Site Audit Report

St Mary's International Freight Terminal, 2 Forrester Road, St Mary's NSW
MP162

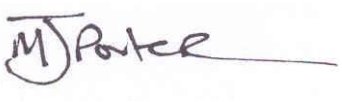
12 November 2021

Document Information

Site Audit Report,
St Mary's International Freight Terminal, 2 Forrester Road, St Mary's NSW
Audit Number: MP162

Prepared by:
Senversa Pty Ltd
ABN: 89 132 231 380
Level 24, 1 Market Street, Sydney, NSW 2000
tel: + 61 2 8252 0000; fax: + 61 3 9606 0074
www.senversa.com.au

Prepared for:
Guy Evans of Urbanco, on behalf of
Pacific National Pty Ltd
Level 16/15 Blue Street, North Sydney NSW 2060



EPA Accredited Site Auditor 0803: Melissa Porter

Disclaimer and Limitations:

This document is confidential and has been prepared by Senversa for use only by its client and for the specific purpose described in our proposal which is subject to limitations. No party other than Senversa's client may rely on this document without the prior written consent of Senversa, and no responsibility is accepted for any damages suffered by any third party arising from decisions or actions based on this document. Matters of possible interest to third parties may not have been specifically addressed for the purposes of preparing this document and the use of professional judgement for the purposes of Senversa's work means that matters may have existed that would have been assessed differently on behalf of third parties.
Senversa prepared this document in a manner consistent with the level of care and skill ordinarily exercised by members of Senversa's profession practicing in the same locality under similar circumstances at the time the services were performed.
Senversa requires that this document be considered only in its entirety and reserves the right to amend this report if further information becomes available.
This document is issued subject to the technical principles, limitations and assumptions provided in **Section 16.0.**

Senversa acknowledges the traditional custodians of the land on which this work was created and pay our respect to Elders past and present.

Senversa is an accredited BCorp.

Contents

List of Acronyms

Acronym	Definition
ACL	Added contaminant limit
ACM	Asbestos containing material
AF	Asbestos Fines
AHD	Australian Height Datum
AS	Australian Standard
AST	Above ground storage tank
ANZECC	Australian and New Zealand Environment and Conservation Council
BaP	Benzo(a)pyrene
BH	Borehole
BTEX	Benzene, toluene, ethylbenzene, xylenes
COC	Chain of custody
CoPC	Contaminant of potential concern
CSM	Conceptual site model
DPIE	Department of Planning, Industry and Environment
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
EIL	Ecologically based investigation level
EMP	Environmental Management Plan
EPA	Environment Protection Authority
ESL	Ecological screening level
FA	Fibrous Asbestos
GIL	Groundwater Investigation Level

Acronym	Definition
ha	Hectare
HIL	Health-based investigation level
HSL	Health screening level
km	Kilometres
LCS	Laboratory Control Sample
LNAPL	Light non-aqueous phase liquid
LOR	Limit of reporting
m	Metre
m3	Cubic metres
m AHD	Metres Australian Height Datum
m bgl	Metres below ground level
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Ni: Nickel, Pb: Lead, Zn: Zinc, Hg: Mercury
mg/kg	Milligrams per kilogram
mg/L	Milligrams per litre
ML	Management Limits
MS	Matrix Spike
MW	Monitoring well
NAPL	Non aqueous phase liquids
NATA	National Association of Testing Authorities
NC	Not Calculated
ND	Not Detected
NEPC	National Environment Protection Council

Acronym	Definition
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NL	Non-Limiting
n	Number of Samples
OCP	Organochlorine Pesticides
OPP	Organophosphate Pesticides
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated Biphenyl
PFAS	Per-and poly-fluoroalkyl substances
PID	Photo-ionisation detector
PQL	Practical Quantitation Limit
QA	Quality assurance
QC	Quality control
RAP	Remedial Action Plan
RPD	Relative percentage difference

Acronym	Definition
SAQP	Sampling Analysis and Quality Plan
SAR	Site Audit Report
SAS	Site Audit Statement
SEPP	State Environment Protection Policy
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
UCL	Upper Confidence Limit
USEPA	United States Environment Protection Agency
UST	Underground storage tank
µg/kg	Micrograms per kilogram
µg/L	Micrograms per litre
VOC	Volatile organic compound
%	per cent
-	On tables is "not calculated", "no criteria" or "not applicable"

1.0 Introduction and Objectives

A site contamination audit has been conducted in relation to a portion of St Mary's Intermodal (road and rail) Terminal and container park, 2 Forrester Road, St Marys NSW 2760.

The Audit was conducted to provide an independent review by an EPA Accredited Auditor of whether the audit areas are suitable for commercial/industrial land use as defined in Section 4 (1) (b) (iii) of the NSW Contaminated Land Management Act 1997 (the CLM Act).

1.1 Planning Conditions

Development consent (SSD 7308 issued on 7/5/2020, and subsequent approved modifications) was granted by the Minister for Planning and Public Spaces for the construction and operation for the St Mary's Intermodal (road and rail) Terminal and container park. The consent was subject to a number of requirements associated with site contamination and the requirement of a Site Audit Statement:

> ***"Site Contamination***
>
> *D25. Remediation approved as part of this development consent must be carried out in accordance with the Remediation Action Plan – Stage 1 St Mary's Intermodal Freight Terminal, prepared by Douglas Partners dated 12 August 2019. Any update to the Remediation Action Plan must be approved by a NSW EPA accredited Site Auditor.*
>
> ***Site Audit Statement***
>
> *D26. Prior to the commencement of operation, the Applicant must submit a Site Audit Report and Section A Site Audit Statement for the relevant part of the site, being land within the 'site boundary' as defined in the Remediation Action Plan – Stage 1 St Mary's Intermodal Freight Terminal, prepared by Douglas Partners dated 12 August 2019 and marked in Appendix B of that document. The following applies regarding the Site Audit Statement:*
>
> *(a) the Applicant must engage a NSW EPA accredited Site Auditor;*
>
> *(b) the Applicant must adhere to the management measures in the Remediation Action Plan approved by the Site Auditor;*
>
> *(c) if work is to be completed in stages, the Site Auditor must confirm satisfactory completion of each stage by the issuance of Interim Audit Advice/s;*
>
> *(d) prior to commencement of operation, the Applicant must obtain a Section A1 Site Audit Statement – or a Section A2 Site Audit Statement accompanied by an Environmental Management Plan – from a NSW EPA accredited Site Auditor and submit it to the Planning Secretary and Certifier for information. The Site Audit Statement must certify that the site is suitable for the proposed commercial/industrial land use; and*
>
> *(e) prior to operation, the Applicant must obtain confirmation from the Certifier in writing that the requirement of condition D26(c) has been met."*

The Audit was initiated to comply with relevant conditions of the SSD 7308 approval and is therefore a statutory audit. Notification of the Site Audit (MP162) was forwarded to the EPA on 23 October 2020 (EPA Ref: DOC20/885744).

1.2 Scope of the Audit

Details of the Audit are:

Requested by:	Guy Evans of Urbanco, on behalf of Pacific National Pty Ltd
Request/Commencement Date:	17 August 2020
Auditor:	Melissa Porter
Accreditation No.:	0803

The scope of the Audit included:

- Review of the following reports:
  - 'Preliminary Site Contamination Investigation, Proposed St Marys Freight Hub – 2 Forrester Road, St Mary's, NSW', 1 March 2019, prepared by DP. (DP, 2019a)
  - 'Supplementary Contamination Assessment, Proposed St Marys Freight Terminal – Lot 2 Forrester Road, St Mary's, NSW', 17 April 2019, prepared by DP. (DP, 2019b)
  - 'Further Asbestos Investigation St Mary's Intermodal Freight Terminal, Lot 2 Forrester Road, St Mary's, NSW', 27 June 2019, prepared by DP. (DP, 2019c)
  - 'Remediation Action Plan, Stage 1 – St Mary's Intermodal Freight Terminal, Lot 2 Forrester Road, St Mary's, NSW', 9 October 2020, prepared by DP. (DP, 2020)
  - 'Remedial Works Plan Asbestos Impacted Fill (PAEC1) and Stockpile SP4 Management - Draft', 15 April 2021 prepared by EnviroScience Solutions (EnviroScience). (EnviroScience, 2021)
  - 'Sampling Analysis and Quality Plan, St Marys Intermodal', 24 May 2021 prepared by Harwood Environmental Consultants (HEC). (HEC, 2021a)
  - 'Validation Report St Marys Intermodal', 11 November 2021 prepared by HEC. (HEC, 2021b)
  - 'Long Term Environmental Management Plan', 11 November 2021 prepared by HEC (HEC, 2021c).
- A site visit by the Auditor on 18 February 2021 and 10 November 2021.
- Discussions with Urbanco, McMahon Services (remediation contractor), EnviroScience and HEC (environmental consultants).

All reporting and investigation activities undertaken prior to and including preparation of the RAP were completed prior to the Auditor's engagement and no discussion with the respective consultant's was undertaken on these works/documents.

In addition to the primary reports listed in **Section 1.1**, the Auditor was provided with the following historical reports:

- 'Phase 1 Environmental Site Assessment 55-67 and 69-81 Lee Holm Drive, St Marys', April 2005, prepared by ERM. (ERM, 2005a)
- 'Draft Validation Report 55-67 and 69-81 Lee Holm Drive, St Marys', December 2005, prepared by ERM. (ERM, 2005b).

The reports were considered for context and background information, and it is noted that no remediation-validation work was reported to have been undertaken within the site audit areas. These historical reports have not been considered in any further detail, with reports listed in **Section 1.1** being of more relevance to the site audit areas.

1.3 Audit Site

A Preliminary Site Contamination Investigation (PSI) was undertaken by Douglas Partners (DP) in 2019 followed by intrusive investigations (soil and groundwater)by DP across the wider Intermodal site (DP 2019a, 2019b, 2019c). A Remediation Action Plan (RAP) was prepared (DP, 2020) to address known asbestos impacted fill soil (PAEC1) requiring remediation in the northern section of the site to be placed in a containment cell area and a stockpile (SP4) due to concentrations of pesticides in excess of the Scheduled Chemical Waste Chemical Control Order 2004.

The boundaries of the site audit areas (referred to as PAEC1 and adjoining roadway to the east and Containment Cell 1 and 2) are defined by survey within the wider site. The location of the audit areas is shown in **Attachment 2, Appendix A,** with surveys provided as **Attachment 3 and 4, Appendix A.** The area defined as 'Area North and West of PAEC1' does not form part of the audit area.

To support the RAP, a Remedial Works Plan (RWP) was developed by EnviroScience (2021) and a Sampling Analysis and Quality Plan (SAQP) was developed by HEC to provide supporting remediation and characterisation/validation requirements. Remediation-validation works were completed and a Validation Report and Long-Term Environmental Management Plan were prepared.

While stockpile SP4 was identified as a 'relevant part of the site' in the RAP and captured in Consent Condition D26, it has not been included in the site audit area with consideration to the following:

- Limited initial assessment of stockpile SP4 was completed by DP (2019b) prior to preparation of the RAP with only four samples subject to analysis for a broad range of contaminants of concern, less than the minimum number of samples recommended for stockpiles of approximately 1500 m^3 under NEPM (2013) Schedule B2. The RAP noted that a concentration of pesticide (DDT) was in excess of the Scheduled Chemical Waste criterion of 2 mg/kg. As such, remediation was considered necessary with this material to be placed in an on-site containment cell.
- In March and April 2021, to supplement initial characterisation data collected by DP, validation consultant HEC advanced test pits across SP4 to provide additional characterisation data with a total of 23 primary fill samples collected for laboratory analysis for TRH (total recoverable hydrocarbons), BTEX (Benzene, Toluene, Ethylbenzene, Xylenes), PAH (polycyclic aromatic hydrocarbons), OCP (organochlorine pesticides), OPP (organophosphorus pesticides), PCB (polychlorinated biphenyl), heavy metals and asbestos analysis.
- HEC concluded:
    - SP4 material meets General Solid Waste classification (reporting the 95% Upper Confidence Limit (UCL) for DDT dataset is less than the Scheduled Chemical Waste criterion of 2 mg/kg).
    - Remediation of SP4 is not required under commercial/industrial land use.

The Auditor has considered the reported analytical data and considers the updated waste classification to be acceptable.

As Stockpile SP4 was deemed not to require remediation by HEC and remains in in-situ, SP4 has not been considered further in the Audit.

2.0 Site Details

2.1 Location

The site locality is shown on **Attachment 1, Appendix A**.

The site details are as follows:

Street address:	2 Forrester Road, St Mary's NSW
Identifier:	Part Lot 2 DP876781, Part Lot 3 DP876781
Local Government:	Penrith City Council
Owner:	Pacific National.
Site Area:	PAEC1 and roadway – 1,320 m^2
	Containment Cell 1 - 200 m^2
	Containment Cell 2 - 1,000 m^2.

The boundaries of the site audit areas (referred to as PAEC1 and adjoining roadway to the east and Containment Cell 1 and 2) are defined by survey within the wider site. The location of the audit areas is shown in **Attachment 2, Appendix A,** with surveys provided as **Attachment 3 and 4, Appendix A.** The area defined as 'Area North and West of PAEC1' does not form part of the audit area.

2.2 Zoning

The current zoning of the site is IN1 - General Industrial (Penrith City Council Local Environment Plan 2010) (EnviroScience, 2021).

2.3 Adjacent Uses

The audit areas lie within the wider Intermodal site which is located in a mixed land use area, with the following surrounding land uses (Enviroscience, 2021):

North: Vacant land, and commercial/industrial land use.

East: Commercial/industrial land use.

South: Rail line, recreational open space areas and residential land use.

West: Rail line, South Creek, and recreational open space beyond South Creek.

Enviroscience (2021) reported that nearby sensitive receptors included a tributary of South Creek (known as Little Creek) which runs through the north of the wider Intermodal site, and South Creek, located to the west of the wider Intermodal site. South Creek is located approximately 300 m to 400 m to the west of the site audit areas, while Little Creek lies to the south of PAEC 1 and north of the containment cells. DP (2019b) reported that surface water is anticipated to follow the topographical slope with some areas of the site expected to drain towards Little Creek.

2.4 Site Condition

DP (2019a) conducted a site inspection and described the wider Intermodal site as follows:

- Vacant cleared land with exposed filled surfaces, with overgrown vegetation present in some parts.
- Multiple overhead transmission lines (high and low voltage traverse the site).
- Multiple stockpiles of soil and construction material area present throughout the site.

The Auditor completed a site visit on 18 February 2021 and observed that wider Intermodal site was subject to some earthworks and remediation works had not yet commenced. A further visit was undertaken on 10 November 2021 following completion of remediation and validation works. Site development was complete with the audit areas comprising a private internal roadway and associated roadside verge (PAEC1 and adjoining roadway), a bitumen sealed carpark (Containment Cell 1) and a bitumen sealed Empty Container Park area (Containment Cell 2). Site conditions are consistent with those reported in the validation documentation.

2.5 Proposed Development

It is understood that the site is being developed as the St Marys Intermodal (road and rail) Terminal and container park.

Audit area PAEC1 and adjoining area comprises an internal private roadway and potion of the adjoining roadside verge, while Containment Cells 1 is located within a hardstand carpark. Containment Cell 2 is located with a proposed Empty Container Park area, with development of this area not yet complete at time of Audit finalisation. Development plans are attached to the SAS.

For the purposes of this Audit, the ‘commercial/ industrial use’ land use scenario will be assumed.

3.0 Site History

DP (2019a) documented a site history for the wider Intermodal site based on a review of historical title deeds, aerial photographs and historical reports.

Table 3.1 provides an overview of history title records for the audit areas.

Table 3.1: Historical Title Records (DP, 2019a and EnviroScience, 2021)

Audit area	Date	History / Activity
PAEC 1 and adjacent roadway (Lot 3 DP 976771)	1969 – 1984	Lot 3 was registered under the name of James Hardie & Coy Pty Ltd. EnviroScience (2021) noted that James Hardie manufactured and distributed asbestos building products. It's unknown if the site was used for manufacturing of these products.
	1984 – 1986	Registered under the name of Colmlee (Lands) Pty Ltd before the State Rail Authority acquired the land in 1986.
	2004	EnviroScience (2021) noted that aerial photographs indicated an area may have been used for the laydown of material, with DP (2019a) referring to PAEC1 as a "former building and stockpile footprint' area. 2005 and 2011 photographs show a series of elongated pits which may have been used for burial of material, overgrown with vegetation in later aerial photographs.
Containment cells (Lot 2 DP 976771)	1969 - 1984	Lot 2 was registered under the name of James Hardie & Coy Pty Ltd.
	1984 – 1986	The Lot was registered under the name of Colmlee (Lands) Pty Ltd.
	2002	Lot 2 was reported to be registered under the name of Freight Rail Corporation in June 2002.
	2003	Pacific National acquired the Lot in March 2003.

Historical title and aerial photograph review indicated that the site has been largely vacant (no building development of note shown on photographs), and likely used for commercial/industrial uses based upon title records and site ownership.

DP (2019a) undertook a search of the NSW EPA's public registers:

- The site is not listed in NSW EPA contaminated site register.
- No orders or notices made under the CLM Act have been issued for the site.
- There are no current environmental protection licenses or notices issued for the site under the POEO Act 1997.

DP (2019a) noted several licences and notices were issued between 2002 and 2017 for surrounding premises located between 70 m and 500 m from audit area PAEC1, all of which were located hydraulically downgradient.

DP (2019a) undertook a SafeWork NSW record search on 21 December 2018 for the wider Intermodal site. One record relating to underground and above ground storage tanks for petroleum products at Lot 2 Forrester Road between 1975 and 2000 was noted however upon review it was concluded that the record related to an nearby off-site property. With consideration, the Auditor is satisfied that there appears to be no records relating to the presence of hazardous chemical storage in the site audit areas.

The Auditor considers that the site history is broadly understood, namely industrial/commercial land uses and potential for unknown fill, both of which have the potential to cause contamination within the site audit areas. Uncertainties associated with the filling history in the site audit areas are considered to be adequately compensated for during the investigations and remediation of audit areas.

4.0 Contaminants of Concern

DP (2019a) provided a list of potential sources of contamination and associated contaminants of concern for the wider Intermodal site. Those of relevance to audit areas are included in **Table 4-1**.

Table 4-1: Contaminants of Concern

Potential Source	Potential Contaminants
On-site potential sources including former and existing building/site structures, imported filling, stockpile areas, degradation and demolition, former activities of previous registered owners James Hardie and Coy Pty Ltd	Heavy metals, TRH, BTEX, PAH, BTEX, phenols, OCP, OPP, PCB and asbestos
Off-site potential sources including associated with commercial/industrial activities.	Heavy metals, TRH, BTEX, PAH, BTEX, phenols, OCP, OPP, PCB and VOCs.

Table notes:

TRH (total recoverable hydrocarbons), BTEX (Benzene, Toluene, Ethylbenzene, Xylenes), PAH (polycyclic aromatic hydrocarbons), OCP (organochlorine pesticides), OPP (organophosphorus pesticides), PCB (polychlorinated biphenyls), VOC (volatile organic compounds).

Based on available information for the discrete audit areas, there is no indication of historic activities that included use of per-and poly-fluoroalkyl substances (PFAS) contaminants as set out in Appendix B of PFAS National Environmental Management Plan (NEMP) (2018). Remediation of the discrete audit areas was not proposed in the RAP and the Auditor agrees that assessment for PFAS contaminants is not considered warranted at these discrete areas.

The Auditor considers the sources of potential contamination and the associated contaminants have largely been identified and that the suite of analysis adopted by DP during assessment and by HEC in further characterisation/validation adequately address the site history and condition.

The Auditor notes investigation of PAEC1 by DP did not include VOC analysis in soil. Groundwater assessment across the wider Intermodal site did however include analysis for VOCs with no reported detections (refer **Section 9.0**). Field screening for potential VOCs using a calibrated photo-ionisation detector (PID) was completed during additional pre-remediation characterisation of PAEC1 and adjoining roadway with no elevated results reported. With consideration, the omission of VOC analysis in soils for PAEC1 (roadway in a commercial/industrial land use setting) is not considered to impact the outcome of the Audit.

5.0 Stratigraphy and Hydrogeology

Following a review of the reports provided, a summary of the site stratigraphy and hydrogeology was compiled as follows.

5.1 Stratigraphy

A summary of ground conditions reported is presented in **Table 5.1** and **Table 5.2**.

Table 5.1: Summary of Ground Conditions

Depth (mbgl)	Subsurface Profile
PAEC1	
0.0 – 1.5	Filling – brown silty clay with gravel encountered from surface to 1.5 m bgl. Anthropogenic material including brick fragments, ceramics, plastic and concrete were encountered in fill at many locations across PAEC1. Asbestos was observed at several test pits across the area.
1.0 – 1.5	Silty clay.
Containment Cells	
Cell 1 (Surface to depth)	Walls and floor of containment cell comprised pale yellow / grey coarse grained crushed sandstone fill material.
Cell 2 (Surface to depth)	Walls – pale yellow/grey coarse grained crushed sandstone fill material. Floor – yellow/grey natural sandy clay and yellow/orange/brown clayey sand.

mbgl – metres below ground level

DP (2019a) reviewed available published acid sulphate soil risk maps and the Australian Soil Resource Information System (ASRIS) which indicated a low probability of acid sulphate soil being present at the site.

The Auditor considers that the depth of fill and underlying stratigraphy for PAEC1 and the containment cells have been adequately characterised for the purpose of this Audit.

5.2 Hydrogeology

No registered groundwater bores were identified within a 500 m radius of the site during a search completed by DP on 30 January 2019. A total of 17 registered groundwater bore were identified within 1 km distance from the site with the depth of bores reported to range from 1.5 m to 13.5 m and standing water level ranging from 2.4 m to 7 m below ground level (m bgl).

Four groundwater monitoring wells installed by DP across the wider site (none within the audit areas) confirmed depth to groundwater ranging from 3.1 to 6.2 m below ground level (bgl) in silty clay and shale ground conditions. Groundwater was inferred to flow towards the northwest towards creek lines.

The Auditor considers that the hydrogeology at the site is sufficiently understood for the purposes of this Audit.

6.0 Evaluation of Quality Assurance and Quality Control

The Auditor has assessed the overall quality of the data by review of the information presented in the referenced reports, supplemented by field observations. The data sources are summarised in **Table 6.1.**

Table 6-1: Summary of Investigations

Investigations	Field Investigations	Analytical Data Obtained
DP (2019a)	Soil and groundwater investigation across wider Intermodal site. Locations advanced within site audit areas: • PAEC1 – two test pits (TP112 and TP113). Four groundwater monitoring wells across the site have been considered for context.	Soil - Metals, PAHs, TRH/BTEX, asbestos, OCPs/OPPs, phenols Groundwater - Metals, PAHs, TRH/BTEX, asbestos, OCPs/OPPs, phenols, PCB, VOCs, nutrients (nitrogen, ammonia, phosphorus)
DP (2019b)	Soil investigation to further assess areas of environmental concern identified during DP (2019a) across wider Intermodal site. Locations advanced within site audit areas: • PAEC1 – 19 test pits (TP201 to TP208, TP212 to TP215, TP216 to TP222).	Soil - Metals, PAHs, TRH/BTEX, asbestos, OCPs/OPPs, PCB
DP (2019c)	Soil investigation to further assess asbestos contamination identified at PAEC1. Locations advanced within site audit areas: • PAEC1 - 24 test pits (TP223 to TP246).	Asbestos

The Auditor has assessed the overall quality of the data by review of the information presented in the referenced reports, supplemented by field observations. The Auditor's assessment follows in **Tables 6.2** and **6.3**.

Table 6-2: QA/QC – Sampling and Analysis Methodology Assessment

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Data Quality Objectives (DQO) DP (2019a and 2019b) defined specific DQOs in accordance with the seven-step process outlined in NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme (3rd Ed.). DP (2019c) no specific DQOs were established for this investigation, however it was prepared in consideration of the DQOs from the previous two reports.	These were considered appropriate for the investigations conducted.

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Sampling pattern, locations, and sampling density DP (2019a): Soil investigation comprised two test pits in PAEC1. Test pits were advanced using a backhoe to maximum depths of 1.8 m bgl. A total of four samples from PAEC1 were submitted for analysis. Four groundwater monitoring wells advanced across the wider Intermodal site. No wells located within the audit areas. Monitoring wells were advanced to maximum depths of 10.5 m bgl and were located across the site to provide spatial coverage of general site conditions. DP (2019b): Soil investigation comprised the excavation of 15 test pits in PAEC1 using a backhoe to a maximum depth of 2 m bgl. DP (2019c): Soil investigation comprised the excavation of twenty-two test pits within PAEC1 to a maximum depth of 2 m bgl. Locations were visually assessed for presence of ACM, with ten locations sampled for laboratory analysis. Initial investigation locations were spaced to gain coverage of PAEC1. Further samples were targeted to areas adjacent to sample locations where asbestos was previously identified. Overall comment: PAEC 1 - across all three of the investigations, the sampling density of 39 locations over approximately 0.7 ha exceeds the minimum recommended by EPA (1995) Sampling Design Guidelines.	Acceptable. In the Auditor's opinion, the combined investigation locations adequately target area of concern (PAEC1) for the purposes of remedial planning. These investigations have been supplemented by further characterisation and validation completed as part of the remediation-validation works (refer **Section 10.0**).
Sample depths Samples were collected and analysed from a range of depths, with the primary intervals being within the shallow fill (0.0 to 1.0 mbgl).	In the Auditor's opinion, this sampling strategy was appropriate and adequate to characterise the primary material types present on site. These investigations have been further supplemented with characterisation and validation sampling as part of remediation-validation works (refer **Section 10.0**).
Well construction Groundwater: The monitoring wells were typically installed to depths of 10.5 m bgl, with screen intervals of 4 to 5 m placed in gravel. Wells were constructed of 50 mm uPVC. A bentonite seal typically 0.5 m thickness was placed above the screen and the well backfilled with soil cuttings to the ground surface. The wells were screened across water bearing silty clay and shale formations. A non-conformance was noted by DP which advised that a small quantity of duct tape was applied to the bottom of the well materials, which may impact the reported volatile and semi-volatile concentrations in the laboratory reports. Groundwater was observed at depths of 7 m at BH102 and 3.5 m at BH103 during drilling. Groundwater was not observed at other locations during drilling.	In the Auditor's opinion the well construction was acceptable. DP noted that the use of non-conforming duct tape in well construction may have potentially resulted in detections of xylene in groundwater samples. The Auditor has conservatively screened all reported concentrations against adopted assessment criteria (**Section 9.0**). No exceedances of volatile or semi-volatile fractions in excess of adopted assessment criteria were recorded.

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Sample collection method DP (2019a): Soil: samples were collected by hand using new disposable nitrile gloves for each sample. Groundwater: monitoring was completed on 10 January 2018. Wells were gauged and then sampled using low flow sampling techniques. DP (2019b): Samples were collected using disposable nitrile gloves (new glove for each sample) from the bucket of the backhoe or the shovel. Samples were collected so that only soil that had not come into contact with the bucket or shovel were collected. DP (2019c): Disposable nitrile gloves were used to collect all samples (new gloves for each sample).	Overall the sample collection method was found to be acceptable.
Decontamination procedures Soil: samples were collected by hand with new gloves used for each sample. No decontamination required. Groundwater: Dedicated sampling equipment was used for each well. New gloves were reportedly used for each new sample. No decontamination required.	Acceptable
Sample handling and containers DP (2019a): Soil and groundwater samples were placed into laboratory prepared and preserved sampling containers and chilled during storage and subsequent transport to the laboratory. The project laboratory (Envirolab) noted that excessive samples were collected for asbestos analysis and sub-sampling according to Envirolab procedures was undertaken. The laboratory noted that they could not guarantee that the sub-samples were indicative of the entire sample (batches 207928-B and 207928). Groundwater samples for heavy metals analysis were field filtered. DP (2019b): Soil samples were collected in laboratory-prepared sample jars with Teflon lined lids by hand, ensuring no headspace within the jar. All samples were labelled appropriately and placed into a cooled, insulated and sealed container for transport to the laboratory under chain of custody procedures. Samples for asbestos analysis were placed in 10L bulk bags and 500 ml plastic zip-lock bag. DP (2019c): Samples for asbestos analysis were placed in 10L bulk bags and 500 ml plastic zip-lock bag. Samples were labelled appropriately and placed into a sealed container for transport to the laboratory under chain of custody procedures.	Acceptable. The project laboratory's comment regarding excessive sample volume (DP, 2019a) has been considered however is not considered to impact upon the outcome of the Audit. The preliminary data collected by DP (2019a) has been supplemented with additional investigation/characterisation data which was acceptable for remedial planning purposes.
Chain of Custody (COC) All chain of custody documents provided	Acceptable

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Detailed description of field screening protocols DP (2019a): Soil: Field screening for volatiles was undertaken using a PID. DP reported all PID measurements were less than 10 parts per million (ppm) for all samples screened in the field. Groundwater: Field parameters were measured during well sampling and development. DP (2019b and 2019c): No field screening for volatiles was undertaken.	Acceptable. The absence of field screening is noted for DP (2019b and 2019c); however, this is considered acceptable as the primary contaminants of concern for PAEC1 is asbestos. Further characterisation of PAEC1 was completed during remediation-validation works with field screening protocols in place.
Calibration of field equipment DP (2019a): The report only indicates that the water quality meter was calibrated. There is no indication of what calibration and checks were performed during the use of other field equipment. Calibration certificates from the equipment supplier were not provided. DP (2019b and 2019c): No field equipment used.	While it is unfortunate that limited calibration information was provided in relation to field equipment, this is not considered to impact upon the outcome of the site audit and the investigation data is considered suitable for the purposes of remedial planning noting that the primary contaminant of concern for PAEC1 is asbestos, and that further characterisation/ validation sampling was undertaken for PAEC1 (refer **Section 10.0**).
Sampling logs DP (2019a): Soil: Soil logs provided within the report, indicating sample depth, PID readings (where taken) and lithology. No signs of contamination were noted. Groundwater – no light non-aqueous phase liquid (LNAPL), hydrocarbon odour or sheen reported in groundwater during sampling. Groundwater field sampling records were provided as attachment to report. Monitoring well borelogs were provided and did not record evidence of contamination. **DP (2019b)**: Soil: Soil logs were provided within the report indicating sample depth, lithology and contamination observations. Borelogs reported presence of construction debris and asbestos fragments. DP (2019c): Soil: Soil logs were provided within the report indicating sample depth, lithology and contamination observations. Borelogs reported presence of construction debris, foreign materials and asbestos fragments. No sample registers were provided in any of the DP reports.	Acceptable

Table 6.2: QA/QC – Field and Lab Quality Assurance and Quality Control

Field and Lab QA/QC	Auditor's Opinion
Field quality control samples DP (2019a): Field quality control samples including a rinsate blank (groundwater sampling event) and one intra-laboratory groundwater duplicate were collected. A trip blank and trip spike was analysed as part of the groundwater sampling event. DP (2019b): Field quality control samples included collection of four intra-laboratory duplicate samples. No trip spikes, trip blanks, or rinsate blanks were collected. Rinsate blanks were not collected as dedicated sampling equipment was used for each location. DP (2019c): No field quality control samples were collected as asbestos only assessment being undertaken.	Overall acceptable taking into consideration that the primary contaminant of concern is asbestos (for PAEC1) and non-dedicated equipment was utilised in all soil sampling. It is noted that this initial investigation phase of work is supplemented with later characterisation/validation where further intra- and inter-laboratory duplicates were collected.

Field and Lab QA/QC	Auditor's Opinion
Field quality control results DP (2019a): Reported detections of metals in the rinsate sample which may indicate some potential for cross-contamination during sampling. DP noted that heavy metal concentrations in groundwater were associated with background concentrations. RPDs for the intra-laboratory water duplicate sample for four metals (Cu, Pb, Ni and Zn) ranged from 33 to 61%. The exceedance of the acceptance limit was reported to be associated with the heterogeneous nature of the fill soils. DP (2019b): Reported RPDs for the intra-laboratory soil duplicates analysed for eight metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn) ranged from 0 to 139%. Several exceedances to the acceptance criteria were recorded, which were attributed to low levels of metals detected close to the limit of reporting and/or the heterogeneity of the fill soil. DP (2019c): No duplicates or field quality samples were collected.	Overall, in the context of the dataset reported, the elevated RPD results are not considered significant, and the field quality control results are acceptable. The Auditor has considered the highest of the results in our assessment.
NATA registered laboratory and NATA endorsed methods Laboratories used for primary samples included: Envirolab. Laboratory certificates were NATA stamped. No secondary laboratories were used for any of the investigations.	Acceptable.
Analytical methods Analytical methods were included in the laboratory test certificates. Envirolab provided brief method summaries of in-house NATA accredited methods used based on USEPA and/or APHA methods (excluding asbestos) for extraction and analysis in accordance with the NEPM (2013). Asbestos identification was conducted by Envirolab using polarised light microscopy with dispersion staining by method AS4964-2004 Method for the Qualitative Identification of Asbestos Bulk Samples.	Acceptable. The analytical methods are considered acceptable for the purposes of the site audit, noting that the AS4964-2004 is currently the only available method in Australia for analysing asbestos. DOH (2009) and enHealth (2005) state that "until an alternative analytical technique is developed and validated the AS4964-2004 is recommended for use".
Holding times DP (2019a): Reported exceedance of holding time for some organic analysis for two soil sample batches (207936-A and 207928-B). DP noted that results were consistent with other sample batches analysed within holding time. Batch 207928-B relates to samples from TP/BH112 and TP/BH113 from PAEC1. All groundwater samples were analysed within the recommended holding times. DP (2019b): Review of the COCs and laboratory certificates indicate that the holding times had been met. DP (2019c): Only asbestos was analysed which has no set holding time.	Acceptable. The reported holding time outlier was not considered to impact upon the outcome of the Audit as it only relates to two initial samples collected at PAEC1. The investigation data is considered suitable for the purposes of remedial planning. Subsequent characterisation/validation sampling has included a broad suite of contaminants of potential concern reported broadly consistent results to initial investigation of the area (**Section 10.0**).

Field and Lab QA/QC	Auditor's Opinion
Practical Quantitation Limits (PQLs) Soil: PQLs were less than the threshold criteria for the contaminants of concern. Groundwater: The following trigger values were less than the PQLs: • Mercury 0.1 mg/L, trigger value 0.06 mg/L. • Anthracene 1 µg/L, trigger value 0.01 µg/L. • Phenanthrene 1 µg/L, trigger value 0.6 µg/L. • Benzo(a)pyrene 1 µg/L, trigger value 0.1 µg/L. • Various OCPs. • PCB aroclors 2 µg/L, trigger value 0.01 and 0.3 µg/L.	Soil: Overall the soil PQLs are acceptable. Asbestos: Where presence/absence analysis was undertaken, in the absence of any other validated analytical method, the detection limit for asbestos is considered acceptable. A positive result would be considered to exceed the "no asbestos detected in soil" criteria, providing this is applied within a weight of evidence approach to assess the significance of the exceedance, accounting for the history of the site and frequency of the occurrence. Groundwater: The elevated PQLs were only marginally elevated above the trigger values and in the context of the results reported and observed site conditions for each of the audit areas, these discrepancies are not considered to materially affect the outcome of the Audit.
Laboratory quality control samples Laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks, internal standards and duplicates were undertaken by the laboratory.	Acceptable
Laboratory quality control results DP (2019a): The results of laboratory quality control samples were generally within appropriate limits, with the following exceptions: • RPD for zinc was outside of the control limit and a triplicate was analysed by the laboratory. Both reported concentrations were less than the adopted assessment criteria. DP (2019b): The results of laboratory quality control samples were generally within appropriate limits, with the following exceptions: • Laboratory control samples experienced matrix interference in several results. • RPD for PAH was outside of the acceptance criteria of 50%. • RPD for chromium and copper was outside of the control limits of 50% a triplicate was analysed by the laboratory. Both reported concentrations were less than the adopted assessment criteria. • Spike recovery for copper was outside of the laboratory acceptance limit. • RPD for zinc was outside of the acceptance criteria therefore a triplicate result was issued as a laboratory sample. DP (2019c): Only ACM was analysed therefore there are no laboratory quality control results to report.	In the context of the dataset reported and the heterogeneous soils analysed, the elevated RPDs are not considered significant, and the laboratory quality control results are acceptable.
Data Quality Indicators (DQI) and Data Evaluation (completeness, comparability, representativeness, precision, accuracy) DP (2019a and 2019b): Predetermined DQIs were set in the reports for laboratory analysis including blanks, replicates, duplicates, laboratory control samples, matrix spikes and surrogate spikes. These were discussed with regard to the five category areas. The following data quality conclusions were reported: DP (2019a) concluded "…*it is considered that an acceptable level of field and laboratory precision was achieved and that the field/laboratory data sets are reliable and useable for this assessment*". DP (2019b) concluded *"A review of the adopted QA/QC procedures and results indicates that the DQIs have generally been met with compliance and a minor partial-compliance. On this basis, the sampling and laboratory methods used during the investigation were found to meet DQOs for this project".* DP (2019c) did not define DQIs and did not undertake a formal QA/QC data evaluation against the five category areas.	An assessment of the data quality with respect to the five category areas has been undertaken by the Auditor and is summarised below.

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

- Samples were collected using suitable procedures, and laboratory blank / spike samples were all considered acceptable.
- While minor variation in field duplicates, laboratory control samples and omissions in some field documentation were identified, the results were generally consistent indicating the data is likely to be representative of the overall conditions within the site audit areas.
- Field duplicate samples (where used) generally produced acceptable RPDs and identified heterogeneity in soils. Primary laboratories have provided sufficient information to conclude that the dataset was precise.
- The primary laboratory provided sufficient information to conclude that data are of sufficient precision. In assessment of the dataset, the Auditor adopted the higher of the duplicate results in their assessment and interpretation of contamination.
- Overall, the dataset is considered to adequately characterise the site condition and was relied upon for this Audit.

7.0 Environmental Quality Criteria

The Auditor has assessed the results against Tier 1 criteria from National Environmental Protection Council (NEPC) National Environmental Protection (Assessment of Site Contamination) Measure 1999, as Amended 2013 (NEPM, 2013). Other guidance has been adopted where NEPM (2013) is not applicable, or criteria are not provided. Based on the proposed development, the criteria for 'commercial/industrial land use' have been referred to.

The Auditor has assessed the **soil** data provided with reference to Tier 1 (screening) criteria from the following:

- Human Health Assessment
    - Health Based Investigation Levels (HIL D).
    - Soil Health Screening Levels (HSL D) for Vapour Intrusion. The most conservative criteria were adopted i.e. assumed depth to source < 1 m and sand.
    - CRC CARE (2011) Direct Contact (HSL D and intrusive maintenance worker)
    - Asbestos Health Screening Levels (HSL D).
- Ecological Assessment
    - Ecological Screening Levels (ESL Urban Residential) assuming coarse soil.
    - Ecological Investigation Levels (EIL Urban Residential). In the absence of site-specific soil data on pH, clay content, cation exchange capacity and background concentrations, the published range of the added contaminant values have been applied as an initial screen.
- Management Limits (ML Commercial/Industrial) assuming coarse soil.
- Aesthetics
    - The Auditor has considered the need for remediation based on the 'aesthetic' contamination as outlined in the NEPM (2013).

Criteria for **asbestos** are provided in the NEPM (2013). Criteria considered by the Auditor are for commercial/industrial use and are summarised as follows:

- Less than 0.05% asbestos as asbestos containing material (ACM).
- Less than 0.001% asbestos as asbestos fines (AF) or fibrous asbestos (FA).
- No visible asbestos on the surface.

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

- Human Health Assessment
    - NEPM (2013) Groundwater Health Screening Levels (HSL A and HSL B) for vapour intrusion (sand, 2 to <4 m).
- Ecological Assessment:
    - ANZG (2020) guidelines for freshwater water quality. ANZG (2020) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. The Default Guideline Values (DGV) provided are concentrations of toxicants that should have no significant adverse effects on the aquatic ecosystem. The marine/fresh water 95% level of protection was adopted. Some have been modified based on bioaccumulation or acute-toxicity or potential toxicity to particular species.
    - California Regional Water Quality Board (CRWB, 2016) aquatic habitat screening levels have been adopted for TRH.

It is assumed that the proposed redevelopment will include reticulated potable water supply and beneficial reuse of groundwater will not occur. If beneficial groundwater use is proposed, appropriate testing should be undertaken to confirm its suitability for use.

8.0 Evaluation of Soil Analytical Results

Soil samples were analysed for a variety of contaminants including petroleum hydrocarbons, PAHs, asbestos, OCP/OPP, PCB and heavy metals. The analytical results have been assessed against the environmental quality criteria in **Table 8-1**. In addition, a total of 31 samples were subject to field quantification and laboratory analysis for asbestos, with **Table 8-2** providing a summary of those reporting detections of asbestos. Soil sampling locations are shown as **Attachment 5, 6** and **7**, **Appendix A**.

Table 8-1: Evaluation of Soil Analytical Results – Summary Table (mg/kg)

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013) and Management Limits
PAEC1 investigation results (DP, 2019a, 2019b, 2019c)					
Benzene	13	0	<PQL	0 above HSL D 0-1 m, sand of 3 mg/kg	0 above ESL (commercial/industrial) (coarse) of 75 mg/kg
Toluene	13	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 135 mg/kg
Ethyl benzene	13	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 165 mg/kg
Total Xylenes	13	0	<PQL	0 above HSL D 0-1 m, sand of 230 mg/kg	0 above ESL (commercial/industrial) (coarse) of 180 mg/kg
F1 (TPH C6–C10 minus BTEX)	13	0	<PQL	0 above HSL D 0-1 m, sand of 260 mg/kg	0 above ESL (commercial/industrial) (coarse) of 215 mg/kg 0 above ML (commercial/industrial) of 700 mg/kg
F2 (TPH >C10–C16 minus naphthalene)	13	**0**	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 170 mg/kg 0 above ML (commercial/industrial) of 1,000 mg/kg
TRH C16-C34	13	0	<PQL	-	0 above ESL (commercial/industrial) (coarse) of 1,700 mg/kg 0 above ML (commercial/industrial) of 3,500 mg/kg

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013) and Management Limits
TPH C34-C40	13	0	<PQL	-	0 above ESL (urban residential) (coarse) of 3,300 mg/kg 0 above ML (commercial/industrial) of 10,000 mg/kg
DDT+DDE+DDD	13	2	3	0 above HIL D of 3,600 mg/kg	-
DDT	13	2	3	-	0 above EIL of 640 mg/kg
Aldrin + Dieldrin	13	0	<PQL	0 above HIL D of 45 mg/kg	-
Chlordane	13	0	<PQL	0 above HIL D of 530 mg/kg	-
Endosulfan	13	0	<PQL	0 above HIL D of 2,000 mg/kg	-
Endrin	13	0	<PQL	0 above HIL D of 100 mg/kg	-
Heptachlor	13	0	<PQL	0 above HIL D of 50 mg/kg	-
HCB	13	0	<PQL	0 above HIL D of 80 mg/kg	-
Methoxychlor	13	0	<PQL	0 above HIL D of 2,500 mg/kg	-
Chlorpyrifos	13	0	<PQL	0 above HIL D of 2,000 mg/kg	-
PCBs	13	0	<PQL	0 above HSL D 0-1 m, sand of 7 mg/kg	-
Naphthalene (PAH)	13	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above Generic ESL (commercial/industrial) of 370 mg/kg
Benzo(a)pyrene	13	12	1.2	-	0 above ESL (commercial/industrial) (coarse) of 1.4 mg/kg
BaP TEQ	13	2	2	0 above HIL D 40 mg/kg	-
Total PAHs	13	12	21	1 above HIL D 4,000 mg/kg	-
Arsenic	11	7	8	0 above HIL D 3,000 mg/kg	0 above Generic EIL (commercial/industrial of 160 mg/kg
Cadmium	13	0	<PQL	0 above HIL D 900 mg/kg	-
Chromium	13	13	36	0 above HIL D 3,600 mg/kg	0 above most conservative ACL (commercial/industrial) of 310 mg/kg

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013) and Management Limits
Copper	13	13	110	0 above HIL D 240,000 mg/kg	**1 above most conservative ACL (commercial/industrial) of 85 mg/kg**
Lead	13	13	96	0 above HIL D of 1,500 mg/kg	0 above Generic ACL (commercial/industrial) of 1,800 mg/kg
Mercury	13	0	<PQL	0 above HIL D 730 mg/kg	-
Nickel	13	13	26	0 above HIL D 6,000 mg/kg	0 above most conservative ACL (commercial/industrial) of 55 mg/kg
Zinc	13	13	360	0 above HIL D 400,000 mg/kg	**5 above most conservative ACL (commercial/industrial) of 110 mg/kg**
Asbestos ID in soil	23	2	Present	-	-

n	number of samples
-	No criteria available/used
NL	Non-limiting
ND	Not detected
<PQL	Less than the practical quantitation limit

Table 8-2: PAEC 1 - Asbestos Quantification (mg/kg) (DP, 2019b)

Location	Depth of Fill (m)	Volume of Sample (kg)	Number of fragments >7mm	Condition of Fragments (good/poor)	Size range of fragment (mm)	Weight of ACM (g)	Asbestos (%w/w) HSL D of 0.05%	Weight of AF or FA (g)	Concentration of FA and AF in soil (% w/w) HSL D of 0.001%
TP205	0.0-0.1	18.7	63	Good	10-70	494	**0.4**	-	-
TP208	0.0-0.6	15.7	1	Good	30	96	**0.09**	-	-
TP224	0.0-1.0	13.989	10	Good	30 x 20	80	**0.085**	**-**	**-**
TP225	0.0-1.3	14.280	41	Good	70 x 2	597	**0.630**	**-**	**-**
TP227	0.0-0.9	16.127	-	-	-	-	-	0.029	**0.0047**
TP230	0.0-1.1	14.293	2	Good	10 x 10	5	0.005	-	-
TP246	0.0-0.6	14.561	3	Good	30 x 10	28	0.03	-	-
TP239	0.0-0.9	14.392	1	Good	28 x 34	7.5	0.008	-	-

8.1 Auditor's Opinion

In reviewing the analytical results, the Auditor notes the following:

- The investigations identified the presence asbestos impacted fill (bonded and friable) at PAEC1. The depth of reported impacts ranged from 0.0 to 1.3 m bgl with five occurrences exceeding the adopted human health guidelines. DP (2020) concluded that this area required remediation.
- For PAEC1, some detections in excess of adopted ecological investigation levels were reported for zinc (five occurrences) and copper (one occurrence). Overall, in the context of the proposed redevelopment of this area as a roadway within a commercial/industrial development, no further assessment or management of ecological exceedances are considered warranted with the reported detections considered to present a low and acceptable risk. All other contaminants of concern for PAEC1 were either low or below PQLs.

In the Auditor's opinion, the soil analytical results are broadly consistent with the site history and field observations. The results indicate asbestos impacted fill at PAEC1 requiring remediation, as discussed in **Section 10.0.**

9.0 Evaluation of Groundwater Analytical Results

Groundwater samples were collected from four wells in January 2018 across the wider Intermodal site. None of the wells were located within the site audit boundary, however, have been reviewed and presented for context. Groundwater samples were submitted for a range of analysis including heavy metals, TRH, BTEX, PAH, VOCs, OCP, OPP, PCB and ammonia. The groundwater monitoring well network is shown in **Attachment 5, Appendix A** and discussed in **Table 9-1**. Analytical results are summarised in **Table 9-2**.

Table 9-1: Groundwater Monitoring Well Network

Monitoring Well	Location relative to site audit areas
MW 101	Located in the south of the wider Intermodal site, hydraulically upgradient of audit areas.
MW 102	Located more centrally within the wider Intermodal site, hydraulically upgradient of audit areas.
MW103	Located in the northwest of the wider Intermodal site, hydraulically downgradient of the containment cells, and cross-gradient of PAEC1.
MW104	Located in the north-east of the wider Intermodal site, broadly hydraulically cross-gradient to audit areas.

Table 9-2: Summary of Groundwater Investigation Analytical Results (µg/L)

Analyte	n	Detections	Maximum	n > HSL D sand, 2-<4 m NEPM (2013)	n > GILs Freshwater NEPM (2013) or ANZG (2019) or CRWB (2016)
TRH C_6-C_{10} less BTEX (F1)	4	2	230	0 above HSL of 6,000 µg/L	0 above CRWB of 440 µg/L
TRH >C_{10}-C_{16} less naphthalene (F2)	4	0	<PQL	NL	0
TRH >C16-C34	4	0	<PQL	-	0
TRH >C34-C40	4	0	<PQL	-	0
Benzene	4	0	<PQL	0 above HSL of 5,000 µg/L	0 above ANZG criteria of 950 µg/L
Toluene	4	4	100	NL	0 above ANZG criteria of 180 µg/L
Ethylbenzene	4	0	<PQL	NL	0 above ANZG criteria of 80 µg/L
Xylenes	4	0	<PQL	NL	0 above ANZG criteria of 75 µg/L
Naphthalene	4	0	<PQL	NL	0 above ANZG criteria of 16 µg/L

Analyte	n	Detections	Maximum	n > HSL D sand, 2-<4 m NEPM (2013)	n > GILs Freshwater NEPM (2013) or ANZG (2019) or CRWB (2016)
Benzo(a)pyrene	4	0	<PQL	PQL above ADWG criteria of 0.01 µg/L	PQL above ANZG criteria of 0.1 µg/L
Anthracene	14	0	<PQL	-	PQL above ANZG criteria of 0.01 µg/L
Fluoranthene	14	0	<PQL	-	0
Phenanthrene	14	0	<PQL	-	PQL above ANZG criteria of 0.6 µg/L
Phenols	4	0	<PQL	NA	0
VOCs	4	0	<PQL (various)	-	-
OCP	4	0	<PQL (various)	NA	PQL above ANZG criteria for several OCPs
PCB	4	0	<PQL	NA	PQL above ANZG criteria of 0.01 and 0.3 µg/L
Arsenic	4	0	<PQL	NA	0
Cadmium	4	4	1.4	NA	**2 above ANZG criteria of 0.2 µg/L**
Chromium	4	0	<PQL	NA	0
Copper	4	4	30	NA	**4 above ANZG criteria of 1.4 µg/L**
Lead	4	4	3	NA	0
Mercury	4	0	<PQL	NA	PQL above ANZG criteria of 0.06 µg/L
Nickel	4	4	93	NA	**3 above ANZG criteria of 11 µg/L**
Zinc	4	4	170	NA	**4 above ANZG criteria of 8 µg/L**
Manganese	4	4	16,000	NA	**3 above ANZG criteria of 1900 µg/L**
Ammonia	4	3	220	NA	0

n number of samples

- No criteria available/used

NL Not limiting

<PQL Less than the practical quantitation limit

NA – screening criteria for volatiles only

9.1 Auditor's Opinion

In reviewing the analytical results, the Auditor notes the following:

- Detections of PAH, VOC, phenols, PCB, OCP, OPP were less than the laboratory PQL, noting however that several PQLs were greater than the adopted ecological screening criteria. PQLs greater than the adopted screening levels are not considered to impact upon the outcome of the Audit with consideration to site conditions reported for the discrete audit areas.
- Several heavy metals were reported in excess of the adopted ecological criteria. DP reported that "*the metal concentrations are considered to be naturally occurring background concentrations and do not constrain the site from the proposed industrial use*".
- Detections of petroleum hydrocarbons (toluene and TRH F1 fraction) were reported above the laboratory PQL but less than the adopted human health and ecological screening levels.
- DP (2019a) concluded that "*Based on the results of the current assessment DP considers that there is a low potential for groundwater contamination at the site. Given the presence of off-site contamination sources, an unexpected finds protocol should be developed and implemented in the event impacted groundwater is encountered at the site during the proposed development works*."

The Auditor concurs with this conclusion and notes that evidence of grossly impacted soil/fill representative of potential on-site contamination sources to groundwater has not been identified in the audit areas. Overall, the reported groundwater detections are not considered to present an unacceptable risk to the proposed future commercial/industrial land use of the site audit areas. No further assessment or management of groundwater is considered necessary.

10.0 Evaluation of Remediation

10.1 Conceptual Site Model

A CSM for PAEC1 was discussed by EnviroScience (RWP) and HEC (2021b). **Table 10-1** provides the Auditors review of the CSM.

Table 10-1: Review of Conceptual Site Model

Element of CSM	Consultant	Auditor Opinion
Contaminant source and mechanism	PAEC1 – area of uncontrolled fill material impacted with anthropogenic materials including building demolition waste and asbestos (friable and non-friable).	PAEC1 has been identified and discussed broadly in the RAP, with further detail provided in the RWP and subsequent Validation Report.
Affected media	• Surface soil. • Fill material.	PAEC1 - adequately identified for the purposes of remedial planning. Data gaps have been addressed by further characterisation of this area which was reported in the Validation Report. Groundwater was not encountered or assessed as part of the investigation activities. HEC (2021b) noted "*Asbestos is not considered to pose a risk to groundwater, surface water or ecological receptors."* The Auditor notes that, as asbestos is the primary contaminant of concern, the contamination identified at PAEC1 is not considered to present an unacceptable risk to groundwater.
Receptor identification	Current and future site users. Future construction workers. Future maintenance workers. Off-site workers.	The human receptors have been adequately identified. Based upon the reported exposure pathways, risk to groundwater, surface water or ecological receptors was not identified by EnviroScience (2021) and HEC (2021b). The Auditor concurs.
Exposure pathways	Potential inhalation and/or ingestion of asbestos fibres by site users that have been liberated by the disturbance of asbestos impacted soils.	Adequately identified. The RWP noted that a complete exposure pathway to the buried asbestos impacted soil/fill at PAEC 1 was not complete, however this would change during proposed future excavation works in this area.

10.2 Remediation Required

Localised asbestos impacted fill extending to depths of up to 1.3 m depth requiring remediation was identified at PAEC1.

The following remedial documentation was prepared for the site:

- RAP (October 2020, prepared by DP).
- RWP (April 2021 (Draft), prepared by EnviroScience).

The preferred remedial approach for PAEC1 was excavation and placement of impacted fill in an on-site containment cell. The RWP proposed a deviation to this strategy, with reduced excavation and construction of a capping strategy across areas of residual fill. The Auditor assessed the RAP and RWP by comparison with the checklist included in NSW EPA (2020) *Consultants reporting on contaminated land*. In combination, the RAP and RWP were generally found to address the required information.

Prior to implementation of the RAP and RWP, HEC prepared an SAQP (HEC, 2021a). The additional assessment was to characterise the nature and extent of contamination adjacent to PAEC1 in the proposed roadway. The assessment works were undertaken prior to commencement of remediation works and were reported as part of the Validation Report (refer **Section 10.3**).

10.3 Pre-Remediation Assessment Works

Assessment of the roadway adjacent to PAEC comprised 17 test pits advanced approximately 0.2 m into natural material. The investigation area and test pit locations are shown **Attachment 8, Appendix A**. Fill/soil samples were collected for laboratory analysis including BTEX, TRH, PAH, OCP, OPP, phenols, PCBs, heavy metals and asbestos.

A review of the investigation results against the Auditor adopted criteria is provided in **Table 10-2**.

Table 10-2: Evaluation of Soil Analytical Results HEC (2021b) – Summary Table (mg/kg)

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013) and Management Limits
Benzene	24	0	<PQL	0 above HSL D 0-1 m, sand of 3 mg/kg	0 above ESL (commercial/industrial) (coarse) of 75 mg/kg
Toluene	24	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 135 mg/kg
Ethyl benzene	24	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 165 mg/kg
Total Xylenes	24	1	<PQL	0 above HSL D 0-1 m, sand of 230 mg/kg	0 above ESL (commercial/industrial) (coarse) of 180 mg/kg
F1 (TPH C6–C10 minus BTEX)	24	0	<PQL	0 above HSL D 0-1 m, sand of 260 mg/kg	0 above ESL (commercial/industrial) (coarse) of 215 mg/kg 0 above ML (commercial/industrial) of 700 mg/kg
F2 (TPH >C10–C16 minus naphthalene)	24	**0**	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 170 mg/kg 0 above ML (commercial/industrial) of 1,000 mg/kg
TRH C16-C34	24	1	130	-	0 above ESL (commercial/industrial) (coarse) of 1,700 mg/kg 0 above ML (commercial/industrial) of 3,500 mg/kg

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013) and Management Limits
TPH C34-C40	24	**0**	<PQL	-	0 above ESL (urban residential) (coarse) of 3,300 mg/kg 0 above ML (commercial/industrial) of 10,000 mg/kg
OCP/OPPs	24	0	<PQL	0 above criteria	0 above ESL (commercial/industrial) (coarse) criteria
PCBs	24	0	<PQL	0 above HSL D 0-1 m, sand of 7 mg/kg	-
Naphthalene (PAH)	24	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above Generic ESL (commercial/industrial) of 370 mg/kg
Benzo(a)pyrene	24	3	0.8	-	0 above ESL (commercial/industrial) (coarse) of 1.4 mg/kg
BaP TEQ	24	3	2	0 above HIL D 40 mg/kg	-
Total PAHs	24	6	13	0 above HIL D 4,000 mg/kg	-
Arsenic	24	24	18	0 above HIL D 3,000 mg/kg	0 above Generic EIL (commercial/industrial of 160 mg/kg
Cadmium	24	2	0.6	0 above HIL D 900 mg/kg	-
Chromium	24	24	150	0 above HIL D 3,600 mg/kg	0 above most conservative ACL (commercial/industrial) of 310 mg/kg
Copper	24	22	180	0 above HIL D 240,000 mg/kg	**3 above most conservative ACL (commercial/industrial) of 85 mg/kg**
Lead	24	24	100	0 above HIL D of 1,500 mg/kg	0 above Generic ACL (commercial/industrial) of 1,800 mg/kg
Mercury	24	1	1	0 above HIL D 730 mg/kg	-
Nickel	24	21	99	0 above HIL D 6,000 mg/kg	**3 above most conservative ACL (commercial/industrial) of 55 mg/kg**
Zinc	24	21	740*	0 above HIL D 400,000 mg/kg	**10 above most conservative ACL (commercial/industrial) of 110 mg/kg**
Asbestos fragments visible	24	3	Present	**-**	**-**

n	number of samples
-	No criteria available/used
NL	Non-limiting
<PQL	Less than the practical quantitation limit
ND	Not detected

*Triplicate sample reported zinc result of 20,000 mg/kg compared with primary result of 720 mg/kg. Triplicate result appears to be an outlier compared with general dataset. HEC noted the result was potentially associated with sample heterogeneity/piece of metal in sample. Triplicate would exceed EIL, but not human health criteria.

In reviewing the analytical results, the Auditor notes the following:

- Asbestos impacted fill was identified at three locations beyond the PAEC1 footprint with the depth of reported impacts ranging from ground surface to 1 m bgl. HEC reported that one of the three locations comprised a surface fragment of ACM at location RW7 which was handpicked and removed during the investigation. This area falls outside of the remediation area defined by HEC and is not included within the audit area. The remaining areas were subject to remediation-validation (refer to **Section 10.4**).
- Detections in excess of adopted EILs were reported for zinc (ten occurrences), nickel (three occurrences) and copper (three occurrences). With consideration to the proposed site use (roadway in commercial/industrial site), no further assessment or management of ecological exceedances is considered warranted with the reported detections considered to present a low and acceptable risk in the context of future site use.
- All other contaminants of concern were either low or below PQLs.

In the Auditor's opinion, the soil analytical results are consistent with the site history and field observations.

10.4 Remedial Works Undertaken

Remediation activities were undertaken by Mc Mahon Services, with validation activities completed by HEC. Air monitoring and asbestos clearance activities were undertaken by EnviroScience. The remediation-validation works, and stockpile characterisation activities were largely completed in March and June 2021.

Table 10-3 summarises the remedial works undertaken. In the Auditor's opinion, remediation works undertaken were appropriate and generally in accordance with the RAP and RWP. Deviations to the RAP and RWP were documented within the Validation Report (HEC, 2021b). Validation activities are discussed in further detail in **Section 10.5.**

Table 10-3: Remedial Works Undertaken

Description	Extent of Remediation Undertaken	Auditor Comments
Excavation of asbestos impacted fill – PAEC1 and adjacent roadway. **Completed in April and June 2021 in two stages of work.**	Excavation and removal of the top 300 mm of fill, with approximately 60 m^3 of material excavated and placed in Containment Cell 1. Further excavation and removal of all asbestos impacted fill was completed across the roadway footprint inclusive of the roadway portion of PAEC1 with approximately 300 m^3 of asbestos impacted fil excavated and placed in Containment Cell 2. HEC reported a further 180 m^3 of excavated material from outside of the audit area (roadway to the west) was also placed in the containment cell. Excavation depth varied from 0.3 m to 1.1 m depth across the area. Characterisation/validation samples were collected during both stages of excavation, refer **Section 10.5**. Visual clearance completed by EnviroScience and attached to appendix of Validation Report. Backfill material comprised a combination of site-won sandstone fill and imported material (refer **Section 10.6**).	Remediation works were generally completed in accordance with the RAP and RWP. All asbestos impacted fill was removed from the roadway footprint. Some residual impacted fill remains in parts of PAEC1 which form the roadside verges. This area has been capped and will be subject to long-term management.

Description	Extent of Remediation Undertaken	Auditor Comments
Capping of residual asbestos impacted fill in PAEC1 and containment cells	Placement of brightly coloured geofabric marker layer across the containment cells and residual fill at PAEC1. Placement of capping and pavement materials as follows: • PAEC1: 0.3 m site-won crushed sandstone fill, with 45 m^3 imported mulch surface finish. • Containment Cell 1: 0.5 m site-won crushed sandstone fill, overlain with bitumen. • Containment Cell 2: 0.8 mm site-won crushed sandstone fill, 0.8 mm imported roadbase, overlain with bitumen. Refer to **Section 10.5** for validation of site-won capping materials and **Section 10.6** for imported materials.	Remediation works were generally completed in accordance with the RAP and RWP. A capping thickness of 0.3 m compared with 0.5 m set out in the RAP/RWP was constructed at PAEC1. HEC acknowledged this variation in proposed thickness. In the Auditor's opinion the slightly reduced capping thickness is not considered to present an unacceptable risk to future site users noting the land use (private roadside verge within commercia/industrial site), the presence of validated capping scenario comprising marker layer and 0.3m cap, and appropriate long-term management.

10.5 Validation Activities

A summary of the validation works in provided in **Table 10-4**. The validation excavation areas, corresponding validation sample locations and supplementary assessment sample locations are depicted in figures provided in **Attachment 9 and10, Appendix A**.

Table 10-4: Validation Works Undertaken

Description	Validation Undertaken	Observations
Characterisation/validation of PAEC1 and adjoining roadway - asbestos impacted fill removal	Phase 1 (April 2201) - ten base validation samples collected from the PAEC1 remedial excavation surface with samples scheduled for TRH, BTEX, PAH, heavy metals, OCP, OPP and asbestos analysis. Phase 2 (June 2021) - a total of 58 validation samples collected from the floor/base and walls for asbestos analysis. Validation sample register sample descriptions provided by HEC did not report presence of odours, staining or ACM. Refer to **Table 10-8** for discussion of results. The remedial excavation was backfilled for with validated site-won sandstone fill. Additional imported DBG roadbase material was placed on the road footprint.	Characterisation/validation completed in accordance with RAP/RWP. Refer Figure 5 **Attachment 9**, **Appendix A**. Historical residual asbestos impacted fill material remains in parts of PAEC1 outside of the roadway footprint. This area has been capped and will be subject to long-term management (refer **Section 11.0**). Refer to **Section 10.6** for discussion of imported material.
Capping layer construction - containment cells and residual fill at PAEC1	Cross sections showing the capping scenario discussed in **Section 10.4** provided in Validation Report. Survey provided confirming the lateral extent of capped areas. The depth of capping was confirmed by measurement of the volume of backfill material placed in area. It is understood that a depth survey was not available due to access constraints at time of capping placement.	Validation of the marker and capping layers was completed in accordance with RAP/RWP, with the exception of a survey to confirm capping thickness. HEC reported this was completed using material volumes due to access constraints. It was also reported that the excavation equipment was fitted with GPS which allowed accurate depth measurements. While a survey confirming depth is preferred, the available depth verification/checks confirmed by HEC is considered acceptable and does not impact upon the outcome of the Audit.

Description	Validation Undertaken	Observations
Site-won capping material	Characterisation/validation samples collected from site-won sandstone fill material excavated during construction of the containment cells. Ten samples collected from EM Stockpile for TRH, BTEX, PAH, heavy metals, OCP, OPP, PCB and asbestos analysis. No odours or staining were observed with the material described as crushed sandstone. Refer to **Table 10-8** for discussion of results.	Characterisation/validation completed in accordance with RAP/RWP.
Importation of materials	Imported material comprised: DGB used in construction of the roadway at PAEC1 (0.3 m thickness) and capping of Containment Cell 2 (0.8 m thickness). Timber mulch for surface finish across capped area at PAEC1. Import records confirming the material type and source site were provided. No analytical results were provided.	Further discussion in **Section 10.6.**
Characterisation/validation of containment cells (floor and walls)	Prior to placement of impacted materials in the containment cells, samples were collected from the walls and base of each containment cell: Cell 1 (20 m x 10 m x 2 m) – Two floor samples and six wall samples. Cell 2 (34 m x 34 m x 2.8 m) – Four floor samples and eight wall samples. All samples were scheduled for TRH, BTEX, PAH, heavy metals, OCP, OPP, PCB and asbestos analysis. No odours or staining were observed with the material described as crushed sandstone. Refer to Table 10-8 for discussion of results.	Characterisation/validation completed in accordance with RAP/RWP. Refer Figure 6 Attachment 10, Appendix A.

A review of the validation results against the Auditor adopted criteria is provided in **Section 10.8**.

10.6 Imported Material

The following material was imported to site:

Table 10-5: Imported Material

Supplier	Material	On-site Use	Summary of Documentation	Conclusion
Bingo Recycling/Waste, Eastern Creek.	DGB subbase – crushed concrete/brick	Used roadway construction at PAEC1 (0.3 m thickness) and capping at Containment Cell 2 (0.8 m thickness)	Import records – weighbridge transactions confirming supplier and delivery address. Records provided for imported materials for wider Intermodal site which includes site audit areas. Letters from Resource Laboratories, Seven Hills NSW, confirming the Bingo DBG20 material is typically subject to sampling and testing for compliance with pavement base and subbase materials.	Acceptable. While it is preferred that all import material is subject to visual inspection and confirmatory analysis for contaminants of potential concern for screening purposes as per the RAP requirements, the DBG material is a product generated for use as subbase material with standards and controls in place. The DBG has been placed on site in the roadway and as capping in Containment Cell 2, both of which areas have been sealed with bitumen. The placement of DBG in these areas is not considered to present an unacceptable risk to future site users.
ResourceNSW / Cabbage Tree Landscape, Thornleigh NSW	Timber Mulch	Approximately 45 m^3 Used surface completion of capped area at PAEC1 (roadside verge).	Import records/receipts Letter from Cabbage Tree Landscape confirming visual inspection and material free from foreign materials.	Acceptable. Samples for analysis were not collected from the imported material. This is considered acceptable as the material comprised timber mulch product which was subject to visual inspection by the supplier on delivery and installation.

Given the information available from suppliers and placement below the hardstand, the Auditor concludes that the imported material is suitable for the proposed use.

10.7 Quality Assurance and Quality Control

The Audit has assessed the quality of the soil data by review of the information presented in the final validation report, supported by field observations. The Auditor's assessment following in **Table 10-6** and **10.7**.

Table 10-6 QA/QC – Sampling and Analysis Methodology Assessment

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Data Quality Objectives (DQO) HEC defined specific DQOs in accordance with the seven-step process outlined in NSW EPA (2017).	These are considered appropriate for the work conducted.

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Sampling pattern, locations and sampling density Pre-remediation assessment of roadway area: A total of 17 test pits advanced in approximate grid to characterise sub-surface fill and soil conditions. A total of 25 primary samples were collected. Phase 1 Validation (PAEC1): All validation samples were completed in an approximate grid pattern across the remedial excavation. A total of 10 primary samples were collected from the surface of the excavation. Phase 2 Validation (Roadway): A total of 58 primary samples were collected (30 wall samples, 28 base samples) achieving a sampling rate of approximately of 1 per 5 lineal metres (walls) and 1 sample per 25m^2. Containment Cell 1: Were sampled at a rate of one sample per wall and a minimum of one base sample per cell. • Wall samples: 6 • Base samples: 2 Containment Cell 2: Were sampled at a rate of one sample per wall and a minimum of one base sample per cell. • Wall samples: 8 • Base samples: 4 EM Stockpile (excavated site-won material from containment cells, reused as capping) A total of 10 samples were collected from a stockpile designated as Stockpile EM.	In the Auditor's opinion the validation / characterisation locations adequately target the area of concern.
Sample depths Pre-remediation assessment of roadway area: Representative samples collected from surface fill (0.0-0.2 m bgl), deeper fill (0.7-0.8 m bgl) and 0.2 m into natural materials. Validation Sample Locations: Validation samples were collected from the base and walls of the remedial excavation, typically 0-0.1 m into the wall surface or ground surface.	This sampling strategy is considered to be appropriate and adequate to validate the remedial works.
Sample collection method HEC (2021b) noted reusable equipment was not utilised and new clean nitrile gloves were worn for each sampling location. Soil samples were collected by hand directly from the walls and base of the excavations, containment cells and stockpile.	Overall, the sample collection method was found to be acceptable.
Decontamination procedures HEC (2021b) noted that reusable sampling equipment was not used and therefore decontamination was not required. As noted, disposable gloves were used during sampling activities with new gloves used for each sample collection.	Acceptable.
Sample handling and containers Soil samples were placed into laboratory supplied, appropriately preserved sample containers. Samples were chilled during storage and subsequent transport to the laboratories.	Acceptable.
Chain of Custody (COC) Completed chain of custody forms were provided in the laboratory reports.	Acceptable.

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Detailed description of field screening protocols Pre-remediation area: During the collection of roadway soil samples, ground conditions were recorded on test pit logs and samples were screened using a PID to assess the presence of volatile compounds. Soil sub-samples were placed in zip-lock plastic bags and the headspace measured for VOCs after allowing time for equilibration. Phase 1 and Phase 2 Validation: Statement of ground conditions reported in Validation Report. Asbestos main contaminant of concern, PID screening not undertaken. Containment Cell 1 and 2: Statement of ground conditions reported in Validation Report. Asbestos main contaminant of concern, PID screening completed.	Acceptable. The Auditor recognises that asbestos is the primary contaminant of concern, so it is acceptable that PID screening did not occur in these areas.
Calibration of field equipment The report indicates that a PID had been used during the remediation and validation works. One calibration certificate was provided for the PID. The calibration sheet was dated 10 May 2021, whilst samples were collected on the 27 May 2021.	A PID calibration sheet was provided. It is unclear if daily field calibration checks were performed. This is not considered to impact the overall outcome of the Audit with consideration that asbestos was the primary contaminant requiring remediation. Samples subject to analysis were scheduled for asbestos, or a broad range of contaminants. The PID screening tool was not used to direct remediation or select samples for analysis.
Sampling logs Test pit logs were provided for pre-remediation investigation locations. A validation sample register with material descriptions was provided for validation/characterisation samples.	Overall, the sampling and field logs that were completed are acceptable and a general description of the fill/soil conditions for each of the areas was provided.

Table 10-7 QA/QC – Field and Lab Quality Assurance and Quality Control

Field and Lab QA/QC	Auditor's Opinion
Field quality control samples Inter and intra-laboratory duplicate samples were collected at the following rates: Pre-remediation area: A total of 25 primary samples were collected, inter and intra-laboratory duplicates were collected at a rate of 1 per 14 samples. 2 x duplicates and triplicates were collected from RW11_0.6 and RW14_0.0. Phase 1 Validation (PAEC1): A total of 10 primary samples were collected, inter and intra-laboratory samples were collected at a rate of 1 per 10 primary samples. 1 x duplicate and triplicate were collected with VAL_8. Phase 2 Validation (Roadway): A total of 58 primary samples were collected, no quality control samples collected as asbestos was the only COPC. Containment Cell 1: A total of 8 primary samples were collected, inter and intra-laboratory duplicates were sampled at a rate of 1 in 10 primary samples. Containment Cell 2: A total of 12 primary samples were collected. Inter and intra-laboratory duplicates were sampled at a rate of 1 in 10 primary samples. 1 x duplicate and triplicate were collected with VW_6. EM Stockpile: A total of 10 samples were collected. Inter and intra-laboratory duplicates were sampled at a rate of 1 in 10 primary samples.	Overall, the collection of field quality control samples was acceptable.

Field and Lab QA/QC	Auditor's Opinion
1 x duplicate and triplicate were collected with sample EM_4.	
Field quality control results The results of field quality control samples were generally within appropriate limits. The following exceptions are noted: RPDs outside the acceptable limits were reported for several duplicate and/or triplicate samples for a range of heavy metals. HEC noted exceedances were due to sample heterogeneity. One field triplicate sample 01 reported a zinc concentration of 20,000 mg/kg compared with a primary sample result of 720 mg/kg. HEC confirmed that this triplicate result was likely sample heterogeneity and potentially a piece of metal in sample.	Overall, in the context of the dataset reported, the field quality control results are considered acceptable.
NATA registered laboratory and NATA endorsed methods HEC (2021b) used Eurofins/mgt as the primary laboratory and Envirolab as the secondary laboratory. Asbestos identification analysis was conducted by EnviroScience Solutions. Laboratory certificates were NATA stamped.	Acceptable.
Analytical methods Analytical methods were included in the laboratory test certificates. Both Envirolab and ALS Environmental provided brief method summaries of in-house NATA accredited methods. Asbestos identification was conducted by EnviroScience using polarised light microscopy with dispersion staining by method AS4964-2004 Method for the Qualitative Identification of Asbestos Bulk Samples.	The analytical methods are considered acceptable for the purposes of the site audit, noting that the AS4964-2004 is currently the only available method in Australia for analysing asbestos. DOH (2009) and enHealth (2005) state that "until an alternative analytical technique is developed and validated the AS4964-2004 is recommended for use".
Holding times Review of the relevant COCs and laboratory certificates indicated that the holding times had been met. Eurofins and Envirolab also reported that holding times have been met.	Acceptable.
Practical Quantitation Limits (PQLs) Soil PQLs were less than the threshold criteria for the contaminants of concern. Minor exceedances noted:	Overall, the soil PQLs are considered to be acceptable.
Laboratory quality control samples Laboratory quality control samples included duplicates, matrix and surrogate spikes, method blanks, and laboratory control samples.	Acceptable.
Laboratory quality control results Minor laboratory QA/QC exceedances were reported for laboratory duplicate for heavy metals including chromium, lead, nickel and zinc. However, Eurofins indicated that the results passed their laboratory acceptance criteria. Laboratory duplicate samples were not tested for the triplicate samples sent to Envirolab. HEC (2021b) indicated the data was of a suitable quality for assessing the site.	The Auditor considers the laboratory QA/QC data to be acceptable noting that exceedances were infrequent and minor in the context of the overall dataset.
Data Quality Indicators (DQI) and Data Evaluation (precision, accuracy, representativeness, comparability and completeness - PARCC) The HEC (2021b) report included pre-determined DQIs along with discussion of the DQIs and evaluation against the PARCC parameters. The Validation Report concluded that based upon the results of the field and laboratory QA/QC program, the data are of "suitable quality for assessing the site"	An assessment of the data quality with respect to the five category areas has been undertaken by the Auditor and is summarised below.

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

- Duplicate samples produced acceptable RPDs and identified heterogeneity in soils. Primary and secondary laboratories have provided sufficient information to conclude that the dataset was precise.
- The data is likely to be representative of the site conditions in the site audit areas.
- Samples were generally collected using acceptable procedures, and laboratory blank / spike samples were considered acceptable. The data is considered accurate.
- The laboratory provided sufficient information to conclude that data is of sufficient precision and accuracy.
- The comparability of the dataset is considered to be acceptable.
- There is a high degree of confidence that data was representative of the site, is reproducible and complete for the purpose of assessment.

10.8 Validation Soil Analytical Results

A summary of key soil validation and characterisation results against the criteria outlined in **Section 7.0** are tabulated below.

Table 10-8: Evaluation of Validation Analytical Results – Summary Table (mg/kg)

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013) and Management Limits
PAEC1 – Phase 1 Excavation Area					
Benzene	10	0	<PQL	0 above HSL D 0-1 m, sand of 3 mg/kg	0 above ESL (commercial/industrial) (coarse) of 75 mg/kg
Toluene	10	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 135 mg/kg
Ethyl benzene	10	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 165 mg/kg
Total Xylenes	10	0	<PQL	0 above HSL D 0-1 m, sand of 230 mg/kg	0 above ESL (commercial/industrial) (coarse) of 180 mg/kg
F1 (TPH C6–C10 minus BTEX)	10	0	<PQL	0 above HSL D 0-1 m, sand of 260 mg/kg	0 above ESL (commercial/industrial) (coarse) of 215 mg/kg 0 above ML (commercial/industrial) of 700 mg/kg
F2 (TPH >C10–C16 minus naphthalene)	10	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 170 mg/kg 0 above ML (commercial/industrial) of 1,000 mg/kg

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013) and Management Limits
TRH C16-C34	10	1	110	-	0 above ESL (commercial/industrial) (coarse) of 1,700 mg/kg 0 above ML (commercial/industrial) of 3,500 mg/kg
TPH C34-C40	10	0	<PQL	-	0 above ESL (urban residential) (coarse) of 3,300 mg/kg 0 above ML (commercial/industrial) of 10,000 mg/kg
OCP/OPPs	10	0	<PQL	0 above criteria	0 above ESL (commercial/industrial) (coarse) criteria
PCBs	10	0	<PQL	0 above HSL D 0-1 m, sand of 7 mg/kg	-
Naphthalene (PAH)	10	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above Generic ESL (commercial/industrial) of 370 mg/kg
Benzo(a)pyrene	10	0	<PQL	-	0 above ESL (commercial/industrial) (coarse) of 1.4 mg/kg
BaP TEQ	10	0	<PQL	1 above HIL D 40 mg/kg	-
Total PAHs	10	0	<PQL	1 above HIL D 4,000 mg/kg	-
Arsenic	10	10	11	0 above HIL D 3,000 mg/kg	0 above Generic EIL (commercial/industrial of 160 mg/kg
Cadmium	10	0	<PQL	0 above HIL D 900 mg/kg	-
Chromium	10	10	41	0 above HIL D 3,600 mg/kg	0 above most conservative ACL (commercial/industrial) of 310 mg/kg
Copper	10	10	63	0 above HIL D 240,000 mg/kg	0 above most conservative ACL (commercial/industrial) of 85 mg/kg
Lead	10	10	62	0 above HIL D of 1,500 mg/kg	0 above Generic ACL (commercial/industrial) of 1,800 mg/kg

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013) and Management Limits
Mercury	10	0	<PQL	0 above HIL D 730 mg/kg	-
Nickel	10	10	28	0 above HIL D 6,000 mg/kg	0 above most conservative ACL (commercial/industrial) of 55 mg/kg
Zinc	10	10	240	0 above HIL D 400,000 mg/kg	**3 above most conservative ACL (commercial/industrial) of 110 mg/kg**
Asbestos ID in soil	10	0	ND	-	-
Validation of Roadway and PAEC1 - Phase 2 Excavation Area					
Asbestos ID in soil	**58**	**0**	**ND** **1 Detect of SMF**	-	-
Characterisation/Validation of Containment Cells 1 and 2					
Benzene	20	0	<PQL	0 above HSL D 0-1 m, sand of 3 mg/kg	0 above ESL (commercial/industrial) (coarse) of 75 mg/kg
Toluene	20	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 135 mg/kg
Ethyl benzene	20	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 165 mg/kg
Total Xylenes	20	0	<PQL	0 above HSL D 0-1 m, sand of 230 mg/kg	0 above ESL (commercial/industrial) (coarse) of 180 mg/kg
F1 (TPH C6–C10 minus BTEX)	20	0	<PQL	0 above HSL D 0-1 m, sand of 260 mg/kg	0 above ESL (commercial/industrial) (coarse) of 215 mg/kg 0 above ML (commercial/industrial) of 700 mg/kg
F2 (TPH >C10–C16 minus naphthalene)	20	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 170 mg/kg 0 above ML (commercial/industrial) of 1,000 mg/kg

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013) and Management Limits
TRH C16-C34	20	0	<PQL	-	0 above ESL (commercial/industrial) (coarse) of 1,700 mg/kg 0 above ML (commercial/industrial) of 3,500 mg/kg
TPH C34-C40	20	0	<PQL	-	0 above ESL (urban residential) (coarse) of 3,300 mg/kg 0 above ML (commercial/industrial) of 10,000 mg/kg
OCP/OPPs	20	1 (for endrin aldehyde in 1 sample)	0.05	No criteria for endrin aldehyde 0 above criteria for others	0 above ESL (commercial/industrial) (coarse) criteria No criteria for endrin aldehyde
PCBs	20	0	<PQL	0 above HSL D 0-1 m, sand of 7 mg/kg	-
Naphthalene (PAH)	20	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above Generic ESL (commercial/industrial) of 370 mg/kg
Benzo(a)pyrene	20	0	<PQL	-	0 above ESL (commercial/industrial) (coarse) of 1.4 mg/kg
BaP TEQ	20	0	<PQL	1 above HIL D 40 mg/kg	-
Total PAHs	20	0	<PQL	1 above HIL D 4,000 mg/kg	-
Arsenic	20	19	58	0 above HIL D 3,000 mg/kg	0 above Generic EIL (commercial/industrial of 160 mg/kg
Cadmium	20	0	<PQL	0 above HIL D 900 mg/kg	-
Chromium	20	19	58	0 above HIL D 3,600 mg/kg	0 above most conservative ACL (commercial/industrial) of 310 mg/kg
Copper	20	12	22	0 above HIL D 240,000 mg/kg	0 above most conservative ACL (commercial/industrial) of 85 mg/kg

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013) and Management Limits
Lead	20	20	37	0 above HIL D of 1,500 mg/kg	0 above Generic ACL (commercial/industrial) of 1,800 mg/kg
Mercury	20	0	<PQL	0 above HIL D 730 mg/kg	-
Nickel	20	13	14	0 above HIL D 6,000 mg/kg	0 above most conservative ACL (commercial/industrial) of 55 mg/kg
Zinc	20	20	39	0 above HIL D 400,000 mg/kg	0 above most conservative ACL (commercial/industrial) of 110 mg/kg
Asbestos	10	0	ND	-	-
Site-Won Sandstone Fill Material (Stockpile EM)					
Benzene	10	0	<PQL	0 above HSL D 0-1 m, sand of 3 mg/kg	0 above ESL (commercial/industrial) (coarse) of 75 mg/kg
Toluene	10	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 135 mg/kg
Ethyl benzene	10	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 165 mg/kg
Total Xylenes	10	0	<PQL	0 above HSL D 0-1 m, sand of 230 mg/kg	0 above ESL (commercial/industrial) (coarse) of 180 mg/kg
F1 (TPH C6–C10 minus BTEX)	10	0	<PQL	0 above HSL D 0-1 m, sand of 260 mg/kg	0 above ESL (commercial/industrial) (coarse) of 215 mg/kg 0 above ML (commercial/industrial) of 700 mg/kg
F2 (TPH >C10–C16 minus naphthalene)	10	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above ESL (commercial/industrial) (coarse) of 170 mg/kg 0 above ML (commercial/industrial) of 1,000 mg/kg
TRH C16-C34	10	0	<PQL	-	0 above ESL (commercial/industrial) (coarse) of 1,700 mg/kg 0 above ML (commercial/industrial) of 3,500 mg/kg

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013) and Management Limits
TPH C34-C40	10	0	<PQL	-	0 above ESL (urban residential) (coarse) of 3,300 mg/kg 0 above ML (commercial/industrial) of 10,000 mg/kg
OCP/OPPs	10	0	<PQL	0 above criteria	-
PCBs	10	0	<PQL	0 above HSL D 0-1 m, sand of 7 mg/kg	-
Naphthalene (PAH)	10	0	<PQL	0 above HSL D 0-1 m, sand NL	0 above Generic ESL (commercial/industrial) of 370 mg/kg
Benzo(a)pyrene	10	0	<PQL	-	0 above ESL (commercial/industrial) (coarse) of 1.4 mg/kg
BaP TEQ	10	0	<PQL	0 above HIL D 40 mg/kg	-
Total PAHs	10	0	<PQL	0 above HIL D 4,000 mg/kg	-
Arsenic	10	9	2.5	0 above HIL D 3,000 mg/kg	0 above Generic EIL (commercial/industrial of 160 mg/kg
Cadmium	10	0	<PQL	0 above HIL D 900 mg/kg	-
Chromium	10	9	9.5	0 above HIL D 3,600 mg/kg	0 above most conservative ACL (commercial/industrial) of 310 mg/kg
Copper	10	10	7.9	0 above HIL D 240,000 mg/kg	0 above most conservative ACL (commercial/industrial) of 85 mg/kg
Lead	10	10	21	0 above HIL D of 1,500 mg/kg	0 above Generic ACL (commercial/industrial) of 1,800 mg/kg
Mercury	10	0	<PQL	0 above HIL D 730 mg/kg	-
Nickel	10	9	8	0 above HIL D 6,000 mg/kg	0 above most conservative ACL (commercial/industrial) of 55 mg/kg

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013) and Management Limits
Zinc	10	10	32	0 above HIL D 400,000 mg/kg	0 above most conservative ACL (commercial/industrial) of 110 mg/kg
Asbestos	10	0	ND	-	-

n	number of primary samples
-	No criteria available/used
NL	Non-limiting
<PQL	Less than the practical quantitation limit
ND	Not detected

Phase 1 of the Validation of the PAEC 1 Remedial Footprint included the collection of 10 samples. Based on the above review, concentrations of contaminants of concern were not reported in excess of laboratory PQL and/or the adopted assessment criteria with the exception of three samples reporting detections of zinc in excess of the adopted ecological investigation level. HEC did not provide comment on ecological exceedances, however the Auditor has reviewed the data and in the context of proposed future use of this area as a roadway and more broadly commercial/industrial land use, the reported detections are not considered to present an unacceptable ecological risk and further assessment/management is not warranted.

Where residual asbestos impacted fill remains within PAEC1 outside of the roadway footprint, this area was subsequently capped and is the subject of long-term management. This is considered acceptable by the Auditor.

Phase 2 of the Validation of the PAEC1 and Roadway Remedial Footprint included the collection of samples RW_VF1 to RW_VF28 and RW_VW1 to RW_30. Further excavation was completed along the roadway which included a portion of PAEC1. HEC confirmed all asbestos impacted fill has been removed and no residual impacts remain. Validation samples were collected with no asbestos detections reported. HEC reported a detection of Synthetic Mineral Fibre (SMF) in one sample, with the result considered to be insignificant. The Auditor concurs.

Characterisation/validation of Containment Cells 1 and 2 included the collection of samples from the walls and floor. Based on the above review, concentrations of contaminants of concern were not reported in excess of laboratory PQL and/or the adopted assessment criteria. It is noted that samples collected from Containment Cell 2 were not scheduled for asbestos analysis, however this is not considered to impact upon the outcome of the validation assessment as the description of the cell floor and walls indicated sandstone fill material with no reported evidence of visual contamination. Characterisation/validation results indicated the cells were suitable for the proposed use.

Characterisation/validation of Site-Won Sandstone Fill Material (Stockpile EM) included the collection of samples from excavated material during cell construction (EM stockpile) were scheduled for broad range of contaminants of concern. Analytical results were not reported in excess of laboratory PQL and/or the adopted assessment criteria. The material was suitable for commercial/industrial use and was beneficially re-used for capping of residual fill at PAEC1 and across both containment cells.

Based upon the above review, the contaminant of concern, asbestos, is considered to have been successfully remediated at PAEC1 and the adjoining roadway. Residual asbestos impacted fill has been retained on-site within designated validated capped areas which will be subject to long-term management.

11.0 Ongoing Site Management

HEC propose the ongoing management of remnant contamination at the site through the implementation of the following Long Term Environmental Management Plan (LTEMP):

- 'Long Term Environmental Management Plan, 2 Forrester Road, St Marys, NSW' dated 11 November 2021 by HEC.

Table 11-1 presents an assessment of the LTEMP.

Table 11-1: Assessment of the LTEMP

Item	Auditor Comments
Site Specific stand alone document	The LTEMP is to be adopted for three discrete areas: an area adjacent to roadway (PAEC1), Containment Cell 1 and Containment Cell 2. A figure is provided in the LTEMP clearly depicts the locations which are the subject of the LTEMP. A summary of the site identification, contamination and encapsulation are provided. The LTEMP will be the responsibility of Pacific National as the site owner to implement. Correspondence from Pacific National confirm their acceptance. The Auditor considers that the LTEMP is a site-specific standalone document.
Plan Objectives	The main objective of the plan "*is to ensure the site remains suitable for the proposed future land use*". Section 1.3 notes that the LTEMP "*has been prepared to manage and mitigate potential human health and environmental risks posed by the presence of asbestos impacted fill in PAEC1 and the two containment cells. The fill material poses a negligible risk in its current state, however if the material is disturbed through earthworks or similar activities, the procedures described within this document will need to be followed to ensure the exposed receptors are protected*". The Auditor considers the objectives to be appropriate.
When does the EMP apply?	Section 1.4 of the LTEMP notes that removal of the plan can only occur if remediation of the site occurs and the asbestos contaminated material is removed. As such, the LTEMP will apply indefinitely or until such a time as a Site Audit Statement (SAS) can be prepared by a NSW EPA Accredited Site Auditor stating that the LTEMP is not required at the site. The LTEMP is intended to apply to any activities within the subject areas which could involve disturbance or exposure of contaminants in soil beneath the marker and/or physical barrier. The Auditor considers this to be adequate.
Contamination Issues	The LTEMP provides an overview of identified contamination issues, with the main contaminant of concern being asbestos in fill/soil. Potential exposure pathways to site receptors are presented. The Auditor notes that the main contamination issues noted in the LTEMP are consistent with those summarised in this SAR.
Extent of Capping and Specification of the Cap	Details of marker layer, capping layer and surface finish for each capping scenario are presented in the LTEMP. The nature and extent of the capping scenarios are illustrated in site plans attached to the LTEMP. The LTEMP also provides a summary of residual ground conditions present beneath the capping system requiring management. The LTEMP provides survey plans showing the location of containment cells and residual capped fill. Cross sections are provided showing the depth of marker layer and capping. The Auditor considers that, sufficient information has been provided to highlight the conditions that would be encountered on-site.

Item	Auditor Comments
Responsibilities	The LTEMP clearly identifies those responsible for implementation of the plan and their specific tasks, including the site owner and site manager and on-site workers. The site owner is responsible for amendments to the LTEMP as required under circumstances set out in the LTEMP. The Auditor considers that the responsibilities are reasonably clear and practicable.
Timeframe	The LTEMP is to be implemented for an indefinite period of time while the containment cells and capped residual fill remain. The LTEMP may be removed in the event that remediation of the asbestos containing material occur, a validation report is prepared and reviewed by a NSW EPA Accredited Site Auditor and a Site Audit Statement (SAS) issued that removes the need for ongoing implementation of the LTEMP. The LTEMP will be subject to review by a suitable qualified consultant at least once every five years, or when specific changes are to be documented. Routine annual cap inspections to confirm capping layer integrity are to be completed and recorded. The Auditor considers this to be adequate.
Ensure Engineering Security and Integrity	Asbestos is the contaminant of concern within the capped areas. Impacted soil is contained beneath a cap within a defined area, which minimises the risk of off-site migration. No active monitoring or management of subsurface soil contaminant conditions is required during everyday operation of the site. The capping design comprises a geo-textile marker layer overlain by site-won and imported DGB roadbase materials, with surface finish of imported timber mulch or bitumen. The capping design varies with location and final landform (e.g. roadside verge or hardstand area). In the event that the barrier system is disturbed at any time as a result of planned or unplanned activities, the procedures documented in the LTEMP are required to be implemented to repair the barrier such that there continues to be an effective barrier between the contaminated soil and future site users/workers during day to day use of the site. The LTEMP outlines an annual inspection regime to ensure long-term integrity of the capping system.
Compliant with Relevant Documentation?	The LTEMP is broadly consistent with the required information in NSW EPA 2020, *Consultants Reporting on Contaminated Land*. NSW EPA (2017) *Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme* (3rd edition), and as referred to in the Validation Report prepared for the site.
Occupational Health and Safety (OH&S)	Notification of the LTEMP to subcontractors, compliance with the plan, inclusion of the LTEMP in future work method statement and construction environmental management plan, and induction of site visitors will be the responsibility of the Site Manager. All contractors/ subcontractors must sign an induction form prior to commencing work on site. Any disturbance of asbestos impacted material must be done so under an asbestos management plan prepared by a Licenced Asbestos Assessor with consideration to relevant guidelines and legislation. The Auditor considers the occupation health & safety requirements to be adequate.
Public notification mechanisms	The LTEMP will be attached to the SAS and will be provided to the Planning Secretary as per Development Consent (SSD 7308) conditions. A copy will also be provided to Council. Appropriate notation on future planning certificates issued under s.10.7(2) of the Environmental Planning and Assessment Act can be made to provide notification to parties.
Will be or can reasonably be made to be legally enforceable?	The LTEMP will be legally enforceable via a condition of the development consent via attachment to this SAS issued to address the development consent. Through provision of the SAS, to which the LTEMP is attached, appropriate notation will also be made on future planning certificates to provide notification to parties of the ongoing applicability of the management measured outlined in the LTEMP.
Are the Council in agreement with the EMP?	A copy of the SAS will be given to Council and recorded under Section 10.7(2) of the Environmental Planning and Assessment Act 1979 for the subject areas. The SAS will be noted on future planning certificates. Pacific National has provided correspondence to the consent authority (DPIE) as attached in **Appendix C**.

The appropriate conditions for the implementation of a Environmental Management Plan stated under Section 3.4.6 of NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme (3nd Ed.) have been met, namely:

- The LTEMP has been reviewed by the Auditor.
- The provisions of the LTEMP can be made to be legally enforceable (i.e. Development Consent conditions) in site redevelopment.
- There will be appropriate public notification of restrictions applying to the site through a notification on the Planning Certificate for the site.
- The remnant contamination is not considered to pose an unacceptable risk to onsite or offsite environments.

Based on the above, the Auditor considers that the LTEMP will provide an adequate framework for the management of the residual capped asbestos contamination at the site.

12.0 Contamination Migration Potential

The potential for off-site migration of contaminants (asbestos), in surface water or dust from the site is considered low due to placement of the marker and capping layers across residual contaminated fill. The marker layer and capping material provide a barrier to prevent dust and surface water run-off of impacted materials.

With consideration to the reported remediation-validation works and site condition, in the Auditors' opinion, there is no evidence of significant migration of contamination and little potential for future migration.

13.0 Assessment of Risk

Based on assessment of results against relevant guidelines and consideration of the overall investigation, remediation and validation works, it is the Auditor's opinion that the risks to human health and the environment are low within the site audit areas.

14.0 Compliance with Regulatory Guidance and Directions

The Auditor has used guidelines currently approved by the EPA under section 105 of the NSW Contaminated Land Management Act 1997 (Appendix C).

The remediation-validation was generally conducted in accordance with SEPP 55 Planning Guidelines and reported in accordance with the NSW EPA (2020) Consultants Reporting on Contaminated Sites Contaminated Land Guidelines. The checklist included in that document has been referred to. The EPA's Checklist for Site Auditors using the EPA Guidelines for the NSW Site Auditor Scheme 2017 (October 2017) has also been referred to.

14.1 Development Approvals

Development consent (SSD 7308 issued on 7/5/2020, and subsequent approved modifications) was granted by the Minister for Planning and Public Spaces for the construction and operation for the St Mary's Intermodal (road and rail) Terminal and container park. The consent was subject to a number of requirements associated with site contamination and the requirement of a Site Audit Statement. Refer to **Section 1.0**.

14.2 Waste Disposal

No waste was reported to have been removed off-site during the remediation-validation works.

14.3 Licenses

The Validation Report included a copy of the SafeWork NSW 'Notice of intent to remove friable asbestos' (status: accepted) dated 23 March 2021, for licence holder Aztech Services Australia Pty Ltd, for Class A/ASA.

Two asbestos clearance inspections were undertaken by EnviroScience and a clearance documentation provided in Appendix G of the Validation Report. Clearance was undertaken by the following licensed assessors with photographic records of works included:

- Andres Ortega - Asbestos Assessor Licence No. LAA001346.
- John Bartholomew - Asbestos Assessor Licence No. LAA001156.

15.0 Conclusions and Recommendations

HEC (2021b) conclude the following:

"*… the remediation works within the site have been completed and validated in general accordance with the objectives and/or requirements of the RAP and RWP. PAEC1, containment cell 1 and containment cell 2 are considered suitable for the proposed commercial/industrial land use subject to implementation of an ongoing long-term environmental management plan (LTEMP) to address the retained impacted fill materials below the site capping profile*."

Based on the information presented in HEC reports and observations made on site, and following the Decision-Making Process for Assessing Urban Redevelopment Sites in NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme, the Auditor concludes that the site audit areas are suitable for the purposes of commercial/industrial land use, subject to implementation of the following LTEMP:

- 'Long Term Environmental Management Plan, 2 Forrester Road, St Marys, NSW' dated 11 November2021 by HEC.

16.0 Other Relevant Information

This Audit was conducted on the behalf of Pacific National for the purpose of assessing whether the land is suitable for the proposed commercial/industrial uses i.e. a “Site Audit” as defined in Section 4 (definition of a ‘site audit’ (b)(iii)).

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

In drawing conclusions, the Auditor used reasonable care to avoid reliance upon data and information that may be inaccurate, however a degree of uncertainty is inherent in all subsurface investigations and there remains the possibility that variations may occur between sample locations. The Audit and this report are limited by and rely upon the scope of the review, and the information provided by the Client and their consultants and representatives through documents provided to the Auditor. The Audit is based on a review of the subsurface condition of the site at the time of assessment, as described in the assessment reports attached to the Audit report and site inspections conducted by the Auditor and their representatives. The Auditor’s conclusions presented in this report are therefore based on the information made available to them and arising from their own observations conducted during the audit. If the Auditor is unable to rely on any of those documents, the conclusions of the audit could change.

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

In reaching their conclusions about the site, the Client and NSW EPA may use this audit report and Certificate or Statement of Environmental Audit. The scope of work performed as part of the audit process may not be appropriate to satisfy the needs of any other person. Any other person’s use of, or reliance on, the audit document and report, or the findings, conclusions, recommendations or any other material presented or made available to them, is at that person’s sole risk.

Appendix A: Attachments

Attachment 1 – Figure 1 Site Location

Attachment 2 – Figure 2 Site Layout

Attachment 3 – Survey PAEC1 and Containment Cell

Attachment 4 – Survey Containment Cells

Attachment 5 – Drawing 4 Preliminary Site Contamination Assessment locations

Attachment 6 – Drawing 5 Supplementary Contamination Assessment Locations

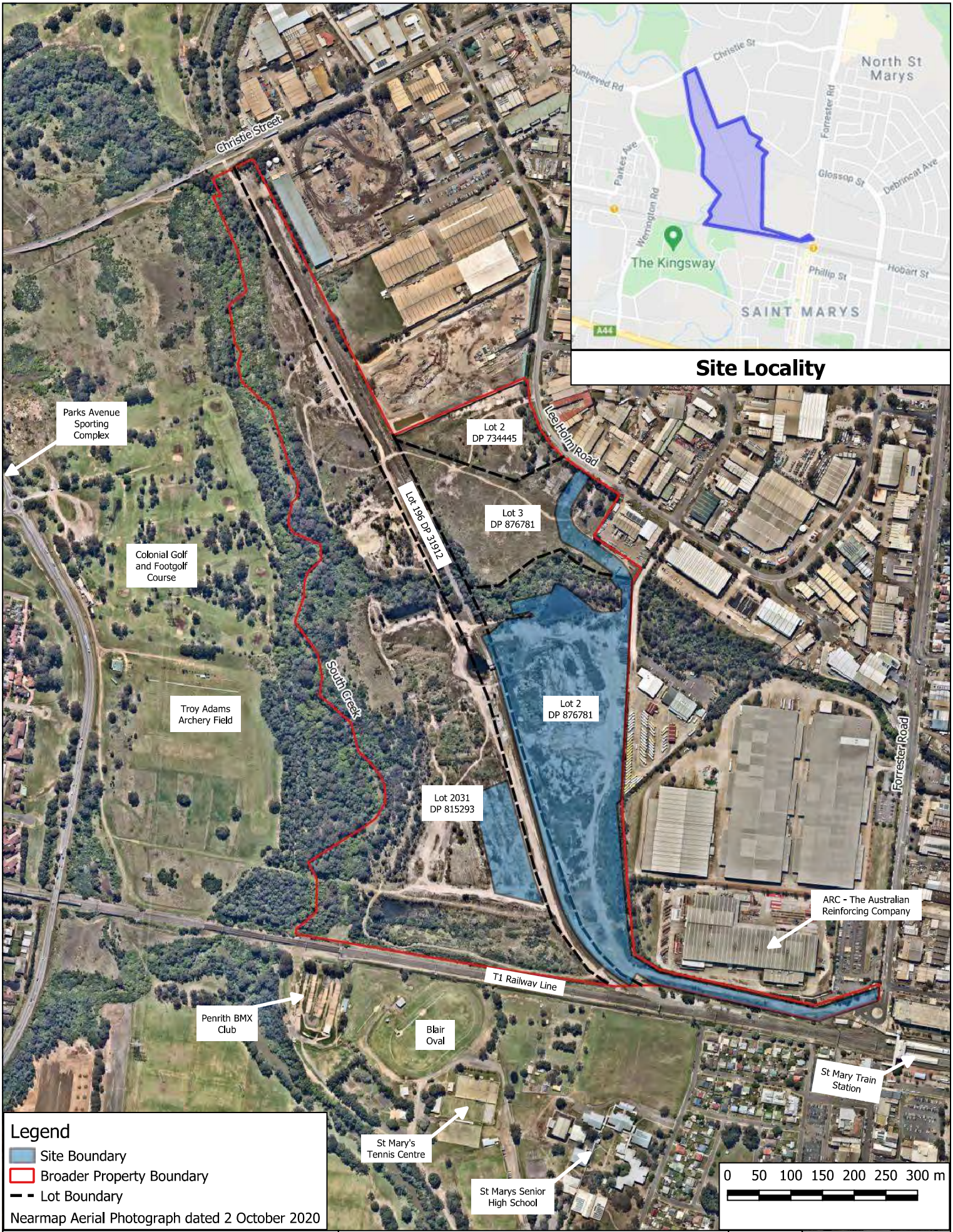
Attachment 7 – Drawing 3 Further Asbestos Investigation Locations

Attachment 7 – Further Asbestos Investigation Locations

Attachment 8 – Figure 3 Pre-remediation Sampling Locations

Attachment 9 – Figure 5 Validation Sample Locations

Attachment 10 –Containment Cell sample locations



Site Locality

Legend
- Site Boundary
- Broader Property Boundary
- Lot Boundary

Nearmap Aerial Photograph dated 2 October 2020

0 50 100 150 200 250 300 m

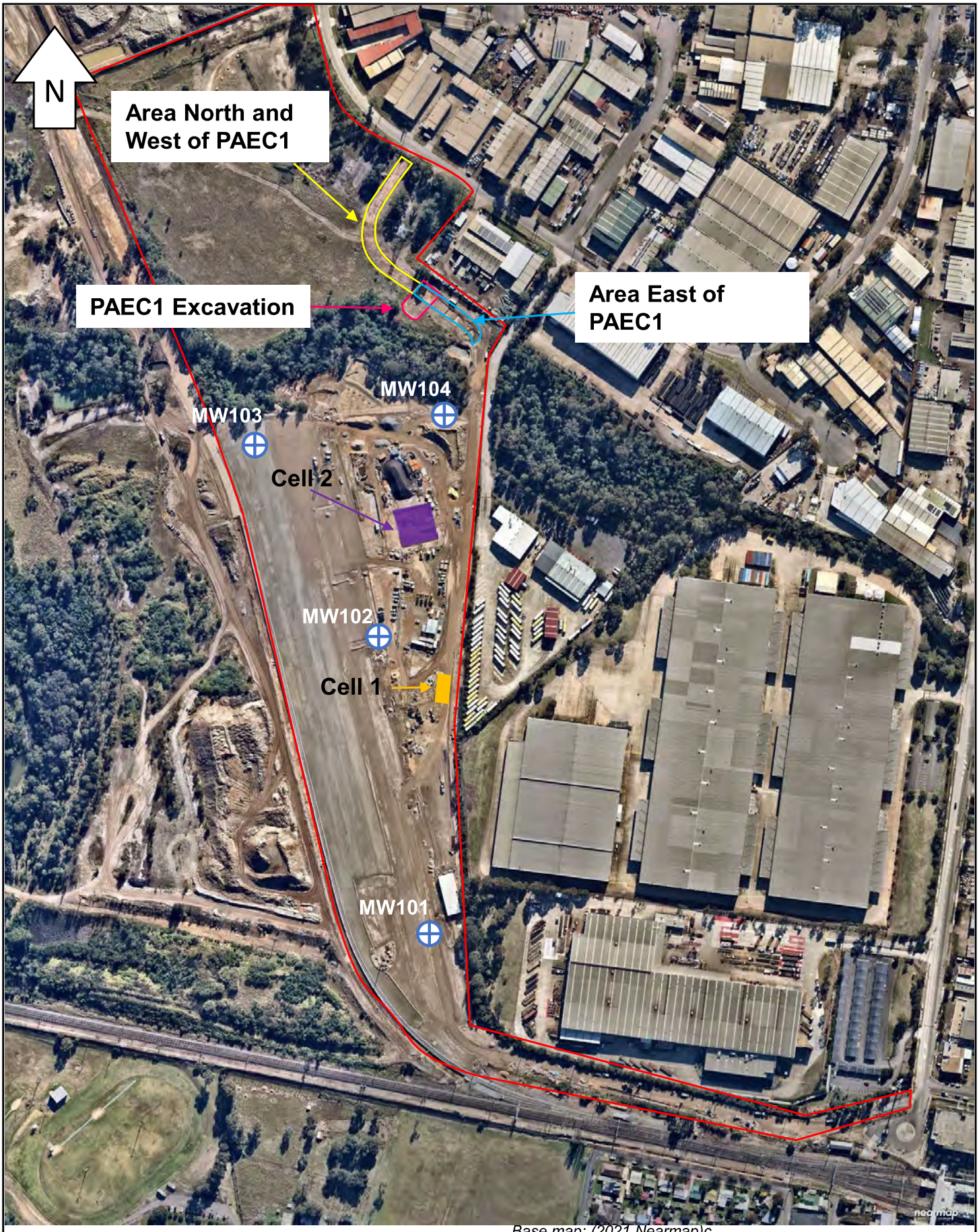
Douglas Partners
Geotechnics | Environment | Groundwater

TITLE: **Site Layout and Locality**
Remediation Action Plan
2 Forrester Rd, St Marys, NSW

MGA

OFFICE: Macarthur
DRAWN BY: LOC / CKM
DATE: 08.10.2020

CLIENT: Pacific National (NSW) Pty Ltd
PROJ. #: 94525.02
DRAWING No: 1
REVISION: 1
SCALE: As Shown



Base map: (2021 Nearmap)c

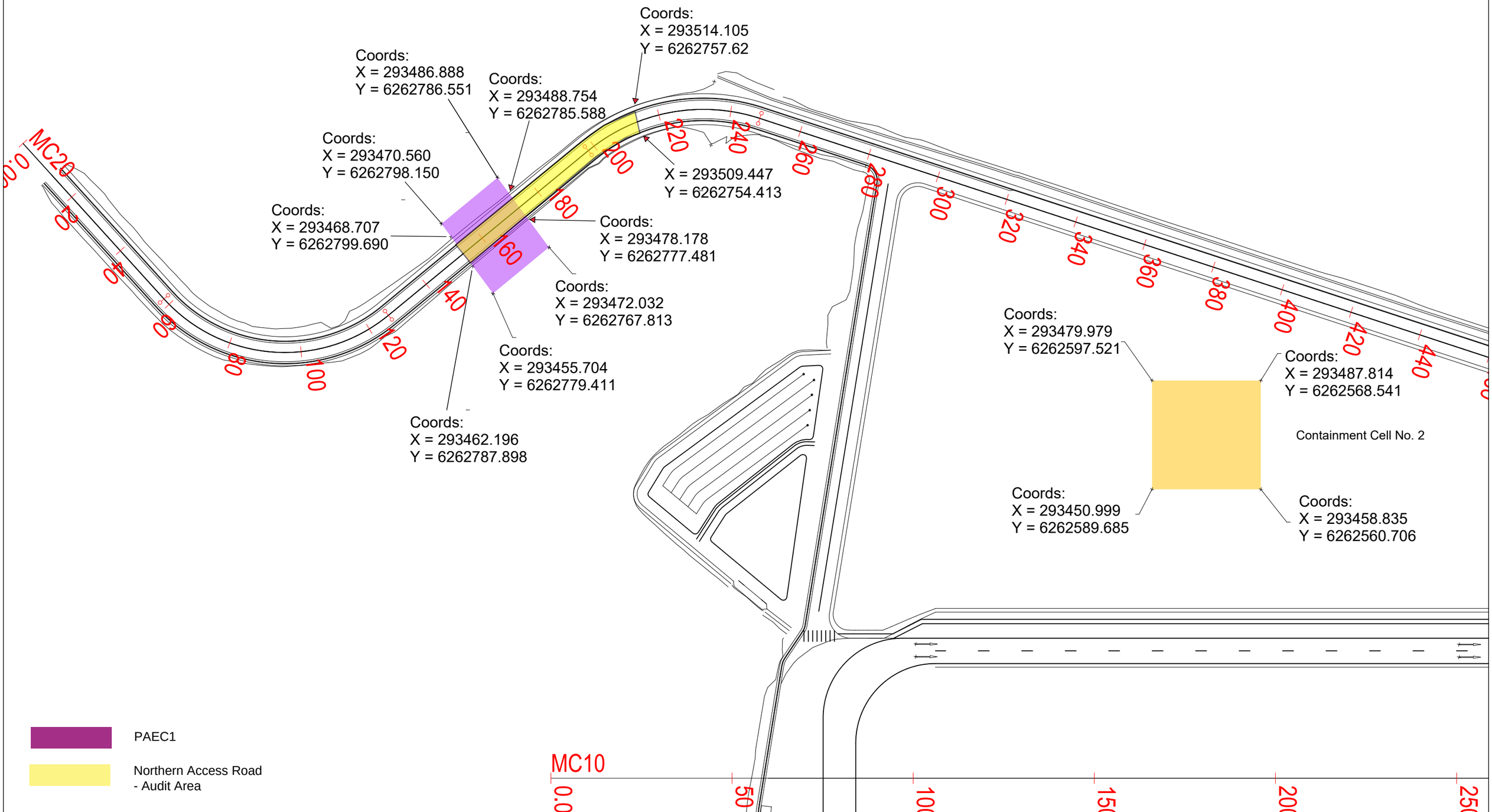
⊕ *Groundwater monitoring well*

0m 10 50

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 2: Site Layout

21003: St Mary's Intermodal Validation – PAEC1, SP4 and Cells



McMahon Services - ST Marys Rail Hub

LV Access Road Box Out

12d Model

Scale 1:1000

Mon Jun 28 13:42:47 2021

Coords:
X = 293479.979
Y = 6262597.521

Coords:
X = 293487.814
Y = 6262568.541

Containment Cell No. 2

Coords:
X = 293450.999
Y = 6262589.685

Coords:
X = 293458.835
Y = 6262560.706

Coords:
X = 293507.567
Y = 6262441.658

Containment Cell No. 1

Coords:
X = 293506.511
Y = 6262421.686

Coords:
X = 293497.581
Y = 6262442.186

Coords:
X = 293496.525
Y = 6262422.214

50 100 150 200 250 300 350 400

McMahon Services - ST Marys Rail Hub
Containment Cells 1 & 2

12d Model
Scale 1:1000
Mon Jun 28 12:35:53 2021

Douglas Partners
Geotechnics / Environment / Groundwater

TITLE: **Investigation Locations**
Preliminary Site Contamination Investigation
2 Forrester Rd, St Marys, NSW

N
MGA

OFFICE: Macarthur
DRAWN CKM
DATE: 28.2.19

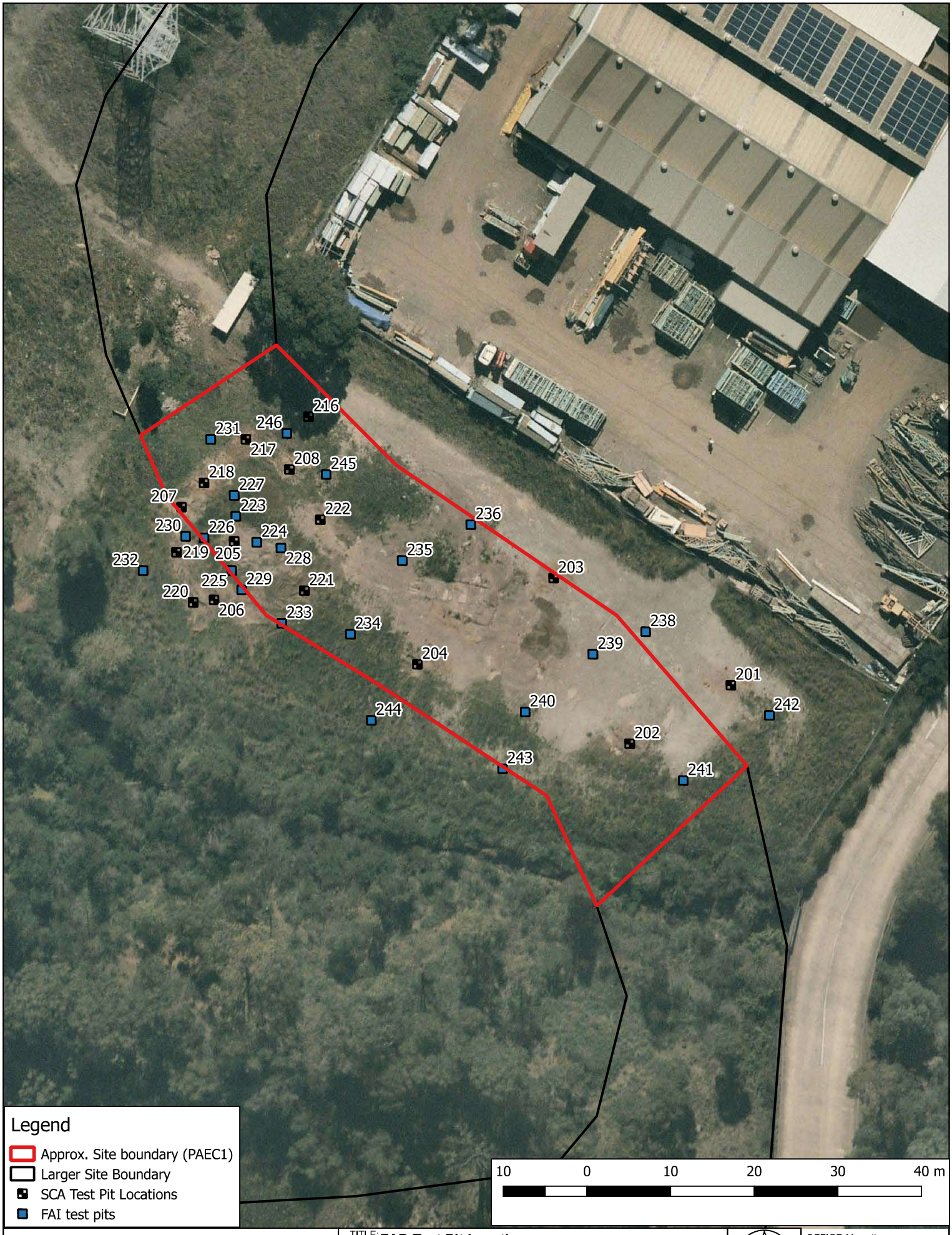
CLIENT: Pacific National (NSW) Pty Ltd
PROJ. 94525.02
DRAWING No: 4
REVISION: 0
SCALE: As Shown

Douglas Partners
Geotechnics | Environment | Groundwater

TITLE: PAEC 1 - Far Northern Former Stockpile Footprint
Sample Locations
Supplementary Contamination Assessment
2 Forrester Rd, St Marys, NSW

OFFICE: Macarthur
DRAWN GAR
DATE: 28.2.19

CLIENT: Pacific National (NSW) Pty Ltd
PROJ. 94525.02
DRAWING No: 5
REVISION: 0
SCALE: As Shown



Douglas Partners
Geotechnics / Environment / Groundwater

TITLE: **FAD Test Pit Locations**
Further Asbestos Investigation
Lot 2 Forrester Road, St Marys NSW

OFFICE: Macarthur
DRAWN GAR
DATE: 25.06.2019

CLIENT:
PROJ. 94525.04
DRAWING No: 3
REVISION: 0
SCALE: As Shown

Base map: (2021 Nearmap)

- Douglas Partners (2019) Test Pit
- HEC (2021) Test Pit

0m 10 50

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 3: Pre-remediation Sampling Locations

21003: St Mary's Intermodal Validation – PAEC1, SP4 and Cells

Base map:
Near Map (2021)

0 4 20

- Validation Floor Sample
- PAEC1 Surface Validation
- Validation Wall Sample
- Excavation to 0.3mBGL
- Deeper excavation where asbestos had been previous identified

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 5: Validation Sample Locations

21003: St Mary's Intermodal Validation – PAEC1, SP4 and Cells

Base map: NearMap June 2021

- Validation Floor Sample
- Validation Wall Sample

0 10 50

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 6: Cell Validation Sample Locations

21003: St Mary's Intermodal Validation – PAEC1, SP4 and Cells

Appendix B: EPA Guidelines

Guidelines made or approved by the EPA under section 105 of the *Contaminated Land Management Act 1997*

(as of: 28 April 2021)

Section 105 of the Contaminated Land Management Act 1997 (CLM Act) allows the EPA to make or approve guidelines for purposes connected with the objects of the Act. The EPA must consider these guidelines whenever they are relevant. Other people must also consider the guidelines, namely, accredited site auditors when conducting a site audit; contaminated land consultants when investigating, remediating, validating and reporting on contaminated sites; and those responsible for land contamination with a duty to notify the EPA.

A current list of guidelines made or approved by the EPA under the CLM Act appears below.

Guidelines made by the EPA

- Assessment and management of hazardous ground gases: Contaminated land guidelines (PDF 4MB)
- Guidelines for the vertical mixing of soil on former broad-acre agricultural land (PDF 148KB)
- Sampling design guidelines (PDF 2MB)
- Guidelines for assessing banana plantation sites (PDF 586KB)
- Consultants reporting on contaminated land: Contaminated land guidelines (PDF 1MB)
- Guidelines for assessing former orchards and market gardens (PDF 172KB)
- Guidelines for the NSW Site Auditor Scheme, 3rd edition (PDF 999KB)
- Guidelines for the assessment and management of groundwater contamination (PDF 604KB)
- Guidelines on the duty to report contamination under the Contaminated Land Management Act 1997 (PDF 412KB)

Guidelines that refer to the

Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, October 2000), are replaced as of 29 August 2018 by the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, August 2018), with the exception of the water quality for primary industries component, which still refer to the ANZECC & ARMCANZ (2000) guidelines

National Environment Protection (Assessment of Site Contamination) Measure 1999 are replaced as of 16 May 2013 by the National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013).

Guidelines approved by the EPA

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZG (August 2018)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 3, Primary Industries - Rationale and Background Information (ANZECC & ARMCANZ (October 2000)
- Composite sampling, Lock, W. H., National Environmental Health Forum Monographs, Soil Series No.3, 1996, SA Health Commission, Adelaide. Email enHealth.Secretariat@health.gov.au for a copy of this publication.
- Environmental health risk assessment: Guidelines for assessing human health risks from environmental hazards, Department of Health and Ageing and EnHealth Council, Commonwealth of Australia (June 2012)
- National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)* (ASC NEPM)
- Guidelines for the Assessment and Clean Up of Cattle Tick Dip Sites for Residential Purposes, NSW Agriculture and CMPS&F Environmental (February 1996)
- Australian Drinking Water Guidelines, NHMRC and Natural Resource Management Ministerial Council of Australia and New Zealand (2011)

*The ASC NEPM was amended on 16 May 2013.

Appendix C: Correspondence

Aoife McKenna

From: Guy Evans <guy.evans@urbanco.com.au>
Sent: 01 November 2021 10:01
To: Lee.McCourt@planning.nsw.gov.au; Gabriel Peters Shaw
Cc: 'David Djulbic'; Melissa Porter; Aoife McKenna; Amy Porter
Subject: SM - St Marys Intermodal - Long Term EMP

Hi Lee/Gabriel

As part of the requirements for the Site Audit Statement for the St Marys Intermodal, we advise that a Long Term Environmental Management Plan (LTEMP) is being prepared for the onsite containment cell.

The LTEMP will be appended to the Site Audit Statement (SAS) which will be submitted to the DPIE shortly in accordance with Condition D26. The SAS and LTEMP will also be provided to Penrith Council.

Please call if you have any questions.

Regards
Guy Evans

Suite 3.03 55 Miller Street PYRMONT NSW 2009 | PO Box 546 PYRMONT NSW 2009
02 9051 9333 | 0477 474 091 | urbanco.com.au

Senversa Pty Ltd

ABN 89 132 231 380
www.senversa.com.au
enquiries@senversa.com.au
LinkedIn: Senversa
Facebook: Senversa