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Remedial Action Plan

New High School for Leppington and Denham Court – 128 to 134 Rickard Road, Leppington NSW 2179

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Abbreviations and Acronyms

Abbreviation / Acronym	Meaning
ACM	Asbestos Containing Material
AEI	Area of Environmental Interest
AF	Asbestos Fines
AHD	Metres Australian Height Datum
ASS	Acid Sulfate Soil
AST	Above-ground Storage Tank
BaP	Benzo(a)pyrene
bgl	Below Ground Level
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CEMP	Construction Environmental Management Plan
CSM	Conceptual Site Model
CT	Contaminant Threshold
CoPC	Contaminants of Potential Concern
CQA	Construction Quality Assurance
DGV	Default Guideline Values
DoE	Department of Education
DSI	Detailed Site Investigation
DQI	Data Quality Indicator
DQO	Data Quality Objective
EMP	Environmental Management Plan
ENM	Excavated Natural Material
EIL	Ecological Investigation Level
ESL	Ecological Screening Level
EPA	Environment Protection Authority
EWMS	Environmental Work Method Statement
FA	Friable Asbestos
GSW	General Solid Waste
HBM	Hazardous Building Material
HIL	Health Investigation Level
HSL	Health Screening Level
IBC	Intermediate Bulk Container
LCS	Laboratory Control Samples
LGA	Local Government Areas
LOR	Limit of Reporting
LTEMP	Long Term Environmental Management Plan

Abbreviation / Acronym	Meaning
m	Metres
mg/kg	Milligrams per kilogram
mg/L	Milligrams per litre
MPN/g	Most Probable Number of Organisms per gram
NATA	National Association of Testing Authorities
NEMP	National Environmental Management Plan
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
OCP	Organochlorine Pesticides
OPP	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
POEO	Protection of the Environment Operations
PPE	Personal Protective Equipment
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance/Quality Control
RAP	Remedial Action Plan
RRE	Resource Recovery Exemption
RRO	Resource Recovery Order
SAS	Site Audit Statement
SCC	Specific Contaminant Concentration
SINSW	School Infrastructure NSW
SMF	Synthetic Mineral Fibres
SOP	Standard Operating Procedure
SPR	Source-Pathway-Receptor
SWL	Standing Water Level
SWMS	Safe Work Method Statement
TCLP	Toxicity Characteristics Leaching Procedure
TRH	Total Recoverable Hydrocarbon
UCL	Upper Confidence Limit
UEF	Unexpected Finds
VENM	Virgin Excavated Natural Material
WHS	Work Health and Safety

Executive Summary

This Remedial Action Plan has been prepared to support a Review of Environmental Factors (REF) for the Department of Education (DoE) for the new high school for Leppington and Denham Court (the activity). The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by State Environmental Planning Policy (Transport and Infrastructure) 2021 (T&I SEPP) as “development permitted without consent” on land carried out by or on behalf of a public authority under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Section 3.37A of the T&I SEPP.

The proposed activity is for the construction of a new high school located at 128-134 Rickard Road, Leppington, NSW, 2179 (the site).

The purpose of this RAP was to provide DoE with a contamination management strategy with respect to remediation of contamination of the Site for the planned high school construction activity.

Based on previous investigations conducted across the Site, the Site can be made suitable for the proposed activity, subject to appropriately managing contamination described in the supplementary Detailed Site Investigation (DSI) (SMEC 2025) and this RAP.

The remediation objective for the Site is to manage the contamination risk to human health and the environment, to render the Site suitable for the proposed activity (the new high school for Leppington and Denham Court).

The Site is mostly vacant land with a residence on Lot B, and agricultural operations/market gardening on Lot A. Site history indicates that the land was used for agricultural activity (paddocks, crop growing and greenhouses) since prior to 1949.

The extensive sampling conducted at the Site identified exceedances of adopted assessment criteria for asbestos for human health criteria. Adopted ecological assessment criteria was exceeded for zinc, benzo(a)pyrene (BaP) and total recoverable hydrocarbon (TRH) F3 fraction. The groundwater monitoring results identified exceedances of 95% default guideline values (DGVs) for copper, nickel and zinc, and the DSI (SMEC 2025b) noted that the exceedances are suspected to reflect the regional groundwater quality. The groundwater standing water level (SWL) was recorded at approximately 88.44 metres Australian Height Datum (m AHD), or 5.71m below ground level (bgl).

At the time of preparing this RAP, a Site 50% concept design was provided by DoE for the proposed new high school for Leppington and Denham Court. Initial planning information and the 50% masterplan provided by DoE appears to include the construction of six multi-storey school buildings, a sports field and six multi-sports courts, an open-air parking area/carpark and a school hall building. Design levels (i.e. cut to fill levels) and expected Site elevations have not been provided.

The Site has been broken down into the following areas, based on the REF drawing submission configuration:

- High School: Site area to be developed into the proposed new high school for Leppington and Denham Court (i.e. secondary school land use)
- Road Reserve A*: Western portion of the Site which is within the proposed footprint of Rickard Road widening upgrade
- Road Reserve B*: Eastern portion and part of the southern portion of Site which is within the proposed East Road and South Road footprints
- Island*: Southern part of Site, proposed to be used as an open air car park.

(* Road widening is not part of the activity and done outside the REF submission)

A remediation options appraisal was undertaken, with the preferred remediation option for the impacted soils at the Site being Onsite Encapsulation with Offsite Disposal as an alternative option for excess soils. The remedial works for soils would involve the following general activities:

1. Obtain approvals, licences and undertake notifications
2. Establish and implement Unexpected Finds (UEF) protocols (during earthworks)
3. Set up Site controls
4. Draining of Dam B (re-use onsite e.g. for irrigation, or disposal)

5. Survey remediation area extents
6. Demolition and removal of structures / utilities
7. Preparation of Encapsulation Area
 - a. The proposed location of the Encapsulation Area is beneath the 'Island' area or the proposed carpark in the southern part of the Site
 - b. To be prepared as a "borrow pit" (including the removal of existing soils beneath the Site to ensure sufficient volume for contaminated soils to be placed)
8. Excavation of impacted fill material (i.e. material exceeding adopted assessment criteria) and either placement within the Encapsulation Area or waste classification and disposal offsite
9. Validation sampling and survey to confirm Remediation Areas have been removed
10. Earthworks involving management of excavated materials
 - a. An Environmental Consultant with suitable experience will be present during bulk earthworks activities to provide oversight and guidance to the contamination management protocols and identify, assess and advise on UEF of contamination
11. Validation sampling to confirm suitability of site won soils or imported fill material (for capping layer)
12. Installation of the Encapsulation Area capping layer where required
13. Preparation of a validation report
14. Preparation of a Long Term Environmental Management Plan (LTEMP) for the ongoing management of the Encapsulation Area.

SMEC considers the Site can be made suitable for the proposed activity if the RAP is implemented and validated, then an LTEMP prepared and applied.

SMEC consider that potential impact can be adequately mitigated through recommended measures and following completion would not be considered to be a significant impact to the proposed activity.

1. Introduction

1.1 General

This Remedial Action Plan has been prepared to support a Review of Environmental Factors (REF) for DoE for the new high school for Leppington and Denham Court (the activity). The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by State Environmental Planning Policy (Transport and Infrastructure) 2021 (T&I SEPP) as “development permitted without consent” on land carried out by or on behalf of a public authority under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Section 3.37 of the T&I SEPP.

The proposed activity is for the construction of a new high school located at 128-134 Rickard Road, Leppington, NSW, 2179 (the Site).

The purpose of this RAP was to provide DoE with a contamination management strategy with respect to remediation of contamination of the Site for the planned high school construction activity.

1.2 Proposed Activity

The proposed activity is for a new high school for Leppington and Denham Court. The new high school will accommodate up to 1,000 students across 3 new buildings that will comprise 48 permanent teaching spaces (PTS), 3 support teaching spaces (STS), 9 specialist labs/workshops/kitchens and a hall. Buildings A, B and C will wrap the western and southern boundaries of the site, with the hall being located in south-east corner. The activity also includes the construction of a sports field in the centre of the site and 3 x multipurpose courts along the northern boundary. The proposed scope of works is illustrated in Figure 1-1 below.



Figure 1-1: New high school for Leppington and Denham Court (Source: DJRD Architects)

Figure 1-1 provided by DoE appears to include the construction of four multi-storey school buildings, a sports field and courts and an open-air parking area/carpark. Design levels (i.e. cut to fill levels) and expected Site elevations have not been provided. The concept design overlaid on the Site is presented as **Figure 5, Appendix A**.

For the purpose of this document, the activity configuration has been considered according to the proposed land use (secondary school) and activity areas. The activity layout areas have been presented on **Figure 5, Appendix A** and are summarised in Table 1–1.

Table 1–1 Activity layout areas.

Area	Activities Description
High School	This is the Site area to be developed into the proposed new high school for Leppington and Denham Court (i.e. secondary school land use).
Road Reserve A*	Road Reserve A (the western portion of the Site) forms part of the proposed Rickard Road (widening upgrade) footprint. Rickard Road is an existing road which currently borders the Site but does not extend within the Site boundary.
Road Reserve B*	Road Reserve B (the eastern portion of the Site) forms part of the proposed East Road footprint.
Island*	The area designated as the 'Island' (south east corner of Site) is proposed to be used as a public carpark, and will be overlaid with hardstand.

* Road widening is not part of the activity and done outside the REF submission

1.3 Purpose and Objectives

The purpose of this RAP was to provide DoE with a contamination management strategy with respect to remediation of contamination of the Site for the proposed activity.

The remediation objective for the Site is to manage the contamination risk to human health and the environment, to render the Site suitable for the proposed activity (the new high school for Leppington and Denham Court).

1.4 Background

Previous reporting on the Site, including the Preliminary Site Investigation (PSI) undertaken by JK Environments (JKE) (2023b), identified a range of potential contamination sources based on the Site history, site observations, and intrusive investigation. SMEC subsequently completed a Detailed Site Investigation (DSI) (SMEC 2025) for the Site as part of investigations to inform the proposed activity of constructing the Site into a high school.

The extensive sampling conducted at the Site identified exceedances of adopted assessment criteria for asbestos for human health criteria. Adopted ecological assessment criteria was exceeded for zinc, benzo(a)pyrene (BaP) and total recoverable hydrocarbon (TRH) F3 fraction. Groundwater standing water levels (SWLs) were recorded at approximately 88.44 metres Australian Height Datum (m AHD), or 5.71m below ground level (bgl). DSI findings are presented in detail in Section 6.

Based on the DSI findings, and assuming unmitigated exposure from the conditions at the time of the assessment, plausible source-pathway-receptor (SPR) linkages have been identified at the Site. SMEC (2024) made recommendations including, but not limited to, the need to prepare a RAP which would outline a contamination management approach and potential remediation methodologies based on the currently available understanding of Site conditions and currently proposed activity.

This RAP has been developed to address the recommendation regarding contamination as part of the DSI (SMEC 2025) to manage the potential risk to human health and the environment.

1.5 Scope of Work

The scope of this report generally follows the policy, standards and guidelines outlined in Section 1.6. The RAP includes:

- Remediation objectives
- Site identification
- A summary of the Site history
- A summary of Site c9orrnditions and surrounding environment

- Remediation criteria
- Site characterisation, including a summary of results and an indicative extent of remediation required
- A Conceptual Site Model (CSM)
- A remediation options assessment and rationale for selecting the preferred remediation approach
- Remediation strategy, including indicative contamination management activities
- Outline of validation requirements
- Outline of contingency measures and unexpected finds protocols
- Waste classification, material tracking and handling requirements
- Site management requirements
- A description and outline of the general environmental safeguards required to complete the remediation in an environmentally acceptable manner
- General Workplace Health and Safety (WHS) requirements
- Overview of regulatory requirements and planning instruments relevant to the site remediation – e.g. SEPPs, Council permits, groundwater dewatering licenses, etc.
- Conclusions and recommendations.

1.6 Published Guidelines

This report was prepared with reference to the following applicable published guidelines:

- CRC CARE. (2017). Technical Report No. 39 - Risk-based management and remediation guidance for benzo(a)pyrene
- NEPC, National Environment Protection (Assessment of site contamination) Measure 1999
- NSW EPA (2005), Contaminated Sites, Guidelines for Assessing Former Orchards and Market Gardens, Environmental Protection Authority
- NSW EPA (2014), Waste Classification Guidelines - Part 1: Classification of waste
- NSW EPA (2016), Addendum to the Waste Classification Guidelines – Part 1: classifying waste, October 2016
- NSW EPA (2020), Contaminated land guidelines: Consultants reporting on contaminated land
- NSW EPA (2022a) Sampling Design Part 1: Application
- NSW EPA (2022b) Sampling Design Part 2: Interpretation
- State Environmental Planning Policy (Resilience and Hazards) 2021
- Standards Australia (2005) Australian Standard AS 4482.1-2005 – Guide to the investigation and sampling of sites with potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds. Standards Australia, Homebush, NSW (withdrawn)
- Standards Australia (1999) Australian Standard AS 4482.2-1999 - Guide to the sampling and investigation of potentially contaminated soil. Part 2: Volatile substances. Standards Australia, Homebush, NSW (withdrawn).

2. Site Identification

The site is known as 128-134 Rickard Road, Leppington, NSW, 2179 and is legally described as Lots A and B in Deposited Plan 411211. The site is located on the eastern side of Rickard Road and is approximately 4.1ha in area. The site is located immediately south of the existing Leppington Public School at 144 Rickard Road and is approximately 700m south of Leppington Train Station.

Figure 2-1 below provides an aerial image of the site.



Figure 2-1 Aerial image of site (source: NearMap)

The northern portion of the site is currently used for residential purposes. The southern portion of the site is used for agricultural purposes, with multiple greenhouses and an existing pond on the property.

A summary of Site details and information is presented below in Table 2–1. The Site locality and present layout is presented in **Figure 1** and **Figure 1A, Appendix A**.

Table 2–1 Site identification information.

Title Identifiers	Lot A and Lot B (DP411211)
Address	128-134 Rickard Road, Leppington, NSW
Area	Approximately 4.1 ha
Owner	The Minister for Education and Early Learning
Local Government Area	Camden Local Government Area (LGA) (Council)
Zoning	B7 – Business Park
Current Land Use	The majority of Lot A is occupied by greenhouses and utilised for agricultural / market gardening purposes. Lot B consists of mostly vacant land with a residential property.
Proposed Land Use	Refer to Section 1.2
Surrounding Land Use	North: Leppington Public School, including demountable structures, fixed building structures and outdoor sports areas. Agricultural use land beyond. South: Agricultural land with scattered residential dwellings East: Agricultural land with scattered residential dwellings West: Rickard Road is located immediately off-site to the west with agricultural land with scattered residential dwellings beyond.

3. Site History

The information in this Section is a summary of key elements extracted from the DSI (SMEC 2025).

3.1 Site History Summary

Historic aerial imagery from 1949 (earliest available) indicated that the Site was predominately utilised for agricultural activity (paddocks and crop growing). Development took place between 1970 and 1975, with a residence constructed in the western portion of Lot B. Development in Lot A occurred between 1990 and 1994, with greenhouses constructed in the southern portion of the Site. The greenhouses were demolished between 2000 and 2005. Additional greenhouses were progressively constructed to cover a majority of Lot A between 2005 and 2021. JK Environments (2023a) also noted the potential for an area of fill materials within the eastern portion of Lot B.

A review of historical land titles at the Site indicated the following:

- The Site was owned by NSW Realty between 1920 and 1929
- The Site was owned by numerous individuals including a farmer between 1929 and present day
- The current land owner is The Minister for Education and Early Learning
- SMEC understands that the Site is currently being leased as follows:
 - Lot A is for agricultural purposes (horticulture)
 - Lot B for use as a residential premises.

A review of historical business directory records carried out by JK Environments (2023a) identified four properties, including a Coles Express Service Station, within a 1km radius of the Site. All four properties were located over 645m away and cross or down gradient of the Site. Due to the distance and regional topography SMEC did not consider these properties to represent off-site sources of contamination.

Relevant Site history observations and Areas of Environmental Interest (AEI) are detailed on **Figure 2, Appendix A**.

3.2 Previous Reports

DoE provided historic reports for environmental and geotechnical investigations undertaken at the Site:

- JK Environments (2023a) Geotechnical Desktop Assessment
- JK Environments (2023b) Preliminary (Intrusive) Site Investigation
- JK Environments (2024) Geotechnical investigation
- JBS&G (2024) Hazardous Building Materials Survey.

These were reviewed as part of the DSI (SMEC 2025), with key findings and relevant analytical data with respect to contamination, considered as part of the assessment. Background information contained in this RAP was sourced from the DSI, and a summary of this report (including relevant historic data) is presented in Section 6.

4. Site Condition and Surrounding Environment

A summary of the Site environmental setting is presented in Table 4-1.

Table 4–1 Summary of Site environmental setting.

Aspect	Detail
Topography and Landforms	The north-eastern portion of the Site represents a high point on the Site (around 100m AHD), from this point the Site slopes down to the west and south to low points in the south-western and south-eastern corners of the Site of around 90m-92m AHD, as shown on Figure 1, Appendix A .
Vegetation	During the Site walkover mature trees were observed sparsely populating the northern portion of Site and to the south and south western boundary. The majority of the groundcover in the northern portion of Site was observed to comprise dense grasses. The southern portion of site was observed to comprise substantial number of crops of various type under different stages of development, some showing signs of failing.
Geology	Reference to the Seamless Surface Geology mapping layers (https://minview.geoscience.nsw.gov.au , accessed on 27 February 2024) indicated that the Site is underlain by Bringelly Shale (described as shale, carbonaceous claystone, laminate, lithic sandstone, rare coal).
Hydrology and Hydrogeology	Reference to the groundwater borehole mapping (https://minview.geoscience.nsw.gov.au, accessed on 14 December 2023), several groundwater bores were present to the south and east, located more than 900m from Site. A review of nearby waterbodies was undertaken (https://minview.geoscience.nsw.gov.au/, accessed on 25 February 2024) and indicated the presence of a non-perennial (i.e. ephemeral) waterbody feeding into Kemps Creek flowing south to north, located approximately 150m west of the Site. A non-perennial waterbody feeding into the Upper Canal flowing south to north was also identified, located approximately 250m east of the Site. These waterbodies are presented on Figure 1, Appendix A. There were two farm dams (Dam A and Dam B) identified onsite in Lot A during the Site walkover. JK Environments (2023a & 2023b) also reported the presence of a suspected farm dam in the south-eastern portion of Lot A. JK Environments (2023b) undertook drilling of 30 boreholes (using a rotary auger) to depths ranging between 1.3m below ground level (bgl) and 5.2m bgl across the Site. The report noted that no standing groundwater or groundwater ingress was observed within any of the boreholes, and all bore logs noted that bores were 'dry on completion'. During the SMEC DSI investigation (2024) the following was noted: • No groundwater inflows were observed within any test pit or hand auger location • During groundwater well installation water ingress was observed within SMW03 at 0.1m bgl (this was noted as a result of the proximity to the farm dam/wastewater pond); following groundwater development and during sampling the SWL was recorded at 94.72m AHD / 0.3m bgl • Groundwater well SMW01 was dry during groundwater installation; during sampling the SWL was recorded at 94.59m AHD / 5.71m bgl • Groundwater well SMW02 was dry during groundwater installation, development, and monitoring. Based on topographic contour mapping for the Site and surrounds, and the location of nearby watercourses (NSW Spatial Services, Perennial and Non-Perennial Water Courses, https://minview.geoscience.nsw.gov.au/, accessed on 25 February 2024), groundwater is expected to flow in an east or north east direction.
Acid Sulfate Soils and Salinity	A review of Acid Sulfate Soil (ASS) information from NSW eSpade online data (https://www.environment.nsw.gov.au/eSpade2Webapp, accessed on 25 February 2024) indicated that the Site is outside the currently mapped area for acid sulfate soil probability mapping. pH field screening and soil characteristics undertaken during DSI sampling (SMEC 2025) did not indicate the presence of ASS at the Site. Salinity was assessed as part of the DSI, with sampled material indicating that soils and sediments were non-saline (<2 dS/m) according to the DLWC (2002) electrical conductivity of water values to determine salinity class, with detected values ranging from 0.019 dS/m to 0.24 dS/m

5. Remediation Criteria

The National Environment Protection (Assessment of Site Contamination) Measure (NEPM) was first published in 1999 and updated in 2013 by the National Environment Protection Council (NEPC) and provides national standards for a variety of environmental issues, including the assessment of Site contamination in Schedule B (1) *Guideline on Investigation Levels for Soil and Groundwater*.

The NEPM requires consideration be given to Health-based Investigation Levels (HIL), Health-based Screening Levels (HSL), Ecological Investigation Levels (EIL), Ecological Screening Levels (ESL), Management Limits, asbestos criteria and aesthetic issues. The following outlines the rationale for the selection of the remediation criteria from the guidelines generic criteria. These generic guideline criteria may be revised by conducting site-specific human health and ecological risk assessments in accordance with NEPM guidelines on human health and ecological risk assessment.

This Section outlines the rationale for the selection of the appropriate Site remediation criteria for the RAP.

5.1 Soil

As the proposed activity is for a high school (i.e. secondary school land use) including open-space sports fields, a carparking area (the Island) and some intersecting road reserves (Road Reserve A and Road Reserve B¹), exposure of Site receptors is likely to include the following:

- Human exposure for future users of the Site (e.g. students, staff, visitors) and Site workers during any future construction works or maintenance activities.
- Ecological exposure for ecological users of vegetated areas.

For the purpose of this RAP, the following criteria has been considered, according to a secondary school land use for the Site (summarised in Table 5–1):

- HIL C ‘public open space’ as the NEPM describes this criteria as being applicable to secondary schools
- HIL A/B ‘low to high density residential’ has been adopted for secondary school buildings for the purpose of evaluating risks from vapour intrusion
- The Canadian Environmental Quality Guidelines (CCME 2010) have been adopted for the consideration of carcinogenic effects of PAHs. The BaP Total Potency Equivalent (TPE) is considered to ensure that humans are protected from direct contact with contaminated soil (calculated values extracted from the DSI, SMEC 2025)
- NEPM (2013) Table 1B (1) to 1B (5) Ecological investigation levels (EILs) – Urban residential and public open space (generic and Site-specific EILs, calculated values extracted from the DSI, SMEC 2025)
- NEPM (2013) Table 1B (6) Ecological screening levels (ESLs) – Urban residential and public open space.

The CCME 2010 environmental health guideline for residential/parkland land use is adopted as an alternative ecological criteria for BaP.

Health Screening Levels (HSLs) for petroleum hydrocarbons are available from ASC NEPM (2013) and CRC Care (Friebel E and Nadebaum P, 2010). These references provide HSLs for vapour intrusion for soil at various depth ranges. CRC Care also provides HSLs for direct contact and for vapour intrusion for intrusive maintenance worker (shallow trench). For initial assessment, we will conservatively assume a soil type of ‘sand’ and coarse-grained soils for application of relevant criteria.

CRC Care also provides HSLs for direct contact, soil results will be compared to health screening levels for direct contact for a HSL-C (recreational/open space) setting.

We note that the CCME 2010 ecological criteria for BaP has been included in this RAP post the DSI. The NEPM (2013) ESL (0.7 mg/kg) is conservative and was based on a Canadian (1999) SQG that has since been updated. NSW EPA has informed Site Auditors that the updated Canadian value – i.e., CCME (2010) (20 mg/kg) – is acceptable for use as an alternate for the NEPM BaP ESL. Since the future use of the site as a school, the presence of significant hardstand and constructed surface cover (playing fields) post-development, the potential for ecological risks is further reduced.

¹ Road widening is not part of the activity and done outside the REF submission

5.1.1 Faecal Coliforms, E. coli

Noting the presence of onsite septic tanks identified during the DSI (SMEC 2025), the adopted site screening level for faecal Coliforms, E. coli has been adopted from the Use and Disposal of Biosolids Products (1997), Table 3-5, Stabilisation Grade A Microbiological Standards (NSW EPA 2000):

- E. Coli – 100 MPN/g
- Faecal Coliforms – 1000 MPN/g.

5.2 Sediment

Noting the presence of onsite dams and existing dam sediments, it is understood that existing sediment is likely to be disturbed and cleaned out as part of the proposed activity and therefore will not remain and act as sediment. Sediments are therefore compared against soil health and ecological criteria.

5.3 Groundwater and Surface Water

It is noted that the proposed activity does not include basement levels and activity requirements are not expected to require excavations greater than 3m bgl (JK Environments 2024). This is below the identified groundwater levels, thus there is no plausible pathway to Site receptors identified as part of the Conceptual Site Model (CSM) (refer to Section 6.3).

It is understood that the surface water existing in onsite dams will not be retained as part of the activity. Remediation criteria for surface water and groundwater is therefore not considered further in this RAP.

Table 5–1 Summary of remediation criteria (soil).

Contaminant	Remediation Criteria					
	Human Health Criteria			Ecological Criteria		Adopted Criteria
	HIL C 'public open space'	HIL A/B 'low to high density residential' ¹	CCME (2010) carcinogenic PAHs	EILs 'urban residential and public open space' (generic and Site-specific ²)	ESLs 'urban residential and public open space'	
Asbestos – bonded in soil	≤0.02%w/w	-	-	-	-	≤0.02%w/w
Asbestos – friable in soil	≤0.001%w/w	-	-	-	-	≤0.001%w/w
Asbestos – bonded	No bonded asbestos containing material at the surface	-	-	-	-	No bonded asbestos containing material at the surface
Zinc	≤ 30,000 mg/kg	-	-	515 mg/kg	-	515 mg/kg
TRH C16-C34 (F4 fraction)	≤ 2,500 mg/kg	-	-	-	300 mg/kg	300 mg/kg
BaP	-	-	-	-	20 mg/kg ³	20 mg/kg ³
BaP TPE	-	-	5.3 mg/kg ⁴	-	-	5.3 mg/kg ⁴
BaP TEQ	≤ 3 mg/kg	-	-	-	-	≤ 3 mg/kg
Aesthetic Criteria	No ash, staining, odorous or anthropogenic waste at the surface	-	-	-	-	No ash, staining, odorous or anthropogenic waste at the surface

Table Notes:

1. Vapour intrusion risk for secondary school buildings only
 2. Site-specific EIL values obtained from the DSI calculations (SMEC 2025)
 3. BaP value obtained from environmental health guidelines based on non-carcinogenic effects of PAHs for residential/parkland land use in CCME (2010)
 4. BaP TPE value obtained from the DSI calculation (SMEC 2025, CCME 2010)
- NL = non limiting.

6. Results

6.1 Site Investigations

SMEC undertook a DSI, including soil, groundwater, sediment and surface water sampling and analysis for contaminants of potential concern (CoPC) within the AEIs identified at the Site. This section presents a summary of information from the following DSI carried out at the Site:

- SMEC (2024) Detailed Site Investigation, Leppington HS 128-134 Rickard Road (reference: 30018043-07.1, Rev1).

Selected photographs of the Site are presented in **Appendix B**, and key features are presented on **Figure 2, Appendix A**. Test pit, borehole and hand auger logs from DSI fieldworks (SMEC 2025) are included in **Appendix C**. A summary of relevant observations at the Site is presented in Table 6–1.

6.1.1 Subsurface Conditions

The generalised subsurface condition encountered across the Site is summarised as follows:

- Topsoil material (clayey silt / silt with rootlets) identified in the backyard of the residential property, and in the west crop area of Lot A
- Fill material was identified as follows:
 - Typically comprising sandy silt, trace clay and gravels, with anthropogenic inclusions
 - Fill material identified at various locations across Site including Lot B central northern portion, Lot B driveway and along the Lot A access road
 - ACM fragments observed in fill materials, locations summarised in Section 6.1.2
- Reworked natural material observed across the Lot A greenhouse area, comprising clay material
- Underlying residual soil (depth to layer ranging from 0 to 0.5m bgl), comprising silty clay and clay material
- Underlying weathered material (depth to layer ranging from 0.8 to 1m bgl), comprising weathered mudstone/claystone material.

6.1.2 Summary of Contamination

A summary of contamination present at the Site is included in Table 6–1. This table provides an overview of findings at the Site from previous investigations (SMEC 2025, JKE 2023b), and should be read in conjunction with the DSI and data presented in **Appendix D**.

Figure 3 and **Figures 3A-C, Appendix A** present the sampling locations undertaken across the Site, and where locations exceed the adopted remediation criteria.

The following is noted for soil and sediment contamination:

- Samples near the onsite septic tank (at location STP13) analysed for faecal coliforms and E. Coli indicated the presence of faecal coliforms
- Health criteria:
 - Generally, sampled soil material recorded concentrations below the adopted human health assessment criteria, with the exception of asbestos (summarised in Table 6–1)
 - BaP was identified above HIL C criteria and below the CCME (2010) assessment criteria for carcinogenic BaP, in one sample (BH6(0.0-0.1m))

- Ecological criteria:
 - Generally, sampled soil material recorded concentrations below the adopted ecological assessment criteria, with the exception of zinc, and TRH F3 Fraction (summarised in Table 6–1). We note that this RAP has considered revised ecological criteria in soil for BaP to what was presented in the DSI and included in the revised summary tables.
 - Calculated 95% UCL for zinc in Lot B central northern portion is below adopted site specific EIL criteria

The following is noted for groundwater contamination:

- The ANZ guideline values for 95% level DGV (i.e. DSI assessment criteria) were exceeded for metals (copper, nickel and zinc)
- The DSI (SMEC 2025) noted that the exceedances are suspected to reflect the regional groundwater quality.

The following is noted for surface water contamination:

- Surface water samples analysed did not exceeded the DSI assessment criteria.

Table 6–1 Summary of contamination.

Site Area	Site Observations	Criteria Exceedances			Indicative Waste Classification
		Asbestos (HIL)	Zinc (EIL)	TRH F3 Fraction (ESL)	
Lot B, driveway	The driveway was observed to be an area of fill material, comprising gravelly sand (sandstone and concrete gravels) and some anthropogenic inclusion (bricks, asphalt, tiles).	ACM-02: surface ACM fragment	-	-	Asbestos detected, indicating Special Waste (Asbestos).
Lot B, central northern portion	- Waste material was observed in this area - Including: remnant/demolished corrugated metal sheeting and associated debris from old sheds onsite, including: metal sheeting, wooden boards/pieces, PVC, plastic, concrete, star pickets, tin/metal cans, hose tubing, mattresses and glass	- STP10/0.1: ACM 0.195%w/w - STP10-B, D, F, H, I, J, M, N (0.1m): visual observations of ACM fragments	- STP07/0.1 (990 mg/kg), STP07-A (550 mg/kg), STP07-D (0.1m) (680 mg/kg) - STP08/0.1 (550 mg/kg), STP08/0.3 (660 mg/kg) - STP10/0.1 (1,500 mg/kg) - BH30(0-0.1m) (860 mg/kg)	-	- Asbestos detected, indicating Special Waste (Asbestos) - Shallow material (i.e. <0.2m) sampled exceeded GSW CT1 criteria for lead (STP07, STP10, BH30).
Lot A, SP3 (Dam A bund wall)	- SP3: soil stockpile approximately 32m in length, 5-15m wide (variable width) and 2-3m in height was observed adjacent to Dam A, acting as a dam bund wall; ACM fragments were observed throughout this stockpile 'Dam A': Large dam/waste water pond, aerial photography estimations approximate the area of the as 100m²; the depth of the dam was unable to be determined.	- ACM-01: surface ACM fragment - STP45-C (0.1m): visual observations of ACM fragments	-	-	Asbestos detected, indicating Special Waste (Asbestos).

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30 January 2025

Site Area	Site Observations	Criteria Exceedances			Indicative Waste Classification
		Asbestos (HIL)	Zinc (EIL)	TRH F3 Fraction (ESL)	
Lot A, access road (east)	- Area falls within the access road, adjacent to SP3 - The access road is unsealed and comprises concrete, sandstone, tiles and gravel	- BH2(0.0-0.1m): ACM 0.0214%w/w - FCF2, FCF3: surface ACM fragments	-	BH2(0-0.1m) (360 mg/kg) ¹	- Asbestos detected, indicating Special Waste (Asbestos) - Shallow material (i.e. <0.2m) sampled exceeded GSW CT1 criteria for BaP (BH2).
Lot A, access road (west)	- Area falls within the access road in the south western portion of Site - Two metal storage units were observed in the area, adjacent to the driveway: 'Shipping Container 1': storage of disused equipment, including wooden stakes, metal drums, an air conditioning unit, wooden pallet, chairs, plastic rubbish 'Storage Shed': locked and inaccessible at the time of inspection - Surface rubbish was evident in the area surrounding these storage units, including: metal poles, black plastic, Styrofoam containers, wooden stakes, metal fencing.	BH9(0.0-0.1m): ACM 0.0015%w/w	-	BH9(0-0.1m) (540 mg/kg) ¹	Asbestos detected, indicating Special Waste (Asbestos).
Lot A, access road (central, east)	- Area falls within the access road, running adjacent to the Greenhouses and the Storage Compound - A small greenhouse was observed in this area, enclosed in plastic and appeared to be in use for seedling propagation - An in-use bird coop was observed in this area, next to the greenhouses and Storage Compound.	BH4/0.3: visual observations of ACM fragments	-	BH4(0-0.1m) (390 mg/kg) ¹	- Asbestos detected, indicating Special Waste (Asbestos) - Shallow material (i.e. <0.2m) sampled exceeded GSW CT1 criteria for nickel (BH4, HA-U) - TCLP testing for nickel was undertaken on sample HA-U/0.0; the TCLP result (0.02 mg/L) was below the respective maximum allowable SCC1 and TCLP1 values for GSW.

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Site Area	Site Observations	Criteria Exceedances			Indicative Waste Classification
		Asbestos (HIL)	Zinc (EIL)	TRH F3 Fraction (ESL)	
Lot A, access road (central)	- SP4: observed in this area, soil stockpile appearing to be approximately 2m in width, 5m in length and 0.5m in height (at the time of site inspection on 25/01/2024) - It is noted that this stockpile was no longer present during the inspection on 24/07/2024, the stockpile source and fate is unknown - A dilapidated caravan was present adjacent to the southern fence.	-	-	BH6(0-0.1m) (390 mg/kg) ¹	Shallow material (i.e. <0.2m) sampled exceeded GSW CT1 criteria for lead (BH6) and BaP (BH6, STP39).
Lot A, access road (near Storage Compound)	- A shipping container ('Shipping Container 2') was observed adjacent to the Storage Compound: - The shipping container was observed to store black plastic, shovels and stakes - Surface rubbish was evident in the area surrounding this shipping container, including: metal pieces, plastic liner, wooden pieces, polystyrene, metal nails, tile fragments and broken glass - Storage Compound: open structure in the southern portion of Site comprising several storage and amenities rooms - Four Intermediate Bulk Containers (IBCs) were observed within the Storage Compound suspected to contain herbicides/pesticides (unknown)	-	-	-	Shallow material (i.e. <0.2m) sampled exceeded GSW CT1 criteria for BaP (BH3) and nickel (STP42).
Lot A, Dam B area	'Dam B': small dam/waste water pond approximately 2m width, 6m length, depth unknown (suspected <0.5m).	-	-	-	Shallow material (i.e. <0.2m) sampled exceeded GSW CT1 criteria for BaP (SHA16).
Stockpile SP1	- Soil stockpile approximately 5m in length, 4m wide and 1.5-2m in height - Comprised dark grey gravels, expected to be asphalt	-	-	SP1-B (970 mg/kg) ²	-
Lot A, driveway entrance	A sheet of fibrous, corrugated material (suspected Six Roofing or Synthetic Mineral Fibre (SMF) roofing) was observed near the Lot A driveway entrance.	Suspected SMF or ACM (visually identified)	-	-	-

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Site Area	Site Observations	Criteria Exceedances			Indicative Waste Classification
		Asbestos (HIL)	Zinc (EIL)	TRH F3 Fraction (ESL)	
Lot A, between the Storage Compound and SP3	- An area with waste material across surface soils was observed in the south east, adjacent to 'Dam A' and 'SP3', including the following observations: 20 to 30 potential ACM or SMF fragments - Evidence of burnt materials, in patches across the area (approximately <0.5m x 0.5m areas), including burnt plastics, cardboard, wood and glass - Sheep carcasses observed only during Site inspection on 24/07/2024 - Potential ACM or SMF in the form of wall sheeting in good condition was observed across the Storage Compound area, suspected to be building material of which the Compound appears to be generally constructed - It is noted that JBS&G (2024) identified the wall panels of the structure to comprise non-asbestos containing fibre cement sheeting - Three Above-ground Storage Tanks (ASTs) ('Tank A', 'Tank B' and 'Tank C'), which appeared to be connected to a pump and irrigation tubing system (use unknown).	Suspected SMF or ACM (visually identified)	-	-	-

Table notes:

1. TRH with silica gel cleanup not run
 2. TRH with silica gel cleanup
- GSW = General Solid Waste; TCLP = Toxicity Characteristics Leaching Procedure; SCC = Specific Contaminant Concentration; CT = Contaminant Threshold.

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6.2 Extent of Remediation

Considering the current characterisation of the Site from available data, the approximate extent of remediation is presented on **Figure 6, Appendix A**, and comprises the Site areas described in Table 6–2.

Table 6–2 Extent of remediation (remediation areas).

Site Area	Remediation Exceedance
Lot B, driveway	Human health (asbestos)
Lot B, central northern portion	Human health (asbestos) and ecological (zinc)
Lot A, access road (west)	Human health (asbestos) and ecological (TRH F3 Fraction)
Lot A, access road (central)	Ecological (TRH F3 Fraction)
Lot A, access road (central, east)	Human health (asbestos) and ecological (TRH F3 Fraction)
Lot A, SP3 (Dam A bund wall)	Human health (asbestos)
Lot A, access road (east)	Human health (asbestos) and ecological (TRH F3 Fraction)
Lot A, driveway entrance	Human health (suspected asbestos or SMF)
Lot A, between the Storage Compound and SP3	Human health (suspected asbestos or SMF)

Table Notes:

- It is noted that surface fibrous material fragments (suspected SMF) were also identified near the driveway entrance at Lot A and between the Storage Compound and SP3.

6.3 Conceptual Site Model

A CSM has been prepared for the Site as part of the DSI (SMEC 2025), which presents the potential source(s), pathway(s) and ecological/human receptor(s) with respect to CoPC. The CSM is summarised in Table 6–3, and presented in **Figure 4, Appendix A**.

Table 6–3 Revised CSM (SMEC 2025).

Remediation Area	Source	Findings	Potential Pathway	Potential Receptor(s)	S-P-R Linkage	
	AEI		Migration Pathway(s)	Exposure Pathway(s)		
- Lot B, driveway - Lot B, central northern portion - Lot A, SP3 (Dam A bund wall) - Lot A, access road (central, east) - Lot A, access road (east) - Between the Storage Compound and SP3 - Near the driveway entrance at Lot A	AEI1 AEI2	- ACM fragments and suspected SMF or ACM fragments, observed at surface - ACM fragments in shallow soils	- Direct contact/ ingestion of contaminated soils - Migration of dusts/ fibres followed by ingestion/ inhalation	Incidental Inhalation and/or ingestion	- Future users of the site e.g. students and staff - Site workers during future construction works or maintenance activities	Plausible if disturbed and not managed
- Lot A, access road (central) - Lot A, access road (near Storage Compound) / SP1 - Lot A, access road (central, east) - Lot A, access road (west)	AEI1 AEI2 AEI3 AEI4 (SHA16 only)	TRH F3 Fraction exceeding the adopted remediation criteria in shallow soils	Exposing soil during earthworks	Ingestion (biota)	Onsite ecological receptors	Plausible if disturbed and not managed

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7. Remediation Options Assessment and Remediation Strategy

7.1 Remediation Objectives

The remediation objectives are defined in Section 0

7.2 Remedial Options Review

7.2.1 NSW EPA Remediation Management Hierarchy

The ASC NEPM Toolbox (*Key Principles for the Remediation and Management of Contaminated Sites*) outlines the preferred hierarchy of options for 'contaminated soil' clean-up and/or management as follows:

- On-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level
- Offsite treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the source location.

If the above is not practicable, then other options for consideration should include:

- Removal of contaminated soil to an approved facility followed by, (where necessary) replacement with clean fill
- Isolation of the contamination on-site in an appropriately designed and managed containment facility
- A less sensitive land use to minimise the need for remedial works which may include partial remediation
- Leaving contaminated material in-situ providing there is no immediate danger to the environment or community and there are appropriate management controls in place.

ASC NEPM (1999) also indicates that:

- Clean-up should not proceed if the process is likely to create a greater adverse effect than leaving the 'contaminated soil' undisturbed. This decision would need to be revised in the light of new technologies or clean-up strategies becoming available
- Sustainability of options should be considered.

7.2.2 Remediation Options Appraisal

In appraising remediation options SMEC has amongst others considered:

- Relevant guidelines such as the CRC CARE guidelines which form a National Framework for Remediation and Management of Contaminated Sites in Australia. Guidance (CRC Care 2019) is available on remediation options assessment, various remediation technologies and for implementation and post remediation
- Regulatory requirements around contaminated land management
- Sustainability
- Current industry practice
- Experience with similar relevant projects.

The primary driver for remediation at the Site is to adequately control possible exposure of future Site users to contaminated media (soil), therefore the discussions that follow focus on the remediation response to this identified risk. Table 7–1 provides an appraisal of the above soil remedial options.

Table 7–1 Remediation options evaluation.

Remedial Option	Discussion	Advantages	Disadvantages
Thermal desorption (ThD) and/or phytoremediation (PhR)	The thermal desorption process involves the use of direct or indirect heat exchange to heat organic contaminants to a temperature where they are volatilized, and thus separated from the soil matrix. The gases are “swept” into a gas carrier and the gas product is subsequently treated, allow for contaminants to be “collected” or destructed. This process is generally undertaken ex-situ (it may potentially be undertaken insitu). While processed soil (if suitable) could be reused onsite, the process does not consider all CoPC identified at the Site (e.g. asbestos) and is time and cost intensive. Phytoremediation involves establishing plants in contaminated soils, and the plants subsequently assist with the dissipation of PAHs in soils and absorption of metals into plant matter. SMEC consider that these technologies have been proven to be effective for PAHs and TPH under certain circumstances, the small volumes and location/depth of effected materials encountered render these technologies ineffective and/or high cost.	- Organics/PAH impacted soils remediated - Reuse of “clean” soil (if suitable)	- High implementation cost (ThD) - Does not consider all CoPC at the Site such as asbestos - Close proximity of potential air emissions to neighbouring residential dwellings and primary school - PhR requires long treatment periods - Not considered appropriate for asbestos contamination
Soil washing	Soil washing involves using a liquid (e.g. water or a non-aqueous solvent) to assist with the removal of adsorbed contaminants from soil. This is generally by separation of particles of contaminants which may have a higher concentration of contaminants (i.e. fine fraction from coarse fraction). This is used for contaminants such as heavy metals and does not consider all contaminants present at the Site (e.g. asbestos). The “washed” material would need to undergo dewatering and potential separation for the disposal or recovery of the contaminants. While the “washed” and “clean” material may be suitable for reuse onsite, the process is considered a cost intensive operation. Soil washing has not been demonstrated as suitable for all identified CoPC at the Site, including asbestos, PAH, TPH and metals. Additionally, it is considered a high cost approach, thus not a viable option.	- Metals impacted soils remediated - Separated “non-contaminated” soils may be retained onsite if suitable for reuse	- High implementation cost - Does not consider all CoPC at the Site such as asbestos - Contamination not demonstrated to be within a specific matrix (with respect to particle size), additional testing required to validate method

Remedial Option	Discussion	Advantages	Disadvantages
Monitored natural attenuation	This remedial option would involve allowing for the effects of naturally occurring processes (physical, chemical and/or biological) to reduce concentration, toxicity, and other characteristics of contaminants. This process is time-consuming and requires ongoing monitoring until the media is considered "remediated". It is predominately used for the remediation of groundwater, which is not relevant to this Site. This method is considered to be sustainable long-term noting the low implementation effort. Monitored natural attenuation does not address all soil contamination present at the Site and is not considered suitable at the Site.	• Low implementation cost • Sustainable long-term	• Ongoing monitoring required • Does not address soil contamination • Effectiveness not demonstrated at the Site • Exceeds feasible time frames
Excavation and offsite disposal	This remedial option proposes the excavation and removal of all material impacted by CoPC, followed by disposal of the impacted material to an offsite facility licensed to accept the material. This would mean all exceeding contamination is removed from Site with no residual impact remaining. The material would then be replaced with suitable, "clean" material where required. Landfill disposal costs of impacted material would be dependent on the waste classification of the Site material. Extensive onsite excavation would be required.	• All exceeding impacted material removed from Site • No ongoing management required • Geotechnically suitable material can be selected for importation to Site	• High implementation cost (cost-benefits depend mainly on quantity of spoil and offsite disposal costs to landfill) • More suited to smaller contaminated areas (or smaller excavations) • A large number of truck movements would be required to transport and dispose of the material offsite • Not sustainable
Cut and fill	Cut and fill remedial option involves the excavation of material which exceeds proposed land-use criteria in more "sensitive" areas (e.g. open space, residential), and placement of this impacted material in areas onsite which are "less sensitive" (e.g. commercial, industrial). In areas where material is placed, a capping layer would be required to prevent human exposure to contaminated soils and minimise the infiltration of surface water. The capping layer would require ongoing management and notification (and potential approval) to the EPA, and council. This method would minimise earthworks and offsite disposal of soils, thus is considered to be a sustainable remediation option. Placement of impacted materials would be restricted by the proposed activity. Similarly, any future development may be restricted by established placement areas. It is noted that if there is not sufficient area to place impacted soils, surplus soils may be generated, which may require offsite disposal.	• Less costly implementation than offsite disposal of all exceeding material • Less vehicle movements • Sustainable	• Contamination remains onsite • Restricted by Site layout • Restricts future developments • The Site level may be raised • Ongoing management required

Remedial Option	Discussion	Advantages	Disadvantages
Insitu capping	Insitu capping involves retaining material “as is” at the Site and constructing an impermeable cap across the Site to prevent human exposure to contaminated soils and minimise the infiltration of surface water. Similarly to the cut and fill option, the capped area would require ongoing management and notification (and potential approval) to the EPA, and council. With respect to sustainability, this method would minimise the generation of waste material offsite, however, would require additional material to be brought onsite. Additionally, the capped area would be restricted by the proposed activity layout, and any subsequent developments would likewise be restricted by the capped areas.	• Less costly implementation • Reduced material handling required • More time efficient	• Contamination remains onsite • Restricted by Site layout • Restricts future developments • Ongoing management
Onsite encapsulation	Onsite encapsulation involves the excavation and reinstatement of impacted materials within a preapproved encapsulation area or areas. The encapsulation area(s) are to be suitably designed and built (requires an impermeable cap, lined to prevent leaching, etc.). Similarly to the cut and fill option, the encapsulation area would require ongoing management and notification (and potential approval) to the EPA, and council. This method would minimise earthworks and offsite disposal of soils, thus is considered to be a sustainable remediation option. Additionally, the encapsulation area would be restricted by the proposed activity layout, and any subsequent developments would likewise be restricted by the placement of the encapsulation area.	• Less costly implementation • Contamination is centralised in a known location • Sustainable	• Contamination remains onsite • Restricted by Site layout • Restricts future developments • Ongoing management required
Management Strategy / Administrative Controls	Contaminated soils management and administrative controls may be adopted in areas of less sensitive land use, potentially in combination with a covering or capping layer. For this option, administrative controls would be documented within a Long Term Environmental Management Plan (LTEMP). This method is considered to be sustainable noting that no waste generation or soil movement is required for implementation. It is noted that the proposed land-use comprises a secondary school. As such, areas where this remedial option is suitable, are limited. Furthermore, any future development would be restricted in areas where this option is applied, and potentially require further remediation.	• Cost effective	• Limited Site applications • Restricts future development • Contamination remains onsite • Notification required on title

Table Notes:

- Remediation technology description in this table makes references to the CRC Care (2019) National Remediation Framework.

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Prepared for DoE

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7.2.3 Recommended Remedial Option

Based on the remediation options appraisal, the preferred remediation option for the impacted soils at the Site is Onsite Encapsulation, with Offsite Disposal as an alternative option for excess soils. The remediation works are summarised in Table 7–2.

Table 7–2 Potential remediation works.

Remediation Works	Remediation Option	
	Onsite Encapsulation	Offsite Disposal (Alternative)
Establishment of Encapsulation Area	- Suitable non-leaching material will be placed in an appropriately located and designed Encapsulation Area - The proposed location of the Encapsulation Area is beneath the 'Island' area or the proposed carpark in the southern part of the Site (presented on Figure 5, Appendix A) - Soil material generated as part of remediation (i.e. impacted material) and construction works (i.e. in excess of Site levels) is to be placed within Encapsulation Area in order of 'most' to 'least' contaminated, with surplus soils disposed of offsite - Once filled, the Encapsulation Area is to be capped	-
Demolition of existing structures/infrastructure as required, following relevant codes and guidelines including removal of surface waste/rubbish	-	-
Excavation of soil material above adopted assessment criteria (including soil stockpiles)	Placement within the Encapsulation Area in order of 'most' to 'least' contaminated	Waste classification and offsite disposal
Excavation of soil material as part of construction works (i.e. in excess of Site levels)	- Classification and re-use on/offsite - Placement within the Encapsulation Area in order of 'most' to 'least' contaminated	Waste classification and offsite disposal
Long Term Environmental Management Plan (LTEMP)	At the completion of remediation, preparation of an LTEMP to be implemented in areas where contaminated materials are retained onsite. This is to provide administrative controls/restrictions, ongoing monitoring and to manage potential future exposure beneath capped areas.	-

The above remedial approach has been selected as the preferred option as this is considered to achieve the remediation goals, to be most efficient, practical, and cost-effective, whilst being compliant with regulatory requirements and providing flexibility.

7.3 Remedial Strategy

7.3.1 Overview

The remedial works for soils that are required are described in the following subsections. It is understood that the remedial works for soils within this RAP would likely be undertaken during the bulk earthworks as part of Site proposed activity, and would involve the following general activities:

1. Obtain approvals, licences and undertake notifications
2. Establish and implement Unexpected Finds (UEF) protocols (during earthworks)
3. Set up Site controls
4. Draining of Dam A and B (re-use onsite e.g. for irrigation, or disposal)
5. Survey remediation area extents
6. Demolition and removal of structures / utilities
7. Conduct surface asbestos pick and asbestos clearance
8. Preparation of Encapsulation Area (i.e. the 'Island' area or the proposed carpark in the south-west corner of the Site, as a "borrow pit" including the removal of existing soils beneath the Site to ensure sufficient volume for contaminated soils to be placed)
9. Excavation of impacted fill material (i.e. material exceeding adopted assessment criteria) and either placement within the Encapsulation Area or waste classification and disposal offsite
10. Validation sampling and survey to confirm impacted fill material areas have been removed from the Remediation Areas
11. Earthworks involving management of excavated materials
12. Validation sampling to confirm suitability of capping layer (this may be either site won material or imported fill)
13. Installation of the capping layer where required
14. Preparation of a validation report
15. Preparation of a Long Term Environment Management Plan (LTEMP) for the ongoing management of the Encapsulation Area.

7.3.2 Approvals, Notifications and Licenses

A summary of approvals, notifications and licenses for consideration is provided in Table 7–3.

Table 7–3 Summary of approvals, notifications, and licenses.

Source	Requirement
CLM Act (1997)	In NSW, contaminated land is regulated under the Contaminated Land Management (CLM) Act (1997).
State Environmental Planning Policy (SEPP) Resilience and Hazards (2021)	In Section 4.6 of SEPP (Resilience and Hazards) (2021) (incorporating former State Environmental Planning Policy No.55 – Remediation of Land, 1998) under the <i>Environmental Planning and Assessment Act 1979</i> indicates that remediation is categorised as: 1. Category 1 – requiring consent; or 2. Category 2 – not requiring consent (and giving Council 30 days’ notice). The proposed activity is subject to a REF assessment process and the RAP will form a component of the REF. The Remediation Contractor will be managing the planning and approval elements of the remediation and will need to confirm that the correct planning processes are undertaken.
Protection of the Environment and Operations (POEO) (Waste) Regulation (2014)	The POEO Act (Section 48) requires a person to obtain a license from the NSW EPA if a ‘premises-based’ activity is to be carried out for the onsite or offsite treatment of contaminated soil, and applies as follows: <i>“ (1) This clause applies to contaminated soil treatment, meaning the on site or off site treatment of contaminated soil (including, in either case, incineration or storage of contaminated soil but excluding excavation for treatment at another site).</i> <i>(2) The activity to which this clause applies is declared to be a scheduled activity if—</i> <i>a. in any case, it has the capacity to treat more than 1,000 cubic metres per year of contaminated soil received from off site, or</i> <i>b. where it treats contaminated soil originating exclusively on site, it has a capacity—</i> <i>i. to incinerate more than 1,000 cubic metres per year of contaminated soil, or</i> <i>ii. to treat (otherwise than by incineration) and store more than 30,000 cubic metres of contaminated soil, or</i> <i>iii. to disturb more than an aggregate area of 3 hectares of contaminated soil.”</i> The remediation works are not expected to involve the treatment of more than 3 hectares of contaminated soil or to require the treatment of more than 30,000 m³ of contaminated soil.

7.3.3 Site Set-up and Controls

The appointed Remediation Contractor would set up the Site with appropriate temporary fencing, access, and environmental controls. The appointed Remediation Contractor will prepare relevant documentation to manage environmental issues during the works, such as in a Construction Environmental Management Plan (CEMP) prepared specifically for the Site. Any other requirements imposed by the Client (or relevant planning authority) to comply with activity consent conditions will also be addressed and take precedence over general measures described in subsequent sections. The CEMP will provide measures to reduce the potential for adverse impacts to health or the environment from items including (but not limited to):

1. Security and signage
2. Stormwater, erosion, and sediment
3. Vegetation/tree management
4. Noise
5. Dust
6. Odour
7. Traffic.

The hazards associated with unacceptable exposure to potential contamination during works will be managed as follows:

1. Work to be performed and overseen by a suitably qualified Remediation Contractor
2. Establishing environmental controls
3. Management of soils including excavation and disposal
4. Implementing environmental monitoring during the proposed activity.

7.3.4 Security and Signage

The Remediation Contractor will provide security through fencing or other means to prevent unauthorised access to the Site. Relevant signage in accordance with (but not limited to) SafeWork NSW, Australian Standards and consent conditions will be provided at the Site. Contact information will be displayed onsite as per DoE requirements.

7.3.5 Unexpected Finds

UEF of potential contamination across the Site may be encountered during earthworks. In the context of this project, a UEF is where evidence of contamination is identified during the course of the construction works that has not been previously identified at the Site or is not already being managed or controlled by another procedure. Examples of UEFs include, but may not be limited to, those described in Table 7–4.

Table 7–4 Typical unexpected finds.

Source Type	Typical Observations
ACM or friable forms of asbestos	- Buried fibre cement sheeting, tubular pipework usually in bonded sheet, coloured mainly white, or potentially brown and blue. Usually occurring together with building and demolition wastes in areas not already known to be present - Potential friable forms of asbestos (less common), including asbestos lagging (within pipe lagging), loose fill asbestos insulation), flexible materials (asbestos brake pads) or bonded ACM which that is in a degraded condition such that it can be broken or crumbled by hand pressure.
Buried wastes	- Pockets of buried materials with higher concentration of wastes – different to what has previously been observed - May include building and demolition wastes, agricultural waste, animal carcasses and may contain ACM - May include putrescible material (larger volumes of buried vegetation).
Chemical containers	Buried fuel or chemical drums/containers/tanks.
Coal tar asphalts	Typically, black asphaltic or tarry material with strong tarry odour or similar.
Industrial contaminated materials or liquids	- Soils containing higher volumes of ash, slag, coal, bitumen or other ‘non-natural’ material - Unusually discoloured material - Soils with unusual (non-natural) odours - Unusual liquids.

An UEF Protocol would be developed by the Remediation Contractor and documented within the CEMP. An example UEF protocol is presented in Appendix F.

It is noted that an UEF may trigger additional management measures that influence Work Health and Safety (WHS) and/or spoil waste classification. The general UEF process would include:

1. Stop Work and restrict access to the area
 - a. Areas would be cordoned off to prevent disturbance until adequate management measures implemented
2. An initial assessment of UEF would be carried out by the Environmental Consultant, and the following additional protocols may be recommended where appropriate

3. If asbestos is present, asbestos removal controls would be implemented in accordance with relevant codes of practice and/or updated to suit the nature of the asbestos (if friable)
4. Excavations involving localised removal stripping of 'unexpected' contaminated materials/layers of would be carried out under the guidance of an Environment Consultant to visually monitor for further evidence of contamination.

7.4 Remediation – Soils

The remediation process for the Site is as follows:

1. Removal of vegetation and surface rubbish across the Site
2. Demolition of all Site structures (Lot B residence, Greenhouses, Storage Compound, Septic Tank, Shipping Container 1, Shipping Container 2, Tank A, Tank B, Tank C)
 - a. Offsite disposal of building materials, including hazardous building materials (HBM)
 - b. Validation of soils beneath structures footprint (refer to Section 8)
3. Conduct surface asbestos pick and asbestos clearance
4. Drainage of Dam B
5. Establishment of the Encapsulation Area
 - a. The proposed location of the Encapsulation Area is beneath the 'Island' area or the proposed carpark in the southern part of the Site
 - b. Preparation as a "borrow pit" including the removal of existing soils beneath the Site to ensure sufficient volume for contaminated soils to be placed; existing soils may be placed to backfill Dam B to required levels
6. Stockpiled material currently onsite:
 - a. SP1 & SP3: soil material to be disposed of offsite or placed in the Encapsulation Area
 - b. SP2: farm equipment (disused) to be disposed of offsite
 - c. Validation of soils beneath stockpile footprints (refer to Section 8)
7. Delineated areas where soil material exceeds adopted assessment criteria (approximate areas presented on **Figure 6, Appendix A**)
 - a. Excavation of impacted soil material
 - b. Validation of the excavation footprint
 - c. Excavated soils placed within the onsite Encapsulation Area or disposed of offsite
8. Excess spoil material generated as part of construction is to be managed as per Section 7.4.2.

7.4.1 Contamination Management – Excavations

Excavation works must be carried out in a manner that reduces the potential for contamination of soils across the Site. Bulk earthworks would be carried out in line with the following general items:

1. An Environmental Consultant with suitable experience will be present during bulk earthworks activities to provide oversight and guidance to the contamination management protocols and identify, assess and advise on Unexpected Finds (UEF) of contamination
2. During bulk excavation activities, an UEF Protocol would be implemented and any UEF of 'contaminated' soils are required to be segregated for separate assessment, handling, transport and disposal under suitable controls (refer to Section 7.4.4)
3. Suitable machinery to be selected for the works based on Site constraints (if any)
4. Excavation works to be carried out with care to reduce potential for cross-contamination. Excavation works will avoid machinery tracking back into remediated areas. If re-tracking into clean areas is required, machinery must be decontaminated before entering clean areas

5. Areas where delineated soil material exceeds adopted assessment criteria are to be marked out, surveyed, the excavated. Once excavated the excavation is to be validated (refer to Section 8) and surveyed, including management as follows:
 - a. Placement of excavated soils within the onsite Encapsulation Area in order of 'most' to 'least contaminated'
 - b. Offsite disposal
 - i. Material for offsite disposal would undergo waste classification in accordance with NSW EPA (2014) *Waste Classification Guidelines: Part 1 Classifying waste for disposal offsite to a designated licenced facility as per licence requirements*
6. Spoil material excavated from non-impacted areas (i.e. surplus fill material) may be reused onsite, where the material meets the remediation criteria for the Site area it is to be placed (refer to Section 5)
 - a. Surplus spoil material not reused onsite would undergo waste classification in accordance with NSW EPA (2014) *Waste Classification Guidelines: Part 1 Classifying waste*. Following, waste classification, surplus contaminated soils will be loaded directly onto a truck for disposal to a designated licenced facility as per licence requirements (refer to Section 7.4.2)
7. Loading and transport of impacted soils will only occur over areas yet to be remediated to reduce the potential for cross contamination
8. Adequate protection will be provided around the perimeter of the excavations that are left open such as temporary fencing or barriers, along with warning signs, in accordance with SafeWork NSW requirements
9. Backfilled excavations are to be finished at Site levels
 - a. The Encapsulation Area is to be finished with a marker layer above impacted fill material and minimum 200mm layer of VENM or ENM placed above the marker layer (i.e. as a capping layer); it is understood that the finished groundcover will be hardstand placed above the capping layer.

It is understood that construction works will not require excavations extending below the groundwater table. Should this change then there may be a requirement for the management of groundwater affected by contamination (if any). This would likely include containment of any encountered groundwater and sampling (if required) prior to disposal offsite.

7.4.2 Material Disposal

The following would be undertaken for waste disposal of surplus spoil materials at the Site during proposed activity works:

1. Waste classification would be carried out in accordance with NSW EPA (2014) *Waste Classification Guidelines, Part 1 Classifying waste*
2. All material disposal documentation and consignments will be retained for inclusion in the validation report
3. The waste classification of ACM pre-classifies as 'Asbestos Waste (special waste)' in accordance with NSW EPA (2014) *Waste classification guidelines, Part 1 Classifying waste*. Where bonded asbestos is intermixed with soils, the soil waste must not be reused and will require disposal to the Encapsulation Area within the Site. Soil materials for disposal would be assessed for waste classification as per adopted assessment criteria (refer to Section 5)
4. Soil materials tracking and management will be undertaken in accordance with Section 7.4.4 and would be confirmed by the remediation contractor within the CEMP.

7.4.3 Imported Management

Where Site-won materials are not suitable for reuse onsite, the importation of soil material may be required. This includes imported material suitable for use as a capping layer. The following will apply across the Site:

1. Imported material will be assessed suitable for use at the Site from a contamination and geotechnical perspective prior to use. Validation of imported material is further discussed in Section 8.
2. Filling would be compacted to a standard acceptable for the proposed activity

3. Copies of all imported material dockets confirming the source, type and quantities of material imported and the location of where the imported material has been placed, will be retained and included in the validation report.

7.4.4 Soil Management and Material Tracking

All excavated soils are expected to be retained within the Site boundaries and managed in accordance with this RAP and the following tracking requirements:

1. Temporary stockpiling areas (if used) would be designated for any 'contaminated' soils which are segregated from other stockpiles and materials. Signage, flagging and/or hoarding will be used to prevent unintentional mixing or contamination with other 'non-contaminated' soils proposed for reuse
 - a. An Environmental Consultant to be onsite monitoring material excavation, segregation, and placement
2. Observations will be made of the material during excavation, stockpiling and/or backfilling to check that only suitable materials approved for use within or above the capping layer occur within the Site
3. A material tracking register will be employed. A register of all loads leaving the Site, including quantities, number of trucks, truck registrations, and days and times of contaminated soil loading and transfer to the landfill should be kept
4. All surplus spoil material will be loaded into leak-proof trucks with a canopy cover. Adequate measures will be installed at the entry to remove soil from truck wheels before they leave the Site. Suitable methods of soil removal from truck and vehicle tyres entering/exiting the Site may include a cattle grid or designated washdown area. The remediation contractor and environmental consultant will be responsible for recording the location of where materials from the source are placed in accordance with environmental consultant. Soil management and material tracking will be documented via the following methods:
 - a. Stockpile diagrams and survey information
 - b. Site photographs
 - c. Materials tracking spreadsheet
5. Documentation will be summarised and included within the validation report.

7.4.5 Management of ASTs

7.4.5.1 ASTs

ASTs were identified onsite within Lot B. The following process should be undertaken for the removal and validation of Site ASTs:

1. Disposal of the AST to an appropriately licensed waste facility
2. Excavation of impacted material, including any material observed to have staining or odours
3. Disposal of impacted material offsite at a suitably licensed waste facility
4. Validation sampling and analysis of the excavated area in accordance with Section 8
5. Inclusion of the results in a validation report in accordance with the required timeframes.

7.4.6 Site Management

7.4.6.1 Vegetation / Tree Management

Several mature trees are existing across the Site (refer to Table 4–1 for further detail). Relevant vegetation/trees are to be managed and protected.

7.4.6.2 Stormwater, Erosion and Sediment Control

The Remediation Contractor would ensure that erosion and sediment control measures are designed, implemented and maintained in accordance with the following:

1. CSIRO 2006 Urban Stormwater – Best Practice Environmental Management Guidelines
2. Landcom 2004, Managing Urban Stormwater – Soils and construction, Volume 1 (also referred to as the “Bluebook”), 4th Edition, March 2004
3. International Erosion Control Association (IECA) 2008, Best Practice Erosion and Sedimentation Control, June 2008.

Additional care will be undertaken for works in closest proximity to stormwater drainage lines. Where practicable, works should be programmed during favourable weather to avoid potential issues with runoff.

Erosion and sediment controls are to be established at the Site prior to commencement of any ground disturbance. These may include silt fencing or other approved measures. These should include preventive measures in existing and proposed stormwater drains/swales and features. Adopted measures should also prevent stormwater entering adjacent properties. Controls will be based on Landcom (2004), *Managing Urban Stormwater – Soils and Construction, 2004*.

Earthworks areas are required to have at a minimum:

1. Silt fencing and/or perimeter bunding along the low side of excavation and around temporary stockpiles, particularly near nearby surface water receptors (i.e. drainage channel)
2. Covering of temporary stockpiles with impermeable material (such as builders’ plastic) to prevent erosion
3. During excavations, leaving soils loosely compacted to reduce high velocity stormwater runoff concentrated flows
4. Re-stabilisation of disturbed areas using temporary or permanent surface treatments (i.e. grass seeding, jute mesh, compacted hardstand gravel, or other where appropriate) to maintain adequate ground cover to prevent erosion
5. Progressive installation, placement and compaction of capping layers in individual portions of the Site to ensure integrity during construction. Repairs carried out as required following stormwater runoff
6. Other approved control measures as deemed appropriate based on Landcom’s, Managing Urban Stormwater – Soils and Construction, 2004.

Adequate monitoring and inspection must be carried out of sediment and erosion control measures and documented in the CEMP.

7.4.6.3 Noise

Sensitive noise receptors in the form of residential dwellings and a primary school adjoin the Site. All remedial works will be carried out in compliance with consent authority regulations on noise and conditions of approval, including any restrictions on working days/hours.

7.4.6.4 Dust

Dust will be controlled during the remedial works so that there is no observable dust movement beyond Site and to prevent airborne fibres. The following management measures will be implemented to prevent dust impacts:

1. High density weave shade cloth will be placed around the remediation work zone, noting this will be limited to areas of potential public exposure areas near Site boundaries
2. Visual monitoring will be carried out and dust suppression such as light water sprays will be used to suppress dust during excavation and loading. Dust is a potential transport mechanism for contaminated material to move beyond the Site and impact adjacent public receptors, therefore it is important that adequate controls are in place. Water sprays should be controlled so that excessive water is not applied where soil becomes saturated and create a risk of runoff

3. All 'contaminated' soil stockpiles are required to be temporary stored at a designated area within the Site and demarcated as 'exclusion area'. Stockpiles will be placed onto a suitable hard surface or polyethylene sheeting (builder's plastic) and covered with similar sheeting, taped and weighted down
4. In the event nuisance dust is generated, works will stop, and dust suppression techniques reviewed, with alternative dust suppression techniques applied.

7.4.6.5 Odour

Odours were identified during DSI fieldwork at the Site (SMEC 2025), however as this was at limited locations and volatile contaminants are not recorded at elevated concentrations, this is not likely to be a widespread issue for the Site. Best practice should be employed for odour control, in accordance with Section 5.4 of the NSW EPA Assessment and management of odour from stationary sources in NSW (2006).

7.4.6.6 Traffic

Adequate traffic management controls will need to be employed for the works due to the movements of plant and trucks within access roads throughout the Site. A suitable traffic management plan may be required by DoE and Council.

7.4.6.7 Community Consultation / Stakeholder Engagement

Neighbouring landowner/occupiers and publicly accessible areas nearby to the Site are to be informed of the intended remedial works as part of the development application process. There may also be requirements for specific consultation as part of the development consent conditions. At a minimum these conditions should be complied with.

Guidance on community engagement and risk communication remediation advice can be found in:

1. NEPM (2013) National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1). Schedule B8, Guideline on Community Engagement and Risk Communication
2. Institute for Sustainable Futures, Step-By-Step Guide for Creating Stakeholder Engagement Plans for Contaminated Sites In NSW.

7.5 Remediation schedule

A remediation schedule will be developed by the Remediation Contractor based on their work methodology.

7.6 Working hours

Working hours for remedial works will be completed in accordance with Council requirements and as stated in the final development consent conditions.

7.7 Roles and Responsibilities

An overview of typical roles and responsibilities which may be required for the implementation of the RAP are summarised in Table 7–5.

Table 7–5 Roles and responsibilities

Role	Key Responsibilities
Site owner (The Minister for Education and Early Learning)	- Overall responsibility for the project - Community consultation / stakeholder engagement - Engaging a remediation contractor and environmental consultant - Oversight of workplace health and safety
Remediation Contractor	- Preparation of Construction Environment Management Plan (CEMP) - All remedial works (excavation, material management, offsite disposal, etc.) - Workplace safety - Service location and disconnection (where required) - Site security - Site environmental management - Incident response - Site amenities - Prepare and implement Asbestos Removal Control Plan (where required)
Construction Quality Assurance (CQA) Engineer	- Providing CQA to design, supply, installation of engineered features in accordance with technical specifications - Independent verification of constructed features of capping layer - Independent verification of reused and/or imported materials to the Site, to ensure material suitability from a geotechnical perspective.
Environmental Consultant	- Guiding extent of remedial/management activities - Validation observations, sampling, and analysis - Provide advice if UEF encountered - Validation reporting - Preparation of LTEMP
Site Auditor (DoE to confirm)	<i>Review and comment on remedial action plan, detailed design drawings, technical specifications and CQA plan where these pertain to the capping layer</i> <i>Review of validation reports prepared by the Environmental Consultant</i> <i>Review of LTEMP prepared by the Environmental Consultant</i> <i>Preparation of Site Audit Statement (SAS) upon verification of the above.</i>
Site maintenance and monitoring (Site Owner or approved subcontractor)	Operational, inspection and maintenance requirements of this RAP and LTEMP (including any subsequent ongoing monitoring)

3.

8. Validation Plan

Validation works will be undertaken with reference to relevant sections of ASC NEPM (1999) and NSW EPA guidelines

8.1 Data Quality Objectives

Data quality objectives (DQO) were developed for this project and are based on the requirements described in ASC NEPM (1999). Data Quality Indicators (DQIs) are included in **Appendix E**.

Table 8–1: Data quality objectives.

Step	Tasks
Step 1 State the problem	The Site was used for residential and agricultural purposes since prior to 1949 and is now proposed for more sensitive land use development (secondary school land use). Investigations at the Site have identified elevated contaminant levels in soils, which require remediation. The remediation goals are outlined in Section 0. A CSM is presented within Section 6.3 based on the DSI (SMEC 2025). The main considerations are described below. Impacted Fill Material • How many samples should be collected to validate the material has been appropriately excavated? • What sample layout should be used to achieve the above objectives? Insitu Capping • What CQA is required? • What frequency of visual inspections should be undertaken? Stockpiled Material (two soil stockpiles, SP1 and SP3) • How many samples should be collected to meet NSW EPA (2014) waste classification guidelines? • What sample layout should be used to achieve this? The key assessment team would include the following: DoE (Client), and landowner (The Minister for Education and Early Learning), CQA engineer, Environmental Consultant, and a Remediation Contractor.
Step 2 Identify the decisions	Determine what remedial actions are required to remediate the Site? The decisions to be made on the basis of the remediation are: • Can the Site be rendered suitable for its intended purpose? • Can it be ensured that the Site does not pose an unacceptable risk to human health and the environment?

Step	Tasks
Step 3 Identify information inputs	The inputs required to make the decisions listed in Step 2 are as follows: Insitu Capping (and validation of imported material) • CQA • Lateral and vertical extent of the capping layer (Works as Executed drawings) • A review of material assessment reports and test certificates • Review of materials tracking records • Laboratory results from a National Association of Testing Authorities (NATA) accredited laboratory (if required). Impacted Fill Material and Surplus Fill Material • A review of previous reports undertaken at the Site • Field observations including appropriate sampling methods and quality assurance and quality control (QA/QC) • Laboratory results from a NATA accredited laboratory • Applicable NSW EPA endorsed guidelines (refer to Section 1.6) • DQIs and data validation. Stockpiled Material • Laboratory results from a NATA accredited laboratory • Waste classification letter.
Step 4 Define the study boundaries	Laterally, the study boundary is defined by the Site boundary (i.e. the investigation boundary), as shown on Figure 1, Appendix A. Vertically, the study boundary for is defined as the depth of proposed works disturbance, which is expected to vary up to 3m bgl. Temporally, the works would occur throughout the duration of the construction, and potentially initially operational phase.

Step	Tasks
Step 5 Develop the analytical approach (decision rule)	The decision rule for the capping layer is as follows: - A capping layer of 0.2m thickness to be established over the Encapsulation Area, supported by laboratory reports and before and after survey levels to demonstrate and document the capping thickness The decision rule for impacted fill material is as follows: - Following excavation of impacted fill material, if contaminant concentrations in remaining soils are below the adopted remediation criteria, then the impacted material is considered sufficiently removed - A data validation assessment will be carried out for all data collected with respect to QA/QC and conclude if the data collected is useable, partially useable with some limitations, or unusable in forming conclusions to the assessment - Deviation to the above will trigger the need for further assessment or remediation. The decision rule for surplus fill material is as follows: - If contaminant concentrations in soil are below the adopted Site assessment criteria, then the material will be acceptable to reuse onsite - A data validation assessment will be carried out for all data collected with respect to QA/QC and conclude if the data collected is useable, partially useable with some limitations, or unusable in forming conclusions to the assessment - The material must meet design and other requirements - Statistical assessment in compliance with NSW EPA (2022) Sampling design part 1 – application, Contaminated land guidelines, August 2022 demonstrates the material meets the assessment criteria - Exceedances outside the above will trigger the need for further assessment or remediation. The decision rule for imported materials used within the Site are as follows: - The material must be permitted to be transported to the Site within the provisions of the POEO Act - Meet the definition of Virgin Excavated Natural Material (VENM) or other applicable resource recovery exemption/order provided sampling and testing requirements for these materials are met and documentation is retained with validation report - The material must be suitable for the proposed activity and land use. The decision rule for stockpiled material is as follows: - A data validation assessment will be carried out for all data collected with respect to QA/QC and conclude if the data collected is useable, partially useable with some limitations, or unusable in forming conclusions to the assessment - Following sampling and waste classification, the material will be disposed of offsite, deviation from the above will trigger the need for further assessment or remediation.
Step 6 Specify performance or acceptance criteria	We have assumed the following to be true in the absence of contrary evidence (i.e. the null hypothesis): - Contamination at the Site currently poses a potential risk to human and/or environmental receptors. The possibility exists of making the following decision errors based on the data obtained during this investigation: - Type 1 error – Deciding the above null hypothesis is false, when it is true - Type 2 error – Deciding the above null hypothesis is true, when it is false. The consequence of making a Type 1 error is more detrimental as it can result in adverse consequences or may include material impact to human and environmental health. The consequence of making a Type 2 error may result in ‘over-conservatism’ and unnecessary expense of conceptual remediation options. The potential for decision errors will be minimised by completing a robust QA/QC program and by completing an investigation that has an appropriate sampling and analytical density for the purposes of the investigation.
Step 7 Optimise the design for obtaining data	Validation observations, monitoring and/or sampling will be undertaken in accordance with the validation plan in Section 8.

8.2 Validation Sampling

8.2.1 Validation - Impacted Material Excavations

Validation sampling and analysis is proposed to assess excavations following removal of impacted materials. Following excavation of impacted material, validation samples are to be collected from the walls and base of the hotspot excavations in accordance with Table 8–2 and Table 8–3.

Table 8–2 Summary of sampling frequencies.

Sampling Frequency	Suite
- At a rate of 1 sample per wall and base (at a minimum) - Where excavation walls are greater than 10 metres in length, validation samples to be collected at a rate of one sample per 10m - Where excavation bases are greater than 25m², validation samples are to be collected at a rate of one sample per 25m²	As per Table 8-3

Table 8–3 Summary of sampling requirements.

Remediation Area	Sampling Requirements
Lot B, driveway	Validation of human health (asbestos) impacted soils
Lot B, central northern portion	Validation of human health (asbestos) and ecological (zinc) impacted soils
Lot A, access road (west)	Validation of human health (asbestos) and ecological (TRH F3 Fraction) impacted soils
Lot A, access road (central)	Validation of ecological (TRH F3 Fraction) impacted soils
Lot A, access road (central, east)	Validation of human health (asbestos) and ecological (TRH F3 Fraction) impacted soils
Lot A, SP3 (Dam A bund wall)	Validation of human health (asbestos) impacted soils
Lot A, access road (east)	Validation of human health (asbestos) and ecological (TRH F3 Fraction) impacted soils
Lot A, driveway entrance	Validation of human health (asbestos or SMF) impacted soils
Lot A, between the Storage Compound and SP3	Validation of human health (asbestos or SMF) impacted soils

Excavated impacted material is to be stockpiled and tracked through a Materials Tracking Register. A waste classification is to be obtained of the material, and it is to be disposed of offsite at an appropriately licensed facility.

To allow for characterisation of the material, samples are to be collected from stockpiled excavated material in accordance with the following:

- NSW EPA (2022), Table 3: Minimum number of samples recommended for initial assessment of stockpiles up to 200m³:
 - Minimum of 3 samples (up to 75m³)
 - 1 soil sample every 25m³ (if greater than 75m³)
- NSW EPA (2022), Table 4: Minimum number of samples recommended for initial assessment of stockpiles over 200m³:
 - Minimum of 10 samples (up to 2,500m³)
 - 1 soil sample every 250m³ (if greater than 2,500m³)

The default analytical schedule for stockpiled impacted material would include contaminants of potential concern relevant to the Site including but not be limited to heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), TRH, BTEX, PAH, OCP, OPP, PCB, and asbestos.

Excavations will be considered validated when either:

1. The reported results are below the relevant adopted remediation criteria for the Site area, or
2. The reported results are less than 250% of adopted remediation criteria, and statistical analysis demonstrates the 95% upper confidence limit (UCL) remains below the adopted remediation criteria and that the standard deviation of the dataset remains within 50% of the criteria.

If this is not achieved then further excavation and validation will be required until the validation requirements are met.

8.2.2 Validation of Encapsulation Area Capping Layer

Construction and installation of the Encapsulation Area capping layer would be independently verified by a CQA Engineer during materials supply, installation and construction. Prior to and during construction, the CQA Engineer would review and verify the suitability of individual system features in accordance with the following detailed design documentation:

1. Design Drawings
2. Technical Specifications
3. CQA Plan for materials testing (if required).

The CQA engineer would undertake inspections/witnessing as required to provided verification during several hold points during construction and installation of the capping layer, as determined within any engineering technical specification.

Following construction and installation, the Remediation Contractor would undertake a detailed site survey of the capping layer and prepare Works-as-Executed drawings showing capping layer location, extent and thickness across the Site.

8.2.3 Validation of Surplus Soils for Reuse

Excess spoil generated during cut and fill should be visually validated as follows:

- Visually inspect the surface of the stockpile for presence of bonded ACM or high proportions (the lesser proportion of: <10% anthropogenic material, or, as geotechnically suitable) of waste that are unlikely to pass the assessment criteria. If, following this, materials are deemed unsuitable, further testing will be undertaken in accordance with Table 8–4.

Table 8–4 Validation of spoil materials for reuse below the Site capping layer.

Validation	Analysis ¹
NSW EPA (2022), Table 3 Minimum number of samples recommended for initial assessment of stockpiles up to 200m³: • Minimum of 3 samples (up to 75m³) • 1 soil sample every 25m³ (if greater than 75m³) NSW EPA (2022), Table 4 Minimum number of samples recommended for initial assessment of stockpiles over 200m³: • Minimum of 10 samples (up to 2,500m³) • 1 soil sample every 250m³ (if greater than 2,500m³)	• Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn) • TRH, BTEX, PAH • OCP, OPP, PCB • Asbestos (ACM and AF/FA) (w/w%)²

Table Notes:

1. BTEX (benzene, toluene, ethylbenzene, xylene), metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc), PAHs (polycyclic aromatic hydrocarbons), OCPs (organochlorinated pesticides), OPPs (organophosphorus pesticides), PCBs (polychlorinated biphenyls), AF (Asbestos Fines), FA (Friable Asbestos)
2. Minimum analysis specified noting additional contaminants of potential concern may be included subject to Site observations of suspected contamination in accordance with UEF
3. Asbestos will be sampled in accordance with WA DoH (2009) Guidelines for the Assessment Remediation and Management of Asbestos-Contaminated Sites in Western Australia, using 'gravimetric sampling' techniques.

8.2.4 Validation of Imported Material

Any imported fill (sourced from offsite) required for filling, levelling, as part of the earthworks during the proposed activity, or as part of the capping layer, would comply with the following:

1. The material must be permitted to be transported to the Site within the provisions of the POEO Act, and meet the definition of:
 - a. VENM, or
2. The material must be suitable for the proposed activity and land use
3. Independent verification (CQA) of the imported fill materials to the Site, to ensure suitability from a geotechnical perspective

The Environmental Consultant will review the source and type of material to be imported to the Site and confirm there is adequate evidence of the suitability of the material for use on the Site with respect to the above. Evidence of this review and reconciliation will be provided within the validation report.

The need for additional verification sampling will be based on this review and to be assessed by the Environmental Consultant at the time. Unless required, no further sampling would be proposed for imported materials which have a VENM certificate and/or waste classification report (completed in accordance with the relevant Resource Recovery Order (RRO)), which are verified upon delivery in accordance with the material source and documentation.

If the Environmental Consultant considers verification sampling is required (i.e., VENM, quarried products, topsoil, and/or materials permitted to be imported via an RRO/Resource Recovery Exemption (RRE)) additional verification sampling would be carried out in accordance with the following:

1. Default sampling frequency would be adopted as per validation sampling for spoil for reuse in Table 8–2. A reduced frequency (e.g. 1 sample per 1,000m³) and/or composite sampling strategy may be adopted where adequate justification demonstrates the imported material source and receipt of delivery batches are relatively homogeneous, requiring 'confirmatory' sampling is carried out in accordance with NSW EPA (2022) Guidelines
2. Default analytical schedule would include contaminants of potential concern relevant to the Site including but not be limited to asbestos (ACM and AF/FA) (w/w%), heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), TRH, BTEX, PAH, OCP, OPP and PCB. A reduced analytical schedule may be adopted where adequate justification demonstrates the imported material source has been adequately characterised for selected contaminants of concern (i.e., natural soils without potential for organic contaminants). Asbestos analysis is not proposed for imported fill, noting where doubt exists on the presence of asbestos an alternative source would be sought
3. Sampling frequency and analytical schedule in accordance with the appropriate RRO.

At a minimum, the Environmental Consultant will observe the material delivery to the Site to check that it is consistent with the material source and documentation. Documentation with adequate validation of the imported fill will be included in the validation report including delivery dockets.

9. Reporting Requirements

9.1 Validation Report

A validation report will be prepared following completion of all validation milestones documenting a summary of the completed works in accordance with relevant sections of ASC NEPM (1999) and NSW EPA (2020) guidelines.

The validation report will:

1. Describe the remedial works undertaken, the validation carried out and the final condition of the Site
2. Confirm that the Site complies with the set remediation criteria
3. Soil remediation: Document the location, extent, and thickness of the Encapsulation Area capping layer and supporting evidence (i.e. works-as-executed drawings, survey information, photographic evidence or equivalent)
4. Document evidence to confirm that waste management has been carried out in accordance with relevant regulatory requirements.
5. Include information confirming (as relevant) that EPA and other regulatory authorities' licence conditions and approvals have been met.
6. Evidence provided by an independent CQA, demonstrating that reused and/or imported fill materials to the Site, are suitable from a geotechnical perspective
7. Provide factual summary and interpretation of all construction phase monitoring data (where available).

9.2 LTEMP

Upon completion of validation, an LTEMP will be prepared in accordance with:

1. NSW EPA (2020) Consultants reporting on contaminated land, Contaminated land guidelines
2. NSW EPA (2022) Preparing Environmental Management Plans for Contaminated Land.

The LTEMP would be implemented in areas where contaminated materials are retained onsite. The LTEMP would include detailed specific procedures for:

1. Inspection and maintenance of the Site capping layer – Including site plan with details of location/extent of the capping layer installed at the Site
2. Any ground engaging activities whereby depths of penetration could extend close to or below the capping layer (trenching, utilities installations, potholing, etc.). This would include details of reinstatement and validation of the capping layer integrity
3. The Site Owner (Minister for Education and Early Learning) should record the existence of the LTEMP onto their property information systems to aid enforcement.

10. Work Health and Safety

10.1 Work Health and Safety Requirements

WHS considerations of the Site during the remedial works will be the responsibility of the appointed Remediation Contractor. Prior to commencement of remediation works the remediation contractor will develop a project-specific Health and Safety Plan. This plan will include Safe Work Method Statements (SWMS) to detail activities to be conducted, associated hazards, an assessment of risk and measures to control the risk.

Work associated with the remediation of the Site will conform, at a minimum, to the requirements of:

1. Work Health and Safety Act 2011.
2. Work Health and Safety Regulation 2017.
3. Other relevant SafeWork NSW regulations and codes, such as (but not limited to):
 - a. SafeWork NSW (2019) Code of Practice: How to Manage and Control Asbestos in the Workplace
 - b. SafeWork NSW (2019) Code of Practice: How to Safely Remove Asbestos.

Typically, the safety plan will contain but not be limited to addressing the following issues:

1. Regulatory requirements
2. Hazard assessment and control
3. Chemical/contaminant hazard control
4. Sample and chemical handling procedures
5. Personal protective equipment
6. Monitoring requirements
7. Work zones
8. Decontamination procedures
9. Training and responsibilities
10. Evacuation and emergency response plans
11. Contingency plans
12. Incident management and reporting.

The Health and Safety Plan will be periodically reviewed and updated based on changing activities and actual conditions within the Site. Any subcontractors will prepare their own activity-specific SWMS for their activities with consideration of the overall Site conditions and hazards. Visitors to the Site will be required to be inducted to the relevant sections of the plan and sign on.

10.2 Hazard Assessment

The Health and Safety Plan and SWMS will identify worker health and safety hazards and appropriate controls. In relation to the potential chemical and physical contamination at the Site associated with works involving disturbance to hotspot areas, the relevant contaminants that need to be considered in the Health and Safety Plan are identified in Table 10–1.

Table 10–1 Hazard assessment – chemical contaminants

Contaminant	Exposure pathways	Human health concerns
Asbestos	Inhalation of dust Ingestion of soils or water	Chronic health issues/poisoning
Heavy metals (various)	Inhalation of dust Ingestion of soils or water	Chronic health issues/poisoning
Volatile organic compounds (VOCs) and petroleum hydrocarbons (lubricating oils, minerals and fuels)	Dermal contact to skin Inhalation of vapours Ingestion of soils or water	Chronic health issues/poisoning
Physical contaminants including: • Needles (if observed) • Other sharps hazards (broken glass, rusted metal)	Physical contact/penetration to skin	Acute injury or health issues (including biological infection)

Other common earthworks hazards that require consideration and controls include (but not limited to):

1. Underground/overhead utilities (including existing and proposed, once installed)
2. Working around plant and equipment
3. Open excavations (including water)
4. Heat/cold stress
5. Physical hazards
6. Geotechnical slope stability / destabilisation (posing risk of engulfment in excavations).

Other key elements to be covered in SWMS are:

1. Consultation and training are to be provided to all workers who may be involved in works that could disturb or be exposed to asbestos
2. All workers onsite should have adequate asbestos awareness training
3. Daily toolbox meetings are to be carried out including induction into the unexpected finds procedure
4. No smoking or eating within contaminated area
5. Operators of earthworks plant are to have closed cabins and work within those closed cabins with air conditioning
6. Adequate protection will be provided around the perimeter of any excavations that are left open such as temporary fencing or barriers, along with warning signs, in accordance with SafeWork NSW requirements.

10.3 Training

The following is recommended for all workers (including the asbestos removalist contractor):

1. Asbestos awareness training (Nationally recognised training i.e. 10314 NAT Course in Asbestos Awareness, or equivalent)
2. Understanding of the nature and extent of asbestos contamination within the Site
3. Controls and notifications to be followed
4. How to prevent exposure to contamination including:
 - a. Dust control measures
 - b. Hazardous ground gas measures
 - c. Handling and disposal procedures
 - d. Selection and use of personal protective equipment and clothing

- e. Personal and equipment decontamination procedures
- f. Emergency procedures.

The Remediation Contractor shall ensure specific inductions are carried out familiarise all workers with the requirements outline within this RAP and the project-specific Health and Safety Plan.

10.4 Personal Protective Equipment

Workers should avoid coming into contact with contaminated media, but where this is not practical, wearing of appropriate personal protective equipment (PPE) will be required. The level of PPE required to control risk of contact with contaminated media will depend on actual conditions, and be at the discretion of the Principal Contractor, but at a minimum should consider the following over and above other PPE:

1. Minimum respirator (minimum half face) fitted with cartridge filters suited to application including but not limited to:
 - a. P2 class respirator or higher (i.e., minimum half-face, particulate filter (cartridge) respirator for bonded ACM removal)
 - b. P3 class respirator or higher (i.e., minimum full-face, particulate filter (cartridge) respirator for friable asbestos removal, if required)
 - c. Depending on volatile concentrations or offensive odours, other forms of respiratory protection may be required.
2. Disposable coveralls (i.e., Minimum long sleeve, long pants and hood, made form material resistance to tearing and liquid penetration suited to chemical/petrochemical industry)
3. Cut resistant gloves (i.e., high penetration protection from needle-stick or glass)
4. Disposable nitrile gloves (or alternate more heavy duty chemical resistant gloves such as rubber)
5. Safety glasses/goggles
6. Laceless work boots (e.g. steel cap gumboots) or disposable boot covers.

For any tasks involving a higher potential for personnel exposure to contaminants the need for higher levels of respirator and personal protective equipment and atmospheric monitoring will be assessed by the Remediation Contractor subject to activity-specific SWMS

10.4.1 Respiratory Protective Equipment

The selection use and maintenance of respirators shall be in accordance with AS/NZS1715-1994 Selection Use and Maintenance of Respiratory Protective Devices. Respirators shall be issued to individuals for their exclusive use. A system of regular cleaning, inspection and maintenance shall be provided for respirators on extended personal issue, and records of all respirators issue and uses shall be established and maintained.

Workers shall receive instruction and training in the correct method of using their respirators, the importance of a correct facial fit and the requirements of the system of regular cleaning, inspection and maintenance.

All workers shall undergo a 'fit test' in order to determine their suitability to wear negative pressure respirators. Persons with beards or other facial hair or stubble will not be protected properly by 'negative pressure' respirators that require a facial seal, so all asbestos removal workers using respirators that require a facial seal shall be clean-shaven.

All filters used while working with contamination shall be disposed of as contaminated waste.

10.4.2 Protective Clothing and Footwear

Protective clothing shall be provided and worn at all times during all works involving:

1. Excavations of known areas of contaminated soils and/or buried waste layers
2. Asbestos removal in the asbestos work area prior to the final clearance inspection.

Protective clothing shall be made from materials which provide adequate protection against fibre penetration. Coveralls shall not have external pockets or Velcro fastenings because these features are easily contaminated and difficult to decontaminate. Disposable coveralls are preferred. They shall never be reused and must be disposed of as contaminated waste.

The use of protective gloves shall be determined by a risk assessment. If significant quantities of asbestos fibres may be present, disposable gloves shall be worn. Protective gloves can be unsuitable, however, if dexterity is required. All gloves used for asbestos removal work must be disposed of as asbestos waste. Regardless of whether gloves are used, asbestos removal workers must clean their hands and fingernails thoroughly after work.

Appropriate safety footwear (i.e., steel-capped rubber-soled work shoes or gumboots) shall be provided for all remediation workers. This footwear should be lace less, because laces and eyelets are easily contaminated. When not in use, the safety footwear shall be stored upside down to minimise asbestos contamination inside the footwear. Storage facilities shall be provided to allow this.

Safety footwear must be decontaminated at the end of the job and upon leaving the work area or sealed in double bags for reuse (but not for any other type of work). Work boots that cannot be effectively decontaminated must be disposed of as contaminated waste.

10.4.3 Decontamination

Decontamination must occur within the remediation work area, whereby all tools and equipment and personal are decontaminated. Asbestos waste bins shall be provided within the asbestos removal area.

The contractor will allow the following (or similar) for personal decontamination:

1. A designated area to remove spent PPE
2. Lined bin or polyethylene bags for PPE disposal
3. Water, containers and brush to wash boots and equipment

All contaminated materials, including plastic sheeting and PPE etc, must be disposed of as contaminated waste (including signage/labelling to indicate 'asbestos waste').

11. Conclusions, Recommendations and Mitigation Measures

11.1 Conclusions and Recommendations

The remediation objective for the Site is to manage the contamination risk to human health and the environment, to render the Site suitable for the proposed activity (the new high school for Leppington and Denham Court).

The remediation options analysis identified the preferred remediation option for the impacted soils at the Site to be Onsite Encapsulation with Offsite Disposal as an alternative option for excess soils. The remedial works for soils would involve the following general activities:

1. Obtain approvals, licences and undertake notifications
2. Establish and implement UEF protocols (during earthworks)
3. Set up Site controls
4. Draining of Dam B (re-use onsite e.g. for irrigation, or disposal)
5. Survey remediation area extents
6. Demolition and removal of structures / utilities
7. Preparation of Encapsulation Area
 - a. The proposed location of the Encapsulation Area is beneath the 'Island' area or the proposed carpark in the south-west corner of the Site
 - b. To be prepared as a "borrow pit" including the removal of existing soils beneath the Site to ensure sufficient volume for contaminated soils to be placed)
8. Excavation of impacted fill material (i.e. material exceeding adopted assessment criteria) and either placement within the Encapsulation Area or waste classification and disposal offsite
9. Validation sampling and survey to confirm Remediation Areas have been removed
10. Earthworks involving management of excavated materials
 - a. An Environmental Consultant with suitable experience will be present during bulk earthworks activities to provide oversight and guidance to the contamination management protocols and identify, assess and advise on UEF of contamination
11. Validation sampling to confirm suitability of site won soils or imported fill material (for capping layer)
12. Installation of the Encapsulation Area capping layer where required
13. Preparation of a validation report
14. Preparation of an LTEMP for the ongoing management of the Encapsulation Area.

SMEC considers the Site can be made suitable for the proposed activity subject to implementation of the RAP and an then the an LTEMP prepared and applied. The suitability assessment assumes no disturbances are undertaken outside the 'proposed activity' works extents and disturbance depths outlined within this RAP.

Subject to successful validation, restrictions would only apply to future ground engaging activities whereby depths of penetration could extend close to or below the capping layer (within the Encapsulation Area). This assumes remediation is undertaken as per this report, and the contamination sources and extents are as per the current CSM.

11.2 Mitigation Measures

Mitigation measures are required for a Review of Environmental Factors (REF) and are actions or measures to avoid, minimise, rectify (by repairing, rehabilitating or restoring) and/or reduce or eliminate over time (by preservation and maintenance) the adverse environmental impacts of a Division 5.1 activity. Mitigation measures specific to contamination with respect to the proposed activity are provided in Table 11–1 below.

Table 11–1: Mitigation Measures

Mitigation Number/Name	Aspect/Section	Mitigation Measure	Reason for Mitigation Measure
Undertake remediation and validation as per RAP	Prior to commencement of any construction work	Suitability of the Site for the proposed activity is subjective to implementation of this RAP and LTEMP. Key remedial works proposed include: • Obtain approvals, set up site controls, site management as per the RAP and implement UEF protocols • Drain Dam B and survey the remediation area extents • Demolish structures/utilities and prepare the Encapsulation Area. • Excavate and manage contaminated material, including soil management, material tracking and validation sampling. • Validate imported soil suitability and install capping layer • Prepare validation report and LTEMP.	Manage contamination risks to human health and the environment, to render the Site suitable for its proposed activity.

SMEC consider that potential impact can be adequately mitigated through recommended measures and following completion would not be considered to be a significant impact to the proposed activity.

12. References

- Australian Standard AS4482.1-2005 Guide the investigation and sampling of site with potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds
- CCME (2010) Canadian Environmental Quality Guidelines, Canadian Council of Ministers of the Environment (CCME), 2008 revised 2010
- Contaminated Land Management (CLM) Act (1997), CLM Act 1997 No 140, dated 14 July 2023.
- CRC Care (2013) Petroleum hydrocarbon vapour intrusion assessment: Australian guidance, Technical Report no. 23, CRC for Contamination Assessment and Remediation of the Environment, dated July 2013.
- DLWC (2002)
- Environmental Planning and Assessment Regulation (2021).
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- International Erosion Control Association (IECA) (2008), Best Practice Erosion and Sedimentation Control, June 2008.
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- JK Environments (2023a) Geotechnical Desktop Report for Proposed Leppington Town Centre High School at 128-134 Rickard Road, Leppington, NSW, Ref.: 35910Brpt, 10 May 2023.
- JK Environments (2023b) Preliminary (Intrusive) Site Investigation (PSI) for Potential Secondary School at 128-134 Rickard Road, Leppington, NSW, Ref.: E3510Prpt3, 22 December 2023.
- JK Environments (2024) Geotechnical Investigation for Proposed Leppington High School at 128-134 Rickard Road, Leppington, NSW, Ref.: 35910BTrpt Draft, 04 January 2024.
- Landcom (2004), Managing Urban Stormwater – Soils and construction, Volume 1 (also referred to as the “Bluebook”), 4th Edition, March 2004.
- NEPC (1999) National Environment Protection (Assessment of site contamination) Measure (NEPM) 1999, as amended in 2013, National Environment Protection Council.
- NSW EPA (2000) Use and Disposal of Biosolids Products, Environmental Guidelines, reprinted December 2000.
- NSW EPA (2005) Contaminated Sites, Guidelines for Assessing Former Orchards and Market Gardens, Environmental Protection Authority, dated June 2005
- NSW EPA (2006) Technical framework, Assessment and management of odour from stationary sources in NSW, dated November 2006.
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- NSW EPA (2015) Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997.
- NSW EPA (2016) Addendum to the Waste Classification Guidelines (2014) – Part 1: classifying waste, dated October 2016.
- NSW EPA (2020) Consultants Reporting on Contaminated Land, Contaminated Land Guidelines, April 2020.
- NSW EPA (2022a) Sampling Design Part 1: Application, Contaminated Land Guidelines, August 2022.
- NSW EPA (2022b) Sampling Design Part 2: Interpretation, Contaminated Land Guidelines, August 2022.
- Protection of the Environment Operations Act (POEO) 1997, POEO Act 1997 No 156, dated July 2023.
- Protection of the Environment Operations Act (POEO) (Waste) Regulation 2014.
- SafeWork NSW (2005) Code of Practice: Storage and handling of dangerous goods.

SafeWork NSW (2019) Code of Practice: How to Manage and Control Asbestos in the Workplace.

SafeWork NSW (2019) Code of Practice: How to Safely Remove Asbestos.

SEPP (2021a) State Environmental Planning Policy (Resilience and Hazards), dated 21 November 2022.

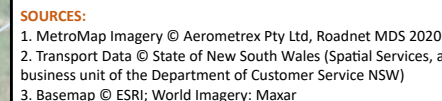
SMEC (20220245) Detailed Site Investigation, Leppington HS 128-134 Rickard Road, Ref.: 30018043-07.1, Revision 2 (Final), 14/01/2025.

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Work Health and Safety Regulation (2017).

Appendix A

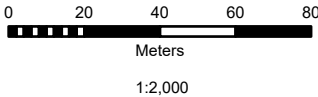
Figures

 Watercourse

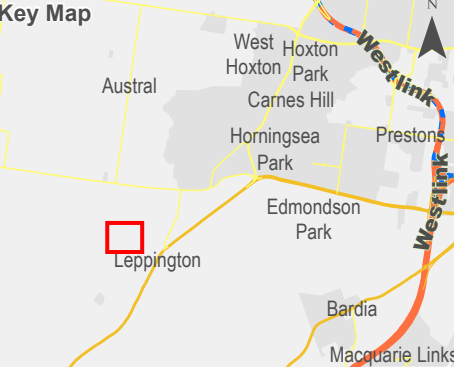
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Coordinate System: GDA2020 MGA Zone 56

PROJECT: Leppington High School
Development RAP
PROJECT NO: 30018043
FIGURE NO: 1
FIGURE TITLE: Site Locality
CREATED BY: FA13847
DATE: 18/03/2024
VERSION: 1
PAGE SIZE: A3



- LEGEND**
-  Site Boundary
 -  Cadastre
 -  Contour 0.5m



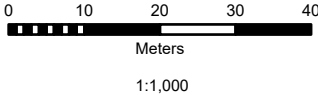
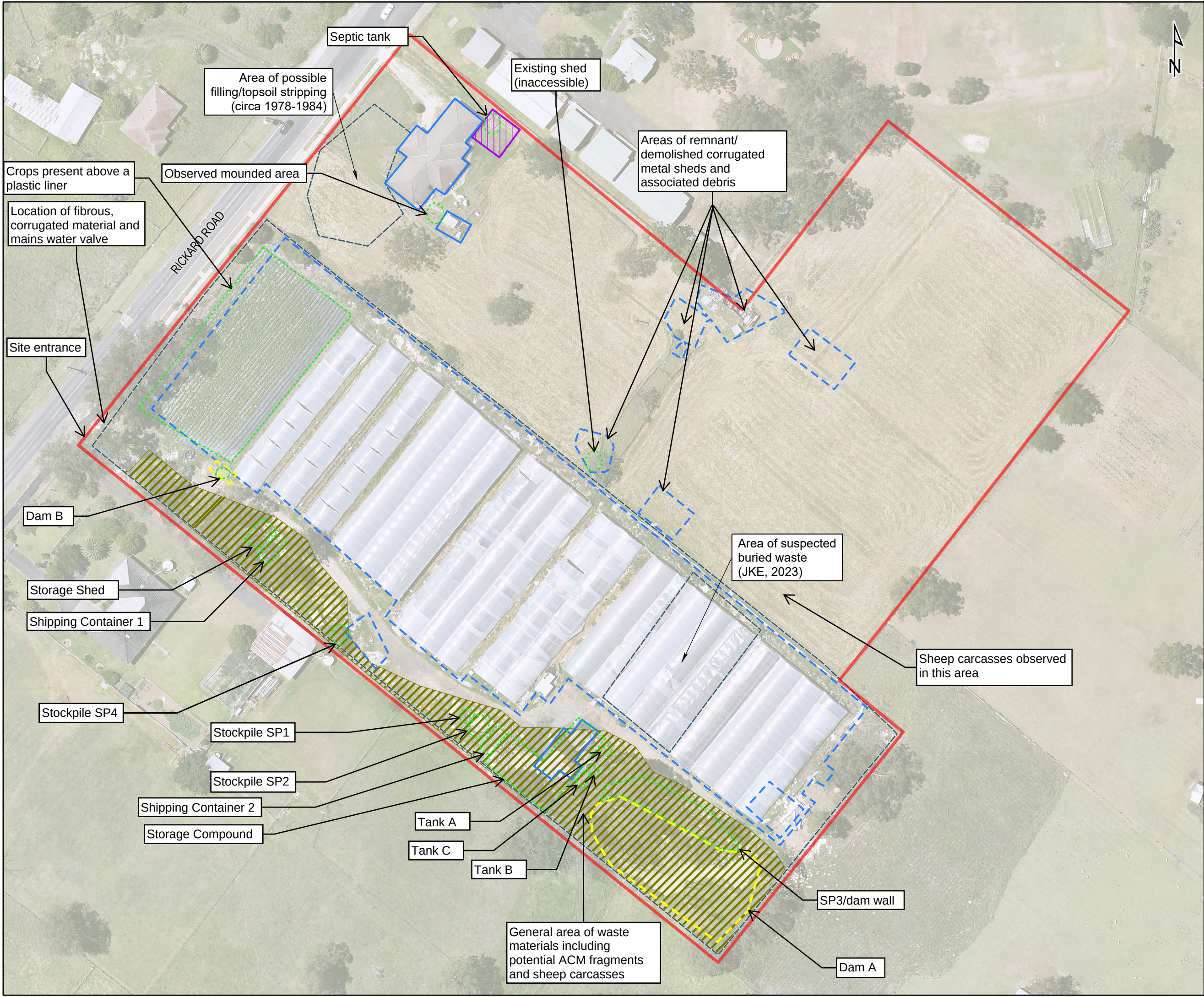
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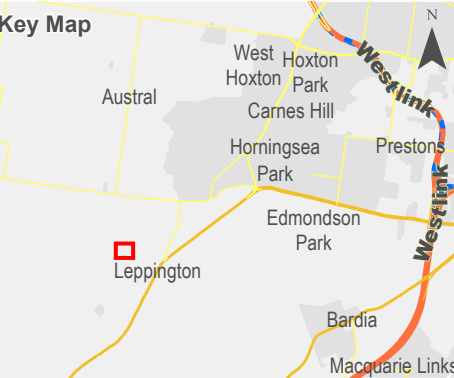
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Coordinate System: GDA2020 MGA Zone 56

PROJECT: Leppington High School Development RAP
PROJECT NO: 30018043
FIGURE NO: 1A
FIGURE TITLE: Site Layout
CREATED BY: FA13847
DATE: 13/02/2024
VERSION: 1
PAGE SIZE: A3



- LEGEND**
- Site Boundary
 - Site Observations
 - AEI 1 - areas near former/existing building structures**
 - Existing Structure
 - Historical Structure
 - AEI 2 - Areas of filling (unknown origin and/or quality)**
 - Sub-surface fill encountered by JKE (2023)
 - Fill encountered by JKE (2023)
 - AEI - whole site**
 - AEI 3 - Spraying of pesticides/herbicides (whole site)
 - AEI 4 - possible farm dam/waste water pond**
 - AEI 4 - possible farm dam/waste water pond
 - AEI 5 - Septic Tank**
 - AEI 5 - Septic Tank

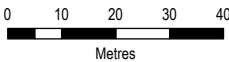


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Coordinate System: GDA2020 MGA Zone 56

PROJECT: Leppington High School Development DSI
PROJECT NO: 30018043
FIGURE NO: 2
FIGURE TITLE: Areas of Environmental Interest
CREATED BY: FA13847
DATE: 15/03/2024
VERSION: 1
PAGE SIZE: A3

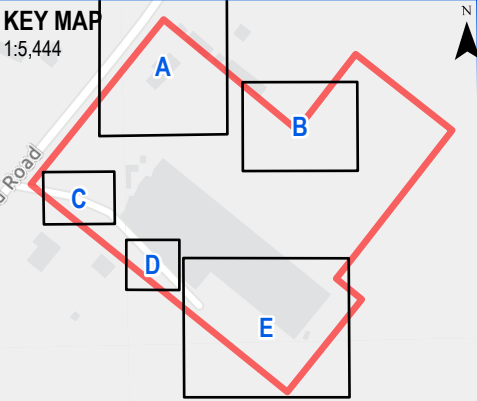


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GDA2020 MGA Zone 56

LEGEND

- Site Boundary
- AEI 1 - areas near former/existing building structures**
 - Existing Structure
 - Historical Structure
- AEI 2 - Areas of filling (unknown origin and/or quality)**
 - Sub-surface fill encountered by JKE (2023)
 - Fill encountered by JKE (2023)
- AEI 4 - possible farm dam/waste water pond**
 - AEI 4 - possible farm dam/waste water pond
- Sampling Locations**
 - SMEC DSI Test Pit
 - SMEC DSI Hand Auger
 - SMEC DSI Grounwater Monitoring Well
 - SMEC DSI Surface Water Sample
 - SMEC DSI Sediment Sample
 - SMEC DSI Surface Sample
 - JK Borehole
 - SMEC DSI Additional Surface Sample
 - SMEC DSI Additional Hand Auger
 - SMEC DSI Additional Test Pit
 - SMEC DSI Additional Test Pit (Observational)



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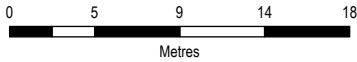
PROJECT: Leppington High School
Development RAP
PROJECT NO: 30018043
FIGURE NO: 3 - Overview
FIGURE TITLE: Sampling and Exceedance
Location
CREATED BY: RS17486
DATE: 13/01/2025
VERSION: 1



Sample	Analyte	Exceedance
ACM-02	Asbestos	ACM fragment detected



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ABN 47 065 475 149

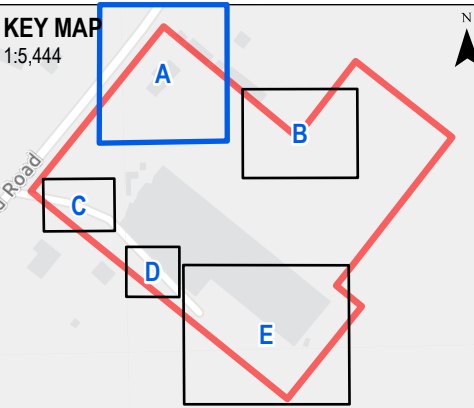


Scale: 1:400 @ A3
GDA2020 MGA Zone 56

LEGEND

- Site Boundary
- Observed Site Features
- AEI 1 - areas near former/existing building structures
- Existing Structure
- Historical Structure
- AEI 2 - Areas of filling (unknown origin and/or quality)
- Sub-surface fill encountered by JKE (2023)
- Sampling Locations
- SMEC DSI Test Pit
- SMEC DSI Grounwater Monitoring Well
- SMEC DSI Surface Sample
- JK Borehole
- SMEC DSI Additional Hand Auger
- SMEC DSI Additional Test Pit
- SMEC DSI Additional Test Pit (Observational)

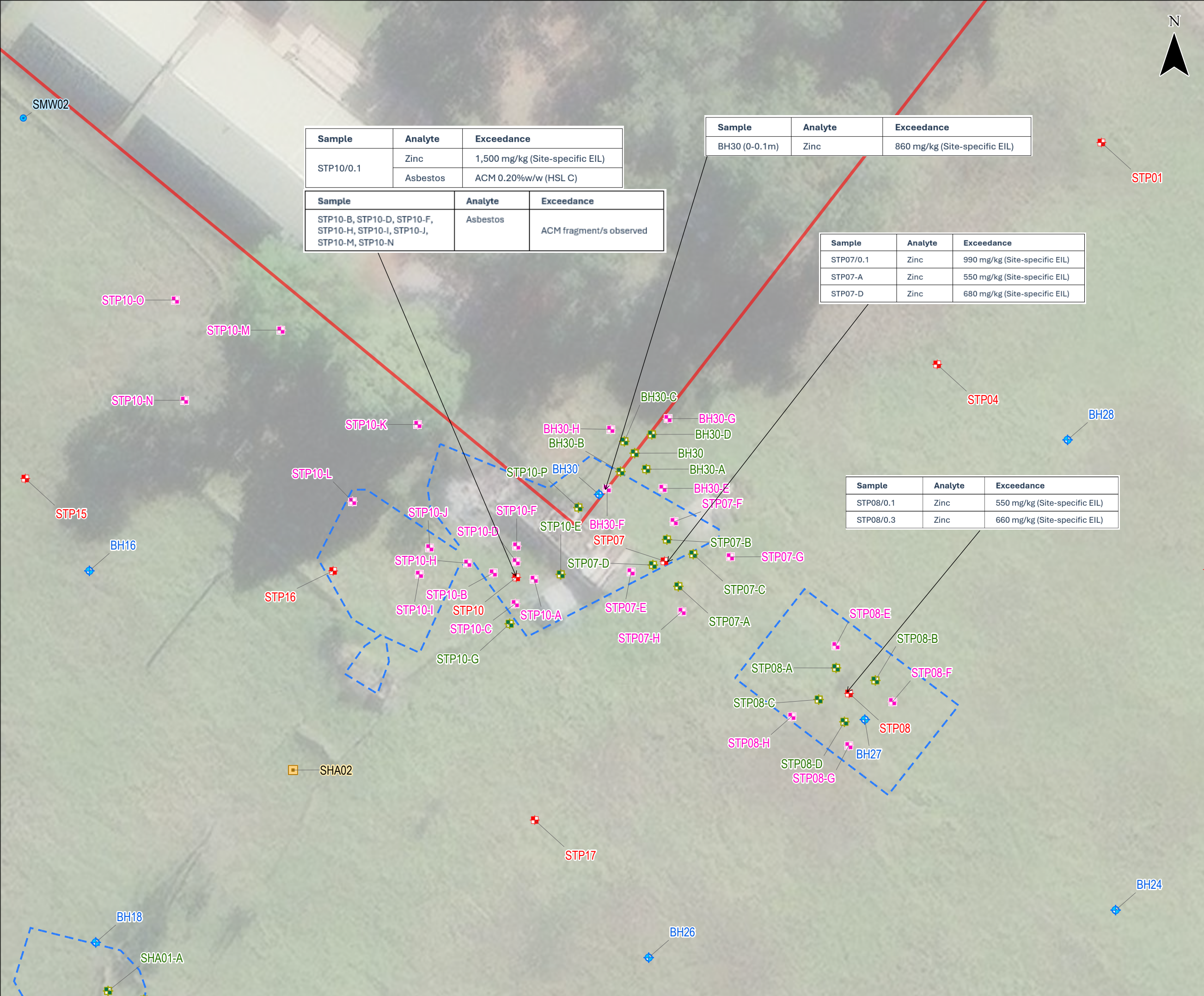
KEY MAP
1:5,444



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PROJECT: Leppington High School Development RAP
PROJECT NO: 30018043
FIGURE NO: 3 - A
FIGURE TITLE: Sampling and Exceedance Location
CREATED BY: RS17486
DATE: 13/01/2025
VERSION: 1





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ABN 47 065 475 149

036912

Metres

Scale:1:300 @ A3
GDA2020 MGA Zone 56

LEGEND

Site Boundary

Observed Site Features

AEI 1 - areas near former/existing building structures

Historical Structure

Sampling Locations

SMEC DSI Test Pit

SMEC DSI Hand Auger

SMEC DSI Grounwater Monitoring Well

JK Borehole

SMEC DSI Additional Test Pit

SMEC DSI Additional Test Pit (Observational)

KEY MAP

1:5,444

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PROJECT:

Leppington High School
Development RAP

PROJECT NO:

30018043

FIGURE NO:

3 - B

FIGURE TITLE:

Sampling and Exceedance
Location

CREATED BY:

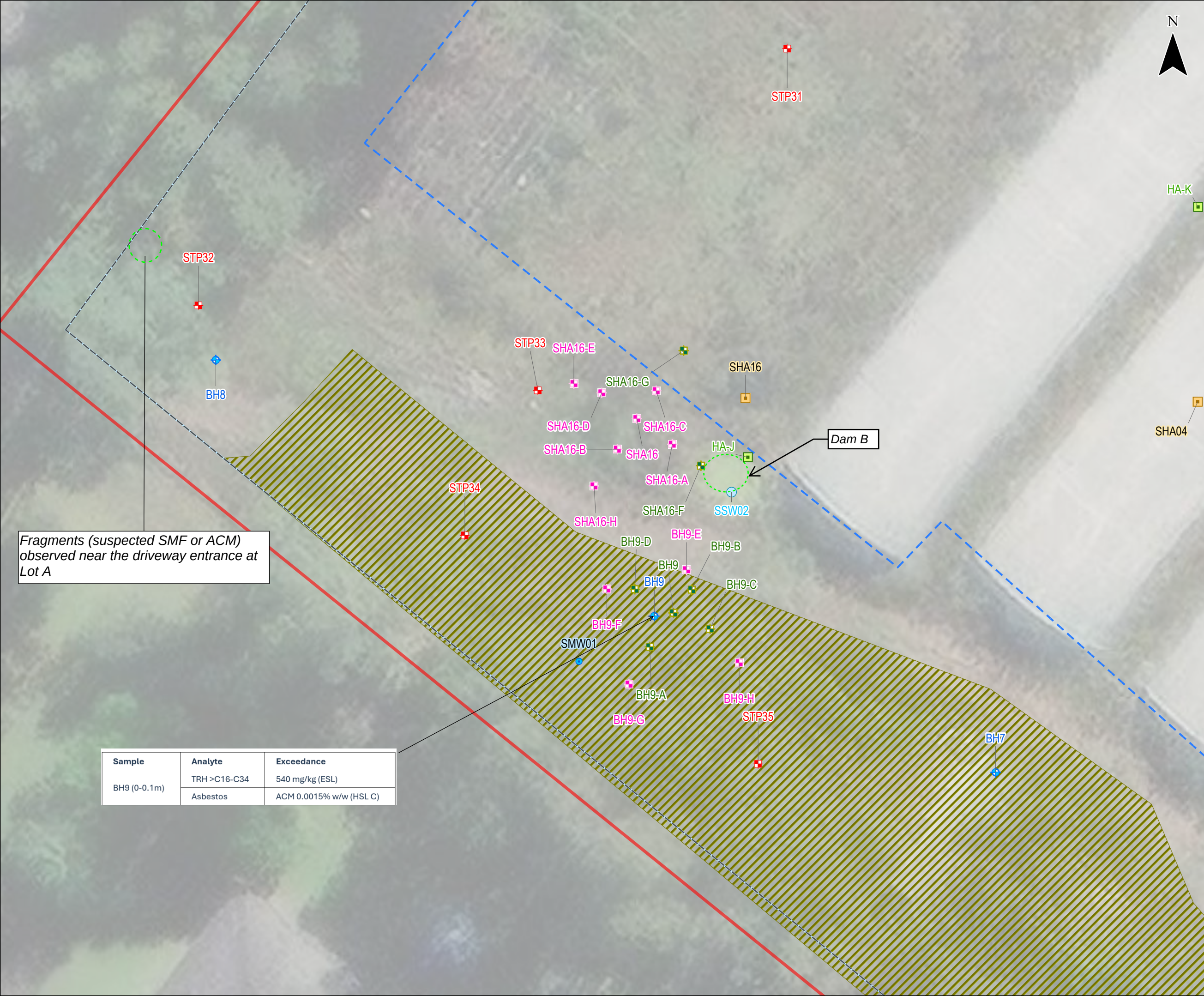
RS17486

DATE:

13/01/2025

VERSION:

1





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ABN 47 065 475 149

02468

Metres

Scale:1:200 @ A3
GDA2020 MGA Zone 56

LEGEND

Site Boundary

Observed Site Features

AEI 1 - areas near former/existing building structures

Historical Structure

AEI 2 - Areas of filling (unknown origin and/or quality)

Sub-surface fill encountered by JKE (2023)

Fill encountered by JKE (2023)

Sampling Locations

SMEC DSI Test Pit

SMEC DSI Hand Auger

SMEC DSI Grounwater Monitoring Well

SMEC DSI Surface Water Sample

JK Borehole

SMEC DSI Additional Hand Auger

SMEC DSI Additional Test Pit

SMEC DSI Additional Test Pit (Observational)

KEY MAP

1:5,444

SOURCES:

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PROJECT:

Leppington High School Development RAP

PROJECT NO:

30018043

FIGURE NO:

3 - C

FIGURE TITLE:

Sampling and Exceedance Location

CREATED BY:

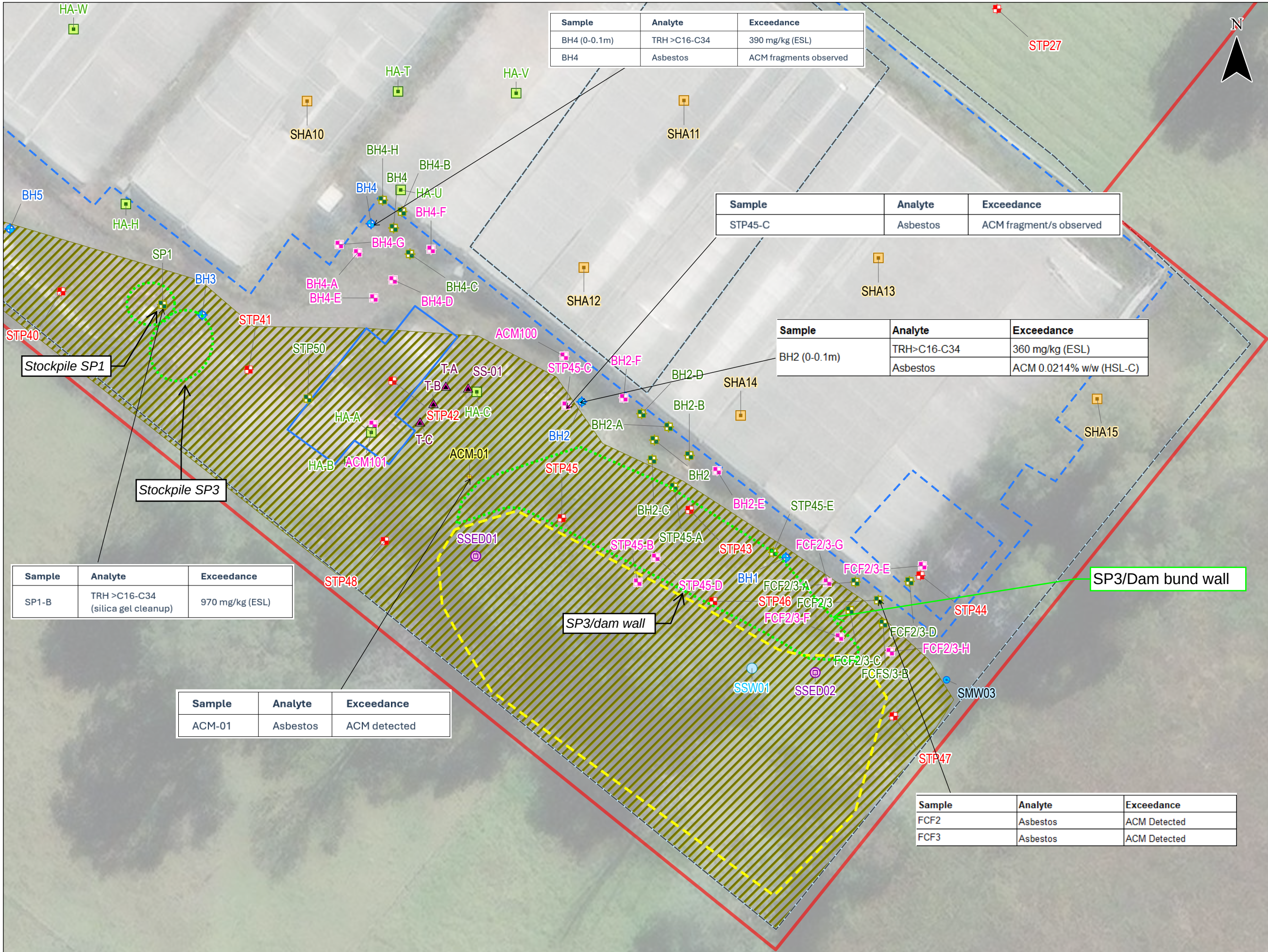
RS17486

DATE:

13/01/2025

VERSION:

1





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ABN 47 065 475 149

0 5 9 14 18
Metres

Scale: 1:400 @ A3
GDA2020 MGA Zone 56

LEGEND

Site Boundary Observed Site Features

AEI 1 - areas near former/existing building structures

Existing Structure
 Historical Structure

AEI 2 - Areas of filling (unknown origin and/or quality)

Sub-surface fill encountered by JKE (2023)
 Fill encountered by JKE (2023)

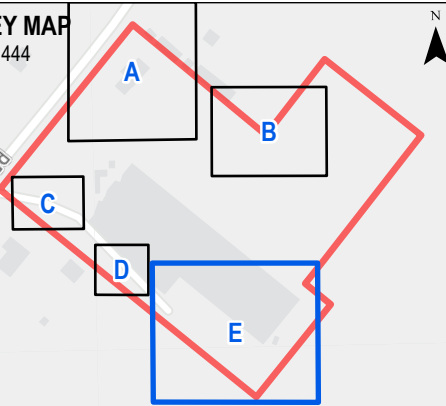
AEI 4 - possible farm dam/waste water pond

AEI 4 - possible farm dam/waste water pond

Sampling Locations

- SMEC DSI Test Pit
- SMEC DSI Hand Auger
- SMEC DSI Grounwater Monitoring Well
- SMEC DSI Surface Water Sample
- SMEC DSI Sediment Sample
- SMEC DSI Surface Sample
- JK Borehole
- SMEC DSI Additional Surface Sample
- SMEC DSI Additional Hand Auger
- SMEC DSI Additional Test Pit
- SMEC DSI Additional Test Pit (Observational)

KEY MAP
1:5,444



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PROJECT: Leppington High School Development RAP

PROJECT NO: 30018043

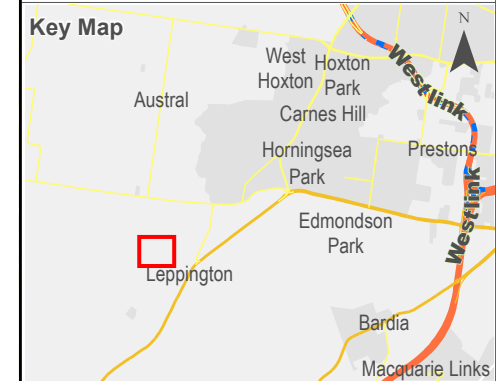
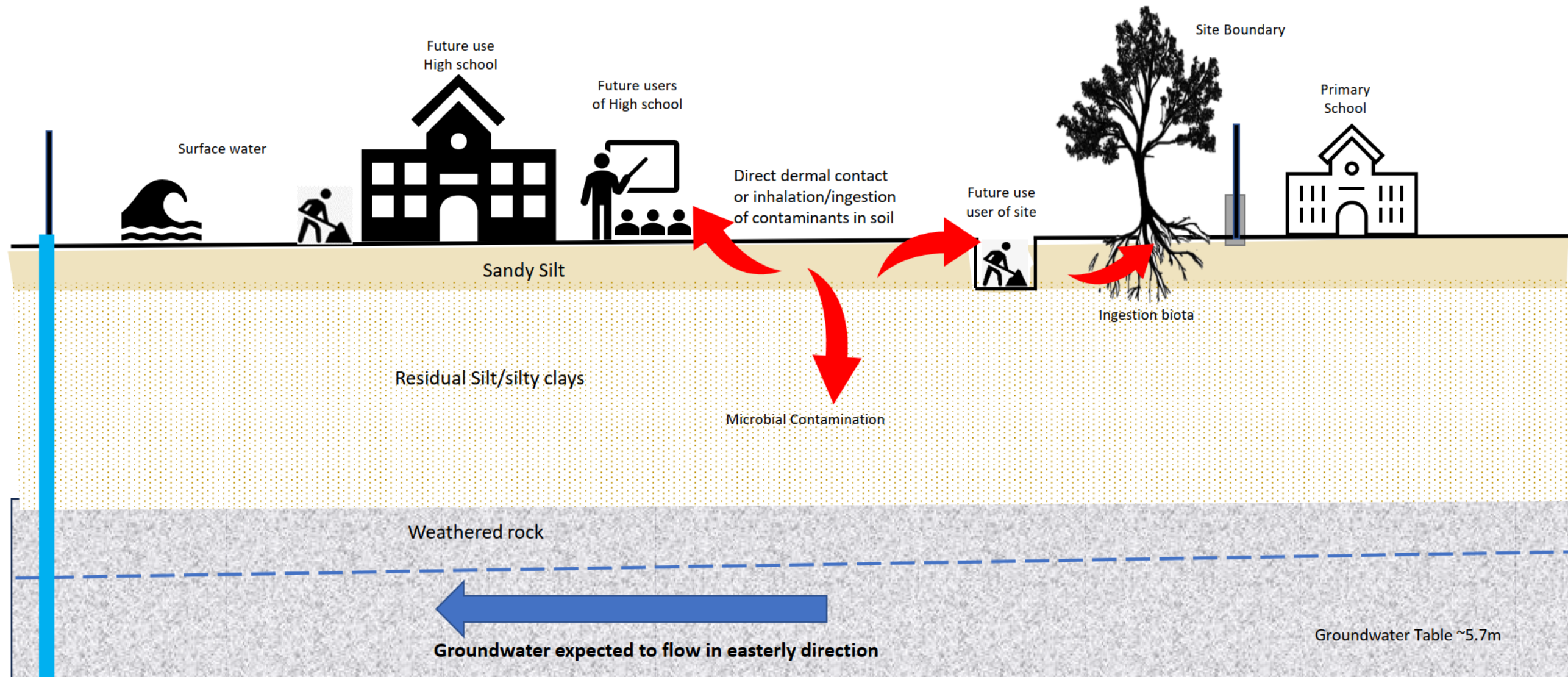
FIGURE NO: 3 - E

FIGURE TITLE: Sampling and Exceedance Location

CREATED BY: RS17486

DATE: 13/01/2025

VERSION: 1

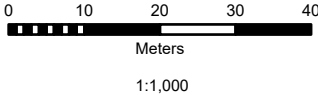


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Coordinate System: GDA2020 MGA Zone 56

PROJECT: Leppington High School Development RAP
PROJECT NO: 30018043
FIGURE NO: 4
FIGURE TITLE: CSM (Revised) (DSI, SMEC 2024)
CREATED BY:
DATE: 13/02/2024
VERSION: 1
PAGE SIZE: A3



LEGEND

- Site Boundary
- Contour 0.5m
- Infrastructure
- High School
- Island
- Road Reserve A*
- Road Reserve B*

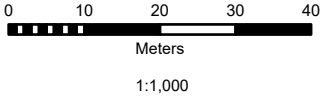
** Road widening is not part of the activity and done outside the REF submission*

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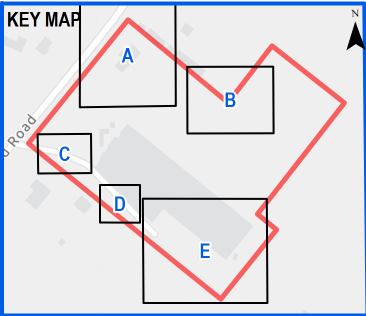
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Coordinate System: GDA2020 MGA Zone 56

PROJECT: Leppington High School Development RAP
PROJECT NO: 30018043
FIGURE NO: 5
FIGURE TITLE: Proposed Development Layout
CREATED BY: LL16284
DATE: 14/01/2025
VERSION: 2
PAGE SIZE: A3



- LEGEND**
- Site Boundary
 - Ecological Remediation Areas (Approximate)
 - Human Health Remediation Areas (Approximate)
 - Surface Fragments Observed, Suspected SMF or ACM
 - Sampling Locations**
 - SMEC DSI Test Pit
 - SMEC DSI Hand Auger
 - SMEC DSI Groundwater Monitoring Well
 - SMEC DSI Surface Water Sample
 - SMEC DSI Sediment Sample
 - SMEC DSI Surface Sample
 - JK Borehole
 - SMEC DSI Additional Surface Sample
 - SMEC DSI Additional Hand Auger
 - SMEC DSI Additional Test Pit
 - SMEC DSI Additional Test Pit (Observational)



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Coordinate System: GDA2020 MGA Zone 56

PROJECT: Leppington High School Development RAP

PROJECT NO: 30018043

FIGURE NO: 6

FIGURE TITLE: Extent of Remediation

CREATED BY: LL16284

DATE: 14/01/2025

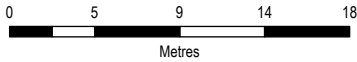
VERSION: 2

PAGE SIZE: A3



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ABN 47 065 475 149



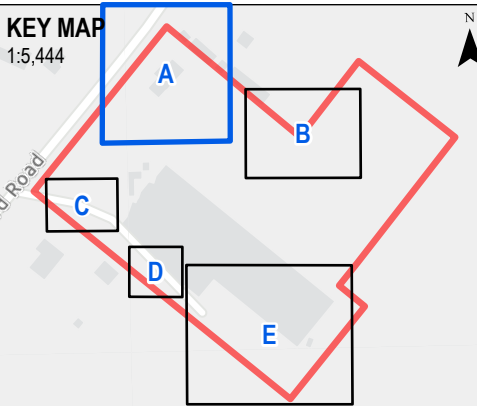
Scale: 1:400 @ A3

GDA2020 MGA Zone 56

LEGEND

- Site Boundary
- Observed Site Features
- AEI 1 - areas near former/existing building structures
 - Existing Structure
 - Historical Structure
- AEI 2 - Areas of filling (unknown origin and/or quality)
 - Sub-surface fill encountered by JKE (2023)
- Sampling Locations
 - SMEC DSI Test Pit
 - SMEC DSI Grounwater Monitoring Well
 - SMEC DSI Surface Sample
 - JK Borehole
 - SMEC DSI Additional Hand Auger
 - SMEC DSI Additional Test Pit
 - SMEC DSI Additional Test Pit (Observational)
 - Ecological Remediation Areas (Approx.)
 - Human Health Remediation Area (Approx.)

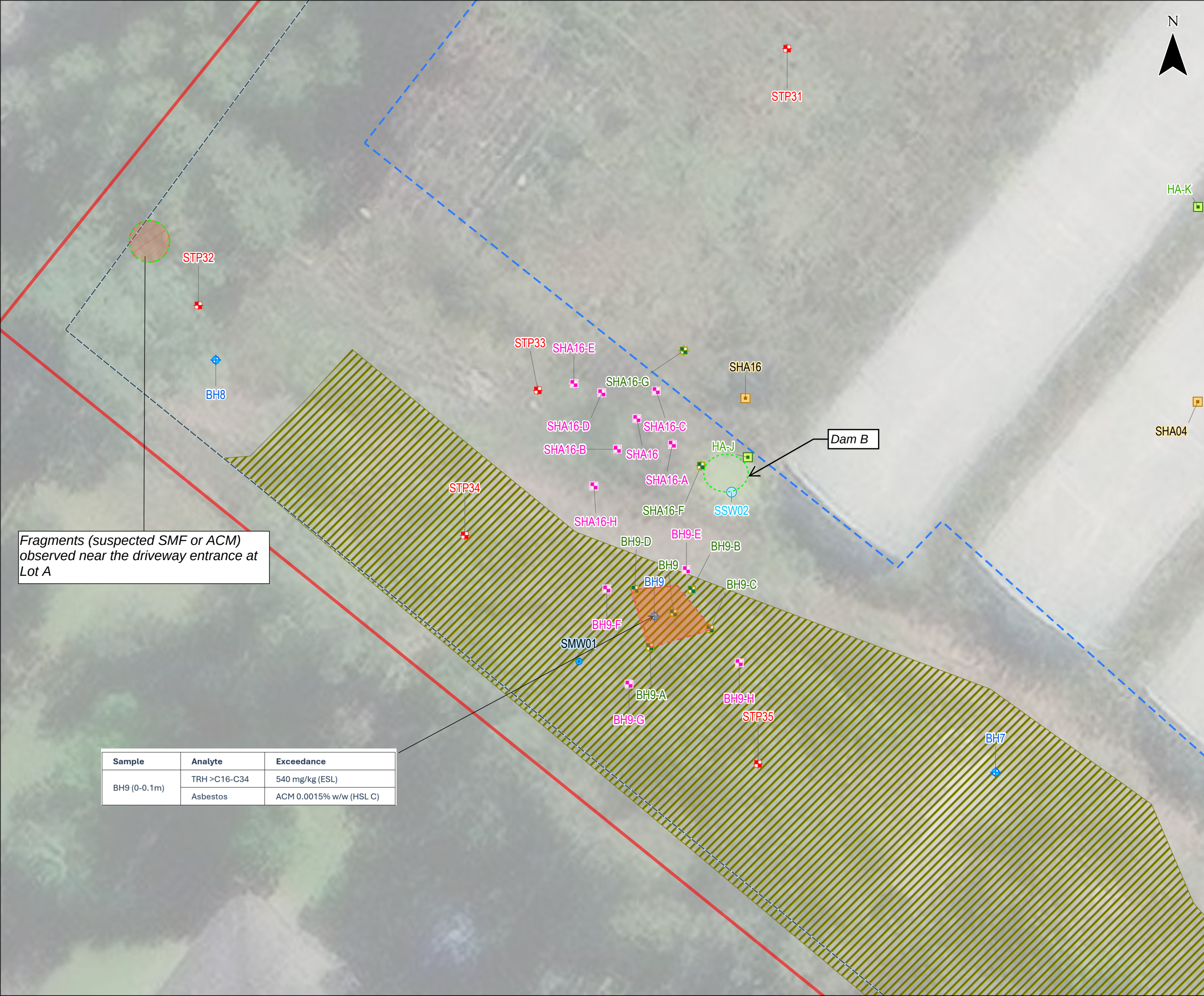
KEY MAP
1:5,444



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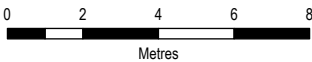
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PROJECT: Leppington High School Development RAP
PROJECT NO: 30018043
FIGURE NO: 6 - A
FIGURE TITLE: Extent of Remediation
CREATED BY: RS17486
DATE: 13/01/2025
VERSION: 1



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ABN 47 065 475 149

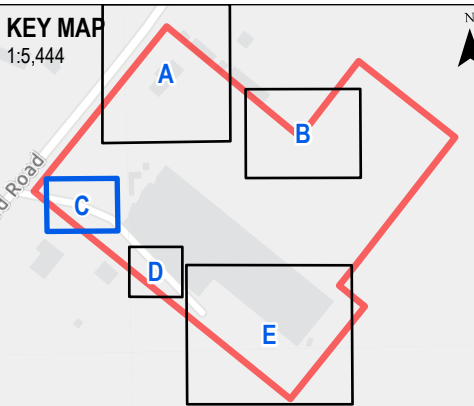


Scale: 1:200 @ A3
GDA2020 MGA Zone 56

LEGEND

- Site Boundary
- Observed Site Features
- AEI 1 - areas near former/existing building structures**
- Historical Structure
- AEI 2 - Areas of filling (unknown origin and/or quality)**
- Sub-surface fill encountered by JKE (2023)
- Fill encountered by JKE (2023)
- Sampling Locations**
- SMEC DSI Test Pit
- SMEC DSI Hand Auger
- SMEC DSI Grounwater Monitoring Well
- SMEC DSI Surface Water Sample
- JK Borehole
- SMEC DSI Additional Hand Auger
- SMEC DSI Additional Test Pit
- SMEC DSI Additional Test Pit (Observational)
- Ecological Remediation Areas (Approx.)
- Human Health Remediation Area (Approx.)
- Surface Fragments Observed

KEY MAP
1:5,444

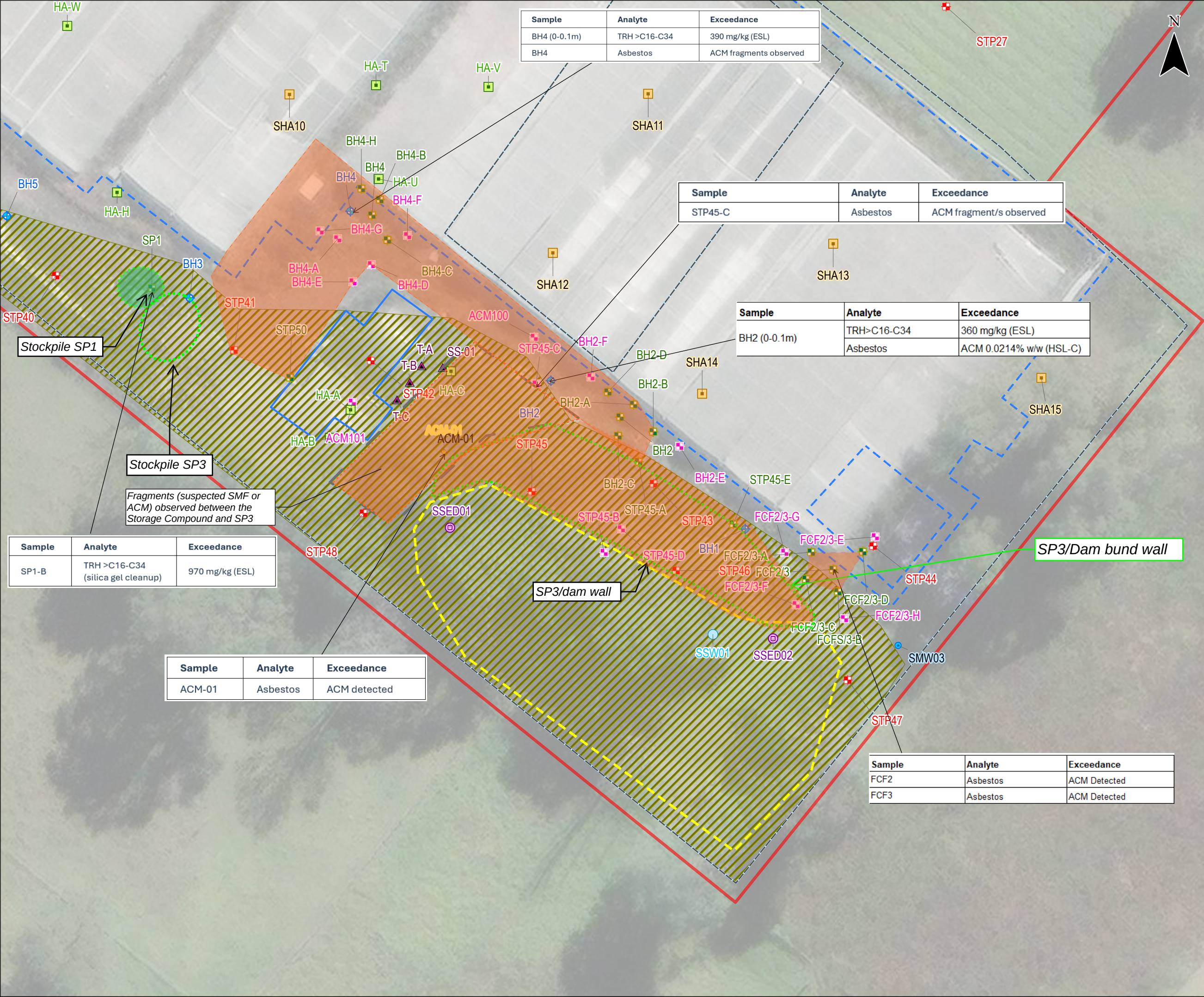


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PROJECT: Leppington High School Development RAP
PROJECT NO: 30018043
FIGURE NO: 6 - C
FIGURE TITLE: Extent of Remediation
CREATED BY: RS17486
DATE: 13/01/2025
VERSION: 1

Sample	Analyte	Exceedance
BH9 (0-0.1m)	TRH >C16-C34	540 mg/kg (ESL)
	Asbestos	ACM 0.0015% w/w (HSL C)





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0591418

Metres

Scale:1:400 @ A3
GDA2020 MGA Zone 56

LEGEND

Site Boundary

Observed Site Features

AEI 1 - areas near former/existing building structures

Existing Structure

Historical Structure

AEI 2 - Areas of filling (unknown origin and/or quality)

Sub-surface fill encountered by JKE (2023)

Fill encountered by JKE (2023)

AEI 4 - possible farm dam/waste water pond

AEI 4 - possible farm dam/waste water pond

Sampling Locations

SMEC DSI Test Pit

SMEC DSI Hand Auger

SMEC DSI Grounwater Monitoring Well

SMEC DSI Surface Water Sample

SMEC DSI Sediment Sample

SMEC DSI Surface Sample

JK Borehole

SMEC DSI Additional Surface Sample

SMEC DSI Additional Hand Auger

SMEC DSI Additional Test Pit

SMEC DSI Additional Test Pit (Observational)

Human Health Remediation Area (Approx.)

KEY MAP

1:5,444

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PROJECT:

Leppington High School Development RAP

PROJECT NO:

30018043

FIGURE NO:

6 - E

FIGURE TITLE:

Extent of Remediation

CREATED BY:

RS17486

DATE:

13/01/2025

VERSION:

1

C:\Projects\300180430018043 - SHS\SV Projects\180 Data\GIS\Maps\J01 2024 - Leppington\J01_Leppington_2024\J01_Leppington_2024_copy.aprx#0003 Sampling Locations

Appendix B

Photographic Log



Image 1: Driveway entrance at Lot A DP411211 (taken facing east, on 25/01/2024)



Image 2: General Lot A DP411211 driveway condition and makeup (taken on 25/01/2024)



Image 3: Western portion of Lot A DP411211 comprising crops underlain by plastic liner and greenhouse structure (taken facing north-east, on 25/01/2024)



Image 4: Example of general various debris and rubbish observed across Lot A DP411211 and plastic irrigation tubing (taken facing west, on 25/01/2024)



Image 5: Example of fibrous corrugated sheets observed near the Site entrance and adjacent to the mains water valve (taken on 25/01/2024)



Image 6: Example of fibrous corrugated sheets observed near the Site entrance and adjacent to the mains water valve (taken on 25/01/2024)



Image 7: Dam B south-east portion of Lot A DP411211 (taken on 25/01/2024)



Image 8: Example of liquified petroleum gas tanks adjacent greenhouses and drainage line running adjacent greenhouses in Lot A DP411211 (taken facing north-west on 25/01/2024)



Image 9: Photograph of SP4 (taken facing south, on 25/01/2024)



Image 10: Dilapidated caravan (taken facing south east, on 24/07/2024)



Image 11: Shipping Container 1 and Storage Shed (taken facing south-east, on 24/07/2024)



Image 12: Shipping Container 1 (internal) (taken on 24/07/2024)



Image 13: Shipping Container 2 (internal) (taken on 24/07/2024)



Image 14: Photograph of SP2 (taken facing south east, on 25/01/2024)



Image 15: Storage Compound area (taken facing south, on 25/07/2024)



Image 16: Storage Room in Storage Compound (taken on 25/07/2024)



Image 17: Kitchen in Storage Compound (taken on 25/07/2024)



Image 18: Storage Compound (taken on 25/07/2024)



Image 19: 'IBC-A' and 'IBC-B' (taken on 24/07/2024)

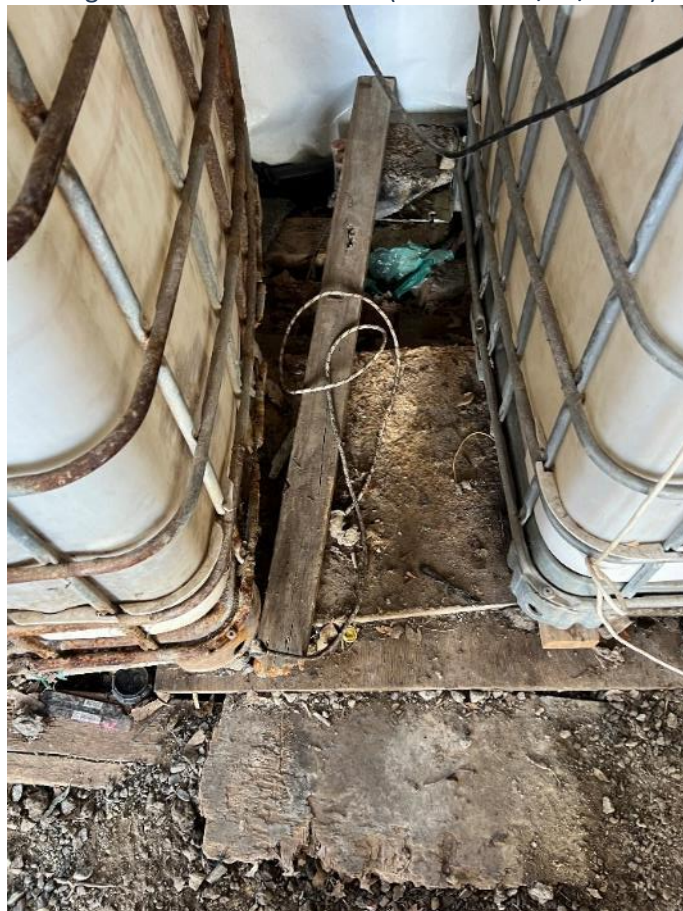


Image 20: Suspected pump connections from 'IBC-A' and 'IBC-B' (taken on 24/07/2024)



Image 21: 'IBC-C' and 'IBC-D' (taken on 24/07/2024)



Image 22: 'IBC-D' (inside container) (taken on 24/07/2024)



Image 23: Container of Evening Primrose Oil (taken on 24/07/2024)



Image 24: Container of Evening Primrose Oil (taken on 24/07/2024)



Image 25: Dam A located to the south-east corner of Lot A DP411211 (taken facing south, on 25/01/2024)



Image 26: Stockpile SP3 (dam wall, adjacent to Dam A), and greenhouses (visible to the right of photograph) in Lot A DP411211 (taken facing west, on 25/01/2024)



Image 27: Eastern edge of Stockpile SP3 (dam wall, adjacent to Dam A), and ACM fragments on ground surface across south east area of Lot A DP411211 (taken facing south, on 25/01/2024)



Image 28: Stockpile SP3 (dam wall, adjacent to Dam A) in Lot A DP411211 (taken facing north, on 24/07/2024)



Image 29: Tank A (taken facing south, on 24/07/2024)



Image 30: Tank B (taken facing south-east, on 24/07/2024)



Image 31: Tank C (taken facing south-east, on 24/07/2024)



Image 32: Observed burnt materials observed to the south-east corner of Lot A DP411211 (taken on 25/01/2024)



Image 33: Stockpile SP1 (taken facing south east, on 24/07/2024)



Image 34: Residence in western portion of Lot B (taken facing west, on 25/01/2024)



Image 35: Example of general debris and rubbish found scattered across the Lot B DP411211 (taken on 25/01/2024)



Image 36: Area of different grading than surrounding topography within backyard of residence at Lot B DP411211 (taken facing south-east, on 25/01/2024)



Image 37: Example of dilapidated and partially demolished shed structures on Lot B DP411211 (taken facing north, 25/01/2025)



Image 38: Lot B DP411211 Residence septic tank located in the backyard within fenced area (taken facing west, on 25/01/2025)



Image 39: Established trees within Lot B DP411211 (taken facing north, on 25/01/2025)



Image 40: Example of remnant and demolished corrugated metal sheds and associated debris within the central northern portion of Lot B DP411211 (taken facing east, on 25/01/2025)



Image 41: Test pit STP02 (taken on 05/02/2024)



Image 42: Representative residual material observed in STP02 (taken on 05/02/2024)



Image 43: Test pit STP03 (taken on 05/02/2024)



Image 44: Representative weathered material observed in STP03 (taken on 05/02/2024)



Image 45: Test pit STP07 (taken on 05/02/2024)



Image 46: Representative fill material taken from STP07 (taken on 05/02/2024)



Image 47: Test pit STP10 area (taken on 05/02/2024)



Image 48: representative fill materials found within STP10 (taken on 05/02/2024)



Image 49: Representative fibre cement fragments taken from STP10 (taken on 05/02/2024)



Image 50: Representative fibre cement fragments taken adjacent STP12 (taken on 07/02/2024)



Image 51: Test pit STP12 (taken on 07/02/2024)



Image 52: Representative fill materials found within STP12 (taken on 07/02/2024)



Image 53: Test pit STP21 (taken on 07/02/2024)



Image 54: Representative top soil material taken from STP21 (taken on 07/02/2024)



Image 55: Test pit STP22 (taken on 07/02/2024)



Image 56: Representative reworked natural material taken from STP22 (taken on 07/02/2022)



Image 57: Test pit STP32 (taken on 07/02/2024)



Image 58: Representative of fill material taken from STP32 (taken on 07/02/2024)



Image 59: Test pit STP45 within dam bund wall (i.e. SP3) (taken on 06/02/2024)



Image 60: Fill soil materials subsequent to sieving (taken on 06/02/2024)



Image 61: Test pit STP47 within dam bund wall (i.e. SP3) (taken on 06/02/2024)



Image 62: Representative of fill material taken from STP47 (taken on 06/02/2024)



Image 63: Hand auger SHA13 (taken on 08/02/2024)



Image 64: Representative of residual material taken from SHA13 (taken on 08/02/2024)



Image 65: Sediment sample location SSED01 (taken on 07/02/2024)



Image 66: Representative of sediment material taken from SSED01 (taken on 07/02/2024)



Image 67: Sediment sample location SSED02 (taken on 07/02/2024)



Image 68: Sediment sample location SSED02 (taken on 07/02/2024)



Image 69: Surface water sample location SSW01 (taken on 07/02/2024)



Image 70: Surface water sample location SSW02 (taken facing south-east, on 07/02/2024)

Appendix C

Logs

Explanatory Notes of Abbreviations and Terms

Used on Borehole and Excavation Logs

General

The “Geological and Engineering Log” presents data from drilling or excavation operations where material recovery is soil and or rock. Data presented is a combination of material recovered, regular sampling and in-situ testing. Excavations may present data obtained on the subsurface profile from observations of natural or man-made excavations. Logs may contain scaled graphical presentations, photography, or downhole imagery results. Logs may not contain all data types presented in these notes.

The “Non Core Drill Hole Engineering Log” presents data from drilling operations where a core barrel has not been used. The material is penetrated using methods other than those designed to recover core and is commonly soil or extremely to highly weathered. The “Cored Drill Hole Engineering Log” presents data from drilling operations where a core barrel has been used. The “Excavation - Geological Log” presents data obtained on the subsurface profile from observations of excavations, either natural or anthropogenic.

As far as is practicable, the data contained on the log sheet is factual. Some interpretation is inevitable with respect to the:

- a. assessment of material boundaries in areas of partial sampling and recovery,
- b. location of areas of core loss,
- c. description and classification of material,
- d. estimate of field strength, and
- e. identification of drilling induced fractures.

Material description and classification is generally based on AS1726-2017 (as amended).

Drilling Method

Code	Description
ADT	Auger drilling with TC-bit
ADV	Auger drilling V-bit
AS	Auger screwing
AT	Air track
CA	Casing advancer
CC	Concrete core
CTR	Cable tool rig
DB	Wash bore drag bit
HA	Hand auger
HAND	Hand methods
HF	Hollow flight auger
HMLC	Diamond core 63.5 mm diameter
HQ / HRQ	Wire line core barrel 63.5 mm diameter
HQ3	Wire line core barrel 61.1 mm diameter
NDD	Non destructive drilling
NMLC	Diamond core 51.9 mm diameter
NQ	Wire line core barrel 47.6 mm diameter
NQ3	Wire line core barrel 45.1 mm diameter
PT	Continuous push tube
PQ	Wire line core barrel 85.0 mm diameter
RAB	Rotary air blast
RC	Reverse circulation
RD	Rotary blade or drag bit
RR	Rock roller
RT	Rotary tricone bit
SD	Sonic drilling
TBX	Tube-X
VC	Vibro-core drilling
WB	Wash bore drilling

Drilling Penetration

Ease of penetration in non-core drilling

Term	Description
VE	Very easy
E	Easy
F	Firm
H	Hard
VH	Very hard

Support and Casing

Code	Description	Code	Description
C	Casing	Hw	114.3 mm
M	Mud	Nw	88.9 mm
W	Water	PVC 150	150 mm

Core Run

Core lifts are identified by a line and depth with core loss per run as a percentage. Core loss is shown in the core run unless otherwise indicated.

Defect Spacing

The average distance between defects is measured parallel to the core axis in mm and may be expressed as a range or average.

Angle / Orientation

Angle from horizontal and orientation to magnetic north.

For inclined cored boreholes the Alpha and Beta angles are presented for orientated core. Alpha (α) is measured relative to the core axis, whilst Beta (β) is measured clockwise from the reference line looking down the core axis in the direction of drilling.

Excavation Method

Term	Definition
N	Natural exposure
X	Existing excavation
BB	Tractor mounted backhoe bucket
EX	Hydraulic excavator
EH	Hydraulic excavator with hammer
B	Bulldozer blade
R	Ripper

Water / Drilling Fluid

The drilling fluid used is identified and loss of return to the surface is estimated as a percentage, generally of each core lift.

Symbol	Description
	Water inflow
	Water outflow
	Water level: during drilling or immediately after completion of drilling
	Groundwater level with date observed prior to introduction of fluids or after standpipe construction
Not observed	The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole / test pit.
Not encountered	The borehole / test pit was dry soon after excavation, however groundwater could be present in less permeable strata. Inflow may have been observed had the borehole / test pit been left open for a longer period.

Colour

The colour of a soil or rock is described in a moist/wet condition using simple terms, such as black, white, grey, red, brown, orange, yellow green or blue. These are modified as necessary by 'pale', 'dark' or 'mottled'. Borderline colours are described as a combination of these colours (e.g. orange-brown). Where a soil or rock consists of a primary colour with a secondary mottling it is described as (primary colour) mottled (first colour) and (secondary colour). Where colour is described outside of the material description it is for the interval.

Black						
White						
			Grey			
			Brown			
			Red			
			Orange			
			Yellow			
			Green			
			Blue			
< Darker				Paler >		

Description of Soil

- vi. Soil name (BLOCK LETTERS)
- vii. Plasticity or particle size of soil
- viii. Colour (i.e. dominant colour of material)
- ix. Secondary soil components names & estimated proportions, including their plasticity / particle characteristics, colour
- x. Minor soil components name, estimated proportions, including their plasticity / particle characteristics, colour
- xi. Other minor soil components
- xii. Moisture condition
- xiii. Consistency / density
- xiv. Structure of soil, geological origin
- xv. Additional observations

Particle Size

Term		Grain Size
Clay		< 2 μ m
Silt		2 – 75 μ m
Sand	Fine	0.075 – 0.21 mm
	Medium	0.21 – 0.6 mm
	Coarse	0.6 – 2.36 mm
Gravel	Fine	2.36 – 6.7 mm
	Medium	6.7 – 19 mm
	Coarse	19 – 63 mm
Cobbles		63 – 200 mm
Boulders		> 200 mm

Fine Grained and Coarse Grained Soils

Term	Description
Fine Grained Soil (cohesive)	More than 35% of the material less than 63 mm is smaller than 0.075 mm (silts and clays)
Coarse Grained Soil	More than 65% of the material less than 63 mm is larger than 0.075 mm (sands, gravels and cobbles)

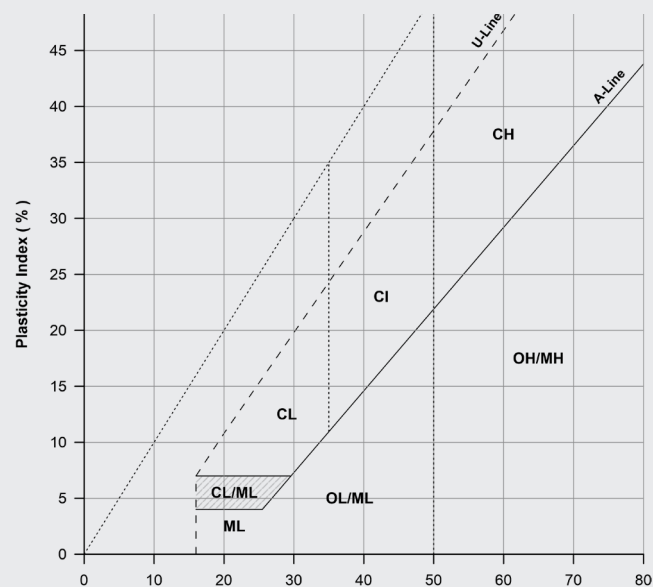
Descriptive Terms for Secondary and Minor Components

Designation of Components	In coarse grained soils				In fine grained soils	
	% Fines	Terminology	% Accessory coarse fraction	Terminology	% Sand / Gravel	Terminology
Minor	≤ 5	trace	≤ 15	trace	≤ 15	trace
	> 5, ≤ 12	with	> 15, ≤ 30	with	> 15, ≤ 30	with
Secondary	> 12	prefix	> 30	prefix	> 30	prefix

Plasticity – Fine Grained Soils

Liquid Limit (LL) %	Description
≤ 35	Low plasticity (L)
> 35 to ≤ 50	Medium plasticity (I)
> 50	High plasticity (H)

Plasticity Chart– Fine Grained Soils



Consistency Terms – Fine Grained Soils

Term	Undrained shear strength (kPa)	Indicative SPT (N) Blow Count	Field Guide to Consistency
Very Soft (VS)	< 12	0 – 2	Easily penetrated several centimetres by fist, exudes between fingers when squeezed in fist
Soft (S)	12 – 25	2 – 4	Easily penetrated several centimetres by thumb, easily moulded by light finger pressure
Firm (F)	25 – 50	4 – 8	Can be penetrated several centimetres by thumb with moderate effort, and moulded between the fingers by strong pressure
Stiff (St)	50 – 100	8 – 15	Readily indented by thumb but penetrated only with difficulty. Cannot be moulded by fingers
Very Stiff (VSt)	100 – 200	15 – 30	Readily indented by thumb nail, still very tough
Hard (H)	> 200	> 30	Indented with difficulty by thumb nail, brittle
Friable (Fr)	-		Can be easily crumbled or broken into small pieces

Density Terms – Coarse Grained Soils

Term	Density Index (%)	SPT (N) Blow Count
Very Loose (VL)	< 15	0 – 4
Loose (L)	15 – 35	4 – 10
Medium Dense (MD)	35 – 65	10 – 30
Dense (D)	65 – 85	30 – 50
Very Dense (VD)	> 85	> 50

Particle Characteristics – Coarse Grained Soils

Term	Description
Well graded	Having good representation of all particle sizes
Poorly graded	With one or more intermediate size poorly represented
Gap graded	With one or more intermediate sizes absent
Uniform	Essentially of one size

Angularity – Coarse Grained Soils

	Rounded
	Sub-rounded
	Angular
	Sub-angular

Origin of Soil

Fill	Formed by anthropogenic activity
Aeolian	Formed by wind
Alluvial	Formed by streams and rivers
Colluvial	Formed on slopes (talus)
Estuarine	Formed in marine environments
Lacustrine	Formed in lakes
Residual	Formed by weathering insitu

Soil Moisture

	Term	Code	Description
Coarse Grained	Dry	D	Looks and feels dry and free running
	Moist	M	Soil feels cool, darkened in colour, soils tend to stick together, soil grains do not run freely through fingers and no visible free water
	Wet	W	Soil feels cool, darkened in colour, soils tend to stick together, free water on remoulding
Fine Grained	Moist, Less than Plastic Limit	W < PL	Hard and friable or powdery, moisture content well below Plastic Limit
	Moist, Near Plastic Limit	W ≈ PL	Soil feels cool, darkened in colour, can be moulded, near Plastic Limit
	Moist, Wet of Plastic Limit	W > PL	Soil feels cool, dark, usually weakened, free water, moisture content well above Plastic Limit
	Wet, Near Liquid Limit	W ≈ LL	Soil exudes easily
	Wet, Wet of Liquid Limit	W > LL	Soil behaves as a liquid

Boundary Classifications

Soils possessing characteristics of two groups are designated by combinations of group symbols. For example, GW-GC, well graded gravel-sand mixture with clay binder.

Graphic Symbols

	Asphalt		MH
	CH		ML
	CI		OH
	CL		OL
	Concrete		PT
	Fill		SC
	GC		SM
	GM		SP
	GP		SW
	GW		Topsoil

Soil Classification

Soils are described in general accordance with AS1726-2017 as shown below.

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 63 mm and basing fractions on estimated mass)					GROUP SYMBOL	PRIMARY NAME		
COARSE GRAINED SOILS More than 65% of the material is less than 63 mm and is larger than 0.075 mm	A particle size of 0.075 is about the smallest size distinguishable to the naked eye	GRAVELS More than half of coarse fraction is larger than 2.36 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes, not enough fines to bind coarse grains, no dry strength; ≤ 5% fines	GW	GRAVEL		
				Predominantly one size or a range of sizes with more intermediate sizes missing, not enough fines to bind coarse grains, no dry strength; ≤ 5% fines	GP	GRAVEL		
			GRAVELS w/ FINES (Appreciable amount of fines)	'Dirty' materials with excess of non-plastic fines, none to medium dry strength; ≥ 12% silty fines	GM	SILTY GRAVEL		
				'Dirty' materials with excess of plastic fines, medium to high dry strength; ≥ 12% clayey fines	GC	CLAYEY GRAVEL		
		SANDS More than half of coarse fraction is smaller than 2.36 mm	CLEAN SANDS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes, not enough fines to bind coarse grains, no dry strength; ≤ 5% fines	SW	SAND		
				Predominantly one size or a range of sizes with more intermediate sizes missing, not enough fines to bind coarse grains, no dry strength; ≤ 5% fines	SP	SAND		
			SANDS w/ FINES (Appreciable amount of fines)	'Dirty' materials with excess of non-plastic fines, none to medium dry strength; ≥ 12% silty fines	SM	SILTY SAND		
				'Dirty' materials with excess of plastic fines, medium to high dry strength; ≥ 12% clayey fines	SC	CLAYEY SAND		
		IDENTIFICATION PROCEDURES ON FRACTIONS < 0.075 mm						
		FINE GRAINED SOILS More than 35% of the material less than 63 mm is less than 0.075 mm	SILTS AND CLAYS Liquid Limit < 50%	DRY STRENGTH	DILATANCY	TOUGHNESS	GROUP SYMBOL	PRIMARY NAME
				None to low	Slow to rapid	Low	ML	SILT
				Medium to high	≥ 12% clayey fines	Medium	CL, CI*	CLAY
Low to medium	Slow			Low	OL	ORGANIC SILT		
SILTS AND CLAYS Liquid Limit > 50%	Low to medium		None to slow	Low to medium	MH	SILT		
	High to very high		None	High	CH	CLAY		
	Medium to high		None to very slow	Low to medium	OH	ORGANIC CLAY		
	HIGHLY ORGANIC SOILS: readily identified by colour, odour, spongy feel and frequently fibrous texture					PT	PEAT	

* CL is low plasticity clay, CI is medium plasticity clay

Description of Rock

- i. Rock name (BLOCK LETTERS)
- ii. Grain size and mineralogy
- iii. Colour (i.e. dominant colour of material)
- iv. Fabric and texture
- v. Features, inclusions, minor components, moisture content and durability
- vi. Strength
- vii. Weathering and/or alteration
- viii. Rock mass properties – discontinuities and structure of rock
- ix. Interpreted stratigraphic unit
- x. Additional observations including geological structure

Simple rock names are used to provide a reasonable engineering description, rather than a precise geological classification. The rock name is chosen by considering the nature and shape of the grains or crystals, the texture and fabric of the rock material, the geological structure and setting, and information from the geological map of the area. Further guidance on the naming of rocks can be found in AS1726-2017, Tables 15, 16, 17 and 18. Typical rock types are described below, though subject to site specific variations.

Rock Type	Description	Example of Rock Name
Sedimentary	Formed by deposited beds of sediments, have grains that are cemented together and often rounded. Significant porosity	COMMON: Conglomerate, Breccia, Sandstone, Mudstone, Siltstone, Claystone ≥90% CARBONATE: Limestone, Dolomite, Calcirudite, Calcarenite, Calcisiltite, Calcilutite PYROCLASTIC: Agglomerate, Volcanic Breccia, Tuff
Igneous	Formed from molten rock and have a crystalline texture. Typically massive and low porosity. Rock types are from coarse to fine grained.	HIGH QUARTZ CONTENT: Granite, Microgranite, Rhyolite MODERATE QUARTZ CONTENT: Diorite, Microdiorite, Andesite LOW QUARTZ CONTENT: Gabbro, Dolerite, Basalt
Metamorphic	Formed when rocks are subject to heat and/or pressure and have typically have directional fabric. Typically have low porosity and crystalline structure. Rock types are from coarse to fine grained	FOLIATED: Gneiss, Schist, Phyllite, Slate NON-FOLIATED: Marble, Quartzite, Serpentinite, Hornfels
Duricrust	Formed as part of a weathering profile and show evidence of being cemented in situ. Cementation is typically irregular and exhibits replacement textures.	Ferricrete (Iron oxides and hydroxides) Silicrete (Silica) Calcrete (Calcium carbonate) Gypcrete (Gypsum)

Note: () denotes dominant cementing mineralogy

Grain Size

Terms describing dominate grain size in sedimentary rocks.

Term	Grain size
Coarse	Mainly 0.6 mm to 2.0 mm
Medium	Mainly 0.2 mm to 0.6 mm
Fine	Mainly 0.06 mm (just visible) to 0.2 mm

Terms describing dominate grain size in igneous and metamorphic rocks

Term	Grain size
Coarse	Mainly greater than 2 mm
Medium	0.06 mm to 2 mm
Fine	Mainly less than 0.06 mm (just visible) to 0.2 mm

Texture and Fabric

Sedimentary rocks

Thickness	Bedding Term
< 6 mm	Thinly laminated
6 – 20 mm	Laminated
20 – 60 mm	Very thinly bedded
60 – 200 mm	Thinly bedded
0.2 – 0.6 m	Medium bedding
0.6 – 2 m	Thickly bedded
> 2 m	Very thickly bedded

Igneous rocks

Term	Definition
Amorphous	Indicates that the rock has no obvious crystalline structure
Crystalline	A regular molecular structure, showing crystal structure and symmetry.
Cryptocrystalline	The texture comprises crystals that are too small to recognise under an ordinary microscope. Indistinctly crystalline.
Porphyritic	Indicates the presence of phenocrysts (relatively large crystals in a fine grained ground mass) in igneous rocks.
Flow banded	Indicates visible flow lines in volcanic rocks and some intrusive rocks
Glassy	Entirely glass like. No crystalline units and without crystalline structure.
Vesicular	A texture of volcanic rocks that indicates the presence of vesicles (small gas bubbles). Where the vesicles are filled with a mineral substance they are termed Amygdales and the texture is Amygdaloidal.

Metamorphic

Term	Definition
Foliation	The parallel arrangement of minerals due to metamorphic process, which shall be defined by the terms in weak, moderate and strongly foliated.
Porphyroblastic	A texture indicating the presence of porphyroblasts (larger crystals formed by recrystallization during metamorphism, such as garnet or staurolite in a mica schist).
Cleavage	A type of foliation developed in fine grained metamorphic rocks such as slates.

Bedding and Fabric Development

Type	Definition
Massive	No obvious development of bedding – rock appears homogeneous
Poorly Developed	Bedding is barely obvious as faint mineralogical layering or grain size banding, but bedding planes are poorly defined.
Well Developed	Bedding is apparent in outcrops or drill core as distinct layers or lines marked by mineralogical or grain size layering.
Very Well Developed	Bedding is often marked by a distinct colour banding as well as by mineralogical or grain size layering.
Indistinct Fabric	There is little effect on strength properties
Distinct Fabric	The rock may break more easily parallel to the fabric

Rock Strength

Term (Code)	UCS (MPa)	Is ₍₅₀₎ (MPa)	Field Guide to Strength
Very Low (VL)	0.6 - 2	> 0.03 to ≤ 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 3 cm thick can be broken by finger pressure.
Low (L)	2 - 6	> 0.1 to ≤ 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blow of the pick point; has dull sound under hammer. A piece of core 150 mm long 50 mm in diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium (M)	6 - 20	> 0.3 to ≤ 1.0	Readily scored with a knife; a piece of core 150 mm long by 50 mm in diameter can be broken by hand with difficulty.
High (H)	20 - 60	> 1 to ≤ 3	A piece of core 150 mm long by 50 mm in diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High (VH)	60 - 200	> 3 to ≤ 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High (EH)	> 200	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Rock strength is assessed by laboratory Uniaxial Compressive Strength (UCS) testing and/or Point Load Strength Index (PLT) testing to obtain the Is₍₅₀₎ the strength table implies a 20 times correlation between Is₍₅₀₎ and UCS used for classification. Note however, multiplier may range from 4 (e.g. some carbonated and low strength rocks) to 40 (e.g. some igneous rocks and/or some high strength rocks). A site specific correlation based on testing, previous investigation or literature may be used where available. These terms refer to the strength of the rock material and not to the strength of the rock mass which may be considered weaker due to the effect of rock defects.

Visual Log

A diagrammatic plot of defects showing type, spacing and orientation in relation to the core axis.

————	Defects open in situ or clay sealed
-----	Defects closed in-situ
.....	Drill induced fractures or handling breaks
■	Infilled seam

Rock Weathering and or Alteration Classification

Term (Code)	Definition
Residual soil (RS)	Soil developed on extremely weathered rock. The rock mass structure and substance fabric are no longer evident but the soil has not been significantly transported.
Extremely weathered (XW)	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded in water, but the texture of original rock is still evident.
Extremely altered (XA)	
Highly weathered (HW)	Whole rock material is discoloured usually by extent that iron staining or bleaching and other signs of chemical or physical decomposition are evident. Porosity and strength may be increased or decreased compared to the fresh rock usually as a result of iron leaching or deposition. The colour and strength of the original rock substance is no longer recognisable
Highly Altered (HA)	Distinctly weathered (DW)*
	Distinctly Altered (DA)
Moderately weathered (MW)	Whole rock material is discoloured usually by staining that original colour of the fresh rock is no longer recognisable
Moderately Altered (MA)	
Slightly weathered (SW)	Rock is slightly discoloured but shows little or no change of strength from fresh rock
Slightly altered (SA)	
Fresh rock (FR)	Rock shows no sign of decomposition or staining.

Rock Core Recovery

TCR = Total Core Recovery (%)

$$\frac{\text{Length of Core Recovered}}{\text{Length of Core run}} \times 100$$

SCR = Solid Core Recovery (%)

$$\frac{\text{Sum Length of Cylindrical Core Recovered}}{\text{Length of Core run}} \times 100$$

RQD = Rock Quality Designation (%)

$$\frac{\text{Sum Length of Sound Core Pieces > 100mm in length}}{\text{Length of Core run}} \times 100$$

Types of Defects

Term		Code	Description
Parting		PT	A surface or crack across which the rock has little or no tensile strength. Parallel or sub-parallel to layering (e.g. bedding) or a planar anisotropy in the rock material (i.e. cleavage). May be opened or closed.
Joint		JT	A surface or crack with no apparent shear displacement and across which the rock has little or no tensile strength, but which is not parallel or sub-parallel to layering or to planar anisotropy in the rock material. May be open or closed.
Sheared Surface		SR	A near planar, curved or undulating surface which is usually smooth, polished or slickensided and which shows evidence of shear displacement.
Sheared Zone		SZ	Zone of rock material with roughly parallel, near planar, curved, or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge-shaped blocks.
Crushed Zone ^a		CZ	A zone of broken and disturbed ground containing more than one identifiable Crushed Seam.
Fracture Zone ^a		FZ	A zone of broken ground with parallel to opposing boundaries dominated by abundant, extremely closely to closely spaced defects, which may be intact or open, and planar, curved, undulating, irregular, or stepped, resulting in a dissected rock mass of angular trapezoidal, triangular or rectangular fragments.
Seam (SE)	Sheared Seam	SS	Seam of soil material with roughly parallel almost planar boundaries, composed of soil materials with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge-shaped blocks.
	Crushed Seam	CS	Seam of soil material with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock material which may be more weathered than the host rock. The seam has soil properties.
	Infilled Seam	IS	Seam of soil material usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1 mm thick may be described as a veneer or coating on a joint surface.
	Extremely Weathered Seam	XS	Seam of soil material, often with gradational boundaries. Formed by weathering of the rock material in place.
Fault ^b		FT	A fracture (defect) or fracture zone along which there has been an observable amount of displacement.
Vein ^c		VE	Any fracture that contains mineralized material. Veins can display either crack-normal extension or shear displacement coupled with crack-normal extension.
Vugh ^a		VG	An open void with secondary crystallisation which may be coated, partly or nearly completely filled.
Void ^a		VO	An open space created through natural or anthropogenic processes, including, but not limited to, caves, kettles, tunnels, mines, pipes, piping, landslides, faulting, shearing, dissolution, & erosion.
Mechanical Break		MB	A fracture or break induced or created by the sampling process (i.e. drilling (DB) handling (HB), drill lift (DL), excavation, or blasting).

All definitions as per AS1726-2017, except:

^a SMEC Field Manual,

^b British Standard BS 5930:2015, and

^c Glossary of Geology (Fifth Edition - revised) (2011), American Geosciences Institute.

Defect Planarity

Code	Description
CR	Curved – A defect with a gradual change in orientation
IR	Irregular – A defect with many sharp changes in orientation
PL	Planar – Defect forms a continuous plane without variation in orientation
ST	Stepped – A defect with distinct sharp steps or step
UN	Undulose – A defect with undulations

Defect Roughness

Code	Description
RO	Rough – Many small surface irregularities generally related to the grain size of the parent rock
SM	Smooth – Few or no surface irregularities related to the grain size of the parent rock
PO	Polished – Planes have a distinct sheen or a smoothness
SL	Slickensided – Planes have a polished, grooved or striated surface consistent with differential movement of the parent rock along the plane
VR	Very rough – many large surface irregularities, amplitude generally more than 1mm

Type of Structures

Term	Code	Description
Bedding	BD	A layered arrangement of minerals parallel to the surface of deposition which has caused planar anisotropy in the rock substance.
Cleavage	CV	An alignment of fine grained minerals caused by deformation.
Schistosity	SH	A layered arrangement of minerals to each other
Foliation	FO	A planar alignment of minerals caused by deformation.
Void	VO	A completely empty space
Dyke	DK	Sheet-like bodies of igneous rock that cut across sedimentary bedding or foliations in rocks. They may be single or multiple in nature
Sill	SL	A sill is an intrusion of magma that spreads underground between the layers of another kind of rock
Contact	CX	A contact between intrusive and stratigraphic units.
Boundary	BN	A distinct boundary between two stratigraphic units
Vugh	VG	An open void with crystallisation

Note: Drill breaks (DB) and handling breaks (HB) are not included as natural discontinuity.

Discontinuity Spacing

Spacing (mm)	Description
> 6000	Extremely Widely Spaced
2000 - 6000	Very Widely Spaced
600 - 2000	Widely Spaced
200 - 600	Medium Spaced
60 - 200	Closely Spaced
20 - 60	Very Closely Spaced
< 20	Extremely Closely Spaced

Infill Material

Code	Name	Code	Name
Ap	Apatite	Ga	Galena
Ca	Calcite	Gp	Gypsum
Ch	Chlorite	Mn	Manganese
Cl	Clay	MnO	Manganese Oxide
Co	Coal	MS	Secondary mineral
Ep	Epidote	Py	Pyrite
Fe	Limonite/ Ironstone/ Goethite	Um	Unidentified mineral
FeO	Iron oxide	Qz	Quartz
Fs	Feldspar	X	Carbonaceous
		Ze	Zeolite

Discontinuity Observation

Term	Code	Description
Clean	CN	No visible coating or infill
Stain	SN	No visible coating or infill but surfaces are discoloured by mineral staining
Veneer < 1 mm	VN	A visible coating or soil or mineral substance but usually unable to be measured. If discontinuous over the plane, patchy veneer.
Coating > 1 mm to < 10 mm	CT	A visible coating or infilling of soil or mineral substance. Describe composition and thickness.
Filling (Filled) > 10 mm	FD	A visible filling of soil or mineral substance. Describe composition and thickness.

Discontinuity Orientation

Code	Description
VT	Vertical
HO	Horizontal
RL	Top right to bottom left
LR	Top left to bottom right

Samples and Field Tests

Code	Description
B	Bulk disturbed sample
BLK	Block sample
C	Core sample
CBR	CBR Mould Sample
CPT _u	Cone Penetration Test (with pore pressure)
DT	Dilatometer
DS	Small disturbed sample
ES	Soil sample for environmental testing
EW	Water sample for environmental testing
FP	Pressuremeter
G	Gas sample
H	Hydraulic fracturing
HP	Hand penetrometer test
I	Impression device
IS ₍₅₀₎	Point Load Index
K	Permeability
LB	Large bulk disturbed sample
N	Standard penetration test result (N* denotes SPT sample recovery)
O	Core orientation
P	Piston sample
PID	Photoionisation detector reading in ppm
PP	Penetrometer
R	Hammer bouncing / refusal
SPT	Standard Penetration Test
U	Undisturbed push in sample
UCS	Uniaxial Compressive Strength
U50	Undisturbed tube sample (50 mm diameter)
U75	Undisturbed tube sample (75 mm diameter)
U100	Undisturbed tube sample (100 mm diameter)
VS	Vane shear test
● (A)	Axial Test
○ (D)	Diametral Test
□	Irregular Lump test

Completion Details

Type	Description
Collapse	Exploratory hole collapsed before reaching planned depth
Equipment Failure	Boring or excavator equipment operational failure
Flooding	Flooding of excavation
Machine Limit	Limit of machine capability reached
Obstruction	Obstruction preventing further advancement
Operator Limit	Limit of operator limit/safety reached
Possible services	Indication of possible services below
Services present	Services encountered during exploratory hole
Squeezing	Hole squeezing boring equipment
Target Depth	Depth reached as planned
Target Depth (Instrumentation Installed)	Depth reached as planned instrumentation installed
Target Depth (Standpipe Installed)	Depth reached as planned open standpipe constructed
Material Refusal	Material preventing further advancement

Laboratory Tests

Code	Description
ACM	Asbestos Containing Material
CD	Consolidated Drained
CU	Consolidated Undrained
LL	Liquid Limit
LS	Linear Shrinkage
MC	Moisture Content
MDD	Maximum Dry Density
OMC	Optimum Moisture Content
PBT	Plate Bearing Test
PI	Plasticity Index
PL	Plastic Limit
PSD	Particle Size Distribution
ρ_b	Bulk Density
ρ_p	Particle Density
ρ_d	Dry Density
UU	Undrained Unconsolidated

Backfill / Standpipe Detail

Symbol	Description	Symbol	Description
	Cement seal		Filter pack: sand filter
	Grout backfill GP -Cement BE - Bentonite Cement		Filter pack: gravel filter
	Un-slotted pipe		Bentonite seal
	Slotted pipe		Cutting – excavated material backfill
	Surface Completion: Monument Above Ground		Surface Completion: Gatic Ground Monument

Status

Code	Description
-2	Historic
-1	For information
0	Preliminary
1	Checked
2	Draft
3	Final

Project: SINSW Projects
Location: Leppington Public School
Client: SINSW
Job No.: 30018043

Position: Richard Road Leppington NSW
Contractor: Drill Rig: Hand Auger
Inclination: -90°

Date Started: 7/2/2024
Date Completed: 7/2/2024
Logged: PV

Drilling				Sampling			Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	E-E	Not Encountered	0.0		ES 0.10 m			ML	SILT: low plasticity, brown, trace clay.	D	L - MD	RESIDUAL SOIL 0.00: Grass cover 0.00-0.50: Rootlets
	E-E		0.40		ES 0.50 m			CL-CI	CLAY: low to medium plasticity, red-brown.	D	D	
			0.60									
			0.6						Hole Terminated at 0.60 m Target Depth			
			0.8									
			1.0									
			1.2									
			1.4									
			1.6									
			1.8									
			2.0									

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Drilling				Sampling		Field Material Description							
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION		MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	E-E	Not Encountered	0.0		ES 0.10 m			ML	SILT: low plasticity, brown, trace clay.		D	L - MD	RESIDUAL SOIL 0.00: Grass cover 0.00-0.50: Rootlets
	E-E		0.40					ES 0.50 m	CL-CI	CLAY: low to medium plasticity, red-brown.		D	
			0.60						Hole Terminated at 0.60 m Target Depth				
			0.8										
			1.0										
			1.2										
			1.4										
			1.6										
			1.8										
			2.0										

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METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION		MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	F-F	Not Encountered	0.0		ES 0.10 m			ML	CLAY: low plasticity, red-brown.		D	MD	REWORKED NATURAL
	F-F		0.30					ES 0.50 m	CI	CLAY: medium plasticity, red-brown.		D	
			0.60					Hole Terminated at 0.60 m Target Depth					
			0.8										
			1.0										
			1.2										
			1.4										
			1.6										
			1.8										
			2.0										
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											Date	29/8/2024	

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Drilling				Sampling		Field Material Description						
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	F-F	Not Encountered	0.0	0.30	ES 0.10 m			ML	CLAY: low plasticity, red-brown.	D	MD	REWORKED NATURAL
	F-F		ES 0.50 m				CI	CLAY: medium plasticity, mottled red-grey.	D	D	RESIDUAL SOIL 0.50: organic material - black wood piece	
			0.60						Hole Terminated at 0.60 m Target Depth			
			0.8									
			1.0									
			1.2									
			1.4									
			1.6									
			1.8									
			2.0									

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HA	F-F	Not Encountered	0.0	0.20	ES 0.10 m			ML	Clayey SILT: red-brown, trace sub-angular, coarse gravel.	D	MD	REWORKED NATURAL
	F-F						CI	CLAY: medium plasticity, mottled red-grey.	D	D	RESIDUAL SOIL	
			0.60		ES 0.50 m				Hole Terminated at 0.60 m Target Depth			
			0.8									
			1.0									
			1.2									
			1.4									
			1.6									
			1.8									
			2.0									

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HA	F-F	Not Encountered	0.0	0.20	ES 0.10 m			ML	Clayey SILT: red-brown, trace sub-rounded to sub-angular, coarse gravel.	D	MD		REWORKED NATURAL
	F-F		0.2					CI		CLAY: medium plasticity, mottled red-grey.	D	D	
			0.6	0.60					Hole Terminated at 0.60 m Target Depth				
			0.8										
			1.0										
			1.2										
			1.4										
			1.6										
			1.8										
			2.0										

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HA	F-F	Not Encountered	0.0	0.20	ES 0.10 m			ML	Clayey SILT: red-brown, trace sub-rounded to sub-angular, coarse gravel.	D	MD	REWORKED NATURAL
	F-F		0.2					CI	CLAY: medium plasticity, mottled red-grey.	D	D	RESIDUAL SOIL
			0.6	0.60	ES 0.60 m				Hole Terminated at 0.60 m Target Depth			
			0.8									
			1.0									
			1.2									
			1.4									
			1.6									
			1.8									
			2.0									
Comments										Checked	HS	
										Date	29/8/2024	

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METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	F-F	Not Encountered	0.0	0.20	ES 0.10 m			ML	Clayey SILT: red-brown, trace sub-rounded to sub-angular, coarse gravel.	D	MD	REWORKED NATURAL
	F-F		0.2					CI	CLAY: medium plasticity, mottled red-grey.	D	D	RESIDUAL SOIL
			0.60		ES 0.60 m				Hole Terminated at 0.60 m Target Depth			
			0.8									
			1.0									
			1.2									
			1.4									
			1.6									
			1.8									
			2.0									

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METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	F-F	Not Encountered	0.0	0.20	ES 0.10 m			ML	Clayey SILT: red-brown, trace sub-rounded to sub-angular, coarse gravel.	D	MD	REWORKED NATURAL
	F-F		0.2					CI	CLAY: medium plasticity, mottled red-grey.	D	D	RESIDUAL SOIL
			0.6	0.60	ES 0.60 m				Hole Terminated at 0.60 m Target Depth			
			0.8									
			1.0									
			1.2									
			1.4									
			1.6									
			1.8									
			2.0									

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HA	F-F	Not Encountered	0.0	0.20	ES 0.10 m			ML	Clayey SILT: red-brown, trace sub-angular, coarse gravel.	D	MD	REWORKED NATURAL
	F-F		0.2				CI	CLAY: medium plasticity, mottled red-grey.	D	D	RESIDUAL SOIL	
			0.6	0.60					Hole Terminated at 0.60 m Target Depth			
			0.8									
			1.0									
			1.2									
			1.4									
			1.6									
			1.8									
			2.0									

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HA	F-F	Not Encountered	0.0	0.20	ES 0.10 m			ML	Clayey SILT: red-brown, trace sub-angular, coarse gravel.	D	MD	REWORKED NATURAL
	CI		CLAY: medium plasticity, mottled red-grey.							RESIDUAL SOIL		
	F-F		0.4				ES 0.50 m			D	D	
			0.6	0.60					Hole Terminated at 0.60 m Target Depth			
			0.8									
			1.0									
			1.2									
			1.4									
			1.6									
			1.8									
			2.0									

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HA	F-F	Not Encountered	0.0	0.20	ES 0.10 m			ML	Clayey SILT: red-brown, trace sub-angular, coarse gravel.	D	MD	REWORKED NATURAL		
	CI		CLAY: medium plasticity, mottled red-grey.							RESIDUAL SOIL				
	F-F		0.2				ES 0.50 m			D	D			
			0.60					Hole Terminated at 0.60 m Target Depth						
			0.8											
			1.0											
			1.2											
			1.4											
			1.6											
			1.8											
			2.0											

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METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	F-F	Not Encountered	0.0	0.20	ES 0.10 m			ML	Clayey SILT: red-brown.	D	MD	REWORKED NATURAL
	F-F		0.2					CI		CLAY: medium plasticity, mottled red-grey.	D	
			0.6	0.60					Hole Terminated at 0.60 m Target Depth			
			0.8									
			1.0									
			1.2									
			1.4									
			1.6									
			1.8									
			2.0									

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Drilling				Sampling		Field Material Description								
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION		MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	
HA	F-F	Not Encountered	0.0		ES 0.00 m			ML	Clayey SILT: red-brown, trace medium grained sand.		D	MD	REWORKED NATURAL 0.00: Black staining, fertilizer odour	
	F-F		0.2	0.20				CI	CLAY: medium plasticity, mottled red-grey.		D	D	RESIDUAL SOIL	
			0.6	0.60	ES 0.50 m				Hole Terminated at 0.60 m Target Depth					
			0.8											
			1.0											
			1.2											
			1.4											
			1.6											
			1.8											
			2.0											

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METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION		MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	F-F	Not Encountered	0.0	0.25	ES 0.10 m			CL-CI	Silty CLAY: low to medium plasticity, red-brown.	D	MD-D	RESIDUAL SOIL	
	F-F		CI					CLAY: medium plasticity, mottled red-grey.	D	D			
			0.60		ES 0.50 m				Hole Terminated at 0.60 m Target Depth				
			0.8										
			1.0										
			1.2										
			1.4										
			1.6										
			1.8										
			2.0										

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Drilling				Sampling		Field Material Description							
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	F-F	Not Encountered	0.0		ES 0.10 m			CI	CLAY: medium plasticity, mottled red-pale orange.				REWORKED NATURAL
			0.2							D	D		
	F-F		0.30					ML	FILL Sandy Clayey SILT: brown, sand is fine to medium grained; trace medium to coarse grained, sub-angular to angular gravel; anthropogenic material [$\leq 5\%$].	D	L - MD		FILL 0.30-0.40: plastic, metal
			0.40		ES 0.40 m				Hole Terminated at 0.40 m Refusal on HDPE liner				
			0.6										
			0.8										
			1.0										
			1.2										
			1.4										
			1.6										
			1.8										
			2.0										

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Drilling				Sampling		Field Material Description						
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	E-E	Not Encountered	0.0		ES 0.10 m			ML	TOPSOIL Clayey SILT: brown, clay is low plasticity.	D	L - MD	TOPSOIL 0.00-0.30: Rootlets
			0.2						0.10: black plastic			
			0.30					CI	CLAY: medium plasticity, red.			RESIDUAL SOIL
	E-E								0.50: Becoming mottled grey-red	D	D	
			0.6		ES 0.60 m							
			0.70						Hole Terminated at 0.70 m Target Depth			
			0.8									
			1.0									
			1.2									
			1.4									
			1.6									
			1.8									
			2.0									

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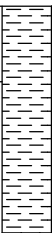
Date Started: 8/2/2024
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Drilling				Sampling		Field Material Description							
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION		MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	E-E	Not Encountered	0.0		ES 0.10 m			ML	TOPSOIL Clayey SILT: brown, clay is low plasticity.		D	L - MD	TOPSOIL 0.00-0.30: Rootlets 0.10: black plastic
			0.2										
	E-E		0.30		ES 0.60 m			CI	CLAY: medium plasticity, red.		D	D	RESIDUAL SOIL
			0.70										
			0.8					Hole Terminated at 0.70 m Target Depth					
			1.0										
			1.2										
			1.4										
			1.6										
			1.8										
			2.0										
Comments													
											Checked	HS	
											Date	29/8/2024	

Project: SINSW Projects
Location: Leppington Public School
Client: SINSW
Job No.: 30018043

Position: Richard Road Leppington NSW
Contractor: Drill Rig: Hand Auger
Inclination: -90°

Date Started: 8/2/2024
Date Completed: 8/2/2024
Logged: PV

Drilling				Sampling		Field Material Description						
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	E-E	Not Encountered	0.0	0.30	ES 0.10 m			ML	TOPSOIL Clayey SILT: brown, clay is low plasticity.	D	L - MD	TOPSOIL 0.00: Sticks, leaves 0.00-0.30: Rootlets
	E-E		0.30					ES 0.60 m				
			0.70						Hole Terminated at 0.70 m Target Depth			
			0.8									
			1.0									
			1.2									
			1.4									
			1.6									
			1.8									
			2.0									

Comments

Checked HS
Date 29/8/2024

Project: SINSW Projects
Location: Leppington Public School
Client: SINSW
Job No.: 30018043

Position: Richard Road Leppington NSW
Contractor: Drill Rig: Hand Auger
Inclination: -90°

Date Started: 8/2/2024
Date Completed: 8/2/2024
Logged: PV

Drilling				Sampling		Field Material Description						
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	E-E	Not Encountered	0.0	0.30	ES 0.10 m			ML	TOPSOIL Clayey SILT: brown, clay is low plasticity; minor inclusions of black plastic.	D	L - MD	TOPSOIL 0.00-0.30: Rootlets 0.10: black plastic
	E-E		CI					CLAY: medium plasticity, red.				
			0.70		ES 0.60 m				Hole Terminated at 0.70 m Target Depth			
			0.8									
			1.0									
			1.2									
			1.4									
			1.6									
			1.8									
			2.0									

Comments

Checked HS
Date 29/8/2024

Project: SINSW Projects
Location: Leppington Public School
Client: SINSW
Job No.: 30018043

Position: Richard Road Leppington NSW
Contractor: Drill Rig: Hand Auger
Inclination: -90°

Date Started: 6/2/2024
Date Completed: 6/2/2024
Logged: JP

Drilling				Sampling		Field Material Description						
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	F-F	Not Encountered	0.0	0.20	ES 0.20 m			ML	Clayey SILT: red-brown, trace sub-rounded to sub-angular gravel.	D	MD	REWORKED NATURAL
			0.2					CI	CLAY: medium plasticity, mottled red-grey.			RESIDUAL SOIL
	F-F		0.4							D	D	
			0.6						ES 0.60 m			
			0.70						Hole Terminated at 0.70 m Target Depth			
			0.8									
			1.0									
			1.2									
			1.4									
			1.6									
			1.8									
			2.0									

Comments

Checked HS
Date 29/8/2024

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP01

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :

SURFACE ELEVATION :

EQUIPMENT TYPE : Excavator

METHOD : Excavation

DATE EXCAVATED : 7/2/2024

LOGGED BY : PV

CHECKED BY : HS

EXCAVATION DIMENSIONS : 2.40 m LONG 0.60 m WIDE

EXCAVATION						MATERIAL										
VE E F H PENETRATION			SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER				STRUCTURE & Other Observations
			Not Encountered	0.10m ES	0.0		ML	SILT: brown, trace clay.	D	L - MD		RESIDUAL SOIL 0.00: Grass cover 0.00-0.50: Rootlets				
					0.2											
					0.4		CL-CI	CLAY: low to medium plasticity, red-brown.	D	D						
0.50m ES	0.60m															
					0.6			Hole Terminated at 0.60 m Target Depth								
					0.8											
					1.0											
					1.2											
					1.4											
					1.6											
					1.8											

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP02
 FILE / JOB NO : 30018043
 SHEET : 1 OF 1

CLIENT : SINSW PROJECT : SINSW Projects
 LOCATION : Richard Road Leppington NSW

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.60 m LONG 0.50 m WIDE	

EXCAVATION						MATERIAL								
VE E F H		SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER			STRUCTURE & Other Observations
		Not Encountered		0.10m ES	0.0		ML	SILT: brown, trace clay.	D	L - MD				RESIDUAL SOIL 0.00: Grass cover 0.00-0.40: Rootlets
				0.40m ES	0.40m	CLAY: low to medium plasticity, red-brown.								
				0.70m ES	0.6		CL-CI	0.70: Becoming mottled red-grey	D	D				
					0.8			Hole Terminated at 0.80 m Target Depth						
					1.0									
					1.2									
					1.4									
					1.6									
					1.8									
					2.0									

PHOTOGRAPHS NOTES ☐ YES ☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP03

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.40 m LONG 0.60 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
				0.0			SILT: brown, trace clay.			100	RESIDUAL SOIL 0.00: Grass/weed cover 0.00-0.30: Rootlets
			0.10m ES			ML		D	L - MD	200	
			0.30m ES	0.30m			CLAY: low to medium plasticity, red-brown.			300	
				0.4		CL-CI		D	D	400	
			0.80m ES	0.80m			MUDSTONE: grey, weathered.	D			EXTREMELY WEATHERED
				0.90m			Hole Terminated at 0.90 m Target Depth				
				1.0							
				1.2							
				1.4							
				1.6							
				1.8							
				2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP04

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.20 m LONG 0.55 m WIDE	

EXCAVATION							MATERIAL							
VE	E	F	H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
							0.0			SILT: brown, trace clay.			100	RESIDUAL SOIL 0.00: Grass cover 0.00-0.30: Rootlets
						0.10m ES			ML		D	L - MD	200	
							0.2						300	
										0.30m				
										CLAY: low to medium plasticity, red-brown.				0.60: Root
						0.50m ES					D	D		
							0.4							
											</			

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP05

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.40 m LONG 0.50 m WIDE	

EXCAVATION						MATERIAL								
VE	E	F	H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
							0.0			SILT: brown, trace clay.			100	RESIDUAL SOIL 0.00: Grass cover 0.00-0.40: Rootlets
						0.10m ES	0.2		ML		D	L - MD	200	
						0.40m ES	0.4			CLAY: low to medium plasticity, red-grey-brown.			300	
					Not Encountered		0.6		CL-CI		D	D	400	
						0.90m ES	0.90			Hole Terminated at 0.90 m Target Depth				
							1.0							
							1.2							
							1.4							
							1.6							
							1.8							
							2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP06

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 7/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.30 m LONG 0.50 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
				0.0			SILT: brown, trace clay.			100	RESIDUAL SOIL 0.00: Gass cover 0.00-0.60: Rootlets
			0.10m ES	0.2		ML		D	L - MD	200	
				0.30m						300	
				0.4		CL-CI	CLAY: low to medium plasticity, red-brown.	D	D	400	
			0.50m ES	0.60m			Hole Terminated at 0.60 m Target Depth				
				0.6							
				0.8							
				1.0							
				1.2							
				1.4							
				1.6							
				1.8							
				2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP07

FILE / JOB NO : 30018043

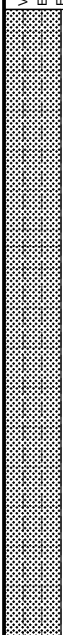
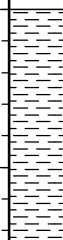
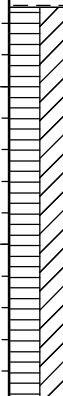
CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.20 m LONG 0.55 m WIDE	

EXCAVATION						MATERIAL							
VE E PENETRATION F H			SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
				Not Encountered	0.10m ES	0.0		ML	FILL SILT: brown, trace clay; trace anthropogenic material (5%), trace roadbase/asphalt, black.	D	L - MD		FILL 0.00: Grass cover 0.00-0.60: Rootlets, concrete, rubble, broken tiles, glass, metal pieces 0.10: Bone
						0.2		CL-CI	CLAY: low to medium plasticity, red-brown.	D	D		RESIDUAL SOIL
					0.50m ES	0.4							
					0.6								
					0.80m ES	0.8		Hole Terminated at 0.80 m Target Depth					
					1.0								
						1.2							
						1.4							
						1.6							
						1.8							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP08

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.80 m LONG 0.50 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
				0.0			FILL SILT: brown, with clay; trace coarse, sub-angular gravel; trace anthropogenic material (<5%).			100 200 300 400	FILL 0.00: Grass cover 0.00-0.40: Plastic, rootlets, fabric, glass
			0.10m ES	0.2		ML		D	L - MD		
			0.40m ES	0.4			CLAY: red-brown.				RESIDUAL SOIL
				0.6							
				0.8		CL-Cl	0.80: Becoming mottled red-brown-grey	D	D		
			1.00m ES	1.0			1.00: Transitioning to weathered material Hole Terminated at 1.00 m Target Depth				
				1.2							
				1.4							
				1.6							
				1.8							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP09

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.30 m LONG 0.65 m WIDE	

EXCAVATION						MATERIAL									
VE E F H			SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations		
				Not Encountered	0.10m ES	0.0		ML	SILT: brown, trace clay.	D	L - MD	100	RESIDUAL SOIL 0.00: Grass cover, black plastic 0.00-0.70: Rootlets		
						0.2			0.30m ES			200			
					0.30m ES	0.3		CL-CI	CLAY: low to medium plasticity, red-brown.	D	D	300			
						0.4			0.70m ES			400			
					0.70m ES	0.7			0.70: Becoming mottled red-brown-grey Hole Terminated at 0.70 m Target Depth						
						0.8									
						0.8									
						0.9									
						1.0									
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 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP10

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.10 m LONG 0.60 m WIDE	

EXCAVATION						MATERIAL										
VE E F H			SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components		MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER			STRUCTURE & Other Observations
						0.0			FILL SILT: brown, trace clay; trace anthropogenic material (<5%), trace asphalt/roadbase, black (<1%).	D	L - MD				FILL 0.00: Grass cover 0.00-0.50: Rootlets 0.00-0.40: Metal, terracotta pipe, tiles, concrete rubble 0.10: PACM, 3 fragments, all good condition: approximately 2cm x 1cm, 2cm x 2cm, 10cm x 5cm	
					0.10m ES	0.2	ML									
						0.4		0.40m	CLAY: medium plasticity, red-grey-brown mottled.						RESIDUAL SOIL	
					0.50m ES	0.6				D	D					
						0.8	CI									
					0.90m ES	0.9		0.90m	MUDSTONE: grey-orange-brown.	D					EXTREMELY WEATHERED	
						1.0		1.00m	Hole Terminated at 1.00 m Target Depth							
						1.2										
						1.4										
						1.6										
						1.8										
						2.0										

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP11

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 7/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 1.70 m LONG 0.60 m WIDE	

EXCAVATION						MATERIAL										
VE E F H			SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER				STRUCTURE & Other Observations
			Not Encountered	0.10m ES	0.50m ES	1.10m ES		CL	FILL Silty CLAY: low plasticity, brown, trace coarse grained sand; trace medium to coarse grained, sub-angular to sub-rounded gravel; trace antropogenic material (<10%).	D	MD		FILL 0.00: Grass cover 0.00-0.70: Glass, bricks, rootlets, glass mortar, sticks			
								0.70m	CLAY: medium plasticity, mottled red-orange-grey.	D	D		RESIDUAL SOIL			
								1.20m	Hole Terminated at 1.20 m Target Depth							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP12

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :

SURFACE ELEVATION :

EQUIPMENT TYPE : Excavator

METHOD : Excavation

DATE EXCAVATED : 7/2/2024

LOGGED BY : PV

CHECKED BY : HS

EXCAVATION DIMENSIONS : 1.70 m LONG 0.60 m WIDE

EXCAVATION						MATERIAL								
VE	E	F	H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
						0.10m ES	0.0			FILL Gravelly SAND: fine to coarse grained, pale yellow-brown, gravel is fine to coarse grained, sub-angular to sub-rounded (sandstone, concrete); with cobbles.			100 200 300 400	FILL 0.00-0.50: Sandstone cobbles, concrete rubble, rootlets, bricks, asphalt, and tiles
							0.2		SW		D	L		
						0.50m ES	0.50m			CLAY: low to medium plasticity, brown, trace medium to coarse grained sand.				REWORKED NATURAL
				Not Encountered			0.6		CL-CI		D			
							0.8			CLAY: medium plasticity, red.		D		RESIDUAL SOIL
						1.10m ES	1.0		CI	1.00: Becoming mottled grey-red	D			
							1.2			Hole Terminated at 1.20 m Target Depth				
							1.4							
							1.6							
							1.8							
							2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP13

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 7/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 1.70 m LONG 0.55 m WIDE	

EXCAVATION						MATERIAL									
VE E PENETRATION F H			SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations		
			Not Encountered	0.10m ES	0.0		ML	SILT: brown, trace clay.	D	L - MD		RESIDUAL SOIL 0.00: Grass cover 0.00-0.30: Rootlets			
					0.2										
					0.30m		CI	CLAY: medium plasticity, mottled red-grey.	D	D					
0.50m ES	0.4	0.60m													
			1.10m ES	Hole Terminated at 0.60 m Target Depth	0.6										
					0.8										
					1.0										
					1.2										
					1.4										
					1.6										
					1.8										
					2.0										
					2.2										
					2.4										

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP14

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.50 m LONG 0.60 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
				0.0			SILT: low to medium plasticity, brown, trace clay.	D	L - MD	100 200 300 400	RESIDUAL SOIL 0.00: Grass cover 0.00-0.80: Rootlets
			0.10m ES	0.2		ML	CLAY: medium plasticity, red.				
			0.30m ES	0.4		CI		D	D		
			0.80m ES	0.8			0.80: Becoming mottled red-orange-grey				
				0.90m			0.90: Transitioning to weathered material Hole Terminated at 0.90 m Target Depth				
				1.0							
				1.2							
				1.4							
				1.6							
				1.8							
				2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP15

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.40 m LONG 0.55 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
				0.0			SILT: brown, trace clay.			100 200 300 400	RESIDUAL SOIL 0.00: Grass cover 0.00-0.30: Rootlets
			0.10m ES	0.2		ML		D	L - MD		
			0.40m ES	0.30m			CLAY: medium plasticity, red-brown.				
		Not Encountered		0.4		Cl		D	D		
				0.6							
				0.70: Becoming mottled red-brown-grey							
			0.80m ES	0.80m			Hole Terminated at 0.80 m Target Depth				
				1.0							
				1.2							
				1.4							
				1.6							
				1.8							
				2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP16

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.60 m LONG 0.60 m WIDE	

EXCAVATION				MATERIAL												
VE	E	PENETRATION	F	H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations	
								0.0			SILT: brown, trace low plasticity clay.	D	L - MD		RESIDUAL SOIL 0.00: Grass cover 0.00-1.00: Rootlets	
							0.10m ES			ML						
							0.2		0.20m		CLAY: medium plasticity, red-brown-grey.					
							0.40m ES			CL		D	D			
							0.6									
							0.8									
							1.00m ES				MUDSTONE: grey-orange.				EXTREMELY WEATHERED	
								1.0								
								1.10m			Hole Terminated at 1.10 m Target Depth					
								1.2								
								1.4								
								1.6								
								1.8								
								2.0								

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP17

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
EXCAVATION DIMENSIONS : 2.30 m LONG 0.50 m WIDE	CHECKED BY : HS

EXCAVATION							MATERIAL							
VE E F H PENETRATION			SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations	
			Not Encountered	0.10m ES	0.60m ES	0.0			CLAY: low to medium plasticity, brown, with silt.		MD - D	100	RESIDUAL SOIL 0.00: Grass cover 0.00-0.50: Rootlets	
						0.2				200				
						0.4	CL-CI				300			
						0.6					400			
						0.8	CI	0.60m	CLAY: medium plasticity, red-brown-grey.	D				
				0.90m ES		0.8			MUDSTONE: mottled grey-orange.	D			EXTREMELY WEATHERED	
						0.90m								
						1.0		Hole Terminated at 0.90 m Target Depth						
						1.2								
						1.4								
						1.6								
						1.8								
						2.0								
						2.2								
						2.4								

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP18

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.60 m LONG 0.60 m WIDE	

EXCAVATION						MATERIAL							
VE E PENETRATION F H			SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
			Not Encountered	0.10m ES		0.0		Cl	CLAY: medium plasticity, brown.	D	D	100	RESIDUAL SOIL 0.00: Grass cover 0.00-0.40: Rootlets
						0.2						200	
						0.4			0.40: Becoming mottled orange-grey-brown			300	
				0.60m ES		0.6		0.60m	Hole Terminated at 0.60 m Target Depth			400	
						0.8							
						1.0							
						1.2							
						1.4							
						1.6							
						1.8							
						2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP19

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 7/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.10 m LONG 0.50 m WIDE	

EXCAVATION						MATERIAL											
VE E PENETRATION F H			SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components		MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER				STRUCTURE & Other Observations
				Not Encountered	0.10m ES	0.0		ML	SILT: brown, trace clay.	D	L - MD				RESIDUAL SOIL 0.00: Grass cover 0.00-0.30: Rootlets		
						0.2											
						0.30m	CLAY: low to medium plasticity, red-brown.										
				0.50m ES	0.4		CL-CI	CLAY: low to medium plasticity, red-brown.	D	D							
					0.50: Becoming mottled red-brown-grey												
					0.60m	Hole Terminated at 0.60 m Target Depth											
					0.6												
					0.8												
					1.0												
					1.2												
					1.4												
					1.6												
					1.8												

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP20

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 7/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 1.70 m LONG 0.50 m WIDE	

EXCAVATION						MATERIAL										
VE E F H PENETRATION			SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER				STRUCTURE & Other Observations
			Not Encountered	0.10m ES		0.0		ML	SILT: brown, trace clay.	D	L - MD		RESIDUAL SOIL 0.00: Grass cover 0.00-0.30: Rootlets			
						0.2										
						0.4										
				0.70m ES		0.50m		Cl	CLAY: medium plasticity, mottled red-grey.	D	D					
						0.6										
						0.8										
						0.80m			Hole Terminated at 0.80 m Target Depth							
						1.0										
						1.2										
						1.4										
						1.6										
						1.8										
						2.0										
						2.2										
						2.4										
						2.6										

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP21

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 7/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 1.60 m LONG 0.50 m WIDE	

EXCAVATION						MATERIAL									
VE	E	F	H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations	
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 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP22

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 7/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.40 m LONG 0.60 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP23

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 7/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.20 m LONG 0.60 m WIDE	

EXCAVATION				MATERIAL								
VE PENETRATION F H		SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
<												

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP24

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 7/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.10 m LONG 0.55 m WIDE	

EXCAVATION						MATERIAL									
VE	E	F	H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations	
						0.10m ES	0.0			SILT: brown, trace clay.	D	L - MD	100	RESIDUAL SOIL 0.00: Grass cover 0.00-0.40: Rootlets	
							0.2		ML				200		
													300		
						0.50m ES	0.4			CLAY: medium plasticity, red-brown.	D	D	400		
							0.6		CI						
										Hole Terminated at 0.60 m Target Depth					
							0.8								
							1.0								
							1.2								
							1.4								
							1.6								
							1.8								
							2.0								

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP25

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.50 m LONG 0.50 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
			0.10m ES	0.0		ML	SILT: low to medium plasticity, brown, with clay.	D	L - MD		RESIDUAL SOIL 0.00: Grass cover 0.00-0.30: Rootlets
			0.20m ES	0.2		CLAY: medium plasticity, red-brown.					
			0.30m ES	0.4		CI	0.70: Becoming mottled grey-red	D	D		
			0.80m ES	0.8			Hole Terminated at 0.80 m Target Depth				
				1.0							
				1.2							
				1.4							
				1.6							
				1.8							
				2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP26

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.50 m LONG 0.80 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER at 300 mm	STRUCTURE & Other Observations
				0.0			CLAY: low to medium plasticity, brown, with silt.		L - MD	100	RESIDUAL SOIL 0.00: Grass cover 0.00-0.50: Rootlets
			0.10m ES	0.2		CL-CI		D		200	
			0.50m ES	0.50m			CLAY: medium plasticity, red-brown.		D	300	
				0.6		CI		D		400	
				0.8			0.90: Becoming mottled red-grey				
			1.00m ES	1.0			Hole Terminated at 1.00 m Target Depth				
				1.2							
				1.4							
				1.6							
				1.8							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP27

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 5/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.40 m LONG 0.60 m WIDE	

EXCAVATION						MATERIAL								
VE	E	F	H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
							0.0			SILT: brown, trace clay.			100	RESIDUAL SOIL 0.00: Grass cover 0.00-0.50: Rootlets
						0.10m ES		ML			D	L - MD	200	
						0.30m ES			0.30m				300	
					Not Encountered					CLAY: medium plasticity, red-brown.				
							0.4		Cl		D	D		
							0.6			0.70: Becoming mottled grey-red				
						0.80m ES	0.8		0.80m	Hole Terminated at 0.80 m Target Depth				
							1.0							
							1.2							
							1.4							
							1.6							
							1.8							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP32

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 7/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 1.90 m LONG 0.50 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
</											

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP33

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 6/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.00 m LONG 0.70 m WIDE	

EXCAVATION					MATERIAL									
VE	E	F	H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
							0.0			Silty CLAY: low to medium plasticity, brown.			100	REWORKED NATURAL 0.00: Rubbish on surface 0.00-0.40: Rootlets
						0.10m ES	0.2		CL-CI		D	MD - D	200	
						0.40m ES	0.4			CLAY: medium plasticity, red.			300	
							0.6		CI		D	D	400	RESIDUAL SOIL
						0.70m ES	0.70m			Hole Terminated at 0.70 m Target Depth				
							0.8							
							1.0							
							1.2							
							1.4							
							1.6							
							1.8							
							2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP34

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 6/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.20 m LONG 0.60 m WIDE	

EXCAVATION						MATERIAL									
VE	E	F	H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations	
				Not Encountered		ES	0.0		SW	FILL Silty SAND: fine to medium grained, brown.	D	L		FILL 0.00: Black plastic 0.00-0.10: Rootlets, weeds	
						0.10m									
						0.20m ES	0.2		ML	FILL Sandy Clayey SILT: brown, sand is fine to medium grained; trace medium to coarse grained, sub-angular to angular gravel; trace anthropogenic material (<5%).	D	L - MD			
						0.30m									
						0.40m									
				Not Encountered		0.50m ES	0.4		CI	CLAY: red-brown.	D	D		RESIDUAL SOIL	
						0.60m									
						0.80m									
						0.90m									
						1.00m ES	1.0			MUDSTONE: mottled red-grey, weathered.	D			EXTREMELY WEATHERED	
						1.00m ES	1.0			Hole Terminated at 1.00 m Target Depth					
						1.20m									
						1.40m									
						1.60m									
						1.80m									

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP35

FILE / JOB NO : 30018043

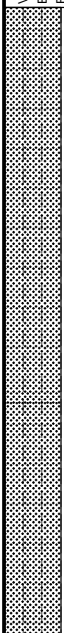
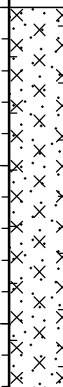
CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 6/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.30 m LONG 0.55 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER 100 200 300 400	STRUCTURE & Other Observations
	Not Encountered		0.10m ES	0.0		ML	FILL Sandy Clayey SILT: brown, sand is fine to medium grained; trace medium to coarse grained, sub-angular to angular gravel; trace anthropogenic material (<10%).	D	L - MD		FILL 0.00-0.50: Rootlets, rope, concrete rubble, plastic, wire, styrofoam, and bricks
			0.50m ES	0.50			CLAY: red-brown.				
						0.80m ES	0.8		CI	Hole Terminated at 0.80 m Target Depth	
				1.0							
				1.2							
				1.4							
				1.6							
				1.8							
				2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP36

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 6/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.20 m LONG 0.50 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
				0.0			FILL Clayey Sandy SILT: brown, sand is fine to medium grained; clay is low plasticity; trace fine to coarse grained, sub-angular gravel.			100 200 300 400	FILL 0.00-0.50: Plastic, HDPE pipe, leaves, twigs, rootlets
			0.10m ES	0.2		ML		D	L - MD		
			0.40m ES	0.4							
		Not Encountered		0.50m			CLAY: medium plasticity, mottled red-grey.				RESIDUAL SOIL
				0.6							
			0.90m ES	0.8		CI		D	D		
				1.0			Hole Terminated at 1.00 m Target Depth				
				1.2							
				1.4							
				1.6							
				1.8							
				2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP37

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 6/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.40 m LONG 0.60 m WIDE	

EXCAVATION						MATERIAL								
VE	E	F	H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP39

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 6/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.30 m LONG 0.60 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
			0.10m ES	0.0			FILL Sandy SILT: dark brown, sand is fine to coarse grained; with clay; trace fine to medium grained, sub-angular gravel; trace anthropogenic material (<5%).	D	L - MD	100 200 300 400	FILL 0.00-0.40: Plastic, HDPE pipe, rootlets
		Not Encountered	0.50m ES	0.2		ML					
				0.4			0.40m CLAY: medium plasticity, red.				RESIDUAL SOIL
				0.6							
				0.8		CI	0.80: Becoming mottled grey-red	D	D		
			1.00m ES	1.0			1.00m Hole Terminated at 1.00 m Target Depth				
				1.2							
				1.4							
				1.6							
				1.8							
				2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP40

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 6/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.40 m LONG 0.60 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
				0.0			FILL Sandy Silty CLAY: low to medium plasticity, dark brown, sand is fine to coarse grained; trace fine to medium grained, sub-angular gravel; trace anthropogenic material (<5%).			100 200 300 400	FILL 0.00-0.30: Concrete rubble, plastic, tiles, wire/conduit
			0.20m ES	0.2		CL-Cl		D	L - MD		
			Not Encountered	0.30m			CLAY: medium plasticity, orange-red-grey mottled.				RESIDUAL SOIL
			0.50m ES	0.4							
			0.80m ES	0.6		Cl		D	D		
				0.90m			Hole Terminated at 0.90 m Target Depth				
				1.0							
				1.2							
				1.4							
				1.6							
				1.8							
				2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP41

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :

SURFACE ELEVATION :

EQUIPMENT TYPE : Excavator

METHOD : Excavation

DATE EXCAVATED : 7/2/2024

LOGGED BY : PV

CHECKED BY : HS

EXCAVATION DIMENSIONS : 1.90 m LONG 0.60 m WIDE

EXCAVATION						MATERIAL									
VE	PE	TH	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations		
						0.0									
					0.10m ES				FILL Gravelly Silty SAND: brown, gravel is fine to coarse grained, sub-angular to sub-rounded; with (Concrete & construction rubble) cobbles; anthropogenic material (<10%).				FILL		
			Not Encountered			0.2		SW		D	L		0.00-0.50: Concrete rubble, sticks, rootlets, bricks, tiles		
						0.4			CLAY: medium plasticity, mottled grey-red.				0.10: HDPE pipe (irrigation)		
					0.60m ES			CI		D	D		RESIDUAL SOIL		
						0.70m			Hole Terminated at 0.70 m Target Depth						
						0.8									
						1.0									
						1.2									
						1.4									
						1.6									
						1.8									
						2.0									

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP42

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 6/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.10 m LONG 0.60 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER 100 200 300 400	STRUCTURE & Other Observations
			Not Encountered	0.0		ML	FILL Sandy SILT: low plasticity, black-brown, sand is fine to medium grained; trace fine to coarse grained, sub-angular gravel.	D	L - MD		FILL 0.00-0.40: Tiles, bricks, rootlets
				0.2							
				0.4		CI	0.40m CLAY: medium plasticity, red.	D	D	RESIDUAL SOIL	
0.6											
0.70m ES			0.70: Becoming mottled red-grey								
0.8			0.80m Hole Terminated at 0.80 m Target Depth								
1.0											
1.2											
1.4											
1.6											
1.8											
2.0											

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP43

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 6/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.30 m LONG 0.70 m WIDE	

EXCAVATION				MATERIAL							
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER 100 200 300 400	STRUCTURE & Other Observations
			0.10m ES	0.0		ML	TOPSOIL Sandy Clayey SILT: brown, clay is low plasticity; sand is fine to medium grained; with coarse, sub-angular gravel; trace anthropogenic material (<2%).	D	L - MD		TOPSOIL 0.00-0.10: Rootlets, concrete rubble, tiles
				0.10m		SP	FILL SAND: medium grained, yellow-brown.	D	L		FILL
				0.20m		CI	CLAY: medium plasticity, red.	D	D		RESIDUAL SOIL
0.50m ES	0.4										
0.80m ES	0.8										
				0.90m			Hole Terminated at 0.90 m Target Depth				
				1.0							
				1.2							
				1.4							
				1.6							
				1.8							
				2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP45

FILE / JOB NO : 30018043

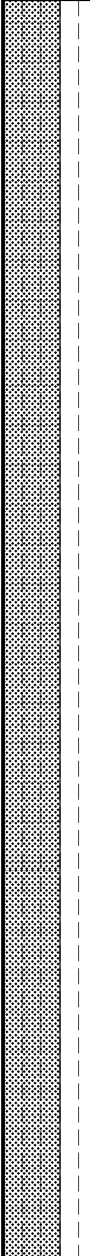
CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 6/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.40 m LONG 1.00 m WIDE	

EXCAVATION						MATERIAL											
VE E F H			SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations				
			Not Encountered	0.10m ES	0.0		ML	FILL Sandy SILT: brown, sand is fine to medium grained; trace low plasticity clay; trace medium to coarse grained, sub-angular to sub-rounded gravel; trace anthropogenic material (<15%).	D	L		FILL 0.00-1.10: Plastic rope, bricks, tiles, wire, metal pieces, fabric, terracotta pipe, rootlets, sticks, leaves					
					0.2												
					0.4												
					0.6												
					0.8												
					1.0												
					1.10m												
					1.2								Cl	CLAY: medium plasticity, mottled red-grey.	D		RESIDUAL SOIL
					1.4												
					1.50m ES												
1.6																	
					1.60m		Hole Terminated at 1.60 m Target Depth										
					1.8												
					2.0												

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP46

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 6/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.50 m LONG 0.80 m WIDE	

EXCAVATION						MATERIAL								
VE E PENETRATION F H			SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations	
			Not Encountered	0.10m ES	0.50m ES	0.0		ML	FILL Sandy SILT: brown, sand is fine to medium grained; trace low plasticity clay; trace medium to coarse grained, sub-angular to sub-rounded gravel; trace anthropogenic material (<15%).	D	L - MD	100	FILL 0.00-0.70: Tiles, plastic, styrofoam, rootlets, leaves	
						200								
						300								
0.80m ES		CI	CLAY: mottled grey-orange,red.	D	D	400	RESIDUAL SOIL							
					Hole Terminated at 0.90 m Target Depth	1.0								
						1.2								
						1.4								
						1.6								
						1.8								

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

EXCAVATION - GEOLOGICAL LOG

PIT NO : STP47

FILE / JOB NO : 30018043

CLIENT : SINSW

PROJECT : SINSW Projects

LOCATION : Richard Road Leppington NSW

SHEET : 1 OF 1

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Excavator	METHOD : Excavation
DATE EXCAVATED : 6/2/2024	LOGGED BY : PV
CHECKED BY : HS	
EXCAVATION DIMENSIONS : 2.90 m LONG 0.90 m WIDE	

EXCAVATION				MATERIAL							
VE E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	USCS CODE	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations
			0.10m ES	0.0			FILL Sandy SILT: brown, sand is fine to medium grained; trace low plasticity clay; trace medium to corase grained, sub-angular to sub-rounded gravel; trace anthropogenic material (<10%).			100 200 300 400	FILL 0.00-1.40: Styrofoam, tiles, rope, plastic, sticks, leaves, rootlets, bricks, HDPE pipe, wood pieces 0.10: PACM, good condition, approximately 2cm x 2cm
			0.60m ES	0.2							
				0.4							
				0.6		ML		D	L - MD		
				0.8							
				1.0							
			1.20m ES	1.2							
				1.4			1.40m CLAY: medium plasticity, red-grey mottled.				RESIDUAL SOIL
				1.6		CI		D	D		
			1.70m ES	1.8			1.80m Hole Terminated at 1.80 m Target Depth				
				2.0							

 PHOTOGRAPHS
NOTES

☐ YES

☒ NO

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

SUMMARY TEST PIT LOG

Pit Identifier: FCF2/3

Project: Leppington Detailed Site Investigation – Additional Sampling

Client: School Infrastructure

Site:

Job No: 30018043

Easting:

Northing:

Elevation:

Datum:

Contractor: Smartscan

Equipment Type: 3.5T Excavator

Pit Dimensions:

Test Pit ID	Depth (m bgl)	Material Description	Moisture	Consistency / Density	PID (ppm)	Structure and other observations
FCF2/3	0.0-0.2	Clayey SILT: low plasticity, brown.	D	MD	Refer to Appendix G	TOPSOIL 0.00-0.20: Rootlets
	0.2-0.5	CLAY: medium plasticity, red.	D	D		RESIDUAL SOIL

Test pit terminated at 0.5m
Target depth reached

Water Inflow: None observed
Water Level: NA

Observations and Comments: The logs of FCF2/3 step-out locations are the same as test pit FCF2/3	Logged by: A Huang	Date: 24/07/2024
	Approved by:	Date:

SUMMARY TEST PIT LOGPit Identifier: **STP45-A**

Project: Leppington Detailed Site Investigation – Easting:
Additional Sampling
Client: School Infrastructure Northing:
Site: Elevation:
Job No: 30018043 Datum:

Contractor: Smartscan
Equipment Type: 3.5T Excavator
Pit Dimensions:

Test Pit ID	Depth (m bgl)	Material Description	Moisture	Consistency / Density	PID (ppm)	Structure and other observations
STP45-A	0.0-0.2	Sandy Clayey SILT: brown, clay is low plasticity; sand is fine to medium grained; with coarse, sub-angular gravel; trace anthropogenic material	D	MD	Refer to Appendix G	TOPSOIL 0.00-0.10: Rootlets, concrete rubble, tiles
	0.2-2.0	CLAY: medium plasticity, red.	D	D		RESIDUAL SOIL

Test pit terminated at 2.0m

Target depth reached

Water Inflow: None observed
Water Level: NA

Observations and Comments: The logs of STP45-D and STP45-E are the same as test pit STP45-A	Logged by: A Huang	Date: 24/07/2024
	Approved by:	Date:

SUMMARY TEST PIT LOG

Pit Identifier: **STP45-C**

Project: Leppington Detailed Site Investigation – Additional Sampling

Client: School Infrastructure

Site:

Job No: 30018043

Easting:

Northing:

Elevation:

Datum:

Contractor: Smartscan

Equipment Type: 3.5T Excavator

Pit Dimensions:

Test Pit ID	Depth (m bgl)	Material Description	Moisture	Consistency / Density	PID (ppm)	Structure and other observations
STP45-C	0.0-0.5	Clayey SILT: low plasticity, brown.	D	MD	Refer to Appendix G	FILL 0.0-0.3 Significant amount of ACM fragments observed

Test pit terminated at 0.5m
Target depth reached

Water Inflow: None observed
Water Level: NA

Observations and Comments:	Logged by: A Huang	Date: 24/07/2024
	Approved by:	Date:

SUMMARY TEST PIT LOG

Pit Identifier: **STP45-B**

Project: Leppington Detailed Site Investigation – Additional Sampling

Client: School Infrastructure

Site:

Job No: 30018043

Easting:

Northing:

Elevation:

Datum:

Contractor: Smartscan

Equipment Type: 3.5T Excavator

Pit Dimensions:

Test Pit ID	Depth (m bgl)	Material Description	Moisture	Consistency / Density	PID (ppm)	Structure and other observations
STP45-B	0.0-0.5	CLAY: medium plasticity, red.	D	D	Refer to Appendix G	RESIDUAL SOIL

Test pit terminated at 0.5m
Target depth reached

Water Inflow: None observed
Water Level: NA

Observations and Comments:	Logged by: A Huang	Date: 24/07/2024
	Approved by:	Date:

SUMMARY TEST PIT LOG

Pit Identifier: **STP45-B**

Project: Leppington Detailed Site Investigation – Additional Sampling

Client: School Infrastructure

Site:

Job No: 30018043

Easting:

Northing:

Elevation:

Datum:

Contractor: Smartscan

Equipment Type: 3.5T Excavator

Pit Dimensions:

Test Pit ID	Depth (m bgl)	Material Description	Moisture	Consistency / Density	PID (ppm)	Structure and other observations
STP45-B	0.0-0.5	CLAY: medium plasticity, red.	D	D	Refer to Appendix G	RESIDUAL SOIL

Test pit terminated at 0.5m
Target depth reached

Water Inflow: None observed
Water Level: NA

Observations and Comments:	Logged by: A Huang	Date: 24/07/2024
	Approved by:	Date:

SUMMARY TEST PIT LOG

Pit Identifier: **BH2**

Project: Leppington Detailed Site Investigation – Additional Sampling

Client: School Infrastructure

Site:

Job No: 30018043

Easting:

Northing:

Elevation:

Datum:

Contractor: Smartscan

Equipment Type: 3.5T Excavator

Pit Dimensions:

Test Pit ID	Depth (m bgl)	Material Description	Moisture	Consistency / Density	PID (ppm)	Structure and other observations
BH2	0.0-0.2	Sandy Clayey SILT: brown, clay is low plasticity; sand is fine to medium grained; with coarse, sub-angular gravel; trace anthropogenic material	D	MD	Refer to Appendix G	TOPSOIL 0.00-0.10: Rootlets, concrete rubble, tiles
	0.2-0.5	CLAY: medium plasticity, red.	D	D		RESIDUAL SOIL

Test pit terminated at 0.5m
Target depth reached

Water Inflow: None observed

Water Level: NA

Observations and Comments: The logs of BH2 step-out locations are the same as test pit BH2	Logged by: A Huang	Date: 24/07/2024
	Approved by:	Date:

SUMMARY TEST PIT LOG

Pit Identifier: **BH4**

Project: Leppington Detailed Site Investigation – Easting:
 Additional Sampling
 Client: School Infrastructure Northing:
 Site: Elevation:
 Job No: 30018043 Datum:

Contractor: Smartscan
 Equipment Type: 3.5T Excavator
 Pit Dimensions:

Test Pit ID	Depth (m bgl)	Material Description	Moisture	Consistency / Density	PID (ppm)	Structure and other observations
BH4	0.0-0.5	Sandy Clayey SILT: brown, clay is low plasticity; sand is fine to medium grained; with coarse, sub-angular gravel; trace anthropogenic material	D	MD	Refer to Appendix G	RESIDUAL SOIL 0.00-0.20m: Concrete rubble, bricks, tiles 0.30-0.40m: Layer of ACM fragments
	0.5-2.0	CLAY: medium plasticity, red.	D	D		RESIDUAL SOIL

Test pit terminated at 2.0m

Target depth reached

Water Inflow: None observed
 Water Level: NA

Observations and Comments: The logs of BH4 step-out locations and STP50 are the same as test pit BH4. ACM fragments were also observed in step-out test pit BH4-A and D	Logged by: A Huang	Date: 24/07/2024
	Approved by:	Date:

SUMMARY TEST PIT LOG

Pit Identifier: **STP39**

Project: Leppington Detailed Site Investigation – Additional Sampling

Client: School Infrastructure

Site:

Job No: 30018043

Easting:

Northing:

Elevation:

Datum:

Contractor: Smartscan

Equipment Type: 3.5T Excavator

Pit Dimensions:

Test Pit ID	Depth (m bgl)	Material Description	Moisture	Consistency / Density	PID (ppm)	Structure and other observations
STP39	0.0-0.2	Clayey SILT: low plasticity, brown, trace anthropogenic material	D	MD	Refer to Appendix G	TOPSOIL 0.00-0.20: Rootlets, concrete rubble, bricks, tiles
	0.2-0.5	CLAY: medium plasticity, red.	D	D		RESIDUAL SOIL

Test pit terminated at 0.5m
Target depth reached

Water Inflow: None observed
Water Level: NA

Observations and Comments: The logs of STP39, BH6, BH9 and SHA16 step-out locations the same as test pit STP39	Logged by: A Huang	Date: 24/07/2024
	Approved by:	Date:

SUMMARY TEST PIT LOG

Pit Identifier: **ACM02**

Project: Leppington Detailed Site Investigation – Additional Sampling

Client: School Infrastructure

Site:

Job No: 30018043

Easting:

Northing:

Elevation:

Datum:

Contractor: Smartscan

Equipment Type: 3.5T Excavator

Pit Dimensions:

Test Pit ID	Depth (m bgl)	Material Description	Moisture	Consistency / Density	PID (ppm)	Structure and other observations
ACM02	0.0-0.4	FILL Gravelly SAND: fine to coarse grained, pale yellow-brown, gravel is fine to coarse grained, sub-angular to sub-rounded (sst, concrete); with cobbles.	D	MD	Refer to Appendix G	FILL 0.00-0.50: cobbles, concrete rubble, rootlets, bricks, and tiles

Test pit terminated at 0.4m
Target depth reached

Water Inflow: None observed
Water Level: NA

Observations and Comments: The logs of ACM02 step-out locations the same as test pit ACM02	Logged by: A Huang	Date: 24/07/2024
	Approved by:	Date:

SUMMARY TEST PIT LOG

Pit Identifier: **STP21**

Project: Leppington Detailed Site Investigation – Additional Sampling

Client: School Infrastructure

Site:

Job No: 30018043

Easting:

Northing:

Elevation:

Datum:

Contractor: Smartscan

Equipment Type: 3.5T Excavator

Pit Dimensions:

Test Pit ID	Depth (m bgl)	Material Description	Moisture	Consistency / Density	PID (ppm)	Structure and other observations
STP21	0.0-0.3	SILT: brown, trace clay.	D	MD	Refer to Appendix G	TOPSOIL 0.00-0.30: Rootlets and grass cover
	0.3-0.5	CLAY: medium plasticity, mottled red-grey	D	D		RESIDUAL SOIL

Test pit terminated at 0.5m
Target depth reached

Water Inflow: None observed
Water Level: NA

Observations and Comments: The logs of STP21, BH30, STP07, STP08 and SHA01 step-out locations, HA-D, HA-E, HA-F, and HA-G are the same as test pit STP39	Logged by: A Huang	Date: 24/07/2024
	Approved by:	Date:

SUMMARY TEST PIT LOG

Pit Identifier: **STP10**

Project: Leppington Detailed Site Investigation – Easting:
 Additional Sampling
 Client: School Infrastructure Northing:
 Site: Elevation:
 Job No: 30018043 Datum:

Contractor: Smartscan
 Equipment Type: 3.5T Excavator
 Pit Dimensions:

Test Pit ID	Depth (m bgl)	Material Description	Moisture	Consistency / Density	PID (ppm)	Structure and other observations
STP10	0.0-0.02	SILT: brown, trace clay	D	MD	Refer to Appendix G	TOPSOIL 0.00-0.02: Rootlets and grass cover
	0.02-0.3	SILT: brown, trace anthropogenic material				FILL 0.02-0.30: Rubbles, concrete, bricks, terracotta tiles
	0.3-0.5	CLAY: medium plasticity, mottled red-grey	D	D		RESIDUAL SOIL

Test pit terminated at 0.5m
 Target depth reached

Water Inflow: None observed
 Water Level: NA

Observations and Comments: The logs of STP21 step-out locations, HA-D, HA-E, HA-F, and HA-G are the same as test pit STP39	Logged by: A Huang	Date: 24/07/2024
	Approved by:	Date:

SUMMARY TEST PIT LOGPit Identifier: **HA-H**

Project: Leppington Detailed Site Investigation – Easting:
Additional Sampling
Client: School Infrastructure Northing:
Site: Elevation:
Job No: 30018043 Datum:

Contractor: Smartscan
Equipment Type: 3.5T Excavator
Pit Dimensions:

Test Pit ID	Depth (m bgl)	Material Description	Moisture	Consistency / Density	PID (ppm)	Structure and other observations
HA-H	0.0-0.2	SILT: dark brown, trace clay.	W	L	Refer to Appendix G	FILL
	0.2-0.5	CLAY: medium plasticity, red	W	D		RESIDUAL SOIL

Test pit terminated at 0.5m

Target depth reached

Water Inflow: None observed
Water Level: NA

Observations and Comments: The logs of HA-I and HA-J are the same as hand auger location HA-H	Logged by: A Huang	Date: 24/07/2024
	Approved by:	Date:

SUMMARY TEST PIT LOGPit Identifier: **HA-K**

Project: Leppington Detailed Site Investigation – Easting:
Additional Sampling
Client: School Infrastructure Northing:
Site: Elevation:
Job No: 30018043 Datum:

Contractor: Smartscan
Equipment Type: 3.5T Excavator
Pit Dimensions:

Test Pit ID	Depth (m bgl)	Material Description	Moisture	Consistency / Density	PID (ppm)	Structure and other observations
HA-H	0.0-0.2	SILT: brown	D	MD	Refer to Appendix G	FILL 0.0-0.2: rootlets
	0.2-0.5	CLAY: medium plasticity, red	D	D		RESIDUAL SOIL

Test pit terminated at 0.5m

Target depth reached

Water Inflow: None observed
Water Level: NA

Observations and Comments: The logs of hand auger locations within greenhouse footprint (HA-K, HA-L, HA-M, HA-N, HA-O, HA-P, HA-Q, HA-R, HA-T, HA-U, HA-V, HA-W) are the same as hand auger location HA-K	Logged by: A Huang	Date: 24/07/2024
	Approved by:	Date:

Appendix D

Tables

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				Physical		Asbestos		Metals												Inorganics								TRH								TRH - (Silica Gel Cleanup)								TPH																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Sample ID	Sample Date	Field Mobilisation	Lab Report Number	Total Organic Carbon	Moisture Content (dried @ 103°C)	Cation Exchange Capacity	pH Clay*	Weight 10L	Comment	Asbestos (D = Detect / ND = Non-Detect)	Asbestos AF/FA (WA Guidelines)	Iron (%)	Arsenic	Cadmium	Chromium (III+VI)	Copper	Iron	Lead	Mercury	Nickel	Nickel TCLP	Zinc	Conductivity (1:5 aqueous extract)	Nitrite + Nitrate as N	Electrical Conductivity (µS)	Nitrate as N	Nitrite as N	Nitrogen (Total)	pH (Lab)	Total Phosphorus	G-C10 Fraction (F1)	G-C10 (F1 minus BTEX)	X-C10-C16 Fraction (F2)	X-C10-C16 Fraction (F2 minus Naphthalene)	X-C16-C24 Fraction (F3)	X-C24-C40 Fraction (F4)	X-C10-C40 Fraction (Sum)	X-C10-C16 Fraction (S5)	X-C16-C24 Fraction (S5)	X-C24-C40 Fraction (S5)	X-C10-C40 Fraction (S5)	C10-C14 Fraction (S5)	C15-C28 Fraction (S5)	C28-C36 Fraction (S5)	G-C39 Fraction																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
CRC Care HSL-C Recreational / Open Space				0.1	1	0.5	2.5					0.001	0.01	2	0.4	2	20	5	600	80	1,200	30,000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						

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Environmental Standards
CRC Care, 2011, CRC Care HSL-C Recreational / Open Space
2013, NEMP 2013 Table 1A(1) H/Ls Rec C Soil
2013, NEMP 2013 Table 1A(3) Rec C Soil H/Ls for Vapour Intrusion, Sand
2013, NEMP 2013 Table 1B(6) E/SLs for Urban Res, Coarse Soil
NEMP, 2013, NEMP 2013 Table 7 Rec C Soil for Asbestos on Soil
NSW EPA, November 2014, NSW 2014 General Solid Waste CT1 (No Leaching)
NSW EPA, November 2014, NSW 2014 Restricted Solid Waste CT2 (No Leaching)
HEPA, January 2020, PFAS NEMP 2020 Public open space (H/LC)

NL = Non Limiting

[illegible]

[illegible]

Environmental Standards

CRC Care, 2011, CRC Care HSL-C Recreational / Open Space

2013, NEPM 2013 Table 1A(1) HILs Rec C Soil

2013, NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand

2013, NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil

2013, NEPM 2013 Table 7 Rec C Soil for Asbestos in Soil

NSW EPA, November 2014, NSW 2014 General Solid Waste CT1 (No Leaching)

NSW EPA, November 2014, NSW 2014 Restricted Solid Waste CT2 (No Leaching)

HEPA, January 2020, PFAS NEMP 2020 Public open space (HLC)

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NL = Non Limiting

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NL = Non Limiting

		Organophosphorous Pesticides																																Acid Sulphate Soils		Pesticides																
		Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Dimethoate	Disulfoton	Ethion	Ethionap	Fenitrothion	Fenitrothion	Fenitrothion	EPN	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Parathion	Phorate	Phosphoromethyl	Prothios	Pyraclophos	Ronnel	Terbufos	Trichlorfonate	Tetrachlorophos	Reaction Rate	Reaction Rate	3-Hydroxy Carburetan	Adicarb	Bendiocarb	Cararyl	Carbofuran	Cypermethrin(sotal)	Demeton-S-methyl	Fenamiphos	Fenvalerate	Methionyl	Oxamyl	Pemethrin					
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg					
CRC Care HSL-C Recreational / Open Space		LOR	0.005	0.05	0.05	0.002	0.2																																													
NEPM 2013 Table 1A(1) HSLs Rec C Soil				250																																																
NEPM 2013 Table 1A(3) HSLs Res B Soil				340																																																
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand																																																				
NEPM 2013 Table 1B(5) Generic EL - Urban Res & Public Open Space																																																				
NEPM 2013 Site Specific EL - Urban Res & Public Open Space																																																				
NEPM 2013 Table 1B(6) ELs for Urban Res, Coarse Soil (CME 2013 for Bar)																																																				
NEPM 2013 Table 7 Rec C HSL for Asbestos in Soil																																																				
NSW 2014 General Solid Waste CT1 (No Leaching)				4																																																
NSW 2014 Restricted Solid Waste CT2 (No Leaching)				16																																																
NSW 2014 General Solid Waste TOLP1																																																				
NSW 2014 General Solid Waste SCOT																																																				
PFAS NEPM 2020 Public open space (HLLC)																																																				
Sample ID	Sample Date	Field Mobilisation	Lab Report Number	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
ACM-01	07 Feb 2024	Mobilisation 1: Initial DSI mobilisation	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
ACM-02	06 Feb 2024	Mobilisation 1: Initial DSI mobilisation	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ACM02-0.3	25 Jul 2024	Mobilisation 2: Additional 'step-out' sampling	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
ACM02-A	25 Jul 2024	Mobilisation 2: Additional 'step-out' sampling	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
ACM02-B	25 Jul 2024	Mobilisation 2: Additional 'step-out' sampling	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
ACM02-C	25 Jul 2024	Mobilisation 2: Additional 'step-out' sampling	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH2-0.3	24 Jul 2024	Mobilisation 2: Additional 'step-out' sampling	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH2-A	24 Jul 2024	Mobilisation 2: Additional 'step-out' sampling	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH2-B	24 Jul 2024	Mobilisation 2: Additional 'step-out' sampling	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH2-C	24 Jul 2024	Mobilisation 2: Additional 'step-out' sampling	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH2-D	24 Jul 2024	Mobilisation 2: Additional 'step-out' sampling	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH4-0.5	24 Jul 2024	Mobilisation 2: Additional 'step-out' sampling	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH4-B	24 Jul 2024	Mobilisation 2: Additional 'step-out' sampling	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH4-C	24 Jul 2024	Mobilisation 2: Additional 'step-out' sampling	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-</										

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			Organophosphorous Pesticides																																Acid Sulphate Soils		Pesticides																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
			Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Dimethoate	Dialifoson	Ethion	Ethionoprop	Fenitrothion	Fenprothion	Fenprothion	EPN	Malathion	Meperhos	Methyl parathion	Mevinphos (Prosdin)	Monocrotophos	Naled (Dibrom)	Omethoate	Parathion	Phorate	Triumphosphoromethyl	Prothiofos	Pyrocaphos	Ronnel	Tenofus	Trichloronate	Tenachlorophos	Reaction Rate	Reaction Rate	3-Hydroxy Carbolluran	Aldicarb	Bendiocarb	Carabaryl	Carbolluran	Cypermethrin (total)	Demeton-S-methyl	Fenamiphos	Fenvalerate	Methionyl	Oxamyl	Pemethrin																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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Environmental Standards
CRC Care, 2011, CRC Care HSL-C Recreational / Open Space
2013, NEPM 2013 Table 1A(1) HILs Rec C Soil
2013, NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand
2013, NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil
NEPM, 2013, NEPM 2013 Table 7 Rec C HSL for Asbestos in Soil
NSW EPA, November 2014, NSW 2014 General Solid Waste CT1 (No Leaching)
NSW EPA, November 2014, NSW 2014 Restricted Solid Waste CT2 (No Leaching)
HEPA, January 2020, PFAS NEMP 2020 Public open space (HIL C)

Nil = Non Limiting

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[illegible]

NL = Non Limiting



Table D2 - Water Analytical Table

	Inorganics						Metals								TRH							
	Total Phosphorus as P (Organic Phosphate as P)	Nitrite + Nitrate as N	Kjeldahl Nitrogen Total	Nitrate (as N)	Nitrite (as N)	Nitrogen (Total)	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	C6-C10 Fraction (F1)		C6-C10 (F1 minus BTEX)	>C10-C16 Fraction (F2)	>C10-C16 Fraction (F2 minus Naphthalene)	>C16-C34 Fraction (F3)	>C34-C40 Fraction (F4)	>C10-C40 Fraction (Sum)
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	%	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR	0.01	0.01	0.1	0.02	0.02	0.1	0.001	0.0001	0.001	0.001	0.001	0.0001	0.001	0.005	20	1	20	50	50	100	100	100
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs								0.0002			0.0034	0.0006	0.011									
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand																	NL NL NL		NL NL NL			
PFAS NEMP 2020 Freshwater 95%																						

Sample ID	Sample Date	Lab Report Number																						
PFAS BLANK	07 Feb 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
QA10	08 Feb 2024	1067428	7.9	<0.05	3.2	<0.02	<0.02	3.2	0.002	<0.0002	<0.001	0.002	<0.001	<0.0001	0.002	0.016	<20	-	<20	<50	<50	<100	<100	<100
QA10a	08 Feb 2024	ES2404961	8.16	0.01	4.6	-	-	4.6	0.001	<0.0001	<0.001	0.003	<0.001	<0.0001	0.003	0.016	<20	-	<20	<100	<100	<100	<100	<100
RINSATE01	06 Feb 2024	1067428	<0.01	<0.05	<0.2	<0.02	<0.02	<0.2	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005	<20	-	<20	<50	<50	<100	<100	<100
RINSATE01	24 Jul 2024	1123575	-	-	-	-	-	-	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005	<20	-	<20	<50	<50	<100	<100	<100
RINSATE02	07 Feb 2024	1067428	<0.01	<0.05	<0.2	<0.02	<0.02	<0.2	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005	<20	-	<20	<50	<50	<100	<100	<100
RINSATE02	26 Jul 2024	1123575	-	-	-	-	-	-	<0.001	<0.0002	0.008	0.002	<0.001	<0.0001	0.001	<0.005	<20	-	<20	<50	<50	<100	<100	<100
RINSATE03	29 Jul 2024	1123575	-	-	-	-	-	-	<0.001	<0.0002	0.003	<0.001	<0.001	<0.0001	<0.001	<0.005	<20	-	<20	<50	<50	<100	<100	<100
SSW01	08 Feb 2024	1067428	7.7	<0.05	0.4	<0.02	<0.02	0.4	0.002	<0.0002	<0.001	0.003	<0.001	<0.0001	0.002	0.017	<20	-	<20	<50	<50	<100	<100	<100
SSW02	08 Feb 2024	1067428	1.4	4.7	3.4	4.7	0.06	8.1	0.002	<0.0002	0.002	0.012	0.002	<0.0001	0.004	0.034	<20	-	<20	<50	<50	<100	<100	<100
WATER TRIP BLANK 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	<20	-	-	-	-	-
WATER TRIP BLANK 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	<20	-	-	-	-	-
WATER TRIP SPIKE 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	72	-	-	-	-	-	-
WATER TRIP SPIKE 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	110	-	-	-	-	-	-

Environmental Standards
ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
2013, NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%

NL = Non Limiting



Table D2 - Water Analytical Table

	TPH						BTEXN																					
	C6-C9 Fraction		C10-C14 Fraction		C15-C28 Fraction		C29-C36 Fraction		C10-C36 Fraction (Sum)		Naphthalene (VOC)		Naphthalene		Benzene		Toluene		Ethylbenzene		Xylene (m & p)		Xylene (o)		Xylene Total		Total BTEX	
	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		
LOR	20	1	50	100	50	50			5	1	1		1		1		1		2	1	1		1	1	2	1	1	
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs									16		16		950		180		80				350							
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand									NL		NL		NL		NL		NL							NL				
PFAS NEMP 2020 Freshwater 95%																												

Sample ID	Sample Date	Lab Report Number																									
PFAS BLANK	07 Feb 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QA10	08 Feb 2024	1067428	<20	-	<50	<100	<100	<100	<10	-	<1	<1	-	<1	-	<1	-	<2	-	<1	-	<3	-	-	-	-	-
QA10a	08 Feb 2024	ES2404961	<20	-	<50	<100	<50	<50	<5	-	<1.0	<1	-	<2	-	<2	-	<2	-	<2	-	<2	-	<3	-	<1	<1
RINSATE01	06 Feb 2024	1067428	<20	-	<50	<100	<100	<100	<10	-	<1	<1	-	<1	-	<1	-	<2	-	<1	-	<3	-	-	-	-	-
RINSATE01	24 Jul 2024	1123575	<20	-	<50	<100	<100	<100	<10	-	<1	<1	-	<1	-	<1	-	<2	-	<1	-	<3	-	-	-	-	-
RINSATE02	07 Feb 2024	1067428	<20	-	<50	<100	<100	<100	<10	-	<1	<1	-	<1	-	<1	-	<2	-	<1	-	<3	-	-	-	-	-
RINSATE02	26 Jul 2024	1123575	<20	-	<50	<100	<100	<100	<10	-	<1	<1	-	<1	-	<1	-	<2	-	<1	-	<3	-	-	-	-	-
RINSATE03	29 Jul 2024	1123575	<20	-	<50	<100	<100	<100	<10	-	<1	<1	-	<1	-	<1	-	<2	-	<1	-	<3	-	-	-	-	-
SSW01	08 Feb 2024	1067428	<20	-	<50	<100	<100	<100	<10	-	<1	<1	-	<1	-	<1	-	<2	-	<1	-	<3	-	-	-	-	-
SSW02	08 Feb 2024	1067428	<20	-	<50	<100	<100	<100	<10	-	<1	<1	-	<1	-	<1	-	<2	-	<1	-	<3	-	-	-	-	-
WATER TRIP BLANK 1	25 Jan 2024	1067428	<20	-	-	-	-	-	<10	-	-	<1	-	<1	-	<1	-	<2	-	<1	-	<3	-	-	-	-	-
WATER TRIP BLANK 2	25 Jan 2024	1067428	<20	-	-	-	-	-	<10	-	-	<1	-	<1	-	<1	-	<2	-	<1	-	<3	-	-	-	-	-
WATER TRIP SPIKE 1	25 Jan 2024	1067428	-	71	-	-	-	-	-	97	-	-	110	-	88	-	100	-	110	-	100	-	110	-	110	-	-
WATER TRIP SPIKE 2	25 Jan 2024	1067428	-	110	-	-	-	-	-	98	-	-	110	-	83	-	98	-	100	-	97	-	98	-	98	-	-

Environmental Standards

ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
2013, NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%

NL = Non Limiting



	MAH										Other											
	Total MAH	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	Actril (loxynil)	Other chlorinated hydrocarbons EPAVic	Chlorinated hydrocarbons EPAVic	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane
	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
LOR	3	1	1	1	5	5	5	5	1	5	1	5	5	1	1	1	1	1	1	5	1	5
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs				30											270	400	6,500		700			
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand																						
PFAS NEMP 2020 Freshwater 95%																						

Sample ID	Sample Date	Lab Report Number																						
PFAS BLANK	07 Feb 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QA10	08 Feb 2024	1067428	<3	<1	<1	<1	-	-	-	-	<1	-	-	<5	<5	<1	<1	<1	<1	<1	-	<1	-	-
QA10a	08 Feb 2024	ES2404961	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
RINSATE01	06 Feb 2024	1067428	<3	<1	<1	<1	-	-	-	-	<1	-	<1	<5	<5	<1	<1	<1	<1	<1	-	<1	-	-
RINSATE01	24 Jul 2024	1123575	<3	<1	<1	<1	-	-	-	-	<1	-	<1	<5	<5	<1	<1	<1	<1	<1	-	<1	-	-
RINSATE02	07 Feb 2024	1067428	<3	<1	<1	<1	-	-	-	-	<1	-	<1	<5	<5	<1	<1	<1	<1	<1	-	<1	-	-
RINSATE02	26 Jul 2024	1123575	<3	<1	<1	<1	-	-	-	-	<1	-	-	<5	<5	<1	<1	<1	<1	<1	-	<1	-	-
RINSATE03	29 Jul 2024	1123575	<3	<1	<1	<1	-	-	-	-	<1	-	<1	<5	<5	<1	<1	<1	<1	<1	-	<1	-	-
SSW01	08 Feb 2024	1067428	<3	<1	<1	<1	-	-	-	-	<1	-	-	<5	<5	<1	<1	<1	<1	<1	-	<1	-	-
SSW02	08 Feb 2024	1067428	<3	<1	<1	<1	-	-	-	-	<1	-	-	<5	<5	<1	<1	<1	<1	<1	-	<1	-	-
WATER TRIP BLANK 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP BLANK 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards
ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
2013, NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%

NL = Non Limiting



	Chlorinated Hydrocarbons																					
	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Dichloromethane	Hexachlorobutadiene	Trichloroethene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Vinyl chloride
	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
LOR	1	1	1	5	1	1	1	1	1	5	5	5	1	1	1	5	5	1	1	1	1	5
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs	1,900	900	1,100					240			770					4,000		330	70			100
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand																						
PFAS NEMP 2020 Freshwater 95%																						

Sample ID	Sample Date	Lab Report Number																					
PFAS BLANK	07 Feb 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QA10	08 Feb 2024	1067428	<1	<1	<1	-	<1	<1	<1	<1	<1	<5	<5	<5	<1	<1	<5	-	<1	<1	<1	<1	<5
QA10a	08 Feb 2024	ES2404961	<5	<5	<5	<5	-	<5	<5	<5	<5	<50	<5	<5	<5	-	<5	<5	<5	<5	<5	<5	<50
RINSATE01	06 Feb 2024	1067428	<1	<1	<1	-	<1	<1	<1	<1	<1	<5	<5	<5	<1	<1	<5	-	<1	<1	<1	<1	<5
RINSATE01	24 Jul 2024	1123575	<1	<1	<1	-	<1	<1	<1	<1	<1	<5	<5	<5	<1	<1	<1	<5	-	<1	<1	<1	<5
RINSATE02	07 Feb 2024	1067428	<1	<1	<1	-	<1	<1	<1	<1	<1	<5	<5	<5	<1	<1	<1	<5	-	<1	<1	<1	<5
RINSATE02	26 Jul 2024	1123575	<1	<1	<1	-	<1	<1	<1	<1	<1	<5	<5	<5	<1	<1	<1	<5	-	<1	<1	<1	<5
RINSATE03	29 Jul 2024	1123575	<1	<1	<1	-	<1	<1	<1	<1	<1	<5	<5	<5	<1	<1	<1	<5	-	<1	<1	<1	<5
SSW01	08 Feb 2024	1067428	<1	<1	<1	-	<1	<1	<1	<1	<1	<5	<5	<5	<1	<1	<1	<5	-	<1	<1	<1	<5
SSW02	08 Feb 2024	1067428	<1	<1	<1	-	<1	<1	<1	<1	<1	<5	<5	<5	<1	<1	<1	<5	-	<1	<1	<1	<5
WATER TRIP BLANK 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP BLANK 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards
ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
2013, NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%

NL = Non Limiting



	Halogenated Benzenes									Halogenated Hydrocarbons					Herbicides							
	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Chlorobenzene	1,2-dibromoethane	Bromomethane	Dichlorodifluoromethane	Iodomethane	Trichlorofluoromethane	2,4,5-Trichlorophenoxy Acetic Acid	2,4,5-TP (Silvex)	Hedonal	2,4-Dichlorprop	4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	Dicamba	Dinoseb	2-Methyl-4-chlorophenoxyacetic acid
	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
LOR	5	5	1	1	1	5	1	1	1	1	5	5	1	5	1	1	1	1	1	1	1	1
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs	10	170	160	260	60				55						36		280					
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand																						
PFAS NEMP 2020 Freshwater 95%																						

Sample ID	Sample Date	Lab Report Number																					
PFAS BLANK	07 Feb 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QA10	08 Feb 2024	1067428	-	-	<1	<1	<1	-	<1	<1	<1	<1	<5	<5	<1	<5	-	-	-	-	-	-	-
QA10a	08 Feb 2024	ES2404961	<5	<5	<5	<5	<5	<5	<5	<5	<5	<50	<50	<50	<5	<50	-	-	-	-	-	-	-
RINSATE01	06 Feb 2024	1067428	-	-	<1	<1	<1	-	<1	<1	<1	<1	<5	<5	<1	<5	<1	<1	<1	<1	<1	<1	<1
RINSATE01	24 Jul 2024	1123575	-	-	<1	<1	<1	-	<1	<1	<1	<1	<5	<5	<1	<5	<1	<1	<1	<1	<1	<1	<1
RINSATE02	07 Feb 2024	1067428	-	-	<1	<1	<1	-	<1	<1	<1	<1	<5	<5	<1	<5	<1	<1	<1	<1	<1	<1	<1
RINSATE02	26 Jul 2024	1123575	-	-	<1	<1	<1	-	<1	<1	<1	<1	<5	<5	<1	<5	-	-	-	-	-	-	-
RINSATE03	29 Jul 2024	1123575	-	-	<1	<1	<1	-	<1	<1	<1	<1	<5	<5	<1	<5	<1	<1	<1	<1	<1	<1	<1
SSW01	08 Feb 2024	1067428	-	-	<1	<1	<1	-	<1	<1	<1	<1	<5	<5	<1	<5	-	-	-	-	-	-	-
SSW02	08 Feb 2024	1067428	-	-	<1	<1	<1	-	<1	<1	<1	<1	<5	<5	<1	<5	-	-	-	-	-	-	-
WATER TRIP BLANK 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP BLANK 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards

ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
2013, NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%

NL = Non Limiting



Table D2 - Water Analytical Table

	2-Methyl-4-Chlorophenoxy Butanoic Acid	Mecoprop	PFAS						(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkane Carboxylic Acids									
			Perfluorononanesulfonic acid (PFNS)	Sum of PFHxS and PFOS	Sum of PFAS	Sum of PFAS (WA DER List)	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	Sum of PFAS (PFOS + PFOA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)
	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
LOR	1	1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs																						
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand																						
PFAS NEMP 2020 Freshwater 95%																	220					

Sample ID	Sample Date	Lab Report Number																					
PFAS BLANK	07 Feb 2024	1067428	-	-	<0.01	<0.01	<0.1	<0.05	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
QA10	08 Feb 2024	1067428	-	-	<0.01	<0.01	0.13	0.13	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	0.08	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
QA10a	08 Feb 2024	ES2404961	-	-	-	<0.01	0.11	0.11	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.1	0.06	0.05	<0.02	<0.01	<0.02	<0.02	<0.05
RINSATE01	06 Feb 2024	1067428	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RINSATE01	24 Jul 2024	1123575	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RINSATE02	07 Feb 2024	1067428	<1	<1	<0.01	<0.01	<0.1	<0.05	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
RINSATE02	26 Jul 2024	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RINSATE03	29 Jul 2024	1123575	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SSW01	08 Feb 2024	1067428	-	-	<0.01	<0.01	0.11	0.11	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	0.06	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SSW02	08 Feb 2024	1067428	-	-	<0.01	<0.01	0.29	0.29	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.05	0.11	0.13	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
WATER TRIP BLANK 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP BLANK 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards
ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
2013, NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%

NL = Non Limiting



	Perfluoroundecanoic acid (PFUnDA)	Perfluoroalkane Sulfonic Acids							Perfluoroalkyl Sulfonamides							Solvents						
		Perfluoropropanesulfonic acid (PFPrS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Methyl Ethyl Ketone	2-hexanone (MBK)	4-Methyl-2-pentanone	Acetone	Allyl chloride	Carbon disulfide	Vinyl acetate
	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
LOR	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.05	0.02	0.05	0.05	0.02	0.05	5	50	5	5	1	1	50
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs							0.48															
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand																						
PFAS NEMP 2020 Freshwater 95%							0.13															

Sample ID	Sample Date	Lab Report Number																					
PFAS BLANK	07 Feb 2024	1067428	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-
QA10	08 Feb 2024	1067428	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<5	-	<5	<5	<1	<1
QA10a	08 Feb 2024	ES2404961	<0.02	-	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<50	<50	<50	-	-	<5
RINSATE01	06 Feb 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5	-	<5	<5	<1	<1
RINSATE01	24 Jul 2024	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5	-	<5	<5	<1	<1
RINSATE02	07 Feb 2024	1067428	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<5	-	<5	<5	<1	<1
RINSATE02	26 Jul 2024	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5	-	<5	<5	<1	<1
RINSATE03	29 Jul 2024	1123575	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5	-	<5	<5	<1	<1
SSW01	08 Feb 2024	1067428	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<5	-	<5	<5	<1	<1
SSW02	08 Feb 2024	1067428	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<5	-	<5	<5	<1	<1
WATER TRIP BLANK 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP BLANK 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards

ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
2013, NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%

NL = Non Limiting



	VOCs			PAH																	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic
	cis-1,4-Dichloro-2-butene	trans-1,4-Dichloro-2-butene	Pentachloroethane	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(b+)]fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	Benzo(a)pyrene TEQ calc (Zero)	PAHs (Sum of total)		
	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	mg/L	µg/L	µg/L	µg/L
LOR	5	5	5	1	1	1	1	0.5	1	1	1	1	1	1	1	1	1	1	0.0005	0.5	2	2
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs			80			0.4		0.2							1.4		2					
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand																						
PFAS NEMP 2020 Freshwater 95%																						

Sample ID	Sample Date	Lab Report Number																					
PFAS BLANK	07 Feb 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QA10	08 Feb 2024	1067428	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<2	<2
QA10a	08 Feb 2024	ES2404961	<5	<5	<5	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.0005	<0.5	-	-
RINSATE01	06 Feb 2024	1067428	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<2	<2
RINSATE01	24 Jul 2024	1123575	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<2	<2
RINSATE02	07 Feb 2024	1067428	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<2	<2
RINSATE02	26 Jul 2024	1123575	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<2	<2
RINSATE03	29 Jul 2024	1123575	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<2	<2
SSW01	08 Feb 2024	1067428	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<2	<2
SSW02	08 Feb 2024	1067428	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<2	<2
WATER TRIP BLANK 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP BLANK 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards
ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
2013, NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%

NL = Non Limiting



Table D2 - Water Analytical Table

	Organochlorine Pesticides																					
	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)	Chlordane (trans)	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
	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
LOR	0.2	0.2	0.2	0.2	0.2	0.5	0.5	0.5	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
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs						0.08					0.01						0.02				0.2	0.09
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand																						
PFAS NEMP 2020 Freshwater 95%																						

Sample ID	Sample Date	Lab Report Number																					
PFAS BLANK	07 Feb 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QA10	08 Feb 2024	1067428	<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
QA10a	08 Feb 2024	ES2404961	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RINSATE01	06 Feb 2024	1067428	<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
RINSATE01	24 Jul 2024	1123575	<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
RINSATE02	07 Feb 2024	1067428	<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
RINSATE02	26 Jul 2024	1123575	<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
RINSATE03	29 Jul 2024	1123575	<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
SSW01	08 Feb 2024	1067428	<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
SSW02	08 Feb 2024	1067428	<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
WATER TRIP BLANK 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP BLANK 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards
ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
2013, NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%

NL = Non Limiting



Table D2 - Water Analytical Table

				Organophosphorous																		
	Hexachlorobenzene	Methoxychlor	Toxaphene	Tokuthion	Azinophos methyl	Bolstar (Sulprofos)	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Dimethoate	Disulfoton	Ethion	Ethoprop	Fenitrothion	Fensulfotthion
	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
LOR	0.2	0.2	5	2	0.5	2	0.5	0.5	0.5	0.5	0.5	20	2	2	0.5	0.5	0.5	2	0.5	2	2	2
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs	0.1		0.2		0.02					0.01					0.01		0.15				0.2	
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand																						
PFAS NEMP 2020 Freshwater 95%																						

Sample ID	Sample Date	Lab Report Number																					
PFAS BLANK	07 Feb 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QA10	08 Feb 2024	1067428	<0.2	<0.2	<5	<2	<2	<2	-	-	<20	<2	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2
QA10a	08 Feb 2024	ES2404961	<0.5	<2.0	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	-	-	<0.5	<0.5	<0.5	-	<0.5	-	-	-
RINSATE01	06 Feb 2024	1067428	<0.2	<0.2	<5	<2	<2	<2	-	-	<20	<2	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2
RINSATE01	24 Jul 2024	1123575	<0.2	<0.2	<5	<2	<2	<2	-	-	<20	<2	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2
RINSATE02	07 Feb 2024	1067428	<0.2	<0.2	<5	<2	<2	<2	-	-	<20	<2	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2
RINSATE02	26 Jul 2024	1123575	<0.2	<0.2	<5	<2	<2	<2	-	-	<20	<2	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2
RINSATE03	29 Jul 2024	1123575	<0.2	<0.2	<5	<2	<2	<2	-	-	<20	<2	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2
SSW01	08 Feb 2024	1067428	<0.2	<0.2	<5	<2	<2	<2	-	-	<20	<2	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2
SSW02	08 Feb 2024	1067428	<0.2	<0.2	<5	<2	<2	<2	-	-	<20	<2	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2
WATER TRIP BLANK 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP BLANK 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards
ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
2013, NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%

NL = Non Limiting



Table D2 - Water Analytical Table

	Pesticides																		Pesticides			
	Fenthion	EPN	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Parathion	Phorate	Pririmphos-methyl	Prothiofos	Pyrazophos	Ronnel	Terbufos	Trichloronate	Tetrachlorvinphos	Demeton-S-methyl	Fenamiphos	Pirimphos-ethyl	Arochlor 1016
	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
LOR	0.5	2	0.5	2	2	2	2	2	20	2	2	20	0.5	2	2	2	2	2	0.5	0.5	0.5	5
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs			0.05							0.004												
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand																						
PFAS NEMP 2020 Freshwater 95%																						

Sample ID	Sample Date	Lab Report Number																				
PFAS BLANK	07 Feb 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QA10	08 Feb 2024	1067428	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<20	-	<2	<2	<2	<2	<2	-	-	<5
QA10a	08 Feb 2024	ES2404961	<0.5	-	<0.5	-	<2.0	-	-	<2.0	-	-	<0.5	-	-	-	-	-	<0.5	<0.5	<0.5	-
RINSATE01	06 Feb 2024	1067428	<2	<2	<2	<2	<2	<2	<20	<2	<2	<20	-	<2	<2	<2	<2	<2	<2	-	-	<5
RINSATE01	24 Jul 2024	1123575	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<20	-	<2	<2	<2	<2	<2	-	-	<5
RINSATE02	07 Feb 2024	1067428	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<20	-	<2	<2	<2	<2	<2	-	-	<5
RINSATE02	26 Jul 2024	1123575	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<20	-	<2	<2	<2	<2	<2	-	-	<5
RINSATE03	29 Jul 2024	1123575	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<20	-	<2	<2	<2	<2	<2	-	-	<5
SSW01	08 Feb 2024	1067428	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<20	-	<2	<2	<2	<2	<2	-	-	<5
SSW02	08 Feb 2024	1067428	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<20	-	<2	<2	<2	<2	<2	-	-	<5
WATER TRIP BLANK 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP BLANK 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards
ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
2013, NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%

NL = Non Limiting



	PCBs							Phenols
	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	4,6-Dinitro-2-methylphenol
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR	5	5	5	5	5	5	1	1
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs			0.6		0.03			
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand								
PFAS NEMP 2020 Freshwater 95%								

Sample ID	Sample Date	Lab Report Number								
PFAS BLANK	07 Feb 2024	1067428	-	-	-	-	-	-	-	-
QA10	08 Feb 2024	1067428	<5	<5	<5	<5	<5	<5	<5	-
QA10a	08 Feb 2024	ES2404961	-	-	-	-	-	-	<1	-
RINSATE01	06 Feb 2024	1067428	<5	<5	<5	<5	<5	<5	<5	<1
RINSATE01	24 Jul 2024	1123575	<5	<5	<5	<5	<5	<5	<5	<1
RINSATE02	07 Feb 2024	1067428	<5	<5	<5	<5	<5	<5	<5	<1
RINSATE02	26 Jul 2024	1123575	<5	<5	<5	<5	<5	<5	<5	-
RINSATE03	29 Jul 2024	1123575	<5	<5	<5	<5	<5	<5	<5	<1
SSW01	08 Feb 2024	1067428	<5	<5	<5	<5	<5	<5	<5	-
SSW02	08 Feb 2024	1067428	<5	<5	<5	<5	<5	<5	<5	-
WATER TRIP BLANK 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-
WATER TRIP BLANK 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 1	25 Jan 2024	1067428	-	-	-	-	-	-	-	-
WATER TRIP SPIKE 2	25 Jan 2024	1067428	-	-	-	-	-	-	-	-

Environmental Standards

ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
2013, NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
HEPA, January 2020, PFAS NEMP 2020 Freshwater 95%

NL = Non Limiting

Table D3 - Historical Soil Analytical Tables (JKE 2023b)

Preliminary (Intrusive) Site Investigation
128-134 Rickard Road, Leppington, NSW
E35910PT



TABLE 51 SOIL LABORATORY RESULTS COMPARED TO NEPM 2013. HIL-C: 'Public open space; secondary schools; and footpaths'																						
All data in mg/kg unless stated otherwise			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	Carcinogenic PAHs	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos		
PQL - EnviroLab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Site Assessment Criteria (SAC)			300	90	300	17000	600	80	1200	30000	300	3	10	340	400	10	70	400	10	250	1	Detected/Not Detected
Sample Reference	Sample Depth	Sample Description																				
BH1	0-0.1	F: Silty Clay	4	<0.4	12	20	13	<0.1	7	30	0.58	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH1 - [LAB_DUP]	0-0.1	F: Silty Clay	4	<0.4	12	18	16	<0.1	7	28	0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	
BH2	0-0.1	F: Silty Sand	4	<0.4	16	38	40	<0.1	19	96	7.5	1.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Detected	
BH2	0.8-1.0	Silty Clay	4	<0.4	13	42	18	<0.1	11	62	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
BH2 - [LAB_DUP]	0.8-1.0	Silty Clay	5	<0.4	14	45	20	<0.1	12	65	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
BH3	0-0.1	F: Silty Sand	<4	<0.4	9	14	36	<0.1	7	49	8.1	1.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH3	0.5-0.95	Silty Clay	<4	<0.4	15	18	16	<0.1	4	22	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
BH4	0-0.1	F: Silty Sand	<4	<0.4	21	56	8	<0.1	45	110	2.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH5	0-0.1	F: Silty Sandy Clay	5	<0.4	11	24	14	<0.1	12	39	0.9	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH6	0-0.1	F: Silty Sand	19	0.4	46	150	120	0.2	40	250	23	3.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH6	0.5-0.95	Silty Clay	4	<0.4	13	19	16	<0.1	6	24	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
BH7	0-0.1	F: Silty Sand	5	<0.4	10	33	17	<0.1	21	54	4.4	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH8	0-0.1	F: Silty Sand	5	<0.4	15	11	18	<0.1	6	19	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH9	0-0.1	F: Silty Sand	<4	<0.4	12	38	24	<0.1	9	80	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Detected	
BH9	0.7-0.9	Silty Clay	5	<0.4	16	28	14	<0.1	6	35	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH10	0-0.1	F: Silty Clay	5	<0.4	20	26	18	<0.1	10	43	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH11	0-0.1	F: Silty Clay	5	<0.4	21	29	19	<0.1	11	49	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH11 - [LAB_DUP]	0-0.1	F: Silty Clay	5	<0.4	20	29	21	<0.1	10	52	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	
BH11	0.5-0.9	Silty Clay	<4	<0.4	15	43	13	<0.1	10	48	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
BH12	0-0.1	F: Silty Sandy Clay	5	<0.4	17	32	18	<0.1	15	47	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH13	0-0.1	F: Silty Clay	5	<0.4	17	24	18	<0.1	8	34	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH13	0.6-0.95	Silty Clay	<4	<0.4	6	17	8	<0.1	3	18	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
BH14	0-0.1	F: Silty Clay	4	<0.4	19	26	18	<0.1	8	35	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH15	0-0.1	F: Silty Clay	4	<0.4	22	36	17	<0.1	10	44	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH16	0-0.1	F: Silty Clay	<4	<0.4	16	37	18	<0.1	11	83	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH17	0-0.1	F: Silty Clay	4	<0.4	17	39	19	<0.1	12	50	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH18	0-0.1	F: Silty Clay	<4	<0.4	13	38	18	<0.1	9	75	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH19	0-0.1	F: Silty Clay	5	<0.4	17	37	18	<0.1	11	47	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH20	0-0.1	F: Silty Clay	5	<0.4	18	42	20	<0.1	12	49	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH20 - [LAB_DUP]	0-0.1	F: Silty Clay	4	<0.4	17	39	20	<0.1	11	54	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	
BH21	0-0.1	F: Silty Clay	4	<0.4	32	44	21	<0.1	14	60	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH22	0-0.1	F: Silty Clay	4	<0.4	17	37	16	<0.1	9	47	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH23	0-0.1	F: Silty Clay	4	<0.4	20	42	18	<0.1	11	56	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH24	0-0.1	F: Silty Clay	<4	<0.4	20	45	21	<0.1	13	63	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH24	0.7-0.9	XW Claystone	<4	<0.4	14	40	14	<0.1	15	75	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
BH25	0-0.1	F: Silty Clay	5	<0.4	23	40	22	<0.1	10	64	0.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH25 - [LAB_DUP]	0-0.1	F: Silty Clay	5	<0.4	26	45	22	<0.1	11	69	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	
BH25	0.7-0.9	Silty Clay	22	<0.4	12	24	12	<0.1	7	32	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
BH26	0-0.1	F: Silty Clay	5	<0.4	21	49	27	<0.1	15	79	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH27	0-0.1	F: Silty Clay	5	<0.4	36	36	27	<0.1	11	160	0.07	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH27	0.8-0.9	Silty Clay	<4	<0.4	11	43	28	<0.1	14	60	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
BH28	0-0.1	F: Silty Clay	7	<0.4	20	57	31	<0.1	11	59	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH28	0.7-0.8	Silty Clay	6	<0.4	17	36	45	<0.1	10	55	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
BH29	0-0.1	F: Silty Clay	11	<0.4	18	34	38	<0.1	11	79	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH30	0-0.1	F: Silty Clay	6	1	26	56	110	0.1	13	860	0.82	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH30	0.6-0.8	Silty Clay	<4	<0.4	17	39	51	<0.1	26	190	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
S1	-	Sediment	4	<0.4	15	26	16	<0.1	8	44	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
SDUP1	BH10 0-0.1m	F: Silty Clay	5	<0.4	16	25	17	<0.1	10	37	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	
SDUP2	BH11 0-0.1m	F: Silty Clay	6	<0.4	23	34	13	<0.1	14	61	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
SDUP2 - [LAB_DUP]	BH11 0-0.1m	F: Silty Clay	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
SDUP3	BH16 0-0.1m	F: Silty Clay	<4	<0.4	17	44	18	<0.1	11	71	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	
SDUP4	BH18 0-0.1m	F: Silty Clay	4	<0.4	19	45	16	<0.1	13	80	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected	
BH2-FCF1	0-0.5	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected	
FCF1	Surface	Material	NA	NA</																		

HOL SON ASSESSMENT CONTINUED												
Sample Reference	Sample Depth	Sample Description	Depth Category	Soil Category	G _u G _u [P1]	G _u G _u [P2]	Benzene	Toluene	Ethylbenzene	Xylenes	Nonhydrocarbon	
BH1 [JAB, DUF]	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH2	0-0.1	F. Silty Sand	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH3	0-1.0	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH4 [JAB, DUF]	0-1.0	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH5	0-0.1	F. Silty Sand	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH6	0.5-0.9	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH7	0-0.1	F. Silty Sandy Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH8	0-0.1	F. Silty Sand	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH9	0-0.1	F. Silty Sand	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH10	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH11	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH12 [JAB, DUF]	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH13	0-0.1	F. Silty Sandy Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH14	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH14.1	0.5-0.9	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH15	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH16	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH17	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH18	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH19	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH20	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH21 [JAB, DUF]	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH22	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH23	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH24	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH24.1	0-7.0	HW Claystone	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH25	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH26 [JAB, DUF]	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH27	0-7.0	HW Claystone	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH28	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH29	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH30	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH31	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH32	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH33	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH34	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH35	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH36	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH37 [JAB, DUF]	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH38	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH39	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH40	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH41	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH42	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH43	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH44	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH45	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH46	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH47	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH48	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH49	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH50	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH51	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH52	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH53	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH54	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH55	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH56	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH57	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH58	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH59	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH60	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH61	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH62	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH63	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH64	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH65	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH66	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH67	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH68	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH69	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH70	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH71	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH72	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH73	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH74	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH75	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH76	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH77	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH78	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH79	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH80	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH81	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH82	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH83	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH84	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH85	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH86	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH87	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH88	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH89	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH90	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH91	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH92	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH93	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH94	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH95	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH96	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH97	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH98	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH99	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH100	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH101	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH102	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH103	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH104	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH105	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH106	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH107	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH108	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH109	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH110	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH111	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH112	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH113	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH114	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH115	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH116	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH117	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH118	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH119	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH120	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	
BH121	0-0.1	F. Silty Clay	0-15 cm	Stoned	43	120	0.5	100	50	40	3	

Table D3 - Historical Soil Analytical Tables (JKE 2023b)

Preliminary (Intrusive) Site Investigation
128-134 Rickard Road, Leppington, NSW
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TABLE S4 SOIL LABORATORY RESULTS COMPARED TO DIRECT CONTACT CRITERIA All data in mg/kg unless stated otherwise										
Analyte	C ₁₀ -C ₁₀	>C ₁₀ -C ₁₀	>C ₁₀ -C ₁₄	>C ₁₄ -C ₄₀	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID
PQL - EnviroLab Services	25	50	100	100	0.2	0.5	1	1	1	
CRC 2011 - Direct contact Criteria	5,100	3,800	5,300	7,400	120	18,000	5,300	15,000	1,900	
Site Use										
RECREATIONAL - DIRECT SOIL CONTACT										
Sample Reference	Sample Depth									
BH1	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	14.2
BH1 - [LAB_DUP]	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	14.2
BH2	0-0.1	<25	<50	360	290	<0.2	<0.5	<1	<1	6.8
BH2	0.8-1.0	<25	<50	<100	<100	<0.2	<0.5	<1	<1	16.8
BH2 - [LAB_DUP]	0.8-1.0	<25	<50	<100	<100	<0.2	<0.5	<1	<1	16.8
BH3	0-0.1	<25	<50	230	130	<0.2	<0.5	<1	<1	1.7
BH3	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<1	3.8
BH4	0-0.1	<25	<50	390	550	<0.2	<0.5	<1	<1	0.6
BH5	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.6
BH6	0-0.1	<25	<50	360	330	<0.2	<0.5	<1	<1	2.7
BH6	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<1	4.9
BH7	0-0.1	<25	<50	100	<100	<0.2	<0.5	<1	<1	1.8
BH8	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.9
BH9	0-0.1	<25	<50	540	290	<0.2	<0.5	<1	<1	1.4
BH9	0.7-0.9	<25	<50	<100	<100	<0.2	<0.5	<1	<1	2.6
BH10	0-0.1	<25	<50	350	200	<0.2	<0.5	<1	<1	2
BH11	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	2.9
BH11 - [LAB_DUP]	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	2.9
BH11	0.5-0.9	<25	<50	<100	<100	<0.2	<0.5	<1	<1	3.3
BH12	0-0.1	<25	<50	410	370	<0.2	<0.5	<1	<1	5.6
BH13	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.8
BH13	0.6-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.9
BH14	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	2
BH15	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	3.7
BH16	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	0.9
BH17	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	0.6
BH18	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	0.8
BH19	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	0.9
BH20	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.1
BH20 - [LAB_DUP]	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.2
BH21	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.2
BH22	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	0.9
BH23	0-0.1	<25	<50	190	<100	<0.2	<0.5	<1	<1	1
BH24	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.4
BH24	0.7-0.9	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.3
BH25	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.4
BH25 - [LAB_DUP]	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.4
BH25	0.7-0.9	<25	<50	<100	<100	<0.2	<0.5	<1	<1	2.6
BH26	0-0.1	<25	<50	140	<100	<0.2	<0.5	<1	<1	1
BH27	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	2.4
BH27	0.8-0.9	<25	<50	<100	<100	<0.2	<0.5	<1	<1	2.4
BH28	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	3
BH28	0.7-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<1	2.1
BH29	0-0.1	<25	69	210	100	<0.2	<0.5	<1	<1	1.7
BH30	0-0.1	<25	<50	270	190	<0.2	<0.5	<1	<1	2.7
BH30	0.6-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.6
S1		<25	<50	<100	<100	<0.2	<0.5	<1	<1	
SDUP1	BH10 0-0.1m	<25	<50	360	210	<0.2	<0.5	<1	<1	-
SDUP2	BH11 0-0.1m	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-
SDUP2 - [LAB_DUP]	BH11 0-0.1m	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-
SDUP3	BH16 0-0.1m	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-
SDUP4	BH18 0-0.1m	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-
Total Number of Samples	52	52	52	52	52	52	52	52	52	46
Maximum Value	<PQL	69	540	550	<PQL	<PQL	<PQL	<PQL	<PQL	16.8
Concentration above the SAC										
Concentration above the PQL										

Table D3 - Historical Soil Analytical Tables (JKE 2023b)

Preliminary (Intrusive) Site Investigation
128-134 Richard Road, Leppington, NSW
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TABLE 55 ASBESTOS QUANTIFICATION - FIELD OBSERVATIONS AND LABORATORY RESULTS HSL-C-Public open space; secondary schools; and footpaths																					
FIELD DATA													LABORATORY DATA								
Date Sampled	Sample reference	Sample Depth	Visible ACM in top 100mm	Approx. Volume of Soil (L)	Soil Mass (g)	Mass ACM (g)	Mass Asbestos in ACM (g)	(Asbestos from ACM in soil) (fibre/g)	Mass ACM <7mm (g)	Mass Asbestos in ACM <7mm (g)	(Asbestos from ACM <7mm in soil) (fibre/g)	Mass FA (g)	Mass Asbestos in FA (g)	(Asbestos from FA in soil) (fibre/g)	Lab Report Number	Sample reference	Sample Depth	Sample Mass (g)	Asbestos ID in soil (AS4964) >0.1g/kg	Trace Analysis	
SAC			No					0.02			0.001			0.001							
27/11/2023	BH1	0-0.3	No	10	11,320	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH1	0-0.1	550.75		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
27/11/2023	BH2	0-0.5	Yes	10	12,220	11.6	1.74	0.0142	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH2	0-0.1	734.87		Chrysotile asbestos detected: Amosite asbestos detected: Organic fibres detected	No asbestos detected
27/11/2023	BH3	0-0.5	No	10	12,880	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH3	0-0.1	849.13		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
27/11/2023	BH4	0-0.5	No	10	12,750	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH4	0-0.1	934.2		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
27/11/2023	BH5	0-0.5	No	10	13,040	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH5	0-0.1	627.5		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
27/11/2023	BH6	0-0.5	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH6	0-0.1	581.83		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
27/11/2023	BH7	0-0.5	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH7	0-0.1	709.15		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
27/11/2023	BH8	0-0.5	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH8	0-0.1	613.53		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
1/12/2023	BH9	0-0.1	No	10	14,230	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH9	0-0.1	620.42		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
28/11/2023	BH9	0.1-0.5	NA	<10	4,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH9	0.7-0.9	804		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
28/11/2023	BH10	0-0.3	No	10	10,030	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH10	0-0.1	686.25		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
28/11/2023	BH11	0-0.5	No	10	10,120	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH11	0-0.1	690.32		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
28/11/2023	BH12	0-0.6	No	10	10,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH12	0-0.1	548.75		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
28/11/2023	BH13	0-0.6	No	10	10,060	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH13	0-0.1	648.13		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
28/11/2023	BH14	0-0.6	No	10	10,120	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH14	0-0.1	555.06		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
28/11/2023	BH15	0-0.5	No	10	11,320	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH15	0-0.1	378.97		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
30/11/2023	BH16	0-0.2	No	10	10,750	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH16	0-0.1	684.47		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
30/11/2023	BH17	0-0.2	No	10	10,020	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH17	0-0.1	706.82		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
30/11/2023	BH18	0-0.1	No	10	10,320	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH18	0-0.1	655.34		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
30/11/2023	BH19	0-0.2	No	10	11,290	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH19	0-0.1	621.53		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
30/11/2023	BH20	0-0.2	No	10	11,310	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH20	0-0.1	670.64		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
30/11/2023	BH21	0-0.3	No	10	12,130	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH21	0-0.1	539.1		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
30/11/2023	BH22	0-0.1	No	10	11,950	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH22	0-0.1	648.1		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
30/11/2023	BH23	0-0.2	No	10	12,310	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH23	0-0.1	576.01		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
30/11/2023	BH24	0-0.2	No	10	11,710	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH24	0-0.1	604.85		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
30/11/2023	BH25	0-0.1	No	10	11,370	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH25	0-0.1	635.4		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
1/12/2023	BH26	0-0.2	No	10	12,350	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH26	0-0.1	616.35		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
1/12/2023	BH27	0-0.1	No	10	11,330	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH27	0-0.1	734.85		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
1/12/2023	BH28	0-0.3	No	10	13,470	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH28	0-0.1	574.19		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
1/12/2023	BH29	0-0.1	No	10	12,930	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH29	0-0.1	655.27		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
1/12/2023	BH29	0.1-0.4	NA	<10	1,130	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH29	0-0.1	655.27		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
1/12/2023	BH30	0-0.2	No	10	14,320	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	339409	BH30	0-0.1	567.01		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	339409	S1	--	707		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected
Concentration above the SAC			VALUE																		

Sample Reference	Sample Depth	Sample Description	Test Feature	psi	CRC	Clay Content (%)	Arsonic	Chromom	Copper	Lead	Nickel	Zinc	Neutrophane	DSP	Co-Cu (PS)	Mn-Co-Cu (PS)	Mn-Co-Cu (PS)	Mn-Co-Cu (PS)	Barium	Toluene	Ethylbenzene	Total Aromatics	HAZ
BH1	0-0.1	F - Silty Clay	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
		F - Silty Sand	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
BH2	0-0.1	F - Silty Clay	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
		F - Silty Sand	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
BH3	0-0.1	F - Silty Clay	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
		F - Silty Sand	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
BH4	0-0.1	F - Silty Clay	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
		F - Silty Sand	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
BH5	0-0.1	F - Silty Clay	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
		F - Silty Sand	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
BH6	0-0.1	F - Silty Clay	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
		F - Silty Sand	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
BH7	0-0.1	F - Silty Clay	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
		F - Silty Sand	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
BH8	0-0.1	F - Silty Clay	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
		F - Silty Sand	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
BH9	0-0.1	F - Silty Clay	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
		F - Silty Sand	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
BH10	0-0.1	F - Silty Clay	Free	9	18	NA	100	200	250	1000	200	780	170	180	180	1200	1300	1000	65	105	125	45	20
		F - Silty Sand	Free	9	18	NA	100	20															

Table D3 - Historical Soil Analytical Tables (JKE 2023b)

Preliminary (Intrusive) Site Investigation
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TABLE S7 SOIL LABORATORY RESULTS COMPARED TO WASTE CLASSIFICATION GUIDELINES All data in mg/kg unless stated otherwise																								
			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total	TRH					BTEX COMP	
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B[a]P	Total Endosulfans	Chlorpyrifos	Total Moderately Harmful	Total Scheduled	PCBs	C ₁₀ -C ₁₄	C ₁₅ -C ₁₈	C ₁₉ -C ₂₈	Total C ₁₀ -C ₂₈	Benzene	Toluene	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	25	50	100	50	0.2	0.5	
General Solid Waste CT1			100	20	100	NSL	100	4	40	NSL	200	0.8	60	4	250	50	50	650	NSL	NSL	10,000	10	288	
General Solid Waste SCC1			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	50	50	650	NSL	NSL	10,000	18	518	
Restricted Solid Waste CT2			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	50	50	2600	NSL	NSL	40,000	40	1,152	
Restricted Solid Waste SCC2			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	50	50	2600	NSL	NSL	40,000	72	2,073	
Sample Reference	Sample Depth	Sample Description																						
BH1	0-0.1	F: Silty Clay	4	<0.4	12	20	13	<0.1	7	30	0.58	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH1 - [LAB_DUP]	0-0.1	F: Silty Clay	4	<0.4	12	18	16	<0.1	7	28	0.05	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH2	0-0.1	F: Silty Sand	4	<0.4	16	38	40	<0.1	19	96	7.5	0.94	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	190	270	460	<0.2	<0.5
BH2	0.8-1.0	Silty Clay	4	<0.4	13	42	18	<0.1	11	62	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5
BH2 - [LAB_DUP]	0.8-1.0	Silty Clay	5	<0.4	14	45	20	<0.1	12	65	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5
BH3	0-0.1	F: Silty Sand	<4	<0.4	9	14	36	<0.1	7	49	8.1	0.93	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	150	130	280	<0.2	<0.5
BH3	0.5-0.95	Silty Clay	<4	<0.4	15	18	16	<0.1	4	22	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5
BH4	0-0.1	F: Silty Sand	<4	<0.4	21	56	8	<0.1	45	110	2.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	110	440	550	<0.2	<0.5
BH5	0-0.1	F: Silty Sandy Clay	5	<0.4	11	24	14	<0.1	12	39	0.9	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH6	0-0.1	F: Silty Sand	19	0.4	46	150	120	0.2	40	250	23	2.4	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	190	290	470	<0.2	<0.5
BH6	0.5-0.95	Silty Clay	4	<0.4	13	19	16	<0.1	6	24	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5
BH7	0-0.1	F: Silty Sand	5	<0.4	10	33	17	<0.1	21	54	4.4	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH8	0-0.1	F: Silty Sand	5	<0.4	15	11	18	<0.1	6	19	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH9	0-0.1	F: Silty Sand	<4	<0.4	12	38	24	<0.1	9	80	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	260	430	690	<0.2	<0.5
BH9	0.7-0.9	Silty Clay	5	<0.4	16	28	14	<0.1	6	35	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH10	0-0.1	F: Silty Clay	5	<0.4	20	26	18	<0.1	10	48	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	140	280	440	<0.2	<0.5
BH11	0-0.1	F: Silty Clay	5	<0.4	21	29	19	<0.1	11	49	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH11 - [LAB_DUP]	0-0.1	F: Silty Clay	5	<0.4	20	29	21	<0.1	10	52	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH11	0.5-0.9	Silty Clay	<4	<0.4	15	43	13	<0.1	10	48	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5
BH12	0-0.1	F: Silty Sandy Clay	5	<0.4	17	32	18	<0.1	15	47	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	160	390	550	<0.2	<0.5
BH13	0-0.1	F: Silty Clay	5	<0.4	17	24	18	<0.1	8	34	<0.05	<0.05	<0.1	<0.1	<0.1	0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH13	0.6-0.95	Silty Clay	<4	<0.4	6	17	8	<0.1	3	18	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5
BH14	0-0.1	F: Silty Clay	4	<0.4	19	26	18	<0.1	8	35	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH15	0-0.1	F: Silty Clay	4	<0.4	22	36	17	<0.1	10	44	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH16	0-0.1	F: Silty Clay	<4	<0.4	16	37	18	<0.1	11	83	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH17	0-0.1	F: Silty Clay	4	<0.4	17	39	19	<0.1	12	50	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH18	0-0.1	F: Silty Clay	<4	<0.4	13	38	18	<0.1	9	75	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH19	0-0.1	F: Silty Clay	5	<0.4	17	37	18	<0.1	11	47	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH20	0-0.1	F: Silty Clay	5	<0.4	18	42	20	<0.1	12	49	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH20 - [LAB_DUP]	0-0.1	F: Silty Clay	4	<0.4	17	39	20	<0.1	11	54	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH21	0-0.1	F: Silty Clay	4	<0.4	32	44	21	<0.1	14	60	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH22	0-0.1	F: Silty Clay	4	<0.4	17	37	16	<0.1	9	47	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH23	0-0.1	F: Silty Clay	4	<0.4	20	42	18	<0.1	11	56	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH24	0-0.1	F: Silty Clay	<4	<0.4	20	45	21	<0.1	13	63	<0.05	<0.05	<0.1	<0.1	<0.1	0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH24	0.7-0.9	XW Claystone	<4	<0.4	14	40	14	<0.1	15	75	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5
BH25	0-0.1	F: Silty Clay	5	<0.4	23	40	22	<0.1	10	64	0.2	0.08	<0.1	<0.1	<0.1	0.2	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH25 - [LAB_DUP]	0-0.1	F: Silty Clay	5	<0.4	26	45	22	<0.1	11	69	<0.05	<0.05	<0.1	<0.1	<0.1	0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH25	0.7-0.9	Silty Clay	22	<0.4	12	24	12	<0.1	7	32	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5
BH26	0-0.1	F: Silty Clay	5	<0.4	21	49	27	<0.1	15	79	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	110	110	<0.2	<0.5
BH27	0-0.1	F: Silty Clay	5	<0.4	36	36	27	<0.1	11	160	0.07	0.07	<0.1	<0.1	<0.1	0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH27	0.8-0.9	Silty Clay	<4	<0.4	11	43	28	<0.1	14	60	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5
BH28	0-0.1	F: Silty Clay	7	<0.4	20	57	31	<0.1	11	59	<0.05	<0.05	<0.1	<0.1	<0.1	0.5	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5
BH28	0.7-0.8	Silty Clay	6	<0.4	17	36	45	<0.1	10	55	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<			

Table D3 - Historical Soil Analytical Tables (JKE 2023b)

Preliminary (Intrusive) Site Investigation
128-134 Rickard Road, Leppington, NSW
E35910PT



TABLE S8 SOIL LABORATORY TCLP RESULTS All data in mg/L unless stated otherwise					
			Lead	Nickel	B(a)P
PQL - Envirolab Services			0.03	0.02	0.001
TCLP1 - General Solid Waste			5	2	0.04
TCLP2 - Restricted Solid Waste			20	8	0.16
TCLP3 - Hazardous Waste			>20	>8	>0.16
Sample Reference	Sample Depth	Sample Description			
BH2	0-0.1	F: Silty sand	NA	NA	<0.0001
BH2 - [LAB_DUP]	0-0.1	F: Silty sand	NA	NA	<0.0001
BH3	0-0.1	F: Silty sand	NA	NA	<0.0001
BH4	0-0.1	F: Silty sand	NA	0.03	NA
BH4 - [LAB_DUP]	0-0.1	F: Silty sand	NA	0.03	NA
BH6	0-0.1	F: Silty sand	<0.03	NA	<0.0001
BH30	0-0.1	F: Silty clay	<0.03	NA	NA
Total Number of samples			2	2	4
Maximum Value			<PQL	0.03	<PQL
General Solid Waste			VALUE		
Restricted Solid Waste			VALUE		
Hazardous Waste			VALUE		
Concentration above PQL			Bold		

Appendix E

Data Quality Indicators

DQIs for the project will be based on the field and laboratory considerations in NEPM Schedule B2 Appendix B, (NEPC 2013), which include:

1. Completeness – a measure of the amount of useable data (expressed as %) from a data collection activity
2. Comparability – the confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event
3. Representativeness – the confidence (expressed qualitatively) that data are representative of each media present on the Site
4. Precision – A quantitative measure of the variability (or reproducibility) of data
5. Accuracy – a quantitative measure of the closeness of reported data to the true value.

The DQIs adopted for this assessment and checking of compliance is discussed in Table E1 to E5 below.

References

Table E1 – DQIs – Completeness

Completeness					
Field Considerations	DQI	DQI Compliance	Laboratory Considerations	DQI	DQI Compliance
All critical locations will be sampled	Samples will be collected as per Section 8		All critical samples analysed.	Samples will be analysed as per Section 8	
All samples collected	Samples will be collected from relevant media as per Section 8		All analytes analysed according to sampling plan	Samples will be analysed as per Section 8	
SOPs appropriate and complied with	SMEC standard operating procedures (SOPs)/field instructions will be implemented			Samples will be analysed by laboratories NATA accredited for the analyses to be performed and appropriate methods will be used. LORs will be less than or equal to the assessment criteria.	
Experienced sampler	An experienced SMEC environmental consultant will conduct the sampling		Sample documentation complete	Chain of custody (COC) will be returned, signed, and dated by laboratory. NATA endorsed laboratory certificates will be completed in accordance with NEPC (1999). Field documentation will be completed in accordance with SMEC SOPs.	
Documentation correct	Samples will be handled and transported under appropriate COC documentation. Sample receipt advice (or equivalent) from the laboratory will be reviewed to assess that samples are received cool and in good condition. Calibration certificates for the field instruments will be provided daily (or in accordance with manufacturers recommended calibration interval).		Sample holding times complied with	Samples will be analysed within holding times specified by NEPC (1999)	

Remedial Action Plan

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30 January 2025

Table E2 – DQIs – Comparability

Comparability					
Field Considerations	DQI	DQI Compliance	Laboratory Considerations	DQI	DQI Compliance
Same SOPs used on each occasion	SMEC SOPs/field instructions will be implemented		Same sample analytical method used	The same NATA accredited laboratory will be used to undertake analyses of all primary samples collected for this study. The laboratory will use the same analytical methods for each sample for each analytical parameter	
Experienced sampler	An experienced SMEC environmental consultant will conduct the sampling		Same sample LORs		
Climatic conditions (temperature, rainfall, wind, etc.)	Sampling for this work will be completed when necessary. Climatic conditions are not expected to cause issues for comparability of data		Same laboratories (justify/quantify if different)		
Same types of samples collected	Samples will be collected in the appropriate laboratory supplied container specific to the analyses performed		Same units (justify/quantify if different)		

Table E3 – DQIs – Representativeness

Representativeness					
Field Considerations	DQI	DQI Compliance	Laboratory Considerations	DQI	DQI Compliance
Appropriate media sampled according to sample plan	Samples will be collected and analysed as listed in Section 8, any variations will be justified		All samples analysed according to sample plan	Samples will be collected and analysed as listed in Section 8 NATA accredited environmental testing laboratories will implement a quality control plan conforming to Schedule B (3) ‘Guideline on Laboratory Analysis of Potentially Contaminated Soils’ of the National Environment Protection (Assessment of Site Contamination) Measure (1999).	
All media identified in sample plan	Samples will be collected as listed in Section 8		All samples analysed according to sample plan	Samples will be collected and analysed as listed in Section 8	

Table E4 – DQIs – Precision

Precision					
Field Considerations	DQI	DQI Compliance	Laboratory Considerations	DQI	DQI Compliance
SOPs appropriate and complied with	SMEC SOPs/field instructions will be implemented		Analysis of: laboratory duplicates	The number of duplicate analyses should be the smaller of one per process batch or one per 10 samples	
Analysis of: field duplicates	Collection of field duplicate samples including: - Field intra-laboratory duplicate samples (1 in 20 samples) - Field inter-laboratory duplicate samples (1 in 20 samples) Note: field duplicates excluded for asbestos gravimetric sampling.		Analysis of: field duplicates	Field duplicates have relative percentage difference control limits: - Less than 30% (soil) where result is greater than 10 times LOR - No limit where result is less than 10 times LOR.	
	Experienced and trained staff to carry out sampling. Sampling methodologies appropriate and complied with.		Analysis of: laboratory duplicates	Laboratory duplicates have RPD control limits: - Results <10 times LOR: no limit - Results between 10-20 times LOR: RPD must lie between 0-50% - Results >20 times the LOR: RPD must lie between 0-30% In accordance with laboratory specific QC acceptance criteria.	
			Analysis of laboratory-prepared volatile trip spikes (only if volatile contaminants are being tested)	Trip spikes recoveries were recorded between 60% and 110% for volatile contaminants (TRHC6-C10/BTEX)	
			Analysis of laboratory-prepared volatile trip blanks (only if volatile contaminants are being tested)	Trip blanks were free of detectable concentrations of volatile contaminants (TRHC6-C10/BTEX)	

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Table E5 – DQIs – Accuracy (bias)

Accuracy (bias)					
Field Considerations	DQI	DQI Compliance	Laboratory Considerations	DQI	DQI Compliance
SOP appropriate and complied with	SMEC SOPs/field instructions will be implemented		Analysis of field blanks	A laboratory prepared trip blank will be analysed for soil sampling (as defined in AS4482.2-1999 and NEPM (1999). Results are to be less than the LOR	
Rinsate blank	Where reusable sampling equipment is utilised (if any) a rinsate blank will be analysed and results compared against the practical quantitation limit		Analysis of method blank	Method blanks will be analysed as per NEPC (1999) at least 1 per process batch (typically 1 in 20). Results to be less than LOR	
Trip spike	Trip spikes are collected and analysed together with samples		Analysis of matrix spike	Matrix spikes will be analysed as per NEPC (1999) (one matrix spike per soil type per process batch). Results to be within laboratory acceptance limits based on NEPC (1999). Acceptance limits are on the laboratory certificates (typically 70-130%, depends on analyte. A lower range typically accepted for phenols 30%-130%)	
Preservation, transport, and storage	Samples appropriately preserved in laboratory supplied containers, stored, and transported correctly and within holding times		Analysis of surrogate spike	Surrogates will be analysed as per NEPC Schedule B3 (1999). All samples spiked where appropriate (e.g. chromatographic analysis of organics). Acceptance limits 70% to 130% (inorganics), or 50% to 150% (organics).	
			Analysis of laboratory control samples (LCS)	LCS will be analysed as per NEPC Schedule B3 (1999) (at least 1 per batch). Results to be within laboratory acceptance limits based on NEPC (2013). Acceptance limits are on the laboratory certificates (typically 70-130%, depends on analyte)	
			Analysis of laboratory-prepared spikes	Spikes will be analysed as per NEPC Schedule B3 (1999). Recovery results to be within laboratory acceptance limits based on NEPC Schedule B3 (1999). Acceptance limits are on the laboratory certificates.	

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Appendix F

Unexpected Finds Procedure



Procedural steps	Details
Unexpected find encountered	• STOP ALL WORK in the immediate/affected area. • Immediately notify the Site Supervisor • Establish an exclusion zone and isolate/barricade the area • If the material contains potential asbestos, follow any existing ACM management procedures • Recommence works in an alternative area where practicable.
Assess the area	• Environmental Consultant to be notified to assess the unexpected find and provide advice as to the required scope of a contamination investigation in the area of the find • The assessment may require sampling of the material(s) as determined by the Environmental Consultant • Develop an action plan to manage the potential contamination in consultation with DoE, based on the investigation findings. Where the contamination find requires reporting to the EPA, notify DoE for liaison with the EPA.
Implementation, Environmental management and work health safety management	• Implement the action plan as approved in consultation with DoE • Where the material is to be removed from Site, it must be appropriately classified and ensure it is disposed of at an appropriately licensed facility • For any work in identified contaminated areas the Environmental Consultant shall advise as to levels of PPE required • A specific Environmental Work Method Statement (EWMS) may be required depending on the extent and magnitude of the contamination • Prior to any contamination investigation, management or remediation activities appropriate SWMS will be updated or prepared for review and approval by the Environmental Consultant.
Remedial action and clearance	• If excavation and offsite disposal is selected as the preferred remedial option, this will be carried out under the instruction of the Environmental Consultant with appropriate waste classification and validation/clearance. For any other option such as leaving contamination undisturbed and capping, this will only be carried out following consultation and approval with DoE, Council and/or EPA, as required • In the case of finding random fragments of ACM, these will be managed through the implementation of an Asbestos Management Plan and in most cases will be picked up by licenced contractors and disposed offsite. A clearance for the area will be issued by a competent person • Environmental Consultant to issue a clearance/validation report confirming the unexpected find has been adequately managed • Documentation implementation of approved action plan and records provided to DoE as required.
Recommence works	• Recommence works once remedial works have been implemented and clearance/validation issued.



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