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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) 34,
43B Luddenham Road, Orchard Hills

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

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

	Signature	Date
Author		28 June 2023
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Douglas Partners acknowledges Australia's First Peoples as the Traditional Owners of the Land and Sea on which we operate. We pay our respects to Elders past and present and to all Aboriginal and Torres Strait Islander peoples across the many communities in which we live, visit and work. We recognise and respect their ongoing cultural and spiritual connection to Country.

FS 604853

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

Executive Summary

Douglas Partners Pty Ltd (DP) has 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) 34.

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 AEC 34 that will be disturbed for SCAW activities and to determine whether further investigation and / or management is required. It is understood that the site will be subject to a Site Audit (by Melissa Porter).

The scope of work for the DSI included the collection of soil samples from six test pits (AEC34TP01 to AEC34TP06); collection of a groundwater sample from an existing groundwater monitoring well (SMGW-BH-B341); analysis of selected soil samples and the groundwater sample for potential contaminants and soil parameters; and preparation of this report.

At all test pit locations, the soil profile was observed to comprise a surface layer of gravelly silty clay fill, 0.2 m to 0.3 m thick, underlain by silty clay to depths of 1.4 m to 2 m. No signs of gross contamination were observed during sampling. The groundwater level at SMGW-BH-B341 was recorded to be at a depth of 1.43 m prior to sampling on 8 September 2022.

For the current investigation, concentrations of chemicals for all analysed soil samples are within the site assessment criteria (SAC). Asbestos was not detected in any analysed sample.

For the previous investigation (Borehole SMGW-BH-B341), concentrations of chemicals were within the SAC except for the concentration of zinc (1200 mg/kg) in the natural soil sample from a depth of 4 m which exceeded the ecological investigation level (EIL) for a public open space land use (420 mg/kg) and for a commercial / industrial land use (610 mg/kg). This concentration is considered likely to be a natural occurrence, particularly given that zinc concentrations in overlying fill were low and there is no known contamination source for zinc. Asbestos was not detected in analysed fill sample.

For the groundwater sample, concentrations of metals were low and within the SAC. Concentrations of total recoverable hydrocarbons (TRH) were within the practical quantitation limits (PQL) for the primary sample and the intra-laboratory replicate sample (BD3/20220908). A TRH $>C_{16}$-C_{34} concentration of 300 µg/L was recorded for the inter-laboratory replicate sample (BD4/20220908). It is noted that TRH $>C_{16}$-C_{34} concentrations were below the PQL in soil samples (indicating an absence of a source of TRH $>C_{16}$-C_{34} in the soil). Concentrations of other chemicals were less than the practical quantitation limits (PQL) and within the site assessment criteria.

It is understood that excavated soil is to be reused for the SCAW project, however, preliminary waste classification comments are provided below in the case that excavated soil is to be disposed to an off-site licensed landfill or subject to reuse outside of the SCAW project area. With respect to fill, concentrations of chemical contaminants were within the CT1 criteria for General Solid Waste. With respect to PFAS, concentrations for the sample from SMGW-BH-B341, depth 0.1 m, 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. Results for metals, TRH, BTEX, PAH and pH were within the associated criteria for Excavated Natural Material (ENM).

With respect to natural soil samples to a maximum depth of 3 m 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).

Field observations and analysis of soil and groundwater samples has not revealed contamination that requires remediation. Based on the results reported herein, it is considered, from a contamination perspective, that the site (AEC 34) is suitable for the final intended land use. Tested soils that are to be excavated are considered suitable for use at the site.

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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) 34, 43B Luddenham Road, Orchard Hills

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) 34.

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 AEC 34 which will be disturbed for SCAW activities, and to determine whether further investigation and / or management is required. The site is shown on Drawing 1, 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).

It is understood that the site will be 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 an area of the SCAW AEC 34 as shown in Drawing 1, Appendix A.

Table 1: Site Identification Information

Item	Details
Site Address (from SIX Maps)	43B Luddenham Road, Orchard Hills, NSW
Legal Description (from SIX Maps)	(Part of) Lot 51, Deposited Plan 1276956
Approximate area of site (AEC 34)	0.07 ha
Zone (from ePlanning Spatial Viewer)	RU2: Rural Landscape
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. AEC 34 will be part of an area used as a stabling yard.

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, 2021b) (HHERA) provides (simple) conceptual site models (CSMs) 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 presumed that there is an absence of buildings in areas of passive open space.

The site will form part of the rail corridor land usage as it is part of the proposed stabling yard.

Development of the site will likely include stripping of topsoil and placement of (geotechnically suitable) soil where required to raise the ground level (approximately 5 m) for the stabling yard (which will be at approximately 37 m Australia Height Datum (AHD) at the site). Stripped topsoil from the site will be subject to reuse elsewhere within the greater SCAW area. Soil to raise ground levels will be sourced from off-site.

3. Scope of Work

The scope of work for the DSI, 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) 34, 1793 Elizabeth Drive, Badgerys Creek,* August 2022, (204814.01.SAQP.002.DftA), included the following:

- Collection of soil samples from test pits at six locations using an excavator;
- Collection of a groundwater sample from the existing groundwater monitoring well (SMGW-BH-B341);

- Analysis of selected soil samples for potential contaminants and soil parameters;
- Analysis of a groundwater water sample 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 32 m AHD. Slopes at and around the site are generally down to the north.
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 sulfate soils (NSW Acid Sulfate Soil Risk map).
Surface water bodies	No surface water bodies are at the site. A farm dam is located approximately 100 m to the east of the site. Blaxland Creek is located approximately 500 m to the west of the site and flows to the northeast. South Creek is located approximately 730 m to the east of the site and flows to the north. Blaxland Creek flows into South Creek approximately 1 km to the north of the site. Surface water at the site is likely to infiltrate the permeable ground surface of flow as runoff to the north.
Groundwater flow direction and discharge	Based on the topography, shallow groundwater (if any) is expected to flow to the north or north-east and potentially discharge into South Creek.
Registered groundwater bores	There are no registered groundwater bores within 500 m of the site (WaterNSW).
Site land use	The site comprises land for grazing (EIS).
Surrounding land use	Surrounding land is used for rural purposes and typically comprises grazier land with minor buildings, sheds, animal shelters / pens and dams (EIS).
Site Features	According to the EIS, 'Bare Earth' was identified at the site, although it is noted that specific areas of AEC 34 were not indicated to have 'Bare Earth'.

Item	Details
Information from historical aerial photographs	The land at and surrounding the site appears to have been pastoral land since 1955 (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). The Patons Lane Landfill at 129 Patons Lane, Orchard Hills, located approximately 940 m to the south-west of the site is licensed (EPL 20814) under the *Protection of the Operations Act 1997* (EIS). There were no NSW EPA PFAS investigation sites within 2 km of the site (EIS). No penalty notices were issued by NSW EPA for the site or nearby surrounding land (EIS).

5. Previous Investigation Data

Cardno, *Contamination Assessment Report - Phase D/E, Sydney Metro Western Sydney Airport,* 26 November 2021 (Cardno, 2021a) included installation of a groundwater well (SMGW-BH-B341) approximately 3 m beyond the north-eastern boundary of the site. The borehole log is provided in Appendix C. In summary, clayey silt fill to a depth of 0.2 m was underlain by silty clay, sandy clay and gravelly clay to a depth of 6 m; then sandstone, interbedded and interlaminated sandstone and siltstone to a depth of 15.42 m. Groundwater was not encountered whilst drilling through soil to a depth of 5.51 m (which is where core drilling using water commenced). The groundwater well was installed (as described in the 'Sydney Metro Specification' and to a depth required by 'Technical Advisors') to a depth of 6.5 m with a slotted screen from a depth of 2.5 m to 5.5 m. The filter pack used consisted of 2 mm graded sand and bentonite seals were constructed using HoleplugTM bentonite pellets. The well was developed a minimum of one day following installation. The groundwater depth was not recorded. Table 3 lists the laboratory testing undertaken for soil samples collected from SMGW-BH-B341.

Table 3: Soil Sample Testing

Sample Location	Sample Depth (m) (Replicate Identification)	Fill / Natural Soil	Laboratory Testing Suite
SMGW-BH-B341	0.1	Fill	Asbestos; total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN); volatile organics; tetraethyl lead; pH; polycyclic aromatic hydrocarbons (PAH); organochlorine pesticides (OCP); organophosphorus pesticides (OPP); polychlorinated biphenyls (PCB); halogenated phenols; non-halogenated phenols; metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); and per- and poly-fluoroalkyl substances (PFAS).

Sample Location	Sample Depth (m) (Replicate Identification)	Fill / Natural Soil	Laboratory Testing Suite
	0.5	Natural	TRH; BTEXN; pH; PAH; metals (arsenic, cadmium, chromium, copper, lead, nickel and zinc); and PFAS.
	1	Natural	TRH; BTEXN; volatile organics; tetraethyl lead; pH; PAH; halogenated phenols; non-halogenated phenols; (7) metals; and PFAS.
	1.5	Natural	pH, (7) metals; and PFAS.
	2	Natural	pH; (7) metals; and PFAS.
	3	Natural	pH; (7) metals; and PFAS.
	4	Natural	TRH; BTEXN; volatile organics; pH; PAH; halogenated phenols; non-halogenated phenols; (7) metals; PFAS; and nickel in US leachate.
	5.2	Natural	TRH; BTEXN; pH; PAH; halogenated phenols; non-halogenated phenols; and PFAS.
	8.17	Rock	TRH; BTEXN; pH; PAH; halogenated phenols; non-halogenated phenols; (7) metals; PFAS; and nickel in US leachate.

Although the soil samples from SMGW-BH-B341 were collected from beyond the site boundary, the analytical results for these samples are summarised in Appendix C. The analytical results are discussed in Section 11.

6. Potential Contamination Sources and Preliminary Conceptual Site Model

Potential sources of contamination for AEC 34 were identified in the EIS to be: *Potential filled areas, areas of potential hazardous building material use*.

For the potential contamination sources for AEC 34, contaminants of potential concern were identified in the EIS to be: heavy metals, TRH, PAH, OCP and asbestos. DP notes that specific heavy metals are not listed in the EIS.

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
Possible fill	• 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 • Asbestos • Volatile organic compounds (VOC) (for groundwater)
Hazardous building material use.	• PCB • Lead (from lead paint) • Asbestos

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 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). The preliminary conceptual site model for the proposed development of the site is presented in Table 5.

Table 5: Preliminary CSM

Potential Contamination Source	Potential Exposure Pathway	Potential Receptors
Contaminated ground from potential fill and potential hazardous building material use.	– 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 – Inhalation of vapours	– Adjacent site users
	– Surface run-off – Leaching of contaminants into groundwater and lateral migration of groundwater	– Surface water bodies

Potential Contamination Source	Potential Exposure Pathway	Potential Receptors
	− Leaching of contaminants into groundwater	− Groundwater
	− Ingestion, inhalation and direct contact	− Terrestrial ecosystems
	− Direct contact	− In ground structures

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, thus, there is a low probability that substantial fertiliser application has occurred. In addition, PFAS concentrations in soil samples from SMGW-TP-B341 were very 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. Fieldwork

Fieldwork was undertaken as per the SAQP.

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 sample density of six soil sample points (AEC34TP01 to AEC34TP06) was adopted and was based on the minimum recommended sample density of six sample points for a 0.1 ha site in NSW EPA, *Sampling Design Guidelines*, 1995 (NSW EPA, 1995). Sampling from test pits was carried out on 29 July 2022. It is noted that the soil sampling was conducted prior to the release of NSW EPA, *Contaminated Land Guidelines Sampling design part 1 - application*, 2022 in August 2022.

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

- Collect soil samples from excavator bucket returns 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 / topsoil 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.

It is noted that as potential ACM or copious quantities of building rubble were not observed in fill, 10 L bulk samples were not collected for sieving / screening for asbestos assessment.

7.3 Groundwater Well Sampling

Groundwater sampling of the existing groundwater monitoring well (SMGW-BH-B341) was carried out on 8 September 2022 in accordance with DP standard operating procedures. This monitoring well was selected for sampling as it is down gradient of the site. The sampling method adopted is as follows:

- 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.

8. Laboratory Analysis

Laboratory analysis was undertaken as per the SAQP.

8.1 Soil Samples from Test Pits

A fill (primary) sample from each test pit location was analysed at a NATA accredited laboratory for COPC comprising: metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRH, BTEX, PAH, OCP, OPP, PCB, total phenols and asbestos (in 500 mL soil) as fill was considered to have a greater risk of contamination compared to the observed underlying natural soil.

Natural soil samples from four sample locations were analysed to obtain data for the natural soil profile. The natural soil samples were analysed for metals, TRH, BTEX, PAH, OCP, OPP, PCB and total phenols. A natural soil sample from AEC34TP02 (depth 0.5 to 0.6 m) was also analysed for asbestos.

Two fill samples were analysed for pH and cation exchange capacity (CEC) for the calculation of EIL.

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

8.2 Groundwater Samples

A groundwater sample from SMGW-BH-B341 was analysed for COPC including metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), PAH, TRH, BTEX, VOC, OCP, OPP, PCB and phenols. Hardness was also analysed for the calculation of hardness adjusted default guideline values (DGV).

9. Site Assessment Criteria

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

The site will form part of the rail corridor land usage as it is part of the proposed stabling yard, so the SAC for the rail corridor (land use scenario D) are applicable to the site. It is noted, however, that soil sourced from the site may be used elsewhere within the greater SCAW area which also has proposed passive open space, and so SAC for passive open space (land use scenario C) have also been adopted to provide assessment with respect to the overall SCAW project.

10. Field Work Results

10.1 Test Pits

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

- A surface layer of gravelly silty clay fill, 0.2 m to 0.3 m thick, was present at all test locations; and
- Surficial fill was underlain by silty clay to test pit termination depths of 1.4 m to 2 m.

PID results were less than 3 ppm, indicating a low potential for the presence of volatile contaminants. The PID calibration certificate is provided in Appendix H.

No signs of gross contamination (e.g., odours, staining or potential asbestos-containing materials) were observed during sampling.

No free groundwater was observed in the test pits.

10.2 Groundwater

The groundwater level at SMGW-BH-B341 was recorded to be at a depth of 1.43 m prior to sampling on 8 September 2022. The water purged and sampled from the well was observed to be slightly turbid, grey, and have a sulphurous odour. No oil sheen was observed, and no phase separated hydrocarbons were detected using the interface dipmeter. The groundwater field sheet 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 investigation are summarised in Table I1, Appendix I, against the most conservative (Tier 1) SAC (see Appendix F). Analytical results for the previous investigation sample location that was just beyond the site boundary is shown in Table C1, Appendix C.

For the current investigation, concentrations of chemicals for all analysed soil samples were within the SAC for all CoPC analysed. Asbestos was not detected in any analysed sample. It is noted that concentrations of BTEX, PAH, OCP, OPP, PCB and total phenols were less than the practical quantitation limits.

For the previous investigation (Borehole SMGW-BH-B341), concentrations of chemicals were within the SAC except for the concentration of zinc (1200 mg/kg) in the natural soil sample from a depth of 4 m which exceeded the EIL for a public open space land use (420 mg/kg) and for a commercial / industrial land use (610 mg/kg). This concentration is considered likely to be a natural occurrence, particularly given that zinc concentrations in overlying fill were low and there is no known contamination source for zinc. Asbestos was not detected in analysed fill sample.

11.2 Groundwater Samples

Analytical results for groundwater samples from SMGW-BH-B341 are summarised in Table I2, Appendix I, against the SAC. Although the groundwater level will likely be greater than 4 m below the final ground level (post-development), health screening levels (HSL) for vapour intrusion at depth 2 m to <4 m are shown as these are more conservative than HSL for greater depths. Default guideline values (DGV) for metals have been adjusted for hardness where possible.

Concentrations of metals were low and within the SAC.

Concentrations of TRH were within the practical quantitation limits (PQL) for the primary sample and the intra-laboratory replicate sample (BD3/20220908). A TRH $>C_{16}$-C_{34} concentration of 300 µg/L was recorded for the inter-laboratory replicate sample (BD4/20220908). It is noted that TRH $>C_{16}$-C_{34} concentrations were below the PQL in soil samples (indicating an absence of a source of TRH $>C_{16}$-C_{34} in the soil).

Concentrations of VOC (including BTEX), OCP, OPP, PCB and phenols were less than the practical quantitation limits (PQL) and within the SAC.

11.3 Preliminary Waste Classification Comments

It is understood that excavated soil is to be reused for the SCAW project, however, preliminary waste classification comments are provided below in the case that excavated soil is to be disposed to an off-site licensed landfill or subject to reuse outside of the SCAW project area.

Table I3, Appendix I, presents 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 C1, Appendix C, presents the analytical 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.

With respect to fill, concentrations of chemical contaminants were within the CT1 criteria for General Solid Waste. With respect to PFAS, concentrations for the sample from SMGW-BH-B341, depth 0.1 m, 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 the fill represented by this sample is to be disposed off-site to a licenced landfill, TCLP analysis for PFAS should be conducted to provide a waste classification. Results for metals, TRH, BTEX, PAH and pH were within the associated criteria for Excavated Natural Material (ENM).

With respect to natural soil samples to a maximum depth of 3 m, 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*. Excavations beyond a depth of 3 m are not anticipated.

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

Field observations and analysis of soil and groundwater samples has not revealed contamination that requires remediation. Based on the results reported herein, it is considered, from a contamination perspective, that the site (AEC 34) is suitable for the final intended land use. Tested soils that are to be excavated are considered suitable for use at the site.

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 not 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 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.

Appendix A

Drawing

EASTING 292229.0
NORTHING 6257568.9

AEC34TP01

SMGW-BH-B341 (C)

AEC34TP02

AEC34TP03

EASTING 292217.4
NORTHING 6257552.7

AEC34TP04

EASTING 292257.0
NORTHING 6257552.2

AEC34TP05

AEC 34

AEC34TP06

EASTING 292244.3
NORTHING 6257534.0

LOCALITY PLAN

SITE

PATONS LANE

LUDDENHAM RD

LUDDENHAM RD

0 5 10 15 20 25 m

Legend

- SCAW Alignment
- EIS AEC: Medium Risk
- AEC34 Site Boundary - co-ordinates shown are for Zone 56, MGA 2020
- Borehole with Groundwater Well, Cardno 2021
- Test Pit

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	CPBUI JV		
OFFICE:	Sydney	DRAWN BY:	MG
SCALE:	1:500 @ A3	DATE:	01/11/2022

TITLE: **AEC34 Test Location Plan**
Sydney Metro Western Sydney Airport - SCAW
Elizabeth Drive, Badgerys Creek

N

PROJECT No:	204814.01
DRAWING No:	AEC34-01
REVISION:	Rev 1

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 Summary of Results from Previous Investigation

Table C1 - Summary of Results for Soil for Previous Investigation (Cardno)

	BTEX						MAH				
	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total MAH	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	Styrene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.1	0.1	0.1	0.2	0.1	0.3	0.5	0.5	0.5	0.5	0.5
NSW 2014 Excavated Natural Material (Absolute Max)	0.5	65	25			15					
NSW 2014 Excavated Natural Material (Maximum Average)											
NSW 2014 General Solid Waste CT1 (No Leaching)	10	288	600			1000					60
NSW EPA PFAS Waste Class Addendum 2016 - SCC1											
NSW 2014 Restricted Solid Waste CT2 (No Leaching)	40	1152	2400			4000					240
NSW EPA PFAS Waste Class Addendum 2016 - SCC2											
NSW TCLP1 Criteria											
NEPM 2013 EIL/ESL UR/POS, Site Specific (Clay)	65	105	105			45					
NEPM 2013 EIL/ESL Comm./Ind., Site Specific (Clay)	95	135	135			95					
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses											
NEPM 2013 HIL, Recreational C											
PFAS NEMP 2.0 Table 2 Health Public open space											
HSL C for Direct Contact	120	18,000	5300			15,000					
NEPM 2013 HIL, Commercial/Industrial D											
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay											
0-1m	4	NL	NL			NL					
1-2m	6	NL	NL			NL					
2-4m	9	NL	NL			NL					
>4m	20	NL	NL			NL					
PFAS NEMP 2.0 Table 2 Industrial/Commercial											
HSL D for Direct Contact	430	99,000	27,000			81,000					
NEPM 2013 Management Limits, C/I, Coarse Soil											

	TRH								
	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	TPH C10-C14 Fraction after Silica Cleanup	TPH C15-C28 Fraction after Silica Cleanup	TPH C29-C36 Fraction after Silica Cleanup	C10 - C36 Fraction (sum) (SG)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	20	20	50	50	50	20	50	50	100
NSW 2014 Excavated Natural Material (Absolute Max)					500				
NSW 2014 Excavated Natural Material (Maximum Average)									
NSW 2014 General Solid Waste CT1 (No Leaching)	650				10000				
NSW EPA PFAS Waste Class Addendum 2016 - SCC1									
NSW 2014 Restricted Solid Waste CT2 (No Leaching)	2600				40000				
NSW EPA PFAS Waste Class Addendum 2016 - SCC2									
NSW TCLP1 Criteria									
NEPM 2013 EIL/ESL UR/POS, Site Specific (Clay)									
NEPM 2013 EIL/ESL Comm./Ind., Site Specific (Clay)									
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses									
NEPM 2013 HIL, Recreational C									
PFAS NEMP 2.0 Table 2 Health Public open space									
HSL C for Direct Contact									
NEPM 2013 HIL, Commercial/Industrial D									
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay									
0-1m									
1-2m									
2-4m									
>4m									
PFAS NEMP 2.0 Table 2 Industrial/Commercial									
HSL D for Direct Contact									
NEPM 2013 Management Limits, C/I, Coarse Soil									

	CRC Care TPH Fractions										
	C6-C10	C10-C16	C16-C34	C34-C40	C10 - C40 (Sum of total)	F1: C6-C10 less BTEX	F2: >C10-C16 less NAPHTHALENE	>C10 - C16 Fraction (SG)	>C16 - C34 Fraction (SG)	>C34 - C40 Fraction (SG)	>C10 - C40 Fraction (sum) (SG)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	20	50	100	100	100	20	50	50	100	100	100
NSW 2014 Excavated Natural Material (Absolute Max)											
NSW 2014 Excavated Natural Material (Maximum Average)											
NSW 2014 General Solid Waste CT1 (No Leaching)											
NSW EPA PFAS Waste Class Addendum 2016 - SCC1											
NSW 2014 Restricted Solid Waste CT2 (No Leaching)											
NSW EPA PFAS Waste Class Addendum 2016 - SCC2											
NSW TCLP1 Criteria											
NEPM 2013 EIL/ESL UR/POS, Site Specific (Clay)		120	1300	5600		180					
NEPM 2013 EIL/ESL Comm./Ind., Site Specific (Clay)		170	2500	6600		215					
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses											
NEPM 2013 HIL, Recreational C											
PFAS NEMP 2.0 Table 2 Health Public open space											
HSL C for Direct Contact			5300	7400		5100	3800				
NEPM 2013 HIL, Commercial/Industrial D											
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay											
0-1m						310	NL				
1-2m						480	NL				
2-4m						NL	NL				
>4m						NL	NL				
PFAS NEMP 2.0 Table 2 Industrial/Commercial											
HSL D for Direct Contact			26,000	38,000		26,000	20,000				
NEPM 2013 Management Limits, C/I, Coarse Soil	700	1000	3500	10000							

	Metals								
	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/L	mg/kg
EQL	2	0.4	5	5	5	0.1	5	0.01	5
NSW 2014 Excavated Natural Material (Absolute Max)	40	1	150	200	100	1	60		300
NSW 2014 Excavated Natural Material (Maximum Average)	20	0.5	75	100	50	0.5	30		150
NSW 2014 General Solid Waste CT1 (No Leaching)	100	20	100		100	4	40		
NSW EPA PFAS Waste Class Addendum 2016 - SCC1									
NSW 2014 Restricted Solid Waste CT2 (No Leaching)	400	80	400		400	16	160		
NSW EPA PFAS Waste Class Addendum 2016 - SCC2									
NSW TCLP1 Criteria								2	
NEPM 2013 EIL/ESL UR/POS, Site Specific (Clay)	100		540	170	1100		110		420
NEPM 2013 EIL/ESL Comm./Ind., Site Specific (Clay)	160		900	250	1800		180		610
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses									
NEPM 2013 HIL, Recreational C	300	90		17000	600	80	1200		30000
PFAS NEMP 2.0 Table 2 Health Public open space									
HSL C for Direct Contact									
NEPM 2013 HIL, Commercial/Industrial D	3000	900		240000	1500	730	6000		400000
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay									
0-1m									
1-2m									
2-4m									
>4m									
PFAS NEMP 2.0 Table 2 Industrial/Commercial									
HSL D for Direct Contact									
NEPM 2013 Management Limits, C/I, Coarse Soil									

Field ID	Alternative Name	Sample Date	Easting	Northing	Depth	Soil Type	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total MAH	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	Styrene
BH-B341_0.1	SMGW-BH-B341_0.1	23/08/2021	291776.273	6257631.191	0.1	Fill	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5
BH-B341_0.5	SMGW-BH-B341_0.5	23/08/2021	291776.273	6257631.191	0.5	Natural Soil	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	-	-	-	-	-
BH-B341_1	SMGW-BH-B341_1	23/08/2021	291776.273	6257631.191	1	Natural Soil	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5
BH-B341_1.5	SMGW-BH-B341_1.5	23/08/2021	291776.273	6257631.191	1.5	Natural Soil	-	-	-	-	-	-	-	-	-	-	-
BH-B341_2	SMGW-BH-B341_2	23/08/2021	291776.273	6257631.191	2	Natural Soil	-	-	-	-	-	-	-	-	-	-	-
BH-B341_3	SMGW-BH-B341_3	23/08/2021	291776.273	6257631.191	3	Natural Soil	-	-	-	-	-	-	-	-	-	-	-
BH-B341_4	SMGW-BH-B341_4	23/08/2021	291776.273	6257631.191	4	Natural Soil	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5
BH-B341_5.2	SMGW-BH-B341_5.2	23/08/2021	291776.273	6257631.191	5.2	Natural Soil	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	-	-	-	-	-
BH-B341_8.17	SMGW-BH-B341_8.17	23/08/2021	291776.273	6257631.191	8.17	Natrual Rock	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	-	-	-	-	-

Field ID	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	TPH C10-C14 Fraction after Silica Cleanup	TPH C15-C28 Fraction after Silica Cleanup	TPH C29-C36 Fraction after Silica Cleanup	C10 - C36 Fraction (sum) (SG)
BH-B341_0.1	<20	<20	<50	<50	<50	<50	<100	<100	<100
BH-B341_0.5	<20	<20	<50	<50	<50	<50	<100	<100	<100
BH-B341_1	<20	<20	<50	<50	<50	<50	<100	<100	<100
BH-B341_1.5	-	-	-	-	-	-	-	-	-
BH-B341_2	-	-	-	-	-	-	-	-	-
BH-B341_3	-	-	-	-	-	-	-	-	-
BH-B341_4	<20	<20	<50	<50	<50	<50	<100	<100	<100
BH-B341_5.2	<20	<20	<50	<50	<50	<50	<100	<100	<100
BH-B341_8.17	<20	<20	<50	<50	<50	<20	<50	<50	<50

Field ID	C6-C10	C10-C16	C16-C34	C34-C40	C10 - C40 (Sum of total)	F1: C6-C10 less BTEX	F2: >C10-C16 less NAPHTHALENE	>C10 - C16 Fraction (SG)	>C16 - C34 Fraction (SG)	>C34 - C40 Fraction (SG)	>C10 - C40 Fraction (sum) (SG)
BH-B341_0.1	<20	<50	<100	<100	<100	<20	<50	<50	<100	<100	<100
BH-B341_0.5	<20	<50	<100	<100	<100	<20	<50	<50	<100	<100	<100
BH-B341_1	<20	<50	<100	<100	<100	<20	<50	<50	<100	<100	<100
BH-B341_1.5	-	-	-	-	-	-	-	-	-	-	-
BH-B341_2	-	-	-	-	-	-	-	-	-	-	-
BH-B341_3	-	-	-	-	-	-	-	-	-	-	-
BH-B341_4	<20	<50	<100	<100	<100	<20	<50	<50	<100	<100	<100
BH-B341_5.2	<20	<50	<100	<100	<100	<20	<50	<50	<100	<100	<100
BH-B341_8.17	<20	<50	<100	<100	<100	<20	<50	<50	<100	<100	<100

Field ID	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel (mg/kg)	Nickel (mg/L)	Zinc
BH-B341_0.1	7.3	<0.4	22	11	24	<0.1	5.7	-	24
BH-B341_0.5	5.5	<0.4	18	19	10	-	6.2	-	18
BH-B341_1	3.1	<0.4	9.1	9.2	6.1	-	<5	-	14
BH-B341_1.5	5.8	<0.4	18	20	13	-	6.7	-	25
BH-B341_2	6.3	<0.4	20	15	12	-	7.9	-	28
BH-B341_3	8.2	<0.4	18	24	14	-	18	-	62
BH-B341_4	12	<0.4	21	42	23	-	48	<0.01	1200
BH-B341_5.2	16	<0.4	21	42	29	-	33	-	230
BH-B341_8.17	3.5	<0.4	7.1	45	18	-	49	0.21	82

Table C1 - Summary of Results for Soil for Previous Investigation (Cardno)

		Organo Metals	Asbestos			Organochlorine Pesticides																						
		Tetraethyl lead	Asbestos Results	Moisture Content (dried @ 103°C)	pH (aqueous extract)	Other organochlorine pesticides iWRG621	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide
		mg/kg	Comment	%	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
EQL		5		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
NSW 2014 Excavated Natural Material (Absolute Max)																										
NSW 2014 Excavated Natural Material (Maximum Average)																										
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																										
NSW TCLP1 Criteria																										
NEPM 2013 EIL/ESL UR/POS, Site Specific (Clay)															180											
NEPM 2013 EIL/ESL Comm./Ind., Site Specific (Clay)															640											
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses																										
NEPM 2013 HIL, Recreational C										10		70				400					20				10	
PFAS NEMP 2.0 Table 2 Health Public open space																										
HSL C for Direct Contact																										
NEPM 2013 HIL, Commercial/Industrial D										45		530				3600					100				50	
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay																										
0-1m																										
1-2m																										
2-4m																										
>4m																										
PFAS NEMP 2.0 Table 2 Industrial/Commercial																										
HSL D for Direct Contact																										
NEPM 2013 Management Limits, C/I, Coarse Soil																										
Field ID	**Alternative Name**	**Sample Date**	**Easting**	**Northing**	**Depth**	**Soil Type**																				
BH-B341_0.1	SMGW-BH-B341_0.1	23/08/2021	291776.273	6257631.191	0.1	Fill	<5	No asbestos detected at the reporting limit of 0.01% w/w.Organic fibre detected.No trace asbestos detected	8.1	6.4	<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
BH-B341_0.5	SMGW-BH-B341_0.5	23/08/2021	291776.273	6257631.191	0.5	Natural Soil	-	-	16	5.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_1	SMGW-BH-B341_1	23/08/2021	291776.273	6257631.191	1	Natural Soil	<5	-	15	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_1.5	SMGW-BH-B341_1.5	23/08/2021	291776.273	6257631.191	1.5	Natural Soil	-	-	13	4.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_2	SMGW-BH-B341_2	23/08/2021	291776.273	6257631.191	2	Natural Soil	-	-	9.8	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_3	SMGW-BH-B341_3	23/08/2021	291776.273	6257631.191	3	Natural Soil	-	-	6.7	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_4	SMGW-BH-B341_4	23/08/2021	291776.273	6257631.191	4	Natural Soil	-	-	15	7.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_5.2	SMGW-BH-B341_5.2	23/08/2021	291776.273	6257631.191	5.2	Natural Soil	-	-	3.7	6.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_8.17	SMGW-BH-B341_8.17	23/08/2021	291776.273	6257631.191	8.17	Natrual Rock	-	-	6.7	8.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C1 - Summary of Results for Soil for Previous Investigation (Cardno)

										Organophosphorous Pesticides																														Herbicides	Insecticides	Pesticides			
Field ID	Alternative Name	Sample Date	Easting	Northing	Depth	Soil Type	Hexachlorobenzene	Methoxychlor	Toxaphene	Azinophos methyl	Bolstar (Sulprofos)	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Dimethoate	Disulfoton	Ethion	Ethoprop	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Phorate	Pyrazophos	Ronnel	Terbufos	Trichloronate	Tetrachlorvinphos	Dinoseb	Tokuthion	Parathion	Pirimiphos-methyl	Naphthalene	Acenaphthylene
							mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL							0.05	0.05	0.1	0.2	0.2	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	20	0.2	0.2	0.2	0.5	0.5
NSW 2014 Excavated Natural Material (Absolute Max)																																													
NSW 2014 Excavated Natural Material (Maximum Average)																																													
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																																													
NSW TCLP1 Criteria																																													
NEPM 2013 EIL/ESL UR/POS, Site Specific (Clay)																																												170	
NEPM 2013 EIL/ESL Comm./Ind., Site Specific (Clay)																																												370	
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses																																													
NEPM 2013 HIL, Recreational C							10	400	30				250																																
PFAS NEMP 2.0 Table 2 Health Public open space																																													
HSL C for Direct Contact																																												1900	
NEPM 2013 HIL, Commercial/Industrial D							80	2500	160				2000																																
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay																																													
0-1m																																												NL	
1-2m																																												NL	
2-4m																																												NL	
>4m																																												NL	
PFAS NEMP 2.0 Table 2 Industrial/Commercial																																													
HSL D for Direct Contact																																												11,000	
NEPM 2013 Management Limits, C/I, Coarse Soil																																													
BH-B341_0.1	SMGW-BH-B341_0.1	23/08/2021	291776.273	6257631.191	0.1	Fill	<0.05	<0.05	<0.5	<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	<20	<0.2	<0.2	<0.2	<0.5	<0.5
BH-B341_0.5	SMGW-BH-B341_0.5	23/08/2021	291776.273	6257631.191	0.5	Natural Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5
BH-B341_1	SMGW-BH-B341_1	23/08/2021	291776.273	6257631.191	1	Natural Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	-	-	<0.5	<0.5
BH-B341_1.5	SMGW-BH-B341_1.5	23/08/2021	291776.273	6257631.191	1.5	Natural Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_2	SMGW-BH-B341_2	23/08/2021	291776.273	6257631.191	2	Natural Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_3	SMGW-BH-B341_3	23/08/2021	291776.273	6257631.191	3	Natural Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_4	SMGW-BH-B341_4	23/08/2021	291776.273	6257631.191	4	Natural Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	-	-	<0.5	<0.5
BH-B341_5.2	SMGW-BH-B341_5.2	23/08/2021	291776.273	6257631.191	5.2	Natural Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	-	-	<0.5	<0.5
BH-B341_8.17	SMGW-BH-B341_8.17	23/08/2021	291776.273	6257631.191	8.17	Natrual Rock	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	-	-	<0.5	<0.5

Table C1 - Summary of Results for Soil for Previous Investigation (Cardno)

Field ID	Alternative Name	Sample Date	Easting	Northing	Depth	Soil Type
BH-B341_0.1	SMGW-BH-B341_0.1	23/08/2021	291776.273	6257631.191	0.1	Fill
BH-B341_0.5	SMGW-BH-B341_0.5	23/08/2021	291776.273	6257631.191	0.5	Natural Soil
BH-B341_1	SMGW-BH-B341_1	23/08/2021	291776.273	6257631.191	1	Natural Soil
BH-B341_1.5	SMGW-BH-B341_1.5	23/08/2021	291776.273	6257631.191	1.5	Natural Soil
BH-B341_2	SMGW-BH-B341_2	23/08/2021	291776.273	6257631.191	2	Natural Soil
BH-B341_3	SMGW-BH-B341_3	23/08/2021	291776.273	6257631.191	3	Natural Soil
BH-B341_4	SMGW-BH-B341_4	23/08/2021	291776.273	6257631.191	4	Natural Soil
BH-B341_5.2	SMGW-BH-B341_5.2	23/08/2021	291776.273	6257631.191	5.2	Natural Soil
BH-B341_8.17	SMGW-BH-B341_8.17	23/08/2021	291776.273	6257631.191	8.17	Natrual Rock

	PAH			PAH														
	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(k)fluoranthene	Benzo(b+j)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	Benzo(a)pyrene TEQ (Zero LOR)	Benzo(a)pyrene TEQ (Half LOR)_0	Benzo(a)pyrene TEQ (Full LOR)	PAHs (Sum of total)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	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 (Absolute Max)											1							40
NSW 2014 Excavated Natural Material (Maximum Average)											0.5							20
NSW 2014 General Solid Waste CT1 (No Leaching)											0.8							200
NSW EPA PFAS Waste Class Addendum 2016 - SCC1																		
NSW 2014 Restricted Solid Waste CT2 (No Leaching)											3.2							
NSW EPA PFAS Waste Class Addendum 2016 - SCC2																		
NSW TCLP1 Criteria																		
NEPM 2013 EIL/ESL UR/POS, Site Specific (Clay)											0.7							
NEPM 2013 EIL/ESL Comm./Ind., Site Specific (Clay)											1.4							
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses																		
NEPM 2013 HIL, Recreational C																3		300
PFAS NEMP 2.0 Table 2 Health Public open space																		
HSL C for Direct Contact																		
NEPM 2013 HIL, Commercial/Industrial D																40		4000
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay																		
0-1m																		
1-2m																		
2-4m																		
>4m																		
PFAS NEMP 2.0 Table 2 Industrial/Commercial																		
HSL D for Direct Contact																		
NEPM 2013 Management Limits, C/I, Coarse Soil																		
BH-B341_0.1	<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
BH-B341_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
BH-B341_1	<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
BH-B341_1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_4	<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
BH-B341_5.2	<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	0.6	1.2	<0.5
BH-B341_8.17	<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

	Phenols												
	Phenols (non-halogenated) IWRG621	Phenols(halogenated) IWRG621	2,4-dimethylphenol	2,4-dinitrophenol	2-methylphenol	2-nitrophenol	3-&4-methylphenol	4,6-Dinitro-2-methylphenol	4,6-Dinitro-o-cyclohexyl phenol	4-chloro-3-methylphenol	4-nitrophenol	Cresol (Total)	Phenol
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	20	1	0.5	5	0.2	1	0.4	5	20	1	5	0.5	0.5
NSW 2014 Excavated Natural Material (Absolute Max)													
NSW 2014 Excavated Natural Material (Maximum Average)													
NSW 2014 General Solid Waste CT1 (No Leaching)	288				4000							4000	
NSW EPA PFAS Waste Class Addendum 2016 - SCC1													
NSW 2014 Restricted Solid Waste CT2 (No Leaching)	1152				16000							16000	
NSW EPA PFAS Waste Class Addendum 2016 - SCC2													
NSW TCLP1 Criteria													
NEPM 2013 EIL/ESL UR/POS, Site Specific (Clay)													
NEPM 2013 EIL/ESL Comm./Ind., Site Specific (Clay)													
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses													
NEPM 2013 HIL, Recreational C												4000	40000
PFAS NEMP 2.0 Table 2 Health Public open space													
HSL C for Direct Contact													
NEPM 2013 HIL, Commercial/Industrial D												25000	240000
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay													
0-1m													
1-2m													
2-4m													
>4m													
PFAS NEMP 2.0 Table 2 Industrial/Commercial													
HSL D for Direct Contact													
NEPM 2013 Management Limits, C/I, Coarse Soil													
BH-B341_0.1	<20	<1	<0.5	<5	<0.2	<1	<0.4	<5	<20	<1	<5	<0.5	<0.5
BH-B341_0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_1	<20	<1	<0.5	<5	<0.2	<1	<0.4	<5	<20	<1	<5	<0.5	<0.5
BH-B341_1.5	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_2	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_3	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_4	<20	<1	<0.5	<5	<0.2	<1	<0.4	<5	<20	<1	<5	<0.5	<0.5
BH-B341_5.2	<20	<1	<0.5	<5	<0.2	<1	<0.4	<5	<20	<1	<5	<0.5	<0.5
BH-B341_8.17	<20	<1	<0.5	<5	<0.2	<1	<0.4	<5	<20	<1	<5	<0.5	<0.5

	Polychlorinated Biphenyls									
	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	8:2 Fluorotelomer sulfonate
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0005	0.0001
NSW 2014 Excavated Natural Material (Absolute Max)										
NSW 2014 Excavated Natural Material (Maximum Average)										
NSW 2014 General Solid Waste CT1 (No Leaching)								<50		
NSW EPA PFAS Waste Class Addendum 2016 - SCC1										
NSW 2014 Restricted Solid Waste CT2 (No Leaching)								<50		
NSW EPA PFAS Waste Class Addendum 2016 - SCC2										
NSW TCLP1 Criteria										
NEPM 2013 EIL/ESL UR/POS, Site Specific (Clay)										
NEPM 2013 EIL/ESL Comm./Ind., Site Specific (Clay)										
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses										
NEPM 2013 HIL, Recreational C								1		
PFAS NEMP 2.0 Table 2 Health Public open space										
HSL C for Direct Contact										
NEPM 2013 HIL, Commercial/Industrial D								7		
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay										
0-1m										
1-2m										
2-4m										
>4m										
PFAS NEMP 2.0 Table 2 Industrial/Commercial										
HSL D for Direct Contact										
NEPM 2013 Management Limits, C/I, Coarse Soil										
BH-B341_0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.0005	<0.0001
BH-B341_0.5	-	-	-	-	-	-	-	-	<0.0005	<0.0001
BH-B341_1	-	-	-	-	-	-	-	-	<0.0005	<0.0001
BH-B341_1.5	-	-	-	-	-	-	-	-	<0.0005	<0.0001
BH-B341_2	-	-	-	-	-	-	-	-	<0.0005	<0.0001
BH-B341_3	-	-	-	-	-	-	-	-	<0.0005	<0.0001
BH-B341_4	-	-	-	-	-	-	-	-	<0.0005	<0.0001
BH-B341_5.2	-	-	-	-	-	-	-	-	<0.0005	<0.0001
BH-B341_8.17	-	-	-	-	-	-	-	-	<0.0005	<0.0001

Table C1 - Summary of Results for Soil for Previous Investigation (Cardno)

							Perfluorocarbons																									
							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)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	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)
							mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL							0.0005	0.0005	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0005	0.0005	0.0005	0.0001	0.0001	0.0001	0.0001	0.0005	0.0001	0.0001	0.0005
NSW 2014 Excavated Natural Material (Absolute Max)																																
NSW 2014 Excavated Natural Material (Maximum Average)																																
NSW 2014 General Solid Waste CT1 (No Leaching)																																
NSW EPA PFAS Waste Class Addendum 2016 - SCC1																								1.8	1.8							
NSW 2014 Restricted Solid Waste CT2 (No Leaching)																																
NSW EPA PFAS Waste Class Addendum 2016 - SCC2																								7.2	7.2							
NSW TCLP1 Criteria																																
NEPM 2013 EIL/ESL UR/POS, Site Specific (Clay)																																
NEPM 2013 EIL/ESL Comm./Ind., Site Specific (Clay)																																
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses																									0.01							
NEPM 2013 HIL, Recreational C																																
PFAS NEMP 2.0 Table 2 Health Public open space																														1		
HSL C for Direct Contact																																
NEPM 2013 HIL, Commercial/Industrial D																																900
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay																																
0-1m																																
1-2m																																
2-4m																																
>4m																																
PFAS NEMP 2.0 Table 2 Industrial/Commercial																														20		
HSL D for Direct Contact																																
NEPM 2013 Management Limits, C/I, Coarse Soil																																
Field ID	**Alternative Name**	**Sample Date**	**Easting**	**Northing**	**Depth**	**Soil Type**																										
BH-B341_0.1	SMGW-BH-B341_0.1	23/08/2021	291776.273	6257631.191	0.1	Fill	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	0.0003	<0.0001	<0.0001	<0.0005	<0.0001	0.0003	<0.0005
BH-B341_0.5	SMGW-BH-B341_0.5	23/08/2021	291776.273	6257631.191	0.5	Natural Soil	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<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
BH-B341_1	SMGW-BH-B341_1	23/08/2021	291776.273	6257631.191	1	Natural Soil	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<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
BH-B341_1.5	SMGW-BH-B341_1.5	23/08/2021	291776.273	6257631.191	1.5	Natural Soil	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<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
BH-B341_2	SMGW-BH-B341_2	23/08/2021	291776.273	6257631.191	2	Natural Soil	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<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
BH-B341_3	SMGW-BH-B341_3	23/08/2021	291776.273	6257631.191	3	Natural Soil	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<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
BH-B341_4	SMGW-BH-B341_4	23/08/2021	291776.273	6257631.191	4	Natural Soil	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<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
BH-B341_5.2	SMGW-BH-B341_5.2	23/08/2021	291776.273	6257631.191	5.2	Natural Soil	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<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
BH-B341_8.17	SMGW-BH-B341_8.17	23/08/2021	291776.273	6257631.191	8.17	Natrual Rock	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<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

Table C1 - Summary of Results for Soil for Previous Investigation (Cardno)

							Organic				SVOCs	Chlorinated Hydrocarbons																											Halo
							Perfluorooctanoate (PFOA)	Perfluorononanesulfonic acid (PFNS)	Perfluoropropanesulfonic acid (PFPrS)	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	EPN	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	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Dichloromethane	Trichloroethene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Vinyl chloride	Chlorinated hydrocarbons IWRG621	1,2-dibromoethane	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene
							mg/kg	UG/KG	UG/KG	UG/KG	UG/KG	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL							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	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 (Absolute Max)																																									
NSW 2014 Excavated Natural Material (Maximum Average)																																									
NSW 2014 General Solid Waste CT1 (No Leaching)													200	600	26	24		14		10						10			120				172	10	14			4			86		150
NSW EPA PFAS Waste Class Addendum 2016 - SCC1							18																																		
NSW 2014 Restricted Solid Waste CT2 (No Leaching)													800	2400	104	96		56		40						40			480				688	40	56			16			344		600
NSW EPA PFAS Waste Class Addendum 2016 - SCC2							72																																		
NSW TCLP1 Criteria																																									
NEPM 2013 EIL/ESL UR/POS, Site Specific (Clay)																																									
NEPM 2013 EIL/ESL Comm./Ind., Site Specific (Clay)																																									
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses																																									
NEPM 2013 HIL, Recreational C																																									
PFAS NEMP 2.0 Table 2 Health Public open space							10																																		
HSL C for Direct Contact																																									
NEPM 2013 HIL, Commercial/Industrial D																																									
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay																																									
0-1m																																									
1-2m																																									
2-4m																																									
>4m																																									
PFAS NEMP 2.0 Table 2 Industrial/Commercial							50																																		
HSL D for Direct Contact																																									
NEPM 2013 Management Limits, C/I, Coarse Soil																																									

Field ID	Alternative Name	Sample Date	Easting	Northing	Depth	Soil Type																																						
BH-B341_0.1	SMGW-BH-B341_0.1	23/08/2021	291776.273	6257631.191	0.1	Fill	<0.0001	<0.1	<0.1	0.3	0.3	<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	<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
BH-B341_0.5	SMGW-BH-B341_0.5	23/08/2021	291776.273	6257631.191	0.5	Natural Soil	<0.0001	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_1	SMGW-BH-B341_1	23/08/2021	291776.273	6257631.191	1	Natural Soil	<0.0001	<0.1	<0.1	<0.1	<0.1	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH-B341_1.5	SMGW-BH-B341_1.5	23/08/2021	291776.273	6257631.191	1.5	Natural Soil	<0.0001	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_2	SMGW-BH-B341_2	23/08/2021	291776.273	6257631.191	2	Natural Soil	<0.0001	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_3	SMGW-BH-B341_3	23/08/2021	291776.273	6257631.191	3	Natural Soil	<0.0001	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_4	SMGW-BH-B341_4	23/08/2021	291776.273	6257631.191	4	Natural Soil	<0.0001	<0.1	<0.1	<0.1	<0.1	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH-B341_5.2	SMGW-BH-B341_5.2	23/08/2021	291776.273	6257631.191	5.2	Natural Soil	<0.0001	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_8.17	SMGW-BH-B341_8.17	23/08/2021	291776.273	6257631.191	8.17	Natrual Rock	<0.0001	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C1 - Summary of Results for Soil for Previous Investigation (Cardno)

									Halogenated Hydrocarbons							Halogenated Phenols							Solvents						
									4-chlorotoluene	Bromobenzene	Bromomethane	Chlorobenzene	Dichlorodifluoromethane	Iodomethane	Trichlorofluoromethane	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,6-dichlorophenol	2-chlorophenol	Pentachlorophenol	Tetrachlorophenols	Methyl Ethyl Ketone	4-Methyl-2-pentanone	Acetone	Allyl chloride	Carbon disulfide	Vic EPA IWRG 621 OCP (Total)*	Vic EPA IWRG 621 Other CHC (Total)*
									mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	MG/KG	MG/KG
EQL									0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	1	0.5	0.5	0.5	1	10	0.5	0.5	0.5	0.5	0.5	0.1	0.5
NSW 2014 Excavated Natural Material (Absolute Max)																													
NSW 2014 Excavated Natural Material (Maximum Average)																													
NSW 2014 General Solid Waste CT1 (No Leaching)												2000				8000	40						4000						
NSW EPA PFAS Waste Class Addendum 2016 - SCC1																													
NSW 2014 Restricted Solid Waste CT2 (No Leaching)												8000				32000	160						16000						
NSW EPA PFAS Waste Class Addendum 2016 - SCC2																													
NSW TCLP1 Criteria																													
NEPM 2013 EIL/ESL UR/POS, Site Specific (Clay)																													
NEPM 2013 EIL/ESL Comm./Ind., Site Specific (Clay)																													
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses																													
NEPM 2013 HIL, Recreational C																					120								
PFAS NEMP 2.0 Table 2 Health Public open space																													
HSL C for Direct Contact																													
NEPM 2013 HIL, Commercial/Industrial D																					660								
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Clay																													
0-1m																													
1-2m																													
2-4m																													
>4m																													
PFAS NEMP 2.0 Table 2 Industrial/Commercial																													
HSL D for Direct Contact																													
NEPM 2013 Management Limits, C/I, Coarse Soil																													
Field ID	**Alternative Name**	**Sample Date**	**Easting**	**Northing**	**Depth**	**Soil Type**																							
BH-B341_0.1	SMGW-BH-B341_0.1	23/08/2021	291776.273	6257631.191	0.1	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.5
BH-B341_0.5	SMGW-BH-B341_0.5	23/08/2021	291776.273	6257631.191	0.5	Natural Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_1	SMGW-BH-B341_1	23/08/2021	291776.273	6257631.191	1	Natural Soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5
BH-B341_1.5	SMGW-BH-B341_1.5	23/08/2021	291776.273	6257631.191	1.5	Natural Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_2	SMGW-BH-B341_2	23/08/2021	291776.273	6257631.191	2	Natural Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_3	SMGW-BH-B341_3	23/08/2021	291776.273	6257631.191	3	Natural Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-B341_4	SMGW-BH-B341_4	23/08/2021	291776.273	6257631.191	4	Natural Soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5
BH-B341_5.2	SMGW-BH-B341_5.2	23/08/2021	291776.273	6257631.191	5.2	Natural Soil	-	-	-	-	-	-	-	<1	<1	<0.5	<0.5	<0.5	<1	<10	-	-	-	-	-	-	-
BH-B341_8.17	SMGW-BH-B341_8.17	23/08/2021	291776.273	6257631.191	8.17	Natrual Rock	-	-	-	-	-	-	-	<1	<1	<0.5	<0.5	<0.5	<1	<10	-	-	-	-	-	-	-

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : SMGW-BH-B341 REV 1
FILE / JOB NO : 80021888
SHEET : 1 OF 3

PROJECT : SMWSA GI
LOCATION : 31-39 Luddenham Road Orchard Hills

POSITION : E: 292251.068, N: 6257559.570 (56 MGA2020) SURFACE ELEVATION : 31.754 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hanjin D&B 8 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : CH

DATE STARTED : 8/23/21 DATE COMPLETED : 8/23/21 DATE LOGGED : 8/23/21 LOGGED BY : SL CHECKED BY : TH

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
	N/A				0.0 31.8			FILL: CLAYEY SILT: brown, low plasticity			TOPSOIL
								0.20m SILTY CLAY: brown-yellow, grey, high plasticity, trace ironstone gravel			0.10: PID = 0.1 ppm; Non-calcareous POSSIBLE ALLUVIUM
							CH			F	0.50: PID = 0.1 ppm
		E		1.00m SPT 4, 8, 11 N=19	1.0 30.8					St	1.00: PID = 0.1 ppm; Non-calcareous
								1.30m SANDY CLAY: grey, high plasticity, fine to medium grained sand			
				1.45m 1.50m U			CH	1.60m			1.40: SV: 204 kPa 1.50: PID = 0.4 ppm
				1.90m				SILTY CLAY: brown-yellow, grey, medium to high plasticity			
				2.00m D	2.0 29.8		CI-CH	2.00m GRAVELLY CLAY: brown, brown-yellow, grey, medium to high plasticity, fine to medium grained, sub-angular to angular gravel			2.00: PID = 0.5 ppm
				2.50m SPT 10, 12, 11 N=23			CI-CH		M	VSt	
AD/T			Not Encountered	2.95m				2.80m SILTY CLAY: brown-yellow, grey, medium plasticity, trace ironstone gravel			POSSIBLE RESIDUAL SOIL
		F			3.0 28.8						3.00: U75 failed, tube broke off from the barrel, possibly due to VSt-H clay 3.00: PID = 0.3 ppm; Non-calcareous
											3.50: limited returns from auger
				4.00m SPT 16, 14, 18 N=32	4.0 27.8		CI				4.00: PID = 0.5 ppm
				4.45m						H	
				4.80m D							
					5.0 26.8						5.00: PID = 0.7 ppm; Non-calcareous
								5.20m SILTY CLAY: grey, low to medium plasticity, inferred extremely weathered, very low strength			5.20: PID = 0.7 ppm
		H		**5.50m** SPT 10/10mm HB N=R 5.51m			CL-CI	5.51m Continued as Cored Drill Hole			
					6.0 25.8						
					7.0 24.8						
					8.0 23.8						

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

CARDNO NSW/ACT PTY LTD

CORED DRILL HOLE LOG

HOLE NO : SMGW-BH-B341 REV 1
FILE / JOB NO : 80021888
SHEET : 2 OF 3

PROJECT : SMWSA GI
LOCATION : 31-39 Luddenham Road Orchard Hills

POSITION : E: 292251.068, N: 6257559.570 (56 MGA2020) SURFACE ELEVATION : 31.754 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hanjin D&B 8 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : CH

DATE STARTED : 8/23/21 DATE COMPLETED : 8/23/21 DATE LOGGED : 8/23/21 LOGGED BY : SL CHECKED BY : TH

CASING DIAMETER : BARREL (Length) : 3.00 m BIT : SURFACE SET 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 31.8						
					1.0 30.8						
					2.0 29.8						
					3.0 28.8						
					4.0 27.8						
					5.0 26.8						
							5.51m START CORING AT 5.51m				
HQ	5% Water LOSS	0% LOSS 6.90	29		6.0 25.8		SILTY CLAY (CL-CI): brown-yellow, brown-grey, low to medium plasticity, trace ironstone gravel	RS			
							6.14m 6.00m: becoming grey				
				Is(50) d=0.06 a=0.1 MPa			INTERLAMINATED SANDSTONE (50%) AND SILTSTONE (50%): at 0-10°, grey, brown-grey, fine grained sandstone, brown-yellow, grey to dark grey siltstone, trace 10mm rounded siltstone clasts, iron stained	HW			6.15: PID = 0.6 ppm
				Is(50) d=0.48 a=1.16 MPa			6.50m SANDSTONE: grey, fine grained, 5-10% carbonaceous laminations at 0-5°	SW			6.66: BP 0° Clay PR S
	0% Water LOSS	0% LOSS	99	Is(50) d=0.05 a=0.54 MPa	7.0 24.8		7.51m SILTSTONE: grey to dark grey, indistinctly bedded, with 5-15mm rounded to sub-rounded siltstone clasts 7.58-7.69m: grey	MW			7.15: PID = 0.3 ppm; Non-calcareous 7.19: BP 0° CN PR S 7.22: BP 0° CN PR S
				Is(50) d=0.05 a=0.27 MPa	8.0 23.8						

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

CARDNO NSW/ACT PTY LTD

CORED DRILL HOLE LOG

HOLE NO : SMGW-BH-B341 REV 1
FILE / JOB NO : 80021888
SHEET : 3 OF 3

PROJECT : SMWSA GI
LOCATION : 31-39 Luddenham Road Orchard Hills

POSITION : E: 292251.068, N: 6257559.570 (56 MGA2020) SURFACE ELEVATION : 31.754 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hanjin D&B 8 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : CH

DATE STARTED : 8/23/21 DATE COMPLETED : 8/23/21 DATE LOGGED : 8/23/21 LOGGED BY : SL CHECKED BY : TH

CASING DIAMETER : BARREL (Length) : 3.00 m BIT : SURFACE SET 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
HQ	0% Water LOSS	0% LOSS	99	Is(50) d=0.2 a=0.31 MPa	8.0 23.8		8.15m	MW			8.15: BP 0° Clay PR S 8.17: PID = 0.2 ppm
							SILTSTONE: grey, indistinctly bedded				
					9.0 22.8			SW			9.15: PID = 0 ppm
				Is(50) d=0.32 a=0.5 MPa Is(50) d=0.13 a=0.37 MPa							9.32: JT 0° CN IR RF
		9.90					9.80m				
		0% LOSS	100	Is(50) d=0.3 a=0.57 MPa Is(50) d=0.16 a=0.83 MPa	10.0 21.8		SILTSTONE: grey to dark grey, indistinctly bedded, with 5-40mm rounded to sub-rounded siltstone clasts 10.04m INTERLAMINATED AND INTERBEDDED SANDSTONE (75%) AND SILTSTONE (25%): at 0-10°, grey, fine grained sandstone, grey to dark grey, pale brown siltstone				10.15: PID = 0.2 ppm; Non-calcareous 10.21: JT 10° CN UN S 10.54: BP 0° CN PR S
					11.0 20.8		11.06m				10.92: BP 0° CN PR S
				Is(50) d=0.26 a=0.85 MPa Is(50) d=0.28 a=0.51 MPa			SILTSTONE: grey to dark grey, indistinctly bedded, 10% grey, fien grained sandstone laminations, 5% pale brown siltstone laminations at 0-5°	MW SW			11.15: PID = 0.3 ppm 11.21: JT 20° Clay PR S
							11.44-11.57m: grey				
							11.81-11.92m: 20-40mm rounded siltstone clasts				11.81: BP 10° CN UN S
				Is(50) d=0.74 a=0.9 MPa	12.0 19.8		12.04m				
				Is(50) d=0.11 a=0.21 MPa			SILTSTONE: grey to dark grey, interbedded, individually indistinctly bedded, trace coal laminations	MW SW			12.06-12.22: JT 70 - 90° Coal UN RF 12.15: PID = 0.2 ppm
		12.78					12.78m				
		0% LOSS	81	Is(50) d=0.07 a=0.6 MPa Is(50) d=0.05 a=0.55 MPa	13.0 18.8		SILTSTONE: grey to dark grey, indistinctly bedded, with 10-50mm rounded siltstone clasts 12.99-13.08m: grey, fine grained sandstone				12.89: BP 5° CN PR RF 13.08: BP 0° CN PR S 13.15: BP 0° CN PR RF 13.15: PID = 0.3 ppm; Non-calcareous
				Is(50) d=0.03 a=0.19 MPa				MW HW MW			13.66: BP 0° CN PR S 13.75: BP 0° Clay PR S
					14.0 17.8		14.05m				
		14.25					SILTSTONE: dark grey, indistinctly bedded, trace coal laminations	SW			14.05: BP 10° Coal CU S 14.15: BP 0° Coal PR S 14.15: PID = 0.9 ppm
		0% LOSS	100	Is(50) d=0.66 a=0.61 MPa			14.35m				14.35: BP 5° CN PR S
							SILTSTONE: grey to dark grey, indistinctly bedded, 5% pale brown siltstone laminations at 0-5°, trace 10-40mm rounded to sub-rounded siltstone clasts	MW SW			
					15.0 16.8		15.08m				
							SANDSTONE: grey, fine grained, 5% grey to dark grey, pale brown siltstone laminations at 0-10°, trace 10-50mm rounded to sub-rounded siltstone clasts	F			15.15: PID = 0.2 ppm
		15.42					15.42m				
							BOREHOLE SMGW-BH-B341 REV 1 TERMINATED AT 15.42 m Target depth				
					16.0 15.8						

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

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Appendix D

Data Quality Objectives

Data Quality Objectives
SAQP for AEC34, 43B Luddenham Road, Orchard Hills
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 proposed 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 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 detailed 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 detailed in Appendix B of the DSI. 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 1, 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 sampling plan are presented in the DSI. Adequately experienced environmental scientists / engineers are 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 AEC34

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,* 2011 (CRC CARE, 2011).
- HEPA, *PFAS National Environmental Management Plan,* 2020 [NEMP] (HEPA, 2020).

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 investigation levels (HIL) for per- and poly-fluoroalkyl substances (PFAS) (Table 5). At the time of preparing this document, screening values were available only for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS); and
- Health screening levels for asbestos (Table 6).

For HSL for vapour intrusion, HSL for 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)
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)
CLAY	**0 m to <1 m**	**1 m to <2 m**	**2 m to <4 m**	**4 m+**
Benzene	4	6	9	20
Toluene	NL	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	NL	NL	NL	NL
Naphthalene	NL	NL	NL	NL
TPH C6-C10 less BTEX	310	480	NL	NL
TPH >C10-C16 less naphthalene	NL	NL	NL	NL

Notes: TPH is total petroleum hydrocarbons

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

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

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

Notes: TPH is total petroleum hydrocarbons.

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

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

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

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

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

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

3.0 Ecological Criteria

Ecological SAC for soil and the associated future use are listed 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 6.8 which is the average pH for the two analysed soil samples (see Laboratory Certificate 301941); and
- A Cation Exchange Capacity (CEC) of 8.2 meq/100g which is the average CEC for the two analysed soil samples (see laboratory certificate 301941);
- Contamination is assumed to be 'aged' based on site history;
- A organic carbon content value of 1 % has been used as a default value;
- A clay content of 10% has been used as a relatively conservative value given the clay soil profile encountered during the investigation; and
- The state is NSW and the traffic volume is 'low'.

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	170	250
Nickel	110	180
Chromium III	410	670
Lead	1100	1800
Zinc	420	610
PAH		
Naphthalene	170	370

Contaminant	Public Open Space EIL for Passive Open Space (mg/kg)	Commercial and Industrial EIL for Rail Corridor (mg/kg)
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	105	135
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 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 AEC34

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	3.1 *

Contaminant	Fresh Water DGV (µg/L)
Chromium (III)	42 *
Chromium (VI)	1.0
Copper	1.4
Lead	172 *
Mercury (inorganic)	0.06
Nickel	152*
Zinc	111*
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 660 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

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Appendix G

Test Pit Logs

EXCAVATION - GEOLOGICAL LOG

PIT NO : AEC34TP01
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : SMF - Orchard Hills

POSITION : E: 292231.2, N: 6257563.7 (56 MGA2020)	SURFACE ELEVATION : 31.60 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 29/07/22	LOGGED BY : SR	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
		N/A	0.10m ES 0.20m	0.0			FILL: gravelly silty CLAY: low to medium plasticity, dark brown, with angular to subangular gravel and rootlets	w<PL			FILL 0.10: PID=2.1
							0.25m				
			0.50m ES 0.60m	0.5		CI-CH	Silty CLAY: medium to high plasticity, red-orange, with angular to subangular gravel and rootlets	w<PL	St		RESIDUAL SOIL 0.50: PID=1.2
		Not Observed		1.0			At 0.8m: pale grey and red-orange				
							1.10m				
			1.20m ES 1.30m				Silty CLAY: low to medium plasticity, pale grey and yellow, with extremely weathered sandstone	w<PL	VSt		1.20: PID=2.5
				1.5		CL-CI					
							1.70m				
							EXCAVATION AEC34TP01 TERMINATED AT 1.70 m Target depth				
				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 : AEC34TP02
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : SMF - Orchard Hills

POSITION : E: 292239.1, N: 6257557.4 (56 MGA2020)	SURFACE ELEVATION : 31.80 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 29/07/22	LOGGED BY : SR	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
		N/A	ES 0.10m	0.0			FILL: gravelly silty CLAY: low to medium plasticity, pale brown, angular to subangular gravel, rootlets	w<PL			FILL 0.00: PID=1.1
				0.20m							
			0.50m ES 0.60m	0.5		CH	Silty CLAY: high plasticity, red-orange and brown, with organic matter and rootlets	w<PL	St		RESIDUAL SOIL 0.50: PID=2.5
		Not Observed		1.00m							
			1.20m ES 1.30m	1.0		CL-CI	Silty CLAY: low to medium plasticity, pale grey, orange and yellow, with extremely weathered ironstone and rootlets	w<PL	VSt		1.20: PID=1.6
				1.50m							
				1.5			EXCAVATION AEC34TP02 TERMINATED AT 1.50 m Target depth				
				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 : AEC34TP03
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : SMF - Orchard Hills

POSITION : E: 292250.9, N: 6257552.0 (56 MGA2020)	SURFACE ELEVATION : 31.90 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 29/07/22	LOGGED BY : SR	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 (100 / 200 / 300 / 400)	STRUCTURE & Other Observations
		N/A	ES 0.10m	0.0			FILL: gravelly silty CLAY: low to medium plasticity, pale brown, angular to subangular gravel, rootlets	w<PL			FILL 0.00: PID=1.2
				0.20m							
			0.50m ES 0.60m	0.5		Cl	Silty CLAY: medium plasticity, pale grey and yellow, with ironstone gravel and rootlets	w<PL	St		RESIDUAL SOIL 0.50: PID=1.1
		Not Observed		0.90m			Silty CLAY: low plasticity, pale grey and yellow, with ironstone and rootlets				
			1.10m ES 1.20m	1.0							1.10: PID=1.4
			1.60m ES 1.70m	1.5		CL	At 1.4m: pale grey, yellow and red-orange, extremely weathered ironstone gravel	w<PL	St - VSt		1.60: PID=0.9
				2.00m			EXCAVATION AEC34TP03 TERMINATED AT 2.00 m Target depth				
				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 : AEC34TP04
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : SMF - Orchard Hills

POSITION : E: 292223.3, N: 6257553.2 (56 MGA2020)	SURFACE ELEVATION : 31.70 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 29/07/22	LOGGED BY : SR	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 PENETRO-METER (kPa)	STRUCTURE & Other Observations
		N/A	0.10m ES 0.20m	0.0			FILL: gravelly silty CLAY: low to medium plasticity, dark brown, with angular to subangular gravel and rootlets	w<PL			FILL 0.10: PID=1.2
							0.20m Silty CLAY: medium to high plasticity, red-orange, with angular to subangular gravel and rootlets				Field Replicate BD1/20220729 taken at 0.1-0.2m depth
			0.50m ES 0.60m	0.5		CI-CH	At 0.7m: pale grey and red-orange	w<PL	St		RESIDUAL SOIL 0.50: PID=1.5
		Not Observed		1.0			1.10m Silty CLAY: low plasticity, pale grey and red-orange, with ironstone gravel				
			1.20m ES 1.30m			CL		w<PL	VSt		1.20: PID=1.2
				1.5			1.60m EXCAVATION AEC34TP04 TERMINATED AT 1.60 m Target depth				
				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 : AEC34TP05
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : SMF - Orchard Hills

POSITION : E: 292233.3, N: 6257547.3 (56 MGA2020)	SURFACE ELEVATION : 31.90 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 29/07/22	LOGGED BY : SR	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
		N/A	ES 0.10m	0.0			FILL: gravelly silty CLAY: low to medium plasticity, dark brown, with angular to subangular gravel and rootlets	w<PL			FILL 0.00: PID=1
				0.20m							
			0.40m				Silty CLAY: medium to high plasticity, red-orange, with angular to subangular gravel and rootlets				RESIDUAL SOIL
			ES 0.50m	0.5		CI-CH		w<PL	St		0.40: PID=2.2
		Not Observed		0.70m							
			0.90m				Silty CLAY: low plasticity, pale grey and red-orange, with ironstone gravel				
			ES 1.00m	1.0		CL		w<PL	VSt		0.90: PID=1.2
				1.40m			EXCAVATION AEC34TP05 TERMINATED AT 1.40 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 : AEC34TP06
FILE / JOB NO : 204814.01
SHEET : 1 OF 1

PROJECT : Western Sydney Airport - Surface and Civil Alignment Works
LOCATION : SMF - Orchard Hills

POSITION : E: 292244.0, N: 6257540.4 (56 MGA2020)	SURFACE ELEVATION : 32.00 (mAHD)	
EQUIPMENT TYPE : 14 tonne Excavator	METHOD : 800mm bucket	
DATE EXCAVATED : 29/07/22	LOGGED BY : SR	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
		N/A	ES 0.10m	0.0			FILL: gravelly silty CLAY: low to medium plasticity, dark brown, angular to subangular gravel, rootlets	w<PL			FILL 0.00: PID=1 Field Replicate BD10/20220710 taken at 0.0-0.1 depth
				0.30m			Silty CLAY: high plasticity, red-orange, organic matter and rootlets				RESIDUAL SOIL
		Not Observed	0.50m ES 0.60m	0.5		CH		w<PL	St		0.50: PID=1.8
				0.90m			Silty CLAY: medium to high plasticity, pale grey, orange and yellow, with extremely weathered ironstone gravel				
			1.10m ES 1.20m	1.0		CI-CH		w<PL	VSt		1.10: PID=1.1
				1.50m			EXCAVATION AEC34TP06 TERMINATED AT 1.50 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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Sampling Methods

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Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- 'Moist, dry of plastic limit' or 'w <PL' (i.e. hard and friable or powdery).
- 'Moist, near plastic limit' or 'w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- 'Moist, wet of plastic limit' or 'w >PL' (i.e. soils usually weakened and free water forms on the hands when handling).
- 'Wet' or 'w ≈LL' (i.e. near the liquid limit).
- 'Wet' or 'w >LL' (i.e. wet of the liquid limit).

Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Abbreviation	Unconfined Compressive Strength MPa	Point Load Index * $Is_{(50)}$ MPa
Very low	VL	0.6 - 2	0.03 - 0.1
Low	L	2 - 6	0.1 - 0.3
Medium	M	6 - 20	0.3 - 1.0
High	H	20 - 60	1 - 3
Very high	VH	60 - 200	3 - 10
Extremely high	EH	>200	>10

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Residual Soil	RS	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered	XW	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible
Highly weathered	HW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately weathered	MW	The whole of the rock material is discoloured , usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	No signs of decomposition or staining.
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.

Rock Descriptions

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq \text{100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

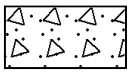
Symbols & Abbreviations

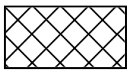
Graphic Symbols for Soil and Rock

General


Asphalt


Road base

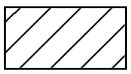

Concrete

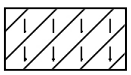

Filling

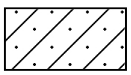
Soils


Topsoil

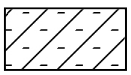

Peat

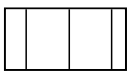

Clay

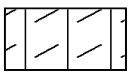

Silty clay

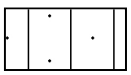

Sandy clay

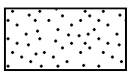

Gravelly clay

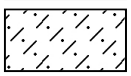

Shaly clay

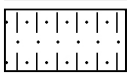

Silt


Clayey silt


Sandy silt

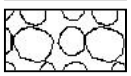

Sand

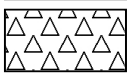

Clayey sand


Silty sand


Gravel

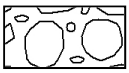

Sandy gravel


Cobbles, boulders

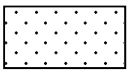

Talus

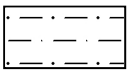
Sedimentary Rocks

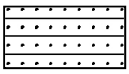

Boulder conglomerate

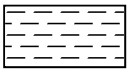

Conglomerate


Conglomeratic sandstone

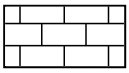

Sandstone


Siltstone

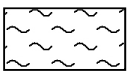

Laminite

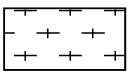

Mudstone, claystone, shale


Coal


Limestone

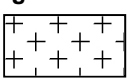
Metamorphic Rocks

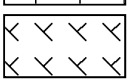

Slate, phyllite, schist

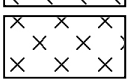

Gneiss

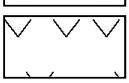

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

Appendix H

Groundwater Field Sheet and Calibration Certificates

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CALIBRATION RECORD

Project: Luddenham WSA SCAW

Project Number: 204814.01

Calibrated Equipment

Model:	Minirae Lite
Serial No.:	595-00 2219
DP Reference:	PID3
Other:	10.6eV Lamp

Calibration

Date(s):	27/07/2022
Operator(s):	SR
Zero Gas:	ambient air
Span Gas:	isobutylene 100
Span Gas Concentration:	100
Response Factor:	1.0
Pre-calibration Reading:	99.1
Post-calibration Reading:	100.0

Approved: R. Kth.

Date: 27/7/2022

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**

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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:	SMGW-BH-B341
Project Name:	SCAW
Project Number:	204819.01
Site Location:	ORCHARD HILLS
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:	8/9/22 11:00am
Sampled By:	JH/LL
Weather Conditions:	SUNNY
GW Level (pre-purge):	1.43 m bgl
GW Level (post sample):	2.18 m bgl
PSH observed:	Yes / (No) (interface / visual). Thickness if observed:
Observed Well Depth:	5.85 m bgl
Estimated Bore Volume:	31 L
Total Volume Purged:	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	17.4	1.42	16127	5.21		120.8
30 / 1.0	17.1	0.73	16826	5.18		119.6
45 / 1.5	17.0	0.64	16893	5.15		119.2
60 / 2.0	17.0	0.59	16924	5.09		118.8
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	4 m bgl, MIDDLE OF SCREEN
Sample Appearance (e.g. colour, siltiness, odour):	SLIGHTLY TURBID, GREY, SULPHUR ODOUR, NO SHEEN
Sample ID:	SMGW-BH-B341
QA/QC Samples:	BD3/20220908 BD4/20220908
Sampling Containers and filtration:	2x AMBER 3x PLASTIC 2x VIAL
Comments / Observations:	LOGGER IN WELL

Appendix I

Summary of Results for Current Investigation

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Table I1: Summary of Laboratory Results for Soil – Metals, TRH, BTEX, PAH

				Metals								TRH						BTEX						PAH			
				Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	TRH C6-C10 less BTEX	THRH >C10-C16 less Naphthalene	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene	Total Xylenes	Naphthalene [b]	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs
Sample ID	Depth	Sample Date	Fill / Natural Soil	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
AEC34TP01	0.1 - 0.2 m	29/07/2022	Fill	6	<0.4	21	7	20	<0.1	4	13	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<2	<1	<0.1	<0.05	<0.5	<0.05
				300 100	90 -	300 410	17000 170	600 1100	80 -	1200 110	30000 420	- -	- 120	310 180	NL -	- 1300	- 5600	4 65	NL 105	NL 125	- -	- -	NL 45	NL 170	- 0.7	3 -	300 -
AEC34TP02	0.5 - 0.6 m	29/07/2022	Natural	<4	<0.4	9	11	7	<0.1	2	6	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<2	<1	<0.1	<0.05	<0.5	<0.05
				300 100	90 -	300 410	17000 170	600 1100	80 -	1200 110	30000 420	- -	- 120	310 180	NL -	- 1300	- 5600	4 65	NL 105	NL 125	- -	- -	NL 45	NL 170	- 0.7	3 -	300 -
AEC34TP03	0.1 - 0.2 m	29/07/2022	Fill	6	<0.4	24	12	22	<0.1	6	16	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<2	<1	<0.1	<0.05	<0.5	<0.05
				300 100	90 -	300 410	17000 170	600 1100	80 -	1200 110	30000 420	- -	- 120	310 180	NL -	- 1300	- 5600	4 65	NL 105	NL 125	- -	- -	NL 45	NL 170	- 0.7	3 -	300 -
AEC34TP03	1.1 - 1.2 m	29/07/2022	Natural	<4	<0.4	7	7	5	<0.1	3	8	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<2	<1	<0.1	<0.05	<0.5	<0.05
				300 100	90 -	300 410	17000 170	600 1100	80 -	1200 110	30000 420	- -	- 120	480 180	NL -	- 1300	- 5600	6 65	NL 105	NL 125	- -	- -	NL 45	NL 170	- 0.7	3 -	300 -
AEC34TP04	0.1 - 0.2 m	29/07/2022	Fill	4	<0.4	16	8	14	<0.1	4	9	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<2	<1	<0.1	<0.05	<0.5	<0.05
				300 100	90 -	300 410	17000 170	600 1100	80 -	1200 110	30000 420	- -	- 120	310 180	NL -	- 1300	- 5600	4 65	NL 105	NL 125	- -	- -	NL 45	NL 170	- 0.7	3 -	300 -
BD9/20220729	0.1 - 0.2 m	29/07/2022	Fill	6	<0.4	17	7	15	<0.1	4	10	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<2	<1	<0.1	<0.05	<0.5	<0.05
				300 100	90 -	300 410	17000 170	600 1100	80 -	1200 110	30000 420	- -	- 120	310 180	NL -	- 1300	- 5600	4 65	NL 105	NL 125	- -	- -	NL 45	NL 170	- 0.7	3 -	300 -
AEC34TP04	1.2 - 1.3 m	29/07/2022	Natural	<4	<0.4	7	13	11	<0.1	6	16	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<2	<1	<0.1	<0.05	<0.5	<0.05
				300 100	90 -	300 410	17000 170	600 1100	80 -	1200 110	30000 420	- -	- 120	480 180	NL -	- 1300	- 5600	6 65	NL 105	NL 125	- -	- -	NL 45	NL 170	- 0.7	3 -	300 -
AEC34TP05	0 - 0.1 m	29/07/2022	Fill	6	<0.4	21	7	18	<0.1	6	11	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<2	<1	<0.1	<0.05	<0.5	<0.05
				300 100	90 -	300 410	17000 170	600 1100	80 -	1200 110	30000 420	- -	- 120	310 180	NL -	- 1300	- 5600	4 65	NL 105	NL 125	- -	- -	NL 45	NL 170	- 0.7	3 -	300 -
AEC34TP06	0 - 0.1 m	29/07/2022	Fill	6	<0.4	20	13	17	<0.1	5	14	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<2	<1	<0.1	<0.05	<0.5	<0.05
				300 100	90 -	300 410	17000 170	600 1100	80 -	1200 110	30000 420	- -	- 120	310 180	NL -	- 1300	- 5600	4 65	NL 105	NL 125	- -	- -	NL 45	NL 170	- 0.7	3 -	300 -
BD10/202207	0 - 0.1 m	29/07/2022	Fill	7.4	<0.4	31	13	18	<0.1	6.6	15	<20	53	<20	53	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5	<0.5	<0.5	<0.5
				300 100	90 -	300 410	17000 170	600 1100	80 -	1200 110	30000 420	- -	- 120	310 180	NL -	- 1300	- 5600	4 65	NL 105	NL 125	- -	- -	NL 45	NL 170	- 0.7	3 -	300 -
AEC34TP06	0.5 - 0.6 m	29/07/2022	Natural	6	<0.4	24	8	19	<0.1	6	10	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<2	<1	<0.1	<0.05	<0.5	<0.05
				300 100	90 -	300 410	17000 170	600 1100	80 -	1200 110	30000 420	- -	- 120	310 180	NL -	- 1300	- 5600	4 65	NL 105	NL 125	- -	- -	NL 45	NL 170	- 0.7	3 -	300 -

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

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/P Urban Residential and Public Open Space (NEPC, 2013)

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

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Table I1: Summary of Laboratory Results for Soil – Phenols, OCP, OPP, PCB, Asbestos

				Phenols					OCP																				OPP		PCB	Asbestos					
				Total Phenols	Pentachlorophenol	Cresols	Phenol	Other Phenols	DDD	DDT+DDE+DDD [c]	DDE	DDT	Aldrin	Dieldrin	Aldrin & Dieldrin	alpha-chlordane	gamma-Chlordane	Endosulfan I	Total Chlordane	Endosulfan II	Endosulfan Sulphate	Endrin	Total Endosulfan	Heptachlor	Hexachlorobenzene	Methoxychlor	Other OCP	Chlorpyriphos	Other OPP	Total PCB	Asbestos ID in soil >0.1g/kg	Trace Analysis	Asbestos ID in soil <0.1g/kg	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation
Sample ID	Depth	Sample Date	Fill / Natural Soil	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	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)
AEC34TP01	0.1 - 0.2 m	29/07/2022	Fill	<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	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	NAD	NAD	NAD	-	-	<0.001
				120	-	120	-	4000	-	400	180	-	180	-	-	-	10	-	-	-	70	-	-	-	20	-	340	-	10	-	10	-	400	-	-	250	-	-	1	-						
AEC34TP02	0.5 - 0.6 m	29/07/2022	Natural	<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	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	NAD	NAD	NAD	-	-	<0.001
				120	-	120	-	4000	-	400	180	-	180	-	-	-	10	-	-	-	70	-	-	-	20	-	340	-	10	-	10	-	400	-	-	250	-	-	1	-						
AEC34TP03	0.1 - 0.2 m	29/07/2022	Fill	<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	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	NAD	NAD	NAD	-	-	<0.001
				120	-	120	-	4000	-	400	180	-	180	-	-	-	10	-	-	-	70	-	-	-	20	-	340	-	10	-	10	-	400	-	-	250	-	-	1	-						
AEC34TP03	1.1 - 1.2 m	29/07/2022	Natural	<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	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	-	-	-
				120	-	120	-	4000	-	400	180	-	180	-	-	-	10	-	-	-	70	-	-	-	20	-	340	-	10	-	10	-	400	-	-	250	-	-	1	-						
AEC34TP04	0.1 - 0.2 m	29/07/2022	Fill	<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	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	NAD	NAD	NAD	-	-	<0.001
				120	-	120	-	4000	-	400	180	-	180	-	-	-	10	-	-	-	70	-	-	-	20	-	340	-	10	-	10	-	400	-	-	250	-	-	1	-						
BD9/20220729	0.1 - 0.2 m	29/07/2022	Fill	<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	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	-	-	-
				120	-	120	-	4000	-	400	180	-	180	-	-	-	10	-	-	-	70	-	-	-	20	-	340	-	10	-	10	-	400	-	-	250	-	-	1	-						
AEC34TP04	1.2 - 1.3 m	29/07/2022	Natural	<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	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	-	-	-
				120	-	120	-	4000	-	400	180	-	180	-	-	-	10	-	-	-	70	-	-	-	20	-	340	-	10	-	10	-	400	-	-	250	-	-	1	-						
AEC34TP05	0 - 0.1 m	29/07/2022	Fill	<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	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	NAD	NAD	NAD	-	-	<0.001
				120	-	120	-	4000	-	400	180	-	180	-	-	-	10	-	-	-	70	-	-	-	20	-	340	-	10	-	10	-	400	-	-	250	-	-	1	-						
AEC34TP06	0 - 0.1 m	29/07/2022	Fill	<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	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	NAD	NAD	NAD	-	-	<0.001
				120	-	120	-	4000	-	400	180	-	180	-	-	-	10	-	-	-	70	-	-	-	20	-	340	-	10	-	10	-	400	-	-	250	-	-	1	-						
BD10/202207	0 - 0.1 m	29/07/2022	Fill	-	-	<1	<0.5	<0.5	<PQL	<0.05	<0.05	<0.05	<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	<PQL	<0.2	<PQL	<0.1	-	-	-	-	-	-
				120	-	120	-	4000	-	400	180	-	180	-	-	-	10	-	-	-	70	-	-	-	20	-	340	-	10	-	10	-	400	-	-	250	-	-	1	-						
AEC34TP06	0.5 - 0.6 m	29/07/2022	Natural	-	-	-	-	-	<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	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1	-	-	-	-	-	-
				120	-	120	-	4000	-	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

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c Criteria applies to DDT only

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)

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

Sample Location / Identification (Borehole or Replicate)	Sample Date	Metals (dissolved): Arsenic	Cadmium	Chromium (III + VI)	Copper	Lead	Mercury	Nickel	Zinc	Polycyclic Aromatic Hydrocarbons: Naphthalene	Anthracene	Fluoranthene	Benzo(a)pyrene	Phenanthrene	Other PAH
SMGW-BH-B341	8/09/2022	4	<0.1	<1	<1	<1	<0.05	5	4	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL
BD3/20220908	8/09/2022	4	<0.1	<1	<1	<1	<0.05	6	6	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL
BD4/20220908	8/09/2022	4	<0.2	<1	<2	<1	<0.1	6	<5	<0.01	<0.01	<0.01	<0.01	<0.01	<PQL
Assessment Criteria															
Freshwater DGV		24 for As(III) 13 for As(V)	3.1	42 for Cr(III) 1.0 for Cr(VI)	1.4	172	0.06	152	111	16	0.01	1	0.1	0.6	-
Guidelines for Recreational Water	**Health**	100	20	500 for Cr(VI)	20000	100	10	200	-	-	-	-	0.1	-	-
Guidelines for Recreational Water	**Aesthetic**	-	-	-	1000	-	-	-	3000	-	-	-	-	-	-
HSL D for Vapour Intrusion, Clay (depth 2 m to <4 m)		-	-	-	-	-	-	-	-	NL	-	-	-	-	-

Sample Location / Identification (Borehole or Replicate)	Sample Date	Total Recoverable Hydrocarbons, BTEX and Volatile Organic Compounds: TRH C6-C10 less BTEX	TRH >C10-C16 less Naphthalene	TRH C6-C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toulene	Ethylbenzene	o-xylene	m+p-xylene
SMGW-BH-B341	8/09/2022	<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<2
BD3/20220908	8/09/2022	<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<2
BD4/20220908	8/09/2022	<20	<50	<20	<50	300	<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	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
SMGW-BH-B341	8/09/2022	<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
BD3/20220908	8/09/2022	<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
BD4/20220908	8/09/2022	<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	-	<1	<5	<PQL
Assessment Criteria																																
Freshwater DGV		30	700	-	-	-		100	70	330	3	85	160	260	60	55	400	270	6500	1900	240	370	-	-	-	900	1100	-	-	20	-	-
Guidelines for Recreational Water	**Health**	-	300	600		1000		3	500	-	300		15000	-	400	3000	-	-	-	30	30	2500				-	-	300	7	-	40	-
Guidelines for Recreational Water	**Aesthetic**	-	-	-		-		-	-	-	5		1	20	0.3	10	-	-	-	-	-	-				-	-	4	-	-	-	-
HSL D for Vapour Intrusion, Clay (depth 2 m to <4 m)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

PQL Practical Quantitation Limit

\- not defined/ not analysed/ not applicable

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
SMGW-BH-B341	8/09/2022	<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	<1	<20	<1	-	<5	<1	<20	<1	<1	<PQL
BD3/20220908	8/09/2022	<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	<1	<20	<1	-	<5	<1	<20	<1	<1	<PQL
BD4/20220908	8/09/2022	<0.2	<0.2	-	-	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<PQL	<2	<2	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<PQL	<1	<1	<1	<3	<10	<3	<3	-	<30	<10	<3	<30	<3	<3	<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)		-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

PQL Practical Quantitation Limit

\- not defined/ not analysed/ not applicable

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

				Metals								TRH		BTEX				PAH		Phenols						OCP		OPP		PCB	Asbestos
				Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C9	TRH C10-C36	Benzene	Toluene	Ethylbenzene	Xylenes (total)	Benzo(a)pyrene (BaP)	Total PAHs	2-Methylphenol (0-Cresol)	Cresol (total)	Toatl 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
Sample ID	Depth	Sample Date	Fill / Natural Soil	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-
AEC34TP01	0.1 - 0.2 m	29/07/2022	Fill	6	<0.4	21	7	20	<0.1	4	13	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
AEC34TP02	0.5 - 0.6 m	29/07/2022	Natural	<4	<0.4	9	11	7	<0.1	2	6	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
AEC34TP03	0.1 - 0.2 m	29/07/2022	Fill	6	<0.4	24	12	22	<0.1	6	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
AEC34TP03	1.1 - 1.2 m	29/07/2022	Natural	<4	<0.4	7	7	5	<0.1	3	8	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-
AEC34TP04	0.1 - 0.2 m	29/07/2022	Fill	4	<0.4	16	8	14	<0.1	4	9	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BD9/20220729	0.1 - 0.2 m	29/07/2022	Fill	6	<0.4	17	7	15	<0.1	4	10	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-
AEC34TP04	1.2 - 1.3 m	29/07/2022	Natural	<4	<0.4	7	13	11	<0.1	6	16	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-
AEC34TP05	0 - 0.1 m	29/07/2022	Fill	6	<0.4	21	7	18	<0.1	6	11	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
AEC34TP06	0 - 0.1 m	29/07/2022	Fill	6	<0.4	20	13	17	<0.1	5	14	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	<5	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BD10/202207	0 - 0.1 m	29/07/2022	Fill	7.4	<0.4	31	13	18	<0.1	6.6	15	<20	110	<0.1	<0.1	<0.1	<0.3	<0.5	<0.5	<0.2	<0.5	-	<1	<1	<0.5	<0.05	<0.05	<0.2	<0.2	<0.1	-
AEC34TP06	0.5 - 0.6 m	29/07/2022	Natural	6	<0.4	24	8	19	<0.1	6	10	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-
Waste Classification Criteria [f]																															
CT1				100	20	100	NC	100	4	40	NC	650	10000	10	288	600	1000	0.8	200	4000	4000	NC	8000	40	288	60	<50	4	4	<50	NC
SCC1				500	100	1900	NC	1500	50	1050	NC	650	10000	18	518	1080	1800	10	200	7200	200	NC	14400	72	518	108	<50	7.5	7.5	<50	NC
TCLP1				N/A	N/A	N/A	NC	N/A	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	NC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NC
CT2				400	80	400	NC	400	16	160	NC	2600	40000	40	1152	2400	4000	3.2	800	16000	16000	NC	32000	160	1152	240	<50	16	16	<50	NC
SCC2				2000	400	7600	NC	6000	200	4200	NC	2600	40000	72	2073	4320	7200	23	800	28800	28800	NC	57600	288	2073	432	<50	30	30	<50	NC
TCLP2				N/A	N/A	N/A	NC	N/A	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	NC	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	0.5	20	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Absolute maximum concentration				40	1	150	200	100	1	60	300	NC	500	0.5	65	25	15	1	40	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

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

Appendix J

Data Quality Assurance and Quality Control

Data Quality Assurance and Quality Control Report for DSI for AEC34

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

1.0 Field and Laboratory Data Quality Assurance and Quality Control for Soil

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
Rinsate	1 per sampling event; <PQL	C for groundwater NR for soil
Laboratory / Reagent Blanks	1 per batch; <PQL	C
Laboratory Duplicate	1 per lab batch; As 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

Laboratory analysis for soil was undertaken with recommended holding times except for pH analysis. The analysis of pH outside of the recommended holding time (7 days) is not considered to affect the assessment of analytical results.

Laboratory analysis for the groundwater interlaboratory replicate sample (BD4/20220908) was slightly outside the recommended holding time (7 days) for TRH, PAH, OCP, OPP, VOC, phenols (non-halogenated) and PCB analysis. The analysis slightly outside of the recommended holding time is not considered to affect the assessment of analytical results.

As noted in laboratory certificate 301941, the spike recovery was not possible to report for arsenic, cadmium and lead in sample 301941-22 due to the inhomogeneous nature of the elements in the sample, however, an acceptable recovery was obtained for the laboratory control sample.

As noted in laboratory certificate 301941, the laboratory RPD acceptance criterion was exceeded for chromium in sample 301941-31, so a triplicate result was issued as sample number 301941-46. It is noted that all the chromium concentrations were generally low for this sample and it is considered that the high RPD does not affect the assessment of results.

As noted in laboratory certificate 911123-S, the matrix spike recovery for endrin aldehyde is outside of the recommended acceptance criterion for sample S22-Au0009526, however, an acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.

The RPD results for soil were within the acceptable range with the exception of a small number of the results for metals analysis (arsenic for replicate BD9/20220729 and chromium for replicate BD10/202207). The exceedances are not, however, considered to be of concern given low actual differences in the concentrations between the primary and replicate samples.

The RPD results for groundwater samples were within the acceptable range with the exception of a small number of exceedances (zinc for replicate BD3/20220908 and TRH $>C_{16}$-C_{34} for replicate BD4/20220908). The exceedances are not, however, considered to be of concern given low actual differences in the concentrations between the primary and replicate samples.

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. 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. Rinsate test results were all less than the practical quantitation limits.

Trip spikes and trip blanks were subject to the same conditions in the field as collected soil samples. Results for BTEX in trip spikes were within the acceptable range and the results for BTEX in trip blanks were less than the practical quantitation limits.

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 samplers 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 for Soil

		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	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs	Total Phenols	DDD	DDT+DDE+DDD	DDE	DDT	Aldrin	Dieldrin	Aldrin & Dieldrin	Endosulfan I	Total Chlordane	Endosulfan II	Endosulfan Sulphate	Endrin	Total Endosulfan	Heptachlor	Hexachlorobenzene	Methoxychlor	Other OCP	Chlorpyriphos	Other OPP	Total PCB
Sample ID	Depth	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BD9/20220729	0.1 - 0.2 m	6	<0.4	17	7	15	<0.1	4	10	<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	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1
AEC34TP04	0.1 - 0.2 m	4	<0.4	16	8	14	<0.1	4	9	<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	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1
		2	0	1	1	1	0	0	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
		40%	0%	6%	13%	7%	0%	0%	11%	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%
BD10/202207	0 - 0.1 m	7.4	<0.4	31	13	18	<0.1	6.6	15	<20	53	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	NT	<PQL	<0.05	<0.05	<0.05	<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	<PQL	<0.2	<PQL	<0.1
AEC34TP06	0 - 0.1 m	6	<0.4	20	13	17	<0.1	5	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	<0.1	<0.1	<0.1	<0.1	<0.1	<PQL	<0.1	<PQL	<0.1
		1.4	0	11	0	1	0	1.6	1	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
		21%	0%	**43%**	0%	6%	0%	28%	7%	0%	6%	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 QA2: Trip Blank Results - Soils (mg/kg)

Sample ID	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene
TB-20220729	<0.2	<0.5	<1	<1	<2

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

Sample ID	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene
TS-20220729	107	105	106	107	106

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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	µg/L
BD3/20220908	4	<0.1	<1	<1	<1	<0.05	6	6	<10	<50	<100	<100	<1	<1	<1	<1	<2	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL	<1	<1	<1	<20	<1	-	<5	<1	<20	<1	<1	<PQL	<0.01	<0.01	<0.01	<0.01	<0.006	<0.01	<0.01	<0.01	<0.01	<0.01
SMGW-BH-B341	4	<0.1	<1	<1	<1	<0.05	5	4	<10	<50	<100	<100	<1	<1	<1	<1	<2	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL	<1	<1	<1	<20	<1	-	<5	<1	<20	<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	1	2	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%	18%	**40%**	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%
BD4/20220908	4	<0.2	<1	<2	<1	<0.1	6	<5	<20	<50	300	<100	<1	<1	<1	<1	<2	<0.01	<0.01	<0.01	<0.01	<0.01	<PQL	<3	<10	<3	<3	-	<30	<10	<3	<30	<3	<3	<PQL	<0.2	<0.2	<2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
SMGW-BH-B341	4	<0.1	<1	<1	<1	<0.05	5	4	<10	<50	<100	<100	<1	<1	<1	<1	<2	<0.2	<0.1	<0.1	<0.1	<0.1	<PQL	<1	<1	<1	<20	<1	-	<5	<1	<20	<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	1	0	0	0	200	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%	18%	0%	0%	0%	**100%**	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%

Table QA4: Relative Percentage Difference Results for Groundwater

		OPP												PCB			VOC																													
	Other OCP	Azinphos-methyl	Bromophos-ethyl	Chlorpyrifos	Diazinon	Dichlorovos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Methyl Parathion	Other OPP	Aroclor 1242	Aroclor 1254	Other PCB	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	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
BD3/20220908	<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	<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
SMGW-BH-B341	<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	<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%	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%
BD4/20220908	<PQL	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<PQL	<1	<1	<1	<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
SMGW-BH-B341	<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	<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%	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	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene
TB-W080922	<1	<1	<1	<1	<2

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

Sample ID	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene
TS-W080922	92	97	102	119	119

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Table QA7: Rinsate Results for Water Sampling

		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	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	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	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Rinsate-W080922	22/09/2022	<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	<1	<1	<1	<20	<1	<5	<1	<20	<1	<1	<PQL	<0.01	<0.01	<0.01	<0.01	<0.006	<0.01	<0.01	<0.01	<0.01	<0.01	<PQL