidelines for Water Recycling - Drinking Water
#8:NHMRC	(2011) Drinking Water Guidelines [2016] Health
#9:US EPA	(2012) Health Advisories for Drinking Water Contaminants
#10:California EPA	(2014) Public Health Goals for Drinking Water
#11:WHO	(2011) Drinking Water Quality
#12:WHO	(2020) Trichloroethene in drinking-water: Background document for development of WHO Guidelines for drinking-water quality. WHO/HEP/ECH/WSH/2020.10

Environmental Resources Management Australia Pty Ltd

	Fluorotelomer Sulfonic Acids				Perfluoroalkane Carboxylic Acids										Perfluoroalkane Sulfonic Acids							Perfluoroalkyl Sulfonamides							PFAS Sums								
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluoropentanoic acid (PFPeA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorobutanoic acid (PFBA)	Perfluorodecanoic acid (PFDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorooctanoic acid (PFOA)	Perfluorooctanesulfonic acid (PFOS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutane sulfonic acid (PFBS)	Sum of PFHxS and PFOS	N-methyl PFO sulfonamidoethanol (EtFOSE)	N-methyl-PFO sulfonamidoacetic acid (MeFOSAA)	N-methyl-PFO sulfonamidoacetic acid (MeFOSAA)	N-methyl PFO sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSE)	N-methyl PFO sulfonamidoethanol (MeFOSE)	Perfluorooctane sulfonamide (FOSA)	Sum of PFAS	Sum of PFAS (WA DER List)						
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L					
EQL	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.05	0.02	0.02	0.1	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.05	0.02	0.02	0.05	0.05	0.05	0.02	0.01	0.01						
NEMP (2020) Interim Marine - Default slightly to moderately disturbed systems															19 ^{#1}	0.00023 ^{#1}																					
NEMP (2020) Recreational Water															10 ^{#2}	2 ^{#2}		2 ^{#2}				2 ^{#2}															
LocCode	Field_ID	Sampled_Date																																			
SMW_BH066	SMW_BH066	23/04/2020		<0.05	<0.05	<0.05	<0.05	-	-	<0.02	-	<0.02	<0.02	<0.1	-	-	-	<0.01	<0.01	-	<0.02	-	-	<0.02	<0.01	-	-	-	-	-	-	<0.01					
SMW_BH067	SMW_BH067	23/04/2020		<0.05	<0.05	<0.05	<0.05	-	-	<0.02	-	<0.02	<0.02	<0.1	-	-	-	<0.01	<0.01	-	<0.02	-	-	<0.02	<0.01	-	-	-	-	-	-	<0.01					
SMW_ENV026	SMW_ENV026	22/01/2019		<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.02	<0.01					
SMW_ENV026	SMW_ENV026	4/05/2021		<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.02	<0.01					
SMW_ENV027	SMW_ENV027	22/01/2019		<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.02	<0.01					
SMW_ENV034	SMW_ENV034	22/01/2019		<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.02	<0.01					
SMW_ENV034	SMW_ENV034	10/05/2021		<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.02	<0.01					
Statistical Summary																																					
Number of Results	7	7	7	7	5	5	7	5	7	7	7	5	5	5	7	7	5	7	5	5	7	7	5	5	5	5	5	5	5	5	5	7					
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Minimum Concentration	<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.02	<0.01						
Maximum Concentration	<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.02	<0.01						
Average Concentration	0.025	0.025	0.025	0.025	0.01	0.01	0.01	0.025	0.01	0.01	0.05	0.01	0.01	0.01	0.005	0.005	0.01	0.01	0.01	0.01	0.01	0.005	0.025	0.01	0.01	0.025	0.025	0.025	0.01	0.005	0.005						
Standard Deviation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					

Env Stds Comments

#1:99% level of protection be used for slightly to moderately disturbed systems.

#2:NHMRC (2019)

Appendix F: **Soil Vapour Assessment (JBS&G, 2017)**

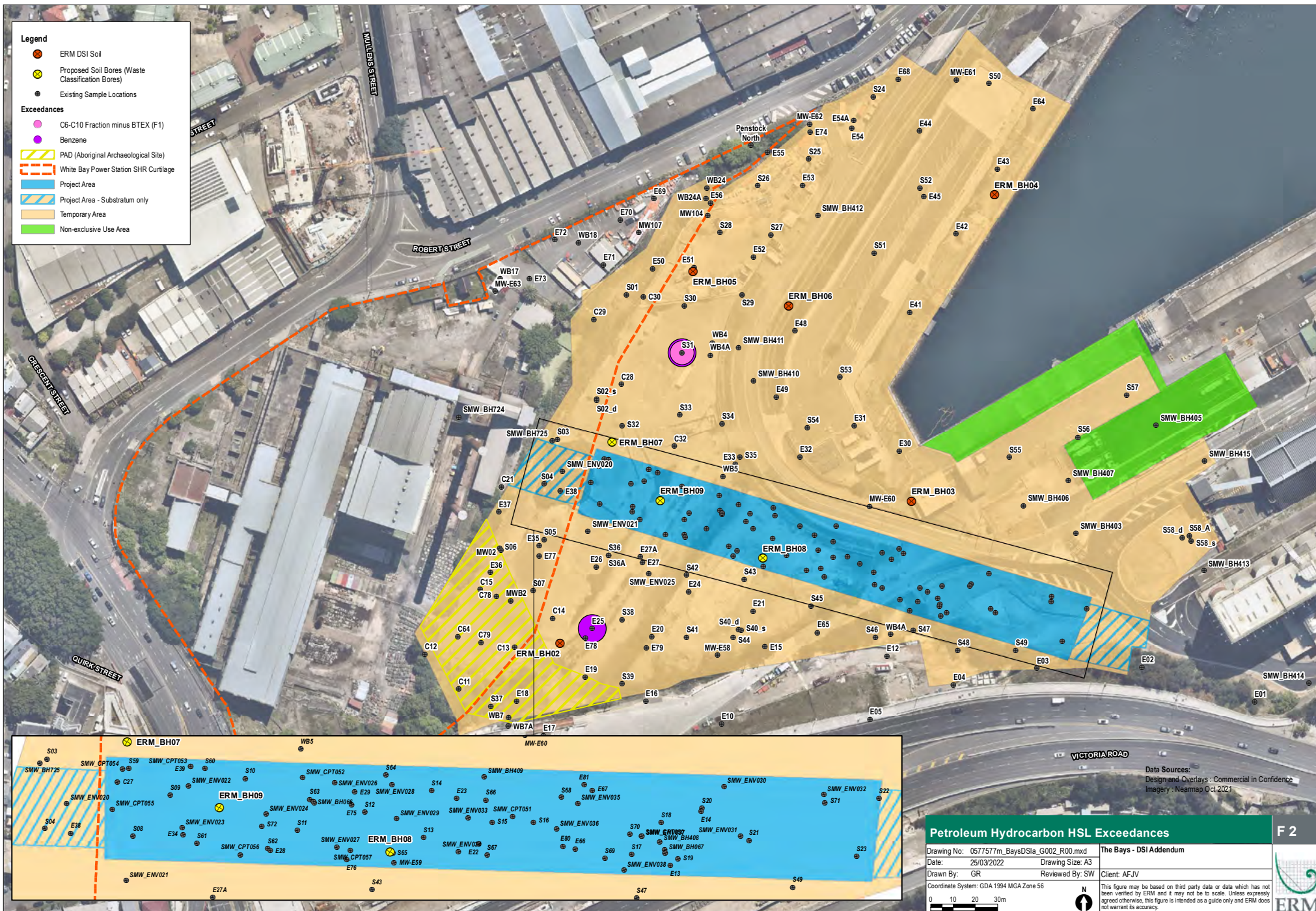
	PAHs			coverable Hydro		BTEx							Chlorinated Hydrocarbons																								
	Naphthalene	>C10-C16 Fraction	C6-C10 Fraction	Benzene	Toluene	Ethylbenzene	Total Xylene	1,1-dichloropropene	1,1-dichloroethane	1,1-dichloroethene	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,2-dibromo-3-chloropropane	1,1,2-trichloroethane	1,1,2,2-tetrachloroethane	1,2,3-trichloropropane	1,2-dichloroethane	1,3-dichloropropane	1,2-dichloropropene	2,2-dichloropropene	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroform	cis-1,2-dichloroethene	Dibromomethane	cis-1,3-dichloropropene	Hexachlorobutadiene	Tetrachloroethene	trans-1,3-dichloropropene	Trichloroethene	Vinyl chloride	1,2,3-trichlorobenzene	1,2-dichlorobenzene	
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³		
EQL	80	1670	1670	80	80	80	250	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	
NEPM (1999) Soil Vapour HSLs for Vapour Intrusion 0-1m	3000	500,000	680,000	4000	4,800,000	1,300,000	840,000																														
CRC Care (2011) Intrusive Maint. Worker - Sand 0 to <2 m	880000			760000	NL	NL	NL																														
CRC Care (2011) Intrusive Maint. Worker - Sand 2 to <4 m	NL			5100000	NL	NL	NL																														
CRC Care (2011) Intrusive Maint. Worker - Sand 4 to <8 m	NL			15000000	NL	NL	NL																														
CRC Care (2011) Intrusive Maint. Worker - Sand 8 m+	NL			36000000	NL	NL	NL																														
LocCode	Field_ID	Sampled_Date		<83.35	<1667	<1667	<83.35	<83.35	<83.35	<250.1	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35		
E75	E75	23/03/2017		<83.35	<1667	<1667	<83.35	<83.35	<83.35	<250.1	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35		
E76	E76	23/03/2017		<83.35	<1667	<1667	<83.35	<83.35	<83.35	<250.1	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35		
E80	E80	23/03/2017		<83.35	<1667	<1667	<83.35	<83.35	<83.35	<250.1	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35		
E81	E81	23/03/2017		<83.35	<1667	<1667	<83.35	<83.35	<83.35	<250.1	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35		
Statistical Summary																																					
Number of Results	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Minimum Concentration	<83.35	<1667	<1667	<83.35	<83.35	<83.35	<250.1	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35		
Maximum Concentration	<83.35	<1667	<1667	<83.35	<83.35	<83.35	<250.1	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35		
Average Concentration	42	834	834	42	42	42	125	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42		
Standard Deviation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Number of Guideline Exceedances	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Number of Guideline Exceedances(Detects Only)	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

	Halogenated Benzenes						Aromatic Hydrocarbons		MAH								Solvents	
	1,2,4-trichlorobenzene	1,3-dichlorobenzene	2-chlorotoluene	1,4-dichlorobenzene	4-chlorotoluene	Chlorobenzene	1,2-dibromoethane	Trichlorofluoromethane	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	tert-butylbenzene	Styrene	2-Propanol
	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
EQL	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	830	1670
NEPM (1999) Soil Vapour HSLs for Vapour Intrusion 0-1m																		
CRC Care (2011) Intrusive Maint. Worker - Sand 0 to <2 m																		
CRC Care (2011) Intrusive Maint. Worker - Sand 2 to <4 m																		
CRC Care (2011) Intrusive Maint. Worker - Sand 4 to <8 m																		
CRC Care (2011) Intrusive Maint. Worker - Sand 8 m+																		

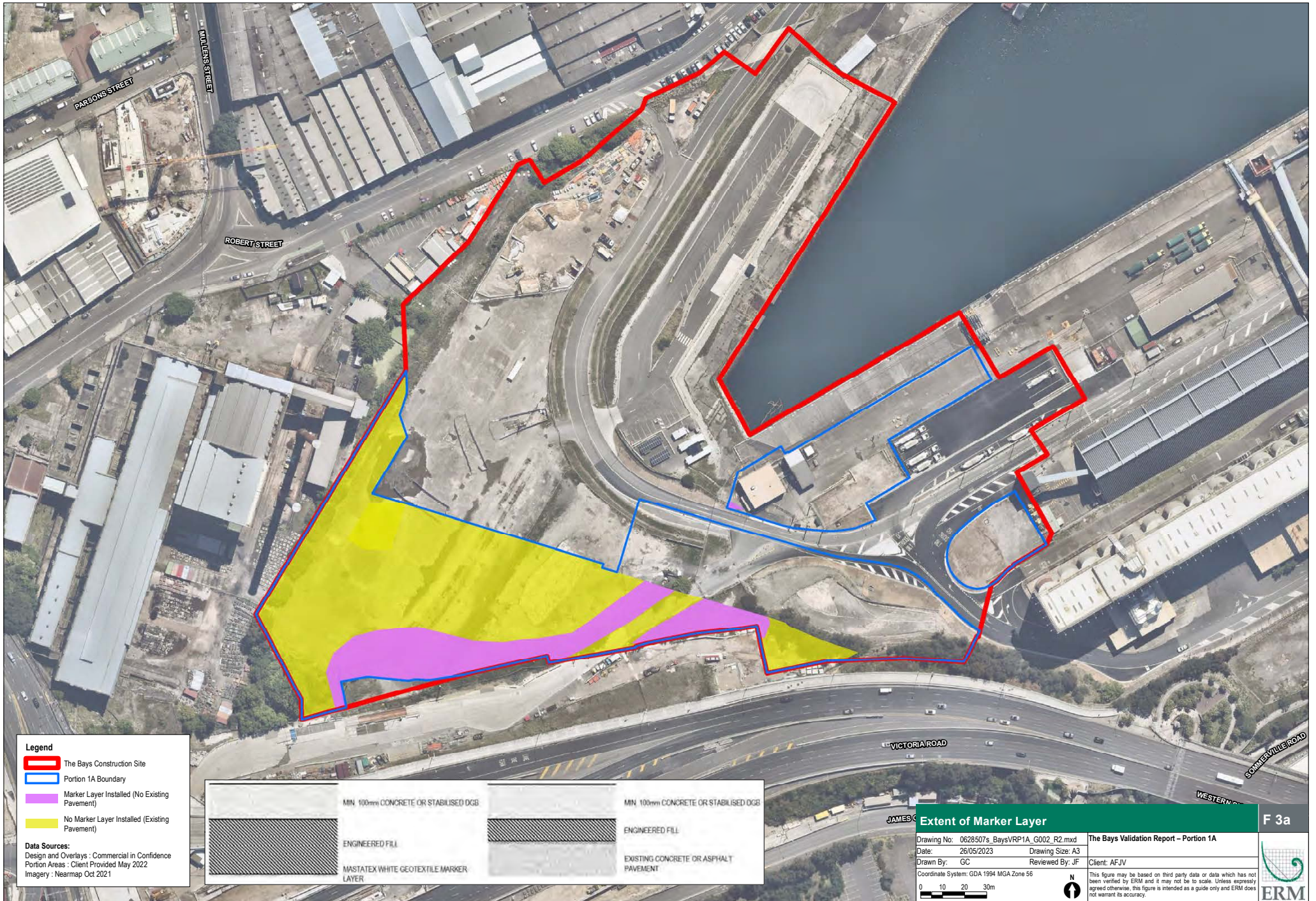
LocCode	Field_ID	Sampled_Date	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<1667
E75	E75	23/03/2017	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<1667
E76	E76	23/03/2017	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<1667
E80	E80	23/03/2017	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<1667
E81	E81	23/03/2017	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<1667

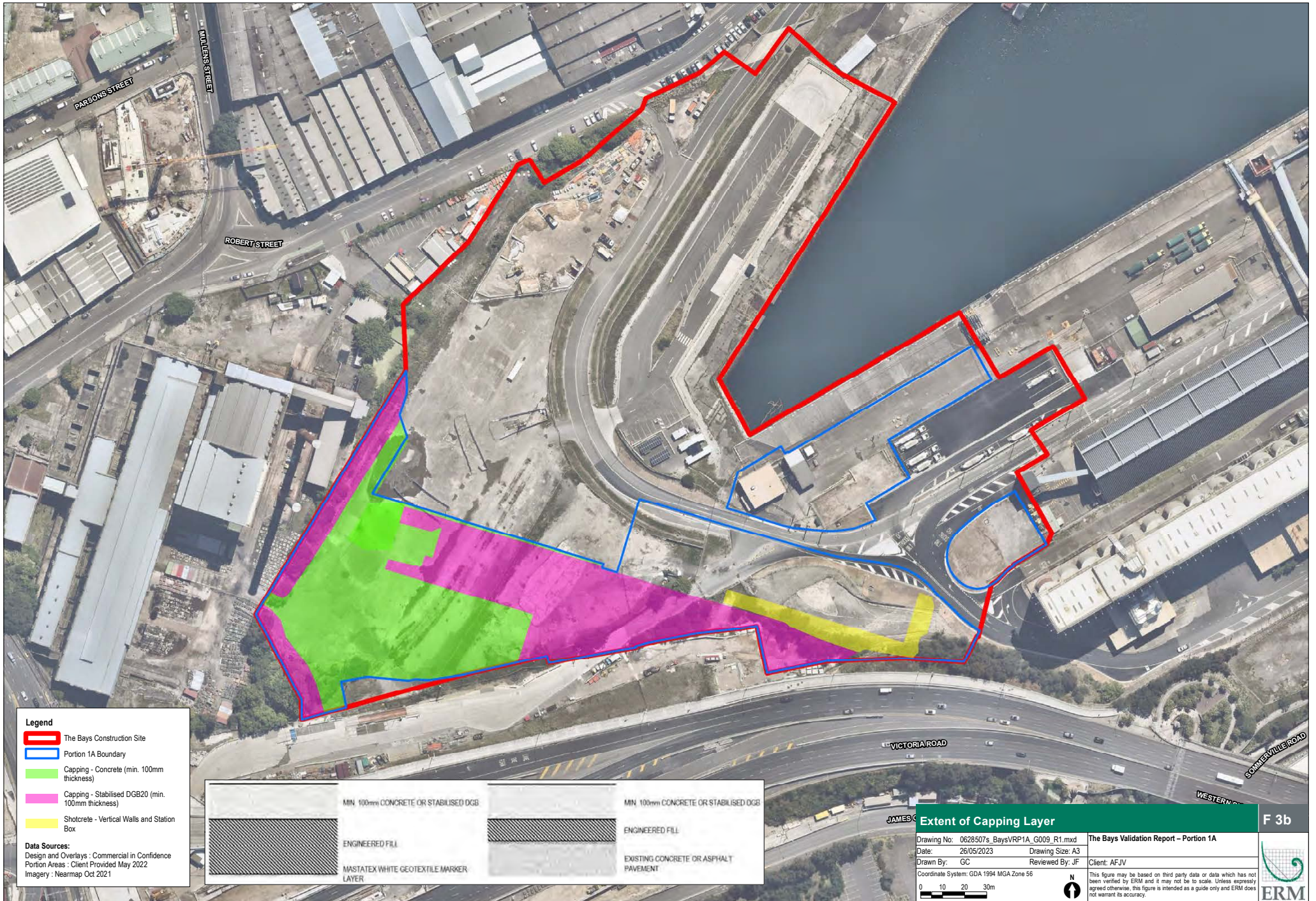
Statistical Summary																			
Number of Results	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<833.5	<1667
Maximum Concentration	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<83.35	<833.5	<1667
Average Concentration	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	417	834
Standard Deviation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix G:
DSI Addendum Benzene Locations (ERM, June 2022)



Appendix H: **Validation Report Figures (ERM, September 2024)**





Legend
The Bays Construction Site
CTP Portion Boundary

CUT AND FILL ANALYSIS				
Number	Color	Lower Value (m)	Upper Value (m)	
1		-9.503	-6.000	
2		-6.000	-4.000	
3		-4.000	-2.000	
4		-2.000	-1.000	
5		-1.000	-0.500	
6		-0.500	0.000	
7		0.000	0.275	
8		0.275	0.350	
9		0.350	1.000	
10		1.000	2.000	
11		2.000	3.000	
12		3.000	4.000	
13		4.000	6.000	
14		6.000	8.000	
15		8.000	10.000	
16		10.000	12.300	

CUT AND FILL ANALYSIS FOR OVERALL SITE ESTABLISHMENT WORKS SITE

CUT VOLUME: 5,100m³
FILL VOLUME: 14,300m³
NET VOLUME: 9,200m³ (EXCESS FILL)

NOTES:

- THIS CUT AND FILL ANALYSIS IS BASED ON POINT CLOUD SURVEY "ACA_NSW_AUST_CTP_210927_White_Bay_Site_LAZ_GDA2020_MGA_zone_56_54_788_050_points.las" DATED 27/09/2021. EXISTING GROUND LEVELS AND CUT AND FILL DEPTHS TO BE VERIFIED ON SITE. CUT AND FILL VOLUMES OUTSIDE THE PROPOSED WESTCANNEX ROAD ARE TO BE CONFIRMED.
- CUT AND FILL DEPTHS AND VOLUMES ARE FROM EXISTING POINT CLOUD SURVEY SURFACE TO FINAL PAVEMENT SURFACE AND DO NOT INCLUDE THE PAVEMENT CONSTRUCTION.
- TEMPORARY RATER ASSUMED TO BE MAXIMUM 1 IN 1 FOR FILL DEPTH UP TO 1m. THIS ASSUMPTION IS TO BE CONFIRMED BY GEOTECHNICAL ENGINEER ON SITE.
- NO BULKING FACTORS, SEPARATION FOR EXISTING PAVEMENTS, TOPSOIL OR COMPACTION FACTORS HAVE BEEN INCLUDED IN THIS CUT AND FILL ANALYSIS.

Data Sources:
Design and Overlays : Commercial in Confidence
Portion Areas : Client Provided May 2022
Imagery : Nearmap Oct 2021

Cut/Fill Areas and Volumes - Survey

Drawing No: 0628507s_BaysVRP1A_G008_R0.mxd
Date: 24/05/2023 Drawing Size: A3
Drawn By: GC Reviewed By: JF
Coordinate System: GDA 1994 MGA Zone 56

The Bays Validation Report - Portion 1A

Client: AFJV

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

F 4

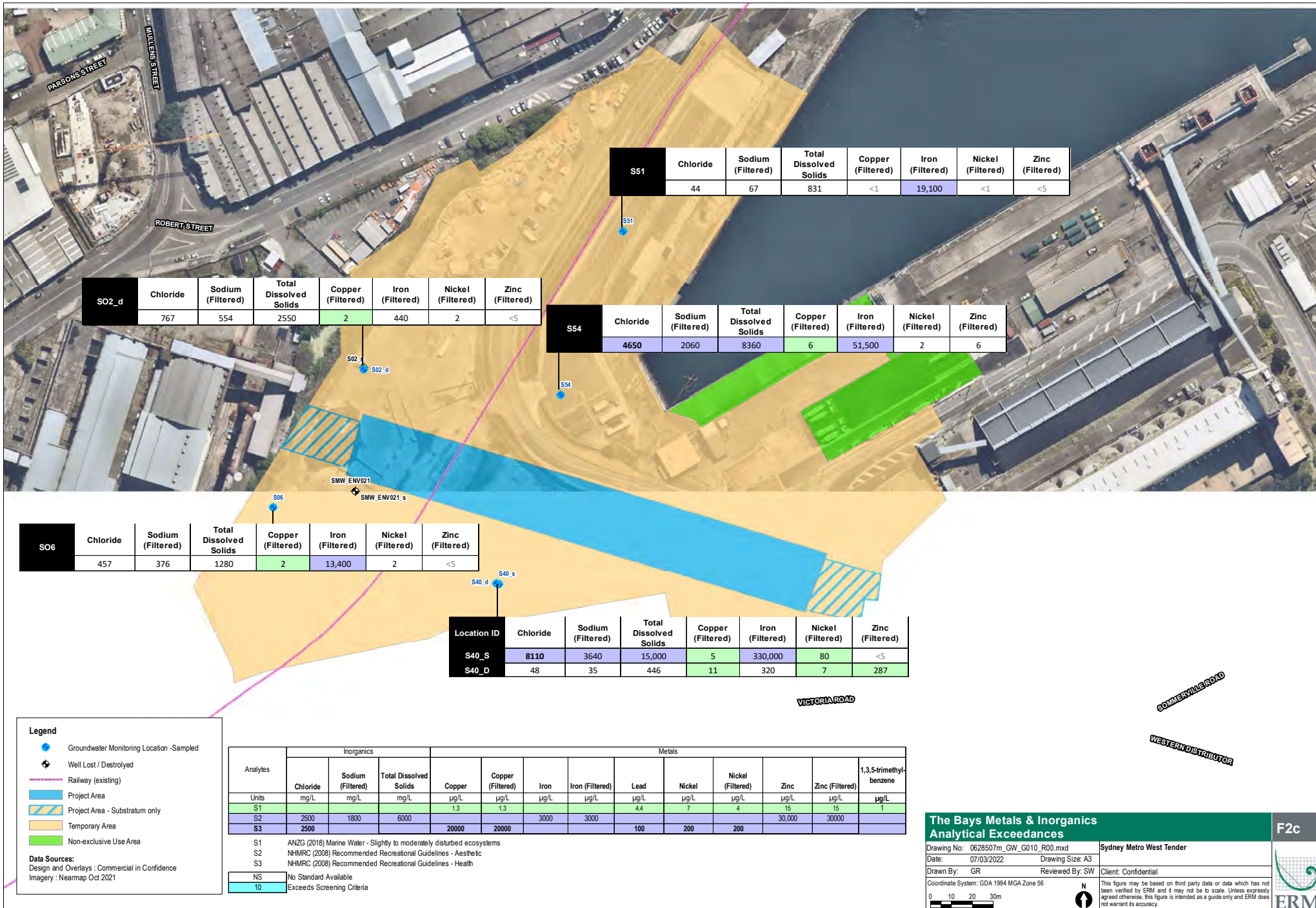


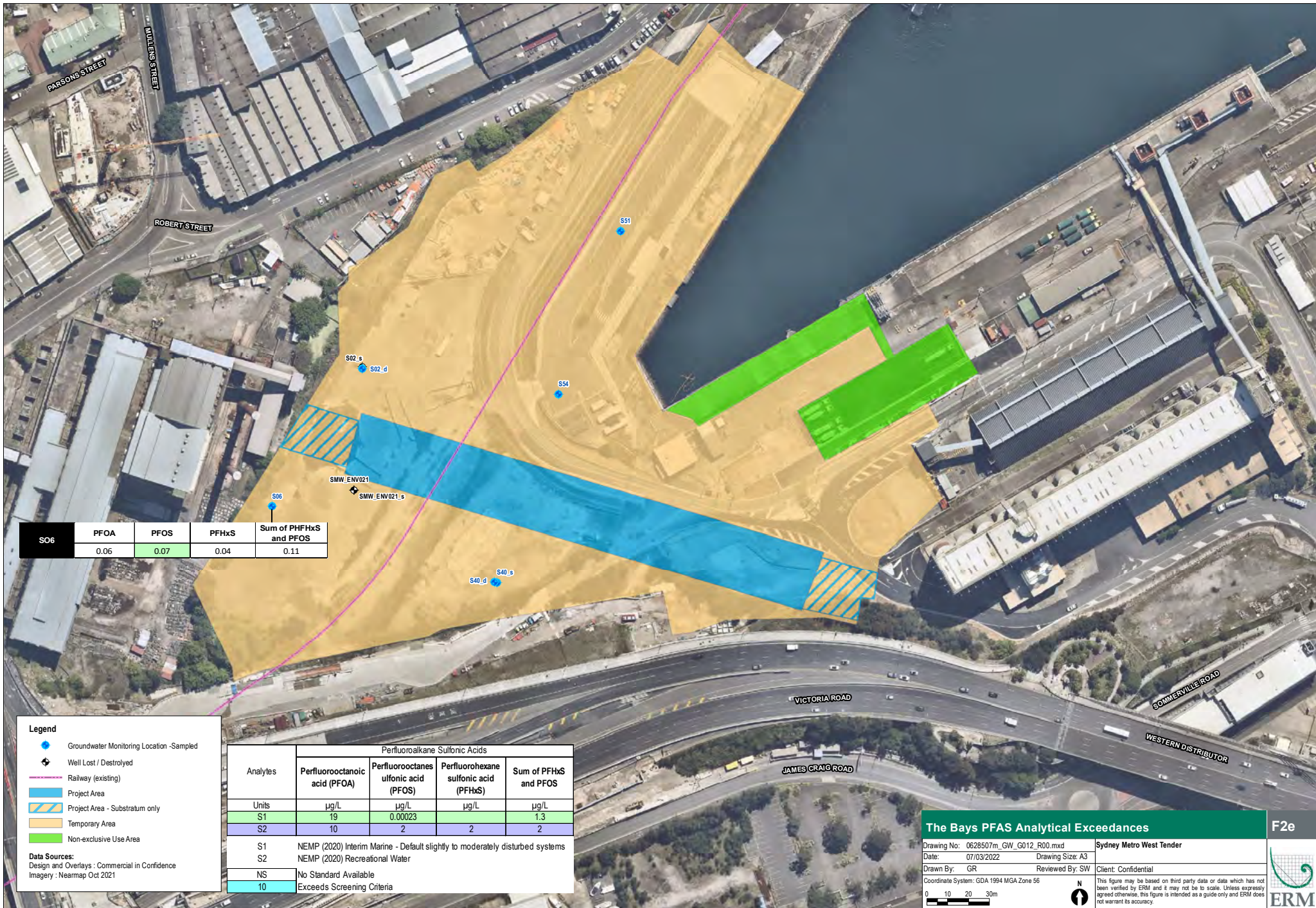


Appendix I:

Groundwater Remediation Monitoring Figures







Appendix J: Groundwater Remediation Monitoring Tables



Table 1. Groundwater Gauging Data
Baseline Groundwater Monitoring, January 2022
Sydney Metro West - 0628507

ID	Gauging Date	Site Identification	TOC Elevation (mAHD)	Ground Surface Elevation (mAHD)	Total Measured Depth (mbTOC)	Depth to LNAPL (mbTOC)	Depth to Water (mbTOC)	LNAPL Thickness (m)	Corrected Depth to Water (mbgl)	Water Elevation (mAHD)	Comments
SMW_BH044	18/01/2022	Burwood	22.6	22.6	-	-	-	-	-	-	Unable to be accessed, car parked over well (Note left on car, but no response)(see photos)
SMW_BH046	18/01/2022	Burwood	6.47	6.47	-	-	-	-	-	-	Lost/destroyed. Construction works likely paved over well (see photos)
SMW_BH046_s	18/01/2022	Burwood	6.47	6.47	2.887	-	1.702	-	1.702	4.768	Data logger and tubing in well, no odour
SMW_BH015	21/01/2022	Sydney Olympic Park	22.94	22.94	29.622	-	15.489	-	15.489	7.451	Data logger in well, no odour, minor silt on IP
SMW_BH015_s	21/01/2022	Sydney Olympic Park	22.02	22.02	2.579	-	Dry	-	Dry	-	Data logger in well, dry
SMW_BH019	19/01/2022	Sydney Olympic Park	17.33	17.33	26.365	-	14.452	-	14.452	2.878	Data logger, organic odour
SMW_BH68_s	21/01/2022	Sydney Olympic Park	23.36	23.36	3.680	-	Dry	-	Dry	-	Data logger, tubing in well. Dry, no odour
SMW_BH120	19/01/2022	Sydney Olympic Park	17.38	17.38	22.034	-	16.943	-	16.943	0.437	Data logger, organic odour
SMW_BH009	18/01/2022	North Strathfield	18.45	18.45	33.230	-	30.581	-	30.581	-12.131	Data logger in well, no odour
SMW_BH009_s	17/01/2022	North Strathfield	18.6	18.6	4.933	-	3.692	-	3.692	14.908	Water in casing, data logger and tubing in well. No odour
SMW_BH035	18/01/2022	North Strathfield	26.74	26.74	42.240	-	35.551	-	35.551	-8.811	Data logger in well
SMW_BH035_s	18/01/2022	North Strathfield	26.62	26.62	2.700	-	1.589	-	1.589	25.031	Data logger in well, no odour
SMW_BH038	17/01/2022	North Strathfield	9.91	9.91	25.210	-	12.658	-	12.658	-2.748	Data logger in well
SMW_BH050	17/01/2022	Five Dock	24.34	24.34	26.008	-	23.181	-	23.181	1.159	Data logger in well, no odour
SMW_BH050_s	17/01/2022	Five Dock	24.35	24.35	1.211	-	0.321	-	0.321	24.029	Data logger in well, no odour
SMW_051	18/01/2022	Five Dock	21.68	21.68	10.615	-	2.258	-	2.258	19.422	Tubing and two data loggers. No odour
SMW_BH051_s	18/01/2022	Five Dock	21.66	21.66	1.811	-	Dry	-	Dry	-	Data logger in well. Well dry
SMW_BH040	18/01/2022	Tunnel - NS to B	23.06	23.06	+50	-	24.010	-	24.010	-0.950	Data logger in well, one bolt missing, depth of well greater than IP length. No odour
S02_d	20/01/2022	The Bays	3	3.11	15.300	-	2.000	-	2.000	1.000	Data logger and tubing in well. Approx. 0.9m taken off well depth and water level surface to TOC being elevated 0.9m from ground surface
S02_s	20/01/2022	The Bays	2.99	3.11	-	-	-	-	DRY	-	Could not be accessed (covered)
S06	20/01/2022	The Bays	3.04	3.13	21.229	-	2.225	-	2.225	0.815	Water in well, depth to surface changed, re-surveyed
S40_d	20/01/2022	The Bays	3.66	3.68	15.235	-	3.254	-	3.254	0.406	2x data loggers and tubing in well, no odour
S40_s	20/01/2022	The Bays	3.49	3.6	4.340	-	1.699	-	1.699	1.791	Data logger and tubing in well. No odour
S51	20/01/2022	The Bays	4.01	4.15	5.899	-	3.361	-	3.361	0.649	No odour
S54	20/01/2022	The Bays	3.53	3.59	16.898	-	3.065	-	3.065	0.465	Data logger and tubing in well. Organic odour
SMW_ENV021	20/01/2022	The Bays	3.03	3.1	-	-	-	-	-	-	Could not be accessed due to construction works
SMW_ENV021_s	20/01/2022	The Bays	3.03	3.09	-	-	-	-	-	-	Could not be accessed due to construction works

Notes:

mAHD metres Australian Height Datum
mbgl metres below ground level
mbTOC metres below top of casing
m metres
pre pre purging

Equipment: Interface probe
312115 & 312482
Operators: Ruel Muldoon & Taj Morison



Table 2. Groundwater Field Parameters
Baseline Groundwater Monitoring, January 2022
Sydney Metro West - 0628507

Well ID	Purge Date	Site Identification	DO (ppm)	EC (µS/cm)	pH	ORP (mV)	TEMP (°C)	Purge Volume (L)	Comments
SMW_BH019	19/01/2022	Sydney Olympic Park	0.77	17,570	6.66	-170.4	20.4	3.0	Cloudy, grey, organic odour
SMW_BH120	19/01/2022	Sydney Olympic Park	1.4	18,890	6.66	-139.7	22.3	3.0	Cloudy, black, white suspended solids, slight organic odour
SMW_BH035	18/01/2022	North Strathfield	5.1	16,430	6.71	13.1	23.7	0.4	Clear, no odour. Pump struggling to bring up water. Taken over 3 hours to bring water up. Samples taken prior to stabilization
SMW_BH035_s	18/01/2022	North Strathfield	2.73	4522	5.73	60.62	22.5	4.0	Cloudy, brown, no odour, sand particles. Samples taken due to low amount of water in well using a bailer
SMW_BH038	17/01/2022	North Strathfield	2.6	4700	12.03	-95.8	20.9	5.0	Clear, grey suspended solids, no odour
SMW_BH051	18/01/2022	Five Dock	1.11	7130	6.03	-6.8	20.9	5.0	Slightly cloudy, grey tinge, no odour
S02_d	20/01/2022	The Bays	2.25	2837	6.67	-235.3	21.5	5.0	Cloudy, dark brown, slight organic odour
S06	20/01/2022	The Bays	0.75	2175	6.53	-126.9	21.7	4.0	Slightly cloudy, light brown, organic odour
S40_d	20/01/2022	The Bays	0.79	21,370	6.16	-79.7	20.7	4.0	Cloudy, grey/brown, slight organic odour
S40_s	20/01/2022	The Bays	0.55	624	6.69	6.6	22.3	4.0	Cloudy, light brown, no odour
S51	20/01/2022	The Bays	0.75	1387	7.19	-190.1	22.2	4.0	Black suspended solids, clear, no odour
S54	20/01/2022	The Bays	0.78	12,520	5.78	-112.1	22.3	4.0	Cloudy, brown, slight organic odour

Post After purging
 DO Dissolved Oxygen
 mg/L milligrams per litre
 EC electronic conductivity
 µS_{cm}⁻¹ microsiemens per centimetre
 Eh Redox
 mV millivolts
 TDS Total Dissolved Solids
 L Litres

Equipment: ERM YSI WQM #1
 Operators: Ruel Muldoon and Taj Morison



Table 3. Historical Groundwater Gauging Data
Baseline Groundwater Monitoring, January 2022
Sydney Metro West - 0628507

ID	Gauging Date	Site Identification	TOC Elevation (mAHD)	Ground Surface Elevation (mAHD)	Total Measured Depth (mbTOC)	Depth to LNAPL (mbTOC)	Depth to Water (mbTOC)	LNAPL Thickness (m)	Corrected Depth to Water (mbgl)	Water Elevation (mAHD)	Comments
SMW_BH044	23/05/2018	Burwood	22.6	22.6	32.300	-	9.220	-	9.220	13.380	
SMW_BH044	18/01/2022	Burwood	22.6	22.6	-	-	-	-	-	-	Unable to be accessed, car parked over well (Note left on car, but no response)
SMW_BH046	24/08/2018	Burwood	6.47	6.47	16.000	-	11.000	-	11.000	-4.530	No odour
SMW_BH046	18/01/2022	Burwood	6.47	6.47	-	-	-	-	-	-	Lost/destroyed. Construction works likely paved over well
SMW_BH046_s	18/01/2022	Burwood	6.47	6.47	2.887	-	1.702	-	1.702	4.768	Data logger and tubing in well, no odour
S02_d	4/05/2021	The Bays	3	3.11	15.030	-	2.130	-	2.130	0.870	Sulphurous odour
S02_d	20/01/2022	The Bays	3	3.11	15.300	-	2.000	-	2.000	1.000	Data logger and tubing in well. Approx. 0.9m taken off well depth and water level due to TOC being elevated 0.9m from ground surface
S02_s	3/05/2021	The Bays	2.99	3.11	5.660	-	2.050	-	2.050	0.940	Excellent recharge
S02_s	20/01/2022	The Bays	2.99	3.11	-	-	-	-	-	-	Could not access (covered)
S06	3/05/2021	The Bays	3.04	3.13	20.440	-	2.152	-	2.152	0.888	
S06	20/01/2022	The Bays	3.04	3.13	21.229	-	2.225	-	2.225	0.815	Water in well, depth to surface changed, re-surveyed
S40_d	6/05/2021	The Bays	3.66	3.68	15.120	-	3.480	-	3.480	0.180	
S40_d	20/01/2022	The Bays	3.66	3.68	15.235	-	3.254	-	3.254	0.406	2x data loggers and tubing in well, no odour
S40_s	6/05/2021	The Bays	3.49	3.6	7.870	-	2.000	-	2.000	1.490	yellow/orange sediment present
S40_s	20/01/2022	The Bays	3.49	3.6	4.340	-	1.699	-	1.699	1.791	Data logger and tubing in well. No odour
S51	7/05/2021	The Bays	4.01	4.15	5.800	-	3.580	-	3.580	0.430	
S51	20/01/2022	The Bays	4.01	4.15	5.899	-	3.361	-	3.361	0.649	No odour
S54	5/05/2021	The Bays	3.53	3.59	16.610	-	3.020	-	3.020	0.510	Hydrocarbon odour
S54	20/01/2022	The Bays	3.53	3.59	16.898	-	3.065	-	3.065	0.465	Data logger and tubing in well. Organic odour
SMW_ENV021	17/12/2018	The Bays	3.09	3.09	14.300	-	2.130	-	2.130	0.960	No odour
SMW_ENV021	27/04/2020	The Bays	3.09	3.09	-	-	2.290	-	2.290	0.800	
SMW_ENV021	31/08/2020	The Bays	3.09	3.09	-	-	2.240	-	2.240	0.850	
SMW_ENV021	10/05/2021	The Bays	3.09	3.09	14.400	-	2.150	-	2.150	0.940	
SMW_ENV021	20/01/2022	The Bays	3.09	3.09	-	-	-	-	-	-	Could not be accessed due to construction works
SMW_ENV021_s	17/12/2018	The Bays	3.09	3.09	4.610	-	2.090	-	2.090	1.000	No odour
SMW_ENV021_s	22/01/2019	The Bays	3.09	3.09	-	-	2.210	-	2.210	0.880	
SMW_ENV021_s	27/04/2020	The Bays	3.09	3.09	-	-	2.260	-	2.260	0.830	
SMW_ENV021_s	31/08/2020	The Bays	3.09	3.09	-	-	2.200	-	2.200	0.890	
SMW_ENV021_s	10/05/2021	The Bays	3.09	3.09	4.580	-	2.110	-	2.110	0.980	
SMW_ENV021_s	20/01/2022	The Bays	3.09	3.09	-	-	-	-	-	-	Could not be accessed due to construction works
SMW_BH051	15/08/2018	Five Dock	21.68	21.68	10.500	-	2.800	-	2.800	18.880	
SMW_BH051	18/01/2022	Five Dock	21.68	21.68	10.615	-	2.258	-	2.258	19.422	Tubing and two data loggers. No odour
SMW_BH050	5/09/2018	Five Dock	24.34	24.34	25.100	-	12.200	-	12.200	12.140	No odour
SMW_BH050	17/01/2022	Five Dock	24.34	24.34	26.008	-	23.181	-	23.181	1.159	Data logger in well, no odour
SMW_BH050_s	5/09/2018	Five Dock	24.35	24.35	1.300	-	Dry	-	Dry	-	
SMW_BH050_s	17/01/2022	Five Dock	24.35	24.35	1.211	-	0.321	-	0.321	24.029	Data logger in well, no odour
SMW_BH051_s	15/08/2018	Five Dock	21.66	21.66	2.000	-	Dry	-	Dry	-	
SMW_BH051_s	18/01/2022	Five Dock	21.66	21.66	1.811	-	Dry	-	Dry	-	Data logger in well. Well dry
SMW_BH009	30/08/2018	North Strathfield	18.45	18.45	42.850	-	32.800	-	32.800	-14.350	



Table 3. Historical Groundwater Gauging Data
Baseline Groundwater Monitoring, January 2022
Sydney Metro West - 0628507

ID	Gauging Date	Site Identification	TOC Elevation (mAHD)	Ground Surface Elevation (mAHD)	Total Measured Depth (mbTOC)	Depth to LNAPL (mbTOC)	Depth to Water (mbTOC)	LNAPL Thickness (m)	Corrected Depth to Water (mbgl)	Water Elevation (mAHD)	Comments
SMW_BH009	18/01/2022	North Strathfield	18.45	18.45	33.230	-	30.581	-	30.581	-12.131	Data logger in well, no odour
SMW_BH009_s	8/08/2018	North Strathfield	18.6	18.6	4.900	-	3.900	-	3.900	14.700	
SMW_BH009_s	3/09/2018	North Strathfield	18.6	18.6	5.000	-	3.880	-	3.880	14.720	No odour
SMW_BH009_s	17/01/2022	North Strathfield	18.6	18.6	4.933	-	3.692	-	3.692	14.908	Water in casing, data logger and tubing in well. No odour
SMW_BH035	23/08/2018	North Strathfield	26.74	26.74	51.440	-	28.770	-	28.770	-2.030	
SMW_BH035	18/01/2022	North Strathfield	26.74	26.74	42.240	-	35.551	-	35.551	-8.811	Data logger in well
SMW_BH035_s	23/08/2018	North Strathfield	26.62	26.62	-	-	Dry	-	Dry	-	No depth provided by Golder (2018)
SMW_BH035_s	18/01/2022	North Strathfield	26.62	26.62	2.700	-	1.589	-	1.589	25.031	Data logger in well, no odour
SMW_BH038	31/08/2018	North Strathfield	9.91	9.91	30.500	-	13.500	-	13.500	-3.590	
SMW_BH038	17/01/2022	North Strathfield	9.91	9.91	25.210	-	12.658	-	12.658	-2.748	Data logger in well
SMW_BH015	24/08/2018	Sydney Olympic Park	22.94	22.94	29.300	-	14.440	-	14.440	8.500	
SMW_BH015	21/01/2022	Sydney Olympic Park	22.94	22.94	29.622	-	15.489	-	15.489	7.451	Data logger in well, no odour, minor silt on IP
SMW_BH015_s	24/08/2018	Sydney Olympic Park	22.02	22.02	3.900	-	3.900	-	3.900	18.120	Dry
SMW_BH015_s	21/01/2022	Sydney Olympic Park	22.02	22.02	2.579	-	Dry	-	Dry	-	Data logger in well, Dry
SMW_BH019	7/09/2018	Sydney Olympic Park	17.33	17.33	26.000	-	15.300	-	15.300	2.030	
SMW_BH019	19/01/2022	Sydney Olympic Park	17.33	17.33	26.365	-	14.452	-	14.452	2.878	Data logger, organic odour
SMW_BH120	12/09/2019	Sydney Olympic Park	17.38	17.38	19.900	-	16.960	-	16.960	0.420	No odour
SMW_BH120	19/03/2020	Sydney Olympic Park	17.38	17.38	-	-	17.070	-			
SMW_BH120	2/09/2020	Sydney Olympic Park	17.38	17.38	-	-	17.000	-			
SMW_BH120	4/10/2020	Sydney Olympic Park	17.38	17.38	-	-	17.250	-			
SMW_BH120	19/01/2022	Sydney Olympic Park	17.38	17.38	22.034	-	16.943	-	16.943	0.437	Data logger, organic odour
SMW_BH168_s	24/08/2018	Sydney Olympic Park	23.36	23.36	3.700	-	3.700	-	3.700	19.660	No odour
SMW_BH168_s	21/01/2022	Sydney Olympic Park	23.36	23.36	3.680	-	Dry	-	Dry	-	Data logger, tubing in well. Dry, no odour
SMW_BH040	21/08/2018	Tunnel - NS to B	23.06	23.06	60.000	-	25.240	-	25.240	-2.180	
SMW_BH040	18/01/2022	Tunnel - NS to B	23.06	23.06	50+	-	24.010	-	24.010	-0.950	Data logger in well, one bolt missing, depth of well greater than IP length. No odour

Notes:

mAHD metres Australian Height Datum
mbgl metres below ground level
mbTOC metres below top of casing
m metres
pre pre purging

Table 4. Groundwater Metals and Inorganics Analytical Results
Sydney Metro West - 0628570

EQ1	ANZG (2018) Marine Water - Slightly to moderately disturbed ecosystems		NHMRC (2008) Recommended Recreational Guidelines - Aesthetic		NHMRC (2008) Recommended Recreational Guidelines - Health	
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Alkalinity	Hydroxide Alkalinity (as CaCO ₃)	1	1			
	Total Alkalinity (as CaCO ₃)	1	1			
	Sulfate as SO ₄ - Turbidimetric (Filtered)	1	1			
	Cadmium (Filtered)	1	1			
	Chloride	1	1			
Major Ions	Magnesium (Filtered)	1	1			
	Cobaltum (Filtered)	1	1			
	Sodium (Filtered)	1	1			
	Anions Total	mg/L	0.01			
	Cations Total	mg/L	0.01			
	% Ion Balance		0.01			
	Total Dissolved Solids	mg/L	10			
	Ammonia (as N)	mg/L	0.01			
	Nitrate (as N)	mg/L	0.01			
	Nitrite (as N)	mg/L	0.01			
Inorganics	Total Kjeldahl Nitrogen	mg/L	0.1			
	Phosphorus (as P)	mg/L	100			
	Nitrogen (Total)	mg/L	1			
	Arsenic	mg/L	1			
	Arsenic (Filtered)	mg/L	1			
	Cadmium	mg/L	0.1			
	Cadmium (Filtered)	mg/L	0.1			
	Chromium	mg/L	1			
	Chromium (Filtered)	mg/L	1			
	Copper	mg/L	1			
Metals	Copper (Filtered)	mg/L	1			
	Iron	mg/L	50			
	Iron (Filtered)	mg/L	50			
	Lead	mg/L	1			
	Lead (Filtered)	mg/L	1			
	Mercury	mg/L	0.1			
	Mercury (Filtered)	mg/L	0.1			
	Mercury (Filtered)	mg/L	0.1			
	Mercury (Filtered)	mg/L	0.1			
	Mercury (Filtered)	mg/L	0.1			

LocoCode	Field ID	Sample Type	Sample Date/Time	SNW_BH125	BUR_BH125	BUR_MM108	SNW_BH019	SNW_BH019	SNW_BH019	SNW_BH035	SNW_BH035	SNW_BH035	SNW_BH035	SNW_BH038	SNW_BH051	SNW_BH120	SNW_BH120
<5	4	<0.1	-	4	<0.1	-	28	<0.1	2	2	2	2	2	2	2	2	2
15	28	<0.1	-	28	<0.1	-	28	<0.1	2	2	2	2	2	2	2	2	2
<5	506	Normal	20/07/2022	506	Normal	20/07/2022	506	Normal	20/07/2022	506	Normal	20/07/2022	506	Normal	20/07/2022	506	Normal
<5	502_d	Normal	20/07/2022	502_d	Normal	20/07/2022	502_d	Normal	20/07/2022	502_d	Normal	20/07/2022	502_d	Normal	20/07/2022	502_d	Normal
<5	506	Normal	20/07/2022	506	Normal	20/07/2022	506	Normal	20/07/2022	506	Normal	20/07/2022	506	Normal	20/07/2022	506	Normal
<5	540_d	Normal	20/07/2022	540_d	Normal	20/07/2022	540_d	Normal	20/07/2022	540_d	Normal	20/07/2022	540_d	Normal	20/07/2022	540_d	Normal
<5	551	Normal	20/07/2022	551	Normal	20/07/2022	551	Normal	20/07/2022	551	Normal	20/07/2022	551	Normal	20/07/2022	551	Normal
<5	554	Normal	20/07/2022	554	Normal	20/07/2022	554	Normal	20/07/2022	554	Normal	20/07/2022	554	Normal	20/07/2022	554	Normal
13	Field_D	Field_D	19/07/2022	Field_D	Field_D	19/07/2022	Field_D	Field_D	19/07/2022	Field_D	Field_D	19/07/2022	Field_D	Field_D	19/07/2022	Field_D	Field_D
14	DO1_220119	Normal	19/07/2022	DO1_220119	Normal	19/07/2022	DO1_220119	Normal	19/07/2022	DO1_220119	Normal	19/07/2022	DO1_220119	Normal	19/07/2022	DO1_220119	Normal
14	InterLab_D	InterLab_D	19/07/2022	InterLab_D	InterLab_D	19/07/2022	InterLab_D	InterLab_D	19/07/2022	InterLab_D	InterLab_D	19/07/2022	InterLab_D	InterLab_D	19/07/2022	InterLab_D	InterLab_D
30	568	Normal	18/01/2022	568	Normal	18/01/2022	568	Normal	18/01/2022	568	Normal	18/01/2022	568	Normal	18/01/2022	568	Normal
456	131	Normal	18/01/2022	131	Normal	18/01/2022	131	Normal	18/01/2022	131	Normal	18/01/2022	131	Normal	18/01/2022	131	Normal
<5	163	Normal	18/01/2022	163	Normal	18/01/2022	163	Normal	18/01/2022	163	Normal	18/01/2022	163	Normal	18/01/2022	163	Normal
<5	149	Normal	18/01/2022	149	Normal	18/01/2022	149	Normal	18/01/2022	149	Normal	18/01/2022	149	Normal	18/01/2022	149	Normal
<5	673	Normal	19/01/2022	673	Normal	19/01/2022	673	Normal	19/01/2022	673	Normal	19/01/2022	673	Normal	19/01/2022	673	Normal

Statistical Summary																	
15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Number of Results	2	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Number of Detects	2	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Minimum Concentration	<1	59	1	4	44	<1	9	35	6.78	6.41	0.06	446	446	0.04	0.04	0.04	0.04
Maximum Detect	88	59	1	4	44	2	9	35	6.78	6.41	0.06	446	446	0.04	0.04	0.04	0.04
Maximum Concentration	163	858	680	509	810	474	90	3640	244	214	9.87	15000	15000	5.59	0.46	1.01	1.01
Average Concentration	18	400	255	182	3063	179	90	4.5	57.8	3.75	3.3	6194	4260	0.64	0.04	0.04	0.04
Median Concentration	47	294	229	168	2992	181	24	1235	86	75	3.3	5051	4260	0.64	0.04	0.04	0.04
Standard Deviation	47	294	229	168	2992	181	24	1235	86	75	3.3	5051	4260	0.64	0.04	0.04	0.04
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances (Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

#1: Apply LOSF 95
#2: Apply LOSF 95
#3: NHMRC (2011) Drinking Water Guidelines (2016) Aesthetic
#4: Health Canada (2014) Guidelines for Canadian Drinking Water Quality
#5: NHMRC (2011) Drinking Water Guidelines (2016) Health
#6: WHO (2011) Drinking Water Quality

[illegible][illegible]

T5_W_HC SVOC_220207.xlsm , 25/03/2022

Err	Sids	Comments
#1:Apply	LOSP 99	
#2:Apply	Freshwater LOSP Unknown	
#3:Apply	LOSP 95	
#4:Apply	Freshwater DQG (LOSP Unknown)	
#5:Apply	LOSP Unknown	
#6:Apply	(2011) Drinking Water Guidelines for Water Recycling - Drinking Water	
#7:Apply	(2008) Australian Guidelines for Water Recycling - Aesthetic	
#8:Apply	(2011) Drinking Water Guidelines (2016) Health	
#9:US EPA (2012)	Health Advisors for Drinking Water Contaminants	
#10:California EPA (2016)	Public Health Goals for Drinking Water	
#11:WHO (2021)	Drinking Water Quality	
#12:WHO (2020)	Trichloroethylene in drinking water: background document	

#12:WHO (2020) Trichloethene in drinking-water: Background document
#11:WHO (2011) Drinking Water Quality
#10:California EPA (2014) Public Health Goals for Drinking Water
#9:US EPA (2012) Health Advisories for Drinking Water Contaminants
#8:NMHRC (2011) Drinking Water guidelines (2015) Health
#7:PMHC (2008) Australian Guidelines for Water Recycling - Drinking Water
#6:PMHC (2011) Drinking Water guidelines (2015) aesthetic

Sydney Metro West - 0628570

[illegible]

s [2016] Health
Water Recycling - Drinking Water
Drinking Water Contaminants

Appendix K: **Long Term Environmental Management Plan**



Long Term Environmental Management Plan

The Bays Construction Site – Portion
1B and 1C, Sydney Metro West: Central
Tunnelling Package

PREPARED FOR



Acciona Construction Pty Ltd &
Ferrovia Construction Pty Ltd Joint
Venture

DATE
30 August 2024

REFERENCE
0628507



DOCUMENT DETAILS

DOCUMENT TITLE	Long Term Environmental Management Plan
DOCUMENT SUBTITLE	The Bays Construction Site – Portion 1B and 1C, Sydney Metro West: Central Tunnelling Package
PROJECT NUMBER	0628507
Date	30 August 2024
Version	Final
Author	Madushani Bolonghe, Joe Ferring
Client name	Acciona Construction Pty Ltd & Ferrovial Construction Pty Ltd Joint Venture

DOCUMENT HISTORY

				ERM APPROVAL TO ISSUE		
VERSION	REVISION	AUTHOR	REVIEWED BY	NAME	DATE	COMMENTS
Draft	00	Madushani Bolonghe, Joe Ferring	Peter Lavelle, CEnvP SC	Ashton Hincksman	10.05.2024	Draft for review
Final Draft	01	Madushani Bolonghe, Joe Ferring	Peter Lavelle, CEnvP SC	Ashton Hincksman	24.05.2024	For Auditor review
Final	02	Madushani Bolonghe, Joe Ferring	Peter Lavelle, CEnvP SC	Ashton Hincksman	30.08.2024	Final following comments (Auditor, Metro, IC)

SIGNATURE PAGE

Long Term Environmental Management Plan

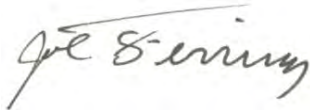
The Bays Construction Site – Portion 1B and 1C, Sydney Metro West:
Central Tunnelling Package
0628507



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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
ACM	Asbestos Containing Material
AFJV	Acciona Construction Pty Ltd and Ferrovial Construction Pty Ltd
AF	Asbestos Fines
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
bgl	Below ground level
ENM	Excavated Natural Material
EPA	Environment Protection Authority
ERM	Environmental Resources Management Australia Pty Ltd
COPC	Contaminant of Potential Concern
FA	Fibrous Asbestos
HIL	Health Investigation Level
HSL	Health Screening Level
LTEMP	Long Term Environmental Management Plan
NEPC	National Environment Protection Council
NOHSC	National Occupational Health and Safety Commission
NSW	New South Wales
PAH	Polycyclic Aromatic Hydrocarbons
PANSW	Port Authority of NSW
PFAS	Per- and Polyfluoroalkyl Substances
PMNSW	Place Management NSW
PPE	Personal Protective Equipment
RAP	Remediation Action Plan
SEPP	State Environmental Planning Policy
TDS	Total Dissolved Solids
TEQ	Toxicity Equivalency Quotient
TRH	Total Recoverable Hydrocarbons
VENM	Virgin Excavated Natural Material

1. INTRODUCTION

1.1 GENERAL

Environmental Resources Management Australia Pty Ltd (ERM) was engaged by Acciona Construction Pty Ltd and Ferrovial Construction Pty Ltd (together "AFJV") to prepare a Long-Term Environmental Management Plan (LTEMP) to manage the risk of potential exposure to, or release of, chemical and asbestos contaminated soils contained beneath a capping layer within Portion 1B and 1C of The Bays Construction Site (referred to herein as "Portion 1B & 1C"). Portion 1B & 1C form part of the Central Tunnelling Package for the Sydney Metro West extension and are located within the White Bay industrial area adjacent to the former White Bay Power Station in Rozelle, NSW.

Portion 1B & 1C comprises land that will form The Bays Metro station (referred to as the Station Box area within this document), as well as land used for construction support which will be redeveloped in future stages of the White Bay Power Station precinct redevelopment (referred to as development land within this document). As soils are to be removed from the Station Box area, this LTEMP is for the development land only, i.e. the area within Portion 1B & 1C excluding the footprint of the Station Box. The Station Box is managed under the *Contaminated Soil Management Plan (CSMP), Station Box for the Bays Construction Site, Sydney Metro West: Central Tunnelling Package*, 25 August 2022 (ERM, 2022d).

This LTEMP is required due to the implementation of a 'Cap and Contain' remediation strategy utilised to contain known and potential chemical and asbestos contaminated fill material that will remain at much of Portion 1B & 1C (i.e. the development land – the whole site area excluding the Station Box footprint). A geotextile marker layer and/or an overlying capping layer were placed at the surface of Portion 1B & 1C in order to isolate contaminated soils and remove exposure pathways for future users. Capping works were undertaken in accordance with the strategy presented in *Remediation Action Plan, The Bays Construction Site, Sydney Metro West: Central Tunnelling Package* (ERM, 2022a).

1.2 OBJECTIVE

The primary objective of this LTEMP is to protect the health of site users by ensuring maintenance of the capping and barrier layers to prevent exposure to contaminants in the soil. Specifically, this LTEMP aims to:

- Detail the sub-surface conditions of Portion 1B & 1C;
- Detail the surface conditions of Portion 1B & 1C;
- Assign responsibilities for implementation of the LTEMP;
- Protect the health of site users by ensuring maintenance of the capping and barrier layers; and
- Protect the health of site users if Portion 1B & 1C surfaces are disturbed by works.

The LTEMP is to be submitted to all contractors involved with any works within Portion 1B & 1C which have the potential to impact the integrity of the capping layer and/or come into direct contact with the underlying contaminated fill.

2. SITE SETTING

2.1 SITE DESCRIPTION AND IDENTIFICATION

Portion 1B & 1C of The Bays Construction Site is located within the White Bay industrial area, adjacent to the former White Bay Power Station in Rozelle, New South Wales. Sydney Metro has licensed approximately 5.6 hectares of The Bays Construction Site from the Port Authority of NSW (PANSW) and a smaller portion of land (around 0.7 ha) from Place Management NSW (PMNSW) for the construction of The Bays Station of Sydney Metro West. Site identification details are summarised in **Table 2-1**.

TABLE 2-1 SITE IDENTIFICATION

ITEM	DESCRIPTION
Site Name	Portion 1B & 1C of The Bays Construction Site
Site Address	Robert Street, Rozelle, 2039
Property Identification	Part Lot 10 DP 1288503 Part Lots 381 & 382 DP 1277236 Part Lot 2 DP 879549
Environmental Plan	Sydney Regional Environmental Plan No. 26 – City West
Current Land Use	Construction area adjacent to former White Bay Power Station

The location and layout of The Bays Construction Site and Portion 1B & 1C are presented in **Figure 1, Appendix A**. The Bays Construction Site is an irregular shape, divided into two main sections:

- The broader site area that will be used as a construction support zone during The Bays Metro Station construction; and
- The Station Box area where spoil will be excavated for the construction of The Bays Metro Station.

Portion 1B & 1C comprises the northern section of The Bays Construction Site and excludes the Station Box.

2.2 CONTAMINATION STATUS

A review of historical information and previous investigations undertaken has indicated that The Bays Construction Site, including Portion 1B & 1C, has primarily been used for commercial/industrial purposes including use as a dock, coal storage and processing, railways, ash handling and storage. Substantial filling of The Bays Construction Site, including Portion 1B & 1C, has been reported including prior to the construction of the White Bay Power Station, during the construction of the ANZAC Bridge, and for land reclamation.

The analytical results of previous investigations completed at The Bays Construction Site, including Portion 1B & 1C, are summarised in the following sections.

Depths of fill were reported in previous investigations as ranging from 4.2 metres below ground level (m bgl) (JBS&G, 2017a and 2017b) to 11 m bgl (Senversa, 2021). Given that previous investigations identified asbestos in fill materials in several locations across The Bays Construction Site, including Portion 1B & 1C, for the purposes of implementing this LTEMP, it must be assumed that all fill materials have the potential to contain asbestos.

2.2.1 SOILS

Soil contamination within The Bays Construction Site which was considered to present a potential human health risk under the proposed future land use (i.e. consistent with 'Commercial / Industrial D' in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 [ASC NEPM]) is summarised in **Table 2-2** and the locations exceeding relevant screening criteria are presented on **Figure 2a** and **Figure 2b, Appendix A**.

Some previous investigation locations were completed in areas outside of Portion 1B & 1C, but the entire dataset summary has been included here for completeness since conditions within Portion 1B & 1C are expected to be similar to other areas across The Bays Construction Site.

TABLE 2-2 SUMMARY OF SOIL SCREENING CRITERIA EXCEEDANCES

Sample ID	Sample Depth (m bgl)	Contaminant of Potential Concern (COPC)	Concentration (mg/kg)	Concentration (mg/kg) Exceeded Guideline
WB4_1.9-2.0	1.9 - 2.4	Lead	1500	HIL-D
C29-0.0-0.1	0.0 - 0.1	Asbestos (ACM) (bonded)	0.0983 *	HIL-D
E20_1.8-1.9	1.8 - 1.9	Benzo(a)pyrene Toxicity Equivalency Quotient (TEQ)	99	HSL-D
		Total recoverable hydrocarbons (TRH) C16-C34	6100	Management Limit (commercial / industrial)
E25_2.0-2.1	2.0 - 2.1	Benzene	4.6	HSL-D
E49_0.5-0.6	0.5 - 0.6	Asbestos (AF / FA)	0.0186 *	HIL-D
E51_0.9-1.0	0.9 - 1.0	Asbestos (AF / FA)	0.0015 *	HIL-D
E64_3.0-3.1	3.0 - 3.1	Benzo(a)pyrene TEQ	150	HIL-D
S31_1.8-2.2	1.8 - 2.2	Benzene	3.4	HSL-D
		TRH less benzene, toluene, ethylbenzene and xylenes (BTEX)	463	HSL-D
ERM_BH05_1.7	1.7 - 1.8	Benzo(a)pyrene TEQ	44.8	HSL-D

* concentration in %w/w

HIL: Health Investigation Level

HSL: Health Screening Level

An inspection of the area surrounding historical investigation location C29, where asbestos in the form of bonded ACM was historically identified, was undertaken by ADE in August 2024 and reported in *Asbestos Materials Clearance Report, the Bays Station, Port Access Road, Rozelle, NSW* (ADE, 2024). This report concluded:

"Based on the information presented in this report, ADE considers that the inspected surface soils within the subject area is free from bonded ACM."

The following limitation was also noted by ADE in this report:

“The LAA [Licensed Asbestos Assessor] was only able to conduct a limited visual inspection of the surface soils in areas where no obstructions (e.g. construction materials) were present and where thick vegetation was not present within the subject area. It is advised that caution be applied if further excavation or ground disturbance activities are undertaken within the subject area.”

Hydrocarbons (benzene and TRH less BTEX) exceeding the HSL-D criteria were further assessed within *Detailed Site Investigation Addendum – Outside Station Box, the Bays Construction Site, Sydney Metro West, Central Tunnelling Package* (ERM, 2022c), which included a risk assessment of the potential vapour intrusion risks from the residual soil impact to future indoor workers within the proposed land use. The proposed land use is commercial / industrial outside the Station Box development following the completion of Sydney Metro Construction works. It was concluded that potential non-carcinogenic risks and carcinogenic risks are unlikely for future commercial / industrial users.

It is noted that several soil samples reported COPCs at concentrations exceeding the adopted ecological investigation and screening levels. However, given that the majority of The Bays Construction Site, including Portion 1B & 1C, was to be covered in hardstand, the risk posed to ecological receptors is considered low and remediation and management of the impacts are not considered necessary.

2.2.2 GROUNDWATER

The historical investigation data indicated that various metals (cadmium, cobalt, copper, lead, manganese, mercury, nickel and zinc), per- and polyfluoroalkyl substances (PFAS), isopropylbenzene and TRH were detected in groundwater at concentrations exceeding ecological criteria at some locations. Total Dissolved Solids (TDS) and iron concentrations also exceeded the recreational guideline value at some locations. PFAS concentrations above the adopted human health recreational guideline were detected in one groundwater sample (C64, located in the south-western corner of the Bays Construction Site).

As noted in the RAP (ERM, 2022a), once the capping layer is in place, the likelihood for migration of shallow soil contamination to groundwater or surface water is significantly reduced. The RAP (ERM, 2022a) also stated that in consideration of the nature of the proposed development and associated construction works, as well as the likely sources and distribution of groundwater contamination underlying the Site, active remediation of groundwater impacts was not considered necessary. Rather, management of groundwater inflow (within excavations) through a program of dewatering and on-site treatment prior to discharge was considered the most feasible and effective approach.

2.2.3 SOIL VAPOUR

Soil vapour was sampled at several locations by JBS&G (2017a and 2017b) and soil vapour concentrations did not exceed the adopted commercial-industrial screening levels.

2.2.4 POTENTIALLY COMPLETE SOURCE-PATHWAY-RECEPTOR LINKAGES

Assessment of the potential for risk from exposure pathways to human health and the environment was completed as part of *Detailed Site Investigation, The Bays Construction Site, Sydney Metro West; Central Tunnelling Package* (ERM, 2022b) and *Detailed Site Investigation Addendum – Outside Station Box, the Bays Construction Site, Sydney Metro West, Central Tunnelling Package* (ERM, 2022c). The following potentially complete source-pathway linkages were identified at The Bays Construction Site, including Portion 1B & 1C:

- Lead and benzo(a)pyrene concentrations in soil in some locations could present a human health risk for construction workers via direct contact with soil;
- Asbestos (ACM and asbestos fines) in some soil samples represent conditions that could present a human health risk to construction workers via inhalation of dust;
- Total Recoverable hydrocarbons in soil in one sample represent conditions that could present a human health risk via exposure to flammable material;
- Groundwater conditions could present a human health risk to future construction workers and recreational users of white bay via direct contact/ingestion of groundwater;
- Dissolved metals in soil could present an environmental risk to aquatic organisms via direct contact/ingestion of groundwater; and
- Dissolved metals in soil could present an environmental risk to aquatic organisms via direct contact/ingestion of groundwater.

2.3 REMEDIATION STRATEGY

Remediation was deemed necessary to render The Bays Construction Site, including Portion 1B & 1C, suitable for use and a 'Cap and Contain' remedial strategy has been implemented whereby contaminated fill materials underlying Portion 1B & 1C are capped in-situ by an impervious barrier. The strategy enables Portion 1B & 1C to be suitable for the planned commercial/industrial use, subject to implementation of a LTEMP (i.e., this document).

2.4 REGULATORY FRAMEWORK

Legislation relevant to the current conditions in the vicinity of the capped areas, and future potential intrusive works, are summarised in **Table 2-3**.

TABLE 2-3 APPLICABLE LEGISLATION

Legislation
Work Health and Safety Act 2011 and associated regulations
Occupational Health and Safety Regulation 2011
Waste Avoidance and Recovery Act 2011
State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP)
National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC, 2013)
Managing asbestos in or on soil (WorkCover NSW, 2014)
How to Safely Remove Asbestos Code of Practice (SafeWork NSW, 2022)
Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018 (2005)]
Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC:3003 (2005)]

3. SURFACE CONDITIONS

The capping layer prevents access to the underlying soil at Portion 1B & 1C with the exception of the areas around the periphery shown in **Figure 3b, Appendix A**.

Of the areas where capping was not installed, there are two sections where residual contamination is present which needs to be managed under this LTEMP (refer to **Figure 3b, Appendix A**):

- The area surrounding historical investigation location C29 where bonded asbestos fragments were identified near the ground surface; and
- The area surrounding historical investigation location E64 where PAHs (as benzo(a)pyrene TEQ) impact is present at a depth of 3-3.1 m bgl exceeding HIL-D (commercial/industrial land use).

The management requirements for the capped areas, as well as the two uncapped areas above, are set out in the remainder of this LTEMP.

The capping design is detailed in **Table 3-1** below.

TABLE 3-1 CAPPING LAYER DETAILS

Location	Capping Layer Specification
Permanent paved areas	Permanent paving with a minimum thickness of 100 mm overlying a white non-woven geotextile marker layer. Chemical and asbestos impacted soil is present immediately below the marker layer.
New services	Where services interact with the capping layers, a minimum soil cover thickness of 100 mm was maintained below the total depth of the services. A white non-woven geotextile marker layer was placed within the trenches prior to installation of the services and backfilling with 'clean' materials. A minimum capping thickness of 100 mm was installed. Chemical and asbestos impacted soil is present immediately below the marker layer.
Site levelling (filling)	Where filling of Portion 1B & 1C was required to raise surface elevation, validated tunneling spoil was placed on top of the marker layer. Site-sourced materials were classified for reuse on-site to raise surface elevations, with the marker layer being placed over the site-sourced material.
Asphalt/concrete as a marker layer	Where asphalt/concrete was in place and fill/capping is placed above, the original asphalt/capping was considered to be an appropriate barrier and acted as a marker layer (i.e., no additional marker layer was required).

Figure 3a, Appendix A shows the extent of the marker layer (existing hardstand and installed geofabric) across Portion 1B & 1C. **Figure 3b, Appendix A** shows the areas of Portion 1B & 1C where each type of capping layer (concrete pavement or stabilised 20 mm Densely Graded Base [DGB20]) was installed. The surveyed capping layer thickness and depth from ground surface to the marker layer is provided as **Appendix C**. At the time this LTEMP was prepared, no additional material had been placed above the capping layer.

It is noted that the Station Box is excluded from the marker layer and capping strategy.

4. DISTURBANCE OF CAPPING LAYER, BELOW MARKER LAYER AND THE AREAS SURROUNDING HISTORICAL INVESTIGATION LOCATIONS C29 AND E64

General usage of Portion 1B & 1C by the public or workers is unlikely to pose a risk to the integrity of the capping layer due to the nature and thickness of the capping material.

4.1 ACCESS RESTRICTION SURROUNDING HISTORICAL INVESTIGATION LOCATIONS C29 AND E64

To ensure that the potential contamination risks posed by the areas surrounding historical investigation locations C29 (bonded asbestos near the ground surface) and E64 (PAHs at a depth of 3.0 – 3.1 m bgl) are appropriately managed, the following controls should be implemented in the event that works will be conducted in the immediate vicinity of either location:

- The area surrounding historical investigation location C29 should be fenced or cordoned off, and access to the area should be restricted. Appropriate signage should be displayed, indicating restricted access. If any works are to be carried out in this area, the controls set out in **Section 4.3** of this LTEMP should be implemented.
- The area surrounding historical investigation location E64 should be marked out with flagging and appropriate signage indicating contamination status and depth. If any intrusive works are to be carried out in this area, the controls set out in **Section 4.3** of this LTEMP should be implemented.

These areas are presented on **Figure 3b, Appendix A**.

4.2 DISTURBANCE OF CAPPING LAYER

Works requiring excavation into the capping layer should be avoided where possible to minimise cap disturbance. In the case intrusive works within the cap are unavoidable, the cap should be reinstated per **Section 5.3**.

4.3 WORKS BELOW MARKER LAYER AND AREAS SURROUNDING HISTORICAL INVESTIGATION LOCATIONS C29 AND E64

Works requiring excavation below the marker layer should be avoided where possible. Access restrictions and management controls for the areas surrounding historical investigation locations C29 and E64 have been detailed in **Section 4.1** of this LTEMP.

In the case that intrusive works below the marker layer are unavoidable, or where work is required within the residual contaminated areas surrounding historical investigation locations C29 and E64 (refer to **Figure 3b, Appendix A**), a task-specific Construction Environmental Management Plan must be prepared prior to the commencement of works. As a minimum, the plan should include the following:

- Environmental controls including sediment and erosion controls;
- Safety controls including personal protective equipment, asbestos air monitoring (refer to **Section 6** of this LTEMP), decontamination, licences and approvals;
- Controls for stockpiling of soils;

- Waste management requirements;
- Subsurface reinstatement and validation requirements;
- Decontamination measures (minimum decontamination requirements have been provided as **Appendix E**Error! Reference source not found.);
- Training requirements;
- Contractor management; and
- Reporting requirements.

Further, in the case that further redevelopment of Portion 1B & 1C is to be carried out in the future, a Remediation Action Plan would be required to appropriately manage the contaminated fill material underlying the cap and the residual contaminated areas surrounding historical investigation locations C29 and E64.

5. INSPECTION AND MANAGEMENT

5.1 OVERVIEW

The LTEMP will be implemented by the Portion 1B & 1C owner / manager, or designated representative, for any intrusive works carried out on-site that have the potential to disturb the capping layer including, but not limited to:

- Bulk excavation works;
- Installation and maintenance of services (trenching); and
- Landscaping.

Given that previous investigations identified asbestos in fill materials in several locations across The Bays Construction Site, including Portion 1B & 1C, for the purposes of implementing this LTEMP, it must be assumed that all fill materials have the potential to contain asbestos. As such, maintenance works that involve ground disturbance beyond the capping and marker layers as well as the residual contaminated areas surrounding historical investigation locations C29 and E64 (refer to **Figure 3b, Appendix A**) must be carried out by a suitably qualified contractor, experienced in undertaking work on contaminated sites in accordance with an LTEMP under the supervision of an Occupational Hygienist / Licensed Asbestos Assessor.

Personal protection equipment (PPE) worn/used by workers at Portion 1B & 1C must include:

- disposable overalls;
- respiratory protection (P2 minimum);
- safety boots;
- hard hat; and
- enclosed cabin with recycled air conditioning (the above PPE is not required within an enclosed cabin).

5.2 INSPECTION OF CAPPING LAYER

To ensure that the structural integrity of the capping layer is sufficiently maintained to allow continued protection of human health, the following is required:

1. Initial inspection of the capping layer by an experienced environmental professional at the completion of the initial capping installation (following completion of all intrusive works). The inspection is to record a baseline for the capping layer by means of photographs and field notes;
2. Detailed visual inspection of the surface of the capping layer should be undertaken by a suitably competent person biannually (twice a year) for at least the first two years after its construction, or post major flood event, referencing the baseline data in order to identify the presence of:
 - Cracks or holes within the capping layer;
 - Subsidence of the capping layer; and/or
 - Any other damage to the capping layer that may affect the integrity.

A competent person in this case would be someone with experience in determining any variation to the integrity of the capping layer, and being able to identify degradation or the requirement of repair or remedial work to reinstate the cap.

Where no damage to the capping layer has been observed for a period of at least two years since its construction, the inspection frequency may be extended to annual (once a year) inspections. Where non-conformances are identified, biannual inspections will continue.

- Are the cracks and holes large enough that they may allow access to the underlying contaminated soils?
 - Has the capping layer subsided to a degree that may cause further cracking or damage to that allows access to the underlying contaminated soils?
 - If the damage is not addressed immediately, is it likely to result in an increased risk to the health of Portion 1B & 1C users over time?
3. Where the visual inspection has identified damage to the capping layer which is significant enough to present a potential risk to the health of Portion 1B & 1C users, repair/maintenance will be required. Requirements for the rectification of issues associated with damage to the capping layer would be provided by an appropriately qualified contractor.

Refer to **Appendix B** - Inspection and Maintenance Checklist.

5.3 MANAGEMENT DURING INTRUSIVE WORKS

Where earthworks extend beyond the marker layer, or within the residual contaminated areas surrounding historical investigation locations C29 and E64, the procedures detailed below are to be followed.

The surveyed capping layer thickness and depth from ground surface to the marker layer is provided as **Appendix C**. At the time this LTEMP was prepared, no additional material had been placed above the capping layer.

5.3.1 SOIL MANAGEMENT

Given the distribution of potentially contaminated fill material across Portion 1B & 1C, the controls below should be applied during all earthworks to mitigate risks associated with exposure to both asbestos and chemical contamination.

1. Due to the potential for asbestos to be present within fill soils:
 - a. an asbestos licensed contractor will be engaged to undertake excavation works beneath the capping layer or within the residual contaminated areas surrounding historical investigation locations C29 and E64; and
 - b. asbestos air monitoring will be undertaken on the boundary of the proposed works and nearest sensitive receptors to ensure adequate controls are in place to minimise dust generation by an Occupational Hygienist or Licensed Asbestos Assessor. Air monitors should be used with the subsequent report issued to the Portion 1B & 1C owner and the sub-contractors involved. Refer to **Section 6** of this LTEMP.
2. Prior to the commencement of excavations in any given area, an exclusion zone consistent with current legislated standards will be established which will include the installation of safety warning signs and barricade measures around the boundary of the excavation;

3. Potentially contaminated material will be excavated to the required depth. Excavated material will be stockpiled on plastic sheeting within a dedicated temporary storage area and:
 - a. classified for appropriate off-site disposal by a suitably qualified and experienced environmental professional in accordance with the Waste Classification Guidelines (NSW EPA, 2014); and/or
 - b. replaced back within the subsurface at the completion of works.

During works:

- The excavator operator and truck driver within enclosed cabs are to remain inside their vehicle during the loading operation. The air-conditioning is to be on 'recirculate' or switched off. If the cab is not enclosed, full PPE is to be worn;
 - Unauthorised access is to be prevented within the exclusion zone;
 - During the loading operation, the materials are to be wetted thoroughly;
 - Material inadvertently spilt on the ledges of the truck or truck sides are to be washed off prior to the truck leaving the area; and
 - On completion of the work the operators should move to the designated decontamination area.
4. At the completion of earthworks, a white non-woven polyester continuous filament or PET such as nonwoven geotextiles will be placed over the top of the contaminated soils, commensurate with the existing marker layer. This provides a barrier to underlying materials, thereby reducing potential exposure risks with the contained materials and allows for the reinstatement of the capping layer;
 5. At the completion of marker layer reinstatement, an Occupational Hygienist or Licensed Asbestos Assessor will conduct a visual clearance prior to non-asbestos qualified personal entering the work site. Following confirmation of a successful visual clearance from the Occupational Hygienist or Licensed Asbestos Assessor, the area can be accessed by non-asbestos qualified personnel;
 6. On completion of the required works, the excavation is to be backfilled with certified excavated natural material (ENM) / virgin excavated natural material (VENM), or subgrade road base materials consisting of natural quarried materials. The backfilled excavation will be sufficiently compacted to minimise the potential for subsidence and subsequent damage to the capping layer. Specifications for compaction should be obtained from a suitably qualified and experienced geotechnical engineer. The capping layer should be reinstated using an impervious concrete pavement or stabilised DGB20 (with 3-4% cement or Stabilment added) with a thickness of no less than 100 mm to match the original construction. The affected area should be surveyed following reinstatement to confirm the lateral extent and thickness of the capping layer; and
 7. An Occupational Hygienist, Licensed Asbestos Assessor and /or suitably qualified Environmental Consultant will undertake all required visual inspections, and air monitoring for airborne asbestos fibres (refer to **Section 6** of this LTEMP), during earthwork activities and associated works penetrating the containment layers.

It is noted that the horizontal boring activities associated with the Sydney Metro tunnel alignment - to be excavated beneath the extent of contaminated material at Portion 1B & 1C - are not considered to be a breach of the capping layer.

5.3.2 GROUNDWATER MANAGEMENT

In the case that groundwater is encountered during excavation works, management and off-site disposal of the groundwater will be carried out in accordance with the following:

- The water will be sampled to allow classification to facilitate appropriate off-site disposal;
- Appropriate erosion and sediment control measures will be implemented to minimise the potential for unauthorised discharge or runoff off-site;
- A license for discharge to stormwater will be sought from the local Council. If analysis indicates compliance with the relevant stormwater disposal criteria provided by the local Council, stormwater disposal can occur;
- In the event of non-compliance with Council criteria, a license to discharge to sewer as trade waste will be required from Sydney Water; and
- In the event of non-compliance with the Sydney Water criteria, the water will be pumped out and disposed off-site to an appropriately licensed wastewater treatment facility.

5.4 REINSTATEMENT OF CAPPING LAYER

All areas disturbed by the earthworks will be appropriately reinstated with ENM or VENM to fill excavations and capping layers will be reinstated using concrete pavement or stabilised DGB20 (with 3-4% cement or Stabilment added) with a thickness of no less than 100 mm to match the original construction as per **Section 5.3.1** of this LTEMP. Reinstatement of the capping layer does not require specialised supervision; however the affected areas are required to be surveyed following reinstatement.

For works within the residual contaminated areas surrounding historical investigation locations C29 and E64, control measures should be implemented at the completion of works to limit future contact with the contaminated materials in these areas. The control measures as a minimum should include the installation of a capping layer or similar suitable physical barrier:

- If capping layer is comprised of concrete or stabilised DGB, then a minimum of 100 mm thickness is required; or
- If capping layer is comprised of VENM or ENM, then a minimum of 200 mm thickness is required.

In the event that details of the capping layer have been altered (i.e. new service trenches extending past the capping layer need to be added to site drawings and survey details), this LTEMP may need to be updated with the details of the works undertaken on-site.

5.5 VALIDATION REQUIREMENTS

Should the marker layer be disturbed, validation works will be required post disturbance to certify that the marker and capping layers have been appropriately re-established (via placement of appropriately classified ENM or VENM) and no ongoing risk of exposure remains. Validation works will include a combination of one or more of the following strategies:

- Visual inspection of both the completed reinstatement of the marker layer and capping layer;
- Documentation of works completed to reinstate the marker and capping layers (i.e. a photographic record); and
- Surveying by a qualified and experienced contractor / surveyor to confirm cap thickness remains acceptable.

The preferred validation strategy / strategies will be determined and carried out by a suitably qualified Environmental Consultant.

5.6 DOCUMENTATION

At the completion of any works that have disturbed the marker layer and/or capping layer, the following information should be recorded to detail the earthworks carried out on-site :

- Date of earthworks;
- Area subject to earthworks, including a site plan;
- Purpose of the earthworks;
- Lateral and vertical extent of excavation;
- Soil disposal details; and
- Cap reinstatement specifics.

6. ASBESTOS AIR MONITORING

Where earthworks extend through the marker layer (disturbing underlying, potentially contaminated fill material) or works are undertaken within the residual contaminated areas surrounding historical investigation locations C29 and E64 (refer to **Figure 3b, Appendix A**), an asbestos air monitoring program as outlined below must be undertaken.

6.1 OVERVIEW

The Portion 1B & 1C owner / manager, or designated representative, and an Occupational Hygienist, Licensed Asbestos Assessor and /or suitably qualified Environmental Consultant will establish monitoring programs, as appropriate, to enable all activities undertaken in relation to asbestos comply with relevant exposure limits, standards and guidelines. Where disturbance of asbestos containing materials is expected to occur, a monitoring program will be implemented.

Monitoring requirements will include:

- daily airborne asbestos monitoring during all works; and
- final clearance monitoring within the works area following the completion of works.

Air monitoring is to be conducted during all earthworks that penetrate the marker layer and disturb the underlying contaminated soils. The number of monitors used will be dependent on the proposed works with a minimum of four sample pumps to be used based on an isolated/localised scenario. If the situation occurs where multiple intrusive works are occurring six air monitors will be located covering the perimeter of Portion 1B & 1C.

Environmental air monitoring will be undertaken daily as required by site works. The location of monitors will be based upon the most susceptible areas to airborne asbestos contamination and transportation or areas of higher risk, e.g. downwind of works, enclosure entry / exit etc.

Monitoring results will be reported to the Portion 1B & 1C owner / manager, or designated representative, within one day of the conclusion of the monitoring interval. Results are required to be readily available and accessible to all site workers, visitors and contractors and displayed in a prominent position.

6.2 AIRBORNE ASBESTOS CRITERIA

The risk associated with asbestos relates to the inhalation of airborne asbestos fibres. These fibres may be liberated by disturbance of the asbestos-containing material or dusts.

Airborne asbestos monitoring will be carried out using the only nationally recognised sampling and analytical methodology - the Membrane Filter Method for Estimating Airborne Asbestos Dust [NOHSC:3003 (2005)].

Once asbestos exposure levels are assessed, a level of action is to be taken in response to the recorded levels. These actions are listed below in **Table 6-1**.

TABLE 6-1 ACTION LEVELS

Measured Fibre Concentration (% of Exposure Standard)	Recommended Action
< 0.01 fibres / mL	No action necessary; maintain a low-level baseline air sampling program and Continue with Control Measures.
≥ 0.01 fibres / mL	1. Review Control Measures. 2. Ensure all PPE requirements and Decontamination practices are being complied with in the area. 3. Increase monitoring frequency, focusing on personal exposure monitoring and worker category assessment. Ensure personal exposures are maintained as low as practicable. Investigate workplace/work practices and control measures. Invoke agreed work and management procedures. Implement routine personal monitoring and auditing procedures.
Result ≥ 0.02 fibres m/L	1. Stop work in the affected area and investigate the cause of elevated results. 2. Designate area and take remedial action. Implement formal asbestos management procedures including cease work until such time as asbestos concentrations are acceptable.

It is important that the interpretation of these results is undertaken by an experienced person conversant with the Membrane Filter Method (NOHSC:3003, 2005) and its limitations. All results of air sampling must be recorded within a monitoring report and filed with the Portion 1B & 1C owner / manager.

Auditing procedures will be used as the primary technique to ensure that agreed work and management procedures and control measures are operating effectively. Auditing will be undertaken by both the Portion 1B & 1C owner / manager or designated representative, and by an Occupational Hygienist, Licensed Asbestos Assessor and /or suitably qualified Environmental Consultant. The auditing process will review all intrusive works undertaken in reference to the LTEMP prior, during and post works. Any items which do not conform to the LTEMP will be risk assessed and appropriate measures undertaken if required which will be reflected in an amended LTEMP.

7. MANAGEMENT AND REPORTING

7.1 HIERARCHY AND RESPONSIBILITY

Responsibility for the management and maintenance of the capping and marker layer will be assigned to the Portion 1B & 1C owner / manager, or designated representative. The Portion 1B & 1C owner / manager, or designated representative, would be the principal point of contact for all matters relating to works or maintenance issues affecting the capping layers. The Portion 1B & 1C owner / manager, or designated representative, would have the primary responsibility for arranging the regular inspection, maintenance and reporting of the capping layers.

It is the responsibility of the Portion 1B & 1C owner / manager, or designated representative that contractors and on-site staff are aware of the LTEMP and the requirements listed here within.

A summary of the key stakeholders is provided in **Table 7-1**.

TABLE 7-1 ROLES AND RESPONSIBILITIES

Role	Responsibilities
Portion 1B & 1C Owner / Manager (or designated representative)	• Implementation and monitoring of the LTEMP. • Provide all supervisory and management staff with an awareness and understanding of their responsibilities under this LTEMP. • Provide employees and contractors with the relevant environmental instruction in relation to the LTEMP and awareness and understanding of their obligations and duties. • Provide appropriate and adequate resources to allow effective implementation and maintenance of the LTEMP. • Provide appropriate and adequate resources to allow scheduled monitoring to be undertaken. • Arrange periodic reviews of the LTEMP.
Construction Contractor	• Be aware of and understand the contents of and the reason for implementing the elements of the LTEMP and ensure all personnel including subcontractors adhere to these requirements. • Provide personnel involved in the project, including subcontractors and visitors, with the appropriate environmental training required to provide them with awareness and understanding of their responsibilities under the LTEMP. • Carry out all work in accordance with the procedures outlined in the LTEMP. • Make sure that all environmental safeguards and precautions are in place and adhered to at all times at Portion 1B & 1C. • Arrange for survey of the final capping layer by qualified and experienced contractor / registered surveyor. • Ensure a Class A Licensed Contractor is engaged to supervise earthworks that extend below the marker layer.

Role	Responsibilities
Occupational Hygienist / Licensed Asbestos Assessor	- For any works that extend beyond the marker layer (disturbing the underlying contaminated soils) or where work is undertaken within the residual contaminated areas surrounding historical investigation locations C29 and E64 (refer to Figure 3b, Appendix A), an Occupational Hygienist / Licensed Asbestos Assessor will be consulted to supervise the works and to advise on management and methodology of works to be undertaken. Occupational Hygienist / Licensed Asbestos Assessor will oversee: - Airborne asbestos monitoring; - Asbestos clearance inspections and sampling; and - Provision of asbestos clearance reports following the completion of works below the marker layer.
Suitably Qualified Environmental Consultant	- Be aware of and understand the contents of and the reason for implementing the elements of the LTEMP. - Provide specialist environmental services where required. - Provide specialist advice to stakeholders where required.

The LTEMP will be registered on the Title deeds under the Conveyancing Act 1919 and Section 10.7 planning certificates. If there is a change of ownership of Portion 1B & 1C, the requirements of the LTEMP must be disclosed to future owners. The LTEMP document should form part of the sale contract information.

7.2 REVIEW OF THE LTEMP

In order to identify non-conformance, or partial conformance, with relevant legislation, an audit of the implementation of the LTEMP is required within the first 6 months. The audit should be carried out by an appropriately qualified contractor / consultant in conjunction with the Portion 1B & 1C owner / manager.

Any reported damage and the subsequent repairs undertaken on the capping layers should include a review of the LTEMP to ensure up to date information of the cap is maintained. Any works that require intrusive activities into underlying soils also require an appropriate amendment to this LTEMP to maintain the most current information about the cap within this document. Any changes to the structure of the capping layer should involve appropriate amendments to this LTEMP that reflect the works undertaken. The Portion 1B & 1C owner / manager, or designated representative, will be required to annually assess compliance with this LTEMP and document the outcome. Any deviations from the LTEMP or its requirements will also require documentation.

The Portion 1B & 1C owner / manager, or designated representative, will be required to annually assess the compliance of this LTEMP with relevant current legislation. Any amendments will require documentation.

7.3 DURATION OF THE LTEMP

This LTEMP is to be permanently enforced and will apply indefinitely until such time as a Site Audit Statement can be prepared by a NSW EPA accredited Site Auditor stating that the LTEMP is no longer required.

Future works may result in disturbance of the capping layer. In this case, the LTEMP will need to be updated to include relevant information related to any changed site condition and as-built plans to enable the long-term management of Portion 1B & 1C.

Any amendment of the LTEMP require approval from a NSW EPA accredited Site Auditor.

7.4 NON-COMPLIANCE WITH LTEMP

The following flow chart regarding non-compliance with the LTEMP will be adopted:

LTEMP Non-compliance Identified



Notify Portion 1B & 1C Owner / Manager / Representative

Notify all non-compliance incidents to the Portion 1B & 1C Owner / Manager, or designated representative. Ensure subcontractors are advised of notification requirements.



Establish Immediate Priorities

Assess which component of the non-compliance incident needs to be controlled first



Investigate and Implement Corrective Action

Conduct non-compliance incident investigation in consultation with appropriate personnel.

Implement any corrective action.



Incident Reporting

Document non-compliance as required.

Update LTEMP with additional procedures as required to minimise the potential for non-compliance to re-occur.

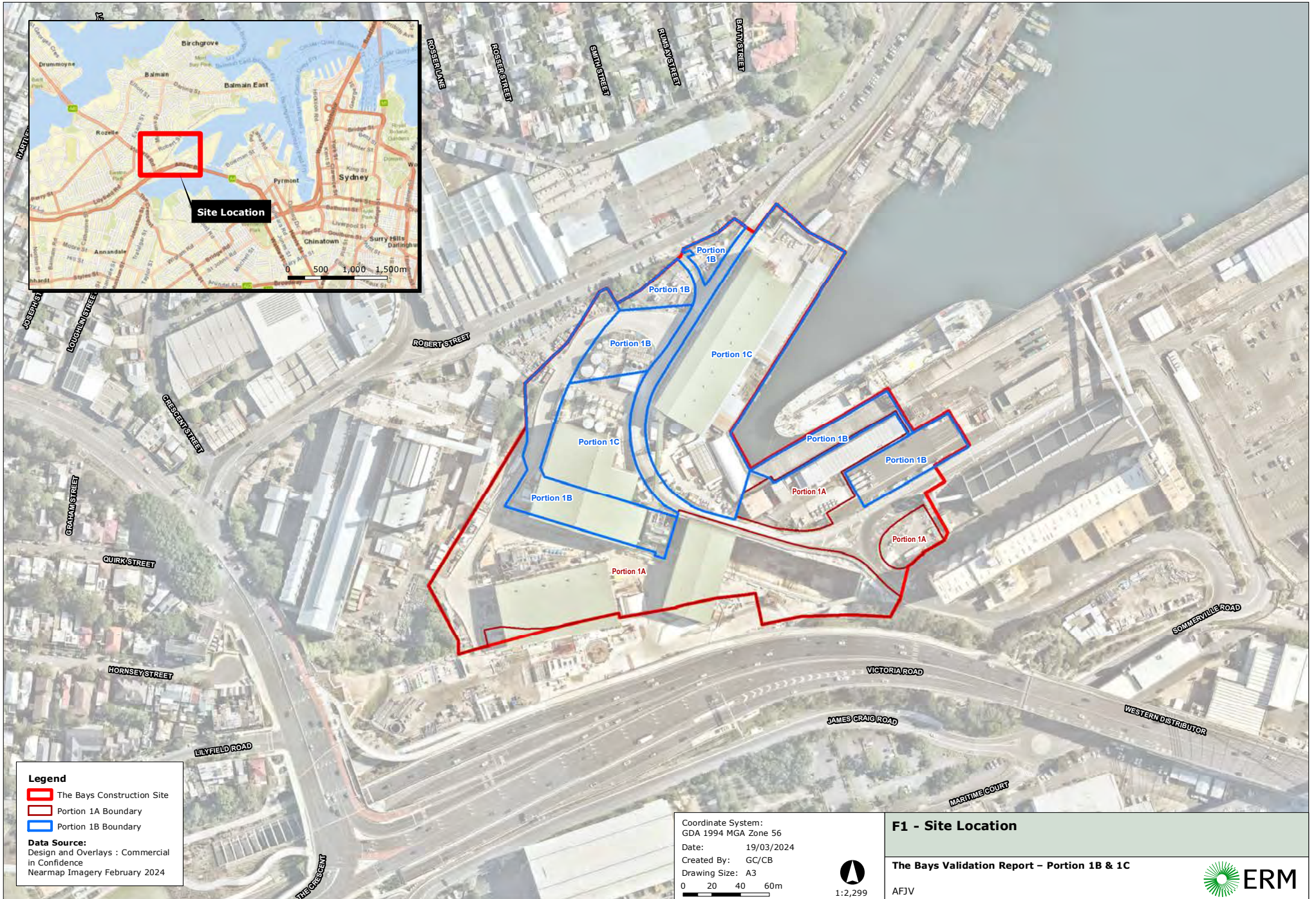
Site Auditor review / endorsement of revised LTEMP.

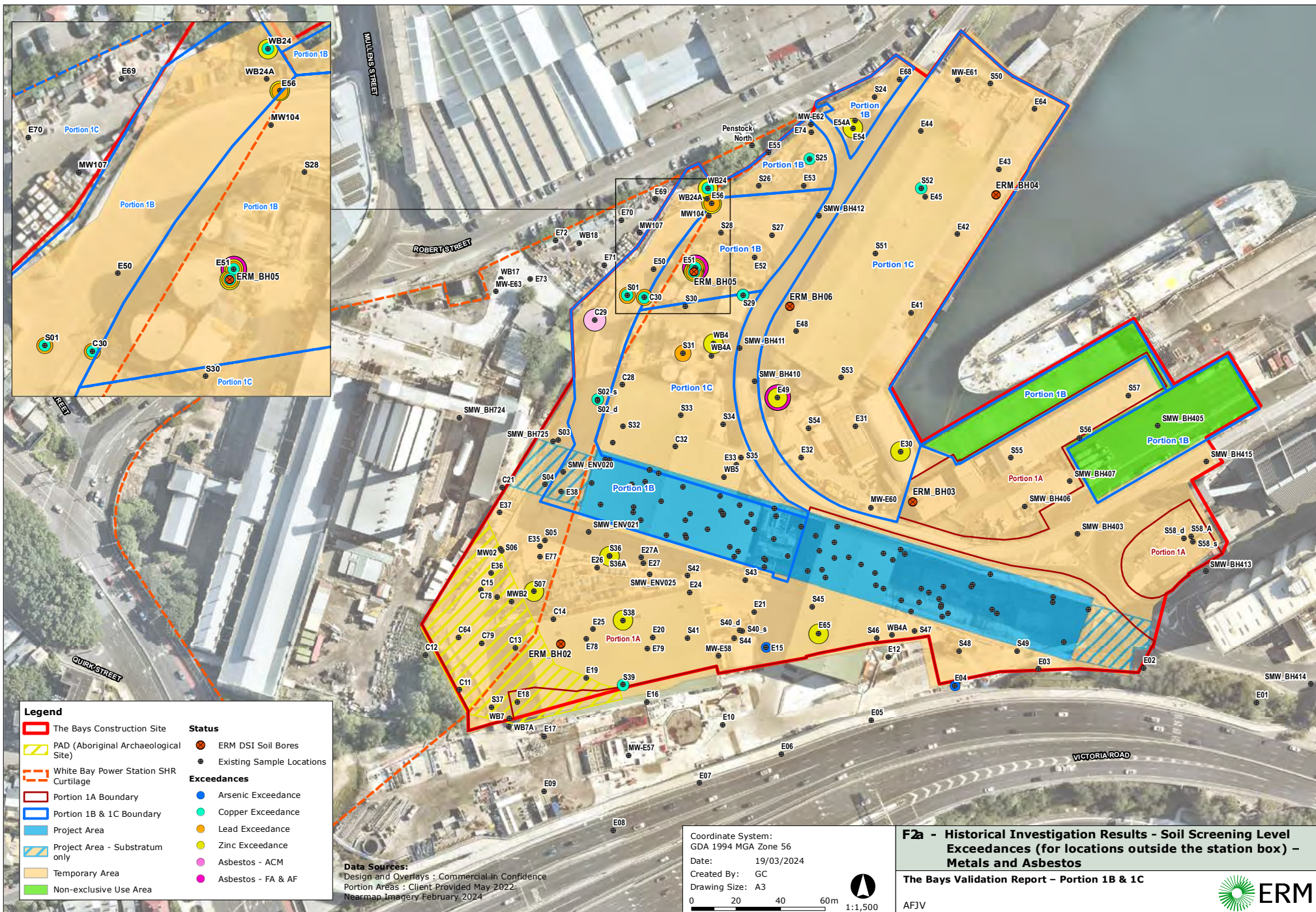
8. REFERENCES

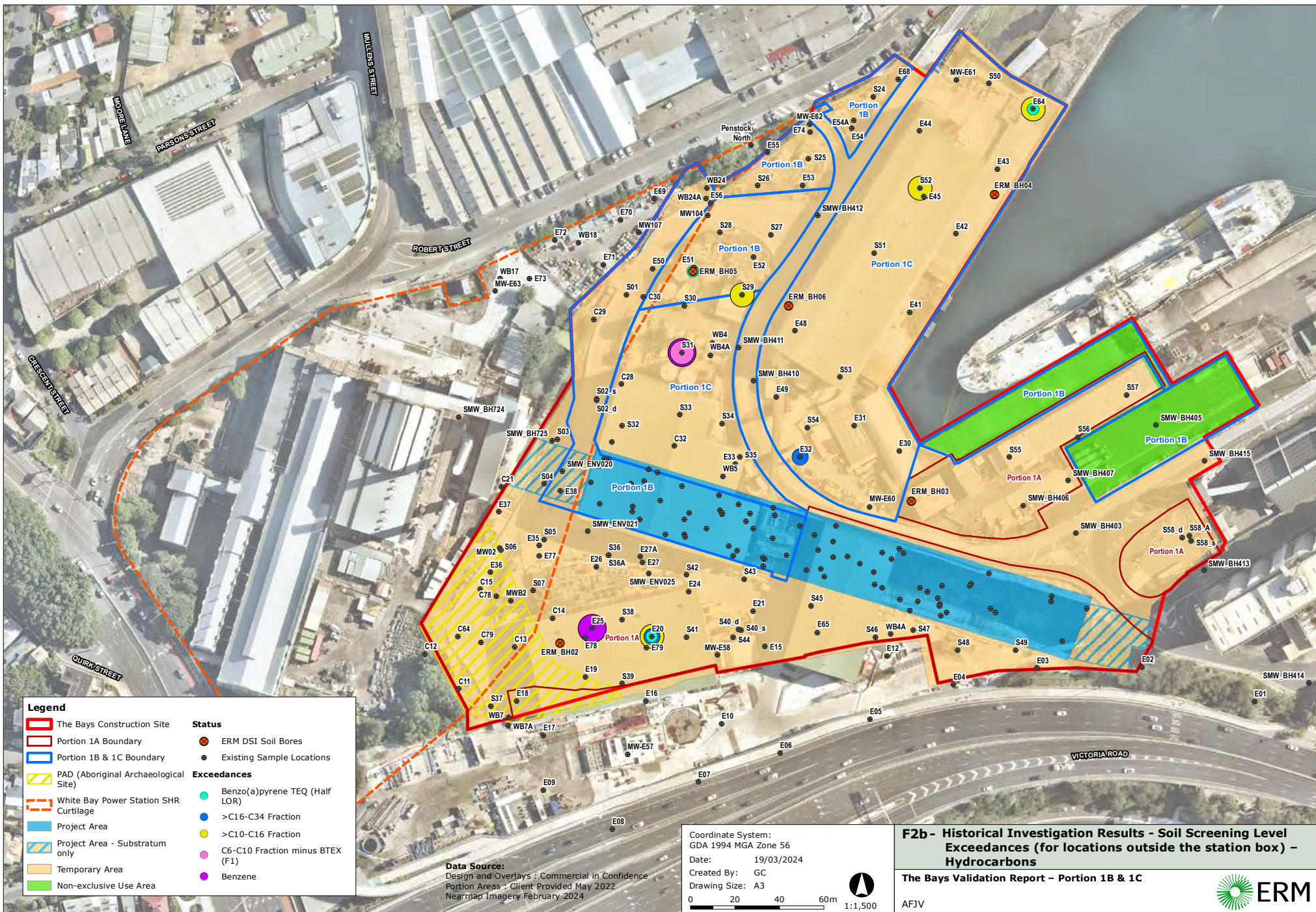
- ADE (2024). Asbestos Materials Clearance Report, the Bays Station, Port Access Road, Rozelle, NSW.
- ERM (2022a). Remediation Action Plan, The Bays Construction Site, Sydney Metro West: Central Tunnelling Package.
- ERM (2022b). Detailed Site Investigation, The Bays Construction Site, Sydney Metro West; Central Tunnelling Package. Dated 14 January 2022.
- ERM (2022c). Detailed Site Investigation Addendum – Outside Station Box, the Bays Construction Site, Sydney Metro West, Central Tunnelling Package.
- ERM (2022d). Contaminated Soil Management Plan (CSMP), Station Box for the Bays Construction Site, Sydney Metro West: Central Tunnelling Package, 25 August 2022.
- JBS&G (2017a). Detailed Site Investigation White Bay Power Station, Proposed Lot 1, Roberts Street, Rozelle, NSW. JBS&G Australia Pty Ltd.
- JBS&G (2017b). Detailed Site Investigation White Bay Power Station, Proposed Lot 2, Roberts Street, Rozelle, NSW. JBS&G Australia Pty Ltd.
- NEPC (2013). National Environment Protection (Assessment of Site Contamination) Measure 1999.
- NOHSC (2005). Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC:3003 (2005)].
- NOHSC (2005). Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018 (2005)].
- NSW EPA (2014). Waste Classification Guidelines.
- SafeWork NSW (2022). How to Safely Remove Asbestos Code of Practice. SafeWork NSW.
- Senversa (2021). Factual Contamination Investigation Report – The Bays, Sydney Metro West, White Bay Site Investigation.
- WorkCover (2014). Managing Asbestos in or on Soil. Workcover NSW.

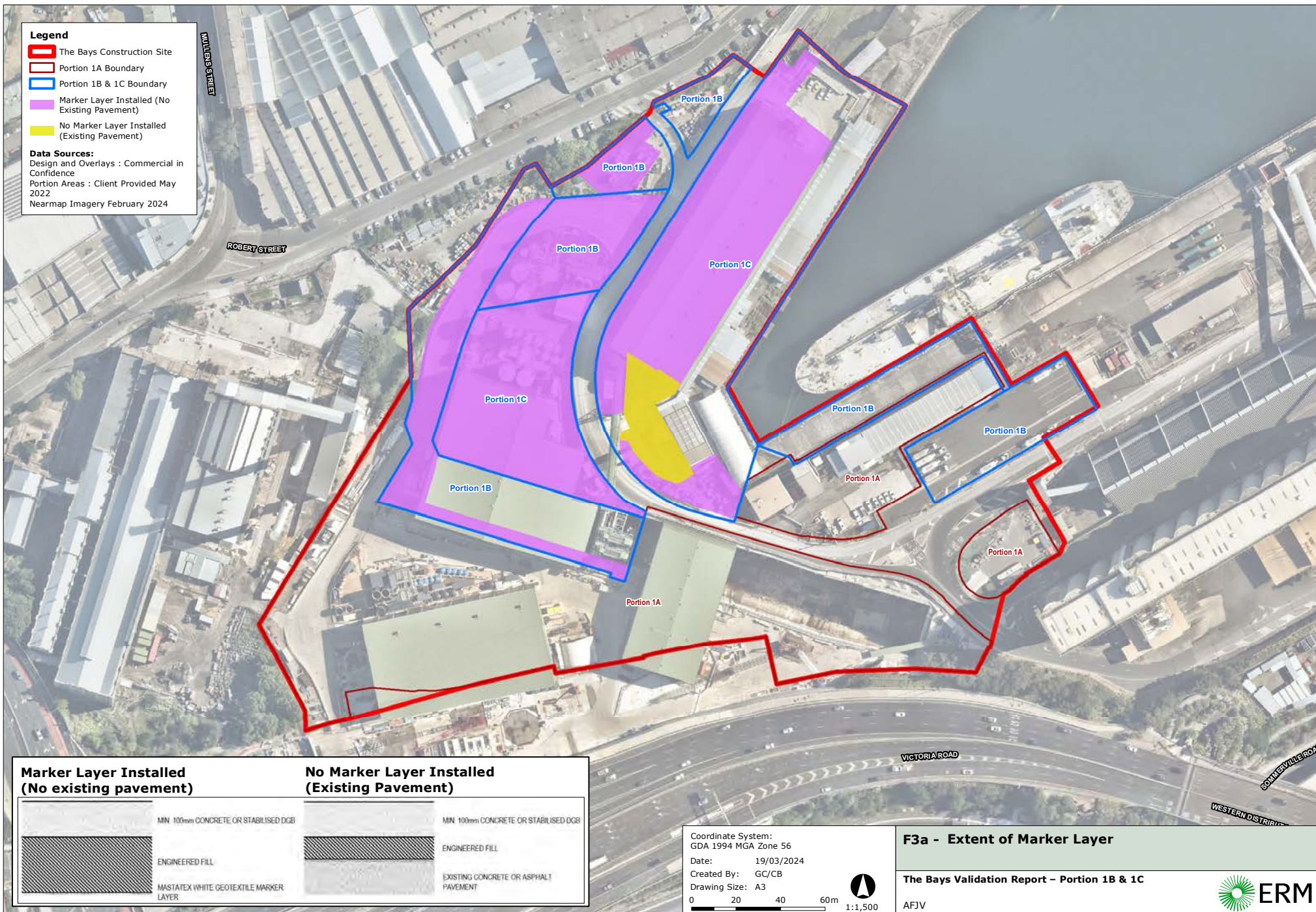


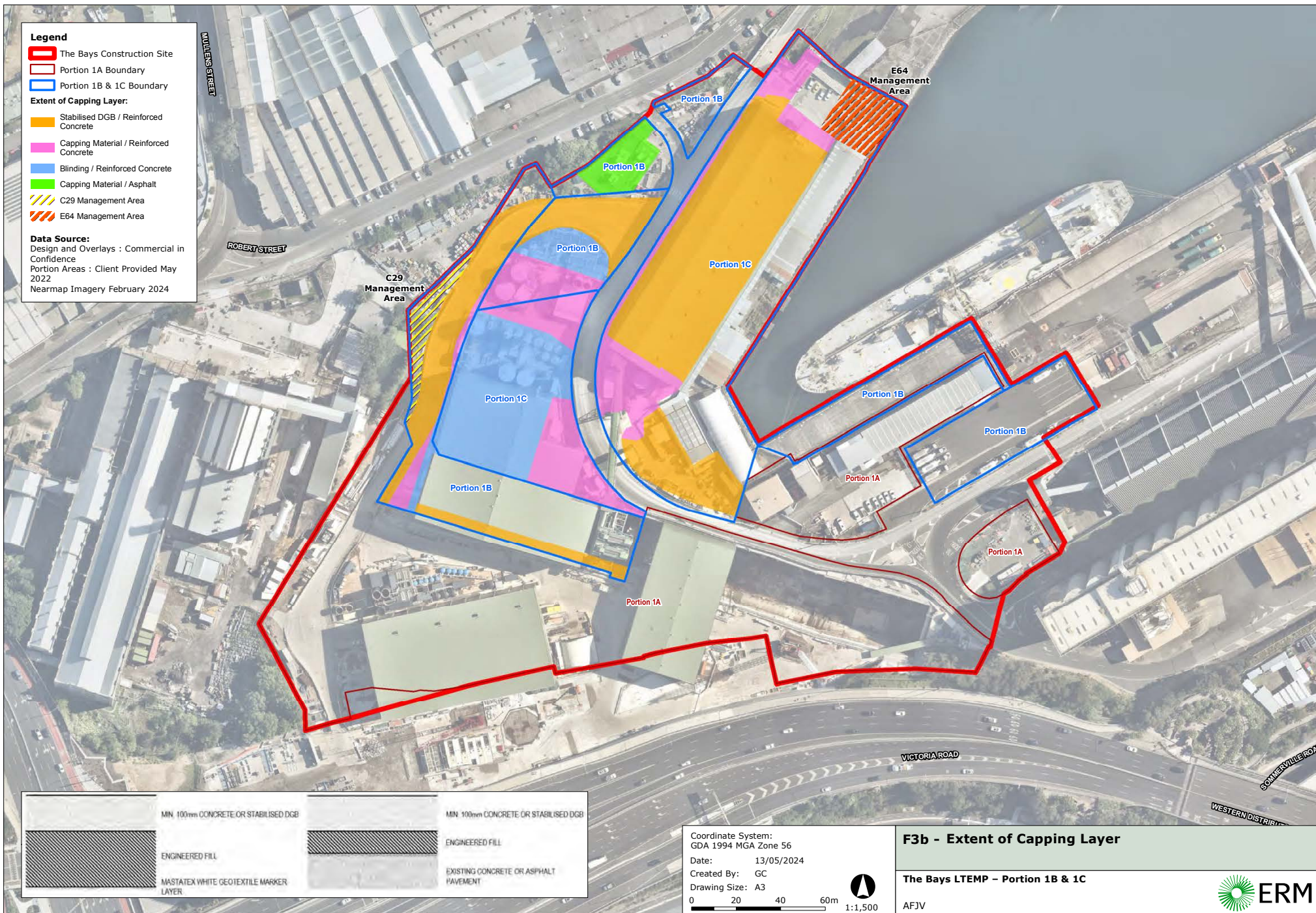
APPENDIX A FIGURES













APPENDIX B

INSPECTION AND MAINTENANCE CHECKLIST

INSPECTION AND MAINTENANCE CHECKLIST

Location / Site Name:

Date / Time:

Inspection Item	Inspection Frequency	Inspected? (Yes / No / NA)	Maintenance Required? (Yes / No / NA)	Comments
Paved Areas				
Cracking	A			
Breakage	A			
De-bonding	A			
Missing Pavement	A			
Geotextile Layer Exposed	A			
Unevenness of Surface / Subsidence	A			
Moisture Patches	A			
Localised Seepage	A			
Drilling / Excavation	A			

Inspection Frequency Key: A - Annually

Additional inspections should be carried out immediately following heavy / prolonged rainfall that may result in inundation / flooding.

Inspector Comments:

If any of the above Inspection Items are checked 'Yes' for *Maintenance Required*, list the maintenance actions and their completion due dates below:

Maintenance Actions Required	Due Date

Other Comments / Actions

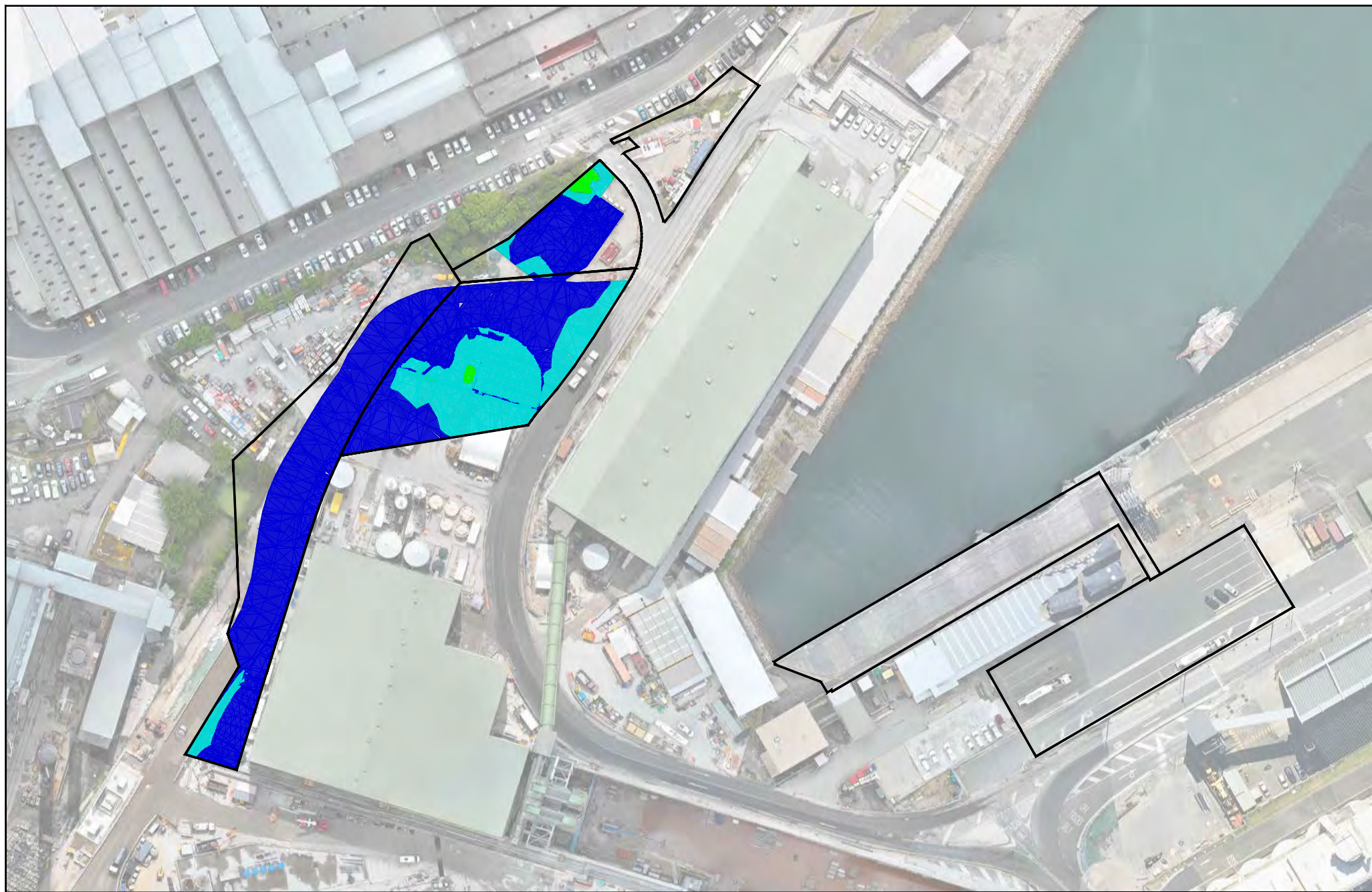
Inspected by:

(signature) _____

(printed) _____



APPENDIX C CAPPING LAYER SURVEY PLANS



DC							04/03/24
REV	AMENDMENT DESCRIPTION		Design by	Verified by	Approved by		Date

SCALE: 1:1000

KEY

Portion 1B Boundary
Thickness < 0.10 CUT IN VENM
Thickness 0.10m - 0.20m
Thickness 0.20m - 0.50m
Thickness 0.50m - 1.20m



CLIENT:



The information shown on this drawing is for the purposes of the Sydney Metro Project only. No warranty is given or implied as to its suitability for any other purpose. The Service Providers accept no liability arising from the use of this drawing and the information shown thereon for any purpose other than the Sydney Metro Project.

DRAWN	DC	_____	_____	_____	_____
DESIGNED		_____	_____	_____	_____
DRG CHECK		_____	_____	_____	_____
DESIGN CHECK		_____	_____	_____	_____
APPROVED	DC	_____	_____	_____	_____

SYDNEY METRO WEST

The Bays
 Portion 1B - Validation Report
 Marker Layer / Current Ground Level - Depth of Capping Material

FILE No:	SHEET: 01 OF 01	©
STATUS:	EDMS No:	
DRG No:	REV 01	VER 1.1



APPENDIX D RISK ASSESSMENT

RISK ASSESSMENT

Asbestos Exposure Risks

Asbestos-related diseases are mainly cancers of the lungs, cancers of the chest lining (mesothelioma) and asbestosis, which is a non-cancerous condition. The lower the level of exposure to asbestos the lower the level of risk.

SafeWork NSW summarises the human health risks of asbestos in soil in Managing asbestos in or on soil (WorkCover, 2014).

Exposure likelihood is related to:

- The potential for asbestos containing materials (ACM) to release fibres;
- Whether ACM is covered or contained; and
- Operational control measure and PPE applied to limit generation and inhalation of fibres.

Non-friable asbestos in sound condition represents a lower human health risk than friable asbestos or damaged/crumbling non-friable asbestos. Both friable asbestos and damaged non-friable asbestos have the potential to generate or release free fibres which require management to minimise the release of asbestos fibres into the air where they can potentially be inhaled.

The friable or bonded nature of asbestos fragment materials was clarified by SafeWork NSW in their documentation How to Safely Remove Asbestos Code of Practice (SafeWork NSW, 2016). The definitions of friable and non-friable asbestos provided in that document are as follows:

- Friable Asbestos: material that is in a powder form or that can be crumbled, pulverised or reduced to a powder by hand pressure when dry, and contains asbestos; and
- Non-Friable Asbestos: material containing asbestos that is not friable asbestos, including material containing asbestos fibres reinforced with a bonding compound (also known as bonded asbestos).

The friable or bonded nature of asbestos fragment materials was clarified by the ASC NEPM as follows:

- Bonded ACM: ACM which is in sound condition and where the asbestos is bound in a matrix such as cement or resin (e.g. asbestos fencing and vinyl tiles). Bonded ACM refers to, in this instance, material that cannot pass a 7-mm x 7 mm sieve;
- Bonded Fibrous Asbestos: friable asbestos material and includes severely weathered cement sheet, insulation products and woven asbestos material. This material is in a degraded condition such that it can be broken or crumbled by hand pressure; and
- Asbestos Fines: asbestos fines (AF) includes free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7-mm x 7 mm sieve.

Chemical Exposure Risks

The primary chemical contaminants of concern associated with the soil underlying Portion 1B & 1C were Total Recoverable Hydrocarbons (TRH), benzene and benzo(a)pyrene.

TRH

TRH is a term used to describe a large family of several hundred chemical compounds that originally come from crude oil. TRH is a mixture of chemicals, but they are all made mainly from hydrogen and carbon, called hydrocarbons. Some chemicals that may be found in TRH are hexane, jet fuels, mineral oils, benzene, toluene, xylenes, naphthalene, and fluorene, as well as other petroleum products and gasoline components. However, it is likely that samples of TRH will contain only some, or a mixture, of these chemicals.

Elevated TRH concentrations identified within the subsurface of The Bays Construction Site, including Portion 1B & 1C, comprised light to mid-fraction hydrocarbons, specifically TRH C6-C34.

Some TRH compounds can affect the human central nervous system. One compound can cause headaches and dizziness at high levels in the air, while another can cause a nerve disorder called "peripheral neuropathy" consisting of numbness in the feet and legs. Other TRH compounds can cause effects on the blood, immune system, lungs, skin, and eyes.

TRH may enter the environment through accidents, from industrial releases, or as by-products from commercial or private uses. Human exposure to TRH mainly results from:

- Breathing air at petrol stations, using chemicals at home or work, or using certain pesticides;
- Drinking water contaminated with TRH;
- Working in occupations that use petroleum products;
- Living in an area near a spill or leak of petroleum products; and
- Touching soil or water contaminated with TRH.

Benzene

Benzene occurs naturally in crude oil, and can be formed from natural processes, such as volcanoes and forest fires.

The primary man-made releases of benzene are through emissions from motor vehicles and aircrafts, and cigarette smoke. Benzene is used mainly as a starting material in the manufacture of other chemicals, including plastics, lubricants, rubbers, dyes, detergents, drugs, and pesticides. In the past it was also commonly used as an industrial solvent.

The most common sources of human exposure to benzene are from breathing contaminated air, particularly in areas of heavy motor vehicle traffic and petrol stations, and through cigarette smoke. Benzene can also be absorbed through the skin during contact with a source such as gasoline, but this is less common as liquid benzene evaporates quickly.

Exposure to benzene can cause drowsiness and fatigue, dizziness, headaches, tremors, confusion, and unconsciousness. Long term exposure to benzene can cause cancer and leukaemia.

Benzo(a)pyrene

Benzo[a]pyrene is one of a large number of polycyclic aromatic hydrocarbons (PAHs) that are formed during the incomplete combustion of organic matter. Benzo(a)pyrene can result from burning of wood and coal, operation of cars, trucks and other vehicles, and can be formed from natural processes such as volcanoes and forest fires.

The most common sources of human exposure to benzo(a)pyrene are from breathing contaminated air, particularly in areas of heavy motor vehicle traffic, in coking, coal-tar and asphalt production plants, and from inhalation of cigarette smoke. Benzo[a]pyrene can also be absorbed through the skin or ingested.

Exposure to benzo(a)pyrene can cause a skin rash or eye irritation with redness and/or a burning sensation. Exposure to sunlight and the chemical together can increase these effects. Long term exposure to benzo(a)pyrene can cause cancer.

Lead

Lead is a naturally occurring toxic metal found in the Earth's crust. Sources of environmental contamination include mining, smelting, manufacturing and recycling activities, and, in some countries, the continued use of leaded paint and leaded aviation fuel.

Common sources of human exposure to lead are from inhalation of lead particles generated by burning materials containing lead, for example during smelting, recycling, stripping leaded paint and using leaded aviation fuel; and ingestion of lead-contaminated dust, water (from leaded pipes) and food (from lead-glazed or lead-soldered containers).

Exposure of children to lead may result in behaviour and learning problems, lower IQ and hyperactivity, slowed growth, hearing problems and anaemia. Adults exposed to lead can suffer from cardiovascular effects including increased blood pressure and incidence of hypertension, decreased kidney function, and reproductive problems.

Source, Pathway, Receptor Linkages

Links between sources, pathways and receptors for contamination present on-site are summarised in the following table.

Potential Receptors	Potential Exposure Pathway	Potential Exposure Risk to Receptor
Portion 1B & 1C users / owners / visitor	Nil – there are no clear pathways for exposure to contaminated materials, unless intrusive works are being carried out to depths sufficient to breach the marker layers underlying the capping material. Where intrusive works are being carried out to depths sufficient to breach the marker layers, site users have the potential to be exposed to contamination through direct contact/ingestion with contaminated soil or inhalation of asbestos fibres within soils underlying the capping layers.	No Yes – managed via control measures set out in this LTEMP
Maintenance / construction workers	Nil – there are no clear pathways for exposure to contaminated materials, unless intrusive works are being carried out to depths sufficient to breach the marker layers underlying the capping material. Where intrusive works are being carried out to depths sufficient to breach the marker layers, Portion 1B & 1C owners / users have the potential to be exposed to contamination through direct contact/ingestion with contaminated soil/groundwater or inhalation of asbestos fibres within soils underlying the capping layers.	No Yes – managed via control measures set out in this LTEMP
General public	Nil – there are no clear pathways for exposure to contaminated materials, unless intrusive works are being carried out to depths sufficient to breach the marker layers underlying the capping material.	No
Ecological receptors	Aquatic organisms have the potential to be exposed to contamination through direct contact/ingestion with contaminated groundwater within groundwater leaving Portion 1B & 1C.	Yes; however the likelihood for migration of shallow soil contamination to groundwater or surface water is significantly reduced following capping construction.

APPENDIX E DECONTAMINATION MEASURES

E1. DECONTAMINATION

In the event that excavation works extend through the capping and marker layers (disturbing underlying, potentially contaminated fill material or works are undertaken within the residual contaminated areas surrounding historical investigation locations C29 and E64 (refer to **Figure 3b, Appendix A**), decontamination measures as outlined below must be adhered to.

E1.1 PERSONAL DECONTAMINATION

Issue	Appropriate hygiene and decontamination assists with minimising worker exposure and the transportation of potentially contaminated materials from work areas to more sensitive environments.
Criteria	No contaminated clothing or PPE to leave the work areas.
Controls	1. Eating, drinking, chewing gum and smoking will be prohibited at all times whilst working in the vicinity of the containment cell. 2. All individuals working at Portion 1B & 1C will pass through a decontamination area prior to exiting work areas in accordance with How to Safely Remove Asbestos Code of Practice (SafeWork NSW, 2022). All outer work material will be physically removed from personnel prior to exiting work areas. 3. Remain in full PPE in work areas at all times.

E1.2 VEHICLE DECONTAMINATION

Issue	Appropriate vehicle and equipment decontamination assists with minimising worker exposure and the transportation of potentially contaminated materials from work areas to more sensitive environments.
Criteria	No contaminated vehicle or equipment to leave the work areas.
Controls	1. Trucks and equipment will remain within the works area until the completion of works. Vehicles will not traffic between work areas and other areas of Portion 1B & 1C, including lunch areas, car parks, etc. 2. Truck cleaning areas will be used to wash down all vehicles potentially coming into contact with contaminated soil when leaving all remediation or works areas. The surface of internal access roads carrying vehicular traffic will be kept clean. Prior to discharge, the water will be sampled and analysed in accordance with the relevant requirements of the approved discharge consent. Following discharge of wheel wash water, the sediment retained at the base of the wheel wash will be sampled and disposed off-site in accordance with the Waste Classification Guidelines (NSW EPA, 2014). 3. Vehicles carrying fill materials sourced from Portion 1B & 1C will at all times be covered with an "enviro-tarp" or similar impervious material to prevent the escape of dust or other material. 4. A log of all trucks removing fill material from Portion 1B & 1C will be kept in a Truck Log book.



ERM HAS OVER 160 OFFICES ACROSS THE FOLLOWING
COUNTRIES AND TERRITORIES WORLDWIDE

Argentina	The Netherlands
Australia	New Zealand
Belgium	Peru
Brazil	Poland
Canada	Portugal
China	Romania
Colombia	Senegal
France	Singapore
Germany	South Africa
Ghana	South Korea
Guyana	Spain
Hong Kong	Switzerland
India	Taiwan
Indonesia	Tanzania
Ireland	Thailand
Italy	UAE
Japan	UK
Kazakhstan	US
Kenya	Vietnam
Malaysia	
Mexico	
Mozambique	

ERM's Sydney Office

Level 14 207 Kent Street
Sydney NSW 2000

T: +61 2 8584 8888

www.erm.com

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. 0301-2206-2

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 James Davis

Company Enviroview Pty Ltd

Address PO Box 327

GLADESVILLE

NSW

Postcode

2110

Phone 0467 375 481

Email james.davis@enviroview.com.au

Site details

Address Portion 1B and 1C, Sydney Metro West: The Bays Station

Robert Street

ROZELLE

NSW

Postcode

2039

Property description

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

Part Lot 10 DP 11288503, Part Lots 318 and 382 DP 1277236, Part Lot 2 DP 879549

(See attached plan)

Local government area	Inner West Council
Area of site (include units, e.g. hectares)	2.06 Ha
Current zoning	Port and Employment - State Environmental Planning Policy (Precincts—Eastern Harbour City 2021, Sydney Regional Environmental Plan No 26.)

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	Jared Lipton
Company	Acciona Construction Pty Ltd and Ferrovial Construction Pty Ltd
Address	PO BOX 7110 SILVERWATER NSW Postcode 2128
Phone	1800 612 173
Email	jared.lipton@ctp-afjv.com.au

Contact details for contact person (if different from above)

Name

Company

Address

Postcode

Phone

Email

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)

Condition of development consent of State Significance Infrastructure SSI 10038

approved by the Minister for Planning and Public Spaces on 11 March 2021.

- ☐ 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: Commercial/Industrial (Sydney Metro Station)

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: **commercial/industrial**

Information sources for site audit

Consultancies which conducted the site investigations and/or remediation:

Environmental Resources Management Australia Pty Ltd (ERM)

Titles of reports reviewed:

Environmental Resources Management Australia Pty Ltd (ERM). Sampling and Analysis Quality Plan, The Bays Construction Site, Sydney Metro West; Central Tunnelling Package. Report Reference: 0577577 V2.0, dated 8 September 2021. (ERM, September 2021)

Environmental Resources Management Australia Pty Ltd (ERM). Detailed Site Investigation, The Bays Construction Site, Sydney Metro West; Central Tunnelling Package. Report Reference: 0577577_R03, dated 14 January 2022. (ERM, January 2022)

Environmental Resources Management Australia Pty Ltd (ERM). Station Box Detailed Site Investigation, The Bays Construction Site. Report Reference: 0577577_R04, dated 27 June 2022. (ERM, June 2022)

Site Audit Statement

Environmental Resources Management Australia Pty Ltd (ERM). Detailed Site Investigation Addendum – Outside Station Box, The Bays Construction Site, Sydney Metro West, Central Tunneling [sic] Package. Project No.: 0577577_R04, dated 27 June 2022. (ERM, June 2022)

Environmental Resources Management Australia Pty Ltd (ERM). Remediation Action Plan, Remediation Action Plan, The Bays Construction Site, Sydney Metro West: Central Tunnelling Package. Report Reference: 0577577 Final Version 03 Revision 02, dated 25 August 2022. (ERM, August 2022)

Environmental Resources Management Australia Pty Ltd (ERM). Validation Report, The Bays Construction Site – Portion 1B & 1C, Sydney Metro West: Central Tunnelling Package. Report Reference: 0628507 Rev 02 Final, dated 9 September 2024. (ERM, September 2024).

Environmental Resources Management Australia Pty Ltd (ERM). Long Term Environmental Management Plan, The Bays Construction Site – Portion 1B and 1C, Sydney Metro West: Central Tunnelling Package. Report Reference: 0628507 Rev 02 Final, dated 30 August 2024. (ERM, August 2024)

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

JBS&G (2017) Detailed Site Investigation White Bay Power Station Proposed Lot 1 (JBS&G, 2017)

JBS&G (2017) Detailed Site Investigation White Bay Power Station Proposed Lot 2

Golder–Douglas (2018) Groundwater Monitoring Report – Sydney Metro West Geotechnical Investigation

Golder–Douglas (2020) Geotechnical Investigation Factual Report – White Bay Pavement Investigation

Golder–Douglas (May 2021) Groundwater Monitoring Report – Stage 2 Locations – Sydney Metro West Geotechnical Investigation

Golder–Douglas (June 2021) Sydney Metro West- Groundwater Monitoring Report – Stage 3 Locations

Senversa (2021) Factual Contamination Investigation Report – The Bays, Sydney Metro West, White Bay Site Investigation. Report Reference 000013/11868, dated 21 May 2021 (Senversa, May 2021)

Environmental Resources Management Australia Pty Ltd. Station Box Waste Classification – W01 – ‘Fill’, The Bays Construction Site. Report Reference: 0577577_R02, dated 21 January 2022.

Enviroview [Site Auditor – James Davis]. Site Audit Report, Sydney Metro West: The Bays Station Report, Ref: 600199_0301-2117 dated 7 September 2022 – Site Audit Statement 0301-2117 – Certifying that the Site can be made suitable with the implementation of the RAP. (Enviroview [Site Auditor - James Davis], September 2022)

Site audit report details

Title Site Audit Report, Portion 1B and 1C, Sydney Metro West: The Bays Station,

Rozelle, NSW

Report no. 600199_0301-2206-2

Date 30 September 2024

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 plan¹, 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 plan² (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 Long Term Environmental Management Plan, The Bays Construction Site – Portion

1B and 1C, Sydney Metro West: Central Tunnelling Package

Author Environmental Resources Management Australia Pty Ltd (ERM)

Date 30 August 2024

No. of pages 45 (incl. cover)

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 systems³~~
- ☒ requires maintenance of **passive** control systems only³.

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:

Levels of contamination (primarily asbestos, metals, petroleum hydrocarbons and PAHs) were identified to pose an unacceptable risk to users of the site under the proposed land use. The LTEMP is required due to the implementation of a 'Cap and Contain' remediation strategy utilised to contain known and potential chemical and asbestos contaminated fill material across much of Portion 1B and 1C of The Bays Metro Station site, excluding the 'Station Box'.

Description of the nature of the residual contamination:

Contaminants of concern include lead, TRH, PAHs (benzo(a)pyrene), and asbestos. These were identified to pose an unacceptable risk to users of the site under the proposed land use, primarily via direct contact, or inhalation of airborne particulate or in the case of asbestos the inhalation of fibres. A geotextile marker layer and an overlying capping layer were placed at the surface of Portion 1B and 1C to isolate contaminated soils and remove exposure pathways for future users.

Summary of the actions required by the EMP:

The primary objective of this LTEMP is to protect the health of site users by ensuring maintenance of the capping and barrier layers to prevent exposure to contaminants in the soil. General usage of Portion 1B and 1C by the public or workers is unlikely to pose a risk to integrity of the capping layer due to the nature and depth of the capping material. The LTEMP has requirements for the monitoring and maintenance of the cap. Works requiring excavation into the capping layer should be avoided where possible to minimise cap disturbance. In the case that intrusive works within the cap are unavoidable, the LTEMP requires a task-specific Construction Environmental Management Plan to be prepared prior to the commencement of works. For intrusive works that are below the cap and marker layer requirements are specified for the management of excavated material and reinstatement of the marker layer and cap and documentation. Further the LTEMP provides requirements relating to Work Health and Safety in the event of intrusive works.

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

The implementation of the RAP (and therefore the LTEMP) and the issuing of a Site Audit Statement, which is subject to the implementation of the LTEMP, is a condition of the State Significant Infrastructure conditions of approval. The responsibility for maintaining the site in accordance with the LTEMP will be that of the landowner. That task may be delegated to third parties (a contractor, licence holder or a lessee) as applicable; however, the contamination will remain the liability of the landowner – being the State Government of NSW, who has the capacity to require compliance with the LTEMP through contractual arrangements with those third parties.

How there will be appropriate public notification:

Appropriate public notification of the LTEMP will be provided by the recording of the Site Audit Statement on the s 10.7 Planning Certificate by Council as is required under s 59(2)(e) of the *Contaminated Land Management Act 1997*.

Overall comments:

Section B

Purpose of the plan⁴ which is the subject of this audit:

I certify that, in my opinion:

(B1)

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

AND/OR (B2)

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

AND/OR (B3)

- ☐ ~~The site testing plan:~~
☐ ~~**is** appropriate to determine~~
☐ ~~**is not** appropriate to determine~~
~~if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*~~

AND/OR (B4)

- ☐ ~~The terms of the approved voluntary management proposal* or management order** (strike out as appropriate):~~
☐ ~~**have** been complied with~~
☐ ~~**have not** been complied with.~~

~~*voluntary management proposal no.~~

~~**management order no.~~

AND/OR (B5)

- ☐ ~~The site **can be made suitable** for the following uses:~~
~~(Tick all appropriate uses and strike out those not applicable.)~~
☐ ~~Residential, including substantial vegetable garden and poultry~~
☐ ~~Residential, including substantial vegetable garden, excluding poultry~~
☐ ~~Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry~~

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

Site Audit Statement

- ☐ ~~Day care centre, preschool, primary school~~
- ☐ ~~Residential with minimal opportunity for soil access, including units~~
- ☐ ~~Secondary school~~
- ☐ ~~Park, recreational open space, playing field~~
- ☐ ~~Commercial/industrial~~
- ☐ ~~Other (please specify):~~

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

~~*Strike out as appropriate~~

Plan title

Plan author

Plan date _____ No. of pages

SUBJECT to compliance with the following condition(s):

Overall comments:

Part III: Auditor's declaration

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

Accreditation no. 0301

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 30 September 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.

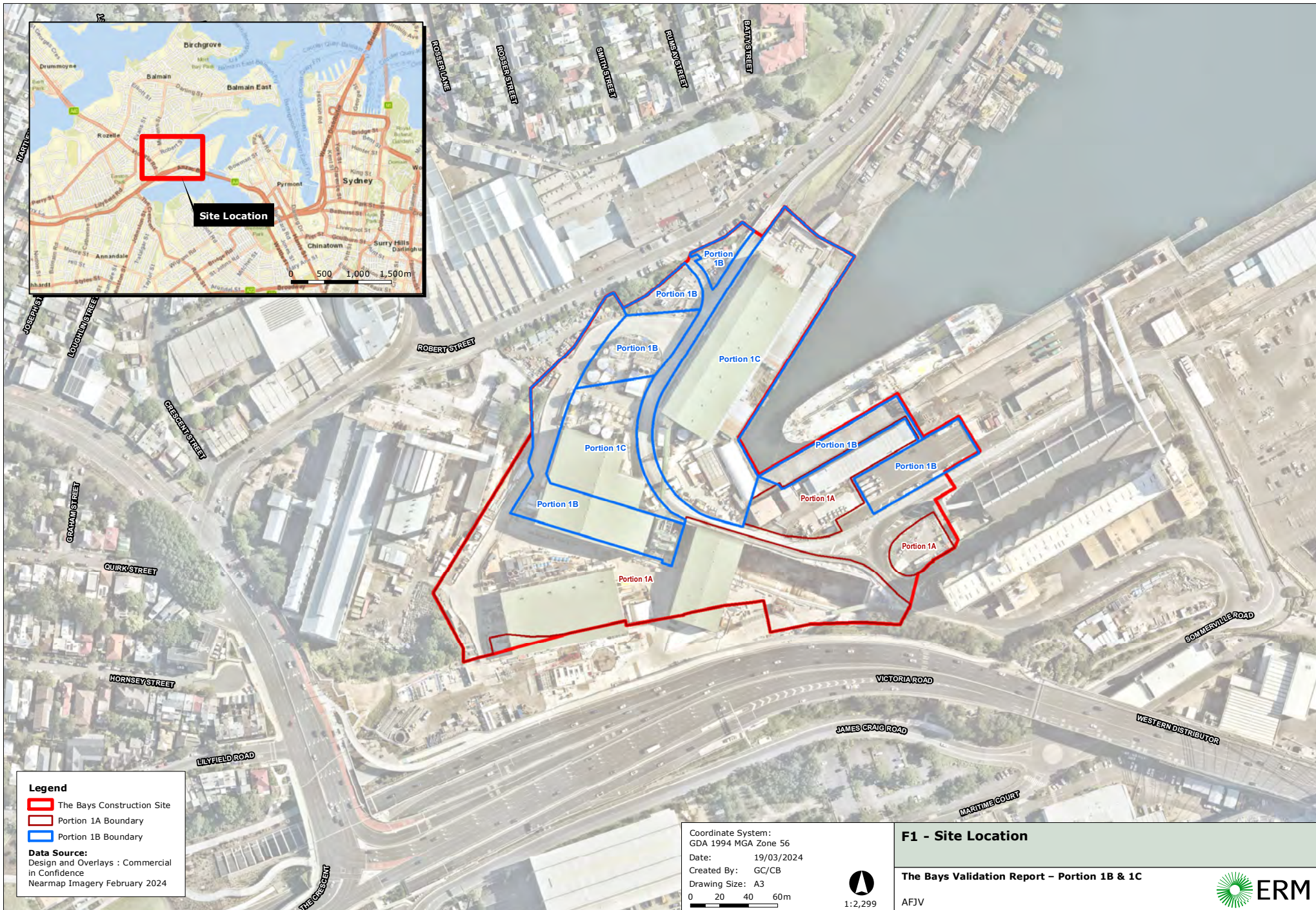
Where to send completed forms

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.





Long Term Environmental Management Plan

The Bays Construction Site – Portion
1B and 1C, Sydney Metro West: Central
Tunnelling Package

PREPARED FOR



Acciona Construction Pty Ltd &
Ferrovia Construction Pty Ltd Joint
Venture

DATE
30 August 2024

REFERENCE
0628507



DOCUMENT DETAILS

DOCUMENT TITLE	Long Term Environmental Management Plan
DOCUMENT SUBTITLE	The Bays Construction Site – Portion 1B and 1C, Sydney Metro West: Central Tunnelling Package
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Final Draft	01	Madushani Bolonghe, Joe Ferring	Peter Lavelle, CEnvP SC	Ashton Hincksman	24.05.2024	For Auditor review
Final	02	Madushani Bolonghe, Joe Ferring	Peter Lavelle, CEnvP SC	Ashton Hincksman	30.08.2024	Final following comments (Auditor, Metro, IC)

SIGNATURE PAGE

Long Term Environmental Management Plan

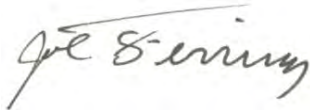
The Bays Construction Site – Portion 1B and 1C, Sydney Metro West:
Central Tunnelling Package
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FIGURE 3B: EXTENT OF CAPPING LAYER

ACRONYMS AND ABBREVIATIONS

Acronyms	Description
ACM	Asbestos Containing Material
AFJV	Acciona Construction Pty Ltd and Ferrovial Construction Pty Ltd
AF	Asbestos Fines
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
bgl	Below ground level
ENM	Excavated Natural Material
EPA	Environment Protection Authority
ERM	Environmental Resources Management Australia Pty Ltd
COPC	Contaminant of Potential Concern
FA	Fibrous Asbestos
HIL	Health Investigation Level
HSL	Health Screening Level
LTEMP	Long Term Environmental Management Plan
NEPC	National Environment Protection Council
NOHSC	National Occupational Health and Safety Commission
NSW	New South Wales
PAH	Polycyclic Aromatic Hydrocarbons
PANSW	Port Authority of NSW
PFAS	Per- and Polyfluoroalkyl Substances
PMNSW	Place Management NSW
PPE	Personal Protective Equipment
RAP	Remediation Action Plan
SEPP	State Environmental Planning Policy
TDS	Total Dissolved Solids
TEQ	Toxicity Equivalency Quotient
TRH	Total Recoverable Hydrocarbons
VENM	Virgin Excavated Natural Material

1. INTRODUCTION

1.1 GENERAL

Environmental Resources Management Australia Pty Ltd (ERM) was engaged by Acciona Construction Pty Ltd and Ferrovial Construction Pty Ltd (together "AFJV") to prepare a Long-Term Environmental Management Plan (LTEMP) to manage the risk of potential exposure to, or release of, chemical and asbestos contaminated soils contained beneath a capping layer within Portion 1B and 1C of The Bays Construction Site (referred to herein as "Portion 1B & 1C"). Portion 1B & 1C form part of the Central Tunnelling Package for the Sydney Metro West extension and are located within the White Bay industrial area adjacent to the former White Bay Power Station in Rozelle, NSW.

Portion 1B & 1C comprises land that will form The Bays Metro station (referred to as the Station Box area within this document), as well as land used for construction support which will be redeveloped in future stages of the White Bay Power Station precinct redevelopment (referred to as development land within this document). As soils are to be removed from the Station Box area, this LTEMP is for the development land only, i.e. the area within Portion 1B & 1C excluding the footprint of the Station Box. The Station Box is managed under the *Contaminated Soil Management Plan (CSMP), Station Box for the Bays Construction Site, Sydney Metro West: Central Tunnelling Package*, 25 August 2022 (ERM, 2022d).

This LTEMP is required due to the implementation of a 'Cap and Contain' remediation strategy utilised to contain known and potential chemical and asbestos contaminated fill material that will remain at much of Portion 1B & 1C (i.e. the development land – the whole site area excluding the Station Box footprint). A geotextile marker layer and/or an overlying capping layer were placed at the surface of Portion 1B & 1C in order to isolate contaminated soils and remove exposure pathways for future users. Capping works were undertaken in accordance with the strategy presented in *Remediation Action Plan, The Bays Construction Site, Sydney Metro West: Central Tunnelling Package* (ERM, 2022a).

1.2 OBJECTIVE

The primary objective of this LTEMP is to protect the health of site users by ensuring maintenance of the capping and barrier layers to prevent exposure to contaminants in the soil. Specifically, this LTEMP aims to:

- Detail the sub-surface conditions of Portion 1B & 1C;
- Detail the surface conditions of Portion 1B & 1C;
- Assign responsibilities for implementation of the LTEMP;
- Protect the health of site users by ensuring maintenance of the capping and barrier layers; and
- Protect the health of site users if Portion 1B & 1C surfaces are disturbed by works.

The LTEMP is to be submitted to all contractors involved with any works within Portion 1B & 1C which have the potential to impact the integrity of the capping layer and/or come into direct contact with the underlying contaminated fill.

2. SITE SETTING

2.1 SITE DESCRIPTION AND IDENTIFICATION

Portion 1B & 1C of The Bays Construction Site is located within the White Bay industrial area, adjacent to the former White Bay Power Station in Rozelle, New South Wales. Sydney Metro has licensed approximately 5.6 hectares of The Bays Construction Site from the Port Authority of NSW (PANSW) and a smaller portion of land (around 0.7 ha) from Place Management NSW (PMNSW) for the construction of The Bays Station of Sydney Metro West. Site identification details are summarised in **Table 2-1**.

TABLE 2-1 SITE IDENTIFICATION

ITEM	DESCRIPTION
Site Name	Portion 1B & 1C of The Bays Construction Site
Site Address	Robert Street, Rozelle, 2039
Property Identification	Part Lot 10 DP 1288503 Part Lots 381 & 382 DP 1277236 Part Lot 2 DP 879549
Environmental Plan	Sydney Regional Environmental Plan No. 26 – City West
Current Land Use	Construction area adjacent to former White Bay Power Station

The location and layout of The Bays Construction Site and Portion 1B & 1C are presented in **Figure 1, Appendix A**. The Bays Construction Site is an irregular shape, divided into two main sections:

- The broader site area that will be used as a construction support zone during The Bays Metro Station construction; and
- The Station Box area where spoil will be excavated for the construction of The Bays Metro Station.

Portion 1B & 1C comprises the northern section of The Bays Construction Site and excludes the Station Box.

2.2 CONTAMINATION STATUS

A review of historical information and previous investigations undertaken has indicated that The Bays Construction Site, including Portion 1B & 1C, has primarily been used for commercial/industrial purposes including use as a dock, coal storage and processing, railways, ash handling and storage. Substantial filling of The Bays Construction Site, including Portion 1B & 1C, has been reported including prior to the construction of the White Bay Power Station, during the construction of the ANZAC Bridge, and for land reclamation.

The analytical results of previous investigations completed at The Bays Construction Site, including Portion 1B & 1C, are summarised in the following sections.

Depths of fill were reported in previous investigations as ranging from 4.2 metres below ground level (m bgl) (JBS&G, 2017a and 2017b) to 11 m bgl (Senversa, 2021). Given that previous investigations identified asbestos in fill materials in several locations across The Bays Construction Site, including Portion 1B & 1C, for the purposes of implementing this LTEMP, it must be assumed that all fill materials have the potential to contain asbestos.

2.2.1 SOILS

Soil contamination within The Bays Construction Site which was considered to present a potential human health risk under the proposed future land use (i.e. consistent with 'Commercial / Industrial D' in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 [ASC NEPM]) is summarised in **Table 2-2** and the locations exceeding relevant screening criteria are presented on **Figure 2a** and **Figure 2b, Appendix A**.

Some previous investigation locations were completed in areas outside of Portion 1B & 1C, but the entire dataset summary has been included here for completeness since conditions within Portion 1B & 1C are expected to be similar to other areas across The Bays Construction Site.

TABLE 2-2 SUMMARY OF SOIL SCREENING CRITERIA EXCEEDANCES

Sample ID	Sample Depth (m bgl)	Contaminant of Potential Concern (COPC)	Concentration (mg/kg)	Concentration (mg/kg) Exceeded Guideline
WB4_1.9-2.0	1.9 - 2.4	Lead	1500	HIL-D
C29-0.0-0.1	0.0 - 0.1	Asbestos (ACM) (bonded)	0.0983 *	HIL-D
E20_1.8-1.9	1.8 - 1.9	Benzo(a)pyrene Toxicity Equivalency Quotient (TEQ)	99	HSL-D
		Total recoverable hydrocarbons (TRH) C16-C34	6100	Management Limit (commercial / industrial)
E25_2.0-2.1	2.0 - 2.1	Benzene	4.6	HSL-D
E49_0.5-0.6	0.5 - 0.6	Asbestos (AF / FA)	0.0186 *	HIL-D
E51_0.9-1.0	0.9 - 1.0	Asbestos (AF / FA)	0.0015 *	HIL-D
E64_3.0-3.1	3.0 - 3.1	Benzo(a)pyrene TEQ	150	HIL-D
S31_1.8-2.2	1.8 - 2.2	Benzene	3.4	HSL-D
		TRH less benzene, toluene, ethylbenzene and xylenes (BTEX)	463	HSL-D
ERM_BH05_1.7	1.7 - 1.8	Benzo(a)pyrene TEQ	44.8	HSL-D

* concentration in %w/w

HIL: Health Investigation Level

HSL: Health Screening Level

An inspection of the area surrounding historical investigation location C29, where asbestos in the form of bonded ACM was historically identified, was undertaken by ADE in August 2024 and reported in *Asbestos Materials Clearance Report, the Bays Station, Port Access Road, Rozelle, NSW* (ADE, 2024). This report concluded:

"Based on the information presented in this report, ADE considers that the inspected surface soils within the subject area is free from bonded ACM."

The following limitation was also noted by ADE in this report:

“The LAA [Licensed Asbestos Assessor] was only able to conduct a limited visual inspection of the surface soils in areas where no obstructions (e.g. construction materials) were present and where thick vegetation was not present within the subject area. It is advised that caution be applied if further excavation or ground disturbance activities are undertaken within the subject area.”

Hydrocarbons (benzene and TRH less BTEX) exceeding the HSL-D criteria were further assessed within *Detailed Site Investigation Addendum – Outside Station Box, the Bays Construction Site, Sydney Metro West, Central Tunnelling Package* (ERM, 2022c), which included a risk assessment of the potential vapour intrusion risks from the residual soil impact to future indoor workers within the proposed land use. The proposed land use is commercial / industrial outside the Station Box development following the completion of Sydney Metro Construction works. It was concluded that potential non-carcinogenic risks and carcinogenic risks are unlikely for future commercial / industrial users.

It is noted that several soil samples reported COPCs at concentrations exceeding the adopted ecological investigation and screening levels. However, given that the majority of The Bays Construction Site, including Portion 1B & 1C, was to be covered in hardstand, the risk posed to ecological receptors is considered low and remediation and management of the impacts are not considered necessary.

2.2.2 GROUNDWATER

The historical investigation data indicated that various metals (cadmium, cobalt, copper, lead, manganese, mercury, nickel and zinc), per- and polyfluoroalkyl substances (PFAS), isopropylbenzene and TRH were detected in groundwater at concentrations exceeding ecological criteria at some locations. Total Dissolved Solids (TDS) and iron concentrations also exceeded the recreational guideline value at some locations. PFAS concentrations above the adopted human health recreational guideline were detected in one groundwater sample (C64, located in the south-western corner of the Bays Construction Site).

As noted in the RAP (ERM, 2022a), once the capping layer is in place, the likelihood for migration of shallow soil contamination to groundwater or surface water is significantly reduced. The RAP (ERM, 2022a) also stated that in consideration of the nature of the proposed development and associated construction works, as well as the likely sources and distribution of groundwater contamination underlying the Site, active remediation of groundwater impacts was not considered necessary. Rather, management of groundwater inflow (within excavations) through a program of dewatering and on-site treatment prior to discharge was considered the most feasible and effective approach.

2.2.3 SOIL VAPOUR

Soil vapour was sampled at several locations by JBS&G (2017a and 2017b) and soil vapour concentrations did not exceed the adopted commercial-industrial screening levels.

2.2.4 POTENTIALLY COMPLETE SOURCE-PATHWAY-RECEPTOR LINKAGES

Assessment of the potential for risk from exposure pathways to human health and the environment was completed as part of *Detailed Site Investigation, The Bays Construction Site, Sydney Metro West; Central Tunnelling Package* (ERM, 2022b) and *Detailed Site Investigation Addendum – Outside Station Box, the Bays Construction Site, Sydney Metro West, Central Tunnelling Package* (ERM, 2022c). The following potentially complete source-pathway linkages were identified at The Bays Construction Site, including Portion 1B & 1C:

- Lead and benzo(a)pyrene concentrations in soil in some locations could present a human health risk for construction workers via direct contact with soil;
- Asbestos (ACM and asbestos fines) in some soil samples represent conditions that could present a human health risk to construction workers via inhalation of dust;
- Total Recoverable hydrocarbons in soil in one sample represent conditions that could present a human health risk via exposure to flammable material;
- Groundwater conditions could present a human health risk to future construction workers and recreational users of white bay via direct contact/ingestion of groundwater;
- Dissolved metals in soil could present an environmental risk to aquatic organisms via direct contact/ingestion of groundwater; and
- Dissolved metals in soil could present an environmental risk to aquatic organisms via direct contact/ingestion of groundwater.

2.3 REMEDIATION STRATEGY

Remediation was deemed necessary to render The Bays Construction Site, including Portion 1B & 1C, suitable for use and a 'Cap and Contain' remedial strategy has been implemented whereby contaminated fill materials underlying Portion 1B & 1C are capped in-situ by an impervious barrier. The strategy enables Portion 1B & 1C to be suitable for the planned commercial/industrial use, subject to implementation of a LTEMP (i.e., this document).

2.4 REGULATORY FRAMEWORK

Legislation relevant to the current conditions in the vicinity of the capped areas, and future potential intrusive works, are summarised in **Table 2-3**.

TABLE 2-3 APPLICABLE LEGISLATION

Legislation
Work Health and Safety Act 2011 and associated regulations
Occupational Health and Safety Regulation 2011
Waste Avoidance and Recovery Act 2011
State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP)
National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC, 2013)
Managing asbestos in or on soil (WorkCover NSW, 2014)
How to Safely Remove Asbestos Code of Practice (SafeWork NSW, 2022)
Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018 (2005)]
Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC:3003 (2005)]

3. SURFACE CONDITIONS

The capping layer prevents access to the underlying soil at Portion 1B & 1C with the exception of the areas around the periphery shown in **Figure 3b, Appendix A**.

Of the areas where capping was not installed, there are two sections where residual contamination is present which needs to be managed under this LTEMP (refer to **Figure 3b, Appendix A**):

- The area surrounding historical investigation location C29 where bonded asbestos fragments were identified near the ground surface; and
- The area surrounding historical investigation location E64 where PAHs (as benzo(a)pyrene TEQ) impact is present at a depth of 3-3.1 m bgl exceeding HIL-D (commercial/industrial land use).

The management requirements for the capped areas, as well as the two uncapped areas above, are set out in the remainder of this LTEMP.

The capping design is detailed in **Table 3-1** below.

TABLE 3-1 CAPPING LAYER DETAILS

Location	Capping Layer Specification
Permanent paved areas	Permanent paving with a minimum thickness of 100 mm overlying a white non-woven geotextile marker layer. Chemical and asbestos impacted soil is present immediately below the marker layer.
New services	Where services interact with the capping layers, a minimum soil cover thickness of 100 mm was maintained below the total depth of the services. A white non-woven geotextile marker layer was placed within the trenches prior to installation of the services and backfilling with 'clean' materials. A minimum capping thickness of 100 mm was installed. Chemical and asbestos impacted soil is present immediately below the marker layer.
Site levelling (filling)	Where filling of Portion 1B & 1C was required to raise surface elevation, validated tunneling spoil was placed on top of the marker layer. Site-sourced materials were classified for reuse on-site to raise surface elevations, with the marker layer being placed over the site-sourced material.
Asphalt/concrete as a marker layer	Where asphalt/concrete was in place and fill/capping is placed above, the original asphalt/capping was considered to be an appropriate barrier and acted as a marker layer (i.e., no additional marker layer was required).

Figure 3a, Appendix A shows the extent of the marker layer (existing hardstand and installed geofabric) across Portion 1B & 1C. **Figure 3b, Appendix A** shows the areas of Portion 1B & 1C where each type of capping layer (concrete pavement or stabilised 20 mm Densely Graded Base [DGB20]) was installed. The surveyed capping layer thickness and depth from ground surface to the marker layer is provided as **Appendix C**. At the time this LTEMP was prepared, no additional material had been placed above the capping layer.

It is noted that the Station Box is excluded from the marker layer and capping strategy.

4. DISTURBANCE OF CAPPING LAYER, BELOW MARKER LAYER AND THE AREAS SURROUNDING HISTORICAL INVESTIGATION LOCATIONS C29 AND E64

General usage of Portion 1B & 1C by the public or workers is unlikely to pose a risk to the integrity of the capping layer due to the nature and thickness of the capping material.

4.1 ACCESS RESTRICTION SURROUNDING HISTORICAL INVESTIGATION LOCATIONS C29 AND E64

To ensure that the potential contamination risks posed by the areas surrounding historical investigation locations C29 (bonded asbestos near the ground surface) and E64 (PAHs at a depth of 3.0 – 3.1 m bgl) are appropriately managed, the following controls should be implemented in the event that works will be conducted in the immediate vicinity of either location:

- The area surrounding historical investigation location C29 should be fenced or cordoned off, and access to the area should be restricted. Appropriate signage should be displayed, indicating restricted access. If any works are to be carried out in this area, the controls set out in **Section 4.3** of this LTEMP should be implemented.
- The area surrounding historical investigation location E64 should be marked out with flagging and appropriate signage indicating contamination status and depth. If any intrusive works are to be carried out in this area, the controls set out in **Section 4.3** of this LTEMP should be implemented.

These areas are presented on **Figure 3b, Appendix A**.

4.2 DISTURBANCE OF CAPPING LAYER

Works requiring excavation into the capping layer should be avoided where possible to minimise cap disturbance. In the case intrusive works within the cap are unavoidable, the cap should be reinstated per **Section 5.3**.

4.3 WORKS BELOW MARKER LAYER AND AREAS SURROUNDING HISTORICAL INVESTIGATION LOCATIONS C29 AND E64

Works requiring excavation below the marker layer should be avoided where possible. Access restrictions and management controls for the areas surrounding historical investigation locations C29 and E64 have been detailed in **Section 4.1** of this LTEMP.

In the case that intrusive works below the marker layer are unavoidable, or where work is required within the residual contaminated areas surrounding historical investigation locations C29 and E64 (refer to **Figure 3b, Appendix A**), a task-specific Construction Environmental Management Plan must be prepared prior to the commencement of works. As a minimum, the plan should include the following:

- Environmental controls including sediment and erosion controls;
- Safety controls including personal protective equipment, asbestos air monitoring (refer to **Section 6** of this LTEMP), decontamination, licences and approvals;
- Controls for stockpiling of soils;

- Waste management requirements;
- Subsurface reinstatement and validation requirements;
- Decontamination measures (minimum decontamination requirements have been provided as **Appendix E**Error! Reference source not found.);
- Training requirements;
- Contractor management; and
- Reporting requirements.

Further, in the case that further redevelopment of Portion 1B & 1C is to be carried out in the future, a Remediation Action Plan would be required to appropriately manage the contaminated fill material underlying the cap and the residual contaminated areas surrounding historical investigation locations C29 and E64.

5. INSPECTION AND MANAGEMENT

5.1 OVERVIEW

The LTEMP will be implemented by the Portion 1B & 1C owner / manager, or designated representative, for any intrusive works carried out on-site that have the potential to disturb the capping layer including, but not limited to:

- Bulk excavation works;
- Installation and maintenance of services (trenching); and
- Landscaping.

Given that previous investigations identified asbestos in fill materials in several locations across The Bays Construction Site, including Portion 1B & 1C, for the purposes of implementing this LTEMP, it must be assumed that all fill materials have the potential to contain asbestos. As such, maintenance works that involve ground disturbance beyond the capping and marker layers as well as the residual contaminated areas surrounding historical investigation locations C29 and E64 (refer to **Figure 3b, Appendix A**) must be carried out by a suitably qualified contractor, experienced in undertaking work on contaminated sites in accordance with an LTEMP under the supervision of an Occupational Hygienist / Licensed Asbestos Assessor.

Personal protection equipment (PPE) worn/used by workers at Portion 1B & 1C must include:

- disposable overalls;
- respiratory protection (P2 minimum);
- safety boots;
- hard hat; and
- enclosed cabin with recycled air conditioning (the above PPE is not required within an enclosed cabin).

5.2 INSPECTION OF CAPPING LAYER

To ensure that the structural integrity of the capping layer is sufficiently maintained to allow continued protection of human health, the following is required:

1. Initial inspection of the capping layer by an experienced environmental professional at the completion of the initial capping installation (following completion of all intrusive works). The inspection is to record a baseline for the capping layer by means of photographs and field notes;
2. Detailed visual inspection of the surface of the capping layer should be undertaken by a suitably competent person biannually (twice a year) for at least the first two years after its construction, or post major flood event, referencing the baseline data in order to identify the presence of:
 - Cracks or holes within the capping layer;
 - Subsidence of the capping layer; and/or
 - Any other damage to the capping layer that may affect the integrity.

A competent person in this case would be someone with experience in determining any variation to the integrity of the capping layer, and being able to identify degradation or the requirement of repair or remedial work to reinstate the cap.

Where no damage to the capping layer has been observed for a period of at least two years since its construction, the inspection frequency may be extended to annual (once a year) inspections. Where non-conformances are identified, biannual inspections will continue.

- Are the cracks and holes large enough that they may allow access to the underlying contaminated soils?
 - Has the capping layer subsided to a degree that may cause further cracking or damage to that allows access to the underlying contaminated soils?
 - If the damage is not addressed immediately, is it likely to result in an increased risk to the health of Portion 1B & 1C users over time?
3. Where the visual inspection has identified damage to the capping layer which is significant enough to present a potential risk to the health of Portion 1B & 1C users, repair/maintenance will be required. Requirements for the rectification of issues associated with damage to the capping layer would be provided by an appropriately qualified contractor.

Refer to **Appendix B** - Inspection and Maintenance Checklist.

5.3 MANAGEMENT DURING INTRUSIVE WORKS

Where earthworks extend beyond the marker layer, or within the residual contaminated areas surrounding historical investigation locations C29 and E64, the procedures detailed below are to be followed.

The surveyed capping layer thickness and depth from ground surface to the marker layer is provided as **Appendix C**. At the time this LTEMP was prepared, no additional material had been placed above the capping layer.

5.3.1 SOIL MANAGEMENT

Given the distribution of potentially contaminated fill material across Portion 1B & 1C, the controls below should be applied during all earthworks to mitigate risks associated with exposure to both asbestos and chemical contamination.

1. Due to the potential for asbestos to be present within fill soils:
 - a. an asbestos licensed contractor will be engaged to undertake excavation works beneath the capping layer or within the residual contaminated areas surrounding historical investigation locations C29 and E64; and
 - b. asbestos air monitoring will be undertaken on the boundary of the proposed works and nearest sensitive receptors to ensure adequate controls are in place to minimise dust generation by an Occupational Hygienist or Licensed Asbestos Assessor. Air monitors should be used with the subsequent report issued to the Portion 1B & 1C owner and the sub-contractors involved. Refer to **Section 6** of this LTEMP.
2. Prior to the commencement of excavations in any given area, an exclusion zone consistent with current legislated standards will be established which will include the installation of safety warning signs and barricade measures around the boundary of the excavation;

3. Potentially contaminated material will be excavated to the required depth. Excavated material will be stockpiled on plastic sheeting within a dedicated temporary storage area and:
 - a. classified for appropriate off-site disposal by a suitably qualified and experienced environmental professional in accordance with the Waste Classification Guidelines (NSW EPA, 2014); and/or
 - b. replaced back within the subsurface at the completion of works.

During works:

- The excavator operator and truck driver within enclosed cabs are to remain inside their vehicle during the loading operation. The air-conditioning is to be on 'recirculate' or switched off. If the cab is not enclosed, full PPE is to be worn;
 - Unauthorised access is to be prevented within the exclusion zone;
 - During the loading operation, the materials are to be wetted thoroughly;
 - Material inadvertently spilt on the ledges of the truck or truck sides are to be washed off prior to the truck leaving the area; and
 - On completion of the work the operators should move to the designated decontamination area.
4. At the completion of earthworks, a white non-woven polyester continuous filament or PET such as nonwoven geotextiles will be placed over the top of the contaminated soils, commensurate with the existing marker layer. This provides a barrier to underlying materials, thereby reducing potential exposure risks with the contained materials and allows for the reinstatement of the capping layer;
 5. At the completion of marker layer reinstatement, an Occupational Hygienist or Licensed Asbestos Assessor will conduct a visual clearance prior to non-asbestos qualified personnel entering the work site. Following confirmation of a successful visual clearance from the Occupational Hygienist or Licensed Asbestos Assessor, the area can be accessed by non-asbestos qualified personnel;
 6. On completion of the required works, the excavation is to be backfilled with certified excavated natural material (ENM) / virgin excavated natural material (VENM), or subgrade road base materials consisting of natural quarried materials. The backfilled excavation will be sufficiently compacted to minimise the potential for subsidence and subsequent damage to the capping layer. Specifications for compaction should be obtained from a suitably qualified and experienced geotechnical engineer. The capping layer should be reinstated using an impervious concrete pavement or stabilised DGB20 (with 3-4% cement or Stabilment added) with a thickness of no less than 100 mm to match the original construction. The affected area should be surveyed following reinstatement to confirm the lateral extent and thickness of the capping layer; and
 7. An Occupational Hygienist, Licensed Asbestos Assessor and /or suitably qualified Environmental Consultant will undertake all required visual inspections, and air monitoring for airborne asbestos fibres (refer to **Section 6** of this LTEMP), during earthwork activities and associated works penetrating the containment layers.

It is noted that the horizontal boring activities associated with the Sydney Metro tunnel alignment - to be excavated beneath the extent of contaminated material at Portion 1B & 1C - are not considered to be a breach of the capping layer.

5.3.2 GROUNDWATER MANAGEMENT

In the case that groundwater is encountered during excavation works, management and off-site disposal of the groundwater will be carried out in accordance with the following:

- The water will be sampled to allow classification to facilitate appropriate off-site disposal;
- Appropriate erosion and sediment control measures will be implemented to minimise the potential for unauthorised discharge or runoff off-site;
- A license for discharge to stormwater will be sought from the local Council. If analysis indicates compliance with the relevant stormwater disposal criteria provided by the local Council, stormwater disposal can occur;
- In the event of non-compliance with Council criteria, a license to discharge to sewer as trade waste will be required from Sydney Water; and
- In the event of non-compliance with the Sydney Water criteria, the water will be pumped out and disposed off-site to an appropriately licensed wastewater treatment facility.

5.4 REINSTATEMENT OF CAPPING LAYER

All areas disturbed by the earthworks will be appropriately reinstated with ENM or VENM to fill excavations and capping layers will be reinstated using concrete pavement or stabilised DGB20 (with 3-4% cement or Stabilment added) with a thickness of no less than 100 mm to match the original construction as per **Section 5.3.1** of this LTEMP. Reinstatement of the capping layer does not require specialised supervision; however the affected areas are required to be surveyed following reinstatement.

For works within the residual contaminated areas surrounding historical investigation locations C29 and E64, control measures should be implemented at the completion of works to limit future contact with the contaminated materials in these areas. The control measures as a minimum should include the installation of a capping layer or similar suitable physical barrier:

- If capping layer is comprised of concrete or stabilised DGB, then a minimum of 100 mm thickness is required; or
- If capping layer is comprised of VENM or ENM, then a minimum of 200 mm thickness is required.

In the event that details of the capping layer have been altered (i.e. new service trenches extending past the capping layer need to be added to site drawings and survey details), this LTEMP may need to be updated with the details of the works undertaken on-site.

5.5 VALIDATION REQUIREMENTS

Should the marker layer be disturbed, validation works will be required post disturbance to certify that the marker and capping layers have been appropriately re-established (via placement of appropriately classified ENM or VENM) and no ongoing risk of exposure remains. Validation works will include a combination of one or more of the following strategies:

- Visual inspection of both the completed reinstatement of the marker layer and capping layer;
- Documentation of works completed to reinstate the marker and capping layers (i.e. a photographic record); and
- Surveying by a qualified and experienced contractor / surveyor to confirm cap thickness remains acceptable.

The preferred validation strategy / strategies will be determined and carried out by a suitably qualified Environmental Consultant.

5.6 DOCUMENTATION

At the completion of any works that have disturbed the marker layer and/or capping layer, the following information should be recorded to detail the earthworks carried out on-site :

- Date of earthworks;
- Area subject to earthworks, including a site plan;
- Purpose of the earthworks;
- Lateral and vertical extent of excavation;
- Soil disposal details; and
- Cap reinstatement specifics.

6. ASBESTOS AIR MONITORING

Where earthworks extend through the marker layer (disturbing underlying, potentially contaminated fill material) or works are undertaken within the residual contaminated areas surrounding historical investigation locations C29 and E64 (refer to **Figure 3b, Appendix A**), an asbestos air monitoring program as outlined below must be undertaken.

6.1 OVERVIEW

The Portion 1B & 1C owner / manager, or designated representative, and an Occupational Hygienist, Licensed Asbestos Assessor and /or suitably qualified Environmental Consultant will establish monitoring programs, as appropriate, to enable all activities undertaken in relation to asbestos comply with relevant exposure limits, standards and guidelines. Where disturbance of asbestos containing materials is expected to occur, a monitoring program will be implemented.

Monitoring requirements will include:

- daily airborne asbestos monitoring during all works; and
- final clearance monitoring within the works area following the completion of works.

Air monitoring is to be conducted during all earthworks that penetrate the marker layer and disturb the underlying contaminated soils. The number of monitors used will be dependent on the proposed works with a minimum of four sample pumps to be used based on an isolated/localised scenario. If the situation occurs where multiple intrusive works are occurring six air monitors will be located covering the perimeter of Portion 1B & 1C.

Environmental air monitoring will be undertaken daily as required by site works. The location of monitors will be based upon the most susceptible areas to airborne asbestos contamination and transportation or areas of higher risk, e.g. downwind of works, enclosure entry / exit etc.

Monitoring results will be reported to the Portion 1B & 1C owner / manager, or designated representative, within one day of the conclusion of the monitoring interval. Results are required to be readily available and accessible to all site workers, visitors and contractors and displayed in a prominent position.

6.2 AIRBORNE ASBESTOS CRITERIA

The risk associated with asbestos relates to the inhalation of airborne asbestos fibres. These fibres may be liberated by disturbance of the asbestos-containing material or dusts.

Airborne asbestos monitoring will be carried out using the only nationally recognised sampling and analytical methodology - the Membrane Filter Method for Estimating Airborne Asbestos Dust [NOHSC:3003 (2005)].

Once asbestos exposure levels are assessed, a level of action is to be taken in response to the recorded levels. These actions are listed below in **Table 6-1**.

TABLE 6-1 ACTION LEVELS

Measured Fibre Concentration (% of Exposure Standard)	Recommended Action
< 0.01 fibres / mL	No action necessary; maintain a low-level baseline air sampling program and Continue with Control Measures.
≥ 0.01 fibres / mL	1. Review Control Measures. 2. Ensure all PPE requirements and Decontamination practices are being complied with in the area. 3. Increase monitoring frequency, focusing on personal exposure monitoring and worker category assessment. Ensure personal exposures are maintained as low as practicable. Investigate workplace/work practices and control measures. Invoke agreed work and management procedures. Implement routine personal monitoring and auditing procedures.
Result ≥ 0.02 fibres m/L	1. Stop work in the affected area and investigate the cause of elevated results. 2. Designate area and take remedial action. Implement formal asbestos management procedures including cease work until such time as asbestos concentrations are acceptable.

It is important that the interpretation of these results is undertaken by an experienced person conversant with the Membrane Filter Method (NOHSC:3003, 2005) and its limitations. All results of air sampling must be recorded within a monitoring report and filed with the Portion 1B & 1C owner / manager.

Auditing procedures will be used as the primary technique to ensure that agreed work and management procedures and control measures are operating effectively. Auditing will be undertaken by both the Portion 1B & 1C owner / manager or designated representative, and by an Occupational Hygienist, Licensed Asbestos Assessor and /or suitably qualified Environmental Consultant. The auditing process will review all intrusive works undertaken in reference to the LTEMP prior, during and post works. Any items which do not conform to the LTEMP will be risk assessed and appropriate measures undertaken if required which will be reflected in an amended LTEMP.

7. MANAGEMENT AND REPORTING

7.1 HIERARCHY AND RESPONSIBILITY

Responsibility for the management and maintenance of the capping and marker layer will be assigned to the Portion 1B & 1C owner / manager, or designated representative. The Portion 1B & 1C owner / manager, or designated representative, would be the principal point of contact for all matters relating to works or maintenance issues affecting the capping layers. The Portion 1B & 1C owner / manager, or designated representative, would have the primary responsibility for arranging the regular inspection, maintenance and reporting of the capping layers.

It is the responsibility of the Portion 1B & 1C owner / manager, or designated representative that contractors and on-site staff are aware of the LTEMP and the requirements listed here within.

A summary of the key stakeholders is provided in **Table 7-1**.

TABLE 7-1 ROLES AND RESPONSIBILITIES

Role	Responsibilities
Portion 1B & 1C Owner / Manager (or designated representative)	• Implementation and monitoring of the LTEMP. • Provide all supervisory and management staff with an awareness and understanding of their responsibilities under this LTEMP. • Provide employees and contractors with the relevant environmental instruction in relation to the LTEMP and awareness and understanding of their obligations and duties. • Provide appropriate and adequate resources to allow effective implementation and maintenance of the LTEMP. • Provide appropriate and adequate resources to allow scheduled monitoring to be undertaken. • Arrange periodic reviews of the LTEMP.
Construction Contractor	• Be aware of and understand the contents of and the reason for implementing the elements of the LTEMP and ensure all personnel including subcontractors adhere to these requirements. • Provide personnel involved in the project, including subcontractors and visitors, with the appropriate environmental training required to provide them with awareness and understanding of their responsibilities under the LTEMP. • Carry out all work in accordance with the procedures outlined in the LTEMP. • Make sure that all environmental safeguards and precautions are in place and adhered to at all times at Portion 1B & 1C. • Arrange for survey of the final capping layer by qualified and experienced contractor / registered surveyor. • Ensure a Class A Licensed Contractor is engaged to supervise earthworks that extend below the marker layer.

Role	Responsibilities
Occupational Hygienist / Licensed Asbestos Assessor	- For any works that extend beyond the marker layer (disturbing the underlying contaminated soils) or where work is undertaken within the residual contaminated areas surrounding historical investigation locations C29 and E64 (refer to Figure 3b, Appendix A), an Occupational Hygienist / Licensed Asbestos Assessor will be consulted to supervise the works and to advise on management and methodology of works to be undertaken. Occupational Hygienist / Licensed Asbestos Assessor will oversee: - Airborne asbestos monitoring; - Asbestos clearance inspections and sampling; and - Provision of asbestos clearance reports following the completion of works below the marker layer.
Suitably Qualified Environmental Consultant	- Be aware of and understand the contents of and the reason for implementing the elements of the LTEMP. - Provide specialist environmental services where required. - Provide specialist advice to stakeholders where required.

The LTEMP will be registered on the Title deeds under the Conveyancing Act 1919 and Section 10.7 planning certificates. If there is a change of ownership of Portion 1B & 1C, the requirements of the LTEMP must be disclosed to future owners. The LTEMP document should form part of the sale contract information.

7.2 REVIEW OF THE LTEMP

In order to identify non-conformance, or partial conformance, with relevant legislation, an audit of the implementation of the LTEMP is required within the first 6 months. The audit should be carried out by an appropriately qualified contractor / consultant in conjunction with the Portion 1B & 1C owner / manager.

Any reported damage and the subsequent repairs undertaken on the capping layers should include a review of the LTEMP to ensure up to date information of the cap is maintained. Any works that require intrusive activities into underlying soils also require an appropriate amendment to this LTEMP to maintain the most current information about the cap within this document. Any changes to the structure of the capping layer should involve appropriate amendments to this LTEMP that reflect the works undertaken. The Portion 1B & 1C owner / manager, or designated representative, will be required to annually assess compliance with this LTEMP and document the outcome. Any deviations from the LTEMP or its requirements will also require documentation.

The Portion 1B & 1C owner / manager, or designated representative, will be required to annually assess the compliance of this LTEMP with relevant current legislation. Any amendments will require documentation.

7.3 DURATION OF THE LTEMP

This LTEMP is to be permanently enforced and will apply indefinitely until such time as a Site Audit Statement can be prepared by a NSW EPA accredited Site Auditor stating that the LTEMP is no longer required.

Future works may result in disturbance of the capping layer. In this case, the LTEMP will need to be updated to include relevant information related to any changed site condition and as-built plans to enable the long-term management of Portion 1B & 1C.

Any amendment of the LTEMP require approval from a NSW EPA accredited Site Auditor.

7.4 NON-COMPLIANCE WITH LTEMP

The following flow chart regarding non-compliance with the LTEMP will be adopted:

LTEMP Non-compliance Identified



Notify Portion 1B & 1C Owner / Manager / Representative

Notify all non-compliance incidents to the Portion 1B & 1C Owner / Manager, or designated representative. Ensure subcontractors are advised of notification requirements.



Establish Immediate Priorities

Assess which component of the non-compliance incident needs to be controlled first



Investigate and Implement Corrective Action

Conduct non-compliance incident investigation in consultation with appropriate personnel.

Implement any corrective action.



Incident Reporting

Document non-compliance as required.

Update LTEMP with additional procedures as required to minimise the potential for non-compliance to re-occur.

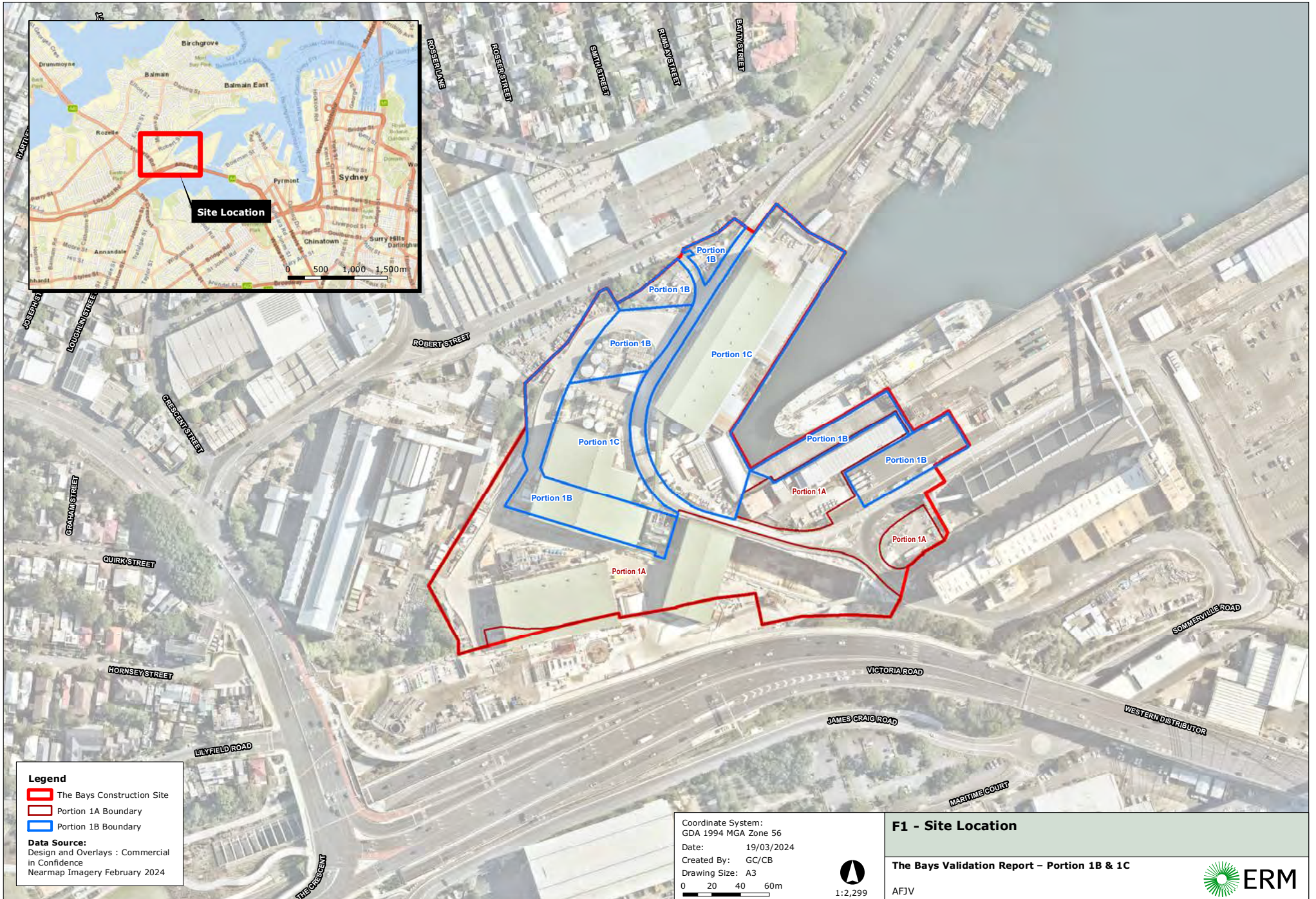
Site Auditor review / endorsement of revised LTEMP.

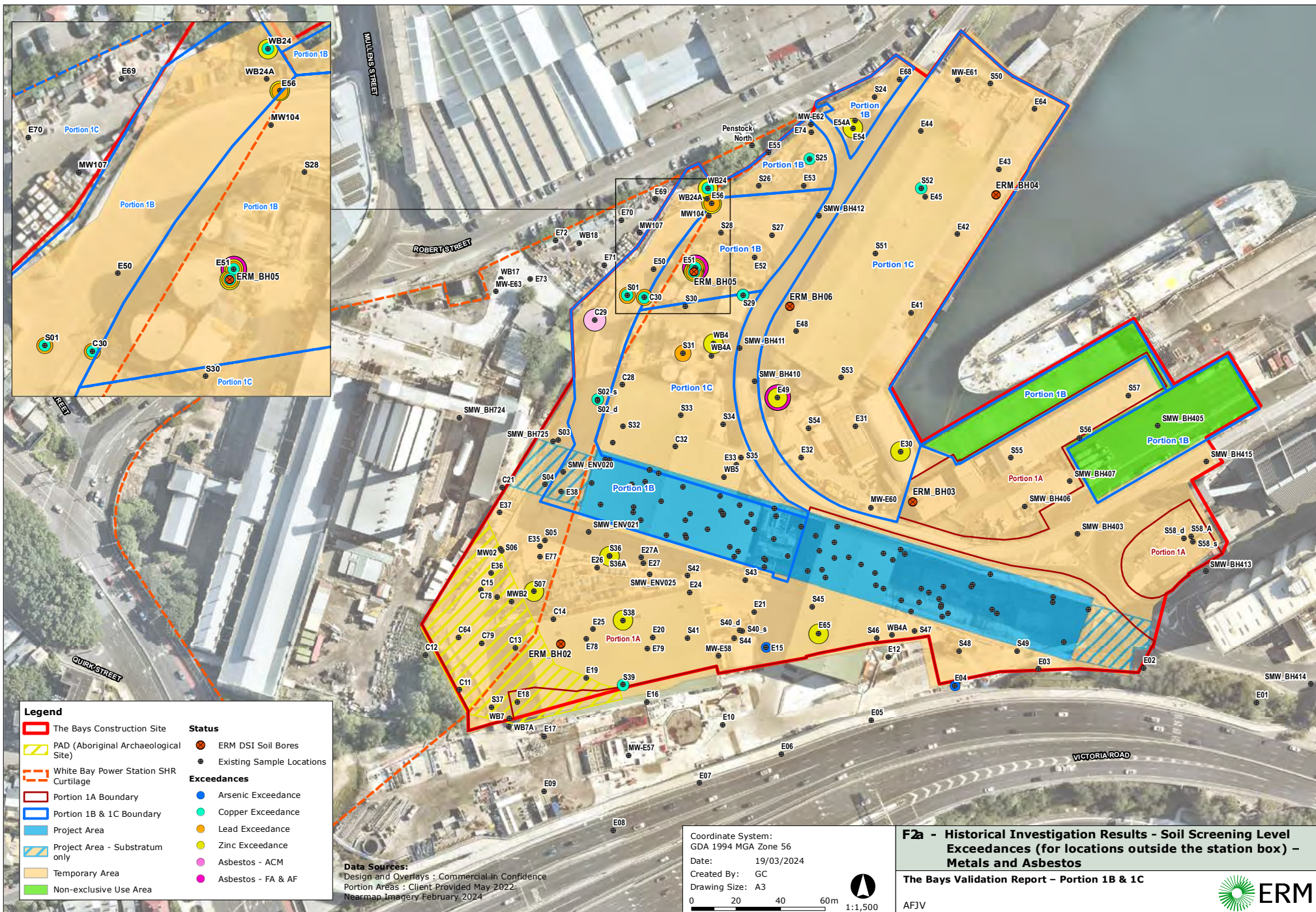
8. REFERENCES

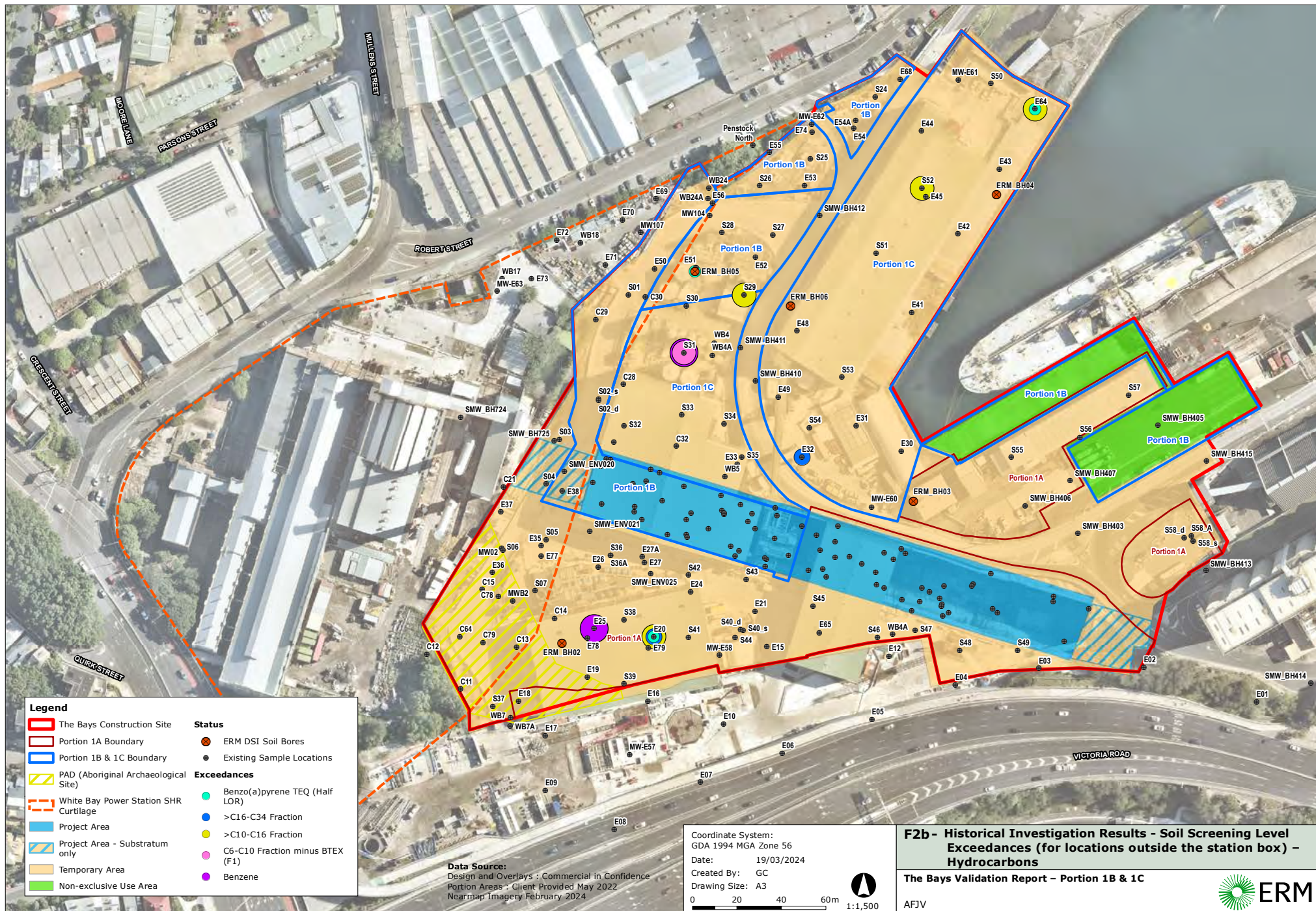
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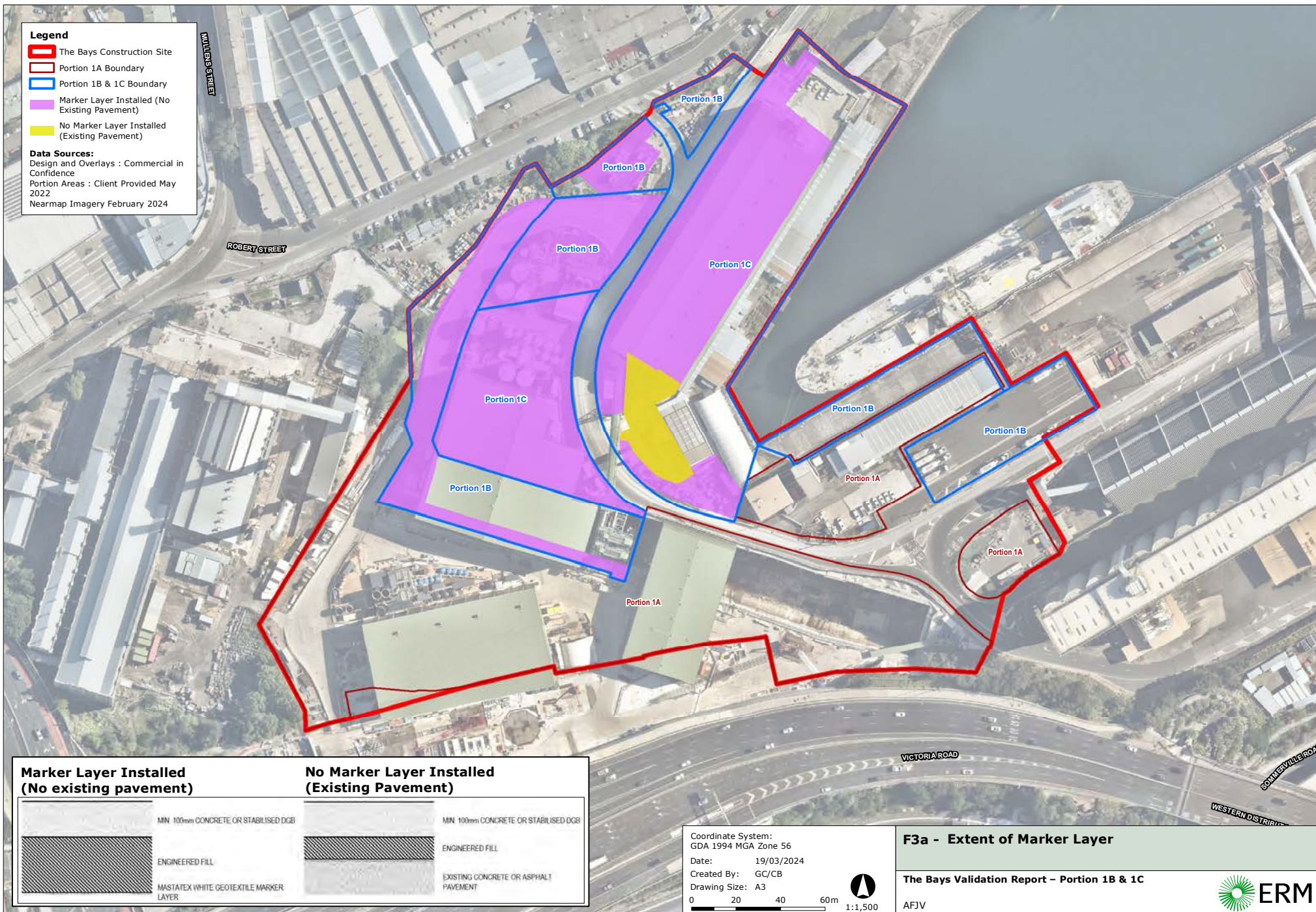


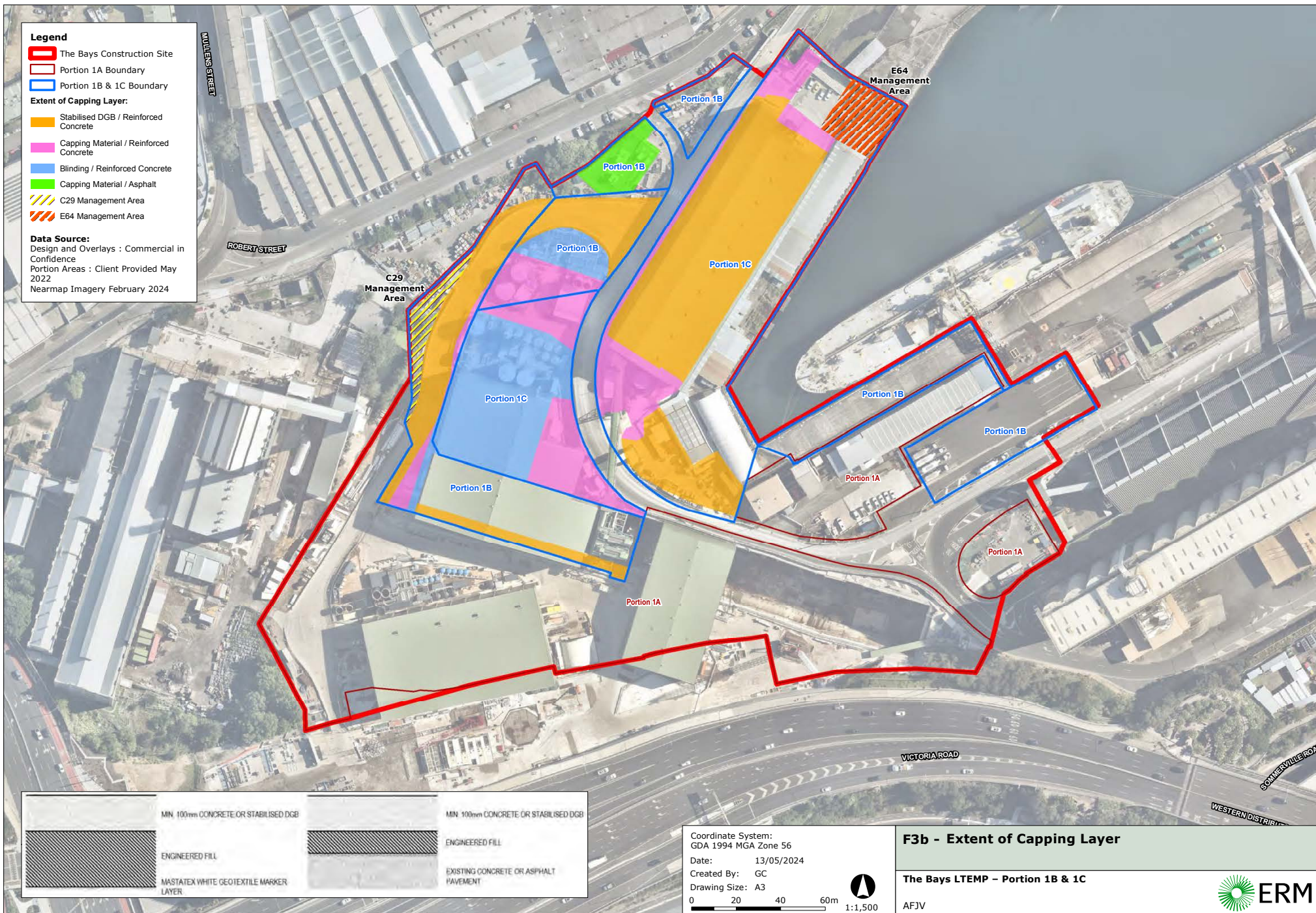
APPENDIX A FIGURES













APPENDIX B

INSPECTION AND MAINTENANCE CHECKLIST

INSPECTION AND MAINTENANCE CHECKLIST

Location / Site Name:

Date / Time:

Inspection Item	Inspection Frequency	Inspected? (Yes / No / NA)	Maintenance Required? (Yes / No / NA)	Comments
Paved Areas				
Cracking	A			
Breakage	A			
De-bonding	A			
Missing Pavement	A			
Geotextile Layer Exposed	A			
Unevenness of Surface / Subsidence	A			
Moisture Patches	A			
Localised Seepage	A			
Drilling / Excavation	A			

Inspection Frequency Key: A - Annually

Additional inspections should be carried out immediately following heavy / prolonged rainfall that may result in inundation / flooding.

Inspector Comments:

If any of the above Inspection Items are checked 'Yes' for *Maintenance Required*, list the maintenance actions and their completion due dates below:

Maintenance Actions Required	Due Date

Other Comments / Actions

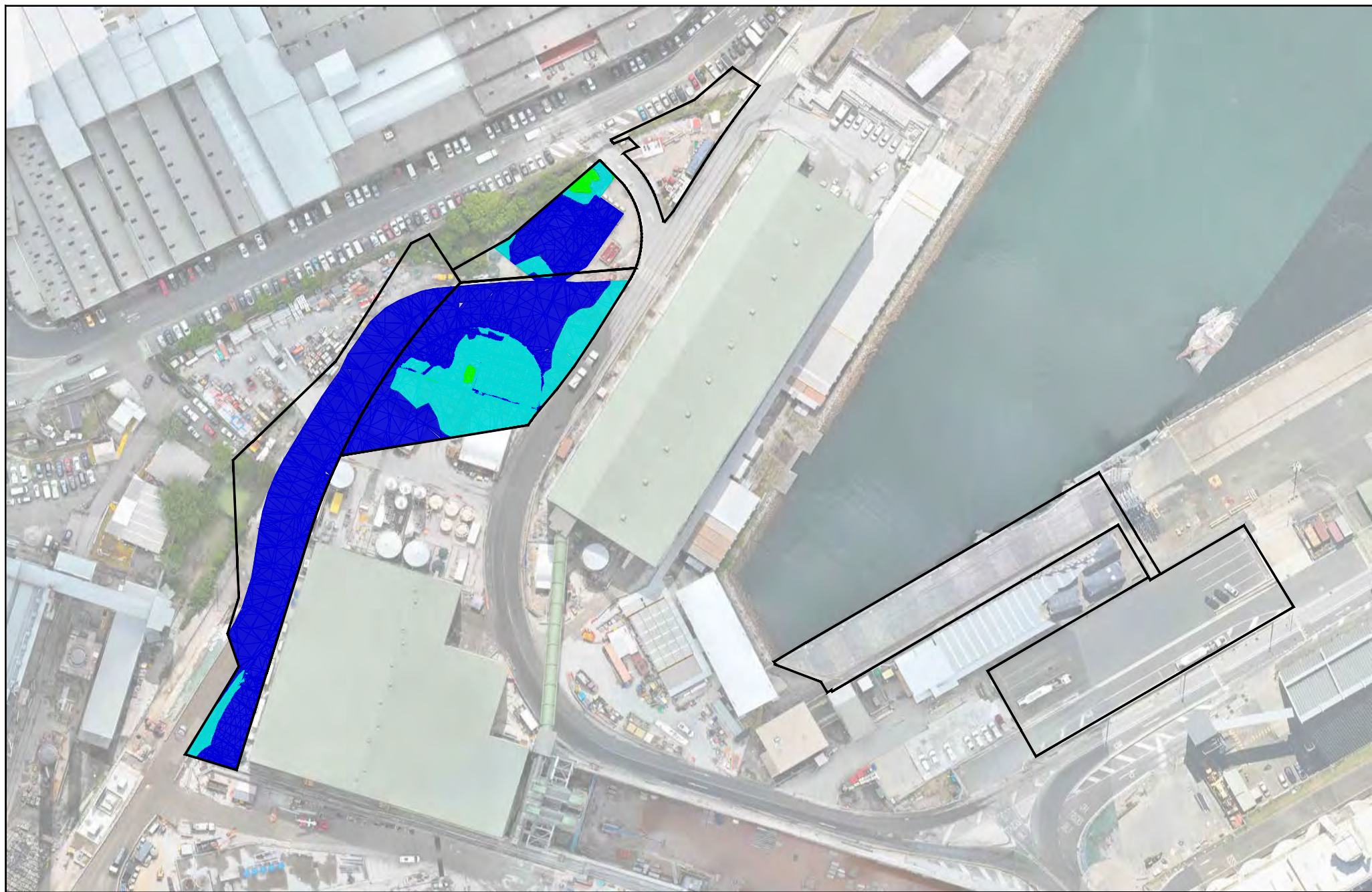
Inspected by:

(signature) _____

(printed) _____



APPENDIX C CAPPING LAYER SURVEY PLANS



DC					04/03/24
REV.	AMENDMENT DESCRIPTION	Design by	Verified by	Approved by	Date

SCALE: 1:1000

KEY

Portion 1B Boundary

Thickness < 0.10 CUT IN VENM
Thickness 0.10m - 0.20m
Thickness 0.20m - 0.50m
Thickness 0.50m - 1.20m



CLIENT:



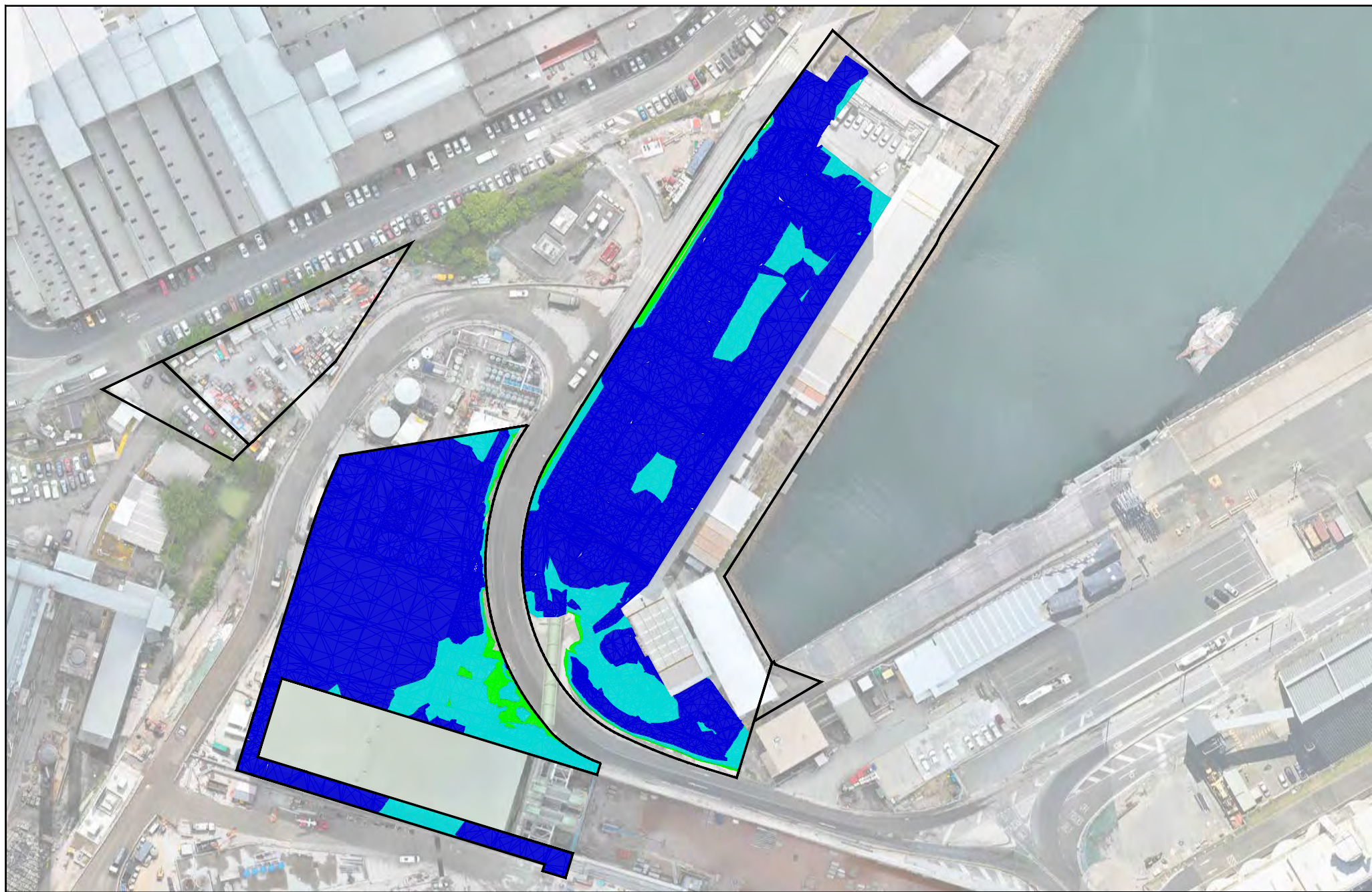
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DRAWN	DC	_____	_____	_____	_____
DESIGNED		_____	_____	_____	_____
DRG CHECK		_____	_____	_____	_____
DESIGN CHECK		_____	_____	_____	_____
APPROVED	DC	_____	_____	_____	_____

|SYDNEY METRO WEST

The Bays
 Portion 1B - Validation Report
 Marker Layer / Current Ground Level - Depth of Capping Material

FILE No:	SHEET: 01 OF 01	©
STATUS:	EDMS No:	
DRG No:	REV 01	VER 1.1



DC								DC	04/03/24
REV.									
A1 Original	Co-ordinate System: GDA2020/MGAZONE 56					Height Datum: AHD		This sheet may be	

SCALE: 1:1000

KEY

Portion 1C Boundary

Thickness < 0.10m	CUT IN VENM
Thickness 0.10m - 0.20m	
Thickness 0.20m - 0.50m	
Thickness 0.50m - 1.20m	



CLIENT:



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DRAWN DC _____

DESIGNED _____

DRG CHECK _____

DESIGN CHECK _____

APPROVED DC _____

SYDNEY METRO WEST

Portion 1C - Validation Report
Marker Layer / Current Ground Level - Depth of Capping Material

FILE No:	SHEET: 01 OF 01	VER
STATUS:	EDMS No:	
DRG No:	REV 01	VER 1.1



APPENDIX D RISK ASSESSMENT

RISK ASSESSMENT

Asbestos Exposure Risks

Asbestos-related diseases are mainly cancers of the lungs, cancers of the chest lining (mesothelioma) and asbestosis, which is a non-cancerous condition. The lower the level of exposure to asbestos the lower the level of risk.

SafeWork NSW summarises the human health risks of asbestos in soil in Managing asbestos in or on soil (WorkCover, 2014).

Exposure likelihood is related to:

- The potential for asbestos containing materials (ACM) to release fibres;
- Whether ACM is covered or contained; and
- Operational control measure and PPE applied to limit generation and inhalation of fibres.

Non-friable asbestos in sound condition represents a lower human health risk than friable asbestos or damaged/crumbling non-friable asbestos. Both friable asbestos and damaged non-friable asbestos have the potential to generate or release free fibres which require management to minimise the release of asbestos fibres into the air where they can potentially be inhaled.

The friable or bonded nature of asbestos fragment materials was clarified by SafeWork NSW in their documentation How to Safely Remove Asbestos Code of Practice (SafeWork NSW, 2016). The definitions of friable and non-friable asbestos provided in that document are as follows:

- Friable Asbestos: material that is in a powder form or that can be crumbled, pulverised or reduced to a powder by hand pressure when dry, and contains asbestos; and
- Non-Friable Asbestos: material containing asbestos that is not friable asbestos, including material containing asbestos fibres reinforced with a bonding compound (also known as bonded asbestos).

The friable or bonded nature of asbestos fragment materials was clarified by the ASC NEPM as follows:

- Bonded ACM: ACM which is in sound condition and where the asbestos is bound in a matrix such as cement or resin (e.g. asbestos fencing and vinyl tiles). Bonded ACM refers to, in this instance, material that cannot pass a 7-mm x 7 mm sieve;
- Bonded Fibrous Asbestos: friable asbestos material and includes severely weathered cement sheet, insulation products and woven asbestos material. This material is in a degraded condition such that it can be broken or crumbled by hand pressure; and
- Asbestos Fines: asbestos fines (AF) includes free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7-mm x 7 mm sieve.

Chemical Exposure Risks

The primary chemical contaminants of concern associated with the soil underlying Portion 1B & 1C were Total Recoverable Hydrocarbons (TRH), benzene and benzo(a)pyrene.

TRH

TRH is a term used to describe a large family of several hundred chemical compounds that originally come from crude oil. TRH is a mixture of chemicals, but they are all made mainly from hydrogen and carbon, called hydrocarbons. Some chemicals that may be found in TRH are hexane, jet fuels, mineral oils, benzene, toluene, xylenes, naphthalene, and fluorene, as well as other petroleum products and gasoline components. However, it is likely that samples of TRH will contain only some, or a mixture, of these chemicals.

Elevated TRH concentrations identified within the subsurface of The Bays Construction Site, including Portion 1B & 1C, comprised light to mid-fraction hydrocarbons, specifically TRH C6-C34.

Some TRH compounds can affect the human central nervous system. One compound can cause headaches and dizziness at high levels in the air, while another can cause a nerve disorder called "peripheral neuropathy" consisting of numbness in the feet and legs. Other TRH compounds can cause effects on the blood, immune system, lungs, skin, and eyes.

TRH may enter the environment through accidents, from industrial releases, or as by-products from commercial or private uses. Human exposure to TRH mainly results from:

- Breathing air at petrol stations, using chemicals at home or work, or using certain pesticides;
- Drinking water contaminated with TRH;
- Working in occupations that use petroleum products;
- Living in an area near a spill or leak of petroleum products; and
- Touching soil or water contaminated with TRH.

Benzene

Benzene occurs naturally in crude oil, and can be formed from natural processes, such as volcanoes and forest fires.

The primary man-made releases of benzene are through emissions from motor vehicles and aircrafts, and cigarette smoke. Benzene is used mainly as a starting material in the manufacture of other chemicals, including plastics, lubricants, rubbers, dyes, detergents, drugs, and pesticides. In the past it was also commonly used as an industrial solvent.

The most common sources of human exposure to benzene are from breathing contaminated air, particularly in areas of heavy motor vehicle traffic and petrol stations, and through cigarette smoke. Benzene can also be absorbed through the skin during contact with a source such as gasoline, but this is less common as liquid benzene evaporates quickly.

Exposure to benzene can cause drowsiness and fatigue, dizziness, headaches, tremors, confusion, and unconsciousness. Long term exposure to benzene can cause cancer and leukaemia.

Benzo(a)pyrene

Benzo[a]pyrene is one of a large number of polycyclic aromatic hydrocarbons (PAHs) that are formed during the incomplete combustion of organic matter. Benzo(a)pyrene can result from burning of wood and coal, operation of cars, trucks and other vehicles, and can be formed from natural processes such as volcanoes and forest fires.

The most common sources of human exposure to benzo(a)pyrene are from breathing contaminated air, particularly in areas of heavy motor vehicle traffic, in coking, coal-tar and asphalt production plants, and from inhalation of cigarette smoke. Benzo[a]pyrene can also be absorbed through the skin or ingested.

Exposure to benzo(a)pyrene can cause a skin rash or eye irritation with redness and/or a burning sensation. Exposure to sunlight and the chemical together can increase these effects. Long term exposure to benzo(a)pyrene can cause cancer.

Lead

Lead is a naturally occurring toxic metal found in the Earth's crust. Sources of environmental contamination include mining, smelting, manufacturing and recycling activities, and, in some countries, the continued use of leaded paint and leaded aviation fuel.

Common sources of human exposure to lead are from inhalation of lead particles generated by burning materials containing lead, for example during smelting, recycling, stripping leaded paint and using leaded aviation fuel; and ingestion of lead-contaminated dust, water (from leaded pipes) and food (from lead-glazed or lead-soldered containers).

Exposure of children to lead may result in behaviour and learning problems, lower IQ and hyperactivity, slowed growth, hearing problems and anaemia. Adults exposed to lead can suffer from cardiovascular effects including increased blood pressure and incidence of hypertension, decreased kidney function, and reproductive problems.

Source, Pathway, Receptor Linkages

Links between sources, pathways and receptors for contamination present on-site are summarised in the following table.

Potential Receptors	Potential Exposure Pathway	Potential Exposure Risk to Receptor
Portion 1B & 1C users / owners / visitor	Nil – there are no clear pathways for exposure to contaminated materials, unless intrusive works are being carried out to depths sufficient to breach the marker layers underlying the capping material. Where intrusive works are being carried out to depths sufficient to breach the marker layers, site users have the potential to be exposed to contamination through direct contact/ingestion with contaminated soil or inhalation of asbestos fibres within soils underlying the capping layers.	No Yes – managed via control measures set out in this LTEMP
Maintenance / construction workers	Nil – there are no clear pathways for exposure to contaminated materials, unless intrusive works are being carried out to depths sufficient to breach the marker layers underlying the capping material. Where intrusive works are being carried out to depths sufficient to breach the marker layers, Portion 1B & 1C owners / users have the potential to be exposed to contamination through direct contact/ingestion with contaminated soil/groundwater or inhalation of asbestos fibres within soils underlying the capping layers.	No Yes – managed via control measures set out in this LTEMP
General public	Nil – there are no clear pathways for exposure to contaminated materials, unless intrusive works are being carried out to depths sufficient to breach the marker layers underlying the capping material.	No
Ecological receptors	Aquatic organisms have the potential to be exposed to contamination through direct contact/ingestion with contaminated groundwater within groundwater leaving Portion 1B & 1C.	Yes; however the likelihood for migration of shallow soil contamination to groundwater or surface water is significantly reduced following capping construction.

APPENDIX E DECONTAMINATION MEASURES

E1. DECONTAMINATION

In the event that excavation works extend through the capping and marker layers (disturbing underlying, potentially contaminated fill material or works are undertaken within the residual contaminated areas surrounding historical investigation locations C29 and E64 (refer to **Figure 3b, Appendix A**), decontamination measures as outlined below must be adhered to.

E1.1 PERSONAL DECONTAMINATION

Issue	Appropriate hygiene and decontamination assists with minimising worker exposure and the transportation of potentially contaminated materials from work areas to more sensitive environments.
Criteria	No contaminated clothing or PPE to leave the work areas.
Controls	1. Eating, drinking, chewing gum and smoking will be prohibited at all times whilst working in the vicinity of the containment cell. 2. All individuals working at Portion 1B & 1C will pass through a decontamination area prior to exiting work areas in accordance with How to Safely Remove Asbestos Code of Practice (SafeWork NSW, 2022). All outer work material will be physically removed from personnel prior to exiting work areas. 3. Remain in full PPE in work areas at all times.

E1.2 VEHICLE DECONTAMINATION

Issue	Appropriate vehicle and equipment decontamination assists with minimising worker exposure and the transportation of potentially contaminated materials from work areas to more sensitive environments.
Criteria	No contaminated vehicle or equipment to leave the work areas.
Controls	1. Trucks and equipment will remain within the works area until the completion of works. Vehicles will not traffic between work areas and other areas of Portion 1B & 1C, including lunch areas, car parks, etc. 2. Truck cleaning areas will be used to wash down all vehicles potentially coming into contact with contaminated soil when leaving all remediation or works areas. The surface of internal access roads carrying vehicular traffic will be kept clean. Prior to discharge, the water will be sampled and analysed in accordance with the relevant requirements of the approved discharge consent. Following discharge of wheel wash water, the sediment retained at the base of the wheel wash will be sampled and disposed off-site in accordance with the Waste Classification Guidelines (NSW EPA, 2014). 3. Vehicles carrying fill materials sourced from Portion 1B & 1C will at all times be covered with an "enviro-tarp" or similar impervious material to prevent the escape of dust or other material. 4. A log of all trucks removing fill material from Portion 1B & 1C will be kept in a Truck Log book.



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