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Mirvac Residential (NSW) Developments Pty Ltd
Prepared by
Ramboll Australia Pty Ltd
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SITE AUDIT REPORT
REMEDIATION ACTION PLAN, WESTERN SYDNEY UNIVERSITY CAMPUS, 2 AND 2A BULLECOURT AVENUE, MILPERRA

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27 September 2022

Mirvac Residential (NSW) Developments Pty Ltd
Attn.: Theo Zotos
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Sydney NSW 2000

By email: theo.zotos@mirvac.com

Dear Theo

SITE AUDIT REPORT - REMEDIATION ACTION PLAN, WESTERN SYDNEY UNIVERSITY CAMPUS, 2 AND 2A BULLECOURT AVENUE, MILPERRA

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Ref 3180015001500

I have pleasure in submitting the Site Audit Report for the subject site. The Site Audit Statement, produced in accordance with the NSW *Contaminated Land Management Act 1997*, is included as Appendix B of the Site Audit Report. The Audit was commissioned by Mirvac Residential (NSW) Developments Pty Ltd to assess the suitability of a remediation action plan.

The Audit was initiated to comply with a condition specified in a NSW Department of Planning and Environment report titled '*Gateway determination report – PP-2021-5837 Wester Sydney University Milperra Campus*' dated 1 June 2022 and is therefore a statutory audit.

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

Yours faithfully,
Ramboll Australia Pty Ltd

Louise Walkden
EPA Accredited Site Auditor 1903

Ramboll Australia Pty Ltd
ACN 095 437 442
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Measures

µg/L	Micrograms per Litre
ha	Hectare
km	Kilometres
m	Metre
mAHD	Metres Australian Height Datum
mbgl	Metres below ground level
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
mL	Millilitres
mV	Millivolts
ppm	Parts Per Million

General

ABC	Ambient Background Concentration
ACL	Added Contaminant Limit
ACM	Asbestos Containing Material
ADWG	Australian Drinking Water Guidelines
AEC	Area of Environmental Concern
AF	Asbestos Fines
AG	Alliance Geotechnical Pty Ltd
AHD	Australian Height Datum
ALS	Australian Laboratory Services
ANZG	Australian & New Zealand Guidelines
BaP	Benzo(a)pyrene
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes & Naphthalene
CLM Act	NSW Contaminated Land Management Act 1997
Coffey	Coffey Environments Pty Ltd
COC	Chain of Custody
CoPC	Contaminants of potential concern
CSM	Conceptual Site Model
DO	Dissolved Oxygen
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
DSI	Detailed Site Investigation
EC	Electronic conductivity
EIL	Ecological Investigation Level
EIS	Environmental Investigation Services
Envirolab	Envirolab Services Pty Ltd
EPA	Environment Protection Authority (NSW)
EPL	Environmental Protection Licences
ESL	Ecological Screening Level
FA	Fibrous Asbestos
FCF	Fibre cement fragment
GME	Groundwater Monitoring Event
HIL	Health Investigation Level
HSL	Health Screening Level
JBS&G	JBS&G Australia Pty Ltd
LEP	Local Environmental Plan
LNAPL	Light Non-Aqueous Phase Liquid
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Ni: Nickel, Pb: Lead, Zn: Zinc, Hg: Mercury
Mgt-LabMark	Mgt-LabMark Environmental Laboratories
Mirvac	Mirvac Residential (NSW) Developments Pty Ltd
ML	Management Limits
NAA	Noel Arnolds and Associates
NATA	National Association of Testing Authorities
NC	Not Calculated

ND	Not Detected
NEPC	National Environmental Protection Council
NEPM	National Environment Protection Measure
NL	Non-Limiting
NSW	New South Wales
NSW DEP	NSW Department of Planning and Environment
OCPs	Organochlorine Pesticides
OPPs	Organophosphorus Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCS	Preliminary Contamination Screening
PFAS	Per- and Poly-fluoroalkyl substances
pH	A measure of acidity, hydrogen ion activity
PID	Photoionisation Detector
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
Ramboll	Ramboll Australia Pty Ltd
RAP	Remediation Action Plan
RPD	Relative Percent Difference
SAR	Site Audit Report
SAS	Site Audit Statement
SGS	SGS Australia
SCI	Soil Contamination Investigation
SWL	Standing Water Level
TEQ	Toxic Equivalence Quotient
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
-	On tables is "not calculated", "no criteria" or "not applicable"

1. INTRODUCTION

1.1 Audit Details

A site contamination audit has been conducted in relation to the site at 2 and 2A Bullecourt Avenue, Milperra, New South Wales (NSW) (the site). The Audit was conducted to provide an independent review by an EPA Accredited Auditor of the suitability and appropriateness of a remedial action plan (RAP), i.e. a "Site Audit" as defined in Section 4 (1) (b) (v) of the NSW *Contaminated Land Management Act 1997* (the CLM Act).

The site is currently used as a Western Sydney University campus. Mirvac Residential (NSW) Developments Pty Ltd (Mirvac) propose to rezone and redevelop the site for predominantly residential land use (the planning proposal). NSW Department of Planning and Environment (DPE) is considering the planning proposal and have recommended in their report titled '*Gateway determination report – PP-2021-5837 Western Sydney University Milperra Campus'* dated 1 June 2022 (NSW DPE Gateway determination report) that a RAP be prepared to demonstrate that the site can be made suitable for residential use. They also requested that the RAP be reviewed by a NSW EPA accredited Site Auditor and a Section B Site Auditor Statement (SAS) and supporting Site Audit Report (SAR) be prepared.

The Audit was initiated to comply with the condition specified in the NSW DPE Gateway determination report and is therefore a statutory audit.

Details of the Audit are:

Requested by:	Theo Zotos on behalf of Mirvac
Request/Commencement Date:	4 July 2022
Auditor:	Louise Walkden
Accreditation No.:	1903

1.2 Scope of the Audit

The scope of the Audit included:

- Review of the following reports:
  - 'Phase 2 Environmental Site Assessment – Student Residence Development University of Western Sydney, Bankstown Campus', 25 August 2011, Coffey Environments Pty Ltd (Coffey) (**the Phase 2**).
  - 'Soil Contamination Investigation, University of Western Sydney – Bankstown Campus Bullecourt Avenue, Milperra NSW', October 2011, Noel Arnolds and Associates (NAA) (**the SCI**).
  - 'Preliminary Contamination Screening and Waste Classification, Proposed Oval Facilities, UWS Bankstown Campus, 2 Bullecourt Avenue, Milperra', 7 April 2016, Environmental Investigation Services (EIS) (**the PCS**).
  - 'Phase 1 Environmental Assessment Report, Bullecourt Avenue, Milperra NSW', 7 February 2018, JBS&G Australia Pty Ltd (JBS&G) (**The Phase 1**).
  - 'Detailed Site Investigation, Bullecourt Avenue, Milperra NSW', 30 January 2020, Alliance Geotechnical Pty Ltd (AG) (**the DSI**).
  - 'Remediation Action Plan Western Sydney University – Milperra Campus, Horsley Rd & Bullecourt Ave, Milperra, NSW 2214', 15 September 2022 (and earlier drafts), AG (**the RAP**).

  - NSW DPE Gateway determination report dated 1 June 2022.
- A site visit by the Auditor on 15 September 2022
- Discussions with Mirvac, and with AG who undertook the DSI and prepared the RAP.

The Phase 2, the SCI and the PCS were limited to specific parts of the site, whilst the Phase 1, the DSI and the RAP were site-wide assessments. Indicative boundaries of the areas targeted in the Phase 2, the SCI and the PCS are shown in Figure 1.

The Phase 2, SCI, PCS, Phase 1 and DSI were completed prior to the Auditors engagement, and therefore the proposed scope of work and the resulting reports were not reviewed by the Auditor.

Figure 1: Areas targeted by the Phase 2, the PCS and the SCI. Red solid line represents site boundary

2. SITE DETAILS

2.1 Location

The site locality is shown in Figure 2, extracted from the Gateway report.

Figure 2: Site locality (red solid line represents site boundary)

The site details are as follows:

Street address:	2A and 2 Bullecourt Avenue, Milperra NSW
Identifier:	Lot 1 in Deposited Plan (DP) 101147 (2A Bullecourt Avenue) Lot 105 in DP 1268911 (2 Bullecourt Avenue)
Local Government:	Canterbury-Bankstown Council
Owner:	University of Western Sydney
Site Area:	Approximately 19.64 Hectares (ha)

2.2 Zoning

In accordance with the Bankstown Local Environmental Plan (LEP) 2015, the current zoning of the site is Zone SP2 Electricity Transmission or Distribution Network (2A Bullecourt Avenue) and Zone SP2 Educational Establishment (2 Bullecourt Avenue).

The planning proposal seeks to rezone the site from Special Uses to Residential, Business, Recreation and Conservation uses.

The proposed site zoning is shown in Figure 3, extracted from the NSW DPE Gateway determination report.

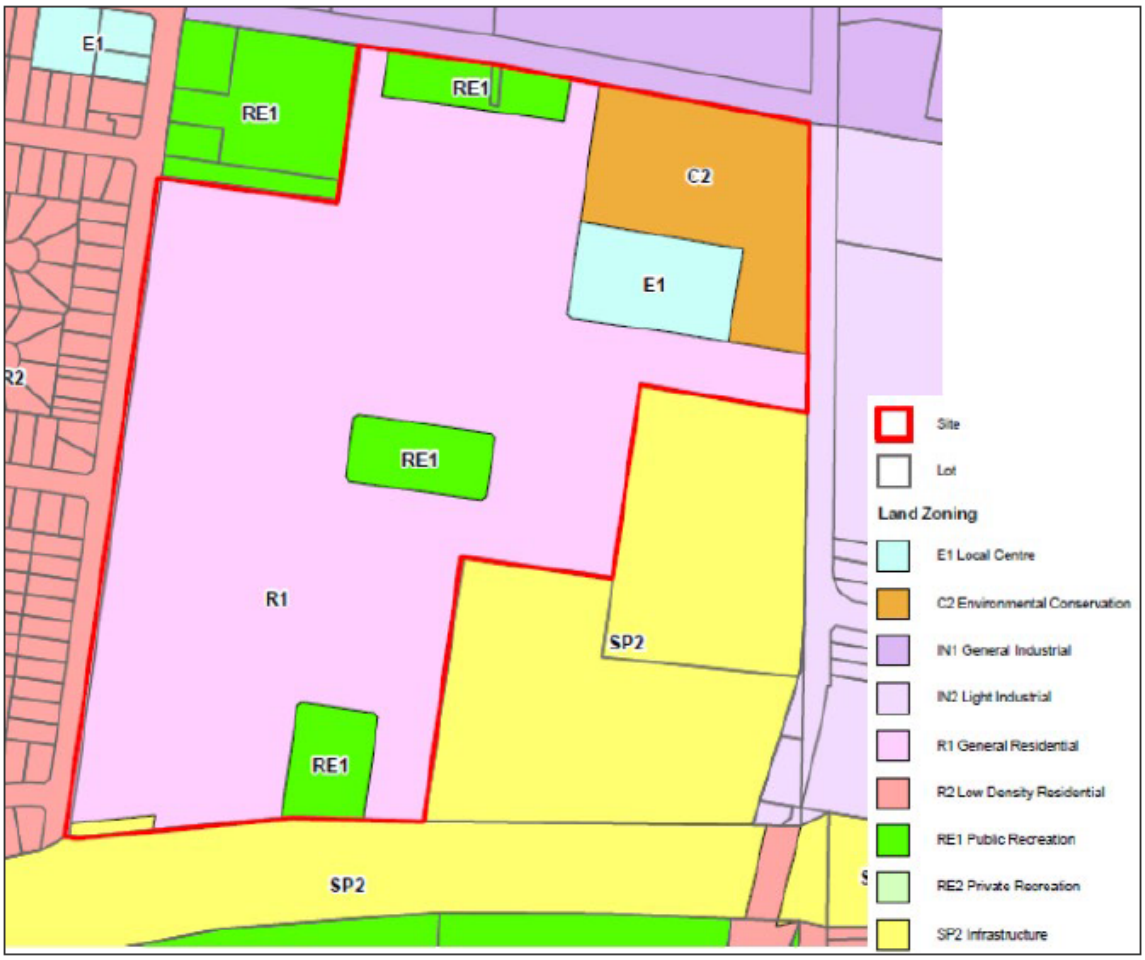


Figure 3: Proposed site zoning map

2.3 Adjacent Uses

The site is bound by:

- North by Bullecourt Avenue, with a series of heavy industrial uses on the northern side of Bullecourt Avenue.
- Northwest/west by Milperra Reserve and Ashford Avenue, beyond which are existing low density residential and industrial premises including a service station to the north-west.
- South by the M5 Motorway, beyond which is Kelso Waste Facility (landfill, further discussion in Section 3).
- East by Mount St Joseph Catholic College and Horsley Road, with existing light industrial uses located on the eastern side of Horsley Road.

The adjacent land uses are shown in Figure 4 extracted from the NSW DPE Gateway determination report.

Figure 4: Surrounding land uses[1]

2.4 Site Condition

The site is irregular in shape and the primary access to the site is via Bullecourt Avenue.

The north-eastern portion of the site contains approximately 2.035 ha of Cumberland Plain Woodlands (Figure 4), which is considered to be an Endangered Ecological Community, with mature trees and scattered vegetation located throughout the remainder of the site.

Key on-site features include building structures utilised for student accommodation, education and administrative purposes, a day care facility to the immediate southwest of the Cumberland Plain Woodlands, open air carparks and open space areas including a cricket oval in the southern portion of the site.

The site slopes from the north-eastern corner (~23 m Australian Height Datum (AHD)) to the south-western corner (~5 mAHD) of the site.

During their site inspection on 23 August 2017, JBS&G noted:

- Cut and fill activities were visible across the site.
- Mounded material along the northern boundary of the site.

[1] The Auditor has added "On-site Cumberland Plain Woodlands" and "Cricket Oval" to the original figure included in the Gateway determination report.

- The ground level of the cricket oval was below that of surrounding land to the north, east and west, and was approximately 3 m higher than the land to the immediately south.

The Auditor undertook a site visit on 15 September 2022 and observations were largely consistent with those described above. The following was noted by the Auditor during the site visit:

- The site was fenced with various access points off Horsley Road, Bullecourt Avenue and Ashford Avenue.
- The topography of the site generally slopes from the north-east to south-west, however, the area within the site boundary is undulating with evidence of filling across the site in the form of landscaped mounds and elevated areas.
- The site is occupied by campus buildings including lecture halls, library and student accommodation blocks, carpark areas, a childcare centre, internal roadways and landscaped areas with garden beds. The playing field (cricket oval) in the southern portion of the site was at an elevation of approximately 3 m lower than land to the north and was surrounded by grassed mounds.
- Buildings appeared in a good state of repair. No ACM was observed on the ground surface.
- Vegetation included the area of Cumberland Plain Woodlands in the north-east and various exotic species across the remainder to the site. All vegetation appeared in good condition and the landscaped areas were well maintained.

2.5 Proposed Development

As per the NSW DPE Gateway determination report (and Figure 3 above), "*the planning proposal will deliver a two to three storey mixed use neighbourhood with 430 dwellings, a new 8,200 m^2 local neighbourhood centre, approximately 1.49Ha of public open space and retention of approximately 2.035Ha of Cumberland Plain Woodlands in an environmental conservation area*".

For the purposes of this Audit and given that the redevelopment design is yet to be finalised, the most conversative land use exposure scenario, namely 'residential with garden/accessible soil', which also includes childcare centre, preschools and primary schools, will be assumed.

3. SITE HISTORY

JBS&G reviewed historical site information in the Phase 1 and provided a summary of the site history based on aerial photographs, site photographs, NSW EPA records, local Council records, SafeWork NSW records on Storage of Hazardous Chemicals and Certificates of Title. The Auditor has summarised the site history in Table 3.1.

Table 3.1: Site History

Date	Activity
1930-1965	The site appeared to be a combination of small market gardens on the western and southern portions, bushland on the north-eastern portion and cleared paddocks on the eastern portion. Some building structures were visible in the western and southern portions. These structures were likely to be associated with the market gardens.
1965-1986	Development of the site commenced sometime between 1965 and 1975. The 1975 aerial photograph showed that the former market gardens and associated building structures were removed and construction of one of the existing university buildings was in progress. By 1986, the existing building structures in the centre and the cricket oval in the southern portion of the site were constructed.
1986 - Present	Additional university building and carpark structures were progressively constructed. No evident changes to the site layout since 2017.

The site was owned by private owners from 1917 and was mainly used as small farms and market gardens until approximately 1965 when the site was purchased by Milperra Public School and then by University of Western Sydney and the Minister for Education Training and Youth Affairs.

The SafeWork NSW records indicated that the site contained two 2,500-litre underground storage tanks (USTs). The former USTs were located in the central western portion of the site and were used to store unleaded petrol and diesel. The former USTs were decommissioned (via removal) on 19 December 1997, however, it is not clear whether or not contamination validation was undertaken during tank removal.

In addition, historical features within the Phase 2 targeted area (Figure 1) were reported to include a farm dam (northern portion) and an area for burial of building rubble (southern end). The Phase 2 also reported that this area had been levelled with clay from an unknown source.

On 15 July 2022, the Auditor completed a search of the contaminated land record of notices under sections 15, 17, 19, 21, 26, 28 and 53B and the list of sites notified under section 60 of the CLM Act, the public register sites under section 308 of the *Protection of the Environment Operations Act 1997* (the POEO Act) and the NSW Government per- and poly-fluoroalkyl substances (PFAS) Investigation Program list. The Auditor's search identified:

- Four sites within the suburb of Milperra were notified to the EPA, including Heatcraft Australia Pty Ltd located at 286 Horsley Road, United Group Rail Pty Ltd at 373 Horsley Road, Caltex Service Station located at 264 Milperra Road and a former landfill located at 479 Henry Lawson Drive. The EPA have completed their assessments and have decided that regulation under the CLM Act is not required on these sites. These sites are located to the east, north and northwest of the site, within approximate 1 kilometre (km) radius of the site.
- Kelso Waste Facility located at Bransgrove Road, which is approximately 200 m to the south, holds two Environmental Protection Licences (EPL) (No. 4606 and No 12752) for resource recovery, waste storage, waste processing and disposal. According to the EPLs, wastes allowed to be stored or processed on the Kelso Waste Facility include garden waste, general solid waste (putrescible), virgin excavated natural material (VENM), building and demolition

waste, asphalt waste, waste tyres and waste collected by or on behalf of local Councils from street sweeping.

- Jamestrong Package Australia Pty Ltd located at 11 Amour Street, which is approximately 450 m to the northeast, holds an EPL (No. 20054) for metal coating, metal processing and metal waste generation.
- SIMS Group Ltd located at 43 Ashford Avenue, which is approximately 300 m to the northwest, holds an EPL (No. 2207) for scrap metal processing.
- Bankstown Airport located approximately 1 km to the north (Figure 2) is listed on the NSW Government PFAS Investigation Program.

3.1 Auditor's Opinion

In the Auditor's opinion, the site history provides an adequate indication of past activities. Previous site uses with the most potential to cause contamination include use of pesticides, hazardous building materials, filling of land and storage and use of fuels.

Potential off-site sources of contamination include service stations, industrial use of land and Bankstown Airport to the north and Kelso Waste Facility to the south.

4. CONTAMINANTS OF CONCERN

4.1 The Phase 1

The Phase 1 provided a list of the contaminants of potential concern (CoPC) and potentially contaminating activities or areas of environmental concern (AECs). This information has been reproduced in Table 4.1.

Table 4.1: Phase 1 Contaminants of Potential Concern

Potential Contaminating Activities / AEC	Potential Contaminants
Demolition of historical site structures which may have contained hazardous building materials.	Asbestos and lead.
Surface soils impacted with herbicides/pesticides due to the maintenance of site from noxious weeds/pests.	Organochlorine pesticides (OCPs).
Fill materials across the site, potentially imported to the site.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), total recoverable hydrocarbons (TRHs), benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), OCPs, polychlorinated biphenyls (PCBs) and asbestos.
Burial area (fill material).	Heavy metals, PAHs, OCPs and asbestos.
Groundwater along the northern and eastern boundaries adjacent to commercial/industrial properties.	Heavy metals, TRH, BTEX, PAH and volatile organic compounds (VOC).
Hazardous ground gas along the southern boundary adjacent to Kelso Waste Facility.	Methane and other hazardous ground gases.

4.2 The DSI

The CoPCs and AECs were modified in the DSI, which are presented as Table 4.2. These AECs are shown in Attachment 1 in Appendix A. The DSI also included groundwater assessments at the site boundary. This is discussed in detail in Section 9.

Table 4.2: The DSI Contaminants of Potential Concern

AEC	Potential Contaminating Activities	Potential Contaminants
AEC01	Whole site – historical uncontrolled demolition, uncontrolled filling and regrading, historical farming practices	Metals, TRH, BTEX, PAH, PCB, OCP/OPP, phenols and asbestos
AEC02	Building Rubble Burial Area (refer to Coffey 2011 & JBS&G 2018)	Metals, TRH, BTEX, PAH, PCB, OCP/OPP, phenols and asbestos
AEC03	Uncontrolled large-scale filling/bulk soil storage	Metals, TRH, BTEX, PAH, PCB, OCP/OPP, phenols and asbestos
AEC04	Underground storage of petroleum-based products on-site (refer JBS&G 2018)	Metals, PAH, BTEX, TRH

4.3 Auditor's Opinion

Despite some discrepancies, the Auditor considers that the analyte lists and the AECs identified in the Phase 1 and in the DSI are reasonably aligned and adequately reflect the site history and condition.

No assessments for the potential presence of PFAS in soil or in groundwater have been undertaken. In the Auditor's opinion there are no indications in the site history that they would

comprise site-specific CoPCs. However, due to the site locality (1 km to the south of Bankstown Airport and down gradient of an industrial area), there is a potential for PFAS impacted groundwater entering the site. This needs to be assessed in future works.

The Auditor notes that the potential for migration of hazardous ground gases from the adjacent Kelso Waste Facility onto the site is identified in the PSI as a potential exposure pathway. The DSI did not include it as an AEC given the distance of the landfill from the site boundary (>200 m), the potential for migration of ground gas onto the site at concentrations that pose a risk is likely to be low. The RAP proposes further assessment of landfill gas, which is considered appropriate.

5. STRATIGRAPHY AND HYDROGEOLOGY

5.1 Stratigraphy

JBS&G reviewed geological maps and reported that the site is underlain by Ashfield of the Wianamatta Group in the Phase 1.

The sub-surface profile encountered in the Phase 2 (25 boreholes and two surface soil sampling locations), the SCI (eight boreholes), the PCS (three boreholes), the Phase 1 (10 surface soil sampling locations) and the DSI (91 boreholes and 11 test pits) is summarised by the Auditor in Table 5.1.

Table 5.1: Stratigraphy

Depth (mbgl)	Subsurface Profile
0.0 – depths between 0.1 and 2.7	**Fill** comprising gravelly silt, gravelly clay, silt, silty topsoils, silty clay, sandy clay and/or sand with inclusions of reworked clay, building rubble (fragments of concrete/bitumen/asbestos containing material (ACM), bricks, terracotta pipe, piece of geofabrics, sandstone boulders and tiles) at some locations. Fragments of ACM were observed during the DSI at BH59, TP09 and TP101 (on surface); TP53 (1.2 mbgl) and TP56 (throughout the fill profile up to 2.2 mbgl). Fragments of potential ACM was observed at 0.45 mbgl at the Phase 2 investigation location EBH1. Olfactory signs of contamination were not observed at any of the investigation locations. Asphalt/concrete pavement were encountered at some locations and ranged in thickness from 50 millimetres (mm) to 200 mm.
0.1 to 2.7 – to 10	**Silty Clay/Clay.**
0.3 to 10 - 10.5 (maximum extent of investigation)	**Shale bedrock.**

mbgl – metres below ground level

See Attachment 2 to Attachment 6 in Appendix A for the Phase 2, SCI, PCS, Phase 1 and DSI investigation locations, respectively.

5.2 Hydrogeology

The Auditor undertook a search for registered bores (realtimedata.waternsw.com.au) on 16 July 2022 which identified three registered bores within a 500 m radius of the site. The bores (GW113993, GW113994 and GW113998) were located within the commercial/industrial premises to the east and were installed between 4 mbgl and 5.5 mbgl for monitoring purposes.

During the DSI, AG installed eight groundwater monitoring wells (MW01 to MW08) along the site boundary. The wells were installed at depths of between approximately 6.1 (MW07) and 10.5 mbgl (MW02) and were reported to be screened in natural clay and shale (well construction details were not provided on the borelogs). See Attachment 6 in Appendix A for well locations.

AG undertook one groundwater monitoring event (GME) in January 2020. Monitoring wells MW06 and MW07, which were located along the northern site boundary, were found to be dry at the time of the GME. Standing water levels (SWLs) in the remaining wells were between 0.86 mbgl (MW01) and 5.96 mbgl (MW03) or from 1.53 mAHD (MW03) to 16.31 mAHD (MW05), indicating a southerly/south-westerly groundwater flow direction.

Recorded groundwater quality parameters indicated the following:

- pH ranged from 5.28 to 6.59 indicating slightly acidic groundwater.
- Electrical conductivity (EC) readings ranged from 8,962 microsiemens per centimetre (µS/cm) to 23,668 µS/cm.

- Redox potential (Eh) ranged from 60.5 millivolts (mV) to 157.7 mV.
- Dissolved oxygen (DO) ranged from 0.67 parts per million (ppm) to 3.44 ppm.

5.3 Auditor's Opinion

The Auditor considers that the underlying stratigraphy has been generally characterised in the accessible areas of the site. However, most investigation locations to date were boreholes which limits visual assessment of the subsurface, hence, there is the potential for fill soils containing a greater proportion of anthropogenic materials (including asbestos) to be present than indicated from the assessments. Data gaps also exist beneath the building structures.

The quality of the fill soils has the greatest potential to impact the remediation of the site. Further investigation to characterise fill soils is not considered necessary prior to demolition given the access restrictions due to site infrastructure. A data gap assessment is proposed within the RAP (Section 11).

The Auditor considers that the site hydrogeology is sufficiently well known for the purpose of remediation planning. A shallow aquifer is encountered at shallow depths within the natural clay and shale and has the potential to be contaminated due to historical activities on the site and in the surrounding areas. Evaluation of the GME results is presented in Section 9 and a data gap assessment to improve current understanding on site groundwater is proposed within the RAP (Section 11).

Based on the expected low permeability of the shallow aquifer and lack of registered abstraction bores within the 500 m radius of the site, the Auditor is of the opinion that the potential for groundwater to be abstracted for beneficial use in the vicinity of the site is low.

6. EVALUATION OF QUALITY ASSURANCE AND QUALITY CONTROL

The Auditor has assessed the overall quality of the investigation data by review of the information presented in the referenced reports. The data sources are summarised in Table 6.1.

Table 6.1: Summary of Investigations

Stage of Works	Field Data	Analytical Data
^Phase 2 (Coffey 2011) *Fieldwork date: July 2011*	25 boreholes (EBH1-EBH25) to a maximum depth of 2.85 mbgl. Soil sampling at all locations: 38 fill samples and 1 natural soil sample. 2 surface soil samples (SS1 and SS2).	**Soil:** Metals (34 fill and 1 natural soil samples), OCPs (24 fill and 1 natural soil samples), PAHs/TRHs/BTEX (10 fill samples), PCBs (3 fill samples) and asbestos (presence/absence, 25 fill samples).
^^The SCI (NAA 2011) *Fieldwork date: October 2011*	Eight boreholes (HA01-HA08) to depths between 1 mbgl and 1.2 mbgl. Two samples per location: one from around 0.2 mbgl in fill and the other from approximately 1 mbgl in natural soil[2]. Additionally, the SCI indicated Coffey sampled 3 soil bores (BH1, BH2 and BH3) and 9 surface soil samples (S1 – S9) from this area in June 2011.	**Soil (NAA and Coffey):** Metals (20 fill and 11 natural soil samples), PAHs, TRHs and BTEX (11 fill samples and 8 natural soils), OCPs and PCBs (3 fill samples).
The PCS (EIS, 2016) *Fieldwork date: March 2016*	Three boreholes (BH1, BH2 and BH3) to depths between 6 mbgl and 6.5 mbgl. Soil sampling from all locations: 3 fill samples (one per location) and 2 natural soil samples (BH1 and BH3).	**Soil:** Metals, PAHs, TRHs, BTEX, OCPs, OPPs and PCBs (3 fill and 2 natural soil samples) and asbestos (presence/absence, 3 fill samples).
The Phase 1 (JBS&G 2018) *Fieldwork date: August 2017*	10 surface fill soil samples (SS01 – SS10).	**Soils:** Metals, PAHs, OCPs and asbestos (500 mL, asbestos fines/fibrous asbestos (AF/FA), 10 fill samples).
The DSI (AG 2020). *Fieldwork date: December 2019 and January 2020*	91 boreholes to up to 10.5 mbgl and 11 test pits to up to 3 mbgl. Soil sampling at each location except BH70. 137 samples: 107 fill and 30 natural soil samples. Eight boreholes were converted into groundwater monitoring wells (MW1-MW8). Wells MW6 and MW7 were dry and were not sampled.	**Soil:** Metals and PAHs (107 fill and 30 natural soil samples); BTEX and TRH (105 fill and 30 natural soil samples); OCPs, OPPs, PCBs and phenols (56 fill and 16 natural soil samples). Asbestos (75 fill and 21 natural soil samples for 500 mL AF/FA). 6 x fibre cement fragment (FCF) for asbestos identification. **Groundwater:** Metals, TRH, MAHs, PAHs, VOCs, PCBs, OCPs, OPPs, cations and anions (6 samples).

^ A review of the relevant borehole logs indicated some samples were collected from the interface between fill soil and natural soils. These samples were counted as fill soil samples in the table.
^^ The SCI report also included analytical results of soil samples collected by Coffey in June 2011. These samples were also considered herein. Full version of the Coffey report was not sighted or reviewed by the Auditor

[2] The geological logs did not specify whether the deeper samples were in fill or in natural soils. For this Audit report, the Auditor has assumed that the deeper samples were from natural soils.

The Auditor's assessment of data quality follows in Table 6.2 and Table 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) Specific DQOs in accordance with the seven-step process outlined in Schedule B2 of NEPM (2013) were discussed in the SCI, the Phase 1, the DSI and the RAP. DQOs were not discussed in the Phase 2 and the PCS.	The identified DQOs in the DSI and in the RAP were considered appropriate. On the basis that the consultants have clearly stated the project objectives and have designed reasonable sampling strategies to achieve them, overall the Auditor considers that the omission of specific DQOs in the Phase 2 and the PCS does not affect the outcome of the Audit.
Sampling pattern and locations *Soil:* Investigation locations completed to date were spaced on a generally systematic sampling pattern in accessible areas to gain coverage. Soil conditions beneath the building footprints have not been assessed due to access constraints. *Groundwater:* Monitoring wells were placed along the site boundary to inform the quality of groundwater entering and leaving the site.	In the Auditor's opinion, the investigation locations were adequate to assess the site for remediation planning purposes. The Auditor however, notes that there are data gaps in soil and groundwater data below building footprints and in the vicinity of the former USTs in the central western portion of the site. These data gaps are to be addressed through the additional investigation proposed in the RAP. Assessment of hazardous ground gases on the southern boundary of the site has not been assessed to date, however is proposed in the RAP.
Sampling density *Soil:* The Phase 2, the SCI and the PCS targeted various parts of the site and the sampling density adopted in these investigations met the NSW EPA (1995) *Sampling Design Guidelines.* The Phase 1 and the DSI were site-wide assessments and resulted in a combined sampling density of 112 locations across accessible areas of the site (estimated to be 12.77 ha or 65% of the total site area). This provided a 95% confidence of detecting a residual hot spot of approximately 38 m diameter. It is noted that the NSW EPA (1995) *Sampling Design Guidelines* do not specify a sampling density for sites with an area greater than 5 ha (55 locations). Sampling targeted fill soils (approximately 170 samples were collected), with the underlying natural soils being sampled on a lower frequency (approximately 40 samples were collected). Samples analysed for asbestos were not collected according to the density outlined in NEPM (2013) (Schedule B1) and 10 L volumes were not assessed as per NEPM (2013). *Groundwater*: A total of eight groundwater wells were installed for assessing groundwater conditions at the site boundary, however 6 were dry at the time of sample collection.	In the Auditor's opinion, the sampling density was sufficient to inform remediation planning. Lower sampling density of natural soils is considered acceptable given the low concentrations of contaminants detected in the overlying fill soils and limited industrial activities on the site. The Auditor considers that there are data gaps beneath existing structures and related to the use of boreholes to visually assess for asbestos, the low density of analysis for asbestos and absence of 10 L samples for ACM. This data gap is to be addressed through the additional investigation proposed in the RAP. The density of groundwater sampling is relatively low based on the site area. Additionally, two (out of eight) existing groundwater monitoring wells were dry and could not be sampled. Therefore, installation of additional groundwater monitoring wells (in addition to those discussed above) is likely to be required. Notwithstanding this, given the historical activities and the low contaminant concentrations identified in soil to date, the site groundwater quality is not expected to be grossly impacted. The Auditor notes that the NSW EPA (1995) *Sampling Design Guidelines* has been superseded by updated guidelines on 19 August 2022. As the investigation works were completed prior to this date, compliance with the updated guidelines is not required.

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Sample depths Samples were collected and analysed from a range of depths, with the primary intervals being within the fill. The maximum depth of investigation was 10.5 mbgl and the maximum depth of sampling was 4.5 mbgl.	In the Auditor's opinion, the sampling strategy was appropriate and adequate to characterise the primary material types present on site.
Well construction *Groundwater:* The monitoring wells were typically installed to depths of between 6 and 10.5 mbgl, with screen intervals presumably within natural silty clay and weathered bedrock, although well construction details were not recorded on the logs. Wells were reportedly constructed of 50 mm uPVC. A bentonite seal of 0.5-1.0 m thickness was placed above the screen and the well backfilled with sand and cement grout to the ground surface.	Well construction details were not provided on the borelogs in the DSI, however, text within the body of the DSI indicated that wells were screened from at least 0.5 m above the measured standing water level (SWL) to the base of the wells. The details in the DSI suggest the well construction was appropriate for assessing groundwater within the shallow aquifer, however, wells MW06 and MW07, which were located along the northern site boundary, in assumed up hydraulic positions, were observed to be dry.
Sample collection method *Soil*: Surficial soil samples were collected using a hand auger. Borehole samples were collected using push tubes lined with disposable plastic PVC liners, standard penetration test (SPT) split spoon samplers, or directly from the drilling rods or from a hand auger. Test pit sampling was conducted in the DSI, however, descriptions of the sampling procedure were not provided. During the Phase 2 and the PCS, 50 g samples were collected for analysis for asbestos presence/absence. During the Phase 1 and the DSI, 500 mL samples were collected for analysis for AF/FA. *Groundwater*: Wells were installed by solid flight augers and developed with a submersible pump or a bailer until dry. Groundwater samples were collected using a peristaltic pump. Prior to purging and sampling, the wells were gauged using an oil/water interface meter and bailers were then used to assess presence/absence of light non-aqueous phase liquid (LNAPL) in the wells.	Overall, in consideration of the contamination encountered, the sample collection methods were found to be acceptable for remediation planning purposes. The Auditor notes that field screening of soil samples for ACM >7 mm was not completed in accordance with the asbestos quantification methodology outlined in NEPM (2013) (Schedule B1) and full characterisation of fill for ACM is a data gap that will be addressed during the additional investigation proposed in the RAP.
Decontamination procedures *Soil:* Sampling personnel used disposable nitrile gloves during sampling activities. Re-usable sampling equipment was reported to be decontaminated using detergent and potable water between sampling locations. *Groundwater*: Decontamination procedure was not discussed in the DSI.	Although not discussed in the DSI, it is expected that dedicated sampling equipment was used at each well location. Overall, the decontamination procedures were found to be acceptable for remediation planning purposes.
Sample handling and containers Samples were placed into prepared and preserved sampling containers provided by the laboratory and chilled during storage and subsequent transport to the labs. Samples for asbestos analysis were placed in plastic zip-lock bags. It is not clear whether or not the collected groundwater samples were field filtered for analysis of dissolved metals. Therefore, the metals concentrations reported may be over- or under-estimate site conditions.	Acceptable. Based on the detected concentrations of metals in groundwater, the uncertainty over field filtering is not considered to affect the overall conclusions of this Audit.
Chain of Custody (COC) Completed COC forms were provided in the reports.	Acceptable.
Detailed description of field screening protocols *Soil:* Field screening for volatiles was undertaken in the Phase 2, the SCI and the DSI using a photoionisation detector (PID). The Phase 2 and the DSI reported that the PID was pre-	Acceptable. PID field screening was not performed in the PCI or in the Phase 1. This is not considered to be a data gap as VOCs are not identified as key

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
calibrated and the screening was conducted on sub-samples placed in separate zip-lock bags. Descriptions of the field screening protocols were not provided in the SCI. *Groundwater:* Field parameters were measured during well sampling using a pre-calibrated water quality meter.	contaminants of concern in soil and the analytical results indicated that soils are unlikely to have been impacted by VOCs. The missing descriptions on the field screening procedures in the SCI is not considered to have materially changed the outcomes of the investigation.
Calibration of field equipment The Phase 2 and the DSI stated that calibration of the PID and/or water quality meter had been undertaken. The DSI also provided calibration certificates from the equipment suppliers. Field notes attached to the SCI showed PID screening of soil samples was conducted in the field. Descriptions on the field screening protocols and calibration records of the PID were not included in the report.	Acceptable. The missing PID calibration records in the Phase 2 and in the SCI are not considered to have materially affected the investigation results.
Sampling logs *Soil*: Soil logs indicating sample depth, PID readings (where available) and lithology were provided within the reports, except the PSI. Ten surficial samples were collected during the PSI and a general description of the samples collected was provided. *Groundwater*: Groundwater field records indicating SWL and field parameters were tabulated in the DSI.	Acceptable.

Table 6.3: QA/QC – Field and Lab Quality Assurance and Quality Control

Field and Lab QA/QC	Auditor's Opinion
Field quality control samples Field quality control samples collected in the Phase 2, Phase 1 and the DSI included trip blanks, trip spikes, rinsate blank (Phase 1 only), field intra-laboratory and inter-laboratory duplicates. Field quality control samples were not prepared in the PCS and SCI.	Acceptable. The PCS and SCI were targeted investigations with a limited number of samples collected. The lack of field quality control samples was not considered as a significant data gap.
Field quality control results The results of field quality control samples were generally within appropriate limits, with the exception of minor Relative Percent Difference (RPD) outliers reported between some primary and the field duplicate/field triplicate samples.	Overall, in the context of the dataset reported, the minor RPD outliers are not considered significant and the field quality control results are acceptable.
NATA registered laboratory and NATA endorsed methods Laboratories used included: Australian Laboratory Services (ALS), Envirolab Services (Envirolab), Eurofins Environmental Testing (Eurofins), Mgt-LabMark Environmental Laboratories (Mgt-LabMark) and SGS Australia (SGS). Laboratory certificates were NATA stamped.	Acceptable.
Analytical methods Analytical methods were included in the laboratory test certificates and were NATA accredited. Asbestos identification was conducted using polarised light microscopy with dispersion staining by method AS4964-2004 *Method for the Qualitative Identification of Asbestos Bulk Samples*.	Acceptable. The analytical methods for asbestos are considered acceptable for the purposes of this 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 COCs and laboratory certificates indicate that the holding times had general been met.	Acceptable. Given the holding time outliers were related to QA/QC samples they are not considered to impact the conclusions of the Audit.

Field and Lab QA/QC	Auditor's Opinion
The holding times for the trip spike and trip blank samples prepared in the Phase 2 were beyond the recommended holding time by approximately 5 days.	
Practical Quantitation Limits (PQLs) *Soil:* PQLs were less than the threshold criteria for the contaminants of concern. *Asbestos in soil:* The NATA approved limit of detection for asbestos in soil was 0.01% w/w although NEPM (2013) analyses were reported to 0.001% w/w for AF/FA. *Groundwater:* PQLs were less than the threshold criteria for the contaminants of concern except for: • Mercury PQL of 0.1 milligrams per litre (mg/L) greater than the adopted ecological based criterion of 0.06 mg/L. • Aroclor-1242 PQL of 5 micrograms per litre (µg/L) greater than the adopted ecological based criterion of 0.3 µg/L • Aroclor-1254 PQL of 5 µg/L greater than the ecological criterion of 0.01 µg/L.	*Soil (except asbestos):* Overall the soil PQLs are acceptable. *Asbestos:* In the absence of any other validated analytical method, the detection limit for asbestos is considered acceptable. *Groundwater*: The elevated PQLs were limited to 3 analytes and therefore they are not expected to impact the conclusions of the Audit. It is also noted that mercury and PCBs are not identified as the key contaminants for this site.
Laboratory quality control samples Laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks and duplicates were undertaken by the laboratory.	Acceptable
Laboratory quality control results The results of laboratory quality control samples were within appropriate limits, except for some minor recovery or RPD outliers reported in matrix spikes (due to matrix interferences), laboratory duplicates (due to the heterogenous nature of soil samples).	In the context of the dataset reported, the minor non-conformances in laboratory quality control results are not considered significant and the laboratory quality control results are acceptable.
Data Quality Indicators (DQI) and Data Evaluation (completeness, comparability, representativeness, precision, accuracy) Predetermined DQIs were set for laboratory analyses including blanks, replicates, duplicates, laboratory control samples, matrix spikes and surrogate spikes and results were discussed in the Phase 2, the SCI, the Phase 1 and the DSI. No data evaluation was performed in the PCS.	An assessment of the overall data quality with respect to the five category areas has been undertaken by the Auditor and is summarised below.

6.1 Auditor's Opinion

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

- The data is likely to be representative, with the exception of the potential for asbestos to be present in fill, which may have been underestimated based on the sampling methodology (boreholes) adopted.
- The data is largely complete, although there are data gaps in soil conditions beneath building footprints and groundwater conditions in the vicinity of the former USTs and at the assumed up hydraulic gradient locations. In addition, field screening of soil samples was not completed in accordance with the asbestos quantification methodology outlined in NEPM (2013) (Schedule B1) and full characterisation of fill for ACM is also a data gap. There was also no assessment of hazardous ground gas conditions on the southern site boundary with the Kelso Waste Facility. These data gaps are acknowledged and will be addressed during the additional investigation proposed in the RAP.
- There is a high degree of confidence that data is comparable for each soil sampling event. Only one groundwater monitoring event has been completed so no assessment of comparability can be completed for groundwater data.

- The laboratories provided sufficient information to conclude that data is of sufficient precision.
- The data is likely to be accurate.

7. ENVIRONMENTAL QUALITY CRITERIA

The Auditor has assessed the results against Tier 1 criteria from National Environmental Protection Council (NEPC) *National Environmental Protection (Assessment of Site Contamination) Measure 1999*, as Amended 2013 (NEPM, 2013). Other guidance has been adopted where NEPM (2013) is not applicable or criteria are not provided.

As per Section 2.5, the human health and ecological criteria appropriate for 'residential with garden/accessible soil, also includes childcare centre, preschools and primary schools' were adopted.

7.1 Soil Assessment Criteria

7.1.1 Human Health Assessment Criteria

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

- NEPM (2013) Health Investigation Levels (HILs) for 'Residential' (HIL A) land use.
- NEPM (2013) Health Screening Levels (HSLs) for 'Low-High Density Residential' (HSL A & B) land use. The HSLs conservatively assumed a sand soil type. Depth to source adopted was <1 m as an initial screen.
- NEPM (2013) Management Limits (MLs) for petroleum hydrocarbons for 'Residential and Open Space' land use and assuming coarse soil texture.
- NEPM (2013) HSLs for Asbestos Contamination in Soil for 'Residential A' (HSL A) land use.

7.1.2 Ecological Assessment Criteria

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

- NEPM (2013) Ecological Screening Levels (ESLs) for 'Urban Residential and Public Open Space' land use, assuming coarse soil.
- NEPM (2013) Ecological Investigation Levels (EILs) for 'Urban Residential and Public Open Space' land use. In the absence of site-specific soil data on pH, clay content, cation exchange capacity and background concentrations in fill, the EILs were calculated using the most conservative soil-specific added contaminant limits (ACL) for aged contaminants and added background concentration (ABC) referenced from Olszowy et al (1995) (background concentration for high traffic, old suburbs in NSW).
- Canadian Council of Ministers of the Environment (CCME) (2010) *Canadian soil quality guidelines: carcinogenic and other polycyclic aromatic hydrocarbons (PAHs)* soil quality guideline (SQG) for benzo(a)pyrene for 'Residential' land use. The SQG has been adopted in place of the NEPM (2013) ESL as it is based on a larger and more up-to-date toxicity database than the low reliability NEPM (2013) ESL.

7.1.3 Soil Aesthetic Considerations

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

7.2 Groundwater Assessment Criteria

7.2.1 Human Health Assessment Criteria

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

- NEPM (2013) HSLs for 'Low-High Density Residential' (HSL A & B) land use. The HSLs conservatively assumed a sand soil type and a depth to groundwater of 2 to <4 m.
- NHMRC (2011) *National Water Quality Management Strategy, Australian Drinking-Water Guidelines* (ADWG), Version 3.5 Updated August 2018 where HSLs are not applicable due to shallow (<2 m) depth to groundwater.

7.2.2 Ecological Assessment Criteria

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

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

7.3 Auditor's Opinion

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

- A number of guidelines were superseded (e.g., NSW DEC (2006) '*Guidelines for the NSW Site Auditor Scheme (2nd edition)* and the NSW EPA (1994) '*Guidelines for Assessing Service Station Sites')* or amended (e.g. NEMP 1999) since the completion of the Phase 2 and the SCI. Those guidelines were not adopted herein by the Auditor.
- Based on the land use at the time, the human health criteria for 'recreational' land use were considered by the PCS.
- Based on the proposed development (residential dwelling with commercial/industrial and open spaces), the human health based criteria for 'residential with minimal opportunity for soil access', 'recreational' and 'commercial/industrial' land uses were all considered in the PSI. The human health based criteria adopted in the PSI were less conversative than those adopted by the Auditor.
- ADWG was not considered when assessing the groundwater analytical results in the DSI.

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

8. EVALUATION OF SOIL RESULTS

8.1 Field Results

Fill was encountered at the completed investigation locations, except at the DSI locations BH71 and BH74. Typical thickness of the fill layer was between 0.5 m and 1.5 m, with thickness greater than 1.5 m being noted at the Phase 2 investigation locations EBH4 (2.3 m) and EBH23 (1.8 m); at the PCS investigation locations BH1 (2.7 m) and BH2 (2.5 m); and at the DSI investigation locations BH02 (2 m), BH28 (1.9 m), TP16 (1.9 m), TP17 (2.2 m), TP22 (2.5 m), TP56 (2.2 m) and TP85 (2.5 m). The majority of the locations with fill greater than 1.5 m thick were in the southwestern portion of the site.

The completed investigation locations were terminated in natural soils with the exception of DSI locations BH19 and BH40 (terminated at 0.2 mbgl in fill), BH24, BH34, BH39, BH41-BH44, BH46, BH47 and BH96 (terminated at 0.3 mbgl in fill), BH27 and BH54 (terminated at 0.4 mbgl in fill), BH98 (terminated at 0.7 mbgl in fill), TP17 and TP56 (terminated at 2.2 mbgl in fill) and TP22 (terminated at 2.5 mbgl in fill).

Field screening of soil samples was completed in the Phase 2, the SCI and the DSI, and the associated PID results indicated an absence of VOC contamination. No olfactory signs of contamination were reported.

Fragments of ACM were observed in fill soils.

8.2 Analytical Results

The analytical results for fill soil samples from the various investigations are summarised in Table 8.1 to Table 8.5 respectively. The analytical results of natural soil samples are summarised in Table 8.6. Soil sampling locations from various investigations are shown in Attachments 2 to 6, Appendix A.

Table 8.1: Evaluation of Fill Soil Analytical Results – Summary Table (Phase 2)

Analyte	n	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Asbestos (Presence/Absence)	25	**6**	-	-	-
BTEX	10	Nil	<PQL	0 above HSL A&B 0-1 m, sand	0 above ESL (urban residential) (coarse)
F1 (TRH C_6–C_{10} minus BTEX)	10	Nil	<PQL	0 above HSL A&B 0-1 m, sand 45 mg/kg	0 above ESL (urban residential) (coarse) 180 mg/kg
F2 (TRH >C_{10}–C_{16} minus naphthalene)	10	Nil	<PQL	0 above HSL A&B 0-1 m, sand 110 mg/kg	-
F3 TRH >C_{16}-C_{34}	10	Nil	<PQL	0 above ML (urban residential) 2500 mg/kg	0 above ESL 300 mg/kg
F4 TRH >C_{34}-C_{40}	10	Nil	<PQL	0 above ML (urban residential) 10,000 mg/kg	0 above ESL 2800 mg/kg
Naphthalene	10	Nil	<PQL	0 above HSL A&B 0-1 m, sand 3 mg/kg	0 above EIL (urban residential) 170 mg/kg

Analyte	n	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Benzo(a)pyrene	10	Nil	<PQL	-	0 above CCME SQG (residential) 20 mg/kg
Total PAHs	10	Nil	<PQL	0 above HIL A 300 mg/kg	-
Arsenic	34	33	16	0 above HIL A 100 mg/kg	0 above EIL (urban residential) 100 mg/kg
Cadmium	34	18	0.7	0 above HIL A 20 mg/kg	-
Chromium	34	34	37	0 above HIL A 100 mg/kg	0 above most conservative ACL (urban residential) 190 mg/kg
Copper	34	34	29	0 above HIL A 6000 mg/kg	0 above most conservative ACL (urban residential) 60 mg/kg
Lead	34	34	35	0 above HIL A 300 mg/kg	0 above generic ACL (urban residential) 1100 mg/kg
Mercury	34	3	0.09	0 above HIL A 40 mg/kg	-
Nickel	34	34	**32**	0 above HIL A 400 mg/kg	**1 above most conservative ACL (urban residential) 30 mg/kg**
Zinc	34	34	**200**	0 above HIL A 7400 mg/kg	**10 above most conservative ACL (urban residential) 70 mg/kg**
PCB	3	Nil	<PQLs	0 above HIL A 1 mg/kg	-
OCP	24	Nil	<PQLs	0 above HIL A	0 above EIL

n number of samples
- No criteria available/used
NL Non-limiting
<PQL Less than the practical quantitation limit
mg/kg Milligrams per kilogram

Table 8.2: Evaluation of Fill Soil Analytical Results – Summary Table (SCI)

Analyte	N	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
BTEX	11	Nil	<PQL	0 above HSL A&B 0-1 m, sand	0 above ESL (urban residential) (coarse)
F1 (TRH C_6–C_{10} minus BTEX)	11	Nil	<PQL	0 above HSL A&B 0-1 m, sand 45 mg/kg	0 above ESL (urban residential) (coarse) 180 mg/kg
F2 (TRH >C_{10}–C_{16} minus naphthalene)	11	Nil	<PQL	0 above HSL A&B 0-1 m, sand 110 mg/kg	0 above ESL (urban residential) (coarse) 120 mg/kg
TRH >C_{16}-C_{34}	11	Nil	<PQL	0 above ML (urban residential) 2500 mg/kg	0 above ESL 300 mg/kg

Analyte	N	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
TRH >C_{34}-C_{40}	11	Nil	<PQL	0 above ML (urban residential) 10,000 mg/kg	0 above ESL 2800 mg/kg
Naphthalene	11	Nil	<PQL	0 above HSL A&B 0-1 m, sand 3 mg/kg	0 above EIL (urban residential) 170 mg/kg
Benzo(a)pyrene	11	Nil	<PQL	-	0 above CCME SQG (residential) 20 mg/kg
Total PAHs	11	Nil	<PQL	0 above HIL A 300 mg/kg	-
Arsenic	20	17	9	0 above HIL A 100 mg/kg	0 above EIL (urban residential) 100 mg/kg
Cadmium	20	10	8.1	0 above HIL A 20 mg/kg	-
Chromium	20	17	24	0 above HIL A 100 mg/kg	0 above most conservative ACL (urban residential) 190 mg/kg
Copper	20	20	74	0 above HIL A 6000 mg/kg	1 above most conservative ACL (urban residential) 60 mg/kg
Lead	20	20	**4400**	**2 above HIL A 300 mg/kg**	**2 above generic ACL (urban residential) 1100 mg/kg**
Mercury	20	20	0.14	0 above HIL A 40 mg/kg	-
Nickel	20	20	7.5	0 above HIL A 400 mg/kg	0 above most conservative ACL (urban residential) 30 mg/kg
Zinc	20	20	**6800**	0 above HIL A 7400 mg/kg	**9 above most conservative ACL (urban residential) 70 mg/kg**
PCB	3	Nil	<PQL	0 above HIL A 1 mg/kg	-
OCP	3	Nil	<PQL	0 above HIL A	0 above EIL

n number of samples
- No criteria available/used
NL Non-limiting
<PQL Less than the practical quantitation limit

Table 8.3: Evaluation of Fill Soil Analytical Results – Summary Table (PCS)

Analyte	N	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Asbestos (Presence/Absence)	3	Nil	-	-	-
BTEX	3	Nil	<PQL	0 above HSL A&B 0-1 m, sand	0 above ESL (urban residential) (coarse)

Analyte	N	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
F1 (TRH C_6–C_{10} minus BTEX)	3	Nil	<PQL	0 above HSL A&B 0-1 m, sand 45 mg/kg	0 above ESL (urban residential) (coarse) 180 mg/kg
F2 (TRH >C_{10}–C_{16} minus naphthalene)	3	Nil	<PQL	0 above HSL A&B 0-1 m, sand 110 mg/kg	0 above ESL (urban residential) (coarse) 120 mg/kg
TRH >C_{16}-C_{34}	3	Nil	<PQL	0 above ML (urban residential) 2500 mg/kg	0 above ESL 300 mg/kg
TRH >C_{34}-C_{40}	3	Nil	<PQL	0 above ML (urban residential) 10,000 mg/kg	0 above ESL 2800 mg/kg
Naphthalene	3	Nil	<PQL	0 above HSL A&B 0-1 m, sand 3 mg/kg	0 above EIL (urban residential) 170 mg/kg
Benzo(a)pyrene	3	Nil	<PQL	-	0 above CCME SQG (residential) 20 mg/kg
Benzo(a)pyrene TEQ	3	Nil	<PQL	0 above HIL A 3 mg/kg	-
Total PAHs	3	Nil	<PQL	0 above HIL A 300 mg/kg	-
Arsenic	3	3	8	0 above HIL A 100 mg/kg	0 above EIL (urban residential) 100 mg/kg
Cadmium	3	Nil	<PQL	0 above HIL A 20 mg/kg	-
Chromium	3	3	16	0 above HIL A 100 mg/kg	0 above most conservative ACL (urban residential) 190 mg/kg
Copper	3	3	29	0 above HIL A 6000 mg/kg	0 above most conservative ACL (urban residential) 60 mg/kg
Lead	3	3	19	0 above HIL A 300 mg/kg	0 above generic ACL (urban residential) 1100 mg/kg
Mercury	3	Nil	PQL	0 above HIL A 40 mg/kg	-
Nickel	3	3	15	0 above HIL A 400 mg/kg	0 above most conservative ACL (urban residential) 30 mg/kg
Zinc	3	3	**77**	0 above HIL A 7400 mg/kg	**1 above most conservative ACL (urban residential) 70 mg/kg**
PCB	3	Nil	<PQL	0 above HIL A 1 mg/kg	-
OCP	3	Nil	<PQL	0 above HIL A	0 above EIL
OPP	3	Nil	<PQL	0 above HIL A	-

n number of samples
- No criteria available/used
NL Non-limiting
<PQL Less than the practical quantitation limit

Table 8.4: Evaluation of Fill Soil Analytical Results – Summary Table (Phase 1)

Analyte	N	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
AF/FA (500 mL samples)	10	1	**0.02 % w/w**	**1 above HSL 0.001%**	-
Naphthalene	10	Nil	<PQL	0 above HSL A&B 0-1 m, sand 3 mg/kg	0 above EIL (urban residential) 170 mg/kg
Benzo(a)pyrene	10	Nil	<PQL	-	0 above CCME SQG (residential) 20 mg/kg
Benzo(a)pyrene TEQ	10	Nil	<PQL	0 above HIL A 3 mg/kg	-
Total PAHs	10	1	2.1	0 above HIL A 300 mg/kg	-
Arsenic	10	9	8.6	0 above HIL A 100 mg/kg	0 above EIL (urban residential) 100 mg/kg
Cadmium	10	Nil	<PQL	0 above HIL A 20 mg/kg	-
Chromium	10	10	15	0 above HIL A 100 mg/kg	0 above most conservative ACL (urban residential) 190 mg/kg
Copper	10	10	29	0 above HIL A 6000 mg/kg	0 above most conservative ACL (urban residential) 60 mg/kg
Lead	10	10	59	0 above HIL A 300 mg/kg	0 above generic ACL (urban residential) 1100 mg/kg
Mercury	10	2	0.6	0 above HIL A 40 mg/kg	-
Nickel	10	7	14	0 above HIL A 400 mg/kg	0 above most conservative ACL (urban residential) 30 mg/kg
Zinc	10	10	**120**	0 above HIL A 7400 mg/kg	**7 above most conservative ACL (urban residential) 70 mg/kg**
OCP	10	1	0.2 (Total Chlordanes)	0 above HIL A	0 above EIL

n number of samples
- No criteria available/used
NL Non-limiting
<PQL Less than the practical quantitation limit

Table 8.5: Evaluation of Fill Soil Analytical Results – Summary Table (DSI)

Analyte	N	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
AF/FA (500 mL samples)	75	1	0.00021 % w/w	0 above HSL 0.001%	-

Analyte	N	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Asbestos (Presence/Absence)	6	6	-	-	-
BTEX	105	Nil	<PQL	0 above HSL A&B 0-1 m, sand	0 above ESL (urban residential) (coarse)
F1 (TRH C_6–C_{10} minus BTEX)	105	Nil	<PQL	0 above HSL A&B 0-1 m, sand 45 mg/kg	0 above ESL (urban residential) (coarse) 180 mg/kg
F2 (TRH >C_{10}–C_{16} minus naphthalene)	105	6	**210**	**4 above HSL A&B 0-1 m, sand 110 mg/kg**	**4 above ESL (urban residential) (coarse) 120 mg/kg**
TRH >C_{16}-C_{34}	105	37	**1800**	0 above ML (urban residential) 2500 mg/kg	**8 above ESL 300 mg/kg**
TRH >C_{34}-C_{40}	105	14	610	0 above ML (urban residential) 10,000 mg/kg	0 above ESL 2800 mg/kg
Naphthalene	107	Nil	<PQL	0 above HSL A&B 0-1 m, sand 3 mg/kg	0 above EIL (urban residential) 170 mg/kg
Benzo(a)pyrene	107	Nil	<PQL	-	0 above CCME SQG (residential) 20 mg/kg
Benzo(a)pyrene TEQ	107	Nil	<PQL	0 above HIL A 3 mg/kg	-
Total PAHs	107	2	1.2	0 above HIL A 300 mg/kg	-
Pentachlorophenol	56	Nil	<PQL	0 above HIL A 100 mg/kg	-
Total Phenols	56	Nil	<PQL	0 above HIL A 3000 mg/kg	-
Arsenic	107	106	72	0 above HIL A 100 mg/kg	0 above EIL (urban residential) 100 mg/kg
Cadmium	107	1	0.5	0 above HIL A 20 mg/kg	-
Chromium	107	103	51	0 above HIL A 100 mg/kg	0 above most conservative ACL (urban residential) 190 mg/kg
Copper	107	105	47	0 above HIL A 6000 mg/kg	0 above most conservative ACL (urban residential) 60 mg/kg

Analyte	N	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Lead	107	106	73	0 above HIL A 300 mg/kg	0 above generic ACL (urban residential) 1100 mg/kg
Mercury	107	4	0.2	0 above HIL A 40 mg/kg	-
Nickel	107	60	**38**	0 above HIL A 400 mg/kg	**2 above most conservative ACL (urban residential) 30 mg/kg**
Zinc	107	107	**180**	0 above HIL A 7400 mg/kg	**27 above most conservative ACL (urban residential) 70 mg/kg**
PCB	56	Nil	<PQL	0 above HIL A 1 mg/kg	-
OCP	56	11	0.4 (total DDT+DDE+DDD)	0 above HIL A	0 above EIL
OPP	56	Nil	<PQL	0 above HIL A	-

n number of samples
- No criteria available/used
NL Non-limiting
<PQL Less than the practical quantitation limit

Table 8.6: Evaluation of Natural Soil Analytical Results – Summary Table

Analyte	n	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
AF/FA (500 mL samples)	21	Nil	-	0 above HSL 0.001%	-
BTEX	40	Nil	<PQL	0 above HSL A&B 0-1 m, sand	0 above ESL (urban residential) (coarse)
F1 (TRH C_6–C_{10} minus BTEX)	40	Nil	<PQL	0 above HSL A&B 0-1 m, sand 45 mg/kg	0 above ESL (urban residential) (coarse) 180 mg/kg
F2 (TRH >C_{10}–C_{16} minus naphthalene)	40	Nil	<PQL	0 above HSL A&B 0-1 m, sand 110 mg/kg	0 above ESL (urban residential) (coarse) 120 mg/kg
TRH >C_{16}-C_{34}	40	1	120	0 above ML (urban residential) 2500 mg/kg	0 above ESL 300 mg/kg
TRH >C_{34}-C_{40}	40	Nil	<PQL	0 above ML (urban residential) 10,000 mg/kg	0 above ESL 2800 mg/kg
Naphthalene	40	Nil	<PQL	0 above HSL A&B 0-1 m, sand 3 mg/kg	0 above EIL (urban residential) 170 mg/kg
Benzo(a)pyrene	40	Nil	<PQL	-	0 above CCME SQG (residential) 20 mg/kg
Benzo(a)pyrene TEQ	40	Nil	<PQL	0 above HIL A 3 mg/kg	-
Total PAHs	40	1	2.2	0 above HIL A 300 mg/kg	-
Pentachlorophenol	16	Nil	<PQL	0 above HIL A 100 mg/kg	-
Total Phenols	16	Nil	<PQL	0 above HIL A 3000 mg/kg	-
Arsenic	44	42	18	0 above HIL A 100 mg/kg	0 above EIL (urban residential) 100 mg/kg
Cadmium	44	1	0.1	0 above HIL A 20 mg/kg	-
Chromium	44	44	32	0 above HIL A 100 mg/kg	0 above most conservative ACL (urban residential) 190 mg/kg
Copper	44	43	41	0 above HIL A 6000 mg/kg	0 above most conservative ACL (urban residential) 60 mg/kg
Lead	44	44	59	0 above HIL A 300 mg/kg	0 above generic ACL (urban residential) 1100 mg/kg
Mercury	44	5	0.2	0 above HIL A 40 mg/kg	-
Nickel	44	26	**73**	0 above HIL A 400 mg/kg	**1 above most conservative ACL (urban residential) 30 mg/kg**

Analyte	n	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Zinc	44	43	**240**	0 above HIL A 7400 mg/kg	**5 above most conservative ACL (urban residential) 70 mg/kg**
PCB	18	Nil	<PQL	0 above HIL A 1 mg/kg	-
OCP	19	Nil	<PQL	0 above HIL A	0 above EIL
OPP	18	Nil	<PQL	0 above HIL A	-

n number of samples
- No criteria available/used
NL Non-limiting
<PQL Less than the practical quantitation limit

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

- Organic and inorganic contaminant concentrations in soil samples acquired from the various investigations were generally consistent.
- With the exception of asbestos, concentrations of contaminants of concern were generally below the laboratory PQL or below site assessment criteria indicating that widespread contamination by organic and inorganic contaminants in soil was not present.
- Chemical concentrations exceeding the adopted environmental quality criteria were noted in some locations as following:
  - Lead concentrations in two surface soil samples exceeded the adopted human-health and environmental based criteria during the SCI completed in the north-eastern area of the site prior to development of the childcare centre. The impacts were localised and were delineated laterally and vertically. While no validation report was provided for the childcare development, it is likely that the development resulted in the removal of this impact. The subsequent DSI included sampling of surface soils in this area of the site and no exceedances of the adopted assessment criteria for lead were detected.
  - Concentrations of TRH F2 (TRH >C_{10}–C_{16} minus naphthalene) in four surface soil samples analysed during the DSI (BH62, BH64, BH78 and BH86) reported concentrations (up to 210 mg/kg) exceeding the adopted human-health criterion of 110 mg/kg. These detections may be attributed to natural organics in areas vegetated areas. A small portion (<10%) of fill soil samples from the DSI also reported TRH >C_{10}–C_{16} and TRH >C_{16}-C_{34} concentrations greater than the adopted ecological based criteria.
  - Concentrations of nickel and zinc were detected in a small proportion of fill and natural soil samples at concentrations above the most conservative screening criteria for protection of terrestrial ecology.
- ACM were observed during intrusive investigations and one soil sample analysed for asbestos reported a FA/AF concentration exceeding the adopted human-health based criterion. As noted in Section 6, field screening of soil samples was not completed in accordance with the asbestos quantification methodology outlined in NEPM (2013) (Schedule B1) and full characterisation of fill for ACM is also a data gap.

8.3 Auditor's Opinion

In the Auditor's opinion, the soil analytical results are consistent with the site history and field observations and indicate that widespread chemical contamination in fill and natural soils is not present. The detected lead exceedances were localised and likely to have been removed during

development of the childcare centre. Other locations where metal concentrations exceeded ecological criteria are localised and do not pose a risk to future site use.

TRH impact was identified in northern and north-eastern areas of the site and is unlikely to be related to petroleum hydrocarbons and was not detected in the vicinity of former USTs in the west of the site.

Asbestos (in the form of ACM and FA/AF) was detected in fill. As the majority of the sample locations were completed using boreholes, which limits the opportunity for visual assessment of the subsurface, there is the potential for areas of fill material with a greater proportion of anthropogenic inclusions, including asbestos, to be present. The data gap associated with determining the extent of asbestos impacted soils is considered in the RAP (discussed in Section 11).

The Auditor is satisfied that soil at the site has been adequately characterised for the purposes of remediation planning.

9. EVALUATION OF GROUNDWATER RESULTS

9.1 Field Results

Only one round of groundwater monitoring was completed at the site in January 2020 during the DSI. Groundwater was encountered in six of the eight wells (MW01-MW05 and MW08). The SWLs recorded during the GME are shown in Table 9.1 extracted from the DSI.

Table 9.1: Monitoring Well Gauging Results

Sampling Point	Top of Casing (TOC) Level (m AHD)	Gauged Depth to Groundwater (m) from (TOC)	Standing Water Level (m AHD)
MW01	7.374	0.875	6.499
MW02	5.475	3.800	1.675
MW03	7.494	5.960	1.534
MW04	16.672	4.503	12.169
MW05	21.697	5.385	16.312
MW06	18.711	Well Dry	Not Applicable
MW07	20.557	Well Dry	Not Applicable
MW08	16.641	4.335	12.306

The DSI did not discuss whether or not visual or olfactory signs of contamination were observed during well sampling.

9.2 Analytical Results

Groundwater samples collected in January 2020 were submitted for analyses for the identified CoPCs. The analytical results are summarised below in Table 9.2.

Table 9.2: Summary of Maximum Groundwater Investigation Analytical Results (µg/L)

Analyte	n	Detections	Maximum	n > Human health criteria	n > Ecological criteria
TRH C_6-C_{10} less BTEX (F1)	6	Nil	<PQL	0 above HSL A & B, sand 2-<4 m (1,000)	-
TRH >C_{10}-C_{16} less naphthalene (F2)	6	3	80	0 above HSL A & B, sand 2-<4 m (1,000)	-
TRH >C_{16}-C_{34} (F3)	6	3	200	-	-
TRH >C_{34}-C_{40} (F4)	6	Nil	<PQL	-	-
BTEX	6	Nil	<PQL	0 above HSL A & B, sand 2-<4 m 0 above ADWG	0 above GIL
Naphthalene	6	Nil	<PQL	0 above HSL A & B, sand 2-<4 m NL	0 above GIL of 16
Benzo(a)pyrene	6	Nil	<PQL	0 above ADWG of 0.01	-

Analyte	n	Detections	Maximum	n > Human health criteria	n > Ecological criteria
Tetrachloroethene (PCE)	6	Nil	<PQL	0 above ADWG of 50	-
Trichloroethene (TCE)	6	Nil	<PQL	-	-
1,1,2-Trichloroethane	6	Nil	<PQL	-	0 above GIL of 6500
Cis-1,2-dichloroethene (DCE)	6	Nil	<PQL	0 above ADWG of 60	-
1,1-dichloroethene	6	Nil	<PQL	0 above ADWG of 30	-
Vinyl Chloride (VC)	6	Nil	<PQL	0 above ADWG of 0.3	-
Chloromethane	6	Nil	<PQL	0 above ADWG of 250	-
Arsenic	6	4	**13**	**1 above ADWG of 10**	0 above GIL of 13
Cadmium	6	5	**16**	**5 above ADWG of 2**	**5 above GIL of 0.2**
Chromium	6	5	**15**	0 above ADWG of 50	**1 above GIL of 3.3**
Copper	6	5	**22**	0 above ADWG of 2000	**5 above GIL of 1.4**
Lead	6	3	1	0 above ADWG of 10	0 above GIL of 3.4
Mercury	6	Nil	<PQL	0 above ADWG of 1	0 above GIL of 0.06
Nickel	6	6	**340**	**4 above ADWG of 20**	**5 above GIL of 11**
Zinc	6	6	**89**	-	**5 above GIL of 8**
Ammonia	6	6	**1200**	-	**1 above GIL of 900**

n number of samples
- No criteria available/used
<PQL Less than the practical quantitation limit
NL non limiting

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

- Concentrations of organic compounds including TRH, BTEXN, VOCs, PAHs, OCPs, OPPs and PCBs were below the laboratory detections and/or the adopted environmental quality criteria.
- Metals were detected in groundwater at concentrations greater than the drinking water or the ecological criteria. AG concluded in the DSI that the concentrations of heavy metals in groundwater were likely to be representative of background concentrations of surrounding commercialised environments.
- Nutrients including ammonia were detected in site groundwater and are likely to be associated with the historical activities on the site and/or in the surrounding areas.

9.3 Auditor's Opinion

In the Auditor's opinion, the groundwater monitoring undertaken provides a general indication of the groundwater quality beneath the site and migrating onto the site from adjacent industrial premises. The groundwater analytical results indicated that widespread groundwater contamination was unlikely to be present beneath the site, which is aligned with the site historical activities and the on-site soil conditions. The Auditor notes that beneficial use of groundwater within the area was not identified from the completed bore search (Section 5.2).

Due to the low density of groundwater wells and the fact that two wells within the monitoring network were dry during sampling for the DSI, installation of additional groundwater monitoring wells should be undertaken to assess groundwater conditions in the northern portion of the site. Additional wells may also be required if point sources of potential groundwater contaminations (such as USTs) are encountered during the development works.

In the Auditor's opinion, the groundwater conditions are sufficiently well known for the purposes of remediation planning.

10. EVALUATION OF THE CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is a representation of the source, pathway and receptor (SPR) linkages at a site. AG developed a CSM in the DSI to inform decisions around investigations and refined the CSM based on the findings of the investigation to inform remediation requirements. AG included a CSM in the RAP. Table 10.1 provides the Auditor's review of the CSM refined by AG following the DSI and summarised in the RAP.

Table 10.1: Review of the Conceptual Site Model

Element of CSM	Consultant	Auditor Opinion
Contaminant source and mechanism	Historical uncontrolled filling, hazardous building materials from poor demolition practices, herbicides and pesticides from historical farming practices and site maintenance activities, underground storage of petroleum based products on-site, industrial land use to the north and north-east, landfill activities to the south. Contaminants of concern include heavy metals, asbestos, TRH, BTEX PAHs, phenols, PCBs, OCPs, OPPs, methane and carbon dioxide.	The identified sources of contamination and contaminants of concern are appropriate. Based on the analytical results collected to date, phenols, PCBs, OCPs and OPPs are unlikely to be the key contaminants of concern but should be assessed in areas of the site where access has been restricted (e.g. building footprints) during the remediation process and validation.
Affected media	Soil and groundwater.	The potentially affected media have been identified. It is noted that a source of hazardous ground gases has been identified to the south of the site, although ground gas is not specifically identified as a contaminated media. There are data gaps associated with site soil, groundwater and ground gas conditions which are to be addressed in the RAP.
Receptor identification	Construction workers, intrusive maintenance workers, users of neighbouring premises and future residential site users and future ecological receptors (terrestrial ecology and aquatic ecosystems).	Acceptable.
Exposure pathways	Inhalation/ingestion of contaminants released in dust and as vapour/ground gas and direct contact with contaminants during redevelopment.	The exposure pathways identified are appropriate. Subject to the depth of proposed future excavation, dermal contact with groundwater by construction and intrusive site workers could also be a potential exposure pathway.
Presence of preferential pathways for contaminant movement	Preferential pathways are not discussed.	There is a potential for hazardous ground gases to migrate from the adjacent Kelso Waste Facility to the south onto the site via preferential pathways (e.g., utility conduits). This warrants further investigation.
SPR linkages requiring remediation or management	Inhalation of asbestos, dermal contact or ingestion of metals (lead) and uptake of metals by biota (lead, cadmium, zinc).	The identified SPR linkages are appropriate. Several data gaps have been identified. Subject to the findings from the data gap assessment, additional complete SPR linkages may be identified. The data gaps and contingency remediation options are considered in the RAP (discussed in Section 11).

Element of CSM	Consultant	Auditor Opinion
Evaluation of data gaps	Data gaps were not explicitly identified in the CSM in Appendix B of the RAP, however, Section 7 of the RAP does identify data gaps as including: - The extent of asbestos impacted soils - The extent of metal impacted soils - Nature and extent of contamination associated with former USTs - Soil quality beneath the existing buildings - Risks associated with migration of hazardous ground gas - Groundwater conditions in the northern and north-eastern portions of the site.	The Auditor agrees with the identified data gaps, although notes that given the distance to the landfill to the south of >200 m, the potential for migration of ground gas at concentrations and flow rates that pose a risk to future site use is considered low.

10.1 Auditor's Opinion

The Auditor is of the opinion that the CSM is a reasonable representation of the known contamination at the site and is considered an adequate basis for assessing additional investigation and remedial requirements as outlined in Section 11.

The main complete SPR linkage identified was exposure of future site users and construction workers to asbestos in soils. Additional investigation is required to confirm the extent of asbestos impacted soils that require remediation or management. Data gaps in relation to soil conditions in previously inaccessible areas (building footprints and below other structures) also require assessment. While the risk to future site use from migration of hazardous ground gas and groundwater contamination is considered to be low, additional investigation is required to fully assess these risks. The identified data gaps are addressed in the RAP as discussed in Section 11.

11. EVALUATION OF PROPOSED REMEDIATION

11.1 Data Gap Assessment

AG identified several data gaps in the CSM that are to be addressed through additional investigation. The RAP notes that, prior to commencing the data gap assessment, a detailed Sampling Analysis Quality Plan (SAQP) should be prepared and reviewed by a suitably qualified contaminated land consultant. The proposed scope of the additional investigation is summarised in Table 11.1.

Table 11.1: Scope of Additional Investigation

AEC	Data gap	Proposed Sampling
Potential asbestos impacted fill across whole site including within: AEC01 (12,800 m^2), AEC02 (17,100 m^2), AEC03 (13,500 m^2 of known asbestos contamination and 18,240 m^2 of potentially asbestos impacted soils), AEC01a (12,800 m^2), Areas outside AEC (80,000 m^2)	Potential for asbestos to be present in soils. Additional investigation proposed to characterise the nature and extent of asbestos in surface soils and fill at the site, assess whether the detected concentrations of asbestos present an unacceptable human health exposure risk, in the context of the proposed land use scenario and determine the extent of asbestos in soil that requires management or remediation.	Quantification of asbestos in soils through gravimetric assessment in accordance with the methodology included in NEPM 2013. Field screening of 10 L bulk soil samples and collection of a 500 ml soil sample for laboratory analysis for AF/FA every 1 m from surface (commencing with the top 100 mm of soil) to the base of the fill materials in nominated areas at a density in accordance with the Government of Western Australia Department of Health *Guidelines for the assessment, remediation and management of asbestos contaminated sites* (WA DoH, 2021). Completion of a grid-based walkover to assess whether the top 10 cm of site is visually free of asbestos.
Footprints of existing buildings and structures AEC05 (37,000 m^2)	Post demolition assessment to assess condition of soils in the footprints of former buildings and structures.	Sampling at a density in accordance with the NSW EPA Sampling Design Guidelines. Proposed 47 test pit locations. Test pits to be excavated to 0.3 m into natural soil. Collection of soil samples for chemical analysis at the near surface and every 0.5 m or with change of strata. Collection of 10 L and 500 ml samples for asbestos quantification. Analysis of samples for TRH, BTEX, metals, PAH, OCPs and asbestos (0.001% w/w).
AEC04 – area of former USTs	Assess soils in area of previously decommissioned USTs to confirm residual petroleum hydrocarbon impacts are acceptable.	Six test pits/boreholes are proposed in the area of the former USTs into natural soils. Two groundwater wells are proposed to assess groundwater conditions in this area of the site. Wells are to be installed to depths of 6 m or 2 m below groundwater depth. Collection of soil samples for chemical analysis at the near surface and every 0.5 m or with change of strata and collection of groundwater samples using low-flow sampling methods. Analysis of soil and groundwater samples for TRH, BTEX, metals, phenols, VOCs and SVOCs.
AEC06 – potential for hazardous ground gas from adjacent landfill to south	Assess the potential for migration of hazardous ground gas from landfill to the south to impact on site.	Installation of two gas wells on the southern site boundary to depths of between 3.5 to 6.0 mbgl depending on depth to groundwater. Monitoring on the two new gas wells and existing

AEC	Data gap	Proposed Sampling
		groundwater wells in the vicinity of the AEC (MW2 and MW3) during time of falling pressure to assess flow rates and concentrations of methane, carbon monoxide, carbon dioxide, hydrogen sulfide, oxygen and VOCs. The RAP notes that should additional ground gas monitoring data be required, the number of monitoring events will take into consideration advice provided in Section 3.4.6 of NSW EPA (2020) *Guidelines for Assessment and Management of Hazardous Ground Gas*, which may include 6-12 monitoring rounds over a period of 2 months to 24 months, to facilitate capturing worse case meteorological scenarios.
AEC07 – groundwater conditions in northern and north-eastern portions of site	Confirm that migration of contaminated groundwater from up gradient industrial land uses is not impacting the site.	Groundwater monitoring of all eight wells within the existing well network (MW1-MW8). Analysis of groundwater samples for heavy metals, TRH, BTEX, PAH, VOCs, OCP/OPP, PCB and PFAS. If wells MW6 and MW7 remain dry, consider requirement to install new wells.

Based on the outcomes of the data gap assessment, the RAP is to be revised or an addendum to the RAP prepared which considers the refined CSM and the final development design.

11.1.1 Auditor's Opinion

The Auditor considers the proposed data gap assessment to be sufficient to address the identified data gaps and confirm the extent of contamination requiring remediation or management. An SAQP is to be prepared prior to completion of the investigation. The SAQP should be reviewed by an Auditor. The results of the data gap assessment should be reported in a standalone report in accordance with the requirements of the NSW EPA (2020) *Guidelines for Consultants Reporting on Contaminated Land*.

An addendum to the RAP should be prepared based on the outcomes of the investigation and the final development design to document the extent of remediation required. The revised RAP/RAP addendum should be reviewed by a Site Auditor. While the final extent of remediation will be refined following the data gap assessment, the remediation strategy described in the RAP, and reviewed in the following sections, will remain applicable.

11.2 Remediation Required

AG determined remedial requirements based on review of investigation results against screening criteria and consideration of aesthetic issues. The Auditor has summarised the issues identified as requiring remediation and the preferred options considered in the RAP in Table 11.2.

Remedial works are proposed following removal and disposal of hazardous materials from existing site buildings, demolition of buildings and structures, lawful removal of demolition wastes off-site and exposure of underlying soil.

Table 11.2: Remediation Required and Preferred Options

Description	Extent of Remediation Required	Preferred Options
Asbestos Contaminated Soil	Lateral: AEC01-03 and potentially AEC05 shown on	Excavation and off-site disposal with potential for containment and ongoing management. AG note in the RAP that the areas of the site where encapsulation may be feasible are

Description	Extent of Remediation Required	Preferred Options
	Figure 3 in RAP (Attachment 7 in Appendix A). Vertical: from surface potentially to maximum encountered depth of fill of 2.7 m. AG estimate a volume of approximately 50,000 m^3 of asbestos impacted soil may require remediation.	likely to be limited and adoption of this strategy will require revision of the RAP based on final development design, identification of appropriate encapsulation areas and approval of the strategy with the planning authority and relevant stakeholders.
Contingency remediation for mitigation of hazardous ground gas	Dependant on results of data gap assessment	The preferred strategy is to be incorporated into a revision of the RAP or preparation of a remediation works plan (RWP) following data gap investigation. Possible options include passive measures, including vertical barrier installation, vertical sub-surface venting, building foundation and ventilation design amendments, floor slab joint and penetration sealing; gas proof membranes, and venting systems beneath buildings or active measures, including sub-slab depressurisation, sub-slab venting systems, gas extraction wells or trenches, and over-pressurisation systems (for buildings and/or slabs).
Contingency remediation for groundwater contamination	Dependant on results of data gap assessment	The preferred strategy is to be incorporated into a revision of the RAP or preparation of a remediation works plan (RWP) following data gap investigation. Options include point source removal, in-situ air sparging to facilitate contaminant biodegradation, or be coupled with soil vapour extraction (SVE), in-situ chemical oxidation (ISCO), product skimming, monitored natural attenuation (MNA), barrier systems (either reactive barriers or impermeable walls), pump and treat systems; or long term management by way of embargoes on groundwater abstraction.

11.2.1 Auditor's Opinion

The Auditor considers the remediation strategy for asbestos impacted soils of excavation and off-site disposal as technically feasible, although it is noted that the volume of soil requiring disposal is still to be confirmed. AG estimate a volume of approximately 50,000 m^3 of asbestos impacted soil may require remediation, however, there is the potential for additional asbestos impacted soil to be encountered below existing buildings (AEC05) and in areas investigated by boreholes.

The remediation strategy of capping and containment is generally not suitable for low density residential land use if ongoing management of containment systems is required to mitigate risk. Depending on the final development design and consultation with Council, there may be opportunities to contain asbestos impacted soils at depths below 3.0 m, where they generally do not require ongoing management, or in areas where ongoing management is feasible and the site use poses a low risk to receptors, for example below commercial structures or in areas of recreational land use where there is an entity that can implement any necessary management requirements. The feasibility of the cap and containment method will require review following the final design and should be documented in a RAP addendum and reviewed by an Auditor.

The proposed contingency remediation options for mitigation of risks associated with groundwater contamination are generally feasible but are to be documented in a RAP addendum,

if required, and reviewed by an Auditor. The passive contingency measures proposed for mitigation of hazardous ground gases are feasible remediation options, however, active management measures are unlikely to be appropriate for a residential site use. The Auditor considers that, based on distance from the landfill, the requirement for ground gas mitigation systems is likely to be low. Should the data gap investigation suggest a risk, the remediation strategy is to be documented in a RAP addendum and reviewed by an Auditor.

11.3 Evaluation of RAP

The Auditor has assessed the RAP by comparison with the checklist included in NSW EPA (2020) *Consultants Reporting on Contaminated Land*. The RAP was found to address the required information, as detailed in Table 11.3, below.

Table 11.3: Evaluation of RAP

Remedial Action Plan	Auditor Comments
Remedial Goal The remedial goal in the RAP is to remediate potential soil contamination (where identified) to a level that does not present an unacceptable human health or ecological exposure risk, based on the proposed land use scenario.	In the Auditor's opinion, this goal is considered appropriate, although it is noted that, depending on the results of the data gap investigation, there may be the requirement for remediation of localised groundwater contamination or mitigation of ground gas intrusion in addition to remediation of identified soil contamination.
Discussion of the Extent of Remediation Required Remediation required for each area was discussed within the RAP as discussed in Section 11.2 above. The extent of remediation is to be refined through the data gap assessment.	The RAP estimates the extent of asbestos in soil that requires remediation but acknowledges that this may increase depending on the outcomes of the data gap assessment. The Auditor considers that the remediation strategy outlined in the RAP remains relevant even if the extent of remediation changes. The RAP stipulates the requirement for review and revision/addendums to the RAP following the data gap assessment which is appropriate. Any revision or addendum to the RAP should be reviewed by an Auditor to confirm the remediation strategy remains suitable.
Remedial Options Remedial options were assessed and included do nothing, capping and containment of impacted soils and excavation and off-site disposal. A number of other options have been listed as contingencies for remediation of groundwater and ground gas if required based on the outcomes of the data gap assessment as discussed in Section 11.2 above.	The Auditor considers that a range of options were considered.
Selected Preferred Option and Rationale Preferred options were discussed within the RAP as discussed in Section 11.2 above. The preferred options for asbestos impacted soil were excavation and off-site disposal or onsite containment.	As discussed in Section 11.2.1 above, the Auditor considers that excavation and off-site disposal is an appropriate option for impacted soils. The feasibility of on-site containment and ongoing management is to be reviewed following the data gap assessment and with consideration of the final development design. The preferred option for remediation of groundwater and ground gas will be addressed through a RAP addendum, if required.
Description of Remediation to be Undertaken Initial tasks include review of the data gap assessment results and revision/addendum to the RAP with Site Auditor	The description of remediation works provided in the RAP is adequate for this stage of remediation planning. As noted in Section 11.2.1, the feasibility of containment of impacted soils on-site will need to be

Remedial Action Plan	Auditor Comments
review and approval followed by notification and planning requirements and site establishment. Impacted soils within AEC01, AEC01a, AEC02 and AEC03 will be excavated to the base of fill materials, exposing underlying natural materials. The fill materials will be stockpiled within an AEC and sampled for waste classification in accordance with the relevant waste classification and SafeWork NSW Codes of Practice. Soils are to be disposed of to a licensed waste facility. If contained on-site, soils within the area proposed for encapsulation will be excavated to an appropriate depth in order to accommodate the placement of the asbestos impacted materials and clean fill capping materials. Area that require backfilling following excavation and disposal are to be backfilled with virgin excavated natural material (VENM), excavated natural material (ENM), materials produced under a resource recovery order (RRO) or material from on-site that has been validated as suitable for reuse. The capping system is to include: - placement of high visibility geo-textile membrane (marker layer) over contaminated fill material. The marker layer is to be water permeable, highly visible, rot-proof and chemically inert and have high tensile strength. The marker layer is to cover the entire contaminated area and 0.5 m beyond contaminated boundary (if practical). Parallel sheets are to be fixed together or overlap by a minimum of 20 cm. - A capping layer of clean fill (ENM or VENM) is to be placed over the geo-textile membrane to the nominal depth of up to 1.0 m, with a minimum thickness of at least 0.5 m cap for residential/commercial and an additional minimum of 0.2 m of topsoil in landscaped areas, and minimum of 1 m cap for open space and landscaped areas. - In areas where there is to be installation of inground services, a capping layer of clean fill (ENM or VENM) is placed over geo-textile membrane to the nominal minimum depths (about 0.5 m below proposed invert levels) below surface finished level. The depth of clean fill capping may be reduced in areas of hardstand (i.e. carparks, slabs, pavements).	addressed through a revision of the RAP or RAP addendum following final development design and consultation with Council and other relevant stakeholders. Although the capping system described in the RAP is generally sufficient to mitigate risk, the specific capping arrangements for areas of the site where impacted soils are to be retained should be reviewed in the RAP addendum depending on the proposed land use and management requirements.
Proposed Validation Criteria Outlined in Section 5 of the RAP. For soil and groundwater, NEPM 2013 criteria for low density residential land use are proposed: HIL A, HSL A&B, EIL and ESL for urban residential/public open space and Residential HSL A for asbestos. For ground gas, the criteria in the NSW EPA (2020) *Guidelines for Assessment and Management of Hazardous Ground Gases* are proposed.	The proposed criteria are appropriate.
Proposed Validation Testing The proposed validation testing is outlined in Table 11.4. below	The Auditor notes that imported material must either be VENM, ENM or be classified under a Resource Recovery Exemption. The density of testing would need to be commensurate with the documentation provided and the consistency of the results.
Contingency Plan if Selected Remedial Strategy Fails A contingency plan is included in the RAP for specific potential problems including identification of unexpected contamination and detection of greater volumes of contaminated material than anticipated.	In the Auditor's opinion, the procedure for handling unexpected finds, which includes stopping work and identification of materials is appropriate and practical and can be implemented within the proposed remediation strategy.

Remedial Action Plan	Auditor Comments
The remedial strategy has a low risk of failure, as validation failure would lead to further excavation and off-site disposal. Contingency procedures are provided for the unexpected finds, groundwater contamination and ground gas.	Contingency options for management of groundwater and ground gas issues are feasible and appropriate. Should groundwater or ground gas issues be identified that require remediation, an addendum to the RAP is to be prepared and reviewed by an Auditor prior to implementation.
Interim Site Management Plan (before remediation) The site is currently covered by hardstand or landscaped areas and there was considered to be a low risk to receptors in the interim. AG recommended that the site owner be notified of the asbestos impacted soils encountered and the asbestos management plan (AMP) for the site be updated to include appropriate management controls.	The Auditor agrees that, based on the nature of the contamination (bonded ACM) and existing surface cover at the site, the risk to current site users of the university campus is low. However, the locations where asbestos impact has been encountered in soils should be notified to the site owner for management through an AMP.
Site Management Plan (operation phase) including stormwater, soil, noise, dust, odour and OH&S A Site Management Plan (SMP) is outlined in the RAP which outlines requirements for asbestos management and control, soil and stormwater management, groundwater management, dust and noise control, stockpiling, excavation pump out, waste management, traffic management, vibration management, fill importation and work health and safety requirements. AG notes in the RAP that an AMP and an asbestos dust and management plan must be prepared and incorporated as a sub-plan of the site Construction Environmental Management Plan (CEMP).	The SMP outlined in the RAP is adequate. A CEMP should be prepared based on the final development design and development and remediation staging.
Remediation Schedule and Hours of Operation The RAP notes that remediation works will be undertaken on Monday to Friday between the hours of 7:00am to 5:00pm, and Saturday between the hours of 8:00am and 1:00pm.	The Auditor notes that the staging and scheduling of remediation will be determined based on the development design and staging and that hours of operation will be determined by development planning consent conditions.
Contingency Plans to Respond to Site Incidents Contingency management plans for site incidents, including excessive dust and rain, chemical spills, odour and noise generation and unexpected finds are to be documented in the RAP.	Acceptable. The contingency plans are appropriate and can be implemented during the works. Contingency plans should be included in a CEMP based on final development design and staging.
Licence and Approvals AG notes in the RAP that the remedial works classified as Category 2 under State Environmental Planning Policy (SEPP) Hazards and Resilience (2021), do not require development consent. However, in the event that the proposed remedial works trigger the Category 1 criteria in the SEPP, then development consent for the remedial works may be required. Demolition works are to be undertaken by a contractor holding an appropriate SafeWork NSW demolition licence. That licence will hold a chemical endorsement, in the event that demolition works include an underground and/or aboveground storage tank. Approvals are to be obtained (if required) from NSW Roads and Maritime Services (RMS) for works being undertaken adjacent to (or on) RMS identified assets. A water access licence will be obtained (if required) from Water NSW, in the event remediation works requires water to be taken at specified times, rates and circumstances from specified areas or locations. A water supply work and use approval will be obtained (if required) from Water NSW, in the event remediation works	Acceptable. Approval is being sort at this stage for change in the site zoning.

Remedial Action Plan	Auditor Comments
require construction and use of a specific water supply at a specified location. Water supply works may include pumps, bores, spear points and wells. Asbestos removal works will be notified to SafeWork NSW by the remediation contractor. The asbestos removal works will be undertaken by a contractor holding a: • Class A licence for removal of friable asbestos / asbestos fines; and • Class B licence for removal of bonded asbestos. An appropriately licensed landfill should be selected and the material tracked from the Site to the landfill.	
Contacts/Community Relations Specific site contacts are not provided in the RAP, however, roles and responsibilities are outlined. The RAP states that a sign is to be posted on the boundary of the site, adjacent to the site access point, which will include 24-hour contact details of the remediation contractor. This sign is to be maintained onsite until all remediation works are complete. A brief procedure for dealing with community communications/complaints is included in the RAP and requires direct community consultation with regards to remediation works.	Adequate for current purposes. Following rezoning, it is envisaged that community consultation will be undertaken as part of the development planning and approvals process.
Staged Progress Reporting AG note in the RAP that staged development may be undertaken with staged demolition and bulk earthworks during redevelopment works. AG understand that data gap assessments (where required) and area/stage specific RAPs will be prepared and implemented to coincide with the proposed staged demolition and bulk earthworks plan for the site.	The number of stages required for development of the site is not specified in the RAP. If staged remediation is undertaken, it is assumed that there will be staged validation reporting to allow occupation and development of staged areas. Interim validation reports should be reviewed by the Auditor and Site Audit Statements provided to confirm staged validation has been completed in accordance with the RAP.
Long Term Environmental Management Plan An Environmental Management Plan (EMP) has been proposed if containment of asbestos impacted soils is undertaken such that ongoing management of the contained area is required. The EMP will identify capped asbestos-impacted areas and identify appropriate health and safety procedures for any works that require penetration of the cap. Specifically, AG note that the practicality of implementation and the mechanism for enforcing the EMP following the completion of the proposed redevelopment needs to be considered. Council must confirm that containment of contamination is a suitable strategy on land that is to be reverted to Council. It is also noted that the EMP will be required to be recorded on the planning certificate issued under Section 10.7 of the EP&A Act 1979 or a covenant registered on the title to land under section 88B of the Conveyancing Act 1919. It is not stated who will be responsible for ensuring implementation of the EMP.	As discussed in Section 11.2.1, the appropriateness and practicality of containing asbestos impacted soils on-site will need to be considered based on the proposed development design and in consultation with Council. A RAP addendum should be prepared for areas where containment of soils is proposed with management through an EMP and the feasibility of implementation of the EMP considered. It is not appropriate to have an EMP on privately owned residential properties or on land to be reverted to Council if Council are not accepting of the management requirements.

Remedial Action Plan	Auditor Comments
Waste Management Waste management is discussed in Section 13.4 of the RAP and requires removal of materials from site for recycling and/or disposal, to be undertaken with reference to the relevant provisions of the Protection of the Environment Operations Act 1997, SafeWork NSW (2019) and NSW EPA (2014) *Waste Classification Guidelines.* The remediation contractor is to maintain detailed records of materials removed from the site, including date/time of removal, quantities of materials, transport company details and vehicle registration details. The remediation contractor is to retain records verifying lawful disposal of the materials, including weighbridge / tipping dockets from the waste receiver. Waste disposal is to be to a facility licensed to accept the category of waste.	Acceptable.

Table 11.4: Proposed Validation Testing

Validation Aspect	Validation Sampling/Inspection	Analytes	Auditor Comment
Removal of asbestos impacted soils	A systematic visual assessment of the base and walls of the excavation to be undertaken by an environmental consultant. Fill material within the AEC will be excavated down to natural soils. Collection of a 500 mL soil sample for analysis for asbestos quantification (0.001% w/w) validation sample is required to be collected at a rate of 1 per 50 m^2. Collection of one 10 L sample and field screen for fragments of ACM >7 mm, per 10 linear metres of excavation wall (minimum one per wall for every vertical metre of exposed fill materials). One (1) 500 mL sample for asbestos quantification (0.001%) per 10 linear metres of excavation wall (minimum one per wall for every vertical metre of exposed fill materials). A visual clearance and an asbestos clearance report issued by a licensed asbestos assessor upon removal	Asbestos	Acceptable.
Cap placement and thickness	Lateral and vertical survey pre- and post-cap installation to confirm the extent of each containment area and the installation thickness for the overlying cap; inspection of geotextile marker layer to confirm its adequacy as a high visibility layer, the extent of placement over fill materials and the integrity of the geotextile when placed; and assessment of imported fill (VENM/ENM) prior to placement.	N/A	Approach to survey of cap placement is acceptable. Details of capping construction are to be documented in a revised RAP or RAP addendum
Imported Material – VENM or ENM	Validation/classification letters required stating that the material is VENM or ENM (or otherwise approved by the Environmental Consultant). The imported material	Not specified.	The Auditor notes that verification testing by the consultant will be required if the supporting

Validation Aspect	Validation Sampling/Inspection	Analytes	Auditor Comment
	must be inspected prior to backfilling to ensure that it is consistent with the material originally sampled. Samples to be collected and analysed at a rate of 1 sample per 1,000 m^3 per stockpile/source.		documentation is not sufficient. The frequency of sampling would depend on the source of the material and supplied documentation. Analysis for asbestos, metals, TRH, BTEXN and PAH should be undertaken as a minimum.
Imported resource recovery order/ exemption material	Laboratory certification required to confirm imported engineering materials have been classified with reference to a relevant resource recovery order/exemption. Visual verification (by the client) of materials upon delivery to site for confirmation they are free of visible/olfactory indicators of contamination. At least 3 samples per source site. For aggregates - samples are to be analysed for asbestos (absence/presence) by a NATA accredited lab, or, if the material contains significant fines, asbestos testing to be conducted in accordance with NEPM (2013) w/w% for asbestos quantification by a NATA accredited lab. One (1) 500 mL NEPM asbestos quantification (0.001%) (sealable plastic bag) sample (minimum 3 samples).	Not specified	The Auditor notes that verification testing by the consultant will be required if the supporting documentation is not sufficient. The frequency of sampling would depend on the source of the material and supplied documentation. Analysis for asbestos, metals, TRH, BTEXN and PAH should be undertaken as a minimum.

11.4 Overall Auditor's Opinion

In the Auditors' opinion, the RAP generally meets the guidelines prepared or endorsed by NSW EPA in particular the NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme (3rd Edition)* and the NSW EPA (2020) *Contaminated Land Guidelines: Consultants Reporting on Contaminated Land*.

Previous investigations of the site have not identified significant widespread contamination, with the exception of asbestos impacted soils. The proposed remediation strategy of excavation and off-site disposal of asbestos impacted soils is practical, technically feasible and appropriate for the contamination identified. The practicality and appropriateness of containment of impacted soils and ongoing management through an EMP is to be assessed based on the final development design and in consultation with Council. Capping and containment of impacted soils is generally not suitable for low density residential land use if ongoing management of containment systems is required to mitigate risk. The feasibility of the cap and containment method will require review following the final design and should be documented in a RAP addendum and reviewed by an Auditor.

If adequately implemented, the RAP should be able to ensure that the site is suitable for the proposed land use through assessment of data gaps and removal of asbestos impacted soils. Successful validation will be required to confirm this. Review of the RAP and preparation of addenda to the RAP is required should the data gap assessment indicate that remediation of

groundwater contamination is required or mitigation of ground gas intrusion risks. It is noted that the RAP has been prepared to support a rezoning application and should be refined based on final development design and proposed development staging. The revised RAP or addenda to the RAP should be reviewed and approved by a Site Auditor.

12. CONTAMINATION MIGRATION POTENTIAL AND ASSESSMENT OF RISK

12.1 Auditor's opinion

Based on the results of the previous site investigations and the scope of the proposed remediation works, the Auditor considers that there is a low potential for significant migration of contamination off-site. There is a potential for migration of dust during the development works, however, dust generation will be controlled through implementation of a CEMP.

Based on the results of previous investigations and the CSM, potentially complete SPR linkages have been identified for contamination at the site and include:

- Exposure to construction workers during development through inhalation of asbestos fibres.
- Exposure to future residential site users and intrusive maintenance workers from inhalation of asbestos.

Based on the current data set, the potential for significant groundwater contamination and ground gas intrusion issues is low, however, data gaps in relation to these issues are to be addressed through the data gap assessment outlined in the RAP.

The proposed data gap assessment, remediation and validation works reviewed herein are considered adequate to address the identified risks to human health under a residential land use scenario based on the CSM. Any change to the remediation strategy based on the findings of the additional assessment will require revision of the RAP which should be reviewed and approved by the Auditor prior to implementation.

13. COMPLIANCE WITH REGULATORY GUIDELINES AND DIRECTIONS

13.1 General

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

The investigation and preparation of the RAP were generally conducted in accordance with SEPP 55 Planning Guidelines and reported in accordance with the NSW EPA (2020) *Consultants Reporting on Contaminated Land: Contaminated Land Guidelines*.

13.2 Notification

AG notes in the RAP that the remedial works classified as Category 2 under State Environmental Planning Policy (SEPP) Hazards and Resilience (2021) do not require development consent. However, in the event that the proposed remedial works trigger the Category 1 criteria in the SEPP, then development consent for the remedial works may be required. The final development design for the site has not yet been determined as the site is subject to application for rezoning. Development approval will be required for the redevelopment of the site and associated remediation.

13.3 Duty to Report

Consideration has been given to the requirements of the EPA (2015) *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*. The Auditor considers that based on the findings of the historical investigations, there is no requirement to notify the NSW EPA under the NSW EPA Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act.

13.4 Licenses

Excavation and removal of asbestos impacted soil is to be conducted by appropriately licensed contractors. Any soils disposed of off-site are to be disposed of to a waste facility licensed to accept the waste.

13.5 Conflict of Interest

The Auditor has considered the potential for a conflict of interest in accordance with the requirements of Section 3.2.3 of the NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme (3rd Edition)*.

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

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

14. CONCLUSIONS AND RECOMMENDATIONS

The site investigations and preparation of the RAP were generally conducted in accordance with the Hazards and Resilience SEPP and reported in accordance with the NSW EPA (2020) *Contaminated Land Guidelines: Consultants Reporting on Contaminated Land*.

AG conclude in the RAP that:

> *"Based on the information presented in the historical contamination assessment reports and AG's observations on site, AG concludes that the remedial strategies and goals can be achieved and the site made suitable in informing future land use planning and rendering the site suitable for proposed land use, subject to:*

- *Preparation of a SAQP prior to commencement of data gap assessment.*
- *Implementation of the strategies, methodologies and measures set out in this RAP.*
- *Should newly identified unacceptable land contamination risks be identified during supplementary assessment works, an addendum to this RAP may be required. The addendum should be prepared by a suitably experienced environmental consultant.*
- *Prior to any removal of soils from site for offsite disposal during remedial works, waste classification for those soils should be prepared by a suitably experienced environmental consultant. Residual impacted fill materials must also be appropriately characterised as per the strategy outlined in this RAP.*
- *AG recommends that any waste classifications, remediation monitoring and validation works be undertaken by a suitably experienced environmental consultant.*
- *It is recognised that contamination risks may remain on the site. If so, a LT-EMP will document areas where residual contamination is present on the site, and information on management measures that have been adopted. Provisions contained in the LT-EMP will need to have a mechanism to be legally enforceable and will be publicly notified. A revised RAP will be prepared to document where and how management measures will be implemented, and how a LTEMP can be made legally enforceable."*

In the Auditors opinion, the nature and extent of contamination has been sufficiently determined for remediation planning purposes, noting data gaps can be adequately addressed under the RAP framework. Previous investigations of the site have not identified significant widespread contamination, with the exception of asbestos impacted soils. The proposed remediation strategy of excavation and off-site disposal of asbestos impacted soils is practical, technically feasible and appropriate for the contamination identified. The practicality and appropriateness of containment of impacted soils and ongoing management through an EMP is to be assessed based on the final development design and in consultation with Council. Capping and containment of impacted soils is generally not suitable for low density residential land use if ongoing management of containment systems is required to mitigate risk. The feasibility of the cap and containment method will require review following the final design and should be documented in a RAP addendum and reviewed by an Auditor.

If adequately implemented, the RAP should be able to ensure that the site is suitable for the proposed land use through assessment of data gaps and removal of asbestos impacted soils. Successful validation will be required to confirm this.

Based on the information presented in the reviewed reports, and observations made on site, and following the Decision-making process for assessing urban redevelopment sites in NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme (3rd Edition)*, the Auditor concludes that the

site can be made suitable for the purposes of 'residential' site use if remediated in accordance with the following RAP:

- 'Remedial Action Plan, Western Sydney University – Milperra Campus, Bullecourt Ave, Milperra NSW' dated 15 September 2022, AG.

Subject to compliance with the following conditions:

1. Development of a SAQP for the data gap assessment and review and approval by a NSW EPA Accredited Site Auditor.
2. The data gap assessment is to be completed following building demolition and removal of hardstand and prior to commencement of bulk earthworks.
3. Should the results of the data gap assessment indicate the requirement for a change in the remediation strategy, the requirement for remediation of groundwater or ground gas issues, or should containment of asbestos impacted soils be confirmed as a remediation strategy, a revision to the RAP (either as an addendum to the RAP or as a RWP) will be required to be developed and approved by a NSW EPA Accredited Site Auditor.
4. Validation of the remediation works is required to be documented in a final site validation report prepared by a qualified environmental consultant confirming that the works have been undertaken in accordance with the RAP and certifying the suitability of the site for the proposed development.
5. Preparation of an EMP for the management of any contamination remaining on site following redevelopment that presents a risk to human health or the environment.
6. Preparation of a Section A Site Audit Statement and Site Audit Report by a NSW EPA Accredited Site Auditor reviewing the above information and confirming the suitability of the site for the intended use.

15. OTHER RELEVANT INFORMATION

This Audit was conducted on the behalf of Mirvac for the purpose of assessing the suitability and appropriateness of a RAP, i.e., a "Site Audit" as defined in Section 4 (definition of a 'site audit' (b)(v)) of the CLM Act.

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

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

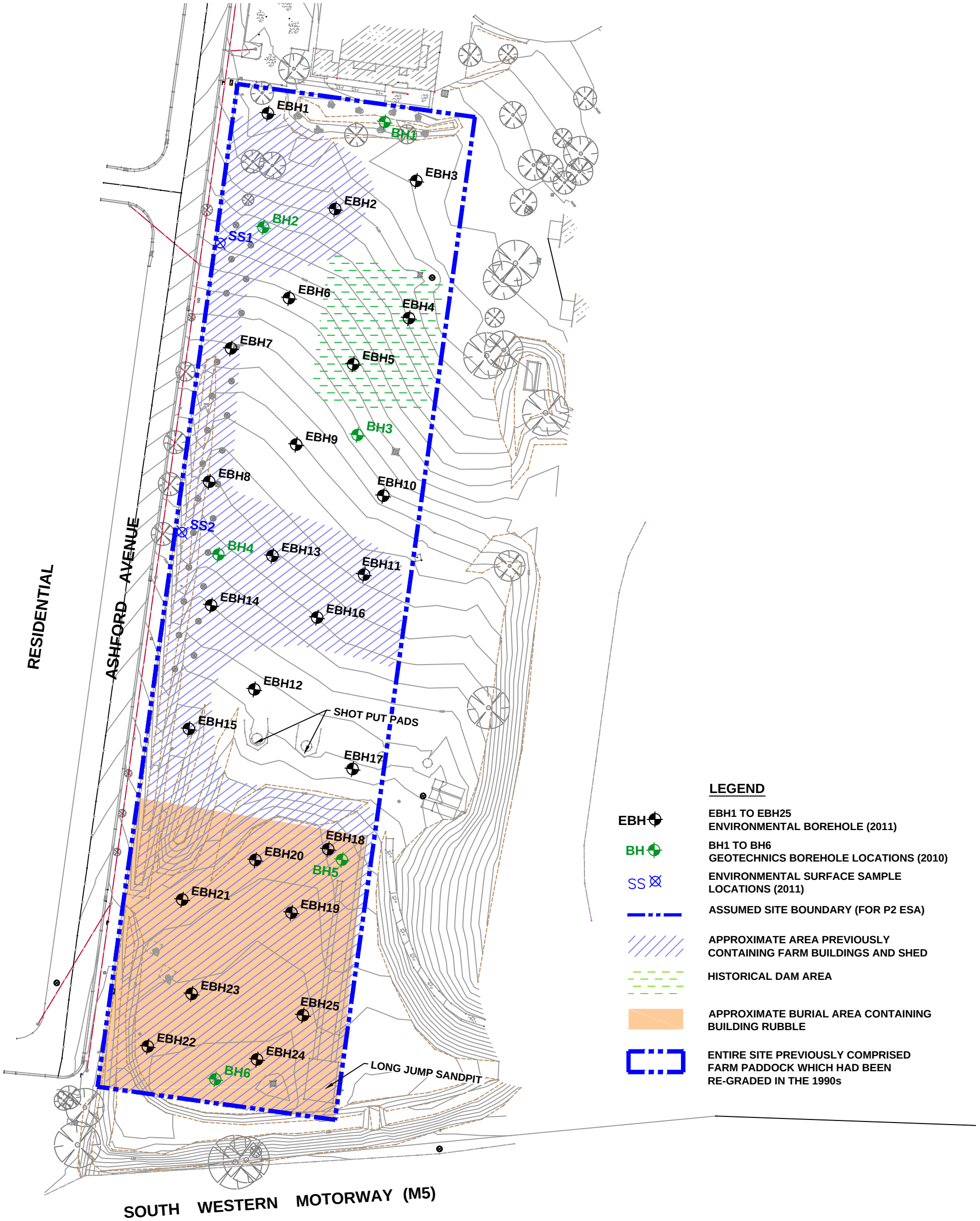
It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice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

APPENDIX A
ATTACHMENTS

Attachment 1: Areas of Environmental Concern, DSI, AG 2020
Attachment 2: Phase 2 Sample Location Plan, Coffey, 2011
Attachment 3: SCI Sample Locations, Noel Arnold and Associates, 2011
Attachment 4: PCS Sample Locations, EIS, 2016
Attachment 5: Phase 1 Sample Locations, JBS&G, 2018
Attachment 6: DSI Sample Locations, AG, 2020
Attachment 7: Areas of Environmental Concern with RAP, AG 2022

Attachment 1: Areas of Environmental Concern, DSI, AG 2020

Alliance Geotechnical ENGINEERING | ENVIRONMENTAL | TESTING Manage the earth, eliminate the risk	Areas of Environmental Concern			
	Client Name:	Mirvac Homes NSW PTY Ltd	Figure Number:	3
	Project Name:	Stage 2 Detailed Site Investigation	Figure Date:	10 December 2019
	Project Location:	Western Sydney University – Milperra Campus – 2 Bullecourt Avenue, Milperra NSW	Report Number:	9996-ER-1-1



N

10 0 10 30 50

Horizontal Scale (metres) 1:1000

Coffey Environments Australia Pty Ltd

drawn	MV
approved	EW
date	15.07.11
scale	AS SHOWN
original size	A3

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

client: UNIVERSITY OF WESTERN SYDNEY

project: PHASE 2 ENVIRONMENTAL SITE ASSESSMENT
STUDENT RESIDENCE DEVELOPMENT,
UWS - BANKSTOWN CAMPUS, MILPERRA, NSW

title: SITE PLAN SHOWING BOREHOLE LOCATIONS

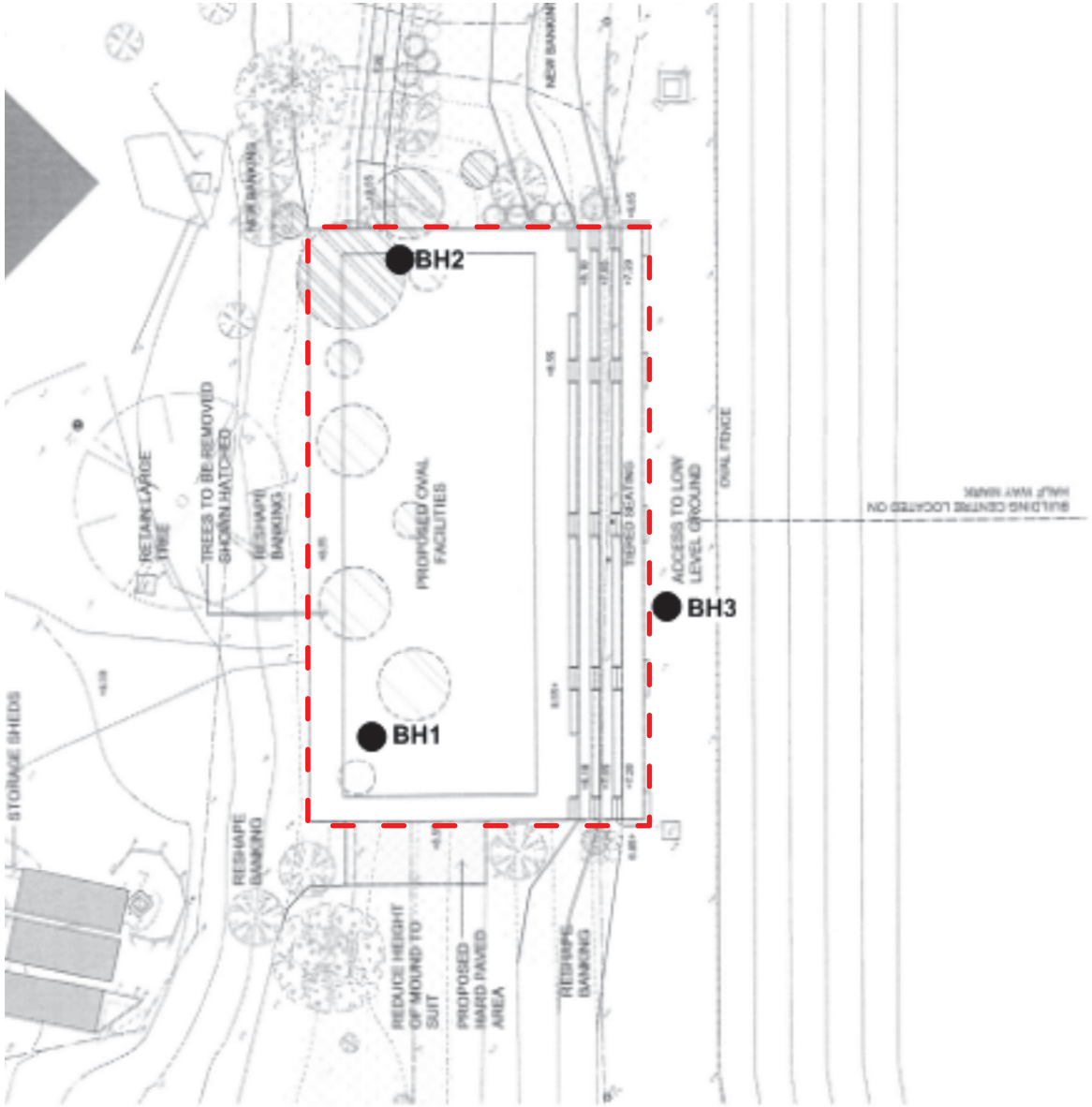
project no: GEOTLCOV24163AD

figure no: FIGURE 2

PLOT DATE: 25/7/2011 5:37 PM DWG FILE: F:\PROJECTS\OTHER OFFICES\GEOTLCOV\GEOTLCOV24163AC_AD\DRAWINGS\GEOTLCOV24163AD.DWG

Attachment 3: SCI Sample Locations, Noel Arnold and Associates, 2011

Noel Arnold & Associates RISK MANAGEMENT SERVICES	**Legend**		**Project Details**	
	⊗	Indicative Sample location	Client Name:	JDH Architects
Level 2, 11-17 Khartoum Road	▭	Approximate New Work Boundary	Client Number:	SJ0085
North Ryde, NSW 2113			Project Number:	95458
Ph: 02-9889-1800			Project Description:	Soil Contamination Investigation
Fx: 02-9889-1811	**Details of Photo**		Address:	Bullecourt Avenue, Milperra NSW
www.noel-arnold.com.au	Image Source:	www.nearmap.com	Figure Name:	Site Locality Map



OUTLINE OF PROPOSED WORKS

SITE LOCATION PLAN (Not to scale)

N

This plan should be read in conjunction with the EIS report.

Approximate site boundary

BH (Fill Depth) Borehole location, number and depth of fill (m) (EIS 2016)

SCALE (m) @ A3: NTS - taken from JK Geotechnics Figure 1

EIS
ENVIRONMENTAL INVESTIGATION SERVICES
www.jkgroup.net.au

SAMPLE LOCATION PLAN

2 BULLECOURT AVENUE
MILPERRA NSW

PROJECT ID: E29069K

F2

Attachment 5: Phase 1 Sample Locations, JBS&G, 2018

Legend:

- Approximate Site Boundary
- Burial Area Containing Building Rubble (Coffey 2011)
- Sample Location

Note:
HIL B = NEPM 2013 Soil HIL B
HIL C = NEPM 2013 Soil HIL C
HIL D = NEPM 2013 Soil HIL D

JBS&G

Job No: 54086

Client: Western Sydney University

Version: R01 Rev A	Date: 12-Sep-2017
Drawn By: BC	Checked By: KL

Scale 1:4,000

0 40 80
metres

Coor. Sys. GDA 1994 MGA Zone 56

2 Bullecourt Avenue
Milperra, NSW

SAMPLING LOCATIONS & EXCEEDANCES

FIGURE 3

File Name: 54086_03
Reference: Nearmaps - http://www.nearmap.com.au/. Imagery - 09-08-2017.

Scale: 100.00 m

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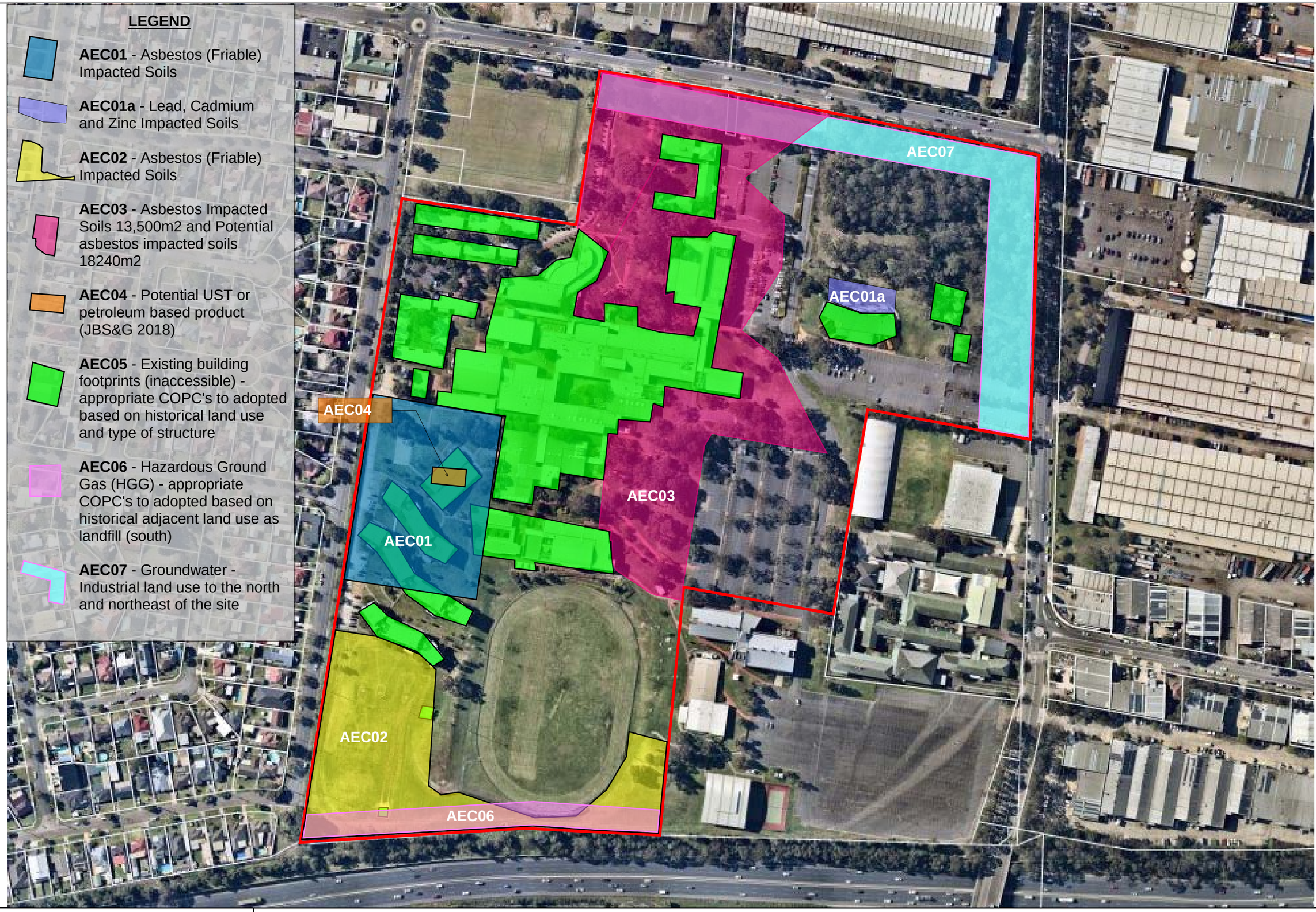
Sampling Point Layout Plan

Client Name:	Mirvac Homes NSW PTY Ltd	Figure Number:	4
Project Name:	Stage 2 Detailed Site Investigation	Figure Date:	10 December 2019
Project Location:	Western Sydney University – Milperra Campus – 2 Bullecourt Avenue, Milperra NSW	Report Number:	9996-ER-1-1



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Manage the earth, eliminate the risk

Areas of Environmental Concern

Client Name:	Mirvac Homes NSW PTY Ltd	Figure Number:	3
Project Name:	Remediation Action Plan	Figure Date:	20 November 2020
Project Location:	Western Sydney University – Milperra Campus – 2 Bullecourt Avenue, Milperra NSW	Report Number:	9996-ER-2-1

N

APPENDIX B
SITE AUDIT STATEMENT

NSW Site Auditor Scheme

Site Audit Statement

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

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

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

Part I: Site audit identification

Site audit statement no. LW-030

This site audit is a:

☒ statutory audit

☐ non-statutory audit

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

Site auditor details

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

Name	Louise Walkden
Company	Ramboll Australia Pty Ltd
Address	Level 3, 100 Pacific Highway, North Sydney
	Postcode 2060
Phone	02 9954 8100
Email	lwalkden@ramboll.com

Site details

Address: Western Sydney University Milperra Campus, 2 & 2a Bullecourt Avenue, Milperra

Postcode: 2214

Property description

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

Lot 105 DP 1268911 and Lot 1 DP 101147

Local government area: City of Canterbury Bankstown

Area of site (include units, e.g. hectares): approximately 20 ha

Current zoning: SP2 Infrastructure

Regulation and notification

To the best of my knowledge:

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

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

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

To the best of my knowledge:

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

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

Site audit commissioned by

Name: Theo Zotos

Company: Mirvac Residential (NSW) Developments Pty Ltd

Address: Level 28, 200 George Street, Sydney, NSW

Postcode: 2000

Phone: +61 2 9080 8062

Email: theo.zotos@mirvac.com

Contact details for contact person (if different from above)

Name: N/A

Phone:

Email:

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

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

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

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

Condition of determination under section 3.34(2) of the Environmental Planning and Assessment Act 1979 for amendment of the Bankstown Local Environmental Plan 2015 as documented in the NSW Department of Planning and Environment 'Gateway determination report – PP-2021-5837 Western Sydney University Milperra Campus' dated 1 June 2022 and signed by Executive Director Metro East and South at the Department of Planning and Environment, as delegate of the Minister for Planning and Homes.

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

Purpose of site audit

☐ **A1** To determine land use suitability

Intended uses of the land:

OR

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

Intended uses of the land:

OR

(Tick all that apply)

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

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

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

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

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

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

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

Intended uses of the land: Residential

Information sources for site audit

Consultancies which conducted the site investigations and/or remediation:

Coffey Environments Pty Ltd (Coffey)

Environmental Investigation Services Pty Ltd (EIS)

Noel Arnolds and Associates (NAA)

JBS&G Australia Pty Ltd (JBS&G)

Alliance Geotechnical Pty Ltd (AG)

Titles of reports reviewed:

- ‘Phase 2 Environmental Site Assessment – Student Residence Development University of Western Sydney, Bankstown Campus’, 25 August 2011, Coffey
- ‘Soil Contamination Investigation, University of Western Sydney – Bankstown Campus Bullecourt Avenue, Milperra NSW’, October 2011, NAA
- ‘Preliminary Contamination Screening and Waste Classification, Proposed Oval Facilities, UWS Bankstown Campus, 2 Bullecourt Avenue, Milperra’, 7 April 2016, EIS
- ‘Phase 1 Environmental Assessment Report, Bullecourt Avenue, Milperra NSW’, 7 February 2018, JBS&G
- ‘Detailed Site Investigation, Bullecourt Avenue, Milperra NSW’, 30 January 2020, AG
- ‘Remediation Action Plan Western Sydney University – Milperra Campus, Horsley Rd & Bullecourt Ave, Milperra, NSW 2214’, 15 September 2022, AG

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

Site audit report details

Title	Remediation Action Plan, Western Sydney University Campus, 2 and 2A Bullecourt Avenue, Milperra
Report no.	LW-030 (Ramboll Ref: 318001500) Date: 27 September 2022

Part II: Auditor's findings

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

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

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

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

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

Section A1

I certify that, in my opinion:

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

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

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

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

☐ Day care centre, preschool, primary school

☐ Residential with minimal opportunity for soil access, including units

☐ Secondary school

☐ Park, recreational open space, playing field

☐ Commercial/industrial

☐ Other (please specify):

OR

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

Overall comments:

Section A2

I certify that, in my opinion:

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

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

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

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

☐ Day care centre, preschool, primary school

☐ Residential with minimal opportunity for soil access, including units

☐ Secondary school

☐ Park, recreational open space, playing field

☐ Commercial/industrial

☐ Other (please specify):

_____

EMP details

Title: _____

Author: _____

Date: _____ No. of pages: _____

EMP summary

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

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

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

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

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

~~Purpose of the EMP:~~

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

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

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

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

~~Overall comments:~~

Section B

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

Remediation Action Plan for remediation of the site to make it suitable for residential site use

I certify that, in my opinion:

(B1)

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

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

AND/OR (B2)

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

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

~~AND/OR (B3)~~

☐ ~~The site testing plan:~~

- ☐ ~~**is** appropriate to determine~~
- ☐ ~~**is not** appropriate to determine~~

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

~~AND/OR (B4)~~

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

- ☐ ~~**have** been complied with~~
- ☐ ~~**have not** been complied with.~~

~~*voluntary management proposal no.~~

~~**management order no.~~

AND/OR (B5)

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

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

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

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

☒ Day care centre, preschool, primary school

☒ Residential with minimal opportunity for soil access, including units

☒ Secondary school

☒ Park, recreational open space, playing field

☒ Commercial/industrial

☐ ~~Other (please specify):~~

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

*Strike out as appropriate

Plan title: 'Remedial Action Plan, Western Sydney University – Milperra Campus, Horsley Rd & Bullecourt Ave, Milperra, NSW 2214'

Plan author: Alliance Geotechnical Pty Ltd

Plan date: 15 September 2022 No. of pages: 96

SUBJECT to compliance with the following condition(s):

1 Development of a sampling analysis and quality plan (SAQP) for the data gap assessment and review and approval by a NSW EPA Accredited Site Auditor.

2. The data gap assessment is to be completed following building demolition and removal of hardstand and prior to commencement of bulk earthworks.

3. Should the results of the data gap assessment indicate the requirement for a change in the remediation strategy, the requirements for remediation of groundwater or ground gas issues, or should containment of asbestos impacted soils be confirmed as a remediation strategy, a revision to the RAP (either as an addendum to the RAP or as a remedial works plan (RWP)) will be required, which should be reviewed and approved by a NSW EPA Accredited Site Auditor.

4. Validation of the remediation works is required to be documented in a final site validation report prepared by a qualified environmental consultant confirming that the works have been undertaken in accordance with the RAP and certifying the suitability of the site for the proposed development.

5. Preparation of an environmental management plan (EMP) for the management of any contamination remaining on site following redevelopment that presents a risk to human health or the environment.

6. Preparation of a Section A Site Audit Statement and Site Audit Report by a NSW EPA Accredited Site Auditor reviewing the above information and confirming the suitability of the site for the intended use.

Overall comments:

The site is currently used as a Western Sydney University campus and has historically been used for residential and agricultural purposes (market gardens) prior to development as an educational facility in the late 1960s. Previous site activities with the greatest potential to cause contamination include use of pesticides, hazardous building materials, filling of land and storage and use of fuels.

Potential off-site sources of contamination include industrial use of land and Bankstown Airport to the north and Kelso Waste Facility to the south.

The site is the subject of a rezoning application to allow residential site use. The final development design is not currently known but is to include low-density residential land use and public open space. The development will involve demolition of existing site structures and bulk earthworks to achieve the required development levels.

Historical investigations at the site indicate that widespread chemical contamination of soils and groundwater is not present. Asbestos containing materials (ACM) as bonded fragments of ACM and as fibre bundles have been detected in surface soils and fill at the site. Additional investigation is required to confirm the extent of asbestos impacted soils that require remediation or management. Data gaps in relation to soil and groundwater conditions in previously inaccessible areas (building footprints and below other structures) also require assessment. While the risk to future site users from migration of hazardous ground gas and groundwater contamination is considered to be low, additional investigation is required to fully assess these risks. In the Auditor’s opinion, the contamination status of the site is sufficiently well known for remediation planning purposes.

A remediation action plan (RAP) was prepared to address the data gaps and document the remediation strategy for asbestos in soils. The RAP also includes contingency remediation options for addressing groundwater and ground gas contamination (if required) and unexpected finds.

The proposed remediation strategy of excavation and off-site disposal of asbestos impacted soils is practical, technically feasible and appropriate for the contamination identified. The practicality and appropriateness of containment of impacted soils and ongoing management through an EMP is to be assessed based on the final development design and in consultation with Council. The feasibility of the cap and containment method will require review following the final development design and should be documented in a RAP addendum and reviewed by an Auditor.

If adequately implemented, the RAP should be able to ensure that the site is suitable for the proposed residential land use through assessment of data gaps and removal of asbestos impacted soils, subject to compliance with the conditions outlined above.

Part III: Auditor's declaration

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

Accreditation no. 1903

I certify that:

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

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

Signed: 

Date: 27 September 2022

Part IV: Explanatory notes

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

How to complete this form

Part I

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

Part II

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

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

Section A1

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

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

Section A2

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

Environmental management plan

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

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

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

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

Active or passive control systems

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

Auditor's comments

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

Section B

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

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

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

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

Part III

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

Where to send completed forms

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

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

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

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