ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

SOIL CONTAMINATION ASSESSMENT AT MIMOSA PARK, 22 BOX ROAD, CASULA, NSW

LIVERPOOL CITY COUNCIL

18 OCTOBER 2021
121070
VERSION 1

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

18 October 2021

Liverpool City Council
3 Hoxton Park Road
Liverpool NSW 2170

Attention: **Earin Short**
Contaminated Land Officer

Soil Contamination Assessment at Mimosa Park, 22 Box Road, Casula, NSW.

Please find enclosed a copy of our report entitled as above. Thank you for the opportunity to undertake this work. Should you have any queries, please do not hesitate to contact us on (02) 9922 1777.

For and on behalf of
Environmental Earth Sciences NSW

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121070_Mimosa Park SCA_V1

EXECUTIVE SUMMARY

Introduction and objectives

Environmental Earth Sciences NSW was engaged by Liverpool City Council (LCC) to undertake a soil contamination assessment (SCA) at Mimosa Park located in Casula, NSW and identified as Lot 1103 in Deposited Plan (DP) 1051233, hereafter referred to as the "site" in order to facilitate the proposed children's playground at the site.

The objectives of the assessment are to evaluate the site's suitability for recreational open space use and provide information in regard to worker safety and material management during construction.

Scope of work

The scope of work included a review of site history information including aerial photographs, publicly available maps relating to soils, topography, geology, hydrogeology, acid sulfate soils and salinity, a site inspection and intrusive soil investigation and the preparation of this report on the findings of the SCA.

Findings

Based on the results of the soil contamination assessment, the following findings were made:

- The site is a vacant undeveloped parcel of land located in Casula that was initially part of a much larger property that was used for agricultural/ market garden purposes between the mid 1970s and the early 2000s. The broader property was developed for residential purposes from the early 2000s. The site has not been developed.
- During the site inspection, domestic rubbish including empty food cans and plastic pipes and minor building rubble including concrete pieces and minor brick and tile fragments were noted along the western boundary wall. Furthermore, scaffolding was present along the southern boundary to facilitate construction of the neighbouring property. Evidence of gross contamination (including potential ACM) or staining was not evidenced at the site surface.
- The reported concentrations of contaminants of potential concerns were either below the laboratory's LOR and or investigation criteria.

Conclusion and recommendations

Based upon findings from the desktop study, review of historical information, site observations, intrusive investigation and laboratory results, Environmental Earth Sciences considers that the site presents a LOW risk to human health and the environment. As such further assessment and/or remediation is not considered necessary.

In view of the findings of the assessment and the proposed development, it is recommended that an unexpected finds protocol (UFP) be adopted to manage potential contamination and or hazardous materials which may be encountered.

ENVIRONMENTAL EARTH SCIENCES
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TABLE OF CONTENTS

Table of Figures

Tables

Appendices

1 INTRODUCTION

Environmental Earth Sciences NSW was engaged by Liverpool City Council (LCC) to undertake a soil contamination assessment (SCA) at Mimosa Park located in Casula, NSW and identified as Lot 1103 in Deposited Plan (DP) 1051233, hereafter referred to as the "site" in order to facilitate the proposed children's playground at the site. The site location and extent are presented in **Figures 1** and **2**.

In accordance with the requirements of the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (National Environment Protection Council (NEPC) 2013, (ASC NEPM, 2013), this assessment aims to identify potential:

- Sources of contamination, historical contaminating uses and impacted areas;
- Contaminants of concern associated with identified sources of impact or contaminated areas;
- Potentially affected media (i.e. soil); and
- Human and ecological receptors.

The purpose of collecting basic site information is to formulate a conceptual site model (CSM) to assess contamination exposure linkages to identified receptors, following a review of site history, physical setting and site conditions.

Consideration is also given to the continuing land usage for this property (being RE1 – Public recreation). The assessment will inform recommendations for further detailed assessment and/or remediation (if required).

Additionally, included at the end of this report is a waste classification report for surface soils across the site should off-site disposal of surplus material be required during construction of the proposed park upgrade. This has been reported separately.

This report should be read in conjunction with the limitations and appendices contained within the proposal (ref: PO12134_V1 dated 16 July 2021) and the limitations detailed at the end of this report.

2 OBJECTIVES

The objectives of the assessment are to:

- evaluate the site's suitability for recreational open space use; and
- provide information in regard to worker safety and material management.

3 STATUTORY GUIDELINES

The SCA was conducted in general accordance with the following guidance made or approved by the NSW Environment Protection Authority (EPA) in accordance with the *Contaminated Land Management Act 1997* (CLM Act):

- National Environment Protection Council (NEPC) (2013) - *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)* (ASC NEPM).
- NSW EPA (2017) - *Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd edition).*
- NSW EPA (2020) - *Contaminated Guidelines: Consultants reporting on contaminated land*.

4 SCOPE OF WORK

The following scope of work was completed.

- Site history review including:
    - Inspection of current and historical aerial photographs of the site.
    - Review of publicly available maps relating to topography, geology, hydrogeological, and acid sulfate soils.
    - Review of publicly available EPA records including the Contaminated Land Management Record of Notices, the Protection of the Environment Operations Public Register, and List of NSW Contaminated Sites Notified to EPA.
- Site inspection and intrusive investigation including:
    - A detailed site walkover, assessing current site features, potential sources of contamination and contaminated areas, and where possible noted potentially contaminating offsite activities.
    - An intrusive soil investigation of the site to assess the extent of on-site soil contamination and areas of concern. This involved the excavation of ten test pits across the site to inspect ground conditions and collect soil samples for subsequent laboratory analysis of contaminants of potential concern (COPC).
- Preparation of this report on results of the SCA.

5 ENVIRONMENTAL SETTING

5.1 Location and property description

The site is comprised of a rectangular lot situated in a residential area. Site identification details area provided in **Table 1** below.

Table 1: Site identification

Item	Details
Site Owner	Liverpool City Council
Address	22 Box Road, Casula, NSW
Lot & Plan number	Lot 1103 in DP 1051233
Area	565 m^2
Current zoning	RE1 – Public Recreation
Site location and layout	**Figure 1** and **Figure 2**

5.2 Surrounding features

Features of surrounding land uses identified in the immediate vicinity of the site, as observed during fieldwork and from current aerial imagery are summarised in **Table 2** below.

Table 2: Surrounding site uses

Direction	Description
North	Residential premises. The M5 Motorway is located approximately 130 m north of the site.
South	Residential premises. Commercial/ industrial premises are located about 500 m south east of the site.
East	A Sydney water reservoir tank is situated on the other side of Box Road, beyond which are residential premises followed by the ground of Casula High School (approx. 180 m to the east).
West	Residential premises beyond which is Peter Miller park, playing fields and recreational park (approx.175 m to the west)

5.3 Sensitive receptors

The nearest sensitive human receptors include current and future site users as well as residents of neighbouring properties, occupants of Casula High School, and users of Peter Millar park.

The nearest sensitive environmental receptors include ecological communities which inhabit the soil, groundwater associated with the site itself.

5.4 General environmental setting

Detailed information on the geology, soils, topography, vegetation, and hydrogeology are provided in the reports and maps presented in **Appendix A**.

5.4.1 Geology

The Penrith 1:100 000 Geological series sheet (Herbert and Smith, 1991), describes the lithology of the site as being shale, carbonaceous claystone, laminite, lithic sandstone and occurrences of coal.

5.4.2 Soils

The soils at the site are classified in the Soil Landscapes of the Penrith 1:100 000 Geological series sheet (Herbert and Smith, 1991) as belonging to the Blacktown residual soil landscape. The site is situated upon sedimentary Bringelly shales belonging to the Wianamatta Group of shales. A soil landscape is an area of land that has recognisable and specifiable topographies and soils. The Blacktown soil landscape is characterised by shallow to moderately deep, hard setting mottled texture contrast soil, typically red and brown in colour which corresponds to the natural subsurface soils noted across the site. Limitations of Blacktown landscape soils include Seasonal waterlogging (localised), water erosion hazard (slight to moderate), surface movement potential (localised). Refer to **Appendix B** for the detailed soil landscape.

5.4.3 Topography, drainage and hydrology

Herbert and Smith (1991) describe the regional topography as being characterised by gently undulating rises with a local relief up to 30 m and slopes of >5%. The site is gently sloping downwards towards the west with the eastern portion of the site sitting on a broad crest in the landscape at approximate elevation of 72 meters Australian Heights Datum (mAHD) dipping to ~68 mAHD in the west.

5.4.4 Vegetation

The dominant vegetative species of the Blacktown soil landscape include *Eucalyptus tereticornis (forest red gum), E. crebra (narrow-leaved ironbark), E. moluccana (grey box) and E. maculata (spotted gum)*. The region, which once comprised of dry schlerophyll forest, has been historically cleared and is now used for medium and low-density housing. The site is grassed with no trees or shrubs.

5.4.5 Acid sulfate soil risk

The potential acid sulfate soils (PASS) risk maps published in the Liverpool Local Environmental Plan 2008 indicates that the site is not mapped within an acid sulfate soils risk management zone. It is also not within 500 m of any ‘Category 1 or 2’ PASS risk sites and therefore it is considered low risk at the site.

5.4.6 Hydrogeology and drainage

There are no natural surface water features onsite. The site is covered with grassy vegetation, therefore precipitation will percolate directly into surface soils and into local groundwater. The New South Wales (NSW) Department of Infrastructure, Planning and Natural Resource (DIPNR) (2002), *Salinity Potential in Western Sydney 2002* identifies the site as having a very high salinity potential.

For full reports of salinity and hydrogeological information please see **Map 1.4a** of **Appendix A.**

5.4.7 Nearby groundwater bores

An online search for groundwater bores registered with WaterNSW (https://realtimedata.waternsw.com.au/water.stm, accessed 27 September 2021) indicates that there are no registered bores located within a 500 m radius of the site.

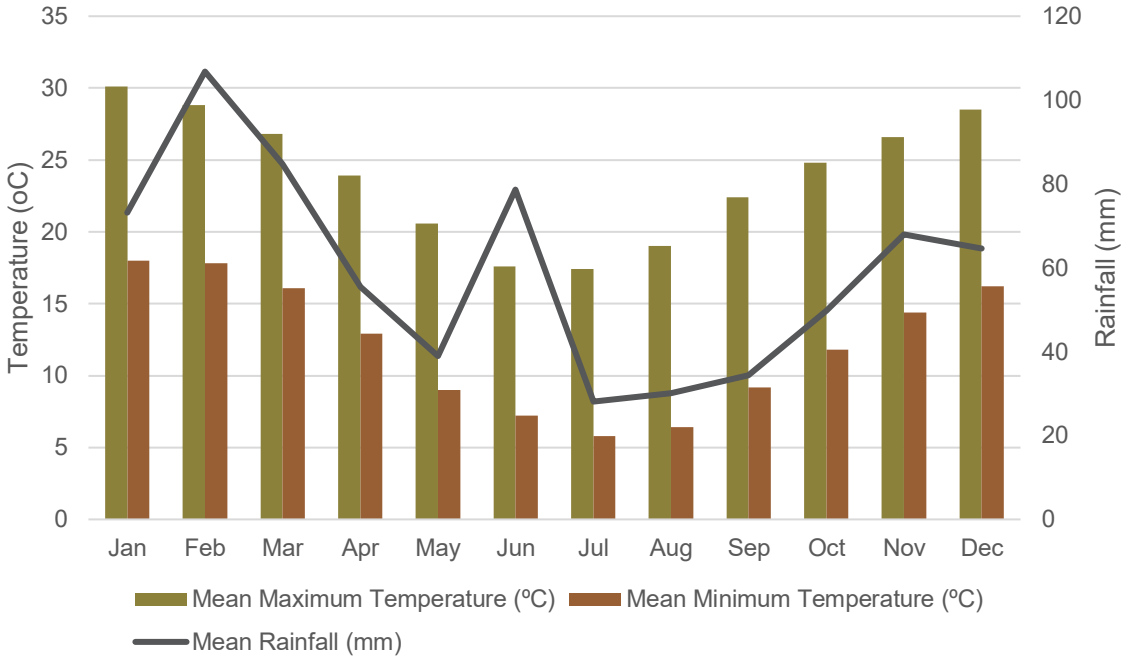
5.4.8 Groundwater dependent ecosystems

A search of the groundwater dependent ecosystems atlas (GDE) (http://www.bom.gov.au/water/groundwater/gde/map.shtml accessed 6 August 2021) indicates that there are no ecosystems at or near the site that have potential to rely on site groundwater.

5.5 Climate and meteorology

The site is located within an area of moderate to high rainfall in the centre of the Western Sydney region. Regional meteorological data has been sourced from the Bureau of Meteorology (*www.bom.gov.au*, accessed 6 August 2021). The rainfall mean, maximum and mean minimum monthly temperature data were received from Holsworthy Aerodrome automatic weather station (AWS) (no. 066161) located approximately 7.3 km to the south east of the site. Average monthly rainfall mean, maximum and minimum monthly temperatures were calculated between 2012 and present and presented in **Chart A** below.

Chart A: Average monthly climate data (2012 to August 2021)



6 HISTORICAL REVIEW

This section includes a review of:

- Available historic aerial photography;
- Records held by the NSW EPA including:
    - POEO Public Register;
    - Contaminated Land Record; and
    - Contaminated Sites Register.
- The underground petroleum storage system (UPSS) regulation sensitive zones map for the area.

6.1 Historical aerial photograph review

A review of aerial photographs and other available imagery of the site is summarised in **Table 3.** Historical aerial photographs are presented in **Appendix C**. The earliest historical photograph available for the site is from 1930.

Table 3: Site historical aerial photographs

Year	Colour / B & W	Notes
1930 - 1970	B & W	**Site**: Historic clearing is evident as the site is sparsely vegetated. The site is undeveloped. **Site surrounds**: Mostly cleared for grazing/agriculture over the time period with some remnant forest to the sites west. Rural residential properties and open agricultural fields gradually established to the sites north, south and east. Sydney water reservoir constructed in 1965. Greater portion of land to north and south cleared for market gardening in 1970.
1975 - 1998	B & W ('75 to '78) Colour ('61 to '98)	**Site**: Cleared for market gardening (1975) with evidence of usage through to 1978 after which field appear to be fallow or abandoned. **Site surrounds**: surrounding areas cleared for market gardening and in use until 1978. Urban development begins far to the sites north in 1975 and again to the sites east in 1991 followed by the construction of the M5 motorway in 1994.
2005 - 2021	Colour	**Site**: Site clear, no construction occurring onsite. **Site surrounds**: Development of area surrounding the site begins in 2005 and pushes west over the period culminating with the development of peter miller reserve in 2015 after which the area is in its present day state.

Notes: Historical imagery sourced from Land Insight & Resources.

6.2 NSW EPA Regulatory Searches

6.2.1 POEO Public Register

A search of the NSW EPA POEO Public Register for Environment Protection licences, applications, notices, audits or pollution studies and reduction programs in the suburb of Casula was conducted on 26 September 2021.

The search results indicate a clean-up notice was issued on 17 March 2017 to Casula High School, approximately 200 m east of the site, related to the removal of asbestos waste.

The clean-up notice required Council to have the school site remediated including engaging an environmental consultant to prepare a remedial action plan and site validation report (following remediation) as well as engaging an NSW EPA accredit Site Auditor to certify whether the school site was suitable for continued use as a school. It is understood that the remediation was completed by Terra Civil during the December 2017 / January 2018 school holidays. The site validation report was prepared by Douglas Partners and the Site Audit was completed by Ms Rowena Salmon.

Given the distance to the school and the limited mobility of the contaminant (being asbestos), the likelihood of contamination at the school to impact the site is considered to be low.

The location of the school is shown on **Map 3.3** of **Appendix A** and a copy of the clean-up notice is provided in **Appendix D.**

6.2.2 Contaminated Land Record

A search of the NSW EPA Contaminated Land Record for the suburb of Casula was conducted on 26 September 2021. The search did not provide any results.

6.2.3 Contaminated Sites Register

The search of the list of notified contaminated sites[1] conducted on 26 September 2021 indicates the site has not been notified as potentially contaminated.

6.3 Underground petroleum storage system regulation – sensitive zones map

Review of the Department of Environment, Climate Change and Water (NSW) (2010) Underground Petroleum Storage System (UPSS) regulation sensitive zones map indicated that the site is not located within a sensitive zone. The above-mentioned map is presented in **Map 2.1** of **Appendix A.**

6.4 Site history summary

Based on the results of the site history review, the site had been undeveloped since at least the 1930s until the mid-1970s when it was used for agricultural/ market garden purposes. During the early 2000s, use of the site for agricultural/ market garden purposes stopped as the surrounding land (and site) was developed for residential purposes. The site has been undeveloped since the early 2000s. There is no indication that the site was used for industrial or commercial purposes.

7 FIELD PROGRAM

A site inspection and intrusive soil investigation were undertaken on 17 September 2021 by Environmental Earth Sciences to assess the current site condition and collect representative soil samples. Site features and sampling locations are detailed on **Figure 2** with Photo Plates of site features and representative soil profiles provided in **Appendix E**.

7.1 Site observations

The site is vegetated with long grass and is bounded to the south, west and north by residential properties and to the east by Box Road.

[1] https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/clm/site-list/contaminated-sites-list-pdf-september-2021.pdf?la=en&hash=262170C939D0AD2BE5DFAE8928B521D093DF4216

The topography of the site slopes downwards to the west which is consistent with local topography. A retaining wall is located at the western site boundary, the change in elevation to the neighbouring property is approximately three metres.

At the time of the inspection, domestic rubbish including empty food cans and plastic pipes and minor building rubble including concrete pieces and minor brick and tile fragments were noted along the western boundary wall. Scaffolding was present along the southern boundary to facilitate construction of the dwelling to the south. A dumpster (approx. volume of 10 m^3), filled with building material, was located in the south eastern corner of the site.

Evidence of gross contamination (including potential asbestos containing materials (ACM) or staining was not evidenced at the site surface. No evidence of potential sources of contamination such as areas fuel/ chemical storage were observed at the site.

7.2 Intrusive soil investigation

Soil sampling was undertaken to assess the nature and extent of potential soil contamination. The recommended minimum number of sampling points required for site characterisation per the *Sampling Design Guidelines* (NSW EPA 1995) for a site with an area of 565 m^2 is six sampling points. To provide appropriate coverage of the site, sampling was conducted at ten locations based on a judgemental/ grid-based sampling pattern, refer **Figure 2**.

The sampling included excavating ten test pits across the site using a 5-tonne excavator. During sampling, the soil characteristics including lithology, extent of lithology, colour, odour, and other inclusions were recorded on test pit logs, which are provided in **Appendix F**.

Representative soil samples were collected, with discrete sampling being undertaken from each identified soil layer. Soil samples were collected from the centre of the excavator bucket with a new pair of gloves were used at each sampling location.

Samples collected for assessment of asbestos soil contamination in accordance with Schedules B1 and B2 of the NEPM were processed on site by sieving approx. 10 L of soil through a 7 mm sieve before collecting a 500 g sample for laboratory analysis.

The samples were placed into laboratory supplied glass jars and transported to the laboratory in a chilled container under full chain-of-custody documentation. The laboratory was accredited with the National Association of Testing Authorities (NATA) for each analytical method used. Sampling of soil was conducted in accordance with the following:

- Standards Australia (1999) - *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 2: Volatile substances* (AS 4482.2), Standards Australia, Homebush, NSW
- Standards Australia (2005) - *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds* (AS 4482.1), Standards Australia, Sydney, NSW
- Environmental Earth Sciences NSW (2010) - *Procedures for field, laboratory and reporting quality assurance and quality control manual*.

- Environmental Earth Sciences (2011) - *Soil, gas and groundwater sampling manual*, 7th Edition (Unpublished).

8 LABORATORY ANALYSIS

Seven soil samples were submitted to Australian Laboratory services (ALS) for chemical testing and Australian Safer Environment and Technology (ASET) for asbestos testing. Both laboratories NATA accredited for the methods used.

The soil samples were submitted to the laboratory for the following analysis:

- Heavy metals (As, Cd, Cu, CrTOTAL, Pb, Hg, Ni, Zn);
- Total Recoverable Hydrocarbons (TRH) (Fractions C_6-C_{40});
- Benzene, Toluene, Ethylbenzene and Total xylenes (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAH); and
- Asbestos Weight for Weight (w/w) NEPM specification.

9 PROCEDURES FOR QUALITY CONTROL AND QUALITY ASSURANCE

Quality control is achieved by using NATA registered laboratories using American Society for Testing and Materials (ASTM) standard methods supported by internal duplicates, the checking of high, abnormal or otherwise anomalous results against background and other chemical results for the sample concerned.

Quality assurance is achieved by confirming that field results, or anticipated results based upon comparison with field observations, are consistent with laboratory results. Also, that sampling methods are uniform, and decontamination is thorough. In addition, the laboratory undertakes additional duplicate analysis as part of their internal quality assurance program on the basis of one duplicate analysis for every 20 samples analysed.

Field observations are compared with laboratory results when they are not as expected. Confirmation, re-sampling and re-analysis of a sample are undertaken if the results are not consistent with field observations and/or measurements. In addition, field duplicate sample results have to be within the acceptable range of reproducibility. A discussion of the QAQC is presented in **Appendix G.**

10 SOIL INVESTIGATION CRITERIA

10.1 Health investigation levels (HILs)

Appropriate health-based investigation levels (HILs) will be applied to the site for current use as open space purposes and being close to residential premises. These HILs are taken from the ASC NEPM (2013) and are presented for reference in **Table 4.** The applicable HILs for this investigation will include the following:

- HIL C – Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths.

Table 4: Health investigation levels for soil contaminants

Analyte	Health-based investigation levels (mg/kg) [1]
	Recreational C
Arsenic [2]	300
Cadmium	90
Chromium (VI)	300
Copper	17,000
Lead [3]	600
Mercury (inorganic)	80
Nickel	1,200
Zinc	30,000
Carcinogenic PAHs (as BaP TEQ) [4]	3
Total PAHs [5]	300

Notes:

1. HIL C – Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths.
2. Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability may be important and should be considered where appropriate (refer Schedule B7).
3. Lead: HIL is based on blood lead models (IEUBK for HILs A, B and C and adult lead model for HIL D where 50% oral bioavailability has been considered. Site-specific bioavailability may be important and should be considered where appropriate.
4. Carcinogenic PAHs: HIL is based on the 8 carcinogenic PAHs and their TEFs (potency relative to B(a)P) adopted by CCME 2008 (refer Schedule B7). The B(a)P TEQ is calculated by multiplying the concentration of each carcinogenic PAH in the sample by its B(a)P TEF, given below, and summing these products.
5. Total PAHs: HIL is based on the sum of the 16 PAHs most commonly reported for contaminated sites (WHO 1998).

PAH species	TEF	PAH species	TEF
Benzo(a)anthracene	0.1	Benzo(g,h,i)perylene	0.01
Benzo(a)pyrene	1	Chrysene	0.01
Benzo(b+j)fluoranthene	0.1	Dibenz(a,h)anthracene	1
Benzo(k)fluoranthene	0.1	Indeno(1,2,3-c,d)pyrene	0.1

10.2 Health screening levels

Health Screening Levels (HSLs) for soils for validation have been adopted from *Table 1A(3)* of ASC NEPM (2013) – *Schedule B1: Investigation Levels for Soil and Groundwater*. The HSLs for volatile organic compound (VOC) contamination are based on vapour intrusion risk associated with soil petroleum hydrocarbon contamination.

HSLs are for assessing human health risk associated with inhalation, and depend on specific soil properties and depths, types of land use and characteristics of buildings for each land use scenario. The material type adopted was clay, which represents the most conservative soil texture for application of the HSLs. Refer to a summary of Tier 1 HSLs in **Table 5**.

Table 5: Health screening levels

Analyte	Soil type	HSL-C threshold concentration (mg/kg)
		0 m to <1 m
F1 (C_6-C_{10} – BTEX)	Clay	NL
F2 (>C_{10}-C_{16}) – Naphthalene	Clay	NL
Benzene	Clay	NL
Toluene	Clay	NL
Ethylbenzene	Clay	NL
Xylenes	Clay	NL
Naphthalene	Clay	NL

Notes:
mg/kg Milligrams per kilogram
NL No applicable risk-based limit applies

10.3 Health-based Screening Levels (HSLs) - asbestos

Health screening levels for asbestos in soil were adopted from the ASC NEPM (2013) and are outlined in **Table 6**.

Table 6: Health screening levels for asbestos contamination in soil

Form of asbestos	HSL (w/w)
	HSL C
Bonded ACM[1]	0.02% w/w
FA[2] and AF[2] (friable asbestos)	0.001% w/w
All forms of asbestos	No visible asbestos for surface soil

Notes:
1. ACM – Bonded asbestos containing material;
2. FA – Fibrous asbestos; AF – Asbestos fines

10.4 Ecological investigation levels (EILs) for soil

The ecological investigation levels (EILs) assigned by ASC NEPM (2013) – *Schedule B5a: Guideline on Ecological Risk Assessment* are adopted for this assessment. This guideline presents the methodology for deriving terrestrial EILs using both fresh and aged (i.e. >2 years old) contamination for soil with the following land use types:

- Areas of ecological significance.
- Urban residential/ public open space.
- Commercial / industrial.

The methodology has been developed to protect soil processes, soil biota (flora and fauna) and terrestrial invertebrates and vertebrates. The proposed land use at the site is for residential / open space land use, as such the adopted EILs for this validation will be protective of this scenario

The ACL concentrations were ascertained for representative locations based on site-specific results for either pH alone, or pH and cation exchange capacity (CEC) in accordance with procedures in ASC NEPM (2013) – *Schedule 5c: - EILs for As Cr Cu DDT Pb Naphthalene Ni Zn*. Refer to a summary of site-specific EILs in **Table 7**.

Table 7: Ecological investigation level thresholds

Analyte	EIL for Urban residential and public open space (mg/kg)
Naphthalene	170
Arsenic	100
Chromium (III)	198
DDT	180
Copper	210
Lead	1,200
Nickel	175
Zinc	775

10.5 Ecological screening levels (ESLs)

For petroleum hydrocarbons, ESLs have been derived in ASC NEPM (2013) based upon fraction ranges of hydrocarbons, BTEXN component and benzo(a)pyrene (BaP) together with soil texture classes. These ESLs are of low reliability except for the volatile and semi-volatile hydrocarbon fractions which are of moderate reliability. Nonetheless the ESLs will be adopted for the investigation to be protective of soils in an urban residential and public open space land use scenario.

The adopted ESLs are designed to be protective of soil fauna, soil processes plants. The ASC NEPM (2013) states that these factors only apply within the rhizome (i.e. zone in the top two metres of soil) and as such ESL criteria need not be applied to chemical results below this depth. Criteria are summarised below in **Table 8**.

Table 8: Ecological screening levels for soil contaminants

Analyte	Soil Texture	Management Limits	ESL (mg/kg dry Soil)
			Urban residential and public open space
F1 (C_6- C_{10})	Coarse	700	180 *
	Fine	800	
F2 (>C_{10}-C_{16})	Coarse	1,000	120 *
	Fine	1,000	
Benzene	Coarse	----	50
	Fine	----	65
Toluene	Coarse	----	85
	Fine	----	105
Ethyl-benzene	Coarse	----	70
	Fine	----	125
Xylenes	Coarse	----	105
	Fine	----	45
Benzo(a)pyrene	Coarse	----	0.7
	Fine	----	0.7

11 RESULTS

11.1 Intrusive soil investigation

The sample locations assessed are illustrated on **Figure 2** with test pit logs provided in **Appendix F.**

The field conditions can be described as:

- Ground surface to 0.5 m – fill material at locations TP1 to TP8 consisting of firm brown clay and very minor trace inclusions of glass, brick or tile fragment up to 0.5 m in depth in the lower-lying western portion of the site at location TP1 and gradually shallower towards the eastern side with a thickness of approximately 0.15 m at location TP8.
- Underlying natural soil is described as mottled red/orange/ brown and pale grey clay overlaying brown and dark grey shale cobbles and boulders.

Fill material consistent with the above description was not identified at locations TP9 and TP10 as it did not include anthropogenic material. However, the surface soil at TP9 and TP10 included a minor percentage of weathered shale, which should not be anticipated at shallow depths. It is presumed this material is present due to preparatory earthworks as part of the development of the broader area when cut and fill would likely have occurred.

Groundwater was not encountered in any of the test pit excavation. Therefore, the depth to groundwater exceeds 1.8 m deep, which is the depth of the deepest test pit.

11.2 Analytical results

A summary of laboratory results for chemical analysis against adopted site criteria is presented in **Appendix H** and laboratory certificates of analysis is provided in **Appendix I**.

11.2.1 Chemical analysis

The reported concentrations of TRH, BTEX, PAH and Heavy metals were below the laboratory's limit of reporting (LOR) and / or the applicable health and ecologically based criteria.

11.2.2 Asbestos analysis

Asbestos was not identified on the site's surface nor within fill material. No free asbestos fibres or friable asbestos materials were observed or identified during laboratory analysis. Furthermore, asbestos was not detected as part of the asbestos quantification that was conducted as part of the assessment.

12 CONCEPTUAL SITE MODEL

12.1 Introduction

A key component of the investigation/ risk assessment process is the development of a Conceptual Site Model (CSM) as this drives the risk management and remediation process. This identifies potential sources of contamination, potential migration pathways along which identified contaminants could migrate and potential receptors which may become exposed.

The CSM considers all plausible pollutant linkages associated with the identified contamination. By evaluating these linkages proposed controls can be outlined and recommendations developed for appropriate remediation or management.

12.2 Sources of contamination

Based on the findings of the desktop search, site inspection and limited intrusive investigation, the primary source of contamination is considered to be:

- Refuse and debris (consisting of empty food cans, plastic pipes and trace amounts of domestic building rubble) near the western site boundary.

- Shallow fill material up to 0.5 m deep.

12.3 Contaminants of potential concern

Although COPC were identified as part of the desktop review and site history, the reported concentrations of COPC are either below the laboratory's LOR and or investigation criteria.

12.4 Pathways

The potential pathways by which contamination present at the site could reach potential receptors are considered to be:

- Direct contact (dermal);
- Ingestion;
- Inhalation;
- Plant uptake.

12.5 Receptors

Identified potential sensitive receptors are considered to be:

- Current and future site users;
- Adjacent site users;
- Future construction and maintenance workers at the site.
- Site and surrounding flora, fauna and soil processes

12.6 Source to receptor linkages

Based upon the results and findings of this assessment, a source-pathway-receptor risk-linkage analysis is presented in **Table 9**.

Table 9: Source pathway receptor analysis

Potential Source	CoPC	Pathway	Receptor	Risk	Associated Data Gaps / Recommendations
Unverified fill	Heavy metals, BTEX, TRH and PAHs	Direct contact; Ingestion and Inhalation	**Human -** Current and future site users **Ecological –** Site fauna	LOW	The trace anthropogenic material observed in shallow fill at locations TP1 to TP8 is not suitable from an aesthetic perspective and will be removed as part of the proposed development. The fill material identified in shallow soils in these locations was not found to be impacted by and any of the CoPCs identified for the site.
			Human - Adjacent site users	LOW	
		Plant uptake	**Ecological –** Site flora	LOW	
	Asbestos	Inhalation of fibres	**Human –** Current and future site users	LOW	

Notes:

HIGH RISK - desktop review and site inspection have identified potentially contaminating site activities and intrusive works must be carried out to remediate.
MODERATE RISK - desktop review and site inspection cannot rule out the presence of potentially contaminating site activities without undertaking recommended intrusive works
LOW RISK - desktop review and site inspection have not identified any potentially contaminating site activities.

13 CONCLUSIONS

Environmental Earth Sciences was requested by Liverpool City Council to undertake a soil contamination assessment of the site to evaluate its suitability for the proposed development, being the installation of children's playground.

Based on the results of the soil contamination assessment, the following conclusions are made:

- The site is a vacant undeveloped parcel of land located in Casula that was initially part of a much larger property that was used for agricultural/ market garden purposes between the mid-1970s and the early 2000s. The broader property was developed for residential purposes from the early 2000s. The site has not been developed.

- During the site inspection, domestic rubbish including empty food cans and plastic pipes and minor building rubble including concrete pieces and minor brick and tile fragments were noted along the western boundary wall. Furthermore, scaffolding was present along the southern boundary to facilitate construction of the neighbouring property. Evidence of gross contamination (including potential ACM) or staining was not evidenced at the site surface.

- The reported concentrations of contaminants of potential concerns were either below the laboratory's LOR and or investigation criteria.

Based upon findings from the desktop study, review of historical information, site observations, intrusive investigation and laboratory results, Environmental Earth Sciences considers that the site presents a LOW risk to human health and the environment. As such further assessment and/or remediation is not considered necessary. There are general recommendations made for any proposed earthworks in **Section 14**.

14 RECOMMENDATIONS

In view of the findings of the assessment and the proposed development, it is recommended that an unexpected finds protocol (UFP) be adopted to manage potential contamination and or hazardous materials which may be encountered. An example UFP is provided in **Appendix J**.

15 LIMITATIONS

This report has been prepared by Environmental Earth Sciences NSW ACN 109 404 006 in response to and subject to the following limitations:

1. The specific instructions received from Liverpool City Council;

2. The specific scope of works set out in PO121134_V1 issued by Environmental Earth Sciences NSW for and on behalf of Liverpool City Council, is included in **Section 4** of this report;

3. May not be relied upon by any third party not named in this report for any purpose except with the prior written consent of Environmental Earth Sciences NSW (which consent may or may not be given at the discretion of Environmental Earth Sciences NSW);

4. This report comprises the formal report, documentation sections, tables, figures and appendices as referred to in the index to this report and must not be released to any third party or copied in part without all the material included in this report for any reason;

5. The report only relates to the site referred to in the scope of works being located at 22 Box Road, Casula, NSW ("the site");

6. The report relates to the site as at the date of the report as conditions may change thereafter due to natural processes and/or site activities;

7. No warranty or guarantee is made in regard to any other use than as specified in the scope of works and only applies to the depth tested and reported in this report;

8. Fill, soil, groundwater and rock to the depth tested on the site may be fit for the use specified in this report. Unless it is expressly stated in this report, the fill, soil and/or rock may not be suitable for classification as clean fill, excavated natural material (ENM) or virgin excavated natural material (VENM) if deposited off site;

9. This report is not a geotechnical or planning report suitable for planning or zoning purposes; and

10. Our General Limitations set out at the back of the body of this report.

16 REFERENCES

Bureau of Meteorology, Australian Government website (accessed 20 August 2021) http://www.bom.gov.au/

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ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

ENVIRONMENTAL EARTH SCIENCES GENERAL LIMITATIONS

Scope of services
The work presented in this report is Environmental Earth Sciences response to the specific scope of works requested by, planned with and approved by the client. It cannot be relied on by any other third party for any purpose except with our prior written consent. Client may distribute this report to other parties and in doing so warrants that the report is suitable for the purpose it was intended for. However, any party wishing to rely on this report should contact us to determine the suitability of this report for their specific purpose.

Data should not be separated from the report
A report is provided inclusive of all documentation sections, limitations, tables, figures and appendices and should not be provided or copied in part without all supporting documentation for any reason, because misinterpretation may occur.

Subsurface conditions change
Understanding an environmental study will reduce exposure to the risk of the presence of contaminated soil and or groundwater. However, contaminants may be present in areas that were not investigated, or may migrate to other areas. Analysis cannot cover every type of contaminant that could possibly be present. When combined with field observations, field measurements and professional judgement, this approach increases the probability of identifying contaminated soil and or groundwater. Under no circumstances can it be considered that these findings represent the actual condition of the site at all points.

Environmental studies identify actual sub-surface conditions only at those points where samples are taken, when they are taken. Actual conditions between sampling locations differ from those inferred because no professional, no matter how qualified, and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden below the ground surface. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from that predicted. Nothing can be done to prevent the unanticipated. However, steps can be taken to help minimize the impact. For this reason, site owners should retain our services.

Problems with interpretation by others
Advice and interpretation is provided on the basis that subsequent work will be undertaken by Environmental Earth Sciences NSW. This will identify variances, maintain consistency in how data is interpreted, conduct additional tests that may be necessary and recommend solutions to problems encountered on site. Other parties may misinterpret our work and we cannot be responsible for how the information in this report is used. If further data is collected or comes to light we reserve the right to alter their conclusions.

Obtain regulatory approval
The investigation and remediation of contaminated sites is a field in which legislation and interpretation of legislation is changing rapidly. Our interpretation of the investigation findings should not be taken to be that of any other party. When approval from a statutory authority is required for a project, that approval should be directly sought by the client.

Limit of liability
This study has been carried out to a particular scope of works at a specified site and should not be used for any other purpose. This report is provided on the condition that Environmental Earth Sciences NSW disclaims all liability to any person or entity other than the client in respect of anything done or omitted to be done and of the consequence of anything done or omitted to be done by any such person in reliance, whether in whole or in part, on the contents of this report. Furthermore, Environmental Earth Sciences NSW disclaims all liability in respect of anything done or omitted to be done and of the consequence of anything done or omitted to be done by the client, or any such person in reliance, whether in whole or any part of the contents of this report of all matters not stated in the brief outlined in Environmental Earth Sciences NSW's proposal number and according to Environmental Earth Sciences general terms and conditions and special terms and conditions for contaminated sites.

To the maximum extent permitted by law, we exclude all liability of whatever nature, whether in contract, tort or otherwise, for the acts, omissions or default, whether negligent or otherwise for any loss or damage whatsoever that may arise in any way in connection with the supply of services. Under circumstances where liability cannot be excluded, such liability is limited to the value of the purchased service.

FIGURES

Legend

Site Boundary

0 0.75 1.5 2.25 km

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

Title: Site locality

Client: Liverpool City Council

Location: Mimosa Park, 22 Box Road, Casula NSW

Project Manager: Lachlan Desailly | Scale: As Shown | Job No: 121070

Drawn By: Karin Azzam | Date: September 2021

Figure 1

Legend

- Samples analysed
- Test Pit Locations
- scaffolding
- Domestic refuse/ trace building rubble at surface
- Site Boundary

0 5 10 15 m

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

Title: Site features and test pit locations

Client: Liverpool City Council

Location: Mimosa Park, 22 Box Road, Casula NSW

Project Manager: Lachlan Desailly | Scale: As Shown | Job No: 121070

Drawn By: Karin Azzam | Date: September 2021

Figure 2

APPENDIX A: ENVIRONMENTAL SETTING MAPS

Appendix A

REPORT MAPS

PROPERTY SETTING

MAP 1.1

Subject Area and Sensitive Receptors

Subject area

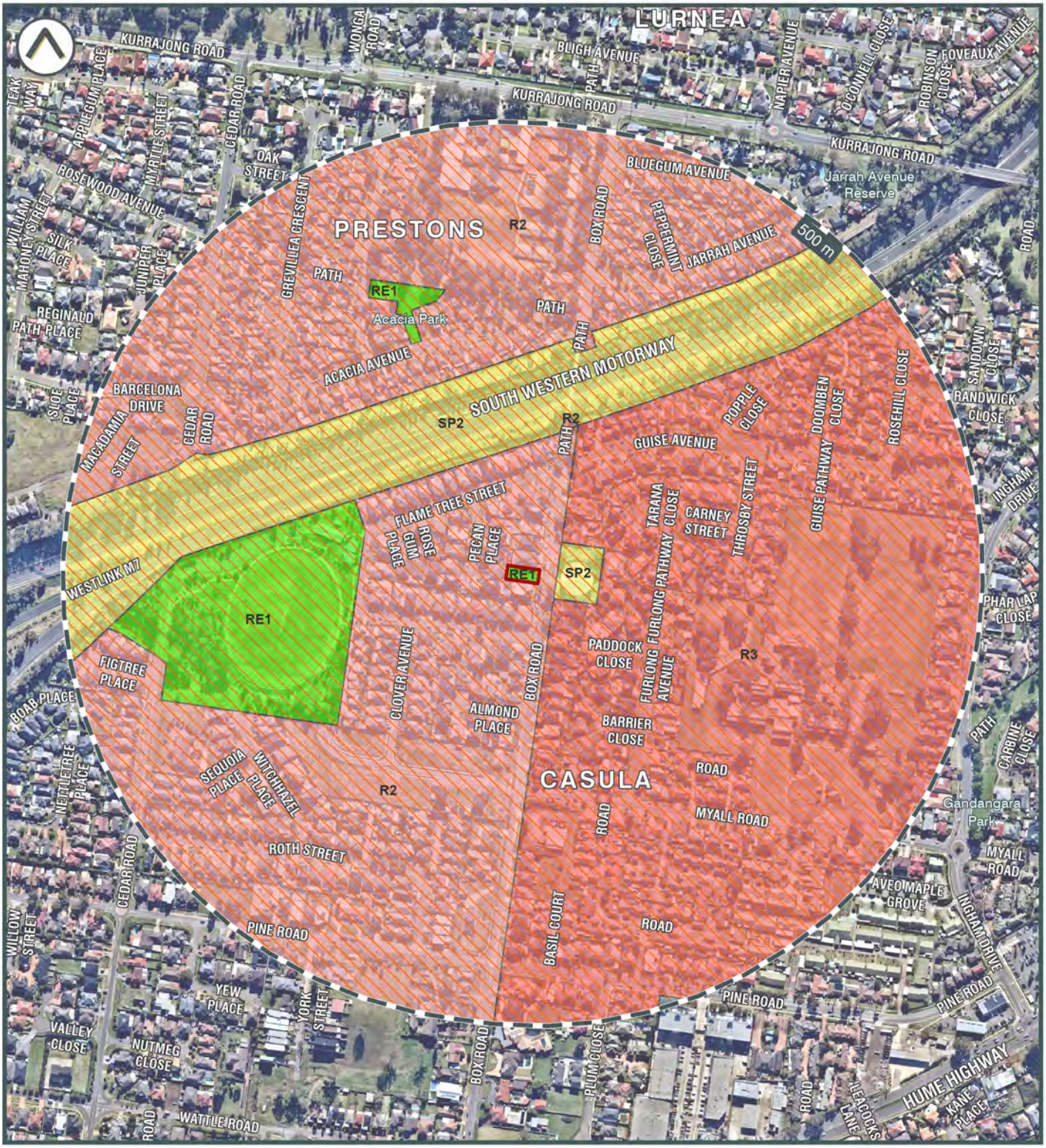
0 50 100 150 200 250m

Land Insight

PROPERTY SETTING

MAP 1.2

Planning Controls



Subject area
Local Provisions

Land Zoning
B6 | Enterprise Corridor
R2 | Low Density Residential
R3 | Medium Density Residential
RE1 | Public Recreation
SP2 | Special Purposes Zone – Infrastructure

0 50 100 150 200 250m

Land Insight

PROPERTY SETTING

Heritage

MAP 1.3

Subject area

Heritage conservation Area (LEP)
State Heritage Register
Commonwealth Heritage List (CHL)

National Heritage List (NHL)
World Heritage Area (WHA)

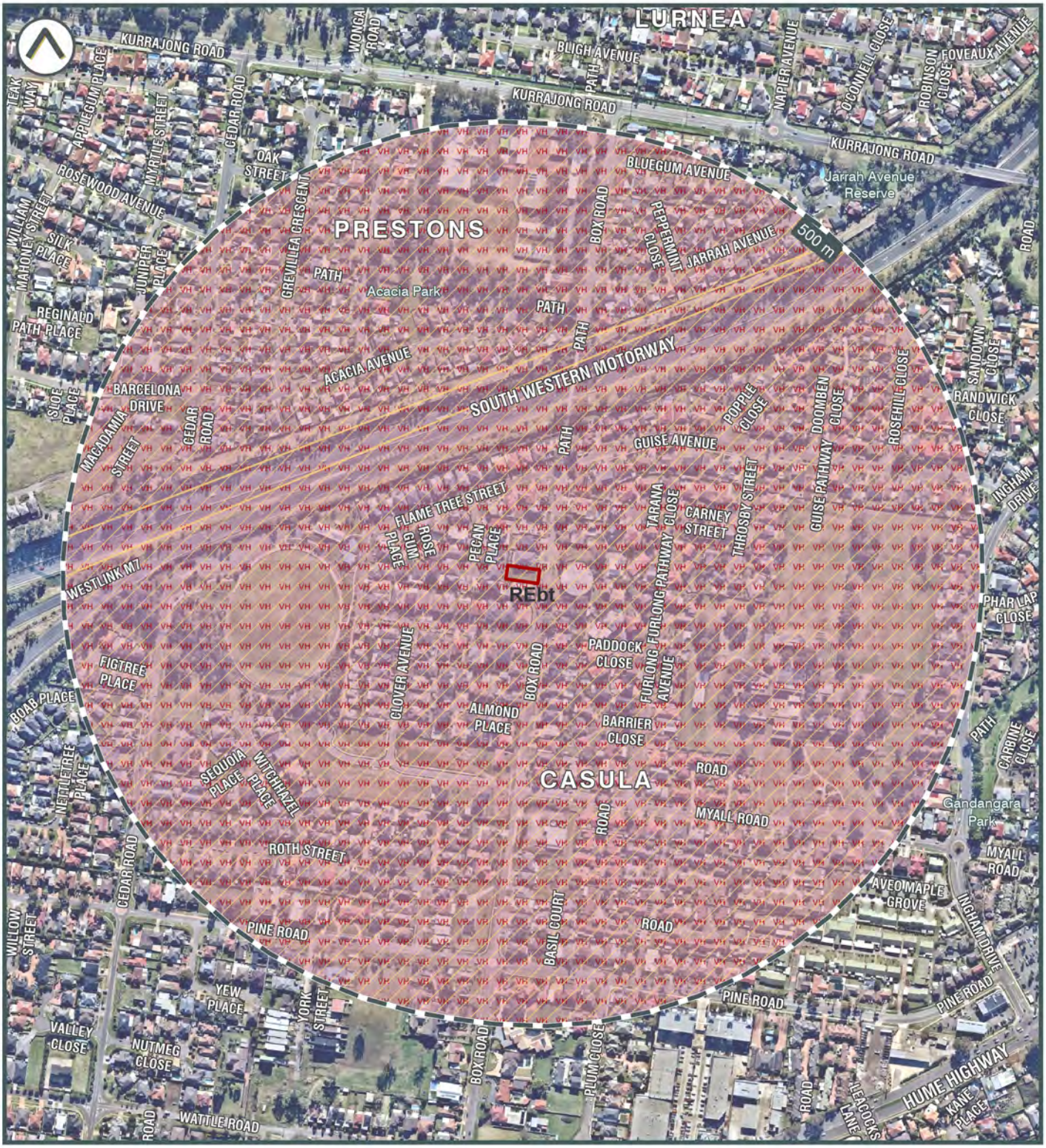
0 50 100 150 200 250m

Land Insight

PROPERTY SETTING

MAP 1.4a

Soil Landscape and Salinity



Subject area

Salinity Hazard
VH Very High

Radon Level (Bq/m3)
5–19

Soils Landscape
REbt | RESIDUAL

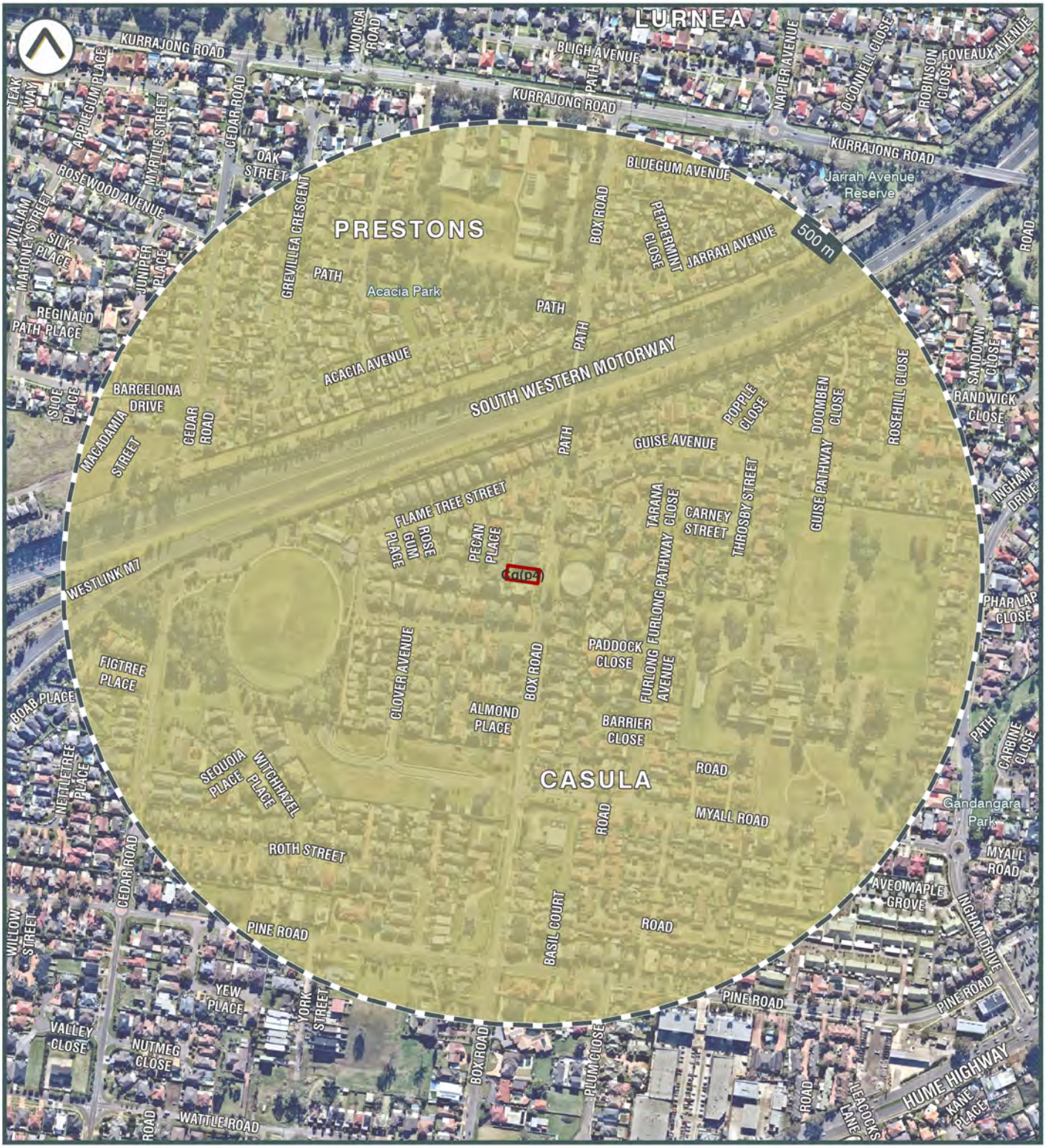
0 50 100 150 200 250m

Land Insight

PROPERTY SETTING

Acid Sulfate Soils

MAP 1.4b



Subject area

ASRIS Atlas of Australian Sulfate Soils

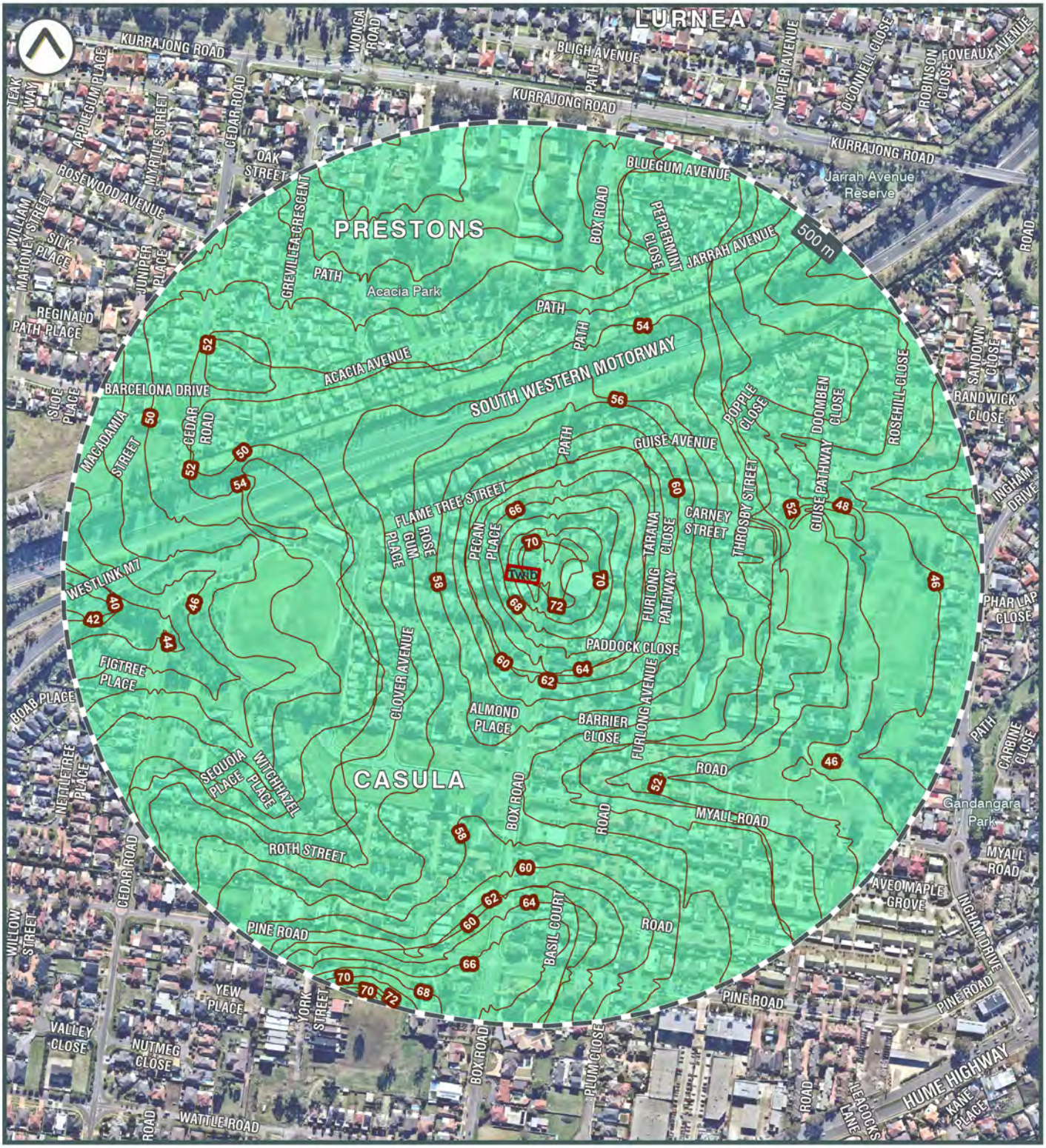
Cq(p4) | ASS in inland lakes, waterways, wetlands and riparian zones

0 50 100 150 200 250m

Land Insight

MAP 1.5

Geology and Topography



Subject area
Topographic contour (m)

PERMO-TRIASSIC BASINS
Twlb

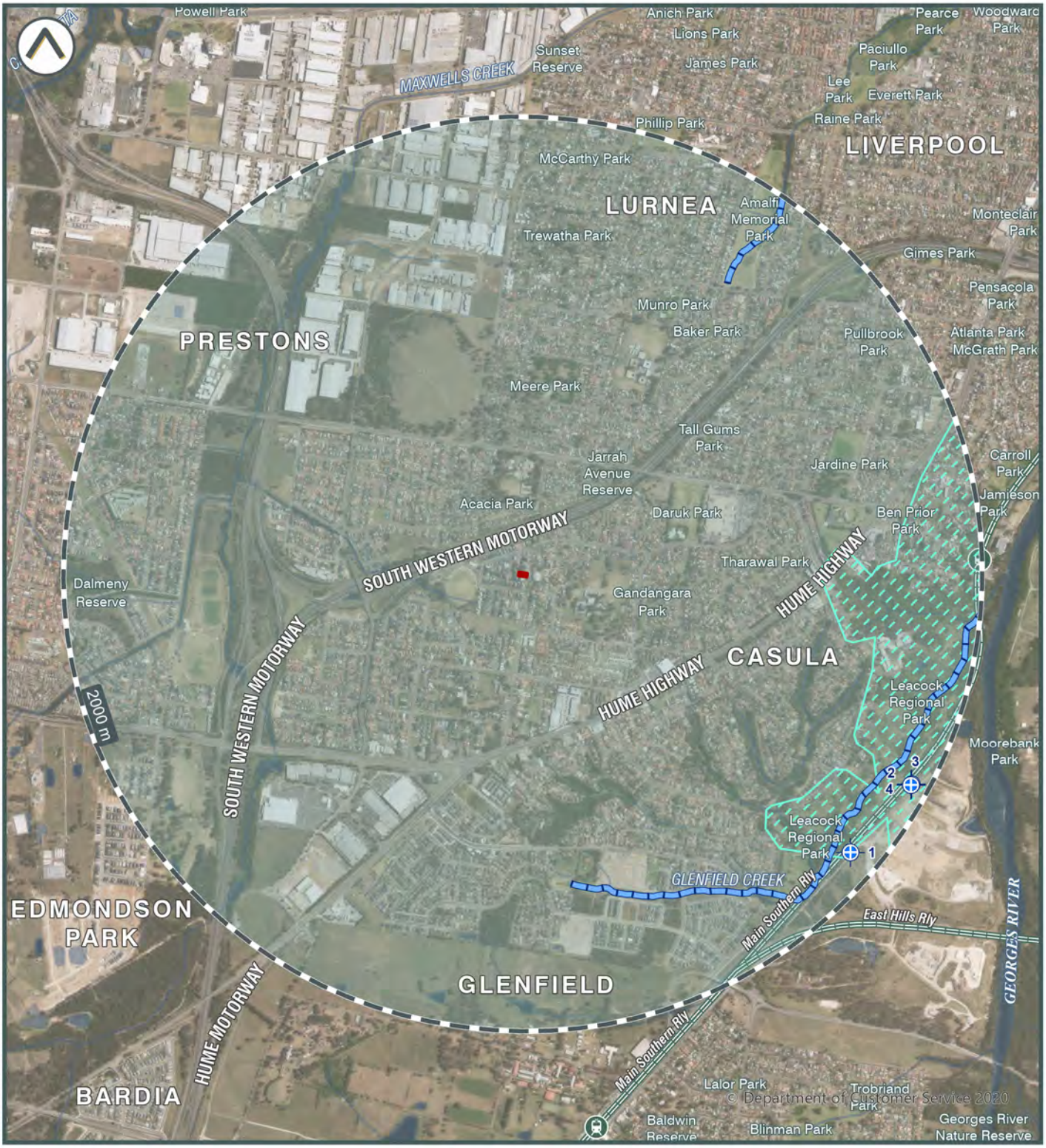
0 50 100 150 200 250m

Land Insight

HYDROGEOLOGY

MAP 2.1

Hydrogeology and Groundwater Boreholes



Subject area

Groundwater bores

Protected Riparian Corridor

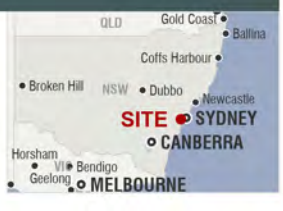
UPSS Environmentally Sensitive Zone

Aquifer type

Porous, extensive aquifers of low to moderate productivity

0 200 400 600 800 1,000m

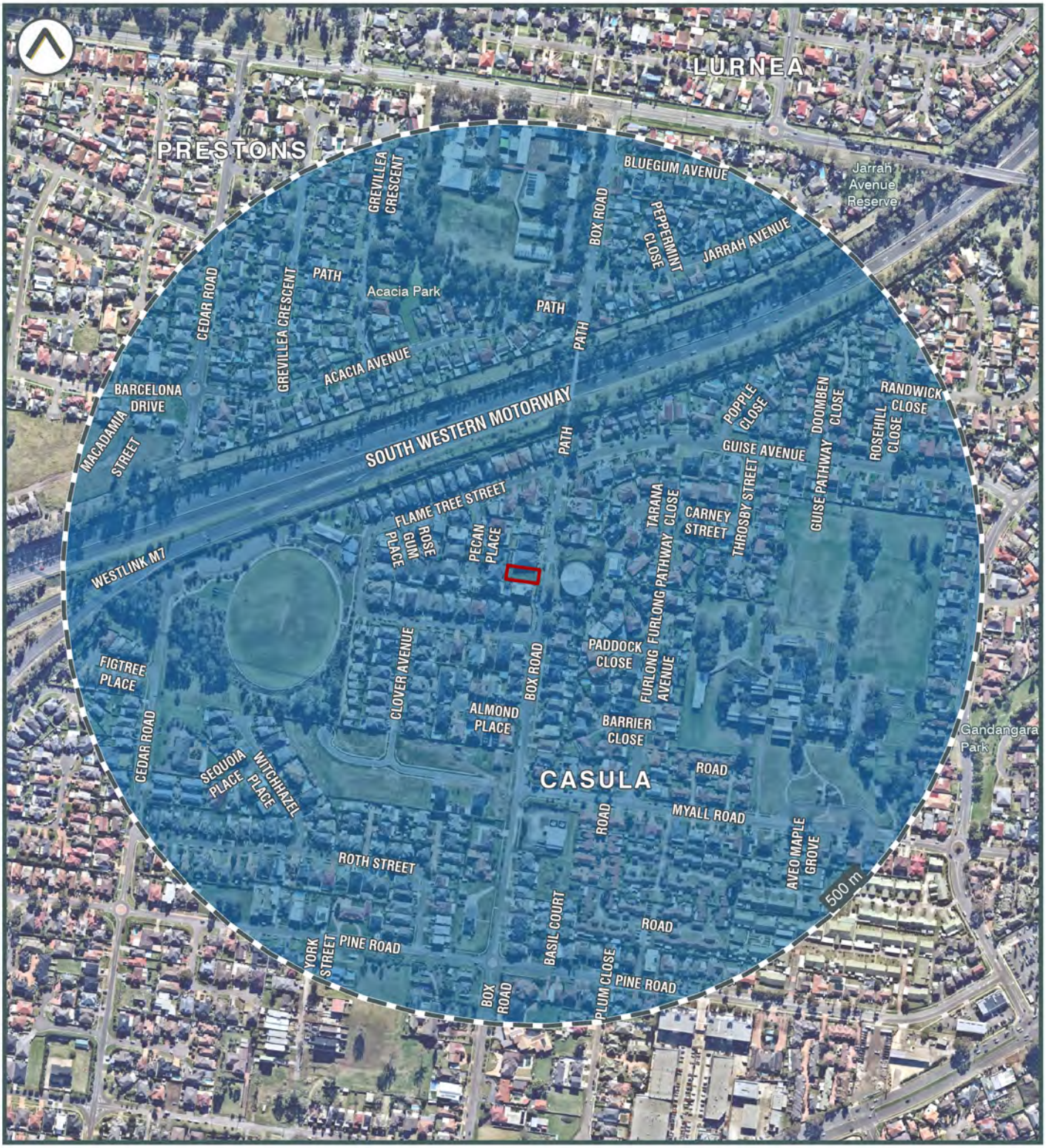
Land Insight



HYDROGEOLOGY

MAP 2.2

Hydrogeology and Other Boreholes



Subject area

Other borehole/monitoring well location

Hydrogeologic Unit

Late Permian/Triassic sediments (porous media – consolidated)

0 50 100 150 200 250m

Land Insight

ENVIRONMENTAL REGISTERS LICENSES AND INCIDENTS

MAP 3.1

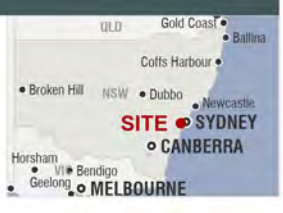
Contaminated Land Public Register

Subject area

Contaminated Land Register (EPA)
Contaminated Land Register (EPA)
Contaminated Land Record of Notices

0 200 400 600 800 1,000m

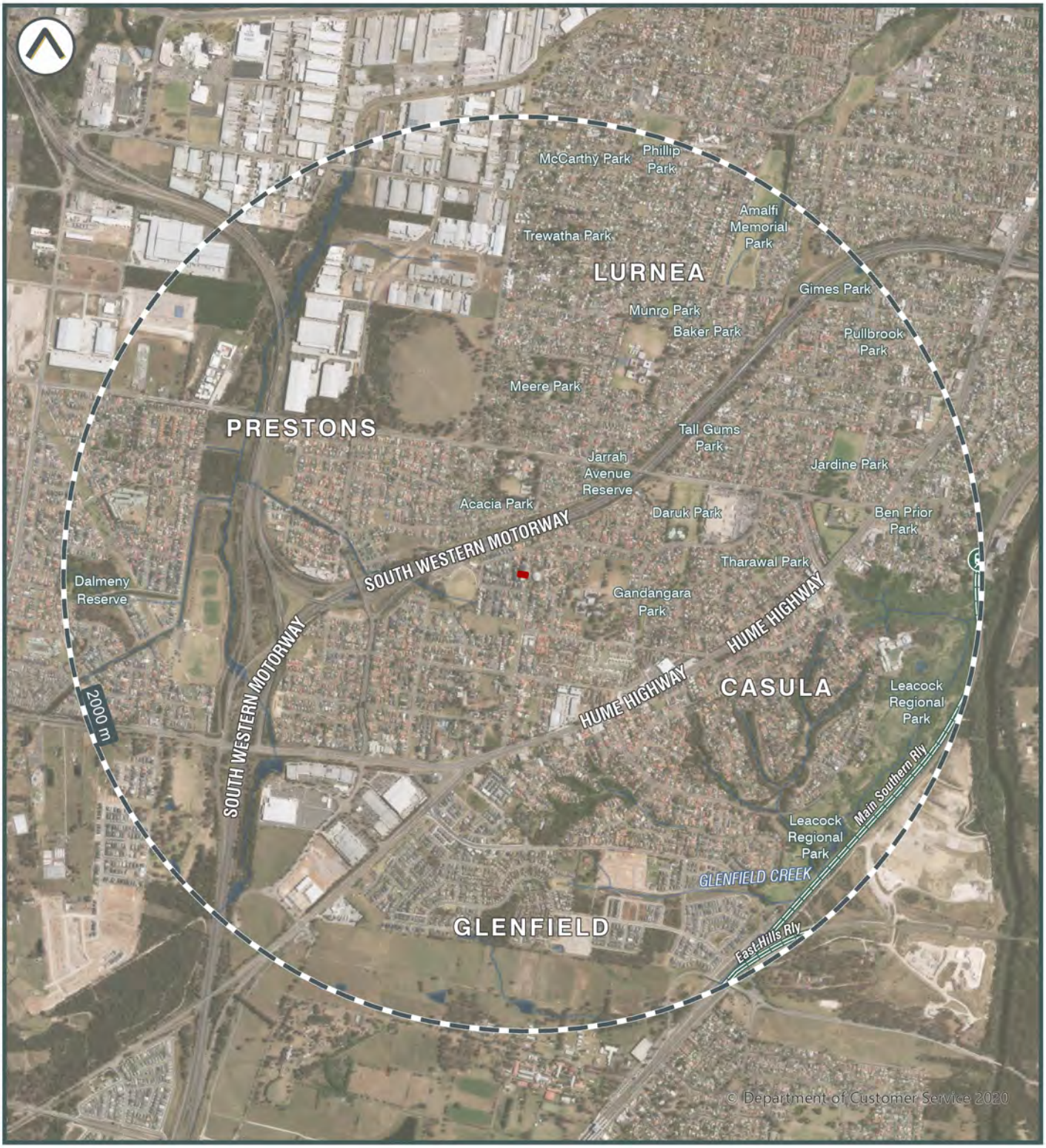
Land Insight



ENVIRONMENTAL REGISTERS LICENSES AND INCIDENTS

MAP 3.2

Sites Regulated by other Jurisdictional Body



Subject area

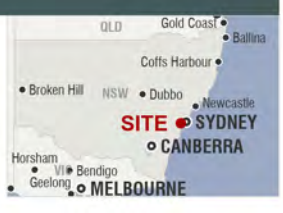
PFAS sites
NPI Facilities
Former Gasworks Sites

Unexploded Ordnance (UXO) Areas
Substantial Potential
Slight potential
Sea Dumping of Depth Charges

Other Sea Dumping Sites
Other
Defence Controlled Area
Defence Sites

0 200 400 600 800 1,000m

Land Insight



ENVIRONMENTAL REGISTERS LICENSES AND INCIDENTS

MAP 3.3

Licensing Under the POEO Act

Subject area

POEO Licences
- Issued
- Surrendered Licences still Regulated by EPA

Clean Up and Penalty Notices

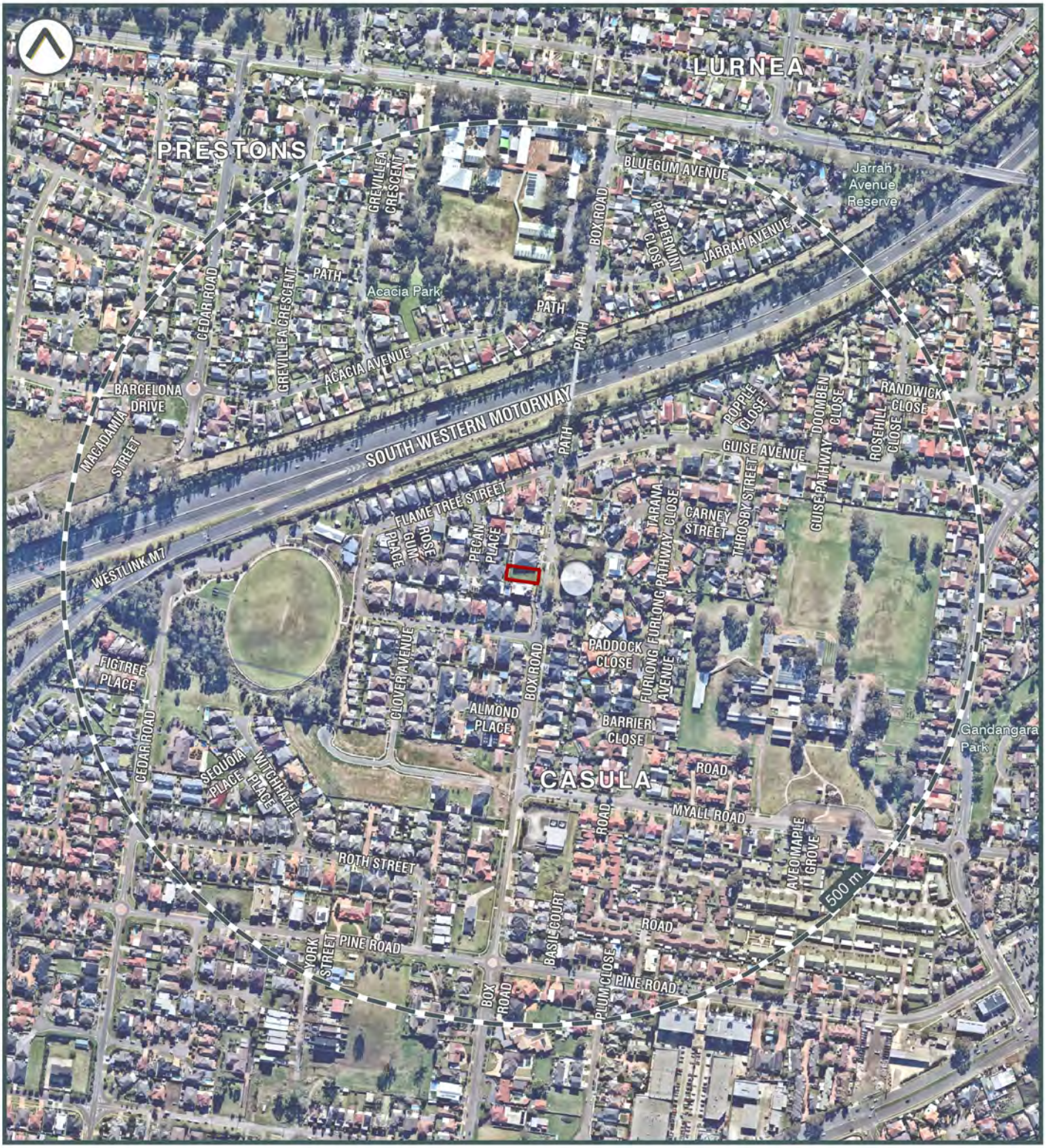
0 50 100 150 200 250m

Land Insight

POTENTIALLY CONTAMINATED AREAS

MAP 4.1

Potentially Contaminating Activities (PCAs)



- Subject area
- Liquid Fuel Depots
- Operational Petrol Stations
- Former Petrol Stations
- Waste Management Facilities

Data is current as when this report was created. However due to the turnover of business locations, some addresses may be former.

0 50 100 150 200 250m

Land Insight

NATURAL HAZARDS

MAP 5.1

Fire and Flood Hazards

Subject area

Erosion Hazard
- High
- Minor to moderate
- Nil to minor erosion

0 50 100 150 200 250m

Land Insight

Land Insight RESOURCES

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

APPENDIX B: SOIL LANDSCAPE

bt	BLACKTOWN	Residual

Landscape—gently undulating rises on Wianamatta Group shales. Local relief to 30 m, slopes usually >5%. Broad rounded crests and ridges with gently inclined slopes. Cleared Eucalypt woodland and tall open-forest (dry schlerophyll forest).

Soils—shallow to moderately deep (>100 cm) hardsetting mottled texture contrast soils, Red and Brown Podzolic Soils (Dr3.21, Dr3.31, Db2.11, Db2.21) on crests grading to Yellow Podzolic Soils (Dy2.11, Dy3.11) on lower slopes and in drainage lines.

Limitations—localised seasonal waterlogging, localised water erosion hazard, moderately reactive highly plastic subsoil, localised surface movement potential.

LOCATION

Occurs extensively on the Cumberland Lowlands. Examples include Blacktown, Mount Druitt, Glossodia and Leppington.

Isolated examples are found at Bilpin on the Blue Mountains plateau surface and along the Silverdale Road south of Wallacia.

LANDSCAPE

Geology

Wianamatta Group—Ashfield Shale consisting of laminite and dark grey siltstone, Bringelly Shale which consists of shale with occasional calcareous claystone, laminite and infrequent coal, and Minchinbury Sandstone consisting of fine to medium-grained quartz lithic sandstone.

Topography

Gently undulating rises on Wianamatta Shale with local relief 10–30 m and slopes generally >5% but occasionally up to 10%. Crests and ridges are broad (200–600 m) and rounded with convex upper slopes grading into concave lower slopes. Outcrops of shale do not occur naturally on the surface. They may occur, however, where soils have been removed.

Vegetation

Almost completely cleared open-forest and open-woodland (dry sclerophyll forest). The original woodland and open-forest were dominated by *Eucalyptus tereticornis* (forest red gum), *E. crebra* (narrow-leaved ironbark), *E. moluccana* (grey box) and *E. maculata* (spotted gum) (Benson, 1981).

Further west near Penrith remnant stands of *E. punctata* (grey gum) occur. Between Liverpool and St Marys, the dominant species are *E. globoidea* (white stringybark) and *E. fibrosa* (broad-leaved ironbark), with *E. longifolia* (woollybutt) as an understorey species. Individual trees or small stands of *E. sideroxylon* (mugga ironbark) are occasionally found on crests.

Landuse

The dominant landuses are intensive residential (Fairfield, Blacktown and Mt Druitt), horticulture and animal husbandry (Vineyard, Scheyville and Leppington) and light and heavy industry (Yennora and Moorebank).

Existing Erosion

No appreciable erosion occurs on this unit. Minor sheet and gully erosion may be found where surface vegetation is not maintained.

Associated Soil Landscapes

South Creek (**sc**) soil landscape occurs along drainage depressions. Picton (**pn**) soil landscape occurs on steeper south and southeast facing slopes. Small areas of Luddenham (**lu**) soil landscape may also occur.

SOILS

Dominant Soil Materials

bt1—Friable brownish black loam.

This is a friable brownish black loam to clay loam with moderately pedal subangular blocky structure and rough-faced porous ped fabric. This material occurs as topsoil (A horizon).

Peds are well defined subangular blocky and range in size from 2–20 mm. Surface condition is friable. Colour is brownish black (10YR 2/2) but can range from dark reddish brown (5YR 3/2) to dark yellowish brown (10YR 3/4). The pH varies from moderately acid (pH 5.5) to neutral (pH 7.0). Rounded iron indurated fine gravel-sized shale fragments and charcoal fragments are sometimes present. Roots are common.

bt2—Hardsetting brown clay loam.

This is a brown clay loam to silty clay loam which is hardsetting on exposure or when completely dried out. It has apedal massive to weakly pedal structure and slowly porous earthy fabric. It occurs as an A2 horizon.

Peds when present are weakly developed, subangular blocky and are rough faced and porous. They range in size between 20–50 mm. This material is water repellent when extremely dry.

Colour is dark brown (7.5YR 4/3) but can range from dark reddish brown (2.5YR 3/3) to dark brown (10YR 3/3). The pH varies from moderately acid (pH 5.0) to slightly acid (pH 6.5). Platy, iron indurated gravel-sized shale fragments are common. Charcoal fragments and roots are rarely present.

bt3—Strongly pedal, mottled brown light clay.

This is a brown light to medium clay with strongly pedal polyhedral or sub-angular to blocky structure and smooth-faced dense ped fabric. This material usually occurs as subsoil (B horizon).

Texture often increases with depth. Peds range in size from 5–20 mm. Colour is brown (7.5YR 4/6) but may range from reddish brown (2.5YR 4/6) to brown (10YR 4/6). Frequent red, yellow or grey mottles occur often becoming more numerous with depth. The pH varies from strongly acid (pH 4.5) to slightly acid (pH 6.5). Fine to coarse gravel-sized shale fragments are common and often occur in stratified bands. Both roots and charcoal fragments are rare.

bt4—Light grey plastic mottled clay.

This is a plastic light grey silty clay to heavy clay with moderately pedal polyhedral to subangular blocky structure and smoothfaced dense ped fabric. This material usually occurs as deep subsoil above shale bedrock (B3 or C horizon).

Peds range in size from 2–20 mm. Colour is usually light grey (10YR 7/1) or, less commonly, greyish yellow (2.5YR 6/2). Red, yellow or grey mottles are common. The pH varies from strongly acid (pH 4.0) to moderately acid (pH 5.5). Strongly weathered ironstone concretions and rock fragments are common. Gravel-sized shale fragments and roots are occasionally present. Charcoal fragments are rare.

Occurrence and Relationships

Crests. On crests and ridges up to 30 cm of friable brownish black loam (**bt1**) overlies 10–20 cm of hardsetting brown clay loam (**bt2**) and up to 90 cm of strongly pedal, brown mottled light clay (**bt3**) [red podzolic soils (Dr3.21, 3.11) and brown podzolic soils (Db2.11)]. **bt1** is occasionally absent. Boundaries between the soil materials are usually clear. Total soil depth is <100 cm.

Upper slopes and Midslopes. Up to 30 cm of **bt1** overlies 10–20 cm of **bt2** and 20–50 cm of **bt5**. This in turn overlies up to 100 cm of a light grey plastic mottled clay (**bt4**) [Red Podzolic Soils (Dr3.21), Brown Podzolic Soils (Db2.21). Occasionally **bt1** is absent. The boundaries between the soil materials are usually clear. Total soil depth is<200 cm.

Lower sideslopes. Up to 30 cm of **bt1** overlies 10–30 cm of **bt2** and 40–100 cm of **bt3**. Below **bt3** there is usually >100 cm of **bt4** [Yellow Podzolic Soils (Dy2.11, Dy3.11)]. The boundaries between the soil materials are clear. Total soil depth is >200 cm.

LIMITATIONS TO DEVELOPMENT

Soil Limitations

btl Strongly acid

bt2 Hardsetting
Low fertility
Strongly acid
High aluminium toxicity

bt3 High shrink-swell (localised)
Low wet strength
Low permeability

Low available water capacity
Salinity (localised)
Sodicity (localised)
Very low fertility
Very strongly acid
Very high aluminium toxicity

bt4 High shrink-swell (localised)
Low wet strength
Stoniness
Low available water capacity
Low permeability
Salinity (localised)
Sodicity (localised)
Low fertility
Strongly acid
Very high aluminium toxicity
High erodibility (localised)

Fertility

General fertility is low to moderate. Soil materials have low to moderate available water capacity, low CEC values, hardsetting surfaces (**bt2**), very low phosphorus and low to very low nitrogen levels. The subsoils (**bt3**, **bt4**) may be locally sodic with low permeability. When **bt1** is present its higher organic matter content and moderate nitrogen levels result in higher general fertility.

Erodibility

Blacktown soil materials have moderate erodibility. The topsoils (**bt1**, **bt2**) are often hardsetting and they have high fine sand and silt content, but they also have high to moderate organic matter content. The subsoils (**bt3**, **bt4**) are very low in organic matter. Where they are also highly dispersible and occasionally sodic the erodibility is high.

Erosion Hazard

The erosion hazard for non-concentrated flows is slight to moderate but ranges from low to very high. Calculated soil loss during the first twelve months of urban development for topsoil and exposed subsoil tends to be low (7–11 t/ha). Soil erosion hazard for concentrated flows is moderate to high.

Surface Movement Potential

The deep clay soils are moderately reactive. These are generally found on side-slopes and footslopes. Shallower soils on forests are slightly reactive.

Landscape Limitations

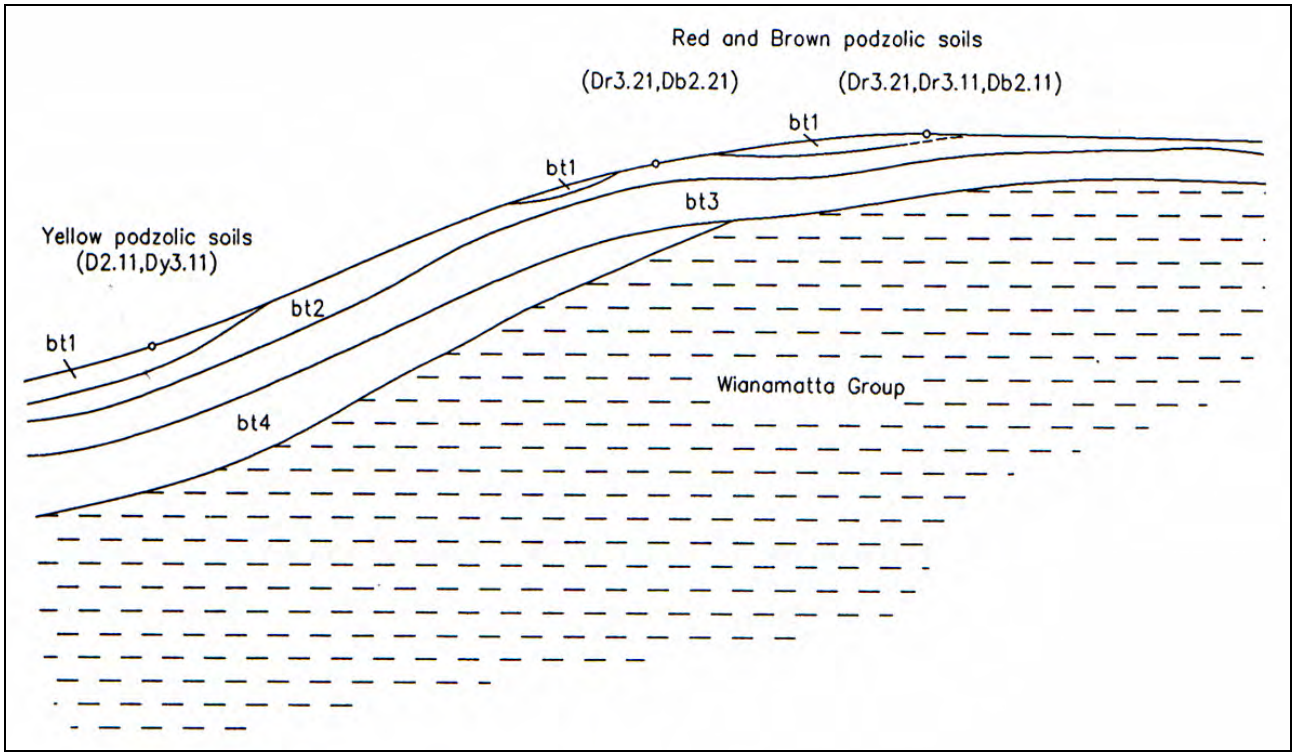
Seasonal waterlogging (localised), water erosion hazard (localised), surface movement potential (localised).

Urban Capability

High capability for urban development with appropriate foundation design.

Rural Capability

Small portions of this soil landscape which have not been urbanised are capable of sustaining regular cultivation and grazing.



Distribution diagram of the Blacktown soil landscape showing the occurrence and relationship of dominant soil materials.

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

APPENDIX C: HISTORICAL AERIAL PHOTOGRAPHS

Appendix B

HISTORIC IMAGERY

Historic Aerial Photograph - 1930

LIR-02011 Aerial Photograph 1930 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 1947

LIR-02011 Aerial Photograph 1947 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 1955

LIR-02011 Aerial Photograph 1947, 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 1965

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 1970

LIR-02011 Aerial Photograph 1970 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 1975

LIR-02011 Aerial Photograph 1975 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 1978

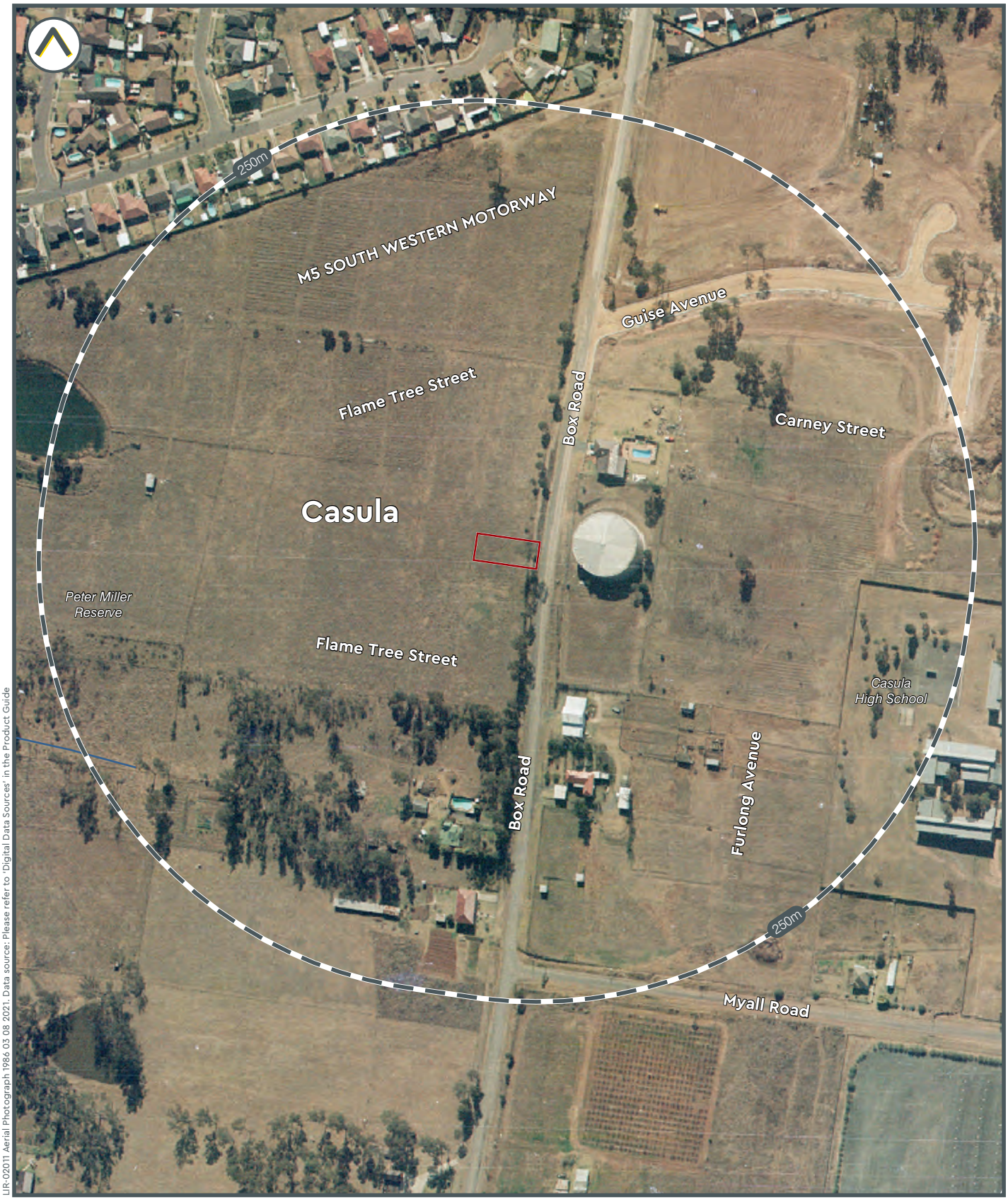
LIR-02011 Aerial Photograph 1978 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 1986



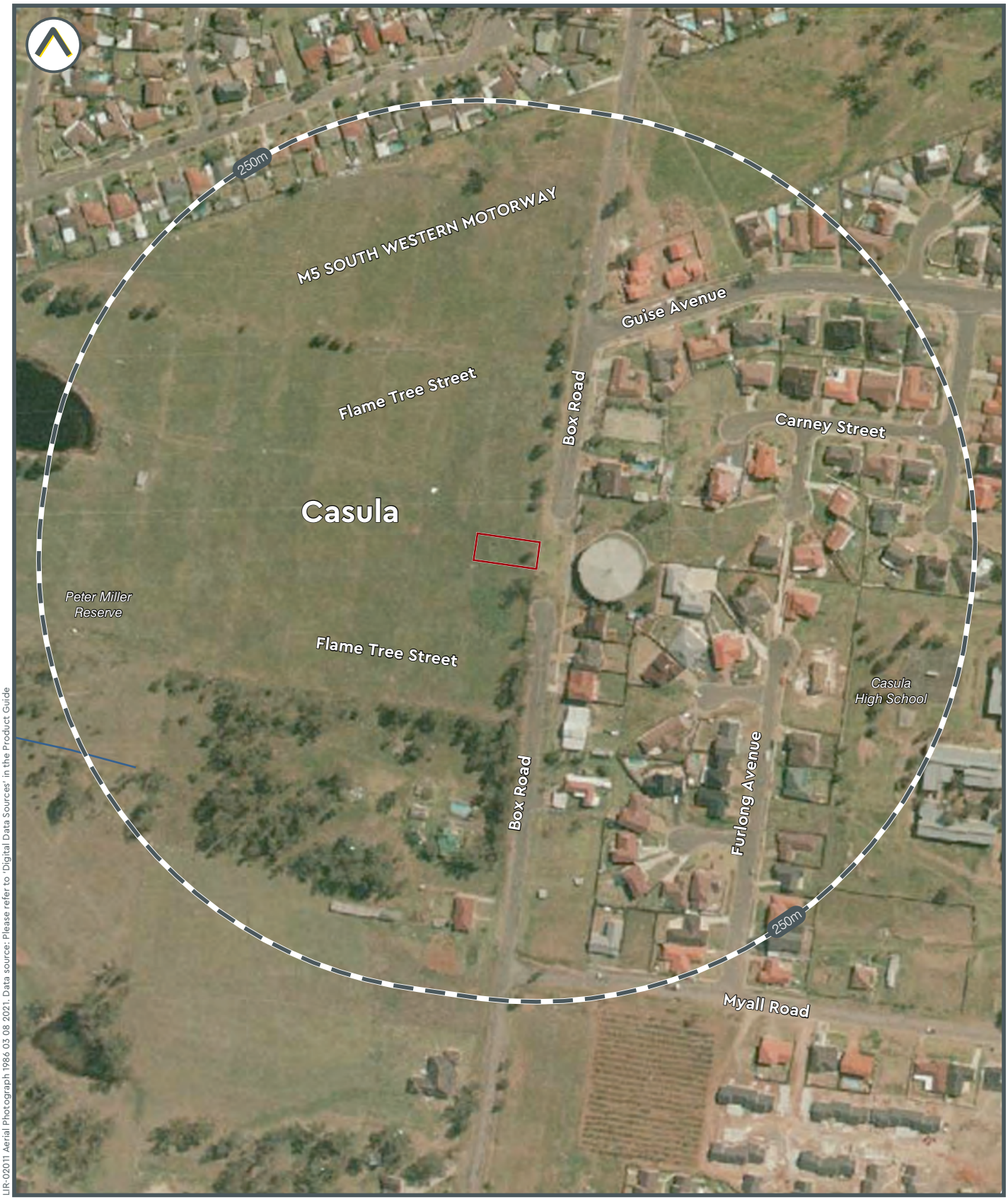
LIR-02011 Aerial Photograph 1986 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 1991



LIR-02011 Aerial Photograph 1986 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 1994

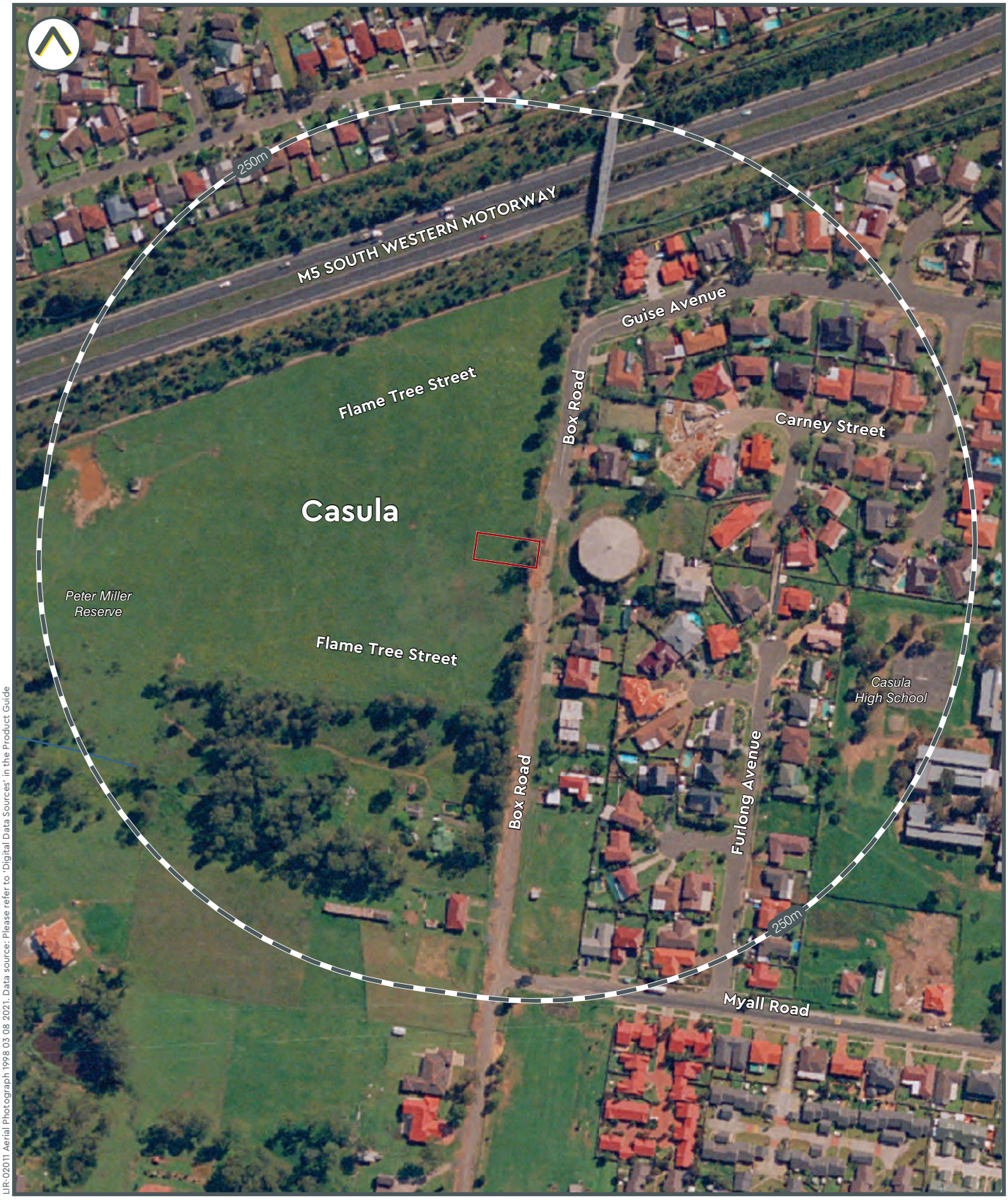
LIR-02011 Aerial Photograph 1994 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 1998



LIR-02011 Aerial Photograph 1998 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 2005

LIR-02011 Aerial Photograph 2005 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 2008

LIR-02011 Aerial Photograph 2005 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 2012

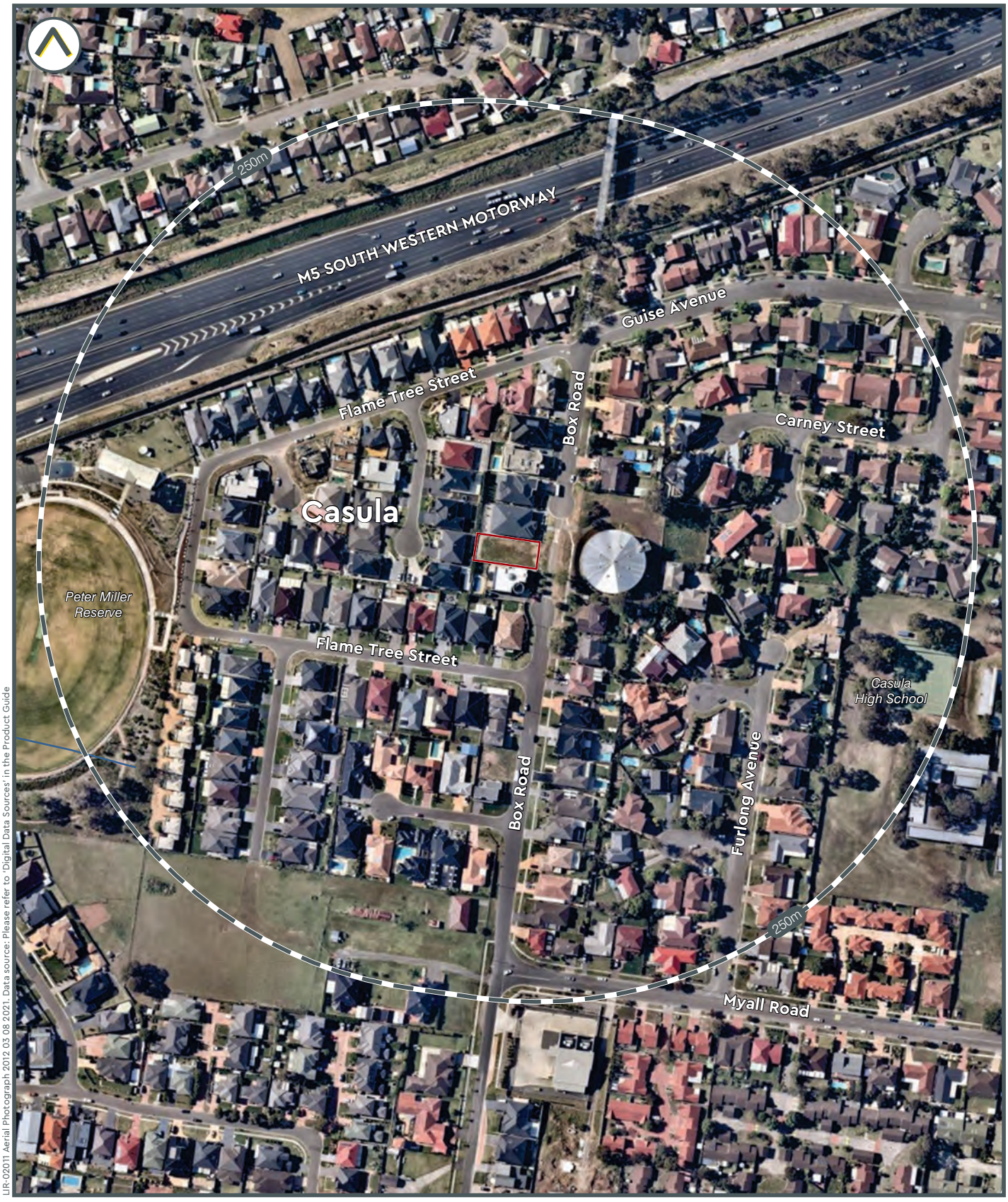
LIR-02011 Aerial Photograph 2012 03 08 2021, Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 2015



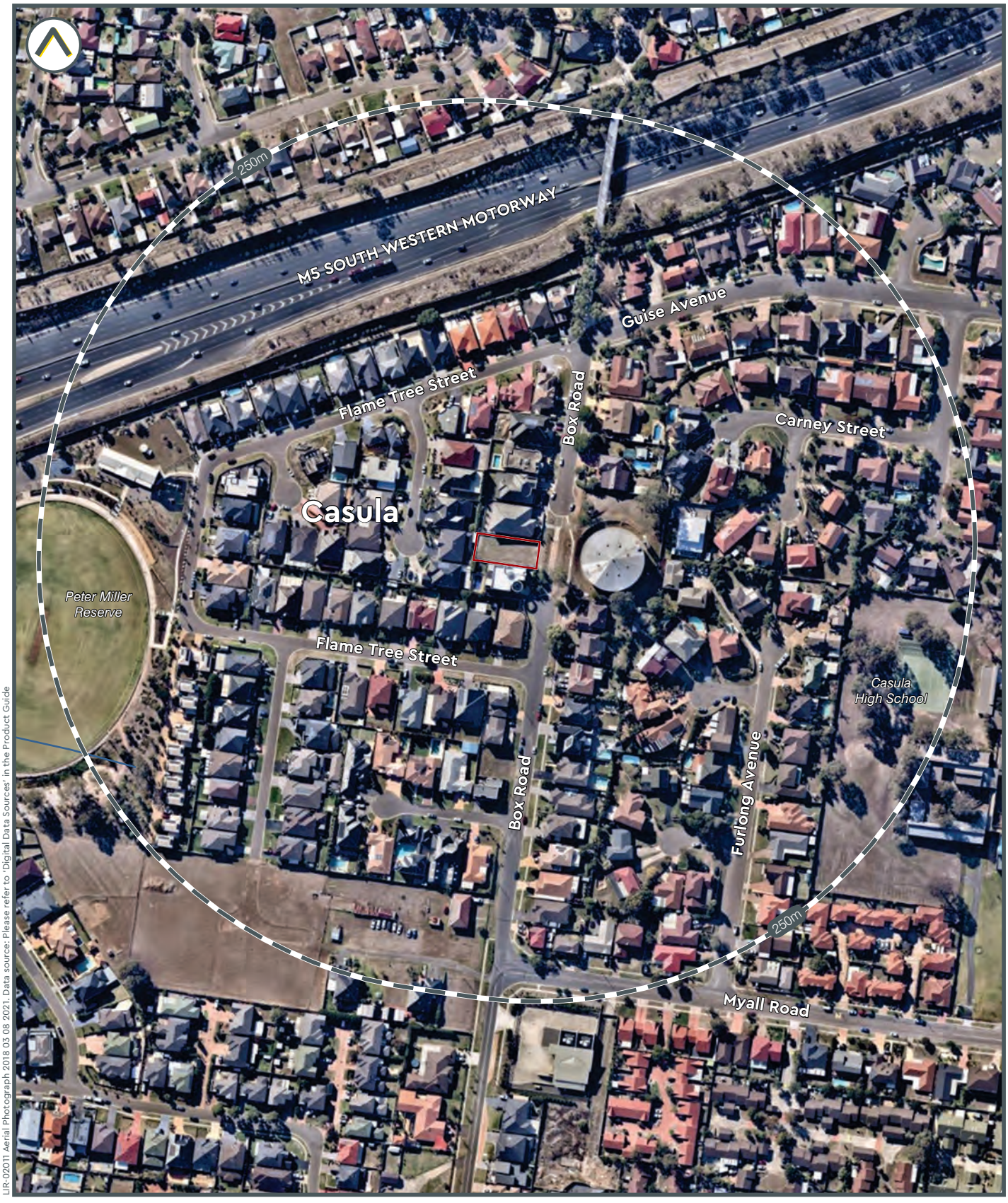
LIR-02011 Aerial Photograph 2012 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 2018



LIR-02011 Aerial Photograph 2018 03 08 2021, Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Historic Aerial Photograph - 2021

LIR-02011 Aerial Photograph 2021 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m

Land Insight

Land Insight RESOURCES

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

APPENDIX D: NSW EPA NOTICE

Section 91 Protection of the Environment Operations Act 1997

Clean-Up Notice

LIVERPOOL CITY COUNCIL
ABN 84 181 182 471
Locked Bag 7064
LIVERPOOL BC NSW 1871

Attention: Rajendra Autar

Notice Number	1549298
File Number	EF14/11084
Date	17-Mar-2017

NOTICE OF CLEAN-UP ACTION

BACKGROUND

1. The Environment Protection Authority (**"the EPA"**) is responsible for the administration and enforcement of the *Protection of the Environment Operations Act 1997* (**"the Act"**), including the processing, transport and disposal of waste.

2. The Act defines "waste" to include:
   a. any substance (whether solid, liquid or gaseous) that is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment, or
   b. any discarded, rejected, unwanted, surplus or abandoned substance, or
   c. any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or for recycling, processing, recovery or purification by a separate operation from that which produced the substance, or
   d. any processed, recycled, re-used or recovered substance produced wholly or partly from waste that is applied to land, or used as fuel, but only in the circumstances prescribed by the regulations, or
   e. any substance prescribed by the regulations to be waste.

   A substance is not precluded from being waste for the purposes of the Act merely because it is or may be processed, recycled, re-used or recovered.

3. The Act provides that any waste that contains asbestos is "asbestos waste".

4. The application of special waste (asbestos waste) to land is a scheduled activity under Schedule 1 of the Act.

5. The EPA understands that asbestos waste from the Western Depot was transported to the Casula High School (**"the Premises"**) by Liverpool City Council (**"Council"**) in the course of undertaking works at the Premises.

6. The EPA notes that there are asbestos impacted soils at the Premises not associated with Council's works described above.

7. The Premises does not hold an Environment Protection Licence for the scheduled activity of waste application to land.

8. Fragments of fibrous cement boarding found in the material at the Premises have been analysed and confirmed to contain asbestos.

9. Clause 109 of the *Protection of the Environment Operations (General) regulation 2009* prescribes that placing more than 10 tonnes of asbestos waste onto land is land pollution.

10. Investigations carried out by the EPA to date indicate that Council caused the application of asbestos waste to land at the Premises.

11. Land Pollution or pollution of land means placing in or on, or otherwise introducing into or onto, the land (whether through an act or omission) any matter, whether solid, liquid or gaseous:
    a) that causes or is likely to cause degradation of the land, resulting in actual or potential harm to the health or safety of human beings, animals or other terrestrial life or ecosystems, or actual or potential loss or property damage, that is not trivial, or
    b) that is of a prescribed nature, description or class that does not comply with any standard prescribed in respect of that matter.

12. The EPA reasonably believes that the application of waste to land at the Premises is causing land pollution as it:
    a) is prescribed as land pollution (as set out in 9.) and,
    b) has potential human health and environmental impacts caused by the asbestos waste.

13. The EPA requires Council to take the clean-up actions as set out below.

DIRECTION TO TAKE CLEAN-UP ACTION

The Environment Protection Authority directs Council, to take the following clean-up action:

A. Council must cause a Remediation Action Plan ("RAP") to be drafted that sets out the actions that will be taken by Council. The RAP must be to a standard that is satisfactory to the EPA and the Site Auditor and provided to the EPA at least thirty (30) days prior to the remediation works commencing.

B. The RAP must address the asbestos waste that was caused to be land applied by Council.

C. Council must remediate the area where the asbestos containing material was caused to be land applied, in accordance with the RAP as stated above.

D. All asbestos impacted material that is excavated during the remediation works must be transported to a suitably licensed landfill unless otherwise stated in the RAP.

E. The remediation works must be undertaken by a suitably qualified and licensed contractor.

Clean-Up Notice

F. Council must nominate, in writing, a time/s and date/s that the remediation works will be conducted at least five (5) business days prior to undertaking the any remediation works.

G. All remediation works must be completed by no later than **5:00 p.m. on Sunday 31 December 2017**.

H. A Validation Report for the remediation and a Site Management Plan for the on-going management of the remediation area, must be supplied to the EPA within sixty (60) days of the remediation works being completed.

I. A Site Audit Statement issued by a NSW EPA accredited Site Auditor certifying whether in the Auditor's opinion the remediation area is suitable for continuing use as a school subject to the implementation of a specified Site Management Plan, must be supplied to the EPA within sixty (60) days of the Validation Report and Site Management Plan being supplied to the EPA.

J. The Site Audit Statement must be provided to the EPA by no later than one hundred and twenty (120) days after the remediation works have are completed.

K. Information required by this notice must be provided electronically to waste.operations@epa.nsw.gov.au or in hard copy to PO Box A290 Sydney South NSW 1232 and must be addressed to:

GREG SHEEHY
Director Waste Compliance

FEE TO BE PAID

- You are required by law to pay a fee of $520 for the administrative costs of issuing this notice. An invoice for the fee has been attached to this notice.
- It is an offence not to pay this fee. However you can apply for an extension of time to pay the fee or for the fee to be waived. At the end of this notice there is information about how and when to pay the fee and how to apply for an extension or a waiver of the fee.

.....

Greg Sheehy

Director Waste Compliance

Waste & Resource Recovery

(by Delegation)

INFORMATION ABOUT THIS CLEAN-UP NOTICE

- This notice is issued under section 91 of the Protection of the Environment Operations Act 1997.

Clean-Up Notice

- It is an offence against the Act not to comply with a clean-up notice unless you have a reasonable excuse.

Penalty for not complying with this notice

- The maximum penalty for a corporation is $1,000,000 and a further $120,000 for each day the offence continues. The maximum penalty for an individual is $250,000 and a further $60,000 for each day the offence continues.

Cost recovery from the person who caused the incident

- If you comply with this clean-up notice but you are not the person who caused the pollution incident to which the notice relates, you have a right to go to court to recover your costs of complying with the notice from the person who caused the incident.

Deadline for paying the fee

- The fee must be paid by **no later than 30 days after the date of this notice**, unless the EPA extends the time to pay the fee, or waives the fee.

How to pay the fee

- Possible methods of payment are listed on the last page of the attached invoice/statement.
- Please include the payment slip from the attached invoice/statement with your payment.

How to apply for an extension of time to pay/waive the fee

- Any application for and extension of time to pay the fee or for the fee to be waived should be made in writing to the EPA. The application should set out clearly why you think your application should be granted.

Other costs

- The Protection of the Environment Operations Act allows the EPA to recover from you reasonable costs and expenses it incurs in monitoring action taken under this notice, ensuring the notice is complied with and associated matters. (If you are going to be required to pay these costs and expenses you will later be sent a separate notice called a “Notice Requiring Payment of Reasonable Costs and Expenses”).

Continuing obligation

- Under section 319A of the Act, your obligation to comply with the requirements of this notice continues until the notice is complied with, even if the due date for compliance has passed.

Variation of this notice

- This notice may only be varied by subsequent notices issued by the EPA.

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

APPENDIX E: PHOTO PLATES

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

Mimosa Park, Box Road – 17 September 2021

Photo Plate 1: The site, Mimosa Park – facing west from Box Road.

Photo Plate 2: Facing east from south western corner of the site.

Photo Plate 3: Test pit TP1

Photo Plate 4: Test pit TP1 – Natural mottled red and beige clay from ~0.5 mBGL.

Photo Plate 5: Test pit TP1 – Natural dark brown/ grey shale cobbles from 0.9 mBGL.

Photo Plate 6: Test pit TP2 – Shallow fill overlaying natural mottle orange and grey clay with shale cobbles from ~1.0 mBGL.

Photo Plate 7: Test pit TP3 - Pieces of asphalt and road base material at surface.

Photo Plate 8: Test pit TP3 – Brown clay from 0 – 0.5 mBGL with inclusions of trace brick and tile fragments and metal rod.

Photo Plate 9: Test pit TP3 – Orange and grey mottled clay from ~1.0 mBGL

Photo Plate 10: Test pit TP3 – Brown and dark grey shale cobbles from ~1.4 mBGL.

Photo Plate 11: Test pit TP5 – Shallow fill overlaying orange and grey mottled clay with shale cobbles at depth

Photo Plate 12: Test pit TP5 – Piece of metal ribbon within shallow fill.

Photo Plate 13: Test pit TP5 – dark grey shale cobbles from 1.4 mBGL.

Photo Plate 14: Test pit TP7

Photo Plate 15: Test pit TP7 – Trace inclusion of tile fragment within shallow fill.

Photo Plate 16: Test pit TP7 – Large, brown and dark grey shale cobbles from ~1.4 mBGL.

Photo Plate 17: Test pit TP10 – Shale cobbles and boulders from 0.15 mBGL.

Photo Plate 18: Test pit TP10 – Excavated, large shale cobbles and boulders from 0.15 mBGL with quantity and size increasing with depth.

Photo Plate 19: Western boundary wall, with neighbouring property to the left in the photograph – facing north.

Photo Plate 20: Western boundary wall, with domestic refuse at surface including food cans and plastic and corrugated tubing – facing north.

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

APPENDIX F: TEST PIT LOGS

Geological Borelog

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

LOCATION: Mimosa Park, 22 Box Road, Casula NSW		**Borehole Log: TP1**	**Logged by:** KA
SURFACE ELEVATION: N/A	**JOB NUMBER:** 121070		
GROUNDWATER: Not encountered	**DATUM:**	**PROJECT:** Mimosa Park DSI	**Proj. Manager:** LD
DRILL METHOD: Mechanical Excavation	**DATE DRILLED:** 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft, brown CLAY with very minor trace inclusions of concrete, terracotta tile and glass fragments.		0.2 0.4		TP1_0.3	D	
NATURAL Firm, red CLAY with pale grey mottles and minor inclusions of dark grey shale gravels.		0.6 0.8			D	
NATURAL Brown, firm CLAY with 60 % shale cobbles and boulders		1.0 1.2 1.4 1.6 1.8				
EOH @ 1.8 mBGL		2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

LOCATION: Mimosa Park, 22 Box Road, Casula NSW		**Borehole Log: TP2**	**Logged by:** KA
SURFACE ELEVATION: N/A	**JOB NUMBER:** 121070		
GROUNDWATER: Not encountered	**DATUM:**	**PROJECT:** Mimosa Park DSI	**Proj. Manager:** LD
DRILL METHOD: Mechanical Excavation	**DATE DRILLED:** 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft, brown CLAY with very minor trace inclusions of concrete and terracotta tile fragments.		0.2			D	
		0.4		TP2_0.3		
NATURAL Firm, red/ orange and pale grey mottled CLAY.		0.6				
		0.8			D	
NATURAL Firm, grey and beige mottled CLAY with 50 % dark grey shale cobbles.		1.0				
		1.2				
		1.4			D	
EOH @ 1.5 mBGL		1.6				
		1.8				
		2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

LOCATION: Mimosa Park, 22 Box Road, Casula NSW		**Borehole Log: TP3**	**Logged by:** KA
SURFACE ELEVATION: N/A	**JOB NUMBER:** 121070		
GROUNDWATER: Not encountered	**DATUM:**	**PROJECT:** Mimosa Park DSI	**Proj. Manager:** LD
DRILL METHOD: Mechanical Excavation	**DATE DRILLED:** 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft, brown CLAY with grey shale cobbles (~5%) and minor trace inclusions of concrete and terracotta tile fragments, one metal rod and a metal wire.		0.2			D	Domestic refuse and minor building rubble including bricks and concrete cobbles visible along western site boundary.
		0.4	■	TP3_0.4		
NATURAL Firm, brown CLAY with 30% dark grey shale gravels and cobbles.		0.6				
		0.8			D	
NATURAL Firm, brown and pale grey CLAY with red mottles. Minor inclusions of grey shale cobbles.		1.0				
		1.2				
		1.4			D	
NATURAL Dark grey and brown shale cobbles and boulders.						
EOH @ 1.5 mBGL		1.6				
		1.8				
		2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

LOCATION: Mimosa Park, 22 Box Road, Casula NSW		**Borehole Log: TP4**	**Logged by:** KA
SURFACE ELEVATION: N/A	**JOB NUMBER:** 121070		
GROUNDWATER: Not encountered	**DATUM:**	**PROJECT:** Mimosa Park DSI	**Proj. Manager:** LD
DRILL METHOD: Mechanical Excavation	**DATE DRILLED:** 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft brown CLAY with 5% grey shale cobbles and singular inclusion of glass fragment and one concrete cobble.		0.2		TP4_0.2	D	
NATURAL Very firm, red CLAY with minor pale grey mottles.		0.4 0.6				
NATURAL Very firm, red CLAY with pale grey mottles and grey shale cobbles increasing with depth.		0.8			D	
EOH @ 1.0 mBGL		1.0 1.2 1.4 1.6 1.8 2.0			D	

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

LOCATION: Mimosa Park, 22 Box Road, Casula NSW		**Borehole Log: TP5**	**Logged by:** KA
SURFACE ELEVATION: N/A	**JOB NUMBER:** 121070		
GROUNDWATER: Not encountered	**DATUM:**	**PROJECT:** Mimosa Park DSI	**Proj. Manager:** LD
DRILL METHOD: Mechanical Excavation	**DATE DRILLED:** 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft brown CLAY with ~5% grey shale cobbles and singular inclusion of rusty metal ribbon (length: ~20 cm)		0.2		TP5_0.2	D	
NATURAL Very firm, orange and pale grey mottled CLAY with black and dark grey shale gravels.		0.4 0.6				
NATURAL Firm, grey CLAY with ~50% dark grey shale gravels and cobbles.		0.8			D	
EOH @ 1.0 mBGL		1.0 1.2 1.4 1.6 1.8 2.0			D	

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

LOCATION: Mimosa Park, 22 Box Road, Casula NSW		**Borehole Log: TP6**	**Logged by:** KA
SURFACE ELEVATION: N/A	**JOB NUMBER:** 121070		
GROUNDWATER: Not encountered	**DATUM:**	**PROJECT:** Mimosa Park DSI	**Proj. Manager:** LD
DRILL METHOD: Mechanical Excavation	**DATE DRILLED:** 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Firm, brown CLAY with minor trace inclusion of brick fragments and singular plastic frangment.		0.2		TP6_0.1	D	
NATURAL Firm, brown CLAY with brown and grey shale cobbles (20%)		0.4 0.6			D	
NATURAL Firm, grey CLAY with ~50% dark grey shale gravels and cobbles.		0.8			D	
NATURAL Firm, brown and orange CLAY with ~60% brown and grey shale cobbles and boulders.						
EOH @ 0.9 mBGL		1.0 1.2 1.4 1.6 1.8 2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

LOCATION: Mimosa Park, 22 Box Road, Casula NSW		**Borehole Log: TP7**	**Logged by:** KA
SURFACE ELEVATION: N/A	**JOB NUMBER:** 121070		
GROUNDWATER: Not encountered	**DATUM:**	**PROJECT:** Mimosa Park DSI	**Proj. Manager:** LD
DRILL METHOD: Mechanical Excavation	**DATE DRILLED:** 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft, brown CLAY with ~5% grey shale cobbles with singular tile fragment.		0.2		TP7_0.2	D	
NATURAL Firm, brown CLAY with ~5% black / dark grey shale gravels.		0.4 0.6			D	
NATURAL Firm, brown and grey CLAY with ~70% grey and brown shale cobbles and boulders.		0.8 1.0			D	
EOH @ 1.0 mBGL		1.2 1.4 1.6 1.8 2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

LOCATION: Mimosa Park, 22 Box Road, Casula NSW		**Borehole Log: TP8**	**Logged by:** KA
SURFACE ELEVATION: N/A	**JOB NUMBER:** 121070		
GROUNDWATER: Not encountered	**DATUM:**	**PROJECT:** Mimosa Park DSI	**Proj. Manager:** LD
DRILL METHOD: Mechanical Excavation	**DATE DRILLED:** 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft, brown CLAY with minor trace inclusions of brick and terracotta fragments.		0.2		TP8_0.15	D	
NATURAL Stiff red CLAY with minor pale yellow mottles.		0.4 0.6			D	
NATURAL Firm, brown CLAY with ~75% black / dark grey shale cobbles / boulders		0.8 1.0 1.2			D	
EOH @ 1.2 mBGL		1.4 1.6 1.8 2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

LOCATION: Mimosa Park, 22 Box Road, Casula NSW		**Borehole Log: TP9**	**Logged by:** KA
SURFACE ELEVATION: N/A	**JOB NUMBER:** 121070		
GROUNDWATER: Not encountered	**DATUM:**	**PROJECT:** Mimosa Park DSI	**Proj. Manager:** LD
DRILL METHOD: Mechanical Excavation	**DATE DRILLED:** 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft, brown CLAY with brown, black and dark grey shale gravels and cobbles.		0.2		TP9_0.15	D	
NATURAL Firm, orange, brown and grey mottled CLAY with ~ 10% black shale gravels and cobbles.		0.4				
Firm, brown CLAY with ~40% dark grey shale gravels and cobbles.		0.6			D	
		0.8			D	
NATURAL Firm, brown CLAY with ~70% dark grey shale cobbles.		1.0				
		1.2				
EOH @ 1.3 mBGL		1.4				
		1.6				
		1.8				
		2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

LOCATION: Mimosa Park, 22 Box Road, Casula NSW		**Borehole Log: TP10**	**Logged by:** KA
SURFACE ELEVATION: N/A	**JOB NUMBER:** 121070		
GROUNDWATER: Not encountered	**DATUM:**	**PROJECT:** Mimosa Park DSI	**Proj. Manager:** LD
DRILL METHOD: Mechanical Excavation	**DATE DRILLED:** 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Firm brown CLAY with ~30% black shale gravels.				TP10_0.05	D	
NATURAL Firm, brown CLAY with ~50% black shale gravels and cobbles.		0.2 0.4			D	
~80% dark grey shale cobbles and boulders with <20% brown clay.		0.6 0.8			D	
EOH @ 0.9 mBGL		1.0 1.2 1.4 1.6 1.8 2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

APPENDIX G: QUALITY ASSURANCE / QUALITY CONTROL

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

TABLE OF CONTENTS

Tables

1 INTRODUCTION AND BACKGROUND

1.1 Introduction

The aim of quality control and quality assurance (QA/QC) is to deliver data that is:

- representative of what is sampled;
- precise;
- accurate; and
- reproducible.

As investigations involve both field and laboratory QA/QC, these are similarly divided. The objective of this document is to evaluate and identify the data quality objectives (DQOs) and the data quality indicators (DQIs), which are used to assess whether the DQOs have been met.

All soil sampling procedures to be followed are described in full in our Soil, gas and groundwater sampling manual (Environmental Earth Sciences Pty Ltd 2011). This document should be referred to for field procedures for sampling and conveyance. Copies are available for inspection if required.

The NSW guideline documents used in the evaluation of the data set for this investigation are:

- National Environment Protection Council (NEPC) (2013) - *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)* (ASC NEPM, 2013).
- NSW EPA (2017). *Contaminated Land Management: Guidelines for NSW Site Auditor Scheme (3rd edition).*
- NSW Environment Protection Authority (EPA) (1995). *Contaminated Sites: Sampling design guidelines*.
- NSW EPA (2020). *Contaminated Land: Guidelines: Consultants Reporting on Contaminated Sites.*
- Standards Australia (1999). Guide to the investigation and sampling of sites with potentially contaminated soil, Part 2: Volatile substances (AS4482.2).
- Standards Australia (2005). Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds (AS 4482.1).

Data quality is typically discussed in terms of precision, accuracy, representativeness, comparability and completeness. These are referred to as the PARCC parameters. The PARCC (and additional QA) parameters are discussed within this report.

The following items form part of the QA/QC appendix:

- repeatability;
- precision;
- accuracy;
- representativeness;
- completeness;
- comparability;
- sensitivity;
- holding times;
- blanks; and
- procedures for anomalous samples and confirmation checking.

1.2 Background

Quality Assurance (QA) is “a set of activities intended to establish confidence that quality requirements will be met” (AS/NZS ISO 9000:2005).

This encompasses all actions, procedures, checks and decisions undertaken to ensure the accuracy and reliability of analysis results. It includes routine procedures which ensure proper sample control, data transfer, instrument calibration, the decisions required to select and properly train staff, select equipment and analytical methods, and the day-to-day judgements resulting from regular scrutiny and maintenance of the laboratory system.

Quality Control (QC) is “a set of activities intended to ensure that quality requirements are actually being met” (AS/NZS ISO 9000:2005). In other words, the operational techniques and activities used to fulfil the requirements for quality.

These are the components of QA which serve to monitor and measure the effectiveness of other QA procedures by comparison with previously decided objectives. They include measurement of the quality of reagents, cleanliness of apparatus, accuracy and precision of methods and instrumentation, and reliability of all of these factors as implemented in a given laboratory from day to day.

A complete discussion of either of these terms or the steps for implementing them is beyond the scope of this document. It is widely recognised, however, that adoption of sound laboratory QA and QC procedures is essential and readers are referred to documentation available from the National Association of Testing Authorities (NATA), if further information is required.

2 DATA QUALITY OBJECTIVES

Development of data quality objectives (DQOs) for each project is a requirement of the NEPC (2013). This is based on a DQO process formulated by the USEPA for contaminated land assessment and remediation and provides sound guidance for a consistent approach in understanding site assessment and remediation.

The DQOs are defined in a series of seven steps. **Table 1** outlines the seven steps and refers to the sections of the report which address these quality objectives.

Table 1: Data quality objectives

Step	Description	Comment	Location in main report
1	State the problem	The problem will be addressed directly by scientists from Environmental Earth Sciences NSW. The problem is that the site will be used for future recreational and public use and Liverpool City Council wish to determine if there is the potential for soil contamination to have occurred due to past land uses. The purpose of this investigation is to collect basic site information to identify potential contaminants, potentially affected media and potential areas of contamination by reviewing the site history, physical setting including local geology and hydrogeology and site conditions.	**Section 1**
2	Identify the decision	A detailed environmental site investigation (DSI) was commissioned to determine if the past or present site activities have adversely impacted the site or environment. If required, Environmental Earth Sciences NSW will provide guidance on actions required to ensure the site becomes suitable for continued or future use.	**Sections 1 and 2**
3	Identify the inputs for the decision	The study inputs include historical site information including aerial photographs for the site and reference to published guidelines to assist the decision-making process.	**Sections 4 and 5**
4	Define the boundaries for the study	The site location and physical boundaries are shown on **Figure 1** and **Figure 2** and defined in the report. The temporal boundary of the project is restricted to the timing of the investigation.	**Section 4, Figures 1 and 2**
5	Develop a decision rule	All analytical data will be compared and evaluated against appropriate published criteria. The NEPC (2013) will be used as the primary guidance document in decision making on action levels. Dependent upon the sampling and analysis design, statistical parameters such as arithmetic mean, standard deviation and 95% upper confidence limits (95% UCLs) may be applied to designated soil populations for particular analytes. In the event that action levels are exceeded, a management plan, remedial action plan, and/or qualitative risk assessment (with modelling of potential groundwater impacts on the local receiving environment) will be required. These procedures constitute the alternative action plan.	**Section 7**

Step	Description	Comment	Location in main report
6	Specify tolerable limits on decision error	Acceptable limits for field data analysis (relative percent differences for primary and duplicate results) are between 50 and 150 percent (depending on the origin of the sample and volatility of the chemicals present). Acceptable limits for laboratory duplicate analysis may be affected by the heterogeneity of soil and will be set based on site specific information such as background concentrations. These are summarised in Table 2 as the measurement data quality indicators (MDQIs), which will be used to establish whether the DQOs have been met. Most of the procedures in the Standards Australia AS 4482.1 (2005) *Guide to the investigation and sampling of sites with potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds* and NEPC (2013) have risk probabilities associated with allowable error margins incorporated into them. It is therefore proposed that no further "tolerable limits" be investigated at this stage of the project.	**Section 7, QA/QC Appendix (G).**
7	Optimise the design for obtaining data	The sample design will be undertaken with reference to AS4482.1. As well as a statistically justifiable *systematic* sampling design, this sampling pattern has also taken into account targeted areas of concern on the site (i.e. *judgemental* sampling locations). Environmental Earth Sciences NSW believes that the sampling design is optimal considering temporal limitations and access constraints. The density of the sampling pattern and the quality of the data set are suitable for determination of the suitability of the site for its proposed current and future use.	**Sections 6**

Based on the DQOs the following measurement data quality indicators (MDQIs) are provided in **Table 2** below.

Table 2: Measurement data quality indicators (MDQIS)

Parameter	Procedure	Minimum Frequency	Criteria	
			(5 to 10x LOR[4])	>10x LOR
Precision	Field Duplicates	1 in 20 - metals	<80 RPD	<50 RPD
		1 in 20 - semi-volatiles	<100 RPD	<80 RPD
		1 in 20 - volatiles	<150 RPD	<130 RPD
	Lab Replicate*	1 in 20	<50 RPD	<30 RPD
Accuracy*	Reference Material	1 in 10	60% to 140%R	80% to 120%R
	Matrix spikes			
	Surrogate spikes			
Representativeness*	Reagent Blanks	1 per batch	No detection	
	Holding Times*	Every sample	-	
Blanks**	Trip Blank	1 per batch	No detection	
	Rinsate Blanks			
Sensitivity	Limit of Reporting	Every sample	LOR < ½ site criteria	

Notes:
1. RPD – relative percentage difference;
2. %R – percent recovery;
3. LOR – limit of reporting;
4. no limit at <5x LOR;
5. * the MDQI is usually specified in the standard method. If not, use the default values set out in this table; and
6. ** only necessary when measuring dissolved metals and volatile organic compounds in water samples.

It should be noted that Standards Australia (AS4482.1) specify that typical MDQIs for precision should be ≤50% RPD, however also acknowledge that low concentrations and organic compounds in particular can be acceptably outside this range. The standard suggests that ≤50% RPD be used as a 'trigger' and values above this level of repeatability need to be noted and explained.

Our adopted MDQIs for precision acknowledge the intrinsic heterogeneity of metal and semi volatile chemical concentrations in disturbed soil that may potentially cause large variations in results between laboratory subsamples (although all efforts are made to homogenise non-volatile duplicate samples). Similarly, large variations in volatile chemical concentrations between duplicates may be unavoidable even when using best practice sampling methodology, especially as we seek to minimise the disturbance to the sample while splitting it which means a high degree of inherent heterogeneity is expected.

As such, our adopted RPD criteria are considered to be a suitable measure for the reproducibility of results within a naturally heterogeneous media such as soil. A ≤50% RPD trigger value will be used, with any exceedance discussed and assessed for acceptability.

3 QUALITY CONTROL AND QUALITY ASSURANCE

3.1 Measurement data quality objectives

Step 7 of the DQO process (**Section 2.0**) is a focus on the quality of the information by measurement, that is, measurement data quality objectives (MDQOs). The aim of a quality control and quality assurance (QA/QC) is to deliver data that is representative of what is sampled, precise, accurate and reproducible. As investigations involve both field and laboratory QA/QC, these are similarly divided. The objective of this section is to provide the MDQOs and the measurement data quality indicators (MDQIs), which will be used to establish whether the DQOs have been met.

All surface water, groundwater and soil sampling procedures need to be undertaken according to a standard procedure, for example those procedures set out in:

- NSW Environment Protection Authority (EPA) (1995). *Contaminated sites: Sampling design guidelines;*
- NSW EPA (2020). *Contaminated Land Guidelines: Consultants reporting on contaminated sites*;

- Standards Australia (1999). Guide to the investigation and sampling of sites with potentially contaminated soil, Part 2: Volatile substances, (AS 4482.2). Homebush, NSW; and

- Standards Australia (2005). Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds, (AS 4482.1). Homebush, NSW

3.2 Field QA/QC

3.2.1 Details of sampling team

Fieldwork was conducted on 17 September 2021 by a competent environmental scientist.

3.2.2 Sampling controls

Decontamination procedures carried out between sampling events included the following.

All sampling equipment that was re-used which came into contact with soil samples, were thoroughly washed with detergent (Decon 90 or similar) water, then rinsed with clean water and dried before the collection of each sample. Any items accidentally contaminated were similarly washed before re-use.

Soil samples were collected from soil profiles removed from excavator bucket. New nitrile gloves were used at each sampling location. During this process the field scientist would also determine the colour and texture of the soil sample.

Sample notation details

The chemical analyses performed on each sample are presented on the chain of custody documentation (**Appendix I**) which also identified for each sample – the sampler, nature of the sample, collection date, analyses to be performed, sample preservation method (if any), departure time from the site and dispatch courier.

Site observations and weather conditions during sampling are described in **Sections 5.5** and **7.1** of the main report. Primary and intra (blind) duplicate samples for this project was completed by ALS.

Intra (blind) duplicate sampling

The intra (blind) duplicate sample was collected at a rate of one duplicate per twenty samples collected (5%). For this project one intra (blind) duplicate sample was collected for analysis. The summary of the relative percentage differences (RPDs) of the collected intra duplicate sample is presented in **Table 3**.

Duplicate samples were split evenly distributing the soil sample between two clean glass jars. The field scientists typically attempt to disturb soils as little as possible.

The scope of this project did not include analysis of trip and field blanks, background samples, rinsate samples or laboratory prepared trip spikes for the soil sampling program.

3.3 Field Duplicate RPD assessment

Analysis of the relative percentage difference (RPD) between the field duplicate and a primary sample resulted in strong agreement between the samples with all values below measurement data quality indicators (MDQIS) RPD thresholds or below the laboratory's level of reporting.

Table 3: Calculable RPDs

Sample ID	TP10	FD1	RPD %
Sample Date	17/09/2021	17/09/2021	
Analyte group/ Analyte			
Heavy metals			
Arsenic	<5	<5	NC
Cadmium	<1	<1	NC
Chromium	12	14	15.39
Copper	36	41	12.99
Lead	14	14	0
Nickel	18	19	48.28
Zinc	76	69	9.66
Mercury	<0.1	<0.1	NC
Total Petroleum Hydrocarbons			
C6 - C9 Fraction	<10	<10	NC
C10 - C14 Fraction	<50	<50	NC
C15 - C28 Fraction	<100	<100	NC
C29 - C36 Fraction	<100	<100	NC
C10 - C36 Fraction (sum)	<50	<50	NC
Total Recoverable Hydrocarbons			
C6 - C10 Fraction	<10	<10	NC
C6 - C10 Fraction minus BTEX (F1)	<10	<10	NC
>C10 - C16 Fraction	<50	<50	NC
>C16 - C34 Fraction	<100	<100	NC
>C34 - C40 Fraction	<100	<100	NC
>C10 - C40 Fraction (sum)	<50	<50	NC
>C10 - C16 Fraction minus Naphthalene (F2)	<50	<50	NC

Sample ID	TP10	FD1	RPD %
Sample Date	17/09/2021	17/09/2021	
Analyte group/ Analyte			
BTEX			
Benzene	<0.2	<0.2	NC
Toluene	<0.5	<0.5	NC
Ethylbenzene	<0.5	<0.5	NC
meta- & para-Xylene	<0.5	<0.5	NC
ortho-Xylene	<0.5	<0.5	NC
Total Xylenes	<0.5	<0.5	NC
Sum of BTEX	<0.2	<0.2	NC

Notes:

- Values heighted in green are within acceptable RPD limits as outlined in **Table 2.**

3.4 Laboratory QA/QC

Laboratory analysis of primary and intra (blind) duplicate samples for this project were completed by ALS and SAL, who are accredited by NATA for the methods used, details of this accreditation can be viewed at http://www.nata.asn.au/, while details of the samples sent to each laboratory and the analysis requested are contained in the chain of custody documentation held in **Appendix I**. The analytical methods are noted on the laboratory transcripts.

3.4.1 Holding times

The collection date of samples, laboratory extraction date and allowable holding times are presented in the laboratory quality reports. All analysis was completed within the allowable holding times.

3.4.2 Limits of reporting

Acceptable limits of reporting (LOR) were mostly provided by the analytical laboratory to allow the results to be compared against the soil investigation levels with the exception of few analytes (list analytes) that were considered not be a chemical of concern.

3.5 QA/QC data evaluation

The general “rule of thumb” is that one intra-laboratory duplicate samples should be taken for every 20 samples taken (5%). The relative percentage differences (RPD) of the primary and duplicate sample for all contaminants were reported within the accepted ranges (refer to **Table 2** in this appendix). An assessment of the data collected indicated that appropriate rate of QA/QC samples were collected as part of the fieldwork program.

Field observations and measurements are comparable to laboratory data. The presence (and absence) of odours noted by olfactory senses correspond to the detected concentration of volatile chemicals at those locations.

Extraction and analysis of samples were all within the relevant prescribed holding times. The internal laboratory control results (blanks, duplicates and spikes) are considered to be acceptable.

4 QA/QC APPENDIX REFERENCES

American Public Health Association (APHA) 2012, *Standard methods for the examination of water and waste-water*, 22nd edition, APHA, Washington DC.

Australian/New Zealand Standard (AS/NZS) 2008, *Quality management systems - Requirements (AS/NZS ISO 9001:2008)*, Standards Australia/Standards New Zealand, Sydney/Wellington.

Environmental Earth Sciences Pty Ltd 2011, *Soil, gas and groundwater sampling manual*, 7th Edition (Unpublished).

International Organisation for Standardisation 2005, *Quality management systems – Fundamentals and vocabulary* (ISO 9000:2005).

National Environment Protection Council (NEPC) (2013) – *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)* (ASC NEPM, 2013).

NSW EPA (1995) — *Contaminated sites: Sampling Design Guidelines* (EPA, 1995) (the "Sampling Design Guidelines").

NSW EPA (2017) — *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme 3rd Edition* (the "Site Auditor Guidelines").

NSW EPA (2020) – *Contaminated Land Guidelines: Consultants Reporting on Contaminated Land*.

Rayment, GE and Lyon, DJ 2011, *Soil chemical methods – Australasia*, CSIRO Publishing.

Rayment, GE and Higginson, FR 1992, *Australian laboratory handbook of soil and water chemical methods*, Inkarta Press, Melbourne.

Standards Australia 1999, *Guide to the investigation and sampling of sites with potentially contaminated soil*, Part 2: Volatile substances (AS4482.2).

Standards Australia 2005, *Guide to the investigation and sampling of sites with potentially contaminated soil*, Part 1: Non-volatile and semi-volatile compounds (AS 4482.1).

APPENDIX H: RESULTS SUMMARY TABLE

Table A: Laboratory Results Summary Table - Beneficial re-use

						Location:	Mimosa Park, Box Road, Casula						
						Field ID:	TP1_0.3	TP3_0.4	TP5_0.2	TP6_0.1	TP7_0.2	TP8_0.15	TP10_0.05
						Sample Date:	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021
Analyte Group / Name	**Units**	**LOR**	**HIL C**	**HSL C (Asbestos)**	**HSL C (Vapour)**								
Asbestos													
Asbestos presence / absence	Yes/No	-	---	No visible asbestos on the ground surface	---		No	No	No	No	No	No	No
Asbestos present as free fibres	Yes/No	-	---	---^^	---		No	No	No	No	No	No	No
Moisture Content													
Moisture Content	%	1	---	---	---		11.9	11.1	11.5	10	13.8	8.2	8.7
BTEX													
Benzene	mg/kg	0.2	---	---	3000		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	0.5	---	---	NL		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	mg/kg	0.5	---	---	NL		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of BTEX	mg/kg	0.2	---	---	---		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Metals													
Arsenic	mg/kg	5	300	---	---		6	<5	<5	5	<5	<5	<5
Cadmium	mg/kg	1	90	---	---		<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	2	300	---	---		17	11	13	15	14	12	12
Copper	mg/kg	5	17,000	---	---		30	36	37	33	30	21	36
Lead	mg/kg	5	600	---	---		20	18	13	14	16	11	14
Mercury	mg/kg	0.1	80	---	---		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	1200	---	---		11	15	18	16	13	11	18
Zinc	mg/kg	5	30,000	---	---		51	70	73	73	58	43	76
PAH													
Naphthalene	mg/kg	0.5	---	---	NL		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	mg/kg	0.5	3	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	mg/kg	0.5	---	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of polycyclic aromatic hydrocarbons	mg/kg	0.5	300	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ (zero)	mg/kg	0.5	3	---	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5	3	---	---		0.6	0.6	0.6	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5	3	---	---		1.2	1.2	1.2	1.2	1.2	1.2	1.2
TPH Fractions													
C6 - C9 Fraction	mg/kg	10	---	---	---		<10	<10	<10	<10	<10	<10	<10
C10 - C14 Fraction	mg/kg	50	---	---	---		<50	<50	<50	<50	<50	<50	<50
C15 - C28 Fraction	mg/kg	100	---	---	---		<100	<100	<100	<100	<100	<100	<100
C29 - C36 Fraction	mg/kg	100	---	---	---		<100	<100	<100	<100	<100	<100	<100
C10 - C36 Fraction (sum)	mg/kg	50	---	---	---		<50	<50	<50	<50	<50	<50	<50
TRH - NEPM 2013 Fractions													
C6 - C10 Fraction	mg/kg	10	---	---	---		<10	<10	<10	<10	<10	<10	<10
C6 - C10 Fraction minus BTEX (F1)	mg/kg	10	---	---	NL		<10	<10	<10	<10	<10	<10	<10
>C10 - C16 Fraction	mg/kg	50	---	---	---		<50	<50	<50	<50	<50	<50	<50
>C16 - C34 Fraction	mg/kg	100	---	---	---		<100	<100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	mg/kg	100	---	---	---		<100	<100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	mg/kg	50	---	---	---		<50	<50	<50	<50	<50	<50	<50
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	50	---	---	NL		<50	<50	<50	<50	<50	<50	<50

Notes:

LOR: Limit Of Reporting

HILC: Health Investigation Level for open space / recreational land use scenario 'C' (ASC NEPM, 2013)

HSL C: Health Screening levels for open space / recreational land use scenario 'C' (ASC NEPM, 2013)

# denotes friable asbestos as soft fibro plaster and/ or highly weathered ACM that will easily crumble.

^ denotes loose fibres of relevant asbestos types detected in soil/dust.

^^No criteria for loose fibres within soil (only friable or asbestos fines which must be gravimetrically analysed)

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

APPENDIX I: LABORATORY TRANSCRIPTS AND CHAIN-OF-CUSTODY DOCUMENTATION

CHAIN OF CUSTODY - ANALYSIS REQUEST FORM

Job No: 121070 | Laboratory: ALS

Project Manager: LD | Sampler: KA | Site Location: Box Rd, Casula | Sheet: 1 of 1

No. of samples	Sample ID/ Depth	Anticipated Result (PID)/EC reading	Date sampled	Time sampled	Sample Matrix: Soil	Water	Sediment	Analysis Required: S-26	Hold											Sample-specific instructions/ notes
1	TP1_0.3		17/9/21		X			X												
2	TP3_0.4		↓		X			X												
3	TP5-0.2		↓		X			X												
4	TP6_0.1		↓		X			X												
5	TP7_0.2		↓		X			X												
6	TP8-0.15		↓		X			X												
7	TP10-0.05		↓		X			X												
8	FD1		↓		X				X											
9	TP1_0.7		↓		X				X											
10	TP6_0.5		↓		X				X											
11	TP5_0.5		↓		X				X											
	TOTAL																			

Environmental Division
Sydney
Work Order Reference
ES2133888

Telephone : + 61-2-8784 8555

Turn Around (circle): NORMAL (circled) / 3 DAYS / 48 HRS / 24 HRS (confirm with lab in advance if quick turn-around is required)

Lab Quotation No. (if applicable):

Comments/ Instructions:

Send report to (email address): kazzam@eesigroup.com

Cc: report to (email address): ~~ldesailly~~ ldesailly@eesigroup.com

Cc: invoice to (email address): accounts@eesigroup.com

	Name	Signature	Date	Time
Sent off Site/Office by:	Karin Azzam	[signature]	17/9/21	2pm
Receiving Lab:	[signature]	[signature]	17/9/21	1500 2.6C
Receiving Lab:				

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED
Phone: (02) 9922 1777
Fax: (02) 9922 1010
PO Box: 380, North Sydney NSW 2059
Email: eesNSW@eesigroup.com

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2133888**
Amendment : **1**

Client	: **ENVIRONMENTAL EARTH SCIENCES**	Laboratory	: Environmental Division Sydney
Contact	: LACHLAN DESAILLY	Contact	: Christopher Redford
Address	: PO 380 North Sydney 2056	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: LDesailly@eesigroup.com	E-mail	: Christopher.Redford@ALSGlobal.com
Telephone	: ----	Telephone	: +61 2 8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 121070	Page	: 1 of 2
Order number	: ----	Quote number	: ES2020ENVEAR0009 (EN/010/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: BOX RD, CASULA		
Sampler	: KARIN AZZAM		

Dates

Date Samples Received	: 17-Sep-2021 15:00	Issue Date	: 30-Sep-2021
Client Requested Due Date	: 07-Oct-2021	Scheduled Reporting Date	: **07-Oct-2021**

Delivery Details

Mode of Delivery	: Pickup	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 2.6' C
Receipt Detail	:	No. of samples received / analysed	: 11 / 8

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES2133888-001	17-Sep-2021 00:00	TP1_0.3		✓	✓
ES2133888-002	17-Sep-2021 00:00	TP3_0.4		✓	✓
ES2133888-003	17-Sep-2021 00:00	TP5_0.2		✓	✓
ES2133888-004	17-Sep-2021 00:00	TP6_0.1		✓	✓
ES2133888-005	17-Sep-2021 00:00	TP7_0.2		✓	✓
ES2133888-006	17-Sep-2021 00:00	TP8_0.15		✓	✓
ES2133888-007	17-Sep-2021 00:00	TP10_0.05		✓	✓
ES2133888-008	17-Sep-2021 00:00	FD1		✓	✓
ES2133888-009	17-Sep-2021 00:00	TP1_0.7	✓		
ES2133888-010	17-Sep-2021 00:00	TP6_0.5	✓		
ES2133888-011	17-Sep-2021 00:00	TP5_0.5	✓		

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS EESI GROUP

- A4 - AU Tax Invoice (INV)	Email	accounts@eesigroup.com

KARIN AZZAM

- *AU Certificate of Analysis - NATA (COA)	Email	kazzam@eesigroup.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	kazzam@eesigroup.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	kazzam@eesigroup.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	kazzam@eesigroup.com
- Chain of Custody (CoC) (COC)	Email	kazzam@eesigroup.com
- EDI Format - ENMRG (ENMRG)	Email	kazzam@eesigroup.com
- EDI Format - ESDAT (ESDAT)	Email	kazzam@eesigroup.com

LACHLAN DESAILLY

- *AU Certificate of Analysis - NATA (COA)	Email	LDesailly@eesigroup.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	LDesailly@eesigroup.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	LDesailly@eesigroup.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	LDesailly@eesigroup.com
- Chain of Custody (CoC) (COC)	Email	LDesailly@eesigroup.com
- EDI Format - ENMRG (ENMRG)	Email	LDesailly@eesigroup.com
- EDI Format - ESDAT (ESDAT)	Email	LDesailly@eesigroup.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2133888**	Page	: 1 of 9
Amendment	: **1**		
Client	: **ENVIRONMENTAL EARTH SCIENCES**	Laboratory	: Environmental Division Sydney
Contact	: LACHLAN DESAILLY	Contact	: Christopher Redford
Address	: PO 380 North Sydney 2056	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: 121070	Date Samples Received	: 17-Sep-2021 15:00
Order number	: ----	Date Analysis Commenced	: 21-Sep-2021
C-O-C number	: ----	Issue Date	: 06-Oct-2021 12:35
Sampler	: KARIN AZZAM		
Site	: BOX RD, CASULA		
Quote number	: EN/010/20		
No. of samples received	: 11		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG005T: Poor precision was obtained for Mn on sample ES2133888 #4. Confirmed by re-digestion and reanalysis.
- Amendment (30/09/2021): This report has been amended and re-released to allow the reporting of additional analytical data as per Lachlan Desailly to sample FD1.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP1_0.3	TP3_0.4	TP5_0.2	TP6_0.1	TP7_0.2
			Sampling date / time	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	ES2133888-001	ES2133888-002	ES2133888-003	ES2133888-004	ES2133888-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**11.9**	**11.1**	**11.5**	**10.0**	**13.8**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**6**	<5	<5	**5**	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**17**	**11**	**13**	**15**	**14**
Copper	7440-50-8	5	mg/kg	**30**	**36**	**37**	**33**	**30**
Lead	7439-92-1	5	mg/kg	**20**	**18**	**13**	**14**	**16**
Nickel	7440-02-0	2	mg/kg	**11**	**15**	**18**	**16**	**13**
Zinc	7440-66-6	5	mg/kg	**51**	**70**	**73**	**73**	**58**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP1_0.3	TP3_0.4	TP5_0.2	TP6_0.1	TP7_0.2
			Sampling date / time	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	ES2133888-001	ES2133888-002	ES2133888-003	ES2133888-004	ES2133888-005
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**88.2**	**84.8**	**82.8**	**85.8**	**78.0**
2-Chlorophenol-D4	93951-73-6	0.5	%	**89.1**	**85.1**	**83.2**	**86.1**	**78.8**
2.4.6-Tribromophenol	118-79-6	0.5	%	**72.4**	**64.8**	**64.8**	**68.6**	**61.4**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**99.9**	**96.5**	**93.4**	**95.6**	**88.1**
Anthracene-d10	1719-06-8	0.5	%	**100**	**96.8**	**94.4**	**96.6**	**88.1**
4-Terphenyl-d14	1718-51-0	0.5	%	**86.5**	**83.4**	**81.1**	**83.2**	**76.0**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**109**	**108**	**107**	**108**	**99.8**
Toluene-D8	2037-26-5	0.2	%	**80.9**	**80.8**	**81.2**	**81.4**	**88.5**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP1_0.3	TP3_0.4	TP5_0.2	TP6_0.1	TP7_0.2
				Sampling date / time	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00
Compound	CAS Number	LOR	Unit		ES2133888-001	ES2133888-002	ES2133888-003	ES2133888-004	ES2133888-005
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%		**78.9**	**78.9**	**77.9**	**77.9**	**80.4**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP8_0.15	TP10_0.05	FD1	----	----
			Sampling date / time	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2133888-006	ES2133888-007	ES2133888-008	--------	--------
				Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	8.2	8.7	9.0	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg	12	12	14	----	----
Copper	7440-50-8	5	mg/kg	21	36	41	----	----
Lead	7439-92-1	5	mg/kg	11	14	14	----	----
Nickel	7440-02-0	2	mg/kg	11	18	19	----	----
Zinc	7440-66-6	5	mg/kg	43	76	69	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP8_0.15	TP10_0.05	FD1	----	----
			Sampling date / time	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2133888-006	ES2133888-007	ES2133888-008	--------	--------
				Result	Result	Result	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**84.0**	**80.1**	**95.2**	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**84.1**	**79.9**	**88.8**	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**64.0**	**61.5**	**69.8**	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**94.1**	**91.2**	**103**	----	----
Anthracene-d10	1719-06-8	0.5	%	**95.3**	**90.7**	**98.8**	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**82.2**	**78.8**	**93.4**	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**111**	**112**	**94.3**	----	----
Toluene-D8	2037-26-5	0.2	%	**81.6**	**85.0**	**104**	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP8_0.15	TP10_0.05	FD1	----	----
				Sampling date / time	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2133888-006	ES2133888-007	ES2133888-008	--------	--------
					Result	Result	Result	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%		**77.8**	**79.7**	**90.6**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2133888**	Page	: 1 of 11
Amendment	: **1**		
Client	: **ENVIRONMENTAL EARTH SCIENCES**	Laboratory	: Environmental Division Sydney
Contact	: LACHLAN DESAILLY	Contact	: Christopher Redford
Address	: PO 380 North Sydney 2056	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: 121070	Date Samples Received	: 17-Sep-2021
Order number	: ----	Date Analysis Commenced	: 21-Sep-2021
C-O-C number	: ----	Issue Date	: 06-Oct-2021
Sampler	: KARIN AZZAM		
Site	: BOX RD, CASULA		
Quote number	: EN/010/20		
No. of samples received	: 11		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3917309)									
ES2133703-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	4	6	44.6	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.0	No Limit
ES2133888-004	TP6_0.1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	15	15	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	16	16	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	33	32	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	14	34	79.3	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	73	68	6.4	0% - 50%
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3937149)									
ES2133888-008	FD1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	14	15	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	19	24	27.1	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	41	44	7.1	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	14	17	17.5	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	69	91	27.2	0% - 50%
ES2134449-028	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	21	31	38.1	0% - 50%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3937149) - continued									
ES2134449-028	Anonymous	EG005T: Nickel	7440-02-0	2	mg/kg	4	4	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	11	12	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.0	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3917313)									
ES2133795-002	Anonymous	EA055: Moisture Content	----	0.1	%	46.6	46.8	0.5	0% - 20%
ES2133888-007	TP10_0.05	EA055: Moisture Content	----	0.1	%	8.7	9.1	5.4	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3932940)									
ES2133888-008	FD1	EA055: Moisture Content	----	0.1	%	9.0	8.8	2.2	No Limit
ES2135379-001	Anonymous	EA055: Moisture Content	----	0.1	%	14.8	14.9	1.0	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3917310)									
ES2133703-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2133888-004	TP6_0.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3937150)									
ES2133888-008	FD1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2134449-028	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3914286)									
ES2133888-004	TP6_0.1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
ES2133872-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3914286) - continued									
ES2133872-001	Anonymous	EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	0.6	0.7	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.7	0.7	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	1.3	1.4	7.4	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3933193)									
ES2133888-008	FD1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3913161)									
ES2133666-038	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES2133888-003	TP5_0.2	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3914287)									
ES2133888-004	TP6_0.1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES2133872-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3932845)									
ES2135298-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3933194)									
ES2133888-008	FD1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3913161)									
ES2133666-038	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES2133888-003	TP5_0.2	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3914287)									
ES2133888-004	TP6_0.1	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES2133872-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3932845)									
ES2135298-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3933194)									
ES2133888-008	FD1	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080: BTEXN (QC Lot: 3913161)									
ES2133666-038	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP080: BTEXN (QC Lot: 3913161) - continued									
ES2133888-003	TP5_0.2	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP080: BTEXN (QC Lot: 3932845)									
ES2135298-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3917309)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	95.4	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	93.1	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	102	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	107	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	96.6	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	93.1	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	90.6	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3937149)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	101	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	84.0	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	115	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	107	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	94.9	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	106	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	88.8	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3917310)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	113	70.0	125
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3937150)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	97.1	70.0	125
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3914286)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	114	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	108	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	119	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	113	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	111	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	114	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	110	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	111	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	90.0	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	105	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	87.9	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	104	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	104	70.0	126

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3914286) - continued								
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	97.0	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	100	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	94.6	63.0	121
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3933193)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	119	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	109	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	112	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	109	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	103	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	104	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	99.4	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	100	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	97.7	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	110	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	93.8	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	108	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	104	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	96.9	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	102	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	96.8	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3913161)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	96.5	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3914287)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	89.7	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	90.8	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	89.8	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3932845)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	106	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3933194)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	103	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	101	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	102	71.0	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3913161)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	97.1	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3914287)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	91.8	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	89.0	74.0	138

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3914287) - continued								
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	85.9	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3932845)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	107	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3933194)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	106	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	99.5	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	100	63.0	131
EP080: BTEXN (QCLot: 3913161)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	95.6	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	98.2	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	96.3	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	94.1	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	92.8	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	106	63.0	119
EP080: BTEXN (QCLot: 3932845)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	105	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	100	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	98.2	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	94.7	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	97.0	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	88.5	63.0	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3917309)							
ES2133703-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	85.4	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	91.2	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	91.0	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	90.4	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	93.6	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	87.3	70.0	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3917309) - continued							
ES2133703-001	Anonymous	EG005T: Zinc	7440-66-6	250 mg/kg	90.5	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3937149)							
ES2133888-008	FD1	EG005T: Arsenic	7440-38-2	50 mg/kg	94.9	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	92.2	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	98.0	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	100	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	92.9	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	95.1	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	85.2	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3917310)							
ES2133703-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	97.6	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3937150)							
ES2133888-008	FD1	EG035T: Mercury	7439-97-6	5 mg/kg	110	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3914286)							
ES2133872-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	106	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	111	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3933193)							
ES2133888-008	FD1	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	102	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	116	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3913161)							
ES2133666-038	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	102	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3914287)							
ES2133872-001	Anonymous	EP071: C10 - C14 Fraction	----	480 mg/kg	106	73.0	137
		EP071: C15 - C28 Fraction	----	3100 mg/kg	110	53.0	131
		EP071: C29 - C36 Fraction	----	2060 mg/kg	114	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3932845)							
ES2135298-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	99.7	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3933194)							
ES2133888-008	FD1	EP071: C10 - C14 Fraction	----	480 mg/kg	111	73.0	137
		EP071: C15 - C28 Fraction	----	3100 mg/kg	100	53.0	131
		EP071: C29 - C36 Fraction	----	2060 mg/kg	111	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3913161)							
ES2133666-038	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	104	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3914287)							
ES2133872-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	106	73.0	137

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3914287) - continued							
ES2133872-001	Anonymous	EP071: >C16 - C34 Fraction	----	4320 mg/kg	114	53.0	131
		EP071: >C34 - C40 Fraction	----	890 mg/kg	95.2	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3932845)							
ES2135298-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	99.2	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3933194)							
ES2133888-008	FD1	EP071: >C10 - C16 Fraction	----	860 mg/kg	98.4	73.0	137
		EP071: >C16 - C34 Fraction	----	4320 mg/kg	105	53.0	131
		EP071: >C34 - C40 Fraction	----	890 mg/kg	103	52.0	132
EP080: BTEXN (QCLot: 3913161)							
ES2133666-038	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	97.3	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	91.4	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	80.5	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	93.5	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	93.5	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	83.5	70.0	130
EP080: BTEXN (QCLot: 3932845)							
ES2135298-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	90.9	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	89.7	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	91.2	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	91.1	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	92.4	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	84.8	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2133888**	Page	: 1 of 5
Amendment	: **1**		
Client	: **ENVIRONMENTAL EARTH SCIENCES**	Laboratory	: Environmental Division Sydney
Contact	: LACHLAN DESAILLY	Telephone	: +61 2 8784 8555
Project	: 121070	Date Samples Received	: 17-Sep-2021
Site	: BOX RD, CASULA	Issue Date	: 06-Oct-2021
Sampler	: KARIN AZZAM	No. of samples received	: 11
Order number	: ----	No. of samples analysed	: 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	**17-Sep-2021**	**----**	----	----	**22-Sep-2021**	01-Oct-2021	✓
Soil Glass Jar - Unpreserved (EA055)							
FD1	**17-Sep-2021**	**----**	----	----	**30-Sep-2021**	01-Oct-2021	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
FD1	**17-Sep-2021**	**05-Oct-2021**	16-Mar-2022	✓	**05-Oct-2021**	16-Mar-2022	✓
Soil Glass Jar - Unpreserved (EG005T)							
TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	**17-Sep-2021**	**23-Sep-2021**	16-Mar-2022	✓	**23-Sep-2021**	16-Mar-2022	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
FD1	**17-Sep-2021**	**05-Oct-2021**	15-Oct-2021	✓	**05-Oct-2021**	15-Oct-2021	✓
Soil Glass Jar - Unpreserved (EG035T)							
TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	**17-Sep-2021**	**23-Sep-2021**	15-Oct-2021	✓	**24-Sep-2021**	15-Oct-2021	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
FD1	**17-Sep-2021**	**01-Oct-2021**	01-Oct-2021	✓	**01-Oct-2021**	10-Nov-2021	✓
Soil Glass Jar - Unpreserved (EP075(SIM))							
TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	**17-Sep-2021**	**22-Sep-2021**	01-Oct-2021	✓	**23-Sep-2021**	01-Nov-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071)							
FD1	**17-Sep-2021**	**01-Oct-2021**	01-Oct-2021	✓	**01-Oct-2021**	10-Nov-2021	✓
Soil Glass Jar - Unpreserved (EP080)							
TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	**17-Sep-2021**	**21-Sep-2021**	01-Oct-2021	✓	**22-Sep-2021**	01-Oct-2021	✓
Soil Glass Jar - Unpreserved (EP071)							
TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	**17-Sep-2021**	**22-Sep-2021**	01-Oct-2021	✓	**22-Sep-2021**	01-Nov-2021	✓
Soil Glass Jar - Unpreserved (EP080)							
FD1	**17-Sep-2021**	**30-Sep-2021**	01-Oct-2021	✓	**30-Sep-2021**	01-Oct-2021	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP071)							
FD1	**17-Sep-2021**	**01-Oct-2021**	01-Oct-2021	✓	**01-Oct-2021**	10-Nov-2021	✓
Soil Glass Jar - Unpreserved (EP080)							
TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	**17-Sep-2021**	**21-Sep-2021**	01-Oct-2021	✓	**22-Sep-2021**	01-Oct-2021	✓
Soil Glass Jar - Unpreserved (EP071)							
TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	**17-Sep-2021**	**22-Sep-2021**	01-Oct-2021	✓	**22-Sep-2021**	01-Nov-2021	✓
Soil Glass Jar - Unpreserved (EP080)							
FD1	**17-Sep-2021**	**30-Sep-2021**	01-Oct-2021	✓	**30-Sep-2021**	01-Oct-2021	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	**17-Sep-2021**	**21-Sep-2021**	01-Oct-2021	✓	**22-Sep-2021**	01-Oct-2021	✓
Soil Glass Jar - Unpreserved (EP080)							
FD1	**17-Sep-2021**	**30-Sep-2021**	01-Oct-2021	✓	**30-Sep-2021**	01-Oct-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	3	19	**15.79**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	3	24	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	25	**12.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	2	19	**10.53**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	2	19	**10.53**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	2	19	**10.53**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

CHAIN OF CUSTODY - ANALYSIS REQUEST FORM

Job No: 121070 Laboratory: ASET

Project Manager: LD Sampler: KA Site Location: Box Rd, Casula Sheet: 1 of 1

No. of samples	Sample ID/ Depth	Anticipated Result (PID)/EC reading	Date sampled	Time sampled	Sample Matrix: Soil	Water	Sediment	Analysis Required: Asbestos NEPM/WA	Sample-specific instructions/ notes
									ASET96265/99446/1-7
1	TP1_0.3				X			X	
2	TP3_0.4				X			X	
3	TP5_0.2				X			X	
4	TP6_0.1				X			X	
5	TP7_0.2				X			X	
6	TP8_0.15				X			X	
7	TP10_0.05				X			X	
	TOTAL								

21 SEP 2021

Turn Around *(circle)*: **NORMAL / 3 DAYS / 48 HRS / 24 HRS** *(confirm with lab in advance if quick turn-around is required)*

Lab Quotation No. *(if applicable)*:

Comments/ Instructions:

Send report to *(email address)*: kazzam@eesigroup.com

Cc: report to *(email address)*: ldesailly@eesigroup.com

Cc: invoice to *(email address)*: accounts@eesigroup.com

	Name	Signature	Date	Time
Sent off Site/Office by:	Karin Azzam	KA	21/9/2021	9.20am
Receiving Lab:	Kim		21/9/21	1pm
Receiving Lab:				

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED
Phone (02) 9922 1777
Fax (02) 9922 1010
PO Box 380, North Sydney NSW 2059
Email eesNSW@eesigroup.com

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref : ASET96265 / 99445 / 1 - 7
Your ref : 121070 – Box Road Casula
NATA Accreditation No: 14484

22 September 2021

Environmental Earth Sciences
PO Box 380
North Sydney NSW 2059

Attn: Ms Karin Azzam

Accredited for compliance with ISO/IEC 17025 - Testing.

Dear Karin

Asbestos Identification
This report presents the results of seven samples, forwarded by Environmental Earth Sciences on 21 September 2021, for analysis for asbestos.

1.Introduction: Seven samples forwarded were examined and analysed for the presence of asbestos on 22 September 2021.

2. Methods : The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining method **(Australian Standard AS 4964 - 2004 and Safer Environment Method 1 as the supplementary work instruction) (Qualitative Analysis only).**

The report also provides approximate weights and percentages, categories of asbestos forms appearing in the sample, such as **AF**(Asbestos Fines), **FA**(Friable Asbestos) and **ACM** (Asbestos Containing Material), also satisfying the requirements of the WA/ NEPM Guidelines).

3. Results :

Sample No. 1. ASET96265 / 99445 / 1. 121070 - TP1_0.3.
Approx dimensions 10.0 cm x 10.0 cm x 6.0 cm
Approximate total dry weight of soil = 598.0g.
The sample consisted of a mixture of clayish sandy soil, organic fibres, stones, fragments of cement, wood chips, plant matter.
No asbestos detected.

Sample No. 2. ASET96265 / 99445 / 2. 121070 - TP3_0.4.
Approx dimensions 10.0 cm x 10.0 cm x 6.9 cm
Approximate total dry weight of soil = 693.0g.
The sample consisted of a mixture of clayish sandy soil, organic fibres, stones, fragments of cement and plant matter.
No asbestos detected.

Sample No. 3. ASET96265 / 99445 / 3. 121070 - TP5_0.2.
Approx dimensions 10.0 cm x 10.0 cm x 7.4 cm
Approximate total dry weight of soil = 735.0g.
The sample consisted of a mixture of clayish sandy soil, organic fibres, stones, fragments of cement and plant matter.
No asbestos detected.

Sample No. 4. ASET96265 / 99445 / 4. 121070 - TP6_0.1.
Approx dimensions 10.0 cm x 10.0 cm x 6.5 cm
Approximate total dry weight of soil = 652.0g.
The sample consisted of a mixture of clayish sandy soil, stones, fragments of cement, slag, wood chips and plant matter.
No asbestos detected.

Sample No. 5. ASET96265 / 99445 / 5. 121070 - TP7_0.2.
Approx dimensions 10.0 cm x 10.0 cm x 7.3 cm
Approximate total dry weight of soil = 725.0g.
The sample consisted of a mixture of clayish sandy soil, organic fibres, stones, fragments of cement, wood chips and plant matter.
No asbestos detected.

Sample No. 6. ASET96265 / 99445 / 6. 121070 - TP8_0.15.
Approx dimensions 10.0 cm x 10.0 cm x 7.7 cm
Approximate total dry weight of soil = 765.0g.
The sample consisted of a mixture of clayish sandy soil, stones, fragments of brick, cement, wood chips and plant matter.
No asbestos detected.

Sample No. 7. ASET96265 / 99445 / 7. 121070 - TP10_0.05.
Approx dimensions 10.0 cm x 10.0 cm x 7.8 cm
Approximate total dry weight of soil = 779.0g.
The sample consisted of a mixture of clayish sandy soil, stones, fragments of cement, wood chips and plant matter.
No asbestos detected.

Reported by,

Mahen De Silva. BSc, MSc, Grad Dip (Occ Hyg)
Occupational Hygienist / Approved Identifier.
Approved Signatory

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

This report is consistent with the analytical procedures and reporting recommendations in the Western Australia Guidelines for the Assessment Remediation and Management of Asbestos contaminated sites in Western Australia and it also satisfies the requirements of the current NEPM Guidelines. NATA Accreditation does not cover the performance of this service.

Disclaimers;

The approx; weights given above can be used only as a guide. They do not represent absolute weights of each kind of asbestos, as it is impossible to extract all loose fibres from soil and other asbestos containing building material samples using this method. However above figures may be used as closest approximations to the exact values in each case. Estimation and/ or reporting of asbestos fibre weights in asbestos containing materials and soil is out of the Scope of the NATA Accreditation. NATA Accreditation only covers the qualitative part of the results reported. This weight disclaimer also covers weight / weight percentages if given.

ACM - Asbestos Containing Material - Products or materials that contain asbestos in an inert bound matrix such as cement or resin. Here taken to be sound material, even as fragments and not fitting through a 7mm X 7 mm sieve.

AF -Includes asbestos free fibres, small fibre bundles and also ACM fragments that pass through a 7mm X 7 mm sieve.

FA -Friable asbestos material such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products.

^ denotes loose fibres of relevant asbestos types detected in soil/dust.
*** denotes asbestos detected in ACM in bonded form.**
 # denotes friable asbestos as soft fibro plaster and/ or highly weathered ACM that will easily crumble.

The results contained in this report relate only to the sample/s submitted for testing. Australian Safer Environment & Technology accepts no responsibility for whether or not the submitted sample/s is/are representative. Results indicating "No asbestos detected" indicates a reporting limit specified in AS4964 -2004 which is 0.1g/ Kg (0.01%). Any amounts detected at assumed lower level than that would be reported, however those assumed lower levels may be treated as "No asbestos detected" as specified and recommended by A4964-2004. Trace / respirable level asbestos will be reported only when detected and trace analysis have been performed on each sample as required by AS4964-2004. When loose asbestos fibres/ fibre bundles are detected and reported that means they are larger handpicked fibres/ fibre bundles, and they do not represent respirable fibres. Dust/soil samples are always subjected to trace analysis except where the amounts involved are extremely minute and trace analysis is not possible to be carried out. When trace analysis is not performed on dust samples it will be indicated in the report that trace analysis has not been carried out due to the volume of the sample being extremely minute.

Estimation of asbestos weights involves the use of following assumptions;
Volume of each kind of Asbestos present in broken edges have been visually estimated and its been assumed that volumes remain similar throughout the binding matrix and those volumes are only approximate and not exact. Material densities have been assumed to be similar to commonly found similar materials and may not be exact.

All samples indicating "No asbestos detected" are assumed to be less than 0.001% for friable AF and FA portions detected and 0.01 % for ACM detected unless the approximate weight is given.

APPENDIX J: UNEXPECTED FINDS PROTOCOL

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

Unexpected Findings Protocol Form

Site: **Job reference:**

Client:

Personnel Onsite: **Date:**

Daily Summary

1. Fill or suspect material encountered during daily activities _____ (if yes compete 2 - 8).
2. Environmental consultant contacted: _____
3. Record location of foreign material (label occurrences sequentially 1, 2, 3, etc).

Description of material encountered:

4. Asbestos or suspected asbestos containing material present (Yes/No): _____
5. If No to 4 is there an obvious odour present (Note: Do Not sniff soil) (Yes/No): _____
6. Visible staining (Yes/No): _____
7. Brief written description:

8. Material quarantined (Yes/No): _____
9. Location of contaminated material: _____
10. Attach photographs taken _____

Signature: _____