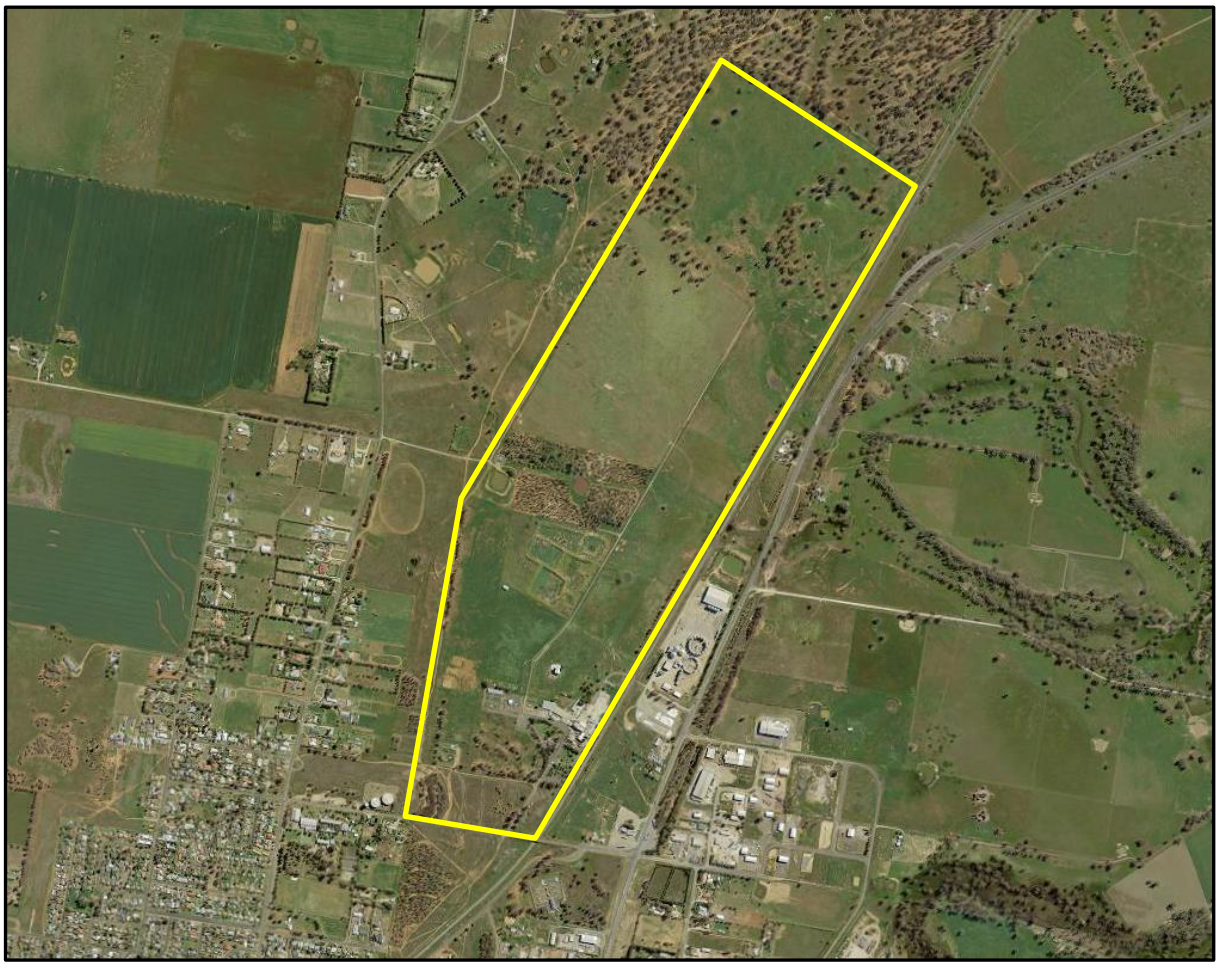

Detailed Investigation

Lachley Estate,

Forbes, NSW, 2871

Report No: 26835R01

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Detailed Investigation

Lachley Estate,

Forbes, NSW, 2871

January 2023

Report No: 26835R01

Prepared For:

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Version	Date	Prepared	Reviewed	Approved
V1	11 July 2022	S Ramsey	M Williamson	J Duffy
V2	15 Aug 2022	S Ramsey	M Williamson	J Duffy
V3	17 Aug 2022	S Ramsey	B Croxon	J Duffy
V4 (Draft)	28 Oct 2022	G Murphy	M Williamson	J Duffy
V5 (Draft)	1 Nov 2022	M Williamson	G Murphy	J Duffy
V6	30 Nov 22	G Murphy	M Williamson	J Duffy
V2	23 Jan 22	G Murphy	S Ramsey	J Duffy

1. EXECUTIVE SUMMARY

EnviroScience Solutions Pty Ltd were engaged by Brisull Industries (Brisull) to undertake a detailed investigation including soil sampling, surface water and groundwater sampling as part of a Development Application for the former Lachley Abattoir and surrounding grazing lands located at Lachley Estate, off Lachley Street, Forbes NSW, 2871 (Figure 1). The site boundary was defined by the Client.

This assessment was triggered following recommendations made in the Preliminary Investigation undertaken by Envirowest Consulting dated 14th March 2013. This identification of potentially contaminated materials triggered a detailed soil and surface water sampling event on the 30th of June 2022.

This report was made in accordance with the National Environment Protection (Assessment of Site Contamination) Measure, (NEPM 2013). The State Environmental Planning Policy No- 55 2014 (SEPP 55) was used to establish sampling requirements, however due to the size of the property this report is not in accordance with the sampling guidelines, rather undertaken via a targeted sampling regime specifically localised around areas of environmental concern identified in the Preliminary Investigation and site observations made by EnviroScience Solutions staff.

The Preliminary Investigation comprised of desktop research and a walk-over survey to identify past potentially contaminating activities, potential contamination types and identify potential areas of contamination and assess the need for further investigation if the site is to be used as a Residential Subdivision.

In 2013 the site was vacant and used for agricultural grazing, with previous use as an abattoir. The abattoir was operational from 1968 to 2001 and included infrastructure such as stock yards, killing rooms, chiller rooms, boning rooms, freezers, skin sheds, workshop, chemical store, an above ground storage tank and various offices and amenities. At the time of the Envirowest inspection the freezers had been demolished and building debris was stockpiled in the former quarry.

Five (5) dams located to the north-west of the abattoir were used for wastewater storage from the abattoir, which was then used to irrigate the site. A former quarry was found to be located at the north of the former abattoir and mining areas were observed to the east and north of the

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wastewater storage dams. Three (3) water monitoring wells were found to be located in the eastern section of the site. A former landfill area was identified on the northeast of the site boundary.

The objectives of the Detailed Investigation were to:

- Determine the suitability of the site for the proposed use as a mixed purpose site consisting of residential, recreational, and industrial portions.

It should be noted that the Zoning Plan included in this report was not provided to EnviroScience Solutions Pty Ltd until after Version 6 of this report had been submitted to the Client and was not available prior to sampling and analysis.

To achieve these objectives, the scope of works includes:

- Carry out detailed soil sampling targeting areas of contamination identified in the Preliminary Investigation (Envirowest, 2013); areas of potential contamination as follows:
    - Surrounding the skin-sheds;
    - In the vicinity of the former Aboveground Storage Tank (AST);
    - In the vicinity of the transformer;
    - Within the quarry area;
    - Within the treatment and irrigation ponds;
    - Mining areas;
    - Downgradient and within the landfill areas;
    - From the surrounding paddocks;
    - Farm dams.
- The preliminary soil samples were tested for a suite of contaminants of potential concern, including Heavy Metals, Polycyclic Aromatic Hydrocarbons (PAH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), and Total Recoverable Hydrocarbons (TRH), Organochlorine Pesticides (OCP) and Organophosphorus Pesticides (OPPs), Electrical Conductivity (EC), Pathogens, Nitrogen and Phosphorus.
- Deeper excavations were triggered in the identified “landfill area” and “mining spoil area”. Samples were collected at varying depths within the soil profile to establish vertical contamination within the soil profile.
- In addition to the soil sampling program, surface water bodies were targeted that were accessible within the former quarry area, farm dams and irrigation ponds.
- Three groundwater wells (MW1, MW2 and MW6) were sampled and analysed for a suite of common contaminants of potential concern. As information was not provided for locations

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of groundwater wells MW3, MW4 and MW5 they were not located nor sampled as part of this report.

A total of fifty-three (53) soil samples were taken across the approximately 1.7km^2 area. Four (4) duplicate and one (1) triplicate samples were also taken from the site, making a total of fifty-eight (58) soil samples.

The soil contamination on the site was found to be isolated to the sediment, soils, and surface water within the irrigation ponds in the central portion of the site. The TRH contamination reported above the Health Screening and Ecological Screening Levels for Commercial/Industrial D was present within sediment/ soils in irrigation dam D1/SED, reported at 340,000mg/kg. Water pooled within these dams reported heavy metals and E. Coli/ coliforms above the Australian Drinking Water Guidelines (2011) Health Guideline Values and the NEPM (2013) Groundwater Investigation Levels for Fresh Water in sample W2 and W5.

These exceedances are likely attributed to historical quarrying/ landfilling on the property and use of these irrigation ponds for agricultural purposes and sediment deposition.

Deeper excavations undertaken in the landfill area identified uncontrolled fill to depths greater than 2 metres below ground surface. Three of the test pits (TP2, TP3 and TP4) in this area encountered trace amounts of asbestos containing materials and exceedances of the adopted site criteria for heavy metals including copper, lead and zinc. It should be noted that these samples are no longer included in the current site zoning plan. However, the analysis results have been included in this report in the event that this area is to be developed in the future.

Surface water samples reported elevated levels of heavy metals (chromium) above the NEPM (2013) Groundwater Investigation Levels for Fresh Water in samples FD1, FD2, FD3 and FD5 (all reported at 2µg/L), however these were below the Australian Drinking Water Guidelines (2011) Health Guideline Values.

The groundwater investigation reported that elevated concentrations of heavy metals were present at groundwater monitoring locations MW1 (Copper and Zinc), MW2 (Copper, Nickel and Zinc) and MW6 (Copper, Lead and Zinc) above the ASC NEPM 2013 Groundwater Investigation Levels for Fresh Water. All other analytes were reported below the adopted guidelines for the site. The groundwater

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investigation determined groundwater levels onsite were present at less than 2m below ground surface at MW1 and MW2 and at depths less that 5m below ground surface at MW6.

Trace amounts of asbestos debris have been identified in the form of pipe lagging and fibre cement debris which were found adjacent to the former skin shed footprint and is likely associated with the former structures in this area.

Unknown amounts of asbestos debris in the form of corrugated 'super six' sheeting have been observed within the former quarry area approximately 125m northwest of the former abattoir building footprint.

EnviroScience Solutions recommends that the site may be suitable for the development should the above discussed areas be addressed, and certain further investigation and remedial practices be undertaken, such as:

- Removal of the Hydrocarbon impacted sediment located in Sediment Basin 1. Further sampling of this material should be undertaken to determine waste classification for the materials prior to offsite removal.
- Further investigation of the waste and building waste within the open-faced quarry area.
- Further investigation and waste classification of the landfill area in the northern portion of the site.

EnviroScience solutions believes that the site can be made suitable following remediation of the above outlined areas by means of excavation of contaminated materials and removal offsite to landfill.

The surrounding field areas/ paddocks are currently in suitable condition for the proposed development. However, it should be noted that samples were collected from discrete locations and contamination may be present in areas that remain unassessed.

Following asbestos removal and demolition of the abattoir itself and related infrastructure surrounding the abattoir, sub surface investigation within the building's footprint should be undertaken to establish any areas of potential environmental concern. It is noted that the asbestos register for the abattoir was not made available for EnviroScience Solutions as part of this report.

EnviroScience Solutions recommend the following to bring the site within acceptable Health and Ecological guidelines.

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- A Remedial Action Plan (RAP) is prepared by a suitably qualified and experienced land consultant prior to the commencement of earthworks and site development.
- The RAP will outline targeted requirements within the quarry area, the irrigation ponds and around the footprint of the abattoir to remediate areas of environmental concern outlined in this assessment.
- The RAP should include an appropriate Unexpected Finds Procedure (UFP) within this plan to provide a procedure for emergency response should previously unidentified areas of contamination be uncovered.

This Remedial Action Plan (RAP) can be implemented to effectively clean up the current onsite contamination in the areas identified as well as unexpected finds during remediation.

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2. INTRODUCTION

EnviroScience Solutions Pty Ltd were engaged by Brisull Industries (Brisull) to undertake a detailed site investigation including soil sampling and surface water sampling as part of a Development Application for the former Lachley Abattoir and surrounding grazing lands located at Lachley Estate, off Lachley Street, Forbes NSW, 2871 (Figure 1). The site boundary was defined by the Client.

This assessment was triggered following recommendations made in the Preliminary Investigation undertaken by Envirowest Consulting dated 14th March 2013. This identification of potentially contaminated materials triggered a detailed soil and surface/ ground water sampling event on the 30th of June 2022 and the 28th of July 2022 respectively.

The work included in this DSI only included an assessment of human health and environmental risks from shallow (<200 mm depth) soil and surface water bodies present on the site. Deeper soil investigation was undertaken in the former landfill area towards the north of the site and within the western fields identified in the PSI as being impacted by mining spoil. Mining spoil areas identified in the PSI on the eastern side of the site's access track were not investigated by mechanical means due to the area being inundated with water and due to access restrictions. Deeper excavation was not undertaken in the open quarry due to inundation with water and restricted access via mechanical means. Groundwater samples were collected from the three (3) known wells on site (MW1, MW2 and MW6), information regarding locations or existence of groundwater wells (MW3, MW4 and MW5) has not been provided to EnviroScience and these wells were not found during the site investigations.

It is understood that an asbestos register has been created for the abattoir and surrounding buildings, however it is noted that this has not been provided to EnviroScience Solutions and therefore has not been incorporated into this report.

This report was made in accordance with the National Environment Protection (Assessment of Site Contamination) Measure, (NEPM 2013). The State Environmental Planning Policy No- 55 2014 (SEPP 55) was used to establish sampling requirements, however due to the size of the property this report is not in accordance with the sampling guidelines. Rather, it has been made on a targeted sampling regime specifically localised around areas of environmental concern identified in the Preliminary Investigation and site observations made by EnviroScience Solutions staff.

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3. OBJECTIVES

The objectives of the Detailed investigation were to:

- Determine the suitability of the site for the proposed use as a mixed purpose site consisting of residential, recreational, and industrial portions.

4. SCOPE OF WORK

To achieve these objectives, the scope of works includes:

- Carry out detailed soil sampling targeting areas of contamination identified in the Preliminary Investigation (Envirowest, 2013), areas of potential contamination as follows:
    - Surrounding the skin sheds;
    - In proximity to the former Aboveground Storage Tank (AST);
    - In proximity to the transformer;
    - Within the quarry area;
    - Within the treatment and irrigation ponds;
    - Mining areas;
    - Downgradient and within the landfill areas;
    - From the surrounding paddocks;
    - Farm dams.
- The preliminary soil samples were tested for a suite of contaminants of potential concern, including Heavy Metals, Polycyclic Aromatic Hydrocarbons (PAH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), and Total Recoverable Hydrocarbons (TRH), Organochlorine Pesticides (OCP) and Organophosphorus Pesticides (OPPs), Electrical Conductivity (EC), Pathogens, Nitrogen and Phosphorus.
- In addition to the soil sampling program surface water bodies were targeted that were accessible within the former quarry area, farm dams and irrigation ponds.
- Groundwater was assessed at three locations across the site and was analysed for a suite of contaminants of potential concern.
- Assess the contaminant concentrations detected against the adopted site assessment criteria based on a residential use of the site.
- Prepare this DSI report.

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5. SITE IDENTIFICATION

Site Owner: Brissull Industries

Address: Off Lachley Street, Forbes, NSW, 2871

Latitude and Longitude: 33°21'36.92"S 148°01'15.70"E (taken from abattoir area)

Site Area: 150ha

Current Land Use: Vacant land used for cattle grazing

Proposed Planned Land use: Large Lot Residential (R5), Environmental Management (C3), Productivity Support (E3) and Infrastructure (SP2).

Local Government Area: Forbes Shire Council

Real Property Description: Lots 1544, 1545, 1551, 1559, 1621, 1622, 1649 of DP750158, Lot 8 DP 211100, Lot 4, DP210102 and Lot 22 DP1002358.

Land Zoning: RU1 – Primary production under the Forbes Local Environment Plan 2012.

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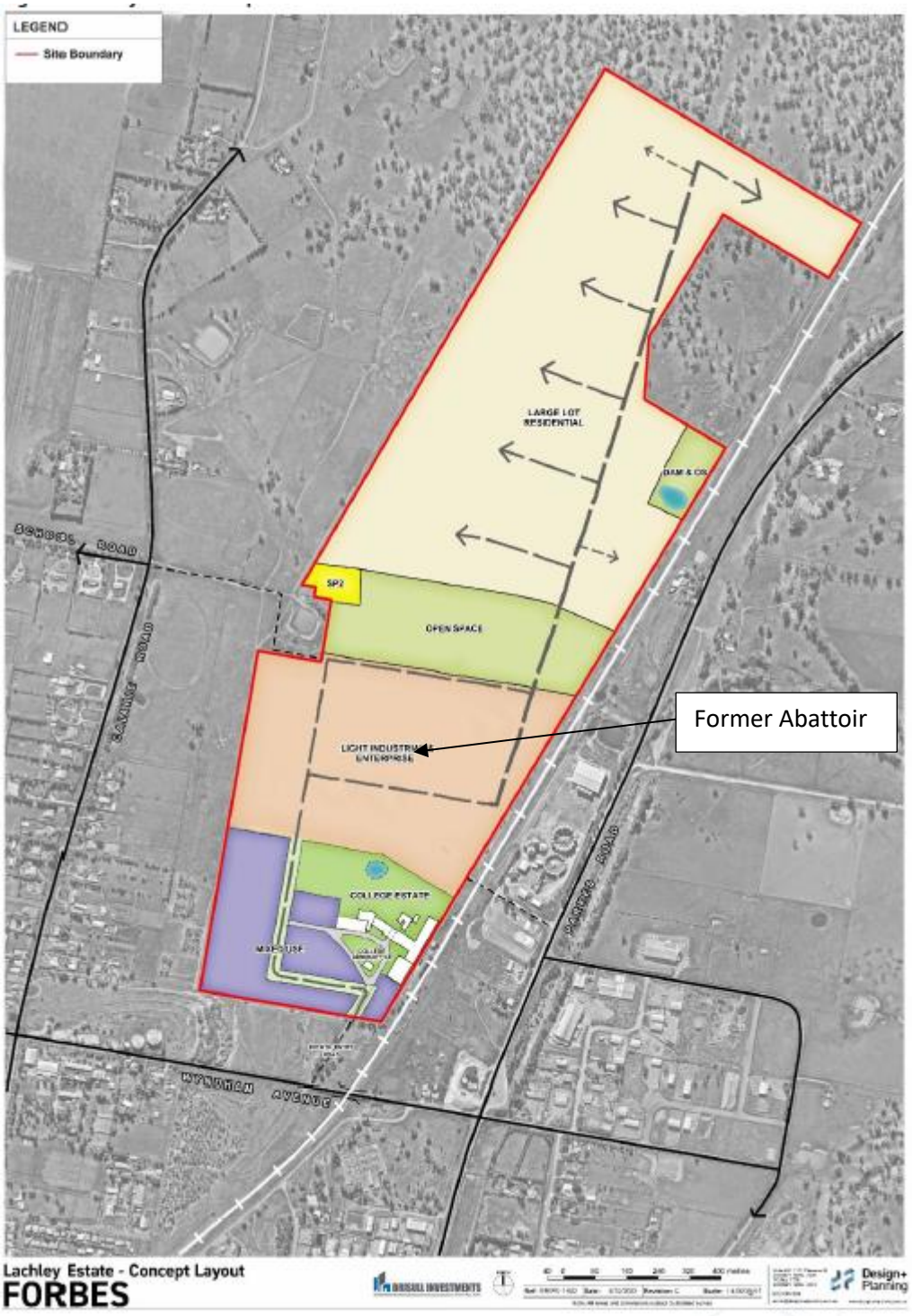

Figure 1-Site Location Lachley Estate, Forbes NSW

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Current land uses in the vicinity of the site can be described as grazing land for cattle and previous use as an abattoir on a portion of the site. The abattoir ceased operation in 2001. The abattoir consisted of stockyards, killing rooms, chiller rooms, boning rooms, freezers, skin shed, workshops, a chemical store, an aboveground storage tank and various offices and amenities (Envirowest, 2013).

5.1 NEIGHBOURING LAND USES

Current land uses in the vicinity of the site can be described as grazing vacant land with the remnants of the abattoir facilities located in the southern area of the site. The surrounding land uses are presented below.

- North and East—Rural & Residential Land
- South and West—Agricultural Stores and Commercial/Industrial Use and Railway Line

5.2 TOPOGRAPHY

The site ranges from a mid-slope to a lower slope and drainage depression with an inclination 2-4%. The site has a predominantly north easterly to easterly aspect. A seasonal drainage line traverses the northern section of the site.

5.3 GEOLOGY

The site Is underlain by the Cotton Formation, Burrandong Creek Member and Parkes Volcanics. Lithologies range from sedimentary sequences of siltstones, chert, conglomerates, sandstones and limestones to volcanic sandstones and intermediate volcanics (King 1998).

The 1:250,000 Forbes Geological Sheet indicates that the site Is underlain by shallow slope colluvial plains and rises, some residual veneer; interfingers with inactive alluvial plains (Raymond et al. 2000).

The overall soil identification has been adopted from information provided within the Preliminary Investigation report (2013).

There is no probability of Naturally Occurring Asbestos (NOA) within the site boundaries. No rock outcrops possessing potential NOA nor residual evidence of NOA were observed during the site investigation.

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5.4 SOILS

The site is within the Parkes Soil Landscape (King 1998). The natural soil materials within the landscape are dark reddish brown sandy clay loam to loam topsoil with a clear change to dark reddish brown medium clay subsoil. The soil has a low to very low fertility and a high erosion hazard. The overall soil identification has been adopted from information provided within the Preliminary Investigation report 2013.

5.5 HYDROGEOLOGY AND GROUNDWATER BORE SEARCH

Reference to the Water NSW All Groundwater Map shows there are no registered groundwater bores within 500m of the site. Information relating to the historic groundwater report for details on boreholes closest to the site including water bearing zones and standing water levels is provided in the table below. Groundwater is likely to follow the local topography towards the centre of the site and local water bodies to the east of the site. Due to the depth of groundwater in nearby bores (>5mbgl) infiltration to groundwater of contaminants from surface down movement is considered unlikely.

TABLE 1: GROUNDWATER BORE SUMMARY

Groundwater bore reference	Authorised Purpose	Total Depth (m)	Yield (L/s)	Standing Water Level	Salinity (ppm)	Direction from site*
GW702740	Domestic	46.00	-	-	Salty	770m South East
GW026828	Irrigation	18.30	0.19	6.10	-	690m North West
GW701359	Monitoring Bore	39.60	-	29.60	-	1.67km North East

*Direction from site taken from closest outer boundary of the site.

Three groundwater (MW1, MW2 and MW6) bores were assessed within the site boundaries, a summary of the bores is presented in Table 14 of Section 13.2.2. These bores were not registered on the Water NSW All Groundwater Map.

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5.6 HYDROLOGY

Surface water flows into several intermittent drainage lines and dams located on the site. The drainage lines flow east into Lake Forbes. Lake Forbes is located approximately 300m east of the site. Lake Forbes is a highly disturbed constructed ecosystem (as referred to in the Preliminary Investigation 2014).

6. SITE HISTORY

A site history was undertaken to identify potential contaminants of concern for the site, pathways and exposure routes. The site history comprised of database searches, a review of previous investigations undertaken on the site, supplied aerial photographs and Council records.

The following information has been reviewed to determine historical land use and assess the likelihood of potentially contaminating activities having occurred at the site:

- Historical aerial photographs dating back to 1985;
- NSW Environment Protection Authority (EPA) contaminated land database and public register for regulated contaminated sites;
- List of NSW Contaminated Sites Notified to EPA; and
- PFAS Investigation Program.

6.1 HISTORICAL AERIAL PHOTOGRAPHS

Historical aerial photographs were obtained as part of the research results for the site dating back to 1985.

The research results are below;

- The aerial imagery from 1985 is of poor quality, however it appears that Abattoir building is already present in the south of the site and that the remaining land is open agricultural land
- The next available image is from 2006 shows the presence of the abattoir building with the remainder of the site agricultural with the presence of several dams on the site, some of which are the waste storage dams for the abattoirs.

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- The aerial image from 2010 shows that part of the abattoirs has been demolished to the west and that building Debris is present on-situ and the waste storage dams are relatively empty of water.
- The 2012 aerial image shows no major changes from the 2010 image
- The 2014 aerial image shows no major changes from the 2012 image
- The 2016 image shows the dam in the North of the site is full
- The 2018 images show little to no change from the 2016 image
- The 2020 image is the most current image available and shows little to no change from the 2016 image.

After review of the images the former Abattoir appears to be the main source of potential contamination historically

TABLE 2: HISTORICAL AERIAL PHOTOGRAPHS

	
30/12/1985	26/01/2006

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1/03/2010

22/05/2012

11/02/2014

7/08/2016

14/10/2018

10/05/2020

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6.2 NSW ENVIRONMENT PROTECTION AUTHORITY (EPA) CONTAMINATED LAND DATABASE AND PUBLIC REGISTER FOR REGULATED CONTAMINATED SITES

A search of the register was undertaken, and one (1) site was found within the 1000m dataset buffer, which was a Service Station located approximately 680m to the South-East of the site.

6.3 LIST OF NSW CONTAMINATED SITES NOTIFIED TO EPA

A search was conducted of the NSW Contaminated Sites Notified to EPA. No sites were listed in the area.

6.4 PFAS INVESTIGATION PROGRAM

A search of the PFAS investigation program map undertaken on the 15th July 2021 showed that the site was not within any EPA PFAS Site Investigation areas.

6.5 PREVIOUS INVESTIGATIONS

6.5.1 PRELIMINARY INVESTIGATION – 14 MARCH 2013

A preliminary investigation was undertaken by Envirowest Consulting Pty Ltd (Envirowest) in March 2013 for the proposed residential subdivision at the site.

The report comprised of desktop research and a walk-over survey to identify past potentially contaminating activities, potential contamination types and identify potential areas of contamination and assess the need for further investigation if the site is to be used as a Residential Subdivision.

In 2013 the site was vacant and used for agricultural grazing, with previous use as an abattoir. The abattoir was operational from 1968 to 2001 and included infrastructure such as stock yards, killing rooms, chiller rooms, boning rooms, freezers, skin sheds, workshop, chemical store, an above ground storage tank and various offices and amenities. At the time of the Envirowest inspection the freezers had been demolished and building debris was stockpiled in the former quarry.

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Five (5) dams located to the north-west of the abattoir were used for wastewater storage from the abattoir, which was then used to irrigate the site. A former quarry was found to be located at the north of the former abattoir and mining areas were observed to the east and north of the wastewater storage dams. Three (3) water monitoring wells were found to be located in the eastern section of the site (MW1, MW2 and MW6). A Former landfill was identified on the northeast boundary.

The report concluded that the potential for contamination to exist in the following areas;

- Skin Sheds (Arsenic Chromium)
- Surrounding Above ground storage tank (Hydrocarbons)
- Transformer (PCB and oils)
- Quarry (Metals and Hydrocarbons)
- Treatment and Irrigation damns (Metals, pathogens, nitrogen, phosphorus, salinity)
- Mining areas (metals)
- Downslope of landfill (metals, Organochlorine Pesticides, Organophosphate Pesticides, hydrocarbons)
- General field areas (metals, Organochlorine Pesticides, salinity, asbestos cement irrigation pipes
- Farm Dams (Metals and salinity)
- Abattoir buildings (Asbestos sheeting and insulation)

6.6 GAPS IN SITE HISTORY

The gaps within the site history review are as follows:

- It is not known what practices of farming were undertaken prior to 1968,
- It is also unsure what spoils from mining works remain on site and if these spoils were returned to where they were excavated.

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7. SAMPLE AND ANALYSIS QUALITY PLAN

This report is based on a sampling regime to compare soil analysis levels for land use as a mixed use site consisting of residential, recreational and industrial sites, where the criteria selected is deemed appropriate for industrial use as stipulated in the *National Environment Protection (Assessment of Site Contamination) Measure 2003*. Sampling was not undertaken in accordance with *Contaminated Sites Sampling Design Guidelines* (EPA, 1995), however was undertaken on a smaller scale with localised targeted sampling program to identify potential areas requiring further assessment.

Preliminary soil and water samples were analysed for a range of contaminants of potential concern (COPCs) based on the sampling regime specified in the Preliminary Contamination report prepared by Envirowest in 2013. Table 5 below outlines the analysis schedule for the samples. Further samples were collected at EnviroScience Consultants judgement following identification of areas of concern during the site investigation and walkover.

TABLE 3: ADOPTED SITE ASSESSMENT CRITERIA SOIL

Location	Sampling Locations	Substrate	Analytes
Skin Sheds	4	Soil	Metals (As, Cr)
Near Aboveground Storage Tank	2	Soil	Hydrocarbons (TRH C6-C36)
Transformer	1	Soil	Hydrocarbons (TRH C10-C36 & PCBS)
Quarry	1	Soil/Water	Metals (As, Cd, Cr, Cu, Ni, Pb, Zn) and Hydrocarbons (TRH C6-C36)
Treatment and Irrigation Ponds	5	Soil/Water	Metals (As, Cd, Cr, Cu, Ni, Pb, Zn), pathogens (*E. coli* & Total Coliforms), nitrogen, phosphorus, Electrical conductivity
Mining Areas	4	Soil	Metals (As, Cd, Cr, Cu, Ni, Pb, Zn)
Downslope of Landfill	3	Soil	Metals (As, Cd, Cr, Cu, Ni, Pb, Zn), Pesticides (OCP & OPP), Hydrocarbons (TRH C6-C36)
Field areas	2 per paddock	Soil	Metals (As, Cd, Cr, Cu, Ni, Pb, Zn), pesticides (OCP), Electrical Conductivity
Farm dams	6	Soil/Water	Metals (As, Cd, Cr, Cu, Ni, Pb, Zn), Electrical Conductivity
Groundwater Wells	3	Water	Metals (As, Cd, Cr, Cu, Ni, Pb, Zn), pH, Electrical Conductivity, TRH

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Samples obtained were sent to a National Association of Testing Authorities (NATA) accredited Laboratory (Envirolab Services Pty Ltd – Chatswood, NSW and SGS - Alexandria, NSW) and were analysed for the above outlined analytes.

8. SOIL ASSESSMENT CRITERIA

Health and ecological investigation and screening levels for soil as presented in Schedule B1 of ASC NEPM are generally used when selecting assessment criteria to evaluate risk to human health and ecosystems resulting from site contamination.

Health and ecological investigation and screening levels are applicable to the first stage (Tier 1) of site assessment and are used to assist in the iterative development of a Conceptual Site Model (CSM). They are adopted as concentrations of a contaminant above which either further appropriate investigation and/or evaluation will be required, or development of an appropriate management strategy.

Health Investigation Levels (HILs) are applicable for assessing human health risk via relevant exposure pathways. HILS were developed for a broad range of metals and organic substances. These are generic to all soil types and apply generally to a depth of 3m below the soil surface.

Ecological Investigation Levels (EILs) are associated with selected metals and organic compounds and have been developed for assessing risk to terrestrial ecosystems under residential land use scenarios. They apply to the top 2m of accessible soil type (sand, silt and clay), building configurations and land use scenarios.

Similarly, Ecological Screening Levels (ESLs) have been developed for selected petroleum compounds and fractions and are applicable for assessing risk to terrestrial ecosystems. The ESLs broadly apply to coarse and fine-grained soils under various land use scenarios and are applicable to the top 2m of accessible soils.

The NSW EPA (2000) Environmental Guidelines; Use and Disposal of Biosolids Products has been adopted in order to assess materials present within the irrigation dams.

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8.1 ADOPTED HEALTH AND ECOLOGICAL INVESTIGATION AND SCREENING LEVELS

The intended use for the site is indicated in the attached Rural Residential and Zoning Plan (Figure 1) and in the College Estate Concept Layout (Figure 2).The adopted HIL and EIL/ESL screening levels apply to a sand soil and adopted and applied separately to the zones indicated in the zoning planThe adopted criteria thresholds for site water are taken from the Schedule B1 of ASC NEPM, the Australian and New Zealand Guidelines for Fresh Water and Marine Water Quality (ANZECC, 2000) and the Airport (Environment Protection) Regulations 1997, Schedule 2. The adopted site criteria are presented in Table 4 below. Results tables are presented in Appendix 2.

It should be noted that when the Sampling Design program and sampling was initially undertaken, EnviroScience Solutions Pty Ltd were informed that the use for the entire property was Residential. It was not until after the initial report had been prepared that EnviroScience Solutions were provided with the below Zoning Plans.

Please see below the adopted investigation levels as per the NEPM in regard to the rural residential subdivision plan and zoning;

- Large Lot Residential (R5) -Health Investigation Level A (Residential A),
- Environmental Management (C3) – Health Investigation Level C (Public Open Space C)
- Productivity Support (E3) – Health Investigation Level D (Commercial and Industrial D)
- Infrastructure (SP2) - Health Investigation Level D (Commercial and Industrial D)

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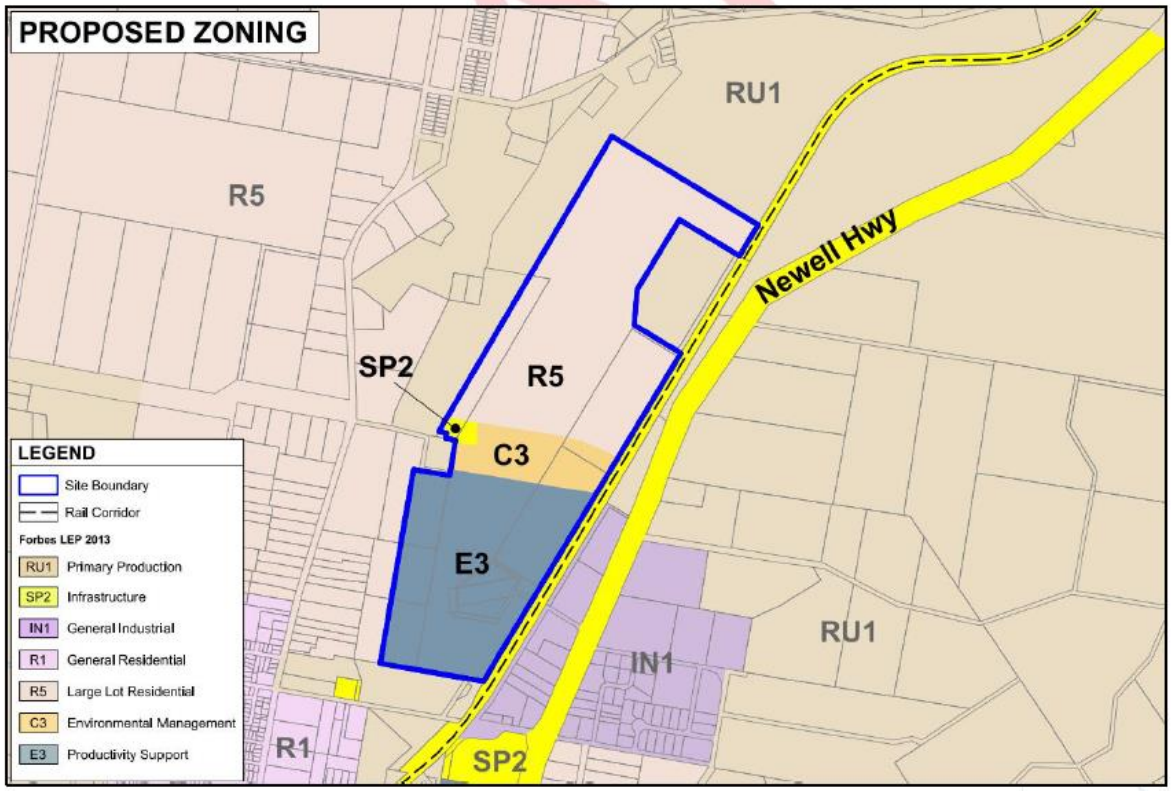

Figure 2: Proposed Zoning 230109 R BRIFB _REV F

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Figure 3: Lachley Estate Concept Master Plan

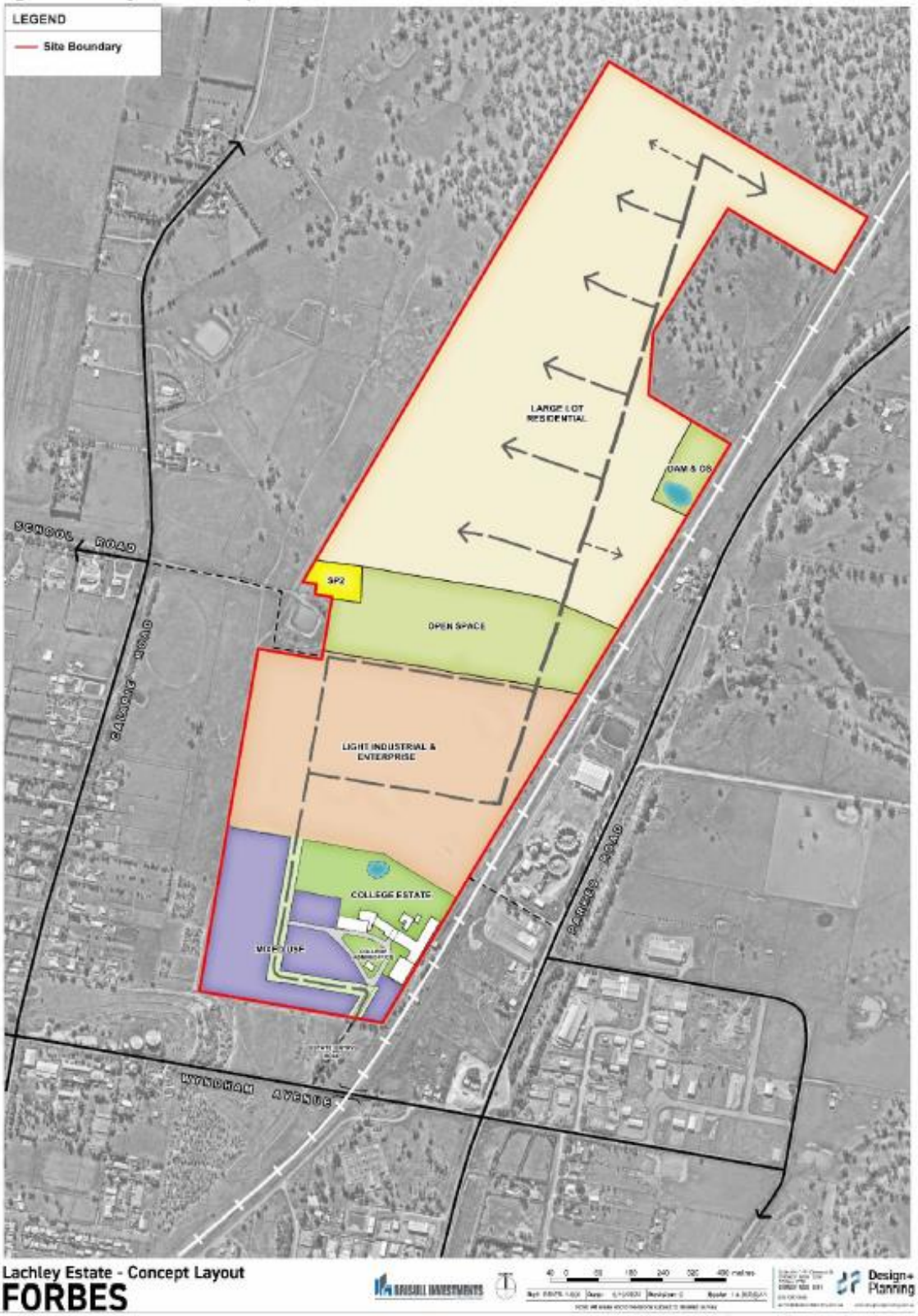

Figure 3: 230109 R BRIFB _REV F Concept Master Plan

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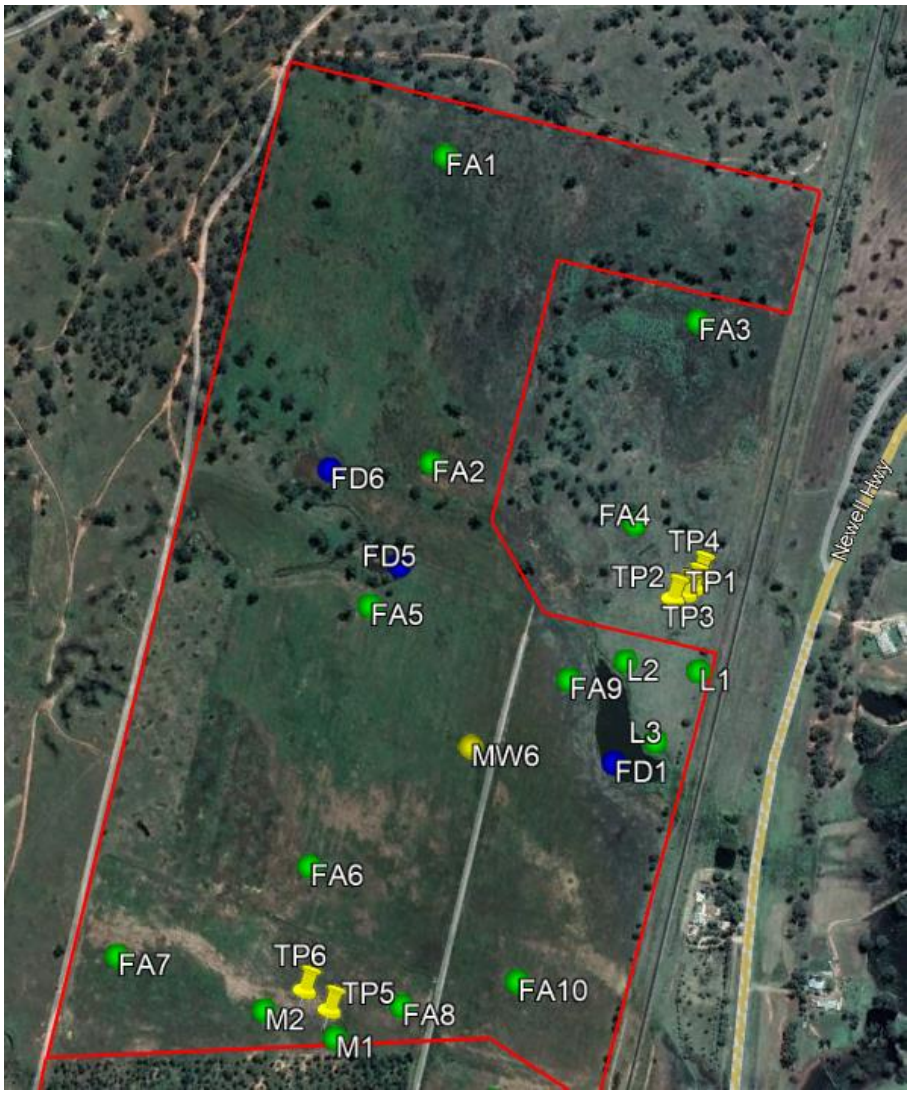
Proposed Zone classification and Related Health Investigation Levels and sampling locations.

Residential Lot R5 – HIL A – Residential A - Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.



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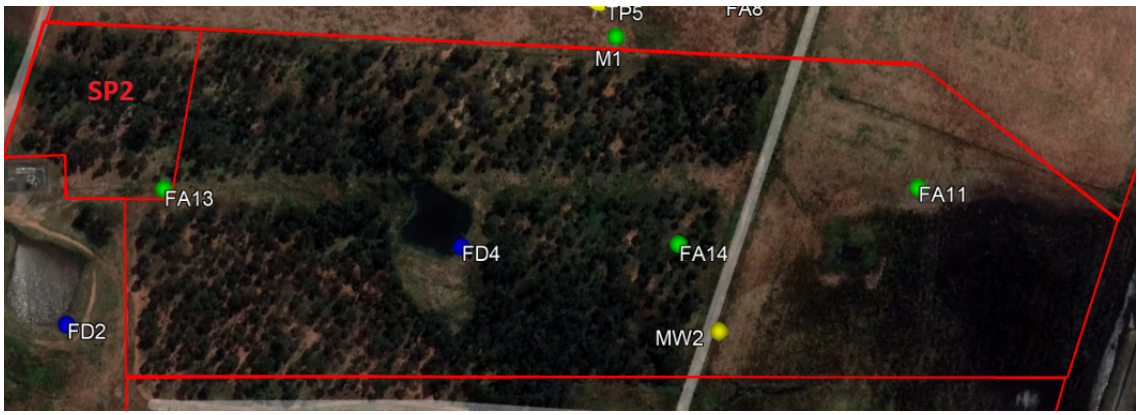
Open Space C3 - Recreational, HIL C - Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate.



Infrastructure SP2 (highlighted area) - HIL D – Commercial/industrial, includes premises such as shops, offices, factories and industrial sites.

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Light Industrial and Enterprise E3 - HIL D – Commercial/industrial, includes premises such as shops, offices, factories and industrial sites.

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TABLE 4: ADOPTED SITE ASSESSMENT CRITERIA SOIL

Chemical	NEPM 2013 HIL Residential A (mg/kg)	NEPM 2013 HIL Recreational C (mg/kg)	NEPM 2013 HIL Commercial Industrial D (mg/kg)	NEPM 2013 HSL Commercial / Industrial D Sand mg/kg	NEPM 2013 HSL Residential A – Sand (mg/kg)	NEPM 2013 HSL Recreational C– Coarse Soil (mg/kg)	NEPM 2013 EIL/ ESL Urban Residential and Public Open Spaces– Coarse Soil (mg/kg)	NEPM 2013 EIL/ ESL Commercial and Industrial– Coarse Soil (mg/kg)	Biosolids Stabilisation Requirements Grade A
	Metals								
Arsenic	100	300	3000	-	-	-	100	160	20
Cadmium	20	90	900	-	-	-	-	-	3
Copper	6000	17 000	240 000	-	-	-	190*	190*	100
Chromium	100	300	3600	-	-	-	190**	310**	100
Lead	300	600	1500	-	-	-	1100	1800	150
Nickel	400	1200	6000	-	-	-	30*	55*	60
Zinc	7400	30 000	400 000	-	-	-	180*	280*	200

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Chemical	NEPM 2013 HIL Residential A (mg/kg)	NEPM 2013 HIL Recreational C (mg/kg)	NEPM 2013 HIL Commercial Industrial D (mg/kg)	NEPM 2013 HSL Commercial / Industrial D Sand mg/kg	NEPM 2013 HSL Residential A – Sand (mg/kg)	NEPM 2013 HSL Recreational C– Coarse Soil (mg/kg)	NEPM 2013 EIL/ ESL Urban Residential and Public Open Spaces– Coarse Soil (mg/kg)	NEPM 2013 EIL/ ESL Commercial and Industrial– Coarse Soil (mg/kg)	Biosolids Stabilisation Requirements Grade A
	Total Recoverable Hydrocarbons								
TRH C6-C10 (F1)	-	-	-	260	45	-	180*	215*	-
TRH C10-C16 (F2)	-	-	-	-	110	-	120*	170*	-
TRH C16-C34 (F3)				-		-	300	1700	-
TRH C34-C40 (F4)	-	-	-	-	-	-	2800	3300	-

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	Organochlorine Pesticides								
DDT	-	-	-	-	-	-	180	640	-
HCB	10	10	80	-	-	-	-	-	-
Heptachlor	6	10	50	-	-	-	-	-	-
Aldrin and Dieldrin	6	10	45	-	-	-	-	-	-
Chlordane	50	70	530	-	-	-	-	-	-
Endosulfan	270	340	2000	-	-	-	-	-	-
Endrin	10	20	100	-	-	-	-	-	-
Methoxychlor	300	400	2500	-	-	-	-	-	-
Total DDT+DDD+DDE	240	400	3600	-	-	-	-	-	-

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Chemical	NEPM 2013 HIL Residential A (mg/kg)	NEPM 2013 HIL Recreational C (mg/kg)	NEPM 2013 HIL Commercial Industrial D (mg/kg)	NEPM 2013 HSL Commercial / Industrial D Sand mg/kg	NEPM 2013 HSL Residential A – Sand (mg/kg)	NEPM 2013 HSL Recreational C– Coarse Soil (mg/kg)	NEPM 2013 EIL/ ESL Urban Residential and Public Open Spaces– Coarse Soil (mg/kg)	NEPM 2013 EIL/ ESL Commercial and Industrial– Coarse Soil (mg/kg)	Biosolids Stabilisation Requirements Grade A
	Other Pesticides								
Chlorpyriphos	160	250	2000	-	-	-	-	-	-
	Other Organics								
Total PCBs	1	1	7	-	-	-	-	-	-
	Microbiology								
E. Coli	-	-	-	-	-	-	-	-	<100
Coliforms	-	-	-	-	-	-	-	-	<1000

*Notes: *Assumed a pH of 5.5 and CEC of 5cmol/kg, **most conservative concentration for Chromium (III) adopted.*

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TABLE 5: ADOPTED SITE ASSESSMENT CRITERIA WATER

Chemical	NEPM 2013 GIL Fresh Water (µg/L)	NEPM 2013 GIL Drinking Water (mg/L)
Metals		
Arsenic	24	0.01
Cadmium	0.2	0.002
Copper	1.4	2
Chromium (Cr VI)	1	0.05
Lead	3.4	0.01
Nickel	11	0.02
Zinc	8	-
Total Recoverable Hydrocarbons		
TRH C6-C10 (F1)	150*	-
TRH C10-C16 (F2)	600*	-

**Levels taken from the Airport (Environment Protection) Regulations 1997, Schedule 2 – water pollution – Table 1.03. It is noted these levels are related to Commercial/ Industrial sites; however, they are deemed acceptable for this assessment.*

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9. SAMPLING METHODOLOGY

9.1 SOIL SAMPLING METHODOLOGY

The Number of samples required for appropriate classification of the site was determined using the recommended sampling pattern for the site as outlined in the Preliminary Investigation prepared by Envirowest in 2013.

A judgemental sampling pattern was used with the areas specified in Table 5 above. Samples were obtained from a depth between 0-300mm.

The soil to a depth of 300mm was focussed on to determine if there was potential contamination that would be encountered in the surface of the site for the housing development.

Samples for soil analysis were collected in laboratory supplied clean glass jars. Foreign material and rocks were removed from the samples and the jars were filled to minimise headspace. The soils were then couriered to EnviroLab Services and SGS - NATA accredited laboratories for analysis.

Sample quality procedures were used to ensure that the sample and data collected from the site was of suitable quality and were in accordance with the Australian Standards, Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soils (AS4482.1-2005).

A summary of the samples collected are presented below.

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TABLE 6: SUMMARY OF COLLECTED SOIL SAMPLES

Sample Number	Date Collected	Depth (mbgl)	Analysis Suite	Notes/Comments
Field Area				
FA1	30/06/2022	0-0.3	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn), Organochlorine Pesticides	Medium red loamy/clay soil. Lots of good vegetation over ploughed field
FA2		0-0.3		Red loamy soil, Weedy vegetation. Some sludgy soft areas
FA3		0-0.3		Low lying reedy vegetation High vegetation Next to dry field Dam Good loamy soil 1x mature eucalypt tree
FA4		0-0.3		High vegetation/weeds Good loamy soil Number of trees
FA5		0-0.3		Good loamy soil High vegetation
FA6		0-0.3		Dark organic loamy soil Lots of good vegetation after ploughing Low lying wet paddock
FA7		0-0.3		Lots of good vegetation Medium loam/sand
FA8		0-0.3		Lots of vegetation/weeds Ploughed paddock Medium loam/light clay soil
FA9		0-0.3		Low lying close to dam High vegetation loamy soil
FA10		0-0.3		Brown clay
FA11		0-0.3		Black/brown clay
FA12		0-0.3		Brown clay

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Sample Number	Date Collected	Depth (mbgl)	Analysis Suite	Notes/Comments
FA13		0-0.3		Lots of vegetation, grass & trees Under electric pylon corridor Rocky aggregate material, sandy loam red soil
FA14		0-0.3		Sparsely forested area Compacted red loam Dry area Good vegetation, scrubby, weeds
FA15		0-0.3		Black/brown podsole
FA16		0-0.3		Brown clay and rock
FA17		0-0.3		Large field area Lots of vegetation Dark Silty loam soil Low lying damp reed/water plants
FA18		0-0.3		Brown podsole
FA19		0-0.3		Brown podsole
FA20		0-0.3		Brown podsole Old paddock Wild rubbish tip
FA21		0-0.3		Red podsole
FA23		0-0.3		Edge of old road Presence of bitumen Brown sandy loam
FA24		0-0.3		Brown podsole Old paddock Sample taken next to a bank
FA25		0-0.3		Pumping station- water came from AST area Black/brown sandy loam Duplicate of FA14

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Sample Number	Date Collected	Depth (mbgl)	Analysis Suite	Notes/Comments
FA26		0-0.3		Soil taken next to dam Brown/black clay Duplicate of FA13
Skin Sheds				
SS1	30/06/2022	0-0.3	Heavy Metals (As, Cr)	Next to concrete support pole. Presence of bitumen, Red pod soil
SS2		0-0.3		Edge of old road Brown sandy loam
SS3		0-0.3		Brown loam
SS4		0-0.3		Brown loam
Farm Dams				
FD1	30/06/2022	0-0.3	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn)	Healthy natural dam High vegetation Near road and rail corridor Saturated area close to dam Loamy soil
FD2		0-0.3		Healthy looking dam Brown leafy slightly silty Lots of vegetation Bird life Soil taken from bike track/dam wall Clay soil dry gravel High vegetation close to dam Near electric substation Kangaroo skin on fence Burnt area on track down from dam Bit of rubbish to the left down from dam
FD4		0-0.3		Water in centre surrounded by vegetation Healthy looking farm dam Lots of vegetation/pond weeds Below dam less vegetation, forested, scrubby

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Sample Number	Date Collected	Depth (mbgl)	Analysis Suite	Notes/Comments
				Soil sample taken from dam run off area Rubbish pile & old dirty mattress Stock feeder Loamy soil
FD5		0-0.3		Overgrown dam Low lying swamp area around dam Lots of good vegetation Burnt out car in swampy area near FD5 Clay excavated down
FD6		0-0.3		Overgrown dam High vegetation Excavated dam wall material Clay loamy soil
Landfill Area				
L1	30/06/2022	0-0.3	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn), Organochlorine Pesticides, Organophosphate Pesticides, Total Recoverable Hydrocarbons	Paddock adjacent to fence line and rail corridor Dryer NE corner of paddock Lots of good vegetation Old metal irrigation pipe Loamy soil
L2		0-0.3		Near FD1 (dam) close to the water High vegetation Sandy loamy soil with clay & gravel
L3		0-0.3		Lots of good vegetation Close to water Low lying wet area Fine sandy loam soil
LID2		0-0.3		Duplicate of L2
D1SED		0-0.3		Sample of deposited material in D1 organic crusty sodium coated material.

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Sample Number	Date Collected	Depth (mbgl)	Analysis Suite	Notes/Comments
TP1	28/07/2022	0-0.5	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn), Organochlorine Pesticides, Organophosphate Pesticides, Total Recoverable Hydrocarbons	Natural Orange brown silty/ sandy clay. On the edge of suspected landfill area.
TP2		0-0.7	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn), Organochlorine Pesticides, Organophosphate Pesticides, Total Recoverable Hydrocarbons	Landfill materials including; building debris, glass bottles, ceramics, bricks, dark brown to black soils, no odour, asbestos debris. Becoming natural clays at 0.7m bgl.
TP3		0.5-1.7	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn), Organochlorine Pesticides, Organophosphate Pesticides, Total Recoverable Hydrocarbons	Landfill materials including; building debris, glass bottles, ceramics, bricks, dark brown to black soils, no odour, asbestos debris. Base of fill materials not reached landfill to depths > 2m.
TP4		1.5-2.0	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn), Organochlorine Pesticides, Organophosphate Pesticides, Total Recoverable Hydrocarbons	Landfill materials including; building debris, glass bottles, ceramics, bricks, dark brown to black soils, no odour, asbestos debris. Base of fill materials not reached landfill to depths > 2m.
SS1		0-0.3	Total Recoverable Hydrocarbons	Sample of deposited material in D1 organic crusty sodium coated material.
SS2		0-0.3		Sample of deposited material in D1 organic crusty sodium coated material.
Mine Area				

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Sample Number	Date Collected	Depth (mbgl)	Analysis Suite	Notes/Comments
M1	30/06/2022	0-0.3	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn)	Lots of good vegetation, grass &weeds Loamy sand
M2		0-0.3		Raised mound Rocky soil material Lots of vegetation, reedy Sandy medium loam soil, worm activity
M3		0-0.3		
M4D3		0-0.3		Duplicate of M4
M4T1		0-0.3		Triplicate of M4
TP5	28/07/2022	0-0.5	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn)	Orange-brown sandy clay, no fill present, no odour.
TP6		0-0.5	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn)	Orange-brown sandy clay, no fill present, no odour.
Above Ground Storage Tank				
AST1	30/06/2022	0-0.3	Total Recoverable Hydrocarbons	Between concrete containment bay and a concrete slab Grey sandy loam Asbestos debris scattered on ground and containment bay
AST2		0-0.3		Next to a concrete containment bay Brown clay Asbestos debris scattered on ground and containment bay
Quarry Area				
QS1	30/06/2022	0-0.3	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn), Total Recoverable Hydrocarbons	Super 6 sheets on bank 1x tank barrel 44 gallon drum possible chemicals

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Sample Number	Date Collected	Depth (mbgl)	Analysis Suite	Notes/Comments
				Soil sample taken next to blue chemical container
Transformer Area				
T1	30/06/2022	0-0.3	Total Recoverable Hydrocarbons, Polychlorinated Biphenyls	Adjacent to maintenance shed Sand in transformer/sample taken below Bakelite board Asbestos debris scattered 15m out of building boundary
Treatment Ponds				
DS1	30/06/2022	0-0.3	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn), Nutrients, E. Coli and Coliforms	Dry settling pond - No Standing Water Organic dark soil Dark silty settled, Material sodium Organic burnt silt
DS2		0-0.3		Plenty of vegetation/weeds organic soil
DS3		0-0.3		Dry pond, no standing water. Plenty of vegetation/weeds Organic topsoil Clay material further down
DS4		0-0.3		Irrigation pond Dry with lots of vegetation/weeds, No standing water.
DS5		0-0.3		Deep settling pond Standing water at bottom, More organic darker soil Plenty of vegetation/weeds

*mbgl = metres below ground level

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9.2 WATER SAMPLING METHODOLOGY

The number of samples required for appropriate classification of the site was determined using the recommended sampling pattern for the site as outlined in the Preliminary Investigation prepared by Envirowest in 2013.

A judgemental sampling pattern was used with the areas specified in Table 5 above. Samples were obtained from surface water present on the site.

Groundwater wells were located following the initial sampling event undertaken on the 30th of June 2022. A secondary site visit was undertaken on the 28th of July 2022 in order to sample groundwater monitoring wells (MW1, MW2 and MW6). It is unknown the location of groundwater wells (MW3, MW4 and MW5) and therefore these wells were not sampled. Groundwater depths and total well depths were measured using an interface probe. Following this each bore was purged dry using a disposable bailer prior to allowing to recharge and sampling of fresh water within the column.

Samples for water analysis were collected in laboratory supplied bottles. The waters were then couriered to EnviroLab Services and SGS - NATA accredited laboratories for analysis on ice.

Sample quality procedures were used to ensure that the sample and data collected from the site was of suitable quality and were in accordance with the Australian Standards, Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soils (AS4482.1-2005).

A summary of the samples collected are presented below.

TABLE 7: SUMMARY OF COLLECTED WATER SAMPLES

Sample Number	Date Collected	Depth (mbgl)	Analysis Suite	Notes/Comments
Field Dams				
FD1	30/06/2022	Surface Water	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn), Electrical Conductivity	Healthy natural dam High vegetation Near road and rail corridor Saturated area close to dam Loamy soil

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Sample Number	Date Collected	Depth (mbgl)	Analysis Suite	Notes/Comments
FD2		Surface Water		Healthy looking dam Brown leafy slightly silty Lots of vegetation Bird life Soil taken from bike track/dam wall Clay soil dry gravel High vegetation close to dam Near electric substation Kangaroo skin on fence Burnt area on track down from dam Bit of rubbish to the left down from dam
FD3		Surface Water		Dam with red algae at surface of water, No Soil Taken
FD4		Surface Water		Water in centre surrounded by vegetation Healthy looking farm dam Lots of vegetation/pond weeds Below dam less vegetation, forested, scrubby Soil sample taken from dam run off area Rubbish pile & old dirty mattress Stock feeder Loamy soil
FD5		Surface Water		Overgrown dam Low lying swamp area around dam Lots of good vegetation Burnt out car in swampy area near FD5 Clay excavated down
FD6		Surface Water		Overgrown dam High vegetation Excavated dam wall

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Sample Number	Date Collected	Depth (mbgl)	Analysis Suite	Notes/Comments
				material Clay loamy soil
DSW6		Surface Water		Green water from pumping station remaining in concrete well Size 6x4m with 100mm water deep
Quarry				
QW1	30/03/2022	Surface Water	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn), Total Recoverable Hydrocarbons	Green water Foam insultation into water Super 6 sheets on bank 1x tank barrel 44-gallon drum possible chemicals
DUP01		Surface Water		Duplicated of QW1
Groundwater Wells				
MW1	28/07/2022	Groundwater	Heavy Metals (As, Cd, Cr, Cu, Pb, Ni, Zn), Total Recoverable Hydrocarbons, pH, Electrical Conductivity	Clear, No Odour
MW2	28/07/2022	Groundwater		Clear, No Odour
MW6	28/07/2022	Groundwater		Clear to slightly cloudy, traces of sediment, No Odour

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10. DATA QUALITY OBJECTIVES

TABLE 8: SUMMARY OF DATA QUALITY OBJECTIVES

Step 1: State the Problem	*Objective of the proposed investigation*	To determine if the site is suitable for use as per the Zoning Plan
	Summary of the contamination issue	Historical evidence indicates the potential for Heavy Metal, Pesticide and Hydrocarbon contamination due to the previous use as an Abattoir
	The reason the project is being undertaken	To determine if the site is suitable for use as per the Zoning Plan
	Identification of the project team and technical support experts	Noellie Bourdoiseau, Mark Austin, and Damien Johnson (Sampler's) & Michael Williamson (Project Manager), Mark Challoner (Contaminated Sites Practitioner)
	Budget and community concern issues	None have been specified
	Identification of the regulatory authorities and the local government area	Environment Protection Authority, Forbes Shire Council
Step 2: Identify the decision/goal of the study	*Was the site suitable (or could the site be made suitable) for the proposed continued use as a residential development*	Is there contamination present from the former use of the site as an Abattoir?
		Can the site be remediated to be suitably used as a Residential Site?
Step 3: Identify the information inputs	*Media to be collected*	Soil, Surface Water and Ground Water
	Site Criteria for each medium of concern	Site Criteria is outlined in sections 8.1 for Soil & Water

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	Analytical methods that are required for chemicals of potential concern	Analytical methods are outlined in Appendices 5
Step 4: Define the boundaries of the study	The study boundaries are defined by the boundaries of the site as shown in Figure 1 in Section 5. The vertical boundary for soil was to maximum depth of 300mm bgl. Deeper excavations were undertaken in the "Mining Spoil" areas and the "Former Landfill" area to the north of the site.	
Step 5: Develop the analytical approach	The analytical approach for chemical concentrations within the soil for criteria as set out in section 8 of this report, where individual samples exceed the health-based criteria then further assessment and /or management may be required.	
Step 6: Specify performance or acceptance criteria	There are two main sources of false results which may cause decision areas: • Sampling errors, where samples collected are not representative of the conditions observed onsite; and • Measurement errors, which occur during sample collection, preparation, and analysis. False results may lead the decision maker to assume the following errors: • Type 1: deciding that the site is not contaminated and therefore suitable for use for the intended purpose as outlined in section 8; and • Type 2: deciding that the site is contaminated and therefore not suitable for use for the intended purpose as outlined in Section 8. Assessment will be made as the likelihood of a Type 1 decision error using QA/QC assessment and the closeness of the data to the assessment criteria. The assessment criteria is explained in Table 4 of Section 8.1. A Type 2 error is less likely and may result in further investigation which may amend the error reported.	
Step 7: Develop the plan for obtaining data	Based on the DQOs outlined within this table the SAQP was derived and is outlined in Section 7 (above).	

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11. DATA QUALITY INDICATORS

11.1 COMPLETENESS

TABLE 9: QA/QC SUMMARY OF PROJECT COMPLETENESS

Were Samples Collected from Specific Locations and at Identified Depths of 0-300mm	A sample was collected from each location, obtained at a depth of 0-300mm for soil samples. Samples were collected using a shovel and washed down between sample locations.	Complete
Were All Critical Locations Sampled	Soil samples were obtained from all Critical locations in regard to Human and Ecological Health.	Complete
Standard Operating Practices (SOP) appropriate and compiled with Experienced Sampler	The sampling methodologies set out in the SAQP (Section 7) were followed on site. Science Based Tertiary Qualified Field Staff who have been inducted into EnviroScience Solutions SOP with prior contaminated sites experience were the samplers	Complete
Documentation Correct	Sample Locations were GPS mapped to ensure correct locations. Chain of Custody (COC) forms were filled out for all samples submitted to the laboratory within holding times (see Appendix 7 for COCs).	Complete
All critical samples and analytes analysed according to SAQP	All samples were analysed by a NATA accredited Laboratory as outlined in the SAQP	Complete
Appropriate Methods and PQLs	Appropriate methods and PQLs were used by the NATA Accredited Laboratories undertaking the analysis.	Complete

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11.2 COMPARABILITY

TABLE 10: QA/QC SUMMARY OF PROJECT COMPARABILITY

Were SOPs appropriate and carried out by an Experienced ES Sampler	Yes. Sampling was carried out in accordance with ES SOPs by an appropriately qualified person.	Complete
Were logs produced at each sampling location outlining the material encountered.	Yes. Soils were logged following the Unified Soil Classification System (USCS). As the top 300mm were targeted topsoils, fills and natural materials (see Appendices 3 & 7).	Complete

11.3 REPRESENTATIVENESS

TABLE 11: QA/QC SUMMARY OF PROJECT REPRESENTATIVENESS

Was the appropriate media relative to the SAQP sampled during field investigations?	Yes. Samples were collected and analysed in accordance with the implemented SAQP. Samples were transported to NATA Accredited laboratories for analysis under Chain of Custody Conditions.	Complete
Were SOPs appropriate to the project and complied with.	Yes. ES's SOPs were implemented. Sample location was recorded with hand-held GPS. Site conditions were recorded during sampling and the COC forms were filled out correctly. Duplicate and triplicate samples were analysed for the appropriate analysis.	Complete
Were sampling and subsampling techniques, containers/ preservation carried out.	Laboratory duplicates were analysed in general accordance with the SAQP. Unique ID labels were used for each	Complete

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	primary/ duplicate/ triplicate sample collected.	
Were duplicate/ triplicate samples collected at an appropriate rate.	Yes. One duplicate sample and One triplicate samples were collected at a rate of 1 per 20 primary samples.	Complete

11.4 PRECISION

TABLE 12: QA/QC SUMMARY OF PROJECT PRECISION

Did the laboratory carry out internal quality control procedures.	Internal laboratory duplicates, control spikes, matrix spikes and method blanks. These were reported within acceptable control limits.	Complete
Were field duplicate/ triplicate analysis within Relative Percentage Difference limits. (30% for concentrations more than 10 times the LOR and 50% for concentrations less than 10 times the LOR).	Analysis of field duplicate and triplicate samples produced no exceedances of the RPDs (See Appendix 2 for lab duplicate tables).	Complete

11.5 ACCURACY

TABLE 13: QA/QC SUMMARY OF PROJECT ACCURACY

Were SOPs appropriate and complied with during field investigations.	ES SOPs were implemented including SWMS prior to fieldworks.	Complete
Was reusable sampling equipment decontaminated between sampling locations	Yes. Shovel was washed in a solution of detergents and potable water between sampling locations to ensure cross contamination was limited.	Complete
Were field blanks and trip blanks used to establish QA/QC procedures	No. trip blanks and trip spikes were not collected with the primary samples. ES does not deem this to unduly affect the usability of the results.	Incomplete

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12. QUALITY ASSURANCE/QUALITY CONTROL

The field Quality Assurance/ Quality Control consisted of duplicate and triplicate sampling undertaken alongside the primary samples. Duplicates and triplicates were collected at the minimum rate of 1 per 20 primary samples. Four duplicate samples and one triplicate sample were collected with the fifty-three primary samples.

Results of the QA/ QC analysis is indicated the following exceedances of relative percentage differences (RPDs);

- In sample pair M4/ M4DUP; arsenic reported at 95% and zinc reported at 160%.
- In sample pair M4/ M4TRIP; no exceedances of RPDs reported.
- In sample pair FA14/ FA25; copper reported at 149%, lead reported at 107% and zinc reported at 195%.
- In sample pair FA13/ FA26; copper reported at 56%, nickel reported at 61% and zinc reported at 85%.
- In sample pair L2/LID2 no exceedances of RPDs reported.

The above exceedances of the relative percentage differences are likely attributed to a heterogenous distribution of the clay, sand content within the samples as observed during sampling which showed differing fine and coarse fractions within the soil's matrix and the variability in the lab sub-sample collected and tested from primary and QC samples.

Internal laboratory QA/QC procedures were followed and included matrix spikes, laboratory duplicates, laboratory control samples and blanks, these parameters were reported within the laboratory's acceptance criteria.

Information regarding the Quality Assurance and Quality Control (QA/QC) can be found in Appendix 9 for the sampling undertaken and Appendices 5 & 6 for the Laboratory analysis undertaken.

12.1 DATA QUALITY ASSESSMENT

Based on an assessment of the field and laboratory QA/QC information, ES considers that the data obtained is representative of the conditions of the site during the site visit and is usable for the purposes of this detailed investigation.

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13. ANALYSIS RESULTS

13.1 SOIL ANALYSIS RESULTS

A total of fifty-three (53) soil samples were taken across the approximately 1.7km^2 area. Four (4) duplicate and one (1) triplicate samples were also taken from the site, making a total of fifty-one (58) soil samples.

Soils appeared to be a natural surface soils overlying residual brown, orange-brown and red-brown loamy clays.

A summary of the soil analysis is presented below.

13.1.1 RESIDENTIAL AREA

- Samples collected within the field areas / vacant paddocks (FA1 to FA10) surrounding the former abattoir were below the adopted Residential site criteria.
- Samples collected from the banks of the field dams present within the vacant paddocks (FD1, FD5 and FD6) reported no exceedances of the adopted Residential site criteria.
- Samples collected from the landfill areas (L1 to L3 and LID2) reported no exceedances of the adopted site criteria.
- Deeper excavations undertaken in the landfill area identified uncontrolled fill to depths greater than 2 metres below ground surface. Three of the test pits (TP2, TP3 and TP4) in this area encountered trace amounts of asbestos containing materials and exceedances of the adopted site criteria for heavy metals including copper, lead and zinc. It should be noted that these samples are no longer included in the current site zoning plan. However, the analysis results have been included in this report in the event that this area is to be developed in the future. This land is proposed to be 'Crown Land'.
- Samples collected from within the former mining areas (M1, M2, TP5 and TP6) were reported below the adopted site criteria for all contaminants analysed.

13.1.2 RECREATIONAL AREA

- Samples collected within the field areas / vacant paddocks (FA11, FA14) surrounding the former abattoir were within the adopted site criteria.
- Samples collected from the banks of the field dams present within the vacant paddocks (FD2 and FD4) reported no exceedances of the adopted site criteria.

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13.1.3 INDUSTRIAL AREA

- Samples collected within the field areas/ vacant paddocks (FA12, FA13, FA14, FA15, FA16, FA17, FA18, FA19, FA20 FA21, FA22, FA23, FA24) surrounding the former abattoir were within the adopted site criteria, the exception to this was zinc above the adopted criteria for EIL/ESL in duplicate sample FA25 (collected with primary sample FA14) reported at 880mg/kg.
- Samples collected within the former skin shed footprint (SS1 to SS4) reported no exceedances of the adopted site criteria.
- Samples collected surrounding the former above ground storage tank (AST1 and AST2) were reported below the adopted site criteria.
- The sample collected from the former quarry area (QS1) reported concentrations of zinc above the adopted criteria for EIL/ESL at 350mg/kg. All other analytes were reported below the site criteria.
- The sample collected from the transformer area was reported below the adopted site criteria for all contaminants analysed. Two potential fragments of asbestos containing materials were collected and analysed at EnviroScience Solutions Dubbo office. B26835-S1 – lagging collected between location FA23 and SS3 was positive for chrysotile, amosite and crocidolite asbestos. B26835-S2 – fibre cement fragment located near the toilet shed adjacent to the skin shed was positive for chrysotile and amosite asbestos.
- Sample D1/SED collected from deposited sediment within D1 (see appendix 1 for location) reported concentrations of TRH C_{16}-C_{34} above the adopted criteria for EIL/ ESL at 340,000mg/kg. Following this high reported value for TRH, two (2) further check samples were collected from this material. Both samples (SS1 and SS2) reported concentrations of TRH C_{16}-C_{34} above the adopted criteria for EIL/ ESL at 38,000mg/kg and 29,000mg/kg respectively. All other contaminants were reported below the adopted site criteria.
- Samples collected from within the former mining areas (M3, M4 and M4D3, M4T1 were reported below the adopted site criteria for all contaminants analysed, the exception to this is zinc in duplicate sample M4D3 reported at 340mg/kg which is above the adopted EIL.
- Samples collected from the irrigation ponds (DS1 to DS5) reported concentrations above the adopted site guidelines in samples DS1 for and zinc (740mg/kg), DS3 for zinc (360mg/kg) and DS5 for zinc (570mg/kg). DS5 was also found to be above the Biosolids Stabilisation Requirements for Grade A for coliforms 1500 CFU/g. Total nitrogen ranges from 960mg/kg to

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20,000mg/kg within the soils collected from the irrigation ponds, Total phosphorus ranged from 580mg/kg to 26,000mg/kg and Electrical conductivity ranged from 220mg/kg to 3,300mg/kg.

The sample locations that exceeded the adopted criteria are highlighted within the Table presented within Appendix 2.

13.2 WATER ANALYSIS RESULTS

13.2.1 SURFACE WATER RESULTS

A total of eleven (11) water samples were collected from surface water bodies located on the wider site. A summary of the samples collected, and any exceedances of the site criteria are presented below.

- Samples collected from the irrigation dams (W2 and W5) exceeded the Australian Drinking Water Guidelines for Escherichia Coli (E. Coli) 14 CFU/g and 70 CFU/g respectively. Coliforms were reported above the ADWG at 4 CFU/g and 66 CFU/g respectively.

- Sample W5 reported heavy metals above the adopted site criteria for NEPM 2013 Groundwater Investigation Levels – Fresh Water and the ADWG for arsenic (27µg/L), chromium (11µg/L), copper (27µg/L) and nickel (31µg/L). All other analytes were reported below the site criteria.

- Samples collected from the field dams reported slight exceedances of the NEPM 2013 GILs – Fresh Water in sample FD1 (2 µg/L), FD2 (2 µg/L), FD3 (2 µg/L) and FD5 (2 µg/L). All other analytes were reported below the site criteria.

- Samples collected from the pooled water located within the former quarry footprint (QW1 and DUP01) reported concentrations of zinc above the NEPM 2013 GILs – Fresh Water reported at 23 µg/L and 21 µg/L, respectively. All other analytes were reported below the site criteria.

13.2.2 GROUNDWATER RESULTS

A total of three (3) water samples were collected from groundwater wells (MW1, MW2 and MW6).

It is noted that the locations of MW3, MW4 and MW5 are unknown; these wells were not registered within the Water NSW All Groundwater Map. The locations of wells MW1, MW2 and MW6 are shown within Appendix A Figures. Table 14 below is a summary of the findings of the groundwater investigation.

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TABLE 14: GROUNDWATER BORE DETAILS

Well Number	Stick up Height (m)	Depth to Groundwater (m)*	Total Depth of Well (m)	Characteristics
MW1	0.61	2.27	6.54	Clear, no odour
MW2	0.71	2.27	7.76	Clear, no odour
MW6	0.70	4.54	11.46	Clear-slightly cloudy, traces of sediment

*Depth to groundwater measured from top of stick up.

Results of the sample analysis indicated exceedances of the ASC NEPM 2013 Groundwater Investigation Levels (GILs) – fresh waters for the following heavy metal analytes.

- MW1 reported elevated concentrations of copper (2µg/L) and zinc (110µg/L).
- MW2 reported elevated concentrations of copper (6µg/L), nickel (12µg/L) and zinc (75µg/L).
- MW6 reported elevated concentrations copper (4µg/L), lead (7µg/L) and zinc (24µg/L).

All other analytes tested were below the adopted guidelines for site groundwater.

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14. CONCEPTUAL SITE MODEL

14.1 SOURCES OF POTENTIAL CONTAMINATION ON SITE

Multiple potential contamination sources have been identified on the area of interest. Sources and potential contaminants are listed in Table 15 below.

TABLE 15: SOURCES AND POTENTIAL CONTAMINANTS ON SITE

Source	Potential Contaminants	Migration/exposure pathways
Skin Sheds—preservatives used to treat skins	Arsenic & Chromium	Direct contact with contaminated soils Migration through surface waters
Near Above-ground Storage Tank	Total Recoverable Hydrocarbons (C6-C36)	Direct contact with contaminated soils Migration through surface waters
Transformer—Oils	Total Recoverable Hydrocarbons (C6-C36), polychlorinated biphenyl (PCB)	Direct contact with contaminated soils Migration through surface waters
Quarry—Building Debris	Heavy Metals and Asbestos	Direct contact with contaminated soils Migration through surface waters
Treatment and irrigation ponds—Effluent Waste and Wastewater Sludge	Heavy Metals, pathogens, nitrogen, phosphorus, and salinity	Direct contact with contaminated soils Migration through surface waters
Mining areas—Leachate Runoff	Heavy Metals	Direct contact with contaminated soils Migration through surface waters

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Source	Potential Contaminants	Migration/exposure pathways
Downslope of Landfill—runoff from former landfill	Heavy Metals, OCP, organophosphate pesticides, Total Recoverable Hydrocarbons, pH	Direct contact with contaminated soils Migration through surface waters
Field areas—Agricultural Activities, Irrigation Pipes	Heavy Metals, Organochlorine Pesticides, Asbestos	Direct contact with contaminated soils Migration through surface waters
Groundwater	Heavy Metals	Direct contact with contaminated groundwater Migration through aquifers
Building Materials—Old Abattoir Buildings	Asbestos and Lead Paint	Direct contact with contaminated soils Migration through surface waters

14.2 RECEPTORS

Human receptors, including workers and contractors to develop the housing estate and later occupants of the housing development.

Methods of exposure include inhalation of dust, direct skin contact with soils, ingestion of soils, and contact with potentially contaminated surface water.

Ecological receptors (surface water bodies and groundwater reservoirs) have been adopted for this assessment due to access to soils by terrestrial ecosystems and transitory wildlife.

14.3 PATHWAYS

A summary of the key exposure pathways is presented in Table 16 below.

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TABLE 16: KEY POTENTIAL EXPOSURE PATHWAY

Receptor/ Media	Exposure Pathway	Comment
Maintenance/ Construction Worker	Complete	There is a potential for workers conducting surface and subsurface disturbance to be exposed to soils containing hydrocarbon, heavy metal and coliform contamination via dermal contact or inadvertent ingestion of materials located within the irrigation ponds. This pathway is complete.
Current and Future Site Users	Complete	Surfaces may present a potentially complete pathway to dermal contact, ingestion of contaminated soils or surface waters.
Surface Water	Potentially Complete	Surface water runoff has the potential to transport hydrocarbon/ effluent waste contamination during rainfall events. Given the distance to the nearest surface water bodies (in the central and eastern portions of the site) a complete pathway may exist.
Groundwater	Potentially Complete	Groundwater bodies are likely to be encountered during development due to the relatively shallow groundwater encountered in bores MW1, MW2 (approximately 1.5m below ground surface) and MW6 (approximately 3.8m below ground surface).

14.4 CONCEPTUAL SITE MODEL

Based on the above history, a conceptual site model was developed to identify the potential pathways for transport and exposure to contaminants. The conceptual site model is in Table 17 below.

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TABLE 17: CONCEPTUAL SITE MODEL

Source	Sediment deposition within the irrigation ponds including hydrocarbon heavy metal and coliform contamination Landfill/ illegal dumping - Scattered Asbestos materials on site surface Landfill/ illegal dumping - Scattered asbestos waste (super six) within the former quarry area Landfill area – North area of the site depths of fill > 2m bgs.
Pathways	Direct contact with soil, ingestion of soil and Surface water. Shallow groundwater encountered onsite <2m in the central and southern portion of the site indicates this pathway is potentially complete.
Receptors	Workers and contractors visiting the site Future site users and occupants The unnamed surface water bodies located in the central and eastern portion of the site Groundwater
Frequency of Exposure	Five days a week up to 10 hours a day
Depth of Impacts	Potentially hydrocarbon, heavy metal and coliform contaminated soils are present to at least 300mm within the irrigation dam (D1) sediment, these sediment stockpiles appear to have been dumped within the sediment basin. Asbestos debris (surface contamination 0-100mm) Groundwater <2m below ground surface MW1 and MW2, and <5m below ground surface at MW6. Heavy metal concentrations were above the adopted site criteria in each well analysed.
Locations of known soil Impacts	Irrigation Ponds 1, 3 and 5 (heavy metals, coliforms, and TRH C_{16}-C_{34}) Asbestos in the form of super six sheeting located within the former quarry Asbestos lagging collected between location FA23 and SS3. Asbestos fibre cement fragment located near the toilet adjacent to the skin shed. Asbestos and heavy metal contamination located to depths of 2m below ground surface within the landfill area.

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15. SITE CHARACTERISATION

The soil contamination on the site was found to be isolated to the sediment, soils, and surface water within the irrigation ponds in the central portion of the site.

The TRH contamination reported above the Commercial/Industrial Health Screening and Ecological Screening Levels was present within sediment/ soils in irrigation dam D1/SED reported at 340,000mg/kg. Check samples collected from this area indicated that elevated levels of TRH were present within this dumped sediment. Both samples (SS1 and SS2) reported concentrations of TRH C_{16}-C_{34} above the adopted criteria for EIL/ ESL at 38,000mg/kg and 29,000mg/kg.

Surface water pooled within these irrigation dams reported heavy metals and E. Coli/ coliforms above the Australian Drinking Water Guidelines (2011) Health Guideline Values and the NEPM (2013) Groundwater Investigation Levels for Fresh Water in sample W2 and W5.

Deeper excavation undertaken in the north of the site within the former landfill area, indicated that landfill to depths greater than 2m was present in this area. Four test pits (TP1 to TP4) were excavated in this area and samples were collected at varying depths. TP1 and TP2 encountered natural materials at surface and at 0.7m bgs respectively. TP3 and TP4 did not encounter natural materials due to hole collapse greater than 2m below surface. Traces of asbestos debris were collected at locations TP2, TP3 and TP4, these suspect asbestos containing materials were analysed and found to contain chrysotile, amosite, and crocidolite asbestos (as shown in lab report A26835R1).

These exceedances are likely attributed to historical mining/ landfilling on the property and use of these irrigation ponds for agricultural purposes.

Surface water samples collected reported elevated levels of heavy metals (chromium) above the NEPM (2013) Groundwater Investigation Levels for fresh water in samples FD1, FD2, FD3 and FD5 (all reported at 2µg/L), however these were below the Australian Drinking Water Guidelines (2011) Health Guideline Values.

Groundwater assessment reported concentrations of the heavy metals copper, lead, nickel and zinc above the adopted Groundwater Investigation Levels (GILs) – ASC NEPM 2013 – Fresh Water. All other analytes were reported within the adopted site guidelines. pH was reported within the range provided in the Australian Drinking Water Guidelines for aesthetic levels (6.5-8.5 pH units). Groundwater was encountered at depths of less than 2m below ground level at location MW1 and MW2.

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Trace amounts of asbestos debris have been identified in the form of pipe lagging and fibre cement debris which were found adjacent to the former skin shed footprint and is likely associated with the former structures in this area.

Unknown amounts of asbestos debris in the form of corrugated 'super six' sheeting have been observed within the former quarry area approximately 125m northwest of the former abattoir building footprint. Due to the depth and amount of bulk building debris and wastes within the quarry, this area remains largely unclassified and further assessment at a later date is recommended to determine the extent and depth of waste materials within this uncovered pit.

It is possible that workers or contractors on site may ingest or absorb contamination during earthworks, or potentially spread possible contamination around the site through transportation of surface waters or movement of bulk earth.

16. WASTE MANAGEMENT

This report does not provide a waste classification for the site. Any waste that is to be removed from the site will need to undergo classification prior to removal from site. The classification will need to be in accordance with the *Waste Classification Guidelines, Part 1: Classifying Waste* (NSW EPA, 2014).

Waste Classification reports must include a description of the waste, photos of the waste, history of the site, and potential contaminating activities. Samples must be collected based on the site history and any other previous testing that has been undertaken.

All wastes should be disposed at an appropriately licensed waste facility in accordance with their classification. Waste disposal dockets or any other waste documentation should be retained and summarised at the completion of the works.

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17. CONCLUSIONS AND RECOMMENDATIONS

Impacts identified from historical activities on the site including mining, landfilling, and using the site grounds for cattle grazing/ agricultural purposes for the abattoir have resulted in several identified areas of localised contamination. Namely the irrigation ponds, the former quarry landfill area and scattered areas of surface asbestos contamination surrounding former infrastructure of the abattoir 'skin-sheds'. See below a summary of the acceptable criteria for each subdivision.

The residential zoned area in the north of the subdivision is majority within the acceptable criteria when compared to the NEPM HIL A, however the, the 'Landfill' area located within the north of the site indicated varying depths of fill as well as multiple stockpiles of soils and wastes in the area. The landfill itself extended at least 2m below ground surface and the extent of this area is yet to be determined. Asbestos observed within three of the test pits within the 'landfill' area indicates that removal of these materials to an offsite waste facility may be required. In order to complete this, a waste classification report will need to be undertaken. This waste classification report would need to be in accordance with the NSW EPA (2014) Waste Classification Guidelines: Part 1 Classifying Waste.

The recreation zoned areas HIL C, that makes up the open space and following analyses of samples provided evidence that these areas should be adequate for the proposed site use.

The Industrial Zoned area located in the southern portion within the proposed site subdivision meets most of the adopted criteria with the exception of the sediments from within the settling ponds / Basin. Prior to works commencing, it would be recommended that the soil is remediated / removed and validation of soils undertaken to ensure that leaching or cross contamination of soil does not occur. The exceptions for these areas however are the fibre cement debris identified around the surrounding old abattoir buildings should be remediated prior to any works commencing in this area. A site assessment and scope of works may need to be completed and an appropriately licensed asbestos removalist, class A or class B approved by Safe Work NSW engaged to remove the debris. Once completed a clearance of the site should be obtained prior to major earth works commencing. Secondly further investigation would be recommended around the quarry location as the full extent of materials within this area is still an unknown. However, EnviroScience believe that this area is reasonably localised and should be easily isolated for remediation.

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EnviroScience Solutions recommends that the site should be suitable for the development should the above discussed areas be addressed, and certain further investigation and remedial practices undertaken, such as:

- Removal of the Hydrocarbon impacted sediment located in Sediment Basin 1. Further sampling of this material should be undertaken to determine waste classification for the materials prior to offsite removal.
- Further investigation of the waste and building waste within the open-faced quarry area.
- Further investigation and waste classification of the landfill area in the northern portion of the site.

EnviroScience solutions believes that the site can be made suitable following remediation of the above outlined areas by means of excavation of contaminated materials and removal offsite to landfill.

The surrounding field areas/ paddocks are currently in suitable condition for the proposed development. However, it should be noted that samples were collected from discrete locations and contamination may be present in areas that remain unassessed.

Following asbestos removal and demolition of the abattoir itself and related infrastructure surrounding the abattoir, sub surface investigation within the building's footprint should be undertaken to establish any areas of potential environmental concern. It is noted that the asbestos register for the abattoir was not made available for EnviroScience Solutions as part of this report.

EnviroScience Solutions recommend the following to bring the site within acceptable Health and Ecological guidelines.

- A Remedial Action Plan (RAP) is prepared by a suitably qualified and experienced land consultant prior to the commencement of earthworks and site development.
- The RAP will outline targeted requirements within the quarry area, the irrigation ponds and around the footprint of the abattoir to remediate areas of environmental concern outlined in this assessment.
- The RAP should include an appropriate Unexpected Finds Procedure (UFP) within this Plan, to provide a procedure for emergency response should previously unidentified areas of contamination be uncovered.

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This Remedial Action Plan (RAP) can be implemented to effectively clean up the current onsite contamination in the areas identified as well as unexpected finds during remediation.

18. LIMITATIONS OF THIS REPORT

The sampling regime was limited to the discrete locations that are outlined in this report and recommendations have been based on the samples mentioned in this report only. The following limitations also apply to remediated contaminated areas.

1. To the extent permitted by law, EnviroScience Solutions Pty Ltd will not be responsible in tort, contract or otherwise for any loss or damage, including for any personal injuries or death, or any consequential loss, loss of markets and pure economic loss, suffered by the Customer, whether or not the loss or damage occurs in the course of performance by EnviroScience Solutions Pty Ltd of this contract or in events which are in the contemplation of EnviroScience Solutions Pty Ltd and/or the Customer or in events which are foreseeable by EnviroScience Solutions Pty Ltd and/or the Customer.

2 To the extent that liability has not been effectively excluded by the proceeding clause, then EnviroScience Solutions Pty Ltd limits its liability to: -

   (a) The supply of services again; or

   (b) The payment of the cost of supplying the services again, at the election of EnviroScience Solutions Pty Ltd.

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19. REFERENCES

Contaminated Land Management Act, 1997 (CLM Act).

Guidelines for Consultants Reporting on Contaminated land (NSW EPA) April 2020

National Occupational Health and Safety Commission (NOHSC) – *Exposure Standards for Atmospheric Contaminants in the Occupational Environment.*

National Environment Protection (Assessment of Site Contamination) Measure, NEPM 2013

NSW EPA, Contaminated Sites, Sampling Design Guidelines

NSW Work Health and Safety Act 2011

NSW Work Health and Safety Regulation 2017

Protection of the Environment Operations Act, 1997 (POEO Act).

State Environmental Planning Policy No- 55 2014 (SEPP 55).

Waste Avoidance and Resource Recovery Act, 2001 (WARR Act).

Waste Classification Guidelines – Part 1 – Classifying Waste (November 2014) – NSW Environment Protection Authority (EPA)

Managing Urban Stormwater: *Soils and Construction*. Landcom, (4th Edition) March 2004 (reprinted 2006) (the "Blue Book"). Volume 1 and Volume 2.

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APPENDIX 1 SITE MAP

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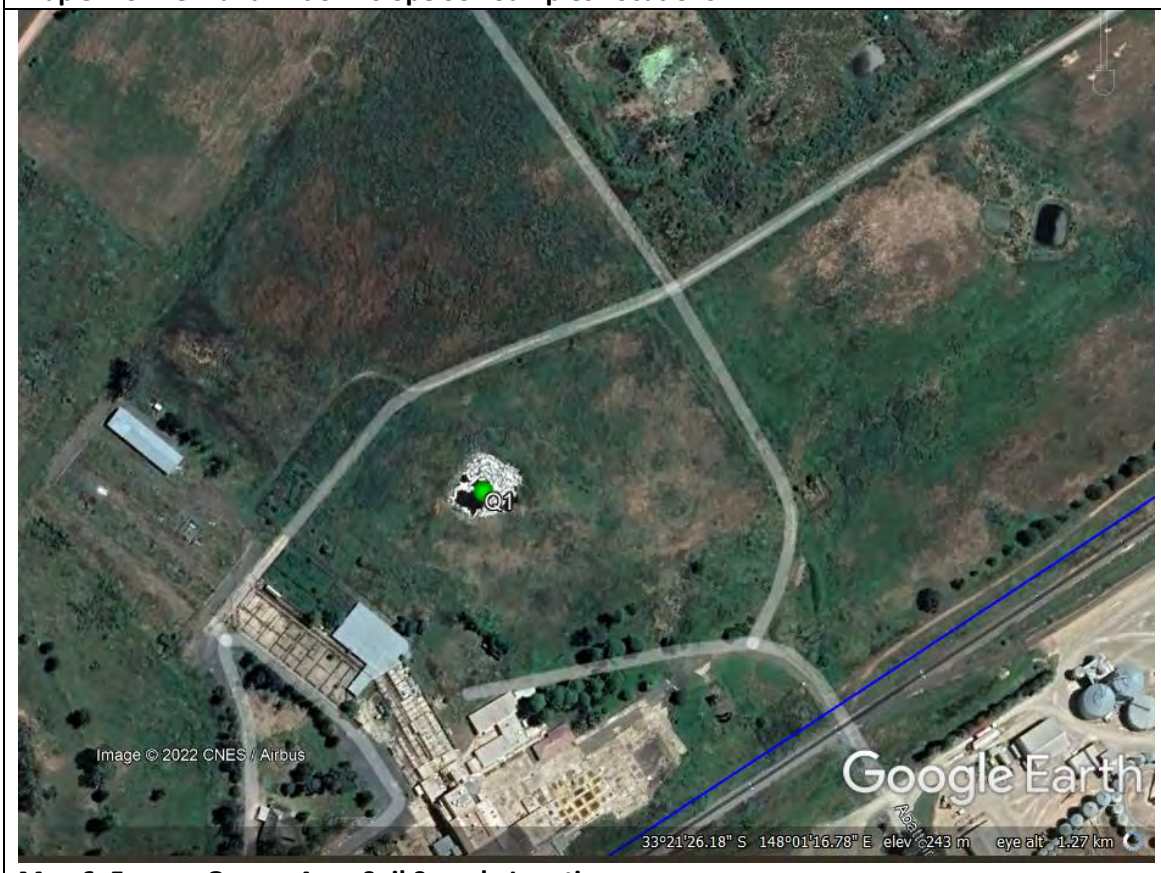
Map 1: Skin Shed Soil Sample Locations

Map 2: Above Ground Storage Tank Soil Sample Locations

Map 3: Treatment and Irrigation Pond Soil Sample Locations

Map 4: Field Area Soil Sample Locations

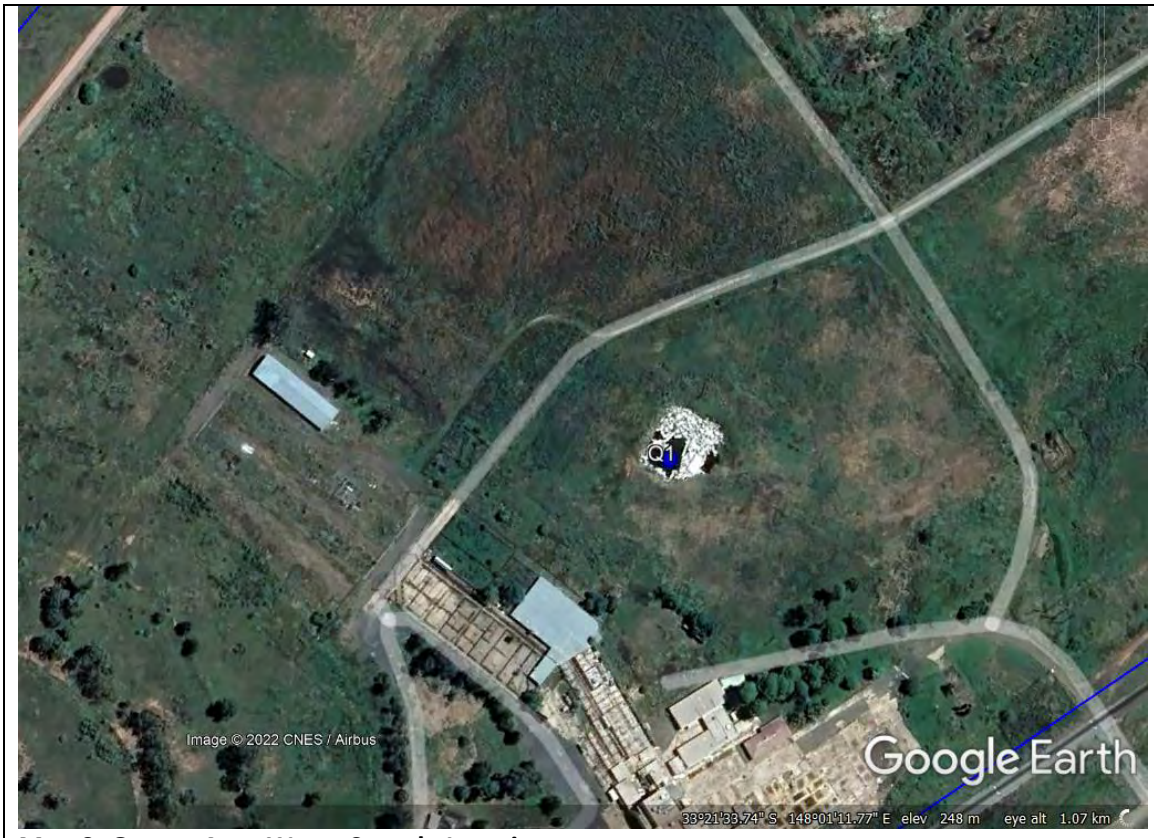
Map 5: Former Landfill downslope Soil Samples Locations



Map 6: Former Quarry Area Soil Sample Location

Map 7: Transformer Soil Sample Location

Map 8: Mining Area Soil Sample Locations



Map 9: Quarry Area Water Sample Location

Map 10: Water Treatment Dam Water Sample Locations

Map 11: Field Dam Water Sample Locations

APPENDIX 2 RESULTS TABLES—SOIL

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TABLE 3-COMMERCIAL/INDUSTRIAL CRITERIA

Table 3a- Commercial/Industrial Criteria - Field Areas

						Field ID	FA12	FA13	FA14	FA15	FA17	FA21	FA25	FA26	FA16	FA18	FA19	FA20	FA23	FA24
						Sample Depth (m)	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3
						Sample Date	30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
						Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Method	ChemName	Units	EQL	NEPM 2013 HILs Commerical Industrial D	NEPM 2013 HSLs Commercial/ Industrial Sand 0 to <1m	NEPM 2013 EILs/ESLs Commercial/ Industrial														
Heavy Metal	Arsenic	mg/kg	4	3000	-	160	7	5	<4	6	<4	<4	4	6	7	4	5	4	4	<4
	Cadmium	mg/kg	0.4	900	-		<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
	Chromium	mg/kg	5	3600	-	310**	25	25	20	20	23	11	30	23	15	28	25	24	12	21
	Copper	mg/kg	5	240000	-	190*	30	8	14	30	11	33	55	25	93	14	13	12	20	6
	Lead	mg/kg	5	1500	-	1800	12	7	9	14	7	6	23	10	8	10	8	13	9	6
	Nickel	mg/kg	5	6000	-	55*	10	5	15	10	6	5	8	8	11	8	6	11	10	6
	Zinc	mg/kg	5	400000	-	280*	49	11	17	69	13	24	880	42	39	16	15	27	180	9
OCP	Apha-BHC	mg/kg	0.1		-		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	HCB	mg/kg	0.1	80	-		<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
	beta-BHC	mg/kg	0.1		-		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	gamma-BHC	mg/kg	0.1		-		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Heptachlor	mg/kg	0.1	50	-		<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
	delta-BHC	mg/kg	0.1		-		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Aldrin	mg/kg	0.1	45	-		<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
	Dieldrin	mg/kg	0.1		-		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Heptachlor Epoxide	mg/kg	0.1		-		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	gamma-Chlordane	mg/kg	0.1	530	-		<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
	alpha-chlordane	mg/kg	0.1	530	-		<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
	Endosulfan I	mg/kg	0.1	2000	-		<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
	pp-DDE	mg/kg	0.1		-		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Endrin	mg/kg	0.1	100	-		<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
	Endosulfan II	mg/kg	0.1	2000	-		<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
	pp-DDD	mg/kg	0.1		-		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Endrin Aldehyde	mg/kg	0.1		-		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	pp-DDT	mg/kg	0.1		-	640	<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
	Endosulfan Sulphate	mg/kg	0.1		-		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Methoxychlor	mg/kg	0.1	2500	-		<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
	Total +ve DDT+DDD+DDE	mg/kg	0.1	3600	-		<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
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Investigation Levels -Commercial/Industrial D																			
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Screening Levels - Commercial/Industrial D,Sand 0 to <1m																			
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Ecological Screening Levels -Commercial and Industrial -Coarse soils																			

Notes NL = Non Limited

** Assumed a pH of 5.5 and CEC of 5cmol/kg*

**Most conservative concentration for Chromium adopted

^Concentrations for coarse soil adopted

Table 3b- Commercial/Industrial Criteria - Mine Area

						Field ID	M3	M4	M4D3	M4T1
						Sample Depth (m)	0-0.3	0-0.3	0-0.3	0-0.3
						Sample Date	30/06/2022	30/06/2022	30/06/2022	30/06/2022
						Matrix	Soil	Soil	Soil	Soil
Method	ChemName	Units	EQL	**NEPM 2013 HILs Commerical Industrial D**	**NEPM 2013 HSLs Commercial/ Industrial Sand 0 to <1m**	**NEPM 2013 EILs/ESLs Commercial/ Industrial**				
Heavy Metal	Arsenic	mg/kg	4	3000	-	160	7	14	5	14
	Cadmium	mg/kg	0.4	900	-		<0.4	<0.4	<0.4	<0.4
	Chromium	mg/kg	5	3600	-	310**	23	18	15	16
	Copper	mg/kg	5	24000	-	190*	20	48	73	37
	Lead	mg/kg	5	1500	-	1800	10	12	11	11
	Nickel	mg/kg	5	6000	-	55*	8	6	9	6
	Zinc	mg/kg	5	400000	-	280*	26	38	340	30

Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Investigation Levels -Commercial/Industrial D
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Screening Levels - Commercial/Industrial D,Sand 0 to <1m
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Ecological Screening Levels -Commercial and Industrial -Coarse soils

Notes NL = Non Limited

** Assumed a pH of 5.5 and CEC of 5cmol/kg*

**Most conservative concentration for Chromium adopted

^Concentrations for coarse soil adopted

Table 3c- Commercial/Industrial Criteria - Treatment Ponds

							Field ID	DS1	DS2	DS3	DS4	DS5
							Sample Depth (m	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3
							Sample Date	30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
							Matrix	Soil	Soil	Soil	Soil	Soil
Method	ChemName	Units	EQL	NEPM 2013 HILs Commerical Industrial D	NEPM 2013 HSLs Commercial/ Industrial Sand 0 to <1m	NEPM 2013 EILs/ESLs Commercial/ Industrial	Biosolids Stabilisation Requirements Grade A					
Heavy Metal	Arsenic	mg/kg	1	3000	-	160	20	11	7	7	3	8
	Cadmium	mg/kg	0.3	900	-		3	0.5	<0.3	<0.3	<0.3	0.9
	Chromium	mg/kg	0.5	3600	-	310**	100	22	14	24	9.5	51
	Copper	mg/kg	0.5	24000	-	190*	100	170	22	84	8.8	170
	Lead	mg/kg	1	1500	-	1800	150	24	11	16	6	26
	Nickel	mg/kg	0.5	6000	-	55*	60	12	6.3	8.9	6.8	13
	Zinc	mg/kg	2	400000	-	280*	200	740	31	360	10	570
Nutrients	Nitrate Nitrogen	mg/kg	0.025	-	-	-	-	130	34	31	4.4	100
	Nitrite, NO2 as N in Soil	mg/kg	0.05	-	-	-	-	<0.05	0.58	<0.05	<0.05	<0.05
	Total Kjeldhal Nitrogen	mg/kg	40	-	-	-	-	20000	1200	8200	960	12000
	Total Nitrogen	mg/kg	40	-	-	-	-	20000	1200	8200	960	12000
	Total Phosphorus	mg/kg	40	-	-	-	-	13000	2300	6500	580	26000
	Conductivity	µS/cm	1	-	-	-	-	3300	240	220	220	3200
Microbiology	Escherichia coli	CFU/g	1	-	-	-	<100	<10	<10	<10	<10	<10
	Coliforms	CFU/g	1	-	-	-	<1000	10	100	130	30	1500

Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Investigation Levels -Commercial/Industrial D
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Screening Levels - Commercial/Industrial D,Sand 0 to <1m
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Ecological Screening Levels -Commercial and Industrial -Coarse soils
Results	Samples highlighted exceed the criteria for Use and Disposal of Biosolids Products 2000 for Grade A unrestricted use

Notes NL = Non Limited

** Assumed a pH of 5.5 and CEC of 5cmol/kg*

**Most conservative concentration for Chromium adopted

^Concentrations for coarse soil adopted

Table 3d- Commercial/Industrial Criteria - Landfill Area

						Field ID	SS1	SS2
						Sample Depth (m)	0.0-0.3	0.0-0.3
						Sample Date	28/07/2022	28/07/2022
						Matrix	Soil	Soil
Method	ChemName	Units	EQL	**NEPM 2013 HILs Commerical Industrial D**	**NEPM 2013 HSLs Commercial/ Industrial Sand 0 to <1m**	**NEPM 2013 EILs/ESLs Commercial/ Industrial**		
Organic	C6-C9	mg/kg	25	-	-	-	<25	<25
	C10-C40 (Sum)	mg/kg	50	-	-	-	40000	30000
	C6-C10 (F1)	mg/kg	25	-	260	215	<25	<25
	C10-C16 (F2)	mg/kg	50	-	-	170	<500	200
	C16-C34 (F3)	mg/kg	100	-	-	1700^	38000	29000
	C34-C40 (F4)	mg/kg	100	-	-	3300^	2400	1000
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Investigation Levels -Commercial/Industrial D							
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Screening Levels - Commercial/Industrial D,Sand 0 to <1m							
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Ecological Screening Levels -Commercial and Industrial -Coarse soils							

Notes NL = Non Limited

** Assumed a pH of 5.5 and CEC of 5cmol/kg*

**Most conservative concentration for Chromium adopted

^Concentrations for coarse soil adopted

Table 3e- Commercial/Industrial Criteria - Landfill Area Sediment Dam

Field ID	D1SED
Sample Depth (m)	0-0.3
Sample Date	30/06/2022
Matrix	Soil

Method	ChemName	Units	EQL	NEPM 2013 HILs Commerical Industrial D	NEPM 2013 HSLs Commercial/ Industrial Sand 0 to <1m	NEPM 2013 EILs/ESLs Commercial/ Industrial	
Heavy Metal	Arsenic	mg/kg	4	3000	-	160	<4
	Cadmium	mg/kg	0.4	900	-		<0.4
	Chromium	mg/kg	5	3600	-	310**	4
	Copper	mg/kg	5	24000	-	190*	13
	Lead	mg/kg	5	1500	-	1800	3
	Nickel	mg/kg	5	6000	-	55*	2
	Zinc	mg/kg	5	400000	-	280*	67
Organic	C6-C9	mg/kg	25	-	-	-	<25
	C10-C40 (Sum)	mg/kg	50	-	-	-	340000
	C6-C10 (F1)	mg/kg	25	-	260	215	<25
	C10-C16 (F2)	mg/kg	50	-	-	170	<50
	C16-C34 (F3)	mg/kg	100	-	-	1700^	340000
	C34-C40 (F4)	mg/kg	100	-	-	3300^	720
OCP	Apha-BHC	mg/kg	0.1		-		<0.1
	HCB	mg/kg	0.1	80	-		<0.1
	beta-BHC	mg/kg	0.1		-		<0.1
	gamma-BHC	mg/kg	0.1		-		<0.1
	Heptachlor	mg/kg	0.1	50	-		<0.1
	delta-BHC	mg/kg	0.1		-		<0.1
	Aldrin	mg/kg	0.1	45	-		<0.1
	Dieldrin	mg/kg	0.1		-		<0.1
	Heptachlor Epoxide	mg/kg	0.1		-		<0.1
	gamma-Chlordane	mg/kg	0.1	530	-		<0.1
	alpha-chlordane	mg/kg	0.1	530	-		<0.1
	Endosulfan I	mg/kg	0.1	2000	-		<0.1
	pp-DDE	mg/kg	0.1		-		<0.1
	Endrin	mg/kg	0.1	100	-		<0.1
	Endosulfan II	mg/kg	0.1	2000	-		<0.1
	pp-DDD	mg/kg	0.1		-		<0.1
	Endrin Aldehyde	mg/kg	0.1		-		<0.1
	pp-DDT	mg/kg	0.1		-	640	<0.1
	Endosulfan Sulphate	mg/kg	0.1		-		<0.1
	Methoxychlor	mg/kg	0.1	2500	-		<0.1
	Total +ve DDT+DDD+DDE	mg/kg	0.1	3600	-		<0.1
OPP	Dichlorvos	mg/kg	0.1		-	-	<0.1
	Dimethoate	mg/kg	0.1		-	-	<0.1
	Diazinon	mg/kg	0.1		-	-	<0.1
	Chlorpyriphos-methyl	mg/kg	0.1		-	-	<0.1
	Ronnel	mg/kg	0.1		-	-	<0.1
	Fenitrothion	mg/kg	0.1		-	-	<0.1
	Malathion	mg/kg	0.1		-	-	<0.1
	Chlorpyriphos	mg/kg	0.1	2000	-	-	<0.1
	Parathion	mg/kg	0.1		-	-	<0.1
	Bromophos-ethyl	mg/kg	0.1		-	-	<0.1
	Ethion	mg/kg	0.1		-	-	<0.1
	Azinphos-methyl	mg/kg	0.1		-	-	<0.1

Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Investigation Levels -Commercial/Industrial D
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Screening Levels - Commercial/Industrial D,Sand 0 to <1m
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Ecological Screening Levels -Commercial and Industrial -Coarse soils

Notes NL = Non Limited

** Assumed a pH of 5.5 and CEC of 5cmol/kg*

**Most conservative concentration for Chromium adopted

^Concentrations for coarse soil adopted

Table 3f- Commercial/Industrial Criteria - Skin Shed

						Field ID	SS1	SS2	SS3	SS4
						Sample Depth (m)	0-0.3	0-0.3	0-0.3	0-0.3
						Sample Date	30/06/2022	30/06/2022	30/06/2022	30/06/2022
						Matrix	Soil	Soil	Soil	Soil
Method	ChemName	Units	EQL	**NEPM 2013 HILs Commerical Industrial D**	**NEPM 2013 HSLs Commercial/ Industrial Sand 0 to <1m**	**NEPM 2013 EILs/ESLs Commercial/ Industrial**				
Heavy Metal	Arsenic	mg/kg	4	3000	-	100	11	5	<4	13
	Chromium	mg/kg	5	3600	-	190**	18	9	<1	12

Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Investigation Levels - Recreational C
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Screening Levels - Recreational C,Sand 0 to <1m
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Ecological Screening Levels -Residential and Public Open Space -Coarse soils

Notes NL = Non Limited

** Assumed a pH of 5.5 and CEC of 5cmol/kg*

**Most conservative concentration for Chromium adopted

^Concentrations for coarse soil adopted

Table 3g- Commercial/Industrial Criteria - Above ground storage tank

						Field ID	AST1	AST2
						Sample Depth (m)	0-0.3	0-0.3
						Sample Date	30/06/2022	30/06/2022
						Matrix	Soil	Soil
Method	ChemName	Units	EQL	**NEPM 2013 HILs Commerical Industrial D**	**NEPM 2013 HSLs Commercial/ Industrial Sand 0 to <1m**	**NEPM 2013 EILs/ESLs Commercial/ Industrial**		
Organic	C6-C9	mg/kg	25	-	-	-	<25	<25
	C10-C40 (Sum)	mg/kg	50	-	-	-	<50	<50
	C6-C10	mg/kg	25	-	-	215	<25	<25
	C10-C16	mg/kg	50	-	-	170	<50	<50
	C16-C34	mg/kg	100	-	-	1700^	<100	<100
	C34-C40	mg/kg	100	-	-	3300^	<100	<100
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Investigation Levels - Recreational C							
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Screening Levels - Recreational C, Sand 0 to <1m							
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Ecological Screening Levels -Residential and Public Open Space -Coarse soils							

Notes NL = Non Limited

** Assumed a pH of 5.5 and CEC of 5cmol/kg*

**Most conservative concentration for Chromium adopted

^Concentrations for coarse soil adopted

Table 2h- Commercial/Industrial Critera - Quarry Area

						Field ID	QS1
						Sample Depth (m)	0-0.3
						Sample Date	30/06/2022
						Matrix	Soil
Method	ChemName	Units	EQL	**NEPM 2013 HILs Commerical Industrial D**	**NEPM 2013 HSLs Commercial/ Industrial Sand 0 to <1m**	**NEPM 2013 EILs/ESLs Commercial/ Industrial**	
Heavy Metal	Arsenic	mg/kg	4	3000	-	160	6
	Cadmium	mg/kg	0.4	900	-		<0.4
	Chromium	mg/kg	5	3600	-	310**	16
	Copper	mg/kg	5	24000	-	190*	77
	Lead	mg/kg	5	1500	-	1800	11
	Nickel	mg/kg	5	6000	-	55*	10
	Zinc	mg/kg	5	400000	-	280*	350
Organic	C6-C9	mg/kg	25	-	-	-	<25
	C10-C40 (Sum)	mg/kg	50	-	-	-	<50
	C6-C10	mg/kg	25	-	-	215	<25
	C10-C16	mg/kg	50	-	-	170	<50
	C16-C34	mg/kg	100	-	-	1700^	<100
	C34-C40	mg/kg	100	-	-	3300^	<100

Result — Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Investigation Levels - Recreational C

Result — Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Screening Levels - Recreational C,Sand 0 to <1m

Result — Samples highlighted exceed the criteria for ASC NEPM 2013 - Ecological Screening Levels -Residential and Public Open Space -Coarse soils

Notes

NL = Non Limited

** Assumed a pH of 5.5 and CEC of 5cmol/kg*

**Most conservative concentration for Chromium adopted

^Concentrations for coarse soil adopted

Table 2i- Commercial/Industrial Criteria - Transformer Area

						Field ID	T1
						Sample Depth (m)	0-0.3
						Sample Date	30/06/2022
						Matrix	Soil
Method	ChemName	Units	EQL	**NEPM 2013 HILs Recreational C**	**NEPM 2013 HSLs Recreational Sand 0 to <1m**	**NEPM 2013 EILs/ESLs Urban Residential and Public Open Space**	
Organic	C6-C9	mg/kg	25	-	-	-	<25
	C10-C40 (Sum)	mg/kg	50	-	-	-	<50
	C6-C10	mg/kg	25	-	-	215	<25
	C10-C16	mg/kg	50	-	-	170	<50
	C16-C34	mg/kg	100	-	-	1700^	<100
	C34-C40	mg/kg	100	-	-	3300^	<100
PCBs	Total PCBs	mg/kg	0.1	1	-	-	<0.1

Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Investigation Levels - Recreational C
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Health Screening Levels - Recreational C,Sand 0 to <1m
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Ecological Screening Levels -Residential and Public Open Space -Coarse soils

Notes NL = Non Limited

** Assumed a pH of 5.5 and CEC of 5cmol/kg*

**Most conservative concentration for Chromium adopted

^Concentrations for coarse soil adopted

APPENDIX 3 RESULTS TABLES—WATER

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LABORATORY LOCATED AT 2/3 DOUGLAS MAWSON ROAD, DUBBO NSW 2830

Table 1-Irrigation Dams

					Field ID	W2	W5
					Sample Depth (m)	Surface	Surface
					Sample Date	30-06-22	30-06-22
					Matrix	Water	Water
Method	ChemName	Units	EQL	**NEPM 2013 GILs Fresh Water**	**Australian Drinking Water Guidelines (2011) Health Guideline Values**		
Heavy Metal	Arsenic	µg/L	1	13	10	7.0	27.0
	Cadmium	µg/L	0.1	0.2	20	<0.1	<0.1
	Chromium	µg/L	1	1	50	<1	11.0
	Copper	µg/L	1	1.4	2000	<1	27.0
	Lead	µg/L	1	3.4	10	<1	<1
	Nickel	µg/L	1	11	20	2.0	31.0
	Zinc	µg/L	5	8	NL	<5	27.0
Nutrients	Nitrate Nitrogen NO3-N	mg/L	0.005	-	50	<0.005	0.047
	Nitrite, NO2 as N in Soil	mg/L	0.005	-	3	0.012	0.062
	Total Kjeldhal Nitrogen	mg/L	0.05	-	-	3.2	44.0
	Total Nitrogen	mg/L	0.05	-	-	3.2	44.0
	Total Phosphorus	mg/L	0.02	-	-	0.47	32.0
	Conductivity	µS/cm	2	-	-	700.0	8000.0
Microbiology	Escherichia coli	CFU/g	1	-	0 in 100ml	14	70
	Coliforms	CFU/g	1	-	0 in 100ml	4	66
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Groundwater Investigation Levels- Fresh Waters						
Result	Samples highlighted exceed the criteria for ANZECC Australian Drinking Water Guidelines 2011 for Health Guideline Values						

Table 2-Field Dams

					Field ID	FD1	FD2	FD3	FD4	FD5	FD6	DSW6
					Sample Depth (m)	Surface	Surface	Surface	Surface	Surface	Surface	Surface
					Sample Date	30-06-22	30-06-22	30-06-22	30-06-22	30-06-22	30-06-22	30-06-22
					Matrix	Water	Water	Water	Water	Water	Water	Water
Method	ChemName	Units	EQL	**NEPM 2013 GILs Fresh Water**	**Australian Drinking Water Guidelines (2011) Health Guideline Values**							
Heavy Metal	Arsenic	µg/L	1	13	10	4	1	1	5	2	1	<1
	Cadmium	µg/L	0.1	0.2	20	<0.1	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1
	Chromium	µg/L	1	1	50	2	2	2	<1	2	<1	<1
	Copper	µg/L	1	1.4	2000	4	4	4	1	3	2	<1
	Lead	µg/L	1	3.4	10	<1	<1	<1	<1	<1	<1	<1
	Nickel	µg/L	1	11	20	4	4	4	2	3	2	<1
	Zinc	µg/L	5	8	NL	5	<5	<5	<5	<5	<5	8
	Conductivity	µS/cm	2	-	-	220	160	250	140	180	160	290
Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Groundwater Investigation Levels- Fresh Waters											
Result	Samples highlighted exceed the criteria for ANZECC Australian Drinking Water Guidelines 2011 for Health Guideline Values											

Table 3- Quarry Surface Water

							Field ID	QW1	DUP01
							Sample Depth (m)	Surface	Surface
							Sample Date	30-06-22	30-06-22
							Matrix	Water	Water
Method	ChemName	Units	EQL	NEPM 2013 GILs Fresh Water	Australian Drinking Water Guidelines (2011) Health Guideline Values	Airport Environment Protection Regulations (1997)			
Heavy Metal	Arsenic	µg/L	1	13	10	-	2	2
	Cadmium	µg/L	0.1	0.2	20	-	<0.1	<0.1
	Chromium	µg/L	1	1	50	-	<1	<1
	Copper	µg/L	1	1.4	2000	-	1	2
	Lead	µg/L	1	3.4	10	-	<1	<1
	Nickel	µg/L	1	11	20	-	<1	<1
	Zinc	µg/L	5	8	NL	-	23	21
Total Recoverable Hydrocarbons	TRH C6-C10	µg/L	50	-	-	150	<50	<50
	TRH C6-C9	µg/L	40	-	-	600	<40	<40
	TRH C10-C40	µg/L	320	-	-	-	<0.5	<0.5
	Benzene	µg/L	0.5	-	-	-	<320	<320

Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Groundwater Investigation Levels- Fresh Waters
Result	Samples highlighted exceed the criteria for ANZECC Australian Drinking Water Guidelines 2011 for Health Guideline Values
Result	Samples highlighted exceed the criteria for Airport (Environment Protection) Regulations 1997, Schedule 2 - Water Pollution

Table 4 - Groundwater Monitoring Wells

							Field ID	MW1	MW2	MW6
							Sample Date	28-07-22	28-07-22	28-07-22
							Matrix	Water	Water	Water
Method	ChemName	Units	EQL	NEPM 2013 GILs Fresh Water	Australian Drinking Water Guidelines (2011) Health Guideline Values	Airport Environment Protection Regulations (1997)			
Heavy Metal	Arsenic	µg/L	1	13	10	-	<1	1	2
	Cadmium	µg/L	0.1	0.2	20	-	0.1	0.1	<0.1
	Chromium	µg/L	1	1	50	-	<1	<1	<1
	Copper	µg/L	1	1.4	2000	-	2	6	4
	Lead	µg/L	1	3.4	10	-	<1	<1	7
	Nickel	µg/L	1	11	20	-	1	12	3
	Zinc	µg/L	5	8	NL	-	110	75	24
Total Recoverable Hydrocarbons	TRH C6-C10	µg/L	100	-	-	150	<100	<100	<100
	TRH C6-C9	µg/L	100	-	-	600	<100	<100	<100
	TRH C10-C40 (Sum)	µg/L	50	-	-	-	<50	200	<50
	TRH C10-C14	µg/L	50	-	-	-	<50	170	<50
	TRH C15-C28	µg/L	100	-	-	-	<100	110	<100
	TRH C29-C36	µg/L	100	-	-	-	<100	<100	<100
	TRH C10-C36 (Sum)	µg/L	50	-	-	-	<50	280	<50
	TRH C10-C16	µg/L	50	-	-	-	<50	200	<50
	TRH C10-C16 less F2	µg/L	50	-	-	-	<50	200	<50
	TRH C16-C34	µg/L	100	-	-	-	<100	<100	<100
	TRH C34-C40	µg/L	100	-	-	-	<100	<100	<100
	Benzene	µg/L	10	-	-	-	<10	<10	<10
	Toluene	µg/L	10	-	-	-	<10	<10	<10
	Ethylbenzene	µg/L	10	-	0.3	-	<10	<10	<10
	Naphthalene	µg/L	10	-	-	-	<10	<10	<10
	Xylene	µg/L	10	-	-	-	<10	<10	<10
	pH	pH units		-	6.5-8.5	-	7.6	7.4	7.1
	Conductivity	µS/cm	2	-	-	-	14000	25000	24000

Result	Samples highlighted exceed the criteria for ASC NEPM 2013 - Groundwater Investigation Levels- Fresh Waters
Result	Samples highlighted exceed the criteria for ANZECC Australian Drinking Water Guidelines 2011 for Health Guideline Values
Result	Samples highlighted exceed the criteria for Airport (Environment Protection) Regulations 1997, Schedule 2 - Water Pollution

APPENDIX 4 LABORATORY CERTIFICATES OF ANALYSIS SOIL

ENVIROSCIENCE SOLUTIONS PTY LTD
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CERTIFICATE OF ANALYSIS 299646

Client Details

Client	EnviroScience Solutions
Attention	Juliet Duffy
Address	PO Box 1645, Dubbo, NSW, 2830

Sample Details

Your Reference	**26835, Lachley Estate, Forbes, NSW**
Number of Samples	49 Soil
Date samples received	05/07/2022
Date completed instructions received	05/07/2022

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	12/07/2022
Date of Issue	12/07/2022

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Results Approved By
Diego Bigolin, Inorganics Supervisor
Dragana Tomas, Senior Chemist
Hannah Nguyen, Metals Supervisor
Liam Timmins, Organic Instruments Team Leader

Authorised By

Nancy Zhang, Laboratory Manager

TRH in Soil (C6-C9) NEPM						
Our Reference		299646-35	299646-36	299646-37	299646-38	299646-39
Your Reference	UNITS	L1	L2	L3	LID2	D1 SED
Depth		0-300mm	0-300mm	0-300mm	0-300mm	Sediment deposit
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
Surrogate aaa-Trifluorotoluene	%	84	96	97	93	90

TRH in Soil (C6-C9) NEPM					
Our Reference		299646-46	299646-47	299646-48	299646-49
Your Reference	UNITS	AST1	AST2	QS1	T1
Depth		0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25
Surrogate aaa-Trifluorotoluene	%	91	99	88	95

svTRH (C10-C40) in Soil						
Our Reference		299646-35	299646-36	299646-37	299646-38	299646-39
Your Reference	UNITS	L1	L2	L3	LID2	D1 SED
Depth		0-300mm	0-300mm	0-300mm	0-300mm	Sediment deposit
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	330,000
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	560
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	330,000
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	340,000
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	720
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	340,000
Surrogate o-Terphenyl	%	88	91	91	78	#

svTRH (C10-C40) in Soil					
Our Reference		299646-46	299646-47	299646-48	299646-49
Your Reference	UNITS	AST1	AST2	QS1	T1
Depth		0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50
Surrogate o-Terphenyl	%	91	87	87	78

Organochlorine Pesticides in soil						
Our Reference		299646-1	299646-2	299646-3	299646-4	299646-5
Your Reference	UNITS	FA1	FA2	FA3	FA4	FA5
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	112	111	105	115	112

Organochlorine Pesticides in soil						
Our Reference		299646-6	299646-7	299646-8	299646-9	299646-10
Your Reference	UNITS	FA6	FA7	FA8	FA9	FA10
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	121	104	107	117	109

Organochlorine Pesticides in soil						
Our Reference		299646-11	299646-12	299646-13	299646-14	299646-15
Your Reference	UNITS	FA11	FA12	FA13	FA14	FA15
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	119	118	115	117	113

Organochlorine Pesticides in soil						
Our Reference		299646-16	299646-17	299646-18	299646-19	299646-20
Your Reference	UNITS	FA16	FA17	FA18	FA19	FA20
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	115	113	107	114	113

Organochlorine Pesticides in soil						
Our Reference		299646-21	299646-22	299646-23	299646-24	299646-25
Your Reference	UNITS	FA21	FA23	FA24	FA25	FA26
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	107	105	112	107	105

Organochlorine Pesticides in soil						
Our Reference		299646-35	299646-36	299646-37	299646-38	299646-39
Your Reference	UNITS	L1	L2	L3	LID2	D1 SED
Depth		0-300mm	0-300mm	0-300mm	0-300mm	Sediment deposit
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	111	109	112	115	77

Organophosphorus Pesticides in Soil						
Our Reference		299646-35	299646-36	299646-37	299646-38	299646-39
Your Reference	UNITS	L1	L2	L3	LID2	D1 SED
Depth		0-300mm	0-300mm	0-300mm	0-300mm	Sediment deposit
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	111	109	112	115	77

PCBs in Soil		
Our Reference		299646-49
Your Reference	UNITS	T1
Depth		0-300mm
Date Sampled		30/06/2022
Type of sample		Soil
Date extracted	-	07/07/2022
Date analysed	-	07/07/2022
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCMX	%	102

Acid Extractable metals in soil						
Our Reference		299646-1	299646-2	299646-3	299646-4	299646-5
Your Reference	UNITS	FA1	FA2	FA3	FA4	FA5
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	19	34	29	32	25
Copper	mg/kg	6	8	11	9	10
Nickel	mg/kg	5	7	7	7	7
Lead	mg/kg	5	7	16	9	8
Zinc	mg/kg	7	11	100	14	13

Acid Extractable metals in soil						
Our Reference		299646-6	299646-7	299646-8	299646-9	299646-10
Your Reference	UNITS	FA6	FA7	FA8	FA9	FA10
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	29	31	26	21	19
Copper	mg/kg	11	12	10	9	10
Nickel	mg/kg	9	8	7	7	10
Lead	mg/kg	9	9	8	8	7
Zinc	mg/kg	15	17	18	10	15

Acid Extractable metals in soil						
Our Reference		299646-11	299646-12	299646-13	299646-14	299646-15
Your Reference	UNITS	FA11	FA12	FA13	FA14	FA15
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Arsenic	mg/kg	<4	7	5	<4	6
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	22	25	25	20	20
Copper	mg/kg	10	30	8	14	30
Nickel	mg/kg	9	10	5	15	10
Lead	mg/kg	8	12	7	9	14
Zinc	mg/kg	14	49	11	17	69

Acid Extractable metals in soil						
Our Reference		299646-16	299646-17	299646-18	299646-19	299646-20
Your Reference	UNITS	FA16	FA17	FA18	FA19	FA20
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Arsenic	mg/kg	7	<4	4	5	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	15	23	28	25	24
Copper	mg/kg	93	11	14	13	12
Nickel	mg/kg	11	6	8	6	11
Lead	mg/kg	8	7	10	8	13
Zinc	mg/kg	39	13	16	15	27

Acid Extractable metals in soil						
Our Reference		299646-21	299646-22	299646-23	299646-24	299646-25
Your Reference	UNITS	FA21	FA23	FA24	FA25	FA26
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Arsenic	mg/kg	<4	4	<4	4	6
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	12	21	30	23
Copper	mg/kg	33	20	6	55	25
Nickel	mg/kg	5	10	6	8	8
Lead	mg/kg	6	9	6	23	10
Zinc	mg/kg	24	180	9	880	42

Acid Extractable metals in soil						
Our Reference		299646-26	299646-27	299646-28	299646-29	299646-30
Your Reference	UNITS	SS1	SS2	SS3	SS4	FD1
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Arsenic	mg/kg	11	5	<4	13	<4
Cadmium	mg/kg	[NA]	[NA]	[NA]	[NA]	<0.4
Chromium	mg/kg	18	9	<1	12	29
Copper	mg/kg	[NA]	[NA]	[NA]	[NA]	13
Nickel	mg/kg	[NA]	[NA]	[NA]	[NA]	11
Lead	mg/kg	[NA]	[NA]	[NA]	[NA]	9
Zinc	mg/kg	[NA]	[NA]	[NA]	[NA]	15

Acid Extractable metals in soil						
Our Reference		299646-31	299646-32	299646-33	299646-34	299646-35
Your Reference	UNITS	FD2	FD4	FD5	FD6	L1
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Arsenic	mg/kg	12	4	<4	10	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	19	27	24	47	34
Copper	mg/kg	19	11	14	19	12
Nickel	mg/kg	13	7	13	13	9
Lead	mg/kg	12	9	9	15	9
Zinc	mg/kg	17	16	17	28	16

Acid Extractable metals in soil						
Our Reference		299646-36	299646-37	299646-38	299646-39	299646-40
Your Reference	UNITS	L2	L3	LID2	D1 SED	M1
Depth		0-300mm	0-300mm	0-300mm	Sediment deposit	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Arsenic	mg/kg	6	<4	<4	<4	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	40	22	34	4	27
Copper	mg/kg	13	10	12	13	16
Nickel	mg/kg	11	6	8	2	10
Lead	mg/kg	11	7	9	3	9
Zinc	mg/kg	14	12	16	67	16

Acid Extractable metals in soil						
Our Reference		299646-41	299646-42	299646-43	299646-44	299646-45
Your Reference	UNITS	M2	M3	M4	M4D3	M4T1
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Arsenic	mg/kg	19	7	14	5	14
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	18	23	18	15	16
Copper	mg/kg	39	20	48	73	37
Nickel	mg/kg	8	8	6	9	6
Lead	mg/kg	9	10	12	11	11
Zinc	mg/kg	30	26	38	340	30

Acid Extractable metals in soil			
Our Reference		299646-48	299646-50
Your Reference	UNITS	QS1	FA1 - [TRIPLICATE]
Depth		0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022
Type of sample		Soil	Soil
Date prepared	-	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022
Arsenic	mg/kg	6	<4
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	16	25
Copper	mg/kg	77	9
Nickel	mg/kg	10	7
Lead	mg/kg	11	7
Zinc	mg/kg	350	10

Moisture						
Our Reference		299646-1	299646-2	299646-3	299646-4	299646-5
Your Reference	UNITS	FA1	FA2	FA3	FA4	FA5
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Moisture	%	11	5.8	8.2	8.1	11

Moisture						
Our Reference		299646-6	299646-7	299646-8	299646-9	299646-10
Your Reference	UNITS	FA6	FA7	FA8	FA9	FA10
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Moisture	%	6.3	9.2	9.5	13	6.8

Moisture						
Our Reference		299646-11	299646-12	299646-13	299646-14	299646-15
Your Reference	UNITS	FA11	FA12	FA13	FA14	FA15
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Moisture	%	14	18	4.9	16	13

Moisture						
Our Reference		299646-16	299646-17	299646-18	299646-19	299646-20
Your Reference	UNITS	FA16	FA17	FA18	FA19	FA20
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Moisture	%	7.3	7.5	6.8	6.3	5.6

Moisture						
Our Reference		299646-21	299646-22	299646-23	299646-24	299646-25
Your Reference	UNITS	FA21	FA23	FA24	FA25	FA26
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Moisture	%	4.9	2.6	4.7	10	27

Moisture						
Our Reference		299646-26	299646-27	299646-28	299646-29	299646-30
Your Reference	UNITS	SS1	SS2	SS3	SS4	FD1
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Moisture	%	3.0	3.7	10	11	19

Moisture						
Our Reference		299646-31	299646-32	299646-33	299646-34	299646-35
Your Reference	UNITS	FD2	FD4	FD5	FD6	L1
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Moisture	%	17	18	20	26	12

Moisture						
Our Reference		299646-36	299646-37	299646-38	299646-39	299646-40
Your Reference	UNITS	L2	L3	LID2	D1 SED	M1
Depth		0-300mm	0-300mm	0-300mm	Sediment deposit	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Moisture	%	16	19	12	11	22

Moisture						
Our Reference		299646-41	299646-42	299646-43	299646-44	299646-45
Your Reference	UNITS	M2	M3	M4	M4D3	M4T1
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Moisture	%	22	19	21	12	9.6

Moisture					
Our Reference		299646-46	299646-47	299646-48	299646-49
Your Reference	UNITS	AST1	AST2	QS1	T1
Depth		0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Moisture	%	6.4	5.0	11	11

Misc Inorg - Soil						
Our Reference		299646-1	299646-2	299646-3	299646-4	299646-5
Your Reference	UNITS	FA1	FA2	FA3	FA4	FA5
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/07/2022	12/07/2022	12/07/2022	12/07/2022	12/07/2022
Date analysed	-	12/07/2022	12/07/2022	12/07/2022	12/07/2022	12/07/2022
Electrical Conductivity 1:5 soil:water	µS/cm	150	55	96	57	110

Misc Inorg - Soil						
Our Reference		299646-6	299646-7	299646-8	299646-9	299646-10
Your Reference	UNITS	FA6	FA7	FA8	FA9	FA10
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/07/2022	12/07/2022	12/07/2022	12/07/2022	12/07/2022
Date analysed	-	12/07/2022	12/07/2022	12/07/2022	12/07/2022	12/07/2022
Electrical Conductivity 1:5 soil:water	µS/cm	93	110	130	78	110

Misc Inorg - Soil						
Our Reference		299646-11	299646-12	299646-13	299646-14	299646-15
Your Reference	UNITS	FA11	FA12	FA13	FA14	FA15
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/07/2022	12/07/2022	12/07/2022	12/07/2022	12/07/2022
Date analysed	-	12/07/2022	12/07/2022	12/07/2022	12/07/2022	12/07/2022
Electrical Conductivity 1:5 soil:water	µS/cm	200	190	54	170	170

Misc Inorg - Soil						
Our Reference		299646-16	299646-17	299646-18	299646-19	299646-20
Your Reference	UNITS	FA16	FA17	FA18	FA19	FA20
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/07/2022	12/07/2022	12/07/2022	12/07/2022	12/07/2022
Date analysed	-	12/07/2022	12/07/2022	12/07/2022	12/07/2022	12/07/2022
Electrical Conductivity 1:5 soil:water	µS/cm	150	72	100	140	61

Misc Inorg - Soil						
Our Reference		299646-21	299646-22	299646-23	299646-24	299646-25
Your Reference	UNITS	FA21	FA23	FA24	FA25	FA26
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/07/2022	12/07/2022	12/07/2022	12/07/2022	12/07/2022
Date analysed	-	12/07/2022	12/07/2022	12/07/2022	12/07/2022	12/07/2022
Electrical Conductivity 1:5 soil:water	µS/cm	140	200	58	110	150

Misc Inorg - Soil						
Our Reference		299646-30	299646-31	299646-32	299646-33	299646-34
Your Reference	UNITS	FD1	FD2	FD4	FD5	FD6
Depth		0-300mm	0-300mm	0-300mm	0-300mm	0-300mm
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/07/2022	12/07/2022	12/07/2022	12/07/2022	12/07/2022
Date analysed	-	12/07/2022	12/07/2022	12/07/2022	12/07/2022	12/07/2022
Electrical Conductivity 1:5 soil:water	µS/cm	73	120	67	190	140

Method ID	Methodology Summary
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: TRH in Soil (C6-C9) NEPM						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	299646-36
Date extracted	-			07/07/2022	35	07/07/2022	07/07/2022		07/07/2022	07/07/2022
Date analysed	-			08/07/2022	35	08/07/2022	08/07/2022		08/07/2022	08/07/2022
TRH C_6 - C_9	mg/kg	25	Org-023	<25	35	<25	<25	0	108	94
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	35	<25	<25	0	108	94
Surrogate aaa-Trifluorotoluene	%		Org-023	99	35	84	93	10	104	88

QUALITY CONTROL: TRH in Soil (C6-C9) NEPM						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	38	07/07/2022	07/07/2022		[NT]	[NT]
Date analysed	-			[NT]	38	08/07/2022	08/07/2022		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	[NT]	38	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	[NT]	38	<25	<25	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	[NT]	38	93	95	2	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	299646-36
Date extracted	-			08/07/2022	35	07/07/2022	07/07/2022		07/07/2022	07/07/2022
Date analysed	-			09/07/2022	35	08/07/2022	08/07/2022		08/07/2022	08/07/2022
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	35	<50	<50	0	114	88
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	35	<100	<100	0	132	107
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	35	<100	<100	0	129	94
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	35	<50	<50	0	114	88
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	35	<100	<100	0	132	107
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	35	<100	<100	0	129	94
Surrogate o-Terphenyl	%		Org-020	84	35	88	82	7	91	91

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	38	07/07/2022	07/07/2022		[NT]	[NT]
Date analysed	-			[NT]	38	08/07/2022	08/07/2022		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	[NT]	38	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	[NT]	38	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	[NT]	38	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	[NT]	38	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	[NT]	38	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	[NT]	38	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-020	[NT]	38	78	84	7	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	299646-2
Date extracted	-			07/07/2022	1	07/07/2022	07/07/2022		07/07/2022	07/07/2022
Date analysed	-			07/07/2022	1	07/07/2022	07/07/2022		07/07/2022	07/07/2022
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	108	108
HCB	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	114	110
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	107	111
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	118	118
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	118	125
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	115	113
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	124	118
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	113	109
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	110
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	104
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	122	1	112	108	4	113	104

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	299646-36
Date extracted	-			[NT]	11	07/07/2022	07/07/2022		07/07/2022	07/07/2022
Date analysed	-			[NT]	11	07/07/2022	07/07/2022		07/07/2022	07/07/2022
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	104	94
HCB	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	103	99
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	97	89
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	113	107
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	112	113
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	111	105
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	116	110
Endrin	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	102	92
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	106	96
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	80	66
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	11	119	114	4	110	109

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	35	07/07/2022	07/07/2022		[NT]	[NT]
Date analysed	-			[NT]	35	07/07/2022	07/07/2022		[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
HCB	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	35	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	35	111	118	6	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	38	07/07/2022	07/07/2022		[NT]	[NT]
Date analysed	-			[NT]	38	07/07/2022	07/07/2022		[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
HCB	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	38	115	106	8	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	299646-36
Date extracted	-			07/07/2022	35	07/07/2022	07/07/2022		07/07/2022	07/07/2022
Date analysed	-			07/07/2022	35	07/07/2022	07/07/2022		07/07/2022	07/07/2022
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	35	<0.1	<0.1	0	84	88
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	35	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	35	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	<0.1	35	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	35	<0.1	<0.1	0	95	83
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	35	<0.1	<0.1	0	95	81
Malathion	mg/kg	0.1	Org-022/025	<0.1	35	<0.1	<0.1	0	118	122
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	35	<0.1	<0.1	0	116	99
Parathion	mg/kg	0.1	Org-022/025	<0.1	35	<0.1	<0.1	0	91	82
Bromophos-ethyl	mg/kg	0.1	Org-022	<0.1	35	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	35	<0.1	<0.1	0	104	92
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	35	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	122	35	111	118	6	113	109

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			[NT]	38	07/07/2022	07/07/2022		07/07/2022	[NT]
Date analysed	-			[NT]	38	07/07/2022	07/07/2022		07/07/2022	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	90	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	93	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	89	[NT]
Malathion	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	122	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	112	[NT]
Parathion	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	86	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	94	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	[NT]	38	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	38	115	106	8	110	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	299646-49
Date extracted	-			07/07/2022	49	07/07/2022	07/07/2022		07/07/2022	07/07/2022
Date analysed	-			07/07/2022	49	07/07/2022	07/07/2022		07/07/2022	07/07/2022
Aroclor 1016	mg/kg	0.1	Org-021	<0.1	49	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	<0.1	49	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	<0.1	49	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	<0.1	49	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	<0.1	49	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	<0.1	49	<0.1	<0.1	0	77	131
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	49	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	122	49	102	115	12	113	102

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			[NT]	[NT]	[NT]	[NT]	[NT]	07/07/2022	[NT]
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	07/07/2022	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	[NT]	[NT]	[NT]	[NT]	[NT]	79	[NT]
Surrogate TCMX	%		Org-021	[NT]	[NT]	[NT]	[NT]	[NT]	110	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	299646-2
Date prepared	-			07/07/2022	1	07/07/2022	07/07/2022		07/07/2022	07/07/2022
Date analysed	-			08/07/2022	1	08/07/2022	08/07/2022		08/07/2022	08/07/2022
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	95	86
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	91	83
Chromium	mg/kg	1	Metals-020	<1	1	19	28	38	93	84
Copper	mg/kg	1	Metals-020	<1	1	6	10	50	92	94
Nickel	mg/kg	1	Metals-020	<1	1	5	8	46	95	87
Lead	mg/kg	1	Metals-020	<1	1	5	8	46	94	88
Zinc	mg/kg	1	Metals-020	<1	1	7	12	53	100	87

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	299646-27
Date prepared	-			[NT]	11	07/07/2022	07/07/2022		07/07/2022	07/07/2022
Date analysed	-			[NT]	11	08/07/2022	08/07/2022		08/07/2022	08/07/2022
Arsenic	mg/kg	4	Metals-020	[NT]	11	<4	<4	0	86	86
Cadmium	mg/kg	0.4	Metals-020	[NT]	11	<0.4	<0.4	0	83	71
Chromium	mg/kg	1	Metals-020	[NT]	11	22	23	4	84	82
Copper	mg/kg	1	Metals-020	[NT]	11	10	9	11	82	96
Nickel	mg/kg	1	Metals-020	[NT]	11	9	6	40	86	77
Lead	mg/kg	1	Metals-020	[NT]	11	8	7	13	85	77
Zinc	mg/kg	1	Metals-020	[NT]	11	14	17	19	93	96

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	299646-36
Date prepared	-			[NT]	26	07/07/2022	07/07/2022		07/07/2022	07/07/2022
Date analysed	-			[NT]	26	08/07/2022	08/07/2022		08/07/2022	08/07/2022
Arsenic	mg/kg	4	Metals-020	[NT]	26	11	10	10	88	75
Cadmium	mg/kg	0.4	Metals-020	[NT]	35	<0.4	<0.4	0	85	78
Chromium	mg/kg	1	Metals-020	[NT]	26	18	19	5	86	86
Copper	mg/kg	1	Metals-020	[NT]	35	12	12	0	84	79
Nickel	mg/kg	1	Metals-020	[NT]	35	9	8	12	88	71
Lead	mg/kg	1	Metals-020	[NT]	35	9	9	0	87	73
Zinc	mg/kg	1	Metals-020	[NT]	35	16	15	6	94	72

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	35	07/07/2022	07/07/2022		[NT]	[NT]
Date analysed	-			[NT]	35	08/07/2022	08/07/2022		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	35	<4	<4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	35	34	31	9	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	38	<0.4	<0.4	0	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	38	12	10	18	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	38	8	7	13	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	38	9	8	12	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	38	16	12	29	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	38	07/07/2022	07/07/2022		[NT]	[NT]
Date analysed	-			[NT]	38	08/07/2022	08/07/2022		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	38	<4	<4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	38	34	32	6	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			12/07/2022	2	12/07/2022	12/07/2022		12/07/2022	[NT]
Date analysed	-			12/07/2022	2	12/07/2022	12/07/2022		12/07/2022	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	2	55	55	0	100	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date prepared	-			[NT]	20	12/07/2022	12/07/2022		12/07/2022	[NT]
Date analysed	-			[NT]	20	12/07/2022	12/07/2022		12/07/2022	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	[NT]	20	61	56	9	99	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Acid Extractable Metals in Soil:
- The laboratory RPD acceptance criteria has been exceeded for 299646-1 for Cu, Pb and Zn. Therefore a triplicate result has been issued as laboratory sample number 299646-50.

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Juliet Duffy	Manager	Huong Crawford
Client	ENVIROSCIENCE SOLUTIONS PTY LTD	Laboratory	SGS Alexandria Environmental
Address	PO BOX 1645 DUBBO NSW 2820	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	0407 120 325	Telephone	+61 2 8594 0400
Facsimile	(Not specified)	Facsimile	+61 2 8594 0499
Email	juliet@enviroscience.com.au	Email	au.environmental.sydney@sgs.com
Project	**26835 Lachley Estate Lachley St Forbes**	SGS Reference	**SE233795 R0**
Order Number	**26835**	Date Received	01 Jul 2022
Samples	5	Date Reported	08 Jul 2022

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

Micro subcontracted to Symbio Laboratories, 2 Sirius Road, Lane Cove West NSW 2066, NATA Accreditation Number 2455. Report No. S1170980.

SIGNATORIES

Dong LIANG
Metals/Inorganics Team Leader

Shane MCDERMOTT
Inorganic/Metals Chemist

Parameter	Units	LOR	Sample Number: SE233795.001 Sample Matrix: Soil Sample Date: 30 Jun 2022 Sample Name: DS1	SE233795.002 Soil 30 Jun 2022 DS2	SE233795.003 Soil 30 Jun 2022 DS3	SE233795.004 Soil 30 Jun 2022 DS4
Soluble Anions (1:5) in Soil/Solids by Ion Chromatography Method: AN245 Tested: 4/7/2022						
Nitrate Nitrogen	mg/kg	0.025	**130**	**34**	**31**	**4.4**
Nitrite Nitrogen in Soil Method: AN277 Tested: 4/7/2022						
Nitrite, NO_2 as N in Soil*	mg/kg	0.05	<0.05	**0.58**	<0.05	<0.05
TKN Kjeldahl Digestion by Discrete Analyser in Soil Method: AN292 Tested: 5/7/2022						
Total Kjeldahl Nitrogen	mg/kg	40	**20000**	**1200**	**8200**	**960**
Total Nitrogen (calc)	mg/kg	40	**20000**	**1200**	**8200**	**960**
Total Phosphorus by Kjeldahl Digestion DA in Soil Method: AN279/AN293(Sydney only) Tested: 5/7/2022						
Total Phosphorus (Kjeldahl Digestion)	mg/kg	40	**13000**	**2300**	**6500**	**580**
Conductivity and TDS by Calculation - Soil Method: AN106 Tested: 4/7/2022						
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	**3300**	**240**	**220**	**220**
Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES Method: AN040/AN320 Tested: 6/7/2022						
Arsenic, As	mg/kg	1	**11**	**7**	**7**	**3**
Cadmium, Cd	mg/kg	0.3	**0.5**	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.5	**22**	**14**	**24**	**9.5**
Copper, Cu	mg/kg	0.5	**170**	**22**	**84**	**8.8**
Nickel, Ni	mg/kg	0.5	**12**	**6.3**	**8.9**	**6.8**
Lead, Pb	mg/kg	1	**24**	**11**	**16**	**6**
Zinc, Zn	mg/kg	2	**740**	**31**	**360**	**10**

Parameter	Units	LOR	Sample Number: SE233795.001 Sample Matrix: Soil Sample Date: 30 Jun 2022 Sample Name: DS1	SE233795.002 Soil 30 Jun 2022 DS2	SE233795.003 Soil 30 Jun 2022 DS3	SE233795.004 Soil 30 Jun 2022 DS4
Moisture Content Method: AN002 Tested: 6/7/2022						
% Moisture	%w/w	1	**30.3**	**20.3**	**16.3**	**18.6**
Sample Subcontracted Method: Tested: 7/7/2022						
Sample Subcontracted*	No unit	-	Symbio	Symbio	Symbio	Symbio

Parameter	Units	LOR	Sample Number SE233795.005 Sample Matrix Soil Sample Date 30 Jun 2022 Sample Name DS5
Soluble Anions (1:5) in Soil/Solids by Ion Chromatography Method: AN245 Tested: 4/7/2022			
Nitrate Nitrogen	mg/kg	0.025	**100**
Nitrite Nitrogen in Soil Method: AN277 Tested: 4/7/2022			
Nitrite, NO_2 as N in Soil*	mg/kg	0.05	<0.05
TKN Kjeldahl Digestion by Discrete Analyser in Soil Method: AN292 Tested: 5/7/2022			
Total Kjeldahl Nitrogen	mg/kg	40	**12000**
Total Nitrogen (calc)	mg/kg	40	**12000**
Total Phosphorus by Kjeldahl Digestion DA in Soil Method: AN279/AN293(Sydney only) Tested: 5/7/2022			
Total Phosphorus (Kjeldahl Digestion)	mg/kg	40	**26000**
Conductivity and TDS by Calculation - Soil Method: AN106 Tested: 4/7/2022			
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	**3200**
Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES Method: AN040/AN320 Tested: 6/7/2022			
Arsenic, As	mg/kg	1	**8**
Cadmium, Cd	mg/kg	0.3	**0.9**
Chromium, Cr	mg/kg	0.5	**51**
Copper, Cu	mg/kg	0.5	**170**
Nickel, Ni	mg/kg	0.5	**13**
Lead, Pb	mg/kg	1	**26**
Zinc, Zn	mg/kg	2	**570**

Parameter	Units	LOR	Sample Number: SE233795.005 Sample Matrix: Soil Sample Date: 30 Jun 2022 Sample Name: DS5
Moisture Content Method: AN002 Tested: 6/7/2022			
% Moisture	%w/w	1	**41.0**
Sample Subcontracted Method: Tested: 7/7/2022			
Sample Subcontracted*	No unit	-	Symbio

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Conductivity and TDS by Calculation - Soil Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	DUP %RPD	LCS %Recovery
Conductivity of Extract (1:5 dry sample basis)	LB252592	µS/cm	1	6%	104%

Moisture Content Method: ME-(AU)-[ENV]AN002

Parameter	QC Reference	Units	LOR	DUP %RPD
% Moisture	LB252883	%w/w	1	3 - 4%

Nitrite Nitrogen in Soil Method: ME-(AU)-[ENV]AN277

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrite, NO_2 as N in Soil*	LB252652	mg/kg	0.05	<0.05	0%	97%

Soluble Anions (1:5) in Soil/Solids by Ion Chromatography Method: ME-(AU)-[ENV]AN245

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrate Nitrogen	LB252591	mg/kg	0.025	<0.025	2%	93%

TKN Kjeldahl Digestion by Discrete Analyser in Soil Method: ME-(AU)-[ENV]AN292

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Kjeldahl Nitrogen	LB252695	mg/kg	40	<40	13%	110%

Total Phosphorus by Kjeldahl Digestion DA in Soil Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Phosphorus (Kjeldahl Digestion)	LB252695	mg/kg	40	<40	2%	103%

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES **Method: ME-(AU)-[ENV]AN040/AN320**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Arsenic, As	LB252901	mg/kg	1	<1	0 - 1%	94%	83%
Cadmium, Cd	LB252901	mg/kg	0.3	<0.3	0 - 34%	75%	88%
Chromium, Cr	LB252901	mg/kg	0.5	<0.5	3 - 11%	84%	38%
Copper, Cu	LB252901	mg/kg	0.5	<0.5	2 - 5%	104%	75%
Nickel, Ni	LB252901	mg/kg	0.5	<0.5	10%	98%	71%
Lead, Pb	LB252901	mg/kg	1	<1	6%	101%	18%
Zinc, Zn	LB252901	mg/kg	2	<2	11%	98%	

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract of as received sample with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Salinity can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. Reference APHA 2510 B.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN277	Nitrite on the extract is determined as an intense red-pink azo dye at 540 nm following diazotisation with sulphanilamide and subsequent coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. The original nitrite is determined. Reference APHA 4500-NO2- B.
AN292	The sample is heated in the presence of Sulphuric acid, K2SO4 and CuSO4 for two and half hours using a temperature controlled digestion block. Amino Nitrogen of many organic materials is converted to ammonium ion. Free ammonia also is converted to ammonium. The digest is cooled and placed on the discrete analyser for Ammonia determination.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
***	Indicates that both * and ** apply.	NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

Symbio LABORATORIES

CERTIFICATE OF ANALYSIS

Certificate Number	S1170980 [R00]	**Page**	1/2
Client	SGS Environmental Services - Sydney	**Registering Laboratory**	Sydney
Contact	SGS Team	**Contact**	Customer Service Team
Address	16/33 Maddox St Alexandria NSW 2015	**Address**	2 Sirius Rd, Lane Cove West, NSW 2066
		Email	admin@symbiolabs.com.au
Telephone	02 8594 0400	**Telephone**	1300 703 166
Order Number	---	**Date Samples Received**	04/07/2022
Project ID	Soil SE233795	**Date Analysis Commenced**	04/07/2022
Sampler	Customer	**Issue Date**	07/07/2022
Client Job Reference	SE233795	**Receipt Temperature (°C)**	12.3
No. of Samples Registered	5 | Sampler: Customer	**Storage Temperature (°C)**	4
Priority	Normal	**Quote Number**	---

Symbio LABORATORIES
Proudly AUSTRALIAN
ABN: 82 079 645 015

NATA
Accreditation No: 2455
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous revision with this reference. This document must not be reproduced, except in full. If samples were provided by the customer, results apply only to the samples 'as received' and responsibility for representative sampling rests with the customer. Water results are reported on an 'as is' basis. Soil and sediment results are reported on a 'dry weight' basis. For other matrices the basis of reporting will be confirmed in the 'Report Comments' section. Measurement Uncertainty is available upon request. If the laboratory was authorised to conduct testing on samples received outside of the specified conditions, all test results may be impacted. Details of samples received outside of the specified conditions are mentioned in the sample description section of this test report.

Definitions

| <: Less Than | >: Greater Than | RP: Result Pending | MPN: Most Probable Number | CFU: Colony Forming Units | ---: Not Received/Not Requested | NA: Not Applicable | ND: Not Detected | LOR: Limit of Reporting | [NT]: Not Tested |

| ~: Estimated | ^ Subcontracted Analysis | TBA: To Be Advised | ** Potential Holding Time Concern | * Test not covered by NATA scope of accreditation | # Result derived from a calculation and includes results equal to or greater than the LOR

Authorised By

Name	Position	Accreditation Category
Melissa Gan	Laboratory Manager – Microbiology	Environmental and Food Microbiology

Sample Information - *Client/Sampler Supplied*

Sample ID	S1170980/1	S1170980/2	S1170980/3	S1170980/4	S1170980/5
Sample Description	SE233795.001 DS1	SE233795.002 DS2	SE233795.003 DS3	SE233795.004 DS4	SE233795.005 DS5
Sample Date/Time	2022-06-30 00:00	2022-06-30 00:00	2022-06-30 00:00	2022-06-30 00:00	2022-06-30 00:00

Client	SGS Environmental Services - Sydney	**Project ID**	Soil SE233795
Certificate Number	S1170980 [R00]	**Sampler**	Customer
Page	2/2	**Order Number**	---

Analytical Results

Compound/Analyte	LOR	Units	SE233795.001 DS1	SE233795.002 DS2	SE233795.003 DS3	SE233795.004 DS4	SE233795.005 DS5
Client Sample Description							
Client Sampling date/time			30/06/2022 00:00	30/06/2022 00:00	30/06/2022 00:00	30/06/2022 00:00	30/06/2022 00:00
			S1170980/1	S1170980/2	S1170980/3	S1170980/4	S1170980/5
			Results	Results	Results	Results	Results
Micro General							
M8.5 - AS/NZS 4276.7							
Escherichia coli	1	CFU/g	<10	<10	<10	<10	<10
M8.5.1 - AS/NZS 4276.5							
Coliforms	1	CFU/g	10	100	130	30	1500

Analysis Location

All in-house analysis was completed by Symbio Laboratories - Sydney.

APPENDIX 5 LABORATORY CERTIFICATES OF ANALYSIS WATER

ENVIROSCIENCE SOLUTIONS PTY LTD
NATA Accreditation No. 19366
ACN 157 918 262
Ph 1300 372 436
info@enviroscience.com.au
www.enviroscience.com.au
LABORATORY LOCATED AT 2/3 DOUGLAS MAWSON ROAD, DUBBO NSW 2830

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Juliet Duffy	Manager	Huong Crawford
Client	ENVIROSCIENCE SOLUTIONS PTY LTD	Laboratory	SGS Alexandria Environmental
Address	PO BOX 1645 DUBBO NSW 2820	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	0407 120 325	Telephone	+61 2 8594 0400
Facsimile	(Not specified)	Facsimile	+61 2 8594 0499
Email	juliet@enviroscience.com.au	Email	au.environmental.sydney@sgs.com
Project	**26835 Lachley Estate Lachley St Forbes**	SGS Reference	**SE233794 R0**
Order Number	**26835**	Date Received	01 Jul 2022
Samples	2	Date Reported	18 Jul 2022

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

Micro subcontracted to Symbio Laboratories, 2 Sirius Road, Lane Cove West NSW 2066, NATA Accreditation Number 2455. Report No. S1170647.

SIGNATORIES

Dong LIANG
Metals/Inorganics Team Leader

Shane MCDERMOTT
Inorganic/Metals Chemist

Parameter	Units	LOR	Sample Number: SE233794.001 Sample Matrix: Water Sample Date: 30 Jun 2022 Sample Name: W2	Sample Number: SE233794.002 Sample Matrix: Water Sample Date: 30 Jun 2022 Sample Name: W5
Anions by Ion Chromatography in Water Method: AN245 Tested: 4/7/2022				
Nitrate Nitrogen, NO3-N	mg/L	0.005	<0.005	**0.047**
Nitrite in Water Method: AN277 Tested: 1/7/2022				
Nitrite Nitrogen, NO2 as N	mg/L	0.005	**0.012**	**0.062**
TKN Kjeldahl Digestion by Discrete Analyser Method: AN292 Tested: 4/7/2022				
Total Kjeldahl Nitrogen	mg/L	0.05	**3.2**	**44**
Total Nitrogen (calc)	mg/L	0.05	**3.2**	**44**
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 4/7/2022				
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.47**	**32**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 4/7/2022				
Conductivity @ 25 C	µS/cm	2	**700**	**8000**
Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 6/7/2022				
Arsenic, As	µg/L	1	**7**	**27**
Cadmium, Cd	µg/L	0.1	<0.1	<0.1
Chromium, Cr	µg/L	1	<1	**11**
Copper, Cu	µg/L	1	<1	**27**
Lead, Pb	µg/L	1	<1	<1
Nickel, Ni	µg/L	1	**2**	**31**
Zinc, Zn	µg/L	5	<5	**27**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	SE233794.001 Water 30 Jun 2022 W2	SE233794.002 Water 30 Jun 2022 W5
Sample Subcontracted Method: Tested: 18/7/2022					
Sample Subcontracted*	No unit	-		Symbio	Symbio

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Anions by Ion Chromatography in Water Method: ME-(AU)-[ENV]AN245

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrate Nitrogen, NO3-N	LB252556	mg/L	0.005	<0.005	0%	96%

Conductivity and TDS by Calculation - Water Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity @ 25 C	LB252577	µS/cm	2	<2	1%	102%

Nitrite in Water Method: ME-(AU)-[ENV]AN277

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Nitrite Nitrogen, NO2 as N	LB252470	mg/L	0.005	<0.005	4%	103%	102%

TKN Kjeldahl Digestion by Discrete Analyser Method: ME-(AU)-[ENV]AN292

Parameter	QC Reference	Units	LOR	DUP %RPD	MS %Recovery
Total Kjeldahl Nitrogen	LB252587	mg/L	0.05	0 - 6%	104%

Total Phosphorus by Kjeldahl Digestion DA in Water Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Phosphorus (Kjeldahl Digestion) as P	LB252587	mg/L	0.02	<0.02	1 - 3%	104%	102%

Trace Metals (Dissolved) in Water by ICPMS Method: ME-(AU)-[ENV]AN318

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Arsenic, As	LB252835	µg/L	1	<1	0 - 1%	96%
Cadmium, Cd	LB252835	µg/L	0.1	<0.1	0%	105%
Chromium, Cr	LB252835	µg/L	1	<1	0 - 3%	109%
Copper, Cu	LB252835	µg/L	1	<1	0 - 1%	108%
Lead, Pb	LB252835	µg/L	1	<1	0%	109%
Nickel, Ni	LB252835	µg/L	1	<1	0%	105%
Zinc, Zn	LB252835	µg/L	5	<5	0%	114%

METHOD	METHODOLOGY SUMMARY
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN106	Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN277	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
AN279/AN293(Sydney)	The sample is digested with Sulphuric acid, K2SO4 and CuSO4. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN281	An unfiltered water or soil sample is first digested in a block digestor with sulfuric acid, K2SO4 and CuSO4. The ammonia produced following digestion is then measured colourimetrically using the Discrete Analyser . A portion of the digested sample is buffered to an alkaline pH , and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
AN318	Determination of elements at trace level in waters by ICP-MS technique,, referenced to USEPA 6020B and USEPA 200.8 (5.4).

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
***	Indicates that both * and ** apply.	NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Juliet Duffy	Manager	Huong Crawford
Client	ENVIROSCIENCE SOLUTIONS PTY LTD	Laboratory	SGS Alexandria Environmental
Address	PO BOX 1645 DUBBO NSW 2820	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	0407 120 325	Telephone	+61 2 8594 0400
Facsimile	(Not specified)	Facsimile	+61 2 8594 0499
Email	juliet@enviroscience.com.au	Email	au.environmental.sydney@sgs.com
Project	**26835 Lachley Estate Lachley St Forbes**	SGS Reference	**SE233945 R0**
Order Number	**26835**	Date Received	06 Jul 2022
Samples	2	Date Reported	13 Jul 2022

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Akheeqar BENIAMEEN
Chemist

Dong LIANG
Metals/Inorganics Team Leader

Teresa NGUYEN
Organic Chemist

Parameter	Units	LOR	Sample Number: SE233945.001 Sample Matrix: Water Sample Date: 30 Jun 2022 Sample Name: QW1	Sample Number: SE233945.002 Sample Matrix: Water Sample Date: 30 Jun 2022 Sample Name: DUP01
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 8/7/2022				
TRH C6-C10	µg/L	50	<50	<50
TRH C6-C9	µg/L	40	<40	<40
Surrogates				
d4-1,2-dichloroethane (Surrogate)	%	-	**91**	**91**
d8-toluene (Surrogate)	%	-	**94**	**95**
Bromofluorobenzene (Surrogate)	%	-	**102**	**105**
VPH F Bands				
Benzene (F0)	µg/L	0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 7/7/2022				
TRH C10-C14	µg/L	50	<50	<50
TRH C15-C28	µg/L	200	<200	<200
TRH C29-C36	µg/L	200	<200	<200
TRH C37-C40	µg/L	200	<200	<200
TRH C10-C40	µg/L	320	<320	<320
TRH F Bands				
TRH >C10-C16	µg/L	60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500
Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 11/7/2022				
Arsenic, As	µg/L	1	**2**	**2**
Cadmium, Cd	µg/L	0.1	<0.1	<0.1
Chromium, Cr	µg/L	1	<1	<1
Copper, Cu	µg/L	1	**1**	**2**
Lead, Pb	µg/L	1	<1	<1
Nickel, Ni	µg/L	1	<1	<1
Zinc, Zn	µg/L	5	**23**	**21**

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Trace Metals (Dissolved) in Water by ICPMS **Method: ME-(AU)-[ENV]AN318**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Arsenic, As	LB253197	µg/L	1	<1	0%	101%	
Cadmium, Cd	LB253197	µg/L	0.1	<0.1	0%	107%	
Chromium, Cr	LB253197	µg/L	1	<1	0%	109%	
Copper, Cu	LB253197	µg/L	1	<1	0%	107%	
Lead, Pb	LB253197	µg/L	1	<1	0%	112%	108%
Nickel, Ni	LB253197	µg/L	1	<1	0 - 2%	106%	
Zinc, Zn	LB253197	µg/L	5	<5	2 - 3%	106%	

TRH (Total Recoverable Hydrocarbons) in Water **Method: ME-(AU)-[ENV]AN403**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH C10-C14	LB252934	µg/L	50	<50	0%	95%
TRH C15-C28	LB252934	µg/L	200	<200	2%	115%
TRH C29-C36	LB252934	µg/L	200	<200	0%	99%
TRH C37-C40	LB252934	µg/L	200	<200	0%	NA
TRH C10-C40	LB252934	µg/L	320	<320	2%	NA

TRH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH >C10-C16	LB252934	µg/L	60	<60	0%	103%
TRH >C10-C16 - Naphthalene (F2)	LB252934	µg/L	60	<60	0%	NA
TRH >C16-C34 (F3)	LB252934	µg/L	500	<500	4%	113%
TRH >C34-C40 (F4)	LB252934	µg/L	500	<500	0%	95%

Volatile Petroleum Hydrocarbons in Water **Method: ME-(AU)-[ENV]AN433**

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
TRH C6-C10	LB253045	µg/L	50	<50	98%
TRH C6-C9	LB253045	µg/L	40	<40	100%

Surrogates

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
d4-1,2-dichloroethane (Surrogate)	LB253045	%	-	89%	98%
d8-toluene (Surrogate)	LB253045	%	-	92%	101%
Bromofluorobenzene (Surrogate)	LB253045	%	-	101%	95%

VPH F Bands

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Benzene (F0)	LB253045	µg/L	0.5		NA
TRH C6-C10 minus BTEX (F1)	LB253045	µg/L	50	<50	96%

METHOD	METHODOLOGY SUMMARY
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN318	Determination of elements at trace level in waters by ICP-MS technique,, referenced to USEPA 6020B and USEPA 200.8 (5.4).
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). Where F2 is corrected for Naphthalene, the VOC data for Naphthalene is used.
AN403	Additionally, the volatile C6-C9/C6-C10 fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoveerable Hydrocarbons - Silica (TRH-Silica) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
***	Indicates that both * and ** apply.	NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Juliet Duffy
Client	ENVIROSCIENCE SOLUTIONS PTY LTD
Address	PO BOX 1645 DUBBO NSW 2820
Telephone	0407 120 325
Facsimile	(Not specified)
Email	juliet@enviroscience.com.au
Project	**26835 Lachley Estate Lachley St Forbes**
Order Number	**26835**
Samples	7

LABORATORY DETAILS

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Laboratory	SGS Alexandria Environmental
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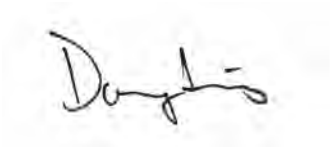
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE233946 R0**
Date Received	06 Jul 2022
Date Reported	12 Jul 2022

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES



Dong LIANG
Metals/Inorganics Team Leader

Parameter	Units	LOR	Sample Number: SE233946.001 Sample Matrix: Water Sample Date: 30 Jun 2022 Sample Name: FD1	SE233946.002 Water 30 Jun 2022 FD2	SE233946.003 Water 30 Jun 2022 FD3	SE233946.004 Water 30 Jun 2022 FD4
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 6/7/2022						
Conductivity @ 25 C	µS/cm	2	**220**	**160**	**250**	**140**
Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 11/7/2022						
Arsenic, As	µg/L	1	**4**	**1**	**5**	**2**
Cadmium, Cd	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Chromium, Cr	µg/L	1	**2**	**2**	<1	**2**
Copper, Cu	µg/L	1	**4**	**4**	**1**	**3**
Lead, Pb	µg/L	1	<1	<1	<1	<1
Nickel, Ni	µg/L	1	**4**	**4**	**2**	**3**
Zinc, Zn	µg/L	5	**5**	<5	<5	<5

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE233946.005 Water 30 Jun 2022 FD5	SE233946.006 Water 30 Jun 2022 FD6	SE233946.007 Water 30 Jun 2022 DSW6
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 6/7/2022					
Conductivity @ 25 C	µS/cm	2	**180**	**160**	**290**
Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 11/7/2022					
Arsenic, As	µg/L	1	**1**	**3**	<1
Cadmium, Cd	µg/L	0.1	<0.1	<0.1	<0.1
Chromium, Cr	µg/L	1	<1	**4**	<1
Copper, Cu	µg/L	1	**2**	**7**	<1
Lead, Pb	µg/L	1	<1	**1**	<1
Nickel, Ni	µg/L	1	**2**	**5**	<1
Zinc, Zn	µg/L	5	<5	**8**	**8**

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Conductivity and TDS by Calculation - Water **Method: ME-(AU)-[ENV]AN106**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity @ 25 C	LB252853	µS/cm	2	<2	3%	95%

Trace Metals (Dissolved) in Water by ICPMS **Method: ME-(AU)-[ENV]AN318**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Arsenic, As	LB253197	µg/L	1	<1	0%	101%	
Cadmium, Cd	LB253197	µg/L	0.1	<0.1	0%	107%	
Chromium, Cr	LB253197	µg/L	1	<1	0%	109%	
Copper, Cu	LB253197	µg/L	1	<1	0%	107%	
Lead, Pb	LB253197	µg/L	1	<1	0%	112%	108%
Nickel, Ni	LB253197	µg/L	1	<1	0 - 2%	106%	
Zinc, Zn	LB253197	µg/L	5	<5	2 - 3%	106%	

METHOD	METHODOLOGY SUMMARY
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN106	Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl.
AN318	Determination of elements at trace level in waters by ICP-MS technique,, referenced to USEPA 6020B and USEPA 200.8 (5.4).

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
***	Indicates that both * and ** apply.	NVL	Not Validated

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Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

APPENDIX 76PHOTO AND SOIL LOGS

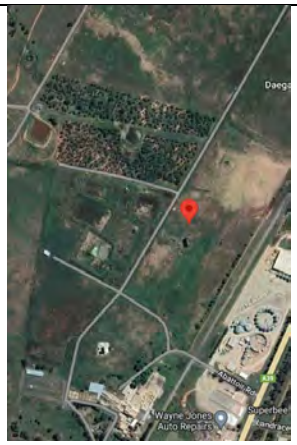
ENVIROSCIENCE SOLUTIONS PTY LTD
NATA Accreditation No. 19366
ACN 157 918 262
Ph 1300 372 436
info@enviroscience.com.au
www.enviroscience.com.au
LABORATORY LOCATED AT 2/3 DOUGLAS MAWSON ROAD, DUBBO NSW 2830

APPENDIX 6: SITE PHOTOS

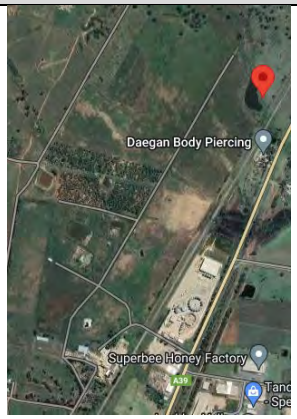
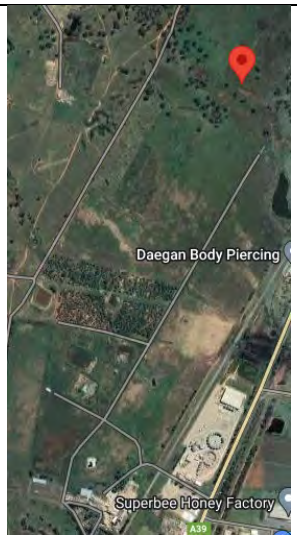
DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3595371 S , 148.0185511 E**		**SS1** Skin Sheds area Next to concrete support pole Presence of bitumen Red pod soil
30/06/2022		**33.3593875 S , 148.0176039 E**		**SS2** Edge of old road Brown sandy loam
30/06/2022		**33.3596354 S , 148.0175026 E**		**SS3** Brown loam

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3598020 S , 148.0184771 E**		**SS4** Brown loam
30/06/2022		**33.3609366 S , 148.0209665 E**		**AST1** Between concrete containment bay and a concrete slab Grey sandy loam Asbestos debris scattered on ground and containment bay
30/06/2022		**33.3608804 S , 148.0205631 E**		**AST2** Next to a concrete containment bay Brown clay Asbestos debris scattered on ground and containment bay

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3607709 S , 148.0205004 E**		**T1** Adjacent to maintenance shed Sand in transformer/sample taken below Bakelite board Asbestos debris scattered 15m out of building boundary
30/06/2022		**33.3587178 S , 148.0196801 E**		**QW1** Green water Foam insultation into water Super 6 sheets on bank 1x tank barrel 44 gallon drum possible chemicals
30/06/2022		**33.3584518 S , 148.0197148 E**		**QS1** Super 6 sheets on bank 1x tank barrel 44 gallon drum possible chemicals Soil sample taken next to blue chemical container Brown podsole

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3521194 S , 148.0223222 E**		**M1** Lots of good vegetation, grass &weeds Loamy sand
30/06/2022		**33.3515361 S , 148.0215750 E**		**M2** Raised mound Rocky soil material Lots of vegetation, reedy Sandy medium loam soil, worm activity
30/06/2022		**33.3553593 S , 148.0225920 E**		**M3** Lots of good vegetation, grass &weeds Loamy sand

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3550317 S , 148.0222745 E**		**M4** Lots of good vegetation, grass &weeds Loamy sand
30/06/2022		**33.3490750 S , 148.0289472 E**		**L1** Paddock adjacent to fence line and rail corridor Dryer NE corner of paddock Lots of good vegetation Old metal irrigation pipe Loamy soil
30/06/2022		**33.3487444 S , 148.0281056 E**		**L2** Near FD1 (dam) close to the water High vegetation Sandy loamy soil with clay & gravel

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3497472 S , 148.0281667 E**		**L3** Lots of good vegetation Close to water Low lying wet area Fine sandy loam soil
30/06/2022		**33.3448722 S , 148.0261694 E**		**FA1** Medium red loamy/clay soil. Lots of good vegetation over ploughed field
30/06/2022		**33.3456278 S , 148.0260917 E**		**FA2** Red loamy soil Weedy vegetation Some sludgy soft areas

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3451806 S , 148.0295417 E**		**FA3** Low lying reedy vegetation High vegetation Next to dry field damn Good loamy soil 1x mature eucalypt tree
30/06/2022		**33.3466861 S , 148.0289472 E**		**FA4** High vegetation/weeds Good loamy soil Number of trees
30/06/2022		**33.3454444 S , 148.0246111 E**		**FA5** Good loamy soil High vegetation

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3510583 S , 148.0238333 E**		**FA6** Dark organic loamy soil Lots of good vegetation after ploughing Low lying wet paddock
30/06/2022		**33.3503833 S , 148.0201250 E**		**FA7** Lots of good vegetation Medium loam/sand
30/06/2022		**33.3517583 S , 148.0235889 E**		**FA8** Lots of vegetation/weeds Ploughed paddock Medium loam/light clay soil

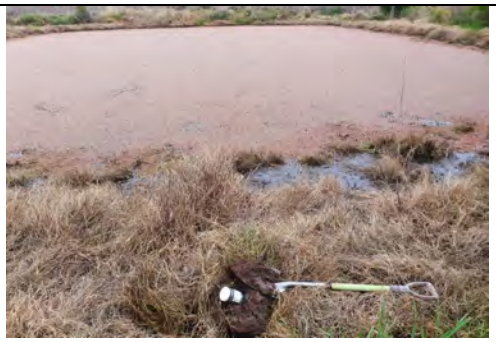
DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3493944 S , 148.0272056 E**		**FA9** Low lying close to damn High vegetation loamy soil
30/06/2022		**33.3525588 S , 148.0242034 E**		**FA10** Brown clay
30/06/2022		**33.3528581 S , 148.0238644 E**		**FA11** Black/brown clay

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3554498 S , 148.0233012 E**		**FA12** Brown clay
30/06/2022		**33.3525056 S , 148.0188611 E**		**FA13** Lots of vegetation, grass & trees Under electric pylon corridor Rocky aggregate material, sandy loam red soil
30/06/2022		**33.3517806 S , 148.0235889 E**		**FA14** Sparsely forested area Compacted red loam Dry area Good vegetation, scrubby, weeds

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3565583 S , 148.0190373 E**		**FA15** Black/brown podsole
30/06/2022		**33.3585923 S , 148.0183925 E**		**FA16** Brown clay and rock
30/06/2022		**33.3538889 S , 148.0175944 E**		**FA17** Large field area Lots of vegetation Dark Silty loam soil Low lying damp reed/water plants

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3577462 S , 148.0165781 E**		**FA18** Brown podsole
30/06/2022		**33.3581557 S , 148.0166776 E**		**FA19** Brown podsole
30/06/2022		**33.3606477 S , 148.0166056 E**		**FA20** Brown podsole Old paddock Wild rubbish tip

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3576811 S , 148.0204281 E**		**FA21** Red podsole
30/06/2022	NA	NA	**NA**	**FA22** NOT TAKEN - See FA21 or QS1 from locations close to FA22
30/06/2022	No Photo Available	No coordinate available		**FA23** Edge of old road Presence of bitumen Brown sandy loam
30/06/2022	No Photo Available	No coordinate available		**FA24** Brown podsole Old paddock Sample taken next to a bank

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3578399 S , 148.0219026 E**		**FA25** Pumping station- water came from AST area Black/brown sandy loam
30/06/2022		**33.3556844 S , 148.0224486 E**		**FA26** Soil taken next to damn
30/06/2022		**33.3560556 S , 148.0198056 E**		**DS/W1** Dry settling pond - No Standing Water Organic dark soil Dark silty settled Material sodium Organic burnt silt? Soil Sample

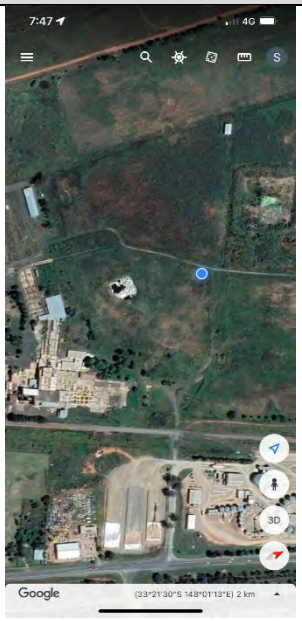
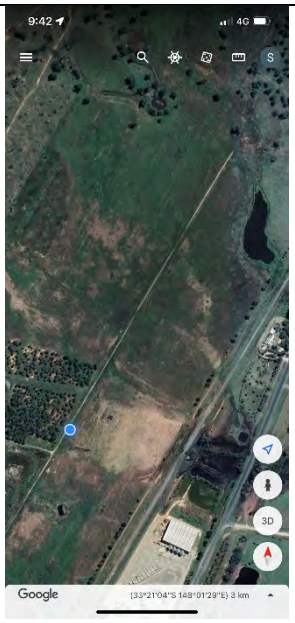
DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3553778 S , 148.0210417 E**		**DS/W2** Plenty of vegetation/weeds organic soil WATER SAMPLE TAKEN
30/06/2022		**33.3553250 S , 148.0197139 E**		**DS/W3** Dry pond, no standing water. Plenty of vegetation/weeds Organic topsoil Clay material further down Soil Sample
30/06/2022		**33.3545333 S , 148.0204000 E**		**DS/W4** Irrigation pond Dry with lots of vegetation/weeds, No standing water. Soil Sample

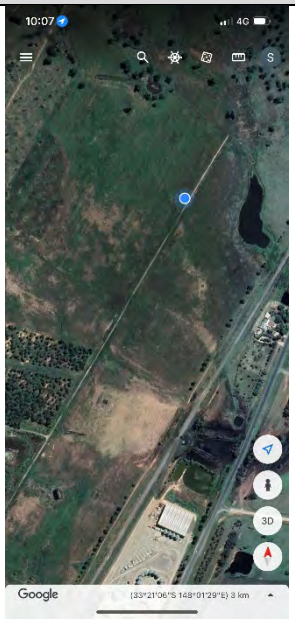
DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3548250 S , 148.0211028 E**		**DS/W5** Deep settling pond Standing water at bottom, WATER SAMPLE TAKEN More organic darker soil Plenty of vegetation/weeds
30/06/2022		**33.3577940 S , 148.0218200 E**		**DSW6** Green water from pumping station remain in concrete well Size 6x4m with 100mm water deep
30/06/2022	No Photo Available	No coordinate available		**D1/SED** Sample of deposited material in D1 - organic crusty sodium coated material. - sample included in "landfill" soil testing COC.

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3494444 S , 148.0273278 E**		**FD1** Healthy natural dam High vegetation Near road and rail corridor Saturated area close to damn Loamy soil
30/06/2022		**33.3526000 S , 148.0178389 E**		**FD2** Healthy looking dam, Brown leafy slightly silty, Lots of vegetation Soil taken from bike track/dam wall, Clay soil dry gravel, High vegetation close to dam , Near electric substation, Burnt area on track down from damn , Bit of rubbish to the left down from dam
30/06/2022		**33.3556570 S , 148.0223856 E**		**FD3** Dam with red algae at surface of water, No Soil Taken

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3532139 S , 148.0206000 E**		**FD4** Water in center surrounded by vegetation, Healthy looking farm damn, Lots of vegetation/pond weeds, Below damn less vegetation, forested, scrubby , Soil sample taken from damn run off area, Loamy soil Rubbish pile & old dirty mattress, Stock feeder
30/06/2022		**33.3463389 S , 148.0250556 E**		**FD5** Overgrown damn, Low lying swamp area around damn, Lots of good vegetation Burnt out car in swampy area near FD5 Clay excavated down

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
30/06/2022		**33.3453611 S , 148.0246583 E**		**FD6** Overgrown dam High vegetation Excavated dam wall material, Clay loamy soil
30/06/2022		**33.3597384 S, 148.0177606 E**		**S01** Between FA23 and SS3, Asbestos pipes 0.5 linear meter
30/06/2022		**33.3594469 S, 148.0176445 E**		**S02** Toilet Shed Fibre Cement Wall in the Skin Shed Area.

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
28/07/2022		**33° 21.443'S,** **148° 1.218'E**		**MW1** Clear, No Odour
28/07/2022		**33° 21.241'S,** **148° 1.363'E**		**MW2** Clear, No Odour

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
28/07/2022	 	**33° 20.950'S,** **148° 1.533'E**		**MW6** Clear to slightly cloudy, traces of sediment within water column
28/07/2022		**33° 21.388'S,** **148° 1.189'E**	Within sediment basin 1	**SS1** Follow up hydrocarbon sample in Sediment basin 1

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
28/07/2022		**33° 21.368'S,** **148° 1.164'E**	Within sediment basin 1	**SS2** Follow up hydrocarbon sample in Sediment basin 1
28/07/2022		**33° 20.900'S,** **148° 1.733'E**	Landfill Area – south west of landfill edge	**TP1** Natural Orange Brown Sandy Clay
28/07/2022		**33° 20.899'S,** **148° 1.745'E**	Landfill Area – natural material encountered at approximately 0.7m bgs	**TP2** Side profile of test pit indicating uncontrolled fill (including ACM Fragments) and waste materials overlying natural orange brown clay

DATE OF IDENTIFICATION	IMAGES	GPS Coordinates	Location	Visual Description
28/07/2022		**33° 20.896'S,** **148° 1.753'E**	Landfill area – fill encountered to depths greater than 2m bgs	**TP3** Uncontrolled fill (including ACM Fragments)
28/07/2022		**33° 20.889'S,** **148° 1.761'E**	Landfill area – fill encountered to depths greater than 2m bgs	**TP4** Uncontrolled fill (including ACM Fragments)
28/07/2022		**33° 21.118'S,** **148° 1.336'E**	Mining spoil area – no fill materials encountered	**TP5** Orange brown sandy clay, no fill, no odour
28/07/2022		**33° 21.099'S,** **148° 1.320'E**	Mining spoil area – no fill materials encountered	**TP6** Orange brown sandy clay, no fill, no odour

APPENDIX 7 LABORATORY CHAIN OF CUSTODIES

ENVIROSCIENCE SOLUTIONS PTY LTD
NATA Accreditation No. 19366
ACN 157 918 262
Ph 1300 372 436
info@enviroscience.com.au
www.enviroscience.com.au
LABORATORY LOCATED AT 2/3 DOUGLAS MAWSON ROAD, DUBBO NSW 2830

EnviroScience SOLUTIONS

Laboratory Chain of Custody

From:	EnviroScience Solutions	Address:	PO Box 1645 Dubbo NSW, 2830
Ph:	02 6884 8820	Mob:	0407 120 325
Fax:	02 8362 9948	Email:	juliet@enviroscience.com.au

Job No:	26835	Client:	Brisull Industries
Site Address:	LACHLEY ESTATE, FORBES, NSW		
Sampled By	M AUSTIN		
Contact Details:	Phone: 0493237449	Email:	mark@enviroscience.com.au

Analysis Required: As, Cd, Cr, Cu, Ni, Pb, Zn / OCP / EC

	Sample Number	Date & Time Collected	Sample Description	Sample Location	Sample Preservation
1	FA 1	30/6/22	Soil 0-300mm	Field areas	✓
2	FA 2	"	"	"	✓
3	FA 3	"	"	"	✓
4	FA 4	"	"	"	✓
5	FA 5	"	"	"	✓
6	FA 6	"	"	"	✓
7	FA 7	"	"	"	✓
8	FA 8	"	"	"	✓
9	FA 9	"	"	"	✓

ENVIROLAB

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 299646

Signed By:

Date Received: 05/07/22.
Time Received: 1120.
Received by: CH
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

EnviroScience SOLUTIONS

Laboratory Chain of Custody

From:	EnviroScience Solutions	Address:	PO Box 1645 Dubbo NSW, 2830
Ph:	02 6884 8820	Mob:	0407 120 325
Fax:	02 8362 9948	Email:	juliet@enviroscience.com.au

Job No:	26835	Client:	Brisu II Industries
Site Address:	Lachlan Estate, Forbes, NSW		
Sampled By	M Austin		
Contact Details:	Phone: 0493237449	Email:	mark@enviroscience.com.au

Analysis Required: As, Cd, Cr, Cu, Ni, Pb, Zn / OCP / EC

	Sample Number	Date & Time Collected	Sample Description	Sample Location	Sample Preservation
10	FA 10	30/6/22	Soil 0-300mm	Field Areas	✓
11	FA 11	"	"	"	✓
12	FA 12	"	"	"	✓
13	FA 13	"	"	"	✓
14	FA 14	"	"	"	✓
15	FA 15	"	"	"	✓
16	FA 16	"	"	"	✓
17	FA 17	"	"	"	✓
18	FA 18	"	"	"	✓

Signed By: _____

EnviroScience SOLUTIONS

Laboratory Chain of Custody

From:	EnviroScience Solutions	Address:	PO Box 1645 Dubbo NSW, 2830
Ph:	02 6884 8820	Mob:	0407 120 325
Fax:	02 8362 9948	Email:	juliet@enviroscience.com.au

Job No:	26835	Client:	Brisull Industries
Site Address:	Lachlan Estate, Forbes NSW		
Sampled By	M Austin		
Contact Details:	Phone: 0493237469	Email:	mark@enviroscience.com.au

Analysis Required: _____

	Sample Number	Date & Time Collected	Sample Description	Sample Location	Sample Preservation
19	FA19	30/6/22	Soil 0-300mm	Field areas	✓
20	FA20	"	"	"	✓
21	FA21	"	"	"	✓
22	FA23	"	"	"	✓
23	FA24	"	"	"	✓
24	FA25	"	"	"	✓
25 ~~25~~	FA26	"	"	"	✓

Signed By: _____

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Laboratory Chain of Custody

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Fax:	02 8362 9948	Email:	juliet@enviroscience.com.au

Job No:	26835	Client:	BRISULL INDUSTRIES
Site Address:	LACHLEY ESTATE, FORBES NSW 2871		
Sampled By	M AUSTIN		
Contact Details:	Phone: 0493237449	Email:	~~M AUSTIN~~ mark@enviroscience.com.au

Analysis Required: As, Cr

	Sample Number	Date & Time Collected	Sample Description	Sample Location	Sample Preservation
26	SS 1	30/6/22	soil, 0-300mm	skin shed 1	✓
27	SS 2	"	" "	skin shed 2	✓
28	SS 3	"	" "	skin shed 3	✓
29	SS 4	"	" "	skin shed 4	✓

Signed By: _____

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Fax:	02 8362 9948	Email:	juliet@enviroscience.com.au

Job No:	26835	Client:	Brisull Industries	
Site Address:	Lachley Estate, Forbes, NSW			
Sampled By	M Austin			
Contact Details:	Phone:	0493237449	Email:	mark@enviroscience.com.au

Analysis Required: As, Cd, Cr, Cu, Ni, Pb, Zn / EC

	Sample Number	Date & Time Collected	Sample Description	Sample Location	Sample Preservation
30	FD 1	30/6/22	Soil-0-300mm	Field Dams	✓
31	FD 2	"	"	"	✓
32	FD4	"	"	"	✓
33	FD 5	"	"	"	✓
34	FD 6	"	"	"	✓

Signed By: _____

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Fax:	02 8362 9948	Email:	juliet@enviroscience.com.au

Job No:	26835	Client:	BRISULL INDUSTRIES.
Site Address:	LACHLEY ESTATE FORBES NSW		
Sampled By	M Austin		
Contact Details:	Phone: 0493237649	Email:	mark@enviroscience.com.au

Analysis Required: As, Cd, Cr, Cu, Ni, Pb, Zn / OCP, OPP / TRH C6-C36

	Sample Number	Date & Time Collected	Sample Description	Sample Location	Sample Preservation
35	L 1	30/6/22	Soil 0-300mm	Landfill area	✓
36	L 2	"		" "	✓
37	L 3	"		" "	✓
38	L1D2	"		" "	✓
39	D1 SED	"	SEDIMENT DEPOSIT	DAM 1 SEDIMENT	✓

Signed By: _____

EnviroScience SOLUTIONS

Laboratory Chain of Custody

From:	EnviroScience Solutions	Address:	PO Box 1645 Dubbo NSW, 2830
Ph:	02 6884 8820	Mob:	0407 120 325
Fax:	02 8362 9948	Email:	juliet@enviroscience.com.au

Job No:	26835	Client:	BRISULL INDUSTRIES
Site Address:	LACHLEY ESTATE, FORBES NSW 2871		
Sampled By	M AUSTIN		
Contact Details:	Phone: 0493237449	Email:	mark@enviroscience.com.au

Analysis Required: As, Cd, Cr, Cu, Ni, Pb, Zn

	Sample Number	Date & Time Collected	Sample Description	Sample Location	Sample Preservation
40	M1	30/6/22	Soil 0-300mm	mine area	✓
41	M2	"	" "	" "	✓
42	M3	"	" "	" "	✓
43	M4	"	" "	" "	✓
44	M4D3	"	" "	" "	✓
45	M4T1	"	" "	" "	✓

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Ph:	02 6884 8820	Mob:	0407 120 325
Fax:	02 8362 9948	Email:	juliet@enviroscience.com.au

Job No:	26835	Client:	BRISCOE INDUSTRIES
Site Address:	LACHLEY ESTATE FORBES, NSW 2871		
Sampled By	M. AUSTIN	mark@enviroscience.com.au	
Contact Details:	Phone: 0493287449	Email:	markstine

Analysis Required: TRH C6-C36

	Sample Number	Date & Time Collected	Sample Description	Sample Location	Sample Preservation
46	AST 1	30/6/22	Soil 0-300mm	NEAR AST	✓
47	AST 2	30/6/22	Soil 0-300mm	NEAR AST	✓

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Laboratory Chain of Custody

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Fax:	02 8362 9948	Email:	juliet@enviroscience.com.au

Job No:	26835	Client:	Brisull Industries.
Site Address:	LACHLEY ESTATE, FORBES, NSW, 2871		
Sampled By	M. AUSTIN		
Contact Details:	Phone: 0493234449	Email:	mark@enviroscience.com.au

Analysis Required: As, Cd, Cr, Cu, Ni, Pb, Zn, TRH(C6-C36)

Sample Number	Date & Time Collected	Sample Description	Sample Location	Sample Preservation
48 QS1	30/6/22	Soil 0-300mm	QUARRY	✓

Signed By: _____

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Laboratory Chain of Custody

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Fax:	02 8362 9948	Email:	juliet@enviroscience.com.au

Job No:	26835	Client:	BRISULL INDUSTRIES	
Site Address:	LACHLEY ESTATE, FORBES, NSW 2871			
Sampled By	M AUSTIN		mark	
Contact Details:	Phone: 0493237449	Email:	~~maustin~~@enviroscience.com.au	

Analysis Required: TRH C10-C36, PCB

Sample Number	Date & Time Collected	Sample Description	Sample Location	Sample Preservation
49 T1	30/6/22	Soil 0-300mm	TRANSFORMER	✓

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Esky 4

	Sample No.	Sample Type:
	FA1	Soil
	FA2	Soil
	FA3	Soil
	FA4	Soil
Chain of Custody 10	FA5	Soil
	FA6	Soil
	FA7	Soil
	FA8	Soil
	FA9	Soil

299646

CH 05/07

Esky 1

	Sample No.	Sample Type:
Chain of Custody 1	AST1	Soil
	AST2	Soil
Chain of Custody 2	T1	Soil
Chain of Custody 3	QS1	Soil
Chain of Custody 4	SS1	Soil
	SS2	Soil
	SS3	Soil
	SS4	Soil
Chain of Custody 5	FA10	Soil
	FA11	Soil
	FA12	Soil
	FA13	Soil
	FA14	Soil
	FA15	Soil
	FA16	Soil
	FA17	Soil
	FA18	Soil

299646
CH 05107

Esky 2

	Sample No.	Sample Type:
Chain of Custody 6	FD1	Soil
	FD2	Soil
	FD4	Soil
	FD5	Soil
	FD6	Soil
Chain of Custody 7	M1	Soil
	M2	Soil
	M3	Soil
	M4	Soil
	M4 D3	Soil
	M4 T1	Soil

#299646
CH 05107.

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Laboratory Chain of Custody

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Ph:	02 6884 8820	Mob:	0407 120 325
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Job No:	26835	Client:	BRISCOLL INDUSTRIES
Site Address:	LACHLEY ESTATE, LACHLEY ST FORBES NSW 2871		
Sampled By	M. AUSTIN		
Contact Details:	Phone: 0493237449	Email:	m.austin@enviroscience

Nitrogen phosphorus, EC.

Analysis Required: As, Cd, Cr, Cu, Ni, Pb, Zn, E coli, Total coliforms

Sample Number	Date & Time Collected	Sample Description	Sample Location	Sample Preservation
~~W1~~	~~30/6/22~~	~~surface water~~	~~irrigation pond~~	✓
W2	30/6/22	surface water	irrigation pond.	✓
~~W3~~	~~30/6/22~~			
~~W4~~	~~30/6/22~~			
W5	30/6/22	surface water	irrigation pond.	✓

SGS EHS Sydney COC

SE233794

17.22 7.20

Signed By: _____

ACN 157 918 262
Ph 1300 E-SCIENCE
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Laboratory Chain of Custody

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Job No:	26835	Client:	BRISULL INDUSTRIES
Site Address:	LACHLEY ESTATE, FORBES NSW		
Sampled By	M AUSTIN		
Contact Details:	Phone:	Email:	

Analysis Required: HEAVY METALS As, Cd, Cr, Cu, Ni, Pb, Zn / Nitrogen, Phosphorus, EC + Ecoli + TOTAL COLIFORMS

Sample Number	Date & Time Collected	Sample Description	Sample Location	Sample Preservation
DS1	30/6/22	soil, shallow 0 to 300mm	Treatment pond (1)	✓
DS2	30/6/22	soil shallow 0-300mm	" " (2)	✓
DS3	30/6/22	soil " 0-300	" " (3)	✓
DS4	30/6/22	soil " 0-300	" " (4)	✓
DS5	30/6/22	soil " 0-300	" " (5)	✓

SGS EHS Sydney COC

SE233795

01/07/22 @ 7.2

Signed By: _____

EnviroScience SOLUTIONS
ACN 157 918 262
Ph 1300 E-SCIENCE
enviroscience.com.au

EnviroScience SOLUTIONS

Laboratory Chain of Custody

From:	EnviroScience Solutions	Address:	PO Box 1645 Dubbo NSW, 2830
Ph:	02 6884 8820	Mob:	0407 120 325
Fax:	02 8362 9948	Email:	juliet@enviroscience.com.au

Job No:	26835	Client:	Biswll Industries
Site Address:	LACHLEY ESTATE, FORBES, NSW		
Sampled By	M. AUSTIN		
Contact Details:	Phone: 0493237449	Email:	mark@enviroscience.com.au

Analysis Required: As, Cd, Cr, Cu, Ni, Pb, Zn/EC

	Sample Number	Date & Time Collected	Sample Description	Sample Location	Sample Preservation
1	FD 1	30/6/22	Surface Water 1x500ml, 1x125ml	Field Dams	✓
2	FD 2	"	"	"	✓
3	FD 3	"	"	"	✓
4	FD 4	"	"	"	✓
5	FD 5	"	"	"	✓
6	FD 6	"	"	"	✓
7	DSW6	"	"	"	✓

SGS EHS Sydney COC
SE233946

Signed By: _____

M Bassett 6-7-22 1010

APPENDIX 8 PRELIMINARY INVESTIGATION REPORT

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Preliminary investigation
Lachley Abattoir
Lachley Street, Forbes NSW

Date: 14 March 2013

Report Number: R13011c

Envirowest Consulting Pty Ltd ABN 18 103 955 246
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Prepared by:	Envirowest Consulting Pty Ltd 24 William Street Orange NSW 2800
Authorised by:	Greg Madafiglio CPSS Senior Soil Scientist
Assessor:	Joashim Mahon BEnvSci Environmental Scientist
Prepared for:	ARL Consulting PO Box 440 Cowra NSW 2794
Interested authorities:	Forbes Shire Council
Date:	14 March 2013
Report Number:	R13011c

Executive summary

Background

A rural-residential subdivision is proposed of Lots 1544, 1545, 1551, 1559, 1621, 1622, 1649 DP750158, Lot 8 DP211100, Lot 4 DP210102 and Lot 22 DP1002358 Lachley Street Forbes NSW. Lots 278, 279 and 280 are proposed. The site is a former abattoir and potential exists for contamination. An investigation of the site is required to determine areas of potential contamination and possible contaminants.

Objectives of the investigation

A preliminary site investigation was conducted the former Lachley Abattoir, Lachley Street, Forbes to identify past potentially contaminating activities, identify potential contamination types, discuss the site condition, identify potential areas of contamination and assess the need for further investigation..

Investigation

A desktop study was undertaken and information collected on site history. An inspection of the site was made on 1 February 2013. The site is located north west of Forbes in an agricultural setting and has an approximate area of 150ha.

The site is currently vacant and used for grazing. The site has previously operated as an abattoir.

Conclusions

The desktop study and site inspection identified the potential for contamination to exist in the following areas:

- Skin sheds – arsenic, chromium
- Surrounding the AST - hydrocarbons
- Transformer – PCB, oils
- Quarry – metals, hydrocarbons
- Treatment and irrigation dams – metals, pathogens, nitrogen, phosphorus, salinity
- Mining areas - metals
- Downslope of landfill – metals, OCP, OPP, hydrocarbons
- General field areas – metals, OCP, salinity, asbestos cement irrigation pipes
- Farm dams – metals, salinity
- Abattoir buildings – asbestos sheeting and insulation

Recommendations

The following sampling regime is recommended to investigate the potential areas of contamination.

Location	Potential contaminants	Sampling locations	Substrate	Analytes
Skin sheds	Metals	4	Soil	As, Cr
Near AST	Hydrocarbons	2	Soil	TPH(C6-C36)
Transformer	Hydrocarbons	1	Soil	TPH(C10-C36), PCB
Quarry	Metals, hydrocarbons	1	Soil / Water	As, Cd, Cr, Cu, Ni, Pb, Zn, TPH(C6-C36)
Treatment and irrigation ponds	Metals, pathogens, nitrogen, phosphorus, EC	5	Soil / Water	As, Cd, Cr, Cu, Ni, Pb, Zn, *E. coli*, total coliforms, nitrogen, phosphorus, EC
Mining areas	Metals	4	Soil	As, Cd, Cr, Cu, Ni, Pb, Zn
Downslope of landfill	Heavy metals, pesticides, hydrocarbons	3	Soil	As, Cd, Cr, Cu, Ni, Pb, Zn, OCP, OPP, TPH(C6-C36)
Field areas	Metals, pesticides, EC	2 composites per paddock	Soil	As, Cd, Cr, Cu, Ni, Pb, Zn, OCP, EC
Farm dams	Metals, EC	6	Soil / Water	As, Cd, Cr, Cu, Ni, Pb, Zn, EC
Groundwater wells	Metals, pH, EC	3	Water	As, Cd, Cr, Cu, Ni, Pb, Zn, pH, EC

Contents

1. Introduction

A rural-residential subdivision is proposed of Lots 1544, 1545, 1551, 1559, 1621, 1622, 1649 DP750158, Lot 8 DP211100, Lot 4 DP210102 and Lot 22 DP1002358 Lachley Street Forbes NSW. Lots 278, 279 and 280 are proposed. The site is a former abattoir and potential exists for contamination. An investigation of the site is required to determine areas of potential contamination and possible contaminants.

2. Scope of work

Envirowest Consulting Pty Ltd was commissioned by Alan Lindsay of ARL Consulting to undertake a preliminary contamination investigation of the former Lachley Abattoir, Lachley Street, Forbes. The objective was to identify past potentially contaminating activities, identify potential contamination types, discuss the site condition, identify potential areas of contamination and assess the need for further investigation.

3. Site identification

Address	Lachley Abattoir Lachley Street Forbes NSW
Client	ARL Consulting
Deposited plans	Lots 1544, 1545, 1551, 1559, 1621, 1622, 1649 DP750158, Lot 8 DP211100, Lot 4 DP210102 and Lot 22 DP1002358
Australian Map Grid	Zone 55H, E595132m, N6308401m
Locality map	Figure 1
Aerial photograph	Figure 2
Site plan	Figure 3 (site layout)
Area	Approximately 150ha

4. Site history

4.1 Zoning

The site is zoned as RU1 – Primary Production under the Forbes Local Environmental Plan 2012.

4.2 Land-use

The site is currently vacant and used for grazing. The proposed land-use is rural-residential.

4.3 Summary of council records

2000-2002 – Pollution Reduction Program

Lachley Meats began a program to reduce pollution and develop a higher quality of effluent to irrigate over the site. Bimonthly updates were to be supplied to the EPA as part of the licence conditions.

Correspondence regarding the Pollution Reduction Program

- Letters between EPA and Lachley Meats regarding the program

2002 – Development application for additional storage dam

A development application was lodged to Forbes Council for the construction of an additional wastewater storage dam. The Department of Land and Water Conservation required further information regarding the potential impacts on groundwater. It was recommended that two monitoring bores be construction within 50m of the proposed dam and analysis be undertaken to determine baseline levels. No other information regarding the monitoring wells are available.

Correspondence regarding the development application

- Lachley Meats Application to Forbes Shire Council for Development Consent
- Forbes Shire Council letter regarding development application
- Department of Land Water Conservation letter regarding development application

4.4 Sources of information for historical review and site description

- Site visit by Greg Madafiglio and Joashim Mahon on 1 February 2013
- Topographic map of area (Forbes) 1:50 000 CMA of NSW
- Soils Landscapes of the Forbes series
- Forbes geological series sheet 1:250,000
- Aerial photographs 2006, 2009, 2010
- NSW Office of Environment and Heritage (OEH) records of public notices under the CLM Act 1997
- Lachley Abattoir records

4.5 Chronological list of site uses

The locality was settled in the mid 1850's and initial land-use was rural grazing and cropping. Mines were established at two locations on-site. The abattoir commenced operation in 1968. Several renovations and extensions have occurred.

The topographic map for the investigation area is based on 1974 aerial photography with field revision in 1978. The investigation area is not depicted as a built up area or containing orchards. Five buildings associated with the abattoir are located in the southern section of the site. Three buildings expected to be houses are located to the west of the abattoir. Tracks from the east and south provide access to the site. Eleven dams are located in the central and northern sections of the site. Scattered timber is located in the northern section of the site. Three drainage lines traverse the site flowing east. Gilgai areas are identified in the western section of the site and an intermittent lake is identified in the eastern section of the site. A railway line borders the site on the eastern boundary.

The 2006 aerial photograph depicts the majority of the investigation area as agricultural with the abattoir building located in the southern section of the site. Access roads and parking are located to the south of the abattoir buildings. Two dwellings are located south west of the abattoir. The waste storage dams can be identified to the north of the abattoir and appear to be dry. A small hay shed is located west of the waste storage dams. Six dams are located throughout the site. Twelve paddocks can be identified over the site. One paddock contains native tree plantings. The remainder of the paddocks appear to be used for agricultural cropping and grazing. Scattered trees are located in the northern section of the site and south of the abattoir building. A railway line borders the east boundary of the site. The surrounding land appears to be commercial, residential or agricultural.

The 2009 aerial photograph depicts an area of gilgais in the north western section of the site and drainage lines can be observed in the eastern section of the site. No other new features are identifiable in the 2009 aerial photograph.

The 2010 aerial photograph shows the freezer section has been demolished and building debris is located in the former quarry. No other new features are identifiable in the 2010 aerial photograph.

Inspection of the investigation area in February 2013 identified the south eastern area of the site as a former abattoir. The site began operating as an abattoir in 1968 and ceased operation in 2001. The abattoir infrastructure included stock yards, killing rooms, chiller rooms, boning rooms, freezers, skin sheds, workshops, a chemical store, an aboveground storage tank and various offices and amenities. Access roads and car parking are located south of the abattoir. The former administration office is currently used as a residential dwelling. Since operation ceased the freezers have been demolished and building debris is stockpiled in the former quarry and the AST has been removed.

Inspection of the investigation area in February 2013 identified a majority of the remaining site used for agricultural purposes. Five turkey nest dams are located north west of the abattoir and were used to store wastewater from the abattoir. Wastewater was used to irrigate the site. A small hay shed is south west of the wastewater dams. Two residential fibro dwellings are located in the south western section of the site. A former quarry is located north of the former abattoir. Former mining areas were observed east and north of the wastewater storage dams. Six dams are located over the site. A native tree planting was identified in one paddock. Three monitoring wells were located in the eastern section of the site. A former landfill was identified on the north east boundary in an adjacent lot. Scattered trees were located in the northern section of the site. Drainage lines could be observed in the eastern section of the site.

4.6 Buildings and infrastructure

Infrastructure on the site includes six agricultural dams, five turkey nest dams used to store wastewater from the abattoir, a former quarry, a hay shed, two fibro houses and the former abattoir building and auxiliary buildings. The site is fenced. Infrastructure related to the abattoir is listed in Table 1.

Table 1. Description of infrastructure

Building number (Figure 5)	Use	Construction material	Comments
1	Stock yards	Concrete flooring with steel fencing	Stockyards were used to store cattle, sheep, pigs and goats.
2	Administration office	Brick with tiled roof	The building was not accessed.
3	Workshop	Concrete flooring, wooden frame and galvanised iron sheeting	The building is an enclosed iron shed with concrete floor. It had been utilised as a mechanical workshop.
4	Boiler room	Concrete flooring and brick walls	Insulation on pipes and cement sheeting is suspected of containing asbestos.
5	Killing room	Concrete flooring, brick and fibro walls	Insulation on pipes and cement sheeting is suspected of containing asbestos.
6	Chillers	Concrete flooring, galvanised iron, brick and fibro walls	Nil
7	Boning room	Concrete flooring, brick and fibro walls	Insulation on pipes and cement sheeting is suspected of containing asbestos.
8	Freezers	Concrete flooring	The freezer section has been demolished prior to the inspection date.
9	Offices / Amenities / Canteen	Concrete flooring, vinyl tiles, fibro and brick walls	The cement sheeting and mouldings were suspected of containing asbestos in the first aid room, washrooms, canteen, offices and amenities.
10	Chemical store	Concrete flooring, steel frame and tin sheeting	Used for the storage of meat hook cleaner and phosphoric acid.

11	Aboveground storage tank	Steel tank with brick and concrete bund	The tank was removed prior to investigation. The AST was situated in a brick and concrete bunded area.
12	Skin sheds	Steel frame and galvanised iron sheeting	Used for the storage and treatment of skins. The sheds were not accessed.

4.7 Potential contaminants

Based on historical activities and site inspection the contaminants of concern are listed in Table 2.

Table 2. Potential contaminants

Source	Description	Contaminants
Effluent waste	Wastewater sludge	Heavy metals, pathogens, nitrogen, phosphorus, salinity
Skin processing	Preservatives used to treat skins	Arsenic, chromium
Agricultural activities	Pesticides, herbicides, potential fill, fertiliser, irrigation pipes	Heavy metals, organochlorine pesticides (OCP), asbestos (bonded)
Fuels and machinery at plant	Hydrocarbons	Total petroleum hydrocarbons TPH(C6-C36)
Landfill	A former landfill is located in an adjacent lot with the potential for runoff to impact on-site.	Heavy metals, OCP, organophosphate pesticides (OPP), TPH(C6-C36), pH
Mining	Leachate runoff	Heavy metals
Quarry	Building debris	Heavy metals, asbestos
Transformer	Oils	TPH(C10-C36), polychlorinated biphenyls (PCB)
Building material	Insulation in piping Cement sheeting in building construction	Asbestos (friable) Asbestos (bonded)

4.8 Relevant complaint history

None known

4.9 Contaminated site register

The site is not listed on the NSW OEH register of contaminated sites.

4.10 Historical use of adjacent land

- North – Agricultural, former landfill north east
- East – Stockinbingal – Parkes railway line, commercial
- South – Agricultural, commercial
- West – Agricultural, residential

Neighbouring land-uses have the potential to impact on the contamination status of the site.

4.11 Integrity assessment

The information obtained is accurate as the review records have allowed. The information available is considered sufficient for the purpose of the assessment and believed to be correct by the investigator.

5. Site conditions and environment

5.1 Surface cover

Native trees and grassland cover a majority of the agricultural areas of the site. The abattoir buildings and the surrounding areas are predominantly concrete. Gravel and bitumen driveways and car parks are located south of the abattoir building.

5.2 Topography

The site ranges from a mid-slope to a lower slope and drainage depression with an inclination 2-4%. The site has a predominantly north easterly to easterly aspect. A seasonal drainage line traverses the northern section of the site.

5.3 Soil and geology

The site is within the Parkes Soil Landscape (King 1998). The natural soil materials within the landscape are dark reddish brown sandy clay loam to loam topsoil with a clear change to dark reddish brown medium clay subsoil. The soil has a low to very low fertility and a high erosion hazard.

The site is underlain by the Cotton Formation, Burrandong Creek Member and Parkes Volcanics. Lithologies range from sedimentary sequences of siltstones, chert, conglomerates, sandstones and limestones to volcanic sandstones and intermediate volcanics (King 1998).

The 1:250,000 Forbes Geological Sheet indicates that the site is underlain by shallow slope colluvial plains and rises, some residual veneer; interfingers with inactive alluvial plains (Raymond *et al.* 2000).

No erosion was observed on the site.

5.4 Hydrology

5.4.1 Surface water

Surface water flows into several intermittent drainage lines and dams located on the site. The drainage lines flow east into Lake Forbes. Lake Forbes is located approximately 300m east of the site. Lake Forbes is a highly disturbed constructed ecosystem.

5.4.2 Groundwater

The Australian Natural Resources Atlas identifies the site within the Unincorporated Area – Lachlan Fold Belt Province Groundwater Management Unit. The management unit has an area of 238,277km^2 with approximately 47,000 ML consumed per year. Salinity levels are variable ranging from less than 1,000µg/L to greater than 20,000µg/L. Groundwater is located in fractured rock aquifers with variable yield potential. These factors have limited the use of groundwater to stock purposes with some domestic use.

A search of the NSW Natural Resource Atlas located 2 bores within 1km of the site. These bores are licensed for domestic, irrigation and stock use. The bores have depths of 18.3m and 46m, water bearing zones from 15.8m in slate and standing water levels at time of drilling from 6.1m (Table 3).

Monitoring wells were identified on-site on the day of inspection. No well details were available.

Table 3. Registered bores within 1 km of the site

Well	Date constructed	Distance and direction from site	Depth (m)	SWL (m)	WBZ (m)	Intended purpose
GW026828	01/03/1967	0.9km west	18.30	6.10	15.80	Irrigation / stock
GW702740	26/10/2005	0.58km south east	46	-	-	Domestic

5.5 Evidence of contamination checklist

Site layout showing industrial processes	Nil
Sewer and service plans	None known
Manufacturing processes	None known
Underground and above ground tanks	Above ground fuel storage tank previously located on the site has been removed.
Product spills and loss history	None known
Discharges to land, water and air	None known
Disposal locations, presence of drums, wastes and fill materials	Dams on-site were used to store waste water prior to irrigation.
Surface staining	Areas of staining were observed surrounding the former AST
Visible signs of plant stress, bare areas	Bare areas and plant stress observed associated with salinity.
Odours	None identified
Ruins	The former abattoir building is located on-site. The building has been partially demolished. Asbestos cement fragments are scattered around the building areas from damaged walls and ceilings.
Other	Nil

6. Review of previous investigations and summary of results

6.1 Hassall and Associates Pty Ltd (1997) *Assessment of Soil Suitability for Storage Ponds and Options for Salt Management during Irrigation.*

An assessment was conducted to determine the suitability of soil for proposed water storage ponds. The assessment involved the inspection of excavation pits west of the current storage system. No evidence of soil contamination was recorded from the excavation pit borelogs.

6.2 Hassall and Associates Pty Ltd (1998) *Lachley Meats Effluent Reuse – Soil Monitoring Report.*

A soil monitoring survey was conducted to establish base line information regarding the irrigation of effluent water over the site. Five areas were selected across the site for sampling and analysis of pH, salinity, nutrients and exchangeable cations.

Sites one and two had received considerable irrigated effluent for more than 5 years and little nutrient removal. Water logging occurred in several areas across the paddock containing site two. Site three received casual irrigation for five years. Site four had reportedly received no significant irrigation. Site five was selected outside the influence of the effluent as a baseline control.

Table 4. Analytical results – irrigated soil and non-irrigated soil

Location	Depth (cm)	pH	Salinity ($EC_{1:5}$)	Total N (%)	Total P (mg/kg)	Sodium (mol p⁺/kg)	Sodium (%)
Site 1	0-15	6.0	0.2	0.13	500	0.80	8.4
	15-60	6.7	0.2	0.05	140	0.89	8.4
	60-100	7.2	0.4	0.05	64	1.9	44
Site 2	0-15	6.1	0.07	0.16	1000	0.9	7.7
	15-60	7.4	0.13	0.04	98	1.6	9.2
	60-100	8.9	0.4	0.03	82	4.0	17
Site 3	0-15	7.0	0.1	0.07	164	1.4	10
	15-60	7.8	0.3	0.04	83	2.7	18
	60-100	8.2	0.6	0.04	58	3.5	14
Site 4	0-15	5.8	0.2	0.17	771	0.2	2
	15-60	7.8	0.2	0.11	521	1.7	8.6
	60-100	8.3	0.7	0.03	144	6.3	29
Site 5	0-15	5.8	0.06	0.07	180	0.2	2.8
	15-60	7.8	0.1	0.05	47	1.1	5.3
	60-100	8.0	0.3	0.03	49	1.2	3.7

Analysis indicates that pH and salinity increase with depth for soils within the locality. Sites irrigated with the effluent water had higher levels of total nitrogen, total phosphorus and sodium (Table 4).

6.3 Barnson (2001) *Geotechnical Investigation Proposed Effluent Dam, Lachley Meats, Forbes.*

A geotechnical investigation was conducted to determine the sub-surface characteristics of the soil for the proposed water storage dam. Ten backhoe pits were constructed and no evidence of soil contamination was recorded in the excavation pit borelogs.

6.4 Sustainable Soils Management (2001) *Preliminary Assessment of Suitability of Soil at Lachley Meats for Irrigation with Abattoir Effluent.*

An assessment was undertaken to determine the suitability of the soil on-site for irrigation of effluent water. Application of effluent over the site is leading to an increase in phosphorus at some sites. Two areas which had no effluent water previously applied were selected for sampling and analysis of pH, salinity, nutrients and exchangeable cations.

Table 5. Analytical results – non-irrigated soil

Location	Depth	pH	Salinity ($EC_{1:5}$)	Total N (%)	Total P (mg/kg)	CEC (mol p⁺/kg)
Site 1	0-15	7.5	0.045	0.091	180	12.3
	20-120	9.2	0.74	0.04	150	32.4
Site 2	0-15	6.3	0.027	0.086	300	7.8
	15-50	7.4	0.06	0.044	130	18.2
	50-120	9.4	0.3	0.032	110	29.1

6.5 Lachley Meats Pty Ltd (2002 approx.) *Design and Management of Off-site Effluent Irrigation.*

The nutrient and organic load concentrations for the effluent produced by the abattoir were determined from the average figure from four effluent samples (Table 6). Analysis was conducted as part of the EPA monitoring requirements at Lachley Meats.

Table 6. Effluent wastewater – average characteristics

Analyte	Average concentrations (mg/L)
BOD	383
Nitrogen	184
Phosphorus	31.4
Potassium	56.7
Calcium	42.2
Magnesium	28.6
Sodium	168
Chlorine	84
EC (µs/cm)	2410 (approx. 1500 mg/L TDS)
SAR	4.88
pH	7.9
TSS	61

7. Results

An inspection of the site was made on 1 February 2013. A desktop study was undertaken and information collected on site history.

The effluent analysis in 2002 indicates high levels of nitrogen, phosphorus, potassium and sodium. The pH of the effluent water is high and has not resulted in acidification of the soil in irrigated areas. Levels of chlorine indicate the effluent water was disinfected prior to irrigation.

Field sampling results obtained indicate nitrogen not accumulating. Reaction trend (pH) is in the desirable range. Phosphorus and sodium levels in the soil samples are in the high range.

No information is available on the processing of skins. Sheds have been marked as skin processing and potential exists for the use of arsenic and chromium as preservatives.

Leaching and runoff may have occurred for the old landfill located to the north of the site. The leachates may have entered the nearby drainage depression which traverses the site.

Mining occurred on the site in the late 1800's. Spoil from mine workings cover several areas on the site.

Asbestos cement sheeting located in the buildings has been damaged and fragments are present around the building areas at many locations. The insulation around the pipes also has local areas of damage. Asbestos cement was not identified in areas away from the buildings.

The areas of potential contamination are listed below.

Source	Description	Contaminants
Effluent waste	Wastewater sludge. Effluent was treated in dam areas and irrigated over agricultural areas of the site.	Metals, pathogens Nitrogen, phosphorus, pH are not considered contaminants of concern from review of records
Skin processing	Preservatives used in the treatment of skins.	Arsenic, chromium
Agricultural activities	Pesticides, herbicides, potential fill, fertiliser.	Heavy metals, OCP
Fuels and machinery	Hydrocarbons and oils from leakages and spills. A large area of staining was identified near the former AST.	TPH(C6-C36)
Landfill	A former landfill is located in an adjacent lot with the potential for runoff to impact on-site.	Heavy metals, OCP, OPP, TPH(C6-C36), pH
Mining	Leachate runoff	Heavy metals
Quarry	Building debris from the demolished freezer is located in the quarry.	Heavy metals, asbestos
Transformer	Oils from leakages in the transformer.	TPH(C10-C36), PCB
Building material	Asbestos in cement sheeting was identified throughout the abattoir building. Insulation around pipes.	Asbestos (bonded) Asbestos (friable)

8. Recommendations

The following sampling regime is recommended to investigate the potential areas of contamination.

Location	Potential contaminants	Sampling locations	Substrate	Analytes
Skin sheds	Metals	4	Soil	As, Cr
Near AST	Hydrocarbons	2	Soil	TPH(C6-C36)
Transformer	Hydrocarbons	1	Soil	TPH(C10-C36), PCB
Quarry	Metals, hydrocarbons	1	Soil / Water	As, Cd, Cr, Cu, Ni, Pb, Zn, TPH(C6-C36)
Treatment and irrigation ponds	Metals, pathogens, nitrogen, phosphorus, EC	5	Soil / Water	As, Cd, Cr, Cu, Ni, Pb, Zn, *E. coli*, total coliforms, nitrogen, phosphorus, EC
Mining areas	Metals	4	Soil	As, Cd, Cr, Cu, Ni, Pb, Zn
Downslope of landfill	Heavy metals, pesticides, hydrocarbons	3	Soil	As, Cd, Cr, Cu, Ni, Pb, Zn, OCP, OPP, TPH(C6-C36)
Field areas	Metals, pesticides, EC	2 composites per paddock	Soil	As, Cd, Cr, Cu, Ni, Pb, Zn, OCP, EC
Farm dams	Metals, EC	6	Soil / Water	As, Cd, Cr, Cu, Ni, Pb, Zn, EC
Groundwater wells	Metals, pH, EC	3	Water	As, Cd, Cr, Cu, Ni, Pb, Zn, pH, EC

9. Report limitations and intellectual property

This report has been prepared for the use of the client to achieve the objectives given the clients requirements. The level of confidence of the conclusions reached is governed by the scope of the investigation and the availability and quality of existing data. Where limitations or uncertainties are known, they are identified in the report. No liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been predicted using the scope of the investigation and the information obtained.

The investigation identifies the actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists who then render an opinion about overall subsurface conditions, the nature and extent of the contamination, its likely impact on the proposed development and appropriate remediation measures. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, and no sub surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock or time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. It is thus import to understand the limitations of the investigation and recognise that we are not responsible for these limitations.

10. References

CMA (1980) *Forbes Topographic Map 1:50,000* (Central Mapping Authority of New South Wales, Bathurst)

King DP (1998) *Soil Landscapes of the Forbes 1:250 000 Sheet* (Department of Land and Water Conservation, Sydney)

Raymond OL, Duggan MB, Lyons P, Scott MM, Sherwin L, Wallace DA *et al.* (2000) *Forbes 1:250,000 Geological Sheet SI55-7.* (Geological Survey of New South Wales, Orange)

Figure 1. Site locality		
Lachley Abattoirs, Forbes NSW		
	Envirowest Consulting Pty Ltd	
Job: R13011c	Drawn by: JM	Date: 22/02/2013

Legend

- Lot Boundary
- Drainage line
- Tree plantings
- Tracks
- Dam
- Railway
- Fence
- Monitoring well

Approximate Scale 1: 11,000

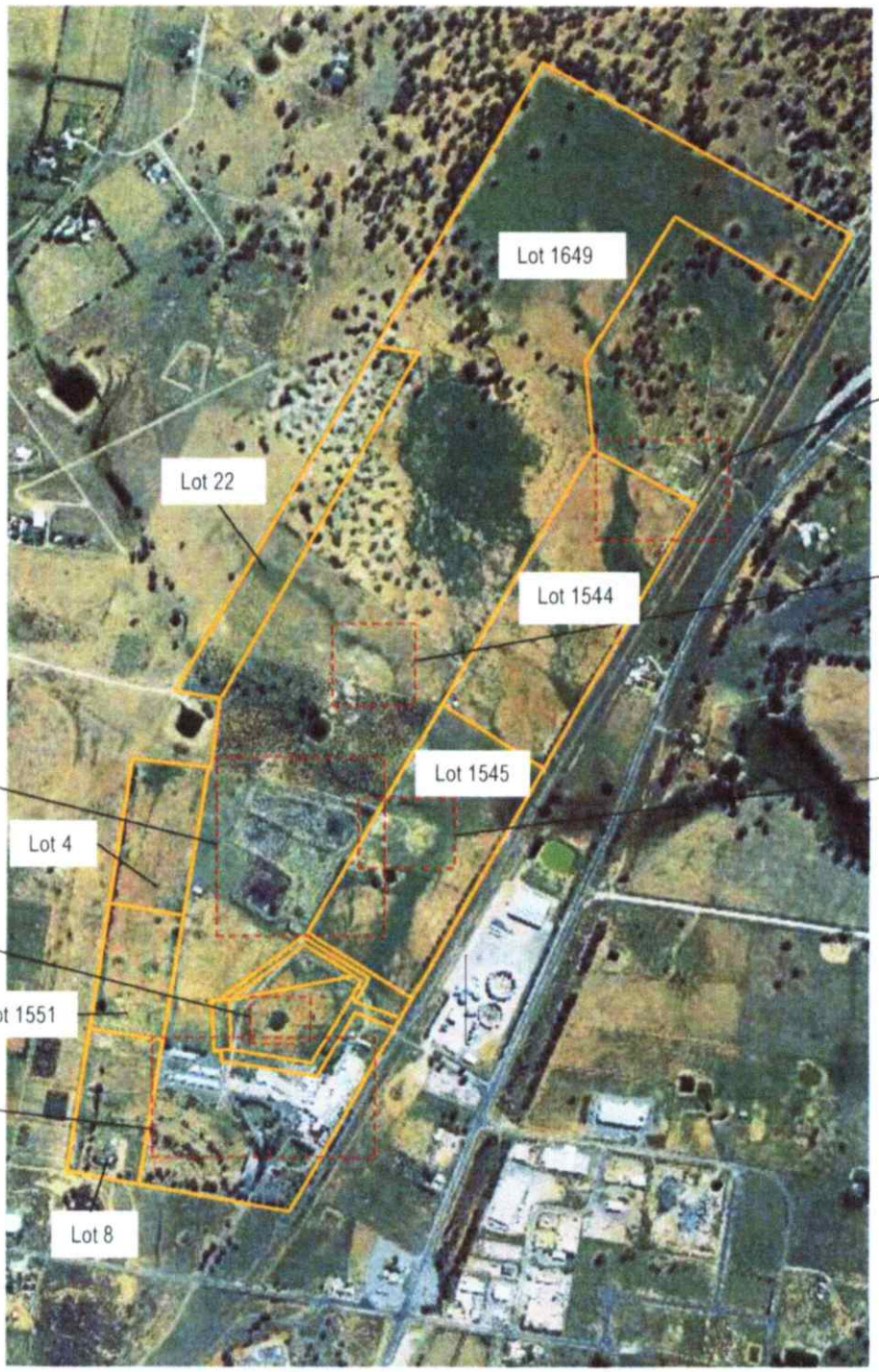
0 110 220 440m

Figure 2. Site layout

Lachley Abattoirs, Forbes NSW

Envirowest Consulting Pty Ltd

Job: R13011c	Drawn by: JM	Date: 22/02/2013



Approximate Scale 1: 14,300

0 143 286 572m

Legend

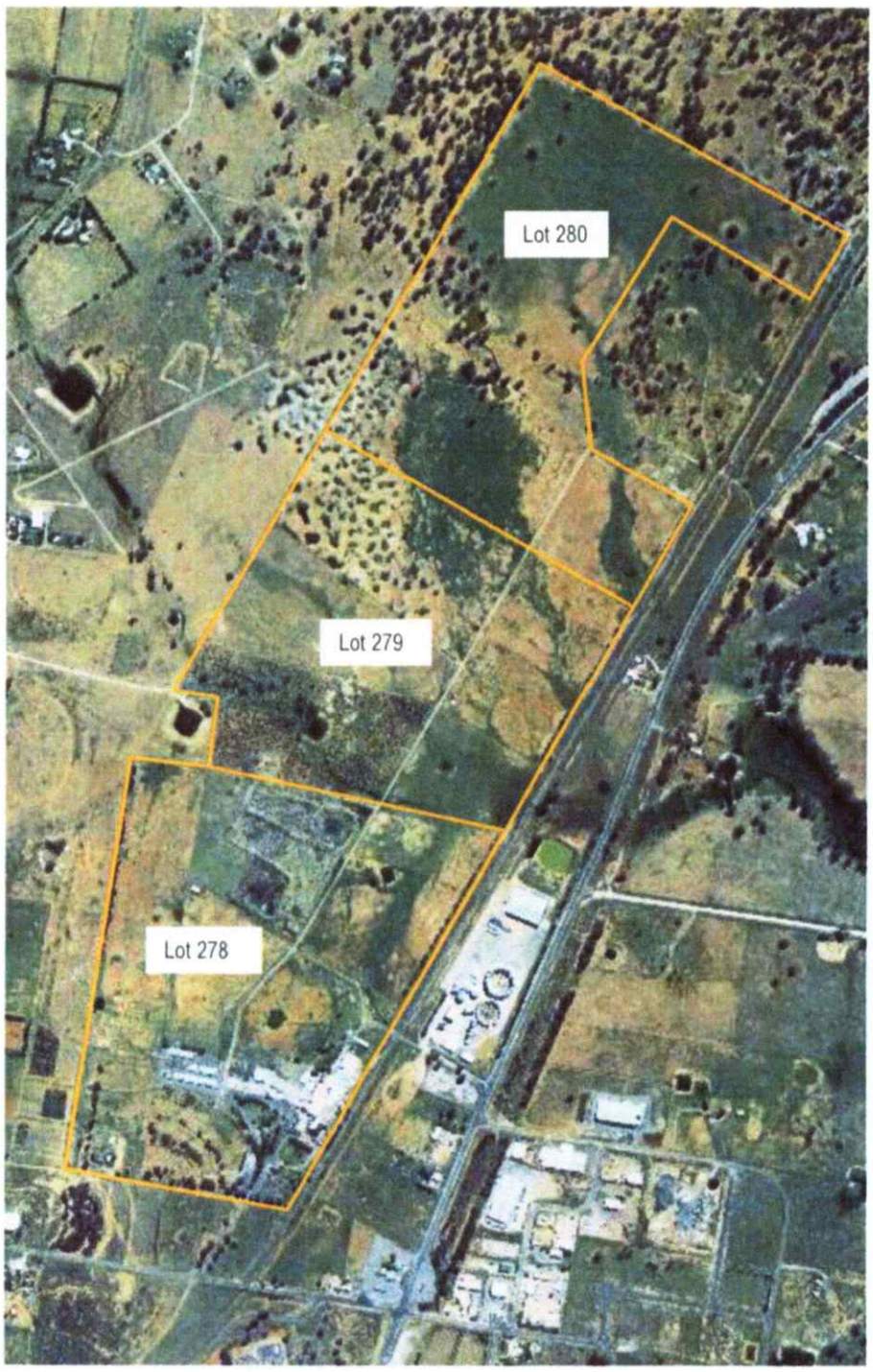
Lot boundary

Figure 3. Aerial photograph and potential areas of contamination

Lachley Abattoirs, Forbes NSW

Envirowest Consulting Pty Ltd

Job R13011c	Drawn by: JM	Date: 22/02/2013



Approximate Scale 1: 14,300

0 143 286 572m

Legend

Proposed lot boundary

Figure 4. Aerial photograph and proposed lot layout

Lachley Abattoirs, Forbes NSW

Envirowest Consulting Pty Ltd

Job R13011c	Drawn by: JM	Date: 14/03/2013

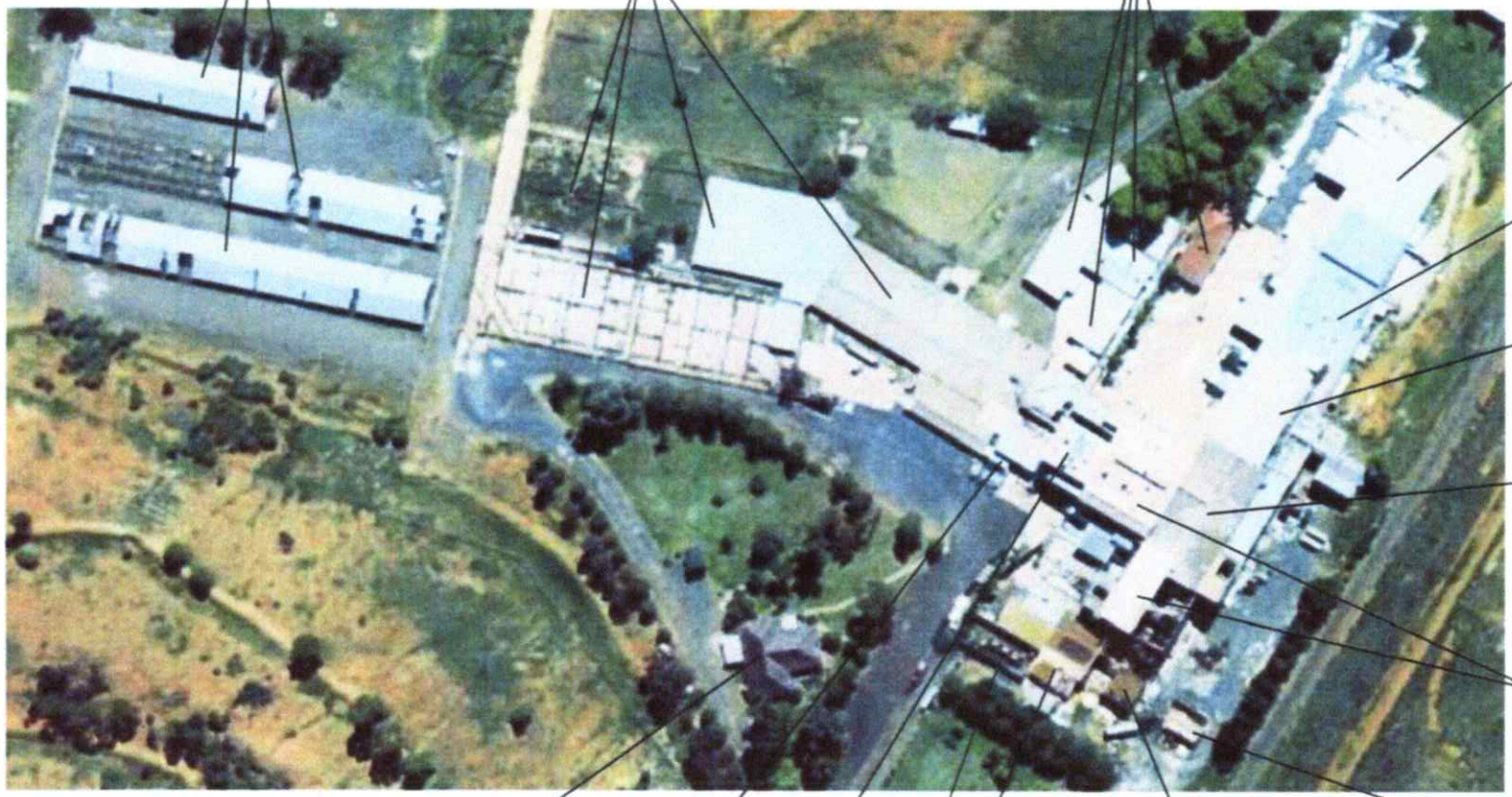


Figure 5. Aerial photograph – abattoir infrastructure

Lachley Abattoirs, Forbes NSW

Envirowest Consulting Pty Ltd

Job R13011c	Drawn by: JM	Date: 7/03/2013

North

Wastewater treatment, irrigation and storage dams

Approximate Scale 1: 2,300

0 23 46 92m

Figure 6. Aerial photograph – wastewater storage dams		
Lachley Abattoirs, Forbes NSW		
	Envirowest Consulting Pty Ltd	
Job R13011c	Drawn by: JM	Date: 7/03/2013

North

Mining spoil

Approximate Scale 1: 1,300

0 13 26 52m

Figure 7. Aerial photograph – former mining area		
Lachley Abattoirs, Forbes NSW		
	Envirowest Consulting Pty Ltd	
Job R13011c	Drawn by: JM	Date: 7/03/2013

North

Mining spoil

Approximate Scale 1: 900

0 9 18 36m

Figure 8. Aerial photograph – former mining area		
Lachley Abattoirs, Forbes NSW		
	Envirowest Consulting Pty Ltd	
Job R13011c	Drawn by: JM	Date: 7/03/2013

North

Former landfill

Legend

Lot boundary

Drainage line

Approximate Scale 1: 2,000

0 20 40 60m

Figure 9. Aerial photograph – former landfill

Lachley Abattoirs, Forbes NSW

Envirowest Consulting Pty Ltd

Job R13011c	Drawn by: JM	Date: 7/03/2013

North

Former quarry

Approximate Scale 1: 600

0 6 12 24m

Figure 10. Aerial photograph – former quarry		
Lachley Abattoirs, Forbes NSW		
	Envirowest Consulting Pty Ltd	
Job R13011c	Drawn by: JM	Date: 7/03/2013

Figure 11. Photographs of the site

Photograph looking north west over former AST bunded area

Photograph of staining near the former AST

Photograph looking west over skin sheds

Photograph looking north over agricultural area and wastewater storage dams

Photograph looking east over former quarry

Photograph looking north west over area of salinity

APPENDIX 9 SAMPLE QA/QC

Item	Comments	Compliance
Details of Sampling Team	The sampling works were conducted by: • Noellie Bourdoiseau *BPCN AssEnBi* • Mark Austin *BSc Honours* • Damien Johnson *BAppSci*	Yes
Sampling Locations and Numbers	Due to the sites area, a targeted sampling plan was selected for the assessment. This sampling regime was not in accordance with the *Contaminated Sites Sampling Design Guidelines (NSW EPA, 1995).* With a total of forty seven (53) primary samples obtained for contaminants of potential concern	No
Analytes of Concern	Samples were analysed for a suite of appropriate analytes based on the background information and previous analysis undertaken across the site	Yes
Instruments and Calibration	No instruments requiring calibration were used	Yes
Equipment Decontamination	Auger was washed down between samples to ensure that cross contamination did not occur Gloves were changed between obtaining each sample to ensure that cross contamination did not occur	Yes
Sample Preservation, Storage and Transport	Soil samples were placed into new laboratory supplied jars and/or bottles marked with appropriate identification and replaced in an esky with ice and ice bricks immediately after sampling. They were kept refrigerated in the office prior to dispatch to the laboratory. Samples were transported to Envirolab (Sydney) by overnight courier service to minimise transit time.	Yes
Field Duplicates & Triplicates	One duplicate was obtained for every twenty (20) samples obtained. One triplicate was obtained for every forty (40) samples.	No—two triplicates should have been obtained

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