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Ramboll Australia Pty Ltd
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SITE AUDIT REPORT
CONTAMINATION ASSESSMENT FOR MANLY HOSPITAL PROPOSED REDEVELOPMENT

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26 February 2021

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Ref 318000919

SITE AUDIT REPORT - CONTAMINATION ASSESSMENT FOR MANLY HOSPITAL PROPOSED REDEVELOPMENT

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 Property NSW to verify the appropriateness of an assessment of contamination completed for the site and provide an independent review by an EPA Accredited Auditor of what management remains necessary before the land is suitable for the specified future use.

This Site Audit Report is not currently required by regulation or legislation and is therefore a non-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

Rowena Salmon
EPA Accredited Site Auditor 1002

Ramboll Australia Pty Ltd
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LIST OF ABBREVIATIONS

Measures

%	per cent
µg/L	Micrograms per Litre
µg/m^3	Micrograms per Cubic Metre
ha	Hectare
km	Kilometres
m	Metre
mAHD	Metres Australian Height Datum
mbgl	Metres below ground level
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
mm	Millimetre
ppm	Parts Per Million

General

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
AHD	Australian Height Datum
ANZG	Australian & New Zealand Guidelines
ASS	Acid Sulfate Soil
AST	Aboveground Storage Tank
BaP	Benzo(a)pyrene
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes & Naphthalene
CCME	Canadian Council of Ministers of the Environment
CLM Act	NSW Contaminated Land Management Act 1997
COC	Chain of Custody
Council	Northern Beaches Council
CSM	Conceptual Site Model
DCE	1,2-dichloroethene
DEC	Department of Conservation (NSW), now EPA
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
EIL	Ecological Investigation Level
EIS	Environmental Investigation Services Pty Ltd
EMP	Environmental Management Plan
Envirolab	Envirolab Services Pty Ltd
EPA	Environment Protection Authority (NSW)
ESA	Environmental Site Assessment
ESL	Ecological Screening Level
FA	Fibrous Asbestos
FCF	Fibre-Cement Fragment
GAI	General Approval of Immobilisation
GSW	General Solid Waste
HIL	Health Investigation Level
HSL	Health Screening Level
LEP	Local Environment Plan
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Ni: Nickel, Pb: Lead, Zn: Zinc, Hg: Mercury
ML	Management Limits
MS	Matrix Spike
NATA	National Association of Testing Authorities
NC	Not Calculated
ND	Not Detected
NEPM	National Environment Protection Measure

NHMRC	National Health and Medical Research Council
NL	Non-Limiting
n	Number of Samples
OCPs	Organochlorine Pesticides
OPPs	Organophosphorus Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
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
SAC	Site Assessment Criteria
SAR	Site Audit Report
SAS	Site Audit Statement
SVOCs	Semi Volatile Organic Compounds
SWL	Standing Water Level
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalence Quotient
TPHs	Total Petroleum Hydrocarbons
TRHs	Total Recoverable Hydrocarbons
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VC	Vinyl Chloride
VCH	Volatile Chlorinated Hydrocarbons
VENM	Virgin Excavated Natural Material
VOCs	Volatile Organic Compounds
-	On tables is "not calculated", "no criteria" or "not applicable"

1. INTRODUCTION

1.1 Audit Details

A site contamination audit has been conducted in relation to the proposed redevelopment of the former Manly Hospital site at 150 Darley Road, Manly, NSW.

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

Details of the Audit are:

Requested by:	Melissa Prochazka of Property and Development NSW
Request/Commencement Date:	3 February 2020
Auditor:	Rowena Salmon
Accreditation No.:	1002

1.2 Project Background

Property and Development NSW is working with the Project Steering Advisory Committee in master planning the future development of the former Manly Hospital site to provide a community and commercial space focussed on health and wellbeing. The site use is likely to include repurposing of existing heritage buildings for commercial and ancillary retail, in addition to health services, and open space land use.

To support the development application for rezoning of the site, Property and Development NSW commissioned an audit of an assessment of contamination (environmental site assessment) at the site that was completed by Environmental Investigation Services Pty Ltd (EIS) in 2018. The primary aims of the environmental site assessment (ESA) were to *"…identify any past or present potentially contaminating activities at the site, identify the potential for site contamination, and make a preliminary assessment of the soil and groundwater contamination conditions".* The ESA also posed the question: *"Is the site suitable for the proposed development, or can the site be made suitable subject to further characterisation and/or remediation?"*

1.3 Scope of the Audit

The scope of the Audit included:

- Review of the following reports:
  - 'Report to Health Infrastructure on Environmental Site Assessment for Proposed Hospital Redevelopment at 150 Darley Road, Manly, NSW', 28 May 2018, Environmental Investigation Services Pty Ltd (EIS) (**the ESA**).
- Review of the Concept Master Plan provided on 21 December 2020 by Property and Development NSW.
- A site visit by the Auditor on 24 February 2020.
- Discussions with Property and Development NSW.

The investigation was completed prior to the Auditor's engagement and no discussion with EIS was undertaken.

2. SITE DETAILS

2.1 Location

The site details are as follows:

Street address:	150 Darley Road, Manly, NSW 2095
Identifier:	Lots 2619, 2727, 2774 and 2728 in DP 752038
Local Government:	Northern Beaches Council
Owner:	NSW Government
Site Area:	The area of the combined Lots is approximately 6.18 ha, however the redevelopment will occupy Lots 2619 and 2728 only which have an area of approximately 4.5 ha.

The site locality is shown on Attachment 1, Appendix A and the site boundaries are shown in Attachment 2, Appendix A.

The developed portion of the site occupies Lot 2619 and part of Lot 2728 with the remainder comprising bushland. The boundaries of the site are well defined to the north by Darley Road and to the northwest by the neighbouring property (St Pauls Catholic College). The southern and south-eastern Lot boundaries are not well defined as they are in bushland.

A survey plan of the site has not been provided.

2.2 Zoning

The current zoning of the developed portion of the site (Lot 2619 and part of Lot 2728) is SP2 Infrastructure while the remaining portion of Lot 2728 and Lots 2774 and 2727 are zoned E2 Environmental Conservation under the Manly Local Environment Plan (LEP) 2013.

2.3 Adjacent Uses

The site is located within an area of predominately residential land use and conservation areas near the entrance to North Head, part of the Sydney Harbour National Park. The surrounding site use includes:

North: Darley Road followed by St Patricks Estate including the seminary, residential site use, a children's hospice and the International College of Management with residential land use and the Pacific Ocean (Cabbage Tree Bay) beyond, approximately 600 m from the site.

East: Darley Road followed by residential land use and conservation areas of North Head. North Head Wastewater Treatment Plant is located approximately 500 m east.

South: Conservation area with Sydney Harbour (Spring Cove) approximately 250 m from the southern site boundary.

West: St Pauls Catholic College and residential land use beyond.

Adjoining land uses are not considered to have the potential to have caused contamination at the site. Sensitive receptors include terrestrial ecology within conservation areas and surface waters at Spring Cove located approximately 250 m south.

2.4 Site Condition

EIS (2018) include a summary of observations made during a site walkover in April 2018. At this time the site was operational as a hospital, occupied by hospital buildings with car parks in the southern and eastern portions of the site. EIS estimated the operational portion of the site to occupy 2.5 ha. It is assumed this area excluded the carpark areas and landscaped areas. The

Auditor estimates the operational portion of the site occupies 4.5 ha. The hospital layout and some (but not all) building identifiers are shown in Attachment 3, Appendix A.

Buildings

In the ESA, EIS provide details on the structure and construction of 35 site buildings. The buildings fall into the following categories:

- Buildings constructed in the early 1900's including the North Wing (Building 1) constructed circa 1890s and the Main Block (Building 2) constructed circa 1900. Both buildings are two storey brick buildings with a basement level.
- Buildings constructed in the 1950s including the former laundry building (Building 13) and the Nurses Home (Building 22), and generally constructed from brick and fibre cement walls with metal or tiled rooves.
- Buildings constructed between 1960 and 1990 (the majority of buildings) including the three storey West Wing (Building 3), the five-storey South Wing (Building 4), the Kiosk (Building 5), the old compressor room, Maternity Wing and plant room (Buildings 8 to 10), the Boiler House (Building 16), Maintenance Store, the Workshop/Engineering Office and Engineers Store (Buildings 17 to 19), the Flammable Goods Store (Building 26), the morgue (Building 27) and the Electricians Store (Building 31).

Buildings of interest from the perspective of potentially contaminating activities include:

- Former laundry building (Building 13)
- Maternity (old) compressor building (Building 8)
- Maternity plant room (Building 9)
- Boiler house (Building 16)
- Maintenance store (Building 17)
- Workshop/engineering office (Building 18)
- Engineers store (Buildings 19)
- Flammable goods store (Building 26)
- Electricians Store (Building 31).

EIS note that hazardous building materials (HBM) may be present in the existing buildings and structures but do not indicate if HBM surveys have been completed for the buildings.

Fibre-cement Fragments (FCF) were observed on the ground surface across the site and beneath existing buildings in crawl spaces. Two representative fragments (F1 and F2) were sent for analysis and were confirmed to contain asbestos.

Fuel storage

Underground storage tanks (USTs), above-ground storage tanks (ASTs) and storage of other fuels were observed at the site by EIS as noted below. The locations are shown on Attachment 4, Appendix A.

- Former Diesel UST – located on the northwest side of the laundry building (Building 13). The nature of the UST was unknown
- Former Bowser – located southwest of the laundry building (Building 13)
- Boiler UST – located beneath the southeast corner of the Nurses staffroom (Building 22)
- Boiler Room – located in the northwest corner of the laundry building (Building 13)
- Three Diesel ASTs - located in the northeast corner of car park P2

- One Diesel AST – located immediately east of the West Wing building (Building 3).

Drums/Chemicals, Waste and Fill Material

EIS report that much of the site has been cut and filled to create level building platforms. Typically, the areas of deepest fill were located on the southwest side of these platforms.

Chemicals were stored across the site in small quantities, with a larger concentration in the laundry building.

Drainage

EIS indicate that surface water would be expected to flow to on-site stormwater infrastructure and that any excess water would be expected to flow to the bushland to the southwest of the site and eventually Spring Cove (Sydney Harbour).

Auditor's Observations

The following was noted by the Auditor during the site visit on 24 February 2020:

- The site was not operational and was fenced to prevent access.
- No demolition work had been undertaken and the site layout was the same as that described by EIS.
- The site topography slopes from the site entrance on Darley Road to the south. Sandstone outcrops were observed in the eastern portion of the site.
- A concrete footing that was potentially the location of the former bowser was observed in the area indicated as the location of the 'old petrol bowser' on Attachment 4 to the south of Building 13 and to the west of the morgue (Building 27). It is unclear where the UST associated with this bowser was located.
- A substation was located to the west of the former bowser area, to the south of Building 22b.
- No UST fill points could be located in the area identified as being the location of the former diesel UST to the west of Building 13. It is not known whether the UST remains insitu.
- The location of the boiler UST could not be accessed as the location appeared to be in the under croft of Building 22 which was identified as a confined space by signage on the door.
- A concrete slab was located in the south-western portion of the site, in car park P1, where the three diesel ASTs were indicated on the site plan. The ASTs had been removed.
- A small diesel AST was still present in the north-western portion of the site, near the western end of Building 12.
- Asbestos containing material (ACM) was noted related to pipes and lagging on external building walls. ACM warning stickers were observed.

2.5 Proposed Development

It is understood that the site is to be redeveloped to provide a community and commercial space focussed on health and wellbeing, including an Adolescent and Young Adult Hospice (AYAH). The Auditor has reviewed the Concept Master Plan provided on 21 December 2020. The plan indicates that most of the site buildings are to be demolished with the exception of the following:

- Building 2 (the Main Block)
- Building 15 (the former physiotherapy building)
- Building 22 (the former nurse's home and library)
- Building 20 (Parkhill Cottage) and the building opposite which is not given a building identifier
- A portion of the façade on Building 1 (North Wing)

- Building 5 (the former kiosk).

These building are to be repurposed for commercial and ancillary retail use, in addition to health services. New buildings are to be constructed on the site of current Building 1 (North Wing) and Building 30 (East Wing) and to the east and south of Building 2. The AYAH is to be situated in the south-eastern portion of the site in the current location of car park P5 and Building 35. The undeveloped areas of the site are to remain undeveloped. Gardens and landscaped areas are proposed around buildings. The southern portion of the site is to be retained for use for car parking and open space.

Property and Development NSW have indicated that the planning proposal for the site aims to expand the range of permitted uses for the site under Schedule 1 of the Manly LEP, whilst maintaining the primary role of the site as a health services facility. The planning proposal seeks to introduce additional permitted uses at the site including the following: a group home, community facility, educational establishment, food and drink premises, centre-based child care facility, indoor recreational facility, neighbourhood shop, function centre and seniors housing.

The 'residential with gardens/accessible soils' exposure scenario has been adopted for the audit as the most sensitive of the proposed land uses.

3. SITE HISTORY

EIS provided a summary of the site history based on aerial photographs dating from 1943, NSW EPA records, SafeWork NSW dangerous goods records, Certificates of Title and a search of historical business directories. EIS summarised the site history as shown in Table 3.1.

Table 3.1: Site History

Date	Activity
Pre-1907	Bushland
1907-1986	Crown land progressively developed as a hospital
1986-2018	Operated as Manly Hospital and owned by Health Services since 1986

The summary indicates that the main historical use of the site was as a hospital. The aerial photographs indicate that the main hospital building and the north wing building were present in the northern portion of the site in 1943 as well as two smaller buildings in the south-western portion of the site. The hospital was progressively developed between the 1950s and 1970s into the south and south-western portions of the site. The hospital ceased operation in October 2018.

EIS reported that there were no records for the site under Section 58 of the CLM Act but that there was one record for a property nearby being the former gasworks located approximately 400 m west of the site (down gradient). The site had not been notified with regards to the Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act. There were two notified properties nearby. These include St Patrick's Estate, located to the north of the site, and the former gasworks, located approximately 400 m west of the site.

EIS reported that there were no records for licenced activities at the site under the *Protection of the Environment Operations Act 1997*. A current license was identified for a sewage treatment plant, located approximately 390 m east of the site, however this activity was considered unlikely to pose a contamination risk to the site. No sites were identified nearby the site that are part of the EPA per- and poly-fluoroalkyl substances (PFAS) investigation program.

3.1 Auditor's Opinion

In the Auditor's opinion, the site history provides an adequate indication of past activities based on reliable sources and the Auditor considers that the site history is broadly understood. Given that development of the site appears to have occurred progressively through the 1950s to the 1970s, progressive importation of fill material is likely to have occurred to level the site. Filling of the southernmost portion of the site appears to have been completed between 1970 and 1982. There appears to be little potential for surrounding land uses to have contaminated the site.

4. CONTAMINANTS OF CONCERN

Based on a review of the site history and the site layout, EIS identified potential contamination sources and areas of environmental concern (AECs) and associated contaminants of potential concern. These have been tabulated in Table 4.1.

Table 4.1: Contaminants of Concern

Source/AEC	Potential Contaminants
Fill material – The site appears to have been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) Petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs) Benzene, toluene, ethylbenzene and xylene (BTEX) Polycyclic aromatic hydrocarbons (PAHs) Organochlorine and organophosphate pesticides (OCPs/OPPS) Polychlorinated biphenyls (PCBs) Asbestos
Fuel storage – At least two USTs were identified at the site. EIS report that the USTs may have been used to store diesel and heating oil (kerosene). Four ASTs were identified at the site that were used to store diesel for generators. One fuel bowser was identified at the site.	Lead, TRH, BTEX and PAHs.
Laundry and Engineering Workshop – The site included a laundry building with an internal boiler room and an engineering workshop. Fuels, oils and solvents may have been used in and around these buildings during this site use.	Heavy metals, TRH, naphthalene, BTEX and Volatile Organic Compounds (VOCs).
Use of pesticides – Pesticides may have been used beneath the buildings and/or around the site.	Heavy metals and OCPs.
Hazardous Building Material – Hazardous building materials may be present as a result of former building and demolition activities. These materials are also present in the existing buildings/ structures on site. FCF were observed on the ground surface across the site.	Asbestos, lead and PCBs.

EIS note that they did not include herbicides as a contaminant of concern as herbicides are not commonly found at residual concentrations likely to pose a risk to human health or the environment (NSW DEC (2005) *Guidelines for Assessing Former Orchards and Market Gardens*).

4.1 Auditor's Opinion

The Auditor considers that the analyte list used by EIS adequately reflects the site history and condition. There has been no assessment by the consultant for the presence of PFAS but in the Auditor's opinion there are no indications in the site history that they would be potential contaminants of concern.

5. STRATIGRAPHY AND HYDROGEOLOGY

5.1 Stratigraphy

EIS reviewed geological maps and reported that the site is underlain by Hawkesbury Sandstone, which typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses.

EIS undertook 61 boreholes across the site during the ESA as shown on Attachment 4, Appendix A. The sub-surface profile of the site encountered during the investigation is included in Table 5.1.

Table 5.1: Stratigraphy

Unit	Subsurface Profile
Surface cover	Asphaltic concrete pavement, approximately 30 mm to 50 mm thick, was encountered at the surface in the majority of locations. Concrete pavement, approximately 100 mm to 140 mm thick, was encountered at the surface in BH18, BH19, BH29 and BH30.
Fill	Fill was encountered at the surface or beneath the pavement in all boreholes and extended to depths of between 0.2 m to >7.3 m. BH55 to BH61 were terminated in the fill at a maximum depth of approximately 1.2 m. The borehole logs indicate that the fill typically comprised silty, gravelly sand, silty sand or silty clay. The fill was typically shallow in the northern portion of the site (0.2 to <1.0 m thick) becoming deeper towards the south. The maximum depth of fill reported was >7.3 metres below ground level (mbgl) in BH28 located in the southern portion of the site. Boreholes surrounding BH28 indicated fill to depths of between 1.2 and 3.0 mbgl. The fill contained inclusions of sandstone and igneous gravel. Fill in 12 of the 61 locations was reported to include anthropogenic inclusions (BH3, BH14, BH28, BH32, BH38, BH39, BH48, BH56, BH58, BH59, BH60 and BH61). These comprised inert material including fragments of glass, brick, concrete and timber. Trace fragments of slag were encountered in the fill in BH48. Ash was encountered in the fill in BH56.
Natural soil	Silty sand, silty clay and sandy clay were encountered beneath the fill in BH3, BH8, BH11, BH21, BH25 and BH27. The natural soil was typically yellow-brown or grey and extended to depths of approximately 1.3 m to 2.4 m overlying bedrock.
Bedrock	Sandstone bedrock was reported beneath the fill or natural soil at depths of between 0.2 mbgl in the northern portion of the site and 5.4 mbgl in BH39 in the south-western portion of the site. Sandstone bedrock was not encountered within a depth of 7.3 mbgl at BH28 in the south.

The fill material across the site appears to be relatively consistent, comprising gravelly, silty or clayey sand. Anthropogenic inclusions were limited in extent and where encountered generally comprised brick, concrete, timber and glass fragments. Traces of slag material were noted in fill at one location, BH48, in the southern portion of the site where fill was present to a depth of 3.0 m and ash was noted in fill at location BH56, located near the boiler UST.

The thickness of fill material increases towards the south. The thickest fill encountered was >7.3 m and was detected at location BH28 in the south-eastern portion near the old petrol bowser. Surrounding boreholes contained fill to depths of between 1.2 and 3.0 mbgl overlying bedrock, hence the depth of fill at BH28 is localised.

EIS reported that the site is not located in an acid sulfate soil (ASS) risk area according to the risk maps prepared by the Department of Land and Water Conservation.

5.2 Hydrogeology

EIS undertook a search for registered bores in 2018. No registered bores were located within a 500 m radius of the site. The nearest registered bore was reported to be located approximately 515 m from the site and utilised for recreational purposes. The Auditor completed a check of

registered bores in April 2020 which indicated that there were no registered bores within 500 m of the site.

Based on local topography, groundwater was anticipated by EIS to flow to the southwest. The closest surface water receptor is Spring Cove located approximately 250 m southwest.

EIS installed five groundwater monitoring wells (BH9/MW9, BH13/MW13, BH19/MW19, BH35/MW35 and BH44/MW44) as shown on Attachment 4, Appendix A. Well construction details are included in Table 5.2.

Table 5.2: Groundwater Monitoring Well Network

Borehole	Depth (mbgl)	Screened interval (mbgl)	Standing Water Level (SWL) April 2018 (mbgl)
BH9/MW9	2.7	1.7-2.7	Dry
BH13/MW13	2.7	1.7-2.7	Dry
BH19/MW19	3.2	2.2-3.2	1.82
BH35/MW35	2.2	0.12-2.2	Dry
BH44/MW44	2.2	1.2-2.2	Dry

EIS reported that groundwater seepage was encountered at the fill/bedrock interface in BH7 and BH48 and at the clay/sand fill interface in BH19 during drilling for the ESA. The seepage was considered likely to be small quantities of perched water at the interface of permeable and less permeable strata as all boreholes, except BH19/MW19, remained dry on completion of drilling. The SWL measured in MW19 on 30 April 2018 was 1.82 mbgl.

5.3 Auditor's Opinion

The Auditor considers that the site stratigraphy is sufficiently well known for the purpose of this review. The depth of fill and underlying stratigraphy have been adequately characterised in the accessible portions of the site, however, subsurface conditions below building footprints are still unknown.

The descriptions of the fill material provided in the borehole logs for the 61 sample locations indicate the fill material is relatively consistent with minor anthropogenic inclusions reported, however, sample locations were completed through the use of a drill rig and auger, and hence there has been little opportunity for detailed visual assessment of the fill material.

The heterogeneity and extent of fill material has the greatest potential to impact the remediation of the site. Further investigation to characterise fill material is not considered necessary prior to demolition given the access restrictions due to site infrastructure and limitations of borehole investigations.

The groundwater investigation completed by EIS indicates that permanent shallow groundwater is not present within fill material and that extraction of groundwater for beneficial use is not likely to occur. Given that significant soil contamination has not been identified (see Section 8), the Auditor is satisfied that further intrusive assessment of groundwater is not required at the site except potentially in the vicinity of the laundry building, in the vicinity of USTs depending on the conditions encountered during UST removal and associated with unexpected finds during the redevelopment.

6. EVALUATION OF QUALITY ASSURANCE AND QUALITY CONTROL

The Auditor has assessed the overall quality of the data by review of the information presented in the ESA. A summary of the investigation data is provided in Table 6.1.

Table 6.1: Summary of Investigation Data

Stage of Works	Field Data	Analytical Data
ESA *Fieldwork date: April 2018*	61 boreholes (BH1-BH61) completed with a drill rig and soil samples collected from 52 locations. Five boreholes converted to monitoring wells (MW9, MW13, MW19, MW35 and MW44). One groundwater sample collected from MW19. Analysis of two FCF (F1 and F2) for asbestos.	*Soil:* 75 x Metals, PAH and TRH/BTEX and asbestos (presence/absence) 32 x PCBs, OCPs 18 x Toxicity Characteristic Leaching Procedure (TCLP) analysis for metals and/or PAH. 2 x FCF analysis for asbestos. *Groundwater:* 1 x Metals, TRH/BTEX, PAHs and VOCs.

The Auditor's assessment of data quality follows in Tables 6.2 and 6.3.

Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Data Quality Objectives (DQO) EIS defined specific DQOs in accordance with the seven-step process outlined in Schedule B2 of NEPM (2013). The following decisions for the ESA were identified in the DQOs: • Did the site inspection, or does the historical information identify potential contamination sources/AEC at the site? • Are any results above the Site Assessment Criteria (SAC)? • Do potential risks associated with contamination exist, and if so, what are they? • Is remediation required? • Is the site characterisation sufficient to provide adequate confidence in the above decisions? • Is the site suitable for the proposed development, or can the site be made suitable subject to further characterisation and/or remediation?	The identified DQOs were considered appropriate for the investigations conducted.
Sampling pattern and locations *Soil:* 61 soil investigation locations were spaced to gain coverage of the majority of the site excluding the densely vegetated area to the south and building footprints. The sample locations targeted potential point sources of contamination including USTs and ASTs and included site coverage to characterise fill material with a greater density in the southern portion of the site where fill is deepest. Most of the samples submitted for analysis were fill material, with only four samples of natural soil submitted for analysis for contaminants. *Groundwater:* Three monitoring wells were located on the down gradient (southern) site boundary (MW44, MW13 and MW9) and were dry. One well was located down gradient of the former diesel UST adjacent to the laundry (MW19) and one well was located on the upgradient, northern site boundary (MW35, dry).	In the Auditor's opinion these investigation locations adequately target the main areas of concern within the accessible portions of the site. A well was located down gradient of the diesel UST (MW19) but a well was not able to be placed near the boiler UST due to site access constraints. A well was placed around 20 m downgradient of the old petrol bowser. This position is close enough to have identified any major groundwater impact from a former UST in the area however this well was dry (2.7 m total depth). Further assessment of groundwater should be considered during remediation of the primary source areas including USTs and the laundry. No sampling was completed below building footprints or within vegetated areas.

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Sampling density *Soil:* EIS report that soil samples were analysed from 52 of the 61 sample locations completed across an area of 2.5 ha. This area is assumed to comprise the area outside of building footprints and car park areas. The area of the site including buildings is estimated to be 4.5 ha, while the larger site, including bushland, is 6.18 ha. The sampling density is equivalent to the minimum recommended by EPA (1995) *Sampling Design Guidelines* for a site of 4.5 ha although samples were targeted to areas outside of building footprints. 71 fill samples and 4 natural soil samples were analysed for the main contaminants of concern being TRH/BTEX, metals, PAH and asbestos. 29 fill samples and three natural soil samples were analysed for PCBs and OCPs. *Groundwater*: Groundwater was present in only one of the five monitoring wells installed, MW19 located down gradient of the diesel UST. This sample was analysed for TRH/BTEX, metals, PAH and VOCs.	In the Auditor's opinion the sampling density was adequate for the current stage of assessment. Samples of fill and natural soil were not analysed for VOCs. This is considered acceptable given that groundwater samples were analysed for VOCs and the results of soil samples are generally not representative. Further assessment for VOCs in groundwater and/or soil vapour is recommended in the vicinity of the laundry.
Sample depths Soil samples were collected and analysed from a range of depths, primarily within the shallow fill at the surface or immediately below pavement, occasionally with a second fill sample from 0.5-0.95 mbgl. The maximum depth of investigation was 7.3 mbgl and the maximum depth of sampling was 7.0-7.3 mbgl.	In the Auditor's opinion, this sampling strategy was acceptable and adequate to characterise the primary material types present on site for the current stage of assessment.
Well construction The five groundwater monitoring wells were typically installed to depths of 2.0 to 3.0 mbgl (refer Table 5.2), with screen intervals of one metre within fill and natural clay. Wells were constructed of 50 mm uPVC. A bentonite seal of 0.1-2.0 m thickness was placed above the screen to the ground surface. The SWL recorded in MW19 was above the screened interval.	In the Auditor's opinion the well construction was generally acceptable for an initial investigation. The SWL was above the screened interval in MW19, which could prevent the detection of any free phase hydrocarbon contamination, however, no dissolved phase hydrocarbon contamination was detected in the groundwater sample to indicate that free phase is likely.
Sample collection method *Soil*: Samples were reported to have been collected using a hand auger or drill rig equipped with spiral flight augers and soils sampled from a standard penetration test (SPT) split spoon sampler or directly from the auger when the SPT sampler could not be used. Analysis of asbestos in soils was completed for presence/absence. Laboratory reports indicate sample sizes were between 5 g and 95 g and that some samples were subsampled from the provided jar while others were provided in a separate container. *Groundwater*: Wells were developed with a submersible electric pump. All wells were dry except MW19. A sample was collected from MW19 13 days after development using a disposable bailer.	Overall the sample collection method was found to be acceptable for most contaminants of concern. It is noted that to obtain sufficient sample for analysis from the auger or SPT sampler, sample intervals for some samples were up to 0.5 m thick. The sample sizes analysed for asbestos in soil were small for several samples, however, the volume of analysis completed for fill across the site (71 samples) and field observations are additional lines of evidence that suggest asbestos is not widespread in fill at the site and the occurrence of asbestos appears to be confined to ACM at the surface. However, the limitation of borehole sampling for observation of ACM within fill is noted and therefore ACM impacts in fill cannot be ruled out.
Decontamination procedures *Soil:* Reusable sampling equipment was reported to have been decontaminated in accordance with the EIS Standard Sampling Procedure which specifies that equipment be cleaned with detergent and tap water between sampling events to prevent cross contamination. New gloves were reportedly used for each new sample. Decontamination of augers between locations was not explicitly reported.	Acceptable.

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Groundwater: Only one well was sampled. New gloves were reportedly used.	
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. It was not reported by EIS if the groundwater sample for metals analysis was field filtered. The metals concentrations reported may therefore be over- or under-estimated depending on the groundwater pH.	Acceptable.
Chain of Custody (COC) Completed COC forms were provided in the report.	Acceptable.
Detailed description of field screening protocols *Soil:* Field screening for volatiles was undertaken using a Photoionisation Detector (PID). Soil sub-samples were placed in ziplock plastic bags and the headspace measured for VOCs after allowing time for equilibration. The highest recorded reading was 34 ppm for the sample collected from BH20 at 0.5-0.95 mbgl. No odour of staining was noted in soils at this location and concentrations of volatile contaminants were not detected above the laboratory practical quantitation limit (PQL) in the analysed soil sample from this depth. All other samples recorded PID readings of 1 ppm or less. *Groundwater:* Field parameters were measured during well sampling and development.	Acceptable.
Calibration of field equipment The ESA indicated that calibration of the PID and water quality meter had been undertaken prior to use and checks were performed during use. Calibration certificates for the equipment were not provided.	Calibration certificates were not provided for the PID or water quality meter. Given the low detections of contaminants in soil and groundwater this is not considered to affect the interpretation of the data.
Sampling logs Soil borehole logs are provided within the report, indicating sample depth and lithology and well construction details. Groundwater field sampling records were provided for MW19, indicating SWL, field parameters, methodology and observations.	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 including trip blanks, trip spikes, rinsate blanks, field intra-laboratory and inter-laboratory duplicates were undertaken for soil. Intra-laboratory soil duplicates were analysed at a frequency of approximately 10% of primary samples and inter-laboratory duplicates at 5% of primary samples. For groundwater, a trip blank and an intra-laboratory duplicate were undertaken. A rinsate blank was not required as dedicated sampling equipment was used during sampling.	Acceptable.
Field quality control results The results of field quality control samples were generally within appropriate limits. The following exceptions were noted for soil: • Elevated relative percent difference calculations (RPDs) were reported for several PAH compounds and TRH F4 in	Overall, in the context of the dataset reported, the elevated RPDs are not considered significant and the field quality control results are acceptable.

Field and Lab QA/QC	Auditor's Opinion
the Dup TC7 sample. The results were all less than the SAC • Elevated RPDs were reported for chromium in the Dup TC6 and Dup TC7 samples. The results were less than the SAC • Elevated RPDs were reported for several PAH compounds and TRH F3 in the Dup TC2 sample. The results were all less than the SAC • Elevated RPDs were reported for chromium in the Dup TC3 sample. The results were less than the SAC • Elevated RPDs were reported for benzo(a)pyrene in the Dup TC4 sample. The results were all less than the SAC. EIS attributed the exceedances to sample heterogeneity. The highest result has been used in the data assessment. The water trip blank collected during the groundwater sampling event contained concentrations of TRH F1 of 39 µ/L. EIS indicate that the detection is attributable to trihalomethanes in tap water which was used for the trip blank.	
NATA registered laboratory and NATA endorsed methods Laboratories used included Envirolab in Chatswood NSW as the primary laboratory and Envirolab in Scoresby Victoria as the secondary laboratory. The laboratories were NATA accredited.	Acceptable
Analytical methods Analytical methods were included in the laboratory test certificates. Envirolab provided brief method summaries of in-house NATA accredited methods used. Asbestos identification was conducted by Envirolab using polarised light microscopy with dispersion staining by method AS4964-2004 *Method for the Qualitative Identification of Asbestos Bulk Samples*.	The analytical methods are considered acceptable for the purposes of the site audit, noting that the AS4964-2004 is currently the only NATA approved method 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 were met. EIS also reported that holding times were met.	Acceptable
Practical Quantitation Limits (PQLs) *Soil (except asbestos):* PQLs were less than the threshold criteria for the contaminants of concern. *Asbestos:* The NATA approved limit of detection for asbestos in soil was 0.01% w/w (0.1 g/kg). *Groundwater:* The PQLs were greater than the assessment criteria for the following: • Anthracene 0.1 µg/L, assessment criteria 0.01 µg/L • Benzo(a)pyrene 0.5 µg/L, assessment criteria 0.01 µg/L • Vinyl Chloride 10 µg/L, assessment criteria 0.3 µg/L	*Soil (except asbestos):* Overall the soil PQLs are acceptable. *Asbestos:* The detection limit for asbestos is considered acceptable for initial site characterisation. *Groundwater*: The elevated PQLs were considered in the context of the results reported and these discrepancies do not materially affect the outcome of the audit.
Laboratory quality control samples Laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks, internal standards and duplicates were undertaken by the laboratory.	Acceptable.
Laboratory quality control results The results of laboratory quality control samples were generally within appropriate limits, with the following exceptions: • The laboratory RPD acceptance criteria was exceeded for nickel and for copper. • The PQL for PAH, PCBs and OCPs in soil was raised for two samples (BH48 0.5-0.95 m and BH56 0.0-0.1 m) due to matrix interference.	In the context of the dataset reported, the elevated RPDs are not considered significant and the laboratory quality control results are acceptable. Raised PQLs were below adopted assessment criteria.

Field and Lab QA/QC	Auditor's Opinion
Data Quality Indicators (DQI) and Data Evaluation (completeness, comparability, representativeness, precision, accuracy) Predetermined data quality indicators (DQIs) were set for laboratory analyses including blanks, replicates, duplicates, laboratory control samples, matrix spikes, surrogate spikes and method blanks. EIS undertook a 'Data (QA/QC) Evaluation' within the ESA and concluded that *"the data are adequately precise, accurate, representative, comparable and complete to serve as a basis for interpretation to achieve the investigation objectives"*.	An assessment of the 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:

- Data is likely to be broadly representative of the fill encountered on the site, however, no sampling beneath building footprints has been completed. The limitation of borehole drilling for the identification of ACM in fill is noted. Limited assessment of groundwater quality has been achieved by the investigations conducted to date. Further assessment of the potential for groundwater contamination is required in the vicinity of potential groundwater contamination source areas.
- The data is complete.
- There is a high degree of confidence that data is comparable given only one sampling event was undertaken for soil and groundwater.
- The primary laboratory provided 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. Based on the proposed development for health care facilities, retail and open space, the human health criteria for 'residential with gardens and accessible soils' and ecological criteria appropriate for 'urban residential and public open space' 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 with gardens/accessible soils' (HIL A) land use.
- NEPM (2013) Health Screening Levels (HSLs) for 'Low-High Density Residential' (HSL A & B) land use. The HSLs assumed a sand soil type. Depth to source adopted was <1 m as an initial screen.
- NEPM (2013) Management Limits (MLs) for petroleum hydrocarbons for 'Residential and Open Space' land use and assuming coarse soil texture. Criteria are relevant for operating sites where significant sub-surface leakage of petroleum hydrocarbons has occurred and when decommissioning industrial and commercial sites.
- Given presence/absence analysis was performed for asbestos, a criterion of "no asbestos detected" was adopted.

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, the published range of the added contaminant limits (ACL) have been applied as an initial screen.
- 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 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. Consideration of drinking water criteria is also protection of recreational users.
- WHO (2017) Guidelines for Drinking-water Quality, Fourth Edition, incorporating the 1st addendum for trichloroethene (TCE).

7.2.2 Ecological Assessment Criteria

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

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

7.3 Auditor's Opinion

The environmental quality criteria referenced by the Auditor are consistent with the SAC adopted by EIS with the exception of the following:

- EIS adopted human health criteria for the 'residential with minimal access to soils' exposure scenario (HIL B). The Auditor has screened against the more conservative HIL A criteria as there is the potential for future site use to include sensitive land uses such as a childcare facility, group home and seniors housing.
- Where exceedances of the soil HSLs were reported for hydrocarbons (TRH/BTEX and naphthalene), the soil health screening levels for direct contact presented in the CRC Care Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document (2011) were considered by EIS. The NEPM (2013) MLs adopted by the Auditor are considered more conservative than the direct contact criteria.
- EIS adopted human health assessment criteria for groundwater for TRH from the World Health Organisation (WHO) document titled Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality (2008) for petroleum hydrocarbons and the USEPA Region 9 screening levels for naphthalene (threshold value for tap water). The Auditor used the NEPM HSLs for screening of these contaminants as extraction of shallow groundwater for potable use is not considered a likely exposure scenario. The ADWG drinking water criteria were used by the Auditor as a screening level for some contaminants where HSLs were not available.

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

8. EVALUATION OF SOIL RESULTS

8.1 Field Results

EIS report that FCF were observed on the ground surface across the site and beneath existing buildings in crawl spaces. Two representative fragments were collected (F1 and F2) and submitted for laboratory analysis. Sample F1 was confirmed to contain chrysotile and sample F2 to contain chrysotile, amosite and crocidolite asbestos.

EIS report that trace slag was encountered in the fill in BH48 at a depth from below the concrete to 0.2 mbgl. The fill sample analysed from this location was from a depth of 0.5-0.95 mbgl and hence may have been from below the slag layer. BH48 is located in the southern portion of the site and fill was present to a depth of 3.0 m. Ash was encountered in the fill in BH56 from surface to 1.0 m bgl. BH56 is located near the boiler UST, also towards the south of the site. Two fill samples from this location were analysed. Concrete and/or timber fragments were encountered in the fill in BH58 to BH61 in the southwest portion of the site. EIS reported hydrocarbon odours in BH7 within fill to 0.6 mbgl and in BH56 within fill to 1.0 mbgl. BH7 is located within a carpark to the east of Building 13. Soil samples from these locations were analysed for TRH and BTEX. The results for BH7 indicated that concentrations of hydrocarbons were below the laboratory PQL but elevated hydrocarbon concentrations were detected in borehole BH56 in the $>C_{10}$-C_{40} range in the sample from surface to 0.1 m bgl.

Field screening for volatile contaminants using a PID indicated that an elevated reading above 1 ppm was reported at one location, being BH20 with a maximum reading of 34 ppm at a depth of 0.5-0.9 m bgl in sandstone. BH20 is located in the approximate centre of the site, south of Building 15. Analysis of a soil sample from this location for TRH and BTEX indicated that concentrations were below the laboratory PQL.

8.2 Analytical Results

Soil samples were analysed for a variety of contaminants including petroleum hydrocarbons, PAHs, asbestos and heavy metals. Most of the samples analysed were from the fill and these results have been assessed against the environmental quality criteria and are summarised in Table 8.1.

Four samples of natural soil were analysed for contaminants of concern and these results have been assessed against the environmental quality criteria and are summarised in Table 8.2.

Soil sampling locations are shown as Attachment 4, Appendix A.

Table 8.1: Evaluation of Soil Analytical Results for Fill – Summary Table

Analyte	n	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Asbestos in soil	71	0	-	0 above 0.1 g/kg	-
Asbestos in material (FCF)	2	2	-	Chrysotile asbestos detected in both FCF samples and amosite and crocidolite in one sample	-
Benzene	71	0	<0.2	0 above HSL A&B 0-1 m, sand 0.5 mg/kg	0 above ESL (urban residential) (coarse) 50 mg/kg
Toluene	71	0	<0.5	0 above HSL A&B 0-1 m, sand 160 mg/kg	0 above ESL (urban residential) (coarse) 85 mg/kg

Analyte	n	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Ethylbenzene	71	0	<1	0 above HSL A&B 0-1 m, sand 55 mg/kg	0 above ESL (urban residential) (coarse) 70 mg/kg
Total Xylenes	71	0	<3	0 above HSL A&B 0-1 m, sand 40 mg/kg	0 above ESL (urban residential) (coarse) 105 mg/kg
F1 (TRH C_6–C_{10} minus BTEX)	71	0	<25	0 above HSL A&B 0-1 m, sand 45 mg/kg	0 above ESL (urban residential) 180 mg/kg
F2 (TRH >C_{10}–C_{16} minus naphthalene)	71	2	**240**	**1 above HSL A&B 0-1 m, sand 110 mg/kg BH48 0.5-0.9 m bgl**	-
TRH >C_{10}–C_{16}	71	2	**240**	0 above ML (urban residential) 1,000 mg/kg	**1 above ESL (urban residential) 120 mg/kg**
TRH >C_{16}-C_{34}	71	11	**4,800**	**2 above ML (urban residential) (coarse) 2,500 mg/kg BH48 0.5-0.9 m bgl BH56 0.0-0.1 m bgl**	**3 above ESL (urban residential) (coarse) 300 mg/kg**
TRH >C_{34}-C_{40}	71	9	960	0 above ML (urban residential) 10,000 mg/kg	0 above ESL (urban residential) (coarse) 2,800 mg/kg
Naphthalene	71	1	0.2	0 above HSL A&B 0-1 m, sand 3 mg/kg	0 above EIL (urban residential) 170 mg/kg
Benzo(a)pyrene	71	26	**22**	-	**1 above CCME SQG (residential) 20 mg/kg**
Benzo(a)pyrene Toxic Equivalence Quotient (TEQ)	71	11	**31**	**3 above HIL A 3 mg/kg BH23 0.5-0.9 m bgl BH48 0.5-0.9 m bgl BH56 0.0-0.1 m bgl**	-
Total PAHs	71	35	160	0 above HIL A 300 mg/kg	-
Arsenic	71	5	9	0 above HIL A 100 mg/kg	0 above EIL (urban residential) 100 mg/kg
Cadmium	71	1	0.5	0 above HIL A 20 mg/kg	-
Chromium	71	71	96	0 above HIL A 100 mg/kg	0 above most conservative ACL (urban residential) 190 mg/kg
Copper	71	71	**180**	0 above HIL A 6,000 mg/kg	**4 above most conservative ACL (urban residential) 60 mg/kg**
Lead	71	71	100	0 above HIL A 300 mg/kg	0 above generic ACL (urban residential) 1100 mg/kg
Mercury	71	9	0.4	0 above HIL A 40 mg/kg	-

Analyte	n	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Nickel	71	68	**150**	0 above HIL A 400 mg/kg	**21 above most conservative ACL (urban residential) 30 mg/kg**
Zinc	71	71	**150**	0 above HIL A 7,400 mg/kg	**10 above most conservative ACL (urban residential) 70 mg/kg**
PCB	29	0	<0.1	0 above HIL A 1 mg/kg	-
OCP	29	0	<PQL	0 above HIL A	0 above EIL
OPP	29	0	<PQL	0 above HIL A	-

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

Table 8.2: Evaluation of Soil Analytical Results for Natural Soil – Summary Table

Analyte	n	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Asbestos in soil	4	0	-	0 above 0.1 g/kg	
Benzene	4	0	<0.2	0 above HSL A&B 0-1 m, sand 0.5 mg/kg	0 above ESL (urban residential) (coarse) 50 mg/kg
Toluene	4	0	<0.5	0 above HSL A&B 0-1 m, sand 160 mg/kg	0 above ESL (urban residential) (coarse) 85 mg/kg
Ethylbenzene	4	0	<1	0 above HSL A&B 0-1 m, sand 55 mg/kg	0 above ESL (urban residential) (coarse) 70 mg/kg
Total Xylenes	4	0	<3	0 above HSL A&B 0-1 m, sand 40 mg/kg	0 above ESL (urban residential) (coarse) 105 mg/kg
F1 (TRH C_6–C_{10} minus BTEX)	4	0	<25	0 above HSL A&B 0-1 m, sand 45 mg/kg	0 above ESL (urban residential) 180 mg/kg
F2 (TRH >C_{10}–C_{16} minus naphthalene)	4	0	<50	0 above HSL A&B 0-1 m, sand 110 mg/kg	-
TRH >C_{16}-C_{34}	4	0	<100	0 above ML (urban residential) (coarse) 2,500 mg/kg	0 above ESL (urban residential) (coarse) 300 mg/kg
TRH >C_{34}-C_{40}	4	0	<100	0 above ML (urban residential) 10,000 mg/kg	0 above ESL (urban residential) (coarse) 2,800 mg/kg
Naphthalene	4	0	<0.1	0 above HSL A&B 0-1 m, sand 3 mg/kg	0 above EIL (urban residential) 170 mg/kg
Benzo(a)pyrene	4	1	0.5	-	0 above CCME SQG (residential) 20 mg/kg
Benzo(a)pyrene TEQ	4	1	0.7	0 above HIL A 3 mg/kg	-

Analyte	n	Detections	Maximum (mg/kg)	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Total PAHs	4	1	5.3	0 above HIL A 300 mg/kg	-
Arsenic	4	2	8	0 above HIL A 100 mg/kg	0 above EIL (urban residential) 100 mg/kg
Cadmium	4	1	0.7	0 above HIL A 20 mg/kg	-
Chromium	4	4	20	0 above HIL A 100 mg/kg	0 above most conservative ACL (urban residential) 190 mg/kg
Copper	4	4	57	0 above HIL A 6,000 mg/kg	0 above most conservative ACL (urban residential) 60 mg/kg
Lead	4	4	83	0 above HIL A 300 mg/kg	0 above generic ACL (urban residential) 1100 mg/kg
Mercury	4	0	<0.1	0 above HIL A 40 mg/kg	-
Nickel	4	4	9	0 above HIL A 400 mg/kg	0 above most conservative ACL (urban residential) 30 mg/kg
Zinc	4	4	**130**	0 above HIL A 7,400 mg/kg	**2 above most conservative ACL (urban residential) 70 mg/kg**
PCB	4	0	<0.1	0 above HIL A 1 mg/kg	-
OCP	4	0	<PQL	0 above HIL A	0 above EIL
OPP	4	0	<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:

- The main contaminants of concern detected in fill were TRH in the C_{10}-C_{40} fraction and PAHs. These are typical contaminants associated with fill containing ash and slag and asphalt or bitumen and have relatively low mobility in the environment. Where detected, concentrations were generally below the criteria for protection of human health. The exceptions were at location BH48 at a depth of 0.5-0.95 mbgl where concentrations of TRH F2, TRH F3 and benzo(a)pyrene (BaP) toxic equivalence quotient (TEQ) exceeded the human health criteria, at location BH56 at a depth of 0.0-0.1 mbgl where TRH F3 and BaP TEQ exceeded human health criteria and at BH23 at a depth of 0.5-0.95 mbgl where BaP TEQ was detected above the assessment criteria. The fill material at BH48 is described as containing traces of slag and at BH56 as containing ash. Both locations are in the central southern portion of the site where the greatest depth of fill was identified. Fill in BH23 was not reported to contain slag, ash or anthropogenic inclusions. This borehole was in the south-western portion of the site in an area of deep fill (<1.5 m). Concentrations of TRH C_{10}-C_{40} and BaP exceeded ESLs at one or more of these locations. The TRH and BaP impacts detected in the fill sample from BH56 were delineated vertically by a fill sample collected from 0.8-0.9 mbgl at this location which did not contain concentrations above the PQL.

- Concentrations of metals were below human health assessment criteria. Elevated concentrations of copper, nickel and zinc were detected in some fill samples at concentrations that exceeded the conservative ecological protection criteria. Concentrations of zinc in fill were in a similar range to those detected in natural soils. Concentrations of nickel and copper were more elevated in fill compared to natural soils. EIS concluded that the ecological guidelines were used as a conservative screening tool only and that the exceedances by some metal concentrations were not considered to have an impact on the suitability of the site for redevelopment. They do note that *"In the event gardens and/or landscaped areas are proposed, further consideration of these assessment criteria may be warranted".*
- Analysis of 71 small volume soil samples for asbestos was completed and no asbestos was detected.
- EIS assessed the waste classification of the fill materials. Based on the presence of slag and ash in the fill, EIS applied the General Approvals of Immobilisation (GAIs) 1995/05 and 2009/07 for ash contaminated soils and metallurgical furnace slag and completed TCLP analysis for BaP and Nickel. TCLP analysis for BaP was completed on six fill samples (including the samples from BH48 and BH56) and concentrations of BaP in leachate from all six samples were below the PQL. TCLP analysis was completed for nickel on 18 fill samples and the leachate analysis reported concentrations of nickel between 0.03 and 0.3 mg/L. Based on the TCLP results the fill was classified as General Solid Waste (non-putrescible) under the GAIs. EIS note that fragments of ACM had been detected on the ground surface and that prior to any excavation, the ACM fragments should be removed, and a clearance certificate provided.
- EIS indicated that the natural soils and bedrock were likely to be classified as virgin excavated natural material (VENM) for off-site disposal or reuse but that additional analysis would be required to confirm this, especially in areas where there was a potential for contamination from storage of fuels and chemicals.

8.3 Auditor's Opinion

In the Auditor's opinion, the soil analytical results are consistent with the site history and field observations. The results indicate that, generally, the fill material presents a low risk to human health and the environment but that localised areas of TRH and PAH contamination related to ash or slag in fill may be present at concentrations above the human health criteria for residential use with garden/accessible soil. While 71 soil samples have been analysed for asbestos and no detections were reported, the small volumes of the analysed samples (between 5 and 95 g) and the sampling method via borehole, limiting visual assessment of the subsurface, means there is some uncertainty with regards to the ability of the sampling strategy to detect areas of asbestos in soil. In addition, sampling beneath building footprints has not been completed. There is the possibility, therefore, that there may be areas where ACM is present in fill materials and this should be considered during the redevelopment as discussed in Section 11.

The ecological risk associated with the fill material is considered to be low based on the current data set and the proposed redevelopment which is likely to require importation of growing medium for construction of open areas and garden beds.

The aesthetics of the fill material will need to be considered when redeveloping the site as discussed in Section 11.

9. EVALUATION OF GROUNDWATER RESULTS

9.1 Field Results

Only one of the five wells installed contained groundwater for sampling. The field sheet completed by EIS during sampling of MW19 indicated that phase separated product was not detected using the interface probe and that the water sample contained a lot of silt. Field measurements recorded for groundwater during sampling were a pH of 6.86, electric conductivity measurement of 258 µS/cm, a redox potential of -5.4 mV and a dissolved oxygen concentration of 3.0 ppm.

9.2 Analytical Results

The groundwater sample from MW19 was analysed for TRH/BTEX, PAH, heavy metals and VOCs. The analytical results are summarised below in Table 9.1.

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

Analyte	n	Detections	Maximum	n > Human Health Criteria	n > ANZG (2018) Marine
TRH C_6-C_{10} less BTEX (F1)	1	1	15	0 above HSL of 1000	-
TRH >C_{10}-C_{16} less naphthalene (F2)	1	0	<50	0 above HSL of 1000	-
TRH >C_{16}-C_{34} (F3)	1	0	<100	-	-
TRH >C_{34}-C_{40} (F4)	1	0	<100	-	-
Benzene	1	0	<1	0 above ADWG of 1	0 above ANZG of 500
Toluene	1	0	<1	0 above ADWG 800	-
Ethylbenzene	1	1	1	0 above ADWG 300	-
Total Xylenes	1	0	<3	0 above ADWG 600	-
Naphthalene	1	0	<1	-	0 above ANZG of 50
Benzo(a)pyrene	1	0	<0.5	-	0 above ANZG of 0.01
Trichloroethene (TCE)	1	1	5	0 above WHO drinking water criteria of 20	0 above ANZG of 330
Tetrachloroethene (PCE)	1	1	2	0 above ADWG of 50	0 above ANZG of 70
Cis-1,2-dichloroethene (DCE)	1	1	17	0 above ADWG of 60	-
Vinyl Chloride (VC)	1	0	<10	0 above ADWG of 0.3	0 above ANZG of 100
Arsenic	1	1	2	0 above ADWG of 10	0 above ANZG of 2.3
Cadmium	1	0	<0.1	0 above ADWG of 2	0 above ANZG of 0.7
Chromium	1	0	<1	0 above ADWG of 50	0 above ANZG of 4.4
Copper	1	0	<1	0 above ADWG of 2000	0 above ANZG of 1.3

Analyte	n	Detections	Maximum	n > Human Health Criteria	n > ANZG (2018) Marine
Lead	1	0	<1	0 above ADWG of 10	0 above ANZG of 4.4
Mercury	1	0	<0.05	0 above ADWG of 1	0 above ANZG of 0.1
Nickel	1	0	<1	0 above ADWG of 20	0 above ANZG of 7
Zinc	1	1	3	-	0 above ANZG of 15

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:

- Low concentrations of PCE and its degradation products, TCE and DCE, were detected in the groundwater sample at concentrations below drinking water criteria. It is noted that the PQL for VC, another degradation product, was above the drinking water criteria and hence concentrations of VC may be present in the sample from MW19 at concentrations above drinking water criteria. The detection of low concentrations of TRH F1 in the groundwater sample are likely to be attributable to the volatile chlorinated hydrocarbons (VCH) reporting as TRH C_6-C_9 in the standard TRH analysis method.
- Concentrations of all other analytes were below PQL or the assessment criteria, although it is noted that the PQL for BaP was above the ANZG (0.5 µg/L compared to 0.01 µg/L).
- EIS consider the source of the low concentrations of VOCs in the MW19 sample to be the adjacent laundry.
- EIS conclude that *"groundwater at the site is likely to be limited due to the shallow bedrock and contaminants that could have impacted the groundwater were generally not encountered in the fill samples. Therefore, EIS consider that the risk of groundwater contamination at the site is relatively low."*

9.3 Auditor's Opinion

Shallow groundwater above 3 mbgl has only been encountered at one location on the site, in MW19 installed downgradient of the diesel UST, adjacent to the laundry building. The low concentrations of PCE and its derivatives TCE and DCE (and possibly VC) detected in groundwater from this well may be associated with impacts from the adjacent laundry. Further assessment of the potential risk from VCH is required. This may include soil vapour assessment beneath the current building and groundwater assessment following the removal of the UST and inspection below the footprint of the laundry building following demolition.

In the Auditor's opinion, the potential for widespread groundwater contamination to have occurred as a result of general filling at the site is low. There is the potential that hydrocarbon or VCH contamination of groundwater may have occurred in source areas such as the area of the boiler UST, diesel ASTs and the petrol bowser and associated with concentrated usage areas such as the laundry (discussed above). It is noted that shallow wells installed down gradient of the petrol bowser (MW13) and from the diesel ASTs (MW44) were dry. Further assessment of the potential for groundwater contamination associated with these source areas should be considered based on field observations and soil analytical results following the removal and validation of USTs and ASTs and inspection under building footprints as discussed in Section 11.

10. EVALUATION OF CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is a representation of the contaminant source, pathway and receptor (SPR) linkages at a site. EIS developed a CSM to inform the sampling plan and discussed the results of the ESA in the context of the CSM in drawing conclusions with respect to complete SPR linkages.

Table 10.1 provides the Auditor's review of the CSM used by EIS to inform further investigation and management decisions.

Table 10.1: Review of the Conceptual Site Model

Element of CSM	Consultant	Auditor Opinion
Contaminant source and mechanism	The PAH and TRH F3 and F4 contamination is associated with ash and/or slag material in fill. The TRH F2, F3 and F4 impacts detected in BH48 are considered likely to be associated with a diesel or oil source and related to a subsurface release, although the source of the release is not identified. EIS conclude that further investigation is required to assess the nature and extent of the hydrocarbon impacts in this area. The source of the low levels of VOCs detected in groundwater from well MW19 is considered to be the adjacent laundry. EIS conclude that the low concentrations detected are not indicative of site contamination.	The Auditor agrees that the PAH and TRH impacts detected in BH23 are likely to be related to ash or slag impacted fill. The source of the TRH and PAH impacts in BH48 is unclear but may be attributed to ash impacted fill, rather than a petroleum hydrocarbon impact. There is the potential for undetected localised hydrocarbon contamination to be present in soil and groundwater around USTs and other fuel infrastructure including the former bowser area and the AST storage areas. The low levels of VOC contamination detected in groundwater at MW19 suggests that impact associated with solvent use in the laundry may also be present beneath the footprint of this building. ACM in building materials onsite is not identified as a potential source by EIS, however the presence of ACM fragments on the site surface indicates that ACM in building materials is a source of contamination and that remediation of surface ACM is required. The presence of asbestos pipes and lagging also indicates the potential for contamination by asbestos fibres in unsealed soils and unlined drains in the vicinity of these. There is also a low potential for ACM to be present in fill material at the site given the limitations of the borehole investigation method used as a result of site constraints.
Affected media	EIS identifies soil and groundwater as affected media. Soil vapour is also identified in the vicinity of BH48 where the concentration of TRH F2 exceeded the HSL for vapour intrusion.	The affected media have been identified appropriately, although it is further noted that soil vapour may be impacted in the vicinity of the VCH impacted groundwater at MW19.
Receptor identification	EIS identify onsite and offsite receptors in the initial CSM but do not revise the receptors in the discussion of results based on the data obtained during the ESA. The identified onsite receptors are site occupants/users (adults and children), construction workers and maintenance workers. Offsite receptors are identified as being adjacent land users and	The main receptors of concern have been identified appropriately. Based on the results of the ESA, the Auditor considers the primary receptors to be onsite users and ecology, with minimal potential for offsite impacts to have occurred based on the site geology, although assessment of groundwater within the bedrock has not been undertaken to confirm this.

Element of CSM	Consultant	Auditor Opinion
	recreational water users within Spring Cove. Ecological receptors are identified as being terrestrial organisms and plants within unpaved areas of the site and marine ecology in Sydney Harbour.	
Exposure pathways	EIS include identified exposure pathways in the initial CSM which are ingestion, dermal absorption and inhalation of dust (all contaminants) and inhalation of vapours (volatile TRH, naphthalene and BTEX). Potential exposure pathways for ecological receptors include primary contact and ingestion. The exposure pathways are not updated based on the results of the ESA to identify the potentially complete exposure pathways.	The identified exposure pathways are appropriate, however, the Auditor notes that, based on the current data set, the potential for vapour intrusion to represent a complete exposure pathway is low due to the generally low concentrations of volatile contaminants detected at the site, with one concentration of TRH F2 exceeding the HSLs in one sample and concentrations of VCH generally below drinking water criteria in the groundwater sample from MW19. However, further assessment of volatile contaminants associated with fuel infrastructure and the laundry building should be undertaken during site remediation/validation. Leaching to groundwater is not identified as an exposure pathway in the CSM but has been assessed by EIS through consideration of groundwater contamination and completion of leachability testing on soil samples containing elevated nickel and PAH. The results indicate a low potential for leaching of contaminants to groundwater.
Presence of preferential pathways for contaminant movement	On-site services and the associated trench backfill are identified in the initial CSM by EIS as potential preferential pathways for contaminant migration through groundwater/seepage if present, or via soil/vapour migration through the trench backfill.	Based on the results of the ESA, the potential for contamination to migrate via preferential pathways is considered low, however, further assessment of the potential for volatile contaminants during removal/validation of former fuel infrastructure should be undertaken.
Potentially complete source-pathway-receptor (SPR) linkages requiring remediation or management	The discussion and conclusions of the ESA do not identify specific complete exposure pathways, however, EIS do state that *"The risk posed by the contamination is considered to be low, however, further assessment will be required to better assess the nature and extent of the contamination above the human health based assessment criteria. The risk of the contamination exposure will increase if the pavement in the vicinity of BH23 is removed, as this will complete the exposure pathway to humans. Similarly if a building is constructed in the vicinity of BH48 the risk of soil vapour accumulation will increase."*	This description is considered reasonable. The contaminants present are generally non-volatile (subject to further assessment) and non-leaching and present a low risk to receptors with the exception of three exceedances of the HIL for BaP and one exceedance of the HSL for TRH F2. Redevelopment of the site is likely to limit the potential for dermal contact with fill material and, based on the generally low concentrations of volatile contaminants, the vapour intrusion pathway is likely to be incomplete for the TRH impacts. This will be dependent on appropriate management of potential contamination during development and ongoing site management. Further assessment is required with respect to VCH impacts in the vicinity of the laundry building.
Is the site suitable for the proposed development, or can the site be made	In response to this DQO, EIS stated that *"The site is considered likely to be suitable for the proposed development,*	The Auditor agrees that the contamination issues identified at the site do not preclude the proposed site redevelopment although it is considered that a remediation action plan

Element of CSM	Consultant	Auditor Opinion
suitable subject to further characterisation and/or remediation?	*however, additional investigation should be undertaken to confirm this. In the event remediation is required, it is likely to be relatively straightforward and, therefore, EIS consider that the site can be made suitable for redevelopment".*	(RAP) will be required, at a minimum to outline the requirements for removal of USTs and associated infrastructure, for removal of surficial ACM impact and to investigate data gaps.
Evaluation of data gaps	EIS identify the following data gaps in the CSM: • Soil sampling was targeted at fill material. Further assessment should include analysis of natural soil/bedrock to better assess the contamination conditions and confirm the waste classification • Groundwater analyses were limited due to the lack of groundwater in four of the five installed wells • The horizontal extent of PAH and TRH impacted soil has not been adequately assessed • Asbestos in the form of FCF remains on the ground surface of the site and, although unlikely to be within the fill material, represents a risk to site users and has the potential to invalidate the fill material waste classification • The assessment was limited to accessible areas of the site. No investigations were undertaken beneath the existing buildings.	The Auditor agrees with the data gaps identified by EIS. In addition, underground or above ground fuel infrastructure should be removed and soils validated. The validation sampling and field observations should be used to determine the need for groundwater investigation and the potential for migration of contaminants in soil vapour or groundwater. VCH impact beneath the former laundry building is also considered a data gap requiring further assessment.

10.1 Auditor's Opinion and Data Gap Assessment

The Auditor is of the opinion that the CSM presented in the ESA was a reasonable representation of the contamination at the site. In the Auditor's opinion, the main potential exposure pathways of concern during and following redevelopment are:

- Dermal contact and dust inhalation of soil contaminated with TRH and PAH by construction workers and future site users
- Inhalation of asbestos fibres in dust by construction workers and future site users
- Potential inhalation of volatile contaminants by future site users through vapour intrusion into retained and new buildings.

Based on the current data, the risk to ecological receptors and off-site receptors from contamination at the site appears to be low.

The CSM identified several data gaps that require further assessment or management to ensure the site can be considered suitable for the proposed future use. These are:

- *Management of fill material:* the fill material imported to level the southern portion of the site is considered a source of TRH and PAH contamination due to the presence of ash and slag at

some locations. ACM may also be present within the fill. During the ESA, concentrations of BaP were detected above the human health criteria at three sample locations and TRH at two locations and it is likely that there may be other localised areas of fill where concentrations of BaP and TRH exceed assessment criteria. The risk to future site users from these contaminants is considered low as the chemicals are non-volatile and relatively immobile. The main exposure pathway of concern is through dermal contact which is likely to be limited following redevelopment due to resurfacing of the site and the low potential for reuse of fill material to be at the surface for aesthetic reasons. If retained on site, the fill material would need to be subject to ongoing management to ensure exposure is prevented. The potential human health risks to construction workers need to be managed during the construction phase and the risk to future site users managed through elimination of the dermal contact exposure pathway.

- *Assessment under building footprints:* visual inspection of the ground surface for potential ACM and sources of contamination should be completed following demolition of buildings, particularly in areas with known usage of chemicals or where drainage pits or other subsurface infrastructure is identified such as the laundry, the boiler room and the flammable goods store. Further assessment of the contamination status of groundwater and/or soil vapour under the laundry building is required to confirm that the VCH impacts detected in groundwater from monitoring well MW19 are not related to a more significant plume.
- *Removal and validation of USTs and ASTs:* all USTs and ASTs should be removed and the requirement for chase out of soil contamination and groundwater assessment should be confirmed based on visual inspection, field screening and soil validation analytical results at each location.
- *Removal of all surface ACM:* fragments of ACM have been identified on the ground surface at the site and the demolition of buildings has the potential to result in further contamination of the ground surface if not managed appropriately. Validation of unsealed soils and unlined drains in the vicinity of asbestos pipes and lagging should be undertaken following removal.

The actions required to close out the data gaps and other management considerations that should be adopted during the redevelopment are outlined in Section 11.

11. EVALUATION OF REMEDIATION

11.1 Requirement for Remediation

The ESA concluded the following:

"EIS consider that the site can be made suitable for proposed redevelopment as a hospital provided the following recommendations are undertaken:

- *Further investigation to better assess the nature and extent of the carcinogenic PAHs contamination encountered in BH23;*
- *Further investigation to better assess the contamination conditions and likely source of TRH encountered in BH48;*
- *Assessment of the requirement to prepare a RAP [Remediation Action Plan] for the site based on the results of additional investigations;*
- *Removal of the surficial FCF at the site followed by preparation of a clearance certificate; and*
- *Further investigation to confirm the waste classification of natural soil and bedrock in the event excavation is proposed as part of the redevelopment works.*

The Auditor generally agrees with these findings, although considers that a RAP will be required. In the Auditor's opinion, the above requirements could be addressed through the redevelopment process. The following sections provides the Auditor's opinion with respect to management of contamination during redevelopment.

11.2 Remediation Action Plan

Prior to commencement of redevelopment, a RAP should be developed for the site by a qualified environmental consultant in accordance with the EPA (2020) *Consultants reporting on contaminated Land: Contaminated land guideline*s.

The RAP should consider the final site layout and land use in different portions of the site when defining remediation goals, remediation strategy and appropriate validation criteria. The staging of the remediation activities will need to align with site development activities to ensure all data gaps are addressed. The remedial options should be assessed and the preferred options identified in the RAP.

Remedial options may include solutions that will require ongoing management such as capping and containment on site or vapour mitigation. Containment could occur under buildings, hardstand areas, landscaped areas with constructed capping or in a purpose-built containment cell. Capital and ongoing management costs would vary for each option. Buildings to be retained should be managed as a cap and containment area unless the absence of fill below the buildings is confirmed.

The RAP should document the procedures and protocols to be adopted for:

- Assessment of VCH impact beneath the laundry.
- Removal of USTs and ASTs and validation of soils and, if necessary, groundwater in the vicinity of the former fuel infrastructure.
- Inspection, remediation and validation of removal of ACM from the site surface and validation of soils for asbestos fibres following removal of asbestos pipes and lagging.
- Inspection and validation under building footprints.
- Management or remediation of fill materials impacted by ash and slag and potentially ACM.

- Management of imported material for regrading, backfill of excavations or landscaping to confirm suitability for the future site use.
- Waste classification, handling and tracking.
- Ensuring final site validation through completion and compliance with a validation sampling, analysis and quality plan.
- Dealing with unexpected finds and contingency actions.
- Capping and containment of contamination if included in the remediation strategy.
- Implementation of an Environmental Management Plan (EMP) if ongoing management is required for the remediation strategy.

The RAP should be reviewed by a Site Auditor prior to implementation.

The completed remediation should be reviewed by a Site Auditor and a Section A site audit undertaken to demonstrate the site is suitable for the intended use.

11.3 Management Priorities During Construction Phase

If remediation works are to occur during the construction phase of the redevelopment, the following items will need to be considered and managed to ensure suitability for the proposed end use:

- Potential for building demolition works to invalidate surface clearance of ACM, appropriate management of hazardous building materials demolition is required.
- Waste tracking of contaminated material for off-site disposal, reuse or on-site containment (if applicable) and assessment of imported materials.
- Management of stockpiles of impacted fill to mitigate contamination of the environment and on and off-site human receptors.
- Potential for cross contamination of validated areas during earthworks.

11.4 Long Term Management

Any remediation strategy that includes on-site capping and containment of material that poses a potential risk to human health will require long-term management through implementation of an EMP. The feasibility of implementing and enforcing a long-term EMP needs to be considered prior to remediation and agreement from Council is required. Implementation of the EMP should be included as a condition of consent to provide a mechanism for enforceability.

11.5 Auditor's Opinion

The Auditor considers that a RAP is required to address the data gaps and contamination issues identified at the site. The RAP should consider the final site layout and land use in different portions of the site when defining remediation goals, remediation strategy and appropriate validation criteria.

The contamination issues identified can be addressed through the redevelopment process however this will require staging of the remediation activities to align with site development activities to ensure all data gaps are addressed. This approach will also require careful remediation planning and management during the construction phase.

12. COMPLIANCE WITH REGULATORY GUIDELINES AND DIRECTIONS

12.1 General

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

The investigation was generally conducted in accordance with SEPP 55 Planning Guidelines and reported in accordance with the EPA (2020) *Consultants reporting on contaminated Land: Contaminated land guidelines*.

12.2 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*. EIS concluded in the ESA that, based on the site conditions there was no requirement for the site to be notified under these guidelines. Based on the findings of this Site Audit Report, the Auditor agrees that the site is not required to be notified under the Duty to Report requirements.

12.3 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 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.

13. CONCLUSIONS AND RECOMMENDATIONS

The former hospital site is to be redeveloped to provide a community and commercial space focussed on health and wellbeing, including an Adolescent and Young Adult Hospice (AYAH). A Concept Master Plan is available for the development that indicates that most of the site buildings will be demolished except for six buildings which are to be repurposed.

EIS completed the ESA with the aim to identify any past or present potentially contaminating activities at the site, identify the potential for site contamination, and make a preliminary assessment of the soil and groundwater contamination conditions. The ESA also posed the question: *Is the site suitable for the proposed development, or can the site be made suitable subject to further characterisation and/or remediation?*

The ESA completed by EIS provided sufficient data on the contamination status of site soils and groundwater to allow for initial remediation planning. The data obtained indicated that fill of varying depths is present at the site, particularly in the southern portion. Concentrations of contaminants in fill are generally low with only three out of 71 samples containing concentrations of TRH and/or BaP above human health criteria, related to the presence of slag and ash material in fill. However, no sampling has been completed beneath building footprints and there is the potential for further localised pockets of fill to contain concentrations of contaminants above adopted assessment criteria. Fragments of ACM were observed during the ESA on the site surface and there is the potential that asbestos contaminated soils may also be present. In addition, assessment of groundwater may be required in the locations of USTs, former ASTs and the former laundry.

EIS concluded that *"The site is considered likely to be suitable for the proposed development, however, additional investigation should be undertaken to confirm this. In the event remediation is required, it is likely to be relatively straightforward and, therefore, EIS consider that the site can be made suitable for redevelopment".*

Based on the information presented in the ESA 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 contamination issues identified at the site do not preclude the proposed site redevelopment and considers that these could be addressed by remediation of the site during the redevelopment process.

The following management remains necessary before the land is suitable for any specified use or range of uses:

- Preparation of a RAP by a suitably qualified environmental consultant to address the following, amongst other items: assessment of VCH impact beneath the laundry; removal and validation of USTs and ASTs; removal of surface ACM and validation of potential asbestos fibre impacts; assessment under building footprints following demolition; and management or remediation of fill material containing concentrations of TRH and PAH above assessment criteria and potentially containing ACM.
- Should the remediation strategy include the requirement for a long-term EMP to manage contamination, the feasibility of implementation and enforceability should be considered in the RAP and agreement for the EMP should be sought from Council. Implementation of the EMP should be included as a condition of consent.
- The RAP should be reviewed by a Site Auditor prior to implementation. The completed remediation should be reviewed by a Site Auditor and a Section A site audit undertaken.

14. OTHER RELEVANT INFORMATION

This Audit was conducted on the behalf of Property NSW for the purpose of assessing what management remains necessary before the land is suitable for any specified use or range of uses i.e. a "Site Audit" as defined in Section 4 (1) (b) (iv) of the CLM Act.

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

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

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

APPENDIX A
ATTACHMENTS

Attachment 1: Site Location
Attachment 2: Site Boundaries
Attachment 3: Hospital Layout
Attachment 4: EIS Sample Investigation Locations

Attachment 1: Site Locality Plan

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.5.1557
AERIAL IMAGE ©: 2015 GOOGLE INC.

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

Title: **SITE LOCATION PLAN**

Location: 150 DARLEY ROAD
MANLY, NSW

Report No: E31233K

Figure No: 1

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

Legend

Site boundary

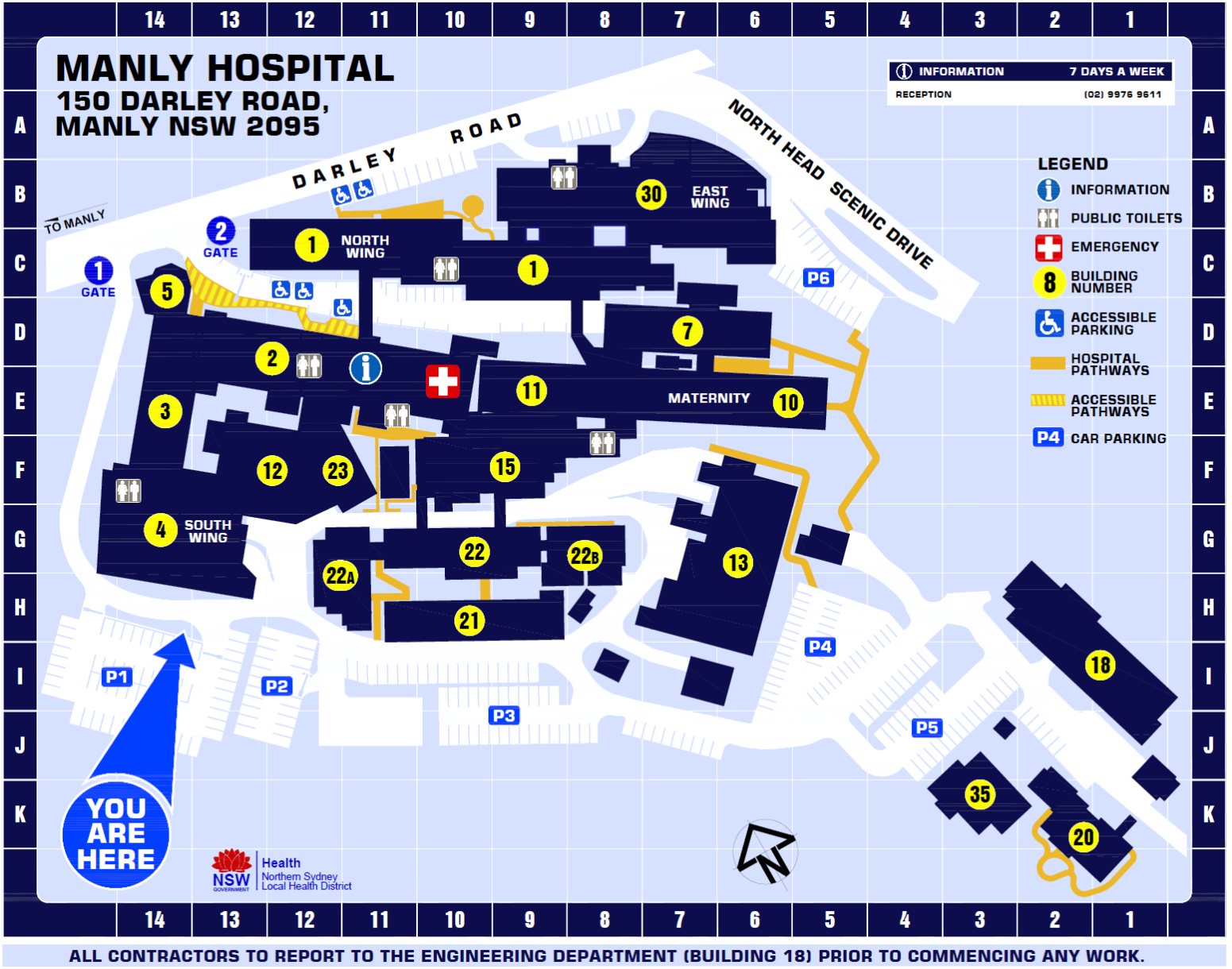
Lot boundaries

A4
1:2,250

Attachment 3: Hospital Layout

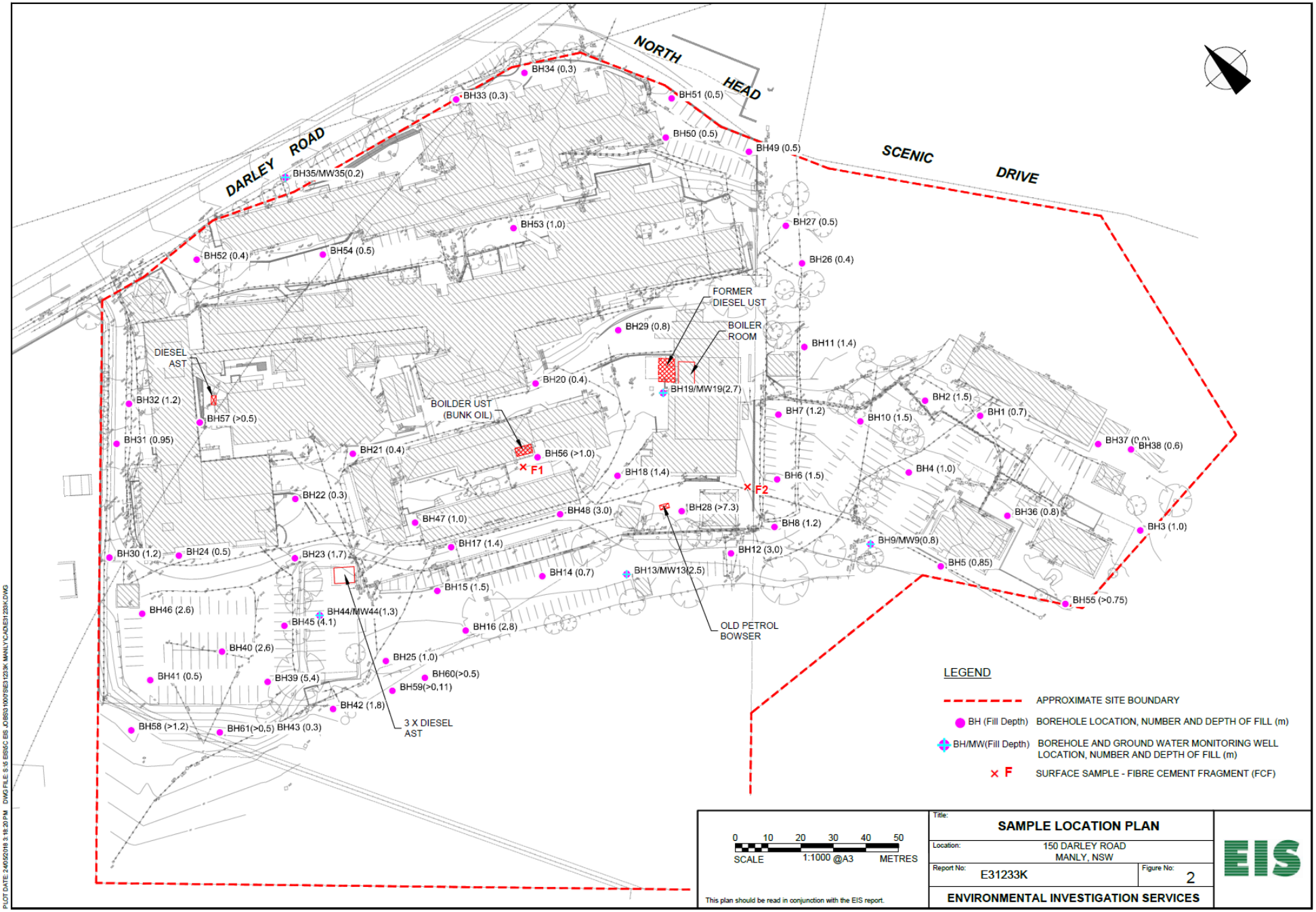
BLD	DEPARTMENT	LEVEL	REFERENCE
3	Admissions - Day Surgery	2	D 14
2	Admissions - Main	1	E 11
2	Ambulatory Care	2	E 10
7	Antenatal (Maternity) Clinic	1	D 8
23	Cardiac Investigation Unit	1	F 11
22a	Cardiac Rehabilitation	1	H 11
4	Chapel	2	F 14
1	Chest Clinic	1	C 9
4	Clinical Governance	2	G 13
12	CSSD	2	F 12
3	Diabetes Clinic	3	D 14
21	Drug & Alcohol	1	H 9
22b	Education Centre	2	G 8
18	Engineering	1	H 2
1	Equipment Loan Pool	1	C 8
23	Executive	2	F 11
1	Finance	2	C 11
7	Gynaecological Clinic	1	D 8
2	Health Information Services	1	D 12
1	Health Promotion	2	C 11
1	JMO Unit	2	C 12
35	Kadesh	1	K 3
22	Kalori	1	G 10
5	Kiosk - North Head Cafe	1	C 14
23	Medical Imaging (Xray - CT - Ultrasound)	1	F 12
1	North Wing Lecture Theatre	2	C 10
3	Northern Beaches Cancer Services	3	E 14
30	Northern Beaches Mental Health Services	2	B 8
21	Northern Sydney Home Nursing Services (NSHNS)	1	H 11
3	Nutrition and Dietetics	3	D 14
15	Occupational Therapy	1	F 9
3	Oncology Clinic	3	E 14
3	Oncology Pharmacy	3	E 14
15	Outpatient Clinic	1	F 9
7	Parent Education	1	D 8
20	Parkhill	1	K 2
3	Pathology North	1	D 14
3	Pharmacy Department	2	D 13
15	Physiotherapy	1	F 9
15	Podiatry	1	F 9
3	Pre Admission Clinic	2	E 14
23	Radiology	1	F 12
2	Security Services	1	E 11
3	Social Work	3	D 14
4	South Wing Dining Annexe	2	G 14
22b	Staff Development	2	G 8
1	Staff Health	1	C 10
4	Stores	1	G 13
23	Ultrasound	1	F 12
23	X-Ray	1	F 12
1	Workforce Services	2	C 12

BLD	WARDS	LEVEL	REFERENCE
7	Birthing Unit	1	D 7
3	Day Surgery	2	E 14
30	East Wing	1	B 7
2	Emergency Department	1	E 10
11	Emergency Medical Unit (EMU)	1	E 9
12	Intensive Care Unit (ICU)	1	F 13
10	Maternity Services	1	D 8
2	Medical Ward 1	2	D 12
11	Psychiatric Emergency Care Centre (PECC)	1	E 8
30	Specialist Mental Health Services for Older Persons Acute Inpatient Unit (SMHSOP AIU)	1	B 6
4	South Wing 4 - Surgical	4	G 14
4	South Wing 5 - Cardiology & Stroke Unit	5	G 14
11	Transit Unit	1	E 9



ALL CONTRACTORS TO REPORT TO THE ENGINEERING DEPARTMENT (BUILDING 18) PRIOR TO COMMENCING ANY WORK.

Attachment 4: EIS Sample Investigation Locations



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. RS 114

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	Rowena Salmon
Company	Ramboll Australia Pty Ltd
Address	Level 3
	100 Pacific Highway, North Sydney
	Postcode 2060
Phone	02 9954 8100
Email	rsalmon@ramboll.com

Site details

Address	Former Manly Hospital, 150 Darley Road, Manly NSW
	Postcode 2095

Property description

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

Lots 2619, 2727, 2774 and 2728 in DP 752038

Local government area: Northern Beaches Council

Area of site (include units, e.g. hectares): approximately 6.2 hectares

Current zoning: Lot 2619 and part of Lot 2728 are SP2 Infrastructure, while the remaining portion of Lot 2728 and Lots 2774 and 2727 are E2 Environmental Conservation

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	Melissa Prochazka
Company	Property and Development NSW
Address	4 Parramatta Square, 12 Darcy Street, Parramatta, NSW
	Postcode 2150
Phone	02 9240 8544
Email	melissa.prochazka@property.nsw.gov.au

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)

☐ 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:

Information sources for site audit

Consultancies which conducted the site investigations and/or remediation:

Environmental Investigation Services Pty Ltd (EIS)

Titles of reports reviewed:

'Report to Health Infrastructure on Environmental Site Assessment for Proposed Hospital Redevelopment at 150 Darley Road, Manly, NSW', 28 May 2018, EIS

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

Concept Master Plan provided on 21 December 2020 by Property and Development NSW

Site audit report details

Title	Site Audit Report – Contamination Assessment for Manly Hospital Proposed Redevelopment		
Report no.	RS 114 (Ramboll Ref: 318000919)	Date	26 February 2021

Part II: Auditor's findings

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

- Use **Section A1** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **without the implementation** of an environmental management plan.
- Use **Section A2** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **with the implementation** of an active or passive environmental management plan.
- Use **Section B** where the audit is to determine:
  - (B1) the nature and extent of contamination, and/or
  - (B2) the appropriateness of an investigation, remediation or management plan[1], and/or
  - (B3) the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or
  - (B4) whether the terms of the approved voluntary management proposal or management order have been complied with, and/or
  - (B5) whether the site can be made suitable for a specified land use (or uses) if the site is remediated or managed in accordance with the implementation of a specified plan.

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

Section A1

I certify that, in my opinion:

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

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

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

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

☐ Day care centre, preschool, primary school

☐ Residential with minimal opportunity for soil access, including units

☐ Secondary school

☐ Park, recreational open space, playing field

☐ Commercial/industrial

☐ Other (please specify):

_____

OR

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

Overall comments:

_____

_____

_____

_____

_____

_____

Section A2

I certify that, in my opinion:

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

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

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

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

☐ Day care centre, preschool, primary school

☐ Residential with minimal opportunity for soil access, including units

☐ Secondary school

☐ Park, recreational open space, playing field

☐ Commercial/industrial

☐ Other (please specify):

_____

EMP details

Title _____

Author _____

Date _____ No. of pages _____

EMP summary

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

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

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

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

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

Purpose of the EMP:

Description of the nature of the residual contamination:

Summary of the actions required by the EMP:

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

How there will be appropriate public notification:

Overall comments:

Section B

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

Environmental Site Assessment (ESA) to identify any past or present potentially contaminating activities at the site, identify the potential for site contamination, and make a preliminary assessment of the soil and groundwater contamination conditions. The ESA also posed the question: Is the site suitable for the proposed development, or can the site be made suitable subject to further characterisation and/or remediation?

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~~

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

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

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

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

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

~~☐ Secondary school~~

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

~~☐ Commercial/industrial~~

~~☐ Other (please specify):~~

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

~~*Strike out as appropriate~~

~~Plan title~~

~~Plan author~~

~~Plan date~~ ~~No. of pages~~

SUBJECT to compliance with the following condition(s):

Overall comments:

The ESA completed by EIS provided sufficient data on the contamination status of site soils and groundwater to allow for initial remediation planning for proposed redevelopment including a group home, community facility, educational establishment, food and drink premises, centre-based child care facility, indoor recreational facility, neighbourhood shop, function centre and seniors housing. The contamination issues identified at the site do not preclude the proposed site redevelopment and these could be addressed by remediation of the site during the redevelopment process.

The following management remains necessary before the land is suitable for any specified use or range of uses:

- Preparation of a remediation action plan (RAP) by a suitably qualified environmental consultant to address the following, amongst other items: assessment of volatile chlorinated hydrocarbon impact beneath the laundry; removal and validation of underground and aboveground storage tanks; removal of asbestos containing material from the site surface and validation of potential asbestos fibre impacts; assessment under building footprints following demolition; and management or remediation of fill

material containing concentrations of total recoverable hydrocarbons and polycyclic aromatic hydrocarbons above assessment criteria and potentially containing asbestos-containing materials.

- Should the remediation strategy include the requirement for a long-term environmental management plan (EMP) to manage contamination, the feasibility of implementation and enforceability should be considered in the RAP and agreement for the EMP should be sought from Council. Implementation of the EMP should be included as a condition of consent.
- The RAP should be reviewed by a Site Auditor prior to implementation. The completed remediation should be reviewed by a Site Auditor and a Section A site audit undertaken.

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. 1002

I certify that:

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

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

Signed 

Date 26 February 2021

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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