NOVEMBER 2022

PLANNING PROPOSAL - 12-20 SHIRALEE ROAD, ORANGE NSW

CURRAJONG
PLANNING, PROPERTY + PROJECT MANAGEMENT

Appendix D

Preliminary Site Contamination Assessments

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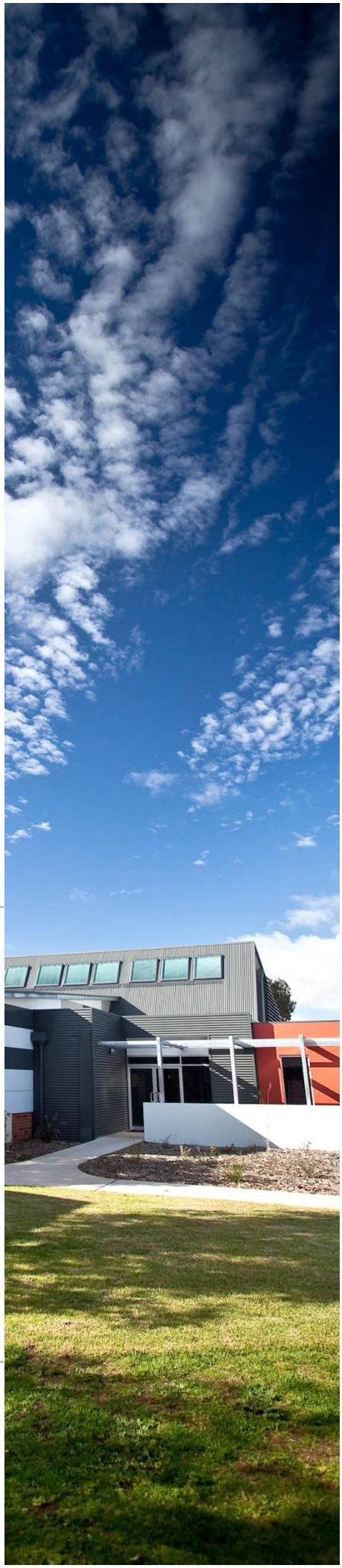

Preliminary Site Contamination Assessment

12 Shiralee Road, Orange

(Our Reference:33422 ER01)

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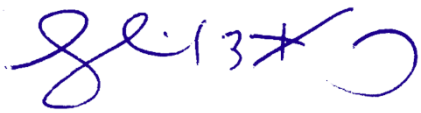
Client:	Orange Enterprises No. 1 Pty Ltd
Project No.	33422
Report Reference	33422 ER01
Date:	23/11/2021
Revision:	Final

Prepared by:	**Reviewed by:**
	
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33422-ER00	Original report issued	15/6/2020
33422-ER01	Re-issue of report to new owner of property	23/11/2021

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1.0 INTRODUCTION

1.1 Background

Barnson was engaged by Peter Basha Planning & Development (Pty) Ltd. to undertake site contamination investigations in support of a Development Application for a residential subdivision of a site located at 12 Shiralee Road, Orange NSW (Subject Site).

In terms of State Environmental Planning Policy 55 (SEPP 55 – Remediation of Land) a consent authority must determine if land is contaminated and, if so, whether it is suitable for the intended purpose or require remediation, when determining a development application.

The primary land use proposed for the subdivision development is residential and the focus of the site contamination assessment is to determine the suitability of the Subject Site for use as residential land.

The Subject Site was historically utilised for agricultural purposes including livestock farming and orcharding. In terms of SEPP 55, agricultural/horticultural activities are considered potentially contaminating uses. As a result of this, Barnson was requested to conduct a Preliminary Contamination Investigation of the Subject Site in support of the Development Application.

1.2 Objectives

The objectives of the investigation are:

- Identify contamination that may affect the site's suitability for development, and;
- Assess the need for possible further investigations, remediation or management of any contamination identified.

1.3 Scope of Work

To meet the objectives, Barnson completed the following scope of work:

- Site identification including a review of site history, site condition, surrounding environment, geology and hydrogeology.
- Desktop review of site history and assessment of potential sources of contamination.
- Development of a Conceptual Site Model (CSM) with information gathered from the data review and site inspection.
- Site inspection to assess site conditions.
- Collection of confirmatory soil samples and analysis to determine nature of possible contamination.
- Provide conclusions as to the suitability of the site for the intended future land use.
- Preparation of a report.

1.4 Purpose of this report

The purpose of this report is to document, with cognizance of the Guidelines for Consultants Reporting on Contaminated sites (NSW EPA, 2011), works undertaken, in accordance with the scope of works as described in Section 1.3, results of the desktop review and site inspection, and recommendations for further actions required to determine fitness of the site for use.

1.5 Assumptions and Limitations

The following assumptions have been made in preparing this report:

- The future use of the site will be for residential purposes. This assumption forms the basis for the Conceptual Site Model (Section 4).

- All information pertaining to the contamination status of the site has been obtained through public record searches, a preliminary site inspection and analysis of confirmatory samples collected at the Subject Site. All documents and information in relation to the Subject Site, which were obtained from public records, are accepted to be correct and has not been independently verified or checked.

It should be recognised that even the most comprehensive site assessments may fail to detect all contamination on a site. This is because contaminants may be present in areas that were not previously surveyed or sampled or may migrate to areas that showed no signs of contamination when sampled. Investigative works undertaken at the Subject Site by Barnson identified actual conditions only at those locations in which sampling and analysis were performed. Opinions regarding the conditions of the site have been expressed based on historical information and analytical data obtained and interpreted from previous assessments of the site. Barnson does not take responsibility for any consequences as a result of variations in site conditions.

2.0 SITE SETTING

2.1 Site Identification

A summary of the available information pertaining to the site is presented in Table 2.1. Figure 2.1 presents a map indicating the location of the Subject Site.

Table 2.1 – Site Setting Summary

Information	Details
Site address	12 Shiralee Road, Orange, NSW 2800
Site area	179,465 m^2
Lot and Deposited Plan No.	Lot 1 on DP630681 and Lot A on DP381933
Zoning	R1 – General Residential RE1 – Public Recreation R2 – Low Density Residential
Local Government Area	Orange City Council

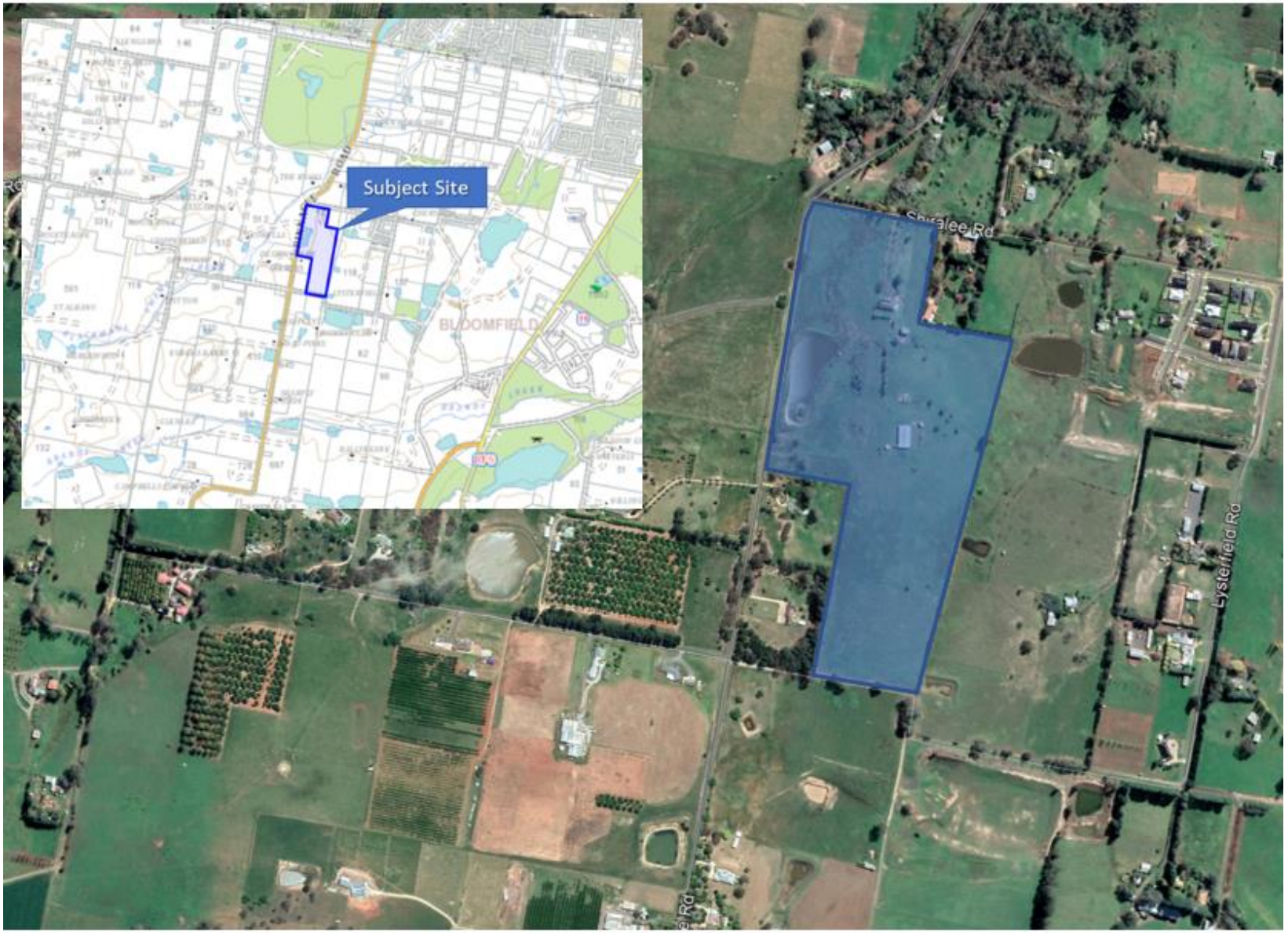

Figure 2.1 – Locality Map and Aerial Photo of Subject Site (highlighted in blue).
(Source: © 2020 Google / Image ©Maxar Technologies, Map Data © 2020)

2.2 Geology

Geologically, the main units underlaying the area south of Orange are the Mount Canobolas tertiary volcanic basalts, which are described as basalt flows which are separated by volcanic ash forming layers of clay and slate. A review of the Orange 1:100,000 Geology map (refer to Figure 2.2) shows the geology of the area where the Subject Site is situated as pyroxene olivine basalt, plagioclase basalt, alkali basalt, trachyBasalt, trackyandesite.

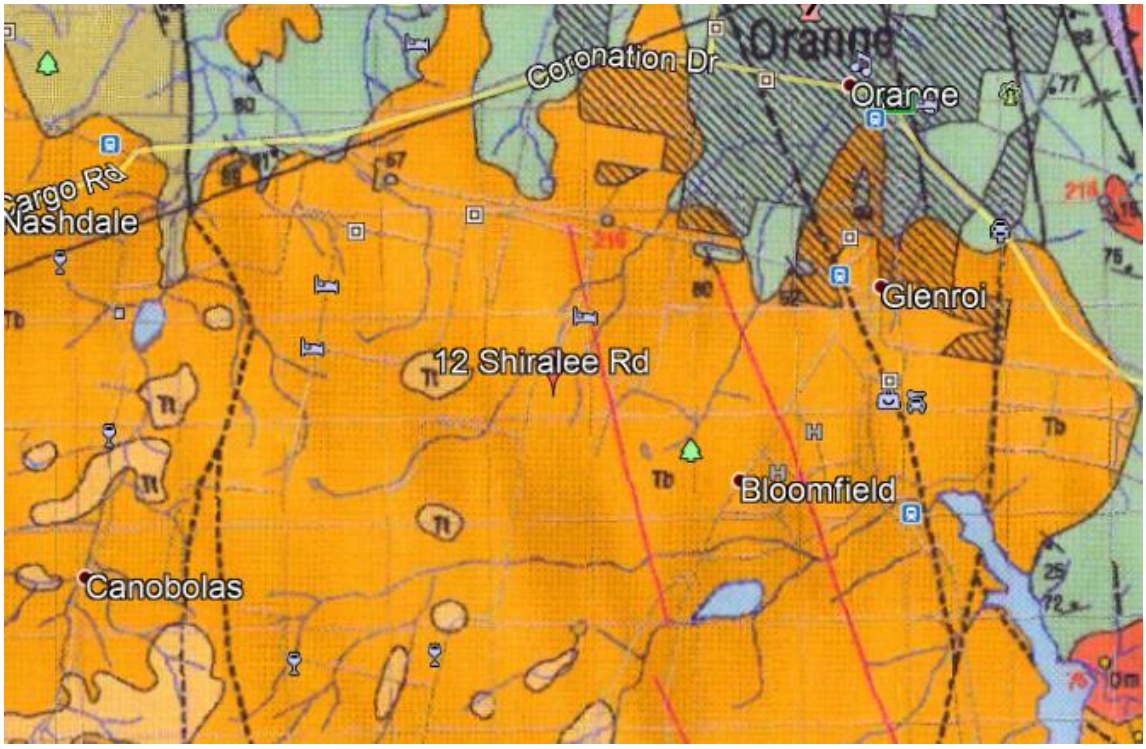

Figure 2.2 – Extract from the Orange 1:100,000 geology map showing the approximate location of the Subject Site

Surface geology of the Subject Site is described as recent colluvium deposits derived from these tertiary volcanics that consist of loam, clay loam and sandy loam soils with basalt 'floaters' (basalt and trachyte pebbles and cobbles) located on the crest and side-slopes of hills.

An examination of the Geological Survey of NSW maps of Naturally Occurring Asbestos (accessed on 13 May 2020), shows that the geological units underlaying the Subject Site does not have any potential for naturally occurring asbestos.

2.3 Topography and Drainage

Figure 2.3 presents topographical information overlain on a map of the Subject Site. The presented data shows that the site slopes gently from an elevated area near the centre of the toward the west and north-west at approximately 1.6°.

Precipitation runoff at the site will most likely seep into surface soils or move in a westerly direction along the natural topography.

The closest natural water body is the Blackmans Swamp Creek, which represent the main drainage for the area, located approximately 70m to the north-west of the Subject Site (see Figure 2.3).

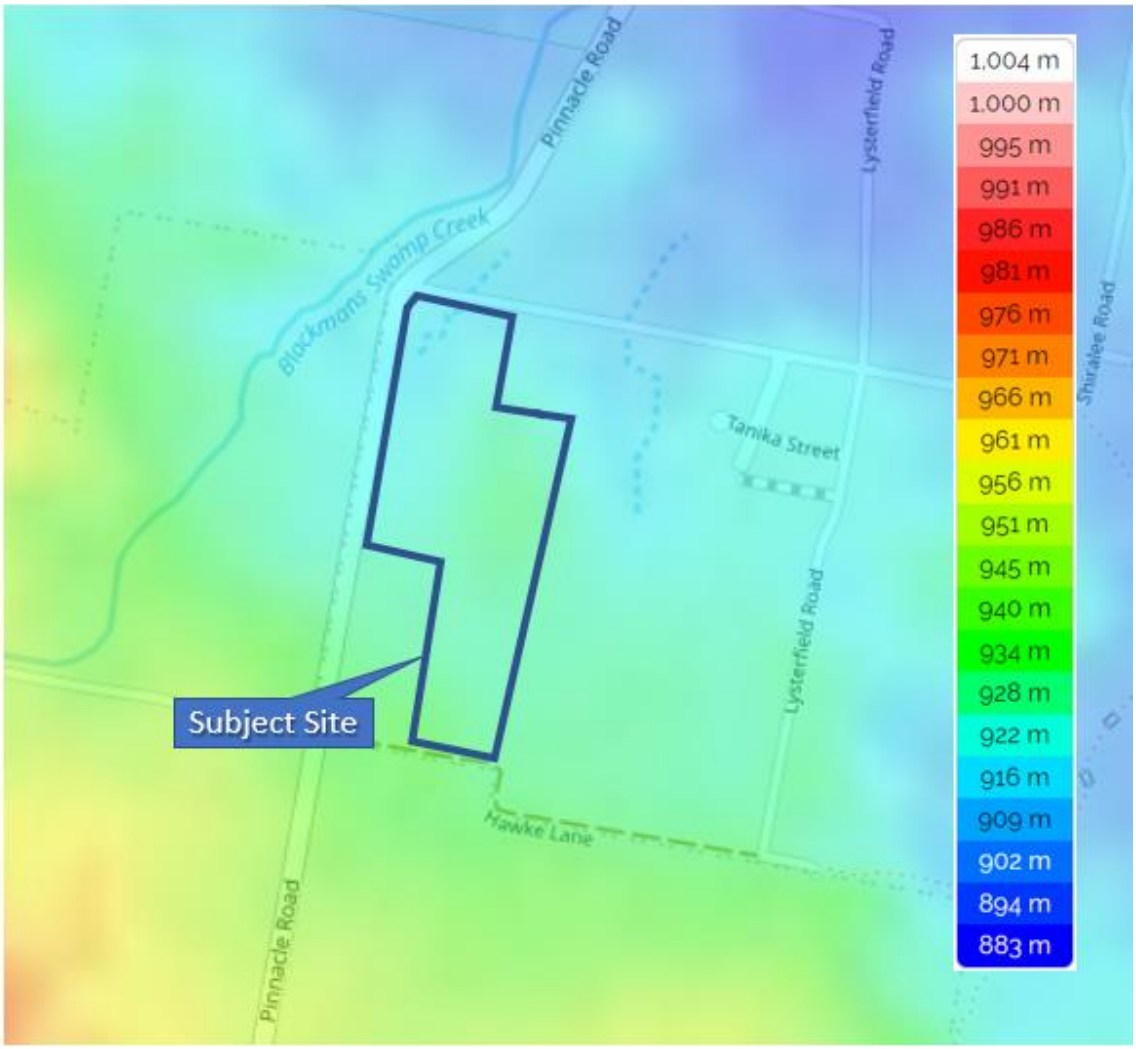

Figure 2.3 - Topography of the Subject Site

2.4 Soils

The subject site is mapped within the 'Spring Hill' soil landscape. In this landscape (see Figure 2.4), soils are described as Krasnozems, of which the topsoil are dark reddish-brown loam with weak to moderate fine crumb structure (pH 6.5) that gradually change dark reddish brown clay loam sub-soil with moderate fine crumb structure (pH 6.0) moving to light clay with strong subangular blocky structure (pH 5.5–6.0) at depth.

The soils of the Spring Hill landscape are described as of moderate to low chemical fertility with known use for orchards, dairying, improved pastures and plantations. While top-soils on hillcrests, slopes and in valleys have good water holding capacity, valley soils are poorly drained. In general, top-soils are considered moderately erodible but sub-soil erodibility is low.

Surface soils are not saline but are susceptible to structure degradation leading to decreased permeability, water holding and drainage. Soils of the Spring Hill landscape are *not* indicated as acid sulphate soils.

The Atlas of Australian Acid Sulfate Soil has the subject site in an area of 'low' probability of occurrence (a 6-7% chance of occurrence). According to the National Assessment dataset for dryland salinity, the subject site does not fall in an area with current risk of soil salinity.

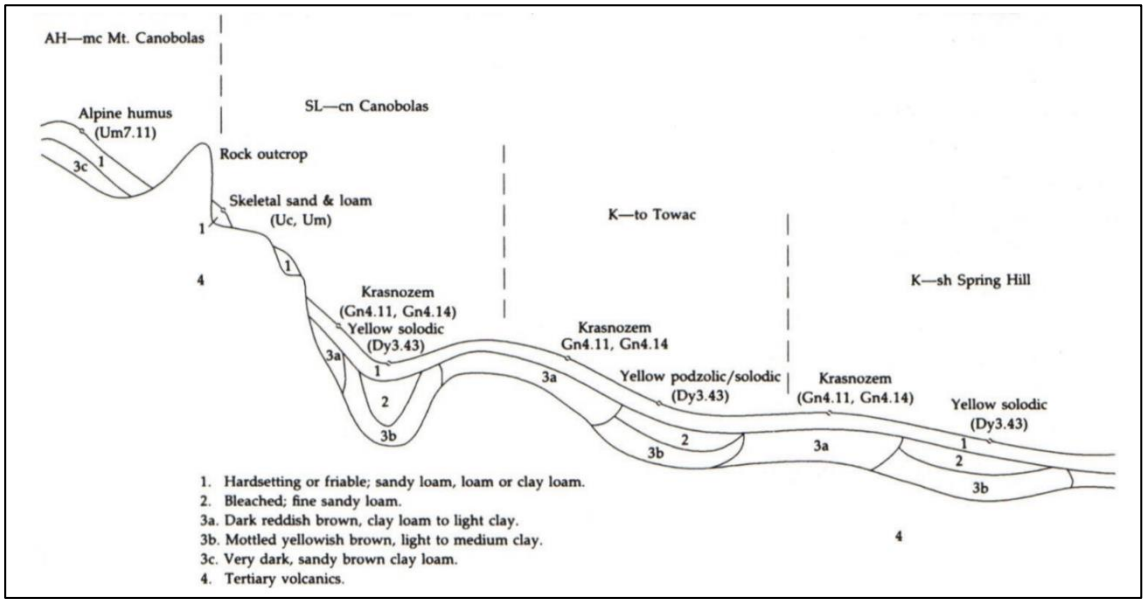

Figure 2.4 – Spring Hill soil landscape distribution diagram

2.5 Groundwater Resources

A review of existing groundwater bore records (WaterNSW, 2020) indicate 31 registered groundwater bores within 500m of the site. The information recorded in the database for these bores closest to the Subject Site indicate an average standing water level of between 6m and 13m (where reported) and average yields around 1 to 2L/s, but up to 18L/S is reported. The nearest identified groundwater bore is located on the adjoining property (Lot1//DP381932) to the north east of the Subject Site, at a distance of 32m. According to the database entry the bore is used for irrigation.

Information on the chemical quality of the groundwater (e.g. salinity) is recorded for some of the bores and indicates the water to be fresh of 'good' (0-500ppm salinity) with only the closest off-site bore indicated as having water with higher measured salinity. A complete list of registered boreholes in a radius of 2km around the project site is attached as Appendix A.

The subject site falls inside the area mapped as a groundwater vulnerable in the Orange City Council Local Environmental Plan (Orange LEP, 2011). Based on the lithology of the area, aquifers are unconfined with groundwater flow occurring vertically and laterally through fractures in bedrock. Minor lateral flow occurs through colluvial deposits on lower slopes, with moderate to high hydraulic conductivity and transmissivity. High runoff rates occur on steeper slopes.

Groundwater flow systems are local with short to medium flow lengths and loosely defined by topographic catchments. Groundwater residence time is short due to steep slopes leading to relatively fresh groundwater.

3.0 SITE HISTORY

3.1 Heritage

A review of historical information available for the site, including aerial photographs and land title records, was undertaken. A search of the Commonwealth Heritage List, National Heritage List and State Heritage Register – Curtilages, returned no results within the site or in a radius of 1,000 m from the site.

No items of state or national significance were identified. However, there are three items of historical significance listed in the Orange Local Environmental Plan, within 1,000m of the Subject Site. Table 3.1 present a list of items of historic significance, indicating distance and direction from the Site.

Table 3.1 – List of Heritage Items Identified in 300m Radius from the Subject Site

Map ID	Name	Significance	Distance	Direction
1	Colveath - Homestead & Buildings	Local	420m	East
2	Towac Park Racecourse (Timber grandstand, Pavilion, entry avenue)	Local	512m	North
3	Dwelling	Local	907m	North-east

Neither the Subject Site itself nor any of the existing buildings that occupies the Site were identified in any of the heritage databases consulted.

3.2 Historical Land Use

Historical aerial images from 1956, 1964, 1972, 1973, 1984, 1969, 1998, 2003 and 2019 were reviewed for this assessment. Results of the aerial photograph review are summarised below with the aerial photographs (as obtained from Lotsearch Pty Ltd) included in **Appendix B.**

Table 3.2 – Review of Historical Aerial Photographs

Details	Observations
1956	The Subject Site and surrounding areas are mostly undeveloped agricultural land. Clearings, tracks and a number of structures, possibly associated with stock farming activities, are visible near the centre of the Subject

Details	Observations
	Site. The rest of the Site looks to be uncultivated agricultural land, most likely used for grazing, if at all. An orchard is visible on the adjoining property north-east of the Subject Site as well as further orchards further to the north across Shiralee Road. The adjoining property south-west includes a sports oval. A small dam is visible in the watercourse near the western boundary of the Subject
1964 to 1973	Development on the subject site remains largely the same although most trees are cleared between 1964 and 1972, likely to increase quality of pasture grass. One building near the centre of the site is replaced with two large adjoining buildings, likely livestock sheds. On site the cleared land and multiple tracks are no longer clearly visible. Only access track from Pinnacle Road remains. Small on-site dam remains visible. To the north of the site the number of orchards increase and buildings are added to the adjoining lots north east and south west of the Subject Site. No discernible change in land use of the Subject Site.
1984	Dwelling house added to the northern portion of the site with access track from Shiralee Road. On site dam significantly larger. Site sub-divided into paddocks with fencing between paddocks clearly visible. Some change in land use in areas surrounding the subject site is observed with a reduction in the number of orchards to the north and replacement of sports oval to the south west with dwelling house.
1996 to 2003	An orchard is established along the north eastern boundary of the Subject Site. Land use on the rest of the Subject Site remains largely the same aside from one of the livestock sheds being demolished between 1996 and 1998. Although the orchard on the adjoining property north-east of the site is no longer there, land use in areas surrounding the subject site remains the same.
2019	Orchard trees on the Subject Site are no longer visible. No further development or changes to land use observed on the Subject Site or surrounding land.

3.3 Historical Record of Site Contamination

Datasets maintained by the Office of Environment and Heritage (OEH) including notices under CLM Act, POEO Environment Protection License Register and environmental incidents were reviewed.

- List of NSW contaminated sites notified to EPA – The sites appearing on the OEH "List of NSW contaminated sites notified to the EPA" indicate that the notifiers consider that the sites are contaminated and warrant reporting to EPA. However, the contamination may or may not be significant enough to warrant regulation by the EPA. The EPA needs to review information before it can make a determination as to whether the site warrants regulation. A search of the listing returned no record for the Subject Site and indicated no listings for any site within a radius of 1,000m of the Subject Site.
- Contaminated Land Record of Notices – A site will be on the Contaminated Land Record of Notices only if the EPA has issued a regulatory notice in relation to the site under the *Contaminated Land Management Act* 1997. A search of the register in May 2020 returned no record for the Subject Site and indicated no listings for any site within a radius of 1,000m of the Subject Site.

There is further no record of the Subject Site in any of the following databases:

- National Waste Management Site Database
- Former Gasworks database
- EPA PFAS Investigation Program
- Defence PFAS Investigation & Management Program
- Airservices Australia National PFAS Management Program
- Defence 3 Year Regional Contamination Investigation Program

3.4 Previous Site Investigations

No information relating to any previous assessment of contamination at the Subject Site were provided to Barnson for review.

4.0 SITE DESCRIPTION

4.1 Subject Site Layout

The Subject Site is currently occupied by a single residential dwelling located on a separately fenced portion (of approximately 6,900 m^2) in the central north of the Subject Site. A number of disused and partially demolished structures, evident of former intensive livestock or dairy farming, are located in the central part of the site. The remainder of the Subject Site is unoccupied with only fencing that separate the site into different paddocks present. Demolition

Figure 4.1 presents an aerial photograph of the Subject Site with the location and layout of notable features of the site indicated. Section 4.2 presents a discussion of the different features of the site, supplemented with information of the site history provided by the current owner.

Figure 4.1 – General site layout.

4.2 Site Features and Historical Notes

The current owner purchased the property in 2003 and has only utilised the property for livestock grazing and residential purposes (the existing dwelling). The dwelling house is currently being rented.

The Subject Site included a 2.5ha plum orchard (refer 2003 aerial photo, Appendix B), which was cleared by the current owner. The area where the plum orchard was located is highlighted in Figure 4.1.

The concrete walled building to the north of the livestock shed (indicated as Building 1 in Figure 4.1), was used by the current owner for storage of building supplies. Its original purpose is not clear and may be related to milking or other animal husbandry use such as slaughtering or meat processing. In 2016/2017 the roof from this building was removed and re-used at a nearby winery.

The concrete pens and pads visible to the east of the large livestock shed (see Figure 4.1) was demolished by the current owner. The demolition waste is stockpiled adjacent (east) to this cleared area. It is understood that the owner intends to sell the demolition waste as fill.

To the north of the stockpiled concrete there is a small, covered enclosure (marked as Building 2 in Figure 4.1) that possibly served as ablution facility to farm workers.

The on-site dam located on the western boundary of the Subject Site has been in the same location from at least 1956. The dam increased in size before 1984. The current owner indicated that water from the dam is used for stock and domestic purposes. The Subject Site has no sewer connection and the dwelling is serviced by a septic and soak-away system located to the west of the house.

The current owner indicated that the only recent instance of imported fill being used on the Subject Site involved material obtained from a spoil stockpile left on the property from excavations by Orange Council during works on Pinnacle Road. The fill was reportedly applied in various areas around the site.

4.3 Proposed Development

The proposed development at the Subject Site involves the subdivision of the site into residential lots of various sizes. The central portion of the Subject Site will remain public open space, in accordance with its current RE1 zoning.

The site is further expected to be upgraded with formalised paved access roads from Shiralee and Pinnacle Roads, with paved access to the lots.

Although the exact scope of the final development is not yet defined in detail, the proposed works will likely include the demolition and removal of all existing buildings from the Subject Site.

Figure 4.2 presents a map indicating the proposed subdivision of the site.

Figure 4.2 – Map of proposed subdivision of the Subject Site.

5.0 CONCEPTUAL SITE MODEL

5.1 General

The conceptual site model (CSM) is intended to provide an understanding of the potential for contamination and exposure to contaminants within the investigation areas. The CSM draws together the available historical information for the site, with site specific geological, hydrogeological and hydro-geochemical information to identify potential contaminants, contamination sources, migration and exposure pathways and sensitive receptors.

5.2 Sources

The identification of sources presented here is based on the review of available historical information and photographs, as well as an understanding of current conditions at the Subject Site. The following is a summary of the potentially contaminated areas and sources of contamination identified at the Subject Site:

- Former Orchard site

The 2.5ha portion of the site historically used as plum orchard, likely required the use of chemicals such as pesticides or fertilisers in the maintenance of the trees. Potential contaminants associated with orchards therefore include heavy metals (particularly arsenic), organochlorine and organophosphate pesticides. Intensive use of fertiliser can also lead to the build-up of heavy metals in surface soil particularly zinc and cadmium, depending on the type and source of the fertiliser.

- Historical farming activities.

The large livestock shed and associated buildings present in the centre of the Subject Site suggest historical intensive stock or dairy farming activities. Potential sources of contamination associated with these activities include the buildings and associated animal pens and yards, as well as the disposal of animal wastes. Activities associated with the management of animal health, including sheep or cattle dip or spraying for the control of parasites could further result in localised contamination. Potential contaminants include pesticides, hydrocarbons, heavy metals, asbestos (associated with buildings) and elevated nutrients. In addition, the former use of portions of the site for grazing purposes may be associated with the use of pesticides and herbicides.

- Use of unclassified fill material

Available information indicates various areas of small-scale land filling with material brought onto site may have occurred at the Subject Site. The materials used for the filling can be obtained from various sources and could potentially include excavated soil or demolition wastes. Consequently, a wide range of contaminants including heavy metals, hydrocarbons, and asbestos could be associated with the use of unclassified fill materials.

- Vehicles and equipment

Operation of farm often involves the use of motorised vehicles and equipment used for a variety of applications such as transport, earth moving or pumping water. The use, storage, maintenance and refuelling of the equipment and vehicles has the potential to contribute to localised contamination of surface soils.

- Storage of demolition waste

The Subject Site currently contains stockpiles of demolition waste and historical information indicates that areas of the site have been used for the storage of building materials, which could include demolition waste brought onto site from elsewhere. Demolition waste can include a variety of materials, most of which are inert (e.g. building rubble) and do not contain any substances of human or environmental health concern. However, depending on the source of the demolition waste, hazardous substances such as asbestos, lead and hazardous hydrocarbons may be present.

5.3 Contaminants of Potential Concern

Considering the potential sources relevant to the Subject Site, a wide variety of contaminants may be present. With the historical agricultural activities considered the primary potential source of contamination, the residues of agricultural chemicals such as pesticides and fertilisers are accepted as the most likely contaminants. Of interest here are chlorinated organic compounds which historically have been widely used as insecticides, fungicides, herbicides and soil fumigants in agriculture and which are stable enough in the environment (persistent) to remain in soil for extended periods of time. Inorganic compounds that contain heavy metal including arsenic, copper, lead and mercury were also historically used as pesticides, particularly in orchards. The use of fertiliser, although not commonly considered a source of soil contamination, potentially could lead to a build-up of heavy metals such as cadmium in soils in areas where it has been extensively applied. Some of these contaminants are also potentially relevant to the areas of the Subject Site used for grazing or where animals may have been treated for external parasites.

The potential presence of lead paint or asbestos containing materials (ACM) in fill brought onto site, as well as any demolition waste stored at Subject Site could have contributed to the dispersion of these substances onto the surface soil of the site, depending on how the wastes from these materials were managed. Fuels and lubricants are further potentially relevant to the on-site storage, maintenance or movement of vehicles and equipment in the operation of the farm.

Based on this understanding of the site history and activities, the contaminants of potential concern identified for the investigation of the Subject Site include:

- pesticides (organochlorines, organophosphates);
- hydrocarbons (mainly fuel and lubricants);
- heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn); and
- asbestos.

5.4 Pathways

The primary pathways by which receptors could be exposed to the contaminants outlined above include:

- Inhalation of dust or vapours.
- Dermal contact with contaminated soils.
- Incidental ingestion of contaminated soils.
- Surface runoff, sediment transport and discharge to surface waters.

- Vertical and horizontal migration of contamination through the soils into the underlying groundwater.

Of the listed potential pathways, the contamination of water resources through runoff and infiltration is considered the most unlikely. Although the subject site is located in a groundwater vulnerable zone (Orange LEP, 2011), the depth to groundwater at the site is estimated to be at least 6m. The slope of the site further would likely affect overland flow of water, with limited vertical migration of any contaminants which may be entering the subsoil from above expected.

5.5 Receptors

Potential receptors may include:

Human receptor populations

- Future students of the subdivided lots.
- Visitors to the site (e.g. workers conducting maintenance, members of the public).
- Workers involved in the construction of any future residential structures.

Environmental Receptors

- Local drainage channels and receiving surface water bodies (the on-site dam).
- Groundwater resources beneath the site (negligible likelihood of contamination expected)

5.6 Potential for Contamination

The Subject Site is not listed in any of the contaminated land databases. Based on the results of the desktop assessment, the overall likelihood for *significant* chemical contamination to be present within the site is low.

Although agricultural activities at the Subject Site is reasoned to have a potential for contaminating surface soils at the site, the type and quantity of contaminants introduced through this land use is not expected to have led to significant contamination of the surface soils.

Table 6.1 summarises the potential areas of environmental concern based on the results of the desktop review.

6.0 SITE INSPECTION

6.1 General

The objective of the investigation is to determine whether there are any environmental risks associated with the Subject Site that could affect the proposed development and would require further investigation or action to render the site suitable for its intended use. The desktop evaluation of the site history and current use of the site did not identify any significant risks in this regard but did identify a number of historical activities that could contribute to contamination of the surface soils of the Subject Site.

Table 6.1 - Potential areas of environmental concern

Description	Rationale	Potential Contaminants
Plum orchard.	Possible use of fertiliser, herbicides and insecticide means that the contaminants could accumulate and build up to significant concentrations in the underlaying soil.	Pesticides, heavy metals.
Historical farm buildings	The farm buildings and sheds are the most likely area where activities relating to the treatment of livestock for external parasites may have occurred. It is further the most likely area where such substances may have been stored. Contaminants associated with the materials used in the construction of the buildings and subsequent dispersion of these contaminants through the demolition or dilapidation of the buildings. Most likely area for the storage, maintenance or use of motorised equipment and vehicles.	heavy metals hydrocarbons (TPH, BTEX), pesticides, asbestos.
Areas used for management of livestock	The possible use of pesticides for the control of external parasites. Spillage or leakage of these chemicals stored in the area.	Pesticides, heavy metals.
Use of contaminated fill material	Hazardous materials present in fill material	Asbestos, lead, hydrocarbons.
Demolition waste storage	Hazardous materials present in demolition waste	Asbestos, lead, hydrocarbons.

Barnson conducted an inspection of the Subject Site on 13 May 2020. The purpose of the site inspection was to verify the findings of the desktop assessment, as well as to collect a number of confirmatory samples of soil from areas of the Subject Site where contamination is suspected.

Based on the findings of the CSM the inspection and sampling were focussed on the surface soils (0-200mm). The site inspection all areas of the site except the area immediately surrounding the existing dwelling.

During the site inspection the following observations were made.

- The site is fenced and the fence is in good order. Access to the site is possible from both Shiralee Road and Pinnacle Road but is controlled via locked gates.

- At the time Barnson conducted the site inspection, most of the Subject Site was covered with vegetation following recent seasonal rain. The surface of the site was only clearly visible in paved or compacted areas.
- The site was systematically walked over and all visible open ground, stockpiles and buildings, aside from the existing residential dwelling, was inspected.
- No visible discoloration or staining of open ground or soil, and no obvious discoloration or irregularities in the occurrence of vegetation was observed during the site inspection.
- A partially overgrown concrete pad and heap of broken concrete was discovered in the area to the south of the dwelling. The purpose of the structures in this area is not clear from historical photographs and there is no information available from the current or previous owner in this regard.

Figure 6.1 – Concrete pad and broken concrete south of existing dwelling.

- Several small stockpiles of soil, consisting of hard-set clay and fine gravel is located along the drainage channel both north and south of the on-site dam (see Figure 6.2). These stockpiles are presumed to be from de-silting excavations in the drainage channel.
- No general waste or any clear signs of any recent disposal of waste or disturbance of the site or soils at the site was observed during the inspection. A number of overgrown piles of demolition waste as well as fence posts and bundles of old fencing wire was observed in several areas (see Figure 6.3). It is accepted that the materials all originated from activities at the Subject Site and were not brought in from elsewhere. All demolition waste piles were visually inspected for asbestos containing materials (ACM). No ACM was observed in any of the stockpiles.

Figure 6.2- Mounds of soil visible near the on-site drainage channel.

Figure 6.3-Examples of demolition rubble stockpiles on site.

- The structure identified as Building 2 in Figure 4.1 includes fibre cement sheeting material as part of its construction. Figure 6.4 show a section of the structure where fibre cement sheeting is visible.
- A number of engines and engine parts are stored in the north west corner of the livestock shed (see Figure 4.1 for location of shed). The shed has a compacted dirt floor. Refer also to Figure 6.5.

Figure 6.4- Fibre-cement sheeting observed in structure at the Subject Site.

Figure 6.5-Engines stored in the livestock shed.

6.2 Confirmatory Sampling

The purpose of collecting confirmatory samples as part of the preliminary site inspection is to determine if any of the potential contaminants identified from the CSM are present. The samples are not intended for statistically valid characterisation or quantification of contamination levels. The collection of surface soil samples at the Subject Site was therefore focussed on areas where contamination of the surface soil could most likely have occurred.

Figure 6.6 presents a map of the Subject Site with the locations of the surface soil samples indicated. Table 6.2 is a summary of the collected samples indicating which samples were included in composites for analysis.

Table 6.2 – Summary of sample details.

Sample ID	Description
01a - 01c	Three samples of surface soil (0-200mm) samples from orchard area. Included in composite sample BPSA-01 for analysis.
02a - 02c	Three samples of surface soil (0-200mm) samples from orchard area. Included in composite sample BPSA-02 for analysis.
03a - 03c	Three samples of surface soil (0-200mm) samples from orchard area. Included in composite sample BPSA-03 for analysis.
04a - 04c	Three samples of surface soil (0-200mm) from area north of dwelling where concrete pad and demolition waste was observed. Included in composite sample BPSA-04 for analysis.
05	Surface soil sample collected north of Building 1
06	Surface soil from demolished concrete pens and pads area.
07	Surface soil sample from engine storage area inside livestock shed.
08	Sample of excavated material south of on-site dam.
09	Sample of fill from stockpile west of on-site dam
10	Fibre-cement fragment collected from Building 2.

The surface soil samples were collected in glass jars, supplied by the laboratory. In addition to the soil samples, one sample of fibre cement was collected in order to determine whether the fibres present in the cement are asbestos.

The pattern followed for the soil sampling can be described as Judgement Sampling, where points are selected on the basis of the investigator's knowledge of the probable distribution of contaminants at a site. It is an efficient sampling method for confirmatory sampling, which utilises knowledge of the site history and field observations to direct sample collection (NSW EPA, 1995).

All discrete and composite surface soil samples and the sample of fibre-cement were submitted for chemical analysis.

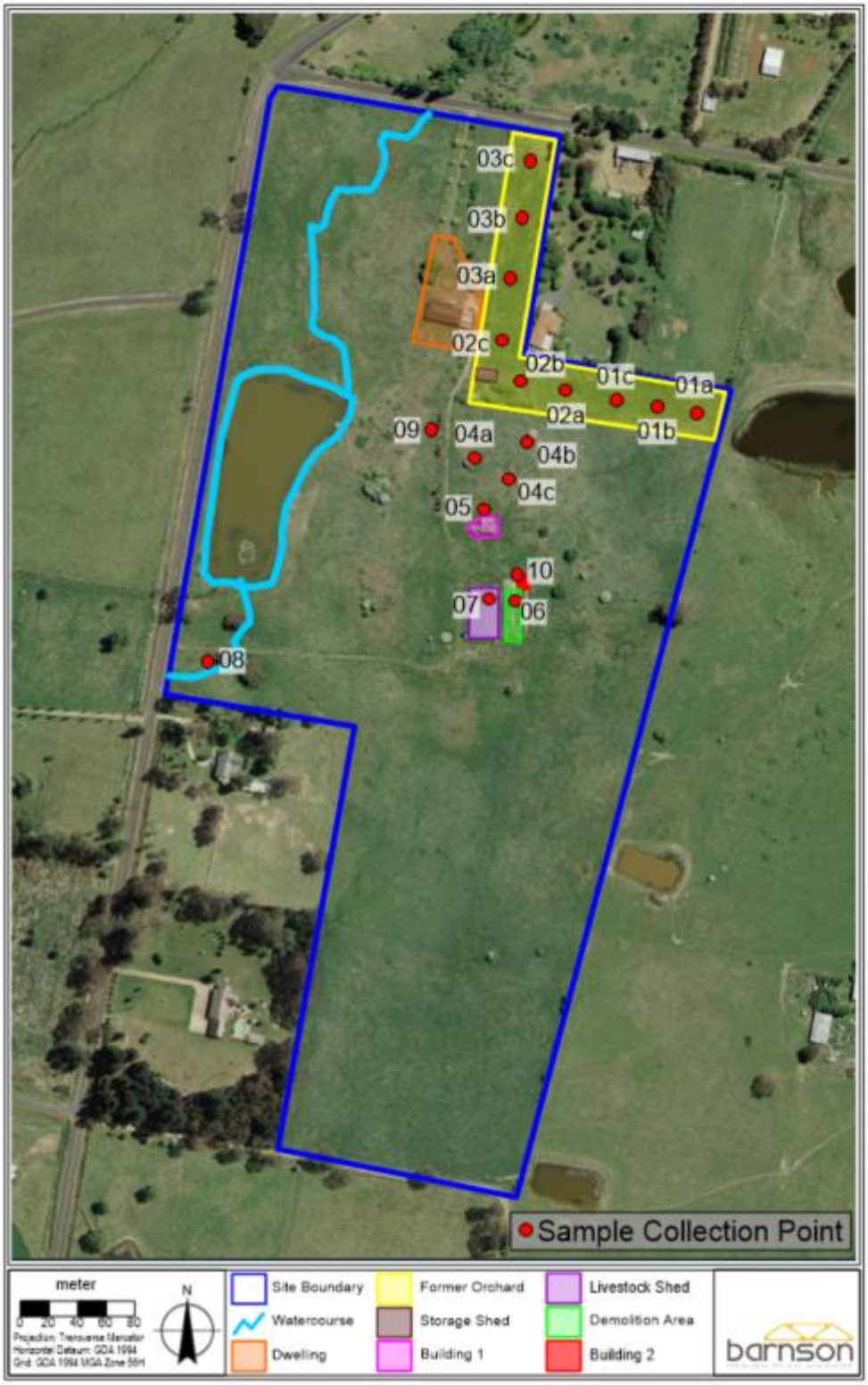

Figure 6.6 – Map indicating locations of confirmatory sample collection.

The soil samples were submitted to Envirolab Services Pty Ltd, Chatswood, Sydney, for determination of the following parameters:

- metallic element (cadmium, chromium, copper, lead, nickel and zinc) concentrations, including arsenic and mercury in soil.
- extraction with organic solvent and analysis of Total Recoverable Hydrocarbons (TRH) fractions C_6 to C_{40}, benzene, toluene, ethylbenzene and total xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs).
- extraction with organic solvent and analysis of Organochlorine (OCP) and Organophosphorus (OPP) Pesticides.
- laboratory QC duplicates and spikes

The laboratory was further requested to investigate the fibre cement sample for qualitative identification of asbestos using Polarised Light Microscopy and Dispersion Staining Techniques. The Envirolab Services laboratory is NATA accredited for the respective analysis.

6.3 Analytical Results

The Envirolab Services laboratory report for the samples is attached as Appendix C. The report indicates that the analytes detected above the limits of detection include metallic elements and hydrocarbons. Table 6.3 to Table 6.5 present summaries of the analytical results for the elements and hydrocarbon compounds detected.

The results reported for petroleum hydrocarbons (BTEXN), OC and OP pesticides in all discrete or composite surface soil samples were below the limits of detection.

The presence of Chrysotile asbestos was confirmed in the sample of fibre-cement collected at the Subject Site.

6.4 Analytical Data Quality

Samples were collected in glass jars provided by the laboratory, refrigerated after collection and transported in an insulated container to the laboratory. Chain of custody was recorded for all samples. A copy of the signed sheet is attached as Appendix C.

The analyses were undertaken at a NATA accredited laboratory. The laboratory quality control procedures in the form of duplicates as well as analyte and surrogate spikes were applied to all contaminant classes analysed. The results reported for the duplicate is within the Relative Percent Difference range of the acceptance criteria for a duplicate sample. The analyte spike recoveries reported for the different sets of organic analytes are indicated as within the acceptance criteria (see Appendix C).

All media appropriate to the objectives of this investigation have been adequately analysed and no area of significant uncertainty exist. It is concluded the data is usable for the purposes of the contaminated site investigation.

Table 6.3- Metal and metalloid concentrations analysed in surface soil samples from the Subject Site.

Element	01	01 Duplicate	02	03	04	05	06	07	08	09
	mg.kg^{-1}									
Arsenic	<4	<4	<4	<4	<4	5	<4	<4	<4	6
Cadmium	<0.4	<0.4	<0.4	<0.4	<0.4	2	<0.4	<0.4	<0.4	<0.4
Chromium	12	13	35	20	16	84	210	200	24	19
Copper	44	44	37	27	44	63	29	37	14	67
Lead	8	8	11	8	13	120	9	11	13	17
Mercury	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	4	4	8	4	5	35	27	39	10	6
Zinc	21	21	23	19	31	5,500	26	80	32	49

Table 6.4- Hydrocarbon fractions analysed in surface soil samples from the Subject Site.

Hydrocarbon fraction	01	01 Duplicate	02	03	04	05	06	07	08	09
	mg.kg^{-1}									
TRH C10 - C14	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH C15 - C28	<100	<100	<100	<100	<100	110	<100	350	<100	<100
TRH C29 - C36	<100	<100	<100	<100	<100	190	<100	<100	<100	<100
TRH >C10-C16	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH >C10 - C16 less Naphthalene	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH >C16-C34	<100	<100	<100	<100	<100	240	<100	380	120	<100
TRH >C34-C40	<100	<100	<100	<100	<100	120	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	<50	<50	<50	<50	<50	350	<50	380	120	<50

Table 6.5-Polyaromatic hydrocarbons analysed in surface soil samples from the Subject Site.

PAH Compound	01	01 Duplicate	02	03	04	05	06	07	08	09
	mg.kg^{-1}									
Naphthalene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06
Indeno(1,2,3-c,d)pyrene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06
Benzo(a)pyrene TEQ calc (zero)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

7.0 ASSESSMENT

7.1 Assessment Criteria - Human Health and Environmental Risk

Screening for human health and ecological risk, utilises published human health investigation levels (HILs) and ecological screening and investigation levels (ESLs & EILs) from the National Environment Protection (Assessment of Site Contamination) Measure (NEPC, 1999) to identify contaminant concentrations in soil that may pose a risk to future residents, people visiting the site, or to ecological receptors.

HILs are scientifically based, generic assessment criteria designed to be used in the screening of potential risks to human health from chronic exposure to contaminants. HIL's are conservatively derived and are designed to be protective of human health under the majority of circumstances, soil types and human susceptibilities and thus represent a reasonable 'worst-case' scenario for specific land-use settings. The HILs selected for evaluation of the Subject Site are those derived for a standard residential scenario (HIL-A) and assumes a residential land use with garden/accessible soil (home grown produce <10% fruit and vegetable intake, and no poultry). The HIL-A criteria are also appropriate for use in the assessment of public open space as land use category.

Although the primary concern in most site assessments is protection of human health, the assessment should also include consideration of ecological risks and protection of groundwater resources that may result from site contamination. EILs provide screening criteria to assess the effect of contaminants on a soil ecosystem and afford species level protection for organisms that frequent or inhabit soil and protect essential soil processes.

Ecological investigation levels (EILs) have been derived for common metallic and hydrocarbon contaminants in soil. The values selected for the evaluation of the heavy metals and hydrocarbons detected in the soil samples from the Subject Site considers the physicochemical properties of soil and contaminants and the capacity of the soil to accommodate increases in contaminant levels above natural background while maintaining ecosystem protection for identified land uses.

Table 7.1 presents a summary of the health-risk based criteria selected for assessment of the Subject Site. This summary of criteria include only analytes that have been detected in the soil samples.

It was confirmed that limits of detection reported by the laboratory reports are below the criteria values. All other contaminants analysed for in the soil samples that are reported below the limit of detection by the laboratory can therefore be excluded from further assessment.

7.2 Findings

Direct comparison of the analytical results presented in Table 6.3 and Table 6.5with the assessment criteria (refer Table 7.1) show that metallic element concentrations are well below health-risk based screening values. The general low concentrations of heavy metals detected suggest naturally occurring element abundance and is most likely not related to contamination.

No contamination was detected in the surface soil samples collected from the area of the site previously used as a plum orchard.

Table 7.1 - Human health and ecological risk screening levels

Element	Health-based Investigation Levels HIL A Residential mg.kg^{-1}	Ecological Investigation Levels (EIL) mg.kg^{-1}
Arsenic (As)	100	100
Cadmium (Cd)	20	-
Chromium (Cr) (Total)	NR	230
Copper (Cu)	7,000	230
Lead (Pb)	300	1,100
Mercury (Hg)	200	-
Nickel (Ni)	400	270
Zinc (Zn)	8,000	300
Benzo(a)pyrene	3	0.7
C_{16}-C_{34}	NA	300
C_{34}-C_{40}	NA	2,800

Note: NR=not relevant due to low human toxicity of Cr(III). NA=No applicable screening level. EILs selected for urban residential and public open space land use scenario.

The only elevated metal concentrations were detected in sample 05, the sample of surface soil collected north of Building 1. Although the elevated concentrations are still below the screening levels, there is a marked increase in the concentrations of various elements (in particular zinc) in this sample.

The 05 sample further show detectable concentrations of hydrocarbon fractions. The elevated concentrations observed here is an indication that historical activities could have contributed to localised contamination at this building. The combination of metals (zinc, lead and copper) suggest pesticides as a possible source. However, as it is uncertain what the purpose of this building was it is difficult to speculate on the specific origin of the contaminants.

Hydrocarbons are also observed in sample 07 (sample collected near the motors stored inside the livestock shed). The hydrocarbon fractions detected are limited to lighter fractions but are present in higher concentrations compared to those in sample 05. The only detected PAH was Benzo(A)pyrene, which was detected just above the limit of detection in a sample collected from a stockpile of fill material. The concentration detected is low and well below all guidelines.

The concentration of zinc in sample 05 and the C_{16}-C_{34} hydrocarbons detected in sample 07 exceeds the ecological investigation level for urban residential and public open space land use.

Asbestos fibres were identified in the fragment of fibre-cement collected at the Subject Site. The fragment was taken from a broken piece of sheeting attached to the partially demolished building indicated as Building 2 in Figure 4.1. No further asbestos containing material (ACM) were observed anywhere else on the surface of the Subject Site or in any of the demolition waste

stockpiles. Although the vegetation cover over the site prevented the close inspection of the entire surface of the site, it is believed that the ACM is limited to Building 2.

The asbestos fibres bound within fibre cement materials are not considered to represent a risk to human health, provided that the fibres remain within the materials. The ACM observed here is largely intact and in general good condition. It is considered unlikely that ACM would have been dispersed from this building. No friable asbestos fibres were identified in any of the surface soil samples collected at the Subject Site.

Overall, the metallic element and hydrocarbon concentrations reported for the soil samples and composites are consistently low and any elevated levels are detected are localised. The confirmatory soil samples thus support the assertion that the overall likelihood of significant chemical contamination to be present within the Subject Site is low.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

In accordance with the objectives stated in Section 1.2, and based on the information contained within this assessment, the following conclusions are presented (subject to the limitations noted in Section 1.5):

- Activities associated with the agricultural use of the Subject Site were identified as having a potential to contaminate surface soil at the site.
- The following potential sources of contamination were identified:
    - Area historically used as plum orchard.
    - Farming and livestock management activities at the buildings located near the centre of the site.
    - Use of unclassified fill material brought onto site.
    - Use, storage and maintenance of vehicles and motorised equipment.
    - Storage of demolition waste
- A review of the available historical information, including contaminated sites databases and aerial photographs indicated a low potential for significant environmental contamination to be present across the site.
- A site investigation and confirmatory sampling conducted to determine the presence and significance of potential contamination associated with the identified sources, revealed that none of the contaminants investigated are present above health-risk based criteria in the surface soils of the Subject Site.
- The screening criteria used in the evaluation of the contaminant concentrations were appropriately conservative and suitable for assessment of both the proposed residential and public open space land use categories.
- Although asbestos containing material (ACM) as observed in the structure of one of the buildings at the subject site, the asbestos fibres contained within the ACM are stable and are not considered to represent a risk to human health.

- Based on the findings of the desktop review and site investigation it is concluded that the subject site is largely suitable for the proposed subdivision and use for residential purposes as there are no contaminants present at the site which are likely to present a risk of impact to the health of humans. However, the disused and partially demolished buildings near the centre of the Subject Site have some localised heavy metal and hydrocarbon contamination at concentrations that may represent risks to the environment if not appropriately managed.

8.2 Recommendations

Based on the conclusions above, the following is recommended:

- Further investigation of the historical farm buildings and livestock sheds located in the centre of the Subject Site is recommended prior to any further demolition works or development in this area. The purpose of this further investigation would be to confirm the presence of the elevated contaminant levels, determine the source of the contamination and delineate the extent of the contamination in support of possible future remediation of the site.
- The asbestos containing material (ACM) will have to be removed before commencement of any further demolition works at the site in order to prevent breakage and dispersion of the ACM and asbestos fibres. It is recommended that the ACM be collected, wrapped and transported to a landfill, licensed to accept the waste, for disposal. The removal can be undertaken by either a competent person or a licensed asbestos removalist (holding either a Class A or B license).
- Notification to SafeWork of the asbestos removal works may be required if the ACM is more than 10m^2.
- Tracking of the ACM will be required. Transport of asbestos waste is regulated under EPA legislation. Disposal sites are regulated by the NSW EPA and local government regulations. Each load of asbestos waste must be tracked to the landfill facility using the EPA *WasteLocate* application.

9.0 REFERENCES

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NSW EPA. (1995). *Contaminated Sites: Sampling Guidelines.* NSW Environmental Protection Agency.

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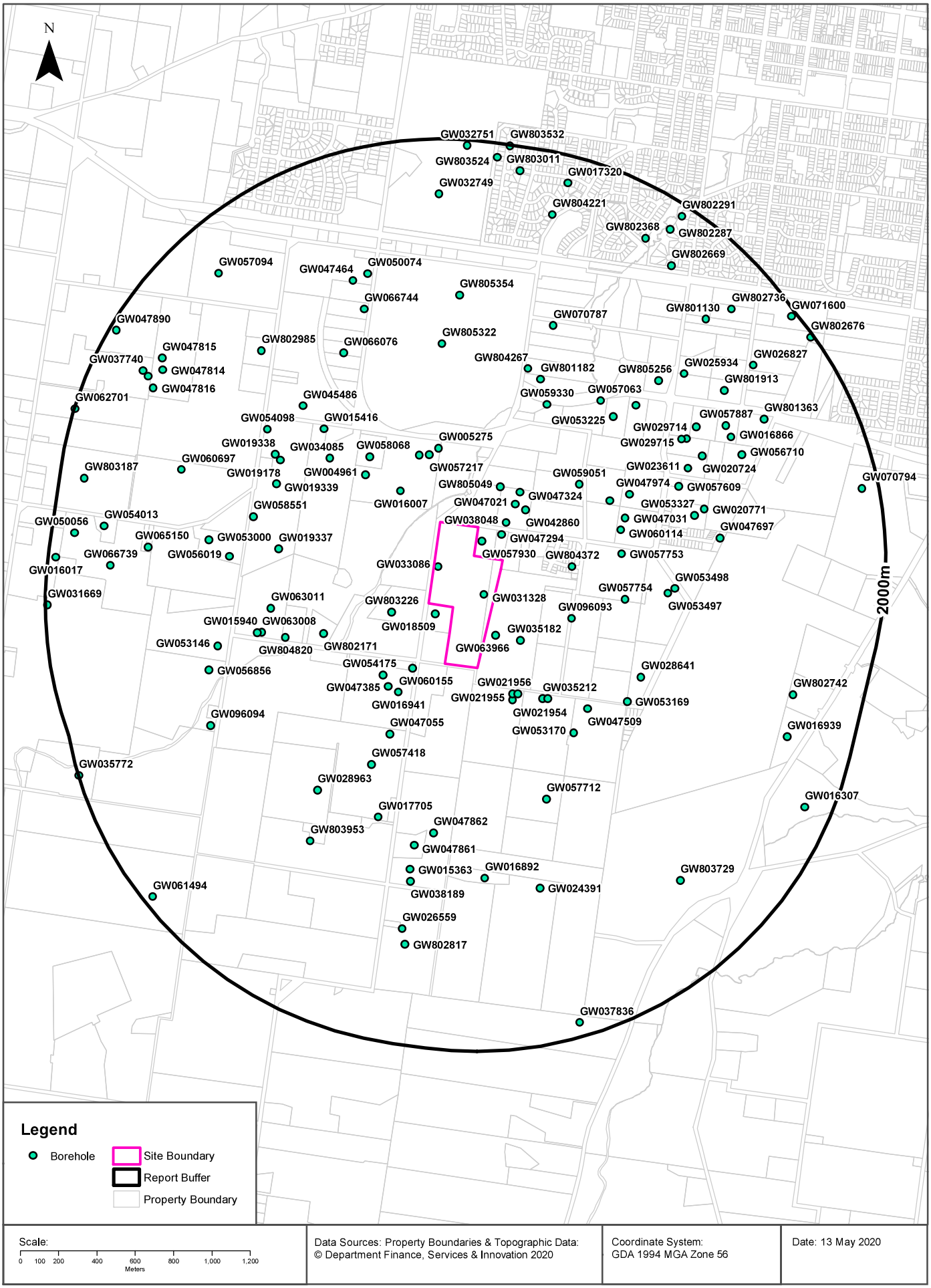
Appendix A – Groundwater Bore Summaries

Groundwater Boreholes

12 Shiralee Road, Orange, NSW 2800



Hydrogeology & Groundwater

12 Shiralee Road, Orange, NSW 2800

Groundwater Boreholes

Boreholes within the dataset buffer:

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW033086	80BL026393, 80WA707855	Bore	Private	Stock	Stock		01/04/1968	45.70	45.70					0m	Onsite
GW031328	80BL023569, 80WA707845	Bore	Private	Farming	General Use		01/01/1969	41.10	41.20	Fresh		3.158		0m	Onsite
GW057930	80BL125684, 80CA708552	Bore open thru rock	Private	Irrigation	Irrigation		01/04/1983	68.00		501-1000 ppm		1.895		32m	North
GW018509	80BL010633, 80CA708708	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/05/1960	60.40	60.40			0.025		50m	South West
GW063966	80BL135831, 80WA708001	Bore	Private	Domestic, Stock	Domestic, Stock		01/01/1987	43.10	43.10	Fresh		1.750		55m	South East
GW047294	80BL109140, 80CA708552	Bore	Private	Irrigation	Irrigation		01/02/1979	66.50	66.50	0-500 ppm		1.240		129m	North East
GW038048	80BL100044	Bore	Private	Irrigation	Irrigation		01/12/1974	64.00	64.00					150m	North East
GW060155	80BL130304, 80WA707978	Bore open thru rock	Private	Domestic, Stock	Domestic, Stock		01/10/1982	64.60	64.60	0-500 ppm		4.500		171m	South West
GW035182	80BL028422, 80WA707866	Bore open thru rock	Private	Domestic, Stock	Domestic, Stock		01/05/1973	41.70	41.80	Good		1.894		188m	South East
GW803226	80BL244389	Bore	Private	Domestic, Stock	Domestic, Stock		07/06/2007	45.50	45.50			0.947		197m	West
GW047021	80BL107113, 80CA708546	Bore open thru rock	Private	Domestic, Irrigation, Stock	Irrigation		01/11/1977	30.50	30.50	Good		0.450		229m	North East
GW021955	80BL014489, 80WA707794	Bore	Private	Domestic, Stock	Irrigation		01/01/1939	17.10		0-500 ppm				230m	South East
GW805049	80BL236209, 80WA708081	Bore	Private	Domestic	Domestic		15/06/1995	36.50	36.50			0.375		241m	North
GW021954	80BL014491	Bore	Private	Not Known	Not Known		01/01/1964	24.40						250m	South East
GW021956	80BL014490, 80WA707795	Well	Private	Domestic, Stock	Not Known		01/01/1945	13.40		Good		0.158		251m	South East
GW016007	80BL009373	Well	Private	Irrigation	Farming		01/06/1955	4.30	4.30	Good				261m	North West
GW042860	80BL105750	Well	Private	Domestic, Irrigation, Stock	Irrigation			2.40		0-500 ppm				265m	North East

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW047 324	80BL110 003	Bore open thru rock	Private	Domestic, Irrigation, Stock	Irrigation		01/05/1979	35.40	35.40	0-500 ppm				285m	North East
GW016 941	80BL007 433, 80WA70 7763	Bore	Private	Orchards (groundwater)	Irrigation		01/04/1958	32.60	32.60			0.316		285m	South West
GW047 385	80BL109 409, 80BL132 735, 80WA70 7985	Bore open thru rock	Private	Domestic, Irrigation, Stock	Irrigation		01/04/1979	61.50	61.50	Fresh		3.000		319m	South West
GW054 175	80BL113 772, 80BL121 584, 80WA70 7917	Bore	Private	Domestic, Irrigation, Stock	Domestic, Stock		01/06/1981	82.40	82.40	Fresh		0.750		329m	South West
GW057 217	80BL121 430, 80WA70 7940	Bore	Private	Domestic, Farming, Stock	Domestic, Stock		01/01/1982	77.50						356m	North
GW804 372	80BL245 922	Bore	Private	Domestic, Stock	Domestic, Stock		06/07/2010	38.00	38.00		6.00	18.960		366m	East
GW045 102	80BL105 191	Bore	Private	Test Bore	G/water Xplore		01/01/1948	54.90	54.90					366m	North
GW035 212	80BL030 105, 80BL138 023, 80BL241 748, 80CA70 8688	Bore open thru rock	Private	Domestic, Irrigation, Stock	Irrigation		01/05/1968	55.10	55.20			7.893		378m	South East
GW005 275	80BL007 054	Bore	Private	Irrigation	Irrigation		01/04/1958	55.20	55.20	Soft				384m	North
GW023 853	80BL017 383, 80CA70 8688	Bore open thru rock	Private	Domestic, Irrigation, Stock	Irrigation		01/04/1966	32.90	32.90			0.568		401m	South East
GW096 093		Bore - Nested (2)	NSW Office of Water		Monitoring Bore		14/03/2001	71.50	80.00		13.00	1.600	922.16	421m	East
GW004 961	80BL009 374	Bore	Private	Irrigation	Farming		01/10/1952	25.60	25.60					461m	North West
GW047 055	80BL107 100, 80BL108 545	Bore open thru rock	Private	Domestic, Irrigation, Stock	Irrigation		01/11/1977	80.80	80.80	Good				466m	South West
GW058 068	80BL121 431, 80WA70 7941	Bore	Private	Domestic, Farming, Stock	Farming		01/01/1982	91.00						500m	North West
GW059 051	80BL126 777	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/06/1981	38.50	38.50	0-500 ppm				562m	North East
GW802 171	80BL237 575, 80WA70 8114	Bore	Private	Domestic, Stock	Domestic, Stock		05/11/1997	53.00	53.00	Good	9.00	1.260		569m	West
GW053 170	80BL117 856, 80BL118 384	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/03/1981	85.00	85.00					608m	South East
GW047 509	80BL111 143, 80CA70 8556	Bore open thru rock	Private	Domestic, Irrigation, Orchards (groundwater), Stock	Irrigation		01/11/1979	46.30	46.30	Good		9.070		616m	South East
GW057 753	80BL123 640	Bore open thru rock	Private	Domestic, Irrigation, Stock	Irrigation		01/10/1982	76.80		0-500 ppm				622m	East

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW060114	80BL131130, 80CA708576	Bore	Private	Irrigation	Irrigation		01/07/1985	66.40	66.50	Good		7.578		636m	East
GW042692	80BL104895	Bore	Private	Domestic, Irrigation, Stock	Irrigation			18.20						638m	North East
GW057418	80BL125459, 80BL127341, 80CA708570	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/12/1982	73.10	73.10	Good		2.270		651m	South West
GW034085	80BL026555	Bore	Private	Test Bore	Not Known		01/01/1969	68.60	68.60					664m	North West
GW057754	80BL123641, 80BL242143, 80CA708692	Bore open thru rock	Private	Domestic, Irrigation, Stock	Irrigation		01/10/1982	69.20		0-500 ppm		2.300		669m	East
GW047031	80BL105981	Bore open thru rock	Private	Domestic, Irrigation, Stock	Irrigation		01/12/1977	27.40	30.50	Good				676m	North East
GW059330	80BL127308, 80BL239435	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/06/1981	51.20	51.20	Good				735m	North East
GW047974	80BL116559	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/10/1980	68.60	68.60	Good				745m	North East
GW804820	80BL236347, 80WA708084	Bore	Private	Domestic	Domestic		31/03/1995	54.00	43.00		10.00	0.170		765m	West
GW057712	80BL115336	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/03/1981	126.50	126.50					774m	South
GW015416	80BL006183	Bore	Private	Domestic, Irrigation	Irrigation		01/06/1957	13.90	13.90	Fair		0.632		776m	North West
GW053169	80BL118383	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/03/1981	51.80	51.80					803m	South East
GW019337	80BL011927, 80WA707781	Well	Private	Domestic	Not Known		01/01/1961	12.20	12.20	Good		1.010		813m	West
GW063011		Bore	Private		Domestic, Stock		01/08/1984	80.80	80.80	Good		0.370		821m	West
GW801182	80BL238896, 80WA708149	Bore	Private	Domestic, Stock	Domestic, Stock		21/06/2000	32.00	32.00	Fresh	10.40	3.151		838m	North
GW028641	80BL021032, 80CA708556	Bore open thru rock	Private	Domestic, Irrigation, Orchards (groundwater), Stock	Irrigation		01/12/1967	61.00	61.00			2.526		845m	South East
GW804267	80BL243504	Bore	Private	Domestic, Stock	Domestic, Stock		24/07/2006	48.00	48.00		12.00	0.500		867m	North
GW017705	80BL007880, 80WA707769	Well	Private	Domestic, Orchards (groundwater)	Domestic		01/11/1957	2.70						874m	South
GW019339	80BL011929, 80WA707783	Well	Private	Domestic	Domestic		01/08/1961	21.30	21.30	Hard				877m	North West
GW053497	80BL119036	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/03/1981	54.90	54.90					880m	East

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW063008	80BL131372, 80CA708578	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/08/1984	64.60	64.60	Good		2.270		881m	West
GW047862	80BL110388, 80BL141753, 80WA708027	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/04/1980	74.70	74.70	Hard		3.020		884m	South
GW019178	80BL012036, 80CA708660	Bore	Private	Domestic, Farming, Irrigation, Stock	Irrigation		01/01/1947	27.40	27.40	0-500 ppm		0.505		894m	North West
GW015940	80BL006589, 80WA707754	Bore open thru rock	Private	Domestic, Orchards (groundwater)	Irrigation		01/11/1957	25.30	25.30			0.379		906m	West
GW053225	80BL116682, 80BL135138, 80WA707995	Bore	Private	Domestic, Irrigation, Stock	Domestic		01/10/1980	27.60	27.60	Fresh		1.000		911m	North East
GW053498	80BL120309, 80CA708562	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/03/1981	61.00	61.00	0-500 ppm		5.040		913m	East
GW057063	80BL124626, 80WA707955	Bore	Private	Domestic, Stock	Domestic, Stock		01/03/1983	30.80	30.80	Fresh		3.000		921m	North East
GW805322	80WA723048	Bore	Private	Domestic, Stock	Domestic, Stock		21/07/2014	40.00	54.00	200	16.00	1.200		929m	North
GW019338	80BL011928, 80WA707782	Well	Private	Domestic, Stock	Not Known		01/01/1961	23.80	23.80	Hard		0.568		930m	North West
GW028963	80BL020013, 80CA708722	Bore open thru rock	Private	Irrigation	Irrigation		01/09/1966	67.10	67.10	Soft		1.768		936m	South West
GW045486	80BL105772, 80WA707890	Well	Private	Domestic	Domestic		01/01/1940	5.50		Good				936m	North West
GW047861	80BL110387, 80BL141754, 80BL241126, 80WA708210	Bore	Private	Domestic, Irrigation, Stock	Domestic		01/04/1980	63.70	63.70	Poor	27.40	1.060		963m	South
GW058551	80BL124745, 80BL239294, 80CA708660	Bore	Private	Domestic, Farming, Irrigation, Stock	Domestic, Stock		01/01/1982	82.30			10.00			968m	West
GW057609	80BL126069, 80WA707970	Bore open thru rock	Private	Domestic, Stock	Domestic, Stock		01/12/1982	83.80	83.80	Good		3.780		996m	North East
GW066076	80BL142954, 80WA708038	Bore	Private	Domestic, Stock	Domestic, Stock		04/04/1991	48.00	48.00	Good		0.380	900.00	1014m	North West
GW054098	80BL113115, 80BL239293, 80CA708660	Bore	Private	Domestic, Farming, Irrigation, Stock	Domestic, Stock		01/11/1980	83.80	83.90	Good	6.00	0.750		1021m	North West

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW053327	80BL120496, 80BL239172, 80WA708161	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/06/1981	46.70	46.70	0-500 ppm		3.750		1029m	East
GW053009	80BL116854, 80BL144492, 80WA708044	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/10/1980	29.20	29.20	0-500 ppm		1.750		1041m	North East
GW056019		Bore	Private		Not Known		01/10/1980	57.90	57.90					1062m	West
GW023611	80BL016893, 80WA707803	Bore	Private	Domestic, Orchards (groundwater)	Irrigation		01/04/1966	32.60	32.60			0.821		1079m	North East
GW020771	80BL013653, 80WA707788	Bore open thru rock	Private	Domestic, Orchards (groundwater)	Irrigation		01/08/1963	26.10	26.10			0.632		1086m	East
GW015363	80BL006285, 80CA708728	Bore	Private	Domestic, Irrigation	Irrigation		01/05/1957	44.80	44.80	Soft				1089m	South
GW016892	80BL007284	Bore open thru rock	Private	Irrigation	Irrigation		01/06/1958	53.60	53.60					1099m	South
GW053146	80BL118323, 80BL144490, 80WA708043	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/04/1981	39.30	39.30			1.100		1120m	West
GW070787	80BL151845, 80WA708059	Bore		Domestic, Stock	Domestic		08/03/1993	67.00	67.00	Fresh		4.000		1123m	North
GW029715	80BL023334, 80WA707844	Bore open thru rock	Private	Orchards (groundwater)	Irrigation		01/04/1968	38.10	38.10			0.101		1128m	North East
GW047697	80BL109195, 80BL114898, 80CA708560	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/10/1980	37.20	37.20	0-500 ppm		7.500		1142m	East
GW038189	80BL102426, 80BL102427, 80BL141752, 80WA708026	Bore open thru rock	Private	Domestic, Irrigation, Stock, Test Bore	Irrigation		01/01/1976	60.90	61.00	0-500 ppm		3.031		1149m	South
GW029714	80BL018978, 80WA707813	Well	Private	Orchards (groundwater)	Irrigation		01/06/1967	7.60	7.60					1150m	North East
GW803953	80BL143825	Bore	Private	Domestic, Stock	Domestic, Stock		26/08/1991	45.00	45.00	Fresh	18.00	5.000		1161m	South West
GW020724	80BL013704, 80WA707790	Bore	Private	Domestic	General Use		01/10/1963	18.70	18.80			0.884		1175m	North East
GW066744		Bore			Domestic, Stock			63.00	63.00			0.130	905.00	1179m	North
GW053000	80BL116759	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/10/1980	62.50	62.50					1181m	West
GW805354	80BL245995	Bore	Private	Domestic, Stock	Domestic, Stock		01/11/2010	30.00	30.00		6.00	0.600		1188m	North

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW024 391	80BL018 471, 80WA70 7808	Bore	Private	Stock	Stock		01/05/1966	30.50	30.50			0.316		1195m	South
GW056 856	80BL123 893, 80WA70 7948	Bore open thru rock	Private	Domestic, Stock	Domestic, Stock		01/01/1983	68.60	68.60	Good		2.270		1197m	West
GW805 256	80WA72 2748	Bore	Private	Domestic, Stock	Domestic, Stock	'Cherrywood'	02/01/2014	60.00	60.00		21.00	1.280		1214m	North East
GW800 489	80BL153 652, 80WA70 8069	Bore	Private	Domestic, Stock	Domestic, Stock		06/12/1993	96.30	96.30			1.390		1227m	North East
GW096 094		Bore - Nested (2)	NSW Office of Water		Monitoring Bore		19/03/2001	65.00	76.00		25.60	1.260	959.32	1264m	South West
GW802 985	80BL242 975	Bore	Private	Domestic, Stock	Domestic, Stock		05/10/2005	37.00	37.00		10.00	0.563		1291m	North West
GW047 464	80BL111 156	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/01/1980	40.20	40.30	Fresh				1339m	North
GW025 934	80BL017 863	Bore	Private	Irrigation, Stock, Waste Disposal	General Use		01/01/1966	29.90	29.90					1342m	North East
GW050 074	80BL111 162	Bore	Private	Test Bore	Irrigation		01/12/1979	40.60	40.60					1350m	North
GW016 866	80BL007 384, 80WA70 7762	Bore	Private	Domestic, Orchards (groundwater)	Irrigation		01/01/1958	22.60	22.60			0.253		1355m	North East
GW057 887	80BL123 050, 80CA70 8568	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/05/1982	60.90	60.90			2.650		1361m	North East
GW056 710	80BL123 580, 80WA70 7946	Bore	Private	Domestic, Stock	Domestic, Stock		01/09/1982	39.00	39.00	Good		2.270		1365m	North East
GW060 697	80BL116 631, 80BL133 911, 80BL239 280, 80CA70 8648	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/01/1980	60.90						1377m	North West
GW026 559	80BL019 665, 80WA70 7821	Bore	Private	Stock	Stock		01/01/1966	42.70	42.70					1402m	South
GW801 913	80BL241 208	Bore	Private	Test Bore	Test Bore		07/01/2003	48.00	48.00		38.00	1.500		1458m	North East
GW802 817	80BL242 112, 80WA70 8270	Bore	Private	Domestic, Stock	Domestic, Stock		08/04/2004	97.50	97.50			0.884		1479m	South
GW065 150	80BL137 589	Bore	Private	Domestic	Domestic		20/12/1986	57.00	57.00	Good	12.20	0.070		1489m	West
GW803 729	80BL245 076	Bore	Private	Domestic, Stock	Domestic, Stock		06/10/2008	69.00	69.00		15.00	6.314		1534m	South East
GW801 363	80BL239 471, 80WA70 8178	Bore	Private	Domestic, Stock	Domestic		23/08/2001	54.00	54.00	Good	9.00	2.500		1551m	North East
GW801 130	80BL238 955, 80WA70 8151	Bore	Private	Domestic, Stock	Domestic, Stock			60.00	60.00	Good	4.00	1.250		1611m	North East
GW802 742	80BL241 956, 80WA70 8258	Bore	Private	Domestic, Stock	Domestic, Stock		03/02/2004	87.00	87.00			0.631		1638m	East

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW047814	80BL114439, 80BL133618, 80WA707989	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/09/1980	86.90	86.90			1.520		1650m	North West
GW047816		Bore	Private		Irrigation		01/09/1980	76.20	76.20					1651m	North West
GW026827	80BL019176, 80WA707815	Bore	Private	Domestic, Orchards (groundwater)	Irrigation		01/03/1966	35.40	35.40		7.60	0.253		1657m	North East
GW016939	80BL007575	Bore open thru rock	Private	Domestic, Irrigation, Orchards (groundwater), Stock	General Use		01/09/1958	44.20	44.20			0.227		1659m	South East
GW066739	80BL141311	Bore	Private	Domestic, Stock	Domestic, Stock		31/05/1990	54.80	54.80				984.00	1669m	West
GW804221	80BL244191	Bore	Private	Domestic	Domestic		08/02/2010	76.00	76.00	Good	45.00	0.760		1677m	North
GW047815		Bore	Private		Irrigation		01/09/1980	57.90	57.90					1683m	North West
GW802669	80BL241451, 80WA708233	Bore	Private	Domestic	Domestic		28/04/2003	104.00	104.00		20.00	0.500		1698m	North East
GW024228	80BL014773, 80CA708540	Bore	Private	Domestic, Farming, Irrigation	Irrigation		01/11/1965	21.30	21.40			0.189		1703m	North West
GW032749	80BL025782	Bore	Private	Test Bore	Recreation (groundwater)		01/03/1970	91.40	91.40		42.70	0.130		1711m	North
GW054013	80BL107910, 80WA707896	Bore	Private	Domestic, Farming, Stock	Domestic, Stock		01/02/1978	97.50	97.50					1733m	West
GW057094	80BL124694, 80WA707959	Well	Private	Domestic	Domestic		01/01/1929	4.00						1738m	North West
GW037740	80BL101731, 80CA708540	Bore open thru rock	Private	Domestic, Farming, Irrigation	Irrigation		01/05/1974	42.60	42.70			12.124		1740m	North West
GW802368	80BL242817, 80WA708315	Bore	Private	Domestic, Stock	Domestic, Stock		18/05/2005	30.00	30.00		3.00	0.625		1745m	North East
GW802736	80BL241937, 80WA708256	Bore	Private	Domestic	Domestic		11/12/2003	85.00	85.00			1.011		1746m	North East
GW802287	80BL242218, 80WA708277	Bore	Private	Domestic	Domestic		30/04/2004	47.00	47.00			0.631		1852m	North East
GW017320	80BL007822, 80WA707768	Bore	Private	Domestic	Domestic, Irrigation		01/05/1958	24.40	24.40	Fair	12.20	0.505		1856m	North
GW016307		Bore	P.W.D.		Not Known		01/07/1958	57.90	57.90			0.126		1859m	South East
GW803187	80BL242976	Bore	Private	Domestic, Stock	Domestic, Stock		19/10/2006	84.00	84.00		45.00	0.631		1870m	West
GW803011	80BL242833	Bore	Private	Domestic	Domestic		28/07/2005	60.00	60.00		6.00	0.821		1873m	North
GW050056	80BL111053, 80WA707905	Well	Private	Domestic, Stock	Domestic, Stock		01/01/1920	13.00						1880m	West

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW070794	80BL152715	Bore	School	Domestic, Farming, Stock	Domestic, Farming, Stock		02/07/1993	50.00	50.00	Fresh	12.00	8.000		1914m	East
GW803524	80BL244583	Bore	Private	Domestic, Stock	Domestic, Stock		06/11/2007	56.00	56.00			0.188		1925m	North
GW037836	70BL030013, 70BL108557	Bore open thru rock	Private	Domestic, Irrigation, Stock	Irrigation		01/08/1972	81.30	81.40					1927m	South
GW802291	80BL242240, 80WA708279	Bore	Private	Domestic	Domestic		07/05/2004	30.00	30.00			0.884		1941m	North East
GW061494	80BL130031, 80BL238679, 80CA708632	Bore open thru rock	Private	Domestic, Irrigation, Stock	Domestic, Stock		01/04/1984	115.00	115.00	Good		5.040		1950m	South West
GW016017	80BL007064, 80WA707761	Well	Private	Orchards (groundwater), Stock	Irrigation		01/04/1958	15.20	15.20					1960m	West
GW047890	80BL109927	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/05/1980	45.70	45.70					1962m	North West
GW032751	80BL025784	Bore	Private	Test Bore	Recreation (groundwater)		01/03/1970	42.70	42.70	Fresh				1969m	North
GW071600	80BL153544, 80WA708068	Bore	School	Recreation (groundwater)	Recreation (groundwater)		29/11/1993	61.00	61.00	Fresh	4.00	12.500	880.00	1971m	North East
GW802676	80BL241509, 80WA708239	Bore	Private	Domestic, Stock	Domestic, Stock		02/06/2003	150.00	150.00			0.252		1984m	North East
GW031669	80BL022376, 80WA707840	Bore	Private	Domestic, Stock	Irrigation		01/06/1968	100.60	100.60					1988m	West
GW803532	80BL244706	Bore	Private	Domestic	Domestic		12/01/2008	55.92	55.92		15.00	0.379		1994m	North
GW062701		Bore open thru rock	Private		Irrigation		01/02/1985	73.20	73.20	Fair		0.120		1996m	North West
GW035772	80BL030119, 80BL139283, 80WA708014	Bore open thru rock	Private	Domestic, Irrigation, Stock	Irrigation		01/04/1968	79.20	79.20			9.408		1998m	South West

Appendix B – Historical Aerial Photographs

Aerial Imagery 2019

12 Shiralee Road, Orange, NSW 2800

Scale:
0 50 100 150 200
Meters

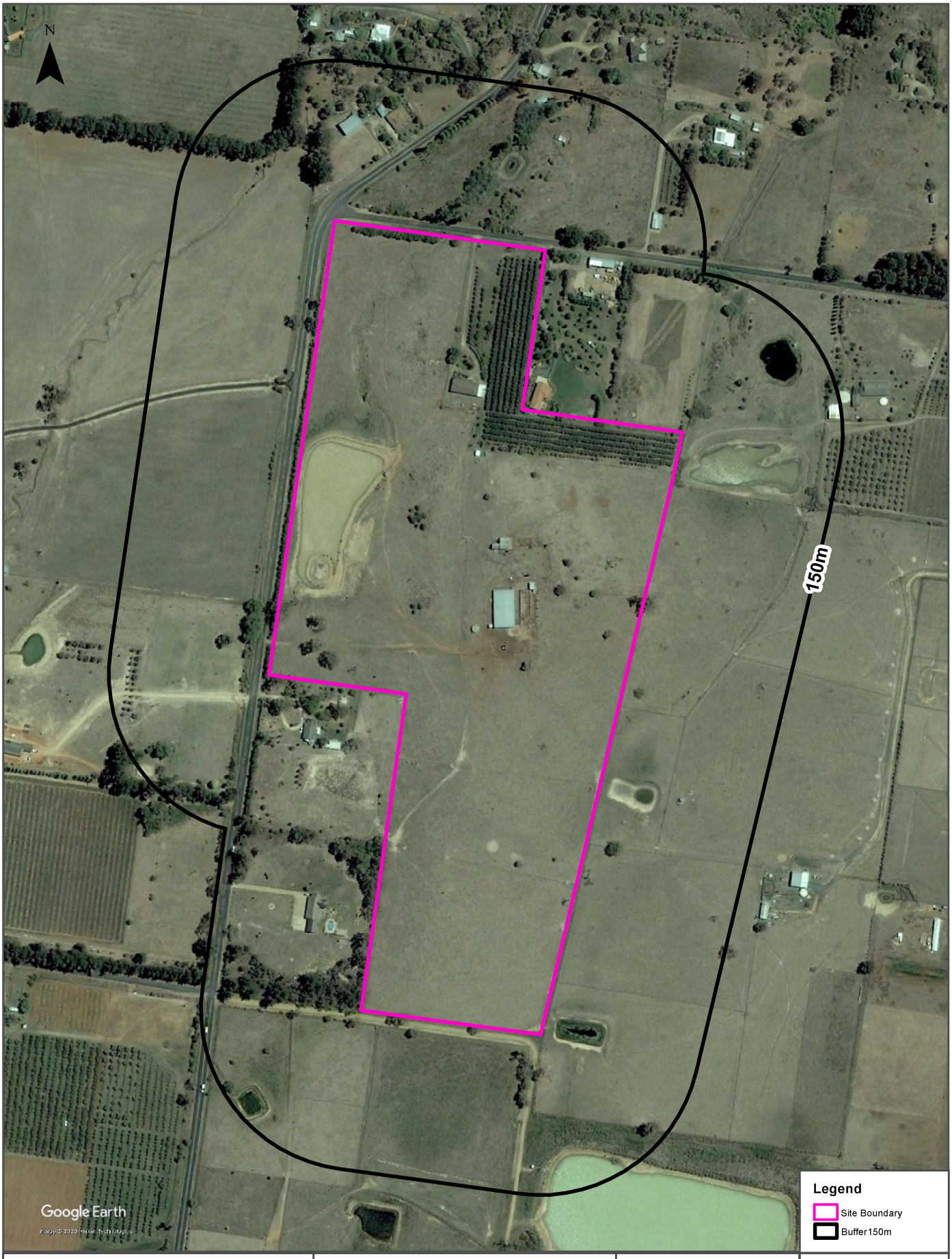
Data Source Aerial Imagery: © 2020 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11 May 2020

Aerial Imagery 2003

12 Shiralee Road, Orange, NSW 2800



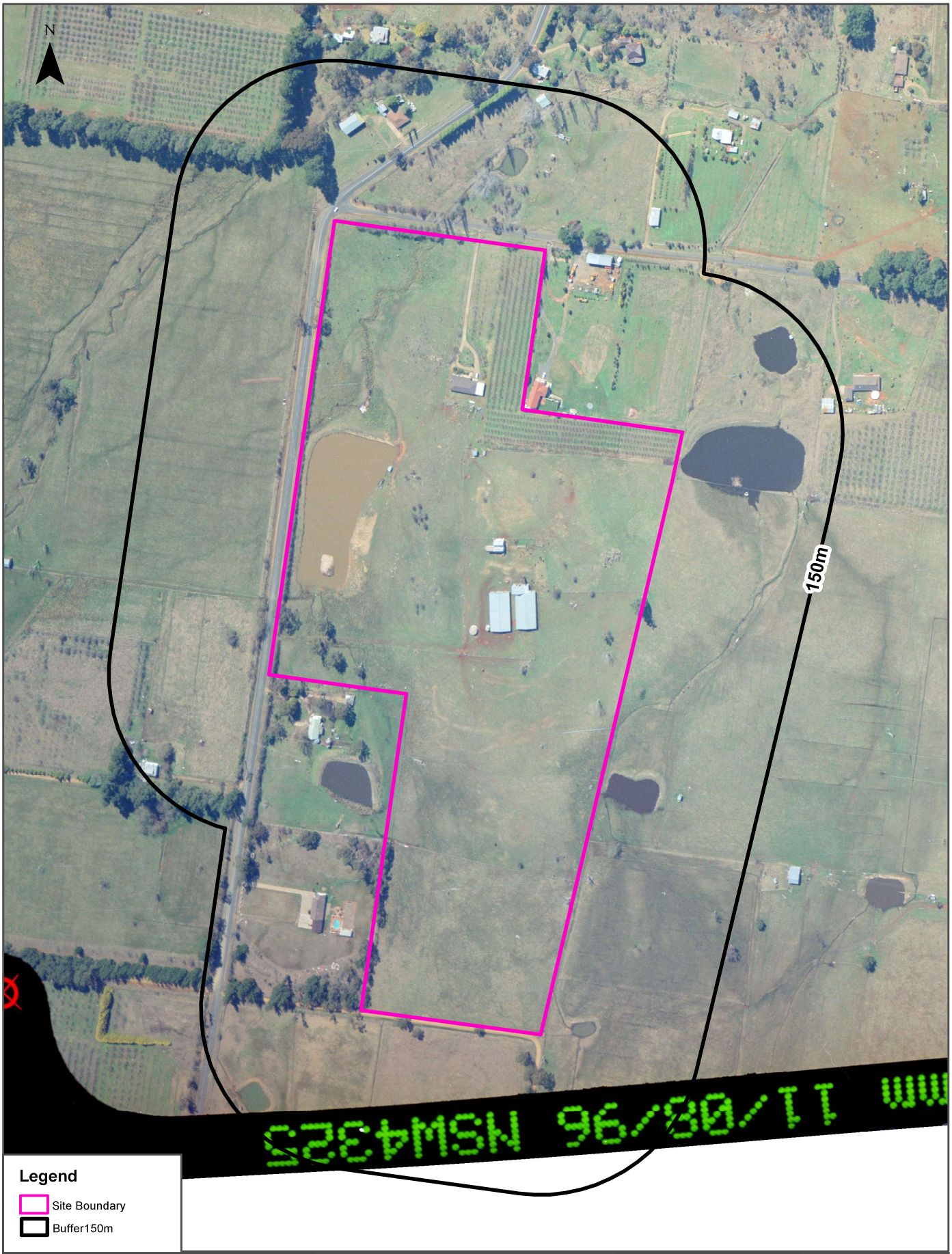
Scale: 0 50 100 150 200 Meters	Data Source Aerial Imagery: © 2020 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.	Coordinate System: GDA 1994 MGA Zone 56	Date: 11 May 2020

Aerial Imagery 1998

12 Shiralee Road, Orange, NSW 2800

Aerial Imagery 1996

12 Shiralee Road, Orange, NSW 2800



Aerial Imagery 1984

12 Shiralee Road, Orange, NSW 2800

Aerial Imagery 1973

12 Shiralee Road, Orange, NSW 2800

Aerial Imagery 1972

12 Shiralee Road, Orange, NSW 2800

Aerial Imagery 1964

12 Shiralee Road, Orange, NSW 2800

Aerial Imagery 1956

12 Shiralee Road, Orange, NSW 2800

Appendix C – Chain of Custody and Laboratory Report

barnson
DESIGN . PLAN . MANAGE

a Unit 4 / 108-110 Market Street
Mudgee NSW 2850
t 1300 BARNSON (1300 227 676)
e generalenquiry@barnson.com.au
w www.barnson.com.au

ENVIROLAB

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

Job No: 24307/

Date Received: 18/5/20
Time Received: 1050
Received By: CM
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

CHAIN OF CUSTODY AND ANALYTICAL REQUEST

Job Number	33422	Date	15/05/2020
Laboratory	EnviroLab	Report to	Nardus Potgieter npotgieter@barnson.com.au
Sample Temperature on Receipt		Notes	
°C	Signature:		

	Sample ID	Description	Sample Date	Sample Matrix	Number of Jars Submitted	Analysis request			
						1	2	3	4
1	BPSA-01	Composite surface soil sample area 1	13/05/2020	Soil	1	X			
2	BPSA-02	Composite surface soil sample area 2	13/05/2020	Soil	1	X			
3	BPSA-03	Composite surface soil sample area 3	13/05/2020	Soil	1	X			
4	BPSA-04	Composite surface soil sample area 4	13/05/2020	Soil	1	X			
5	BPSA-05	Surface soil sample building 1	13/05/2020	Soil	1	X			
6	BPSA-06	Composite surface soil sample under concrete	13/05/2020	Soil	1	X			
7	BPSA-07	Surface soil sample cow shed	13/05/2020	Soil	1	X			
8	BPSA-08	Soil sample north of dam	13/05/2020	Soil	1	X			
9	BPSA-09	Fill sample west of Dam	13/05/2020	Soil	1	X			
10	BPSA-10	Cement board	13/05/2020	Cement board	1 fragment		X		

Analysis request			
1	Combo 6 (BTEX, TRH, PAH, OC, OP, PCB 8metals)		
2	Asbestos ID		
3			
4			

Relinquished by / Affiliation		Accepted by / Affiliation		Date
N Potgieter	/ Barnson	C. McKenzie	/ Envirolab Syd	18/5/20 1050

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 243071

Client Details

Client	Barnson (Mudgee)
Attention	Nardus Potgieter
Address	Unit 2/108-110 Market St, Mudgee, NSW, 2850

Sample Details

Your Reference	**33422**
Number of Samples	9 Soil, 1 Material
Date samples received	18/05/2020
Date completed instructions received	18/05/2020

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.

Report Details

Date results requested by	25/05/2020
Date of Issue	25/05/2020

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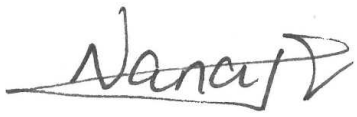
Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Asbestos Approved By
Analysed by Asbestos Approved Identifier: Panika Wongchanda
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Dragana Tomas, Senior Chemist
Jaimie Loa-Kum-Cheung, Metals Supervisor
Josh Williams, Senior Chemist
Lucy Zhu, Asbestos Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		243071-1	243071-2	243071-3	243071-4	243071-5
Your Reference	UNITS	BPSA-01	BPSA-02	BPSA-03	BPSA-04	BPSA-05
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	20/05/2020	20/05/2020	20/05/2020	20/05/2020	20/05/2020
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	104	108	105	107	98

vTRH(C6-C10)/BTEXN in Soil					
Our Reference		243071-6	243071-7	243071-8	243071-9
Your Reference	UNITS	BPSA-06	BPSA-07	BPSA-08	BPSA-09
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	20/05/2020	20/05/2020	20/05/2020	20/05/2020
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	101	114	110	111

svTRH (C10-C40) in Soil						
Our Reference		243071-1	243071-2	243071-3	243071-4	243071-5
Your Reference	UNITS	BPSA-01	BPSA-02	BPSA-03	BPSA-04	BPSA-05
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020	19/05/2020
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	110
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	190
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	240
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	120
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	350
Surrogate o-Terphenyl	%	94	82	81	89	114

svTRH (C10-C40) in Soil					
Our Reference		243071-6	243071-7	243071-8	243071-9
Your Reference	UNITS	BPSA-06	BPSA-07	BPSA-08	BPSA-09
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	19/05/2020	21/05/2020	19/05/2020	19/05/2020
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	350	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100
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	380	120	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	380	120	<50
Surrogate o-Terphenyl	%	78	81	97	80

PAHs in Soil						
Our Reference		243071-1	243071-2	243071-3	243071-4	243071-5
Your Reference	UNITS	BPSA-01	BPSA-02	BPSA-03	BPSA-04	BPSA-05
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	20/05/2020	20/05/2020	20/05/2020	20/05/2020	20/05/2020
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	85	102	97	99	107

PAHs in Soil					
Our Reference		243071-6	243071-7	243071-8	243071-9
Your Reference	UNITS	BPSA-06	BPSA-07	BPSA-08	BPSA-09
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	20/05/2020	20/05/2020	20/05/2020	20/05/2020
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	0.06
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	0.06
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	99	120	95	98

Organochlorine Pesticides in soil						
Our Reference		243071-1	243071-2	243071-3	243071-4	243071-5
Your Reference	UNITS	BPSA-01	BPSA-02	BPSA-03	BPSA-04	BPSA-05
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	20/05/2020	20/05/2020	20/05/2020	20/05/2020	20/05/2020
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	%	84	100	96	96	103

Organochlorine Pesticides in soil					
Our Reference		243071-6	243071-7	243071-8	243071-9
Your Reference	UNITS	BPSA-06	BPSA-07	BPSA-08	BPSA-09
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	20/05/2020	20/05/2020	20/05/2020	20/05/2020
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	95	125	95	97

Organophosphorus Pesticides in Soil						
Our Reference		243071-1	243071-2	243071-3	243071-4	243071-5
Your Reference	UNITS	BPSA-01	BPSA-02	BPSA-03	BPSA-04	BPSA-05
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	20/05/2020	20/05/2020	20/05/2020	20/05/2020	20/05/2020
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	%	84	100	96	96	103

Organophosphorus Pesticides in Soil					
Our Reference		243071-6	243071-7	243071-8	243071-9
Your Reference	UNITS	BPSA-06	BPSA-07	BPSA-08	BPSA-09
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	20/05/2020	20/05/2020	20/05/2020	20/05/2020
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	95	125	95	97

PCBs in Soil						
Our Reference		243071-1	243071-2	243071-3	243071-4	243071-5
Your Reference	UNITS	BPSA-01	BPSA-02	BPSA-03	BPSA-04	BPSA-05
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	20/05/2020	20/05/2020	20/05/2020	20/05/2020	20/05/2020
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	84	100	96	96	103

PCBs in Soil					
Our Reference		243071-6	243071-7	243071-8	243071-9
Your Reference	UNITS	BPSA-06	BPSA-07	BPSA-08	BPSA-09
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	20/05/2020	20/05/2020	20/05/2020	20/05/2020
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	95	125	95	97

Acid Extractable metals in soil						
Our Reference		243071-1	243071-2	243071-3	243071-4	243071-5
Your Reference	UNITS	BPSA-01	BPSA-02	BPSA-03	BPSA-04	BPSA-05
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Arsenic	mg/kg	<4	<4	<4	<4	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	2
Chromium	mg/kg	12	35	20	16	84
Copper	mg/kg	44	37	27	44	63
Lead	mg/kg	8	11	8	13	120
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	4	8	4	5	35
Zinc	mg/kg	21	23	19	31	5,500

Acid Extractable metals in soil					
Our Reference		243071-6	243071-7	243071-8	243071-9
Your Reference	UNITS	BPSA-06	BPSA-07	BPSA-08	BPSA-09
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Arsenic	mg/kg	<4	<4	<4	6
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	210	200	24	19
Copper	mg/kg	29	37	14	67
Lead	mg/kg	9	11	13	17
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	27	39	10	6
Zinc	mg/kg	26	80	32	49

Moisture						
Our Reference		243071-1	243071-2	243071-3	243071-4	243071-5
Your Reference	UNITS	BPSA-01	BPSA-02	BPSA-03	BPSA-04	BPSA-05
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	20/05/2020	20/05/2020	20/05/2020	20/05/2020	20/05/2020
Moisture	%	24	18	18	20	38

Moisture					
Our Reference		243071-6	243071-7	243071-8	243071-9
Your Reference	UNITS	BPSA-06	BPSA-07	BPSA-08	BPSA-09
Date Sampled		13/05/2020	13/05/2020	13/05/2020	13/05/2020
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	19/05/2020	19/05/2020	19/05/2020	19/05/2020
Date analysed	-	20/05/2020	20/05/2020	20/05/2020	20/05/2020
Moisture	%	15	5.8	13	7.4

Asbestos ID - materials		
Our Reference		243071-10
Your Reference	UNITS	BPSA-10
Date Sampled		13/05/2020
Type of sample		Material
Date analysed	-	21/05/2020
Mass / Dimension of Sample	-	125x100x6mm
Sample Description	-	Beige layered fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Organic fibres detected
Trace Analysis	-	[NT]

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
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.
Metals-021	Determination of Mercury by Cold Vapour AAS.
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.

Method ID	Methodology Summary
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
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.
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. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	243071-2
Date extracted	-			19/05/2020	1	19/05/2020	19/05/2020		19/05/2020	19/05/2020
Date analysed	-			20/05/2020	1	20/05/2020	20/05/2020		20/05/2020	20/05/2020
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	85	81
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	85	81
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	77	79
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	81	79
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	83	76
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	93	85
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	86	79
naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	106	1	104	93	11	108	96

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	243071-2
Date extracted	-			19/05/2020	1	19/05/2020	19/05/2020		19/05/2020	19/05/2020
Date analysed	-			19/05/2020	1	19/05/2020	19/05/2020		19/05/2020	20/05/2020
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	117	94
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	95	84
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	108	87
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	117	94
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	95	84
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	108	87
Surrogate o-Terphenyl	%		Org-020	81	1	94	96	2	117	115

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	243071-2
Date extracted	-			19/05/2020	1	19/05/2020	19/05/2020		19/05/2020	19/05/2020
Date analysed	-			20/05/2020	1	20/05/2020	20/05/2020		20/05/2020	20/05/2020
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	102
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	108
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	114	106
Anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	108	104
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	106
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	96	88
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	1	<0.05	<0.05	0	114	110
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	103	1	85	101	17	97	101

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	243071-2
Date extracted	-			19/05/2020	1	19/05/2020	19/05/2020		19/05/2020	19/05/2020
Date analysed	-			20/05/2020	1	20/05/2020	20/05/2020		20/05/2020	20/05/2020
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	122	106
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	132	106
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	116	118
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	140	120
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	132	108
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	132	96
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	140	106
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	126	108
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	126	120
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	106	108
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	103	1	84	98	15	100	107

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	243071-2
Date extracted	-			19/05/2020	1	19/05/2020	19/05/2020		19/05/2020	19/05/2020
Date analysed	-			20/05/2020	1	20/05/2020	20/05/2020		20/05/2020	20/05/2020
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	120	108
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	98
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	114
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	95
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	112	102
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	112	104
Bromophos-ethyl	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	106	104
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	103	1	84	98	15	100	107

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	243071-2
Date extracted	-			19/05/2020	1	19/05/2020	19/05/2020		19/05/2020	19/05/2020
Date analysed	-			20/05/2020	1	20/05/2020	20/05/2020		20/05/2020	20/05/2020
Aroclor 1016	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	110	118
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	103	1	84	98	15	100	107

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	243071-2
Date prepared	-			19/05/2020	1	19/05/2020	19/05/2020		19/05/2020	19/05/2020
Date analysed	-			19/05/2020	1	19/05/2020	19/05/2020		19/05/2020	19/05/2020
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	104	90
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	102	91
Chromium	mg/kg	1	Metals-020	<1	1	12	13	8	101	97
Copper	mg/kg	1	Metals-020	<1	1	44	44	0	106	110
Lead	mg/kg	1	Metals-020	<1	1	8	8	0	102	95
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	82	79
Nickel	mg/kg	1	Metals-020	<1	1	4	4	0	103	94
Zinc	mg/kg	1	Metals-020	<1	1	21	21	0	104	91

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.

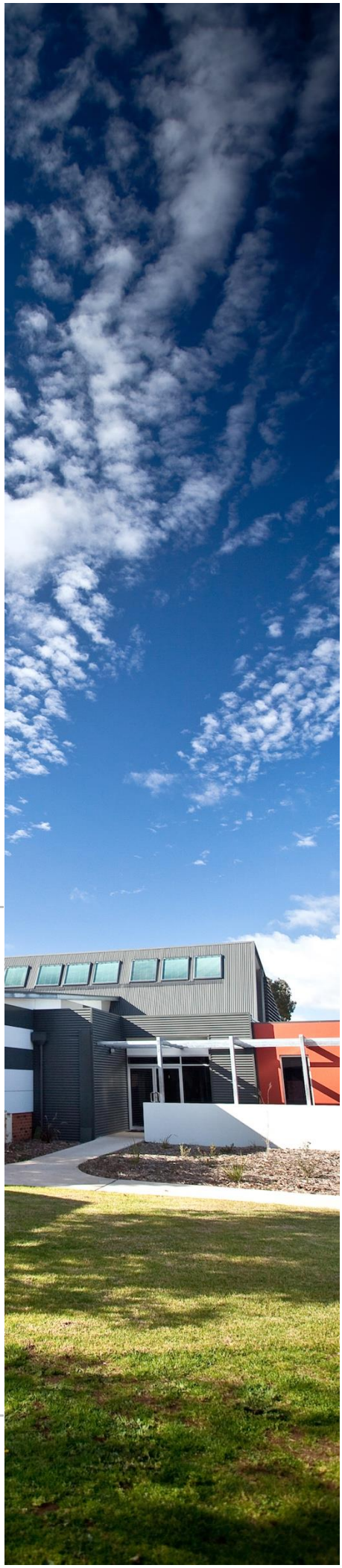
When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

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.



Preliminary Site Contamination Assessment

20 Shiralee Road, Orange, NSW

(Our Reference:33422 ER02)

Disclaimer

This report has been prepared solely for Orange Enterprises No. 1 Pty Ltd (the client) in accordance with the scope provided by the client and for the purpose(s) as outlined throughout this report.

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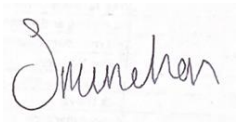
Project Name:	Preliminary Site Contamination Assessment , 20 Shiralee Road, Orange
Client:	Orange Enterprises No. 1 Pty Ltd
Project No.	33422
Report Reference	33422 ER02
Date:	14/12/2021
Revision:	Final

Prepared by:	
	
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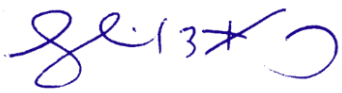	
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EXECUTIVE SUMMARY

Barnson was engaged by Orange Enterprises No. 1 Pty Ltd. to undertake a preliminary contaminated site investigation in support of a residential subdivision of Lot A DP 381935 and Lot 1 DP 381932, known as 20 Shiralee Road, Orange, NSW (hereafter referred to as the Subject Site).

The investigation had as its objectives to identify contamination issues that may affect the suitability of the Subject Site for a future residential subdivision and assess the need for possible further investigations, remediation or management of any contamination issues identified.

The investigation was based on a desktop review of information available for the Subject Site, as well as the findings of a site inspection and confirmatory sampling and analysis of surface soils collected at the site.

A review of the available historical information, including contaminated sites databases, indicated no recorded activities with the potential to significantly contaminate the site.

Although the potential for *significant* environmental contamination to be present across the site was conducted to be low, activities associated with the current and historical use of the Subject Site were identified as having a potential to contaminate surface soil. The following potential sources and areas of contamination were identified:

- Historical agriculture- orchard farming,
- Use, maintenance, and storage of motorised vehicles and equipment, and
- Use of unclassified fill or uncontrolled disposal of waste.

A site inspection, supplemented with confirmatory sampling and analysis, was conducted to determine the presence and significance of potential contamination associated with the identified sources.

Based on the findings of the desktop review and site investigation, it can be stated with a reasonable level of confidence that the area comprising the Subject Site is unlikely to be contaminated and may be further developed for residential use,

This finding is supported with analytical results of surface soil samples collected at the Subject Site, in which contaminants detected were generally below health-risk based screening criteria. These areas are therefore considered suitable for the proposed re-development and subdivision for residential purposes, provided that small areas of stained surface soil are excavated and removed during site clearance in preparation for further development.

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1.0 INTRODUCTION

1.1 Background

Barnson was engaged by Orange Enterprises No. 1 Pty Ltd. (the Client) to undertake a preliminary contaminated site investigation in support of a residential subdivision on Lot A DP 381935 and Lot 1 DP 381932, known as 20 Shiralee Road, Orange NSW (hereafter referred to as the Subject Site).

The client has submitted a request for a Preliminary Site Investigation (PSI) in support of a future residential subdivision of the Subject Site. In accordance with the State Environmental Planning Policy 55 (Remediation of Land) the consent authority must determine if land is contaminated and, if so, whether it is suitable for the intended purpose or require remediation.

1.2 Objectives

The objectives of the investigation are:

- Identify contamination that may affect the site's suitability for a residential subdivision, and;
- Assess the need for possible further investigations, remediation or management of any contamination identified.

1.3 Scope of Work

To meet the objectives, Barnson completed the following scope of work:

- Site identification including a review of site history, site condition, surrounding environment, geology and, where available, hydrogeology.
- Desktop review of site history and assessment of potential sources of contamination.
- Development of a Conceptual Site Model (CSM) with information gathered from the data review and site inspection.
- Site inspection to assess site conditions.
- Collection of confirmatory soil samples and analysis to determine nature of possible contamination.
- Provide conclusions as to the suitability of the site for the intended future land use.
- Preparation of a report.

1.4 Purpose of this report

The purpose of this report is to document, with cognisance of the guidelines for Consultants Reporting on Contaminated Sites (NSW EPA, 2020), works undertaken, in accordance with the scope of works as described in Section 1.3, results of the desktop review and site inspection, and recommendations for further actions required to determine fitness of the site for use.

1.5 Assumptions and Limitations

The following assumptions have been made in preparing this report:

- The future use of the site will be for a future residential subdivision. This assumption forms the basis for the Conceptual Site Model (Section 4).

- All information pertaining to the contamination status of the site has been obtained through public record searches, a preliminary site inspection and analysis of confirmatory samples collected at the Subject Site. All documents and information in relation to the Subject Site, which were obtained from public records, are accepted to be correct and has not been independently verified or checked.

It should be recognised that even the most comprehensive site assessments may fail to detect all contamination on a site. This is because contaminants may be present in areas that were not previously surveyed or sampled or may migrate to areas that showed no signs of contamination when sampled. Investigative works undertaken at the Subject Site by Barnson identified actual conditions only at those locations in which sampling and analysis were performed. Opinions regarding the conditions of the site have been expressed based on historical information and analytical data obtained and interpreted from previous assessments of the site. Barnson does not take responsibility for any consequences as a result of variations in site conditions.

2.0 SITE DESCRIPTION

2.1 Site Identification

Table 2.1 presents a summary of the available information pertaining to the identification of the Subject Site. The Subject Site is comprised of two lots, zoned as R2- Low density Residential, RE1- Public Recreation, and R1- General Residential, pursuant the *Orange Local Environmental Plan 2011.* Table 2.1 presents a summary of the information for the Subject Site.

Table 2.1: Summary of Subject Site identification details.

Information	Details
Site address	20 Shiralee Road Orange, 2800 NSW
Site Area (approx.)	2.35ha
Lot and Deposited Plan No.	Lot A DP 381935 Lot 1 DP 381932
Zoning	R1- General Residential RE1- Public Recreation R2- Low Density Residential
Title Search/ History	Refer to Appendix A.

Information	Details
List of site uses	The site has been previously used for agricultural purposes, orcharding, and the storage of farming machinery. There is large amounts of managed grasslands and several tracts of vegetation. (Google, 2021)
County	Bathurst
Parish	Orange
Local Government Area	Orange Regional Council

Figure 2.1 presents a map indicating the location of the Subject Site.

Figure 2.1: Location of the Subject Site.

2.2 Layout and Features

The Subject Site has an approximate area of 2.35 hectares and is located approximately 200m from the Shiralee Road intersection with Pinnacle Road. The site is located to the south-west of the Orange Central Business District and has a frontage to Shiralee Road to the north (see Figure 2.2).

From available online imagery, the Subject Site has been used as a house lot for an extended period of time with a house located in the south-western corner of the lot. The current owner purchased the property in 1991, extended the existing house and removed all the apple orchard trees from the property. A large shed structure visible on the northern boundary of the property was previously used as fruit packing shed but currently is used for the storage maintenance of

earthmoving equipment. The right hand side of the site is an unoccupied paddock occasionally used for grazing livestock. A stockpile of firewood is also located in this area. Large tracts of vegetation can be seen located around the Site, with the majority working as a buffer for the residential dwelling. The central portion of the site is utilised for keeping livestock and currently houses a few sheep.

Figure 2.2: View of the Subject Site from Shiralee Road.

Figure 2.3 presents an aerial photo of the Subject Site with the main distinguishable areas indicated as sketch plan overlay.

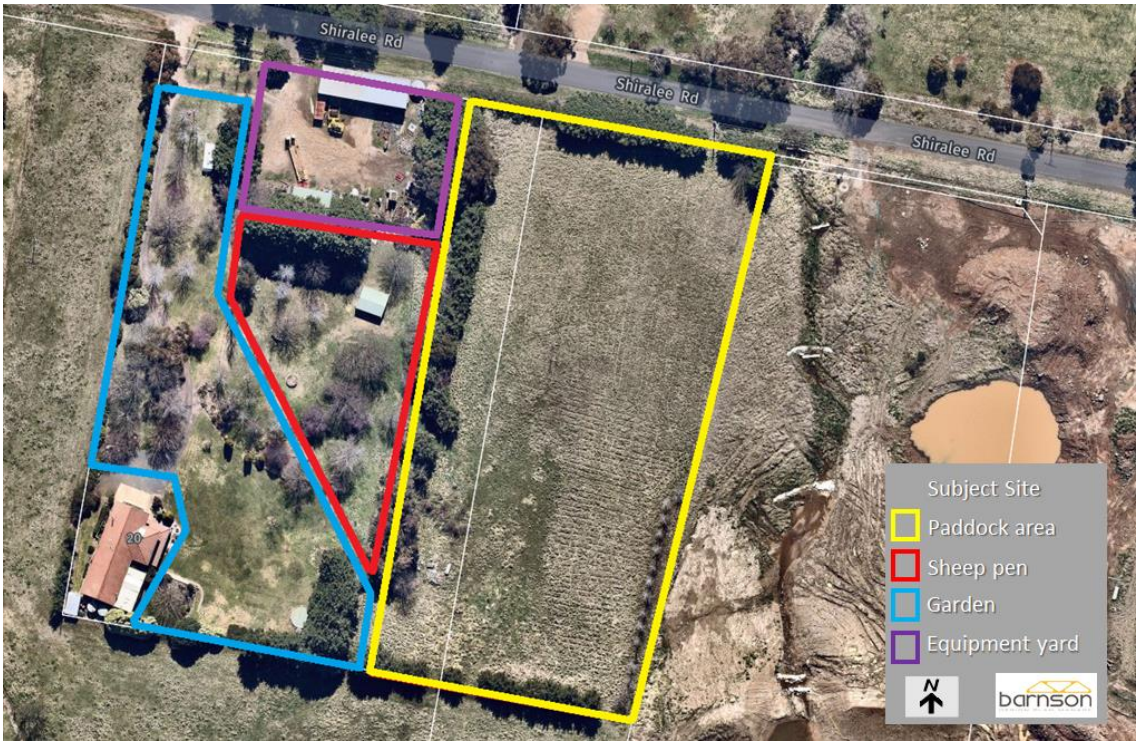

Figure 2.3: Existing Subject Site layout.

2.3 Proposed Development

Orange Enterprises No. 1 Pty Ltd is seeking approval to subdivide Lot A DP 381935 & Lot 1 DP 381932 in favour of a future residential subdivision.

3.0 SITE SETTING

3.1 Geology

A review of the Orange 1:100,000 Geology Map (refer to Figure 3.1) shows the geology of the area where the Subject Site is situated as pyroxene olivine basalt, plagioclase basalt, alkali basalt, trachybasalt, and trackyandesite.

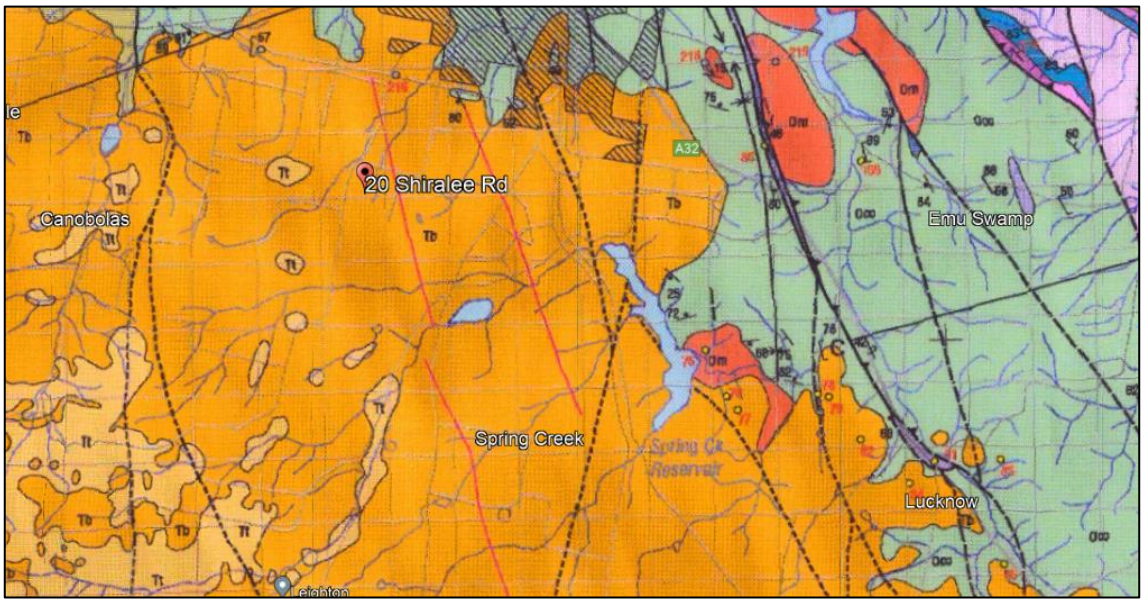

Figure 3.1: Gulgong 1:10000 geology map showing the location of the Subject Site

An examination of the Geological Survey of NSW maps of Naturally Occurring Asbestos (accessed on 25th of November 2021), shows that the geological units underlaying the Subject Site has no asbestos potential.

3.2 Soils

The Subject Site is mapped within the Spring Hill Soil Landscape. In this landscape, soils are described as Krasnozems, of which the topsoil are dark reddish-brown loam with weak to moderate fine crumb structure (pH 6.5) that gradually change dark reddish brown clay loam sub-soil with moderate fine crumb structure (pH 6.0) moving to light clay with strong subangular blocky structure (pH 5.5-6.0) at depth.

The soils are described as of moderate to low chemical fertility with known use for orchards, dairying, improved pastures and plantations. While top-soils on hillcrests, slopes and in valleys have good water holding capacity, valley soils are poorly drained. In general, top-soils are considered moderately erodible but sub-soil erodibility is low.

The Atlas of Australian Acid Sulphate Soil has the Subject Site in an area of 'low' probability of occurrence (a 6-7% chance of occurrence).

3.3 Topography and Drainage

Figure 3.2 presents topographical information overlain on the map of the Subject Site. The presented data shows that the Subject Site is relatively flat with a slight slope to the North-west towards the Blackmans Swamp Creek.

Figure 3.2: Subject Site topography.

The nearest natural water body to the Subject Site is the Blackmans Swamp Creek, which as its closest is located at a distance of approximately 260 metres to the north-west.

3.4 Groundwater Resources

A review of existing groundwater bore records (WaterNSW, 2021) indicate two (2) registered groundwater bores within the Subject Site's boundaries (see Figure 3.3). There is also over 15 registered groundwater bores within a 500m radius of the Subject Site. These have not been considered.

The information recorded in the database for the two (2) bores within the Subject Site's boundaries indicate the depth of the bores range from 66.50m to 68m with a Standing Water Level (S.W.L) of between 3.60m to 22.90m. The shallowest Water Bearing Zone (W.B.Z) is recorded for the GW047294 at 6.70m. According to the database entry the bores are used for irrigation purposes.

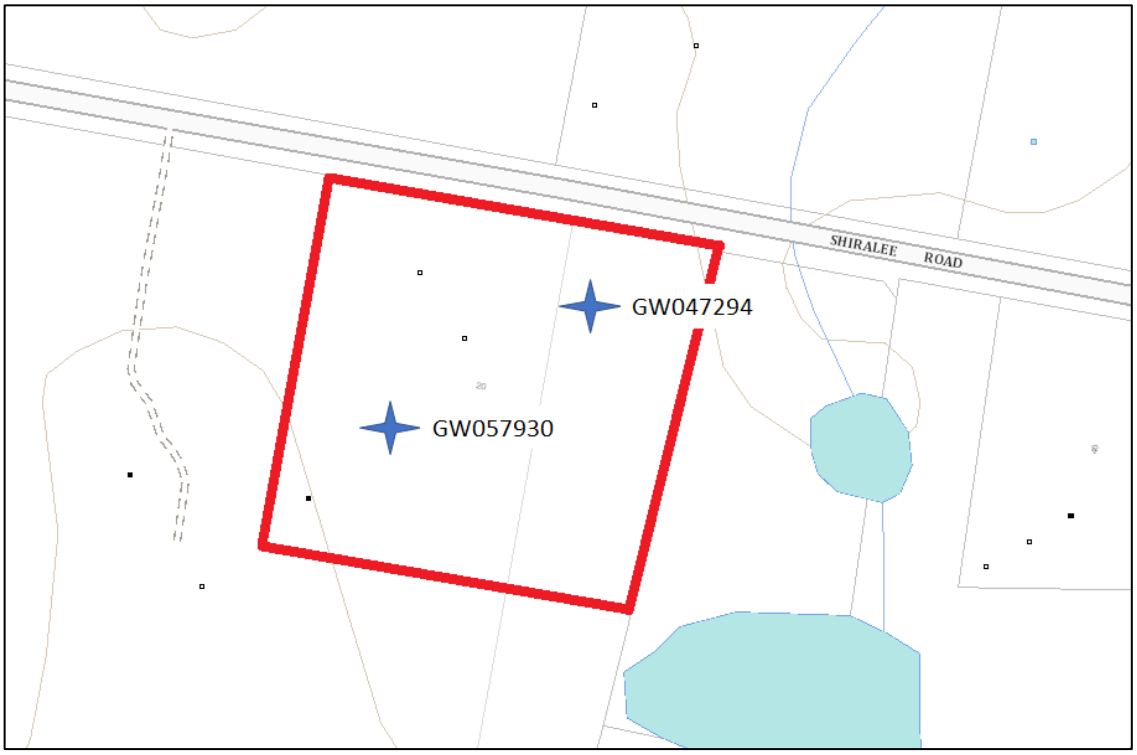

Figure 3.3: Groundwater bores near the Subject Site.

The *Orange Local Environmental Plan 2011* (ORC LEP, 2011) shows the Subject Site as being within a groundwater vulnerable area.

4.0 SITE HISTORY

4.1 Historical Land Use

Historical aerial images from 1956, 1964, 1972, 1973, 1984, 1969, 1998, 2003, and 2019 were reviewed for this assessment. Table 4.1 presents a summary of observations made from the available aerial photographs. The aerial photographs (as obtained from Lotsearch Pty Ltd) are included in Appendix B.

Table 4.1: Summary of historical land use.

Details	Observations
1956	The entirety of the Subject Site has been established as an orchard farm. Similarly, further orchard farms can be visible to the north of the site. Adjoining the east, south, and west of the site is predominantly undeveloped agricultural land. Clearings, tracks, and a number of structures associated with stock farming activities can be observed.

Details	Observations
1996	The site remained largely the same between 1956-1996 with the orchard farm visible with little change. In 1991, the current owner cleared the Site of all orchard trees. A dwelling house has been erected in the south-west corner with a driveway providing access to Shiralee Road. On the boundary with Shiralee Road, a large, shed structure is visible. The area near this shed is fenced and is used for the storage and maintenance of earthmoving equipment. The remainder of the site is mainly greenfield and garden, associated with the dwelling. Bounding the south and west boundaries is a plum orchard on the neighbouring lot.
2019	Trees dissecting the site have grown in size. No further development or changes to land use observed on the Subject Site or surrounding land.

4.2 Historical Record of Site Contamination

Datasets maintained by the Office of Environment and Heritage (OEH) including notices under CLM Act, POEO Environment Protection License Register and environmental incidents were reviewed.

- List of NSW contaminated sites notified to EPA – The sites appearing on the OEH "List of NSW contaminated sites notified to the EPA" indicate that the notifiers consider that the sites are contaminated and warrant reporting to EPA. However, the contamination may or may not be significant enough to warrant regulation by the EPA. The EPA needs to review information before it can make a determination as to whether the site warrants regulation. A search of the listing returned no record for the Subject Site.
- Contaminated Land Record of Notices – A site will be on the Contaminated Land Record of Notices only if the EPA has issued a regulatory notice in relation to the site under the *Contaminated Land Management Act* 1997. A search of the register in November 2021. returned no record for the Subject Site and indicated no listings for any site within a radius of 1,000m.

There is further no record of the Subject Site or within a radius of 1,000m from these areas, in any of the following databases:

- Former Gasworks database
- EPA PFAS Investigation Program
- Defence PFAS Investigation & Management Program
- Airservices Australia National PFAS Management Program
- Defence 3 Year Regional Contamination Investigation Program

4.3 Previous Site Investigations

No information relating to any previous assessment of contamination at the Subject Site was available for review. Barnson undertook a Preliminary Site Investigation (PSI) of the neighbouring property (12 Shiralee Road) in 2020. The PSI investigated agricultural land use activities (plum orcharding and livestock) as potential contaminating activities and concluded that the property was suitable for residential development and land use.

5.0 CONCEPTUAL SITE MODEL

5.1 General

The conceptual site model (CSM) is intended to provide an understanding of the potential for contamination and exposure to contaminants within the investigation areas. The CSM draws together the available historical information for the site, with site specific geological, and hydrogeological information to identify potential contaminants, contamination sources, migration and exposure pathways and sensitive receptors.

5.2 Sources

The identification of sources presented here is based on the review of available historical information and photographs, as well as an understanding of current conditions at the Subject Site. The following is a summary of the potentially contaminated areas and sources of contamination identified:

- Historical farming activities (orcharding).

The entirety of the site was used for apple orcharding pre-1991. This style of farming likely required the use of chemicals such as pesticides or fertilisers in the maintenance of the trees. Potential contaminants associated with orchards include heavy metal (particularly arsenic), organochlorine and organophosphate pesticides. Intensive use of fertiliser can also lead to the build-up of heavy metals in surface soil particularly zinc and cadmium, depending on the type and source of fertiliser.

- Livestock.

Keeping and grazing of livestock has the potential for introducing contaminants into surface soils Activities associated with the management of animal health, including sheep or cattle dip or spraying for the control of parasites could result in localised contamination. Potential contaminants include pesticides, hydrocarbons, heavy metals and elevated nutrients. In addition, the former use of portions of the site for grazing purposes may be associated with the use of pesticides and herbicides.

- Landscape maintenance

The lawn and gardens on Lot 1 (DP 381932) and the paddock area of Lot A (DP 381935) are clearly maintained. Maintenance of lawn and plants could require the use of pesticides or fertilisers, presenting risks of surface soil contamination similar to those discussed for agricultural land use above. The use of motorised gardening equipment on landscaping areas and for mowing the paddock area, have the potential to contribute to localised contamination of surface soils through leakage and spillage of hydrocarbon fuel and lubricants.

- Vehicles and earthmoving equipment.

Historical information and photographs indicate that the a portion of the Subject Site fronting onto Shiralee Road has been utilised for the storage and maintenance of commercial vehicles and earth moving equipment. Activities such as welding, refuelling, and mechanical maintenance of the vehicles and equipment has several potential contaminant sources associated with it and could have led to localised as well as dispersed contamination of this portion of the Subject Site.

5.3 Contaminants of Potential Concern

In considering the potential sources relevant to the Subject Site, a wide variety of contaminants may be present. With the historical agricultural activities (orcharding) and the use of the site for the operation of an earth moving enterprise, considered the primary potential sources of contamination, the most likely contaminants expected at the Subject Site include petroleum hydrocarbons, heavy metals and residues of agricultural chemicals such as pesticides and fertilisers.

Based on this understanding of the site history and activities, the contaminants of potential concern identified for the investigation of the Subject Site include:

- hydrocarbons (mainly fuel and lubricants);
- heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn); and
- pesticides (organochlorines, organophosphates).

There is no reason to expect hazardous materials such as asbestos or lead based paints to be present in significant quantities at the subject site. There is no evidence of historical demolition or construction activities at the site and according to the current owner, there has not been any large-scale use of fill material brought onto the Subject Site from elsewhere.

5.4 Pathways

The primary pathways by which receptors could be exposed to the contaminants outlined above include:

- Inhalation of dust or vapours.
- Dermal contact with contaminated soils.
- Incidental ingestion of contaminated soils.
- Surface runoff, sediment transport and discharge to surface waters.
- Vertical and horizontal migration of contamination through the soils into the underlying groundwater.

Of the listed potential pathways, the contamination of water resources through infiltration is considered the most unlikely. Although the Subject Site is indicated as a groundwater vulnerable zone, the depth to groundwater at the site is reported as >6m. This depth to groundwater and the slope of the site is expected to limit vertical migration of any contaminants which may be entering the surface soil from above.

5.5 Receptors

Potential receptors may include:

Human receptor populations

- Future residents of the subdivided lots.
- Visitors to the site (e.g. workers conducting maintenance, contractors, members of the public); and
- Workers involved in the construction of residential dwellings for future residents of the Subject Site.

Environmental Receptors

- Local drainage channels and receiving surface water bodies; and
- Groundwater resources beneath the site (negligible likelihood of contamination expected).

5.6 Potential for Contamination

The Subject Site is not listed in any of the contaminated land databases. Based on the results of the desktop assessment, the overall likelihood for *significant* chemical contamination to be present within the site is low.

Although agricultural and vehicle/equipment maintenance activities are reasoned to have a potential for contaminating surface soils at the Subject Site, the type and quantity of contamination introduced through these activities is not expected to have led to significant contamination of the surface soils.

6.0 SITE INSPECTION

6.1 General

The objective of the investigation is to determine whether there are any environmental risks associated with the Subject Site that could affect the proposed future development and would require further investigation or action to render the site suitable for its intended use.

The desktop evaluation of the history and current use of the Subject Site did not identify any significant risks in this regard but did identify both historical and current land use activities that could contribute to contamination of the surface soils.

Barnson conducted an inspection of the Subject Site on 29 November 2021. The purpose of the site inspection was to verify the findings of the desktop assessment, as well as to collect confirmatory samples of soil from areas of the Subject Site where contamination is suspected.

Based on the findings of the CSM the inspection and sampling were focussed on the surface soils (50-300mm). The site inspection included all areas of the Subject Site.

During the site inspection the following observations were made:

- The Subject Site is fenced with controlled access from Shiralee Road. The site is in general good order without any visible sign of disturbance to the soils or plants.

- A double story dwelling of brick outer construction is located in the south-western corner of Lot 1 (DP 381932) (Figure 6.1).

Figure 6.1: Dwelling house at south-west corner of Subject Site.

- The dwelling has a gravel driveway leading up to it and is surrounded by a large, maintained garden that include several established trees and a number of small metal sheds and structures used for gardening equipment and for keeping chickens (Figure 6.2).
- To the north-east of the dwelling an area of Lot 1 is fenced of and used for keeping livestock (Figure 6.2). Sheep were observed grazing in this area at the time of the site inspection.

Figure 6.2: Maintained lawn, garden and small shed structure near dwelling house.

Figure 6.3: Sheep pen in use.

- The central livestock pen area also include a shed used for gardening and mowing equipment. Currently the shed is also utilised as sleeping area by the livestock.

Figure 6.4: Storage shed within the livestock pen.

- Further north in the north eastern corner of Lot 1, a fenced area houses an equipment storage yard and maintenance shed for an earthmoving business being operated from the Subject Site. The fenced area of approximately 1,800m2 houses a large steel-sheeted workshop shed (see Figure 6.5) as well as other steel structures (see Figure 6.6) where truck bodies and vehicles are stored. The yard further include some spare parts, water tanks as well as a stockpile of firewood (Figure 6.7).
- According to the site owner, a raised fuel tank and bowser (see Figure 6.8) stored at the equipment yard was never used at the Subject Site. No fuel was stored at the subject site during the tenure of the current owner.
- The owner noted that an underground fuel storage tank (UST), existing when the current owner purchased the property, was removed from the yard area in the early 1990s. This UST was excavated and removed near the south-western corner of the workshop shed. According to the owner, the UST did not leak and was sold to a third party and taken off site.
- The workshop shed has a concrete floor and the area around the entrance is protected with a layer of aggregate to prevent erosion during wet conditions (Figure 6.9).
- Spots of dark stained soil were observed in the areas where large machinery and truck bodies are stored. The spots are small (less than 0.5m across) and localised to specific areas (see Figure 6.10).

Figure 6.5: Large Machinery near shed on Shiralee Road boundary.

Figure 6.6: Equipment storage in the equipment yard in the north of the property.

Figure 6.7: Items stored in the equipment yard.

Figure 6.8: Fuel tanks and refuelling equipment.

Figure 6.9: Workshop shed with concrete slab on ground and gravel stabilised access.

Figure 6.10: Stained soil near suspended truck body.

- The paddock area in the east of the property (Lot A, DP 381935) is unoccupied (Figure 6.11). The pasture is maintained (mowed) and very few weeds are present. At the time of the inspection the ground was very soft (boggy) following recent rain.

Figure 6.11: Paddock area in eastern half of Subject Site.

6.2 Confirmatory Sampling

The purpose of collecting confirmatory samples as part of the site inspection is to determine if any of the potential contaminants identified from the CSM are present. The samples are not intended for statistically valid characterisation or quantification of contamination levels. The collection of surface soil samples at the site was therefore focussed on areas where contamination of the surface soil could most likely have occurred.

Samples of soil were collected from the paddock area, garden and livestock pen as well as. The earth moving equipment yard in the northern part of the Subject Site was also specifically investigated with a separate set of surface soil samples collected. Individual samples collected over large areas were combined into composite samples for analysis. Figure 6.12 presents a map of the Subject Site with the locations of the surface soil samples indicated.

The pattern followed for the soil sampling can be described as Judgement Sampling, where points are selected on the basis of the investigator's knowledge of the proposed land use and likely distribution of contaminants at a site. It is an efficient sampling method for confirmatory sampling that utilises knowledge of the site history and field observations to direct sample collection (NSW EPA, 1995).

Figure 6.12: Locations of confirmatory surface soil samples.

Table 6.1 is a summary description of the collected samples as well as indicating which samples were combined for analysis.

Table 6.1: Summary of sample details.

Reference in Figure 6.12	Description	Composite sample number submitted for analysis
1a-1f	Surface soil (50-300mm) samples collected from paddock area, the eastern portion of the property.	Composite sample prepared of sample 1a-1f, submitted as composite sample 'OP-01' for analysis.
2a-2c	Surface soil (50-300mm) samples collected from sheep pen.	Composite sample prepared of sample 2a to 2c, submitted as composite sample 'OP-02' for analysis.
3a-3c	Surface soil (50-300mm) samples collected from garden area.	Composite sample prepared of sample 3a to 3c, submitted as composite sample 'OP-03' for analysis.

Reference in Figure 6.12	Description	Composite sample number submitted for analysis
4	Surface soil (50-300mm) sample collected from the eastern portion of equipment yard.	Sample submitted as 'OP-04' for analysis.
5	Surface soil (50-300mm) sample of stained area.	Sample submitted as 'OP-05' for analysis.
6	Surface soil (50-300mm) samples collected from western portion of equipment yard	Sample submitted as 'OP-06' for analysis.

The individual sample increments collected were combined in a 5 litre bucket, as presented in Table 6.1, and transferred to the Barnson office in Mudgee for sub-sampling and laboratory submission. The volume of soil in each bucket was reduced by following a 'cone-and-quarter' technique. The increments in each bucket were thoroughly mixed by heaping into a cone and turning the cone over to form a new cone until the operation has been carried out three times. The heap is flattened and quartered along two diameters which intersect at a right angle in the centre of the cone (see Figure 6.13).

One pair of diagonally opposite quarters are removed and the remainder is scooped into a cone and the procedure repeated until a mass of sample sufficient to fill a 250ml glass jar is produced (see Figure 6.14).

Figure 6.13: Cone and quartering.

Figure 6.14: Sample volume reduction.

The glass jars were filled, marked as indicated in Table 6.1, placed in a thermally isolated container with ice bricks and transferred to the analytical laboratory. All samples were submitted to the Australian Laboratory Services Pty Ltd (ALS), laboratory in Mudgee, for determination of the following parameters:

- metallic element (cadmium, chromium, copper, lead, nickel and zinc) concentrations, including arsenic and mercury in soil;
- extraction with organic solvent and analysis of Total Recoverable Hydrocarbons (TRH) fractions C6 to C40, benzene, toluene, ethylbenzene and total xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), polychlorinated biphenyls (PCBs);
- extraction with organic solvent and analysis of Organochlorine (OCP) and Organophosphorus (OPP) Pesticides.

There is no reason to believe that asbestos contamination may be present in the surface soils of the Subject Site. The composite surface soil samples were therefore not analysed for the presence of asbestos fibres. The ALS laboratory is NATA accredited for all the analysis indicated above.

6.3 Analytical Results

The ALS laboratory report for the samples is attached as Appendix C. The laboratory report indicates that mainly metallic elements were detected in the surface soil samples from the gardens, paddock and livestock pen area. In all of the surface soil samples from the garden and livestock pen areas, the concentrations of hydrocarbons as well as persistent pesticide and herbicide compounds are indicated as below the limits of detection. While hydrocarbons are also absent in the surface soil from the paddock, a single pesticide compound was detected.

The discrete samples collected from the equipment yard area showed metallic elements as well as petroleum hydrocarbons. As indicated in Table 6.1, the

The metals detected in the surface soil samples include arsenic (As) chromium (Cr), copper (Cu), lead (Pb), nickel (Ni, and zinc (Zn). Concentrations of, cadmium and mercury were all below or at the laboratory limit of reporting. Table 6.2 presents a summary of the analytical results for the elements and compounds detected.

Table 6.2: Summary of metal, pesticide and hydrocarbon concentrations detected in surface soil samples from the Subject Site.

Element	OP-01	OP-02	OP-03	OP-04	OP-05	OP-06
	mg.kg^{-1}					
Arsenic (As)	<5	<5	<5	7	6	<5
Cadmium (Cd)	<1	<1	<1	<1	<1	<1
Chromium (Cr)	20	29	36	25	24	16
Copper (Cu)	17	18	15	40	55	42
Lead (Pb)	22	13	10	25	22	22
Mercury (Hg)	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Nickel (Ni)	6	11	9	10	9	7
Zinc (Zn)	30	25	20	47	960	143
4.4`-DDE	0.43	<0.05	<0.05	<0.05	<0.25	<0.05
>C10 - C16 Fraction minus Naphthalene (F2)	<50	<50	<50	<50	370	<50
C15 - C28 Fraction	<100	<100	<100	1,200	23,900	140
C29 - C36 Fraction	<100	<100	<100	630	38,400	180
>C16 - C34 Fraction (F3)	<100	<100	<100	1,640	47,000	280
>C34 - C40 Fraction (F4)	<100	<100	<100	330	35,600	<100

6.4 Analytical Data Quality

Samples were collected in new, clean containers using cleaned equipment. Discrete samples were placed in glass jars provided by the laboratory that were refrigerated after filling and transported in an insulated container to the laboratory. Chain of custody was recorded for all samples. A copy of the signed sheet is attached as Appendix A.

The analyses were undertaken at a NATA accredited laboratory. The laboratory quality control procedures in the form of duplicates as well as analyte and surrogate spikes were applied to all contaminant classes analysed. The results reported for the duplicate is within the Relative Percent Difference range of the acceptance criteria for a duplicate sample. The analyte spike recoveries reported for the different sets of organic analytes are indicated as within the acceptance criteria (see Appendix C).

All media appropriate to the objectives of this investigation have been adequately analysed and no area of significant uncertainty exist. It is concluded the data is usable for the purposes of the contaminated site investigation.

7.0 ASSESSMENT

7.1 Assessment Criteria – Human Health and Environmental Risk

Screening for human health and ecological risk, utilises published human health investigation levels (HILs) and ecological screening and investigation levels (ESLs & EILs) from the National Environment Protection (Assessment of Site Contamination) Measure (NEPC, 1999) to identify contaminant concentrations in soil that may pose a risk to future residents, people visiting the site, or to ecological receptors.

HILs are scientifically based, generic assessment criteria designed to be used in the screening of potential risks to human health from chronic exposure to contaminants. HIL's are conservatively derived and are designed to be protective of human health under the majority of circumstances, soil types and human susceptibilities and thus represent a reasonable 'worst-case' scenario for specific land-use settings. The HILs selected for evaluation of the Subject Site are those derived for a standard residential scenario (HIL-A) and assumes a residential land use with garden/accessible soil (home grown produce <10% fruit and vegetable intake, and no poultry).

Table 7.1 presents a summary of the health-risk based criteria and ecological investigation levels selected for assessment of the detected metal and pesticide concentrations.

Although the primary concern in most site assessments is protection of human health, the assessment should also include consideration of ecological risks and protection of groundwater resources that may result from site contamination. EILs provide screening criteria to assess the effect of contaminants on a soil ecosystem and afford species level protection for organisms that frequent or inhabit soil and protect essential soil processes.

Ecological investigation levels (EILs) have been derived for common metallic contaminants as well as selected pesticides in soil. The values selected for the evaluation of the detected contaminants considers the physicochemical properties of soil and contaminants and the capacity of the soil to accommodate increases in contaminant levels above natural background while maintaining

ecosystem protection for identified land uses. The values selected are listed in the last column of Table 7.1.

Table 7.1: Human health and ecological risk screening levels for metals.

Element	Health-based Investigation Levels HIL A Residential mg.kg^{-1}	Ecological Investigation Levels (EIL) Residential mg.kg^{-1}
Arsenic (As)	100	100
Cadmium (Cd)	20	-
Chromium (Cr) (Total)	NR	230
Copper (Cu)	6,000	230
Lead (Pb)	300	1,100
Mercury (Hg)	40	-
Nickel (Ni)	400	270
Zinc (Zn)	7,400	300
DDT+DDE+DDD	240	180 (DDT)

Note: NR=not relevant due to low human toxicity of Cr(III). NA=No applicable screening level. EILs selected for urban residential and public open space land use scenario.

The health risks associated with petroleum hydrocarbon compounds are assessed using Health Screening Levels (HSLs) developed to be protective of human health by determining the reasonable maximum exposure from sources for a range of situations commonly encountered on contaminated sites. HSLs are derived for soil, groundwater and soil vapour and relate to exposure to petroleum hydrocarbons through the vapour inhalation exposure pathway only. Direct exposure pathways such as incidental soil ingestion and dermal exposure pathways are generally not the risk drivers when compared to inhalation exposure (NEPC, 1999). HSLs have been developed for BTEX and naphthalene plus four hydrocarbon fractions namely:

- C6 – C10- Fraction number F1
- >C10 – C16 - Fraction number F2
- >C16 – C34 - Fraction number F3
- >C34 – C40 - Fraction number F4

Ecological risks associated with hydrocarbons are evaluated by using ecological screening levels (ESLs), which are based on EC_{25} weight-of-evidence ecotoxicity data, evaluated for a residential land use scenario (NEPC, 1999). The ESLs are evaluated (see Table 7.2) for the same four fractions ranges (F1 to F4) listed above.

It was confirmed that limits of detection reported by the laboratory are below the criteria values. All other contaminants analysed for in the soil samples that are reported below the limit of detection by the laboratory can therefore be excluded from further assessment.

Table 7.2: Human health and ecological risk screening levels for hydrocarbon fractions.

Hydrocarbon Fraction	Management limits for TPH in Soil Residential mg.kg^{-1}	Health Screening Levels (HSLs) for vapour intrusion Residential (sand) mg.kg^{-1} (soil)	Ecological Screening Levels (ESL) Residential mg.kg^{-1}
F1	700	45	180
F2	1,000	110	120
F3	2,500	-	1,300
F4	10,000	-	5,600

7.2 Findings

Direct comparison of the analytical results presented in Table 6.2 with the assessment criteria (refer Table 7.1) show that metallic element concentrations for all elements are well below health-risk based screening values. The general low concentrations of heavy metals detected in the surface soil samples at the Subject Site suggest naturally occurring element abundance and are not considered to be related to contamination.

The pesticide compound detected in the sample of soil from the paddock area (Lot A), dichlorodiphenyldichloroethylene (DDE), is a chemical compound formed by the chemical breakdown of DDT and is a commonly encountered in the environment where DDT was previously applied. Due to DDT's prevalence in agriculture during the mid-20th century, DDT and DDE are widely encountered in agricultural areas. The concentration of DDE detected at the Subject Site is low and do not indicate a level of concern for the further use of the site.

The three discrete samples of soil collected from the equipment yard area show elevated concentrations of specifically petroleum hydrocarbons (compare Table 7.2). This is to be expected given the almost three decades long use of the area for the storage and maintenance of earthmoving equipment and heavy vehicles. The sample of soil (OP-05) that shows the highest concentrations of hydrocarbons as well as an elevated concentration of zinc, was collected directly from a patch of stained soil, as shown in Figure 6.10. Although the other samples collected from the yard area also indicate elevated concentrations of hydrocarbons, the concentrations are significantly lower and are below health-risk based screening criteria.

The results indicate that although hydrocarbon compounds are prevalent in the surface soils of the equipment yard, the average concentration of these compounds across the area are likely below screening criteria and do not represent a risk to future residents and the broader environment. The few isolated 'hotspots' where accidental spillage or leakage of fuel, lubricants or hydraulic oil has occurred, can be expected to contain high concentrations of hydrocarbon compounds. However, the compounds present does not include the volatile F1 fraction or BTEX, which are indicated for risks to residential land use through inhalation. The risks to human health from these hotspots is therefore accepted to be limited. However, it is advisable to have any stained soil removed and appropriately disposed when the site is being cleared for development.

No other contaminants evaluated were detected at concentrations exceeding screening criteria. The composite soil samples collected from the paddock, gardens and livestock pens areas show no elevated levels of pesticides, hydrocarbons or heavy metals.

The confirmatory soil samples thus support the assertion that significant and widespread chemical contamination is unlikely to be present within the Subject Site.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

In accordance with the objectives stated in Section 1.2, and based on the information contained within this assessment, the following conclusions are presented (subject to the limitations noted in Section 1.5):

- Activities associated with the historical and current use of the Subject Site were identified as having a potential to contaminate surface soil at the site.
- The following potential sources of contamination were identified:
    - Historical farming activities (orcharding);
    - Livestock;
    - Landscape maintenance; and
    - Vehicles and earthmoving equipment.
- A review of the available historical information, including contaminated sites databases and aerial photographs, indicated a low potential for significant environmental contamination to be present across the Subject Site.
- A site investigation revealed evidence of low concentration pesticide residues in a paddock area in the eastern half of the Subject Site as well as hydrocarbon contamination of surface soils, localised to an equipment yard used in the operation of an earthmoving business.
- Confirmatory sampling confirmed that concentrations of the contaminants investigated were below screening criteria, except for petroleum hydrocarbons in small spots of stained soil in the equipment yard.
- The screening criteria used in the evaluation of the contaminant concentrations were appropriately conservative and suitable for assessment of the proposed residential land use categories.
- Based on the findings of the site investigation it is concluded that the concentrations of potential contaminants investigated in the surface soils of the Subject Site does not represent any potential risk to human health or the environment.

8.2 Recommendations

- Based on the findings of the desktop review and site investigation it can be stated with a reasonable level of confidence that the Subject Site is suitable for the proposed re-development and land use.

- It is recommended that any stained areas of soil observed in the equipment yard in the north of Lot 1 (DP381932) be removed and appropriately disposed at the time the site is cleared for further development.
- Any potentially contaminated material excavated from the site must be classified in accordance with the NSW Environment Protection Authority (EPA) Waste Classification Guidelines (NSW EPA, 2014).
- A Construction Environmental Management Plan (CEMP) is recommended to be prepared, prior to further demolition or construction works being undertaken. The purpose of the CEMP is for the management of excavated soils and should include procedures for the management of sediment and erosion as well as a protocol when any contaminated material or hazardous materials are discovered during excavations.

9.0 REFERENCES

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Appendix A - Title search

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: AUTO CONSOL 6671-96

SEARCH DATE	TIME	EDITION NO	DATE
24/11/2021	3:54 PM	3	25/10/2021

LAND

LAND DESCRIBED IN SCHEDULE OF PARCELS
LOCAL GOVERNMENT AREA ORANGE
PARISH OF ORANGE COUNTY OF BATHURST
TITLE DIAGRAM SEE SCHEDULE OF PARCELS

FIRST SCHEDULE

IAN ALEXANDER BROUGH (ND AR383851)

SECOND SCHEDULE (1 NOTIFICATION)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)

NOTATIONS

UNREGISTERED DEALINGS: NIL

SCHEDULE OF PARCELS	TITLE DIAGRAM
LOT 1 IN DP381932	DP381932
LOT A IN DP381935	DP381935.

*** END OF SEARCH ***

Barnson Pty Ltd (Mudgee) PRINTED ON 24/11/2021

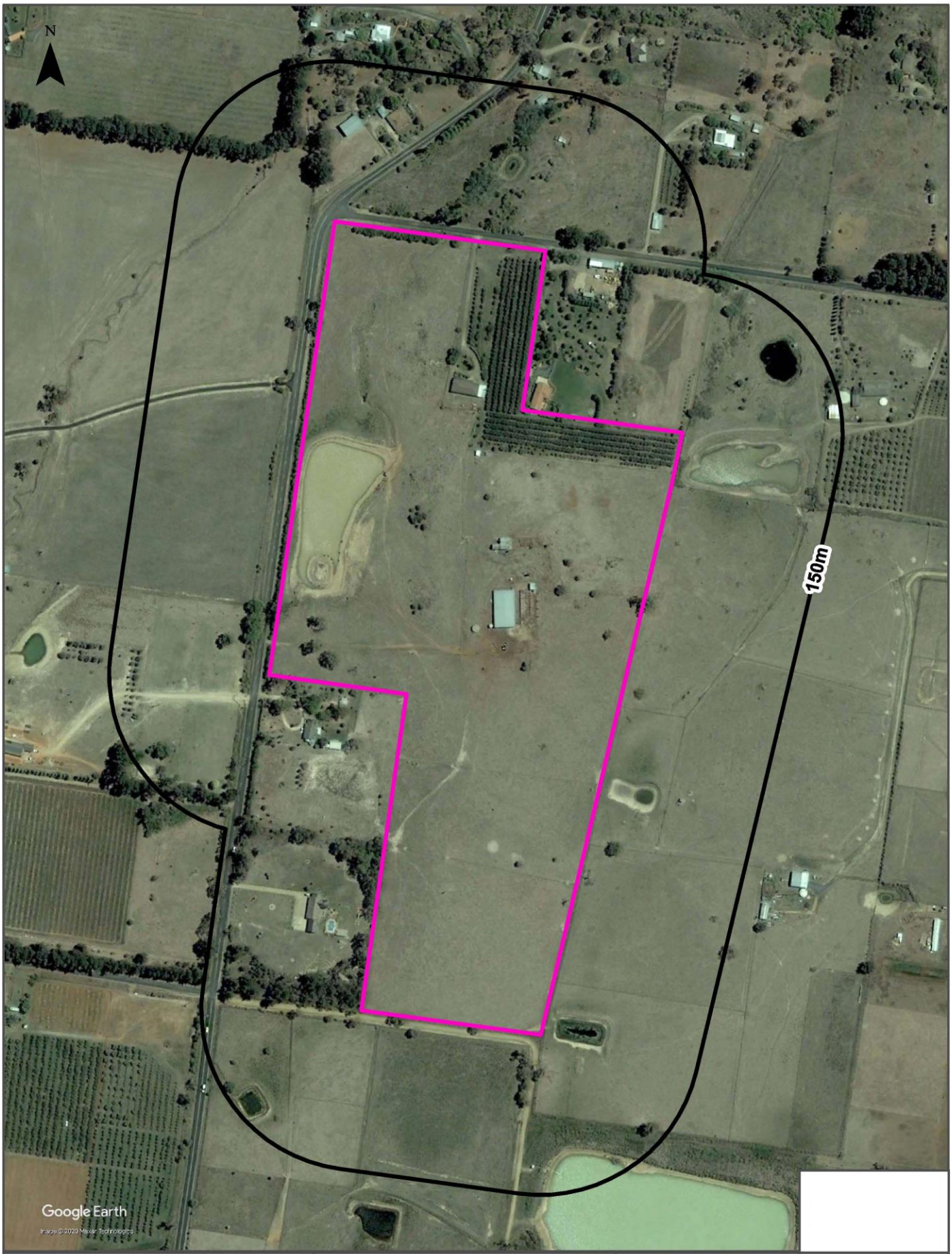
* Any entries preceded by an asterisk do not appear on the current edition of the Certificate of Title.
Warning: the information appearing under notations has not been formally recorded in the Register.

Appendix B – Historical aerial photographs

Aerial Imagery 2019

Scale: 0 50 100 150 200 Meters	Data Source Aerial Imagery: © 2020 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.	Coordinate System: GDA 1994 MGA Zone 56	Date: 11 May 2020

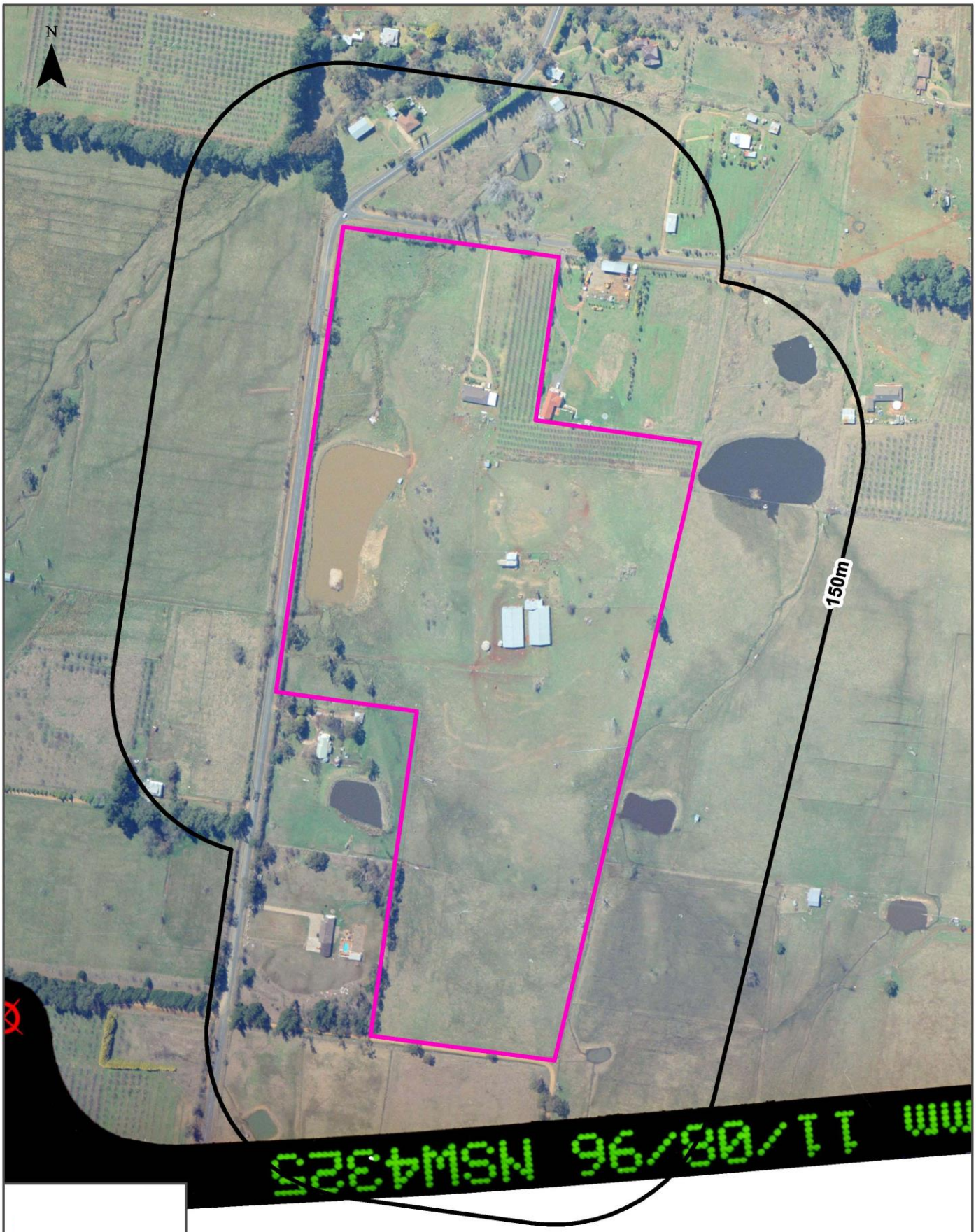
Aerial Imagery 2003



Scale: 0 50 100 150 200 Meters	Data Source Aerial Imagery: © 2020 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.	Coordinate System: GDA 1994 MGA Zone 56	Date: 11 May 2020

Aerial Imagery 1998

Aerial Imagery 1996



Scale: 0 50 100 Meters 150 200	Data Source Aerial Imagery: © NSW Department Finance, Services & Innovation	Coordinate System: GDA 1994 MGA Zone 56	Date: 11 May 2020

Aerial Imagery 1984

Aerial Imagery 1973

Scale:	Data Source Aerial Imagery:	Coordinate System:	Date: 11 May 2020
0 50 100 150 200 Meters	© NSW Department Finance, Services & Innovation	GDA 1994 MGA Zone 56	

Aerial Imagery 1972

Aerial Imagery 1964

Aerial Imagery 1956

Appendix C - Chain of Custody and Laboratory Report

barnson
DESIGN. PLAN. MANAGE.

a Unit 4 / 108-110 Market Street
Mudgee NSW 2850
t 1300 BARNSON (1300 227 676)
e generalenquiry@barnson.com.au
w www.barnson.com.au

Environmental Division
Mudgee
Work Order Reference
ME2101966

Telephone : 02 6372 6735

CHAIN OF CUSTODY AND ANALYTICAL REQUEST

Job Number	33422	Date	29/11/2021
Laboratory	ALS	Report to	Nardus Potgieter npotgieter@barnson.com.au
Sample Temperature on Receipt			
10 °C	Signature:		

ice bricks

Sample ID	Description	Sample Date	Analysis request 1	2	3	4
OP-01	Composite sample of soil from paddock area east	29/11/2021	X			
OP-02	Composite sample of soil from sheep paddock area	29/11/2021	X			
OP-03	Composite sample of soil from garden	29/11/2021	X			
OP-04	Composite sample of soil from machinery area east	29/11/2021	X			
OP-05	Sample of soil from machinery area, stained	29/11/2021	X			
OP-06	Composite sample of soil from machinery area west	29/11/2021	X			

Analysis Request		ALS Method Code
1	TRH (C6-C40) / BTEXN / PAH / OC / OP / PCB / 8 metals	S-16
2		
3		
4		

Relinquished by / Affiliation	Accepted by / Affiliation	Date
/ Barnson	/ ALS Mudgee	29/11/2021

1525

Esky x1

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ME2101966**	Page	: 1 of 11
Client	: **BARNSON**	Laboratory	: Environmental Division Mudgee
Contact	: Nardus Potgieter	Contact	: Mary Monds (ALS Mudgee Sampler)
Address	: Unit 4 108-110 Market Street MUDGEE NSW 2850	Address	: 1/29 Sydney Road Mudgee NSW Australia 2850
Telephone	: 0429 464 067	Telephone	: +61 2 6372 6735
Project	: Soil	Date Samples Received	: 30-Nov-2021 15:25
Order number	: ----	Date Analysis Commenced	: 02-Dec-2021
C-O-C number	: ----	Issue Date	: 08-Dec-2021 11:51
Sampler	: Client Sampler		
Site	: ----		
Quote number	: SY/053/14		
No. of samples received	: 6		
No. of samples analysed	: 6		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

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

General Comments

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

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

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

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

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

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

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

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP068: Positive result have been confirmed by re-extraction and re-analysis.
- EP068: Particular samples required dilution due to matrix interferences. LOR values have been adjusted accordingly.
- EP066 : Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	OP-01 Composite sample of soil from paddock area east	OP-02 Composite sample of soil from sheep paddock area	OP-03 Composite sample of soil from garden	OP-04 Composite sample of soil from machinery area east	OP-05 Sample of soil from machinery area, stained
				Sampling date / time	29-Nov-2021 00:00	29-Nov-2021 00:00	29-Nov-2021 00:00	29-Nov-2021 00:00	29-Nov-2021 00:00
					ME2101966-001	ME2101966-002	ME2101966-003	ME2101966-004	ME2101966-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		**23.3**	**18.2**	**14.7**	**16.6**	**13.2**
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	**7**	**6**
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		**20**	**29**	**36**	**25**	**24**
Copper	7440-50-8	5	mg/kg		**17**	**18**	**15**	**40**	**55**
Lead	7439-92-1	5	mg/kg		**22**	**13**	**10**	**25**	**22**
Nickel	7440-02-0	2	mg/kg		**6**	**11**	**9**	**10**	**9**
Zinc	7440-66-6	5	mg/kg		**30**	**25**	**20**	**47**	**960**
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	**0.1**	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.2
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
beta-BHC	319-85-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
delta-BHC	319-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Heptachlor	76-44-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Aldrin	309-00-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
^ **Total Chlordane (sum)**	----	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.08
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Dieldrin	60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
4.4`-DDE	72-55-9	0.05	mg/kg		**0.43**	<0.05	<0.05	<0.05	<0.25
Endrin	72-20-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.15
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	OP-01 Composite sample of soil from paddock area east	OP-02 Composite sample of soil from sheep paddock area	OP-03 Composite sample of soil from garden	OP-04 Composite sample of soil from machinery area east	OP-05 Sample of soil from machinery area, stained
				Sampling date / time	29-Nov-2021 00:00	29-Nov-2021 00:00	29-Nov-2021 00:00	29-Nov-2021 00:00	29-Nov-2021 00:00
					ME2101966-001	ME2101966-002	ME2101966-003	ME2101966-004	ME2101966-005
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<1.0
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<1.0
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.08
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.05	mg/kg		**0.43**	<0.05	<0.05	<0.05	<0.08
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<1.0
Dimethoate	60-51-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Diazinon	333-41-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<1.0
Malathion	121-75-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Fenthion	55-38-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Parathion	56-38-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<1.0
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Ethion	563-12-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.25
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	OP-01 Composite sample of soil from paddock area east	OP-02 Composite sample of soil from sheep paddock area	OP-03 Composite sample of soil from garden	OP-04 Composite sample of soil from machinery area east	OP-05 Sample of soil from machinery area, stained
				Sampling date / time	29-Nov-2021 00:00	29-Nov-2021 00:00	29-Nov-2021 00:00	29-Nov-2021 00:00	29-Nov-2021 00:00
					ME2101966-001	ME2101966-002	ME2101966-003	ME2101966-004	ME2101966-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	**150**
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	**1200**	**23900**
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	**630**	**38400**
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	**1830**	**62400**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	**370**
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	**1640**	**47000**
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	**330**	**35600**
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	**1970**	**83000**

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	OP-01 Composite sample of soil from paddock area east	OP-02 Composite sample of soil from sheep paddock area	OP-03 Composite sample of soil from garden	OP-04 Composite sample of soil from machinery area east	OP-05 Sample of soil from machinery area, stained
				Sampling date / time	29-Nov-2021 00:00	29-Nov-2021 00:00	29-Nov-2021 00:00	29-Nov-2021 00:00	29-Nov-2021 00:00
					ME2101966-001	ME2101966-002	ME2101966-003	ME2101966-004	ME2101966-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	<50	<50	**370**
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**73.7**	**87.3**	**79.6**	**81.0**	**71.9**
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**91.7**	**118**	**112**	**123**	**69.1**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**85.5**	**97.1**	**98.6**	**84.6**	**82.5**
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**95.4**	**97.0**	**105**	**104**	**102**
2-Chlorophenol-D4	93951-73-6	0.5	%		**94.4**	**96.1**	**102**	**102**	**97.2**
2.4.6-Tribromophenol	118-79-6	0.5	%		**80.0**	**77.8**	**75.6**	**87.4**	**93.3**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**101**	**104**	**102**	**106**	**102**
Anthracene-d10	1719-06-8	0.5	%		**94.2**	**98.2**	**95.8**	**102**	**93.4**
4-Terphenyl-d14	1718-51-0	0.5	%		**99.7**	**102**	**99.9**	**105**	**82.0**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**84.6**	**91.6**	**83.4**	**90.8**	**94.5**
Toluene-D8	2037-26-5	0.2	%		**97.6**	**95.4**	**90.9**	**97.3**	**103**
4-Bromofluorobenzene	460-00-4	0.2	%		**89.5**	**88.4**	**84.3**	**85.0**	**87.6**

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	OP-06 Composite sample of soil from machinery area west	----	----	----	----
				Sampling date / time	29-Nov-2021 00:00	----	----	----	----
					ME2101966-006	--------	--------	--------	--------
					Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		**10.4**	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg		**16**	----	----	----	----
Copper	7440-50-8	5	mg/kg		**42**	----	----	----	----
Lead	7439-92-1	5	mg/kg		**22**	----	----	----	----
Nickel	7440-02-0	2	mg/kg		**7**	----	----	----	----
Zinc	7440-66-6	5	mg/kg		**143**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg		<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg		<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg		<0.05	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg		<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	----	----	----	----
^ **Total Chlordane (sum)**	----	0.05	mg/kg		<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	----	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	----	----	----	----
Endrin	72-20-8	0.05	mg/kg		<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	----	----	----	----
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg		<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID: OP-06 Composite sample of soil from machinery area west	----	----	----	----
			Sampling date / time	29-Nov-2021 00:00	----	----	----	----
				ME2101966-006	--------	--------	--------	--------
				Result	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	----	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	----	----	----
Malathion	121-75-5	0.05	mg/kg	<0.05	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	----	----	----
Parathion	56-38-2	0.2	mg/kg	<0.2	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	----	----	----
Ethion	563-12-2	0.05	mg/kg	<0.05	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	OP-06 Composite sample of soil from machinery area west	----	----	----	----
				Sampling date / time	29-Nov-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ME2101966-006	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	----	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	----	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	----	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg		**140**	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg		**180**	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		**320**	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		**280**	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		**280**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	OP-06 Composite sample of soil from machinery area west	----	----	----	----
				Sampling date / time	29-Nov-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ME2101966-006	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	----	----	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**70.5**	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**133**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**111**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**103**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**103**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**103**	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**110**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		**104**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**105**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**94.2**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		**98.0**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**91.4**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)
(SOIL) EP066: Polychlorinated Biphenyls (PCB)
(SOIL) EP066S: PCB Surrogate
(SOIL) EG035T: Total Recoverable Mercury by FIMS
(SOIL) EG005(ED093)T: Total Metals by ICP-AES
(SOIL) EP080/071: Total Petroleum Hydrocarbons
(SOIL) EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions
(SOIL) EP080: BTEXN
(SOIL) EP080S: TPH(V)/BTEX Surrogates
(SOIL) EP075(SIM)B: Polynuclear Aromatic Hydrocarbons
(SOIL) EP075(SIM)S: Phenolic Compound Surrogates
(SOIL) EP075(SIM)T: PAH Surrogates
(SOIL) EP068A: Organochlorine Pesticides (OC)
(SOIL) EP068B: Organophosphorus Pesticides (OP)
(SOIL) EP068T: Organophosphorus Pesticide Surrogate
(SOIL) EP068S: Organochlorine Pesticide Surrogate