

PRELIMINARY SITE INVESTIGATION

5 McDermott Avenue, Goonellabah, NSW 2480

Job Number: 218158

For:

Social Futures

By:

ENV Services

Date:

August 2023

ENV Services

313 River Street, Ballina NSW 2478

T: 1300 861 325

E: admin@envsolutions.com.au

www.envsolutions.com.au

DOCUMENT CONTROL

Job No:	Job Number: 218158
Client:	Social Futures
Filename:	218158 – Phillip St Goonellabah PSI_202308

	Name:	Date:	Signature:
Prepared By:	Carson Clark	16/08/2023	
Reviewed By:	Ben Pieterse	16/08/2023	
Approved By:	Ben Pieterse	16/08/2023	

SCOPE OF ENGAGEMENT AND LIMITATIONS

This report has been prepared by ENV Services at the request of Social Futures for the purpose of a Preliminary Site Investigation. No other parties may rely on the contents of this report for any purposes except those stated.

This report has been prepared based on the information provided to us and from other information obtained as a result of enquiries made by us. ENV accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this document for a purpose other than that described above.

No part of this report may be reproduced, stored, or transmitted in any form without the prior consent of ENV.

ENV declares that it does not have, nor expects to have, a beneficial interest in the subject project.

To avoid this advice being used inappropriately, it is recommended that you consult with ENV before conveying the information to another who may not fully understand the objectives of the report. This report is meant only for the subject site/project and should not be applied to any other.

TABLE OF CONTENTS

1	Introduction	1
1.1	Objective	1
1.2	Scope of Works	1
1.3	Technical and Regulatory Framework.....	1
2	Site Description and Characteristics	3
2.1	Site Identification Details	3
2.2	Zoning and Land Use	3
2.3	Topography and Drainage	3
2.4	Geology and Soils.....	3
2.5	Surface Water Bodies and Flooding.....	4
2.6	Groundwater Resources.....	4
2.7	Surrounding Environment.....	4
2.8	Contaminated Land Record and Record of Notices.....	4
2.9	POEO Act Public Register Search	5
2.10	Cattle Dip Sites	5
2.11	Historical Aerial Photographs.....	5
2.12	Site Inspection	5
3	Conceptual Site Model.....	7
3.1	Contamination Sources	7
3.2	Chemicals of Potential Concern.....	7
3.3	Potentially Affected Environmental Media	7
3.4	Potential Migration and Exposure Pathways	7
3.5	Potential Receptors of Contamination.....	8
4	Data Quality Objectives	9
4.1	Step 1: State the Problem	9
4.2	Step 2: Identify the Decision(s).....	9
4.3	Step 3: Inputs into the Decision(s).....	9
4.4	Step 4: Define the Study Boundaries	9
4.5	Step 5: Develop the Analytical Approach (Decision Rule).....	9
4.6	Step 6: Specify the Performance or Acceptance Criteria	10
4.7	Step 7: Optimise the Design for Obtaining Data	11

5	Site Investigation Methodology	12
5.1	Site Inspection Overview.....	12
5.2	Sampling and Analysis Plan	12
5.3	Justification of Sampling Design and Analysis Plan	13
6	Results.....	14
6.1	Site Inspection	14
6.2	Laboratory Analysis Results.....	14
6.3	QA/QC Results	14
6.4	Summary of Data Usability.....	15
7	Discussion and Conclusion	16
8	References.....	1

LIST OF TABLES

Table 1: Site Details	3
Table 2: Summary of QA Sample Parameters for Assessing Data Reliability.....	10
Table 3: Soil Sampling Methodology	12
Table 4: Summary of QA/QC Indicators and Results	15

LIST OF APPENDICES

Appendix A	Figures
Appendix B	Photolog
Appendix C	Laboratory Results and Documentation
Appendix D	Field QA Results - RPD Calculations

LIST OF ACRONYMS

Below is a list of commonly used acronyms in this report:

COC	Chain of Custody
COPC	Chemical of Potential Concern
EILs	Ecological Investigation Levels
ENV	ENV Services Pty Ltd
HILs	Health Investigation Levels
NEPC	National Environment Protection Council
NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)
NSW EPA	New South Wales Environment Protection Authority
QA/QC	Quality Assurance and Quality Control

EXECUTIVE SUMMARY

ENV Services Pty Ltd (ENV) has undertaken a Preliminary Site Investigation (PSI) at 5 McDermott Avenue Goonellabah, NSW 2480 (hereafter referred to as the 'site'). ENV understands that the PSI has been requested to support a re-development of the site, in accordance with the requirements under the State Environmental Planning Policy (Resilience and Hazards) 2021.

The PSI included the following components:

- A desktop review of the site conditions, history and surrounding environment;
- Identification of past and present potentially contaminating activities and chemicals of potential concern (COPC);
- An inspection of the site and adjacent areas of land;
- Development of a preliminary conceptual site model (CSM);
- Collection of soil samples from twelve (12) discrete sampling locations within the site, which covers a total area of approximately 1,800 m² (the Investigation Area);
- Assessment of the soil analytical results against relevant Tier 1 investigation levels detailed in the *National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 1999, as amended 2013* (NEPC, 2013); and
- Assessment of the environmental suitability of the site for potential future land uses. For the purposes of this investigation, sensitive land use (residential) criteria have been adopted.

From the desktop review, a preliminary CSM was developed. The preliminary CSM concluded that historical and current land use of the site may have included agricultural activities (grazing). The desktop study and site history review identified one previous structure, not currently present on site, however no contamination was identified in its historical location.

Considering that the site has a history of agricultural use, potential sources of contamination include the use of pesticides, fertilisers, and metals from general farming practices. As such, identified COPC included organochlorine pesticides (OCPs) and metals. Potentially affected environmental media were deemed to primarily comprise surface soils.

A site inspection and soil sampling program were undertaken on 2 August 2023, with no olfactory or visible signs of contamination observed, however some discarded materials including plastics, wood, paint flakes, bolts and tiles were observed. Soil samples were collected from the upper soil stratum (0 to 0.15 mBGL) at twelve (12) discrete locations.

Laboratory analysis results reported concentrations of metals exceeding site specific EILs at sites B1_01 and SS07. These exceedances were not deemed to pose an ecological risk as under the proposed redevelopment, the majority of the block will be sealed beneath structural envelopes or concrete hardstand. No OCPs were detected on site.

Based on the PSI findings, the investigation area is deemed suitable for the planned demolitions and development of a new multi-unit residential dwelling from a chemical perspective.

It is noted that metal concentrations were also found to exceed criteria stated in the Excavated Natural Material Order (ENM) (2014), at site B1_01. If excavated, waste soils will be required to be isolated and deposited off site at a registered, licensed facility.

1 INTRODUCTION

ENV Services Pty Ltd (ENV) was engaged by David McGrath of Social Futures, to complete a Preliminary Site Investigation (PSI) for 5 McDermott Avenue, Goonellabah, NSW 2480 (hereafter referred to as the 'site'). ENV understands that the PSI has been requested to support a potential re-development at the site, in accordance with the requirements under the State Environmental Planning Policy (Resilience and Hazards) 2021.

This PSI has been prepared in general accordance with the requirements of the NSW EPA (2020) document entitled *Consultants Reporting on Contaminated Land (Contaminated Land Guidelines)*, and the *Northern Rivers Regional Policy for the Management of Contaminated Land* (Northern Rivers Regional Councils, 2007).

1.1 Objective

The objective of the PSI was to assess the potential for contamination to exist at the site as a result of historical or current land uses; and if further investigation and/or remediation is required for the site to be considered suitable for future uses (including urban/residential), from a chemical perspective.

1.2 Scope of Works

The PSI included the following components:

- A desktop review of the site conditions, history and surrounding environment;
- Identification of past and present potentially contaminating activities and chemicals of potential concern (COPC);
- An inspection of the site and adjacent areas of land;
- Development of a preliminary conceptual site model (CSM);
- Collection of soil samples from twelve (12) discrete sampling locations within the site, which has a total area of 1,800 m² (the Investigation Area);
- Assessment of the soil analytical results against relevant Tier 1 investigation levels detailed in the *National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 1999, as amended 2013* (NEPC, 2013); and
- Assessment of the environmental (chemical) suitability of the site for potential future land uses. For the purposes of this investigation, (urban/residential) criteria have been adopted.

1.3 Technical and Regulatory Framework

The following technical and regulatory framework has been considered in preparing this PSI:

- Contaminated Land Management Act 1997 (CLM Act);
- Environmental Planning and Assessment Act 1979;
- State Environmental Planning Policy (Resilience and Hazards) 2021;
- *Sampling Design Guidelines* (NSW EPA, 2022);

- *National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 1999, as amended 2013 (NEPC, 2013);*
- *Consultants Reporting on Contaminated Land (Contaminated Land Guidelines) (NSW EPA, 2020); and*
- *Regional Policy for the Management of Contaminated Land (Northern Rivers Regional Councils, 2007).*

2 SITE DESCRIPTION AND CHARACTERISTICS

2.1 Site Identification Details

Table 1 provides an overview of relevant identification details for the site. The site location is depicted in Figure 1 and Figure 2, Appendix A.

Table 1: Site Details

Site Address	5 McDermott Avenue Goonellabah NSW 2480
Real Property Description	Lot 69,70,71, DP 230448
Site Area	1,800 m ²
Investigation Area	1,800 m ²
Local Government Area	Lismore City Council
Existing Land Use	Residential
Proposed Land Use	Residential

2.2 Zoning and Land Use

Under the Lismore Local Environmental Plan (LEP) (2012), the site is zoned General Residential (R1).

An excerpt of Lismore City Council's land use zoning map is provided as Figure 10, Appendix A.

2.3 Topography and Drainage

According to Geoscience Australia (2021), the site is located in a relatively sloped area, at an elevation of approximately 160 metres Australian Height Datum (AHD). Surface water likely drains east/south-east towards the Goonellabah Sports and Aquatic Centre before feeding into the headwaters of Tucci Tucci Creek. This system flows into Henderson's Drain, which ultimately discharges into the Richmond River.

2.4 Geology and Soils

The site is mapped as lying within the Wollongbar soil landscape (9540wo) by the NSW Department of Environment's eSPADE v.2.2 webapp. The soil landscape is summarised as:

- Soils – Mostly deep (>200cm), well-drained Krasnozems (Gn3.11, Gn4.11, Uf5.22) with shallower (80 -150 cm), stonier Krasnozems (Gn3.11, Gn4.11, Uf5.22) on crest/upper slope boundaries. Wet alluvial Krasnozems (Uf5, Uf6) in drainage lines.
- Geology – Lamington Volcanics: Lismore Basalts—Tertiary basalts, with bole and minor agglomerate.

Site observations during the sampling program noted moderately well-drained, Red Krasnozems soils, consistent with the Wollongbar landscape profile. Some fill soils were also encountered close to and below residential dwellings.

Reference to acid sulfate soil (ASS) risk (Lismore LEP, 2012) indicates the site is not mapped with respect to ASS.

2.5 Surface Water Bodies and Flooding

The site does not reside within proximity to any creeks or rivers, with the closest waterway being a drain that runs into Tucci Tucci Creek, approximately 500m to the east. Tucci Tucci Creek is a freshwater system that flows overland into the Richmond River, and ultimately the Pacific Ocean.

The site is mapped by the Lismore City Council as being outside any flood planning area (Lismore LEP, 2012).

2.6 Groundwater Resources

A search of the WaterNSW Realtime groundwater database was completed on 1 August 2023. The search indicated there are no licensed groundwater bores within 500 m of the site.

2.7 Surrounding Environment

The site is located on the corner of McDermott Avenue and Phillip Street, in Goonellabah NSW. Land use immediately surrounding the site can be summarised as:

- North: McDermott Avenue and Quilty Place followed by medium density residential.
- South: Medium density residential.
- East: Phillip Street followed by medium density residential.
- West: Medium density residential followed by sporting reserve.

No potentially contaminating land uses were identified in the immediate vicinity of the investigation area.

2.8 Contaminated Land Record and Record of Notices

The NSW EPA Contaminated Land Record (EPA Notifications) contains a list of sites which have been notified to the NSW EPA under the Contaminated Land Management Act 1997 (CLM Act). Upon receiving the notification, the EPA then assesses the contamination status of the site and decides whether the contamination is significant enough to warrant formal regulation by the EPA in accordance with the provisions of the CLM Act. The NSW EPA Record of Notices contains selected information about sites which have been issued with a Regulatory Notice by the NSW EPA under the CLM Act.

The NSW EPA Contaminated Land Record and Record of Notices were searched on 1 August 2023. One record, noted as McDermotts Cattle Dip was identified approximately 500m north-east of the site (NSW EPA, 2021). Details of the dip are presented in Section 2.10.

2.9 POEO Act Public Register Search

The Protection of the Environment Operations Act 1997 (POEO Act) Public Register contains information about environment protection licences, licence applications, notices issued under the POEO Act, and pollution studies and reduction programs.

The POEO Act Public Register was searched on 1 August 2023 for the area of Goonellabah, with no records identified within 500m of the site.

2.10 Cattle Dip Sites

The NSW DPI's cattle dip site locator was searched on 1 August 2023 with one dip identified within 500m of the site. McDermotts Cattle Dip lies approximately 500m to the north-east of the site. The dip is not considered to be a threat of contamination due to its distance from the property, current inactive status, and downhill gradient from the site.

2.11 Historical Aerial Photographs

A review of five (5) aerial photographs (dated 1958, 1979, 1991, 1997, and 2013) was undertaken to assess changes in land use at the site and immediate surrounds. Aerial photographs were accessed through the NSW Historical Imagery Viewer and Google Earth.

The review of historical aerial photographs indicates that the site has been used for residential purposes since at least 1979. Aerial images show a structure present on site since 1958, however image quality makes it hard to determine the building's purpose. Two original structures appear on site from 1979 until 2013 and appear to be present as modern-day infrastructure. The site appears to remain the same from 1979 until 1997 with small changes in vegetation growth as an exception. In 2013 a large new structure has appeared on the western side of the site which remains to 2023.

Historical land use of nearby properties includes residential and agriculture (primarily cattle) until approximately 1979. From 1979, the surrounding areas experience rapid growth in housing and infrastructure with the site encompassed by new developments. A large sporting reserve is also developed approximately 100 m to the west. Copies of the historical aerial photographs are provided as Figure 3 to Figure 7, Appendix A.

2.12 Site Inspection

A site inspection was undertaken by ENV on 2 August 2023, concurrent with the soil sampling program.

At the time of the inspection, the investigation area comprised two brick, residential dwellings containing multiple units. A car shade area had also been developed on the western side of the block which had been bitumised and connected to the driveway at the entrance to the property. A large portion of the site comprised grassed or vegetated areas with some garden beds closer to the dwellings.

No field indicators (i.e. unnatural odours, soil discolouration or vegetation stress) or other additional sources of contamination were identified however some discarded building materials such as tiles,

paint flakes, bolts and plastics were observed on site. No loose or degraded potentially asbestos containing materials were observed.

3 CONCEPTUAL SITE MODEL

The information presented in the previous sections pertaining to the site characteristics, history, and surrounding environment, has been used to identify potential contamination sources from historic and current activities on the subject site; COPC associated with these sources, plausible receptors of contamination at the site and in off-site areas, and exposure pathways linking the contamination sources and receptors. This information is brought together in what is known as a conceptual site model (CSM), which is presented in the following sub-sections.

3.1 Contamination Sources

The investigation area currently supports three structures. Information from the site owner informs us two are residential structures and one is a parking garage.

The desktop study and site history review identified one structure to the west of the site that occurred across two lots. It is unknown what this building was used for but it is assumed residential based on the residential setting of the site. Historical land use of the site potentially included grazing (cattle). It is unknown whether any cropping has occurred on the site.

Considering that the site supports present and historic structures, potential sources of contamination include the historical use of pesticides and building materials. Some heavy metals and pesticides may also be considered as a product of general farming practices. It was noted that the neighbouring block on the western side of the site, incurred a development between 1997 and 2013, however this was not deemed to be a likely source of contamination.

3.2 Chemicals of Potential Concern

The COPC associated with the identified contamination sources include:

- Metals (e.g. lead, zinc); and
- Organochlorine pesticides (OCPs);

3.3 Potentially Affected Environmental Media

Potentially affected environmental media include surface soils. While other environmental media may be affected by the contamination sources described above, surface soils are considered the most likely media to be directly impacted by the presence of potential contamination sources. If the surface soils at the site are contaminated, it is possible that also other environmental media have been impacted, which will then require further investigation.

3.4 Potential Migration and Exposure Pathways

Potential migration pathways depend on several factors including the chemical properties of the contaminant, soil texture, topography, and hydraulic gradient of shallow groundwater etc.

The significance of different exposure pathways depends on the chemical properties of the contaminant. OCPs such as DDT are largely bound to soil particles and as a result, ingestion of soil

particles/dust is considered the major exposure pathway. However, other OCPs, including aldrin and dieldrin, are readily absorbed by oral, inhalation and dermal exposure routes (NEPC, 2013).

For inorganics (i.e., heavy metals) in soil, ingestion of soil and dust particles is considered the most significant human exposure pathway (NEPC, 2013).

In consideration of the above, potential migration pathways for identified COPC include:

- Volatilisation;
- Generation of dust;
- Stormwater run-off; and
- Plant uptake and bioaccumulation.

Subsequently, potential exposure pathways include:

- Direct contact (ingestion or dermal) with contaminated environmental media;
- Inhalation of dust;
- Ingestion of food grown in contaminated soils; and
- Direct toxicity for plants and terrestrial/aquatic ecosystems.

3.5 Potential Receptors of Contamination

Potential receptors of contamination have been identified as:

- Future workers and visitors on-site (commercial/industrial land use);
- Future construction workers on-site (any land use); and
- Terrestrial ecosystems on-site (any land use).

It is noted that the potential for off-site receptors to be exposed to contamination originating from the site depends on the nature and extent of the contamination, soil properties, local surface water and groundwater hydrology, and distance to the receptors. If contamination is identified on-site, additional investigations may be required to identify and assess the risk to potential off-site receptors.

4 DATA QUALITY OBJECTIVES

4.1 Step 1: State the Problem

ENV understands that a PSI is required to satisfy the requirements under the State Environmental Planning Policy (SEPP) for Resilience and Hazards (2021) in relation to the proposed re-development of the site. The purpose of the PSI is to assess the potential for contamination to exist as a result of current or previous land use.

4.2 Step 2: Identify the Decision(s)

The principal decisions (questions) for this investigation are:

- What are the current and previous land uses at the site and is there a potential for contamination to exist as a result of associated land use activities?
- What are the COPC associated with current and historical land uses?
- Do the concentrations of COPC exceed relevant assessment criteria for the protection of potential receptors?
- Is the investigation area suitable for future land uses from a contamination perspective, or is further investigation and/or remediation required?

4.3 Step 3: Inputs into the Decision(s)

To address the decisions in Step 2, the following activities were completed:

- A desktop review of relevant and available information, to gain an understanding of site characteristics, history and potential receptors, as well as to identify gaps in the existing data;
- An inspection of the site and surrounding areas; and
- Soil sampling and laboratory analysis of COPC.

4.4 Step 4: Define the Study Boundaries

The study boundaries were the site boundaries, with a total area of 1,800 m². The extent of the soil sampling program is depicted in Figure 2, Appendix A.

In terms of temporal boundaries, the site inspection and soil sampling program were undertaken over the course of one day, and therefore provides a snapshot only of the current soil conditions.

4.5 Step 5: Develop the Analytical Approach (Decision Rule)

The number of discrete soil sampling locations required for site characterisation was determined in accordance with NSW EPA (2022) and with reference to the size of the investigation area. Samples were collected using a systematic sampling pattern and involved the collection of soil samples from twelve (12) discrete locations. Soil samples were collected from the upper soil stratum (0-0.15 m below ground level [BGL]) and laboratory analysis results compared to generic (Tier 1) investigation

levels presented in the *NEPM* (NEPC, 2013). To characterise the site, the following statistical measures were adopted, with the results compared to the adopted assessment criteria:

- Maximum observed contaminant concentration of each COPC;

The precision (reproducibility), accuracy, representativeness and overall reliability of the data sets were assessed using the indicators presented in Table 2. This included the collection of appropriate quality assurance (QA) samples during soil sampling activities, and internal QA testing conducted by the analytical laboratories. The QA sampling regime was adopted in accordance with the *NEPM* (NEPC, 2013).

Table 2: Summary of QA Sample Parameters for Assessing Data Reliability

QA Sample Type	Media	Frequency	Acceptable Range of Results
Field Samples			
Intra-laboratory duplicate	Soil	1 per 20 primary samples	Relative percent difference (RPD) ≤50%
Inter-laboratory duplicate	Soil	1 per 20 primary samples	RPD ≤50%
Laboratory Samples			
Internal duplicate	Soil	1 per 10 primary samples	Laboratory specified
Matrix Spike	Soil	1 per sampling batch (20 samples)	Laboratory specified
Surrogate Spike	Soil	1 per sampling batch (20 samples)	Laboratory specified
Control Sample	Soil	1 per sampling batch (20 samples)	Laboratory specified
Laboratory Blank	Soil	1 per sampling batch (20 samples)	Results <LOR

4.6 Step 6: Specify the Performance or Acceptance Criteria

Assessment criteria were adopted from the Tier 1 investigation levels outlined in *Schedule B(1) Guideline on Investigation Levels For Soil and Groundwater* (NEPC, 2013) and included:

Low Density Residential Landuse:

- NEPM Health investigation levels (HILs): exposure settings A – residential, with garden accessible soil.
- NEPM Ecological investigation levels (EILs) for urban residential and public open space. This land-use setting is broadly equivalent to the HIL-A land use scenario. Site-specific EILs were calculated for selected metals (considered to be ‘aged’ contamination (≥2 years)) using the NEPM toolbox/EIL calculator. For these calculations, reasonably expected default values were adopted for pH, cation exchange capacity (CEC), clay content and total organic carbon (TOC), based on modelled soil properties in eSPADE¹ (Environment, Energy and Science, 2021). Generic EILs presented in the NEPM (2013) were also adopted for selected chemicals.
- Site Specific EIL’s - Criteria specific to soils identified in the Wollongbar (wo) Soil Landscape

Tier 1 investigation levels adopted for this PSI are summarised with the tabulated results in Appendix C. The investigation and screening levels contained in NEPC (2013) have been established through toxicity tests and field and laboratory experiments. Laboratory analysis data is simply used as an indicator of the presence and extent of contamination.

4.7 Step 7: Optimise the Design for Obtaining Data

The sampling regime was designed to collect soil data from surface soils. The design incorporated guidance and requirements presented in NEPC (2013), as well as other current industry standards relating to the objectives of the assessment. To optimise the design of the investigation, the sampling and analytical program was devised to specifically target information required to meet the PSI objectives.

5 SITE INVESTIGATION METHODOLOGY

5.1 Site Inspection Overview

A site inspection was completed concurrently with the soil sampling program on 2 August 2023. The aim of the site inspection was to assess the current condition of the site; and record any visible signs of contamination and potential contamination sources not identified by the desktop review.

5.2 Sampling and Analysis Plan

The soil sampling program comprised the collection of soil samples from the upper soil stratum (0 – 0.15 mBGL) at twelve (12) discrete locations within the investigation area, including two (2) samples taken below each structure where soils were accessible. Sampling locations are depicted in Figure 2, Appendix A. The soil sampling methodology is summarised in Table 3.

Table 3: Soil Sampling Methodology

Activity	Details
Sampling	- Soil samples were collected from twelve (12) discrete locations established based on a systematic sampling pattern across the investigation area, including two samples below each existing structure. - At each discrete sampling location, soil was loosened with a shovel and samples collected using a fresh pair of disposable nitrile gloves. Organic matter such as leaves and twigs were removed from the sample as much as practically possible prior to collection. - Samples were collected by appropriately qualified Environmental Scientists Carson Clark from ENV.
Field QA Samples	- Field duplicates were collected and analysed in accordance with NEPC (2013). - Two (2) field duplicates were collected, including intra- and inter-laboratory duplicate samples at location SS08.
Laboratory Analysis	All primary and duplicate samples were analysed for identified COPC.
Sample Preservation and Transport	- Samples were placed in laboratory-supplied sample jars, with no headspace. - Each sample was labelled with the project number, sampling date and unique sample identifier, and immediately placed into a chilled esky with ice, pending dispatch to the laboratory. - Samples were transported to a laboratory accredited by the National Association of Testing Authorities (NATA) for the required analysis, and with accompanying chain of custody (COC) documentation.
Decontamination Procedure	Any reusable equipment was cleaned between sampling locations. This involved washing with potable water and phosphate-free detergent (Decon 90).

5.3 Justification of Sampling Design and Analysis Plan

Justification for the sampling design and analysis plan is as follows:

- The number of discrete sampling locations was established in accordance with the *Sampling Design Guidelines* (NSW EPA, 2022). The sampling density was considered appropriate in consideration of the adopted COPC.
- Field-based sampling locations, including stratum and depth, were based on the results of the site history review and identified COPC. Generally, surface samples were collected from across the site area.
- COPC include contaminants that are persistent in the environment; and are recognised as having been used historically in the Northern Rivers region and Australia generally, for the following purposes:
 - Metals in building materials (i.e. lead based paints).
 - Application of pesticides beneath and around structures (i.e., OCPs, metals);
 - Use of pesticides and fertilisers for agricultural land use;

6 RESULTS

6.1 Site Inspection

The investigation area comprised two residential structures containing multiple dwellings in each. A car shade and bitumen driveway was also present.

Surface soils comprised well drained, red Kraznozems and some clayey fill beneath the dwellings. A significant portion of the block was grassed or covered with vegetation.

No discolouration, unnatural odours, vegetation stress or anthropogenic refuse was observed however some household trash such as plastics, cardboard and glass were noted. Discarded building materials including bricks, wood and plastics were also observed. No loose or degraded potential ACM was observed.

Photographs taken during the site inspection and soil sampling activities are provided in Appendix B.

6.2 Laboratory Analysis Results

Laboratory analysis results for soil samples are tabulated and provided in Appendix D, along with the laboratory issued reports and certificates.

Concentrations of zinc exceeding site specific EIL's were detected for samples B1_01 and SS07. Both sample points were noted to be in the immediate vicinity of structures on site. Notably, levels of lead and zinc also exceed waste classification criteria for ENM (2014) criteria at sit B1_01. No OCPs were detected.

Sample locations are depicted in Appendix A, Figure 2.

6.3 QA/QC Results

Quality assurance and quality control (QA/QC) involved an assessment of the completeness, comparability, representativeness, precision and accuracy of the investigation and collected data. Two RPD's for chromium and lead were found to marginally exceed the acceptable threshold of $\leq 50\%$. All sample concentration that exceeded the threshold was noted to be relatively low and well below the assessment criteria. As such, the exceedances are not considered to be of concern.

RPD results are presented in Table 4.

Table 4: Summary of QA/QC Indicators and Results

QA/QC Indicator	Compliance	Details
Details of Sampling Team	Yes	Field sampling was undertaken by an appropriately qualified Environmental Scientist from ENV, Carson Clark.
Sampling Plan Adhered To	Yes	All planned samples were collected and hence a complete dataset obtained.
Decontamination of Equipment	Yes	Reusable equipment was cleaned between sampling locations using a triple wash procedure. This involved washing with potable water and Phosphate free detergent (Decon 90).
Sample Collection	Yes	- Laboratory supplied jars used (no headspace). - Collected samples placed in cooler box with ice. - Each sample labelled with a unique sample ID. - Samples collected in accordance with the methodology detailed in Section 5.2.
Chain of Custody	Yes	COC was completed with full and demonstrable delivery of samples. COC documentation is presented in Appendix C.
Holding Times	Yes	Samples analysed within the laboratory specified holding times.
Sufficient Duplicates Analysed	Yes	- Field duplicates (inter- and intra-laboratory) collected in accordance with NEPC (2013) with a ratio exceeding 2 duplicates per 20 primary samples (2 duplicates per 16 primary samples). - Field duplicates were collected at sampling location SS08.
Field Duplicate Results – Relative Percentage Difference (RPD)	Yes	- RPDs were calculated between the primary sample and each of the corresponding duplicates. The calculated RPDs are tabulated and presented in Appendix D. - All calculated RPDs were below the acceptable threshold of $\leq 50\%$, with the exception of two internal duplicates from the metals analysis (chromium, lead) which were deemed not to be of concern.
Analyses NATA accredited	Yes	- Samples analysed by Eurofins in Sydney, which is NATA accredited for the analyses required. - Intra-laboratory sample analysed by the NATA accredited laboratory Envirolab.
Laboratory Internal QC	Yes	- Satisfactory internal quality control data reported. - Analytical methods used are presented in the Laboratory Reports, Appendix C.

6.4 Summary of Data Usability

On the basis of the calculated RPDs and other internal quality control data reported by the laboratories (Envirolab and Eurofins), the reproducibility, accuracy and representativeness of the analytical results is considered suitable to meet the objectives of this assessment, and to provide sufficient confidence in the primary dataset for interpretative purposes. N.B. no data has been excluded from the soil data sets for interpretation.

7 DISCUSSION AND CONCLUSION

The investigation area currently supports two residential structures containing multiple dwellings, a car shelter and bitumised driveway/parking area. Majority of the site is grassed or vegetated excluding buildings and the parking area. No field indicators (i.e. unnatural odours, soil discolouration or vegetation stress) or other additional sources of contamination were identified however some discarded building materials such as tiles, bolts, paint flakes, wood and plastics were observed on site.

Laboratory analysis results reported exceedances of site specific EIL's for zinc at sites B1_01 and SS07. Notably, both exceedances were within close proximity to current structures on site. No OCPs were detected.

Based on information provided by the landowner, the intended course of action involves the redevelopment of the site into an expanded residential complex featuring an additional story and underground parking area. While exceedances in site specific EIL's were noted, contaminant exposure was deemed to be low risk due to planned concrete hardstand and structures being developed on majority of the site. As a result, there is limited potential for complete ecosystem exposure pathways, and the risk is considered acceptably low.

Based on the PSI findings, the investigation area is deemed suitable for the development of a new multi-unit residential dwelling from a chemical perspective.

It is noted that metal concentrations were also found to exceed criteria stated in the Excavated Natural Material Order (ENM) (2014), at site B1_01. If excavated, waste soils will be required to be isolated and deposited off site at a registered, licensed facility.

8 REFERENCES

Lismore City Council, 2012. Lismore Local Environmental Plan (LEP) 2012.
<https://legislation.nsw.gov.au/view/html/inforce/current/epi-2013-0066>.

Google Earth, 2023. Google Earth: <https://earth.google.com/web/@-28.81290048,153.27793365,12.161254a,150.91447168d,35y,-0h,0t,0r>.

National Environment Protection Council (NEPC), 2013. *National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 1999* (as amended 2013). Commonwealth of Australia:
<http://nepc.gov.au/nepms/assessment-site-contamination>.

Northern Rivers Regional Councils, 2007. *Regional Policy for the Management of Contaminated Land*. Byron Shire Council: https://www.byron.nsw.gov.au/files/assets/public/hptrim/corporate-management-policies-current/policy-management-of-contaminated-land-adopted-131108-res-no-08-707-current_policies.pdf

NSW Contaminated Land Management Act (CLM Act), 1997. *NSW Legislation*. NSW Government: <https://legislation.nsw.gov.au/view/html/inforce/current/act-1997-140>

NSW Environment Protection Authority (EPA), 2020. *Consultants Reporting on Contaminated Land (Contaminated Land Guidelines)*. NSW Government: <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/contaminated-land/20p2233-consultants-reporting-on-contaminated-land-guidelines.pdf?la=en&hash=EBB6758A2DE448534B6FDD5057D280523E423CC7>.

NSW Department of Planning, Industry and Environment, 2018. *eSPADE v.2.2*. NSW Government: <https://www.environment.nsw.gov.au/eSpade2Webapp>.

NSW Department of Primary Industries (DPI), n.d. *Cattle dip site locator*. NSW Government: <https://www.dpi.nsw.gov.au/animals-and-livestock/beef-cattle/health-and-disease/parasitic-and-protozoal-diseases/ticks/cattle-dip-site-locator>.

NSW Historical Imagery Viewer, n.d. *Historical Imagery, Search and Discovery*. NSW Government: <https://portal.spatial.nsw.gov.au/portal/apps/webappviewer/index.html?id=f7c215b873864d44bccddda8075238cb>.

NSW Protection of Environmental Operations Act (POEO), 1997. *NSW Legislation*. NSW Government: <https://legislation.nsw.gov.au/view/html/inforce/current/act-1997-156>.

Standards Australia, 2005. *AS 4482.1-2005 Guide to the sampling and investigation of potentially contaminated soil – Non-volatile and semi-volatile compounds*. Standards Australia: <https://www.saiglobal.com/pdftemp/previews/osh/as/as4000/4400/4482.1-2005.pdf>.

APPENDIX A

Figures



Site Area (Approximate)

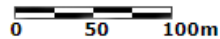


Figure 1 – Site Location
5 McDermott Avenue Goonellabah, NSW 2480
August 2023

Job No: 218158

Client: Social Futures

Project: Preliminary Site Investigation



Site Area (Approximate)



Sample Location (Approximate)

0 3 6m

ENV
Solutions
ENVIRONMENTAL | ASBESTOS | REMEDIATION | RESOURCE RECOVERY

Figure 2 – Sample Plan
5 McDermott Avenue Goonellabah, NSW 2480
August 2023

Job No: 218158

Client: Social Futures

Project: Preliminary Site Investigation



Site Area (Approximate)

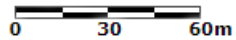


Figure 3 – Historical Aerial Imagery 1958
5 McDermott Avenue Goonellabah, NSW 2480
August 2023

Job No: 218158

Client: Social Futures

Project: Preliminary Site Investigation



Site Area (Approximate)

0 30 60m



Figure 4 – Historical Aerial Imagery 1979
5 McDermott Avenue Goonellabah, NSW 2480
August 2023

Job No: 218158

Client: Social Futures

Project: Preliminary Site Investigation



Site Area (Approximate)

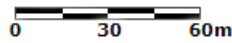


Figure 5 – Historical Aerial Imagery 1991
5 McDermott Avenue Goonellabah, NSW 2480
August 2023



Site Area (Approximate)

0 30 60m



Figure 6 – Historical Aerial Imagery 1997
5 McDermott Avenue Goonellabah, NSW 2480
August 2023

Job No: 218158

Client: Social Futures

Project: Preliminary Site Investigation



Site Area (Approximate)

0 30 60m



Figure 7 – Historical Aerial Imagery 2013
5 McDermott Avenue Goonellabah, NSW 2480
August 2023

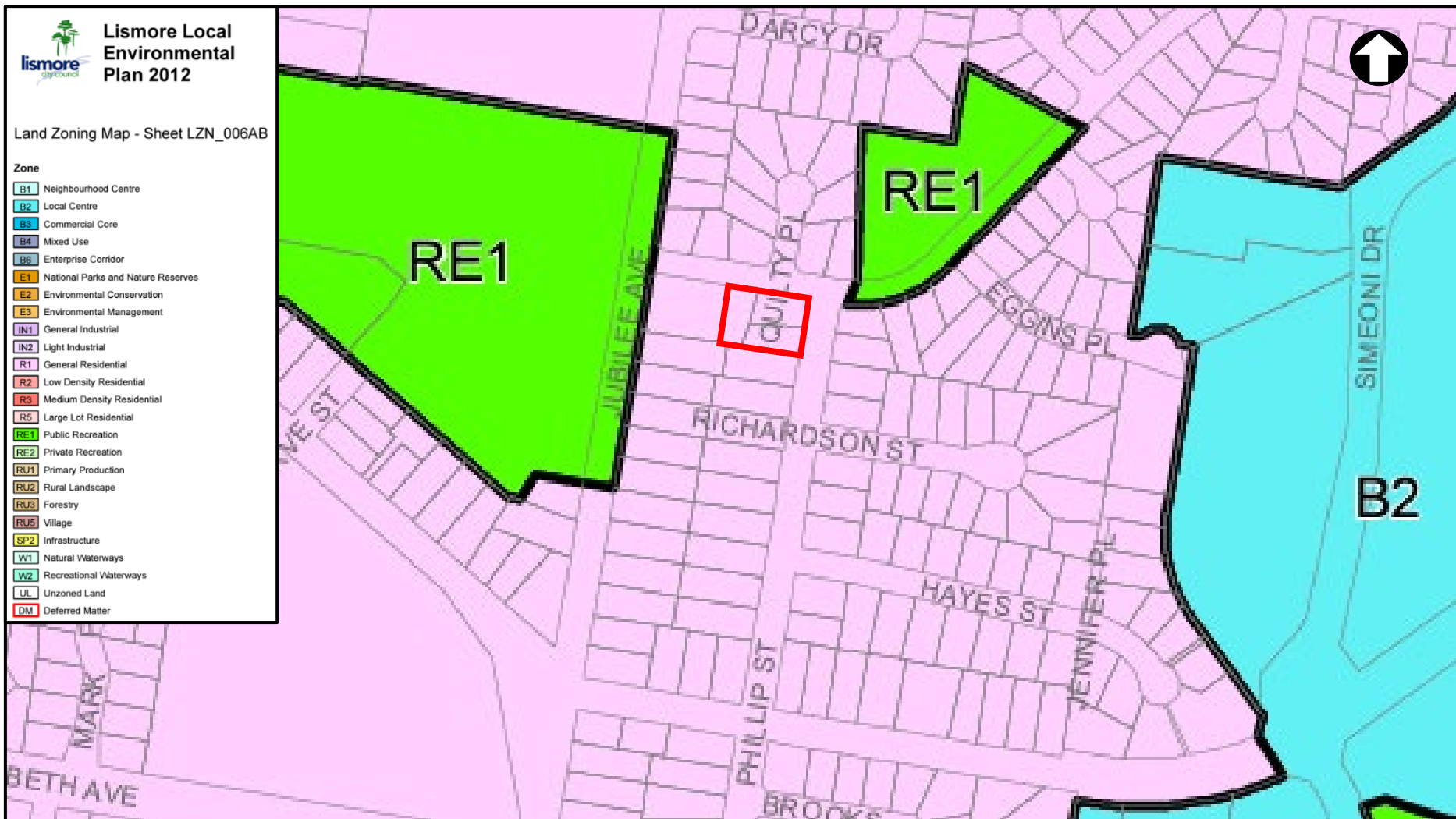
Job No: 218158

Client: Social Futures

Project: Preliminary Site Investigation

Zone

B1	Neighbourhood Centre
B2	Local Centre
B3	Commercial Core
B4	Mixed Use
B6	Enterprise Corridor
E1	National Parks and Nature Reserves
E2	Environmental Conservation
E3	Environmental Management
IN1	General Industrial
IN2	Light Industrial
R1	General Residential
R2	Low Density Residential
R3	Medium Density Residential
R5	Large Lot Residential
RE1	Public Recreation
RE2	Private Recreation
RU1	Primary Production
RU2	Rural Landscape
RU3	Forestry
RU5	Village
SP2	Infrastructure
W1	Natural Waterways
W2	Recreational Waterways
UL	Unzoned Land
DM	Deferred Matter



Site Area (Approximate)

0 30 60m

APPENDIX B

Photolog

Client Name Social Futures	Site Location 5 McDermott Avenue Goonellabah, NSW 2480	Project Preliminary Site Investigation
--------------------------------------	--	--

Photo No.	Date	
1	02/08/2023	
Description The site, viewed from the south-east. Current building structures, as well as vegetated portions of the site can be observed. No obvious visible signs of contamination can be observed.		

Photo No.	Date	
2	02/08/2023	
Description The site, viewed from the north-west. A car shade can be observed in the centre of the site, as well as the bitumised driveway and car park. Vegetation can be observed to the north of the site.		

Client Name Social Futures	Site Location 5 McDermott Avenue Goonellabah, NSW 2480	Project Preliminary Site Investigation
--------------------------------------	--	--

Photo No.	Date	
3	02/08/2023	
Description Image depicts soils at sample location B1_01. Discarded building materials including bricks, metal bolts and plastics can be observed. A bag of potting mix is also present.		

Photo No.	Date	
4	02/08/2023	
Description Image depicts soils at sample location B2_02. Discarded building materials including wood, bricks, plastics and glass can be observed.		

PHOTOGRAPHIC LOG

Client Name Social Futures	Site Location 5 McDermott Avenue Goonellabah, NSW 2480	Project Preliminary Site Investigation
--------------------------------------	--	--

Photo No.	Date	
5	02/08/2023	
Description Image depicts soil at sample location SS08. Building materials including tiles, and bricks can be noted next to the boundary fence. The sample location is partially vegetated.		

APPENDIX C

Laboratory Results and Documentation



CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

☒ Sydney Laboratory

179 Magowar Road, Girraween, NSW 2145

+61 2 9900 8400 EnviroSampleNSW@eurofins.com

☐ Brisbane Laboratory

Unit 1/21 Smallwood Place, Murarie, QLD 4172

+61 7 3902 4600 EnviroSampleQLD@eurofins.com

☐ Perth Laboratory

46-48 Banksia Road, Welshpool, WA 6106

+61 8 6253 4444 EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory

6 Monterey Road Dandenong South VIC 3175

+61 3 8564 5000 EnviroSampleVic@eurofins.com

Company		ENV Solutions		Project No		218158		Project Manager		Carson Clark		Sampler(s)		Carson Clark																	
Address		313 River St Ballina PO Box 248 Ballina NSW 2478		Project Name		Phillip St Goonellabah Development		EDD Format		Esdat		Handed over by		CC																	
Contact Name		Carson Clark		Analysis When results are required, please specify "Total" or "Range" NOTE: code must be used by about 10:00 AM		MB		OCP's						Email for Invoice		accounts@envsolutions.com.au															
Phone No		477112502												Email for Results		carson.clark@envsolutions.com.au labresults@envsolut															
Special Directions		Please send sample QA to Envirolab Sydney to test for MB & OCP's.												Containers		Required Turnaround Time (TAT)															
Purchase Order														Change container type & size if necessary.		Default will be 5 days if not noted.															
Quote ID No		220829ESON										500mL Plastic		250mL Plastic		125mL Plastic		200mL Amber Glass		40mL VOA vial		500mL PFAS Bottle		Jar (Glass or HDPE)		Other (Asbestos AS4804, WA Guidelines)		Sample Comments / Dangerous Goods Hazard Warning			
No	Client Sample ID	Sampled Date/Time	Matrix	Solid (S)	Water (W)																										
1	SS01	02.08.2023	S	X	X																										
2	SS02	02.08.2023	S	X	X																										
3	SS03	02.08.2023	S	X	X																										
4	SS04	02.08.2023	S	X	X																										
5	SS05	02.08.2023	S	X	X																										
6	SS06	02.08.2023	S	X	X																										
7	SS07	02.08.2023	S	X	X																										
8	SS08	02.08.2023	S	X	X																										
9	QC	02.08.2023	S	X	X																										
10	QA	02.08.2023	S																												
Total Counts						9	9																								
Method of Shipment		☒ Courier (#) ☐ Hand Delivered ☐ Postal		Name		Carson Clark		Signature		CC		Date		02.08.2023		Time		1130													
Laboratory Use Only		Received By		Signature		SYD BNE MEL PER ADL NTL DRW		Signature		Date		Time		Temperature		Report No															
		Received By		Signature		SYD BNE MEL PER ADL NTL DRW		Signature		Date		Time		Report No																	

1013604



CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

☒ Sydney Laboratory
179 Magowar Road, Girraween, NSW 2145
+61 2 9900 8400 EnviroSampleNSW@eurofins.com

☐ Brisbane Laboratory
Unit 1/21 Smallwood Place, Murarie, QLD 4172
+61 7 3902 4600 EnviroSampleQLD@eurofins.com

☐ Perth Laboratory
46-48 Banksia Road, Welshpool, WA 6106
+61 8 6253 4444 EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
+61 3 8564 5000 EnviroSampleVIC@eurofins.com

Company	ENV Solutions			Project No	218158				Project Manager	Carson Clark				Sampler(s)	Carson Clark										
Address	313 River St Ballina PO Box 248 Ballina NSW 2478			Project Name	Phillip St Goonellabah Development				EDD Format	ES&L EDDs etc				Esdat											
Contact Name	Carson Clark			Analyses Where suitable are requested, please specify 'Total' or 'Filtered' state, order must be used to obtain suitable pricing	MB	OCP's									Handed over by	CC									
Phone No	477112502														Email for Invoice	accounts@envsolutions.com.au									
Special Directions	Please send sample QA to EnviroLab Sydney to test for MB & OCP's.														Email for Results	carson.clark@envsolutions.com.au labresults@envsolu									
Purchase Order																									
Quote ID No	220829ESON															Containers Change container type & size if necessary:		Required Turnaround Time (TAT) Default will be 5 days if not noted							
No	Client Sample ID	Sampled Date/Time dd/mm/yyyy hh:mm	Matrix Solid (S) Water (W)													500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos Abatement, WA Guideline)	Sample Comments / Dangerous Goods Hazard Warning	
1	B1_01	02.08.2023	S	X	X																				
2	B1_02	02.08.2023	S	X	X																				
3	B2_01	02.08.2023	S	X	X																				
4	B2_02	02.08.2023	S	X	X																				
5																									
6																									
7																									
8																									
9																									
10																									
Total Counts				4	4																				
Method of Shipment	☒ Courier (#) ☐ Hand Delivered ☐ Postal			Name		Carson Clark		Signature		CC		Date		02.08.2023		Time		1130							
Laboratory Use Only	Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time		Temperature										
	Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time		Report No										

Labratory Analysis: Soil Samples



	Inorganics	Halogenated Benzenes	Metals								Organochlorine Pesticides								
	Moisture Content (dried @ 103°C)	Hexachlorobenzene	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	d-BHC
	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	1	0.05	2	0.4	5	5	5	0.1	5	5	0.1	0.1	0.05	0.05	0.05	0.05	0.05	0.1	0.05
Site Specific EIL's			100		460	75	1100		220	200									
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space			100																
NEPM 2013 Table 1A(1) HILs Res A Soil		10	100	20		6,001	300	40	400	7,399						6		50	
The Excavated Natural Material Order 2014 (Absolute Maximum)			40	1	150	200	100	1	60	300									

Field ID	Date																		
B1_01	02 Aug 2023	16	<0.5	3.2	<0.4	51	27	130	<0.1	12	360	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1
B1_02	02 Aug 2023	11	<0.05	2.4	<0.4	41	18	18	<0.1	10	130	0.13	<0.1	<0.05	<0.05	<0.05	0.13	<0.05	<0.1
B2_01	02 Aug 2023	12	<0.05	2.2	<0.4	59	7.8	13	<0.1	<5	170	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
B2_02	02 Aug 2023	16	<0.05	3.0	<0.4	67	8.7	17	<0.1	8.0	65	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
SS01	02 Aug 2023	6.0	<0.05	<2	<0.4	11	<5	<5	<0.1	<5	6.2	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
SS02	02 Aug 2023	21	<0.5	<2	<0.4	21	14	37	<0.1	13	74	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1
SS03	02 Aug 2023	6.6	<0.05	3.9	<0.4	18	15	17	<0.1	<5	100	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
SS04	02 Aug 2023	21	<0.5	3.2	<0.4	65	14	18	<0.1	8.0	94	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1
SS05	02 Aug 2023	18	<0.05	2.2	<0.4	35	6.5	15	<0.1	6.5	38	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
SS06	02 Aug 2023	20	<0.05	2.3	<0.4	63	9.5	16	<0.1	9.9	59	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
SS07	02 Aug 2023	23	<0.5	15	<0.4	71	55	28	<0.1	11	240	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1
SS08	02 Aug 2023	14	<0.5	3.0	<0.4	12	8.3	7.1	<0.1	5.6	44	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1
QC	02 Aug 2023	14	<0.5	3.6	<0.4	22	11	12	<0.1	7.7	73	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1
QA	02 Aug 2023	15	<0.5	<4	<0.5	15	11	10	<0.2	6	58	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1

Statistics																			
Maximum Detect	23	ND	15	ND	71	55	130	ND	13	360	0.13	ND	ND	ND	ND	ND	0.13	ND	ND
Average Concentration *	15	0.13	3.5	0.2	41	15	25	0.05	7.6	112	0.26	0.26	0.13	0.13	0.13	0.13	0.14	0.13	0.26

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards
2013, NEPM 2013 Table 1A(1) HILs Res A Soil
2013, NEPM Table 1B(5) Generic EIL - Urban Res & Public Open Space
The Excavated Natural Material Order 2014 (Absolute Maximum)
Site Specific EIL's

Labratory Analysis: Soil Samples



	Organochlorine Pesticides														
	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	γ-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Toxaphene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5
Site Specific EIL's		180													
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space		180													
NEPM 2013 Table 1A(1) HILs Res A Soil			240					10				6		300	20
The Excavated Natural Material Order 2014 (Absolute Maximum)															

Field ID	Date															
B1_01	02 Aug 2023	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10
B1_02	02 Aug 2023	<0.05	<0.05	<0.05	0.13	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
B2_01	02 Aug 2023	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
B2_02	02 Aug 2023	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
SS01	02 Aug 2023	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
SS02	02 Aug 2023	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10
SS03	02 Aug 2023	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
SS04	02 Aug 2023	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10
SS05	02 Aug 2023	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
SS06	02 Aug 2023	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
SS07	02 Aug 2023	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10
SS08	02 Aug 2023	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10
QC	02 Aug 2023	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10
QA	02 Aug 2023	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10

Statistics																
Maximum Detect	ND	ND	ND	0.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *	0.13	0.13	0.13	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	2.4

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

- 2013, NEPM 2013 Table 1A(1) HILs Res A Soil
- 2013, NEPM Table 1B(5) Generic EIL - Urban Res & Public Open Space
- The Excavated Natural Material Order 2014 (Absolute Maximum)
- Site Specific EIL's

ENV Services Pty Ltd
313 River Street
Ballina
NSW 2478



NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition
Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection, proficiency testing scheme providers and
reference materials producers reports and certificates.

Attention: **Carson Clark**

Report **1013604-S**
Project name **PHILLIP ST GOONELLABAH DEVELOPMENT**
Project ID **218158**
Received Date **Aug 03, 2023**

Client Sample ID			SS01	G01SS02	SS03	G01SS04
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S23- Au0008416	S23- Au0008417	S23- Au0008418	S23- Au0008419
Date Sampled			Aug 02, 2023	Aug 02, 2023	Aug 02, 2023	Aug 02, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 1	< 0.1	< 1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
a-HCH	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Aldrin	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
b-HCH	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
d-HCH	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Dieldrin	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Endosulfan I	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Endosulfan II	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Endrin	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Endrin ketone	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
g-HCH (Lindane)	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Heptachlor	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Methoxychlor	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Toxaphene	0.5	mg/kg	< 0.5	< 10	< 0.5	< 10
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.5	< 0.05	< 0.5
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 1	< 0.1	< 1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 1	< 0.1	< 1
Dibutylchloredate (surr.)	1	%	85	88	75	74
Tetrachloro-m-xylene (surr.)	1	%	82	94	84	84
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	3.9	3.2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	11	21	18	65
Copper	5	mg/kg	< 5	14	15	14
Lead	5	mg/kg	< 5	37	17	18
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	13	< 5	8.0
Zinc	5	mg/kg	6.2	74	100	94

Client Sample ID			SS01	G01SS02	SS03	G01SS04
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S23-Au0008416	S23-Au0008417	S23-Au0008418	S23-Au0008419
Date Sampled			Aug 02, 2023	Aug 02, 2023	Aug 02, 2023	Aug 02, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	6.0	21	6.6	21

Client Sample ID			SS05	SS06	G01SS07	G01SS08
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S23-Au0008420	S23-Au0008421	S23-Au0008422	S23-Au0008423
Date Sampled			Aug 02, 2023	Aug 02, 2023	Aug 02, 2023	Aug 02, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 1	< 1
4,4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
4,4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
4,4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
a-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
b-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
d-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
g-HCH (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Toxaphene	0.5	mg/kg	< 0.5	< 0.5	< 10	< 10
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.5	< 0.5
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 1	< 1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 1	< 1
Dibutylchlorendate (surr.)	1	%	99	101	76	96
Tetrachloro-m-xylene (surr.)	1	%	85	84	78	98
Heavy Metals						
Arsenic	2	mg/kg	2.2	2.3	15	3.0
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	35	63	71	12
Copper	5	mg/kg	6.5	9.5	55	8.3
Lead	5	mg/kg	15	16	28	7.1
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	6.5	9.9	11	5.6
Zinc	5	mg/kg	38	59	240	44
Sample Properties						
% Moisture	1	%	18	20	23	14

Client Sample ID Sample Matrix Eurofins Sample No. Date Sampled Test/Reference	LOR	Unit	G01 QC Soil S23- Au0008424 Aug 02, 2023	G01 B1_01 Soil S23- Au0008425 Aug 02, 2023	B1_02 Soil S23- Au0008426 Aug 02, 2023	B2_01 Soil S23- Au0008427 Aug 02, 2023
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 1	< 1	< 0.1	< 0.1
4,4'-DDD	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
4,4'-DDE	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
4,4'-DDT	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
a-HCH	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
b-HCH	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
d-HCH	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.5	< 0.5	0.13	< 0.05
Endosulfan I	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
g-HCH (Lindane)	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
Toxaphene	0.5	mg/kg	< 10	< 10	< 0.5	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.5	< 0.5	0.13	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.5	< 0.5	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 1	< 1	0.13	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 1	< 1	< 0.1	< 0.1
Dibutylchloroendate (surr.)	1	%	90	106	97	95
Tetrachloro-m-xylene (surr.)	1	%	100	96	85	82
Heavy Metals						
Arsenic	2	mg/kg	3.6	3.2	2.4	2.2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	22	51	41	59
Copper	5	mg/kg	11	27	18	7.8
Lead	5	mg/kg	12	130	18	13
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	7.7	12	10	< 5
Zinc	5	mg/kg	73	360	130	170
Sample Properties						
% Moisture	1	%	14	16	11	12

Client Sample ID			B2_02
Sample Matrix			Soil
Eurofins Sample No.			S23-Au0008428
Date Sampled			Aug 02, 2023
Test/Reference	LOR	Unit	
Organochlorine Pesticides			
Chlordanes - Total	0.1	mg/kg	< 0.1
4,4'-DDD	0.05	mg/kg	< 0.05
4,4'-DDE	0.05	mg/kg	< 0.05
4,4'-DDT	0.05	mg/kg	< 0.05
α-HCH	0.05	mg/kg	< 0.05
Aldrin	0.05	mg/kg	< 0.05
β-HCH	0.05	mg/kg	< 0.05
δ-HCH	0.05	mg/kg	< 0.05
Dieldrin	0.05	mg/kg	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05
Endrin	0.05	mg/kg	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05
γ-HCH (Lindane)	0.05	mg/kg	< 0.05
Heptachlor	0.05	mg/kg	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05
Toxaphene	0.5	mg/kg	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1
Dibutylchloroendate (surr.)	1	%	80
Tetrachloro-m-xylene (surr.)	1	%	83
Heavy Metals			
Arsenic	2	mg/kg	3.0
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	67
Copper	5	mg/kg	8.7
Lead	5	mg/kg	17
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	8.0
Zinc	5	mg/kg	65
Sample Properties			
% Moisture	1	%	16

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Organochlorine Pesticides - Method: LTM-ORG-2220 OCP & PCB in Soil and Water	Sydney	Aug 04, 2023	14 Days
Metals M8 - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Aug 04, 2023	28 Days
% Moisture - Method: LTM-GEN-7080 Moisture	Sydney	Aug 03, 2023	14 Days

Internal Quality Control Review and Glossary

General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	µg/L: micrograms per litre
ppm: parts per million	ppb: parts per billion	%: Percentage
org/100 mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (<i>bis</i> -tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR: RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
- For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4,4'-DDD	mg/kg	< 0.05			0.05	Pass	
4,4'-DDE	mg/kg	< 0.05			0.05	Pass	
4,4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-HCH	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-HCH	mg/kg	< 0.05			0.05	Pass	
d-HCH	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-HCH (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	85			70-130	Pass	
4,4'-DDD	%	85			70-130	Pass	
4,4'-DDE	%	89			70-130	Pass	
4,4'-DDT	%	118			70-130	Pass	
a-HCH	%	86			70-130	Pass	
Aldrin	%	90			70-130	Pass	
b-HCH	%	86			70-130	Pass	
d-HCH	%	88			70-130	Pass	
Dieldrin	%	88			70-130	Pass	
Endosulfan I	%	88			70-130	Pass	
Endosulfan II	%	91			70-130	Pass	
Endosulfan sulphate	%	80			70-130	Pass	
Endrin	%	93			70-130	Pass	
Endrin aldehyde	%	78			70-130	Pass	
Endrin ketone	%	83			70-130	Pass	
g-HCH (Lindane)	%	88			70-130	Pass	
Heptachlor	%	90			70-130	Pass	

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heptachlor epoxide				%	91			70-130	Pass	
Hexachlorobenzene				%	88			70-130	Pass	
Methoxychlor				%	119			70-130	Pass	
LCS - % Recovery										
Heavy Metals										
Arsenic				%	93			80-120	Pass	
Cadmium				%	92			80-120	Pass	
Chromium				%	95			80-120	Pass	
Copper				%	94			80-120	Pass	
Lead				%	101			80-120	Pass	
Mercury				%	118			80-120	Pass	
Nickel				%	95			80-120	Pass	
Zinc				%	91			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1				Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
Organochlorine Pesticides					Result 1					
Chlordanes - Total	S23-JI0065544	NCP	%	78				70-130	Pass	
4,4'-DDD	S23-JI0065544	NCP	%	91				70-130	Pass	
4,4'-DDE	S23-JI0065544	NCP	%	77				70-130	Pass	
a-HCH	S23-JI0065544	NCP	%	82				70-130	Pass	
Aldrin	S23-JI0065544	NCP	%	75				70-130	Pass	
b-HCH	S23-JI0065544	NCP	%	71				70-130	Pass	
d-HCH	S23-JI0065544	NCP	%	76				70-130	Pass	
Dieldrin	S23-JI0065544	NCP	%	72				70-130	Pass	
Endosulfan I	S23-JI0065544	NCP	%	77				70-130	Pass	
Endosulfan II	S23-JI0065544	NCP	%	77				70-130	Pass	
g-HCH (Lindane)	S23-JI0065544	NCP	%	82				70-130	Pass	
Heptachlor epoxide	S23-JI0065544	NCP	%	74				70-130	Pass	
Hexachlorobenzene	S23-JI0065544	NCP	%	86				70-130	Pass	
Spike - % Recovery										
Heavy Metals					Result 1					
Arsenic	S23-Au0005892	NCP	%	88				75-125	Pass	
Cadmium	S23-Au0005892	NCP	%	85				75-125	Pass	
Chromium	S23-Au0005892	NCP	%	88				75-125	Pass	
Copper	S23-Au0005892	NCP	%	87				75-125	Pass	
Lead	S23-Au0005892	NCP	%	94				75-125	Pass	
Mercury	S23-Au0005892	NCP	%	108				75-125	Pass	
Nickel	S23-Au0005892	NCP	%	81				75-125	Pass	
Zinc	S23-Au0005892	NCP	%	78				75-125	Pass	
Spike - % Recovery										
Organochlorine Pesticides					Result 1					
4,4'-DDT	R23-JI0067120	NCP	%	97				70-130	Pass	
Endosulfan sulphate	R23-JI0067120	NCP	%	94				70-130	Pass	
Endrin	R23-JI0067120	NCP	%	95				70-130	Pass	
Endrin aldehyde	R23-JI0067120	NCP	%	87				70-130	Pass	
Endrin ketone	R23-JI0067120	NCP	%	89				70-130	Pass	
Heptachlor	R23-JI0067120	NCP	%	79				70-130	Pass	
Methoxychlor	R23-JI0067120	NCP	%	88				70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S23-JI0067729	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-HCH	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-HCH	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-HCH	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-HCH (Lindane)	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S23-JI0067729	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	S23-JI0067729	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S23-Au0008417	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	S23-Au0008417	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S23-Au0008417	CP	mg/kg	21	29	33	30%	Fail	Q15
Copper	S23-Au0008417	CP	mg/kg	14	12	15	30%	Pass	
Lead	S23-Au0008417	CP	mg/kg	37	21	56	30%	Fail	Q15
Mercury	S23-Au0008417	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S23-Au0008417	CP	mg/kg	13	11	15	30%	Pass	
Zinc	S23-Au0008417	CP	mg/kg	74	67	10	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	S23-Au0008417	CP	%	21	20	4.2	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	S23-Au0008427	CP	%	12	12	2.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	N/A
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Bonnie Pu	Analytical Services Manager
Roopesh Rangarajan	Senior Analyst-Organic
Fang Yee Tan	Senior Analyst-Metal



Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

APPENDIX D

Field QA Results - RPD Calculations

Table 1: Field QA Results - RPD Calculations



	Metals								Organochlorine Pesticides						
	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	4,4-DDE	α-BHC	Aldrin	β-BHC	Chlordane (dis)	Chlordane (trans)	γ-BHC
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	4	0.4	1	1	1	0.1	1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Lab Report Number	Field ID															
219968 (Eurofins)	SS08	3.0	<0.4	12	8.3	7.1	<0.1	5.6	44	<0.5	<0.5	<0.5	<0.5	<1	<1	<0.5
219968 (Eurofins)	QC	3.6	<0.4	22	11	12	<0.1	7.7	73	<0.5	<0.5	<0.5	<0.5	<1	<1	<0.5
RPD		18	N/A	59	28	51	N/A	32	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A

219968 (Eurofins)	SS08	3.0	<0.4	12	8.3	7.1	<0.1	5.6	44	<0.5	<0.5	<0.5	<0.5	<1	<1	<0.5
219968 (Envirolab)	QA	<4	<0.5	15	11	10	<0.2	6	58	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
RPD		N/A	N/A	22	28	34	N/A	7	27	N/A	N/A	N/A	N/A	N/A	N/A	N/A

RPD - Relative Percent Difference
N/A - RPD Not Calculated
RPD = >50%

Table 1: Field QA Results - RPD Calculations



	Organochlorine Pesticides													Halogenated Benzenes
	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	γ-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Hexachlorobenzene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Lab Report Number	Field ID														
219968 (Eurofins)	SS08	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
219968 (Eurofins)	QC	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

219968 (Eurofins)	SS08	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
219968 (Envirolab)	QA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
RPD		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

RPD - Relative Percent Difference

N/A - RPD Not Calculated

RPD = >50%