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Remediation Action Plan

Surface & Civil Alignment Works (SCAW) Package for
Sydney Metro - Western Sydney Airport (SMWSA)
Area of Environmental Concern (AEC) 43, 1793
Elizabeth Drive, Badgerys Creek

Prepared for
CPB Contractors Pty Limited & United Infrastructure
Pty Limited Joint Venture (CPBUI JV)

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

Signature	Date
Author	29 May 2023
Reviewer	29 May 2023

FS 604853

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
96 Hermitage Road
West Ryde NSW 2114
PO Box 472
West Ryde NSW 1685
Phone (02) 9809 0666

Executive Summary

Douglas Partners Pty Ltd (DP) has prepared this Remediation Action Plan (RAP) for the Surface and Civil Alignment Works (SCAW) package for Sydney Metro - Western Sydney Airport (SMWSA) at Area of Environmental Concern (AEC) 43, 1793 Elizabeth Drive, Badgerys Creek. The RAP was commissioned by CPBUI JV.

The remediation objectives, devised in accordance with CRC (2019a), are to:

- Address potentially unacceptable risks to relevant environmental values from contamination; and
- Render the site suitable, from a contamination perspective, for the proposed development.

This RAP provides details of the work that will be required at the site to meet the remediation objectives.

The site layout is shown on Drawing AEC43-01, Appendix A.

During the detailed site investigation (DSI), a buried fibre-cement pipe (asbestos) was encountered at a depth of approximately 0.3 m below ground level at test pit AEC43TP06. The pipe was observed to run in an (approximate) north to south direction. A section of fibre-cement pipe, approximately 0.3 m long, was also observed to be buried at a shallow depth (approximately 0.1 m) next to the pipeline. In addition, asbestos was detected in fill samples from test pit AEC43TP02, depth 0 - 0.1 m, and test pit AEC43TP09, depth 0 - 0.1 m. The concentration of fibrous asbestos (FA) and asbestos fines (AF) in the fill sample from AEC43TP02 exceeded the health screening level (0.001% w/w) adopted for friable asbestos.

The preferred remediation strategy is to excavate and relocate asbestos contaminated soil to a proposed mound at 'PS105' which is at the northern part of Lot 51 Deposited Plan 1276956 and is within the SCAW project boundaries. The remediation strategy for in-ground asbestos pipe is disposal of the pipe to a licensed landfill facility. The general sequence of remediation will include:

- Task 1: Asbestos pipe removal (Remediation Area 2) with validation of its removal, and possibly relocation of associated asbestos impacted soil to PS105 and validation of its removal;
- Task 2: Excavation and relocation of asbestos contaminated soil (Remediation Area 1) to PS105 with validation of its removal; and
- Task 3: Remediation of asbestos identified from a (proposed) data gap investigation (if any) which will further assess the site for asbestos contamination, and site walkover following stripping of vegetation.

The remediation and validation methods and approach (including QA / QC for validation) are documented in this RAP. In addition, this RAP provides a contingency plan and unexpected finds protocol and general site management plan.

It is considered that the site can be made suitable for the proposed development subject to implementation of this RAP.

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Remediation Action Plan

Surface & Civil Alignment Works (SCAW) Package for Sydney Metro - Western Sydney Airport (SMWSA)

Area of Environmental Concern (AEC) 43, 1793 Elizabeth Drive, Badgerys Creek

1. Introduction

Douglas Partners Pty Ltd (DP) has prepared this remediation action plan (RAP) for the Surface and Civil Alignment Works (SCAW) package for Sydney Metro - Western Sydney Airport (SMWSA) at Area of Environmental Concern (AEC) 43, 1793 Elizabeth Drive, Badgerys Creek. The RAP was commissioned by CPBUI JV.

The following key guidelines were consulted in the preparation of this report:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013);
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020); and
- CRC CARE *Remediation Action Plan: Development - Guideline on Establishing Remediation Objectives* (CRC CARE, 2019a).

The remediation objectives, devised in accordance with CRC (2019a), are to:

- Address potentially unacceptable risks to relevant environmental values from contamination; and
- Render the site suitable, from a contamination perspective, for the proposed development.

This RAP provides details of the work that will be required at the site to meet the remediation objectives.

CPBUI JV has engaged NSW EPA accredited site auditor, Melissa Porter, to complete a site audit under the *Contaminated Land Management Act 1997* (NSW), which involves review of this RAP and associated reports.

It should be noted that this RAP does not form a detailed specification for the proposed site remediation works, but rather represents a planning document which outlines the means by which site remediation can be achieved.

The site layout is shown on Drawing AEC43-01, Appendix A. This report must be read in conjunction with all appendices including the notes provided in Appendix B.

2. Site Identification and Proposed Development

Technical Paper 8: Contamination, prepared as part of Sydney Metro - Western Sydney Airport, Environmental Impact Statement (EIS), documents AECs identified for the Sydney Metro - Western Sydney Airport project, one of which is AEC 43. The site covers AEC 43 except a strip of land to the west as shown on Drawing AEC43-01, Appendix A. Table 1 provides a summary of information for site identification.

Table 1: Site Identification Information

Item	Details
Site Address (from SIX Maps)	1793 Elizabeth Drive, Badgerys Creek
Legal Description (from SIX Maps)	(Part of) Lot 73, Deposited Plan 1277011 (Part of) Lot 74, Deposited Plan 1277011
Approximate area of AEC 43	1.7 ha
Approximate site area (within AEC 43)	1.66 ha
Zones for site (from ePlanning Spatial Viewer)	ENT: Enterprise Not Zoned along proposed rail line.
Local Government Area	Penrith City Council

The SCAW package relates to the proposed construction of approximately 10 km of rail alignment between Orchard Hills and the Western Sydney International (future) airport consisting of a combination of viaducts and surface rail. Areas alongside the proposed rail alignment will be used by contractors or for staging and maintenance for the Metro. A surface rail line is proposed to be constructed at the site.

Cardno, *Human Health and Ecological Risk Assessment, Spoil Re-use Sydney Metro and Western Sydney Airport*, 29 June 2021 (80021888 SMSWA HHERARev3-Issued.docx) (Cardno, 2021a) (HHERA) provides (simple) conceptual site models for different general future land uses for the overall SMWSA project. The two general future land uses associated with the SCAW component of the project are considered to be:

- The rail corridor which will include the rail line, embankments / noise barriers, a stabling yard and maintenance facility and Luddenham station; and
- Passive open space. These are areas immediately adjacent to the rail corridor that may be used for bike / commuter paths. It is assumed that there is absence of buildings in areas of passive open space.

It is understood that the site will comprise both of the above-listed land uses.

Development of the site will include stripping of topsoil across the site area and cut (up to a maximum of approximately 3 m depth) for the rail line which is shown on Drawing AEC43-01, Appendix A. Stripped and excavated soil from the site will be subject to reuse elsewhere within the greater SCAW area. Soil may be imported from off-site.

Existing trees will be removed, and existing structures will be demolished to accommodate the development.

3. Scope of Work

The scope of works to achieve the objective is as follows:

- Summarise the findings of previous investigations used to inform the status of contamination and contamination risk at the site;
- Present a conceptual site model (CSM) to list potential and likely contamination source, pathway and receptor linkages to address potentially unacceptable risks to relevant environmental values from contamination;
- Define the anticipated extent of remediation;
- Assess, select and justify a preferred approach to remediation to render the site suitable for its proposed use, and which will minimise potentially unacceptable risk to human health and/or the environment and which includes the consideration of the principles of ecologically sustainable development;
- Select an appropriate remediation strategy to render the site suitable, from a contamination perspective, for the proposed development;
- Establish the remediation acceptance criteria (RAC) to be adopted for validation of remediation;
- Identify how successful implementation of the RAP will be validated;
- Outline waste classification, handling and tracking requirements;
- Outline environmental safeguards required to complete the remediation works; and
- Include contingency plans and an unexpected finds protocol.

4. Site Condition and Environment Information

Table 2 provides a summary of information relating to the site condition and environment.

Table 2: Site Condition and Environment Information

Item	Details
Geology	Bringelly Shale: comprising shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff (Penrith 1:100,000 Geology Sheet)
Soil landscape	Blacktown soil landscape which comprises residual soils. (Penrith 1:100,000 Soils Landscape Sheet).
Topography	The site is at approximately 62 m AHD. Slopes at and around the site are generally down to the east and northeast.
Salinity	The site is at an area of moderate salinity potential (Department of Infrastructure Planning and Natural Resources, *Salinity Potential in Western Sydney Map*).
Acid sulfate soils	The site is not within an area or close to an area associated with a risk of acid sufate soils (NSW Acid Sulfate Soil Risk map).

Item	Details
Surface water bodies	There are no surface water bodies at the site. Farm dams are located on nearby land to the northeast, north and southeast of the site. Badgerys Creek is located approximately 530 m to the east of the site.
Groundwater flow direction and discharge	Based on topography, shallow groundwater (if any) is expected to flow to the east or northeast and discharge Badgerys Creek or potentially the large farm dam located approximately 250 m to the northeast.
Registered groundwater bores	There are no registered groundwater bores within 500 m of the site. A series of registered groundwater bores are located on the opposite side of Badgerys Creek (Water NSW).
Site use and features	Rural use. The land at the site has residences with sheds and animal shelters. The eastern part of the site is used for paddocks. One shed was observed to have a small number of empty paint cans and other small empty chemical containers on the ground surface. The majority of the ground surface was covered in grass.
Surrounding land use	Rural comprising mainly grazier land with minor buildings, sheds, animal shelters / pens and dams. Farm buildings are located approximately 50 m to the west of the site.
Information from historical aerial photographs	The land at and surrounding the site appears to have been grazier land since 1955 with sheds and residential buildings. Sheds are present at the site (EIS).
NSW EPA records	There were no NSW EPA regulated sites (under the *Contaminated Land Management Act 1997*) within 1 km of the site (EIS). There were no sites notified to the NSW EPA (under the *Contaminated Land Management Act 1997*) within 1 km of the site (EIS). There were no properties licensed under the *Protection of Environment Operations Act 1997* within 500 m of the site (EIS). There were no NSW EPA PFAS investigation sites within 2 km of the site (EIS).

5. Previous Reports

The following previous reports are relevant to the RAP

- Cardno, *Contamination Assessment Report, Sydney Metro Western Sydney Airport*, 1 September 2021 (80021888-CDO-CAR-RPT-004-RevE) (Cardno, 2021b); and
- DP, *Detailed Site Investigation (Contamination), Surface & Civil Alignment Works (SCAW) Package for Sydney Metro - Western Sydney Airport (SMWSA), Area of Environmental Concern (AEC) 43, 1793 Elizabeth Drive, Badgerys Creek,* November 2022 (DP, 2022) [DSI].

5.1 Cardno (2021)

Cardno (2021b) includes data for one soil sampling location at the site. The borehole, SMGW-BH-B329, was drilled in March 2021. Silty clay fill to a depth of 0.2 m was found to be underlain by clay to 1.8 m, then silty clay to 2.71 m, and sandy clay to 3.07 m. Soil was underlain by sandstone, mudstone and siltstone to a depth of 15.18 m. The borehole log is provided in Appendix C. The sample location is shown on Drawing AEC43-01, Appendix A.

Selected soil samples were analysed for asbestos; total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN); polycyclic aromatic hydrocarbons (PAH); organochlorine pesticides (OCP); organophosphorus pesticides (OPP); polychlorinated biphenyls (PCB); pH; metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc); per- and polyfluoroalkyl substance (PFAS); volatile organics; and / or pH_F + pH_{FOX} (acid sulfate soils screening test). A summary of analytical results is provided in Tables C1 and C2, Appendix D. Concentrations of chemicals were within the site assessment criteria adopted for the DSI. Asbestos was not detected in the analysed surface soil sample.

5.2 DSI (DP, 2022)

The scope of field work for the DSI included:

- Soil sampling from test pits at 18 locations (AEC43TP02 to AEC43TP06, AEC43TP09 to AEC43TP12, AEC43TP15 to AEC43TP17, AEC43TP21 and AEC43TP25 to AEC43TP29). In addition, as a buried pipe was encountered in test pit AEC43TP06, test pit was AEC43TP06A was excavated adjacent to AEC43TP06. A bulk (10 L) soil sample from AEC25TP25, depth 0-0.2 m, was subject to sieving / screening for asbestos;
- Soil sampling using a hand auger at 12 locations (AEC43HA01, AEC43HA07, AEC43HA08, AEC43HA13, AEC43HA14, AEC43HA18 to AEC43HA20, AEC43HA22 to AEC43HA24 and AEC43HA30); and
- Installation, development and sampling of three groundwater monitoring wells (AEC43BH01 and AEC43BH03).

Sample locations are shown on Drawing AEC43-01, Appendix A. Borehole logs and test pit logs are provided in Appendix C.

For test pits and hand auger boreholes:

- Fill comprising silty sand was encountered at all test pits and hand auger boreholes, between 0.1 and 0.3 m thick, except at AEC43TP06 where sandy silt fill was observed to a depth of 0.4 m, at AEC43TP05 where sandy clay fill was encountered to a depth of 0.1 m, and at AEC43HA30 where sandy silt was encountered to a depth of 0.1 m; and
- Fill was underlain by silty clay to observed depths ranging from 0.4 to 1.2 m (except at AEC43TP06 which was discontinued in fill at a depth of 0.4 m). Test pits and hand auger boreholes were discontinued in silty clay (except at AEC43TP06).

A buried fibre-cement pipe (asbestos) was encountered at a depth of approximately 0.3 m below ground level at AEC43TP06. The pipe was observed to run in an (approximate) north to south direction. A section of fibre-cement pipe, approximately 0.3 m long, was also observed to be buried at a shallow depth (approximately 0.1 m) next to the pipeline.

Boreholes for groundwater monitoring wells were drilled through a surface layer of topsoil (0.15 m or 0.2 m thick) comprising sandy silt or silty clay, then silty clay to depths of 3.8 m to 5.5 m, and then siltstone to termination depths (between 9.2 m and 15 m). At the time of groundwater sampling (16 September 2022), measured groundwater depths ranged between 2.10 m (AEC43BH02) and 6.04 m and (AEC43BH03).

No potential ACM was recovered from the sieved bulk fill sample from AEC43TP25 (depth 0-0.2 m). Results for using the photoionisation detector (PID) were less than 5 ppm, indicating a low potential for the presence of volatile contaminants.

Selected soil samples were analysed for combinations of contaminants of potential concern including metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRH, BTEX, PAH, OCP, OPP, PCB, total phenols and asbestos (in 500 mL of soil). A sample of the pipe (PACM1) from AEC43TP06 was analysed for asbestos. The fill sample from AEC43TP30, depth 0-0.1 m, was analysed for lead in toxicity characteristic leaching procedure (TCLP) for waste classification assessment purposes. A summary of analytical results is provided in Tables I1 and I3, Appendix D. Concentrations of chemicals for all analysed soil samples were within the site assessment criteria adopted for the DSI. Asbestos was detected in:

- The pipe sample (PACM1) from AEC43TP06;
- The 500 mL fill sample from AEC43TP02, depth 0 - 0.1 m. Chrysotile asbestos was identified in 0.1261 g of fibrous matted material. The concentration (0.0116% w/w) of fibrous asbestos (FA) and asbestos fines (AF) exceeded the health screening level (0.001% w/w) adopted for friable asbestos for the DSI; and
- The 500 mL fill sample from AEC43TP09, depth 0 - 0.1 m. Chrysotile asbestos was identified in 3.1082 g of fibre cement material (>7 mm in size).

It was noted that the majority of the site's surface had a thick cover of grass which inhibited making observations for potential ACM on surface soils. It was also noted that only a small amount of soil is retrieved from hand auger boreholes (compared to excavated test pits) and so observations for potential ACM in fill was limited where hand augers were utilised.

Based on field observations and test results, it appears that asbestos impacted soil at AEC43TP02 and AEC43TP09 is limited to surface or near surface fill (approximately 0.1 m to 0.2 m thick) and may be as a result of impacts from hazardous building materials that have been at the site. It was concluded in the DSI that a remediation action plan (RAP) should be prepared for remediation of the site and incorporate procedures for suspected contamination finds and asbestos pipe finds. Prior to demolition, a hazardous materials building survey should be undertaken for structures that will be demolished at the site (if not undertaken already).

6. Conceptual Site Model

The data collected during previous investigations generally confirmed that for certain potential contaminant sources outlined in the preliminary CSM in the DSI, potentially complete pathways to the identified receptors exist, whereas for others, they do not. The source, pathway and receptor linkages are summarised in Table 3.

Potential Sources

Based on the current investigation, the following sources of contamination have been identified:

- S1: Asbestos (as FA/AF and bonded asbestos) impacted surface soil / fill presumably from hazardous building materials that have been at the site. Asbestos impacted surface soil / fill has been identified at AEC43TP02 and AEC43TP09. It is noted that aerial photographs from 2018 and 2019 (Metromap) indicate that there has previously been litter / debris at the site, particularly near structures, including at the area of AEC43TP02 and AEC43TP09. It is presumed that part of this litter / debris contained ACM and is a possible source of the asbestos in surface soil / fill; and
- S2: In-ground asbestos pipe. It is noted that the in-ground asbestos pipe may not be a source of soil contamination if the asbestos pipe is in good condition, however, given the identified asbestos impacted soil (S1) will need to be addressed and the observed section of asbestos pipe (approximately 0.3 m long) next to the asbestos pipeline at AEC43TP06, the asbestos pipe has been listed as a source.

Potential Receptors

The following potential receptors have been identified:

- R1: Construction workers for SMWSA;
- R2: Maintenance workers (following construction of SMWSA);
- R3: Future site users (e.g., pedestrians, rail workers and visitors); and
- R4: Adjacent site users.

Potential Pathways

The following potential pathways have been identified:

- P1: Inhalation of dust.

A summary of the potentially complete exposure pathways for the proposed land use is shown in the table below.

Table 3: Summary of Potentially Complete Exposure Pathways (Proposed Land Use)

Source	Transport Pathway	Receptor
S1: Asbestos impacted surface soil / fill S2: In-ground asbestos pipe	P1: Inhalation of dust	R1: Construction workers for SMWSA; R2: Maintenance workers (following construction of SMWSA); R3: Future site users (e.g., pedestrians, rail workers and visitors); and R4: Adjacent site users.

It is noted that the concentration of asbestos in ACM in fill at AEC43TP09 has not been quantified by sieving / screening of a bulk sample for asbestos, so it is not known if the fibre cement material in exceeds the applicable health screening levels. Given the test location's close proximity to AEC43TP02, it is assumed that the fill at AEC43TP09 is contaminated with asbestos for the purposes of preparing this RAP.

7. Remediation Extent

Based on the findings of the DSI, the extent of remediation comprises:

- Remediation Area 1: The area of asbestos impacted surface soil / fill at AEC43TP02 and AEC43TP09. The approximate extent of Remediation Area 1 is shown on Drawing AEC43-02, Appendix A, and covers approximately 2000 m^2 to a depth of approximately 0.1 m. The actual extent (the final remediation extent) will be established at the completion of the excavation of the area during remediation; and
- Remediation Area 2: Asbestos pipe identified at AEC43TP06, generally running north to south, and any associated pipe fragments that may be present along this alignment. The approximate extent of Remediation Area 2 shown on Drawing AEC43-02, Appendix A, covers a length of approximately 25 m, however, it is noted that it could be significantly longer. The asbestos pipe possibly extends to the site boundary and beyond. The depth of remediation is at the base of the pipe which is approximately 0.4 m below ground level. The remediation extent for the asbestos pipe, for the purposes of site remediation, terminates at the site boundary.

8. Remediation Options Assessment

Section 6 (16) of Volume 1 of NEPC (2013) lists the *preferred hierarchy of options for site clean-up and / or management* which is outlined as follows:

- *On-site treatment of the contamination so that it is destroyed, or the associated risk is reduced to an acceptable level; and*
- *Off-site treatment of excavated soil, so that the contamination is destroyed, or the associated risk is reduced to an acceptable level, after which soil is returned to the site; or*

if the above are not practicable:

- *Consolidation and isolation of the soil on-site by containment with a properly designed barrier; and*
- *Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material;*

or,

- *Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.*

For the asbestos contaminated soil, it is noted that:

- The NSW EPA, *Position Statement - WA guidelines for asbestos contaminated sites* (April 2022) states that emu picking of asbestos is not permitted where asbestos is identified as FA / AF or as a remedial approach to 'clean' asbestos contaminated soils for reuse on site. The asbestos cannot be destroyed by treatment;
- On-site containment of asbestos contaminated soil would consist of the placement of a layer of clean soil or a permanent pavement cap over contaminated soils remaining at the site so as to contain the soil contamination within a barrier. Any retained contaminated soils would need to be subject to ongoing management, typically under an environmental management plan (EMP), which would need to be legally enforceable. Containment of the asbestos contaminated soil within the SCAW project boundaries is considered to be a suitable option for remediation of the asbestos contaminated soils given that there is likely to be sufficient space. It is noted that containment at the site (AEC 43) is considered not to be practicable given the excavation and construction requirements for SCAW at AEC 43. The benefit of containment is that there may be some beneficial reuse of the contaminated soil at the SCAW project. The disadvantage of containment is the need for ongoing management;
- Removal of contaminated material to an approved facility (licensed landfill) is considered to be an appropriate option. The benefits of this option include that the potential exposure risk is removed, and ongoing management is negated. The disadvantages of this option include that it does not follow the principal of sustainability as the soils are not subject to re-use at the site (or elsewhere) and the movement of trucks to and from the landfill can create traffic issues (which have other general environmental impacts); and
- Management without remediation is considered to not be appropriate for the proposed development given that excavation works at the asbestos contaminated area are proposed and these works may result in an exposure risk to the identified potential receptors.

Given that the in-ground asbestos pipe is at the proposed excavation area, it will need to be removed and disposed off-site as asbestos waste to a landfill authorised to accept asbestos waste (as per *Work Health and Safety Regulation 2017*).

9. Remediation Strategy

The preferred remediation strategy for Remediation Area 1, as agreed with CPBUI JV and Sydney Metro, is to excavate and, as much as possible, contain the asbestos contaminated soil within a proposed mound at the northern part of Lot 51 Deposited Plan 1276956 (which has street address 43B Luddenham Road, Orchard Hills), in an area identified as 'PS105' which is within the SCAW project boundaries. It is noted that NSW EPA Environment Protection Licence (EPL) 21695 allows for transport of excavated material suitable for re-use within the SCAW project boundaries to be transported to another area within the SCAW project boundaries by road. The dimensions and encapsulation structure of the proposed mound is yet to be determined as CPBUI JV plan to stockpile asbestos contaminated material encountered from all parts of the SCAW project at PS105 and then determine the volume of asbestos contaminated soil requiring encapsulation for design of the mound. The capping material is likely to comprise 'clean' soil with grass coverage. The design and plan for encapsulating the soil, including a validation plan, is to be captured in a remediation action plan (that is separate to this document and is to be prepared at a later time). Sydney Metro would be responsible for maintenance and management of the completed mound under an asbestos management plan or environmental management plan (which will pe prepared at a later time). The proposed location for the future mound and associated stockpiling area is shown on Drawing A1, Appendix A.

The remediation strategy for in-ground asbestos pipe (Remediation Area 2) is disposal of the pipe to a licensed landfill facility. Soil in close proximity to the pipe that is found to have been impacted with asbestos following separation of the pipe from the soil, will be subject to the same remediation strategy as for asbestos contaminated soil at Remediation Area 1.

The remediation strategy does not include a methodology for the removal of any hazardous building materials from structures.

9.1 Sequence of Remediation

The general sequence of remediation shall be determined by the Contractor (CPBUI JV) and should consider the following sequence:

- Task 1: Asbestos pipe removal (Remediation Area 2) with validation of its removal, and possibly relocation of associated asbestos impacted soil to PS105 and validation of its removal;
- Task 2: Excavation and relocation of asbestos contaminated soil (Remediation Area 1) to PS105, and validation of its removal; and
- Task 3: Remediation of asbestos identified from a (proposed) data gap investigation (if any) which will further assess the site for asbestos contamination, and site walkover following stripping of vegetation.

9.1.1 Task 1: Remediation Area 2 – Asbestos Pipe Removal

The actual sequence of works will depend on the programme of the (Class A or B licensed) Asbestos Contactor, however, it is foreseen to include the sequence below. All works involving removal of the asbestos pipe (identified at AEC43TP06) must be undertaken by the Asbestos Contractor. The proposed sequence comprises the following:

- Notification and site establishment works in accordance with the WHS Regulations. SafeWork NSW is to be notified in writing at least five days before the licensed asbestos removal work commences. An asbestos removal control plan (ARCP) is to be prepared for the asbestos removal work by the licensed asbestos removal contractor;
- All works will be conducted in a safe manner and to minimise environmental impacts (see Section 15);
- The Asbestos Contractor is to be employed to remove the asbestos pipe. Advice for the works should be provided by the Occupational Hygienist (licensed Asbestos Assessor or competent person as defined in the *Work Health and Safety Regulation 2017*). It is recommended that air monitoring is undertaken for the asbestos removal works;
- The contractor is first to excavate soil above and either side of the initial section of pipe to a depth where the pipe becomes accessible for removal. Care is to be taken not to scrape the pipe with the bucket or hoe as this can result in friable shards of cementitious material coming off into the surrounding soil. The excavation is to continue along either side of the pipe until the first pipe collar can be accessed. Excavated soil / fill observed to not contain asbestos should be stockpiled on one side of the trench. 200 micron thick plastic sheeting is to be placed on the other side of the excavation;
- The section of pipe is then to be sprayed with PVA solution to seal the asbestos pipe then carefully split at the collar with minimal breakage and lifted out using the excavator bucket / hoe or sling (strap) attached to the excavator and tied around the pipe. The pipe is to be laid on the plastic sheeting. All sections of pipe will then be wrapped in the plastic sheeting as soon as practicable, sealed with duct tape and placed in a skip or truck for removal off-site to a suitably licensed facility capable of accepting asbestos materials;
- Soil from immediately around the pipe and any soil visually impacted by asbestos is to be stockpiled on the plastic sheeting after the pipe has been wrapped and removed;
- The trench will be visually inspected for cement residue on the exposed soil surface previously beneath and around the pipe. If any residue is seen, then a shallow scrape of soil will be undertaken along the length of the removed pipe section and stockpiled on plastic sheeting. The spoil on both sides of the trench will be inspected, sampled and tested by the Environmental Consultant at the frequency provided in Section 12;
- From the results of sampling and testing, the Environmental Consultant is to provide advice on:
  - Suitability to be reused elsewhere on the SCAW project site;
  - Suitability to be transported to the PS105 stockpiling area for future encapsulation; or
  - The appropriate waste classification for off-site disposal.
- This process will be repeated until the pipe has been removed to a suitable extent (beyond any proposed excavation areas);

- During removal works and / or validation of stockpiled materials, interim clearance inspections may need to be undertaken by the Occupational Hygienist. (Any clearance certificates are to be provided to the Environmental Consultant);
- Upon completion of the removal works, the excavated area will be subject to final visual clearance inspection of exposed areas undertaken by the Occupational Hygienist;
- Once all asbestos materials have been removed and this has been confirmed through visual and analytical means (where applicable), a clearance certificate report will be prepared by the Occupational Hygienist); and
- Following clearance, validation inspection and sampling is to be undertaken by the Environmental Consultant (see Section 11.4.2). Advice for further work is to be provided by the environmental consultant where validation results indicate that asbestos contamination is present.

Asbestos cement pipe in 'good' condition is considered to have asbestos in non-friable form. It is noted, however, that if the pipe is found to be significantly degraded or damaged, then it may be deemed by the Occupational Hygienist that friable asbestos is present. If this is the case, the asbestos removal work (as listed above) must be undertaken by an Asbestos Contractor with a Class A licence. In addition, air monitoring, clearance inspections and the issue of clearance certificates is to be done by a licensed Asbestos Assessor.

Asbestos contaminated soil transported to PS105 is to be stockpiled on geofabric and completely covered in geofabric and secured to prevent the geofabric cover from being removed by wind. Sediment controls (hay bales, sandbags and / or silt fencing) are to be used around stockpiles at the stockpiling area. Stockpiles are to be clearly labelled (pegged or spray painted on the geofabric) and a site record is to be kept including the source location of each stockpile, the position of each stockpile (e.g., coordinates) at PS105 and the date of its placement at PS105. This information is to be provided to the Environmental Consultant for validation reporting. (Further information on stockpiling requirements is provided in the Site Management Plan, Appendix H).

All works associated with the removal and validation of the asbestos pipe(s) is to be appropriately documented for inclusion in the validation report for the site.

9.1.2 Task 2: Remediation Area 1 – Asbestos Contaminated Soil Removal

The remediation of asbestos contaminated fill identified thus far at AEC43TP02 and AEC43TP09 will be undertaken as follows:

- An asbestos removal control plan (ARCP) is to be prepared for the asbestos removal work by the licensed asbestos removal contractor. The work associated with asbestos remediation will be undertaken by an Asbestos Contractor holding a Class A licence. SafeWork NSW is to be notified in writing at least five days before the licensed asbestos removal work commences. Monitoring for airborne asbestos fibres is to be carried out by a licensed Asbestos Assessor (Occupational Hygienist) during the excavation and removal of asbestos contaminated materials;
- All works will be conducted in a safe manner and to minimise environmental impacts (see Section 15);
- The initial excavation area of approximately 50 m long by 40 m wide, around test pits AEC43TP02 and AEC43TP09, will be marked out. The initial excavation area is shown on Drawing AEC43-02 Appendix A. (Note that the actual remediation area may extend beyond this arbitrary area);

- Excavation of identified contaminated soils, extending over the initial area and to a minimum depth of 0.1 m into natural soil (which is anticipated to be approximately 0.3 m below ground level based on the test pit logs for AEC43TP02 and AEC43TP09);
- The extent of the excavation may need to be increased (vertically or horizontally) where signs of contamination (possible ACM or building rubble) are identified by the licensed Asbestos Assessor and / or Environmental Consultant;
- Stockpiling of the excavated soil on an area covered with a suitable plastic membrane to minimise the potential for contaminating soils beneath. In dry and windy conditions, the stockpile will be lightly wetted and covered with plastic whilst awaiting disposal;
- Upon completion of the excavation works, the excavation area will be subject to final visual clearance inspection of exposed areas undertaken by the Occupational Hygienist. Once all asbestos materials have been removed from the excavated area and this has been confirmed through visual and analytical means (where applicable), a clearance certificate report (or interim clearance report) will be prepared by the Occupational Hygienist;
- Validation samples from the excavation pit are to be collected by the Environmental Consultant (as per Section 11.4);
- Samples are to be collected from the stockpile by the Environmental Consultant at the sampling frequency provided in Section 12). From the results of sampling and testing, the Environmental Consultant is to provide advice on:
  - Suitability to be reused elsewhere on the SCAW project site;
  - Suitability to be transported to the PS105 stockpiling area for future encapsulation; or
  - The appropriate waste classification for off-site disposal.
- The excavation is to be expanded under the direction of the Environmental Consultant where test results of validation samples do not meet the remediation acceptance criteria. Subsequent clearance inspection of exposed areas of the excavation is to be undertaken by the Occupational Hygienist and a (interim) clearance certificate is to be provided. Validation sampling of the expanded excavation is to be undertaken by the Environmental Consultant. Additional testing of the excavated soil may be required for suitability for reuse or waste classification assessments. This process may need to be repeated (until all results meet the remediation acceptance criteria);
- At the completion of excavation works and removal of the asbestos impacted stockpile to PS105 or to a licensed landfill, a final clearance inspection is to be carried out and written certification is to be provided by the Occupational Hygienist that the area is safe to be accessed and worked. Following clearance, the area may be reopened for further general excavation or construction work; and
- If required, backfilling of the excavations with suitable material (deemed suitable by the Environmental Consultant and, if required, a geotechnical engineer).

Asbestos contaminated soil transported to PS105 is to be stockpiled on geofabric and covered in geofabric and secured to prevent the geofabric cover from being removed by wind. Sediment controls (hay bales, sandbags and / or silt fencing) are to be used around stockpiles at the stockpiling area. Stockpiles are to be clearly labelled (pegged or spray painted on the geofabric) and a site record is to be kept including the source location of each stockpile, the position of each stockpile (e.g., coordinates) at PS105 and date of its placement at PS105. This information is to be provided to the Environmental

Consultant for validation reporting. (Further information on stockpiling requirements is provided in the Site Management Plan, Appendix H).

9.1.3 Task 3: Remediation of Asbestos Identified in Proposed Test Pits or Site Walkover

Section 11.4.2 describes the validation sampling plan for any asbestos found in additional test pits needed to characterise the site. Where asbestos contamination is identified, it is likely that the procedures described in Sections 9.1.1 and 9.1.2 will need to be adopted. Advice will also need to be provided by the Environmental Consultant to confirm the method of remediation and the initial extent of impacted fill and related remediation.

10. Assessment Criteria

10.1 Remediation Acceptance Criteria

The remediation acceptance criteria which are health screening levels sourced from NEPC (2013), for the remediation works described in Section 9 are as follows:

- Bonded asbestos: 0.02% w/w;
- Fibrous asbestos (FA) and Asbestos Fines (AF): 0.001% w/w; and
- No visible asbestos for surface soil for all forms of asbestos.

The health screening level for bonded asbestos is for a generic recreational land use to account for the passive open space component of the proposed development (which is a more sensitive land use than the rail corridor). The health screening level for bonded asbestos for a commercial / industrial land use (0.05% w/w) may be applicable in some circumstances (i.e., where soil is to remain within the rail corridor), however, given that the surficial soil / fill is proposed to be stripped and relocated, the less conservative health screening level has not been adopted as the primary criterion.

10.2 Site Assessment Criteria

Additional area(s) of contamination encountered beyond those outlined in Section 7, during the course of remediation and excavation works will be subject to the contingency plan or unexpected find protocol (Appendix E) and assessed using the SAC in Appendix F. This is on the provision that other considerations such as risks to groundwater are also taken into account. The SAC were adopted for the DSI and are also shown on the analytical results summary tables in Appendix D.

The SAC should also be used as part of the assessment framework for imported soils.

11. Validation Plan

11.1 Data Quality Objectives

The data quality objectives (DQO) for the validation plan are included in Appendix G.

11.2 Validation Assessment Requirements

The following site validation work will be required:

- Field assessment by the Environmental Consultant comprising:
  - Visual inspections, including taking photographs for record purposes;
  - Collecting validation samples from excavations and stockpiles (and stockpile footprints) resulting from the removal of contaminated soils;
  - Collection of soil samples from test pits across the site for assessment for asbestos; and
  - Visual inspections following vegetation removal.
- Laboratory analysis of validation samples at a NATA accredited laboratory (generally for asbestos, the contaminant of concern relevant to the remediation area);
- Comparison by the Environmental Consultant of the laboratory results with the SAC and / or RAC as appropriate (refer to Section 10);
- Review of clearance inspection reports (prepared by the Occupational Hygienist) by the Environmental Consultant; and
- Preparation by the Environmental Consultant of a validation report detailing the methods and results of the remediation works and validation assessment.

Field assessment validation works are discussed in the following sections.

11.3 Validation of Remediation Areas

11.3.1 Remediation Area 1

Following the excavation of asbestos impacted soil, Remediation Area 1 is to be subject to visual assessment by the Environmental Consultant. (It is noted that the Occupational Hygienist is to conduct visual inspections to provide clearance). The walkover of the area is to be on conducted on a 3 m by 3 m grid.

Validation sampling at Remediation Area 1 will be undertaken by the Environmental Consultant. The sampling frequency will depend on the volume or area to be assessed and the previous results. The following sampling frequencies will be adopted but may be modified by the Environmental Consultant to take into account previous results, where applicable:

- Base of excavation: one sample per 25 m^2 on a general grid pattern (with a minimum of three samples collected); and

- Sides of excavation: one sample per 5 m length. Samples will be collected from the depth of concern (which is expected to be 0-0.1 m depth).

The above sampling frequency may be modified by the Environmental Consultant based on observations. For natural soils, samples will comprise 500 mL soil samples which will be analysed for asbestos. For fill, samples will comprise 10 L bulk soil samples and 500 mL soil samples for analysis for asbestos. The bulk samples will be subject to onsite screening / sieving for ACM as described in Section 11.4. Laboratory analysis will be undertaken at a NATA accredited laboratory.

Where contaminated soils are stored on bare soils, the footprint of the stockpile will require validation following removal of the contaminated soils. The sampling frequency will be one sample per 25 m^2 on a general grid pattern across the stockpile footprint. Samples will comprise 500 mL soil samples which will be analysed for asbestos (and other contaminants of concern if identified during the remediation work).

Validation sample test results will be compared to the RAC. Where the RAC are considered to have not been met, the remediation excavation(s) will be expanded to 'chase-out' impacted material, as instructed by the Environmental Consultant, with the validation sampling then continuing into the extended excavation. This process will continue until the impacted material has been fully chased out.

11.3.2 Remediation Area 2

Following the completion of asbestos pipe removal work, Remediation Area 2 is to be subject to visual assessment (along the length of the area) by the Environmental Consultant. (It is noted that the Occupational Hygienist is to conduct visual inspections to provide clearance).

Validation sampling is to be undertaken by the Environmental Consultant along the trench resulting from the pipe removal work including:

- Along the base of the trench resulting from the pipe removal works at a frequency of at least one sample per 5 m length; and
- At each side of the trench, at the approximate depth of the pipe's original position, at a frequency of at least one sample per 5 m length.

Natural soil samples from the trench will comprise 500 mL soil samples which will be analysed for asbestos. If the samples from the trench are fill, samples will comprise 500 mL soil samples and 10 L bulk soil samples. Bulk samples will be subject to onsite sieving/screening as described in Section 11.5. Laboratory analysis will be undertaken at a NATA accredited laboratory.

Excavated soil from the trench that has been stockpiled separately from the asbestos pipe and asbestos impacted soil, is to be sampled by the Environmental Consultant at a frequency of at least one sample per 10 m^3. Samples are to be collected throughout the length and depth of the stockpiled material. Samples will comprise 500 mL soil samples and 10 L bulk soil samples. Bulk samples will be subject to onsite sieving / screening as described in Section 11.4. Representative samples of any observed potential ACM will be analysed for asbestos.

Where contaminated soils are stored on bare soils, the footprint of the stockpile will require validation following removal of the contaminated soils. The sampling frequency will be one sample per 25 m^2 on

a general grid pattern across the stockpile footprint. Samples will comprise 500 mL soil samples which will be analysed for asbestos (and other contaminants of concern if identified during the remediation work).

11.4 Inspection and Test Pits for Remainder of Site

Following stripping of vegetation at the site, the Environmental Consultant is to do a walkover across the stripped area to observe for signs of contamination, in particular for potential ACM on the ground surface. Similarly, following demolition of structures, the Environmental Consultant is to do a walkover of the ground surface of the footprints of the structures to observe for signs of contamination (including potential ACM). Walkovers are to be on conducted on a 3 m by 3 m grid.

According to NSW EPA, *Sampling Design Part 1 - application, Contaminated Land Guidelines,* 2022 (NSW EPA, 2022), greater sampling densities should generally be used for asbestos compared to those considered appropriate for other purposes. This is because asbestos can occur widely and unpredictably and, as a discrete contaminant, it can be hard to detect using conventional sampling regimes (according to Western Australian Department of Health, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*, May 2009 (WA DOH, 2009)[1] which is referenced in NEPC (2013)). WA DOH (2009) recommends a minimum of 54 sample points for an area covering 1.66 ha where there is known asbestos. To achieve the recommended sample density, an additional 24 test pits are to be excavated. The positions of the proposed test pits are to completement the previous sample locations. Proposed test pit locations are shown on Drawing AEC43-2, Appendix A. The test pit positions may be adjusted slightly to target areas that are observed to have a higher potential for asbestos contamination, such as where surface soil is observed to contain building rubble or other debris (e.g., from building demolition).

Test pits will be excavated into the top of natural soil to confirm the depth of fill (which, based on the DSI results, is likely to be less than 0.5 m deep). At least one sample of fill (or surface soil if no fill is present) is to be collected by the Environmental Consultant from each location with additional samples to be collected for each different fill layer and at least one sample per 1 m depth of fill. Fill samples will be subject to screening / sieving as per the following procedure (from NEPC, 2013):

- Weigh the 10 L bulk sample;
- Each bulk sample is to be sieved through a 7 mm aperture sieve. Components of the soil larger than 7 mm can be removed from the sieve by hand. Clods of soil are to be broken by hand and inspected by hand; and
- Potential ACM retained on the sieve are to be collected as a sample and weighed. The condition of the ACM was also recorded on field notes. (Representative samples of potential ACM will be subject to laboratory analysis to determine the presence of asbestos).

Where building rubble / anthropogenic materials are not observed in the fill / surface soil in a test pit, the soil sample will be collected from a depth of 0-0.1 m.

[1] It is noted that WAH DOH (2009) has been superseded by WA DOH, *Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia*, 2021 (WA DPOH, 2021). At the time of preparing this RAP, according to the Position Statement on the NSW EPA website, NSW EPA was in support of the proposed number of sampling points for the sites larger than 0.2 ha specified in Tables 4 and 5 of WA DOH 2021. With reference to these tables, the recommended sample density for a 1.66 ha site where asbestos is known is the same in WA DOH (2009) and WA DOH (2021).

500 mL soil samples from each test pit location will be analysed at the laboratory for asbestos. Laboratory analysis will be undertaken at a NATA accredited laboratory.

Validation sample test results will be compared to the RAC. Where the remediation criteria are considered to have not been met, the Environmental Consultant is to provide advice on how remediation and validation is to be undertaken (which is likely to be similar to that for Remediation Area 1, or, in the case of asbestos pipe, similar to that for Remediation Area 2).

12. Waste Removal & Disposal

Disposal of waste (outside of the SCAW project area) must be to an appropriately licensed waste facility, as per *Protection of the Environment Operations Act 1997* NSW (POEO Act) and the *Protection of the Environment (Waste) Regulation 2014* NSW. Any waste disposed outside of the SCAW project area must be initially classified (in a report) by the Environmental Consultant in accordance with:

- NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste* (NSW EPA, 2014a);
- NSW EPA *Waste Classification Guidelines, Part 2: Immobilisation of Waste* (NSW EPA, 2014b); and
- NSW EPA *Addendum to the Waste Classification Guidelines (2014) - Part 1: Classifying Waste* (NSW EPA, 2016) [addendum for per- and poly-fluoroalkyl substances (PFAS)].

Samples will be collected from stockpiles at various depths to characterise the full depth of the material. The frequency is to be determined by the Environmental Consultant based on the risk of contamination and heterogeneity of the material.

The suggested sampling frequency for contaminants of potential concern other than asbestos, sourced from NSW EPA (2022)[2], for the initial assessment of stockpiles comprising similar materials shall be:

- For stockpiles up to 200 m^3: one sample per 25 m^3, with a minimum of three per stockpile;
- For stockpiles of 200 m^3 to 2500 m^3: a minimum of 10 samples for application of statistics; and
- For stockpiles of greater than 2500 m^3: one sample per 250 m^3 or part thereof.

Where asbestos is suspected of being present (but not known) the following sample densities are required for asbestos:

- for disposal to a licensed landfill: three samples for stockpiles less than 75 m^3, plus one sample for every additional 75 m^3; and
- for transport to a licensed recycling facility: one sample per 25 m^3 with each sample comprising a 500 mL sample for AF / FA analysis and a 10 L bulk sample for asbestos sieving / screening as per the method described in NEPC (2013).

[2] The sampling densities sourced from NSW EPA (2022) are also presented in Table 2 and Table 3 of EPA Victoria, *Industrial Waste Resource Guidelines,* 2009.

Laboratory analysis of samples will be determined by the Environmental Consultant following a review of any applicable previous results. The general analytical suite will likely comprise metals (arsenic, cadmium, chromium, lead, mercury and nickel), TRH, BTEX, PAH, OCP, OPP, PCB, phenols and asbestos. Analysis will be undertaken at NATA accredited laboratories.

Although not applicable for asbestos contaminated soil, it may be possible to classify excavated soil / fill for reuse on another site under a relevant NSW EPA resource recovery order (RRO) so that it can be used on other sites under the requirements of the corresponding NSW EPA resource recovery exemption (RRE). For this option, the frequency of sampling should be in accordance with the relevant RRO and the contaminants to be analysed will be determined by the Environmental Consultant. The Environmental Consult will provide a report confirming the suitability of the spoil for reuse under a RRO, or otherwise.

All waste must be tracked by the Remediation Contractor from 'cradle to grave'. Copies of all consignment notes / disposal dockets (or similar) and Environment Protection Licences for receipt and disposal of the materials must be maintained by the Remediation Contractor as part of the site log and must be provided to the Environmental Consultant for inclusion in the validation report.

13. Imported Material

Any soil, aggregate, etc., imported for the remediation works must have contaminant concentrations that meet the relevant criteria outlined in Section 10 and have no aesthetic issues of concern. Imported materials will only be accepted for use at the site if:

- It can legally be accepted onto the site. For example:
  - The material is classified as virgin excavated natural material (VENM) and is accompanied by a report / certificate prepared by a qualified environmental consultant;
  - The material classified under a NSW EPA RRO, provided the material can be used on site in accordance with the corresponding RRE. This could include excavated natural material (ENM), classified under NSW EPA Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, *The excavated natural material order 2014* (NSW EPA, 2014d); and
  - It is permitted by a condition of the NSW EPA Environmental Protection Licence 21695 which is for the SCAW project. It is noted in the licence (dated 21 September 2022) *that excavated material suitable for re-use within the premises may be transported to another part of the premises or from the Sydney Metro Western Sydney Airport Project including on-airport sites, to the premises by road*. [The 'premises' is defined as the Sydney Metro Western Sydney Airport SCAW package footprint].
- Visual inspection of the imported soil confirms that the soil has no signs of concern and is consistent with those described in the supporting classification documentation;
- Have no aesthetic issues of concern; and
- The materials are validated (by inspection / sampling) by the Environmental Consultant as being suitable for use at the site.

The classification report / certificate for all material proposed for import (including quarried material) must be reviewed and approved in writing by the Environmental Consultant prior to import. Materials to be imported may need to meet geotechnical requirements which are to be assessed by others, as required.

For the importation of quarried (virgin excavated) material, the imported material is to be inspected by the environmental consultant, however, validation sampling and analysis need not be undertaken where no signs of contamination are noted.

For VENM (not from a quarry) or ENM, the validation sampling and analysis undertaken by the environmental consultant will generally be:

- Inspection of the material at the source site;
- Check sampling at a rate of one sample per 200 m^3 to 1000 m^3, with a minimum of five samples for each source site, for material that has been imported to the site, depending on the risk of contamination at the source site; and
- Laboratory analysis of samples for potential contaminants based on source site history (from supplier documentation). This may include eight priority metals, PAH, TRH, BTEX, OPP, OCP, PCB, phenols and asbestos.

For RRO materials other than ENM, the validation sampling and analysis will need to be determined by the Environmental Consultant and will depend on the source of the material and adequacy of the supporting documentation provided. Any recycled materials (such as recycled aggregates) must be sampled at a minimum frequency of one sample per 25 m^3 for imported material, with a minimum of three samples per imported batch. Analysis for recycled materials will generally be for asbestos, PCB, eight priority metals, TRH and OCP and any other potential contaminants identified by the Environmental Consultant. The recycled material will not be permitted to be used on site until the results of the inspection and laboratory analysis have been approved in writing by the Environmental Consultant. Prior inspection of the material at the source site by the Environment Consultant is recommended where a batch (stockpile) has been designated for import to the site.

For material to be imported to site from other areas of the SCAW package, the requirement for check sampling by the environmental consultant will be determined based on the type of material and the supporting documentation (relating to the source of the material). Uncontaminated virgin excavated material (which has been tested and documented) may be subject to check sampling and analysis similar to that for VENM above. Fill (or topsoil) that has been or is to be imported from elsewhere should be sampled at a rate of one sample per 25 m^3. Laboratory analysis will depend on the potential contaminants associated with the source location. Typically, samples will be analysed for eight priority metals, PAH, TRH, BTEX, OPP, OCP, PCB and asbestos.

14. Quality Assurance and Quality Control

The data quality objectives (DQO) for the validation plan are included in Appendix G.

Samples analysed for asbestos will not be subject to inter-laboratory or intra-laboratory replicate analysis. To avoid the need for decontamination, samples for asbestos analysis will be collected using disposable nitrile gloves, changed for the collection of each sample.

For analysis of chemical contaminants (i.e., excluding asbestos analysis), field quality assurance and quality control (QA / QC) testing will include the following:

- 10% replicate sample analysis;
- Rinsate samples (where re-useable sampling equipment is used), analysed for the suite of analytes analysed by the majority of the primary samples; and
- Trip spike and trip blank samples (analysed for BTEX) (approximately one per batch of samples) where volatile organic compounds are considered to be a contaminant.

The laboratory will undertake analysis in accordance with its NATA accreditation, including in-house QA / QC procedures.

The field QC analytical results will be assessed using the following criteria:

- Sampling location rationale met the sampling objective;
- Standard operating procedures (SOP) are followed;
- Appropriate QA / QC samples are collected / prepared and analysed;
- Samples are stored under secure, temperature-controlled conditions;
- Chain of custody documentation is employed for the handling, transport and delivery of samples to the selected laboratory;
- Conformance with specified holding times;
- Field replicate samples will have a precision average of 30% relative percentage difference (RPD); and
- Rinsate samples will show that the sampling equipment (if used) is free of introduced contaminants, i.e., the analytes show that the rinsate sample is within the normal range for demineralised water.

Limits for laboratory QA / QC samples will depend on the laboratories' internal QA / QC system. Typical laboratory limits for laboratory QA / QC samples are as follows:

- Blank: less than the PQL;
- Duplicate: for >10 x PQL, the RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range of 20 - 50%;
- Matrix Spike: generally, 70-130% recovery for inorganics/metals and 60-140% recovery for organics;
- Laboratory Control Sample (LCS): generally 70-130% recovery for inorganics/metals and 60-140% recovery for organics; and

- Surrogate Spike: generally 70-130% recovery for inorganics/metals and 60-140% recovery for organics.

Field and laboratory test may be considered useable for the validation assessment after evaluation against the following data quality indicators (DQIs):

- Precision – a measure of variability or reproducibility of data;
- Accuracy – a measure of closeness of the data to the 'true' value;
- Representativeness – the confidence (qualitative) of data representativeness of media present on site;
- Completeness – a measure of the amount of usable data from a data collection activity; and
- Comparability – the confidence (qualitative) that data may be considered to be equivalent for each sampling and analytical event.

15. Management and Responsibilities

15.1 Site Management Plan

A general site management plan for the operational phase of site remediation is included in Appendix H. The management plan includes soil, noise, dust, work health safety (WHS), remediation schedule, hours of operation and incident response. The Remediation Contractor is to implement the general site management plan for the duration of remedial works by incorporating the plan into their over-arching construction environmental management plan (CEMP).

Site management is to be in accordance with the Environmental Protection Licence (21695).

15.2 Site Responsibilities

The site management plan (Appendix H) provides a summary of the general program management and associated responsibilities. Contact details for key utilities are also included in the event of needing to respond to any incidents.

15.3 Contingency Plan and Unexpected Finds Protocol

Plans for contingency situations along with an unexpected finds protocol for dealing with unexpected finds during remediation work / earthworks, are included in Appendix E.

16. Validation Reporting

16.1 Documentation

The following documents will need to be collated and reviewed by the Environmental Consultant as part of the validation assessment (including those items that are prepared by the Environmental Consultant):

- Any licences and approvals required for the remediation works;
- Waste classification report(s);
- Transportation Record: comprising a record of all truck-loads of soil (including aggregate) entering the site, including truck identification (e.g., registration number), date, time, source site, load characteristics (e.g., type of material, i.e., quarried aggregate, etc.), approximate volume, use (e.g., general site raising, service trenches, etc.);
- Disposal dockets: for any soil disposed off-site. The Remediation Contractor will supply records of transportation records, spoil source, spoil disposal location, and receipt provided by the receiving waste facility / site. Note: A record of the building materials disposed off-site is also be kept and provided to the on request;
- Imported materials records: records for any soil imported onto the site, including source site, classification reports, inspection records of soil upon receipt at site and transportation records;
- Records relating to any unexpected finds and contingency plans implemented;
- Laboratory certificates and chain-of-custody documentation;
- Inspections records from the Environmental Consultant;
- Photographic records by all contractors and consultants of the works undertaken within their purview of responsibilities;
- Airborne asbestos monitoring records (in the event that asbestos works are undertaken); and
- Interim / final visual and sampling clearances for any asbestos related works (in the event that asbestos works are undertaken).

16.2 Reporting

A validation assessment report will be prepared by the Environmental Consultant in accordance with NSW EPA (2020).

The validation report shall describe the remediation approach adopted, methodology, results and conclusion of the assessment and make a statement regarding the suitability of the site for the proposed development.

17. Conclusions

It is considered that the site can be made suitable for the proposed development subject to implementation of this RAP.

18. References

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NSW EPA. (2016). *Addendum to the Waste Classification Guidelines (2014) - Part 1: Classifying Waste.* NSW Environment Protection Authority.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land.* Contaminated Land Guidelines: NSW Environment Protection Authority.

19. Limitations

Douglas Partners (DP) has prepared this report (or services) for the SCAW project for SMWSA. The work was carried out under a Services Contract. This report is provided for the exclusive use of CPBUI JV for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and / or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and / or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during the previous investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and / or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the (environmental) components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Douglas Partners Pty Ltd

Appendix A

Drawings

LOCALITY PLAN

PATONS LANE
LUDDENHAM RD
LUDDENHAM RD
LUDDENHAM RD
SITE

CH 31300

AEC 43

AEC43HA22
AEC43HA23
AEC43BH03
AEC43BH02
AEC43TP25
AEC43HA24
AEC43TP28
AEC43TP29
AEC43HA18
AEC43HA19
AEC43TP21
AEC43TP26
AEC43HA20
AEC43TP27
AEC43HA13
AEC43HA07
AEC43HA14
AEC43TP15
AEC43TP16
AEC43TP17
AEC43BH01
AEC43HA30
AEC43HA08
SMGW-BH-B329 (C)
AEC43TP10
AEC43TP09
AEC43TP11
AEC43HA01
AEC43TP12
AEC43TP02
AEC43TP06a
AEC43TP03
AEC43TP05
AEC43TP06
AEC43TP04

SHED (CHEMICAL STORE)

BURIED ASBESTOS PIPE

ASBESTOS IDENTIFIED IN FILL (DEPTH 0-0.1m)

CH 31500
AEC 44
AEC44TP11
AEC44TP12

0 10 20 30 40 50 m

Legend

- SCAW Alignment
- EIS AEC: High Risk
- Approximate AEC43 Site Boundary
- Area of vegetation to be offset prior to disturbance
- Borehole (no GW installation), Cardno 2021
- Borehole / Groundwater Well
- Hand Auger Borehole
- Test Pit

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	CPBUI JV		
OFFICE:	Sydney	DRAWN BY:	MG
SCALE:	1:1000 @ A3	DATE:	25/10/2022

TITLE: **AEC43 Test Location Plan**
Sydney Metro Western Sydney Airport - SCAW
Elizabeth Drive, Badgerys Creek

N

PROJECT No:	204814.01
DRAWING No:	AEC43-01
REVISION:	Rev 0

EASTING 291410.9
NORTHING 6250261.2

EASTING 291559.8
NORTHING 6250242.9

CH 31300

AEC43HA22
AEC43HA23
AEC43BH03
AEC43BH02
AEC43HA24
AEC43TP25
AEC43TP28
AEC43TP29
AEC43HA18
AEC43HA19
AEC43TP21
AEC43TP26
AEC43HA20
AEC43TP27
AEC43HA13
AEC43HA07
AEC43HA14
AEC43TP15
AEC43TP16
AEC43TP17
AEC43BH01
AEC43HA30
AEC43HA08
CH 31400
SMGW-BH-B329 (C)
AEC43TP10
AEC43TP09
AEC43TP11
AEC43HA01
AEC43TP12
AEC43TP02
AEC43TP06a
AEC43TP03
AEC43TP05
AEC43TP06
AEC43TP04

AEC 43
AREA 1
AREA 2

SHED (CHEMICAL STORE)

BURIED ASBESTOS PIPE

EASTING 291396.0
NORTHING 6250155.6

ASBESTOS IDENTIFIED IN FILL (DEPTH 0-0.1m)

EASTING 291542.8
NORTHING 6250126.9

CH 31500
AEC 44
AEC44TP11
AEC44TP12

0 10 20 30 40 50 m

Legend

- SCAW Alignment
- EIS AEC: High Risk
- AEC43 Site Boundary - co-ordinates shown are for Zone 56, MGA 2020
- Area of vegetation to be offset prior to disturbance
- Remediation Areas
- Borehole (no GW installation), Cardno 2021
- Borehole / Groundwater Well for DSI
- Hand Auger Borehole
- Test Pit for DSI
- Proposed Test Pit for Asbestos Assessment

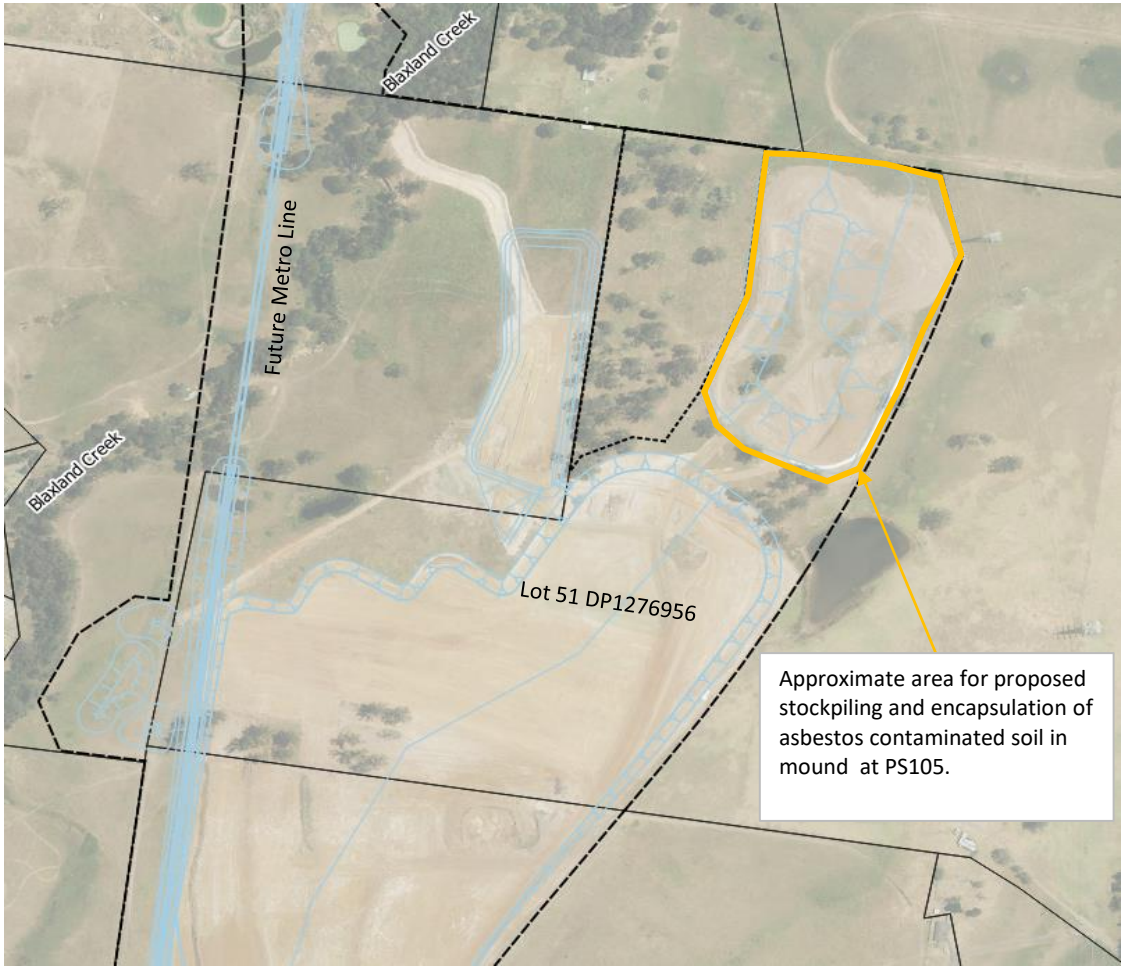
Douglas Partners
Geotechnics / Environment / Groundwater

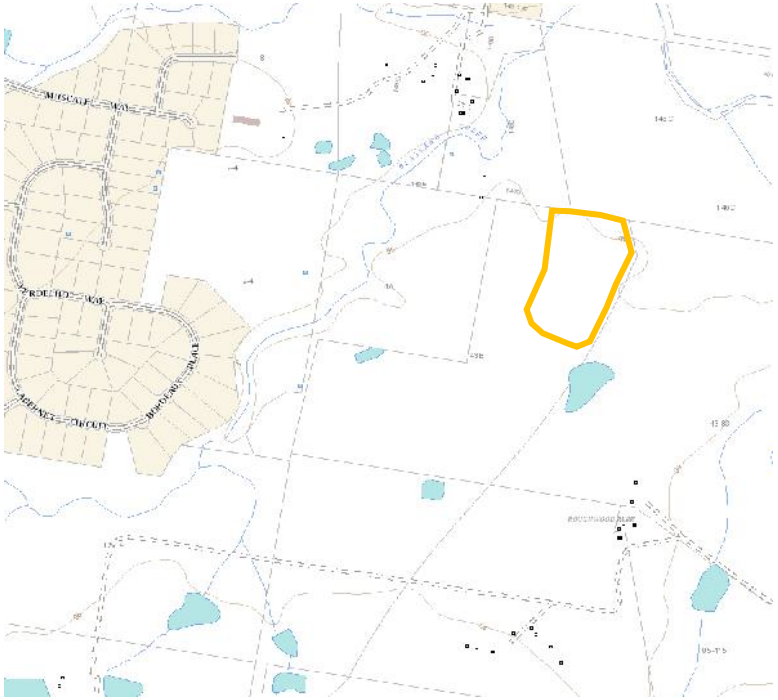
CLIENT:	CPBUI JV		
OFFICE:	Sydney	DRAWN BY:	MG
SCALE:	1:1000 @ A3	DATE:	22/11/2022

TITLE: **AEC43 Proposed Remediation Areas and Test Pits**
Sydney Metro Western Sydney Airport - SCAW
Elizabeth Drive, Badgerys Creek

N

PROJECT No:	204814.01
DRAWING No:	AEC43-02
REVISION:	Rev 1





Locality Plan

0 50 m

Approximate scale

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: CPBUI JV	**Location of Proposed Stockpiling and Encapsulation**	PROJECT No: 204814.01
	OFFICE: Sydney	**Sydney Metro Western Sydney Airport - SCAW**	DWG No: A1
	DATE: 21 Mar 2023	**Elizabeth Drive, Badgerys Creek**	REVISION: 0

Appendix B

Notes About this Report

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Appendix C

Borehole and Test Pit Logs from Previous Reports

PIEZOMETER CONSTRUCTION

HOLE NO : AEC43-BH01
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

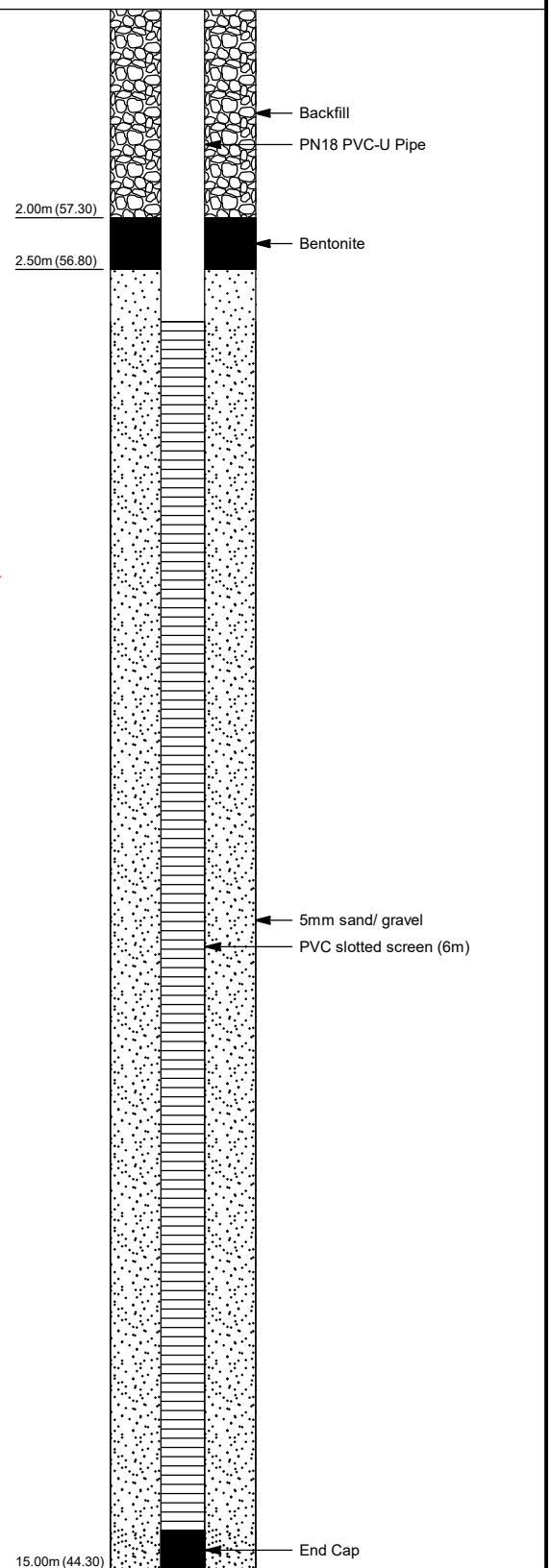
PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291549.1, N: 6250193.5 (56 MGA2020) SURFACE ELEVATION : 59.30 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : DB520 MOUNTING : Track CONTRACTOR : Numac

DATE STARTED : 25/08/22 DATE COMPLETED : 25/08/22 DATE LOGGED : 25/08/22 LOGGED BY : NB CHECKED BY : MB

DRILLING				MATERIAL			PIEZOMETER CONSTRUCTION DETAILS				
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	GROUND WATER LEVELS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL (See geotechnical log for soil/rock detail)	ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date / Static Water Level
							1			15.00 m 44.30 mAHD	25/08/2022
			0.0			0.20m TOPSOIL: sandy SILT: low plasticity, dark brown, fine grained sand, with rootlets					
					CI-CH	Silty CLAY: medium to high plasticity, pale grey, mottled orange-yellow					
						0.90m					
						Silty CLAY: medium to high plasticity, pale grey mottled red-brown, trace fine to medium grained, subangular ironstone gravel					
HW Casing			2.0		CI-CH						
						3.80m					
			4.0			SILTSTONE: dark brown and grey; highly weathered to fresh, very low to high strength					
			6.0								
						At 7.0m: dark grey					
		Not Encountered	8.0								
			10.0								
			12.0								
			14.0								
						AEC43-BH01 TERMINATED AT 15.00 m					
						15.00m Target depth					
AD/T											
WB	0-15% Water										



This report of well/VWP installation must be read in conjunction with accompanying notes and abbreviations. The geotechnical log is a summary only and the detailed log should be referred to for strata details and any core loss zones.

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Geotechnics / Environment / Groundwater

PIEZOMETER CONSTRUCTION

HOLE NO : AEC43-BH02
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291489.2, N: 6250245.4 (56 MGA2020) SURFACE ELEVATION : 59.70 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : DB520 MOUNTING : Track CONTRACTOR : Numac

DATE STARTED : 30/08/22 DATE COMPLETED : 30/08/22 DATE LOGGED : 30/08/22 LOGGED BY : NB CHECKED BY : MB

DRILLING				MATERIAL			PIEZOMETER CONSTRUCTION DETAILS
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	GROUND WATER LEVELS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL (See geotechnical log for soil/rock detail)	ID / Type / Stick Up & RL / Tip Depth & RL / Installation Date / Static Water Level
AD/T		Slow seep	0.0			0.20m TOPSOIL: silty CLAY: low to medium plasticity, dark brown, trace gravel and rootlets	1 / 9.20 m 50.50 mAHD / 30/08/2022
						Silty CLAY: medium to high plasticity, orange-brown, trace sand	
					CI-CH		
			2.0			2.00m	
						Silty CLAY: medium to high plasticity, pale grey and orange-yellow, trace sand	
					CI-CH		
						3.50m	
						Silty CLAY: medium to high plasticity, pale grey and orange	
			4.0		CI-CH		
						5.50m	
						SILTSTONE: dark brown-grey; highly weathered to fresh, very low to medium strength	
			6.0			At 6.0m: dark grey	
			8.0			9.20m	
						AEC43-BH02 TERMINATED AT 9.20 m Target depth	
			10.0				
			12.0				
			14.0				

1.00m (58.70) Backfill
PN18 PVC-U Pipe
1.50m (58.20) Bentonite
5mm sand/ gravel
PVC slotted screen (6m)
9.20m (50.50) End Cap

This report of well/VWP installation must be read in conjunction with accompanying notes and abbreviations. The geotechnical log is a summary only and the detailed log should be referred to for strata details and any core loss zones.

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PIEZOMETER CONSTRUCTION

HOLE NO : AEC43-BH03
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291410.0, N: 6250252.2 (56 MGA2020) SURFACE ELEVATION : 64.20 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : DB520 MOUNTING : Track CONTRACTOR : Numac

DATE STARTED : 30/08/22 DATE COMPLETED : 30/08/22 DATE LOGGED : 30/08/22 LOGGED BY : NB CHECKED BY : MB

DRILLING				MATERIAL			PIEZOMETER CONSTRUCTION DETAILS					
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	GROUND WATER LEVELS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL (See geotechnical log for soil/rock detail)	ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
							1			15.00 m	49.20 mAHD	30/08/2022
			0.0			0.15m TOPSOIL: silty CLAY: low to medium plasticity, dark brown, trace gravel and rootlets						
						Silty CLAY: medium to high plasticity, yellow-orange, trace sand						
AD/T					CI-CH							
HW Casing			2.0									
						3.00m Silty CLAY: medium to high plasticity, pale orange-red						
					CI-CH							
			4.0			4.50m SILTSTONE: dark brown-grey; highly weathered to fresh, very low to high strength						
			6.0			At 7.0m: dark grey						
			8.0									
WB	0-5% Water	Not Encountered	10.0									
			12.0									
			14.0									
			15.00m			AEC43-BH03 TERMINATED AT 15.00 m Target depth						

This report of well/VWP installation must be read in conjunction with accompanying notes and abbreviations. The geotechnical log is a summary only and the detailed log should be referred to for strata details and any core loss zones.

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NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : AEC43HA01
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291414.8, N: 6250165.5 (56 MGA2020) SURFACE ELEVATION : 64.90 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hand Tools MOUNTING : Hand Tools CONTRACTOR : Douglas Partners DRILLER : PJ

DATE STARTED : 18/08/22 DATE COMPLETED : 18/08/22 DATE LOGGED : 18/08/22 LOGGED BY : PJ CHECKED BY : MB

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
HA		E	Not Observed	ES 0.10m	0.0 64.9			0.10m FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL		FILL 0.00: PID <1
				0.20m ES 0.30m				Silty CLAY: high plasticity, red-brown mottled grey, trace fine ironstone gravel			RESIDUAL SOIL 0.20: PID <1 Field Replicate BD2/20220818 taken at 0.2-0.3m depth
				0.70m ES 0.80m	0.5 64.4		CH	0.80m	w~PL	F to St	0.70: PID <1
								BOREHOLE AEC43HA01 TERMINATED AT 0.80 m Target depth			
					1.0 63.9						
					1.5 63.4						
					2.0 62.9						
					2.5 62.4						
					3.0 61.9						
					3.5 61.4						
					4.0 60.9						
					4.5 60.4						
					5.0 59.9						

See Explanatory Notes for details of abbreviations & basis of descriptions.

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP02
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291436.0, N: 6250156.7 (56 MGA2020)	SURFACE ELEVATION : 64.20 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 18/08/22	LOGGED BY : PJ	CHECKED BY : MB
EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE		

DRILLING | MATERIAL

VE / PENETRATION / E / F / H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa (100 / 200 / 300 / 400)	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1
			0.30m ES 0.40m				0.20m Silty CLAY: high plasticity, red-brown mottled grey, trace fine to medium gravel, trace fine to medium siltstone gravel			×	RESIDUAL SOIL 0.30: HP =140 kPa 0.30: PID <1
				0.5		CH		w~PL	St to VSt		
			0.80m ES 0.90m				At 0.6m: grey mottled red-brown 0.90m			×	0.80: HP =200 kPa 0.80: PID <1
				1.0			EXCAVATION AEC43TP02 TERMINATED AT 0.90 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE / E / F / H / VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP03
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291460.3, N: 6250150.1 (56 MGA2020)	SURFACE ELEVATION : 63.60 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 17/08/22	LOGGED BY : PJ	CHECKED BY : MB

EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE

DRILLING | MATERIAL

VE / PENETRATION / E / F / H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa (100 / 200 / 300 / 400)	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1
			0.30m ES 0.40m				0.20m Silty CLAY: high plasticity, grey mottled orange-brown, trace fine to medium ironstone gravel			×	RESIDUAL SOIL 0.30: HP =230 kPa 0.30: PID <1
			0.80m ES 0.90m	0.5		CH		w~PL	VSt	×	0.80: HP =270 kPa 0.80: PID <1
				1.0			0.90m EXCAVATION AEC43TP03 TERMINATED AT 0.90 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE / E / F / H / VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP04
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291487.0, N: 6250139.4 (56 MGA2020)	SURFACE ELEVATION : 62.90 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 17/08/22	LOGGED BY : PJ	CHECKED BY : MB
EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE		

DRILLING | MATERIAL

VE / PENETRATION / E / F / H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa (100 / 200 / 300 / 400)	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1
			0.30m ES 0.40m	0.20m			Silty CLAY: high plasticity, red-brown, trace fine to medium ironstone gravel			×	Field Replicate BD4/20220817 taken at 0.0-0.1m depth RESIDUAL SOIL 0.30: HP =200 kPa 0.30: PID <1
			0.80m ES 0.90m	0.5		CH		w~PL	St to VSt		
				1.0			At 0.8m: grey mottled red-brown			×	0.80: HP =170 kPa 0.80: PID <1
				1.00m			EXCAVATION AEC43TP04 TERMINATED AT 1.00 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP05
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291505.9, N: 6250145.3 (56 MGA2020)	SURFACE ELEVATION : 62.40 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 17/08/22	LOGGED BY : PJ	CHECKED BY : MB

EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa 100 200 300 400	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			0.10m FILL: sandy CLAY: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1
			0.20m ES 0.30m				Silty CLAY: high plasticity, orange-brown, trace fine to medium ironstone gravel			X	RESIDUAL SOIL 0.20: HP =180 kPa 0.20: PID <1
				0.5		CH	At 0.4m: grey mottled orange-brown	w~PL	St		
			0.70m ES 0.80m							X	0.70: HP =170 kPa 0.70: PID <1
							0.90m EXCAVATION AEC43TP05 TERMINATED AT 0.90 m Target depth				
				1.0							
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP06
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291537.9, N: 6250145.4 (56 MGA2020)	SURFACE ELEVATION : 61.20 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 17/08/22	LOGGED BY : PJ	CHECKED BY : MB

EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa 100 200 300 400	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1 0.30: Pipe sample PACM1 taken at 0.3m depth
				0.40m			EXCAVATION AEC43TP06 TERMINATED AT 0.40 m Services present - pipe presumed to contain asbestos				
				0.5							
				1.0							
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP06a
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291539.4, N: 6250155.6 (56 MGA2020)	SURFACE ELEVATION : 60.90 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 17/08/22	LOGGED BY : PJ	CHECKED BY : MB
EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE		

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER 100 200 300 400 kPa	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1
			0.40m ES 0.50m	0.30m			Silty CLAY: high plasticity, red-brown, trace fine ironstone gravel			×	RESIDUAL SOIL 0.40: HP =200 kPa 0.40: PID <1
			0.90m ES 1.00m	0.5		CH		w~PL	St to VSt	×	0.90: HP =210 kPa 0.90: PID <1
				1.00m 1.0			EXCAVATION AEC43TP06a TERMINATED AT 1.00 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT
T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
U50 - Undisturbed Sample 50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D - Dry
M - Moist
W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : AEC43HA07
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291411.0, N: 6250199.4 (56 MGA2020) SURFACE ELEVATION : 65.40 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hand Tools MOUNTING : Hand Tools CONTRACTOR : Douglas Partners DRILLER : PJ

DATE STARTED : 18/08/22 DATE COMPLETED : 18/08/22 DATE LOGGED : 18/08/22 LOGGED BY : PJ CHECKED BY : MB

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
HA		E	Not Observed	ES 0.10m	0.0 65.4			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL		FILL 0.00: PID <1
				0.30m ES 0.40m				0.20m Silty CLAY: high plasticity, red-brown, trace fine to medium ironstone gravel			RESIDUAL SOIL 0.30: PID <1
				0.80m ES 0.90m	0.5 64.9		CH		w~PL	St to VSt	0.80: PID <1
								0.90m BOREHOLE AEC43HA07 TERMINATED AT 0.90 m Target depth			
					1.0 64.4						
					1.5 63.9						
					2.0 63.4						
					2.5 62.9						
					3.0 62.4						
					3.5 61.9						
					4.0 61.4						
					4.5 60.9						
					5.0 60.4						

See Explanatory Notes for details of abbreviations & basis of descriptions.

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NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : AEC43HA08
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291436.0, N: 6250184.8 (56 MGA2020) SURFACE ELEVATION : 64.50 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hand Tools MOUNTING : Hand Tools CONTRACTOR : Douglas Partners DRILLER : PJ

DATE STARTED : 19/08/22 DATE COMPLETED : 19/08/22 DATE LOGGED : 19/08/22 LOGGED BY : PJ CHECKED BY : MB

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
HA		E	Not Observed	ES 0.10m	0.0 64.5			0.10m FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL		FILL 0.00: PID <1
				0.30m ES 0.40m				Silty CLAY: high plasticity, red-brown mottled grey, trace fine ironstone gravel			RESIDUAL SOIL 0.30: PID <1
				0.80m ES 0.90m	0.5 64.0		CH		w~PL	St to VSt	0.80: PID <1
								0.90m BOREHOLE AEC43HA08 TERMINATED AT 0.90 m Target depth			
					1.0 63.5						
					1.5 63.0						
					2.0 62.5						
					2.5 62.0						
					3.0 61.5						
					3.5 61.0						
					4.0 60.5						
					4.5 60.0						
					5.0 59.5						

See Explanatory Notes for details of abbreviations & basis of descriptions.

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP09
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291462.4, N: 6250169.1 (56 MGA2020)	SURFACE ELEVATION : 63.40 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 17/08/22	LOGGED BY : PJ	CHECKED BY : MB

EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa 100 200 300 400	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1
			0.30m ES 0.40m	0.20m			Silty CLAY: high plasticity, grey mottled orange-brown, trace fine to medium ironstone gravel			×	RESIDUAL SOIL 0.30: HP =220 kPa 0.30: PID <1
			0.80m ES 0.90m	0.5		CH		w~PL	VSt	×	0.80: HP =240 kPa 0.80: PID <1
				1.0			EXCAVATION AEC43TP09 TERMINATED AT 1.10 m Target depth				
				1.10m							
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP10
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291493.8, N: 6250171.0 (56 MGA2020)	SURFACE ELEVATION : 62.50 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 17/08/22	LOGGED BY : PJ	CHECKED BY : MB

EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE

DRILLING | MATERIAL

VE / PENETRATION / E / F / H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1
			0.30m ES 0.40m	0.20m			Silty CLAY: high plasticity, red-brown, trace fine to medium ironstone gravel				RESIDUAL SOIL 0.30: HP =190 kPa 0.30: PID <1
			0.80m ES 0.90m	0.5		CH		w~PL	St to VSt		
				0.90m			At 0.8m: grey mottled red-brown				0.80: HP =220 kPa 0.80: PID <1
				1.0			EXCAVATION AEC43TP10 TERMINATED AT 0.90 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP11
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291518.7, N: 6250167.8 (56 MGA2020)	SURFACE ELEVATION : 61.50 (mAHD)
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket
DATE EXCAVATED : 17/08/22	LOGGED BY : PJ CHECKED BY : MB
EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE	

DRILLING | MATERIAL

PENETRATION (VE, E, F, H)	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION (Soil Type, Colour, Plasticity or Particle Characteristic, Secondary and Minor Components)	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	HAND PENETROMETER kPa (100–400)	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1
			0.30m ES 0.40m	0.20m			Silty CLAY: high plasticity, red-brown, trace fine to medium ironstone gravel			×	RESIDUAL SOIL 0.30: HP =200 kPa 0.30: PID <1
			0.80m ES 0.90m	0.5		CH		w~PL	St to VSt		
				1.0			At 0.8m: grey mottled red-brown			×	0.80: HP =200 kPa 0.80: PID <1
				1.20m			EXCAVATION AEC43TP11 TERMINATED AT 1.20 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE, E, F, H, VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP12
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291537.5, N: 6250160.6 (56 MGA2020)	SURFACE ELEVATION : 61.20 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 17/08/22	LOGGED BY : PJ	CHECKED BY : MB

EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa 100 200 300 400	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1
			0.30m ES 0.40m	0.20m		CH	Silty CLAY: medium to high plasticity, red-brown, trace fine to medium ironstone gravel	w~PL	St	×	RESIDUAL SOIL 0.30: HP =170 kPa 0.30: PID <1 Field Replicate BD3/20220817 taken at 0.3-0.4m depth
			0.80m ES 0.90m	0.5 0.60m		CH	Silty CLAY: high plasticity, grey mottled red-brown, trace fine to medium ironstone gravel, trace fine to medium siltstone gravel	w~PL	St to VSt	×	0.80: HP =200 kPa 0.80: PID <1
				1.0 1.10m			EXCAVATION AEC43TP12 TERMINATED AT 1.10 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : AEC43HA13
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291428.7, N: 6250204.8 (56 MGA2020) SURFACE ELEVATION : 64.90 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hand Tools MOUNTING : Hand Tools CONTRACTOR : Douglas Partners DRILLER : PJ

DATE STARTED : 19/08/22 DATE COMPLETED : 19/08/22 DATE LOGGED : 19/08/22 LOGGED BY : PJ CHECKED BY : MB

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
HA		E	Not Observed	ES 0.10m	0.0 64.9			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL		FILL 0.00: PID <1
				0.30m ES 0.40m	0.20m			Silty CLAY: high plasticity, red-brown			Field Replicate BD1/20220819 taken at 0.0-0.1m depth RESIDUAL SOIL 0.30: PID <1
				0.80m ES 0.90m	0.5 64.4		CH	At 0.7m: grey mottled orange	w~PL	St to VSt	0.80: PID <1
					1.0 63.9						
					1.10m			BOREHOLE AEC43HA13 TERMINATED AT 1.10 m Target depth			
					1.5 63.4						
					2.0 62.9						
					2.5 62.4						
					3.0 61.9						
					3.5 61.4						
					4.0 60.9						
					4.5 60.4						
					5.0 59.9						

See Explanatory Notes for details of abbreviations & basis of descriptions.

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NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : AEC43HA14
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291451.7, N: 6250196.3 (56 MGA2020) SURFACE ELEVATION : 63.70 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hand Tools MOUNTING : Hand Tools CONTRACTOR : Douglas Partners DRILLER : PJ

DATE STARTED : 19/08/22 DATE COMPLETED : 19/08/22 DATE LOGGED : 19/08/22 LOGGED BY : PJ CHECKED BY : MB

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
HA		E	Not Observed	ES 0.10m	0.0 63.7			0.10m FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL		FILL 0.00: PID <1
				0.20m ES 0.30m				Silty CLAY: high plasticity, red-brown mottled grey			RESIDUAL SOIL 0.20: PID <1
				0.70m ES 0.80m	0.5 63.2		CH		w~PL	St to VSt	0.70: PID <1
								0.90m BOREHOLE AEC43HA14 TERMINATED AT 0.90 m Target depth			
					1.0 62.7						
					1.5 62.2						
					2.0 61.7						
					2.5 61.2						
					3.0 60.7						
					3.5 60.2						
					4.0 59.7						
					4.5 59.2						
					5.0 58.7						

See Explanatory Notes for details of abbreviations & basis of descriptions.

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP15
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291485.3, N: 6250193.5 (56 MGA2020)	SURFACE ELEVATION : 62.40 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 18/08/22	LOGGED BY : PJ	CHECKED BY : MB

EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE

DRILLING | MATERIAL

VE / PENETRATION (E, F, H)	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	HAND PENETROMETER (100, 200, 300, 400)	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1
			0.30m ES 0.40m	0.20m		CH	Silty CLAY: medium to high plasticity, red-brown, trace fine to medium ironstone gravel	w~PL	St	×	RESIDUAL SOIL 0.30: HP =170 kPa 0.30: PID <1 Field Replicate BD1/20220818 taken at 0.3-0.4m depth
			0.80m ES 0.90m	0.5 0.70m		CH	Silty CLAY: high plasticity, grey mottled red-brown, trace fine to medium ironstone gravel, trace fine to medium siltstone gravel	w~PL	VSt	×	0.80: HP =220 kPa 0.80: PID <1
				0.90m			EXCAVATION AEC43TP15 TERMINATED AT 0.90 m Target depth				
				1.0							
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP16
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291502.2, N: 6250191.9 (56 MGA2020)	SURFACE ELEVATION : 61.80 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 17/08/22	LOGGED BY : PJ	CHECKED BY : MB

EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER 100 200 300 400	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1
			0.30m ES 0.40m	0.20m			Silty CLAY: medium to high plasticity, red-brown, trace fine to medium ironstone gravel			X	RESIDUAL SOIL 0.30: HP =230 kPa 0.30: PID <1
			0.80m ES 0.90m	0.5		CH		w~PL	VSt		Field Replicate BD5/20220817 taken at 0.3-0.4m depth
				0.90m						X	0.80: HP =240 kPa 0.80: PID <1
				1.0		CH	Silty CLAY: high plasticity, grey mottled red-brown, trace fine to medium ironstone gravel	w~PL	VSt	X	0.90: HP =240 kPa
				1.20m			EXCAVATION AEC43TP16 TERMINATED AT 1.20 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP17
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291541.8, N: 6250189.6 (56 MGA2020)	SURFACE ELEVATION : 59.80 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 17/08/22	LOGGED BY : PJ	CHECKED BY : MB
EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE		

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa 100 200 300 400	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1
			0.30m ES 0.40m	0.20m			Silty CLAY: high plasticity, red-brown, trace fine to medium ironstone gravel				RESIDUAL SOIL 0.30: HP =200 kPa 0.30: PID <1
			0.80m ES 0.90m	0.5		CH		w~PL	St to VSt		0.80: HP =180 kPa 0.80: PID <1
				1.00m 1.0			EXCAVATION AEC43TP17 TERMINATED AT 1.00 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT
T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
U50 - Undisturbed Sample 50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D - Dry
M - Moist
W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : AEC43HA18
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291409.1, N: 6250222.6 (56 MGA2020) SURFACE ELEVATION : 65.30 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hand Tools MOUNTING : Hand Tools CONTRACTOR : Douglas Partners DRILLER : PJ

DATE STARTED : 18/08/22 DATE COMPLETED : 18/08/22 DATE LOGGED : 18/08/22 LOGGED BY : PJ CHECKED BY : MB

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
HA		E	Not Observed	ES 0.10m	0.0 65.3			0.10m FILL: sandy SILT: medium to high plasticity, dark brown, with fine to medium gravel, trace rootlets	w~PL		FILL 0.00: PID <1
				0.20m ES 0.30m				Silty CLAY: high plasticity, red-brown			RESIDUAL SOIL 0.20: PID <1
					0.5 64.8		CH		w~PL	St	
				0.70m ES 0.80m				0.80m			0.70: PID <1
								BOREHOLE AEC43HA18 TERMINATED AT 0.80 m Target depth			
					1.0 64.3						
					1.5 63.8						
					2.0 63.3						
					2.5 62.8						
					3.0 62.3						
					3.5 61.8						
					4.0 61.3						
					4.5 60.8						
					5.0 60.3						

See Explanatory Notes for details of abbreviations & basis of descriptions.

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NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : AEC43HA19
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291446.3, N: 6250221.1 (56 MGA2020) SURFACE ELEVATION : 63.40 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hand Tools MOUNTING : Hand Tools CONTRACTOR : Douglas Partners DRILLER : PJ

DATE STARTED : 22/08/22 DATE COMPLETED : 22/08/22 DATE LOGGED : 22/08/22 LOGGED BY : PJ CHECKED BY : MB

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
HA		E	Not Observed	ES 0.10m	0.0 63.4			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL		FILL 0.00: PID <1
				0.30m ES 0.40m				0.20m Silty CLAY: high plasticity, red-brown mottled grey, trace fine to medium ironstone gravel			RESIDUAL SOIL 0.30: PID <1
				0.80m ES 0.90m	0.5 62.9		CH		w~PL	St to VSt	0.80: PID <1
								0.90m BOREHOLE AEC43HA19 TERMINATED AT 0.90 m Target depth			
					1.0 62.4						
					1.5 61.9						
					2.0 61.4						
					2.5 60.9						
					3.0 60.4						
					3.5 59.9						
					4.0 59.4						
					4.5 58.9						
					5.0 58.4						

See Explanatory Notes for details of abbreviations & basis of descriptions.

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NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : AEC43HA20
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291466.3, N: 6250213.9 (56 MGA2020) SURFACE ELEVATION : 62.60 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hand Tools MOUNTING : Hand Tools CONTRACTOR : Douglas Partners DRILLER : PJ

DATE STARTED : 18/08/22 DATE COMPLETED : 18/08/22 DATE LOGGED : 18/08/22 LOGGED BY : PJ CHECKED BY : MB

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
HA		E	Not Observed	ES 0.10m	0.0 62.6			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL		FILL 0.00: PID <1
				0.30m ES 0.40m				0.20m Silty CLAY: high plasticity, red-brown, trace fine to medium ironstone gravel			RESIDUAL SOIL 0.30: PID <1 Field Replicate BD4/20220818 taken at 0.3-0.4m depth
				0.80m ES 0.90m	0.5 62.1		CH		w~PL	St	0.80: PID <1
								0.90m BOREHOLE AEC43HA20 TERMINATED AT 0.90 m Target depth			
					1.0 61.6						
					1.5 61.1						
					2.0 60.6						
					2.5 60.1						
					3.0 59.6						
					3.5 59.1						
					4.0 58.6						
					4.5 58.1						
					5.0 57.6						

See Explanatory Notes for details of abbreviations & basis of descriptions.

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP21
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291490.8, N: 6250217.2 (56 MGA2020)	SURFACE ELEVATION : 61.40 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 18/08/22	LOGGED BY : PJ	CHECKED BY : MB
EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE		

DRILLING | MATERIAL

VE / PENETRATION / E / F / H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa (100 / 200 / 300 / 400)	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <1
			0.30m ES 0.40m	0.20m			Silty CLAY: high plasticity, orange-brown, trace fine to medium ironstone gravel, trace fine to medium siltstone gravel			×	RESIDUAL SOIL 0.30: HP =150 kPa 0.30: PID <1
			0.80m ES 0.90m	0.5		CH	At 0.7m: grey mottled orange-brown	w~PL	St	×	0.80: HP =190 kPa 0.80: PID <1
				1.00m 1.0			EXCAVATION AEC43TP21 TERMINATED AT 1.00 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE / E / F / H / VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : AEC43HA22
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291415.3, N: 6250252.6 (56 MGA2020) SURFACE ELEVATION : 64.10 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hand Tools MOUNTING : Hand Tools CONTRACTOR : Douglas Partners DRILLER : PJ

DATE STARTED : 18/08/22 DATE COMPLETED : 18/08/22 DATE LOGGED : 18/08/22 LOGGED BY : PJ CHECKED BY : MB

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
HA		E	Not Observed	ES 0.10m	0.0 64.1			0.10m FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL		FILL 0.00: PID <1
				0.30m ES 0.40m				Silty CLAY: high plasticity, red-brown			RESIDUAL SOIL 0.30: PID <1
				0.80m ES 0.90m	0.5 63.6		CH	At 0.6m: grey mottled red-brown	w~PL	St	0.80: PID <1
								0.90m BOREHOLE AEC43HA22 TERMINATED AT 0.90 m Target depth			
					1.0 63.1						
					1.5 62.6						
					2.0 62.1						
					2.5 61.6						
					3.0 61.1						
					3.5 60.6						
					4.0 60.1						
					4.5 59.6						
					5.0 59.1						

See Explanatory Notes for details of abbreviations & basis of descriptions.

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NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : AEC43HA23
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291434.3, N: 6250253.2 (56 MGA2020) SURFACE ELEVATION : 63.20 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hand Tools MOUNTING : Hand Tools CONTRACTOR : Douglas Partners DRILLER : PJ

DATE STARTED : 18/08/22 DATE COMPLETED : 18/08/22 DATE LOGGED : 18/08/22 LOGGED BY : PJ CHECKED BY : MB

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
HA		E	Not Observed	ES 0.10m	0.0 63.2			0.10m FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL		FILL 0.00: PID <1
				0.20m ES 0.30m				Silty CLAY: high plasticity, red-brown			RESIDUAL SOIL 0.20: PID <1
				0.70m ES 0.80m	0.5 62.7		CH		w~PL	St	0.70: PID <1
								0.90m BOREHOLE AEC43HA23 TERMINATED AT 0.90 m Target depth			
					1.0 62.2						
					1.5 61.7						
					2.0 61.2						
					2.5 60.7						
					3.0 60.2						
					3.5 59.7						
					4.0 59.2						
					4.5 58.7						
					5.0 58.2						

See Explanatory Notes for details of abbreviations & basis of descriptions.

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NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : AEC43HA24
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291466.0, N: 6250244.0 (56 MGA2020) SURFACE ELEVATION : 61.80 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hand Tools MOUNTING : Hand Tools CONTRACTOR : Douglas Partners DRILLER : PJ

DATE STARTED : 18/08/22 DATE COMPLETED : 18/08/22 DATE LOGGED : 18/08/22 LOGGED BY : PJ CHECKED BY : MB

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
HA		E	Not Observed	ES 0.10m	0.0 61.8			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL		FILL 0.00: PID <1
				0.30m ES 0.40m	0.20m			Silty CLAY: high plasticity, red-brown mottled grey			Field Replicate BD3/20220818 taken at 0.0-0.1m depth RESIDUAL SOIL 0.30: PID <1
				0.80m ES 0.90m	0.5 61.3		CH		w~PL	St	0.80: PID <1
					1.00m 1.0 60.8			BOREHOLE AEC43HA24 TERMINATED AT 1.00 m Target depth			
					1.5 60.3						
					2.0 59.8						
					2.5 59.3						
					3.0 58.8						
					3.5 58.3						
					4.0 57.8						
					4.5 57.3						
					5.0 56.8						

See Explanatory Notes for details of abbreviations & basis of descriptions.

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP25
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291495.6, N: 6250246.0 (56 MGA2020)	SURFACE ELEVATION : 59.10 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 18/08/22	LOGGED BY : PJ	CHECKED BY : MB

EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa 100 200 300 400	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets, hose	w~PL			FILL 0.00: PID <1
			0.30m ES 0.40m	0.20m			Silty CLAY: high plasticity, orange-brown, trace fine to medium ironstone gravel			X	RESIDUAL SOIL 0.30: HP =140 kPa 0.30: PID <1
			0.80m ES 0.90m	0.5		CH	At 0.7m: orange-brown mottled grey	w~PL	St	X	0.80: HP =180 kPa 0.80: PID <1
				1.00m 1.0			EXCAVATION AEC43TP25 TERMINATED AT 1.00 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT
T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
U50 - Undisturbed Sample 50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D - Dry
M - Moist
W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP26
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291513.1, N: 6250215.6 (56 MGA2020)	SURFACE ELEVATION : 60.30 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 02/09/22	LOGGED BY : PJ	CHECKED BY : MB

EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE

DRILLING | MATERIAL

VE / PENETRATION (E, F, H)	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	HAND PENETROMETER (kPa)	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <5
			0.30m ES 0.40m	0.20m			Silty CLAY: high plasticity, red-brown, trace fine to medium ironstone gravel	w~PL	St to VSt	× 100–400	RESIDUAL SOIL 0.30: HP =200 kPa 0.30: PID <5
			0.80m ES 0.90m	0.5		CH	At 0.7m: orange-brown mottled grey			× 100–400	0.80: HP =200 kPa 0.80: PID <5
				1.00m 1.0			EXCAVATION AEC43TP26 TERMINATED AT 1.00 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP27
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291544.6, N: 6250211.5 (56 MGA2020)	SURFACE ELEVATION : 59.00 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 02/09/22	LOGGED BY : PJ	CHECKED BY : MB

EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE

DRILLING | MATERIAL

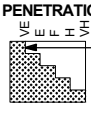
VE / PENETRATION / E / F / H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa 100 200 300 400	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <5
			0.30m ES 0.40m	0.20m			Silty CLAY: high plasticity, red-brown, trace fine to medium ironstone gravel				Field Replicate BD6/20220902 taken at 0.0-0.1m depth
				0.5		CH		w~PL	St to VSt		RESIDUAL SOIL 0.30: HP =180 kPa 0.30: PID <5
			0.80m ES 0.90m	0.90m			EXCAVATION AEC43TP27 TERMINATED AT 0.90 m Target depth				0.80: HP =200 kPa 0.80: PID <5
				1.0							
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION



WATER

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP28
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291522.9, N: 6250237.0 (56 MGA2020)	SURFACE ELEVATION : 58.90 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 02/09/22	LOGGED BY : PJ	CHECKED BY : MB

EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa 100 200 300 400	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <5
			0.30m ES 0.40m	0.20m			Silty CLAY: high plasticity, orange-brown, trace fine to medium ironstone gravel			×	RESIDUAL SOIL 0.30: HP =180 kPa 0.30: PID <5
			0.80m ES 0.90m	0.5		CH	At 0.7m: orange-brown mottled grey	w~PL	St to VSt	×	0.80: HP =190 kPa 0.80: PID <5
				1.00m 1.0			EXCAVATION AEC43TP28 TERMINATED AT 1.00 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC43TP29
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291551.4, N: 6250238.0 (56 MGA2020)	SURFACE ELEVATION : 57.60 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 02/09/22	LOGGED BY : PJ	CHECKED BY : MB

EXCAVATION DIMENSIONS : 1.00 m LONG 0.80 m WIDE

DRILLING | MATERIAL

VE / PENETRATION / E / F / H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa (100 200 300 400)	STRUCTURE & Other Observations
		Not Observed	ES 0.10m	0.0			FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace rootlets	w~PL			FILL 0.00: PID <5
			0.30m ES 0.40m				0.20m Silty CLAY: high plasticity, pale orange-brown, trace fine to medium ironstone gravel			X	RESIDUAL SOIL 0.30: HP =180 kPa 0.30: PID <5
			0.80m ES 0.90m	0.5		CH		w~PL	St	X	0.80: HP =180 kPa 0.80: PID <5
				1.0			0.90m EXCAVATION AEC43TP29 TERMINATED AT 0.90 m Target depth				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

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NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : AEC43HA30
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : Elizabeth Drive - Badgerys Creek

POSITION : E: 291429.8, N: 6250194.2 (56 MGA2020) SURFACE ELEVATION : 65.00 (mAHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hand Tools MOUNTING : Hand Tools CONTRACTOR : Douglas Partners DRILLER : PJ

DATE STARTED : 21/09/22 DATE COMPLETED : 21/09/22 DATE LOGGED : 21/09/22 LOGGED BY : PJ CHECKED BY : MB

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER LOSS	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	STRUCTURE & Other Observations
HA		F	Not Observed	ES 0.10m 0.20m ES 0.30m	0.0 / 65.0			0.10m FILL: sandy SILT: medium to high plasticity, dark brown, fine to medium sand, trace wood	w~PL		FILL 0.00: PID <5
							CI-CH	Silty CLAY: medium to high plasticity, red-brown	w~PL	F to St	RESIDUAL SOIL 0.20: PID <5
								0.40m BOREHOLE AEC43HA30 TERMINATED AT 0.40 m Refusal			
					0.5 / 64.5						
					1.0 / 64.0						
					1.5 / 63.5						
					2.0 / 63.0						
					2.5 / 62.5						
					3.0 / 62.0						
					3.5 / 61.5						
					4.0 / 61.0						
					4.5 / 60.5						
					5.0 / 60.0						

See Explanatory Notes for details of abbreviations & basis of descriptions.

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NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : **SMGW-BH-B329 REV 1**
FILE / JOB NO : 80021888
SHEET : 1 OF 3

PROJECT : SMWSA GI
LOCATION : USYD

POSITION : E: 291453.369, N: 6250187.439 (56 MGA2020) SURFACE ELEVATION : 63.747 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Geo 300 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : Aiden

DATE STARTED : 25/3/21 DATE COMPLETED : 26/3/21 DATE LOGGED : 25/3/21 LOGGED BY : NL CHECKED BY : TH/KP

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/V HW Casing	N/A	E-F	Not Encountered	0.40m D 0.60m	0.0 63.7			FILL: SILTY CLAY: brown to dark brown, low to medium plasticity, with rootlets			FILL
								0.20m			
							CI	CLAY: brown, orange, medium plasticity, trace fine to medium grained, angular gravel	M		POSSIBLE RESIDUAL SOIL
								0.60m		St	
				1.00m			CI-CH	CLAY: orange-brown mottled pale grey, medium to high plasticity, trace silt, trace fine grained, sub-angular gravel	M		
				SPT 6, 13, 18 N=31	1.0 62.7			1.00m CLAY: red-brown mottled pale grey, high plasticity, with silt			1.00: Non-calcareous
				1.45m 1.50m U			CH			VSt	
				1.90m				1.80m			
				2.00m D	2.0 61.7		CI-CH	SILTY CLAY: pale grey, medium to high plasticity, with dark-brown clay pocket	W		
				2.50m				2.00m SILTY CLAY: red-brown mottled pale grey, high plasticity, trace fine to coarse grained sand, trace fine to medium grained gravel			
		F-H		SPT 6, 15/50mm N=R			CH			H	2.50: Non-calcareous
				2.70m				2.71m Continued as Cored Drill Hole			
					3.0 60.7						
					4.0 59.7						
					5.0 58.7						
					6.0 57.7						
					7.0 56.7						
					8.0 55.7						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD

CORED DRILL HOLE LOG

HOLE NO : SMGW-BH-B329 REV 1
FILE / JOB NO : 80021888
SHEET : 2 OF 3

PROJECT : SMWSA GI
LOCATION : USYD

POSITION : E: 291453.369, N: 6250187.439 (56 MGA2020) SURFACE ELEVATION : 63.747 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Geo 300 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : Aiden

DATE STARTED : 25/3/21 DATE COMPLETED : 26/3/21 DATE LOGGED : 25/3/21 LOGGED BY : NL CHECKED BY : TH/KP

CASING DIAMETER : HW BARREL (Length) : 3.00 m BIT : Impreg BIT CONDITION : Good

DRILLING					MATERIAL				FRACTURES	
PROGRESS: DRILLING & CASING	PROGRESS: WATER	(CORE LOSS RUN %) / DRILL DEPTH	RQD (%)	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral VL (-0.1) L (-0.4) M (-1.3) H (-3.8) VH (-12.5) EH	NATURAL FRACTURE (mm) 20 40 100 300 1000	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
					0.0 63.7						
					1.0 62.7						
					2.0 61.7						
							2.71m START CORING AT 2.71m				
HQ	0-5% Water LOSS	0% LOSS	61		3.0 60.7		SANDY CLAY (CH): red-brown mottled pale grey, high plasticity, with fine to medium grained, sub-angular gravel	RS			2.90: Non-calcareous
							3.07m SANDSTONE: brown, medium grained, bedded at 0-10°, with mudstone laminations, trace mudstone clasts	MW			3.08-3.10: BP 10° Clay CT IR 2 mm 3.14-3.16: EWS 10 mm 3.24: BP 0° CN PR RF 3.30: Non-calcareous 3.42: JT 5° CN IR RF 3.54: BP 10° Clay VNR UN RF
				Is(50) d=0.02 a=0.24 MPa							3.71: JT 0° IR RF Fractured 3.74: Mudstone clast
					4.0 59.7						3.88: BP 5° CN PR RF 3.90: Calcareous 4.07: BP 0° Clay VNR PR RF
				Is(50) d=0.2 a=0.39 MPa			4.35m	HW			4.20: Non-calcareous 4.22-4.24: EWS 20 mm 4.29: JT 15° Fe SN IR RF
							SANDSTONE: grey to pale grey, massive, with mudstone clasts	SW			4.44: JT 40° CN CU RF 4.50: Non-calcareous
		4.80					4.70m 4.80m MUDSTONE: brown, moderately fractured	MW			4.70-4.76: JT 90° Clay CT IR RF 1 mm
		0% LOSS	98				5.00m SILTSTONE: dark grey, with 15-20mm mudstone clasts				4.73: Mudstone clast 4.80: Calcareous
				Is(50) d=0.25 a=0.24 MPa	5.0 58.7		5.18m SANDSTONE: pale grey, medium grained, with 2-50mm siltstone clasts, irregular, sub-rounded, iron stained	SW			4.83: BP 0° sandy gravel IR RF 4.86: BP 5° sandy gravel IR RF 5.10: Calcareous
				UCS =5.3 MPa			5.37m SANDSTONE: pale grey, medium grained, massive, iron stained				
				5.51m			SANDSTONE: pale grey, indistinctly bedded at 10°, 2-5mm spacing, trace carbonaceous laminations				5.80: Calcareous
				Is(50) d=0.36 a=0.44 MPa Is(50) d=0.37 a=0.6 MPa Is(50) d=0.22 a=0.3 MPa	6.0 57.7			MW			6.20: Calcareous 6.26: BP 5° CN PR RF
					7.0 56.7						6.90: Calcareous
				Is(50) d=0.69 a=1.03 MPa			7.40m: becoming massive	SW			7.20: Calcareous 7.23: BP 15° CN PR RF
		7.76		Is(50) d=1.52 a=1.36 MPa							7.52: BP 15° CN IR RF
		0% LOSS	100		8.0 55.7						7.80: Calcareous

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD

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CORED DRILL HOLE LOG

HOLE NO : SMGW-BH-B329 REV 1
FILE / JOB NO : 80021888
SHEET : 3 OF 3

PROJECT : SMWSA GI
LOCATION : USYD

POSITION : E: 291453.369, N: 6250187.439 (56 MGA2020) SURFACE ELEVATION : 63.747 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Geo 300 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : Aiden

DATE STARTED : 25/3/21 DATE COMPLETED : 26/3/21 DATE LOGGED : 25/3/21 LOGGED BY : NL CHECKED BY : TH/KP

CASING DIAMETER : HW BARREL (Length) : 3.00 m BIT : Impreg BIT CONDITION : Good

DRILLING

PROGRESS: DRILLING & CASING; WATER

(CORE LOSS RUN %) / DRILL DEPTH

RQD (%)

SAMPLES & FIELD TESTS

DEPTH (m) / RL (m AHD)

MATERIAL

GRAPHIC LOG

DESCRIPTION
ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)

Weathering

ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral
VL -0.1 L -0.4 M -1.3 H -3.8 VH -12.5 EH

FRACTURES

NATURAL FRACTURE (mm) 20 40 100 300 1000

ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other

DEPTH (m) / RL (m AHD)	(CORE LOSS RUN %) / DRILL DEPTH	RQD (%)	SAMPLES & FIELD TESTS	DESCRIPTION	Weathering	ADDITIONAL DATA
8.0 / 55.7	0% LOSS	100	Is(50) d=0.35 a=0.3 MPa	SANDSTONE: pale grey, indistinctly bedded at 10°, 2-5mm spacing, trace carbonaceous laminations *(continued)*	MW	8.30: Calcareous
						8.90: Calcareous
9.0 / 54.7			Is(50) d=0.45 a=0.52 MPa		SW	9.10: Calcareous
						9.70: Calcareous
10.0 / 53.7			Is(50) d=0.35 a=0.4 MPa		MW	10.20: Calcareous
						10.30: BP 15° Clay VNR PR RF
						10.44: BP 15° sandy gravel CT PR RF 1 mm
	10.78					
	0% LOSS	94		10.80m: becoming indistinctly bedded at 10°, 5-10mm spacing with carbonaceous laminations		10.90: Calcareous
11.0 / 52.7			Is(50) d=0.26 a=0.37 MPa			11.30: Calcareous
			Is(50) d=0.5 a=0.12 MPa	11.48m		11.50: BP 0° PR RF
				SILTSTONE: dark grey, bedded at 15° with sandstone laminations, 5-10mm spacing, cross bedded at 0°, undulating bedding planes, trace carbonaceous laminations		11.61-11.64: BP 5° Clay VNR IR RF
						11.73-11.78: JT 60° UN RF
						11.78: BP 0° Sandy Clay VNR IR RF
						11.90: Non-calcareous
12.0 / 51.7			Is(50) d=0.18 a=0.18 MPa			12.34: BP 20° CU RF
						12.51-12.55: BP 0° PR RF
						12.70: Non-calcareous
						12.88: BP 0° CN CU RF
13.0 / 50.7			Is(50) d=0.06 a=0.17 MPa		EW / MW	12.92-12.98: EWS 60 mm
						13.20: Non-calcareous
						13.32: BP 10° CN PR RF
	13.89					
	0% LOSS	98				13.68: BP 0° PR RF
						13.80: Non-calcareous
14.0 / 49.7				SILTSTONE: grey, trace mudstone and sandstone laminations		14.20: Non-calcareous
			Is(50) d=0.2 a=0.19 MPa			
				14.59-14.75m: with mudstone clasts up to 40mm		14.72-14.75: SZ 20 mm
						14.75: Non-calcareous
						14.93: BP 10° CN PR RF
15.0 / 48.7	15.18			15.18m		15.10: Non-calcareous
			Is(50) d=0.22 a=0.16 MPa	BOREHOLE SMGW-BH-B329 REV 1 TERMINATED AT 15.18 m Target depth		
16.0 / 47.7						

HQ

0-5% Water LOSS

See Explanatory Notes for details of abbreviations & basis of descriptions.

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Appendix D

Summary of Results Tables

Douglas Partners
Geotechnics / Environment / Groundwater

Table I1: Summary of Laboratory Results – Metals, TRH, BTEX, PAH, Phenol, OCP, OPP, PCB, Asbestos

				Metals								TRH					BTEX				PAH				Phenols	OCP													OPP		PCB	Asbestos	Asbestos		
				As Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	TRH C6-C10 less BTEX	TRH >C10-C16 less Naphthalene	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene [b]	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs	Total Phenols	DDD	DDT	DDT+DDE+DDD [c]	DDE	DDT	Aldrin & Dieldrin	Total Chlordane	Endrin	Total Endosulfan	Heptachlor	Hexachlorobenzene	Methoxychlor	Other OCP	Chlorpyrifos	Other OPP	Total PCB	Asbestos in material	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation
			PQL	4	0.4	1	1	1	0.1	1	1	25	50	25	50	100	100	0.2	0.5	1	1	0.1	0.05	0.5	0.05	5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1		0.1				<0.001
Sample ID	Soil type	Depth	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	g	g	%(w/w)
AEC43HA01	Fill	0 - 0.1 m	18/08/22	**25**	<0.4	**12**	**17**	**18**	<0.1	**7**	**200**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	**0.2**	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43HA01 - [TRIPLICATE]	Fill	0 - 0.1 m	18/08/22	**6**	<0.4	**14**	**20**	**21**	<0.1	**9**	**200**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43HA01	Natural	0.2 - 0.3 m	18/08/22	**4**	<0.4	**12**	**15**	**7**	<0.1	**3**	**18**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	-
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
BD2/20220818	Natural	0.2 - 0.3 m	18/08/22	<4	<0.4	**10**	**13**	**6**	<0.1	**3**	**14**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	-
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP02	Fill	0 - 0.1 m	18/08/22	**7**	<0.4	**15**	**11**	**18**	<0.1	**9**	**36**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	0.1009	**0.0116**
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP03	Fill	0 - 0.1 m	17/08/22	**4**	<0.4	**11**	**14**	**13**	<0.1	**6**	**29**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP04	Fill	0 - 0.1 m	17/08/22	**7**	<0.4	**17**	**17**	**17**	<0.1	**9**	**29**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
BD4/20220817	Fill	0 - 0.1 m	17/08/2022	**10**	<0.4	**28**	**19**	**23**	<0.1	**17**	**59**	<20	<50	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<PQL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<PQL	<0.2	<PQL	<0.1	-	-	-	-
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP05	Fill	0 - 0.1 m	17/08/22	**10**	<0.4	**16**	**13**	**19**	<0.1	**7**	**33**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP06	Fill	0 - 0.1 m	17/08/22	**10**	<0.4	**20**	**10**	**17**	<0.1	**6**	**27**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	-
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
PACM1	Material	0.3m	17/08/22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**AD**	-	-	-
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP06A	Fill	0 - 0.1 m	17/08/22	**11**	<0.4	**18**	**5**	**12**	<0.1	**5**	**16**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43HA07	Fill	0 - 0.1 m	18/08/22	**7**	<0.4	**17**	**17**	**23**	<0.1	**9**	**29**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43HA08	Fill	0 - 0.1 m	19/08/22	**8**	<0.4	**15**	**19**	**20**	<0.1	**9**	**51**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43HA08 - [TRIPLICATE]	Fill	0 - 0.1 m	19/08/22	**9**	<0.4	**15**	**18**	**23**	<0.1	**10**	**60**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP09	Fill	0 - 0.1 m	17/08/22	**7**	<0.4	**23**	**24**	**30**	<0.1	**13**	**87**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	**0.4662**	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP09	Natural	0.3 - 0.4 m	17/08/22	<4	<0.4	**16**	**23**	**14**	<0.1	**6**	**27**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	-
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP10	Fill	0 - 0.1 m	17/08/22	**8**	<0.4	**23**	**19**	**22**	<0.1	**10**	**34**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP11	Fill	0 - 0.1 m	17/08/22	**10**	<0.4	**24**	**14**	**22**	<0.1	**9**	**30**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP11	Natural	0.3 - 0.4 m	17/08/22	**5**	<0.4	**9**	**14**	**7**	<0.1	**5**	**16**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	-
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP12	Fill	0 - 0.1 m	17/08/22	**7**	<0.4	**13**	**10**	**12**	<0.1	**5**	**18**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43HA13	Fill	0 - 0.1 m	19/08/22	**9**	<0.4	**19**	**22**	**24**	<0.1	**9**	**39**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
BD120220819	Fill	0 - 0.1 m	19/08/22	**10**	<0.4	**20**	**21**	**25**	<0.1	**9**	**36**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	-
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43HA14	Fill	0 - 0.1 m	19/08/22	**7**	<0.4	**17**	**21**	**22**	<0.1	**11**	**40**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP15	Fill	0 - 0.1 m	18/08/22	**7**	<0.4	**18**	**13**	**16**	<0.1	**8**	**24**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP16	Fill	0 - 0.1 m	17/08/22	**7**	<0.4	**16**	**12**	**18**	<0.1	**8**	**27**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43TP17	Fill	0 - 0.1 m	17/08/22	**11**	<0.4	**14**	**15**	**19**	<0.1	**12**	**30**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43HA18	Fill	0 - 0.1 m	18/08/22	**7**	<0.4	**13**	**17**	**15**	<0.1	**6**	**25**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43HA19	Fill	0 - 0.1 m	19/08/22	**8**	<0.4	**17**	**19**	**13**	<0.1	**8**	**32**	<25	<50	<25	<50	**120**	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43HA20	Fill	0 - 0.1 m	18/08/22	**8**	<0.4	**12**	**11**	**13**	<0.1	**4**	**41**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	250	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				
AEC43HA30	Fill	0 - 0.1 m	21/09/2022	**7**	**0.9**	**14**	**33**	**190**	<0.1	**7**	**160**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	<0.001
				300	100	90	300	190	17000	140	600	1100	80	1200	180	30000	330	-	120	350	180	NL	1300	5600	4	65	NL	105	NL	125	NL	45	NL	170	0.7	3	300	120	400	180	180	10	70	20	340	10	10	400	250	1				

Lab result
HIL/HSL value EIL/ESL value

HIL/HSL exceedance EIL/ESL exceedance HIL/HSL and EIL/ESL exceedance ML exceedance ML and HIL/HSL or EIL/ESL exceedance

Indicates that asbestos has been detected by the lab, refer to the lab report **Blue** = DC exceedance HSL 0-<1 Exceedance

Bold = Lab detections - = Not tested or No HIL/HSL/EIL/ESL (as applicable) or Not applicable NL = Non limiting AD = Asbestos detected NAD = No Asbestos detected

HIL = Health investigation level HSL = Health screening level (excluding DC) EIL = Ecological investigation level ESL = Ecological screening level ML = Management Limit DC = Direct Contact HSL

Notes:

a QA/QC replicate of sample listed directly below the primary sample

b Reported naphthalene laboratory result obtained from BTEXN suite

c Criteria applies to DDT only

PACM1 Material sample of pipe from AEC43TP06

Site Assessment Criteria (SAC):

Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:

SAC based on generic land use thresholds for Recreational C including public open space with amenities buildings

HIL C Recreational / Open Space (NEPC, 2013)

HSL D Commercial / Industrial (vapour intrusion) (NEPC, 2013)

DC HSL C Direct contact HSL C Recreational /Open space (direct contact) (CRC CARE, 2011)

EIL/ESL UR/PC Urban Residential and Public Open Space (NEPC, 2013)

ML R/P/POS Residential, Parkland and Public Open Space (NEPC, 2013)

Douglas Partners

Table I2: Summary of Results of Groundwater Analysis (All results in μg/L)

Sample Location / Identification (Borehole or Replicate)	Sample Date	Metals (dissolved)								Polycyclic Aromatic Hydrocarbons					
		Arsenic	Cadmium	Chromium (III + VI)	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene	Anthracene	Fluoranthene	Benzo(a)pyrene	Phenanthrene	Other PAH
AEC43BH01	16/09/2022	4	<0.1	<1	**4**	<1	<0.05	23	15	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL
BD1/20220916	16/09/2022	5	<0.1	<1	1	<1	<0.05	23	15	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL
AEC43BH02	16/09/2022	5	<0.1	<1	<1	<1	<0.05	29	9	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL
BD2/20220916	16/09/2022	5	<0.2	<1	<1	<1	<0.1	26	8	0.02	<0.01	<0.01	<0.01	<0.01	<PQL
AEC43BH03	16/09/2022	4	<0.1	<1	**3**	<1	<0.05	11	84	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL
Assessment Criteria															
Freshwater DGV		24 for As(III) 13 for As(V)	11.2	135 for Cr(III) 1.0 for Cr(VI)	1.4	1060	0.06	515	374	16	0.01	1	0.1	0.6	-
Guidelines for Recreational Water	**Health**	100	20	500 for Cr(VI)	20000	100	10	200	-	-	-	-	0.1	-	-
	Aesthetic	-	-	-	1000	-	-	-	3000	-	-	-	-	-	-
HSL D for Vapour Intrusion, Clay (depth 2 m to <4 m)		-	-	-	-	-	-	-	-	NL	-	-	-	-	-

Sample Location / Identification (Borehole or Replicate)		Total Recoverable Hydrocarbons, BTEX and Volatile Organic Compounds										
		TRH C6-C10 less BTEX	TRH >C10-C16 less Naphthalene	TRH C6-C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toulene	Ethylbenzene	o-xylene	m+p-xylene
AEC43BH01		<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<2
BD1/20220916		<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<2
AEC43BH02		<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<2
BD2/20220916		<20	<50	<20	<50	<100	<100	<1	<1	<1	<1	<2
AEC43BH03		<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<2
Freshwater DGV		-	-	-	-	-	-	950	180	80	350	75 for m-xylene 200 for p-xylene
Guidelines for Recreational Water	**Health**	-	-	-	-	-	-	10	8000	3000	6000	
	Aesthetic	-	-	-	-	-	-	-	25	3	20	
HSL D for Vapour Intrusion, Clay (depth 2 m to <4 m)		NL	NL	-	-	-	-	30000	NL	NL	NL	

Sample Location / Identification (Borehole or Replicate)		Isopropylbenzene	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	cis-1,3-Dichloropropene	Vinyl chloride	Tetrachloroethene	Trichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Chlorobenzene	1,1,2,2-Tetrachloroethane
AEC43BH01		<1	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1
BD1/20220916		<1	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1
AEC43BH02		<1	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1
BD2/20220916		<1	<1	<1	<1	<1	<1	<5	<1	<1	-	-	<1	<1	<1	<1	<1
AEC43BH03		<1	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1
Freshwater DGV		30	700	-	-	-		100	70	330	3	85	160	260	60	55	400
Guidelines for Recreational Water	**Health**	-	300	600		1000		3	500	-	300		15000	-	400	3000	-
	Aesthetic	-	-	-		-		-	-	-	5		1	20	0.3	10	-
HSL D for Vapour Intrusion, Clay (depth 2 m to <4 m)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sample Location / Identification (Borehole or Replicate)		1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,2-Dichloroethane	Carbon tetrachloride	Chloroform	Bromodichloromethane	Dibromochloromethane	Bromoform	1,2-Dichloropropane	1,3-Dichloropropane	Styrene	Hexachlorobutadiene	Carbon disulfide	Dichloromethane (methylene chloride)	Other VOC
AEC43BH01		<1	<1	<1	<1	9	<1	<1	<1	<1	<1	<1	<1	-	-	<PQL
BD1/20220916		<1	<1	<1	<1	9	<1	<1	<1	<1	<1	<1	<1	-	-	<PQL
AEC43BH02		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	<PQL
BD2/20220916		<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	-	<1	<5	<PQL
AEC43BH03		<1	<1	<1	<1	8	<1	<1	<1	<1	<1	<1	<1	-	-	<PQL
Freshwater DGV		270	6500	1900	240	370	-	-	-	900	1100	-	-	20	-	-
Guidelines for Recreational Water	**Health**	-	-	30	30	2500				-	-	300	7	-	40	-
	Aesthetic	-	-	-	-	-				-	-	4	-	-	-	-
HSL D for Vapour Intrusion, Clay (depth 2 m to <4 m)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

PQL Practical Quantitation Limit

\- not defined/ not analysed/ not applicable

NL Not Limiting

BD1/20220916 is blind replicate from AEC43BH01

BD2/20220916 is blind replicate from AEC43BH02

(green shading) Exceedance of DGV

Table I2 (continued): Summary of Results of Groundwater Analysis (All results in µg/L)

Sample Location / Identification (Borehole or Replicate)	Sample Date	Organochlorine Pesticides													Organophosphorus Pesticides																										Polychlorinated Biphenyls			Phenols											
		Aldrin	Dieldrin	gamma-Chlordane	alpha-Chlordane	Total Chlordanes	pp-DDT	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Methoxychlor	Lindane	Other OCP	Azinphos-methyl	Bromophos-ethyl	Chlorpyrifos	Chlorfenvinphos	Diazinon	Dichlorovos	Dimethoate	Disulfoton	Ethion	Ethoprophos (Ethoprop)	Fenitrothion	Fensulfothion	Fenthion	Malathion	Mevinphos (Phosdrin)	Monocrotophos	Omethoate	Parathion	Methyl Parathion	Pyrazophos	Terbufos	Tetrachlorvinphos	Pirimiphos-methyl	Other OPP	Aroclor 1242	Aroclor 1254	Other PCB	Phenol	2,4,6-Trichlorophenol	2,4-Dinitrophenol	4-Nitrophenol	2,3,4,6-Tetrachlorophenol	Total Tetrachlorophenols	Pentachlorophenol	2-Chlorophenol	2,4-Dimethylphenol	2,4-Dichlorophenol	2,6-Dichlorophenol	Other Phenols
AEC43BH01	16/09/2022	<0.01	<0.01	<0.01	<0.01	-	<0.006	<0.01	<0.01	<0.01	<0.01	<0.01	-	<PQL	<0.02	<0.2	<0.01	-	<0.01	<0.2	<0.15	-	<0.2	-	<0.2	-	-	<0.05	-	-	-	<0.01	<0.2	-	-	-	-	<PQL	<0.1	<0.1	<PQL	<1	<1	<20	<20	<1	-	<5	<1	<1	<1	<1	<PQL
BD1/20220916	16/09/2022	<0.01	<0.01	<0.01	<0.01	-	<0.006	<0.01	<0.01	<0.01	<0.01	<0.01	-	<PQL	<0.02	<0.2	<0.01	-	<0.01	<0.2	<0.15	-	<0.2	-	<0.2	-	-	<0.05	-	-	-	<0.01	<0.2	-	-	-	-	<PQL	<0.1	<0.1	<PQL	<1	<1	<20	<20	<1	-	<5	<1	<1	<1	<1	<PQL
AEC43BH02	16/09/2022	<0.01	<0.01	<0.01	<0.01	-	<0.006	<0.01	<0.01	<0.01	<0.01	<0.01	-	<PQL	<0.02	<0.2	<0.01	-	<0.01	<0.2	<0.15	-	<0.2	-	<0.2	-	-	<0.05	-	-	-	<0.01	<0.2	-	-	-	-	<PQL	<0.1	<0.1	<PQL	<1	<1	<20	<20	<1	-	<5	<1	<1	<1	<1	<PQL
BD2/20220916	16/09/2022	<0.2	<0.2	-	-	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<PQL	<2	-	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2	<2	<2	<20	<PQL	<1	<1	<1	<3	<10	<30	<30	-	<30	<10	<3	<3	<3	<3	<PQL
AEC43BH03	16/09/2022	<0.01	<0.01	<0.01	<0.01	-	<0.006	<0.01	<0.01	<0.01	<0.01	<0.01	-	<PQL	<0.02	<0.2	<0.01	-	<0.01	<0.2	<0.15	-	<0.2	-	<0.2	-	-	<0.05	-	-	-	<0.01	<0.2	-	-	-	-	<PQL	<0.1	<0.1	<PQL	<1	<1	<20	<20	<1	-	<5	<1	<1	<1	<1	<PQL
Assessment Criteria																																																						
Freshwater DGV		0.001	0.01	0.03			0.006	0.03		0.01	0.01	0.005	-	-	0.01	-	0.01	-	0.01	-	0.15	-	-	-	0.2	-	-	0.05	-	-	-	0.004	-	-	-	-	-	-	0.3	0.01	-	320	3	45	58	10	0.2	3.6	340	2	120	34	-
Guidelines for Recreational Water	Health	3		20			90	200		-	3	3000	100	-	300	100	100	20	40	50	70	40	40	10	70	100	70	700	50	20	10	200	7	200	9	1000	900	-	-	-	-	-	200	-	-	-	-	100	3000	-	2000	-	-
	Aesthetic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	2	-	-	-	-	-	0.1	-	0.3	-	-
HSL D for Vapour Intrusion, Clay (depth 2 m to <4 m)		-	-	-	-	-	-	-	-	-	0	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

PQL	Practical Quantitation Limit
-	not defined/ not analysed/ not applicable
BD1/20220916	is blind replicate from AEC43BH01
BD2/20220916	is blind replicate from AEC43BH02

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Table I3: Summary of Laboratory Results – Metals, TRH, BTEX, PAH, Phenol, OCP, OPP, PCB, Asbestos

				Metals										TRH		BTEX				PAH		Phenol						OCP		OPP		PCB	Asbestos	pH
				Arsenic	Cadmium	Total Chromium	Copper	Lead	TCLP Lead	Mercury (inorganic)	Nickel	Zinc		TRH C6 - C9	TRH C10-C36	Benzene	Toluene	Ethylbenzene	Xylenes (total)	Benzo(a)pyrene (BaP)	Total PAHs	2-Methylphenol (o-Cresol)	Cresol (total)	Total Phenols	2,4,5-trichlorophenol	2,4,6-trichlorophenol	Phenol (non-halogenated)	Total Endosulfan	Total Analysed OCP	Chlorpyriphos	Total Analysed OPP	Total PCB	Total Asbestos	pH units
			PQL	4	0.4	1	1	1	0.03	0.1	1	1		25	50	0.2	0.5	1	1	0.05	0.05	0.2	0.5	5	1	1	0.5	0.1	0.1	0.1	0.1	0.1	0.001	
Sample ID	Depth	Soil type	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/l	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	
AEC43HA01	0 - 0.1 m	Fill	18/08/22	**25**	<0.4	**12**	**17**	**18**	-	<0.1	**7**	**200**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	**0.4**	<0.1	<0.1	<0.1	NAD	
AEC43HA01 - [TRIPLICATE]	0 - 0.1 m	Fill	18/08/22	**6**	<0.4	**14**	**20**	**21**	-	<0.1	**9**	**200**		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AEC43HA01	0.2 - 0.3 m	Natural	18/08/22	**4**	<0.4	**12**	**15**	**7**	-	<0.1	**3**	**18**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	5
BD2/20220818	0.2 - 0.3 m	Natural	18/08/22	<4	<0.4	**10**	**13**	**6**	-	<0.1	**3**	**14**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	
AEC43TP02	0 - 0.1 m	Fill	18/08/22	**7**	<0.4	**15**	**11**	**18**	-	<0.1	**9**	**36**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	AD	
AEC43TP03	0 - 0.1 m	Fill	17/08/22	**4**	<0.4	**11**	**14**	**13**	-	<0.1	**6**	**29**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43TP04	0 - 0.1 m	Fill	17/08/22	**7**	<0.4	**17**	**17**	**17**	-	<0.1	**9**	**29**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
BD4/20220817	0 - 0.1 m	Fill	17/08/2022	**10**	<0.4	**28**	**19**	**23**	-	<0.1	**17**	**59**		<20	<50	<0.1	<0.1	<0.1	<0.3	<0.5	<0.5	<0.2	<0.5	<PQL	<1	<1	<0.5	<0.05	<0.05	<0.2	<0.2	<0.1	-	
AEC43TP05	0 - 0.1 m	Fill	17/08/22	**10**	<0.4	**16**	**13**	**19**	-	<0.1	**7**	**33**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	5.5
AEC43TP06	0 - 0.1 m	Fill	17/08/22	**10**	<0.4	**20**	**10**	**17**	-	<0.1	**6**	**27**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	
PACM1	0.3 m	Material	17/08/22	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	AD	
AEC43TP06A	0 - 0.1 m	Fill	17/08/22	**11**	<0.4	**18**	**5**	**12**	-	<0.1	**5**	**16**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43HA07	0 - 0.1 m	Fill	18/08/22	**7**	<0.4	**17**	**17**	**23**	-	<0.1	**9**	**29**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43HA08	0 - 0.1 m	Fill	19/08/22	**8**	<0.4	**15**	**19**	**20**	-	<0.1	**9**	**51**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43HA08 - [TRIPLICATE]	0 - 0.1 m	Fill	19/08/22	**9**	<0.4	**15**	**18**	**23**	-	<0.1	**10**	**60**		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AEC43TP09	0 - 0.1 m	Fill	17/08/22	**7**	<0.4	**23**	**24**	**30**	-	<0.1	**13**	**87**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	AD	
AEC43TP09	0.3 - 0.4 m	Natural	17/08/22	<4	<0.4	**16**	**23**	**14**	-	<0.1	**6**	**27**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	
AEC43TP10	0 - 0.1 m	Fill	17/08/22	**8**	<0.4	**23**	**19**	**22**	-	<0.1	**10**	**34**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43TP11	0 - 0.1 m	Fill	17/08/22	**10**	<0.4	**24**	**14**	**22**	-	<0.1	**9**	**30**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43TP11	0.3 - 0.4 m	Natural	17/08/22	**5**	<0.4	**9**	**14**	**7**	-	<0.1	**5**	**16**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	
AEC43TP12	0 - 0.1 m	Fill	17/08/22	**7**	<0.4	**13**	**10**	**12**	-	<0.1	**5**	**18**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43HA13	0 - 0.1 m	Fill	19/08/22	**9**	<0.4	**19**	**22**	**24**	-	<0.1	**9**	**39**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
BD120220819	0 - 0.1 m	Fill	19/08/22	**10**	<0.4	**20**	**21**	**25**	-	<0.1	**9**	**36**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	
AEC43HA14	0 - 0.1 m	Fill	19/08/22	**7**	<0.4	**17**	**21**	**22**	-	<0.1	**11**	**40**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43TP15	0 - 0.1 m	Fill	18/08/22	**7**	<0.4	**18**	**13**	**16**	-	<0.1	**8**	**24**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	6.5
AEC43TP16	0 - 0.1 m	Fill	17/08/22	**7**	<0.4	**16**	**12**	**18**	-	<0.1	**8**	**27**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43TP17	0 - 0.1 m	Fill	17/08/22	**11**	<0.4	**14**	**15**	**19**	-	<0.1	**12**	**30**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43HA18	0 - 0.1 m	Fill	18/08/22	**7**	<0.4	**13**	**17**	**15**	-	<0.1	**6**	**25**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43HA19	0 - 0.1 m	Fill	19/08/22	**8**	**0.5**	**17**	**29**	**32**	-	<0.1	**10**	**280**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43HA20	0 - 0.1 m	Fill	18/08/22	**8**	<0.4	**12**	**11**	**13**	-	<0.1	**4**	**41**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43TP21	0 - 0.1 m	Fill	18/08/22	**8**	<0.4	**13**	**13**	**13**	-	<0.1	**7**	**30**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43HA22	0 - 0.1 m	Fill	18/08/22	**7**	<0.4	**17**	**14**	**18**	-	<0.1	**8**	**23**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43HA23	0 - 0.1 m	Fill	18/08/22	**6**	<0.4	**14**	**16**	**46**	-	<0.1	**6**	**120**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43HA24	0 - 0.1 m	Fill	18/08/22	**8**	<0.4	**14**	**14**	**18**	-	<0.1	**7**	**56**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	5.8
BD3/20220818	0 - 0.1 m	Fill	18/08/2022	**15**	<0.4	**22**	**22**	**26**	-	<0.1	**11**	**100**		<20	**110**	<0.1	<0.1	<0.1	<0.3	<0.5	<0.5	<0.2	<0.5	<PQL	<1	<1	<0.5	<0.05	<0.05	<0.2	<0.2	<0.1	-	
AEC43HA24	0.3 - 0.4 m	Natural	18/08/22	**6**	<0.4	**14**	**16**	**10**	-	<0.1	**5**	**25**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	
AEC43TP25	0 - 0.1 m	Fill	18/08/22	**5**	<0.4	**8**	**14**	**11**	-	<0.1	**6**	**48**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43TP26	0 - 0.1 m	Fill	2/09/22	**9**	<0.4	**11**	**12**	**15**	-	<0.1	**8**	**29**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43TP27	0 - 0.1 m	Fill	2/09/22	**11**	<0.4	**11**	**19**	**16**	-	<0.1	**10**	**40**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43TP28	0 - 0.1 m	Fill	2/09/22	**11**	<0.4	**7**	**16**	**12**	-	<0.1	**8**	**29**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43TP29	0 - 0.1 m	Fill	2/09/22	**6**	<0.4	**10**	**13**	**13**	-	<0.1	**8**	**22**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
AEC43TP29	0.3 - 0.4 m	Natural	2/09/22	<4	<0.4	**9**	**14**	**9**	-	<0.1	**3**	**12**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	
AEC43HA30	0 - 0.1 m	Fill	21/09/2022	**7**	**0.9**	**14**	**33**	**190**	**0.06**	<0.1	**7**	**160**		<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	
Waste Classification Criteria [f]																																		
CT1				100	20	100	NC	100	N/A	4	40	NC		650	10000	10	288	600	1000	0.8	200	4000	4000	-	8000	40	288	60	<50	4	-	<50	NC	
SCC1				500	100	1900	NC	1500	N/A	50	1050	NC		650	10000	18	518	1080	1800	10	200	7200	200	-	14400	72	518	108	<50	7.5	-	<50	NC	
TCLP1				N/A	N/A	N/A	NC	N/A	5	N/A	N/A	NC		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	NC	
CT2				400	80	400	NC	400	N/A	16	160	NC		2600	40000	40	1152	2400	4000	3.2	800	16000	16000	-	32000	160	1152	240	<50	16	-	<50	NC	
SCC2				2000	400	7600	NC	6000	N/A	200	4200	NC		2600	40000	72	2073	4320	7200	23	800	28800	28800	-	57600	288	2073	432	<50	30	-	<50	NC	
TCLP2				N/A	N/A	N/A	NC	N/A	20	N/A	N/A	NC		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	NC	
Excavated Natural Material (ENM) Order Assessment Criteria																																		
Maximum average concentration				20	0.5	75	100	50	-	0.5	30	150	NC	250	N/A	N/A	N/A	N/A	N/A	0.5	20	-	-	-	-	-	-	-	-	-	-	-	-	5 to 9
Absolute maximum concentration				40	1	150	200	100	-	1	60	300	NC	500	0.5	65	25	15	1	40	-	-	-	-	-	-	-	-	-	-	-	-	-	4.5 to 10

CT1 exceedance TCLP1 and/or SCC1 exceedance CT2 exceedance TCLP2 and/or SCC2 exceedance Asbestos detection

NT = Not tested NL = Non limiting NC = No criteria NA = Not applicable

Notes:

a QA/QC replicate of sample listed directly below the primary sample

b Total chromium used as initial screen for chromium(VI).

c Total recoverable hydrocarbons (TRH) used as an initial screen for total petroleum hydrocarbons (TPH)

d Criteria for scheduled chemicals used as an initial screen

e Criteria for Chlorpyrifos used as initial screen

f All criteria are in the same units as the reported results

PQL Practical quantitation limit

CT1 NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values of specific contaminant concentration (SCC) for classification without TCLP: General solid waste

SCC1 NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste

TCLP1 NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste

CT2 NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values of specific contaminant concentration (SCC) for classification without TCLP: Restricted solid waste

SCC2 NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

TCLP2 NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

PACM1 Material sample of pipe from AEC43TP06

Table C1: Summary of Soil Results for SMGW-BH-B329

	BTEX						MAH					CRC Care TPH Fractions							Metals							
	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total MAH	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	Styrene	C6-C10	C10-C16	C16-C34	C34-C40	C10 - C40 (Sum of total)	F1: C6-C10 less BTEX	F2: >C10-C16 less NAPHTHALENE	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.1	0.1	0.1	0.2	0.1	0.3	0.5	0.5	0.5	0.5	0.5	20	50	100	100	50	20	50	2	0.4	1	1	1	0.1	1	1
NEPM 2013 EIL/ESL UR/POS (fine soil)	65	105	125			45							120	1300	5600		180		100		190 for Cr (III)	140	1100		180	330
NEPM 2013 EIL/ESL Comm./Ind (fine soil)	95	135	185			95							170	2500	6600		215	170	160		320 for Cr (III)	190	1800		300	470
PFAS NEMP 2.0 Table 3 Ecologcal Indirect Exposure																										
PFAS NEMP 2.0 Table 3 Ecologcal Direct Exposure																										
NEPM 2013 HIL, Recreational C																			300	90	300 for Cr (VI)	17000	600	80	1200	30000
PFAS NEMP 2.0 Table 2 Health Public open space																										
NEPM 2013 HIL, Commercial/Industrial D																			3000	900	3600 for Cr (VI)	240000	1500	730	6000	400000
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Silt																										
0-1m	4	NL	NL			NL											250	NL								
1-2m	4	NL	NL			NL											360	NL								
2-4m	6	NL	NL			NL											590	NL								
>4m	10	NL	NL			NL											NL	NL								
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay																										
0-1m	4	NL	NL			NL											310	NL								
1-2m	6	NL	NL			NL											480	NL								
2-4m	9	NL	NL			NL											NL	NL								
>4m	20	NL	NL			NL											NL	NL								
PFAS NEMP 2.0 Table 2 Health Industrial / Commercial																										
CRC HSL for Direct Contact, Passive Open Space C	120	18,000	5300			15,000								5300	27,000		5100	3800								
CRC HSL for Direct Contact, Commerical/Industrial D	430	99,000	27,000			81,000								7400	38,000		26,000	20,000								
NEPM 2013 Management Limits, Public Open Space, Fine Soil												800	1000	3500	10000											
NEPM 2013 Management Limits, Commerical /Industrial, Fine Soil												800	1000	5000	10000											

Field ID	Location ID	Sample Date	Easting	Northing	Lab Report																					
SMGW-BH-B329_SURFACE	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	-	-	-	-	-	<20	<50	150	<100	150	<20	<50	9.1	<0.4	25	27	23	<0.1	11	60
SMGW-BH-B329_0.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<20	<50	<100	<100	<100	<20	<50	4.9	<0.4	20	42	20	<0.1	9.6	50
SMGW-BH-B329_1.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	-	-	-	-	-	<20	<50	<100	<100	<100	<20	<50	2.9	<0.4	17	40	18	<0.1	8	44
SMGW-BH-B329_2.5-2.95	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.9	<0.4	11	37	9.8	<0.1	9.2	46

Notes:
HSL C not included as all guidelines are non-limiting within clay.
Duplicate naphthalene results may be present due to different test methods used for BTEXN and PAH.

Table C1: Summary of Soil Results for SMGW-BH-B329

	Asbestos	Inorganics		pH		Organochlorine Pesticides																						
	Asbestos Results	Moisture Content (dried @ 103°C)	pH (aqueous extract)	pH (F)	pH (Fox)	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor
	Comment	%	pH Units	pH Units	pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR		1	0.1	0.1	0.1	0.05	0.05	0.05	0.05	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1
NEPM 2013 EIL/ESL UR/POS (fine soil)														180													
NEPM 2013 EIL/ESL Comm./Ind (fine soil)														640													
PFAS NEMP 2.0 Table 3 Ecologcal Indirect Exposure																											
PFAS NEMP 2.0 Table 3 Ecologcal Direct Exposure																											
NEPM 2013 HIL, Recreational C									10		70				400		340			20				10		10	400
PFAS NEMP 2.0 Table 2 Health Public open space																											
NEPM 2013 HIL, Commercial/Industrial D									45		530				3600		2000			100				50		80	2500
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Silt																											
0-1m																											
1-2m																											
2-4m																											
>4m																											
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay																											
0-1m																											
1-2m																											
2-4m																											
>4m																											
PFAS NEMP 2.0 Table 2 Health Industrial / Commercial																											
CRC HSL for Direct Contact, Passive Open Space C																											
CRC HSL for Direct Contact, Commerical/Industrial D																											
NEPM 2013 Management Limits, Public Open Space, Fine Soil																											
NEPM 2013 Management Limits, Commerical /Industrial, Fine Soil																											

Field ID	Location ID	Sample Date	Easting	Northing	Lab Report																								
SMGW-BH-B329_SURFACE	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	No asbestos detected at the reporting limit of 0.01% w/w.Organic fibre detected.No trace asbestos detected	28	5.7	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2
SMGW-BH-B329_0.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	-	20	5.4	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2
SMGW-BH-B329_1.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	-	13	4.8	5	4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2
SMGW-BH-B329_2.5-2.95	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	-	12	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
HSL C not included as all guidelines are non-limiting within clay.
Duplicate naphthalene results may be present due to different test methods used for BTEXN and PAH.

Table C1: Summary of Soil Results for SMGW-BH-B329

		Organophosphorous Pesticides																												Insecticides	Pesticides				
	Toxaphene	Azinophos methyl	Bolstar (Sulprofos)	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Dimethoate	Disulfoton	Ethion	Ethoprop	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Phorate	Pyrazophos	Ronnel	Terbufos	Trichloronate	Tetrachlorvinphos	Tokuthion	Parathion	Pirimiphos-methyl	Naphthalene	Acenaphthylene	Acenaphthene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.1	0.1	0.2	0.2	0.1	0.1	2	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.2	0.1	0.2	0.2	0.2	2	0.2	2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.1
NEPM 2013 EIL/ESL UR/POS (fine soil)																																	170		
NEPM 2013 EIL/ESL Comm./Ind (fine soil)																																	370		
PFAS NEMP 2.0 Table 3 Ecologcal Indirect Exposure																																			
PFAS NEMP 2.0 Table 3 Ecologcal Direct Exposure																																			
NEPM 2013 HIL, Recreational C	30				250																														
PFAS NEMP 2.0 Table 2 Health Public open space																																			
NEPM 2013 HIL, Commercial/Industrial D	160				2000																														
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Silt																																			
0-1m																																	NL		
1-2m																																	NL		
2-4m																																	NL		
>4m																																	NL		
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay																																			
0-1m																																	NL		
1-2m																																	NL		
2-4m																																	NL		
>4m																																	NL		
PFAS NEMP 2.0 Table 2 Health Industrial / Commercial																																			
CRC HSL for Direct Contact, Passive Open Space C																																			
CRC HSL for Direct Contact, Commerical/Industrial D																																			
NEPM 2013 Management Limits, Public Open Space, Fine Soil																																			
NEPM 2013 Management Limits, Commerical /Industrial, Fine Soil																																			

Field ID	Location ID	Sample Date	Easting	Northing	Lab Report																																
SMGW-BH-B329_SURFACE	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	<0.1	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5
SMGW-BH-B329_0.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	<0.1	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5
SMGW-BH-B329_1.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	<0.1	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5
SMGW-BH-B329_2.5-2.95	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
HSL C not included as all guidelines are non-limiting within clay.
Duplicate naphthalene results may be present due to different test methods used for BTEXN and PAH.

Table C1: Summary of Soil Results for SMGW-BH-B329

	PAH																	Polychlorinated Biphenyls								2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	8:2 Fluorotelomer sulfonate	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	Perfluorobutane sulfonic acid (PFBS)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid (PFNA)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid (PFTeDA)
	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(k)fluoranthene	Benzo(b+j)fluoranthene	Benzo(e)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	Benzo(a)pyrene TEQ (zero LOR)	Benzo(a)pyrene TEQ (Half LOR)_1	Benzo(a)pyrene TEQ (full LOR)	PAHs (Sum of total)	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)													
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5	0.05	0.1	0.1	0.1	0.5	0.5	0.5	0.5	0.5	0.1	0.5	0.5	0.5	0.5	0.5	0.5	0.0005	0.0001	0.0005	0.0005	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0005	0.0001
NEPM 2013 EIL/ESL UR/POS (fine soil)										0.7																											
NEPM 2013 EIL/ESL Comm./Ind (fine soil)										1.4																											
PFAS NEMP 2.0 Table 3 Ecologcal Indirect Exposure																																					
PFAS NEMP 2.0 Table 3 Ecologcal Direct Exposure																																					
NEPM 2013 HIL, Recreational C														3	3	3	300							1													
PFAS NEMP 2.0 Table 2 Health Public open space																																					
NEPM 2013 HIL, Commercial/Industrial D														40	40	40	4000							7													
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Silt																																					
0-1m																																					
1-2m																																					
2-4m																																					
>4m																																					
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay																																					
0-1m																																					
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NEPM 2013 Management Limits, Public Open Space, Fine Soil																																					
NEPM 2013 Management Limits, Commerical /Industrial, Fine Soil																																					

Field ID	Location ID	Sample Date	Easting	Northing	Lab Report																																	
SMGW-BH-B329_SURFACE	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.0005	<0.0001	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001
SMGW-BH-B329_0.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	-	-	-	-	-	-	-	-	-	<0.0005	<0.0001	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001
SMGW-BH-B329_1.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SMGW-BH-B329_2.5-2.95	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
HSL C not included as all guidelines are non-limiting within clay.
Duplicate naphthalene results may be present due to different test methods used for BTEXN and PAH.

Table C1: Summary of Soil Results for SMGW-BH-B329

	Perfluorocarbons																						SVOCs	Chlorinated Hydrocarbons															
	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	Sum of PFAS (WA DER List)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	Perfluorobutanoic acid (PFBA)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluoropentanoic acid (PFPeA)	Sum of PFAS	Perfluorodecanesulfonic acid (PFDS)	Sum of PFHxS and PFOS	6:2 Fluorotelomer Sulfonate (6:2 FtS)	Perfluorooctanoate (PFOA)	Perfluorononanesulfonic acid (PFNS)	Perfluoropropanesulfonic acid (PFPrS)	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	EFN	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,2,3-trichloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	µg/kg	µg/kg	µg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.0001	0.0001	0.0005	0.0001	0.0001	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.1	0.1	0.1	0.1	0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
NEPM 2013 EIL/ESL UR/POS (fine soil)																																							
NEPM 2013 EIL/ESL Comm./Ind (fine soil)																																							
PFAS NEMP 2.0 Table 3 Ecologcal Indirect Exposure											0.01																												
PFAS NEMP 2.0 Table 3 Ecologcal Direct Exposure											1							10																					
NEPM 2013 HIL, Recreational C																																							
PFAS NEMP 2.0 Table 2 Health Public open space																1		10																					
NEPM 2013 HIL, Commercial/Industrial D																																							
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Silt																																							
0-1m																																							
1-2m																																							
2-4m																																							
>4m																																							
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay																																							
0-1m																																							
1-2m																																							
2-4m																																							
>4m																																							
PFAS NEMP 2.0 Table 2 Health Industrial / Commercial																20		50																					
CRC HSL for Direct Contact, Passive Open Space C																																							
CRC HSL for Direct Contact, Commerical/Industrial D																																							
NEPM 2013 Management Limits, Public Open Space, Fine Soil																																							
NEPM 2013 Management Limits, Commerical /Industrial, Fine Soil																																							

Field ID	Location ID	Sample Date	Easting	Northing	Lab Report																																			
SMGW-BH-B329_SURFACE	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	<0.0001	<0.0001	0.0043	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	0.0038	<0.0001	<0.0001	0.0043	<0.0001	0.0038	<0.0005	0.0005	<0.1	<0.1	4.3	4.3	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
SMGW-BH-B329_0.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0005	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SMGW-BH-B329_1.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-	-
SMGW-BH-B329_2.5-2.95	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
HSL C not included as all guidelines are non-limiting within clay.
Duplicate naphthalene results may be present due to different test methods used for BTEXN and PAH.

Table C1: Summary of Soil Results for SMGW-BH-B329

																												Solvents				
	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Dichloromethane	Trichloroethene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Vinyl chloride	1,2-dibromoethane	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	4-chlorotoluene	Bromobenzene	Bromomethane	Chlorobenzene	Dichlorodifluoromethane	Iodomethane	Trichlorofluoromethane	Methyl Ethyl Ketone	4-Methyl-2-pentanone	Acetone	Ethyl chloride	Carbon disulfide
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
NEPM 2013 EIL/ESL UR/POS (fine soil)																													
NEPM 2013 EIL/ESL Comm./Ind (fine soil)																													
PFAS NEMP 2.0 Table 3 Ecologcal Indirect Exposure																													
PFAS NEMP 2.0 Table 3 Ecologcal Direct Exposure																													
NEPM 2013 HIL, Recreational C																													
PFAS NEMP 2.0 Table 2 Health Public open space																													
NEPM 2013 HIL, Commercial/Industrial D																													
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Silt																													
0-1m																													
1-2m																													
2-4m																													
>4m																													
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay																													
0-1m																													
1-2m																													
2-4m																													
>4m																													
PFAS NEMP 2.0 Table 2 Health Industrial / Commercial																													
CRC HSL for Direct Contact, Passive Open Space C																													
CRC HSL for Direct Contact, Commerical/Industrial D																													
NEPM 2013 Management Limits, Public Open Space, Fine Soil																													
NEPM 2013 Management Limits, Commerical /Industrial, Fine Soil																													
Field ID	**Location ID**	**Sample Date**	**Easting**	**Northing**	**Lab Report**																											
SMGW-BH-B329_SURFACE	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SMGW-BH-B329_0.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SMGW-BH-B329_1.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SMGW-BH-B329_2.5-2.95	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
HSL C not included as all guidelines are non-limiting within clay.
Duplicate naphthalene results may be present due to different test methods used for BTEXN and PAH.

Appendix E

Contingency Plan and Unexpected Finds Protocol

Contingency Plan and Unexpected Finds Protocol
RAP for AEC 43, 1793 Elizabeth Drive, Badgerys Creek
SCAW Package for SMWSA

1. General

Where the site conditions are found to be different than that anticipated during the remediation works, the proposed remediation approach may not be appropriate for the contamination encountered. In such cases the Environmental Consultant is to re-assess the contamination and remediation approach and inform the Site Auditor. Where necessary the Environmental Consultant will prepare an addendum to, or revision of, this RAP. Any addendum or revision is to be reviewed and agreed by the Site Auditor before its implementation.

2. Contingency Plan

This contingency plan has been developed to provide guidance on processes to follow if contamination (or indicators of contamination), other than that included in the remediation strategy (Section 9 of RAP), is encountered during the remediation works. Any such finds shall be surveyed, and the location documented.

Although the site has been subject to previous investigation(s), there remains a potential for soil contamination to be present between sampled locations. In the event that signs of soil contamination, other than that included in the remediation strategy, are encountered during remediation e.g., evidence of petroleum, or other chemical odours which weren't previously identified, the following protocols will apply:

- The Site Manager is to be notified and the affected area closed off by the use of barrier tape and warning signs;
- The Environmental Consultant is to be notified to inspect the area and assess the significance of the potential contamination and determine extent of remediation works (if deemed necessary) to be undertaken. An assessment report and management plan detailing this information will be compiled by the Environmental Consultant and provided to the Principal Contractor;
- The assessment results together with a suitable management plan shall be provided by the Principal Contractor to the Site Auditor (and Principal if required);
- The agreed management / remedial strategy, based on the RAP and relevant guidelines shall be implemented; and
- All details of the assessment and remedial works are to be included in the site validation report.

3. Unexpected Finds Protocol

An *Unexpected Finds Soil Contamination and Asbestos Procedure* has been incorporated into CPBUI JV, *Soil and Water Management Sub-plan, Western Sydney Airport – Surface and Civil Alignment Works,* Project N81150, Revision 1, 4 November 2022, and is to be adopted for the SCAW project. The unexpected finds protocol (UFP) herein has been developed with reference to the *Unexpected Finds Soil Contamination and Asbestos Procedure* to provide guidance on processes to follow if any unexpected find is encountered during the remediation or future civil and construction works. Any unexpected finds should be surveyed, and the location documented.

All site personnel are to be inducted into their responsibilities with regard to unexpected finds procedures.

All site personnel are required to report unexpected signs of environmental concern to the Site Supervisor (and, subsequently the CPBUI JV Environmental Coordinator) if observed during the course of their works e.g., presence of potential unexploded ordinance, unnatural staining, potential contamination sources (such as buried drums or tanks) or chemical spills.

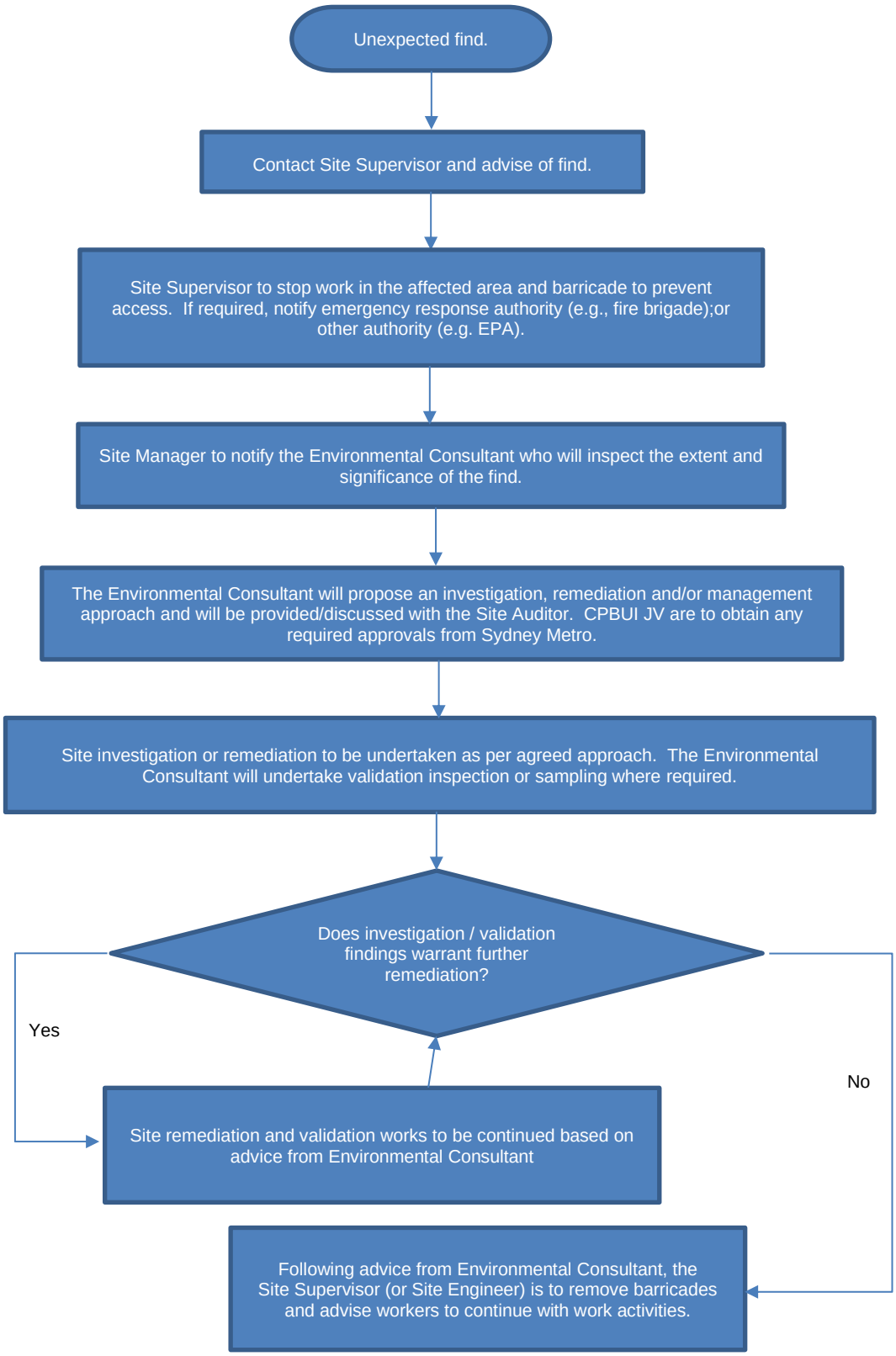
Should signs of concern be observed, the Site Supervisor, as soon as practical, will:

- Stop work in the affected area and ensure the area is barricaded to prevent unauthorised access;
- Notify authorities needed to obtain emergency response for any health or environmental concerns (e.g., fire brigade);
- Notify any of the authorities that the Contractor is legally / contractually required to notify (e.g., EPA);
- Notify the Environmental Consultant of the find; and
- Inform the CPBUI JV Project Manager of the find.

The Environmental Consultant will assess the extent and significance of the find and develop an investigation, remediation or management approach using (where possible) the principles and procedures already outlined in the RAP. The proposed approach will be discussed and agreed with the Site Auditor prior to implementation. Sydney Metro are to be contacted by CPBUI JV to obtain any required approvals for investigation, remediation or management of the contamination.

A flow chart for the unexpected finds protocol is shown below.

Flow Chart for Unexpected Finds Protocol



Douglas Partners Pty Ltd

Appendix F

Site Assessment Criteria

Site Assessment Criteria for Soil for AEC43

Surface & Civil Alignment Works (SCAW) Package for Sydney Metro - Western Sydney Airport (SMWSA)

1.0 Introduction

It is understood that the two general future land uses associated at the site will comprise:

- The rail corridor. The rail corridor will include the rail line, embankments / noise barriers, a stabling yard and maintenance facility and stations; and
- Passive open space. These are areas immediately adjacent to the rail corridor that may be used for bike / commuter paths. It is assumed that there is an absence of buildings in areas of passive open space.

It is understood that the site will comprise both of the above-listed land uses.

The following references were consulted for deriving 'Tier 1' site assessment criteria (SAC) for soil for the two above-listed land uses:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013); and
- CRC CARE *Health screening levels for petroleum hydrocarbons in soil and groundwater* (CRC CARE, 2011).

The Tier 1 criteria are documented in the Sections below.

Where Tier 1 SAC are exceeded, further assessment may be undertaken using other guidelines, as a 'Tier 2' assessment, such as:

- Cardno (NSW/ACT) Pty Ltd *Human Health and Ecological Risk Assessment, Spoil Re-use Sydney Metro and Western Sydney Airport*, *80021888, Version 003* (HHERA) (Cardno, 2021); and
- CRC CARE *Risk-based Management and Remediation Guidance for Benzo(a)pyrene. Technical Report no. 39: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment* (CRC CARE, 2017).

HHERA includes a set of criteria for a range of spoil-re-use scenarios for SMWSA. As discussed in the HHERA, particular considerations are required for use of criteria from HHERA (e.g., the presence of capping to prevent erosion and / or infiltration; the potential risk to groundwater and / or surface water; etc.). Given the considerations required for spoil reuse, the criteria from HHERA have not been listed herein and the HHERA should be referred to for use of the criteria for a Tier 2 assessment.

CRC CARE (2017) provides further guidance on the risk-based management and remediation of benzo(a)pyrene-contaminated sites and provides high reliability ecological guidelines for fresh benzo(a)pyrene which have not been listed herein.

2.0 Human Health-based Criteria

Human health-based SAC for soil and the associated future land uses are listed in Tables 1 to 6. Tier 1 criteria comprise:

- Health Investigation Levels (HIL) for a broad range of metals and organics (Table 1). HIL are applicable for assessing human health risk via all relevant pathways of exposure;
- Health Screening Levels (HSL) for vapour intrusion for selected petroleum hydrocarbons and fractions (Tables 2 and 3). These are applicable for assessing human health via the inhalation pathway. HSL are dependent on soil type and depth. HSL D are applicable to soil / areas to be covered by buildings (e.g., stations, offices and enclosed sheds);
- HSL for direct contact for selected petroleum hydrocarbons and fractions (Table 4). These are applicable for assessing human health via the direct contact pathway;
- Health screening levels for asbestos (Table 5); and
- HEPA PFAS *National Environmental Management Plan* (NEMP) (HEPA, 2020).

For HSL for vapour intrusion, HSL for silt and clay soils are shown as these are the predominant soil types at the site.

Table 1: Health Investigation Levels (Tier 1) from NEPM

Contaminant	HIL C for Passive Open Space (mg/kg)	HIL D for Rail Corridor (mg/kg)
Metals and Inorganics		
Arsenic	300	3000
Cadmium	90	900
Chromium (VI)	300	3600
Copper	17 000	240 000
Lead	600	1500
Mercury (inorganic)	80	730
Nickel	1200	6000
Zinc	30 000	400 000
Polycyclic Aromatic Hydrocarbons (PAH)		
Benzo(a)pyrene TEQ	3	40
Total PAH	300	4000
Phenols		
Phenol	40 000	240 000
Pentachlorophenol	120	660
Cresols	4000	25 000
Organochlorine Pesticides (OCP)		
DDT+DDE+DDD	400	3600
Aldrin and dieldrin	10	45

Contaminant	HIL C for Passive Open Space (mg/kg)	HIL D for Rail Corridor (mg/kg)
Chlordane	70	530
Endosulfan	340	2000
Endrin	20	100
Heptachlor	10	50
HCB	10	80
Methoxychlor	400	2500
Toxaphene	30	160
Organophosphorus Pesticides (OPP)		
Chlorpyrifos	250	2000
Polychlorinated Biphenyls (PCB)		
PCB	1	7

Table 2: Health Screening Levels (Tier 1) for Vapour Intrusion for Passive Open Space from NEPM

Contaminant	HSL C (mg/kg)	HSL C (mg/kg)	HSL C (mg/kg)	HSL C (mg/kg)
SILT	**0 m to <1 m**	**1 m to <2 m**	**2 m to <4 m**	**4 m+**
Benzene	NL	NL	NL	NL
Toluene	NL	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	NL	NL	NL	NL
Naphthalene	NL	NL	NL	NL
TPH C6-C10 less BTEX	NL	NL	NL	NL
TPH >C10-C16 less naphthalene	NL	NL	NL	NL
CLAY	**0 m to <1 m**	**1 m to <2 m**	**2 m to <4 m**	**4 m+**
Benzene	NL	NL	NL	NL
Toluene	NL	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	NL	NL	NL	NL
Naphthalene	NL	NL	NL	NL
TPH C6-C10 less BTEX	NL	NL	NL	NL
TPH >C10-C16 less naphthalene	NL	NL	NL	NL

Notes: TPH is total petroleum hydrocarbons

The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would results in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

Table 3: Health Screening Levels (Tier 1) for Vapour Intrusion for Rail Corridor from NEPM

Contaminant	HSL D (mg/kg)	HSL D (mg/kg)	HSL D (mg/kg)	HSL D (mg/kg)
SILT	**0 m to <1 m**	**1 m to <2 m**	**2 m to <4 m**	**4 m+**
Benzene	4	4	6	10
Toluene	NL	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	NL	NL	NL	NL
Naphthalene	NL	NL	NL	NL
TPH C6-C10 less BTEX	250	360	590	NL
TPH >C10-C16 less naphthalene	NL	NL	NL	NL
CLAY	**0 m to <1 m**	**1 m to <2 m**	**2 m to <4 m**	**4 m+**
Benzene	4	6	9	20
Toluene	NL	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	NL	NL	NL	NL
Naphthalene	NL	NL	NL	NL
TPH C6-C10 less BTEX	310	480	NL	NL
TPH >C10-C16 less naphthalene	NL	NL	NL	NL

Notes: TPH is total petroleum hydrocarbons

The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would results in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

Table 4: Health Screening Levels (Tier 1) for Direct Contact from CRC CARE (2011)

Contaminant	HSL C for Passive Open Space (mg/kg)	HSL D for Rail Corridor (mg/kg)
Benzene	120	430
Toluene	18 000	99 000
Ethylbenzene	5300	27 000
Xylenes	15 000	81 000
Naphthalene	1900	11 000
TPH C6-C10 less BTEX	5100	26 000
TPH >C10-C16 less naphthalene	3800	20 000
TPH >C16-C34	5300	27 000
TPH >C34-C40	7400	38 000

Notes: TPH is total petroleum hydrocarbons.

Table 5: Health Investigation Levels (Tier 1) for PFAS from NEMP

Contaminant	HIL C for Passive Open Space (mg/kg)	HIL D for Rail Corridor (mg/kg)
PFOS and PFHxS *	1	20
PFOA	10	50

Notes: * Includes PFOS only, PFHxS only and the sum of the two.

Table 6: Health Screening Levels (Tier 1) for Asbestos from NEPM

Form of Asbestos	Health Screening Level C for Passive Open Space	Health Screening Level D for Rail Corridor
Bonded asbestos containing materials (ACM)	0.02%	0.05%
Fibrous asbestos (FA) and asbestos fines (AF) (friable asbestos)	0.001%	0.001%
All forms of asbestos	No visible asbestos for surface soil	No visible asbestos for surface soil

Notes: FA comprises friable asbestos material and includes severely weathered cement sheet, insulation products and woven asbestos material. This type of friable asbestos is defined here as asbestos material that is in a degraded condition such that it can be broken or crumbled by hand pressure. This material is typically unbonded or was previously bonded and is now significantly degraded (crumbling).
AF includes free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve.
Surface soils defined as top 10 cm.

3.0 Ecological Criteria

Ecological SAC for soil and the associated future use are listed are listed in Tables 7 to 9. Tier 1 criteria comprise:

- Ecological Investigation Levels (EIL) for arsenic, copper, chromium (III), nickel, lead, zinc, DDT and naphthalene (Table 7). These are derived using the interactive (excel) calculation spreadsheet on the NEPM toolbox website and are used to assess contamination with respect to terrestrial ecosystems. Site specific inputs (including soil parameters) are required to calculate EIL. EIL typically apply to the top 2 m of soil;
- Ecological Screening Levels (ESL) for selected petroleum hydrocarbon compounds and fractions, and benzo(a)pyrene, and are used to assess contamination with respect to terrestrial ecosystems (Table 8). ESL are dependent on soil type and typically apply to the top 2 m of soil; and
- Ecological Soil Guideline Values (EGV) for PFAS (Table 9). At the time of preparing this document, screening values were available only for PFOS and PFOA.

EIL were determined for the DSI using the NEPC Ecological Investigation Level Spreadsheet based on the following inputs:

- A pH of 5.4;
- A Cation Exchange Capacity (CEC) of 10.5 meq/100g;
- Contamination is assumed to be 'aged' based on site history;
- A (default) organic carbon content value of 1% was used as a default value;
- A clay content of 1% was used as a conservative value; and
- The state is NSW and the traffic volume is 'low'.

Predominantly silt and clay soils have been identified at the site and, so, ESL for fine soils have been adopted.

Table 7: Ecological Investigation Levels (Tier 1) from NEPM Toolbox

Contaminant	Public Open Space EIL for Passive Open Space (mg/kg)	Commercial and Industrial EIL for Rail Corridor (mg/kg)
Metals		
Arsenic	100	160
Copper	140	190
Nickel	180	300
Chromium III	190	320
Lead	1100	1800
Zinc	330	470
PAH		
Naphthalene	170	370
OCP		
DDT	180	640

Table 8: Ecological Screening Levels (Tier 1) from NEPM

Contaminant	Soil Type	Public Open Space ESL for Passive Open Space (mg/kg)	Commercial and Industrial ESL for Rail Corridor (mg/kg)
Benzene	Fine	65	95
Toluene	Fine	105	135
Ethylbenzene	Fine	125	185
Xylenes	Fine	45	95
TPH C6-C10 less BTEX	Coarse/ Fine	180*	215*
TPH >C10-C16	Coarse/ Fine	120*	170*
TPH >C16-C34	Fine	1300	2500
TPH >C34-C40	Fine	5600	6600
Benzo(a)pyrene	Coarse / Fine	0.7	1.4

Notes: ESL are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability
TPH is total petroleum hydrocarbons

Table 9: Ecological Soil Guideline Values (Tier 1) from NEMP for all Land Uses

Contaminant	Direct Exposure (mg/kg)	Indirect Exposure (mg/kg)
PFOS	1	0.01
PFOA	10	NC

Notes: NC no criterion
Direct exposure ecological soil guideline applies specifically to protection of organisms that live within, or in close contact with soil, such as earthworms and plants.
The indirect exposure ecological soil guideline accounts for the various pathways through which organisms can be exposed whether or not they are in direct contact with PFAS contaminated soil (i.e. exposure through the food chain). For intensively developed sites with no secondary consumers and minimal potential for indirect ecological exposure, a higher criterion of up to 0.14 mg/kg may be appropriate.

4.0 Management Limits

In addition to appropriate consideration and application of the human health and ecological criteria, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards; and
- Effects on buried infrastructure e.g., penetration of, or damage to, in-ground services.

Management limits are shown in Table 10. Predominantly silt and clay soils were encountered during the investigation and, so, management limits for fine soils have been adopted.

Table 10: Management Limits for TPH from NEPM (mg/kg)

Contaminant	Soil Type	Public Open Space Management Limits for Passive Open Space (mg/kg)	Commercial and Industrial Management Limit for Rail Corridor (mg/kg)
TPH C6-C10	Fine	800	800
TRH >C10-C16	Fine	1000	1000
TPH >C16-C34	Fine	3500	5000
TPH >C34-C40	Fine	10 000	10 000

Appendix G

Data Quality Objectives

Data Quality Objectives
RAP for AEC 43, 1793 Elizabeth Drive, Badgerys Creek
SCAW Package for SMWSA

1. Introduction

The objective of the validation plan is to demonstrate that the site has been made suitable for the proposed development, and to provide information on any environmental impacts which may have resulted from the works.

The validation assessment will be conducted with reference to the seven step data quality objectives (DQOs) as outlined in NEPC (2013), described below. The DQO in NEPC (2013) is in turn, based on the DQO process outlined in USEPA (2006), and associated guidelines.

2. Data Quality Objectives

Table 1: Data Quality Objectives

Step	Summary
1: State the problem	The site requires remediation and validation of remediation in order to render it suitable for proposed land use. The objective of the validation plan is to confirm the successful implementation of this remediation action plan. A conceptual site model (CSM) for the proposed development has been prepared in the RAP.
2: Identify the decisions / goal of the study	The CSM identifies the contaminants of potential concern (CoPC) and the likely impacted media. The key contaminant impacting the site is asbestos. The validation sampling results will be compared against the RAC. The preferred remediation strategy as outlined in the RAP is the excavation and disposal of contaminated soils. The success of the remediation and subsequent validation will be based on a comparison of the analytical results to the adopted RAC. Although not appropriate for asbestos, statistical analysis may be utilised for other contaminants.
3: Identify the information inputs	Relevant inputs to the decision include: • The CSM, identifying the contaminant and affected media; • Analysis using NATA accredited laboratories and methods, where possible; • Field and laboratory QA/QC data to assess the suitability of the environmental data for the validation assessment; and • Results compared with the RAC.

Step	Summary
4: Define the study boundaries	The lateral boundaries of the site are shown on Drawing AEC43-01, Appendix A, of the RAP. The vertical boundaries are to the extent of contamination impact as determined from the site history assessment, site observations and previous investigations used to inform the RAP.
5: Develop the analytical approach (or decision rule)	The decision rule is to compare all analytical results with the RAC. Initial comparisons will be with individual results. Although not appropriate for asbestos, statistical analysis may be utilised for other contaminants. Quality control results are to be assessed according to their relative percent difference (RPD) values. For field and laboratory duplicate results for chemical analysis, RPDs should generally be below 30%; for field blanks, results should be at or less than the limits of reporting (NEPC, 2013). The field and laboratory quality assurance assessment is included in Section 14. It is noted that duplicate samples will not be analysed for asbestos.
6: Specify the performance or acceptance criteria	Baseline condition: Contaminants at the site and/or statistical analysis of data exceed the RAC and pose a potentially unacceptable risk to receptors (null hypothesis). Alternative condition: Contaminants at the site and statistical analysis of data complies with the RAC and as such, do not pose a potentially unacceptable risk to receptors (alternative hypothesis). Unless conclusive information from the collected data is sufficient to reject the null hypothesis, it is assumed that the baseline condition is true.
7: Optimise the design for obtaining data	Sampling design and procedures to be implemented to optimise data collection for achieving the DQOs include the following: • Sampling frequencies in accordance with Section 11 and Section 12; • Analysis for the CoPC at NATA accredited laboratories using NATA endorsed methods will be used to perform laboratory analysis whenever possible; and • Adequately experienced environmental scientists/engineers will conduct field work and sample analysis interpretation.

3. References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

USEPA. (2006). *Guidance on systematic planning using the data quality objectives process, EPA QA/G-4.* Washington DC.: United States Environmental Protection Agency, Office of Environmental Information.

Appendix H

Site Management Plan

Site Management Plan
RAP for AEC 43, 1793 Elizabeth Drive, Badgerys Creek
SCAW Package for SMWSA

1. Introduction

This general site management plan (SMP) has been developed to minimise potentially adverse impacts on the environment, and worker and public health as a result of the proposed remediation works.

The Contractor must have in place a construction environmental management plan (CEMP) (or similar) which is specific to the equipment used for the remediation and the proposed methods to be adopted by the Contractor. This SMP has been prepared to augment the Contractor's CEMP and contains general details for aspects of the work, as per reporting requirements for a remediation action plan (RAP) under NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

Works are to comply with the Environmental Protection Licence (21695) for the SCAW project.

Apart from the management principles outlined in this SMP, the Contractor must also ensure compliance with all relevant environmental legislation and regulations, including (but not limited to) the following:

- *Contaminated Land Management Act 1997* NSW (CLM Act);
- *Protection of the Environment Operations Act 1997* NSW (POEO Act);
- *Protection of the Environment Legislation Amendment Act 2011* NSW;
- *Protection of the Environment Operations Amendment (Scheduled Activities and Waste) Regulation 2008* NSW;
- *Environmentally Hazardous Chemicals Act 1985* NSW;
- *Environmental Offences and Penalties Act 1989* NSW;
- *Pesticide Act 1999* NSW and *Pesticides Regulation 2017*; and
- *Work Health and Safety Act 2011* NDSW (WHS Act) and *Work Health and Safety Regulations 2011* NSW.

2. Roles and Responsibilities

With respect to contamination land management at the site, Sydney Metro (SM) is the Principal, CPBUI JV is the Principal Contractor; and Melissa Porter (of Senversa) is the Site Auditor accredited by NSW EPA under the CLM Act.

The Principal will retain the overall responsibility for ensuring this RAP is appropriately implemented, however, the actual implementation of the RAP will be conducted by the Principal Contractor. Roles and responsibilities for implementing this RAP are discussed below.

2.1 Principal Contractor

The Principal Contractor ('the Contractor') will be the party responsible for daily implementation of this RAP and shall fulfil the responsibilities of the Contractor as defined by SafeWork NSW. It is noted that the Contractor may appoint appropriately qualified sub-contractors or sub-consultants to assist in fulfilling the requirements of the procedures. The Contractor will appoint a Site Manager(s) and/or a Site Supervisor(s).

In addition to the implementation of the RAP it will be the Contractors responsibility to:

- Obtain / ensure relevant sub-contractors obtain specific related approvals as necessary to implement the earthworks including permits for removal of asbestos-containing material, SafeWork NSW notification etc.;
- Develop or request and review any site plans to manage the works to be conducted;
- Ensure that all remediation works and other related activities are undertaken in accordance with this RAP;
- Maintain all site records related to the implementation of this RAP;
- Ensure sufficient information is provided to engage or direct all required parties, including sub-contractors, to implement the requirements of the RAP other than those that are the direct responsibility of the Contractor;
- Manage the implementation of any recommendation made by those parties in relation to work undertaken in accordance with the RAP;
- Inform, if appropriate, the relevant regulatory authorities of any non-conformances with the procedures and requirements of the RAP in accordance with the procedures outlined in this document;
- Retain records of any contingency actions;
- On completion of the project, to review the RAP records for completeness and update as necessary; and
- Recommend any modification to general documentation which would further improve the environmental outcomes of this RAP.

The Principal Contractor will be responsible for ensuring the contamination testing and management is carried out in accordance with the Environmental Protection Licence (21695).

2.2 Asbestos Contractor

The Asbestos Contractor will be responsible for undertaking all asbestos work involving any asbestos impacted filling and will hold the appropriate licence for the removal of asbestos (issued by SafeWork NSW). It is noted that the asbestos identified at the site to date has included both friable and bonded asbestos. A Class A licence will be required for friable asbestos removal work. (A minimum of) a Class B licence will be required for bonded asbestos removal work.

The Asbestos Contractor can be the same entity as the Principal Contractor.

2.3 Sub-contractors

All sub-contractors will be inducted onto the site, informed of their responsibilities in relation to this RAP and sign their agreement to abide by the RAP requirements. Where necessary, sub-contractors will also be trained in accordance with the requirements of this document. All sub-contractors must conduct their operations in accordance with the RAP as well as all applicable regulatory requirements.

2.4 Environmental Consultant

The Environmental Consultant will provide advice on implementing the RAP. The Environmental Consultant will be responsible for:

- Undertaking any required assessments where applicable (e.g., waste classification, validation, etc.,);
- Providing advice and recommendations arising from monitoring and/or inspections, including unexpected finds; and
- Notifying (the client of) any results of assessments, and any observed non-conformances.

2.5 Occupational Hygienist

The Occupational Hygienist will be required to be engaged independently of the Asbestos Contractor to undertake the following:

- Review and approve documentation prepared by the Asbestos Contractor;
- Prepare any WHS plans and advice required by the Contractor;
- Undertake airborne asbestos monitoring;
- Undertake clearance inspections;
- Provide advice and recommendations arising from monitoring and / or inspections; and
- Notify (the client of) results of any assessments and any observed non-conformances.

The Occupational Hygienist will be a licensed Asbestos Assessor for friable asbestos removal work.

2.6 Site Workers

All workers on the site are responsible for observing the requirements of this RAP and other management plans. These responsibilities include the following:

- Being inducted on the site and advised of the general nature of the remediation/environmental issues at the site;
- Being aware of the requirements of this plan;
- Wearing appropriate personal protective equipment (PPE);
- Only entering restricted areas when permitted; and

- Requesting clarification when unclear of requirements of this or any other plans (e.g., safe work method statements (SWMS)).

3. Water Management

3.1 Stormwater

Stormwater must be managed during the remediation works such that potential adverse impacts from surface runoff (e.g., cross contamination, mobilisation of contaminants in soil particles, etc.) are appropriately mitigated. Discharges of water must be in accordance with the Environmental Protection Licence (21695).

The Contractor will take appropriate measures which may include:

- Construction, where necessary, of stormwater diversion channels, bunding and linear drainage sumps with catch pits in and around the remediation areas to divert stormwater from the contaminated areas;
- Provision of appropriately located sediment traps including geotextiles; and
- Discharge of excess water in excavations / low points on a regular basis to limit the potential for flooding.

Where water is not suitable for discharge to the stormwater system, a liquid waste contractor may be required to remove the water for disposal in accordance with regulatory requirements.

3.2 Dewatering of Excavations

Any runoff or seepage water accumulated in site excavations that requires removal must initially be sampled and tested for suspended solids, pH and any contaminants of potential concern (CoPC) as identified by the Environmental Consultant. The options for management of excavation pump-out water, dependent upon the test results, are for disposal of the water as follows:

- Discharge to stormwater with prior approval from Council. Provided the test results comply with relevant ANZG *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018), or any other compliance requirements stipulated by Council. The Environmental Consultant must consider the most appropriate criteria to be used;
- Discharge to sewer, as industrial trade wastewater, with prior approval from Sydney Water. This option would require the analysis of a larger list of analytes, and compliance with the Sydney Water acceptance standards and takes time to obtain relevant approvals; or
- Pumping by a liquid waste contractor for removal of the water off-site, in accordance with regulatory requirements.

Note that, depending on the type and scale of the dewatering required, a permit (water use approval) may need to be obtained through NSW Water.

4. Soil Management Plan

The Contractor is to include a plan to mitigate cross contamination as part of the CEMP (or similar document) to be implemented throughout the works. An *Asbestos Management Plan* (AMP) for *Sydney Metro Western Sydney Airport Surface and Civil Alignment Works (SCAW)* has been prepared by Tetra Tech Coffey Pty Ltd. Reference is to be made to the AMP when undertaking remediation works for asbestos contamination.

4.1 Excavation and Stockpiling of Contaminated Material

Contaminated material shall be excavated and stockpiled at a suitably segregated location(s) away from sensitive areas (e.g., water bodies, drainage lines, stormwater pits, etc.) and ongoing excavations, and in a manner that will not cause nuisance to the neighbouring properties. Soil stockpiles are to be managed as follows:

- An impermeable membrane such as plastic sheeting should be provided at the surface by the Contractor prior to stockpiling. Plastic sheeting should be taped at joins, as necessary;
- All stockpiles of contaminated material shall be surrounded by star pickets and marking tape or other suitable material to clearly delineate their boundaries;
- Stockpiles shall be lightly conditioned by sprinkler or covered by geotextile or similar cover to prevent dust generation;
- Stockpiles impacted, or potentially impacted, with asbestos must be covered by geotextile;
- Any stockpile to remain on-site overnight should be adequately secured in order to reduce the risk of sediment runoff;
- Measures should be taken by the Contractor to prevent the migration of stockpile materials (i.e., perimeter bunds, hay bales, silt fences, etc.);
- Should the stockpile remain on-site for over 24 hours, geotextile silt fences must be erected to prevent losses by surface erosion; and
- A record of stockpile locations (stockpile register), dimensions, descriptions, environmental controls, etc. should be maintained by the Contractor.

All movement of soil within the site and off-site is to be tracked by the Contractor, from cradle to grave. Stockpiles kept on site are to be clearly labelled (pegged or spray painted on geofabric) and a site record is to be kept including the source location of each stockpile and the position of each stockpile (with associated dates). Copies of tracking records must be provided to the Environmental Consultant upon request.

4.2 Loading and Transport of Contaminated Material

Transport of contaminated material from the site shall be via a clearly delineated haul route and this route shall be used exclusively for entry and egress of vehicles used to transport contaminated materials within and away from the site. The proposed waste transport route (to be determined by the Contractor) will be notified to Council and truck dispatch shall be logged and recorded by the Contractor for each load leaving the site. A record of the truck dispatch will be provided to the Environmental Consultant.

All haulage routes for trucks transporting soil, materials, equipment or machinery to and from the site should be selected to meet the following objectives:

- Comply with all road traffic rules;
- Minimise noise, vibration and dust to adjacent premises; and
- Utilise State roads and minimise use of local roads as far as practicable.

The remediation work will be conducted such that all vehicles:

- Conduct deliveries of soil, materials, equipment or machinery only during the specified hours of remediation;
- Have securely covered loads to prevent any dust or odour emissions during transportation; and
- Exit the site in a forward direction.

In addition, measures will be implemented to ensure no contaminated material is spilled onto public roadways or tracked off-site on vehicle wheels. Roadways will be kept clean throughout the remediation works and will be broomed, if necessary, to achieve a clean environment.

All loads will be securely covered and may be lightly wetted, if required, to ensure that no materials or dust are dropped or deposited outside or within the site. Prior to exiting the site each truck should be inspected by Contractor personnel and either noted as clean (wheels and chassis) or broomed prior to leaving the site. Any soil spilled onto surrounding streets will be cleaned by mechanical or hand methods, on a daily basis.

Removal of waste materials from the site shall only be carried out by contractors holding the appropriate license(s), consent or approvals to dispose the waste materials according to the waste classification and with the appropriate approvals obtained from the EPA, were required.

5. Noise and Vibration Control Plan

All equipment and machinery should be operated in an efficient manner to minimise the emission of noise. The use of any plant and/or machinery should not cause unacceptable vibrations to nearby properties and should meet Council requirements.

6. Dust Control Plan

Dust emissions must be confined within the site boundary as far as is practicable. The following example dust control procedures could be employed to comply with this requirement, as necessary:

- Erection of dust screens around the perimeter of the site (as applicable);
- Securely covering all loads entering or exiting the site;
- Use of water sprays across the site to suppress dust;
- Covering of all stockpiles of contaminated soil remaining on site more than 24 hours;

- Include wheel wash (if applicable); and
- Keeping excavation and stockpile surfaces moist.

Regular checking of the fugitive dust issues is to be undertaken. Remedial measures are to be undertaken to rectify any cases of excessive dust.

7. Odour Control Plan

No odours should be detected at any boundary of the site during remediation works by an authorised Council Officer relying solely on sense of smell. The following example procedures could be employed to comply with this requirement as required:

- Use of appropriate covering techniques such as plastic sheeting, polythene or geotextile membranes to cover excavation faces or stockpiles;
- Fine spray of water and/or hydrocarbon mitigating agent on the impacted areas / materials;
- The use of water spray, as and when appropriate;
- Use of sprays or sprinklers on stockpiles or loads to lightly condition the material;
- If required, restrict uncovered stockpiles to appropriate sizes to minimise odour generation;
- Ceasing works during periods of inclement weather such as high winds or heavy rain;
- Regular checking of the fugitive dust and odour issues to ensure compliance. Undertake immediate remediation measures to rectify any cases of excessive dust or odour (e.g., use of misting sprays or odour masking agent); and
- Adequate maintenance of equipment and machinery to minimise exhaust emissions.

8. Work Health and Safety Plan

8.1 General

It is the Contractor's responsibility to devise a SWMS[1] (or series thereof, for various respective tasks) and to implement proper controls that enable the personnel undertaking the remediation to work in a safe environment. This RAP and SMP does not relieve the Remediation Contractor or other contractors of their ultimate responsibility for occupational health and safety of their workforce and to prevent contamination of areas outside the 'remediation' workspace. This RAP and SMP sets out general procedures and the minimum standards and guidelines for remediation that will need to be used in preparing the safe work method statement.

This work health safety plan (WHSP) has been prepared with refence to CRC CARE *Remediation Action Plan: Implementation - Guideline on Health and Safety* (CRC CARE, 2019). The requirements of this WHSP must be incorporated into the Contractor's SWMS.

[1] Either a SWMS or construction environmental management plan (CEMP), or other equivalent document incorporating health and safety aspects of the proposed remedial works.

All site work must be undertaken in a controlled and safe manner with due regard to potential hazards, training and safe work practices. To attain this the SWMS developed by the Contractor must comply with policies specified in the *Work Health and Safety Regulation 2011*.

All appropriate permits, licences and notifications required for the remediation activities must be obtained prior to the commencement of remediation works.

8.2 Site Access

Appropriate fencing and signage must be installed around and within the site to prevent unauthorised access and restrict access to remediation areas and / or excavations. Access restrictions and administrative arrangements for management of entry of workers or related personnel on site is the responsibility of the Contractor.

Any existing pits or unstable areas on site that may generate potential safety, or operational risk should be demarcated and taped off, with appropriate rectification action undertaken (e.g., backfilling of pits).

8.3 Personnel and Responsibilities

Before undertaking works on site, all personnel will be made aware of the officer responsible for implementing WHS procedures. All personnel must read and understand this WHSP and over-arching SWMS prior to commencing site works and sign a statement to that effect. Contractors employed at the site will be responsible for ensuring that their employees are aware of, and comply with, the requirements of this WHSP and Contractor's SWMS.

8.4 Chemical and Physical Hazards

The risks associated with chemical soil contaminants to site personnel and workers involved in the remediation are considered to be low due to the recorded soil and groundwater concentrations in the DSI.

The following physical hazards are associated with conditions that may be created during remediation works:

- Heat exposure;
- Excavations;
- Buried services;
- Noise;
- Dust;
- Electrical equipment;
- Heavy equipment and truck operation; and
- Asbestos.

Safe work practices must be employed to manage the physical risks identified above.

For the most part, the chemical and physical hazards can be managed through appropriate demarcation, access controls and the use of appropriate PPE.

8.5 Safe Work Practices

The appropriate safe work practices should be clearly defined by the Contractor in their SWMS. As a minimum, all personnel on site will be required to wear the following PPE:

- Steel-capped boots (mandatory);
- High visibility clothing / vest (mandatory);
- Safety glasses or safety goggles with side shields requirements (as necessary);
- Hard hat (as necessary);
- Appropriate respiratory and protective equipment for any works involving asbestos; and
- Hearing protection when working in the vicinity of machinery or plant equipment if noise levels exceed exposure standards (as necessary).

Each item of PPE should meet the corresponding relevant Australian Standard(s).

Specific safe work practices will be adopted when working with asbestos, in accordance with (but not limited to) the following codes of practice:

- SafeWork NSW *Code of Practice, How to Manage and Control Asbestos in the Workplace* (SafeWork NSW, 2019a);
- SafeWork NSW *Code of Practice, How to Safely Remove Asbestos* (SafeWork NSW, 2019b);
- WorkCover NSW *Managing Asbestos in or on Soil* (WorkCover NSW, 2014); and
- NOHSC *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Ed* (NOHSC, 2005).

9. Remediation Schedule and Hours of Operation

The remediation works will be conducted within the days and hours specified the Environmental Protection Licence (21695).

10. Response to Incidents

The key to effective management of incidents is the timely action taken before any situation reaches a reportable or critical level. Therefore, surveillance activities are extremely important, and should be conducted for the measures prescribed herein and any other measures prescribed in any additional environmental management plan developed subsequently. During construction activities on the site, the following inspection or preventative actions should be performed by the Contractor:

- Regular inspection of works;
- Completion of routine environmental checklists and follow-up of non-compliance situations;
- Maintenance and supervision on-site; and
- An induction process for site personnel involved in the remediation works that includes relevant information on the contamination status of the site, the remediation works being undertaken, worker health and environmental protection requirements, and ensures that all site personnel are familiar with the site emergency procedures.

An emergency response plan will be in place for all aspects of site works. Any emergency will be reported immediately to the site office and / or the Site Manager (and Safety Officer), and the appropriate emergency assistance should be sought. The Site Manager should be responsible for initiating an immediate emergency response using the resources available on the site. Where external assistance is required, the relevant emergency services should be contacted. A table such as Table 1 below, containing contact details for key personnel who may be involved in an environmental emergency response should be completed and be readily available to personnel at all times. The table should be completed, and thereafter amended, as required. Contact details for key utilities are included in the event of needing to respond to incidents.

The Contractor will be responsible for ensuring that site personnel are aware of the emergency services available and the appropriate contact details. A site Safety Officer should be contactable, or available, on-site during remediation and development works.

Table 1: Summary of Roles and Contact Details

Role	Personnel / Contact	Phone Contact Details
Principal		
Principal's Representative		
Site Manager		
Principal Contractor		
Site Office		
Environmental Consultant		
Regulator	NSW EPA (pollution line and general enquiries)	131 555
Utility Provider	Water (Sydney Water Corporation)	13 20 92
Utility Provider	Power (Ausgrid)	13 13 88
Utility Provider	Gas (Jemena Limited)	131 909

Utility Provider	Telecommunications (Telstra Corporation Limited)	13 22 03
Utility Provider	Telecommunications (Optus)	1800 505 777
Utility Provider	Telecommunications (NBN Co Limited)	1800 687 626

11. References

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Canberra, ACT: Australian and New Zealand Governments and Australian state and territory governments.

CRC CARE. (2019). *Remediation Action Plan: Implementation - Guideline on Health and Safety.* National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

NOHSC. (2005). *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Ed.* Canberra, April 2005, NOHSC:3003: National Occupational Health and Safety Commission, Commonwealth of Australia.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land.* Contaminated Land Guidelines: NSW Environment Protection Authority.

SafeWork NSW. (2019a). *Code of Practice, How to Manage and Control Asbestos in the Workplace.* August 2019.

SafeWork NSW. (2019b). *Code of Practice, How to Safely Remove Asbestos.* August 2019: SafeWork NSW, NSW Government.

WorkCover NSW. (2014). *Managing Asbestos in or on Soil.* March 2014: WorkCover NSW, NSW Government.

Douglas Partners Pty Ltd