Douglas Partners
Geotechnics / Environment / Groundwater

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Report on
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

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

Project 204814.01
November 2022

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

Document details

Project No.	204814.01	Document No.	DSI.002.Rev0 AEC43
Document title	Report on Detailed Site Investigation (Contamination) Surface & Civil Alignment Works (SCAW) Package for Sydney Metro - Western Sydney Airport (SMWSA)		
Site address	Area of Environmental Concern (AEC) 43, 1793 Elizabeth Drive, Badgerys Creek		
Report prepared for	CPB Contractors Pty Limited & United Infrastructure Pty Limited Joint Venture (CPBUI JV)		
File name	204814.01.DSI.002.Rev0 AEC43		

Document status and review

Status	Prepared by	Reviewed by	Date issued
Draft A			27 October 2022
Revision 0			21 November 2022

Distribution of copies

Status	Electronic	Paper	Issued to
Draft A	1	-	
Revision 0	1	-	

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
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Reviewer		21 November 2022

FS 604853

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Executive Summary

Douglas Partners Pty Ltd (DP) has been engaged by CPB Contractors Pty Limited & United Infrastructure Pty Limited Joint Venture (CPBUI JV) to complete this Detailed Site Investigation (Contamination) (DSI) for the Sydney Metro - Western Sydney Airport (SMWSA) Surface and Civil Alignment Works (SCAW) package at Area of Environmental Concern (AEC) 43.

Technical Paper 8: Contamination, prepared as part of Sydney Metro - Western Sydney Airport, Environmental Impact Statement (EIS), documents areas of environmental concern identified for the Sydney Metro - Western Sydney Airport project. The objective of the DSI is to assess the suitability of the part of AEC 43 that will be disturbed by SCAW activities (the site) and to determine whether further investigation and / or management is required. The site is shown on Drawing AEC43-01, Appendix A.

The scope of work included soil sampling from 30 locations (using an excavator or hand auger); installation, development and sampling of three groundwater monitoring wells using a drilling rig; and laboratory analysis of soil and groundwater samples for potential contaminants and parameters.

The land at the site has residences with sheds and animal shelters. The eastern part of the site was used for paddocks. One shed was observed to have a small number of empty paint cans and other small empty old chemical containers on the ground surface. The majority of the ground surface was covered in grass.

At test pit and hand auger locations for the current assessment, fill comprising silty sand was encountered at all test pits and hand auger boreholes, between 0.1 m and 0.3 m thick, except at test pit AEC43TP06 where sandy silt fill was observed to a depth of 0.4 m, at test pit AEC43TP05 where sandy clay fill was encountered to a depth of 0.1 m, and at hand auger borehole AEC43HA30 where sandy silt fill was encountered to a depth of 0.1 m. Fill was underlain by silty clay to observed depths ranging from 0.4 m to 1.2 m (except at test pit AEC43TP06 which was discontinued in fill at a depth of 0.4 m).

A buried fibre-cement pipe (observed to potentially contain 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.

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). Groundwater levels prior to sampling on 16 September 2022 were measured to be between 2.1 m and 6.04 m below ground level.

It is noted that the majority of the site's surface had a thick cover of grass which inhibited making observations for potential asbestos containing materials (ACM) on surface soils. It is 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.

For soil samples for the current investigation, concentrations of chemicals for all analysed soil samples are within the site assessment criteria. 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) exceeds the health screening level (0.001% w/w); 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 (>7mm in size).

For groundwater samples, concentrations of contaminants were within the site assessment criteria, except for the concentrations of copper in the primary samples from AEC43BH01 and AEC43BH03 which were slightly above the default guideline value. These copper concentrations are considered to be at typical background levels.

With respect to fill samples, concentrations of chemical contaminants were within the CT1 criteria for general solid waste (GSW) except for lead in the sample from AEC43HA30, depth 0-0.1 m. Concentrations of lead were within the SCC1 and TCLP1 criteria for GSW. With respect to PFAS, concentrations for the surface sample from SMGW-BH-B329 were within the SCC1 criteria, however, it is noted that it appears that TCLP (toxicity characteristic leaching procedure) was not conducted for comparison with TCLP1 criteria. If fill sourced from SMGW-BH-B329 is to be disposed offsite, TCLP analysis for PFAS should be undertaken for waste classification. Asbestos was identified in the fill (depth 0 - 0.1 m) at AEC43TP02 and AEC43TP09 and in buried pipe at AEC43TP06. Asbestos waste is classed as special waste. Concentrations of metals, TRH, BTEX, PAH and pH are within criteria for excavated natural material (ENM) except for:

- The concentration of arsenic (25 mg/kg) in the sample from AEC43HA01, depth 0-0.1 m, which exceeds the maximum average concentration (20 mg/kg) but not the absolute maximum concentration (40 mg/kg) for ENM;
- The concentration of cadmium (0.9 mg/kg) in the sample from AEC43HA30, depth 0-0.1 m, which exceeds the maximum average concentration (0.5 mg/kg) but not the absolute maximum concentration (1 mg/kg) for ENM;
- The concentration of lead (190 mg/kg) in the sample from AEC43HA30, depth 0-0.1 m, which exceeds both the maximum average concentration (50 mg/kg) and the absolute maximum concentration (100 mg/kg) for ENM; and
- The concentrations of zinc in the samples from a depth of 0-0.1 m from AEC43HA01 (200 mg/kg), AEC43HA19 (280 mg/kg) and AEC43HA30 (160 mg/kg) which exceed the maximum average concentration (150 mg/kg) but the absolute maximum concentration (300 mg/kg) for ENM.

ENM, by definition, cannot contain asbestos, so the fill (depth 0 - 0.1 m) at AEC43TP02 and AEC43TP09 and the asbestos pipe at AEC43TP06 cannot be classified as ENM.

With respect to natural soil samples, concentrations of chemical contaminants were within what are considered to be background levels which is considered to be consistent with the definition of virgin excavated natural material (VENM), as defined in *Protection of the Environment Operations Act 1997*.

Given the presence of asbestos contamination, it is considered that remediation is required to render the site suitable for the proposed development. A Remediation Action Plan (RAP) should be prepared for remediation of the site. Prior to demolition, a hazardous materials building survey should be undertaken for structures that will be demolished at the site (if not undertaken already).

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Report on 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

1. Introduction

Douglas Partners Pty Ltd (DP) has been engaged by CPB Contractors Pty Limited & United Infrastructure Pty Limited Joint Venture (CPBUI JV) to complete this Detailed Site Investigation (Contamination) (DSI) for the Sydney Metro - Western Sydney Airport (SMWSA) Surface and Civil Alignment Works (SCAW) package at Area of Environmental Concern (AEC) 43.

Technical Paper 8: Contamination, prepared as part of *Sydney Metro - Western Sydney Airport, Environmental Impact Statement* (EIS), documents areas of environmental concern identified for the Sydney Metro - Western Sydney Airport project. The objective of the DSI is to assess the suitability of the part of AEC 43 that will be disturbed by SCAW activities (the site) and to determine whether further investigation and / or management is required. The site 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.

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); and
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land,* 2020 (NSW EPA, 2020).

The site is subject to a Site Audit by Melissa Porter, a NSW Environment Protection Authority (EPA) Site Auditor accredited under the *Contaminated Land Management Act 1997*.

2. Site Identification and Proposed Development

Table 1 provides a summary of information for site identification. The site covers the majority of AEC 43 as shown in Drawing AEC43-01, Appendix A.

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

Item	Details
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, 2021e) (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 assumed that the site will comprise both of the above-listed land uses.

Development of the site will likely include stripping of topsoil across the site area and cut (up to a maximum of approximately 3 m depth) for the rail line. 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.

It is understood that there are three areas at the site which has vegetation that requires to be offset (prior to disturbance) for the SCAW project (as part of the EPBC Biodiversity Offset Strategy for the SMWSA project). These are shown in Drawing AEC43-01, Appendix A. At the time of field work for this DSI, approval had not yet been received for disturbance of vegetation within these areas.

Buildings on the site will be demolished for the SCAW project. It is understood that, under European and Other Heritage Construction Environmental Management Plan for the SMWSA project, buildings at the site are not to be damaged until approval has been received. At the time of field work for this DSI, approval had not yet been received.

It is understood that Sydney Metro are in ownership of the site (as part of land acquired for operation of the Metro line).

3. Scope of Work

The scope of work for the DSI, generally based on DP, *Sampling and Analysis Quality Plan (SAQP), Surface & Civil Alignment Works (SCAW) Package for Sydney Metro - Western Sydney Airport (SMWSA) Area of Environmental Concern (AEC) 43, 1793 Elizabeth Drive, Badgerys Creek,* August 2022, (204814.01.SAQP.004.DftA), included the following:

- Collection of soil samples from excavated test pits or hand auger boreholes at 30 locations across the site;
- Using a drill rig, install three groundwater monitoring wells;
- Develop the three groundwater monitoring wells and then return to site to collect groundwater samples;
- Analyse selected soil samples for potential contaminants and soil parameters;
- Analyse groundwater samples for potential contaminants and water parameters; and
- Preparation of this DSI including an assessment of analytical and field results.

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 for the majority of the site. (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).
Surface water	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 and flows towards the north. Rainfall at the site is expected to infiltrate permeable surfaces. Any surface water runoff at the site would flow generally to the east and northeast towards the farm dams and Badgerys Creek.

Item	Details
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. During field work, one shed was observed to have a small number of empty paint cans and other small empty old chemical containers on the ground surface. The majority of the ground surface was covered in grass. Site photographs are provided in Appendix K.
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 Investigation Data

Cardno, *Contamination Assessment Report, Sydney Metro Western Sydney Airport*, 1 September 2021 (80021888-CDO-CAR-RPT-004-RevE) (Cardno, 2021) includes data for one soil sampling location (SMGW-BH-B329) at the site. Borehole SMGW-BH-B329 was drilled on 25 to 26 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 location of SMGW-BH-B329 is shown on Drawing AEC43-01, Appendix A.

Table 3 summarises the laboratory testing undertaken on soil samples from SMGW-BH-B329.

Table 3: Soil Sample Testing

Sample Location	Sample Depth (m)	Fill / Natural Soil	Laboratory Testing Suite
SMGW-BH-B329	surface	Fill	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).
	0.5	Natural	TRH; BTEXN; PAH; OCP; OPP; Ph; (8) metals; PFAS; volatile organics.
	1.5	Natural	TRH; BTEXN; PAH; OCP; OPP; Ph; (8) metals; Ph_F + Ph_{FOX} (acid sulfate soils screening test).
	2.5-2.95	Natural	Ph; (8) metals.

A summary of analytical results is provided in Appendix C. It is noted that (Cardo, 2021) was a factual report and did not provide an assessment of the contamination results with respect to suitability to the proposed development. Given this, results are assessed and discussed in Section 11.

6. Potential Contamination Sources and Preliminary Conceptual Site Model

The potential source of contamination for AEC 43 was identified in the EIS to be: *workshop (fuel/oil/chemical storage and use) and potential spray race (pesticides)*. For AEC 43, contaminants of potential concern were identified in the EIS to be: heavy metals, TRH, semi-volatile organic compounds (SVOC), PCB, and asbestos. It is noted that:

- The spray race was indicated to be approximately 550 m to the north of the site and, therefore, the spray race is not considered to be a potential source of site contamination given this distance;
- A workshop was indicated to be approximately 420 m to the north of the site and, therefore, the workshop is not considered to be a potential source of site contamination given this distance;
- *'farm sheds: potential fuel / oil and chemical storage use and HBM'* are indicated on a drawing in EIS to be at AEC 43 (although particular farm sheds are not indicated). During field work for this assessment, a farm shed was identified to have been likely used for storage of a small amount of chemicals or fuels / oils given the presence of a small number of old chemical bottles and paint tins (Drawing AEC43-01, Appendix A);
- Neighbouring structures located approximately 35 m to the west of the site were indicated on a drawing to be a '*potential up-gradient source'*. No other information as to this potential source was provided. It is noted that the structures are not directly up-gradient of the site; and
- It is noted that specific heavy metals and SVOC were not provided in the EIS.

Drawings extracted from the EIS are provided in Appendix A. The potential source of contamination at AEC 44, to the south and southeast of the site, was noted to be potential filling, however, AEC 44 is not considered to be upgradient of the site.

Table 4 summarises the potential source of contamination and what are considered to be the contaminants of potential concern for the DSI.

Table 4: Potential Source of Contamination and Contaminants of Potential Concern

Potential Source of Contamination	Contaminants of Potential Concern
Fuel/oil/chemical storage and use	• Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) • Total recoverable hydrocarbons (TRH) • Benzene, toluene, ethylbenzene and xylenes (BTEX) • Polycyclic aromatic hydrocarbons (PAH)* • Organochlorine pesticides (OCP) • Organophosphorus pesticides (OPP) • Polychlorinated biphenyls (PCB) • Phenols • Volatile organic compounds (VOC) (for groundwater)
Hazardous building materials	• Metals (lead) • PCB • Asbestos

Note: *Based on a review of site history, analysis for a larger suite of SVOC was not considered warranted.

A Conceptual Site Model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM provides the framework for identifying how the site may have become contaminated and how potential receptors may be exposed to contamination either in the present or the future i.e., it enables an assessment of the potential source - pathway - receptor linkages (complete pathways). Table 5 provides the preliminary CSM which forms the basis of the investigation.

Table 5: Preliminary CSM

Potential Contamination Source	Potential Exposure Pathway	Potential Receptors
Contaminated ground from fuel/oil/chemical storage and use of hazardous building materials	– Ingestion and direct contact – Inhalation of dust – Inhalation of vapours	– Construction workers (for the proposed development) – Future site workers including maintenance workers (post-development) – Pedestrians and commuters
	– Inhalation of dust	– Adjacent site users

Potential Contamination Source	Potential Exposure Pathway	Potential Receptors
	– Inhalation of vapours	
	– Surface run-off – Leaching of contaminants into groundwater and lateral migration of groundwater	– Surface water bodies
	– Leaching of contaminants into groundwater	– Groundwater
	– Ingestion, inhalation and direct contact	– Terrestrial ecosystems
	– Direct contact	– In ground structures
Contaminated groundwater migrating onto the site from an off-site source	– Inhalation of vapours	– Construction workers (for the proposed development) – Future site workers including maintenance workers (post-development) – Pedestrians and commuters

Although *Table B2: Activities associated with PFAS contamination more broadly* of Appendix B of HEPA, PFAS National Environmental Management Plan (NEMP) (HEPA, 2020) lists 'Agriculture: Potentially used as an adjuvant or active ingredient in fertilisers and pesticides….', it is considered that investigation for PFAS is not warranted given that crops did not appear to be established at the site and surrounding area, and, thus, there is a low probability that substantial fertiliser application has occurred. In addition, PFAS concentrations in soil samples from SMGW-TP-B329 were low or below laboratory limits of reporting and considered indicative of general background conditions for soil in urban and rural areas (see Section 11).

7. Sampling and Groundwater Well Installation

7.1 Data Quality Objectives

The DSI was devised with reference to the seven-step data quality objective process which is provided in Appendix B Schedule B2, NEPC (2013). The data quality objective process is outlined in Appendix D.

7.2 Soil Sampling

Based on the CSM and data quality objectives (DQO), a broad grid sampling strategy was adopted to provide data across the site. A total of 30 soil sample points for the site was adopted in order to exceed the minimum number sampling points (27) recommended for a 1.7 ha site in NSW EPA, *Sampling Design Part 1 -Application, Contaminated Land Guidelines,* 2022. Sample point AEC43HA30 was positioned inside the shed where empty paint and chemical containers were observed. It is noted that the site for the DSI covers a larger area within AEC 43 than that for the SAQP and so the adopted number of soil sampling points is greater than that in the SAQP.

Test pits were adopted for soil sample collection from 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 AEC43TP06A was excavated adjacent to AEC43TP06.

A hand auger instead of an excavator was adopted for soil sample collection at 12 locations (AEC43HA01, AEC43HA07, AEC43HA08, AEC43HA13, AEC43HA14, AEC43HA18 to AEC43HA20, AEC43HA22 to AEC43HA24, and AEC43HA30) at areas of the site where existing buildings and vegetation could not be damaged or disturbed (see Section 2).

Soil sampling was undertaken between 18 August 2022 and 21 September 2022.

Soil sampling was carried out in accordance with DP standard operating procedures. The general sampling and sample management procedures is as follows:

- Collect soil samples from excavator bucket returns or the hand auger including at the surface / near surface and regular depth intervals (approximately every 0.5 m) and / or at changes of strata;
- Transfer samples in laboratory-prepared glass jars with Teflon lined lids by hand, capping immediately and minimising headspace within the sample jar;
- Collect replicate samples in zip-lock bags for screening using a photo-ionisation detector (PID);
- For fill samples, collect ~500 ml samples in zip-lock bags (for asbestos analysis);
- Wear a new disposable nitrile glove for each sample point thereby minimising potential for cross-contamination;
- Label sample containers with individual and unique identification details, including project number, sample location and sample depth (where applicable);
- Place samples into a cooled, insulated and sealed container for transport to the laboratory; and
- Use chain of custody documentation.

A bulk (10 L) soil sample from AEC25TP25, depth 0-0.2 m, was subject to sieving / screening for asbestos as an anthropogenic material (hose) was identified in this fill. The procedure was as follows:

- Weigh the bulk sample and record the mass;
- Screen the bulk sample through a ≤7 mm aperture sieve. Clods of soil were broken down by hand to fit through the sieve. Materials retained on the sieve were examined for any asbestos containing material (ACM) or suspect material; and

- Weigh all retrieved potential ACM (if any). Record the condition, size and mass of the potential ACM.

7.3 Groundwater Well Installation and Development

Boreholes for groundwater monitoring wells (AEC43BH01 to AEC43BH03) were drilled to depths of between 9.2 m and 15 m using a track-mounted drilling rig on 25 to 30 August 2022. The groundwater monitoring wells were positioned as per the SAQP. AEC43BH03 was positioned somewhat (hydrogeological) down-gradient to the neighbouring rural property. It is noted that, based on topography, the buildings on neighbouring land to the west are not directly up-gradient of the site. AEC43BH01 and AEC43BH02 were positioned at down -gradient locations at the site.

Auger drilling with a tc-bit was utilised at AEC43BH02. Auger drilling with a tc-bit then washbore drilling were utilised at AEC43BH01 and AEC43BH03.

Monitoring wells were constructed using class 18 uPVC machine slotted screen and blank sections with screw threaded joints. The screened section of each well was backfilled with a washed sand filter pack to approximately 0.5 m above the screened interval. Each well was completed with a hydrated bentonite plug of at least 0.5 m thick and then grout to the ground surface.

The groundwater monitoring wells were developed on 26 and 30 August 2022 using a Twister (plastic) pump.

Locations of the groundwater monitoring wells are shown on Drawing AEC43-01, Appendix A.

7.4 Groundwater Sampling

Groundwater sampling of monitoring wells was carried out on 16 September 2022. The sampling method adopted (as per the SAQP) is as follows:

- Wear new disposable nitrile gloved for each sample point thereby minimising potential for cross-contamination;
- Measure the static water level using an electronic interface probe;
- Lower the well-dedicated tubing into the well at a depth that is at the screened section of the well;
- Set up the peristatic pump to draw water at a low rate that produces laminar flow;
- Measure physical parameters by continuously passing the purged water through a flow cell;
- Following stabilisation of the field parameters using a water quality meter, collect samples in laboratory-prepared bottles minimising headspace within the sample bottle and cap immediately. Samples for metals analysis are filtered in the field using a 0.45 µm filter (prior to bottling of the sample).
- Place samples into a cooled, insulated and sealed container for transport to the laboratory; and
- Use chain of custody documentation.

At AEC43BH01, following measurement of the groundwater level, a clear disposable (single-use) bailer was used to retrieve water from the well to observe the water quality, however, the bailer line became detached from the bailer and the bailer was not able to be retrieved from the well. It is considered that the presence of the bailer in the well does not impact the assessment results.

8. Laboratory Analysis

8.1 Soil Samples from Test Pits and Hand Auger Boreholes

Fill or topsoil (primary) samples from each sample location were analysed at a NATA accredited laboratory for the COPC (see Table 4) 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) as fill / topsoil was considered to have a greater risk of contamination compared to the observed natural soil. Natural soil samples from five sample locations (AEC43HA01, AEC43TP09, AEC43TP11, and AEC43HA24 and AEC43HA29) beneath surface fill / topsoil were analysed for the same suite of COPC excluding asbestos to obtain some data for the natural profile across the site.

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.

Laboratory certificates and chain of custody are provided in Appendix E.

8.2 Groundwater Samples

Groundwater samples were analysed for COPC including VOC, dissolved metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRH, BTEX, PAH, OCP, OPP, PCB and speciated phenols. The samples were also analysed for hardness. (Samples were also analysed for pH, electrical conductivity, sulfate and chloride for geotechnical purposes and have not been reported herein).

9. Site Assessment Criteria

Tier 1 Site Assessment Criteria (SAC) for the assessment of soils, informed by the CSM, at the site are listed in Appendix F.

10. Field Work Results

10.1 Test Pits and Hand Auger Boreholes

The test pit logs and hand auger borehole logs for this assessment are included in Appendix G and should be reference for detailed soil descriptions. In summary:

- Fill comprising silty sand was encountered at all test pits and hand auger boreholes, between 0.1 m and 0.3 m thick, except at AEC43TP06 where sandy silt fill was observed to a depth of 0.4 m (where the fibre-cement pipe was encountered), at AEC43TP05 where sandy clay fill was encountered to a depth of 0.1 m, and at AEC43HA30 (which was drilled inside a shed) where sandy silt fill was encountered to a depth of 0.1 m; and
- Fill was underlain by silty clay to observed depths ranging from 0.4 m 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 (observed to potentially contain 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.

PID results were less than 5 ppm, indicating a low potential for the presence of volatile contaminants. The PID calibration certificates are provided in Appendix H.

Apart from the fibre-cement pipe at AECTP06, no signs of contamination (e.g., odours, staining or potential asbestos contamination materials) were observed during sampling. A hose was identified in the fill at AEC43TP25 (depth 0-0.2 m). No potential ACM was recovered from the sieved bulk fill sample from AEC43TP25 (depth 0-0.2 m).

It is noted that the majority of the site's surface had a thick cover of grass (photographs included in Appendix K) which inhibited making observations for potential ACM on surface soils. It is 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.

No free groundwater was observed at the test pits or hand auger boreholes.

10.2 Groundwater Monitoring Wells

The borehole logs for groundwater monitoring wells for this assessment are included in Appendix G. 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). No signs of contamination were noted whilst drilling.

Groundwater seepage was observed whilst drilling at a depth of 3.6 m at AEC43BH02. Groundwater was not observed whilst drilling at AEC43BH01 and AEC43BH03. It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

10.3 Groundwater Well Development and Sampling

Groundwater levels are summarised in Table 6.

Table 6: Groundwater Levels

Borehole	Prior to Well Development		Prior to Well Sampling	
	Groundwater Depth (m bgl)	Groundwater Level (m AHD)	Groundwater Depth (m bgl)	Groundwater Level (m AHD)
AEC43BH01	0.31 (30/8/2022)	58.99	4.79 (16/9/2022)	54.51
AEC43BH02	2.23 (30/8/2022)	57.47	2.10 (16/9/2022)	57.60
AEC43BH03	5.91 (26/8/2022)	58.29	6.04 (16/9/2022)	58.16

Groundwater levels prior to sampling indicate that the general groundwater flow direction at the site is to the east or northeast.

The water from the development of AEC43BH01 and AEC43BH02 was observed to be cloudy and brown and have no odour. The water from the development of AEC43BH03 was observed to be cloudy, grey and have no odour.

No phase separated hydrocarbons were identified in any of the wells from use of the interface dipmeter prior to sampling. The water sampled from AEC43BH01 was observed to be slightly turbid and brown and have no odour. The water sampled from AEC43BH02 was observed to be clear, colourless and have no odour. The water sample from AEC43BH03 was observed to be clear, grey and have no odour.

The groundwater field sheets and water quality meter calibration record are provided in Appendix H.

11. Discussion of Laboratory Analytical Results

11.1 Soil Samples

Analytical results for soil samples for the current assessment are summarised in Table I1, Appendix I, against the most conservative (Tier 1) SAC (see Appendix E). Analytical results for the previous investigation sample location (SMGW-BH-B329) are shown on Table C1, Appendix C.

For the current assessment, concentrations of chemicals for all analysed soil samples are within the SAC. 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) exceeds the health screening level (0.001% w/w); 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).

Asbestos was not detected in any other analysed sample. It is noted that concentrations of TRH C_6 - C_{10}, TRH >C_{10}- C_{16}, TRH >C_{34}-C_{40}, BTEX, PAH, OPP, PCB and total phenols were less than the practical quantitation limits (PQL). In the sample from AEC43HA01, depth 0 - 0.1 m, low concentrations (at or slightly above the PQL) of dieldrin and chlordane (OCP) were recorded.

For the previous investigation (borehole SMGW-BH-B329), concentrations of chemicals were within the SAC. Asbestos was not detected in the analysed surface soil sample. It is noted that concentrations of TRH C_6-C_{10}, TRH >C_{10}-C_{16}, TRH >C_{34}-C_{40}, BTEXN, volatile organics, OCP, OPP and PCB were less than the PQL. Perfluorooctane sulfonic acid (PFOS) and perfluorooctanoate (PFOA) were recorded at low concentrations in the surface soil sample and not the sample at depth 0.5 m. Other PFAS were less than the PQL.

11.2 Groundwater Samples

Analytical results for groundwater samples are summarised in Table I2, Appendix I.

For groundwater samples, concentrations of metals were within the SAC, except for the concentrations of copper in the primary samples from AEC43BH01 (4 µg/L) and AEC43BH03 (3 µg/L) which were slightly above the default guideline value (DGV) (1.4 µg/L). These concentrations are considered to be at typical background levels. Similarly, the detected concentrations of arsenic, nickel and zinc in groundwater samples are considered to be at background levels. Concentrations of cadmium, chromium, lead and mercury were below the PQL.

Naphthalene was detected in the replicate sample (BD2/20220916) from AEC43BH02 but at a concentration that is well within the SAC. Apart from this detection of naphthalene, concentrations of PAH were below the PQL and within the SAC.

TRH and BTEX concentrations were less than the PQL and within the SAC. Chloroform was detected in the primary sample and replicate sample (BD1/2022916) from AEC43BH01 and the sample from AEC43BH03 but at concentrations within the SAC. Apart from these detections of chloroform, VOC concentrations were less than the PQL and within the SAC.

Concentrations of OCP, OPP, OCB and phenols were less than the PQL and within the SAC.

11.3 Preliminary Waste Classification Comments

Table I3, Appendix I, presents the analytical results for the current investigation against criteria from NSW EPA, *Waste Classification Guidelines*, 2014 (NSW EPA, 2014) and NSW EPA, *The excavated natural material order 2014*. Table C2, Appendix C presents the analytical results for the previous investigation against the same criteria as well as NSW EPA, *Addendum to the Waste Classification Guidelines (2014) - Part 1: classifying waste*, 2016 (NSW EPA, 2016).

With respect to fill samples, concentrations of chemical contaminants were within the CT1 criteria for general solid waste (GSW) except for lead (190 mg/kg) in the sample from AEC43HA30, depth 0-0.1 m. Concentrations of lead were within the SCC1 and TCLP1 criteria for GSW. With respect to PFAS, concentrations for the surface sample from SMGW-BH-B329 were within the SCC1 criteria, however, it is noted that it appears that TCLP (toxicity characteristic leaching procedure) was not conducted for comparison with TCLP1 criteria. If fill sourced from SMGW-BH-B329 is to be disposed offsite, TCLP analysis for PFAS should be undertaken for waste classification to assess against criteria in NSW EPA (2016). Asbestos was identified in the fill (depth 0 - 0.1 m) at AEC43TP02 and AEC43TP09 and in buried pipe at AEC43TP06. Asbestos waste is classed as special waste. Concentrations of metals, TRH, BTEX, PAH and pH are within criteria for excavated natural material (ENM) except for:

- The concentration of arsenic (25 mg/kg) in the sample from AEC43HA01, depth 0-0.1 m, which exceeds the maximum average concentration (20 mg/kg) but not the absolute maximum concentration (40 mg/kg) for ENM;
- The concentration of cadmium (0.9 mg/kg) in the sample from AEC43HA30, depth 0-0.1 m, which exceeds the maximum average concentration (0.5 mg/kg) but not the absolute maximum concentration (1 mg/kg) for ENM;
- The concentration of lead (190 mg/kg) in the sample from AEC43HA30, depth 0-0.1 m, which exceeds both the maximum average concentration (50 mg/kg) and the absolute maximum concentration (100 mg/kg) for ENM; and
- The concentrations of zinc in the samples from a depth of 0-0.1 m from AEC43HA01 (200 mg/kg), AEC43HA19 (280 mg/kg) and AEC43HA30 (160 mg/kg) which exceed the maximum average concentration (150 mg/kg) but the absolute maximum concentration (300 mg/kg) for ENM.

ENM, by definition, cannot contain asbestos, so the fill (depth 0 - 0.1 m) at AEC43TP02 and AEC43TP09 and the asbestos pipe at AEC43TP06 cannot be classified as ENM.

With respect to natural soil samples, concentrations of chemical contaminants were within what are considered to be background levels which is considered to be consistent with the definition of virgin excavated natural material (VENM), as defined in *Protection of the Environment Operations Act 1997*.

11.4 Data Quality Assurance and Quality Control

The data quality assurance and quality control (QA / QC) results are included in Appendix J. Based on the results of the field QA and field and laboratory QC, and evaluation against the data quality indicators (DQI) it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

12. Conclusion

From testing of soil, friable asbestos (FA and AF) contamination has been identified in fill at one location (AEC43TP02, depth 0 - 0.1 m). Asbestos was also identified as fibre cement (> 7mm) in fill at a nearby test location AEC43TP09. Asbestos pipe was also identified in fill at AEC43TP06. Given the presence of asbestos contamination, it is considered that remediation is required to render the site suitable for the proposed development. 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 used at the site. A Remediation Action Plan (RAP) should be prepared for remediation of the site and incorporate procedures for suspected contamination finds and asbestos pipe finds during excavation works.

Prior to demolition, a hazardous materials building survey should be undertaken for structures that will be demolished at the site (if not undertaken already).

13. Limitations

Douglas Partners (DP) has prepared this report (or services) for the SCAW package for SMWSA. The work was carried out under a Service 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 this 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.

Asbestos has been detected in laboratory analysis of soil samples. Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to budget constraints, or to parts of the site being inaccessible and not available for inspection/sampling, or to vegetation preventing visual inspection and reasonable access. It is therefore considered possible that hazardous building materials (HBM), including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that further asbestos is not present.

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

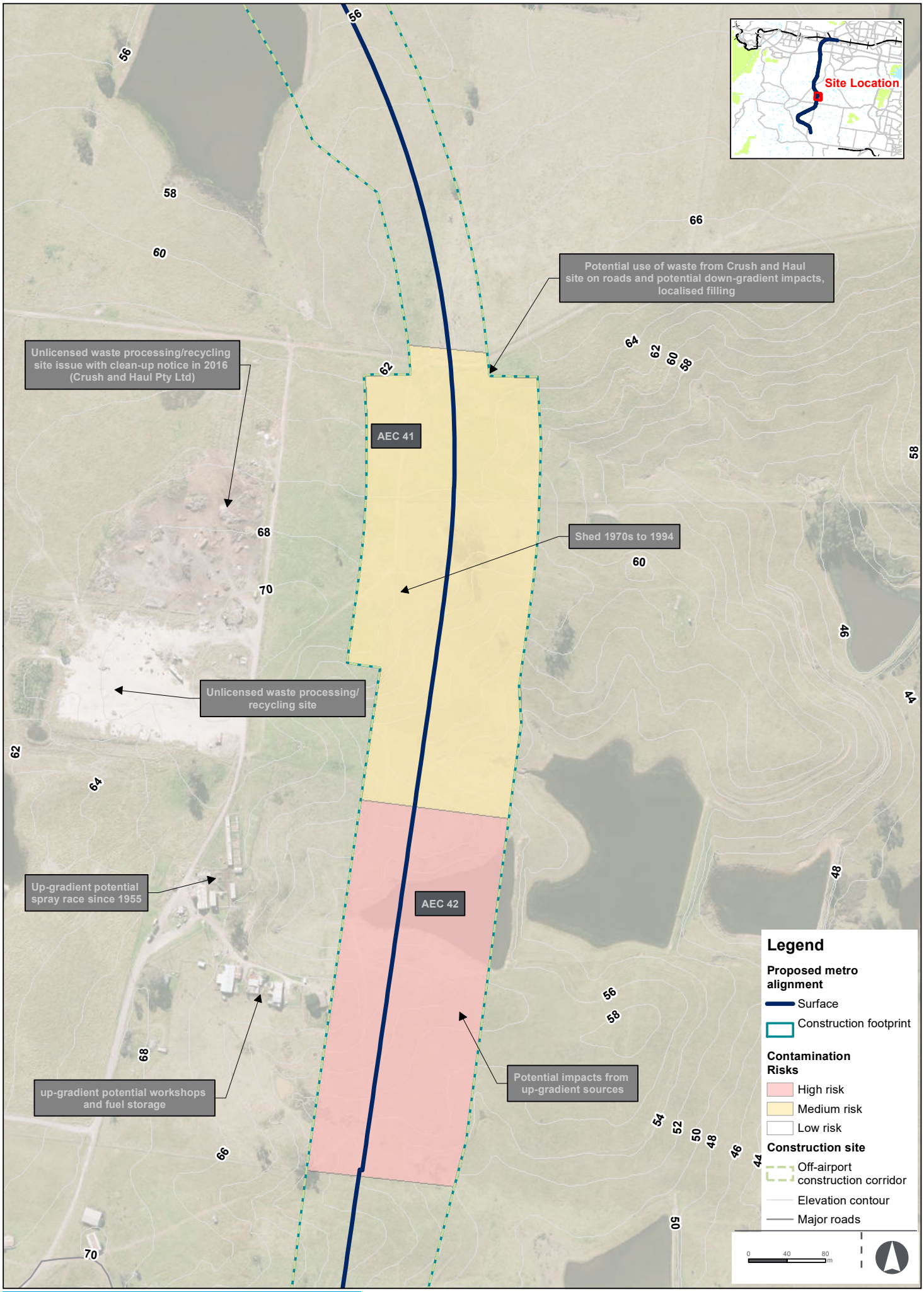
Douglas Partners
Geotechnics / Environment / Groundwater

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

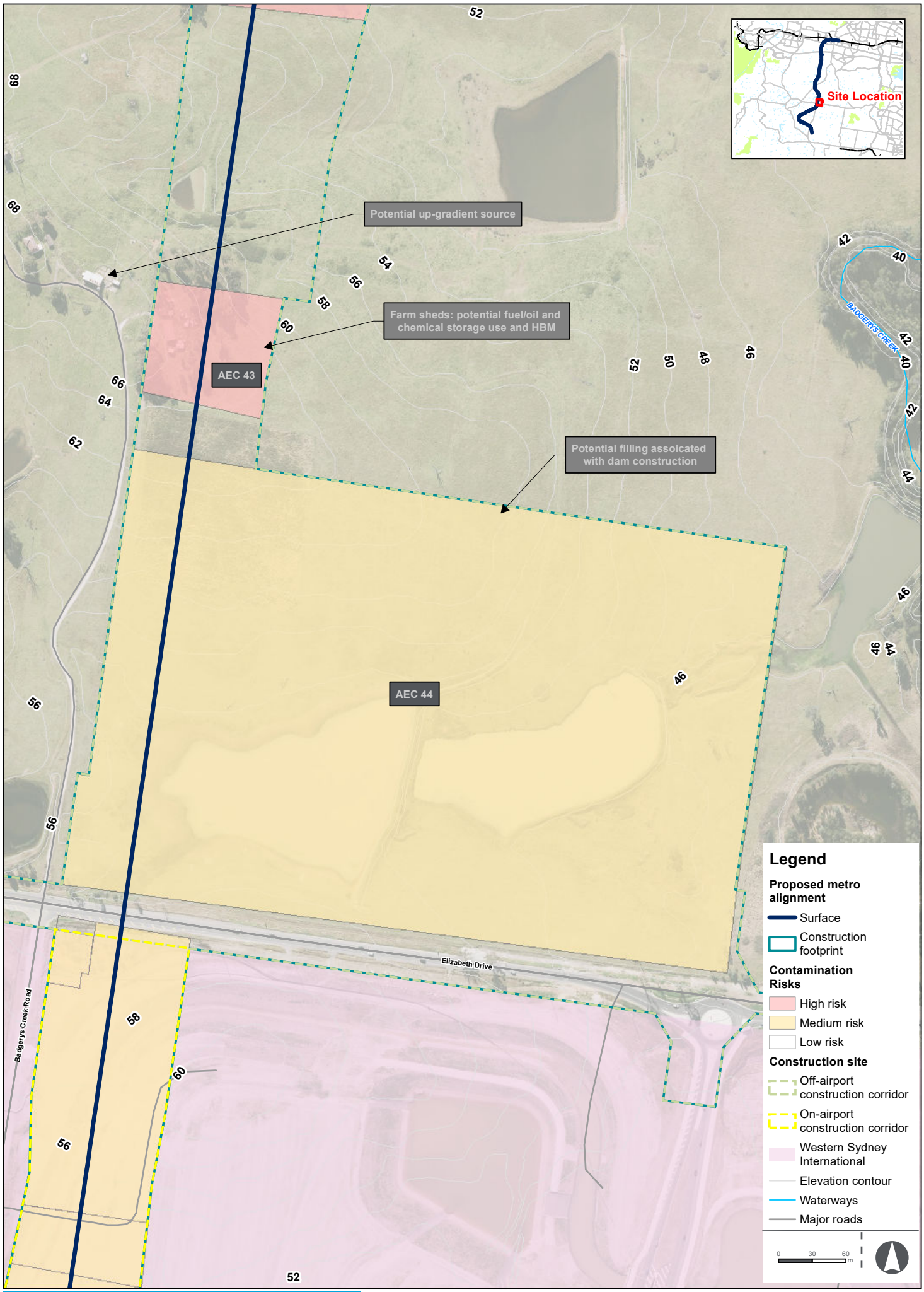


Sydney Metro - Western Sydney Airport

Off-airport construction corridor in Badgerys Creek contamination sources and risk ranking

*HBM - Potential hazardous building materials
Indicative only, subject to design development

Figure A12



Sydney Metro - Western Sydney Airport

Off-airport construction corridor in Badgerys Creek contamination sources and risk ranking

*HBM - Potential hazardous building materials
Indicative only, subject to design development

Figure A13

Appendix B

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 Log and Results Summary from Previous Investigation

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.

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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

Cardno

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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Table C2: Summary of Waste Classification Results for SMGW-BH-B329

							BTEX						MAH					TPH					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 - C9	C10 - C14	C15 - C28	C29-C36	>C10 - C36 (Sum of total)	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	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	20	50	50	50	20	50	100	100	50	20	50	2	0.4	1	1	1	0.1	1	1
NSW 2014 Excavated Natural Material (Maximum average concentration)																						250								20	0.5	75	100	50	0.5	30	150
NSW 2014 Excavated Natural Material (Absolute Max)							0.5	65	25			15										500								40	1	150	200	100	1	60	300
NSW 2014 General Solid Waste CT1 (No Leaching)							10	288	600			1000					60	650				10000								100	20	100		100	4	40	
NSW EPA PFAS Waste Class Addendum 2016 - SCC1																																					
NSW 2014 Restricted Solid Waste CT2 (No Leaching)							40	1152	2400			4000					240	2600				40000								400	80	400		400	16	160	
NSW EPA PFAS Waste Class Addendum 2016 - SCC2																																					
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	<20	84	95	179	<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	<20	<50	<50	<50	<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	<20	<50	<50	<50	<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 C2: Summary of Waste Classification 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	g-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	Toxaphene
						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	0.1	0.1
NSW 2014 Excavated Natural Material (Maximum average concentration)																																
NSW 2014 Excavated Natural Material (Absolute Max)																																
NSW 2014 General Solid Waste CT1 (No Leaching)																					60	60	60									
NSW EPA PFAS Waste Class Addendum 2016 - SCC1																																
NSW 2014 Restricted Solid Waste CT2 (No Leaching)																					240	240	240									
NSW EPA PFAS Waste Class Addendum 2016 - SCC2																																
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	<0.05	<0.05	<0.05	<0.2	<0.1
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	<0.05	<0.05	<0.05	<0.2	<0.1
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	<0.05	<0.05	<0.05	<0.2	<0.1
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 C2: Summary of Waste Classification Results for SMGW-BH-B329

							Organophosphorous Pesticides																									Insecticides		
							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
							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	0.2	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
NSW 2014 Excavated Natural Material (Maximum average concentration)																																							
NSW 2014 Excavated Natural Material (Absolute Max)																																							
NSW 2014 General Solid Waste CT1 (No Leaching)										4																													
NSW EPA PFAS Waste Class Addendum 2016 - SCC1																																							
NSW 2014 Restricted Solid Waste CT2 (No Leaching)										16																													
NSW EPA PFAS Waste Class Addendum 2016 - SCC2																																							
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		<0.2	<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	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
SMGW-BH-B329_0.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080		<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	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
SMGW-BH-B329_1.5	SMGW-BH-B329	25/03/2021	291453.369	6254401.839	783080		<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	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<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 C2: Summary of Waste Classification Results for SMGW-BH-B329

							PAH																Polychlorinated Biphenyls								Per- and Polyfluoroalkyl Substances (PFAS)													
							Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(k)fluoranthene	Benzo(b+j)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(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)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	PCBs (Sum of total)	N-(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)
							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
LOR							0.1	0.1	0.1	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	0.5	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
NSW 2014 Excavated Natural Material (Maximum average concentration)																			0.5							20																					
NSW 2014 Excavated Natural Material (Absolute Max)																			1							40																					
NSW 2014 General Solid Waste CT1 (No Leaching)																			0.8							200							<50													
NSW EPA PFAS Waste Class Addendum 2016 - SCC1																																														
NSW 2014 Restricted Solid Waste CT2 (No Leaching)																			3.2														<50													
NSW EPA PFAS Waste Class Addendum 2016 - SCC2																																													
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	<0.5	<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	<0.5	<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	<0.5	<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 C2: Summary of Waste Classification Results for SMGW-BH-B329

	Perfluorocarbons																					SVOC	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)*		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	Chloroethane
	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	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
NSW 2014 Excavated Natural Material (Maximum average concentration)																																							
NSW 2014 Excavated Natural Material (Absolute Max)																																							
NSW 2014 General Solid Waste CT1 (No Leaching)																								200	600	26	24		14		10						10		
NSW EPA PFAS Waste Class Addendum 2016 - SCC1										1.8	1.8							18																					
NSW 2014 Restricted Solid Waste CT2 (No Leaching)																								800	2400	104	96		56		40						40		
NSW EPA PFAS Waste Class Addendum 2016 - SCC2										7.2	7.2							72																					

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	<0.0005	<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	<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 C2: Summary of Waste Classification Results for SMGW-BH-B329

																												Solvents				
						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	Allyl 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
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
NSW 2014 Excavated Natural Material (Maximum average concentration)																																
NSW 2014 Excavated Natural Material (Absolute Max)																																
NSW 2014 General Solid Waste CT1 (No Leaching)						120					172	10	14			4		86		150				2000				4000				
NSW EPA PFAS Waste Class Addendum 2016 - SCC1																																
NSW 2014 Restricted Solid Waste CT2 (No Leaching)						480					688	40	56			16		344		600				8000				16000				
NSW EPA PFAS Waste Class Addendum 2016 - SCC2																																
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
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 D

Data Quality Objectives

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

As shown in the table below, the DSI has been devised broadly in accordance with the seven-step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).

Step	Summary
1: State the problem	The problem to be addressed is that the extent and nature of potential contamination at the site is unknown and it is unclear whether the site is suitable for the proposed uses. The objective of the DSI is to determine the contamination status of the site with respect to the proposed land use and, if contamination is confirmed, to make recommendations for further investigations and / or remediation to render the site suitable for the proposed uses. In addition, soil from the site may potentially be reused elsewhere within SCAW and the data obtained in the DSI, therefore, may also be used for this purpose. A preliminary conceptual site model (CSM) has been prepared for the proposed development. The proposed project team consists of experienced environmental engineers and scientists.
2: Identify the decisions / goal of the study	The site history has identified possible contaminating previous uses which are identified in the preliminary CSM. The SAC for potential contaminants are provided in the DSI. The decision is to establish whether or not the results fall below the SAC or whether or not the 95% upper confidence limit of the sample population falls below the SAC. On this basis, an assessment of the site's suitability from a contamination perspective and whether (or not) further assessment and / or remediation will be derived.
3: Identify the information inputs	Inputs to the investigation will be the results of analysis of samples to measure the concentrations of potential contaminants at the site using NATA accredited laboratories and methods, where possible. The SAC for each of the potential contaminants are provided in the RAP. A photoionization detector (PID) is used on-site to screen soils for volatile contaminants. PID readings will be used to inform sample selection for laboratory analysis.
4: Define the study boundaries	The site is identified in the DSI. The lateral boundaries of the investigation area are shown on Drawing AEC43-01, Appendix A.

Step	Summary
5: Develop the analytical approach (or decision rule)	The decision rule is to compare all analytical results with SAC. Initial comparisons will be with individual results then, where required and if possible, summary statistics (including mean, standard deviation and 95% upper confidence limit (UCL) of the arithmetic mean (95% UCL)) to assess potential risks posed by the site contamination. Where a sample result exceeds the adopted criterion, a further site-specific assessment will be made as to the risk posed by the presence of that contaminant(s). Initial comparisons will be with individual results then, where required, summary statistics (including mean, standard deviation and 95% upper confidence limit (UCL) of the arithmetic mean (95% UCL)) to assess potential risks posed by the site contamination. Quality control results are to be assessed according to their relative percent difference (RPD) values. For field duplicates, triplicates and laboratory results, RPDs should generally be below 30%; for field blanks and rinsates, results should be at or less than the limits of reporting (NEPC, 2013).
6: Specify the performance or acceptance criteria	Baseline condition: Contaminants at the site and/or statistical analysis of data (in line with NEPC (2013)) exceed human health and environmental SAC and pose a potentially unacceptable risk to receptors (null hypothesis). Alternative condition: Contaminants at the site and statistical analysis of data (in line with NEPC (2013)) comply with human health and environmental SAC 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. Uncertainty that may exist due to the above potential decision errors shall be mitigated as follows: • As well as a primary screening exercise, the use of the 95% UCL as per NEPC (2013) may be applied, i.e.: 95% is the defined confidence level associated with the UCL on the geometric mean for contaminant data. The resultant 95%UCL shall subsequently be screened against the corresponding SAC. • The statistical assessment will only be able to be applied to certain data-sets, such as those obtained via systematic sampling. Identification of areas for targeted sampling will be via professional judgement and errors will not be able to have a probability assigned to them.
7: Optimise the design for obtaining data	As the purpose of the sampling program is to assess for potential contamination across the site, the sampling program is reliant on professional judgement to identify and sample the potentially affected areas. Further details regarding the proposed sampling plan are presented in the DSI. Adequately experienced environmental scientists / engineers are chosen to conduct field work and sample analysis interpretation.

Appendix E

Laboratory Certificates and Chain of Custody

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.

The following references were consulted for deriving 'Tier 1' 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).
- CRC CARE *Health screening levels for petroleum hydrocarbons in soil and groundwater* (CRC CARE, 2011).

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
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

Contaminant	HSL D (mg/kg)	HSL D (mg/kg)	HSL D (mg/kg)	HSL D (mg/kg)
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 using the NEPC Ecological Investigation Level Spreadsheet based on the following inputs:

- A pH of 5.4 which is the average pH for analysed soil samples (see laboratory certificate 303588); and previous results for SMGW-BH-B329;
- A Cation Exchange Capacity (CEC) of 10.5 meq/100g which is the average CEC for analysed soil samples (see laboratory certificate 3030588);
- Contamination is assumed to be ‘aged’ based on site history;
- A (default) organic carbon content value of 1% has been used as a default value;
- A clay content of 1% has been used as a conservative value given the soil profile encountered during the investigation; and
- The state is NSW and the traffic volume is ‘low’.

Predominantly silt and clay soils were encountered during the investigation 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

Site Assessment Criteria for Groundwater for AEC43

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

1.0 Introduction

The following references were consulted for deriving 'Tier 1' SAC for groundwater:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).
- ANZG *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018).
- NHMRC *Guidelines for Managing Risks In Recreational Water* (NHMRC, 2008).
- NHMRC, NRMMC *Australian Drinking Water Guidelines 6 2011, Version 3.8, 2022* (NHMRC, NRMMC, 2022).
- ANZECC *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000).
- HEPA PFAS *National Environmental Management Plan* (NEMP) (HEPA, 2020).

2.0 Ecological Criteria

SAC for the protection of aquatic freshwater ecosystems which may receive groundwater from the site include:

- Default guideline values (DGV) recommended for the protection of slightly to moderately disturbed freshwater ecosystems (or otherwise for an unknown level of protection) from ANZG (2018) (Table 1).

It is noted that livestock at surrounding farmland could potentially be a receptor to discharged groundwater (as surface water) that was sourced from the site, however, water quality guidelines for livestock in ANZECC (2000) are generally less conservative than the DGV and have not been listed herein.

Table 1: Default Guideline Values for Protection of Aquatic Ecosystems from ANZG (2018)

Contaminant	Fresh Water DGV (µg/L)
Metals	
Arsenic (III)	24
Arsenic (V)	13
Cadmium	11.2 *

Contaminant	Fresh Water DGV (µg/L)
Chromium (III)	135 *
Chromium (VI)	1.0
Copper	1.4
Lead	1060 *
Mercury (inorganic)	0.06
Nickel	515 *
Zinc	374*
Aromatic Hydrocarbons (including BTEX)	
Benzene	950
Ethylbenzene	80
Toluene	180
m-Xylene	75
o-Xylene	350
p-Xylene	200
Isopropylbenzene	30
PAH	
Anthracene	0.01
Benzo(a)pyrene	0.1
Fluoranthene	1
Naphthalene	16
Phenanthrene	0.6
Phenols	
2,4-dinitrophenol	45
2,4-dimethylphenol	2
4-nitrophenol	58
Phenol	320
2,3,4,6-tetrachlorophenol	10
2,3,5,6-tetrachlorophenol	0.2
2,4,6-trichlorophenol	3
2,4-dichlorophenol	120
2,6-dichlorophenol	34
2-chlorophenol	340
Pentachlorophenol	3.6
OCP	
Aldrin	0.001
Chlordane	0.03

Contaminant	Fresh Water DGV (µg/L)
DDT	0.006
Dicofol	0.5
Dieldrin	0.01
Endosulfan	0.03
Endrin	0.01
Heptachlor	0.01
Lindane	0.2
Methoxychlor	0.005
Mirex	0.04
Toxaphene	0.1
Hexachlorobenzene	0.05
OPP	
Azinphos methyl	0.01
Chlorpyrifos	0.01
Diazinon	0.01
Dimethoate	0.15
Fenitrothion	0.2
Malathion	0.05
Parathion	0.004
PCB	
Aroclor 1242	0.3
Aroclor 1254	0.01
Other Organics	
1,1,2-trichloroethane	6500
1,1-dichloroethene	700
1,2-dichloroethane	1900
1,2-dichloropropane	900
1,3-dichloropropane	1100
Carbon tetrachloride	240
Chloroform	370
Tetrachloroethene	70
Vinyl chloride	100
1,2,3-trichlorobenzene	3
1,2,4-trichlorobenzene	85
1,2-dichlorobenzene	160
1,3-dichlorobenzene	260

Contaminant	Fresh Water DGV (µg/L)
1,4-dichlorobenzene	60
Chlorobenzene	55
1,1,1-Trichloroethane	270
Trichloroethene	330
1,1,2,2-Tetrachloroethane	400
Carbon disulfide	20

Notes: * Modified for hardness 2767 mgCaCO3/L

3.0 Human Health and Aesthetic Criteria

Human health-based SAC include:

- 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 shown for clay, given that clay is the predominant soil type. HSL D are applicable for areas to be covered by buildings (e.g., stations, offices and enclosed sheds);
- Health-based guidelines for recreational waters (Table 4). These are health-based criteria from NHMRC, NRMMC (2022) multiplied by 10 (to account for lower human consumption of recreational waters compared to drinking water); and
- Recreational water quality guideline values (Table 5) from NEMP.

Given that groundwater in the area is not used for drinking or domestic purposes (according to groundwater bore registered with Water NSW), health-based drinking water guidelines have not been adopted as SAC.

For the consideration of aesthetics of recreational waters, aesthetic guideline values from NHMRC, NRMMC (2022) have been included in Table 4.

Table 2: Groundwater Health Screening Levels for Vapour Intrusion from NEPM for Passive Open Space

Contaminant	HSL C (µg/L)	HSL C (µg/L)	HSL C (µg/L)
CLAY	**2 m to <4 m**	**4 m to <8 m**	**8 m+**
Benzene	NL	NL	NL
Toluene	NL	NL	NL
Ethylbenzene	NL	NL	NL
Xylenes	NL	NL	NL
Naphthalene	NL	NL	NL
TPH C6-C10 minus BTEX	NL	NL	NL
TPH >C10-C16 minus naphthalene	NL	NL	NL

Notes: The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour that is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the water solubility limit, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result 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: Groundwater Health Screening Levels for Vapour Intrusion from NEPM for Rail Corridor

Contaminant	HSL D (µg/L)	HSL D (µg/L)	HSL D (µg/L)
CLAY	**2 m to <4 m**	**4 m to <8 m**	**8 m+**
Benzene	30 000	30 000	35 000
Toluene	NL	NL	NL
Ethylbenzene	NL	NL	NL
Xylenes	NL	NL	NL
Naphthalene	NL	NL	NL
TPH C6-C10 minus BTEX	NL	NL	NL
TPH >C10-C16 minus naphthalene	NL	NL	NL

Notes: The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour that is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the water solubility limit, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result 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: Guidelines for Protection of Recreational Waters from NHMRC (2008) and NHMRC, NRMMC (2022)

Contaminant	Health-based Guideline Value (µg/L)	Aesthetic Guideline Value (µg/L)
Metals		
Arsenic	100	-
Cadmium	20	-

Contaminant	Health-based Guideline Value (µg/L)	Aesthetic Guideline Value (µg/L)
Chromium (VI)	500	-
Copper	20 000	1000
Lead	100	-
Mercury	10	-
Nickel	200	-
Zinc	-	3000
BTEX		
Benzene	10	-
Toluene	8000	25
Ethylbenzene	3000	3
Xylene (total)	6000	20
PAH		
Benzo(a)pyrene	0.1	-
OCP		
Aldrin + Dieldrin	3	-
Chlordane	20	-
DDT	90	-
Endosulfan	200	-
Lindane	100	-
Heptachlor	3	-
Methoxychlor	3000	
OPP		
Azinphos methyl	300	-
Bromophos-ethyl	100	-
Chlorfenvinphos	20	-
Chlorpyrifos	100	-
Diazinon	40	-
Dichlorvos	50	-
Dimethoate	70	-
Disulfoton	40	-
Ethion	40	-
Ethoprophos (Ethoprop)	10	-
Fenitrothion	70	-
Fensulfothion	100	-
Fenthion	70	-

Contaminant	Health-based Guideline Value (µg/L)	Aesthetic Guideline Value (µg/L)
Malathion	700	-
Methyl parathion	7	-
Mevinphos (Phosdrin)	50	-
Monocrotophos	20	-
Omethoate	10	-
Pyrazophos	200	-
Terbufos	9	-
Tetrachlorvinphos	1000	-
Parathion	200	-
Pirimiphos-methyl	900	-
Halogenated Phenols		
2,4,6-trichlorophenol	200	2
2,4-dichlorophenol	2000	0.3
2-chlorophenol	3000	0.1
Pentachlorophenol	100	-
Other Organics		
1,1-dichloroethene	300	-
1,2-dichloroethane	30	-
Carbon tetrachloride	30	-
Hexachlorobutadiene	7	-
Tetrachloroethene	500	-
Vinyl chloride	3	-
1,2-dichlorobenzene	15 000	1
1,3-dichlorobenzene	-	20
1,4-dichlorobenzene	400	0.3
Chlorobenzene	3000	10
Styrene	300	4
Trihalomethanes	2500	-
1,2,3-Trichlorobenzenes (total)	300	5
1,3-Dichloropropene	1000	-
1,2-Dichloroethene	600	-
Dichloromethane (methylene chloride)	40	-

Table 5: Recreational Water Quality Guideline Values From NEMP

Contaminant	Recreational Water Quality Guideline Values (µg/L)
Sum of PFOS and PFHxS	2
PFOA	10

Douglas Partners Pty Ltd

Appendix G

Test Pit Logs and Borehole Logs

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					
AD/T	HW Casing		2.0		CI-CH						
						3.80m SILTSTONE: dark brown and grey; highly weathered to fresh, very low to high strength					
			4.0								
			6.0								
						At 7.0m: dark grey					
		Not Encountered	8.0								
			10.0								
WB	0-15% Water		12.0								
			14.0								
						15.00m AEC43-BH01 TERMINATED AT 15.00 m Target depth					

Backfill

PN18 PVC-U Pipe

2.00m (57.30)

Bentonite

2.50m (56.80)

5mm sand/ gravel

PVC slotted screen (6m)

15.00m (44.30)

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-BH02

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

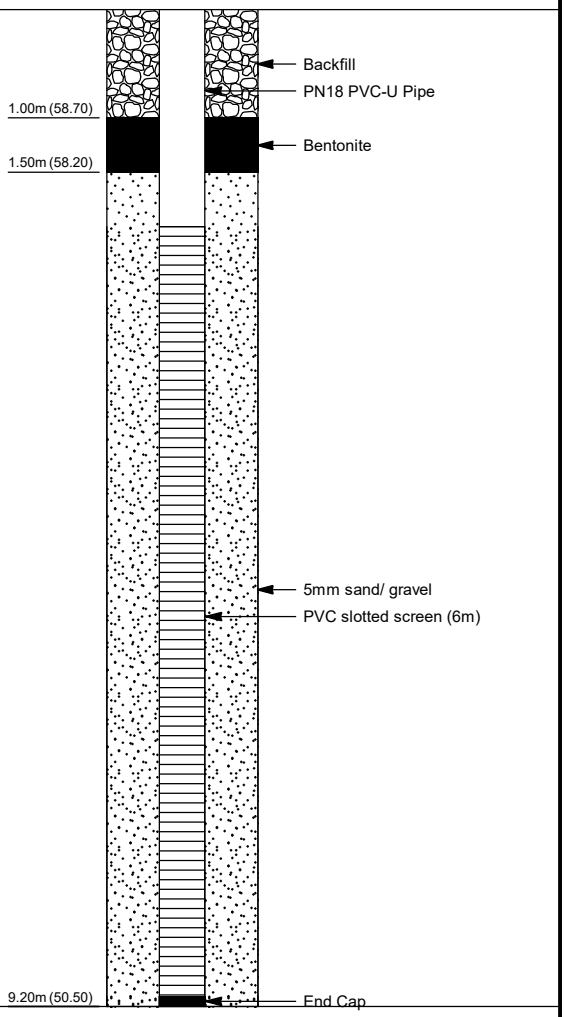
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

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				



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
AD/T			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						
					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									
		Not Encountered				At 7.0m: dark grey						
			8.0									
WB	0-5% Water		10.0									
			12.0									
			14.0									
						15.00m AEC43-BH03 TERMINATED AT 15.00 m Target depth						

Backfill
PN18 PVC-U Pipe
2.00m (62.20)
Bentonite
2.50m (61.70)
5mm sand/ gravel
PVC slotted screen (6m)
15.00m (49.20)
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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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

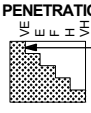
VE / PENETRATION / E / F / H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa 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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Appendix H

Field Sheets and Calibration Records

PID Calibration Certificate

Instrument PhoCheck Tiger
Serial No. T-113854

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
Pump	Operation	✓	
	Filter	✓	
	Flow	✓	
	Valves, Diaphragm	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	PID	✓	10.6 ev
Alarms	Beeper	✓	Low: 50ppm; High: 100ppm; TWA: ; STEL:
	Settings	✓	
Software	Version	✓	
Data logger	Operation	✓	
Download	Operation	✓	
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No		Instrument Reading
PID Lamp		93ppm Isobutylene	NATA	SY361		90.2 ppm Isobutylene

Calibrated by: Alex Buist

Calibration date: 1/09/2022

Next calibration due: 28/02/2023

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GROUNDWATER SAMPLING FORM

Project: WSA SCAW Tender Design	**Project No:** 204814.01
Client: CPB Contractors Pty Limited & United Infrastructure Pty Limited (CPBUIJV)	
Location: Elizabeth Drive, Luddenham	
Sampling Method: Twister Pump	

Bore No.	AEC43BH01				
Purging Date	30/8/22				
Bore Casing Diameter (mm)	50mm				
SWL (m below top of casing)	~~8.200~~ 0.81				
Height of Casing (m above GL*)	0.50				
SWL (m below GL*)	0.31				
Total Bore Depth (m below GL*)	15.56				
Well Volume (L) **[which for 50mm casing is 2L approx. per metre depth]	31.120				
Purged Volume (L) (≈ well vol x 3) 40	60.000	(DRY)			
Sampling Date					
Sampling Time					
Temperature (°C)					
pH (record to one decimal place)					
EC (µS/cm)					
Dissolved Oxygen (% Sat)					
Dissolved Oxygen (mg/L)					
Turbidity (NTU)					
Redox (mV)					
TDS (mg/L)					
Odour	No odour				
Colour	Cloudy, brown				
Recharge Rate					
Observations					
Notes:					
Supervisor:			**Date:**		

Water quality meter calibration details (please tick calibration liquids used):

Meter ID							
Buffer (pH 4)	☐	Use-by Date		Conductivity Standard (2.76 mS/cm)	☐	Use-by Date	
Buffer (pH 6.88)	☐	Use-by Date		Total Dissolved Solids Standard (2 parts per thousand)	☐	Use-by Date	
Buffer (pH 9)	☐	Use-by Date		Rapid Cal Solution	☐	Use-by Date	

*GL – denotes ground level **Well Volume = πr^2 x depth of water, where r is internal casing radius

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GROUNDWATER SAMPLING FORM

Project: WSA SCAW Tender Design	**Project No:** 204814.01
Client: CPB Contractors Pty Limited & United Infrastructure Pty Limited (CPBUIJV)	
Location: Elizabeth Drive, Luddenham	
Sampling Method: Twister Pump.	

Bore No.	AEU43BH02				
Purging Date	30/8/22				
Bore Casing Diameter (mm)	50mm				
SWL (m below top of casing)	2.67				
Height of Casing (m above GL*)	0.44				
SWL (m below GL*)	2.23				
Total Bore Depth (m below GL*)	9.24				
Well Volume (L) **[which for 50mm casing is 2L approx. per metre depth]	14.040				
Purged Volume (L) (≈ well vol x 3)	35.000 (Dry)				
Sampling Date					
Sampling Time					
Temperature (°C)					
pH (record to one decimal place)					
EC (µS/cm)					
Dissolved Oxygen (% Sat)					
Dissolved Oxygen (mg/L)					
Turbidity (NTU)					
Redox (mV)					
TDS (mg/L)					
Odour	No odour				
Colour	Cloudy	Brown			
Recharge Rate					
Observations					
Notes:					
Supervisor:			**Date:**		

Water quality meter calibration details (please tick calibration liquids used):

Meter ID							
Buffer (pH 4)	☐	Use-by Date		Conductivity Standard (2.76 mS/cm)	☐	Use-by Date	
Buffer (pH 6.88)	☐	Use-by Date		Total Dissolved Solids Standard (2 parts per thousand)	☐	Use-by Date	
Buffer (pH 9)	☐	Use-by Date		Rapid Cal Solution	☐	Use-by Date	

*GL – denotes ground level **Well Volume = πr^2 x depth of water, where r is internal casing radius

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GROUNDWATER SAMPLING FORM

Project: WSA SCAW Tender Design	**Project No:** 204814.01
Client: CPB Contractors Pty Limited & United Infrastructure Pty Limited (CPBUIJV)	
Location: Elizabeth Drive, Luddenham	
Sampling Method: Twister Pump	

Bore No.	AE143BH03		Near AE143 (East)		
Purging Date	26/8/22				
Bore Casing Diameter (mm)	50mm				
SWL (m below top of casing)	6.39				
Height of Casing (m above GL*)	0.48				
SWL (m below GL*)	5.91				
Total Bore Depth (m below GL*)	16.20				
Well Volume (L) **[which for 50mm casing is 2L approx. per metre depth]	19.620				
Purged Volume (L) (≈ well vol x 3)	60 L				
Sampling Date					
Sampling Time					
Temperature (°C)					
pH (record to one decimal place)					
EC (µS/cm)					
Dissolved Oxygen (% Sat)					
Dissolved Oxygen (mg/L)					
Turbidity (NTU)					
Redox (mV)					
TDS (mg/L)					
Odour	No odour				
Colour	Cloudy, grey				
Recharge Rate					
Observations					

Notes:

Supervisor:	**Date:**

Water quality meter calibration details (please tick calibration liquids used):

Meter ID							
Buffer (pH 4)	☐	Use-by Date		Conductivity Standard (2.76 mS/cm)	☐	Use-by Date	
Buffer (pH 6.88)	☐	Use-by Date		Total Dissolved Solids Standard (2 parts per thousand)	☐	Use-by Date	
Buffer (pH 9)	☐	Use-by Date		Rapid Cal Solution	☐	Use-by Date	

*GL – denotes ground level **Well Volume = πr^2 x depth of water, where r is internal casing radius

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RECORD OF ASBESTOS SAMPLES

Project: WSA SCAW Tender Design	**Project Number:** 204814.01
Client: CPB Contractors Pty Limited & United Infrastructure Pty Limited (CPBUIJV)	**Date:** 18/8/22
Location: Elizabeth Drive, Luddenham	**Field Staff:** RJ

Sample ID	Sample Type	Sample Depth (m)	Weight of 10 L Bulk Sample (g)	Number of Fragments >7 mm	Condition of Fragments (good/ poor)	Size range of fragments (mm)	Weight of ACM and FA collected (g)
AEC43TP25	Soil	0-0.2	15374	0	-	-	-

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Groundwater Field Sheet

Bore Volume = casing volume + filter pack volume
$= \pi h_1 d_2^2/4 + n(\pi h_1 d_1^2/4 - \pi h_2 d_2^2/4)$
Where: $\pi = 3.14$
n = porosity (0.3 for most filter pack material)
h_1 = height of water column
d_1 = diameter of annulus
h_2 = length of filter pack
d_2 = diameter of casing
Bore Vol Normally: 7.2*h

Project and Bore Installation Details	
Bore / Standpipe ID:	AEC43BH01
Project Name:	SCAW
Project Number:	204814.01
Site Location:	AEC43
Bore GPS Co-ord:	
Installation Date:	
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-
Bore Development Details	
Date/Time:	
Purged By:	
GW Level (pre-purge):	m bgl
GW Level (post-purge):	m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	m bgl
Estimated Bore Volume:	L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry)
Equipment:	
Micropurge and Sampling Details	
Date/Time:	16/9/22 8:00 am
Sampled By:	JH/LL
Weather Conditions:	OVERCAST
-0.51 GW Level (pre-purge):	~~5~~ 4.79 m bgl
GW Level (post sample):	5.50 m bgl
PSH observed:	Yes / (No) ((interface) / visual). Thickness if observed:
Observed Well Depth:	15.49 m bgl
Estimated Bore Volume:	77 L
Total Volume Purged:	2.0 L
Equipment:	PERI-PUMP

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	**0.1° C**	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10%**	**+/- 10 mV**
15 / 0.5	18.1	2.27	15724	4.97		-21
30 / 1.0	18.0	1.10	15827	4.98		-23
45 / 1.5	18.0	1.02	15992	4.99		-24
60 / 2.0	18.0	0.89	16064	5.00		-27
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	7 m bgl, MIDDLE OF SCREEN
Sample Appearance (e.g. colour, siltiness, odour):	SLIGHTLY TURBID, BROWN, NO ODOUR/SHEEN
Sample ID:	AEC43BH01
QA/QC Samples:	BD1/20220916
Sampling Containers and filtration:	2 x GLASS 2 x PLASTIC 2 x VIALS
Comments / Observations:	BAILER STUCK DOWN WELL.

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Groundwater Field Sheet

Bore Volume = casing volume + filter pack volume
$= \pi h_1 d_1^2/4 + n(\pi h_1 d_1^2/4 - \pi h_2 d_2^2/4)$
Where: $\pi = 3.14$
n = porosity (0.3 for most filter pack material)
h_1 = height of water column
d_1 = diameter of annulus
h_2 = length of filter pack
d_2 = diameter of casing
Bore Vol Normally: 7.2*h

Project and Bore Installation Details	
Bore / Standpipe ID:	AEC43BH02
Project Name:	SCAW
Project Number:	204814.01
Site Location:	AEC43
Bore GPS Co-ord:	
Installation Date:	
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-

Bore Development Details	
Date/Time:	
Purged By:	
GW Level (pre-purge):	m bgl
GW Level (post-purge):	m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	m bgl
Estimated Bore Volume:	L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry)
Equipment:	

Micropurge and Sampling Details	
Date/Time:	16/9/22 ~~9:00am~~ 9:00 am
Sampled By:	JH/LL
Weather Conditions:	SUNNY
GW Level (pre-purge):	2.10 m bgl
GW Level (post sample):	2.38 m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	~~8.~~ 9.38 m bgl
Estimated Bore Volume:	52 L
Total Volume Purged:	2.5 L
Equipment:	PERI-PUMP

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	**0.1° C**	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10%**	**+/- 10 mV**
0.5 / 15	18.8	4.36	14133	5.32		-110
1.0 / 30	18.8	1.02	14051	5.30		-112
1.5 / 45	18.7	0.91	13927	5.29		-115
2.0 / 60	18.7	0.86	13882	5.29		-116
2.5 / 75	18.7	0.75	13821	5.28		-118
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	5 m bgl, MIDDLE OF SCREEN
Sample Appearance (e.g. colour, siltiness, odour):	NON-TURBID, COLOURLESS, NO ODOUR/SHEEN
Sample ID:	AEC43BH02
QA/QC Samples:	BD2/20220916
Sampling Containers and filtration:	2x GLASS 2x PLASTIC 2x VIALS
Comments / Observations:	

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Groundwater Field Sheet

Bore Volume = casing volume + filter pack volume
$= \pi h_1 d_2^2/4 + n(\pi h_1 d_1^2/4 - \pi h_2 d_2^2/4)$
Where: $\pi = 3.14$
n = porosity (0.3 for most filter pack material)
h_1 = height of water column
d_1 = diameter of annulus
h_2 = length of filter pack
d_2 = diameter of casing
Bore Vol Normally: 7.2*h

Project and Bore Installation Details	
Bore / Standpipe ID:	AEC43BH03
Project Name:	SCAW
Project Number:	204814.01
Site Location:	AEC43
Bore GPS Co-ord:	
Installation Date:	
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-

Bore Development Details	
Date/Time:	
Purged By:	
GW Level (pre-purge):	m bgl
GW Level (post-purge):	m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	m bgl
Estimated Bore Volume:	L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry)
Equipment:	

Micropurge and Sampling Details	
Date/Time:	16/9/22 10:00 am
Sampled By:	JH / LC
Weather Conditions:	SUNNY
GW Level (pre-purge):	6.04 m bgl
GW Level (post sample):	6.10 m bgl
PSH observed:	Yes / (No) ((interface) / visual). Thickness if observed:
Observed Well Depth:	15.80 m bgl
Estimated Bore Volume:	70 L
Total Volume Purged:	2 L
Equipment:	PERI-PUMP

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	**0.1° C**	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10%**	**+/- 10 mV**
~~15~~ 15/0.5	19.3	1.67	19126	6.52		-60
30 / 1.0	19.2	0.43	18992	6.41		-62
45 / 1.5	19.1	0.38	18914	6.40		-64
60 / 2.0	19.1	0.32	18862	6.39		-66
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	10 m bgl, MIDDLE OF SCREEN
Sample Appearance (e.g. colour, siltiness, odour):	NON-TURBID, GREY, NO ODOUR/SHEEN
Sample ID:	AEC43BH07
QA/QC Samples:	—
Sampling Containers and filtration:	2x GLASS 2x PLASTIC 2x VIALS
Comments / Observations:	

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CALIBRATION RECORD

Project:	
Project Number:	204814.01

Calibrated Equipment

Model:	Minirae
Serial No.:	
DP Reference:	DP710/ PID 4
Other:	10.6eV Lamp

Calibration

Date(s):	15/8/22
Operator(s):	DW
Zero Gas:	ambient air
Span Gas:	isobutylene
Span Gas Concentration:	100
Response Factor:	1.0
Pre-calibration Reading	
Post-calibration Reading	100

Approved:

Date: 15/8/22

Multi Parameter Water Meter

Instrument **YSI Quatro Pro Plus**
Serial No. **11K101271**

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper	✓	
	Settings	✓	
Software	Version	✓	
Data logger	Operation	✓	
Download	Operation	✓	
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 7.00		pH 7.00		381241	pH 6.98
2. pH 4.00		pH 4.00		389384	pH 3.94
3. mV		236.7mV		385070/387771	236.8mV
4. EC		2.76mS		385041	2.76mS
5. D.O		0ppm		379624	0.0ppm
6. Temp		21.5		MultiTherm	21.4

Calibrated by: **Alex Buist**

Calibration date: **01/09/2022**

Next calibration due: **28/02/2023**

Appendix I

Summary of Results

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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)

Metals (dissolved)

Sample Location / Identification (Borehole or Replicate)	Sample Date	Arsenic	Cadmium	Chromium (III + VI)	Copper	Lead	Mercury	Nickel	Zinc
AEC43BH01	16/09/2022	4	<0.1	<1	4	<1	<0.05	23	15
BD1/20220916	16/09/2022	5	<0.1	<1	1	<1	<0.05	23	15
AEC43BH02	16/09/2022	5	<0.1	<1	<1	<1	<0.05	29	9
BD2/20220916	16/09/2022	5	<0.2	<1	<1	<1	<0.1	26	8
AEC43BH03	16/09/2022	4	<0.1	<1	3	<1	<0.05	11	84
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
Guidelines for Recreational Water	Health	100	20	500 for Cr(VI)	20000	100	10	200	-
Guidelines for Recreational Water	Aesthetic	-	-	-	1000	-	-	-	3000
HSL D for Vapour Intrusion, Clay (depth 2 m to <4 m)		-	-	-	-	-	-	-	-

Polycyclic Aromatic Hydrocarbons

Sample Location / Identification (Borehole or Replicate)	Sample Date	Naphthalene	Anthracene	Fluoranthene	Benzo(a)pyrene	Phenanthrene	Other PAH
AEC43BH01	16/09/2022	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL
BD1/20220916	16/09/2022	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL
AEC43BH02	16/09/2022	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL
BD2/20220916	16/09/2022	0.02	<0.01	<0.01	<0.01	<0.01	<PQL
AEC43BH03	16/09/2022	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL
Assessment Criteria							
Freshwater DGV		16	0.01	1	0.1	0.6	-
Guidelines for Recreational Water	Health	-	-	-	0.1	-	-
Guidelines for Recreational Water	Aesthetic	-	-	-	-	-	-
HSL D for Vapour Intrusion, Clay (depth 2 m to <4 m)		NL	-	-	-	-	-

Total Recoverable Hydrocarbons, BTEX and Volatile Organic Compounds

Sample Location / Identification (Borehole or Replicate)	Sample Date	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	16/09/2022	<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<2
BD1/20220916	16/09/2022	<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<2
AEC43BH02	16/09/2022	<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<2
BD2/20220916	16/09/2022	<20	<50	<20	<50	<100	<100	<1	<1	<1	<1	<2
AEC43BH03	16/09/2022	<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<2
Assessment Criteria												
Freshwater DGV		-	-	-	-	-	-	950	180	80	350	75 for m-xylene 200 for p-xylene
Guidelines for Recreational Water	Health	-	-	-	-	-	-	10	8000	3000	6000	
Guidelines for Recreational Water	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)	Sample Date	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
AEC43BH01	16/09/2022	<1	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
BD1/20220916	16/09/2022	<1	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
AEC43BH02	16/09/2022	<1	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
BD2/20220916	16/09/2022	<1	<1	<1	<1	<1	<1	<5	<1	<1	-	-	<1	<1	<1	<1
AEC43BH03	16/09/2022	<1	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Assessment Criteria																
Freshwater DGV		30	700	-	-	-		100	70	330	3	85	160	260	60	55
Guidelines for Recreational Water	Health	-	300	600		1000		3	500	-	300		15000	-	400	3000
Guidelines for Recreational Water	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)	Sample Date	1,1,2,2-Tetrachloroethane	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	16/09/2022	<1	<1	<1	<1	<1	9	<1	<1	<1	<1	<1	<1	<1	-	-	<PQL
BD1/20220916	16/09/2022	<1	<1	<1	<1	<1	9	<1	<1	<1	<1	<1	<1	<1	-	-	<PQL
AEC43BH02	16/09/2022	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	<PQL
BD2/20220916	16/09/2022	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	-	<1	<5	<PQL
AEC43BH03	16/09/2022	<1	<1	<1	<1	<1	8	<1	<1	<1	<1	<1	<1	<1	-	-	<PQL
Assessment Criteria																	
Freshwater DGV		400	270	6500	1900	240	370	-	-	-	900	1100	-	-	20	-	-
Guidelines for Recreational Water	Health	-	-	-	30	30	2500				-	-	300	7	-	40	-
Guidelines for Recreational Water	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

Appendix J

Data Quality Assurance and Quality Control

Data Quality Assurance and Quality Control Report for DSI for AEC43

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

1.0 Field and Laboratory Data Quality Assurance and Quality Control

The field and laboratory data quality assurance and quality control (QA / QC) procedures and results are summarised in the following Table 1. Reference should be made to the field work methodology and the laboratory results / certificates of analysis for further details. The relative percentage difference (RPD) results, along with the other field QC samples are included in the summary results Tables QA1 to QA7.

Table 1: Field and Laboratory Quality Control

Item	Evaluation / Acceptance Criteria	Compliance
Analytical laboratories used	NATA accreditation	C
Holding times	Various based on type of analysis	PC
Intra-laboratory replicates	5% of primary samples	C
	<30% RPD	PC
Inter-laboratory replicates	5% of primary samples	C
	<30% RPD	PC
Trip Spikes	1 per sampling event; 60-140% recovery	C
Trip Blanks	1 per sampling event; <PQL	C
Rinsates	1 per water sampling event; <PQL	C
Laboratory / Reagent Blanks	1 per batch; <PQL	C
Laboratory Duplicate	1 per lab batch; acceptance criteria as per laboratory certificate	PC
Matrix Spikes	1 per lab batch; 70-130% recovery (inorganics); 60-140% recovery (organics)	PC
Surrogate Spikes	All organics analysis; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Control Samples	1 per lab batch; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Standard Operating Procedures (SOP)	Adopting SOP for all aspects of the sampling field work	C

Notes: C = compliance; PC = partial compliance; NC = non-compliance; NR Not required

For the inter-laboratory replicate water sample, analysis was undertaken slightly outside the recommended holding time (seven days) for TRH, PAH, VOC, PCB, OCP and phenols (laboratory certificate 925354-W). The analysis slightly outside the recommended holding time is not considered to affect the assessment of analytical results.

As noted in laboratory certificate 303930, for cation exchange capacity (CEC) analysis, low spike recovery was obtained for sample 303930-40. This sample was re-digested and re-spiked and the low recovery was confirmed and was considered due to matrix interferences. An acceptable recovery was obtained for the laboratory control sample.

As noted in laboratory certificate 303930, the RPD was exceeded for zinc in sample 303930-1. Therefore, a triplicate result was issued.

As noted in laboratory certificate 303930, the spike recovery was not obtained for zinc in sample 303930- 1 due to the inhomogeneous nature of the element in the sample, however, an acceptable recovery was obtained for the laboratory control sample.

As noted in laboratory certificate 304893, the spike recovery was not obtained for zinc in sample 304893- 1 due to the inhomogeneous nature of the element in the sample, however, an acceptable recovery was obtained for the laboratory control sample.

As noted in laboratory certificate 305975, for cations in water, the spike recovery was not obtained for zinc in sample 305975-2 due to the high concentration of the element in the sample, however, an acceptable recovery was obtained for the laboratory control sample.

As noted in laboratory certificate 306482, the laboratory RPD acceptance criteria have been exceeded for sample 306482-74 for chromium, copper, lead and nickel. Therefore, a triplicate result was issued.

As noted in laboratory certificate 306482, the spike recovery was not obtained for zinc in sample 306482-54, however, an acceptable recovery was obtained for the laboratory control sample.

As noted in laboratory certificate 917591-S, the matrix spike recovery was outside the recommended acceptance limits for endrin aldehyde and methoxychlor in sample M22-Au0061975, however, an acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.

As noted in laboratory certificate 917591-S, the RPD for lead and arsenic for sample M22-Au0055018 were outside 30%, however, the RPD passes Eurofins QC acceptance criteria.

For soil, RPD results for intra-laboratory replicates were within the acceptable range. For inter-laboratory replicates, RPD results were within the acceptable range except for some metals analysis. The exceedances are not considered to be of concern given that the replicates were taken from fill which is non-homogeneous in nature and the actual differences in concentrations are generally low.

For water samples, RPD results for intra-laboratory replicates samples were within the acceptable range except for copper. This exceedance is not considered to be of concern given the low actual difference in the concentration between the primary and replicate sample. RPD results for inter-laboratory replicates samples were within the acceptable range.

For groundwater sampling, the electronic interface probe, flow cell and probes were decontaminated between monitoring wells by rinsing in a diluted Liquinox solution and then rinsing in demineralised water. A rinsate (Rinsate-W080922) was collected by running demineralised water over the decontaminated sampling equipment and directing the water into sampling bottles provided by the laboratory. Rinsate test results were all less than the practical quantitation limits. For soil sampling, to avoid the need for decontaminating sampling equipment, disposable nitrile gloves were changed between each sampling event and used for sample collection. Soil samples were carefully collected from the hand auger to be representative of the target strata/material (e.g., natural soil samples were observed to be free of overlying fill).

In summary, the QC data is determined to be of sufficient quality to be considered acceptable for the assessment.

2.0 Data Quality Indicators

The reliability of field procedures and analytical results was assessed against the following data quality indicators (DQIs) as outlined in NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013):

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

Table 2: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Systematic and target locations sampled.
	Preparation of logs, sample location plan and chain of custody records.
	Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody.
	Samples analysed for contaminants of potential concern (COPC) identified in the Conceptual Site Model (CSM).
	Completion of chain of custody (COC) documentation.
	NATA accredited laboratory results certificates provided by the laboratory.
	Satisfactory frequency and results for field and laboratory quality control (QC) samples as discussed above.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project.
	Experienced sampler(s) used.
	Use of NATA registered laboratories, with test methods the same or similar between laboratories.
	Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled.
	Sample numbers recovered and analysed are considered to be representative of the target media and complying with DQOs.
	Samples were extracted and analysed within holding times.
	Samples were analysed in accordance with the COC.
Precision	Field staff followed standard operating procedures.
	Acceptable RPD between original samples and replicates.
	Satisfactory results for all other field and laboratory QC samples.
Accuracy	Field staff followed standard operating procedures.
	Satisfactory results for all field and laboratory QC samples.

Based on the above, it is considered that the DQIs have been generally complied with.

3.0 Conclusion

Based on the results of the field QA and field and laboratory QC, and evaluation against the DQIs it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

4.0 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.

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Table QA1: Relative Percentage Difference Results – Soil Replicates

			Metals								TRH				BTEX				PAH				Phenols	OCP												OPP		PCB
			Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	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+DDE+DDD [c]	DDE	DDT	Aldrin & Dieldrin	Total Chlordane	Endrin	Total Endosulfan	Heptachlor	Hexachlorobenzene	Methoxychlor	Other OCP	Chlorpyriphos	Other OPP	Total PCB
Sample ID	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
BD2/20220818	0.2 - 0.3 m	18/08/22	<4	<0.4	10	13	6	<0.1	3	14	<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	<PQL	<0.1	<PQL	<0.1
AEC43HA01	0.2 - 0.3 m	18/08/22	4	<0.4	12	15	7	<0.1	3	18	<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	<PQL	<0.1	<PQL	<0.1
		Difference	0	0	2	2	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		RPD	0%	0%	18%	14%	15%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
BD4/20220817	0 - 0.1 m	17/08/22	10	<0.4	28	19	23	<0.1	17	59	<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	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<PQL	<0.2	<PQL	<0.1
AEC43TP04	0 - 0.1 m	17/08/22	7	<0.4	17	17	17	<0.1	9	29	<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	<PQL	<0.1	<PQL	<0.1
		Difference	3	0	11	2	6	0	8	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		RPD	**35%**	0%	**49%**	11%	30%	0%	**62%**	**68%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
BD120220819	0 - 0.1 m	19/08/22	10	<0.4	20	21	25	<0.1	9	36	<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	<PQL	<0.1	<PQL	<0.1
AEC43HA13	0 - 0.1 m	19/08/22	9	<0.4	19	22	24	<0.1	9	39	<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	<PQL	<0.1	<PQL	<0.1
		Difference	1	0	1	1	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		RPD	11%	0%	5%	5%	4%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
BD3/20220818	0 - 0.1 m	18/08/22	15	<0.4	22	22	26	<0.1	11	100	<20	<50	110	<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	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<PQL	<0.2	<PQL	<0.1
AEC43HA24	0 - 0.1 m	18/08/22	8	<0.4	14	14	18	<0.1	7	56	<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	<PQL	<0.1	<PQL	<0.1
		Difference	7	0	6	6	8	0	4	44	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		RPD	**61%**	0%	**33%**	**33%**	**36%**	0%	**44%**	**56%**	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

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Table QA2: Trip Blank Results - Soils (mg/kg)

Sample ID	Sampling Date	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene
TB-170822	17/08/2022	<0.2	<0.5	<1	<1	<2
TB-180822	18/08/2022	<0.2	<0.5	<1	<1	<2
TB-190822	19/08/2022	<0.2	<0.5	<1	<1	<2
TB-220822	22/08/2022	<0.2	<0.5	<1	<1	<2
TB-020922	2/09/2022	<0.2	<0.5	<1	<1	<2
TB-210922	22/09/2022	<0.2	<0.5	<1	<1	<2

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Table QA3: Trip Spike Results – Soils (% Recovery)

Sample ID	Sampling Date	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene
TS-170822	17/08/2022	86	87	84	85	84
TS-180822	18/08/2022	107	110	104	105	104
TS-190822	19/08/2022	98	96	94	92	93
TS-220822	22/08/2022	99	98	98	99	96
TS-020922	2/09/2022	104	106	104	105	102
TS-210922	22/09/2022	81	79	82	82	82

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Table QA4: Relative Percentage Difference Results for Groundwater

	Metals								TRH				BTEX					PAH							Phenols												OCP									
	Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	o-xylene	m+p-xylene	Naphthalene	Anthracene	Fluoranthene	Benzo(a)pyrene	Phenanthrene	Other PAH	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	Aldrin	Dieldrin	gamma-Chlordane	alpha-Chlordane	pp-DDT	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Methoxychlor
Sample ID	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BD1/20220916	5	<0.1	<1	1	<1	<0.05	23	15	<10	<50	<100	<100	<1	<1	<1	<1	<2	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL	<1	<1	<20	<20	<1	-	<5	<1	<1	<1	<1	<PQL	<0.01	<0.01	<0.01	<0.01	<0.006	<0.01	<0.01	<0.01	<0.01	<0.01
AEC43BH01	4	<0.1	<1	4	<1	<0.05	23	15	<10	<50	<100	<100	<1	<1	<1	<1	<2	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL	<1	<1	<20	<20	<1	-	<5	<1	<1	<1	<1	<PQL	<0.01	<0.01	<0.01	<0.01	<0.006	<0.01	<0.01	<0.01	<0.01	<0.01
	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22	0%	0%	**120%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
BD2/20220916	5	<0.2	<1	<1	<1	<0.1	26	8	<20	<50	<100	<100	<1	<1	<1	<1	<2	0.02	<0.01	<0.01	<0.01	<0.01	<PQL	<3	<10	<30	<30	-	<30	<10	<3	<3	<3	<3	<PQL	<0.2	<0.2	<2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
AEC43BH02	5	<0.1	<1	<1	<1	<0.05	29	9	<10	<50	<100	<100	<1	<1	<1	<1	<2	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL	<1	<1	<20	<20	<1	-	<5	<1	<1	<1	<1	<PQL	<0.01	<0.01	<0.01	<0.01	<0.006	<0.01	<0.01	<0.01	<0.01	<0.01
	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%	11%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

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Table QA4: Relative Percentage Difference Results for Groundwater

		OPP												PCB		
	Other OCP	Azinphos-methyl	Bromophos-ethyl	Chlorpyrifos	Diazinon	Dichlorovos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Methyl Parathion	Other OPP	Aroclor 1242	Aroclor 1254	Other PCB
Sample ID	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BD1/20220916	<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
AEC43BH01	<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
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
BD2/20220916	<PQL	<2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<PQL	<1	<1	<1
AEC43BH02	<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
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

	VOC																												
	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	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	Other VOC
Sample ID	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BD1/20220916	<1	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	9	<1	<1	<1	<1	<1	<1	<1	<PQL
AEC43BH01	<1	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	9	<1	<1	<1	<1	<1	<1	<1	<PQL
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
BD2/20220916	<1	<1	<1	<1	<1	<1	<5	<1	<1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	-	<PQL
AEC43BH02	<1	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<PQL
	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	0%

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Table QA5: Trip Blank Results - Water (µg/L)

Sample ID	Sampling Date	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene	TRH C6-C10 less BTEX	TRH C6-C10
TS-W0221916	16/09/2022	<1	<1	<1	<1	<2	<10	<10

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Table QA6: Trip Spike Results – Water (% Recovery)

Sample ID	Sampling Date	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene
TS-W220916	16/09/2022	94	97	101	101	100

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Table QA7: Rinsate Results for Water Sampling

		Metals								TRH				BTEX					PAH						OCP										
		Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	o-xylene	m+p-xylene	Naphthalene	Anthracene	Fluoranthene	Benzo(a)pyrene	Phenanthrene	Other PAH	Aldrin	Dieldrin	gamma-Chlordane	alpha-Chlordane	pp-DDT	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Methoxychlor	Other OCP
Sample ID	Sampling Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Rinsate-W0220916	15/09/2022	<1	<0.1	<1	<1	<1	<0.05	<1	<1	<10	<50	<100	<100	<1	<1	<1	<1	<2	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL	<0.01	<0.01	<0.01	<0.01	<0.006	<0.01	<0.01	<0.01	<0.01	<0.01	<PQL

Appendix K

Site Photographs

Photograph 1 - Site buildings

Photograph 2 - Site structures

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs - AEC 43** **Sydney Metro Western Sydney Airport - SCAW, Elizabeth Drive, Badgerys Creek**	PROJECT: 204814.01 PLATE No: 1 REV: 0
	CLIENT: CPBUI JV	DATE: 19-Oct-22

Photograph 3 - Site strutures

Photograph 4 - Shed with paint tins and chemical bottles

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs - AEC 43** **Sydney Metro Western Sydney Airport - SCAW, Elizabeth Drive, Badgerys Creek**	PROJECT: 204814.01 PLATE No: 2 REV: 0
	CLIENT: CPBUI JV	DATE: 19-Oct-22