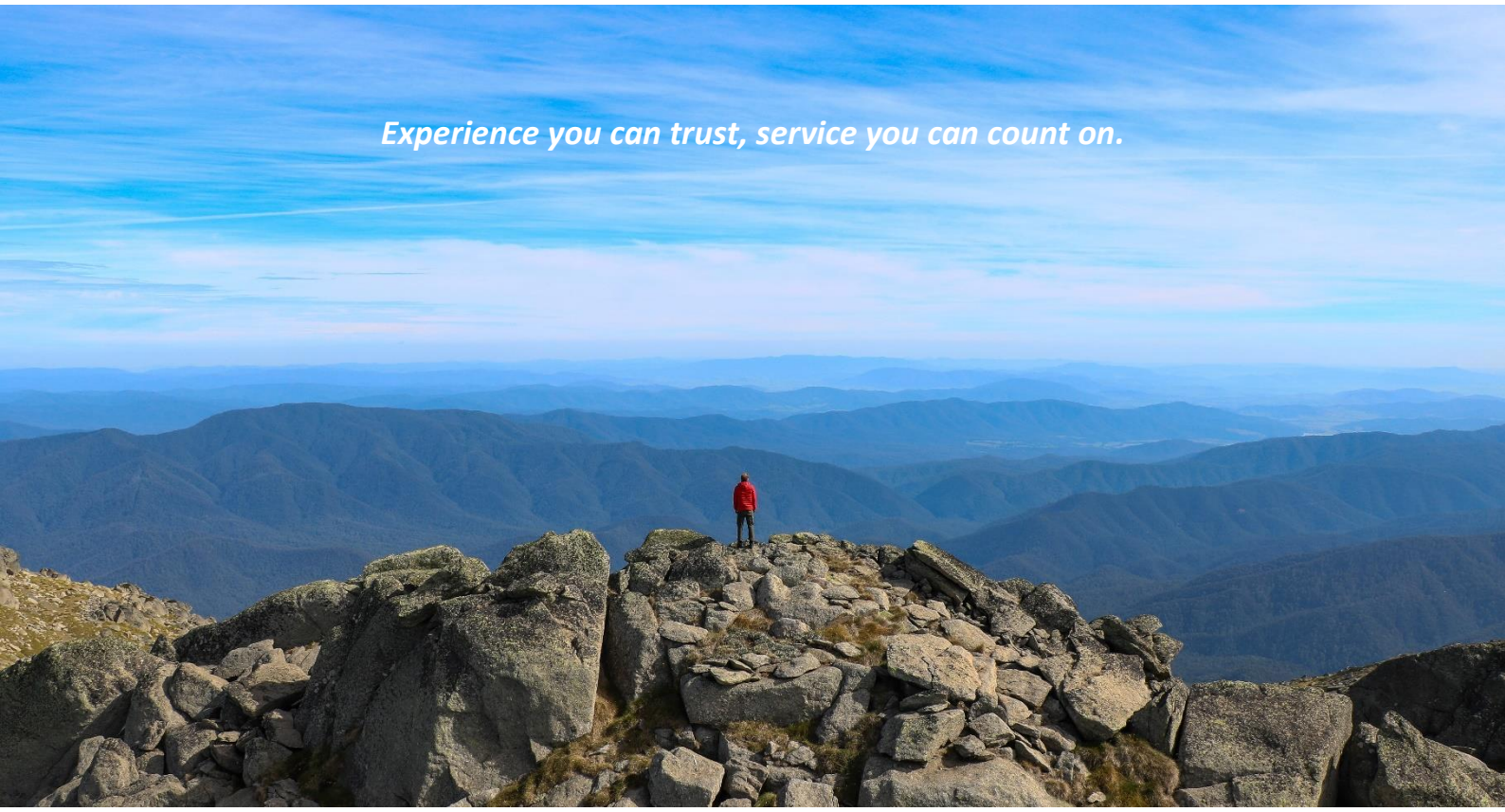

Detailed Site Investigation

40-42 Mamre Road, St Marys NSW 2760

Prepared For:	V Homes Developments Pty Ltd
Reference:	21-1165
Date:	31 May 2021

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This report is to be read in its entirety and should not be review in individual section to provide any level of information independently. Each section of the report relates to the rest of the document and as such is to be read in conjunction, including its appendices and attachments.

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EXECUTIVE SUMMARY

ECON Environmental Pty Ltd was engaged by V Home Developments Pty Ltd to undertake a Detailed Site Investigation on the subject site located at 40-42 Mamre Road, St Marys NSW 2760, as per the conclusions and recommendations of the ECON Environmental Preliminary Site Investigation, 40-42 Mamre Road, St Marys NSW 2760, ref: 21-1155, dated 7 May 2021.

The objective of the investigation is to assess the subject site for contamination, based on the detailed investigation undertaken for the site and acquisition of soil samples from within the site to evaluate its suitability for its intended land use and proposed development.

The total combined area of the subject site (40 & 42 Mamre Roads) is approximately 2,151m2, with 40 Mamre Road being approximately 1,076m^2, and 42 Mamre Road being approximately 1,075m^2. A site investigation was carried out on Wednesday 19 May 2021 by ECON Environmental's representative Con Kariotoglou, which involved a visual assessment of the entire subject site and surrounding areas as well as the acquisition of representative soil samples, and the inspection of all existing building structures on site. Details of the findings are presented within the body of this report, as well as an assessment of significance with regards to the findings of the investigation.

At the time of inspection, on Wednesday 19 May 2021, the following observations were noted:

40 Mamre Road, St Marys:

- The site consisted of a single-storey fibre-cement panelled residential house with terracotta roof tiles and a concrete paved area at the rear of the property,
- A concrete driveway runs from the front of the property to the rear garage,
- The rear garage consists of fibre-cement walls and roof and is in poor condition,
- Low lying grasses and vegetation were evident covering the front and back yards,
- The property was occupied at the time of the inspection,
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection within the subject site.
- Visible signs of asbestos containing materials (ACM) were noted on building structures within the main residence and within the rear garage within the property,
- No visible signs of ACM were noted on surface soils within the boundaries of the property,
- No evidence of underground or above ground chemical storage tanks were evident within the subject site.
- No evidence of any potential human and environmental areas of concern were evident during the inspection within the subject site.

42 Mamre Road, St Marys:

- The site consisted of a single-storey brick and fibre-cement panelled residential house with terracotta roof tiles, the house was in poor condition.
- The property showed no signs of hoarding within the site that was observed during the initial Preliminary Site Investigation by ECON Environmental on Monday 3 May 2021 *(refer to ECON Environmental Preliminary Site Investigation Ref 21-1155, dated 7 May 2021).*

- Low lying grasses and vegetation were evident covering the front and back yards, where soils were exposed where areas of hoarding were removed from the rear of the premises.
- A concrete driveway runs from the front of the property to the rear of the house,
- The property was occupied at the time of the inspection,
- No visible signs of oil stains were detected during the inspection which were previously reported beneath the cars and car parts within the rear portion of the property within the previous ECON Environmental Preliminary Site Investigation, Monday 3 May 2021.
- No olfactory signs of odours were detected during the inspection within the property.
- Visible signs of asbestos containing materials (ACM) were noted on building structures within the main residence and within the rear of the property on surface soils,
- No evidence of underground or above ground chemical storage tanks were evident within the subject site.
- Evidence of potential human and environmental areas of concern were evident during the inspection within the entire subject site.

According to the NSW EPA Contaminated Sites Sampling Guidelines (Sept. 1995), for this sized area site (2,151m^2), a total of seven (7) soil samples plus one (1) QA/QC sample is required to be collected. The soil samples were collected on Wednesday 19 May 2021 via boreholes. A total of seven (7) boreholes (BH1-BH7) were advanced across the entire subject site (Figure 3) and were collected from within the near surface fill material (0-0.3m BGL). Samples were collected from using a hand auger with a 150mm diameter drill. No groundwater was encountered within any of the boreholes drilled onsite.

During the collection of soil samples, any features such as seepage, discoloration, staining, odours, or other physical indicators of contamination were noted. All site work was undertaken by Con Kariotoglou, Environmental Consultant of ECON Environmental.

All soil samples collected on Wednesday 19 May 2021 were reported by the laboratory to have concentrations BELOW the adopted site assessment criteria for HIL A, land use as per the NEPM, 2013, except for the following sample:

- **BH6 (0.2-0.3m) TRH F3(C_{16}-C_{34}) 330mg/kg**
- **BH6 (0.2-0.3m) B(a)P TEQ 9.0mg/kg, B(a)P 6.0mg/kg**

Human exposure to the potential contaminants identified is currently considered as **LOW** as:

- The subject sites are privately owned,
- The site is not publicly accessible,
- The soil sample (BH6) collected on Wednesday 19 May 2021 that was reported by the laboratory to have concentrations ABOVE the adopted site assessment criteria for HIL A, land use as per the NEPM, 2013, was 0.2-0.3m below ground level (BGL), therefore potential exposure risks to humans and the environment were reduced.

Site history information and onsite inspection observations indicated that due to the conditions of the site, there is a **LOW** potential for contaminants to provide exposure risks to humans within the site.

However, if future proposed developments of the subject site include the excavation of the underlying soils with the subject site, then there is a **MEDIUM TO HIGH** potential for contaminants present within surface and underlying soils to have the ability to migrate vertically up into the atmosphere, or down through the water column into the groundwater or migrate horizontally to adjacent properties or washed downgradient with stormwater runoff into adjacent properties or into Mamre Road drainage system to the west.

Subject to the above, it is considered that the subject site can be made suitable for its future intended proposed development and land use, subject to the following recommendations:

- A **Remedial Action Plan (RAP)** is to be prepared by a suitably qualified and experienced professional detailing appropriate **TRH F3(C_{16}-C_{34}), B(a)P TEQ and B(a)P Remediation and Validation** procedures with the vicinity of borehole locations **BH6 (0.2-0.3m)** to render the subject site suitable for its intended future proposed development and land use.
- The removal of all **Hazardous Containing Materials** from building structures within both properties (40 & 42 Mamre Road, St Marys) prior to demolition of building structures according to the Hazardous Material Assessment and Hazardous Registry – Appendix E – Hazardous Materials Assessment.
- An **Asbestos Clearance Certificate** is to be provided by SafeWork NSW Licenced Approved Asbestos Assessor (LAA) prior to building demolition, to confirm that all hazardous materials within the subject sites (40 & 42 Mamre Road, St Marys) have been appropriately removed.
- If any proposed plans for the subject site include excavations and disposal of those underlying soils to a NSW EPA licenced facility, then a **Waste Classification** report of soils is to be prepared in accordance with the NSW EPA Waste Classification Guidelines: Part 1 Classifying Waste (2014).

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1. INTRODUCTION

1.1 Background

ECON Environmental Pty Ltd was engaged by V Home Developments Pty Ltd to undertake a Detailed Site Investigation on the subject site located at 40-42 Mamre Road, St Marys NSW 2760, as per the conclusions and recommendations of the ECON Environmental Preliminary Site Investigation, 40-42 Mamre Road, St Marys NSW 2760, ref: 21-1155, dated 7 May 2021.

The objective of the investigation is to assess the subject site for contamination, based on the detailed investigation undertaken for the site and acquisition of soil samples from within the site to evaluate its suitability for its intended land use and proposed development.

The total combined area of the subject site (40 & 42 Mamre Roads) is approximately 2,151m^2, with 40 Mamre Road being approximately 1,076m^2, and 42 Mamre Road being approximately 1,075m^2. A site investigation was carried out on Wednesday 19 May 2021 by ECON Environmental's representative Con Kariotoglou, which involved a visual assessment of the entire subject site and surrounding areas as well as the acquisition of representative soil samples, and the inspection of all existing building structures on site. Details of the findings are presented within the body of this report, as well as an assessment of significance with regards to the findings of the investigation.

This report was completed in accordance with the *Guidelines for Consultants Reporting on Contaminated Sites, NSW EPA, May 2020.*

1.2 Objectives

The objectives of this Detailed Site Investigation are to:

- Identify potential contaminants of concern,
- Provide soil sampling and analysis to determine the vertical depth and horizontal extent of contamination onsite, and
- Assess the need for further remediation works and investigations.

1.3 Scope of Works

The scope of works included the following:

- A site inspection of building structures and surface soils within the boundaries of the sites,
- Soil sampling and analysis within soil profiles within the sites, and
- Reporting in accordance with the associated legislations and guidelines.

1.4 Legislative Requirements

The legislative framework for the report is based on guidelines that have been set out by the NSW Environmental Protection Agency (EPA) in the form of the following Acts/Regulations:

- Protection of the Environment Operations Act (1997)
- Protection of the Environment Operations Regulation (2008)
- Contaminated Land Management Act (1998)
- Work, Health and Safety (WHS) Act 2011 (2017)
- Work, Health and Safety (WHS) Regulation 2017

In addition, the following guidelines and technical documents have been reviewed and applied where applicable:

- Contaminated Land Management - Guidelines for the NSW Site Auditor Scheme (3 Edition, 2017).
- State Environmental Planning Policy No.55 (SEPP55) – Remediation of Land (2018)
- NSW EPA Guidelines for Consultants Reporting on Contaminated Sites (2020).
- NSW EPA Sampling Design Guidelines (1995).
- NSW EPA Waste Classification Guidelines Part 1: Classifying Waste (2014).
- Guidelines on the Investigation Levels for Soil and Groundwater, National Environmental Protection Measure 1999, 2013 Amendment (NEPC, 2013).
- Guidelines for the Assessment, Remediation & Management of Asbestos - Contaminated Sites (DOH, 2009).

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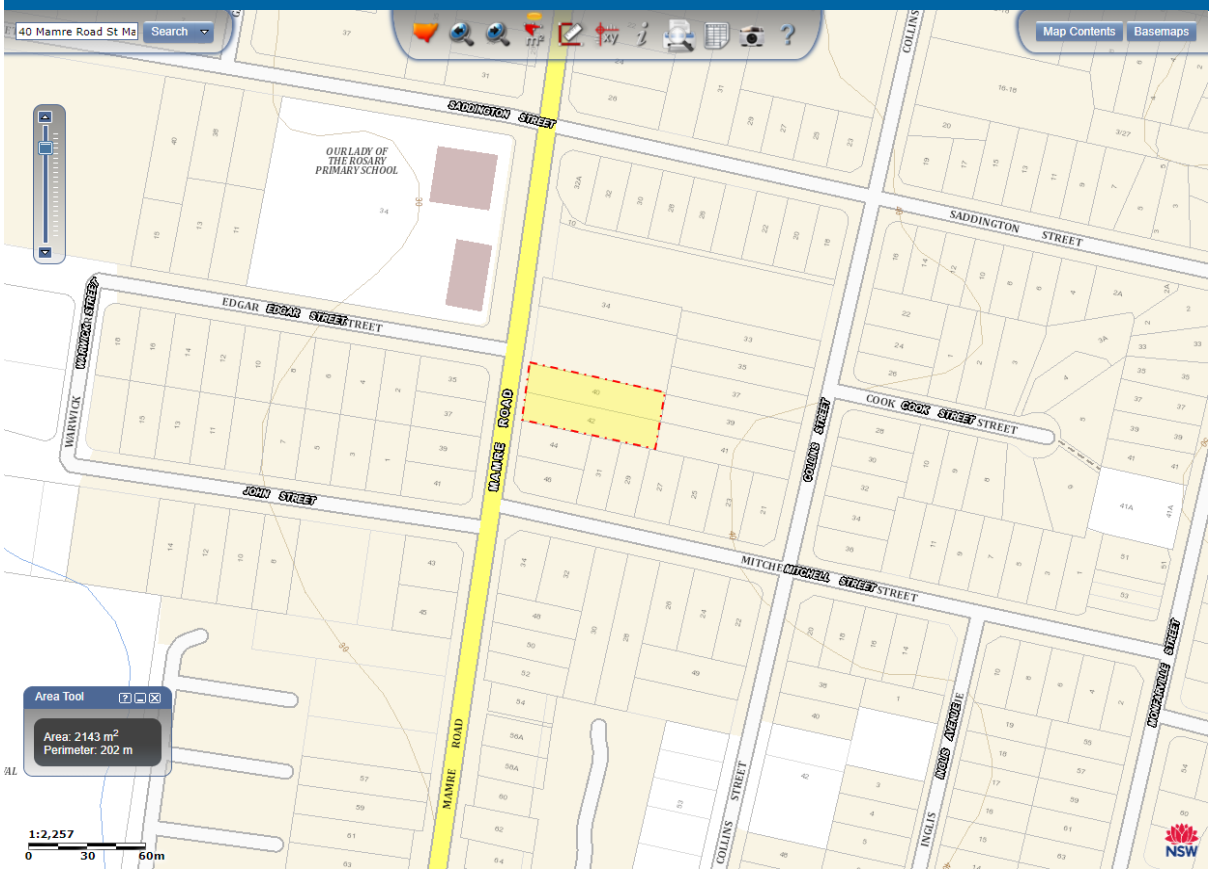
2. SITE IDENTIFICATION

The study sites are 40-42 Mamre Road, St Marys NSW 2760 (Figure 1). Both sites can be identified as rectangular shaped allotments surrounded by low density residential properties on all boundaries. Figure 2 shows an aerial photograph of the site and the surrounding land.

Table 1: Site Identification	
Street Address	40-42 Mamre Road, St Marys NSW 2760
Lot and DP Number	Lot 1 in DP 219187 – 40 Mamre Road Lot 1 in DP 111896 – 42 Mamre Road
Approx. Total Site Area	1,076m^2 - 40 Mamre Road 1,075m^2 - 42 Mamre Road 2,151m^2 - total combine
Zoning	R3 – Medium Density Residential SP2 - Infrastructure
Local Government Area	Penrith City Council
LGA Legislation	Penrith Local Environmental Plan 2010

Figure 1: Site location map – source www.maps.six.nsw.gov.au



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3. REQUIREMENT REASONING

The objective of the 'Detailed Site Investigation' is to assess the subject site for potential contamination, based on detailed investigations undertaken within the site, to ensure the site is suitable for its intended land use and any future proposed development within the subject site.

Figure 2: Aerial photograph of the subject site and surrounds – *source www.maps.six.nsw.gov.au*

3.1 Proposed Development or Intended Land Use

The development approval includes a proposed multi housing residential development, as shown in the proposed development plans in Appendix A – Proposed Development Plans.

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4. SITE DESCRIPTION

4.1 Site Inspections

On Wednesday 19 May 2021, a site investigation was conducted by ECON Environmental's representative Con Kariotoglou. Field work was carried out in accordance with the methodology described in AS4482.1 – 2005 and the NEPM (2013). At the time of inspection, the following observations were noted:

40 Mamre Road, St Marys:

- The site consisted of a single-storey fibre-cement panelled residential house with terracotta roof tiles and a concrete paved area at the rear of the property,
- A concrete driveway runs from the front of the property to the rear garage,
- The rear garage consists of fibre-cement walls and roof and is in poor condition,
- Low lying grasses and vegetation were evident covering the front and back yards,
- The property was occupied at the time of the inspection,
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection within the subject site.
- Visible signs of asbestos containing materials (ACM) were noted on building structures within the main residence and within the rear garage within the property,
- No visible signs of ACM were noted on surface soils within the boundaries of the property,
- No evidence of underground or above ground chemical storage tanks were evident within the subject site.
- No evidence of any potential human and environmental areas of concern were evident during the inspection within the subject site.

42 Mamre Road, St Marys:

- The site consisted of a single-storey brick and fibre-cement panelled residential house with terracotta roof tiles, the house was in poor condition.
- The property showed no signs of hoarding within the site that was observed during the initial Preliminary Site Investigation by ECON Environmental on Monday 3 May 2021 *(refer to ECON Environmental Preliminary Site Investigation Ref 21-1155, dated 7 May 2021).*
- Low lying grasses and vegetation were evident covering the front and back yards, where soils were exposed where areas of hoarding were removed from the rear of the premises.
- A concrete driveway runs from the front of the property to the rear of the house,
- The property was occupied at the time of the inspection,
- No visible signs of oil stains were detected during the inspection which were previously reported beneath the cars and car parts within the rear portion of the property within the previous ECON Environmental Preliminary Site Investigation, Monday 3 May 2021.
- No olfactory signs of odours were detected during the inspection within the property.

- Visible signs of asbestos containing materials (ACM) were noted on building structures within the main residence and within the rear of the property on surface soils,
- No evidence of underground or above ground chemical storage tanks were evident within the subject site.
- Evidence of potential human and environmental areas of concern were evident during the inspection within the entire subject site.

4.2 Surrounding Land Use

The subject site is located within a low and medium density residential setting and bordered by:

- Low density residential properties directly north, south, east and west of the subject site.
- Our Lady of The Rosary Primary School, 30m northwest of the subject site,
- Wilson Oval, 220m south west of the subject site,
- Byrnes Creek, 245m southwest of the subject site,

4.3 Topography and Drainage

According to https://www.environment.nsw.gov.au/eSpade2Webapp the topography of the site includes flat to gently sloping alluvial plain with occasional terraces or levees providing low relief. Slopes <10m.

4.4 Geology and Soils

The Geological Map of Gosford-Lake Macquarie (Geological Series Sheet 9131 & part sheet 9231, Scale 1:100,000), published by the Department of Mineral Resources indicated the site is located within an area underlain by Quaternary alluvium derived from Wianamatta Group shales and Hawkesbury Sandstone.

4.5 Surface Water Hydrology

No surface water or distinct overland flow paths were noted during the investigation. The entire site was covered by grass and/or paved hardstand areas. Stormwater is expected to infiltrate into soils or sheet west down into Mamre Road stormwater system.

5. CONCEPTUAL SITE MODEL (CSM)

5.1 Potential Areas of Concern

Based on the historical records and aerial photographs inspected, as well as the current site inspection observations, the following Table 6 identifies the main Potential Areas of Environmental Concern (PAECs), and their associated potential Contaminants of Concern (COCs) within the subject site using the information gathered through this assessment and qualitative judgement based on consultant experience.

Table 2: Potential Areas of Environmental Concern

PAEC	Potentially Contaminating Activity	Contaminants of Concern	Likelihood of Contamination
40 Mamre Road Entire site	May contain potentially hazardous materials within underlying soils	Heavy Metals, TPH, BTEX, PAH, Asbestos	Likely, *due to historical evidence (2005 photograph) of potentially hazardous activities within the site.*
42 Mamre Road Entire site	May contain potentially hazardous materials within underlying soils	Heavy Metals, TPH, BTEX, PAH, Asbestos	Likely, *due to historical evidence (2005-2020 photograph) and current inspection evidence of potentially hazardous activities within the site.*

5.2 Human Receptors and Sensitive Environments

On-site Human Receptors & Sensitive Environments:

- Construction workers during the construction process
- Future users and/or occupants of the site

Off-site Human Receptors & Sensitive Environments:

- Occupants of the low and medium density residential properties directly surrounding the subject site,
- Staff and students at Our Lady of The Rosary Primary School, 30m northwest of the subject site,
- Public users of Wilson Oval, 220m south west of the subject site,
- Natural ecosystems within Byrnes Creek, 245m southwest of the subject site.

6. SOIL SAMPLING AND ANALYSIS

6.1 Data Quality Objectives

Data quality objectives were established for the site characterisation works, following the decision-making procedures outlined in NEPC (2013):

1. Define the problem,
2. Identify the decision,
3. Identify inputs to the decision,
4. Define the study boundaries,
5. Develop a decision rule,
6. Specify limits on decision errors, and
7. Optimise the design for obtaining data.

6.2 STEP 1 - Define the Problem

Potential risks to human health and the environment exist from potential contamination to underlying soils associated with current business activities within the subject site.

6.3 STEP 2 - Identify the Decision

Based on the decision-making process for assessing urban redevelopment sites, the following decisions must be made:

1. Are there any unacceptable health risks to future onsite receptors?
2. Are there any unacceptable ecological risks posed by the site?
3. Are there any aesthetic issues at the site?
4. Is there any evidence of, or potential for, migration of contaminants from the site?
5. Is a site management strategy required?

6.4 STEP 3 - Identify Inputs to the Decision

The following inputs were used to allow the assessment of the decisions:

1. Historical information,
2. Observations made during site investigations,
3. Soil analytical data from samples collected on site,
4. Adopted site assessment criteria, and
5. Data quality indicators.

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6.5 STEP 4 - Define the Study Boundaries

The study subject site is located at 40-42 Mamre Road, St Marys NSW 2760 (Lot 1 in DP219187 and Lot 1 in DP111896) (Figure 1). It can be identified as a rectangular shaped allotment accessed from Mamre Road to the west.

The lateral extent of the investigation was within the boundaries of the site, as indicated in Appendix A – Proposed Development Plans. The vertical extent of the investigation was to the natural soil material depth, approx. 0.3m BGL.

6.6 STEP 5 - Develop a Decision Rule

Soil analytical data were assessed against National Environmental Protection Measure (NEPM) criteria as referenced in Section 8. Statistical analysis of the data will be undertaken if necessary. The following statistical criteria shall be adopted:

1. The upper 95% confidence limit on the average concentration for each analyte (calculated for samples collected from consistent soil horizons, stratigraphy or material types) must be below the adopted criterion,
2. No single analyte shall exceed 250% of the adopted criterion, and
3. The standard deviation of the results must be below 50 % of the criterion.

The acceptable limits for laboratory QA/QC parameters are shown in the table below and are based upon the laboratory reported acceptable limits and those stated within the NEPM 2013 Schedule B3 Guideline & AS 4482.1-2005.

Table 3: QA/QC Parameters

Type of QC Sample	Control Limit
FIELD	
Rinsate Blanks	Analytes <LOR
Intra-Laboratory Duplicates	RPD's < 30 - 50%
Inter-Laboratory Duplicates	RPD's < 30 - 50%
Trip Blanks	Volatiles <LOR
Trip Spike Recovery	>70%
LABORATORY	
Method Blanks	< Laboratory LOR
Matrix Spike	Recovery targets: • Metals: 70% to 130% • Organics: 60% to 140%
Laboratory Duplicate	RPD's <30%
Laboratory Control Samples	Recovery targets: 70% to 130%
Surrogate Spike	Recovery targets: 60% to 140%

The following conditions should be adopted:

- If the control limits are exceeded, then an assessment of the significance of the results should be carried out,
- If major non-conformances from the laboratory or field data are identified, then further sampling and laboratory analysis may be required to provide an adequate sample set for data reliance,
- If the results of the DQI assessment indicate that the data set is reliable, then the data set will be deemed to be acceptable for the purposes of the validation works, and
- If the measured concentrations of soil, groundwater and soil vapour samples analysed meet their respective validation criteria, then no additional remediation is required.

6.7 STEP 6 - Specify Limits of Decision Errors

The usual null hypothesis for remediation of contamination is that the land has unacceptable risk from residual contamination, and this hypothesis is able to be accepted at a 95% confidence level, giving a 5% risk of a Type I error (site is deemed suitable when it is not).

An assessment of the likelihood of a decision error will be made based on:

- The acceptable limits for inter/intra laboratory duplicate sample comparisons as specified in Step 5 of the DQOs, and
- The acceptable limits for laboratory QA/QC parameters are based upon the laboratory reported acceptable limits and those stated within the NEPM 2013 Schedule B3 Guideline & AS 4482.1-2005.

If the concentration of a particular contaminant of concern exceeds its remediation/validation criteria, then a further assessment is required to address the significance of the result. Statistical analysis (arithmetic mean) based on 95% UCL may be used to assess the significance of the data provided the following conditions are met:

- the 95%ucl of the arithmetic mean must be less than the criterion,
- the standard deviation of the data set is less than 50% of the relevant threshold level, and
- no individual sample result should be greater than 250% of the relevant threshold level.

6.8 STEP 7 - Optimize Design for Obtaining Data

Based on the available information, a targeted sampling plan was considered most appropriate to provide sufficient characterisation data. A total of seven (7) boreholes (BH1-BH7) were advanced across the entire subject site (Figure 3) and were collected from within the near surface fill material (0-0.3m BGL) and at depth.

The optimum design for obtaining data in order to achieve the Data Quality Objectives is as follows:

- Only NATA-accredited environmental testing laboratories will be commissioned to analyse soil samples and will implement a quality control plan conforming to the NEPM (Assessment of Site Contamination) Measure Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils
- Assessment of the Data Quality Indicators to determine if the field procedures and laboratory analytical results are reliable, and
- Field sampling works will be carried out by an experienced and qualified Environmental Scientist in accordance with ECON Environmental protocols, based on National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 Schedules B1, B2, B4, B6 & B9 and other NSW EPA endorsed guidelines.

6.9 Soil Sample Methodology

According to the NSW EPA Contaminated Sites Sampling Guidelines (Sept. 1995), for this sized area site (2,151m^2), a total of seven (7) soil samples plus one (1) QA/QC sample is required to be collected. The soil samples were collected on Wednesday 19 May 2021 via boreholes. A total of seven (7) boreholes (BH1-BH7) were advanced across the entire subject site (Figure 3) and were collected from within the near surface fill material (0-0.3m BGL). Samples were collected from using a hand auger with a 150mm diameter drill. No groundwater was encountered within any of the boreholes drilled onsite.

During the collection of soil samples, any features such as seepage, discoloration, staining, odours, or other physical indicators of contamination were noted. All site work was undertaken by Con Kariotoglou, Environmental Consultant of ECON Environmental. Soil Samples were transferred directly from the boreholes into laboratory supplied 250 mL sample jars sealed with Teflon lids. Asbestos samples were collected in asbestos sample bags and zip locked.

Sampling of asbestos was undertaken as follows:

- A minimum 10L sample from each sample location was recovered,
- Each sample (minimum of 10 L) was screened through a 7mm sieve and the material retained on the sieve examined for any bonded ACM and / or suspect material and forwarded to the laboratory for analysis if any suspected ACM is encountered,
- If visible FA material is present or suspected, the soil was wetted to minimise the release of fibres,
- Identified bonded ACM and FA was weighed for each sample, and
- One wetted 500ml sample from each sampling location was submitted to a NATA accredited laboratory for analysis for AF. Soil asbestos analysis should comply with Australian Standard Method for the Qualitative Identification of asbestos in bulk samples (AS4964–2004).

The samples were stored in a chilled esky and transferred to ALS Environmental Division under stringent chain of custody (COC) procedures. The decontamination of non-dedicated sampling equipment was achieved by washing with phosphate-free detergent and tap water, followed by a final rinse with distilled water. Decontamination was conducted after the collection of samples at each sample location. A clean pair of disposable gloves was used when handling each sample. The hand augers were decontaminated between sampling locations by physically removing soil material between boreholes, washing the augers with Decon 90 and rinsing them with water.

6.10 Laboratory Analysis

The laboratory used for the analysis of all samples was ALS Environmental located at 277-289 Woodpark Road, Smithfield NSW Australia. The laboratory is NATA accredited for the selected analyses. The completed analysis schedule is summarised in Table 5 below providing a diverse range of analytes with the full laboratory certificates in Appendix D:

Table 5: Analytical Schedule.

Sample ID	Location	Analytes
Soil Samples BH1 to BH7 (19.05.2021)	Top 0.3m of fill material within the site (Figure 3).	• Heavy Metals • Hydrocarbons (TRH, BTEX, PAH) • OC/OP Pesticides • Phenols, PCB • Asbestos

Figure 3: Site sampling borehole locations

Refer to Appendix B – Site Photographs for photographic evidence of sampling locations.

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6.11 Sampling Borehole Locations & Descriptions

Table 4: Sampling Borehole Locations & Field Measurements					
Borehole Sample	Soil Description	Sample Depth (m)	Visible signs of environmental areas of concern	Latitude	Longitude
BH1	FILL: SILTY CLAY LOAM, light brown, coarse grained, with minor inclusions of sand, rock and gravel,	0.15-0.25	No oil stains, odours or ACM detected during sampling.	-33.774560194	150.773457183
BH2	FILL: SILTY CLAY LOAM, light brown, coarse grained, with minor inclusions of sand, rock and gravel	0.1-0.2	No oil stains, odours or ACM detected during sampling.	-33.774504455	150.772982432
BH3	FILL: SILTY CLAY LOAM, light brown, coarse grained, with minor inclusions of sand, rock and gravel	0.15-0.25	No oil stains, odours or ACM detected during sampling.	-33.774555177	150.773226513
BH4	FILL: SILTY CLAY LOAM, light brown, coarse grained, with minor inclusions of sand, rock and gravel	0.1-0.2	No oil stains, odours or ACM detected during sampling.	-33.774573571	150.773369341
BH5	FILL: SILTY CLAY LOAM, light brown, coarse grained, with minor inclusions of sand, rock and gravel	0.15-0.25	No oil stains, odours or ACM detected during sampling.	-33.774676687	150.773351907
BH6	FILL: SILTY CLAY LOAM, light brown, coarse grained, with minor inclusions of sand, rock and gravel, followed by: NATURAL: SILTY CLAY, 0.3m to depth, medium plasticity, yellow brown, moist.	0.2-0.3	No oil stains, odours or ACM detected during sampling.	-33.774624293	150.773577212
BH7	FILL: SILTY CLAY LOAM, light brown, coarse grained, with minor inclusions of sand, rock and gravel	0.15-0.25	No oil stains, odours or ACM detected during sampling.	-33.774699954	150.773532956

7. SITE ASSESSMENT CRITERIA

Concentrations of contaminants in soil samples were compared against the National Environmental Protection Council (2013) site assessment criteria presented below and summarised in Table 6:

- Health Investigation Levels (HIL) for Soil Contaminants – NEPM HIL Residential A
- Soil Health Screening Levels (HSL) for Vapour Intrusion – Residential A
- NEPM 2013 Management Limits for TRH Fractions F1-F4 in Soil - Residential, Parkland and Public Open Space (Fine Grained Soils)
- NEPM 2013 ESLs for TRH fractions F1 – F4, BTEX and benzo(a)pyrene in soil
- Health Screening Levels for Asbestos Contamination in Soil – Commercial/Industrial, Guidelines for the Assessment, Remediation and Management Asbestos-Contaminated sites in Western Australia.
- "Technical Report on Synthetic Mineral Fibres' in Technical Report on Synthetic Mineral Fibres and Guidance Note on the Membrane Filter Method for the Estimation of Airborne Synthetic Mineral Fibres" (National Occupational Health and Safety Commission, 1990);
- CCME: Soil Quality Guidelines for the Protection of Environmental and Human Health Agricultural, Residential/Parkland, Commercial and Industrial
- Assessment levels for Soil, Sediment and Water – Department of Environment and Conservation 2010
- Interim Ecological Soil Screening Level – United States Environmental Protection Agency 2005
- Dryland Salinity (1993).

Table 6: Adopted Human Health Based Soil Criteria and Hydrocarbon Management Limits *(all units in mg/kg).*

	Limit of Reporting	Health Screening Levels (HIL A, NEPM 2013)	Environmental Screening Levels	Management Limits
METALS AND INORGANICS				
Arsenic	5.0	100	100	-
Cadmium	1.0	20	-	-
Chromium	2.0	100	410	-
Copper	5.0	6,000	230	-
Lead	5.0	300	1100	-
Nickel	2.0	400	270	-
Zinc	5.0	7,400	770	-
Manganese	5.0	3800	220	-
Mercury	0.1	40	6.6	-
Selenium	5.0	200	1	-
PAH				
BaP (TEQ)	0.5	3	0.7	-
Total PAH	0.5	300		-
BTEX				

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Benzene	0.2	0.6	65	-
Toluene	0.5	390	105	-
Total Xylenes	0.5	95	45	-
Naphthalene	1	4	170	-
PHENOLS				
Phenol	0.5	3,000	3.8	-
Pentachlorophenol	2.0	100	2.1 [8]	-
Cresols	0.5	400	-	-
TRH				
F1 C6 – C10	10	40	180	800
F2 > C10 – C16	50	230	120	1,000
F3 > C16 – C34	100	-	1300	3,500
F4 > C34 – C40	50	-	5600	10,000
ASBESTOS				
Bonded ACM	0.05%		0.05%	
Friable ACM	0.001%		0.001%	
Visible ACM			No visible ACM	
OC AND OP PESTICIDES				
DDT+DDE+DDD	0.05	240	0.7	-
Aldrin and dieldrin	0.05	6	0.022	-
Chlordane	0.05	50	-	-
Endosulfan	0.05	270	-	-
Endrin	0.05	10	-	-
Heptachlor	0.05	6	-	-
HCB	0.05	10	-	-
Methoxychlor	0.05	300	-	-
Mirex	0.05	10	-	-
Toxaphene	0.05	20	-	-

*Health Screening levels are derived from the NEPM, 2013; and

* Asbestos screening levels are derived from the Guidelines for the Assessment, Remediation and Management Asbestos-Contaminated sites in Western Australia.

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8. QUALITY ASSURANCE / QUALIY CONTROL

8.1 Site Procedures

The following field quality assurance and quality control measures were implemented:

1. All sample jars and sample bags were clearly labelled prior to site visit,
2. All soil samples were collected by hand (after using a hand-held auger with a 150mm drill),
3. Disposable gloves were worn throughout the process and changed between the collection of each soil sample,
4. All sampled jars and bags were immediately placed in an ice-block chilled esky,
5. All samples were clearly labelled and sealed for couriering,
6. The ALS Environmental chain-of-custody form was completed and emailed to the lab as well as a hard copy placed with the samples,
7. All samples were kept in the office of ECON Environmental Pty Ltd until collected by courier, and
8. Ice-bricks were interchanged prior to couriering.

8.2 Laboratory

The following is an extract from the quote for service provided by ALS Environmental Division.

"ALS has a comprehensive QA/QC program. Our QA/QC procedures are designed to provide reliable and defensible analytical results. Our analytical services are based on internal QCS3 schedule, which includes Laboratory Control Samples (LCS), Method Blanks (MB), Matrix Spikes (MS), Laboratory Duplicates (Dups) and Surrogates (for target organics) where applicable, at frequencies at or above that detailed in the 1999 NEPM guidelines.

The basis of the QCS3 Schedule is the 'analytical lot' (process analytical batch) of samples. Generally, the laboratory processes samples of similar matrices in groups called 'Lots'. 'Lots' are made up of 20 samples that may consist of several discrete batches and may be independent of project and / or client. The selection of samples for QC purposes will be biased towards the larger batches within the process lot" ...

The following summarizes the frequency that QC samples are processed:

1. 5% Method Blanks (MB) –1 analysed within each process lot of 20 samples.
2. 10% Laboratory Duplicates (Dups) –2 analysed within each process lot of 20 samples.
3. 5% Laboratory Control Samples (LCS) –1 analysed within each process lot of 20 samples.
4. 5% Matrix Spikes (MS) – 1 analysed within each process lot of 20 samples (except for dioxins).
5. Surrogate Spikes on all 'target' organics analyses.

8.3 QA/QC Results

8.3.1 Site

1. All soil samples arrived at ALS Environmental within specified holding times,
2. All soil samples arrived at ALS Environmental within specified temperature requirements,
3. No potential WHS incidents were recorded on site,
4. No quality assurance incidents (such as cross contamination or similar) were recorded,
5. The RPDs for all analytes (for the sampling set Wednesday 19 May 2021) were within their respective control limits. Therefore, the data set is considered to be adequately precise.

8.3.2 Lab

ALS Environmental Division provided a Quality Control Report and Interpretive Quality Control Report (Appendix D). Those Quality Control Reports contain the following information:

1. A Laboratory Duplicate (DUP) Report - referring to a randomly selected intra-laboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. For all matrices, no Duplicate outliers occurred.
2. A Method Blank (MB) Report - referring 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. For all matrices, no Method Blank outliers occurred.
3. Laboratory Control Spike (LCS) Report - referring 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. For all matrices, no Laboratory Control outliers occurred.
4. A Matrix Spike (MS) Report – referring to an intra-laboratory 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. For all matrices, no Matrix Spike outliers occurred.
5. An Analysis Holding Time Compliance Report - No Analysis Holding Time outliers exist.
6. A Frequency of Quality Control Samples Report - No Quality Control Frequency Outliers exist.

8.4 QA/QC Conclusions

The field sampling and handling procedures across the site produced QA/QC results which indicate that the soil data collected is of acceptable quality and suitable for use in site characterisation.

The NATA certified laboratory reports indicate that the laboratory was generally achieving levels of performance within its recommended control limits during the period when the samples from this program were analysed.

On this basis of the results and the laboratory QA/QC program, the soil data is of an acceptable quality upon which to draw conclusions regarding the environmental condition of the site.

9. RESULTS

9.1 Soil Laboratory Results

Detailed laboratory reports and chain of custody documentation are provided in Appendix D. Laboratory results are summarized in Table 7 and Table 8 and discussed in the following sections in relation to the adopted assessment criteria. The summary of results are as follows:

- Heavy Metals: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria.

- TRH: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria, except for samples:
    - **BH6 (0.2-0.3m) F3(C_{16}-C_{34}) 330mg/kg**

- BTEX: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria.

- PAH: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria, except for samples:
    - **BH6 (0.2-0.3m) B(a)P TEQ 9.0mg/kg, B(a)P 6.0mg/kg**

- PCB: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria.

- OC/OP Pesticides: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria.

- Phenols: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria.

- Asbestos: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria.

Table 7: Schedule of Laboratory Testing (Sub-table A)

TABLE A
SCHEDULE OF LABORATORY TESTING

Analyte / Analyte Group / Sample	Depth (m)	TYPE	SAMPLING DATE	DUPLICATE	MET-8	TPH & BTEX	PAH	OCP	PCB	PHENOLS	ASBESTOS
BH1	0.15-0.25	F	19.05.2021		✔	✔	✔	✔	✔	✔	✔
BH2	0.1-0.2	F	19.05.2021		✔	✔	✔	✔	✔	✔	✔
BH3	0.15-0.25	F	19.05.2021	D1	✔	✔	✔	✔	✔	✔	✔
BH4	0.1-0.2	F	19.05.2021		✔	✔	✔	✔	✔	✔	✔
BH5	0.15-0.25	F	19.05.2021		✔	✔	✔	✔	✔	✔	✔
BH6	0.2-0.3	F	19.05.2021		✔	✔	✔	✔	✔	✔	✔
BH7	0.15-0.25	F	19.05.2021		✔	✔	✔	✔	✔	✔	✔

Notes
MET-8: arsenic, cadmium, chromium, copper, lead, mercury, nickel,
OCP : Organochlorine Pesticides
OPP : Organophosphorus Pesticides
PCB : Polychlorinated Biphenyls
VOC: Volatile Organic Compounds
PAH: Polycyclic Aromatic Hydrocarbons
TPH: Total Petroleum Hydrcarbons
BTEX: Benzene, Toluene, Ethyl Benzene, Xylene
F,T,N: Fill, Topsoil, Natural

***Please note: No Rinsate samples were collected during the site inspection on Wednesday 19 May 2021, as all samples were collected by hand using nitrite disposable gloves and placed directly into the sampling containers. New gloves were used between each sampling location.*

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Table 8: Summary of Test Results (Sub-tables B-G)

TABLE B

HEAVY METALS TEST RESULTS FOR HILs & ESLs

Sample Location	Date Sampled	Depth (m)	ARSENIC	CADMIUM	CHROMIUM (VI)	COPPER	MERCURY	NICKEL	LEAD [g]	ZINC
		Analyte	HEAVY METALS (mg/kg)							
BH1	19.05.2021	0.15-0.25	12	<1	34	30	<0.1	21	70	128
BH2	19.05.2021	0.1-0.2	9	<1	33	29	<0.1	21	45	94
BH3	19.05.2021	0.15-0.25	<5	<1	14	16	<0.1	9	31	112
BH4	19.05.2021	0.1-0.2	<5	<1	12	26	<0.1	12	68	247
BH5	19.05.2021	0.15-0.25	11	<1	22	35	<0.1	19	70	268
BH6	19.05.2021	0.2-0.3	9	<1	25	8	<0.1	5	18	7
BH7	19.05.2021	0.15-0.25	8	2	26	78	<0.1	22	248	596
Practical Quantitation Limits (PQL)			5	1	2	5	0.1	2	5	5
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)										
Health Investigation Levels (HIL) - Table 1A (1)										
HIL A [a]			100	20	100	6000	40[e] / 10[f]	400	300	7400
HIL B [b]			500	150	500	30,000	120[e] / 30[f]	1200	1200	60,000
HIL C [c]			300	90	300	17,000	80[e] / 13[f]	1200	600	30,000
HIL D [d]			3000	900	3600	240,000	730[e] / 180[f]	6000	1500	400,000
Ecological Investigation Levels (EIL) - Table 1B (5)										
Areas of ecological significance			40[h]							
Urban residential and public open space [i]			100[h]							
Commercial and industrial			160[h]							

Notes

a: Residential with garden/accessible soil (home grown poduce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.

b: Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high rise buildings and apartments.

c: Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate

d: Commercial/industrial, includes premises such as shops, offices, factories and industrial sites

e: Elemental mercury: HIL does not address elemental mercury. A site-specific assessment should be considered if elemental mercury is present, or suspected to be present,

f: Methyl mercury: assessment of methyl mercury should only occur where there is evidence of its potential source. It may be associated with inorganic mercury and anaerobic microorganism activity in aquatic environments. In addition the reliability and quality of sampling/analysis

g: 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.

h: Aged values are applicable to arsenic contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.

i: Urban residential / public open space is broadly equivalent to the HIL-A, HIL-B and HIL-C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.

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TABLE C
TOTAL RECOVERABLE HYDROCARBONS (TRH), BTEX AND NAPHTHALENE TEST RESULTS FOR HSLs IN SAND

Analyte / Sample Location	Date Sampled	Depth (m)	TRH (mg/kg) F1 [a]	TRH (mg/kg) F2 [b]	BTEX (mg/kg) BENZENE	BTEX (mg/kg) TOLUENE	BTEX (mg/kg) ETHYL BENZENE	BTEX (mg/kg) TOTAL XYLENES	PAH (mg/kg) NAPHTHALENE
BH1	19.05.2021	0.15-0.25	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH2	19.05.2021	0.1-0.2	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH3	19.05.2021	0.15-0.25	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH4	19.05.2021	0.1-0.2	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH5	19.05.2021	0.15-0.25	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH6	19.05.2021	0.2-0.3	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH7	19.05.2021	0.15-0.25	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
Practical Quantitation Limits (PQL)			10	50	0.2	0.5	0.5	0.5	1
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)									
Health Screening Levels (HSL) - Table 1A (3)									
HSL A & HSL B: Low-high density residential									
Source depth - 0m to <1m			45	110	0.5	160	55	40	3
Source depth - 1m to <2m			70	240	0.5	220	NL	60	NL
Source depth - 2m to <4m			110	440	0.5	310	NL	95	NL
Source depth - 4m +			200	NL	0.5	540	NL	170	NL
HSL C: recreational / open space									
Source depth - 0m to <1m			NL	NL	NL	NL	NL	NL	NL
Source depth - 1m to <2m			NL	NL	NL	NL	NL	NL	NL
Source depth - 2m to <4m			NL	NL	NL	NL	NL	NL	NL
Source depth - 4m +			NL	NL	NL	NL	NL	NL	NL
HSL D: Commercial / Industrial									
Source depth - 0m to <1m			260	NL	3	NL	NL	230	NL
Source depth - 1m to <2m			370	NL	3	NL	NL	NL	NL
Source depth - 2m to <4m			630	NL	3	NL	NL	NL	NL
Source depth - 4m +			NL	NL	3	NL	NL	NL	NL

Notes
a: To obtain F1 subtract the sum of BTEX concentrations from the C_6-C_{10} fraction.
b: To obtain F2 subtract naphthalene from the >C_{10}-C_{16} fraction.
NL: Not Limiting

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TABLE D
TOTAL RECOVERABLE HYDROCARBONS (TRH), BTEX AND BENZO(a)PYRENE TEST RESULTS
ESLs FOR COARSE GRAINED SOIL TEXTURE

Analyte / Sample Location	Date Sampled	Depth (m)	TRH (mg/kg) F1 (C_6-C_{10}) [a]	TRH (mg/kg) F2 (>C_{10}-C_{16}) [b]	TRH (mg/kg) F3 (C_{16}-C_{34})	TRH (mg/kg) F4 (C_{34}-C_{40})	BTEX (mg/kg) BENZENE	BTEX (mg/kg) TOLUENE	BTEX (mg/kg) ETHYL BENZENE	BTEX (mg/kg) TOTAL XYLENES	PAH (mg/kg) BENZO(a)PYRENE
BH1	19.05.2021	0.15-0.25	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH2	19.05.2021	0.1-0.2	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH3	19.05.2021	0.15-0.25	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH4	19.05.2021	0.1-0.2	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH5	19.05.2021	0.15-0.25	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH6	19.05.2021	0.2-0.3	<10	<50	**330**	<100	<0.2	<0.5	<0.5	<0.5	**6.0**
BH7	19.05.2021	0.15-0.25	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
Practical Quantitation Limits (PQL)			10	50	100	100	0.2	0.5	0.5	0.5	0.5
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)											
Ecological Screening Levels (ESL) - Table 1B (6)											
Areas of ecological significance			125*	25*	-	-	10	10	1.5	10	0.7
Urban residential and public open space			180*	120*	300	2800	50	85	70	105	0.7
Commercial and industrial			215*	170*	1700	3300	75	135	165	180	0.7

Notes
a: To obtain F1 subtract the sum of BTEX concentrations from the C_6-C_{10} fraction.
b: To obtain F2 subtract naphthalene from the >C_{10}-C_{16} fraction.
*: ESLs are of low reliability except where indicated by * which indicates that the ESL is of moderate
"-": "-" indicates that insufficient data was available to derive a value.

TABLE E
TOTAL RECOVERABLE HYDROCARBONS (TRH) TEST RESULTS
MANAGEMENT LIMITS FOR COARSE GRAINED SOIL TEXTURE

Analyte / Sample Location	Date Sampled	Depth (m)	TRH (mg/kg) F1 (C_6-C_{10}) [a]	TRH (mg/kg) F2 (>C_{10}-C_{16}) [a]	TRH (mg/kg) F3 (C_{16}-C_{34})	TRH (mg/kg) F4 (C_{34}-C_{40})
BH1	19.05.2021	0.15-0.25	<10	<50	<100	<100
BH2	19.05.2021	0.1-0.2	<10	<50	<100	<100
BH3	19.05.2021	0.15-0.25	<10	<50	<100	<100
BH4	19.05.2021	0.1-0.2	<10	<50	<100	<100
BH5	19.05.2021	0.15-0.25	<10	<50	<100	<100
BH6	19.05.2021	0.2-0.3	<10	<50	330	<100
BH7	19.05.2021	0.15-0.25	<10	<50	<100	<100
Practical Quantitation Limits (PQL)			10	50	100	100
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)						
Management Limits - Table 1B (7)						
Residential parkland and public open space			700	1000	2500	10,000
Commercial and industrial			700	1000	3500	10,000

Notes
a: Separate management limits for BTEX and naphthalene are not available hence these should not be subtracted from the relevant fractions to obtain F1 and F2.
b: Management limits are applied after consideration of relevant ESLs and HSLs.

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TABLE F

POLYCYCLIC AROMATIC HYDROCARBONS (PAH), ORGANOCHLORINE PESTICIDES (OCP), POLYCHLORINATED BIPHENYLS (PCB) AND PHENOLS TEST RESULTS FOR HILs, EILs & ESLs

Analyte / Sample Location	Date Sampled	Depth (m)	PAH (mg/kg)				Organochlorine Pesticides (mg/kg)									Phenols (mg/kg)	
			Carcinogenic PAHs (as BaP TEQ) [e]	TOTAL PAHs [f]	BENZO(a)PYRENE	NAPHTHALENE	DDT + DDE + DDD	ALDRIN & DIELDRIN	CHLORDANE	ENDOSULFAN	ENDRIN	HEPTACHLOR	HCB	METHOXYCHLOR	PCB [j]	PHENOL	PENTACHLOROPHENOL
BH1	19.05.2021	0.15-0.25	0.6	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<2
BH2	19.05.2021	0.1-0.2	0.6	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<2
BH3	19.05.2021	0.15-0.25	0.6	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<2
BH4	19.05.2021	0.1-0.2	0.6	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<2
BH5	19.05.2021	0.15-0.25	0.6	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<2
BH6	19.05.2021	0.2-0.3	**9.0**	79.4	**6.0**	<0.5	<0.05	0.16	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<2
BH7	19.05.2021	0.15-0.25	0.6	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1	<0.5	<2
Practical Quantitation Limits (PQL)			0.5	0.5	0.5	0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.1	0.5	2
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)																	
Health Investigation Levels (HIL) - Table 1A (1)																	
HIL A [a]			3	300			240	6	50	270	10	6	10	300	1	3000	100
HIL B [b]			4	400			600	10	90	400	20	10	15	500	1	45,000	130
HIL C [c]			3	300			400	10	70	340	20	10	10	400	1	40,000	120
HIL D [d]			40	4000			3600	45	530	2000	100	50	80	2500	7	240,000	660
Ecological Investigation Levels (EIL) - Table 1B (5)																	
Areas of ecological significance						10 [g]	3 [g, k]										
Urban residential and public open space [h]						170 [g]	180 [g, k]										
Commercial and industrial						370 [g]	640 [g, k]										
Ecological Screening Levels (ESL) - Table 1B (6)																	
Areas of ecological significance					0.7 [i]												
Urban residential and public open space					0.7 [i]												
Commercial and industrial					0.7 [i]												

Notes

a: Residential with garden/accessible soil (home grown poduce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary

b: Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high rise buildings and apartments.

c: Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate.

d: Commercial/industrial, includes premises such as shops, offices, factories and industrial sites

e: 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.

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

Where the B(a)P occurs in bitumen fragments it is relatively immobile and does not represent a significant health risk.

f: Total PAHs: HIL is based on the sum of the 16 PAHs most commonly reported for contaminated sites (WHO 1998). The application of the total PAH HIL should consider the presence of carcinogenic PAHs and naphthalene (the most volatile PAH). Carcinogenic PAHs reported in the total PAHs should meet the B(a)P TEQ HIL. Naphthalene reported in the total PAHs should meet the relevant HSL.

g: Insufficient data was available to calculate aged values for DDT and naphthalene, consequently the values for fresh contamination should be used.

h: Urban residential / public open space is broadly equivalent to the HIL-A, HIL-B and HIL-C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.

i: For coarse and fine grained texture soils.

j: PCBs: HIL relates to non-dioxin-like PCBs only. Where a PCB source is known, or suspected, to be present at a site, a site-specific assessment of exposure to all PCBs (including dioxin-like PCBs) should be undertaken.

k: For DDT only.

NT - Not tested

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TABLE G
ASBESTOS TEST RESULTS

Analyte / Sample Location	Date Sampled	Depth (m)	Field Observations*	Laboratory Results Asbestos Type Present / Absent	Laboratory Results Asbestos %w/w
BH1	19.05.2021	0.15-0.25	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH2	19.05.2021	0.1-0.2	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH3	19.05.2021	0.15-0.25	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH4	19.05.2021	0.1-0.2	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH5	19.05.2021	0.15-0.25	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH6	19.05.2021	0.2-0.3	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH7	19.05.2021	0.15-0.25	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
WA Guidelines for the Assessment, Remediation and Management of Asbestos - Contaminated Sites in Western Australia - May 2009					
National Environment Protection (Assessment of Site Contamination) Measure 2013 Schedule B1					
%w/w asbestos for FA and AF					0.001%
%w/w asbestos for ACM - Residential use, childcare centres, preschools etc.					0.01%
%w/w asbestos for ACM - Residential, minimal soil access (fully sealed surfaces)					0.04%
%w/w asbestos for ACM - Parks, public open spaces, playing fields etc.					0.02%
%w/w asbestos for ACM - Commercial / Industrial					0.05%

Note:
ACM = Asbestos Containing Materials >7mm x 7mm (visible by eye)
FA = Friable and Fibrous Asbestos Materials >7mm x 7mm (visible by eye)
AF = Asbestos Fines <7mm x 7mm ACM including free fibres (visible by microscope only)
* Field Observations: All fibro- cement fragments observed are assumed to contain Asbestos until otherwise tested and recorded as such.
NT = Not Tested

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Table 9: Summary of QA/QC Duplicate Test Results (Sub-table H)

TABLE H
DUPLICATE SAMPLE

ANALYTE	BH3 0.15-0.25 mg/kg	DUPLICATE D1 mg/kg	RELATIVE PERCENTAGE DIFFERENCE %
HEAVY METALS			
Arsenic	<5	<5	33
Cadmium	<1	<1	0
Chromium	14	10	33
Copper	16	18	12
Nickel	9	10	11
Lead	31	32	3
Zinc	112	111	1
Mercury	<0.1	<0.1	0
TOTAL PETROLEUM HYDROCARBONS (TPH)			
C6 - C9	<10	<10	0
C10 - C14	<50	<50	0
C15 - C28	<100	<100	0
C29-C36	<100	<100	0
BTEX			
Benzene	<0.2	<0.2	0
Toluene	<0.5	<0.5	0
Ethyl Benzene	<0.5	<0.5	0
Total Xylenes	<0.5	<0.5	0
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)			
BENZO(a)PYRENE	<0.5	<0.5	0
Total PAH	<0.5	<0.5	0
ORGANOCHLORINE PESTICIDES (OCP)			
Heptachlor	<0.05	<0.05	0
Aldrin	<0.05	<0.05	0
Dieldrin	<0.05	<0.05	0
DDD	<0.05	<0.05	0
DDE	<0.05	<0.05	0
DDT	<0.2	<0.2	0
Chlordane (trans & cis)	<0.05	<0.05	0
POLYCHLORINATED BIPHENYLS (PCB)			
Total PCB	<0.1	<0.1	0
PHENOLS & CYANIDES			
Total Phenols	<0.5	<0.5	0

Note: The RPDs for the majority of analytes were within their respective control limits. Therefore, the data set is considered to be adequately precise.

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10. CONCLUSION AND RECOMMENDATIONS

10.1 Site Observations

Based on the data and evidence collected during the site inspection and site history review, the findings of this Detailed Site Investigation, are as follows:

At the time of inspection, on Wednesday 19 May 2021, the following observations were noted:

40 Mamre Road, St Marys:

- The site consisted of a single-storey fibre-cement panelled residential house with terracotta roof tiles and a concrete paved area at the rear of the property,
- A concrete driveway runs from the front of the property to the rear garage,
- The rear garage consists of fibre-cement walls and roof and is in poor condition,
- Low lying grasses and vegetation were evident covering the front and back yards,
- The property was occupied at the time of the inspection,
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection within the subject site.
- Visible signs of asbestos containing materials (ACM) were noted on building structures within the main residence and within the rear garage within the property,
- No visible signs of ACM were noted on surface soils within the boundaries of the property,
- No evidence of underground or above ground chemical storage tanks were evident within the subject site.
- No evidence of any potential human and environmental areas of concern were evident during the inspection within the subject site.

42 Mamre Road, St Marys:

- The site consisted of a single-storey brick and fibre-cement panelled residential house with terracotta roof tiles, the house was in poor condition.
- The property showed no signs of hoarding within the site that was observed during the initial Preliminary Site Investigation by ECON Environmental on Monday 3 May 2021 *(refer to ECON Environmental Preliminary Site Investigation Ref 21-1155, dated 7 May 2021).*
- Low lying grasses and vegetation were evident covering the front and back yards, where soils were exposed where areas of hoarding were removed from the rear of the premises.
- A concrete driveway runs from the front of the property to the rear of the house,
- The property was occupied at the time of the inspection,
- No visible signs of oil stains were detected during the inspection which were previously reported beneath the cars and car parts within the rear portion of the property within the previous ECON Environmental Preliminary Site Investigation, Monday 3 May 2021.
- No olfactory signs of odours were detected during the inspection within the property.

- Visible signs of asbestos containing materials (ACM) were noted on building structures within the main residence and within the rear of the property on surface soils,
- No evidence of underground or above ground chemical storage tanks were evident within the subject site.
- Evidence of potential human and environmental areas of concern were evident during the inspection within the entire subject site.

10.2 Sampling Methodology

According to the NSW EPA Contaminated Sites Sampling Guidelines (Sept. 1995), for this sized area site (2,151m^2), a total of seven (7) soil samples plus one (1) QA/QC sample is required to be collected. The soil samples were collected on Wednesday 19 May 2021 via boreholes. A total of seven (7) boreholes (BH1-BH7) were advanced across the entire subject site (Figure 3) and were collected from within the near surface fill material (0-0.3m BGL). Samples were collected from using a hand auger with a 150mm diameter drill. No groundwater was encountered within any of the boreholes drilled onsite.

During the collection of soil samples, any features such as seepage, discoloration, staining, odours, or other physical indicators of contamination were noted. All site work was undertaken by Con Kariotoglou, Environmental Consultant of ECON Environmental.

10.3 Soil Laboratory Results

All soil samples collected on Wednesday 19 May 2021 were reported by the laboratory to have concentrations BELOW the adopted site assessment criteria for HIL A, land use as per the NEPM, 2013, except for the following sample:

- **BH6 (0.2-0.3m) TRH F3(C_{16}-C_{34}) 330mg/kg**
- **BH6 (0.2-0.3m) B(a)P TEQ 9.0mg/kg, B(a)P 6.0mg/kg**

10.4 Potential Risks to Onsite Receptors

Human exposure to the potential contaminants identified is currently considered as **LOW** as:

- The subject sites are privately owned,
- The site is not publicly accessible,
- The soil sample (BH6) collected on Wednesday 19 May 2021 that was reported by the laboratory to have concentrations ABOVE the adopted site assessment criteria for HIL A, land use as per the NEPM, 2013, was 0.2-0.3m below ground level (BGL), therefore potential exposure risks to humans and the environment were reduced.

10.5 Potential for Migration of Contaminants

Site history information and onsite inspection observations indicated that due to the conditions of the site, there is a **LOW** potential for contaminants to provide exposure risks to humans within the site.

However, if future proposed developments of the subject site include the excavation of the underlying soils with the subject site, then there is a **MEDIUM TO HIGH** potential for contaminants present within surface and underlying soils to have the ability to migrate vertically up into the atmosphere, or down through the water column into the groundwater or migrate horizontally to adjacent properties or washed downgradient with stormwater runoff into adjacent properties or into Mamre Road drainage system to the west.

10.6 Recommendations

Subject to the above, it is considered that the subject site can be made suitable for its future intended proposed development and land use, subject to the following recommendations:

- A **Remedial Action Plan (RAP)** is to be prepared by a suitably qualified and experienced professional detailing appropriate **TRH F3(C_{16}-C_{34}), B(a)P TEQ and B(a)P Remediation and Validation** procedures with the vicinity of borehole locations **BH6 (0.2-0.3m)** to render the subject site suitable for its intended future proposed development and land use.
- The removal of all **Hazardous Containing Materials** from building structures within both properties (40 & 42 Mamre Road, St Marys) prior to demolition of building structures according to the Hazardous Material Assessment and Hazardous Registry – Appendix E – Hazardous Materials Assessment.
- An **Asbestos Clearance Certificate** is to be provided by SafeWork NSW Licenced Approved Asbestos Assessor (LAA) prior to building demolition, to confirm that all hazardous materials within the subject sites (40 & 42 Mamre Road, St Marys) have been appropriately removed.
- If any proposed plans for the subject site include excavations and disposal of those underlying soils to a NSW EPA licenced facility, then a **Waste Classification** report of soils is to be prepared in accordance with the NSW EPA Waste Classification Guidelines: Part 1 Classifying Waste (2014).

11. LIMITATION STATEMENT

ECON Environmental Pty Ltd has undertaken the following report in accordance with the scope of works set out between ECON Environmental Pty Ltd and the client. ECON Environmental Pty Ltd derived the data in this report primarily from the site and soil assessment conducted on the date of site inspection. The impacts of future events may require future investigation of the site and subsequent data analysis, together with a re-evaluation of the conclusions and recommendations of this report.

In preparing this report, ECON Environmental Pty Ltd has relied upon, and assumed accurate, certain site information provided by the client and other persons. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. ECON Environmental Pty Ltd accepts no liability or responsibility whatsoever for or in respect to any use or reliance upon this report by any third party.

The information contained within this report have been prepared exclusively for the client. ECON Environmental Pty Ltd have prepared the report to address the risk associated with scale of the works. The report has been prepared with a degree of care and skill ordinarily exercised in similar investigations by reputable members of the environmental industry in Australia. No other warranty, expressed or implied, is made or intended. This report is to be read in its entirety including attachments and appendices and should not read in individual sections.

A third party should not rely upon the information prior to making an assessment that the scope of work conducted meets their specific needs. ECON Environmental Pty Ltd cannot be held liable for third party reliance on this document.

ECON Environmental Pty Ltd professional opinions are based upon its professional judgment, experience, training and results from analytical data. In some cases, further testing and analysis may be required, thus producing different results and/or opinions. ECON Environmental Pty Ltd has limited its investigation to the scope agreed upon with its client.

APPENDIX A: PROPOSED DEVELOPMENT PLANS

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NOTES

* THE TITLE BOUNDARIES OF THE PROPERTY HAVE NOT BEEN SURVEYED.
* DIMENSIONS AND AREAS WHERE SHOWN HAVE BEEN TAKEN FROM DP 219187 & DP 111896 (AND DP 1103316).
* CONTOUR INTERVAL = 0.25 METRES
* CONTOURS ARE AN INDICATION OF LANDFORM ONLY AND MUST NOT BE TAKEN IN PREFERENCE TO SPOT LEVELS SHOWN.
* SERVICES SHOWN HEREON HAVE BEEN LOCATED WHERE POSSIBLE BY FIELD SURVEY AND ARE INDICATIVE ONLY FROM SURFACE INDICATORS FOUND ON SITE.
* RIDGE & GUTTER HEIGHTS SHOWN ARE ACCURATE TO +/- 50mm ONLY.
* PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON THE SITE, DIAL BEFORE YOU DIG SHOULD BE CONTACTED FOR POSSIBLE LOCATION OF FURTHER UNDERGROUND SERVICES NOT SURVEYED.
* THIS DETAIL SURVEY IS NOT A "SURVEY" AS DEFINED BY THE SURVEYING AND SPATIAL INFORMATION ACT, 2002. IF ANY CONSTRUCTION IS PLANNED IT WOULD BE MANDATORY TO CARRY OUT FURTHER SURVEY WORK TO DETERMINE THE BOUNDARY DIMENSIONS.
* LOT 1 DP 111896 EXTENTS OF CONCRETE IN THE REAR YARD AREA IS APPROXIMATE ONLY DUE TO THE EXTENT OF MATERIALS STORED ON SITE AND THE EXCESS UNDERGROWTH.
* THESE NOTES ARE AN INTEGRAL PART OF THE PLAN.

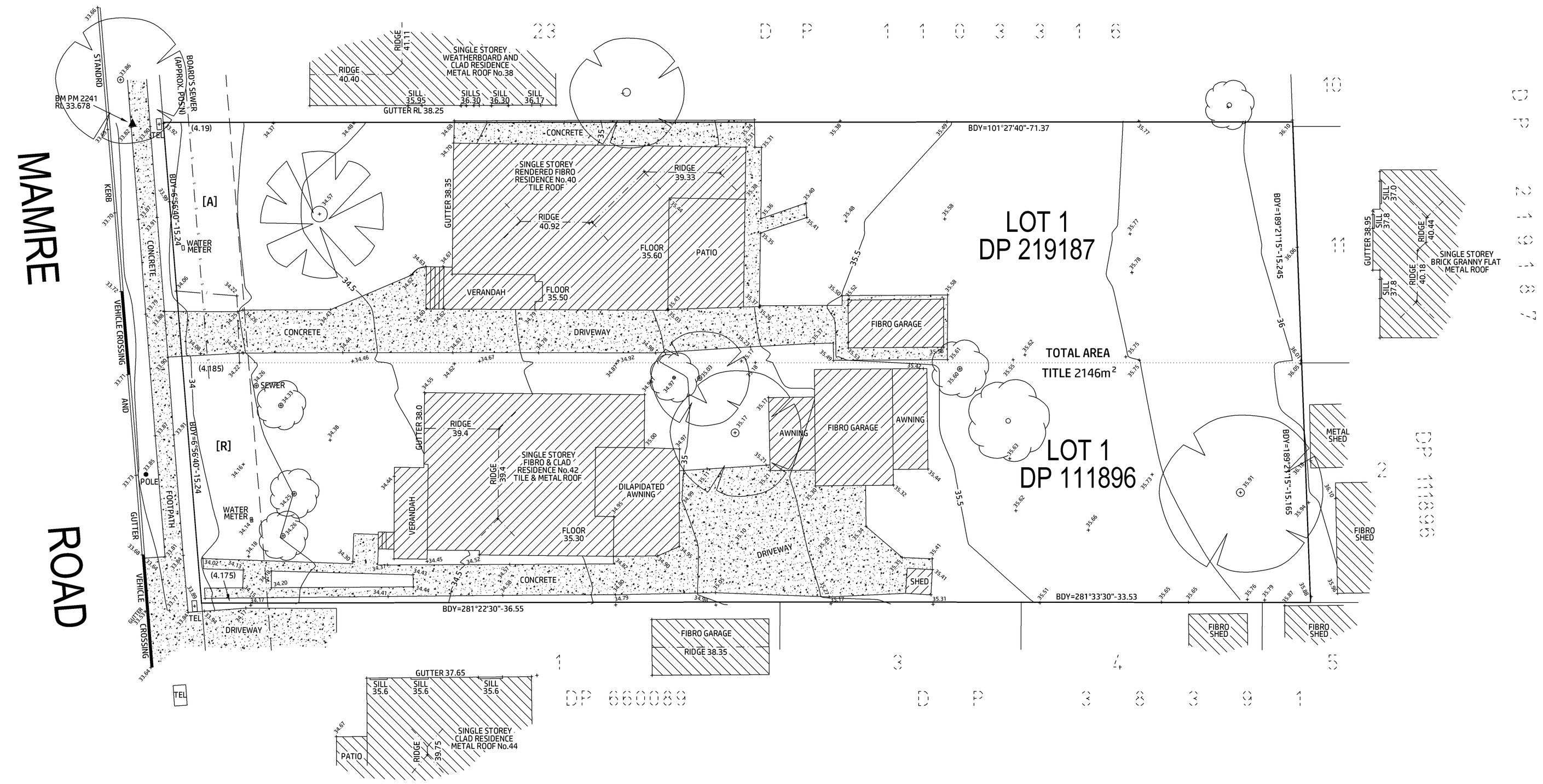
Remember to...

DIAL BEFORE YOU DIG
www.1100.com.au

DECLARATION

NO RESPONSIBILITY WILL BE ACCEPTED BY T GRABARA & ASSOCIATES IF ANY PART OF WHOLE OF THIS PLAN HAS BEEN ALTERED, VARIED, MODIFIED, DELETED, ADDED OR INTERPOLATED IN ANY WAY.

MGA



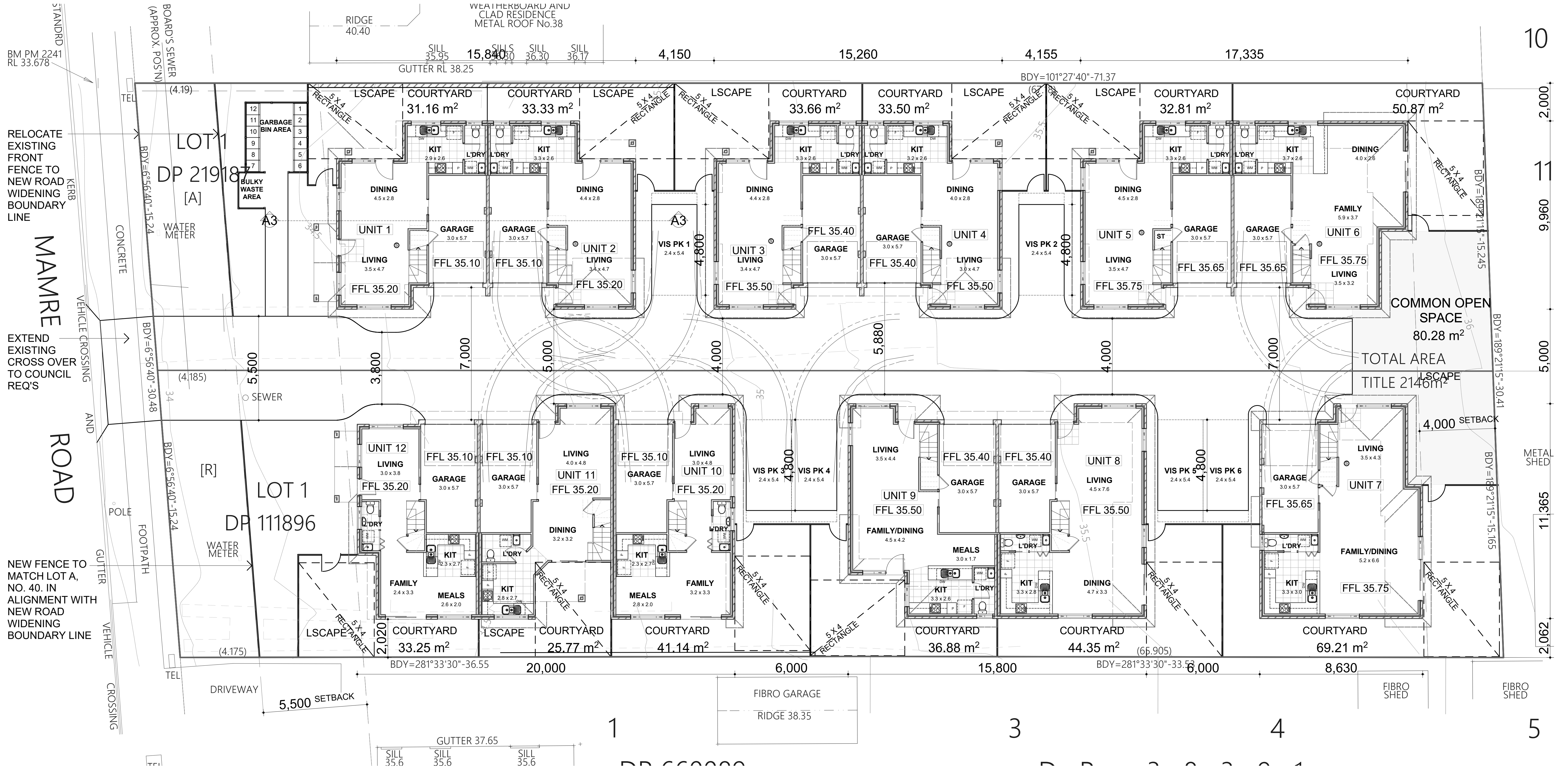
[A] - RESTRICTION ON USER VARIABLE WIDTH (S27 E(6) MAINS ROAD ACT 1924) GAZETTAL 13-08-1965 FOLIO 2587 (DP 225282)

[R] - PROPOSED ROAD WIDENING BEING LOT 14 DP 225282

T GRABARA & ASSOCIATES
A DIVISION OF TRAZTAR PTY LTD ACN 002 207 356
SURVEYORS & DEVELOPMENT CONSULTANTS
OFFICE: No.4/188-190 QUEEN STREET, ST MARYS NSW 2760
POSTAL: PO BOX 50 ST MARYS NSW 1790
Phone: (02) 9833-2733 Email: tga@grabara.com.au

REFERENCE: 4201
DATE: August 6th, 2020
LOCALITY: ST MARYS
LGA: PENRITH
SCALE: 1:150
DATUM: AHD (ORIGIN OF LEVELS PM 2241 RL 33.678m)
SHEET 1 OF 1 SHEETS
REVISION 4201-LEV

PLAN OF LEVELS AND CONTOURS OF LOT 1 DP 219187 AND LOT 1 DP 111896 BEING No.40-42 MAMRE ROAD, ST MARYS FOR Mr JASON GRIMA.

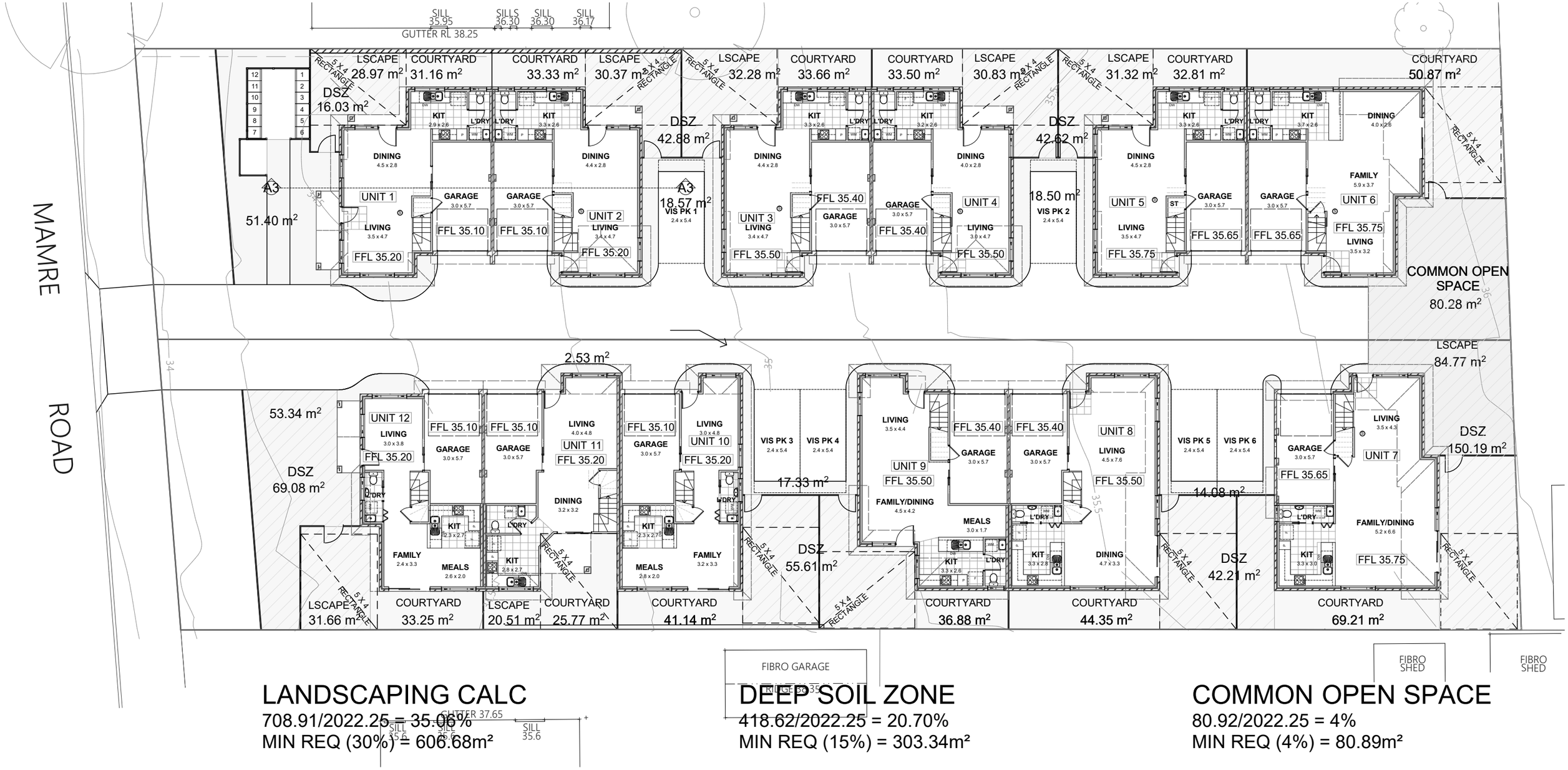


PROPOSED SEPP 2009 AFFORDABLE HOUSING
NO 40-42 MAMRE ROAD, ST MARYS
CLIENT: V HOMES PTY LTD

N. F. BILLYARD P/L
11 YORK STREET, OATLANDS
Ph 02 96302122 Fax 02 96302133

17/12/20 SCALE 1:200 A3 SHEET
SITE/GROUND FLOOR PLANS 1357.DA01

NOTE: ALL DIMENSIONS ARE TO BE CHECKED ON SITE PRIOR TO CONSTRUCTION. WRITTEN DIMENSIONS WILL TAKE PRECEDENCE OVER SCALE. ANY DISCREPANCIES SHOULD BE REFERRED BACK TO THE ARCHITECT.



LANDSCAPING CALC

708.91/2022.25 = 35.06%

MIN REQ (30%) = 606.68m²

DEEP SOIL ZONE

418.62/2022.25 = 20.70%

MIN REQ (15%) = 303.34m²

COMMON OPEN SPACE

80.92/2022.25 = 4%

MIN REQ (4%) = 80.89m²

PROPOSED SEPP 2009 AFFORDABLE HOUSING
NO 40-42 MAMRE ROAD, ST MARYS
CLIENT: V HOMES PTY LTD

N. F. BILLYARD P/L
11 YORK STREET, OATLANDS
Ph 02 96302122 Fax 02 96302133

NOTE: ALL DIMENSIONS ARE TO BE CHECKED ON SITE PRIOR TO CONSTRUCTION. WRITTEN DIMENSIONS WILL TAKE PRECEDENCE OVER SCALE. ANY DISCREPANCIES SHOULD BE REFERRED BACK TO THE ARCHITECT.

17/12/20 SCALE 1:200 A3 SHEET

LANDSCAPE CALCULATIONS 1357.DA02

MAMRE ROAD

15,690 | 4,300 | 15,110 | 4,305 | 15,340

5,500 SETBACK

ALUMINIUM HORIZONTAL LOUVRES, FACING UPWARDS

BDY=101°27'40"-71.37

(4.19)

BDY=6°56'40"-15.24

ROOF BELOW @15.0°

UNIT 1 | UNIT 2 | UNIT 3 | UNIT 4 | UNIT 5 | UNIT 6

A3

BDY=189°21'15"-15.245

6,000 SETBACK

BDY=6°56'40"-15.24

BDY=189°21'15"-15.165

(4.175)

BDY=281°33'30"-36.55

BDY=281°33'30"-33.53

2,000 | 9,960 | 5,400 | 11,005 | 2,020

2,000 | 9,960 | 6,000 | 10,365 | 2,062

20,000 | 6,000 | 15,050 | 6,750 | 6,630

NOTE: ALL DIMENSIONS ARE TO BE CHECKED ON SITE PRIOR TO CONSTRUCTION. WRITTEN DIMENSIONS WILL TAKE PRECEDENCE OVER SCALE. ANY DISCREPANCIES SHOULD BE REFERRED BACK TO THE ARCHITECT.

PROPOSED SEPP 2009 AFFORDABLE HOUSING
NO 40-42 MAMRE ROAD, ST MARYS
CLIENT: V HOMES PTY LTD

N. F. BILLYARD P/L
11 YORK STREET, OATLANDS
Ph 02 96302122 Fax 02 96302133

17/12/20 SCALE 1:200 A3 SHEET

FIRST FLOOR PLANS 1357.DA03

APPENDIX B: SITE PHOTOGRAPHS

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Photo 1: Showing borehole BH1 sampling location, 40 Mamre Road, St Marys.

Photo 2: Showing borehole BH1 sampling location, 40 Mamre Road, St Marys, looking west.

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Photo 3: Showing borehole BH2 sampling location, 42 Mamre Road, St Marys.

Photo 4: Showing borehole BH2 sampling location, 42 Mamre Road, St Marys, looking east.

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Photo 5: Showing borehole BH3 sampling location, 42 Mamre Road, St Marys.

Photo 6: Showing borehole BH3 sampling location, 42 Mamre Road, St Marys, looking north.

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Photo 7: Showing borehole BH4 sampling location, 42 Mamre Road, St Marys.

Photo 8: Showing borehole BH4 sampling location, 42 Mamre Road, St Marys, looking north.

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Photo 9: Showing borehole BH5 sampling location, 42 Mamre Road, St Marys.

Photo 10: Showing borehole BH5 sampling location, 42 Mamre Road, St Marys, looking south.

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Photo 11: Showing borehole BH6 sampling location, 42 Mamre Road, St Marys.

Photo 12: Showing borehole BH6 sampling location, 42 Mamre Road, St Marys, looking east.

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Photo 13: Showing borehole BH7 sampling location, 42 Mamre Road, St Marys.

Photo 14: Showing borehole BH7 sampling location, 42 Mamre Road, St Marys, looking east.

Photo 15: Showing front yard of 40 Mamre Road, St Marys, looking east.

Photo 16: Showing the rear yard of 40 Mamre Road, St Marys, looking east.

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Photo 17: Showing front yard of 42 Mamre Road, St Marys, looking east.

Photo 18: Showing rear yard of 42 Mamre Road, St Marys, looking east.

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APPENDIX C: FIELDNOTES

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Site Assessment
Daily Worksheet Record

ECON

PROJECT NAME:	Detailed Site Investigation	**PROJECT NO:**	21-1165
CLIENT:	V Homes Development	**DATE:**	19-5-21
SITE ADDRESS:	40-42 Maure Rd St Marys		
SITE CONTACT:	Noel Billyod	**PHONE:**	0414 597 913
ECON REPRESENTATIVE:	Con Karcotoglou		
TITLE:	Environmental Consultant	**PHONE:**	04 5265 4962
FIELD NOTES:			

Start Time	10am	Finish Time	12.30pm
Weather	Sunny	Rainfall (mm)	NIL
Wind Direction	WNW	Wind Speed	9 km/hr
Humidity	81%	Temp	11.6°c
Odours Present	Nil	Staining Present	Nil

Environmental and Safety Concerns

Household debris within 42 Maure Rd

Actions

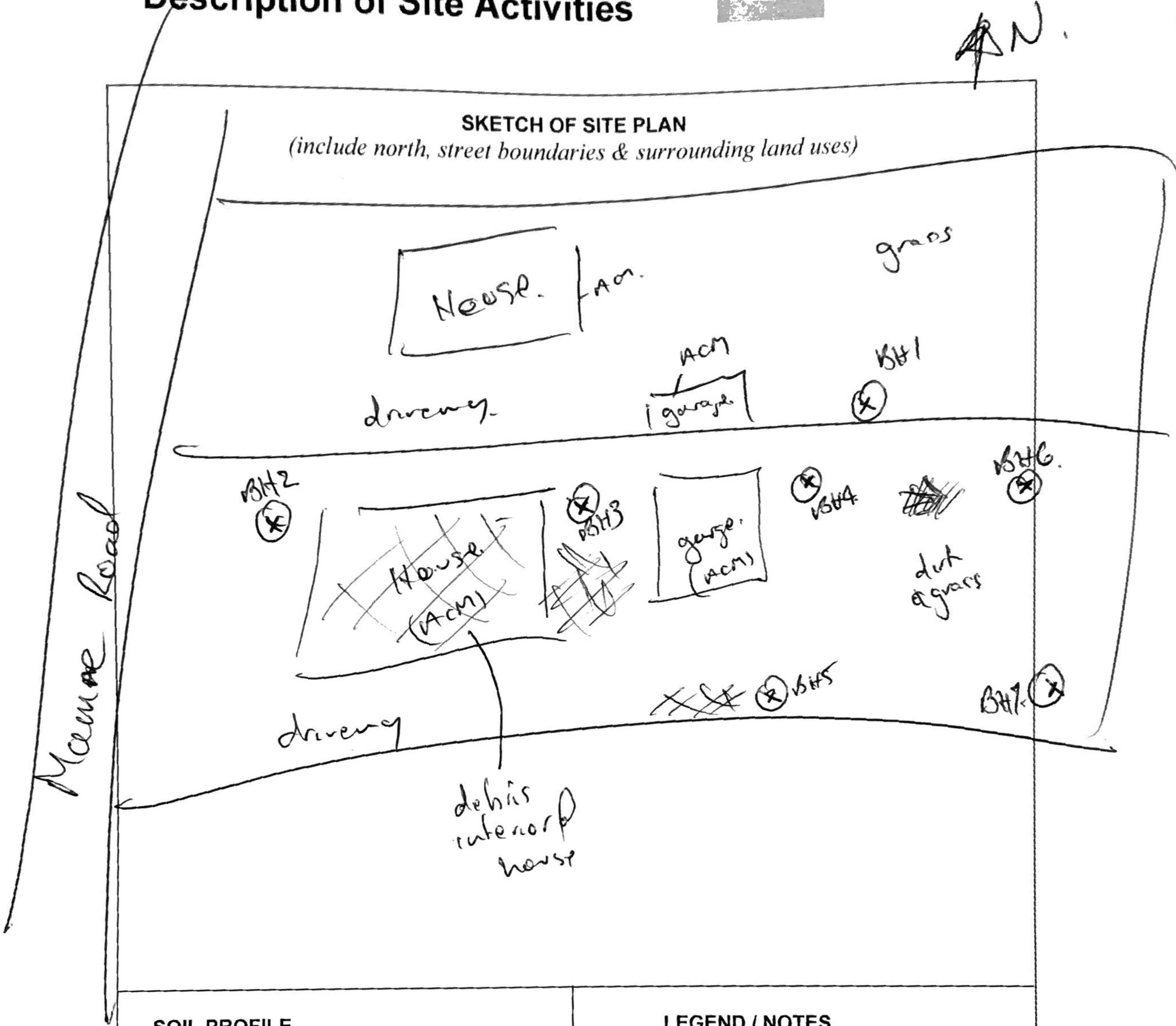
Site Safety Induction	N/A	Stormwater Control	N/A
Dust Suppression	N/A	Traffic Control	N/A
Machinery onsite	N/A	Equipment onsite	Esky, PPE, ice broker, hand auger

ECON

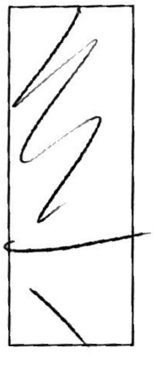
Description of Site Activities

SKETCH OF SITE PLAN

(include north, street boundaries & surrounding land uses)



SOIL PROFILE



0.0

FILL. clay with inclusions of rock, gravel sand.

0.3

Natural silty clay yellow brown, med. plasticity moist

LEGEND / NOTES

Debris Household rubbish.

Soil Sampling

ECON

SOIL ASSESSMENT AND SAMPLING

Sample No. (show on site plan)	Depth (m)	Material Description Fill / Natural	PID (ppm)
BH1	0.15-0.25	FILL silty clay loam with inclusions of rock, gravel, sand	
BH2	0.1-0.2		
BH3 /A	0.15-0.25		
BH4	0.1-0.2		
BH5	0.15-0.25		
BH6	0.2-0.3		
BH7	0.15-0.28		

No staining observed within surface soils
No odours detected during inspection

No ACM detected on surface soils.

APPENDIX D: LABORATORY CERTIFICATES

ECON Environmental Pty Ltd | ABN 25 641 106 783 | PO Box 85 Oatlands NSW 2117
M: 0452 654 962 | **E:** info@econenvironmental.com.au | **W:** www.econenvironmental.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2118737**	Page	: 1 of 15
Client	: **ECON Environmental Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: Con Kariotoglou	Contact	: Customer Services ES
Address	: PO Box 85 Oatlands NSW	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: ST MARYS	Date Samples Received	: 19-May-2021 14:00
Order number	: 21-1165	Date Analysis Commenced	: 20-May-2021
C-O-C number	: ----	Issue Date	: 26-May-2021 19:20
Sampler	: Con Kariotoglou		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 9		
No. of samples analysed	: 9		

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
- Descriptive 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*
Alana Smylie	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Alex Rossi	Organic Chemist	Sydney Inorganics, Smithfield, NSW
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, 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.
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above 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 Zinc on sample WN2105855 #001. Confirmed by redigestion and reanalysis
- EP071: Results of sample BH6 (0.2-0.3m) have been confirmed by re-extraction and re-analysis.
- EP068: Positive result has been confirmed by re-extraction and re-analysis.
- **EA200 Legend**
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200N: Asbestos weights and percentages are not covered under the Scope of NATA Accreditation.
  Weights of Asbestos are based on extracted bulk asbestos, fibre bundles, and/or ACM and do not include respirable fibres (if present)
  The Asbestos (Fines and Fibrous) weight is calculated from the extracted Fibrous Asbestos and Asbestos Fines as an equivalent weight of 100% Asbestos
  Percentages for Asbestos content in ACM are based on the 2013 NEPM default values.
  All calculations of percentage Asbestos under this method are approximate and should be used as a guide only.
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200N: ALS laboratory procedures and methods used for the identification and quantitation of asbestos are consistent with AS4964-2004 and the requirements of the 2013 NEPM for Assessment of Site Contamination
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.

- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.
- EA200: N/A - Not Applicable

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH1 (0.15-0.25m)	BH2 (0.1-0.2m)	BH3 (0.15-0.25m)	BH4 (0.1-0.5m)	BH5 (0.15-0.25m)
			Sampling date / time	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00
Compound	CAS Number	LOR	Unit	ES2118737-001	ES2118737-002	ES2118737-003	ES2118737-004	ES2118737-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	17.6	17.3	17.3	26.0	16.9
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	No	No
Sample weight (dry)	----	0.01	g	551	564	617	480	532
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	No	No
Organic Fibre	----	0.1	g/kg	No	No	No	No	No
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE
EA200N: Asbestos Quantification (non-NATA)								
ø Asbestos (Fines and Fibrous <7mm)	1332-21-4	0.0004	g	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
ø Asbestos (Fines and Fibrous FA+AF)	----	0.001	% (w/w)	<0.001	<0.001	<0.001	<0.001	<0.001
ø Weight Used for % Calculation	----	0.0001	kg	0.551	0.564	0.617	0.480	0.532
ø Fibrous Asbestos >7mm	----	0.0004	g	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	12	9	<5	<5	11
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	34	33	14	12	22
Copper	7440-50-8	5	mg/kg	30	29	16	26	35
Lead	7439-92-1	5	mg/kg	70	45	31	68	70
Nickel	7440-02-0	2	mg/kg	21	21	9	12	19
Zinc	7440-66-6	5	mg/kg	128	94	112	247	268
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH1 (0.15-0.25m)	BH2 (0.1-0.2m)	BH3 (0.15-0.25m)	BH4 (0.1-0.5m)	BH5 (0.15-0.25m)
				Sampling date / time	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2118737-001	ES2118737-002	ES2118737-003	ES2118737-004	ES2118737-005
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
Aldrin	309-00-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH1 (0.15-0.25m)	BH2 (0.1-0.2m)	BH3 (0.15-0.25m)	BH4 (0.1-0.5m)	BH5 (0.15-0.25m)
				Sampling date / time	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2118737-001	ES2118737-002	ES2118737-003	ES2118737-004	ES2118737-005
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg		<2	<2	<2	<2	<2
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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH1 (0.15-0.25m)	BH2 (0.1-0.2m)	BH3 (0.15-0.25m)	BH4 (0.1-0.5m)	BH5 (0.15-0.25m)
			Sampling date / time	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00
Compound	CAS Number	LOR	Unit	ES2118737-001	ES2118737-002	ES2118737-003	ES2118737-004	ES2118737-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
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
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
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**104**	**123**	**102**	**81.9**	**85.2**
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**87.1**	**114**	**98.6**	**76.8**	**87.5**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH1 (0.15-0.25m)	BH2 (0.1-0.2m)	BH3 (0.15-0.25m)	BH4 (0.1-0.5m)	BH5 (0.15-0.25m)
			Sampling date / time	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00
Compound	CAS Number	LOR	Unit	ES2118737-001	ES2118737-002	ES2118737-003	ES2118737-004	ES2118737-005
				Result	Result	Result	Result	Result
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	108	124	103	96.4	90.2
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	82.1	84.8	84.2	87.1	85.0
2-Chlorophenol-D4	93951-73-6	0.5	%	80.0	83.1	82.5	84.5	83.2
2.4.6-Tribromophenol	118-79-6	0.5	%	74.7	81.4	82.4	87.7	79.8
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	91.5	92.8	92.7	98.2	97.8
Anthracene-d10	1719-06-8	0.5	%	97.1	99.0	98.6	101	102
4-Terphenyl-d14	1718-51-0	0.5	%	88.3	89.8	88.6	92.2	91.6
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	116	97.3	103	99.6	105
Toluene-D8	2037-26-5	0.2	%	110	90.9	94.1	92.1	96.3
4-Bromofluorobenzene	460-00-4	0.2	%	104	93.1	93.2	94.0	95.0

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH6 (0.2-0.3m)	BH7 (0.15-0.25m)	D1	----	----
			Sampling date / time	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2118737-006	ES2118737-007	ES2118737-008	--------	--------
				Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	17.1	22.9	16.9	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	----	----
Asbestos Type	1332-21-4	-	--	-	-	-	----	----
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	----	----
Sample weight (dry)	----	0.01	g	570	551	571	----	----
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	----	----
Organic Fibre	----	0.1	g/kg	No	No	No	----	----
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	A. SMYLIE	A. SMYLIE	----	----
EA200N: Asbestos Quantification (non-NATA)								
ø Asbestos (Fines and Fibrous <7mm)	1332-21-4	0.0004	g	<0.0004	<0.0004	<0.0004	----	----
ø Asbestos (Fines and Fibrous FA+AF)	----	0.001	% (w/w)	<0.001	<0.001	<0.001	----	----
ø Weight Used for % Calculation	----	0.0001	kg	0.570	0.551	0.571	----	----
ø Fibrous Asbestos >7mm	----	0.0004	g	<0.0004	<0.0004	<0.0004	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	9	8	<5	----	----
Cadmium	7440-43-9	1	mg/kg	<1	2	<1	----	----
Chromium	7440-47-3	2	mg/kg	25	26	10	----	----
Copper	7440-50-8	5	mg/kg	8	78	18	----	----
Lead	7439-92-1	5	mg/kg	18	248	32	----	----
Nickel	7440-02-0	2	mg/kg	5	22	10	----	----
Zinc	7440-66-6	5	mg/kg	7	596	111	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH6 (0.2-0.3m)	BH7 (0.15-0.25m)	D1	----	----
				Sampling date / time	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2118737-006	ES2118737-007	ES2118737-008	--------	--------
					Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
Aldrin	309-00-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
^ **Total Chlordane (sum)**	----	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg		**0.16**	<0.05	<0.05	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg		**0.16**	<0.05	<0.05	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Dimethoate	60-51-5	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Diazinon	333-41-5	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Malathion	121-75-5	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Fenthion	55-38-9	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Parathion	56-38-2	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH6 (0.2-0.3m)	BH7 (0.15-0.25m)	D1	----	----
				Sampling date / time	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2118737-006	ES2118737-007	ES2118737-008	--------	--------
					Result	Result	Result	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued									
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Ethion	563-12-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2-Methylphenol	95-48-7	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	<1	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Pentachlorophenol	87-86-5	2	mg/kg		<2	<2	<2	----	----
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		**1.7**	<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		**0.6**	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg		**9.7**	<0.5	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg		**2.6**	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg		**15.0**	<0.5	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg		**13.8**	<0.5	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		**6.5**	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg		**5.7**	<0.5	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		**7.5**	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		**2.7**	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		**6.0**	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		**3.1**	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		**0.9**	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH6 (0.2-0.3m)	BH7 (0.15-0.25m)	D1	----	----
				Sampling date / time	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2118737-006	ES2118737-007	ES2118737-008	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		**3.6**	<0.5	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		**79.4**	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		**9.0**	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**9.0**	**0.6**	**0.6**	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**9.0**	**1.2**	**1.2**	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg		**220**	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg		**160**	<100	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		**380**	<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		**330**	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		**330**	<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	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**80.0**	**77.8**	**94.4**	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**88.2**	**78.0**	**104**	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH6 (0.2-0.3m)	BH7 (0.15-0.25m)	D1	----	----
				Sampling date / time	19-May-2021 00:00	19-May-2021 00:00	19-May-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2118737-006	ES2118737-007	ES2118737-008	--------	--------
					Result	Result	Result	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		110	90.6	90.8	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		85.2	85.9	80.2	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		84.5	83.9	79.0	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		92.7	84.9	81.5	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		92.7	95.7	89.8	----	----
Anthracene-d10	1719-06-8	0.5	%		94.2	100	96.2	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		88.7	91.3	86.8	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		111	105	110	----	----
Toluene-D8	2037-26-5	0.2	%		105	96.7	100	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		103	95.6	96.4	----	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOLID)				Sample ID	AS1	----	----	----	----
				Sampling date / time	19-May-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2118737-009	--------	--------	--------	--------
					Result	----	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos Detected	1332-21-4	0.1	g/kg		**No**	----	----	----	----
Asbestos Type	1332-21-4	-	--		**-**	----	----	----	----
Asbestos (Trace)	1332-21-4	5	Fibres		**No**	----	----	----	----
Sample weight (dry)	----	0.01	g		**11.0**	----	----	----	----
Synthetic Mineral Fibre	----	0.1	g/kg		**Yes**	----	----	----	----
Organic Fibre	----	0.1	g/kg		**No**	----	----	----	----
APPROVED IDENTIFIER:	----	-	--		**B.SCHRADER**	----	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	BH1 (0.15-0.25m) - 19-May-2021 00:00	Mid brown soil.
EA200: Description	BH2 (0.1-0.2m) - 19-May-2021 00:00	Mid brown soil.
EA200: Description	BH3 (0.15-0.25m) - 19-May-2021 00:00	Mid brown soil.
EA200: Description	BH4 (0.1-0.5m) - 19-May-2021 00:00	Mid brown soil.
EA200: Description	BH5 (0.15-0.25m) - 19-May-2021 00:00	Mid brown soil.
EA200: Description	BH6 (0.2-0.3m) - 19-May-2021 00:00	Mid brown soil.
EA200: Description	BH7 (0.15-0.25m) - 19-May-2021 00:00	Mid brown soil.
EA200: Description	D1 - 19-May-2021 00:00	Mid brown soil.

Sub-Matrix: **SOLID**

Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples		
EA200: Description	AS1 - 19-May-2021 00:00	Two pieces of cement sheeting.

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
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

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(SOIL) EA200N: Asbestos Quantification (non-NATA)

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

(SOLID) EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples

QUALITY CONTROL REPORT

Work Order	: **ES2118737**	Page	: 1 of 12
Client	: **ECON Environmental Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: Con Kariotoglou	Contact	: Customer Services ES
Address	: PO Box 85 Oatlands NSW	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: ST MARYS	Date Samples Received	: 19-May-2021
Order number	: 21-1165	Date Analysis Commenced	: 20-May-2021
C-O-C number	: ----	Issue Date	: 26-May-2021
Sampler	: Con Kariotoglou		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 9		
No. of samples analysed	: 9		

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*
Alana Smylie	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Alex Rossi	Organic Chemist	Sydney Inorganics, Smithfield, NSW
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, 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

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: 3696798)									
ES2118385-017	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	12	12	0.0	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	6	<5	0.0	No Limit
ES2118653-006	Anonymous	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	8	8	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	11	11	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	31	27	14.1	No Limit
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3696799)									
ES2118737-005	BH5 (0.15-0.25m)	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	22	25	10.7	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	19	20	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	11	11	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	35	37	6.5	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	70	75	7.0	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	268	295	9.6	0% - 20%
WN2105855-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	4	4	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	802	828	3.2	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	109	94	14.1	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: 3696799) - continued									
WN2105855-001	Anonymous	EG005T: Arsenic	7440-38-2	5	mg/kg	9	7	29.2	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	290	248	15.6	0% - 20%
		EG005T: Lead	7439-92-1	5	mg/kg	73	64	13.1	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	1800	# 1460	20.2	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3696801)									
ES2118385-019	Anonymous	EA055: Moisture Content	----	0.1	%	8.5	8.5	0.0	0% - 20%
ES2118678-003	Anonymous	EA055: Moisture Content	----	0.1	%	6.4	6.1	5.3	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3696802)									
ES2118737-007	BH7 (0.15-0.25m)	EA055: Moisture Content	----	0.1	%	22.9	22.8	0.6	0% - 20%
WN2105855-002	Anonymous	EA055: Moisture Content	----	0.1	%	<1.0	<1.0	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3696797)									
ES2118385-017	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2118653-006	Anonymous	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: 3696800)									
ES2118737-005	BH5 (0.15-0.25m)	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
WN2105855-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3688939)									
ES2118737-001	BH1 (0.15-0.25m)	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3688940)									
ES2118737-001	BH1 (0.15-0.25m)	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	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 (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3688940) - continued									
ES2118737-001	BH1 (0.15-0.25m)	EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3688940)									
ES2118737-001	BH1 (0.15-0.25m)	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 3688938)									
ES2118737-001	BH1 (0.15-0.25m)	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3688938)									
ES2118737-001	BH1 (0.15-0.25m)	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

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: 3688938) - continued									
ES2118737-001	BH1 (0.15-0.25m)	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
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3688937)									
ES2118737-001	BH1 (0.15-0.25m)	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: 3691083)									
ES2118569-051	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES2118737-001	BH1 (0.15-0.25m)	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3688937)									
ES2118737-001	BH1 (0.15-0.25m)	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: 3691083)									
ES2118569-051	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES2118737-001	BH1 (0.15-0.25m)	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080: BTEXN (QC Lot: 3691083)									
ES2118569-051	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
ES2118737-001	BH1 (0.15-0.25m)	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

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: 3691083) - continued									
ES2118737-001	BH1 (0.15-0.25m)	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: 3696798)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	90.2	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	97.6	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	87.5	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	90.1	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	84.4	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	81.8	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	76.5	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3696799)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	106	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	111	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	103	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	106	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	98.6	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	95.7	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	90.4	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3696797)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	94.0	70.0	125
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3696800)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	107	70.0	125
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3688939)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	97.8	62.0	126
EP068A: Organochlorine Pesticides (OC) (QCLot: 3688940)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	90.0	69.0	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	95.9	65.0	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	90.2	67.0	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	86.2	68.0	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	86.7	65.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	103	67.0	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	103	69.0	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	95.9	62.0	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	97.0	63.0	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	92.8	66.0	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	99.8	64.0	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	91.5	66.0	116

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068A: Organochlorine Pesticides (OC) (QCLot: 3688940) - continued								
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	94.7	67.0	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.3	67.0	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.7	69.0	115
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	103	69.0	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	85.9	56.0	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	85.5	62.0	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	87.6	66.0	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	84.2	64.0	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	82.2	54.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3688940)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	84.7	59.0	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	98.6	62.0	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	102	54.0	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	86.6	67.0	119
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	89.8	70.0	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	96.8	72.0	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	82.5	68.0	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	81.4	68.0	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	98.2	69.0	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	99.2	76.0	118
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	85.9	64.0	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	96.6	70.0	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	81.5	69.0	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	97.5	66.0	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	76.0	68.0	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	98.1	62.0	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	91.6	68.0	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	86.1	65.0	127
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	99.1	41.0	123
EP075(SIM)A: Phenolic Compounds (QCLot: 3688938)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	6 mg/kg	86.0	71.0	125
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	6 mg/kg	88.4	72.0	124
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	6 mg/kg	89.6	71.0	123
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	12 mg/kg	93.1	67.0	127
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	6 mg/kg	79.8	54.0	114
EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	6 mg/kg	86.6	68.0	126
EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	6 mg/kg	83.9	66.0	120
EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	6 mg/kg	88.6	70.0	120
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	6 mg/kg	82.7	70.0	116

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP075(SIM)A: Phenolic Compounds (QCLot: 3688938) - continued								
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	6 mg/kg	77.1	54.0	114
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	6 mg/kg	78.7	60.0	114
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	12 mg/kg	49.1	10.0	57.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3688938)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	95.8	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	93.5	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	91.6	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	91.7	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	92.4	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	93.5	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	94.8	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	95.6	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	82.8	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	88.2	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	81.0	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	89.1	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	85.0	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	86.6	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	85.3	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	83.8	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3688937)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	95.8	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	93.0	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	103	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3691083)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	108	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3688937)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	104	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	99.8	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	99.6	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3691083)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	113	68.4	128
EP080: BTEXN (QCLot: 3691083)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	103	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	104	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	109	65.0	117

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080: BTEXN (QCLot: 3691083) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	95.7	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	108	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	99.5	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 Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3696798)							
ES2118385-017	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	105	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	99.9	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	94.3	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	99.8	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	104	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	98.1	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	100	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3696799)							
ES2118737-005	BH5 (0.15-0.25m)	EG005T: Arsenic	7440-38-2	50 mg/kg	113	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	96.9	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	102	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	108	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	104	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	108	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	124	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3696797)							
ES2118385-017	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	87.6	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3696800)							
ES2118737-005	BH5 (0.15-0.25m)	EG035T: Mercury	7439-97-6	5 mg/kg	85.2	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3688939)							
ES2118737-001	BH1 (0.15-0.25m)	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	106	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 3688940)							
ES2118737-001	BH1 (0.15-0.25m)	EP068: gamma-BHC	58-89-9	0.5 mg/kg	94.7	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	98.7	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
EP068A: Organochlorine Pesticides (OC) (QCLot: 3688940) - continued							
ES2118737-001	BH1 (0.15-0.25m)	EP068: Aldrin	309-00-2	0.5 mg/kg	97.7	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	106	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	88.8	70.0	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	90.1	70.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3688940)							
ES2118737-001	BH1 (0.15-0.25m)	EP068: Diazinon	333-41-5	0.5 mg/kg	110	70.0	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	98.7	70.0	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	89.9	70.0	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	104	70.0	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	98.8	70.0	130
EP075(SIM)A: Phenolic Compounds (QCLot: 3688938)							
ES2118737-001	BH1 (0.15-0.25m)	EP075(SIM): Phenol	108-95-2	10 mg/kg	88.4	70.0	130
		EP075(SIM): 2-Chlorophenol	95-57-8	10 mg/kg	89.3	70.0	130
		EP075(SIM): 2-Nitrophenol	88-75-5	10 mg/kg	82.0	60.0	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	10 mg/kg	88.3	70.0	130
		EP075(SIM): Pentachlorophenol	87-86-5	10 mg/kg	76.9	20.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3688938)							
ES2118737-001	BH1 (0.15-0.25m)	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	96.0	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	104	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3688937)							
ES2118737-001	BH1 (0.15-0.25m)	EP071: C10 - C14 Fraction	----	523 mg/kg	74.6	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	104	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	96.5	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3691083)							
ES2118569-051	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	118	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3688937)							
ES2118737-001	BH1 (0.15-0.25m)	EP071: >C10 - C16 Fraction	----	860 mg/kg	80.2	73.0	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	106	53.0	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	66.9	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3691083)							
ES2118569-051	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	118	70.0	130
EP080: BTEXN (QCLot: 3691083)							
ES2118569-051	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	101	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	95.6	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	100	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*
EP080: BTEXN (QCLot: 3691083) - continued							
ES2118569-051	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	94.1	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	95.3	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	83.1	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2118737**	Page	: 1 of 7
Client	: **ECON Environmental Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: Con Kariotoglou	Telephone	: +61-2-8784 8555
Project	: ST MARYS	Date Samples Received	: 19-May-2021
Site	: ----	Issue Date	: 26-May-2021
Sampler	: Con Kariotoglou	No. of samples received	: 9
Order number	: 21-1165	No. of samples analysed	: 9

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 Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **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.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005(ED093)T: Total Metals by ICP-AES	WN2105855--001	Anonymous	**Zinc**	7440-66-6	20.2 %	0% - 20%	**RPD exceeds LOR based limits**

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)								
BH1 (0.15-0.25m),	BH2 (0.1-0.2m),	**19-May-2021**	**----**	----	----	**25-May-2021**	02-Jun-2021	✓
BH3 (0.15-0.25m),	BH4 (0.1-0.5m),							
BH5 (0.15-0.25m),	BH6 (0.2-0.3m),							
BH7 (0.15-0.25m),	D1							
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Snap Lock Bag: Separate bag received (EA200)								
BH1 (0.15-0.25m),	BH2 (0.1-0.2m),	**19-May-2021**	**----**	----	----	**20-May-2021**	15-Nov-2021	✓
BH3 (0.15-0.25m),	BH4 (0.1-0.5m),							
BH5 (0.15-0.25m),	BH6 (0.2-0.3m),							
BH7 (0.15-0.25m),	D1							
EA200N: Asbestos Quantification (non-NATA)								
Snap Lock Bag: Separate bag received (EA200N)								
BH1 (0.15-0.25m),	BH2 (0.1-0.2m),	**19-May-2021**	**----**	----	----	**20-May-2021**	15-Nov-2021	✓
BH3 (0.15-0.25m),	BH4 (0.1-0.5m),							
BH5 (0.15-0.25m),	BH6 (0.2-0.3m),							
BH7 (0.15-0.25m),	D1							
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH1 (0.15-0.25m),	BH2 (0.1-0.2m),	**19-May-2021**	**25-May-2021**	15-Nov-2021	✓	**25-May-2021**	15-Nov-2021	✓
BH3 (0.15-0.25m),	BH4 (0.1-0.5m),							
BH5 (0.15-0.25m),	BH6 (0.2-0.3m),							
BH7 (0.15-0.25m),	D1							

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
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH1 (0.15-0.25m),	BH2 (0.1-0.2m),	**19-May-2021**	**25-May-2021**	16-Jun-2021	✓	**26-May-2021**	16-Jun-2021	✓
BH3 (0.15-0.25m),	BH4 (0.1-0.5m),							
BH5 (0.15-0.25m),	BH6 (0.2-0.3m),							
BH7 (0.15-0.25m),	D1							
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)								
BH1 (0.15-0.25m),	BH2 (0.1-0.2m),	**19-May-2021**	**21-May-2021**	02-Jun-2021	✓	**24-May-2021**	30-Jun-2021	✓
BH3 (0.15-0.25m),	BH4 (0.1-0.5m),							
BH5 (0.15-0.25m),	BH6 (0.2-0.3m),							
BH7 (0.15-0.25m),	D1							
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
BH1 (0.15-0.25m),	BH2 (0.1-0.2m),	**19-May-2021**	**21-May-2021**	02-Jun-2021	✓	**24-May-2021**	30-Jun-2021	✓
BH3 (0.15-0.25m),	BH4 (0.1-0.5m),							
BH5 (0.15-0.25m),	BH6 (0.2-0.3m),							
BH7 (0.15-0.25m),	D1							
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068)								
BH1 (0.15-0.25m),	BH2 (0.1-0.2m),	**19-May-2021**	**21-May-2021**	02-Jun-2021	✓	**24-May-2021**	30-Jun-2021	✓
BH3 (0.15-0.25m),	BH4 (0.1-0.5m),							
BH5 (0.15-0.25m),	BH6 (0.2-0.3m),							
BH7 (0.15-0.25m),	D1							
EP075(SIM)A: Phenolic Compounds								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH1 (0.15-0.25m),	BH2 (0.1-0.2m),	**19-May-2021**	**21-May-2021**	02-Jun-2021	✓	**24-May-2021**	30-Jun-2021	✓
BH3 (0.15-0.25m),	BH4 (0.1-0.5m),							
BH5 (0.15-0.25m),	BH6 (0.2-0.3m),							
BH7 (0.15-0.25m),	D1							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH1 (0.15-0.25m),	BH2 (0.1-0.2m),	**19-May-2021**	**21-May-2021**	02-Jun-2021	✓	**24-May-2021**	30-Jun-2021	✓
BH3 (0.15-0.25m),	BH4 (0.1-0.5m),							
BH5 (0.15-0.25m),	BH6 (0.2-0.3m),							
BH7 (0.15-0.25m),	D1							
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
BH1 (0.15-0.25m),	BH2 (0.1-0.2m),	**19-May-2021**	**21-May-2021**	02-Jun-2021	✓	**24-May-2021**	02-Jun-2021	✓
BH3 (0.15-0.25m),	BH4 (0.1-0.5m),							
BH5 (0.15-0.25m),	BH6 (0.2-0.3m),							
BH7 (0.15-0.25m),	D1							

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 Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)							
BH1 (0.15-0.25m), BH2 (0.1-0.2m), BH3 (0.15-0.25m), BH4 (0.1-0.5m), BH5 (0.15-0.25m), BH6 (0.2-0.3m), BH7 (0.15-0.25m), D1	**19-May-2021**	**21-May-2021**	02-Jun-2021	✓	**24-May-2021**	02-Jun-2021	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
BH1 (0.15-0.25m), BH2 (0.1-0.2m), BH3 (0.15-0.25m), BH4 (0.1-0.5m), BH5 (0.15-0.25m), BH6 (0.2-0.3m), BH7 (0.15-0.25m), D1	**19-May-2021**	**21-May-2021**	02-Jun-2021	✓	**24-May-2021**	02-Jun-2021	✓

Matrix: **SOLID**

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
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples							
Snap Lock Bag - ACM/Asbestos Grab Bag (EA200)							
AS1	**19-May-2021**	**----**	----	----	**20-May-2021**	15-Nov-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	35	**11.43**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**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).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Asbestos Classification and Quantitation per NEPM 2013	* EA200N	SOIL	Asbestos Classification and Quantitation per NEPM with Confirmation of Identification by AS 4964 - Gravimetric determination of Asbestos Containing Material, Fibrous Asbestos, Asbestos Fines and sample weight and calculation of percentage concentrations per NEPM protocols. Asbestos (Fines and Fibrous FA+AF) is reported as the equivalent weight in the sample received after accounting for sub-sampling (where applicable for the <7mm and/or <2mm fractions).
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)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique 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.
Asbestos Identification in Bulk Solids	EA200	SOLID	In house: Referenced to AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining

Preparation Methods	Method	Matrix	Method Descriptions

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.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2118737**

Client	: **ECON Environmental Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: Con Kariotoglou	Contact	: Customer Services ES
Address	: PO Box 85 Oatlands NSW	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: info@econenvironmental.com.au	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: ST MARYS	Page	: 1 of 3
Order number	: 21-1165	Quote number	: ES2020ECONEV0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Con Kariotoglou		

Dates

Date Samples Received	: 19-May-2021 14:00	Issue Date	: 20-May-2021
Client Requested Due Date	: 26-May-2021	Scheduled Reporting Date	: **26-May-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 4.1 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 9 / 9

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 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).**
- **Asbestos analysis will be conducted by ALS Newcastle.**
- 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	SOIL - EA055-103 Moisture Content	SOIL - EA200F Asbestos Quantitation (FA+AF) in Soil by	SOIL - S-19 TRH/BTEXN/PAH/Ph/OC/OP/PCB/8 metals
ES2118737-001	19-May-2021 00:00	BH1 (0.15-0.25m)	✓	✓	✓
ES2118737-002	19-May-2021 00:00	BH2 (0.1-0.2m)	✓	✓	✓
ES2118737-003	19-May-2021 00:00	BH3 (0.15-0.25m)	✓	✓	✓
ES2118737-004	19-May-2021 00:00	BH4 (0.1-0.5m)	✓	✓	✓
ES2118737-005	19-May-2021 00:00	BH5 (0.15-0.25m)	✓	✓	✓
ES2118737-006	19-May-2021 00:00	BH6 (0.2-0.3m)	✓	✓	✓
ES2118737-007	19-May-2021 00:00	BH7 (0.15-0.25m)	✓	✓	✓
ES2118737-008	19-May-2021 00:00	D1	✓	✓	✓

Matrix: **SOLID**

Laboratory sample ID	Sampling date / time	Sample ID	SOLID - EA200B Asbestos Identification in Bulk Solids (Excluding
ES2118737-009	19-May-2021 00:00	AS1	✓

Proactive Holding Time Report

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

Requested Deliverables

Con Kariotoglou

- *AU Certificate of Analysis - NATA (COA)	Email	info@econenvironmental.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	info@econenvironmental.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	info@econenvironmental.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	info@econenvironmental.com.au
- A4 - AU Tax Invoice (INV)	Email	info@econenvironmental.com.au
- Chain of Custody (CoC) (COC)	Email	info@econenvironmental.com.au
- EDI Format - ESDAT (ESDAT)	Email	info@econenvironmental.com.au
- EDI Format - XTab (XTAB)	Email	info@econenvironmental.com.au

Environmental Division
Sydney
Work Order Reference
ES2118737

Telephone : + 61-2-8784 8555

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: ECON Environmental Pty Ltd
OFFICE: 1 St Aidans Avenue, Oatlands NSW 2117
PROJECT: St Marys
ORDER NUMBER: 21-1165
PROJECT MANAGER: Con Kariotoglou — CONTACT PH: 0452 654 962
SAMPLER: Con Kariotoglou — SAMPLER MOBILE: 0452 654 962
COC emailed to ALS? (YES) — EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed): info@econenvironmental.com.au
Email Invoice to (will default to PM if no other addresses are listed): info@econenvironmental.com.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☐ Standard TAT (List due date): 26.05.2021
☐ Non Standard or urgent TAT (List due date):
ALS QUOTE NO.: ECONEV

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY: Custody Seal Intact? Free ice / frozen ice bricks present upon receipt? Random Sample Temperature on Receipt: Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Con Kariotoglou	[signature]		
DATE/TIME: 19.05.2021	DATE/TIME: 19/5/21 2pm	DATE/TIME:	DATE/TIME:

SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	S-19	Asbestos EA200F (%w/w)	Asbestos EA200B (absent / present)					Additional Information: Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
BH1 (0.15-0.25m)	19.05.2021	S		2	√	√						sieved on site
BH2 (0.1-0.2m)	19.05.2021	S		2	√	√						sieved on site
BH3 (0.15-0.25m)	19.05.2021	S		2	√	√						sieved on site
BH4 (0.1-0.5m)	19.05.2021	S		2	√	√						sieved on site
BH5 (0.15-0.25m)	19.05.2021	S		2	√	√						sieved on site
BH6 (0.2-0.3m)	19.05.2021	S		2	√	√						sieved on site
BH7 (0.15-0.25m)	19.05.2021	S		2	√	√						sieved on site
D1	19.05.2021	S		2	√	√						sieved on site
AS1	19.05.2021	Fragment		1			√					
TOTAL				17	8	8	1					

Subcon / Forward Lab / Split WO
Lab / Analysis: Newcastle
Organised By / Date:
Relinquished By / Date:
Connote / Courier:
WO No:
Attached By PO / Internal Sheet:

Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

APPENDIX E: HAZARDOUS MATERIAL ASSESSMENT

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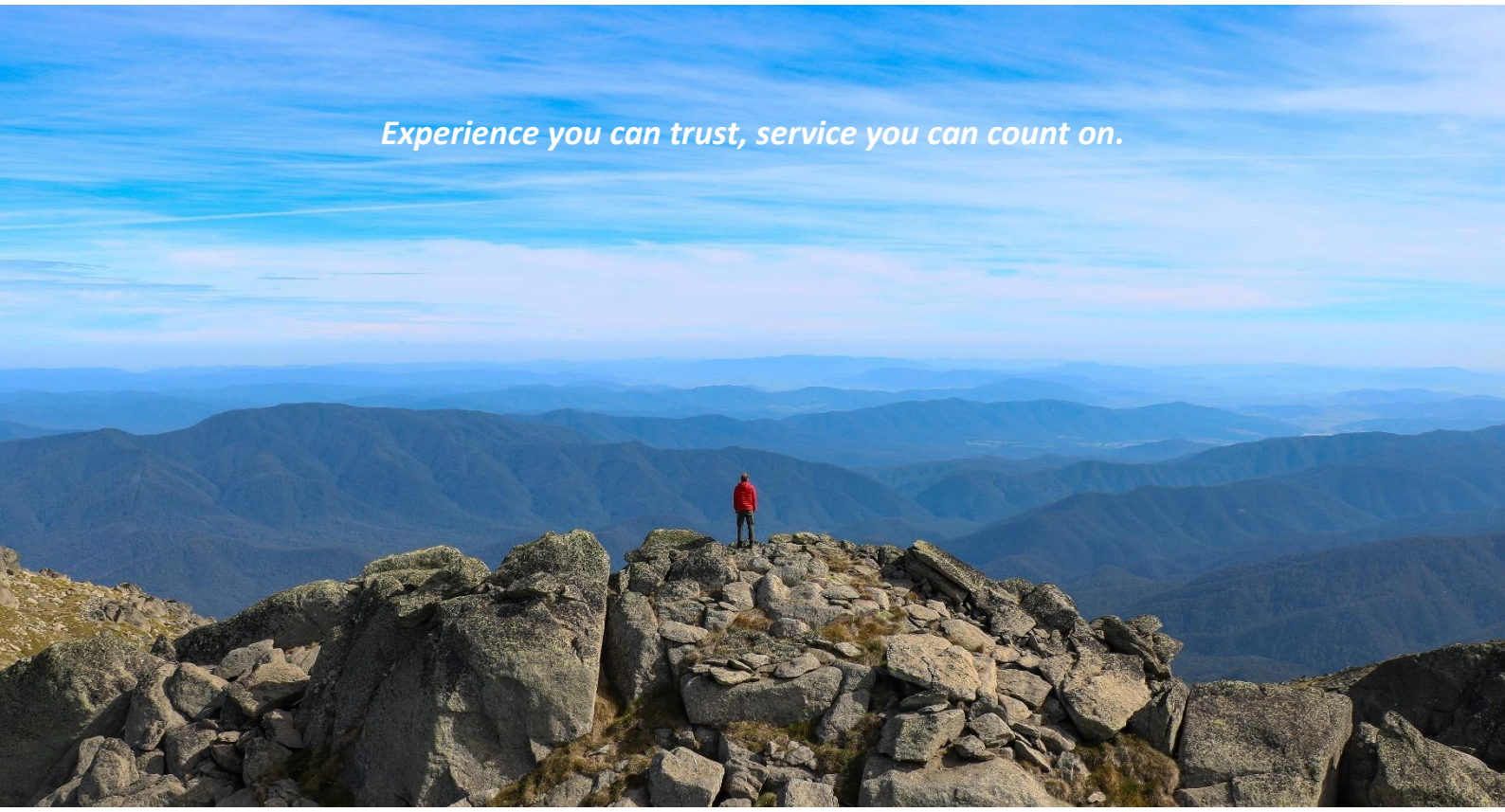

Hazardous Material Assessment

40-42 Mamre Road, St Marys NSW 2760

Prepared For:	V Homes Developments Pty Ltd
Reference:	21-1165HAZ
Date:	31 May 2021

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Document History:		
Document No	**Revision No.**	**Issue Date**
21-1165HAZ	A	31.05.2021

Report Author:	Technical Reviewer
	
Con Kariotoglou Managing Director *BSc, Cert IV WHS, AFMIML, MEIANZ, MALGA* *SafeWork NSW Approved Asbestos Assessor, License No. LAA001006*	Con Kariotoglou Managing Director *BSc, Cert IV WHS, AFMIML, MEIANZ, MALGA* *SafeWork NSW Approved Asbestos Assessor, License No. LAA001006*

This report is to be read in its entirety and should not be review in individual section to provide any level of information independently. Each section of the report relates to the rest of the document and as such is to be read in conjunction, including its appendices and attachments.

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EXECUTIVE SUMMARY

ECON Environmental Pty Ltd was engaged by V Home Developments Pty Ltd to undertake a Hazardous Material Assessment on the subject site located at 40-42 Mamre Road, St Marys NSW 2760, as per the conclusions and recommendations of the ECON Environmental Preliminary Site Investigation, 40-42 Mamre Road, St Marys NSW 2760, ref: 21-1155, dated 7 May 2021.

The site inspections were carried out on the Wednesday 19 May 2021 by Con Kariotoglou *(SafeWork NSW Asbestos Approved Assessor, LAA 001006)*. At the time of the inspection:

40 Mamre Road, St Marys:

- The site consisted of a single-storey fibre-cement panelled residential house with terracotta roof tiles and a concrete paved area at the rear of the property,
- A concrete driveway runs from the front of the property to the rear garage,
- The rear garage consists of fibre-cement walls and roof and is in poor condition,
- Low lying grasses and vegetation were evident covering the front and back yards,
- The property was occupied at the time of the inspection,
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection within the subject site.
- Visible signs of asbestos containing materials (ACM) were noted on building structures within the main residence and within the rear garage within the property,
- No visible signs of ACM were noted on surface soils within the boundaries of the property,
- No evidence of underground or above ground chemical storage tanks were evident within the subject site.
- No evidence of any potential human and environmental areas of concern were evident during the inspection within the subject site.

42 Mamre Road, St Marys:

- The site consisted of a single-storey brick and fibre-cement panelled residential house with terracotta roof tiles, the house was in poor condition.
- The property showed no signs of hoarding within the site that was observed during the initial Preliminary Site Investigation by ECON Environmental on Monday 3 May 2021 *(refer to ECON Environmental Preliminary Site Investigation Ref 21-1155, dated 7 May 2021).*
- Low lying grasses and vegetation were evident covering the front and back yards, where soils were exposed where areas of hoarding were removed from the rear of the premises.
- A concrete driveway runs from the front of the property to the rear of the house,
- The property was occupied at the time of the inspection,
- No visible signs of oil stains were detected during the inspection which were previously reported beneath the cars and car parts within the rear portion of the property within the previous ECON Environmental Preliminary Site Investigation, Monday 3 May 2021.
- No olfactory signs of odours were detected during the inspection within the property.

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- Visible signs of asbestos containing materials (ACM) were noted on building structures within the main residence and within the rear of the property on surface soils,
- No evidence of underground or above ground chemical storage tanks were evident within the subject site.
- Evidence of potential human and environmental areas of concern were evident during the inspection within the entire subject site.

Summary of Results

Hazardous Material	Identified
Friable asbestos presumed:	No
Bonded asbestos presumed:	Yes
Synthetic mineral fibres presumed:	No
Lead-containing paints presumed:	No
Lead containing dust presumed:	No
PCBs containing capacitors presumed:	No
Ozone Depleting Substances presumed:	No

(Refer to Hazardous Materials Register (Appendix A for detailed results).

General Recommendations

- It is a requirement that all controllers of premises provide all occupiers of their place of work with a copy of the Hazardous Materials Register and all associated updates in accordance with the SafeWork NSW Code of Practice: How to manage and control asbestos in the workplace (2019).
- A copy of the Hazardous Materials Register should be made readily available to all contractors conducting works on the premises/site.
- Should any previously unidentified suspect hazardous materials be identified during renovation / demolition, works should cease, and the materials should be inspected by an experienced occupational hygienist.
- Remove all hazardous materials identified in accordance with the appropriate guidelines and codes of practice prior to refurbishment or demolition of an area.

(Refer to recommendations page for more information).

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1. INTRODUCTION

1.1 Background

ECON Environmental Pty Ltd was engaged by V Home Developments Pty Ltd to undertake a Hazardous Material Assessment on the subject site located at 40-42 Mamre Road, St Marys NSW 2760, as per the conclusions and recommendations of the ECON Environmental Preliminary Site Investigation, 40-42 Mamre Road, St Marys NSW 2760, ref: 21-1155, dated 7 May 2021. The intention of client is to demolish the existing dwelling and all associated structures, and the development approval includes a proposed multi housing residential development, as shown in the proposed development plans in Appendix A – Proposed Development Plans.

The total combined area of the subject site (40 & 42 Mamre Roads) is approximately 2,151m^2, with 40 Mamre Road being approximately 1,076m^2, and 42 Mamre Road being approximately 1,075m^2. A site inspection was carried out on Wednesday 19 May 2021 by ECON Environmental's representative Con Kariotoglou *(SafeWork NSW Asbestos Approved Assessor, LAA 001006)*, which involved a visual assessment of the entire building structures within the subject site.

The purpose of the survey is to identify the presence of hazardous building materials within the existing building structures onsite and to assess the risk these materials might present to occupants, workers or contractors. The results of the survey and Hazardous Materials Register (Appendix A) are provided in this report. The results of the survey and Hazardous Materials Register are provided in this report (Please refer to appendix A - Asbestos register).

For the purpose of this report hazardous materials are limited to:

- Asbestos Containing Material (ACM)
- Asbestos Containing Dust (ACD)
- Synthetic Mineral Fibre (SMF)
- Lead Containing Paint (LCP)/ (Pb)
- Lead Containing Dust (LCD)
- Polychlorinated Biphenyls (PCB's)
- Ozone Depleting Substances (ODS)

1.2 Objectives

The objectives / scope of the Hazardous Material Survey is to:

- Complete a Safety, Health & Environmental Work Methods Statement (SH&EWMS) prior to undertaking works
- Identify hazardous materials within the accessible subject areas
- Provide a qualitative risk assessment of the hazardous materials identified
- Provide recommendations on the control measures strategies and
- Prepare a Hazardous Materials Register for the site to ensure legislative compliance prior to and during scheduled demolition works.

1.3 Scope of Works

The scope of work involved the following:

- Walkthrough inspection of the subject areas
- Identification of the hazardous building materials
- Sampling of fixed building fabric, where possible
- Laboratory analysis of selected samples where the inspector suspected the presence of hazardous materials, and
- Preparation of a report/risk assessment outlining the site data and recommendations.

1.4 Results and findings

The results of this hazardous materials survey are provided in a tabular format and are designed to provide readily available information about the presence of hazardous materials on the premises and the risks that these materials present to contractors during upcoming scheduled demolition works.

- The Hazardous Materials Register is shown in Appendix A.
- Photographs taken during the survey are shown in Appendix B.

1.5 Legislative Requirements

The survey works and production of this report have been undertaken in accordance with the requirements of:

- Workplace Health and Safety (WHS) Regulation 2017 & WHS Act 2011 (2017)
- Australian Standard AS2601 (2001) The Demolition of Structures
- SafeWork NSW Code of Practice: Demolition Work (2019)
- SafeWork NSW Code of Practice: How to Manage and Control Asbestos in the Workplace (2019)
- SafeWork NSW Code of Practice: How to Safely Remove Asbestos (2019)
- Code of Practice for Synthetic Mineral Fibres [NOHSC:2006(1990)]
- Australian / New Zealand Standard AS/NZS 4361.1 (2017) Guide to Hazardous Paint Management. Part 1: Lead and Other Hazardous Metallic Pigments in Industrial Applications
- Australian / New Zealand Standard AS/NZS 4361.2 (2017) Guide to Hazardous Paint Management. Part 2: Lead Paint in Residential, Public and Commercial Buildings
- Australian Standard AS4874 (2000) Guide to the Investigation of Potentially Contaminated Soil and Deposited Dust as a Source of Lead Available to Humans
- Australian and New Zealand Environment and Conservation Council ANZECC (1997) Identification of PCB-containing Capacitors: An Information Booklet for Electricians and Electrical Contractors
- ANZECC (2003): Polychlorinated Biphenyls Management Plan.
- Australian Commonwealth Ozone Protection & Synthetic Greenhouse Gas Management Act 1989 & Ozone Protection and Synthetic Greenhouse Gas (Manufacture Levy) Regulations 2004.

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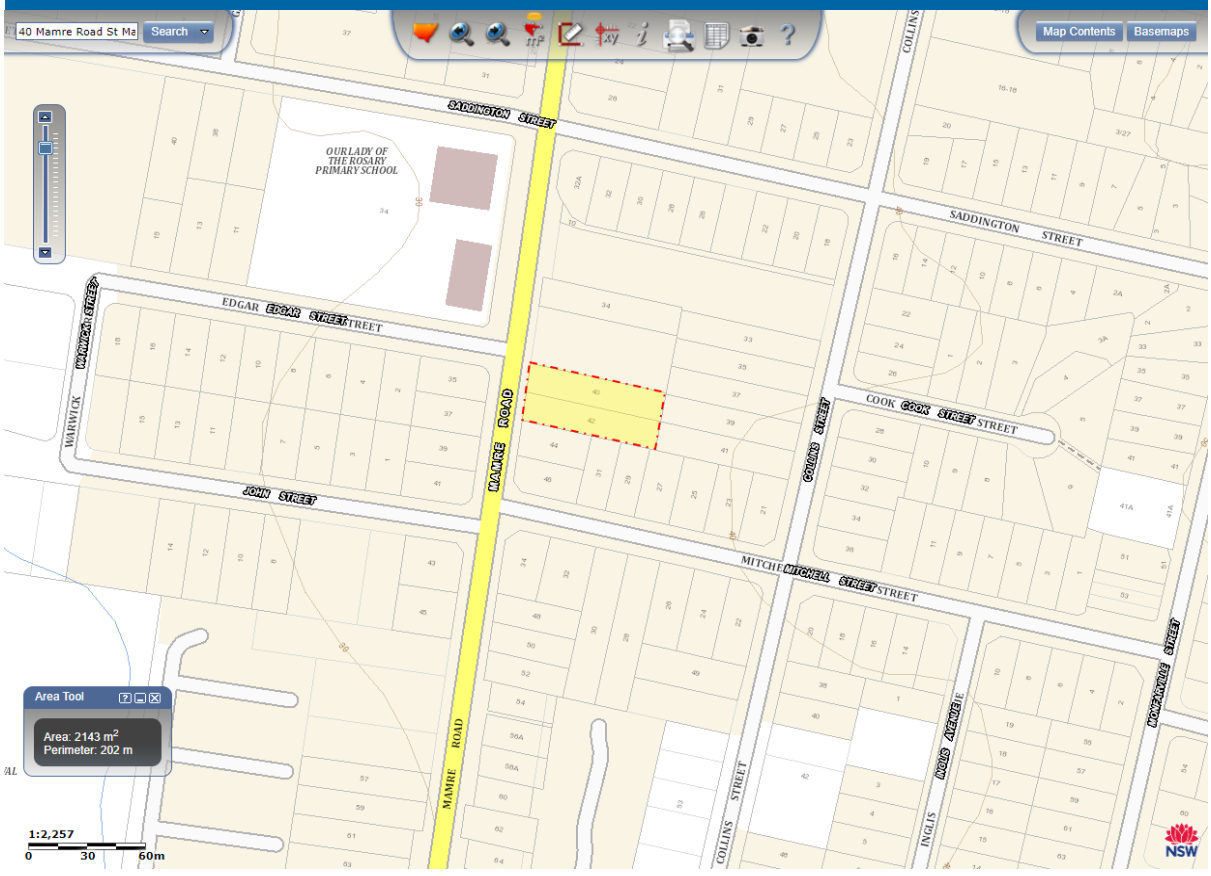
2. SITE IDENTIFICATION

The study sites are 40-42 Mamre Road, St Marys NSW 2760 (Figure 1). Both sites can be identified as rectangular shaped allotments surrounded by low density residential properties on all boundaries. Figure 2 shows an aerial photograph of the site and the surrounding land.

Table 1: Site Identification	
Street Address	40-42 Mamre Road, St Marys NSW 2760
Lot and DP Number	Lot 1 in DP 219187 – 40 Mamre Road Lot 1 in DP 111896 – 42 Mamre Road
Approx. Total Site Area	1,076m^2 - 40 Mamre Road 1,075m^2 - 42 Mamre Road 2,151m^2 - total combine
Zoning	R3 – Medium Density Residential SP2 - Infrastructure
Local Government Area	Penrith City Council
LGA Legislation	Penrith Local Environmental Plan 2010

Figure 1: Site location map – source www.maps.six.nsw.gov.au



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3. REQUIREMENT REASONING

The objective of the 'Hazardous Material Assessment is to assess the existing building structures within the subject site for potential hazardous building materials, prior to their demolition.

Figure 2: Aerial photograph of the subject site – *source www.maps.six.nsw.gov.au*

3.1 Proposed Development or Intended Land Use

The development approval includes a proposed multi housing residential development, as shown in the proposed development plans in Appendix A – Proposed Development Plans.

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4. SITE DESCRIPTION

4.1 Site Inspections

On Wednesday 19 May 2020, a Hazardous Material Assessment was conducted by ECON Environmental's representative Con Kariotoglou *(SafeWork NSW Asbestos Approved Assessor, LAA 001006)*. At the time of inspection, the following observations were noted:

40 Mamre Road, St Marys:

- The site consisted of a single-storey fibre-cement panelled residential house with terracotta roof tiles and a concrete paved area at the rear of the property,
- A concrete driveway runs from the front of the property to the rear garage,
- The rear garage consists of fibre-cement walls and roof and is in poor condition,
- Low lying grasses and vegetation were evident covering the front and back yards,
- The property was occupied at the time of the inspection,
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- No evidence of underground or above ground chemical storage tanks were evident within the subject site.
- No evidence of any potential human and environmental areas of concern were evident during the inspection within the subject site.

42 Mamre Road, St Marys:

- The site consisted of a single-storey brick and fibre-cement panelled residential house with terracotta roof tiles, the house was in poor condition.
- The property showed no signs of hoarding within the site that was observed during the initial Preliminary Site Investigation by ECON Environmental on Monday 3 May 2021 *(refer to ECON Environmental Preliminary Site Investigation Ref 21-1155, dated 7 May 2021).*
- Low lying grasses and vegetation were evident covering the front and back yards, where soils were exposed where areas of hoarding were removed from the rear of the premises.
- A concrete driveway runs from the front of the property to the rear of the house,
- The property was occupied at the time of the inspection,
- No visible signs of oil stains were detected during the inspection which were previously reported beneath the cars and car parts within the rear portion of the property within the previous ECON Environmental Preliminary Site Investigation, Monday 3 May 2021.
- No olfactory signs of odours were detected during the inspection within the property.

- Visible signs of asbestos containing materials (ACM) were noted on building structures within the main residence and within the rear of the property on surface soils,
- No evidence of underground or above ground chemical storage tanks were evident within the subject site.
- Evidence of potential human and environmental areas of concern were evident during the inspection within the entire subject site.

4.2 Restrictions on survey / areas not assessed

It is possible that hazardous building materials, which may be concealed within inaccessible areas/voids, may not have been located during the survey. This may include:

Restricted areas:

- In set ceilings or wall cavities.
- Those areas accessible only by dismantling equipment or performing minor localized demolition works.
- Service shafts, ducts etc., concealed within the building structure.
- Height restricted areas, surfaces above 2.8 meters height.
- Voids or internal areas of plant, equipment, air-conditioning ducts, etc.,
- Totally inaccessible areas such as voids and cavities created and intimately concealed within the building structure (these voids are only accessible during major demolition works).
- Latent asbestos contamination may not be identified on the site during the time of the visual inspection within subsurface soils and beneath building footprints.

Inaccessible areas within both properties at 40 & 42 Mamre Road, St Marys:

- Building interior roof cavities – likely to contain potential hazardous materials, due to the age of the building.
- Building interior subflooring areas – likely to contain potential hazardous materials, due to the age of the building..

5. HAZARDOUS MATERIALS REPORT INTERPRETATION, RISK ASSESSMENT FACTORS AND PRIORITY RATING

5.1 How to interpret this report

To assist in the interpretation of the hazardous materials register, the following provides a detailed explanation and meaning of the headings, the abbreviations and the terms that appear in the table.

- ***Building Name / No*** – States the building name / number (if available) of the particular building on for which the survey was undertaken.
- ***Company preparing report & Occupational Hygienists name*** – provides the source of the report.
- ***Survey Date*** – Provides the date on which the on-site survey of the particular building or room occurred.
- ***Specific Room Name or Area Name & No***. where available – States the room or area name / number (if available) of the particular building for which the survey was undertaken.
- ***Specific Location within Room or Area*** – States the precise location of the material within a room (Direction, adjacent features etc.) – e.g. Infill panel below window on southern wall. Only the specific locations at which hazardous materials are identified are to be shown.
- ***Description of Material*** – States the type of material identified – e.g. Vinyl tile, fibre cement sheeting, fibrous insulation, etc.
- ***Dimension / quantity*** – States the surface area or length of the material usually expressed as square metres (m^2) or linear metres (Lin m), or the number of materials identified (e.g. Number of doors, capacitor etc). The dimension is an estimate only and should not be relied upon as an exact measure.
- ***Sample ID No. / Photo No***. – Sample No. refers to the identification number of any samples collected. Photo No. refers to the identification number of photographs in Appendix C.
- ***Analysis Result*** – Refers to the results of laboratory analysis. The term 'NAD' means no asbestos was detected during laboratory analysis of samples of suspected asbestos containing materials.
- ***Condition*** – Refers to the physical state or condition of the material at the time of the survey.
- ***Good*** – Material shows no, or very minor, sign of damage and/or deterioration.
- ***Fair*** – Material shows signs of minor damage and/or deterioration.
- ***Poor*** – Material shows sign of significant damaged and/or deterioration or the material is partly or wholly unserviceable for its intended use.
- ***Recommended Control measures / Additional Comments*** – Indicates what control measures have been recommended, and also may include any other relevant comments that may assist with the future management of the material. Due to available space, the entry may refer the reader to another location in the Register.
- ***Survey Review Date*** – Refers to recommended next date for review of the Hazardous material at this particular location.
- ***Overall Risk*** – Refers to the level of risk posed by the material based on its present condition, friability, accessibility and other factors such as exposure to future disturbance. Five (5) levels

of risk, based on the above factors are defined as Extreme (E), High (H), Medium (M), Low (L) and Negligible (N) in accordance with the following definitions

5.2 Risk assessment factors and priority rating

To assess the health risk posed by the presence of hazardous materials, all relevant factors must be considered.

5.2.1 Asbestos containing materials (ACM) and asbestos containing dust (ACD)

The following factors were considered when assessing the human health risk posed by ACM:

- Evidence of physical damage, water damage or cracking.
- Requirement for access for building or maintenance works.
- Likelihood of disturbance and accessibility to exposed areas; and
- Environmental and occupational conditions.

High**:** Friable (un-bonded) asbestos material that has deteriorated significantly. The material is readily accessible and prone to further disturbance. Can include unsealed friable asbestos material located in or near air-conditioning systems where disturbance may result in spread of contamination to other areas.

Medium: Minor deterioration of the ACM is evident, or the material is prone to mechanical disturbance due to routine building activity, maintenance, degradation or due to environmental conditions.

Low: Asbestos or other material shows no or very minor signs of damage / deterioration. Routine accessibility is unlikely to cause significant deterioration, or the material is adequately sealed.

5.2.2 Synthetic mineral fibres (SMF)

The risk assessment factors for SMF are similar to those of asbestos including:

- Evidence of physical damage
- Accessibility to material
- Likelihood of disturbance
- Accessibility to exposed areas and
- Environmental and occupational conditions.

High: Friable synthetic mineral fibre exposed and readily accessible.

Medium: Friable synthetic mineral fibre or damaged bonded material which due to its present condition and/or location is likely to be further damaged resulting in fibre release.

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Low: Non friable or sealed friable material that is unlikely to present a risk to health unless damaged, tooled, cut, sanded or machined.

5.2.3 Lead containing paint (LCP)

Lead when inhaled or ingested is toxic to humans. The lead containing paint risk assessment factors are based on these two exposure routes on human receptors (infants, children, adults or contractors). These factors include:

- Likelihood of inhalation or ingestion.
- Likelihood of disturbance.
- Condition of the paint system; and
- Environmental and occupational conditions.

High*:* Damaged or deteriorated paint membrane, which due to its present condition and location, presents a significant health risk.

Medium*:* Paint membrane showing signs of deterioration and weathering, which if left untreated will continue to deteriorate and require abatement that is more extensive than its current requirement.

Low*:* Stable paint membrane that is in good condition or covered by a lead-free paint membrane, which is also in a good condition.

5.2.4 Lead containing dust (LCD)

Settled dust containing lead in ceilings spaces, voids and cavities is in fine particles and has a potential for greater bioavailability causing serious long-term health problems on the brain, kidneys and reproductive organs. Human exposure is through inhalation or ingestion. Routes of exposure and risk assessment factors include:

- Areas of exposed soil adjacent to the building.
- Type of materials and age of the building.
- Refurbishment works conducted on the building.
- Environmental and occupational conditions.
- Distance from roads, commercial garages and mining/smelting operations.
- Dust fall rates and carpet wear; and
- Nature of paint work.

5.2.5 Polychlorinated biphenyls (PCBs)

Polychlorinated biphenyls (PCBs) are a set of persistent organic chemicals that are known or suspected to cause a wide range of health effects. There is clear evidence that PCBs cause cancer in animals, and they are considered probable human carcinogens *U.S. Environmental Protection*

Agency (EPA) 1996. Human and animal data provide evidence that PCBs have significant toxic effects, including effects on the immune system, the reproductive system, the nervous system, and the endocrine system.

High: PCB oil leaking from the component item under consideration.

Low: Component item is in good condition. Unlikely to present a risk to health unless capacitor is damaged or deteriorates.

5.2.6 Ozone depleting substances (ODS)

Refrigeration systems and air conditioning systems may contain chlorofluorocarbon (CFC) or hydrochlorofluorocarbon (HCFC) gases which are ODS. ODS are regulated by the Commonwealth *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989.* Considering that these gases are dangerous when released to the atmosphere, two factors were considering during the assessment:

- Type of refrigerant gas; and
- Condition of the equipment (Air conditioning system, refrigeration system).

High: Refrigerant gas is an ODS and the condition of the equipment is poor (likelihood of leaks).

Low: Refrigerant gas is an ODS and the condition of the equipment is good.

5.3 Assessment conditions of hazardous materials during survey

Poor**:** Friable (un-bonded) asbestos material that has deteriorated significantly. The material is readily accessible and prone to further disturbance. Can include unsealed friable asbestos material located in or near air-conditioning systems where disturbance may result in spread of contamination to other areas.

Bonded asbestos material that has been damaged or major deterioration is evident, which requires replacement.

Fair: Minor deterioration of the ACM is evident, or the material is prone to mechanical disturbance due to routine building activity, maintenance, degradation or due to environmental conditions.

Good: Asbestos or other material shows no or very minor signs of damage / deterioration. Routine accessibility is unlikely to cause significant deterioration, or the material is adequately sealed.

To grade the risk it is important to identify the danger of the hazardous materials. Each material is graded depending on the potential effects they could cause to building occupants. **Table 3** below outlines the consequence rating for the hazardous materials.

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Table 3: Consequence Rating for hazardous materials.			
Scale	**Consequence**	**Description**	**Examples**
5	Severe	Will cause multiple fatalities or significant irreversible effects	Unsealed loose friable asbestos material located in or near air-conditioning systems or wind where disturbance will result in spread of contamination to other areas. Leaking PCB's from capacitors.
4	Major	Can cause multiple fatalities or irreversible health effects or disabling illness to one or more persons	Unsealed friable asbestos material located in or near air-conditioning systems where disturbance may result in spread of contamination to other areas.
3	Moderate	May cause severe irreversible health effects of concern- that would typically result in a medical treatment in a lost time illness	Minor deterioration of the ACM board
2	Minor	Minor chance to cause irreversible health effects of concern that would typically result in a medical treatment in a lost time illness	ACM board shows no or very minor signs of damage / deterioration
1	Negligible	Extremely low chance to cause reversible health effects.	ACM board shows no or very minor signs of damage / deterioration

Table 4. Explanation of the meaning of the likelihood rating with regards to ACM/ACD contaminant exposure.		
Likelihood		**Explanation of the Likelihood rating**
A	Almost certain	Regular contact with the potential hazard at very high levels
B	Likely	Periodic contact with the potential hazard at very high levels or regular contact with the potential hazard at high levels
C	Possible	Periodic contact with the potential hazard at high levels or regular contact with the potential hazard at moderate levels
D	Unlikely	Periodic contact with the potential hazard at moderate levels or regular contact with the potential hazard at low levels
E	Rare	Periodic contact with the potential hazard at low levels
F	Negligible	Negligible contact with the potential hazard

Likelihood is a descriptor of the probability of exposure directly related to a particular consequence that is associated with the hazard in question. **Table 4** on the below page outlines the likelihood ratings used to assess the exposure from the asbestos contaminants. In determining likelihood, it is necessary to consider the exposure to a hazard and the probability that harm will occur following that exposure. Exposure was determined in terms of the amount of product which could be exposed

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to building occupants (including visitors and contractors), the dustiness / volatility of the product and the present ventilation at the time asbestos are exposed to contractors.

Observations at the time of the inspection and laboratory results will be used to determine the amount of contaminant and the subsequent likelihood of exposure.

5.4 Exposure characterisation and likelihood

Table 5 provides the Health Risk Rating combining consequence (health effects) and likelihood (exposures). The matrix therefore gives a health risk rating for each combination of these. The higher the Health Risk Rating, indicated by five bands of risk severity, 'Negligible' (N), 'Low' (L), 'Medium' (M), 'High' (H) and 'Extreme' (E), the higher the priority for action.

Table 5: Health Risk Rating

		Consequence Rating (Health Effect)				
		1 Negligible	2 Minor	3 Moderate	4 Major	5 Severe
Likelihood Rating	A Almost Certain	M	H	H	E	E
	B Likely	M	M	H	H	E
	C Possible	L	M	M	H	H
	D Unlikely	L	L	M	M	H
	E Rare	L	L	L	M	M
	F Negligible	N				

E = Extreme – needs urgent and immediate senior executive management attention.

H = High – requires proactive management (controls).

M = Medium – require active monitoring.

L = Low – will likely not require active management, other than existing routine procedures.

N = Negligible – No action is required.

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6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General recommendations

A copy of the Hazardous Material Registers should be made readily available to all contractors conducting works on the premises/site.

Hazardous containing materials were identified during the inspection within the nominated properties located at 40 & 42 Mamre Road, St Marys NSW.

Should any previously unidentified suspect hazardous materials be identified during demolition, works should cease, and the materials should be inspected by an experienced occupational hygienist.

6.2 Asbestos containing materials

6.2.1 General recommendations for the treatment of friable asbestos and asbestos containing dust (ACD)

At the time of the hazardous materials inspection, NO friable asbestos and asbestos containing dust was visible or potentially present within the building structures. Friable asbestos and asbestos containing dust was NOT suspected due to the good and stable condition of the bonded ACM inspected within the building structures.

However, during demolition works if ACM is identified then the following procedures are required:

- All persons gaining access to the affected area of the property should wear appropriate PPE.
- To ensure that the implemented controls are continually being effective control air monitoring should be conducted until the removal works commence.
- A permit to work will need to be issued by the consent authority SafeWork NSW, for the appropriate type of asbestos materials on site before removal works can commence.
- Delineate and restrict access to the affected areas immediately. If access into the delineated areas is gained appropriate PPE must be worn.
- All dust generating activities should be stopped immediately. E.g. Sweeping or use of fans.
- Ensure that the affected areas remain covered with plastic or geo-fabric until all contaminated materials are removed from the site.
- Control monitoring for airborne asbestos in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres* [NOHSC:3003(2005)] should be carried out during and after the works by a NATA accredited laboratory to ensure the method of control is effective. Refer to WHS Regulation (2017) for requirements.
- The asbestos-containing debris and dust should be removed from all surfaces and disposed of to an NSW EPA licensed landfill. If asbestos-containing materials/dust is found outside of the subject area further dust removal will be required. This process should be repeated until the area is completely remediated.
- All porous materials in the affected areas should be treated as containing asbestos. Materials may be kept if they are decontaminated and cleared by an experienced occupational hygienist.

- All removal procedures should be conducted by an experienced **Class B** licensed removal contractor in accordance with the *NSW Code of Practice: How to Safely Remove Asbestos.*
- Monitoring for airborne asbestos in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres* [NOHSC:3003(2005)] should be carried out by a NATA accredited laboratory during the removal operations. Refer to WHS Regulation (2017) for requirements; and
- A clearance inspection should be carried out after the removal operations are completed. A clearance sampling/analytical program should be undertaken at the discretion of the occupational hygienist within the remediated area. Should none of the samples reveal the presence of asbestos fibres, a clearance certificate can be issued and normal operations at the site can continue.

6.2.2 General recommendations for the treatment of bonded asbestos (ACM):

At the time of the hazardous materials inspection, asbestos containing materials were visibly present within all of the building structures within the subject site.

During demolition works the following procedures are required:

- Remove the asbestos containing materials as per recommendations outlined in the Hazardous Materials Register.
- Appropriate warning signs should be placed on all types of asbestos materials identified. Refer to the *SafeWork Code of Practice: How to Safely Remove Asbestos (2016)*.
- All asbestos containing materials should be removed prior to any renovation, demolition or work taking place in that area. The asbestos containing materials must be lawfully transported and disposed of at a facility licensed to receive the waste.
- All removal procedures should be undertaken by an experienced appropriately licensed removal contractor in accordance with the *SafeWork Code of Practice: How to Safely Remove Asbestos (2016)*.
- Monitoring for airborne asbestos in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres* [NOHSC:3003(2005)] is recommended to be carried out during any removal operations. Refer to Clause 49 and 50 of *the SafeWork WHS Regulation (2017) requirements.*
- At the end of removal operations all surfaces in the subject area, such as frames, floor/ground, etc., should be vacuumed then wet wiped. An industrial High Efficiency Particulate Air (HEPA) vacuum cleaner should be used. Spreading of dust into clean areas or outside the subject areas should be prevented.
- A clearance inspection should be carried out after the removal operations are completed. A clearance sampling/analytical program should consist of a number of samples of residual dust/soil determined by the occupational hygienist. Should none of the samples reveal asbestos fibres, a clearance certificate can be issued and further operations can continue.

6.3 Synthetic mineral fibres (SMF)

At the time of the hazardous materials inspection, NO synthetic mineral fibres was visible or potentially present within the building structures within the subject site. SMF was NOT suspected due to the building containing new air conditioning plant and ductwork.

However, during demolition works if SMF is identified then the following procedures are required:

- If the SMF insulation is to be disturbed or removed, the airborne SMF monitoring should be carried out during the removal operations by a NATA accredited laboratory. Refer to the *SafeWork 2011 Safety Regulations* for requirements.
- The following National Standards and Codes of Practice are applicable to SMF:

Standard for Synthetic Mineral Fibres [NOHSC:1004(1990)]	Sets the recommended maximum exposure level for all types of SMF. (This is also contained in Exposure Standards for Atmospheric Contaminants [NOHSC: 1003 (1995)]
Code of Practice for Safe Use of Synthetic Mineral Fibres NOHSC:2006(1990)]	Provides practical guidance about managing risks from synthetic mineral fibres to keep exposure within the standard

- Use hand tools, not power tools, and wet or dampen the material before cutting. If power tools are used, local exhaust ventilation should be installed.
- Protective equipment must be used wherever other means cannot keep the exposure level below the exposure standard. It should include the appropriate type of mask and clothing. The code of practice has a detailed guide to selecting respiratory protection.
- At the end of demolition/removal operations, a clearance inspection and sampling program should be carried out and a Clearance Certificate issued.

SMF's are currently not on the schedule of substances requiring health surveillance.

6.4 Lead containing paint (LCP)

At the time of the hazardous materials inspection, NO lead containing paint was visible or potentially present within the building. Lead containing paint was NOT suspected due to the building not containing lead painted materials.

However, during demolition works if Lead containing Dust is identified then the following procedures are required: For the specific laws about working with lead, refer to Chapter 7, Part 7.2 of the *WHS Regulation (2017)*.

Lead paints were not identified at the site at the time of inspection. However, during demolition or refurbishment the following generic procedures should be followed:

- Any works which may disturb potential lead-based paint systems should be conducted in accordance with the requirements of Australian / New Zealand Standard AS/NZS 4361.2 (2017) Guide to Hazardous Paint Management. Part 2: Lead Paint in Residential, Public and Commercial Buildings.
- It is recommended to remove or stabilize materials coated in lead-based paint prior refurbishment. However, depending on the selected removal method, these materials may be demolished and disposed of at an appropriate NSW EPA licensed landfill. These materials should not be recycled unless the recycling facility has been notified of the presence of lead paint and deem the material acceptable for disposal/recycling at the facility.
- The materials should be in a wet condition during the removal operations. A manually controlled, consistent low pressure, coarse spray such as from an adjustable, pistol grip garden hose may be used for this purpose.
- Monitoring for airborne lead should be carried out during any removal / demolition operations. Refer to Clause 49 and 50 for the WHS Regulation (2017) requirements.
- AS 1716 approved respirators with P2 (dust) filters and coveralls should be worn to prevent exposure to airborne lead.
- Spreading of lead-based dust into clean areas should be prevented.
- At the end of demolition operations, a clearance inspection and sampling program should be carried out and a clearance certificate issued.
- To ensure that no contamination has occurred as a result of the demolition process, soil and dust testing within the property should be carried out before and after the demolition process.

6.5 Dust accumulation

At the time of the inspection, no significant amounts of dust accumulation were observed across the building. For the generic dust removal, the following needs to be considered:

- All persons gaining access for removal dust in the facility should wear appropriate PPE.
- All dust generating activities should be stopped immediately. E.g. Sweeping or use of fans.
- To ensure that the implemented controls are continually being effective control air monitoring should be conducted during removal operations according to the AS 3640 -2009 Workplace atmospheres – Method for sampling and gravimetric determination of inhalable dust.

6.6 Lead containing dust (LCD)

At the time of the hazardous materials inspection, NO lead containing dust was visible or potentially present within the building. Lead containing dust was NOT suspected due to the building not containing lead painted materials.

However, during demolition works if Lead containing Dust is identified then the following procedures are required:

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ECON Environmental recommends the elimination of the lead containing dust in accordance with the hierarchy of controls. The risk exposure characterization to heavy metals for contractors / removalists was estimated following the methodology of the Australian Institute of Occupational Hygienists, Simplified Occupational Hygiene Risk Management Strategies, explained in section 5.2.6. This risk assessment showed a heavy metals health risk for contractors / removalists to be medium. It means that personal protection equipment (PPE) and active monitoring for inhalable heavy metals will be required at the time of the removal.

During removal, the following generic procedures should be followed:

- Delineate and restrict access to the areas affected by Heavy Metal dust. If access into the delineated areas is gained appropriate PPE must be worn.
- In agreement with the AS/NZS 4361.1:2017 "*Guide to lead paint management Part 1 Lead and other hazardous metallic pigments in industrial applications*" Appendix I "Worker Protection" a respirator suited with a filter for particulates with a minimum protection factor of 10 (for wet and vacuum removal methods) will be required. Additionally disposable overalls, disposable gloves, disposable shoe covers and goggles may be considered as appropriate PPE. Please note that the dust to remove also contains PAHs, therefore in addition to the first particle filter a second filter to retain the PAHs will also be necessary. Organic vapor cartridges filter will be satisfactory.
- All access to the removal spaces should be sealed in order to prevent dust contaminating adjacent areas.
- For further information on Lead Risk Work and Employee Health Surveillance, refer to NSW Work Cover *Lead Risk Work: Notification Guideline.*
- Personal monitoring for airborne heavy metals should be carried out during any removal operations. Refer to WHS Regulation, 2017 and in accordance with the Australian Standard AS3640-2009.
- Spreading of dust into clean areas should be prevented.
- The use of vacuum cleaners which comply with *AS/NZS 3544 Industrial vacuum cleaners for particulates hazardous to health*, to prevent the release of lead containing dust while it is being removed.
- A visual clearance inspection should be carried out after the removal operations are completed.
- Transport and final disposal of lead dust waste material shall be carried out in a manner that will prevent the liberation of lead dust to the atmosphere. All lead dust waste material shall be buried at an approved OEH landfill and in a manner approved by the local and state authorities (Refer to *Waste Classification Guidelines - Part 1: Classifying Waste*, NSW EPA, November 2014).

6.7 Polychlorinated biphenyls (PCBs)

At the time of the hazardous materials inspection, NO PCB's containing ballasts and capacitors were suspected in the fluorescent light fittings of the two buildings. PCB's were NOT suspected due to the age and appearance of the capacitors inside the lights.

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However during demolition works if PCB's are identified then the following procedures are required: Safe working methods, in accordance with the Polychlorinated Biphenyls Management Plans, Revised Edition April 2003 and the PCB Code of Practice for the safe handling of equipment containing Polychlorinated Biphenyl (PCB) Electrical contractor's Associations of Australia Ltd 1993, must be followed, when removing light fittings containing or suspected to contain PCBs. These recommend procedures include:

- Isolate the affected area from air conditioning ventilation and ventilate the area separately to prevent cross-contamination.
- Qualified contractors for the removal of the PCB's containing ballast or capacitors must wear PPE consisting of disposable Tyvek coveralls, chemically resistant gloves made of polyethylene or nitrile rubber, disposable Tyvek shoe covers, mask with organic vapour filters, safety glasses and face shield; PPE made of PVC and natural rubber must be avoided.
- The area must be de-energised prior removal.
- The lamp covers and fluorescent tubes are to be removed first.
- The material that appears to be contaminated with PCB leakage should be place in an approved container for transportation; refer to the Australian Government Department of Infrastructure and Regional Development, Australian Code for the transport of Dangerous Goods by Road and Rail.
- PCB's containing or contaminated materials must be disposed in a PCB remediation waste for disposal facility.
- In the unlikely event of PCB's leakage / spillage, it is recommended to use paper toweling, sawdust, wood, straw or soil to absorb the spill; all PCB's contaminated material must be disposed of with the PCB containing capacitors.
- It is recommended to employ good personal hygiene practices such as showering following removal.

(Maintenance of existing light fittings in good condition)

- Maintain the light fittings in working electrical order.
- Clean up the PCB oil inside the fittings as faults occur to make sure spillage / leakage does not occur.

For further information regarding the handing and removal of PCBs, please refer to WHS guidelines.

6.8 Ozone depleting substances (ODS)

At the time of the hazardous materials inspection, ODS refrigerant gas was NOT suspected in the air conditioning in the two building structures.

However, during demolition works if ODS refrigerant gases are identified, it is recommended to remove and dispose of the air conditioning units by a licensed contractor in accordance with the Ozone Protection and Synthetic Greenhouse Gas Management Amendment Regulation 2012 prior to refurbishment works. A licensed air conditioning contractor who will recycle and reuse the

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refrigerant should decommission CFC and HCFC based equipment that is being disposed of in accordance with Association of Fluorocarbon Consumers and Manufacturers, The Australian Refrigeration and Air Conditioning Code of Good Practice – 1992 and the Ozone Protection and Synthetic Greenhouse Gas Management Act.

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7. LIMITATION STATEMENT

This report has been prepared in accordance with the agreement between the client and ECON Environmental. Within the limitations of the agreed upon scope of services, this work has been undertaken and performed in a professional manner, in accordance with generally accepted practices, using a degree of skill and care ordinarily exercised by members of its profession and consulting practice. No other warranty is expressed, implied, made or intended.

This report is solely for the use of the client and any reliance on this report by third parties shall be at such party's sole risk and may not contain sufficient information for purposes of other parties or for other uses. This report shall only be presented in full and may not be used to support any other objective than those set out in the report, except where written approval with comments is provided ECON Environmental. The following should also be noted:

While the survey has attempted to locate all the hazardous materials, the survey was a visual inspection and sampling process. Only those hazardous materials that were physically accessible could be located and identified. Therefore, it is possible that materials which may be concealed within inaccessible areas/voids, may not have been located during the survey. Such inaccessible areas fall into a number of categories:

- Locations behind locked doors,
- In set ceilings or wall cavities,
- Those areas accessible only by dismantling equipment or performing minor localized demolition works,
- Service shafts, ducts etc., concealed within the building structure,
- Voids or internal areas of plant, equipment, air-conditioning ducts, etc.,
- Totally inaccessible areas such as voids and cavities created and intimately concealed within the building structure (these voids are only accessible during major demolition works); and
- Height restricted areas,
- Latent asbestos contamination may not be identified on the site during the time of the visual inspection. Due to the nature of this identifiable contamination, it is likely that further ACM may be identified in the future subsequent to further weathering and site work.

Destructive surveying and sampling techniques were not employed to gain access to those areas listed above. Consequently, without substantial demolition of the building, it is not possible to guarantee that every source of asbestos has been detected.

It is recommended that an asbestos 'Unexpected Finds Procedure' (UFP) be established and implemented during any future site works. The UFP should include steps such as:

- Stop work
- Isolate the area (plus 10m in each direction where practicable)
- Signpost the area with asbestos warning signs (or Danger/Warning signs at a minimum)
- Contact ECON Environmental to inspect and test the material and provide further advice.

Inaccessible or obscured area may contain ACM, SMF, Lead paint/lead containing dust & PCB's. These may include but are not limited to; false ceilings, material within or beneath concrete, behind wall linings, beneath floor coverings, behind tiles, or within areas with limited access including subfloors, ceiling spaces and the like. Also, some occurrences may have been presumed positive /negative or presumed similar to another occurrence.

Therefore prior to any refurbishment works, further investigations should be performed using destructive survey sampling techniques. During the course of normal site works care should be exercised when entering any previously inaccessible areas and it is imperative that work cease pending further sampling if materials suspected of containing asbestos or unknown materials are encountered. This report is not intended to be used for the purposes of tendering, programming of works, refurbishment works or demolition works unless used in conjunction with a specification detailing the extent of the works. To ensure its contextual integrity, the report must be read in its entirety and should not be copied, distributed.

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APPENDIX A: HAZARDOUS MATERIALS REGISTER

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HAZARDOUS MATERIALS REGISTRY

Address: 40 & 42 Mamre Road, St Marys NSW 2760
Inspection date: 19.05.2021
Hygienist: Con Kariotoglou (LAA001006) - ECON Environmental Pty Ltd

Consequence : 5 Severe/ 4 Major/ 3 Moderate/ 2 Minor/ 1 Negligable
Likelihood: A Almost Certain/ B likely/ C Possible/ D Unlikely/ E Rare / F Negligable

Risk Rating: E= Extreme / H= High / M= Medium / L= Low / N= Negligible

Date	Event	LOCATION			MATERIAL DESCRIPTION								RISK MANAGEMENT					CORRECTIVE ACTIONS			
		Building	Room	Surface	Material Application	Quantity	Units	Sample Type	Sample ID No.	Photo No.	Analytical Result	Condition	Consequence (1-5)	Likelihood (A-F)	Risk Status	Control Recommendations/ Comments	Review date	Consultant/ Hygienist Name	Control Action Taken	Date actioned	Contractor details
19.05.2021	1	40 Mamre Road	Exterior	Walls	Compressed Cement Sheeting	approx 200	sq m	Fibre-cement	AS1	1, 2	Synthetic Mineral Fibre	Good	1	F	Low	Remove as per normal demolition methods	N/A				
19.05.2021	2	40 Mamre Road	Exterior	Electrical Backing Boards	Compressed Cement Sheeting	approx 0.1	sq m	Asbestos	-	3	Visually & Labelled identified as containing ACM	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				
19.05.2021	3	40 Mamre Road	EXterior	Eaves	Compressed Cement Sheeting	30	sq m	Asbestos	-	4	Visually identified as containing ACM	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				
19.05.2021	4	40 Mamre Road	Garage	Walls & Roof	Compressed Cement Sheeting	60	sq m	Asbestos	-	5, 6	Visually identified as containing ACM	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				
19.05.2021	5	42 Mamre Road	Exterior	Walls	Compressed Cement Sheeting	approx 200	sq m	Asbestos	-	11, 12, 13, 22	Visually identified as containing ACM	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				
19.05.2021	6	42 Mamre Road	Rear Toilet	Walls & Ceiling	Compressed Cement Sheeting	approx 16	sq m	Asbestos	-	14	Visually identified as containing ACM	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				
19.05.2021	7	42 Mamre Road	Interior Rear Sunroom	Walls & Ceiling	Compressed Cement Sheeting	approx 100	sq m	Asbestos	-	15, 16	Visually identified as containing ACM	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				

Date	Event	LOCATION			MATERIAL DESCRIPTION								RISK MANAGEMENT					CORRECTIVE ACTIONS			
		Building	Room	Surface	Material Application	Quantity	Units	Sample Type	Sample ID No.	Photo No.	Analytical Result	Condition	Consequence (1-5)	Likelihood (A-F)	Risk Status	Control Recommendations/ Comments	Review date	Consultant/ Hygienist Name	Control Action Taken	Date actioned	Contractor details
19.05.2021	8	42 Mamre Road	Interior Front Sunroom	Walls & Ceiling	Compressed Cement Sheeting	60	sq m	Asbestos	-	19, 20	**Visually identified as containing ACM**	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				
19.05.2021	9	42 Mamre Road	Interior Front Bedroom	Walls & Ceiling	Compressed Cement Sheeting	100	sq m	Asbestos	-	21	**Visually identified as containing ACM**	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				
19.05.2021	10	42 Mamre Road	Rear Garage	Walls & Roof	Compressed Cement Sheeting	100	sq m	Asbestos	-	23, 24	**Visually identified as containing ACM**	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				

		Consequence Rating (Health Effect)				
		1 Negligible	2 Minor	3 Moderate	4 Major	5 Severe
Likelihood Rating	A Almost Certain	M	H	H	E	E
	B Likely	M	M	H	H	E
	C Possible	L	M	M	H	H
	D Unlikely	L	L	M	M	H
	E Rare	L	L	L	M	M
	F Negligible	N				

E= Extreme – needs urgent and immediate senior executive management attention;
H= High – requires proactive management (controls);
M= Medium – require active monitoring;

L= Low – will likely not require active management, other than existing routine procedures;

N= Negligible – No action is required.

APPENDIX B: SITE PHOTOGRAPHS

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Photo 1: Showing subject site at 40 Mamre Road, St Marys NSW, looking east.

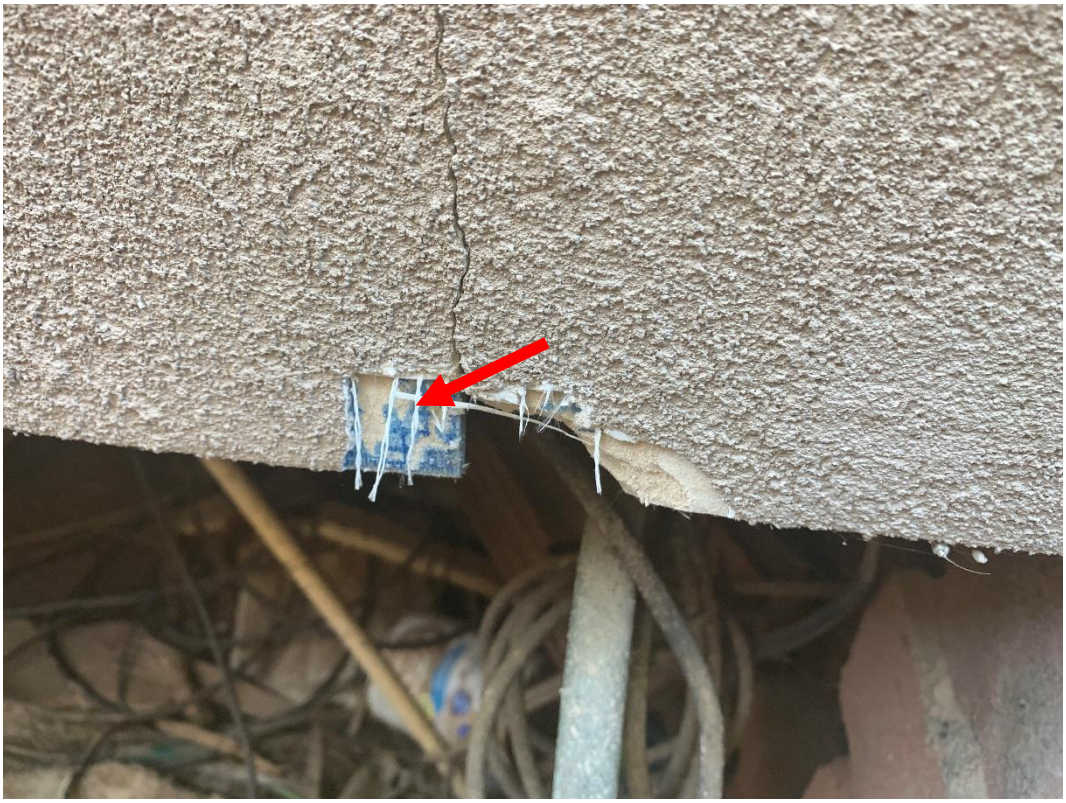

Photo 2: Showing sample AS1 location, external walls of 40 Mamre Road, St Marys, does NOT contain ACM.

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Photo 3: Showing electrical meter backing boards of 40 Mamre Road, S Marys, contains ACM.

Photo 4: Showing exterior perimeter eaves of 40 Mamre Road, St Marys, contains ACM.

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Photo 5: Showing rear garage walls of 40 Mamre Road, St Marys, contains ACM.

Photo 6: Showing rear garage roof of 40 Mamre Road, St Marys, contains ACM.

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Photo 7: Showing interior living areas of 40 Mamre Road, no ACM detected.

Photo 8: Showing interior laundry area of 40 Mamre Road, no ACM detected.

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Photo 9: Showing interior bedrooms of 40 Mamre Road, no ACM detected.

Photo 10: Showing interior kitchen of 40 Mamre Road, no ACM detected.

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Photo 11: Showing subject site at 42 Mamre Road, St Marys NSW, looking east.

Photo 12: Showing external walls beneath existing cladding at 42 Mamre Road, St Marys NSW, contains ACM.

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Photo 13: Showing external rear walls at 42 Mamre Road, St Marys NSW, contains ACM.

Photo 14: Showing interior toilet walls and ceiling at 42 Mamre Road, St Marys NSW, contains ACM.

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Photo 15: Showing interior sunroom walls and ceiling at 42 Mamre Road, St Marys NSW, contains ACM.

Photo 16: Showing interior dining walls and ceiling at 42 Mamre Road, St Marys NSW, contains ACM.

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Photo 17: Showing interior kitchen at 42 Mamre Road, St Marys NSW, no ACM detected.

Photo 18: Showing interior bathroom at 42 Mamre Road, St Marys NSW, no ACM detected.

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Photo 19: Showing front sunroom ceiling at 42 Mamre Road, St Marys NSW, contains ACM.

Photo 20: Showing front sunroom walls at 42 Mamre Road, St Marys NSW, contains ACM.

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Photo 21: Showing front bedroom walls and ceiling at 42 Mamre Road, St Marys NSW, contains ACM.

Photo 22: Showing exterior side walls at 42 Mamre Road, St Marys NSW, contains ACM.

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Photo 23: Showing exterior walls of garage at 42 Mamre Road, St Marys NSW, contains ACM.

Photo 24: Showing exterior roof of garage at 42 Mamre Road, St Marys NSW, contains ACM.

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APPENDIX C: UNEXPECTED ASBESTOS FINDS PROTOCOL

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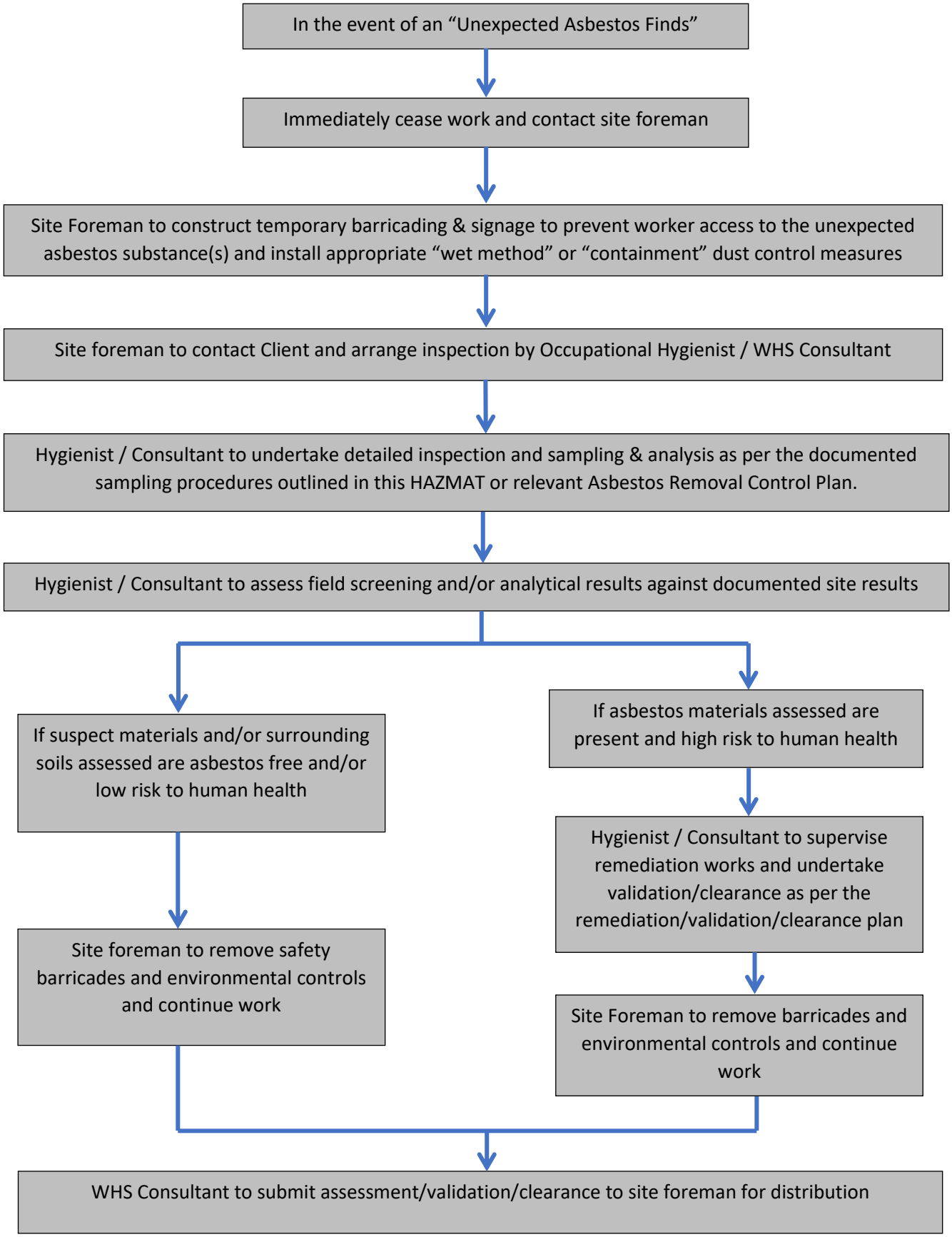

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