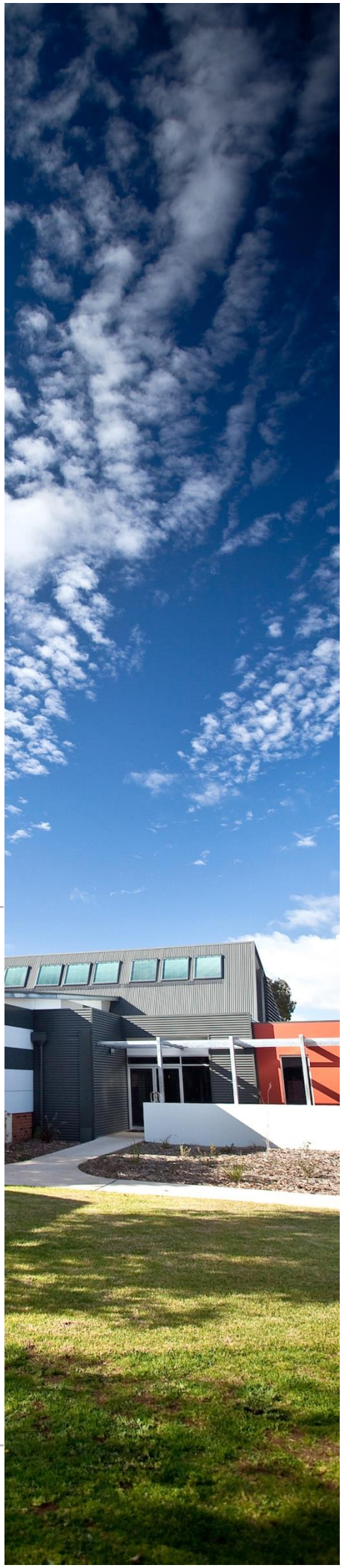

Preliminary Site Contamination Assessment

Wee Waa High School
105-107 Mitchell Street
Wee Waa NSW

(Our Reference:35754 ER01)

Disclaimer

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Project Name:	Wee Waa High School, 105-107 Mitchell Street, Wee Waa, NSW
Client:	NSW Department of Education
Project No.	35754
Report Reference	35754 ER01
Date:	29/04/2021
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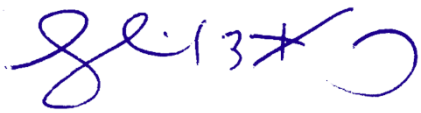
Prepared by:	**Reviewed by:**
	
Nardus Potgieter MSc(Chem) Environmental Scientist	Jim Sarantzouklis MAIBS MEHA RPIA Director

EXECUTIVE SUMMARY

Barnson was engaged by the NSW Department of Education to undertake a preliminary contaminated site investigation in support of the application for Approval of the proposed new Wee Waa High School development, 105-107 Mitchell Street, Wee Waa, NSW.

The investigation had as its objectives to identify contamination issues that may affect the site's suitability for development 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 concluded 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 structures and unregulated waste disposal activities;
- Contaminated stormwater and vehicles accessing the Site; and
- Historical livestock farming and grazing activities.

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. The site investigation revealed evidence of localised heavy metal contamination associated with the historical structures and unregulated disposal in the north eastern corner of Lot 124.

Since the concentrations of heavy metals detected in this area of the Subject Site exceed both health and ecological risk based screening guidelines, it was concluded that the contamination represent a possible risk to human health and the environment and this area specifically is not currently suitable for the proposed redevelopment. Further investigation of the contaminated area and development of a remedial action plan is recommended.

However, as no contamination was discovered in any of the other Lots comprising the Subject Site (Lot 125 (DP 757125), Lot 2 (DP 550633) and Lot 1 (DP 577294)) these areas, as well as the southern half of Lot 124, are considered suitable for the proposed re-development and use for education and training purposes.

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APPENDICES

1.0 INTRODUCTION

1.1 Background

Students and staff were evacuated from the current Wee Waa High School site due to ongoing health issues in late 2020. Students are currently collocated within the town's primary school in an overcrowded site. A Ministerial announcement made on 3 June 2021 committed to the construction of a new High School at Wee Waa on existing Department of Education owned land and adjacent Crown land as an urgent priority. The site is located on Mitchell Street/Kamliaroi Highway and is legally described as Lot 1 DP577294, Lot 2 DP550633 and Lots 124-125 DP757125 (the Subject Site).

Barnson was engaged by the NSW Department of Education to carry out a preliminary contaminated site investigation in support of this development and prepare a report of the findings. This report accompanies a State Significant Development Application (Application SSD-21854025) which seeks consent for the construction of a new high school with a capacity of up to approximately 300 students in a two-storey building, an Indigenous learning centre, sporting fields and associated civil and utilities works. For a detailed project description refer to the EIS prepared by Ethos Urban.

1.2 Objectives

The Secretary's Environmental Assessment Requirements (SEARs) issued for Application SSD-21854025, requires, among other, the assessment and quantification of any soil and groundwater contamination at the Subject Site. The assessment must further demonstrate that the site is suitable for the proposed use in accordance with State Environmental Planning Policy 55 (DUAP, 1998), and must include the following prepared by certified consultants recognised by the NSW Environment Protection Authority:

- Preliminary Site Investigation (PSI).
- Detailed Site Investigation (DSI) where recommended in the PSI.
- Remediation Action Plan (RAP) where remediation is required. This must specify the proposed remediation strategy.
- Preliminary Long-term Environmental Management Plan (LEMP) where containment is proposed on-site.

The investigations and plans listed above must further be prepared in accordance with policies and guidelines relevant to the context of the site and nature of the proposed development. The relevant policies and guidelines include:

- Managing Land Contamination: Planning Guidelines - SEPP 55 Remediation of Land (DUAP, 1998).
- Sampling Design Guidelines (EPA, 1995).
- Consultants Reporting on Contaminated land – Contaminated Land Guidelines (EPA, 2020).
- Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (EPA, 2015).
- Guidelines for the NSW Site Auditor Scheme (3rd edition) (EPA, 2017).

- National Environment Protection (Assessment of Site Contamination) Measure (National Environment Protection Council, as amended 2013).

In addition to this, Education and Care Services National Regulations (Regulation 25(1)d) requires an assessment of the soil for possible contamination for any candidate site identified for the development of an education and childcare service premises. In accordance with the Regulation, a soil assessment means an analysis of soil conducted by an environmental consultant for the purposes of determining—

(a) the nature, extent and levels of contamination; and

(b) the actual or potential risk to human health resulting from that contamination;

In order to fulfil these requirements Barnson undertook a Preliminary Site Investigation (PSI) of the Subject Site in support of both the approval of the facility under the Education and Care Services National Law as well as the Development Approval under NSW Environmental Planning and Assessment Act (1979).

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.

The SEARS requirements, where relevant, are addressed in this report under the following sections as shown in Table 1.1.

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.

Table 1.1: SEARs Requirements

Requirement	Section
Preparation of a Preliminary Site Investigation (PSI) report.	This report
Preparation of a Detailed Site Investigation (DSI) report.	Section 8.2
Remediation Action Plan (RAP) where remediation is required.	Outside the scope of this report
Preliminary Long-term Environmental Management Plan (LEMP) where containment is proposed on-site.	Outside the scope of this report

1.5 Assumptions and Limitations

The following assumptions have been made in preparing this report:

- The future use of the site will be for education and training purposes (high school), with public open space included. 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

Table 2.1 present a summary of the available information pertaining to the identification of the Subject Site. The Subject Site is comprised of four (4) separate vacant lots, adjoining another vacant lot to the north east, which is not included in the proposed development. The lots comprising the Subject Site are Lot 125 DP 757125, Lot 124 DP 757125, Lot 2 DP 550633 and Lot 1 DP 577294.

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

Table 2.1: Summary of Subject Site identification details.

Information	Details
Site address	105-107 Mitchell Street, Wee Waa NSW 2388
Total Development Area	6.03 hectares
Lot and Deposited Plan No.	Lot 125 DP 757125, Lot 124 DP 757125, Lot 2 DP 550633, Lot 1 DP 577294
Zoning	R1 – General residential
Local Government Area	Narrabri Shire Council

Figure 2.1: Locality Map and Aerial Photo of Subject Site.
(Source: © 2021 Google / Image ©Maxar Technologies, Map Data © 2021)

2.2 Geology

Geologically, the Subject Site is underlain by unnamed alluvial units consisting of sand, silt and clay. A review of the Narrabri 1:250000 Geology map (refer to Figure 2.2) shows the majority of the basin sequences are covered with Quaternary age alluvial sandy material.

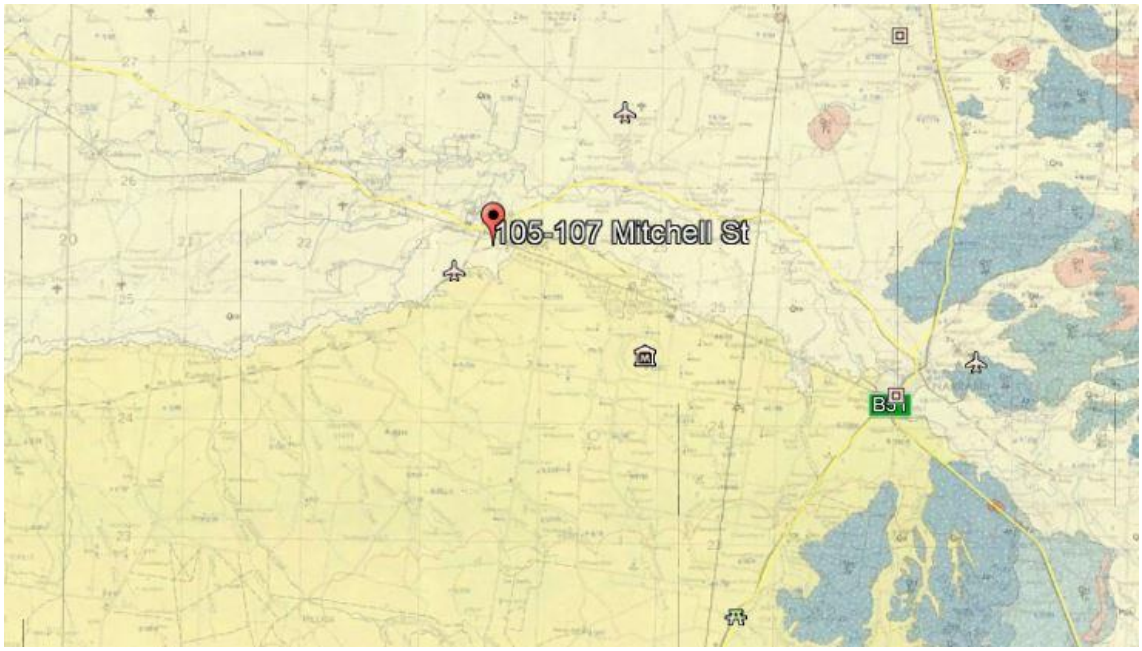

Figure 2.2: Narrabri 1:250000 geology map showing the location of the Subject Site

An examination of the Geological Survey of NSW maps of Naturally Occurring Asbestos (accessed on 15 April 2021), shows that the geological units underlaying the Wee Waa area has no asbestos potential.

2.3 Soils

The Subject Site and is mapped mainly within the Namoi soil landscape. In the Namoi landscape, soils are described deep to very deep, imperfectly drained Grey Vertosols (grey clay) and Black Vertosols (black earths). The Vertosols have high shrink-swell properties and represent a widespread foundation hazard. The soils are further known for poor drainage properties and seasonal waterlogging and is amenable to sheet erosion.

Results from the geotechnical investigation of the Subject Site confirm the soil encountered as sandy silty clay. The Atlas of Australian Acid Sulfate Soil has the subject site in an area of 'extremely low' probability of occurrence (a 1-5% chance of occurrence). Surface soils of the Namoi landscape are not saline.

2.4 Topography and Drainage

Figure 2.3 presents topographical information overlain on a map of the Subject Site. The presented data shows that the site is very flat with almost no slope to facilitate surface water runoff. Precipitation runoff at the site and from the surrounding streets will most likely enter the

drainage channels on the site where it will remain until evaporated or infiltrated into the surface soil of the site.

The closest natural water body to the Subject Site is a feature referred to as the Wee Waa Lagoon, located approximately 400m to the south east.

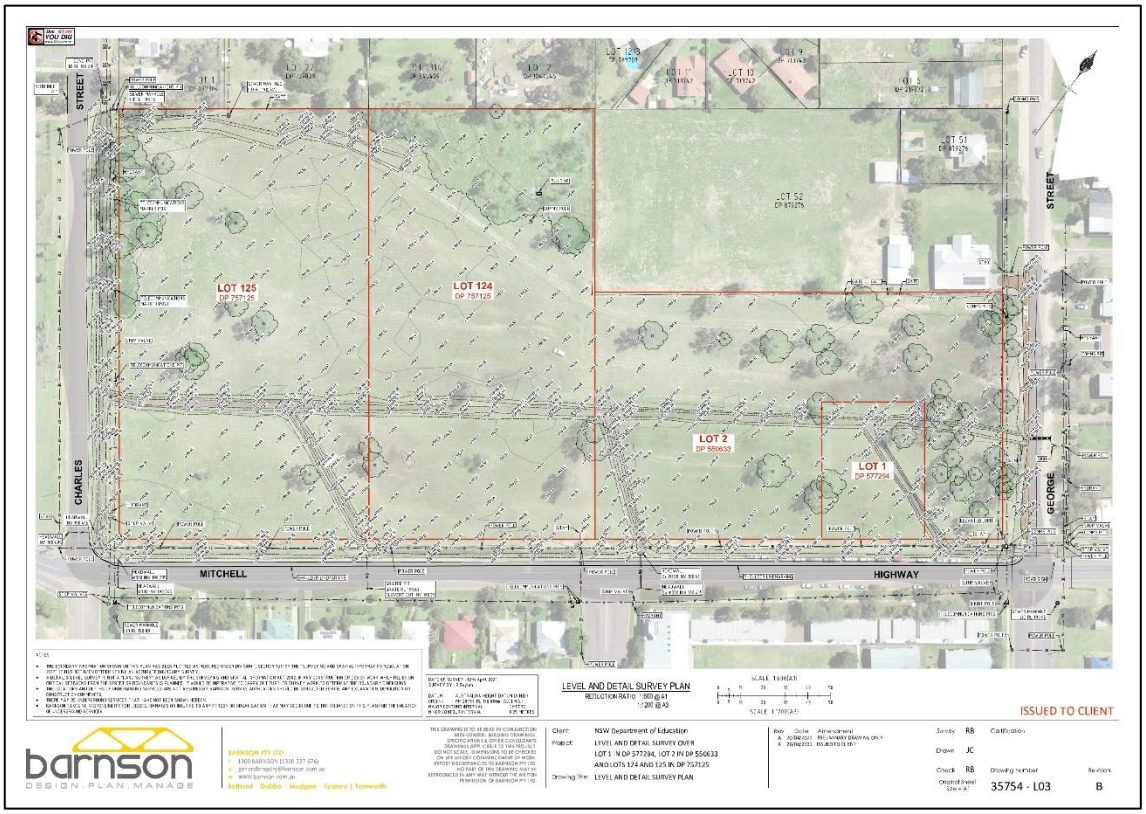

Figure 2.3: Topography of the Subject Site

2.5 Groundwater Resources

A review of existing groundwater bore records (WaterNSW, 2021) indicate 14 registered groundwater bores within 500m of the Subject Site. The information recorded in the database for the bores closest to the Subject Site indicate an average standing water level of between 14m and 18m (where reported) and average yields around 0.3 L/s. Two groundwater bores located in proximity to the development are to the west and north-west of the Subject Site, at a distance of 123m and 150m respectively. According to the database entry the bores are used for domestic purposes.

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 (0-500ppm salinity). Based on the lithology of the area, aquifers are likely unconfined with groundwater flow occurring vertically and laterally through porous geology. Logs for the groundwater bores confirm that hard, white clay is encountered to a depth of 20 to 25 meters.

The Narrabri Local Environmental Plan (Narrabri LEP, 2011) does not show the Subject Site inside a zone of groundwater vulnerability.

3.0 SITE HISTORY

3.1 Historical Land Use

Historical aerial images show that parts of the site have been used for agricultural activities, mainly livestock grazing. There are remnants of simple structures in the northern portion of Lot 124, but we cannot confirm that this area was formally occupied for residential purposes.

3.2 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 April 202. 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

3.3 Previous Site Investigations

No information relating to any previous assessment of contamination at the Subject Site was available for review.

4.0 SITE DESCRIPTION

4.1 Layout and Features

The Subject Site formed part of land used for agricultural purposes. The Subject Site has been vacant for an extended period of time and, except for the remnants of simple structures located in the north eastern sector of Lot 124, there is no indication of any formal structures previously occupying the Site. The Subject site is covered with maintained grass and there are several established trees currently present on the property. The main feature of the site is the series of shallow drainage channels that enter the site from all three street frontages.

The site includes fencing on the boundary with the residential properties to the north. Near this boundary, in a corner formed with an adjoining paddock, there are remnants of former structures as well as piles of discarded building material.

Figure 4.1 presents a sketch plan of the basic layout of the Subject Site, supplemented with photographs showing the different elements of the Site (Figure 4.2 to Figure 4.3). Figure 4.1 includes markers indicating the vantage point and direction of the photographs.

Figure 4.1: General site layout.

Figure 4.2: Photo A –View across the Subject Site from the north west corner of Lot 125 (see Figure 4.1 for location of photo).

Figure 4.3: Photo B – Shallow drainage channel across the Subject Site (see Figure 4.1 for location of photo).

Figure 4.4: Photo C – Culvert and drainage channel north of Mitchel Street (see Figure 4.1 for location of photo).

Figure 4.5: Photo D – Remnants of structures and demolition waste (see Figure 4.1 for location of photo).

4.2 Proposed Development

The proposed development at the Subject Site involves the construction of a new high school with a capacity of up to approximately 300 students in a two-storey building, an Indigenous learning centre, sporting fields and associated civil and utilities works.

Figure 5.1 presents a map indicating the proposed location of the different areas of the proposed development. It is expected that the proposed layout of the development may change as the project progresses. However, the plan presented in Figure 5.1 was valid at the time of this report and is the bases on which the Preliminary Site investigation was undertaken.

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.

Figure 5.1: Proposed development masterplan, valid at the time of this report (April 2021).

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 structures and unregulated waste disposal activities

Remnants of former structures and evidence of demolition waste disposal was observed in the north eastern corner of Lot 124. The former structures and demolition waste could potentially include hazardous materials such as asbestos and lead based paint. Deterioration and demolition of the former structures and disposal of the demolition waste potentially can result in the localised dispersion of hazardous materials over the adjoining lots of the Subject Site.

- Contaminated stormwater and vehicles accessing the Site

The stormwater flow entering the site drainage channels from the adjoining roads could potentially contain fuel and lubricants from vehicles driving on the road or parked along the edge of the site. As the site is poorly drained, any contaminants entering the Site from the road could be deposited onto sediment in the drainage channels. Furthermore, the defined informal vehicle path crossing the site is evidence of motorised vehicles entering and driving across the northern half of the Subject Site. These vehicles can potentially contribute to localised hydrocarbon contamination of the surface soils in this area.

- Historical land use

Historical livestock management activities on portions of the Subject Site have various potential sources of contamination associated including sheep or cattle dip, spraying for the control of parasites or management of animal waste, all of which could result in localised contamination. Potential contaminants include pesticides, hydrocarbons, heavy metals and elevated nutrients. In addition, the use of portions of the site for grazing purposes may be associated with the use of pesticides and herbicides.

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 structures and activities at the site considered the primary potential sources of contamination, the residues of agricultural chemicals such as pesticides and fertilisers used on the grazing areas, as well as hazardous materials (asbestos and heavy metals) 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. 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.

The potential presence of heavy metals or hydrocarbons in stormwater entering the site could have contributed to the dispersion of these substances onto the surface soil of the site. Fuels and

lubricants are further potentially relevant to the on-site movement of vehicles entering the Subject Site.

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 infiltration is considered the most unlikely. The Subject Site is not indicated as a groundwater vulnerable zone and the depth to groundwater at the site is estimated to be in the order of 17m. Furthermore, the clay encountered at surface is reported to continue to at least 20m below surface (based on groundwater bore logs). This clay layer extends over the entire site and it is expected that it would 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

- Visitors to the site (e.g. students, teachers and parents/caregivers);
- Workers involved in the construction of the facilities; and
- Workers conducting maintenance of the gardens or facilities at the 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 Development Area 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 former land use and activities at the site is reasoned to have a potential for contaminating surface soils, the type and quantity of contaminants introduced through this land use is not expected to have led to significant contamination.

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 both historical and current land use activities that could contribute to contamination of the surface soils of the Subject Site.

Barnson conducted an inspection of the Subject Site on 19 March 2021. 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 development is proposed or 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 site is not fenced and access to the site is possible from all street frontages. There is an informal vehicle path traversing the northern part of the Subject Site between Charles and George Streets and there are several footpaths crossing the site.
- At the time Barnson conducted the site inspection, most of the Subject Site was covered with vegetation following seasonal rain. Most of the Site surface was also waterlogged and all drainage trenches contained standing water (see Figure 6.1).

Figure 6.1: Waterlogging near Mitchel Street and George Street frontage.

- The site was systematically walked over and all visible open ground 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.
- Several small mounds of mostly garden waste (grass clippings) and some demolition and general waste were observed in the north eastern corner of Lot 124 (see Figure 6.2).

Figure 6.2: Demolition waste and grass clippings dumped in the vegetation in north eastern corner of Lot 124.

- No general waste or any demolition waste was observed in any other part of the Subject Site during the site inspection.

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 the development is proposed and where contamination of the surface soil could most likely have occurred. The site inspection and collection of samples specifically targeted areas of the site where future students and visitors to the Subject Site could likely be exposed to the surface soil and in that regard considered the proposed site layout as presented in Figure 5.1. It is understood that the site layout will likely change is future, but it was valid at the time of the site inspection.

Samples of soil were specifically collected from the drainage ditches as well as the informal vehicle access path, as both these features represent areas where contaminants potentially deposited on site (e.g. pesticides and vehicle associated hydrocarbons) can accumulate. The area where demolition wastes and remnants of structures were observed was also further investigated.

Figure 6.3 presents a map of the Subject Site with the locations of the surface soil samples indicated. Table 6.1 is a summary of the collected samples indicating which samples were included in composites for analysis.

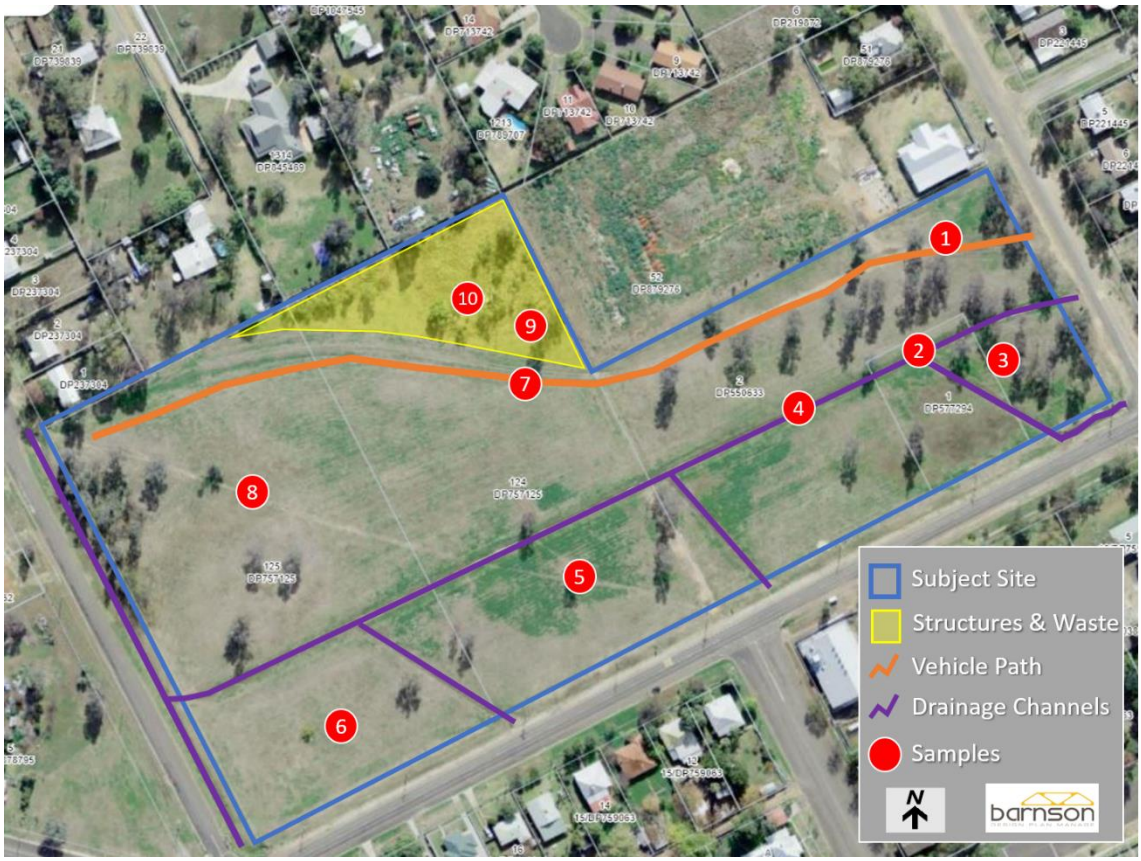

Figure 6.3: Map indicating locations of confirmatory sample collection.

Table 6.1: Summary of sample details.

Sample ID	Description	Sample Submitted for Analysis
1	Surface soil (50-300mm) sample from North East corner of site. Included in composite sample WW-02 for analysis.	WW-02
2	Surface soil (50-300mm) sample from Drainage Channel Node. Submitted as discrete sample.	WW-01
3	Surface soil (50-300mm) sample from South East corner of site. Included in composite sample WW-02 for analysis.	WW-02
4	Surface soil (50-300mm) sample from future school courtyard area. Included in composite sample WW-02 for analysis.	WW-02
5	Surface soil (50-300mm) sample from future sports field 1. Included in composite sample WW-03 for analysis.	WW-03
6	Surface soil (50-300mm) sample from future sports field 2. Included in composite sample WW-03 for analysis.	WW-03
7	Surface soil (50-300mm) sample from North West open area on vehicle path. Included in composite sample WW-04 for analysis.	WW-04
8	Surface soil (50-300mm) sample from North West open area. Included in composite sample WW-04 for analysis.	WW-04
9	Surface soil (50-300mm) sample near hut structure from big tree South East of hut. Submitted as discrete sample.	WW-05
10	Surface soil (50-300mm) sample at visible ACM NW of hut	WW-06

The surface soil samples were collected in glass jars, supplied by the laboratory. 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 development and likely 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 composite surface soil samples were submitted for chemical analysis.

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.
- presence of asbestos fibres
- laboratory QC duplicates and spikes

In addition to the surface soil samples a sample of painted wood (marked WW-11) and a fragment of fibre cement material were collected from the 'Structure and Waste Area' identified in Figure 6.3. These material samples were also submitted with the surface soil samples to the Envirolab Services laboratory. The laboratory was requested to analyse the paint on the wood for lead content and the fibre cement sample for the presence of asbestos.

The Envirolab Services laboratory is NATA accredited for all the analysis indicated above.

6.3 Analytical Results

The Envirolab Services laboratory report for the samples is attached as Appendix A. The laboratory report indicates that heavy metals, mixtures of straight chain organic compounds ranging from C10 to C40 and trace quantities of polycyclic organic compounds were detected in the soil. The concentrations of petroleum hydrocarbons, asbestos (total recoverable) as well as persistent pesticide and herbicide compounds are indicated as below the limits of detection in the surface soil samples.

The metals detected include chromium (Cr), copper (Cu), lead (Pb), nickel (Ni, and zinc (Zn). Concentrations of cadmium and mercury were detected only in two (2) of the samples. The concentration of arsenic remains below detection in all samples.

Table 6.2 presents a summary of the compounds and elements detected above the limit of detection. The laboratory performed a duplicate analysis of sample WW-01 for quality control purposes. The results of this duplicate analysis are also listed in Table 6.2.

Table 6.2: Metal and metalloid concentrations analysed in surface soil samples from the Subject Site.

Analyte	**WW-01**	**WW-01 Duplicate**	**WW-02**	**WW-03**	**WW-04**	**WW-05**	**WW-06**
	mg.kg-1						
Metals ($mg.kg^{-1}$)							
Arsenic (As)	<4	<4	<4	<4	<4	<4	<4
Cadmium (Cd)	<0.4	<0.4	<0.4	<0.4	<0.4	1	1
Chromium (Cr)	22	27	21	33	28	29	31
Copper (Cu)	27	32	25	35	32	29	26
Lead (Pb)	11	11	9	12	11	2600	5400
Mercury (Hg)	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1
Nickel (Ni)	29	27	23	29	28	18	17
Zinc (Zn)	50	52	35	60	48	4300	3600
Hydrocarbons ($mg.kg^{-1}$)							
TRH C29 - C36	<100	<100	<100	<100	<100	130	<100
TRH >C16 - C34 (F3)	<100	<100	<100	<100	<100	150	<100
Total PAHs	<0.05	<0.05	<0.05	<0.05	<0.05	2.9	<0.05

Results for the material samples were positive for lead in the paint (measured at 300 mg/kg) and both chrysotile and amosite asbestos were identified in the sample of fibre cement collected.

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 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 A).

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 public open space (HIL-C) and include land uses such as parks, playgrounds, playing fields and secondary schools.

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 carbon chain fractions namely:

- C6 – C10- Fraction number F1

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

Screening values published for polycyclic aromatic hydrocarbons (PAHs) consider the total concentration of all PAH compounds detected.

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 in soil. The values selected for the evaluation of the heavy metals 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 and ecological investigation levels selected for assessment of the detected metal concentrations.

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

Element	Health-based Investigation Levels HIL C mg.kg^{-1}	Ecological Investigation Levels (EIL) Residential mg.kg^{-1}
Arsenic (As)	300	160
Cadmium (Cd)	90	NA
Chromium (Cr) (Total)	NR	680
Copper (Cu)	17,000	320
Lead (Pb)	600	1,800
Mercury (Hg)	80	NA
Nickel (Ni)	1,200	460
Zinc (Zn)	30,000	460
Total PAH	300	NA

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.

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 (Table 7.2) are evaluated for the same four carbon chain fraction ranges (F1 to F4) listed above.

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

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

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.

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 most elements and in most samples are well below health-risk based screening values. However, the surface soil samples collected in the north eastern corner of Lot 124 (refer sample 9 and 10 Figure 6.3) show elevated levels of lead and zinc. The general low concentrations of heavy metals detected in the surface soil samples at the Subject Site suggest naturally occurring element abundance and are most likely not related to contamination. However, the elevated lead and zinc concentrations detected are significantly higher than the concentrations observed in other areas of the Subject Site and clearly indicate potential contamination, most likely associated with the demolition wastes located in the north eastern corner of Lot 124.

The lead concentration detected in samples 9 and 10 exceed the health risk criteria for residential and public open space land use, while both the lead and zinc concentrations exceed ecological investigation levels. No other contaminants evaluated were detected at concentrations exceeding screening criteria. The organic contaminants detected are present at trace quantities and measured concentrations are below screening criteria (Table 7.2). However, given the hydrocarbons were detected in a sample of surface soil that also had elevated metal concentrations, there is a high probability that the contamination is related and that similar or higher concentrations of hydrocarbon contaminants potentially could be present elsewhere in the area.

Overall, the metallic element concentrations reported for the discrete and composite surface soil samples collected over the remainder of the Subject Site are consistently low, while the elevated levels detected appear to be localised to the north eastern corner of Lot 124, specifically the area where demolition wastes were observed. 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 structures and unregulated waste disposal activities;
  - Contaminated stormwater and vehicles accessing the Site; and
  - Historical livestock farming and grazing activities.
- 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 and confirmatory sampling revealed evidence of localised contamination associated with the historical structures and unregulated disposal in the north eastern corner of Lot 124, with concentrations of lead and zinc exceeding health and ecological risk-based criteria.
- The concentrations of all other contaminants investigated were below screening criteria in all surface soil samples collected.
- The screening criteria used in the evaluation of the contaminant concentrations were appropriately conservative and suitable for assessment of both the proposed education and training, and public open space land use categories.
- The samples of paint and fibre cement collected from the demolition waste present in the north eastern corner of Lot 124 were confirmed to contain hazardous substances, specifically lead based paint and asbestos fibres. Special precautions should be implemented during any removal of these materials from the Subject Site.
- Based on the findings of the site investigation it is concluded that the heavy metal contamination identified in the north eastern corner of Lot 124 represent a potential risk to human health and the environment and this area specifically is not currently suitable for the proposed redevelopment.
- On the remainder of the Subject Site (that is Lot 125 (DP 757125), Lot 2 (DP 550633), Lot 1 (DP 577294) and the southern half of Lot 124 (DP 757125)), no contaminant were detected above health risk or ecological risk screening criteria. Based on the findings of the desktop review and site investigation, the remainder of the Subject Site is considered suitable for the proposed re-development and use for education and training purposes.
- The Subject Site is not currently subject to a Statutory Site Audit. In terms of the Guidelines for the NSW Site Auditor Scheme (NSW EPA, 2017), the EPA may recommend that any remedial work proposed as a result of this assessment be independently verified.

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 Lot 125 (DP 757125), Lot 2 (DP 550633), Lot 1 (DP 577294) and the southern half of Lot 124 (DP 757125) is suitable for the proposed re-development and land use.
- It is recommended that the contamination identified in the north eastern corner of Lot 124 be investigated further to determine the level and extent of contamination and to develop a plan for remedial action.
- This further investigation should conclude whether the contamination must be reported to the EPA based on consideration of the findings in relation to the notification triggers listed in Section 2.3 of the Guidelines on the Duty to Report Contamination (NSW EPA, 2015)
- It is recommended that a suitable contractor, licensed to manage and dispose hazardous materials, be appointed to remove all visible waste from this area of the Site before commencement of any further investigation.
- The asbestos containing material (ACM) and lead based paint identified in the area to the north of the informal vehicle path, requires specialist attention during any removal or remedial action. It is recommended that during any removal of waste from this area, the ACM be removed and transported to a landfill, licensed to accept the waste, for disposal. The removal and disposal task can be undertaken by either a competent person or a licensed asbestos removalist (holding either a Class A or B license).
- Clearance inspection of the asbestos removal area must be undertaken following completion of removal work. The clearance inspection is to be carried out by a licensed, independent, asbestos assessor. A clearance certificate must be obtained from the asbestos assessor.
- Notification to SafeWork of the asbestos removal works will be required if the ACM to be removed is more than $10m^2$.
- Tracking of the collected 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

DUAP. (1998). *Managing Land Contamination: Planning Guidelines - State Environmental Planning Policy No 55, Remediation of Land.* Sydney.

Narrabri LEP. (2011). *Narrabri Shire Local Environmental Plan.* Narrabri: Narrabri Shire Council.

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

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

NSW EPA. (2015). *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997.* Sydney, NSW: State of NSW, Environment Protection Authority.

NSW EPA. (2017). *Contaminated Land Management -Guidelines for the NSW Site Auditor Scheme (3rd edition).* Sydney, NSW: NSW Environmental Protection Authority.

NSW EPA. (2020). *Consultants Reporting on Contaminated Land, Contaminated Land Guidelines.* Sydney: NSW Environmental Protection Authority.

WaterNSW. (2021). *Real Time Data*. Retrieved April 7, 2021, from Water NSW: https://realtimedata.waternsw.com.au/water.stm

Appendix A - 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

CHAIN OF CUSTODY AND ANALYTICAL REQUEST

Job Number	35754	Date	29/03/2021
Laboratory	Envirolab Sydney	Report to	Nardus Potgieter npotgieter@barnson.com.au
Sample Temperature on Receipt		Notes	
(8 °C	Signature: AB		

Sample ID	Description	Sample Date/Time	Analysis request					
			1	2	3	4	5	6
WW01 (1)	50-300mm from Drainage Node	29/03/2021	X					
WW02 (2)	50-300mm from future courtyard area	29/03/2021	X					
WW03 (3)	50-300mm from future sports field 2	29/03/2021	X					
WW04 (4)	50-300mm from north west open area comp	29/03/2021		X				
WW05 (5)	50-300mm near hut structure	29/03/2021	X					
WW06 (6)	50-300mm at ACM NW of hut	29/03/2021		X				
WW11 (7)	Painted wood	29/03/2021			X			
WW12 (8)	Fibre cement fragments	29/03/2021				X		

Analysis Request	
1	Combo 6 (BTEXN, TRH, PAH, OCP, OPP, PCB, 8Metals)
2	Combo 6 (BTEXN, TRH, PAH, OCP, OPP, PCB, 8Metals) + Asbestos
3	Lead (Pb) in paint
4	Asbestos ID bulk materials
5	
6	

Relinquished by / Affiliation	Accepted by / Affiliation	Date
/ Barnson	A·BU / Envirolab Sydney	29/03/2021

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

Job No: 265550
Date Received: 31/3/21
Time Received: 1215
Received By: AB
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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 265550

Client Details

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

Sample Details

Your Reference	**35754**
Number of Samples	6 Soil, 1 Paint, 1 Material
Date samples received	31/03/2021
Date completed instructions received	31/03/2021

Analysis Details

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

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

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

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

Report Details

Date results requested by	09/04/2021
Date of Issue	09/04/2021

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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: Wonnie Condos, Ridwan Wijaya
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Dragana Tomas, Senior Chemist
Giovanni Agosti, Group Technical Manager
Lucy Zhu, Asbestos Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		265550-1	265550-2	265550-3	265550-4	265550-5
Your Reference	UNITS	WW01	WW02	WW03	WW04	WW05
Date Sampled		29/03/2021	29/03/2021	29/03/2021	29/03/2021	29/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	01/04/2021	01/04/2021	01/04/2021	01/04/2021	01/04/2021
Date analysed	-	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021
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	%	99	94	93	91	102

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		265550-6
Your Reference	UNITS	WW06
Date Sampled		29/03/2021
Type of sample		Soil
Date extracted	-	01/04/2021
Date analysed	-	06/04/2021
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	97

svTRH (C10-C40) in Soil						
Our Reference		265550-1	265550-2	265550-3	265550-4	265550-5
Your Reference	UNITS	WW01	WW02	WW03	WW04	WW05
Date Sampled		29/03/2021	29/03/2021	29/03/2021	29/03/2021	29/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	01/04/2021	01/04/2021	01/04/2021	01/04/2021	01/04/2021
Date analysed	-	08/04/2021	02/04/2021	08/04/2021	08/04/2021	08/04/2021
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	130
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	150
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	150
Surrogate o-Terphenyl	%	119	123	102	99	103

svTRH (C10-C40) in Soil		
Our Reference		265550-6
Your Reference	UNITS	WW06
Date Sampled		29/03/2021
Type of sample		Soil
Date extracted	-	01/04/2021
Date analysed	-	02/04/2021
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	100

PAHs in Soil						
Our Reference		265550-1	265550-2	265550-3	265550-4	265550-5
Your Reference	UNITS	WW01	WW02	WW03	WW04	WW05
Date Sampled		29/03/2021	29/03/2021	29/03/2021	29/03/2021	29/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	01/04/2021	01/04/2021	01/04/2021	01/04/2021	01/04/2021
Date analysed	-	06/04/2021	08/04/2021	06/04/2021	06/04/2021	06/04/2021
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	0.3
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.4
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.4
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	0.7
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3
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	0.3
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	2.9
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	0.6
Surrogate p-Terphenyl-d14	%	79	83	77	73	71

PAHs in Soil		
Our Reference		265550-6
Your Reference	UNITS	WW06
Date Sampled		29/03/2021
Type of sample		Soil
Date extracted	-	01/04/2021
Date analysed	-	08/04/2021
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	69

Organochlorine Pesticides in soil						
Our Reference		265550-1	265550-2	265550-3	265550-4	265550-5
Your Reference	UNITS	WW01	WW02	WW03	WW04	WW05
Date Sampled		29/03/2021	29/03/2021	29/03/2021	29/03/2021	29/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	01/04/2021	01/04/2021	01/04/2021	01/04/2021	01/04/2021
Date analysed	-	06/04/2021	08/04/2021	06/04/2021	06/04/2021	06/04/2021
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	%	80	82	78	80	83

Organochlorine Pesticides in soil		
Our Reference		265550-6
Your Reference	UNITS	WW06
Date Sampled		29/03/2021
Type of sample		Soil
Date extracted	-	01/04/2021
Date analysed	-	08/04/2021
alpha-BHC	mg/kg	<0.1
HCB	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	73

Organophosphorus Pesticides in Soil						
Our Reference		265550-1	265550-2	265550-3	265550-4	265550-5
Your Reference	UNITS	WW01	WW02	WW03	WW04	WW05
Date Sampled		29/03/2021	29/03/2021	29/03/2021	29/03/2021	29/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	01/04/2021	01/04/2021	01/04/2021	01/04/2021	01/04/2021
Date analysed	-	06/04/2021	08/04/2021	06/04/2021	06/04/2021	06/04/2021
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	%	80	82	78	80	83

Organophosphorus Pesticides in Soil		
Our Reference		265550-6
Your Reference	UNITS	WW06
Date Sampled		29/03/2021
Type of sample		Soil
Date extracted	-	01/04/2021
Date analysed	-	08/04/2021
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Parathion	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Ethion	mg/kg	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1
Surrogate TCMX	%	73

PCBs in Soil						
Our Reference		265550-1	265550-2	265550-3	265550-4	265550-5
Your Reference	UNITS	WW01	WW02	WW03	WW04	WW05
Date Sampled		29/03/2021	29/03/2021	29/03/2021	29/03/2021	29/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	01/04/2021	01/04/2021	01/04/2021	01/04/2021	01/04/2021
Date analysed	-	06/04/2021	08/04/2021	06/04/2021	06/04/2021	06/04/2021
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	%	80	82	78	80	83

PCBs in Soil		
Our Reference		265550-6
Your Reference	UNITS	WW06
Date Sampled		29/03/2021
Type of sample		Soil
Date extracted	-	01/04/2021
Date analysed	-	08/04/2021
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCMX	%	73

Acid Extractable metals in soil						
Our Reference		265550-1	265550-2	265550-3	265550-4	265550-5
Your Reference	UNITS	WW01	WW02	WW03	WW04	WW05
Date Sampled		29/03/2021	29/03/2021	29/03/2021	29/03/2021	29/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021
Date analysed	-	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	1
Chromium	mg/kg	22	21	33	28	29
Copper	mg/kg	27	25	35	32	29
Lead	mg/kg	11	9	12	11	2,600
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Nickel	mg/kg	29	23	29	28	18
Zinc	mg/kg	50	35	60	48	4,300

Acid Extractable metals in soil		
Our Reference		265550-6
Your Reference	UNITS	WW06
Date Sampled		29/03/2021
Type of sample		Soil
Date prepared	-	06/04/2021
Date analysed	-	06/04/2021
Arsenic	mg/kg	<4
Cadmium	mg/kg	1
Chromium	mg/kg	31
Copper	mg/kg	26
Lead	mg/kg	5,400
Mercury	mg/kg	<0.1
Nickel	mg/kg	17
Zinc	mg/kg	3,600

Moisture						
Our Reference		265550-1	265550-2	265550-3	265550-4	265550-5
Your Reference	UNITS	WW01	WW02	WW03	WW04	WW05
Date Sampled		29/03/2021	29/03/2021	29/03/2021	29/03/2021	29/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	31/03/2021	31/03/2021	31/03/2021	31/03/2021	31/03/2021
Date analysed	-	01/04/2021	01/04/2021	01/04/2021	01/04/2021	01/04/2021
Moisture	%	23	26	38	26	15

Moisture		
Our Reference		265550-6
Your Reference	UNITS	WW06
Date Sampled		29/03/2021
Type of sample		Soil
Date prepared	-	31/03/2021
Date analysed	-	01/04/2021
Moisture	%	9.4

Asbestos ID - soils			
Our Reference		265550-4	265550-6
Your Reference	UNITS	WW04	WW06
Date Sampled		29/03/2021	29/03/2021
Type of sample		Soil	Soil
Date analysed	-	07/04/2021	07/04/2021
Sample mass tested	g	Approx. 35g	Approx. 45g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected

Asbestos ID - materials		
Our Reference		265550-8
Your Reference	UNITS	WW12
Date Sampled		29/03/2021
Type of sample		Material
Date analysed	-	01/04/2021
Mass / Dimension of Sample	-	120x50x4mm
Sample Description	-	Beige fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Amosite asbestos detected
Trace Analysis	-	[NT]

Lead in Paint		
Our Reference		265550-7
Your Reference	UNITS	WW11
Date Sampled		29/03/2021
Type of sample		Paint
Date prepared	-	06/04/2021
Date analysed	-	06/04/2021
Lead in paint	%w/w	0.03

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-020/021/022	Digestion of Paint chips/scrapings/liquids for Metals determination by ICP-AES/MS and or CV/AAS.
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-3	265550-2
Date extracted	-			01/04/2021	1	01/04/2021	01/04/2021		01/04/2021	01/04/2021
Date analysed	-			06/04/2021	1	06/04/2021	06/04/2021		06/04/2021	06/04/2021
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	100	87
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	100	87
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	120	104
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	110	97
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	100	86
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	84	74
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	108	93
naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	106	1	99	88	12	105	93

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	265550-2
Date extracted	-			01/04/2021	1	01/04/2021	01/04/2021		01/04/2021	01/04/2021
Date analysed	-			02/04/2021	1	08/04/2021	08/04/2021		02/04/2021	02/04/2021
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	99	103
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	82	85
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	91	92
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	99	103
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	82	85
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	91	92
Surrogate o-Terphenyl	%		Org-020	90	1	119	61	64	109	123

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	265550-2
Date extracted	-			01/04/2021	1	01/04/2021	01/04/2021		01/04/2021	01/04/2021
Date analysed	-			08/04/2021	1	06/04/2021	06/04/2021		08/04/2021	08/04/2021
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	106
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	79	113
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	79	112
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	105	109
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	91	102
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	93	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	67	105
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	83	121
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	104	1	79	82	4	119	67

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	265550-2
Date extracted	-			01/04/2021	1	01/04/2021	01/04/2021		01/04/2021	01/04/2021
Date analysed	-			08/04/2021	1	06/04/2021	06/04/2021		08/04/2021	08/04/2021
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	97	118
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	94	123
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	89	99
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	103	106
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	97	105
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	99	106
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	101	108
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	102
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	85	95
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	91	103
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	109	1	80	82	2	108	68

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	265550-2
Date extracted	-			01/04/2021	1	01/04/2021	01/04/2021		01/04/2021	01/04/2021
Date analysed	-			08/04/2021	1	06/04/2021	06/04/2021		08/04/2021	08/04/2021
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	71	137
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	91	112
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	63	89
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	138
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	101	117
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	75	98
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	65	115
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	109	1	80	82	2	108	68

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	265550-2
Date extracted	-			01/04/2021	1	01/04/2021	01/04/2021		01/04/2021	01/04/2021
Date analysed	-			08/04/2021	1	06/04/2021	06/04/2021		08/04/2021	08/04/2021
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	100	90
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	109	1	80	82	2	108	68

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	265550-2
Date prepared	-			06/04/2021	1	06/04/2021	06/04/2021		06/04/2021	06/04/2021
Date analysed	-			06/04/2021	1	06/04/2021	06/04/2021		06/04/2021	06/04/2021
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	94	75
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	95	75
Chromium	mg/kg	1	Metals-020	<1	1	22	27	20	93	82
Copper	mg/kg	1	Metals-020	<1	1	27	32	17	95	96
Lead	mg/kg	1	Metals-020	<1	1	11	11	0	95	77
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	99	93
Nickel	mg/kg	1	Metals-020	<1	1	29	27	7	95	78
Zinc	mg/kg	1	Metals-020	<1	1	50	52	4	92	74

QUALITY CONTROL: Lead in Paint						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			06/04/2021	[NT]	[NT]	[NT]	[NT]	06/04/2021	[NT]
Date analysed	-			06/04/2021	[NT]	[NT]	[NT]	[NT]	06/04/2021	[NT]
Lead in paint	%w/w	0.005	Metals-020/021/022	<0.005	[NT]	[NT]	[NT]	[NT]	92	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples 265550-4,6 were sub-sampled from jars provided by the client.