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Site Contamination Investigation

Client: Gowrie NSW

Site Address: Gowrie Childcare Centre - 39 Saleyards Lane, Mudgee

13 August 2024

Our Reference : 41821-ER01_A

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Project Name:	Preliminary Site Contamination Assessment – Gowrie Childcare Centre - 39 Saleyards Lane, Mudgee
Client:	Gowrie NSW
Project Number:	41821
Report Reference:	41821 ER01_A
Date:	16/08/2024

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Executive Summary

Barnson Pty Ltd was engaged by Gowrie NSW (Rep. Nicole Jones) to undertake a preliminary contaminated site investigation in support of the proposed extension of the Gowrie Childcare Centre at 39 Saleyards Lane, Mudgee, hereafter referred to as the Subject Site.

The investigation has as its objectives to identify contamination issues that may affect the suitability of the Subject Site for continued use as childcare facility and assess the need for possible further investigations, and 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 indicated that the Subject Site was previously the location of the Mudgee livestock saleyards.

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 saleyard activities
- Drainage across the site
- Disposal of waste
- Demolition waste or unclassified fill

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 concentrations of all contaminants investigated were found to be below screening criteria in all surface soil samples collected from the Investigation Area.

Based on the findings of the desktop review and site investigation it can be stated with a reasonable level of confidence that the Investigation Area is suitable for the proposed development as childcare facility as there are no contaminants present at the site which are likely to present a risk of impact to the health of humans.

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1. INTRODUCTION

1.1. Background

Barnson Pty Ltd was engaged by Gowrie NSW (Rep. Nicole Jones) to undertake a preliminary contaminated site investigation in support of the proposed extension of the Gowrie Childcare Centre at 39 Saleyards Lane, Mudgee (hereafter referred to as the Subject Site).

The Subject Site is located in the western extent of Mudgee, NSW, to the southwest of Saleyards Lane. Figure 1.1 presents a map indicating the location of the Subject Site. The existing childcare facility is located on Lot 30 DP 1267151. The proposal is to consolidate two adjoining lots (Lot 29 DP 1307255 and Lot 20 DP 1305817) located to the southeast and use the additional land to extend the existing childcare building, play area and parking lot. The additional land identified for the extension of the facility is an area of approximately 700m^2, is identified as the Investigation Area.

Figure 1.1: Location of the Subject Site.

The 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 addition to this, State Environmental Planning Policy (Resilience and Hazards, 2021) require that for any proposed development, the 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.

In order to fulfil these requirements Barnson undertook a Preliminary Site Investigation (PSI) of the Investigation Area, 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).

1.2. Objectives

The objectives of the Investigation are:

- identify potential contamination present at the Subject Site;
- provide a clear indication of potential contamination which may pose a risk to the health of children; and
- assess the need for possible further investigations, remediation or management of significant contamination issues identified.

1.3. Scope of Work

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

- Site identification including a review of site history, site condition, surrounding environment, geology, hydrogeology and hydrology.
- Assessment of potential sources of contamination.
- Development of a conceptual model of the site (CSM) with regard to contaminant sources and exposure pathways, based on information gathered from the data review.
- Site inspection walkover to assess site conditions.

- Assessment of the risk/impact of the identified contamination sources within the context of the site and the CSM.
- Provide conclusions as to whether or not the site is suitable for intended development.

1.4. Purpose of this report

The purpose of this report is to document, with cognisance of the Guidelines of 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 the intended use.

1.5. Assumptions and Limitations

The following assumptions have been made in preparing this report:

- The nature of the intended future use of the site will be the establishment and operation of a childcare facility. This assumption forms the basis for the conceptual site model.
- All information pertaining to the contamination status of the site has been obtained through public record searches, a preliminary site inspection and analysis of samples collected at the site. All documents and information in relation to the 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. SITE DESCRIPTION

2.1. Site Identification

Table 2.1 presents a summary of the available information pertaining to the identification of the Subject Site.

Table 2.1: Summary of Subject Site identification details.

Information	Details
Site address	39 Saleyards Lane, Mudgee, NSW 2850
Lot/Section and Deposited Plan No.	Lot 30 DP 1267151 Lot 29 DP 1307255 Lot 20 DP 1305817
County	Wellington
Parish	Mudgee
Local Government Area	Mid-Western Regional Council
Subject Site Area	Approx. 2,550m^2
Investigation Area	Approx. 700m^2

The Subject Site and the land surrounding it is R1: General Residential. Refer to Figure 2.1

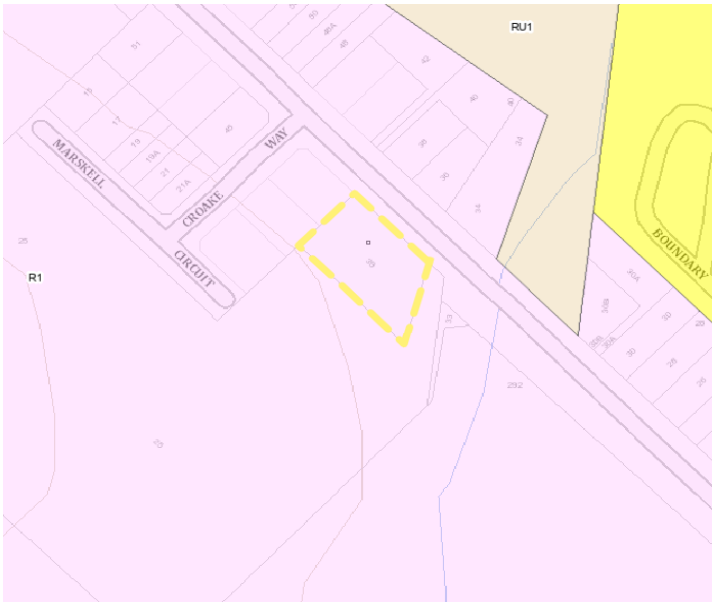

Figure 2.1: Land use zoning of the Subject Site.

2.2. Layout and Features

Figure 2.2 presents an aerial photo of the Subject Site with the features discussed indicated as sketch plan overlay.

The Subject Site is fenced and has direct northeastern frontage to Saleyards Lane. The area to be included and developed is part of a larger former agricultural landholding which includes residential land use to the north and west of the Subject Site. The eastern boundary of the site is an unnamed watercourse flowing in a northerly direction towards the Cudgegong River.

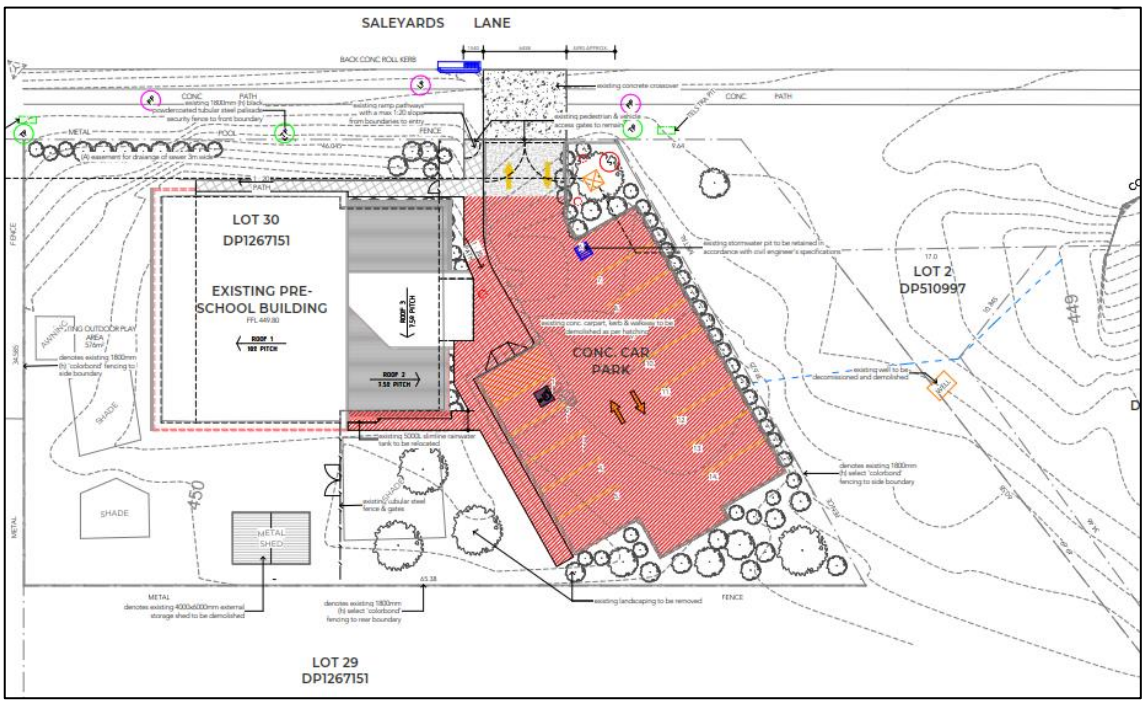

Figure 2.2: Existing Subject Site layout.

The existing facility is fenced and is accessed from the northeast. The additional land being included for the proposed extension is currently unoccupied and the portion fronting onto Saleyards Lane is unfenced (see Figure 2.3). The portion of the land to the south of this is fenced but has been affected by recent construction activities to the north (see Figure 2.4).

Figure 2.3: View of the existing childcare facility with the northern portion of the Investigation Area in the foreground.

Figure 2.4: Remainder of unoccupied Investigation Area with watercourse and culvert under Saleyards Lane in the background.

2.3. Historical Land Use

The Subject Site has historically been occupied by the Mudgee saleyards. Historical aerial images of the site dating back to 1965 show the saleyard pens and administration structure at the location of the Subject Site. The Saleyard operations remained at this location up to the early 2000's when in 2002 some structures on the current Subject Site have been cleared, with the entire area formerly occupied by the saleyards cleared by 2009.

The current childcare facility is observed on the 2015 aerial and is presumed to have been constructed somewhere between 2009 and 2015. The areas included in the Investigation Area that are currently unoccupied have been unoccupied since the Saleyards operations were cleared between 2002 and 2009.

Historical aerial photos of the area with the approximate location of the Subject Site indicated are attached as Appendix A.

2.4. 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 August 2024 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, in any of the following databases:
  - Former Gasworks Database
  - EPA PFAS Investigation Program
  - Defence PFAS Investigation & Management Program
  - Air Services Australia National PFAS Management Program
  - Defence 3 Year Regional Contamination Investigation Program

2.5. Previous Site Investigations

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

2.6. Proposed Development

Gowrie NSW is proposing to extend the current childcare facility, outside play are and parking area to the southeast. Figure 2.5 present an architectural drawing showing the proposed extension.

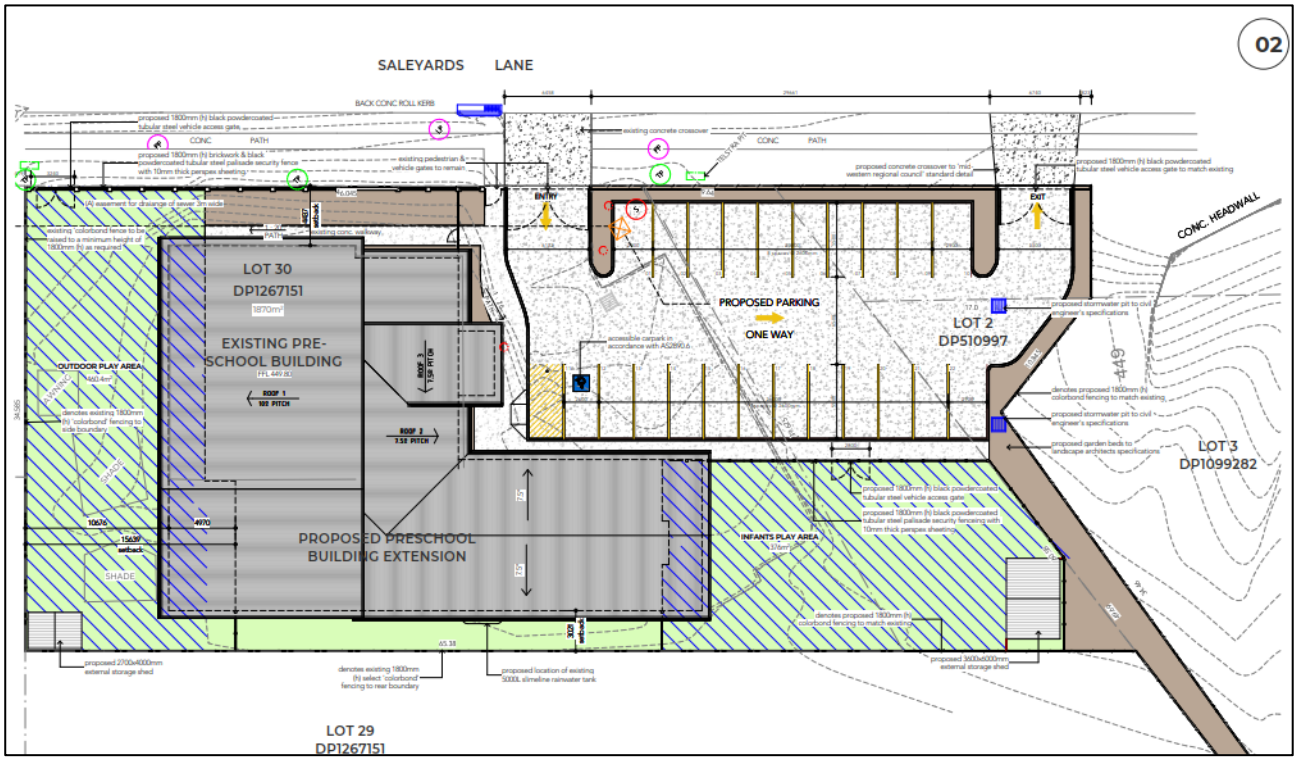

Figure 2.5: Proposed Childcare extension

The preliminary site investigation is undertaken to evaluate potential risks to human health associated with the new areas of the of the extended facility being included in the localities accessible by the children and staff.

3. SITE SETTING

3.1. Geology

A review of the 1:100000 Geology Map of Mudgee (refer to Figure 3.1) shows that geologically, the Subject Site is underlain by Cainozoic aged alluvial silt, clay and sand, variable huic content, sporadic pebble-to cobble-sized unconsolidated conglomeratic lenses.

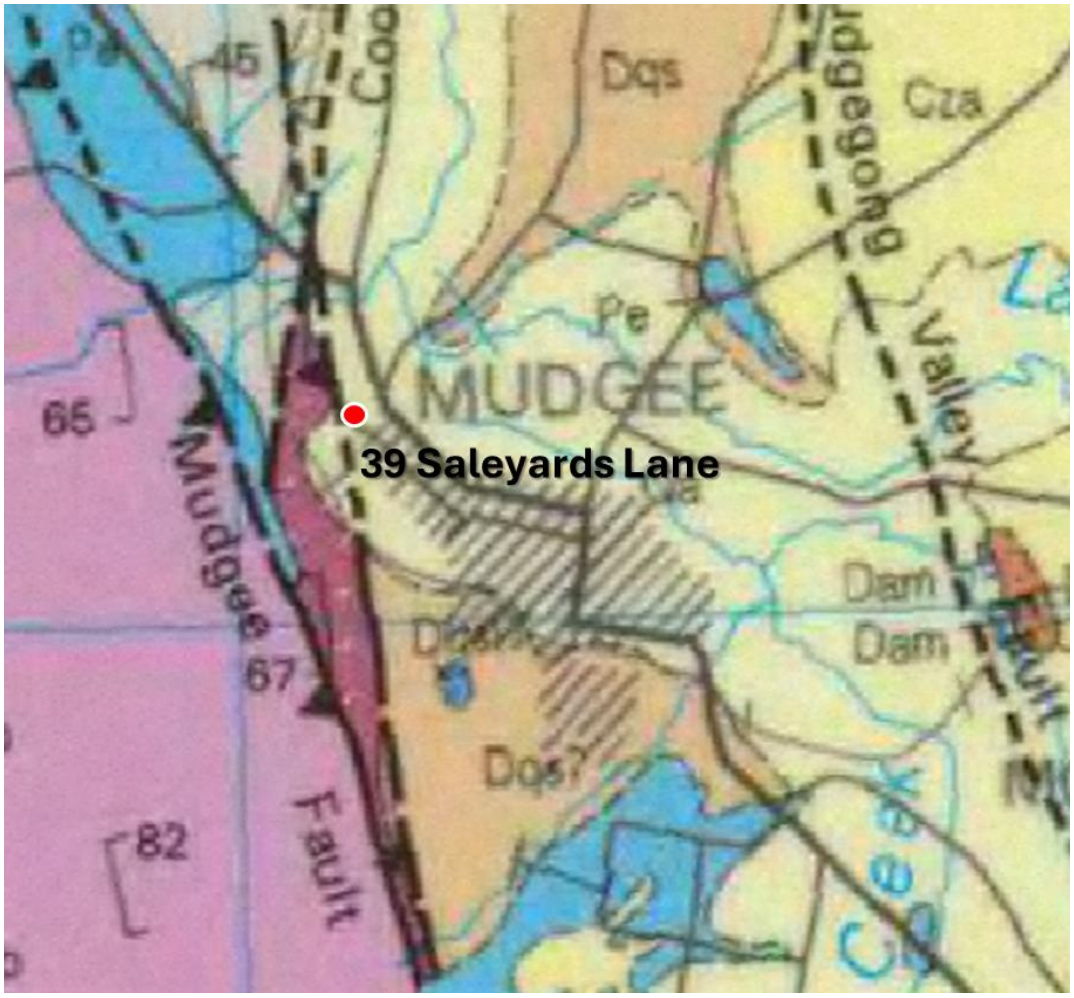

Figure 3.1: Mudgee 1:100,000 geology map showing the location of the Subject Site

Source: Google Earth, accessed 07/08/2024

An examination of the Geological Survey of NSW maps of Naturally Occurring Asbestos (accessed on 02 August 2024), shows that the geological units underlaying the Subject Site area has zero asbestos potential.

3.2. Soils

The Subject Site is mapped within the Craigmore soil landscape. Non-calcic Brown Soils (Dr2.12; Dr2.13; Dr2.42; Dr3.42) and Red Earths (Gn2.15; Gn2.16) on very old Quaternary alluvium. Yellow Podzolic-Solodic Soils intergrades (Dy3.42) on lower lying areas. Some Alluvial Soils (Uc1) and leached loams (Um4.21) on lower terraces adjacent to major streams.

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 in the area can be saline in places.

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 throughout. Generally, the site and surrounding locality has a slight fall to the east, towards the nearby watercourse.

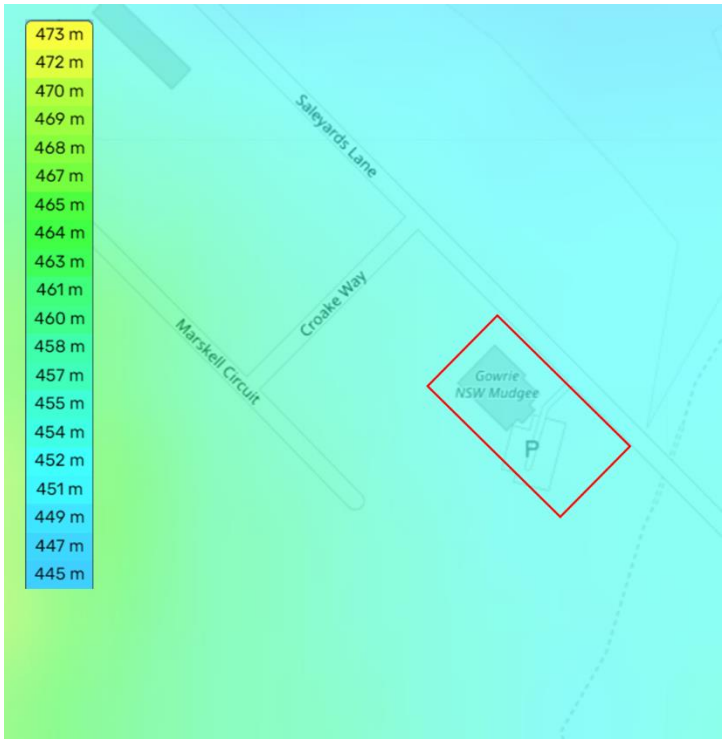

Figure 3.2: Subject Site topography.

The nearest natural water body to the Subject Site is the Cudgegong River, which at its closest is located at a distance of approximately 700m to the northeast.

3.4. Groundwater Resources

A review of existing groundwater bore records (WaterNSW, 2024) indicate there is a well located inside the boundaries of the Investigation Area. No other registered groundwater sites are identified within 500m of the Subject Site. The location of the well is indicated in Figure 3.3.

The information recorded in the database for the well (GW013263) indicate the depth as 10.6m. No information on Standing Water Level (S.W.L), Water Bearing Zone (W.B.Z) or yield is listed. The well was used for stock watering purposes.

Figure 3.3: Groundwater bores near the Subject Site.

Groundwater Sensitivity mapping obtained from the ePlanning Spatial Viewer, indicate that the Subject Site is located on environmentally sensitive land. Refer to Figure 3.4.

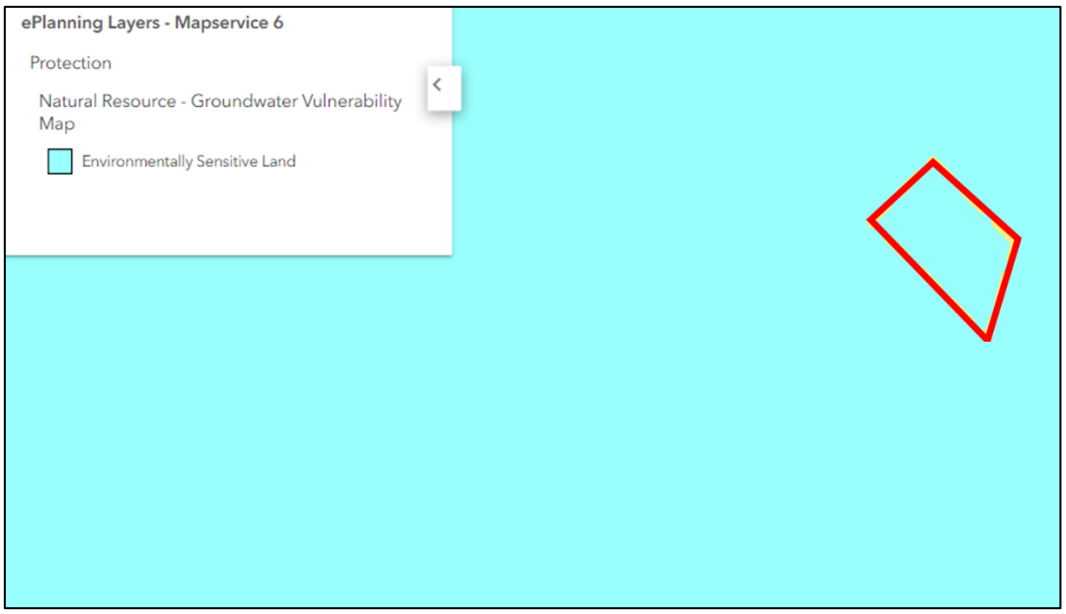

Figure 3.4: Groundwater vulnerability map.

4. CONCEPTUAL SITE MODEL

4.1. 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.

4.2. Sources

Based on the findings of the desktop assessment, the following potential contamination sources were identified:

- Historical saleyard activities

The historical use of the site as saleyards has the potential to contribute contaminants to surface soils through the presence of large numbers of animals in a small area and the use of vehicles in the loading and off-loading of the animals. The animals may contribute increased concentrations of nutrients (nitrogen and phosphate) through waste (manure and urine) while a small quantity of pesticide compounds used for pest control on animals may potentially be introduced. Potential contaminants associated with pesticides include heavy metals, as well as environmentally stable organochlorine and organophosphate compounds. These contaminants also relate to the historical use of the land for agriculture. Contaminants potentially introduced by the use of vehicles as part of the saleyard operations include petroleum hydrocarbons (e.g. fuel and lubricants)

- Drainage across the site

Aerial photos of the site indicate stormwater from the lot to the south drains across the unpaved Investigation Area in a north-easterly direction. The paved parking area is used for parking vehicles and serving as drop off. Contaminants (e.g. hydrocarbons) from the parking area has the potential to wash onto the Investigation Area and accumulate into the surface soils.

- Disposal of waste

Given the site is fenced, it is not readily accessible by the public and large scale illegal disposal of waste onto the site is considered unlikely. However, small quantities of blown waste or perhaps even waste tossed over the fence may be expected on the site.

- Demolition waste or unclassified fill

The demolition of the saleyards infrastructure and clearing and levelling of the site may have introduced fill or demolition waste to the surface of the site. Historical photographs of the site indicate no stockpiles of waste or fill.

4.3. Contaminants of Potential Concern

Considering the potential sources relevant to the Investigation Area, a wide variety of contaminants may be present. With the historical use of the site as saleyards considered the primary potential source of contamination, the potential residues of pesticides, including heavy metals, and hydrocarbons from vehicle use are accepted as the most likely contaminants. To a lesser extent, the drainage of runoff water from the adjoining paved carpark is accepted as a potential secondary source of localised hydrocarbon contamination. The presence of hazardous materials (asbestos and lead) is not considered likely potential contaminants.

Based on this understanding of the site history and activities, the contaminants of potential concern identified for the Investigation Area include:

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

4.4. 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.

4.5. Receptors

Potential receptors may include:

Human receptor populations

- Children attending and carers working at the facility.
- Workers involved in the construction of the proposed structures.
- Visitors to the Subject Site (e.g. workers conducting maintenance, members of the public visiting).

4.6. 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 activities were identified that could potentially have a resulted in contamination of surface soils at the Subject Site, the type and quantity of contaminants introduced through these various sources are not expected to have led to significant contamination of the surface soils.

Description	Rationale	Potential Contaminants
Drainage across the site	Possible washdown of contaminants from adjoining paved parking area.	Hydrocarbons, heavy metals.
Historical saleyard activities	Possible presence of pesticide residue and hydrocarbons in the underlaying soil.	Pesticides, heavy metals, hydrocarbons.

Based on the results of the desktop assessment the overall likelihood for significant chemical contamination to be present at the Subject Site is considered to be low.

5. SITE INSPECTION

5.1. General

Barnson conducted an inspection of the Subject Site on Monday 5 August 2024. During the inspection the following observations were made:

- The surface of the investigation area is covered with managed and unmanaged vegetation (grasses), no trees present. (Figure 5.1).
- Evidence of earthworks and installation of drainage infrastructure to the south of the Investigation Area (see Figure 5.2).
- There are small stockpiles of waste, including steel posts, timber, wire, concrete and tyres located on an adjoining lot outside the fence of the Investigation Area. (Figure 5.3).
- Some evidence of windblown waste (cans and paper) was observed.
- The well located on site is covered. The well was visually inspected from surface and appeared dry with no water present.
- Parking lot is concrete bunded. All stormwater is channelled to a stormwater pit. Contaminated runoff from the carpark is unlikely.
- Landscape area inside existing fenced parking area is covered with vegetation. Landscape soil used to fill area to height of kerb and sustain plants.
- Area immediately outside of childcare facility fence appears to be sprayed with herbicide to reduce the need for maintenance.

Figure 5.1: Maintained and unmaintained vegetation covering surface of the Investigation Area.

Figure 5.2: Evidence of earthworks to the south of Investigation Area

Figure 5.3: Waste stockpiles outside Investigation Area.

Figure 5.4: Existing parking lot.

Figure 5.5: Landscape area in parking lot.

Figure 5.6: Bare soil next to existing facility fence.

The surface of the Investigation Area and landscape areas inside the existing facility was carefully inspected for signs of demolition waste. No evidence of demolition waste was observed anywhere on the surface.

5.2. Confirmatory Sampling

5.2.1. Sampling Design

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.

The pattern followed for the soil sampling can be described as Systematic Sampling, where points are selected at regular intervals across the surface of a site. It is an efficient sampling method for confirmatory sampling that ensures an even coverage of the site, which is ideal for characterising sites (NSW EPA, 2020).

5.2.2. Sampling Density

The sampling density was selected for detection of a potential hot spot with a diameter of 10m at a 95% level of confidence. The grid spacing is 8 m and the sampling frequency is in accordance with the minimum recommended in the NSW EPA Sampling Guideline (NSW EPA, 2020) for grid based systematic sampling.

5.2.3. Sampling Depth

Based on the findings of the CSM the inspection and sampling were focussed on the surface soils (0-150mm). The site inspection included all accessible areas of the Subject Site.

5.2.4. Sampling Methods

Soil samples from the site were taken using a stainless-steel hand trowel. Soil was taken at each individual sampling location below the vegetative and detrital layer. Discrete soil samples were transferred directly to glass jar with a Teflon lined lid, supplied by the laboratory.

Tools were decontaminated between sampling locations to prevent cross contamination by brushing to remove caked or encrusted material, rinsing with clean tap water and allowing to air dry or using a clean towel.

5.2.5. Sampling Locations

Figure 5.7 presents a map of the Subject Site with the locations of the surface soil samples indicated. Table 5.1 is a summary description of the collected samples.

Figure 5.7: Locations of confirmatory surface soil samples.

Table 5.1: Summary of sample details.

Sample ID	Reference in Figure 5.7	Description
TP-01	A	Surface soil (0-150mm) collected from unfenced portion of Investigation Area.
TP-02	B	Surface soil (0-150mm) collected from unfenced portion of Investigation Area.
TP-03	C	Surface soil (0-150mm) co collected from unfenced portion of Investigation Area.
TP-04	D	Surface soil (0-150mm) collected from fenced area with unmanaged vegetation that will form part of future play area
TP-05	E	Surface soil (0-150mm) collected from fenced area with unmanaged vegetation that will form part of future play area.
TP-06	F	Surface soil (0-150mm) collected from landscape area to be repurposed as play area.
TP-07	G	Surface soil (0-150mm) collected from landscape area to be repurposed as play area.
TP-08	H	Surface soil (0-150mm) collected from landscape area to be repurposed as play area.
TP-09	D	Duplicate surface soil (0-150mm) sample collected from Location D.
TP-10	I	Additional surface soil (0-150mm) collected along fence where bare soil observed.

5.2.6. Analytes

The surface soil samples, were submitted to the Australian Laboratory Services (ALS) Pty Ltd 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, and
- 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).

The sample collected from the strip of bare soil discovered along the existing facility fence was analysed also for Organochlorine (OCP) and Organophosphorus (OPP) Pesticides.

All samples submitted for analysis included laboratory QC duplicates and spikes for the parameters analysed.

5.3. Analytical Results

A copy of the laboratory report for the confirmatory samples is attached as Appendix B.

- The laboratory report indicates only metals were detected in the samples of surface soil analysed. In all surface soil samples analysed the concentrations of petroleum hydrocarbons as well as persistent pesticide and herbicide compounds are indicated as below the limits of detection.
- The metals detected include arsenic (As), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), and zinc (Zn). Concentrations of, cadmium and mercury were at or below detection in all samples.

Table 5.2 presents a summary of the analytical results for metals.

Table 5.2: Summary of metal concentrations detected in soil samples collected from the Subject Site

Analyte	TP-01	TP-02	TP-03	TP-04	TP-05	TP-06	TP-07	TP-08	TP-09
	mg.kg^{-1}								
Arsenic (As)	20	11	24	27	32	18	5	<5	28
Cadmium (Cd)	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium (Cr)	16	13	22	26	17	24	16	16	25
Copper (Cu)	27	18	21	9	19	17	11	12	11
Lead (Pb)	69	16	31	15	19	10	<5	<5	18
Mercury (Hg)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel (Ni)	11	5	10	4	31	8	8	10	6
Zinc (Zn)	89	34	66	18	111	143	25	32	34

5.4. Analytical Data Quality

5.4.1. Field

- An experienced sampler was used to collect the samples using standard methods.
- Samples were collected in new, clean containers using cleaned equipment and soils were placed in glass jars provided by the laboratory that were refrigerated after filling and transported in an insulated container to the laboratory.
- The collection of samples was undertaken in accordance with accepted standard protocols (NEPC 1999).
- Duplicate samples were collected at a frequency of 1:10. The duplicate samples were split from field samples, in the field. The duplicates were analysed for the same parameters as the primary samples.

- No field blank, rinsate, trip blank or matrix spikes were submitted for analysis. Samples from all batches did not contain contaminants which confirm the absence of cross contamination during transport and storage.
- Chain of custody was recorded for all samples. A copy of the signed sheet is attached as Appendix B.

5.4.2. Laboratory

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 B).

5.4.3. Data evaluation

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 suitable for the purposes of the contaminated site investigation.

6. ASSESSMENT

6.1. Assessment Criteria – Human Health and Environmental Risk

Screening for human health and ecological risk, utilises published human health investigation levels (HILs) from the National Environment Protection (Assessment of Site Contamination) Measure (NEPC, 1999) to identify contaminant concentrations in soil that may pose a risk to children attending the facility or visiting the site.

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 Investigation Area are those derived for a standard residential scenario (HIL-A), which assumes typical 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 childcare facility 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 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 6.1 presents a summary of the health-risk based criteria and ecological investigation levels selected for assessment of the detected metal concentrations.

Table 6.1: Human health and ecological risk screening levels for metals.

	Health-based Investigation Levels	Ecological Investigation Levels (EIL)
	HIL A Residential	Residential
Element	mg.kg^{-1}	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

Note: NR=not relevant due to low human toxicity of Cr(III). NA=No applicable screening level. EILs selected are most conservative values relevant to Residential land use scenarios.

6.2. Findings

Direct comparison of the analytical results presented in Table 5.2 with the assessment criteria (refer Table 6.1) show that the detected metal concentrations in samples collected from the Investigation Area are well below the health and ecological risk-based criteria values. The general low concentrations of heavy metals detected suggest naturally occurring element abundance and is most likely not related to any of the potential sources of contamination identified for the Investigation Area. The presence of detectable concentrations of arsenic is an indication of the potential contribution of the large number of livestock that occupied the site as part of the saleyards operations. Historically, livestock were treated with arsenic based dip/drench solutions for external parasites. These pesticides could be washed off the hides and over time concentrate in surface soils. However, these results verify the assertion that the activities previously undertaken at the site did not contribute significant or widespread contamination to the surface soils.

The sample of soil collected in the bare soil area where herbicide was presumably applied contained no elevated concentrations of pesticides.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. 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 and evaluated:
  - Historical saleyard activities
  - Drainage across the site
  - Disposal of waste
  - Demolition waste or unclassified fill
- A site investigation and confirmatory sampling conducted to determine the presence and significance of potential contamination associated with the identified sources, revealed no evidence of contamination.
- The concentrations of all contaminants investigated were below screening criteria in all surface soil samples collected from the Investigation Area.
- The screening criteria used in the evaluation of the contaminant concentrations were appropriately conservative and suitable for assessment of the continued use of the site for educational purposes.
- Based on the findings of the desktop review and site investigation it is concluded that the contamination identified at the Subject Site represent no potential risk to human health and the environment and the Site is suitable for the proposed redevelopment.

7.2. Recommendations

- Based on the findings of the desktop review and site investigation it can be stated with a reasonable level of confidence that the Investigation Area is suitable for the proposed development as childcare facility as there are no contaminants present at the site which are likely to present a risk of impact to the health of humans.

8. REFERENCES

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

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

NSW EPA. (2020). *Sampling Design Part 1 - Application, Contaminated Land Guidelines.* Sydney: NSW EPA.

WaterNSW. (2024). *Real Time Data*. Retrieved August 2, 2024, from Water NSW: https://realtimedata.waternsw.com.au/water.stm

barnson.

APPENDIX A

Historical Aerial Photographs

1965

1990

1994


Saleyards Ln
39 Saleyards Ln
Saleyards Ln
Maskell Cct
Fifth St

2002

2009

2015

barnson.

APPENDIX B

Chain of Custody and Laboratory Report

Environmental Division
Mudgee
Work Order Reference
ME2401269

Telephone · 02 6372 6735

barnson

Jnit 4 / 108-110 Market Street
/ludgee, NSW 2850
300 BARNSON (1300 227 676)
jeneralenquiry@barnson.com.au

CHAIN OF CUSTODY AND ANALYTICAL REQUEST

Job Number	41821	Date	6 August 2024
Laboratory	ALS Mudgee	Report to	Nardus Potgieter npotgieter@barnson.com.au
Sample Temperature on Receipt		Notes	
9-11 °C	Signature: [redacted]		

Sample ID	Sample Description	Sample Date	Sample type	Analysis request				
				1	2	3	4	5
TP-01	Surface Soil	05/08/2024	Soil		X			
TP-02	Surface Soil	05/08/2024	Soil	X				
TP-03	Surface Soil	05/08/2024	Soil	X				
TP-04	Surface Soil	05/08/2024	Soil	X				
TP-05	Surface Soil	05/08/2024	Soil	X				
TP-06	Surface Soil	05/08/2024	Soil	X				
TP-07	Surface Soil	05/08/2024	Soil	X				
TP-08	Surface Soil	05/08/2024	Soil	X				
TP-09	Surface Soil	05/08/2024	Soil	X				
TP-10	Surface Soil	05/08/2024	Soil			X		

Analysis request		Method Code
1	8 Metals	S-2
2	TRH (C6-C40) / BTEXN / 8 Metals	S-5
3	OC / OP Pesticides	S-12
4		
5		

[redacted]

		Date
[redacted]	ALS Mudgee	6 August 2024

Client 1x esky
No ice
No ice brick.

CERTIFICATE OF ANALYSIS

Work Order	: **ME2401269**	Page	: 1 of 8
Client	: **BARNSON**	Laboratory	: Environmental Division Mudgee
Contact	: Nardus Potgieter	Contact	: Mary Monds (ALS Mudgee)
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	: 06-Aug-2024 12:15
Order number	: ----	Date Analysis Commenced	: 07-Aug-2024
C-O-C number	: ----	Issue Date	: 13-Aug-2024 16:34
Sampler	: Client Sampler		
Site	: ----		
Quote number	: SY/053/14		
No. of samples received	: 10		
No. of samples analysed	: 10		

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*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, 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 Contract 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.

- 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.
- Unless otherwise stated, analytical work for this work order will be conducted at ALS Mudgee, NATA accreditation no. 825, site no. 15224.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP-01 Surface Soil	TP-02 Surface Soil	TP-03 Surface Soil	TP-04 Surface Soil	TP-05 Surface Soil
				Sampling date / time	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00
Compound	CAS Number	LOR	Unit		ME2401269-001	ME2401269-002	ME2401269-003	ME2401269-004	ME2401269-005
					Result	Result	Result	Result	Result
EA055: Moisture Content									
Moisture Content	----	1.0	%		10.9	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		----	6.7	11.8	12.8	11.3
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		20	11	24	27	32
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		16	13	22	26	17
Copper	7440-50-8	5	mg/kg		27	18	21	9	19
Lead	7439-92-1	5	mg/kg		69	16	31	15	19
Nickel	7440-02-0	2	mg/kg		11	5	10	4	31
Zinc	7440-66-6	5	mg/kg		89	34	66	18	111
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
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		<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	----	----	----	----
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		<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP-01 Surface Soil	TP-02 Surface Soil	TP-03 Surface Soil	TP-04 Surface Soil	TP-05 Surface Soil
				Sampling date / time	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00
Compound	CAS Number	LOR	Unit		ME2401269-001	ME2401269-002	ME2401269-003	ME2401269-004	ME2401269-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	----	----	----	----
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	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**90.0**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		**89.0**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**94.9**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP-06 Surface Soil	TP-07 Surface Soil	TP-08 Surface Soil	TP-09 Surface Soil	TP-10 Surface Soil
			Sampling date / time	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00
Compound	CAS Number	LOR	Unit	ME2401269-006	ME2401269-007	ME2401269-008	ME2401269-009	ME2401269-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**21.5**	**14.2**	**20.1**	**11.2**	**7.9**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**18**	**5**	<5	**28**	**----**
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	**----**
Chromium	7440-47-3	2	mg/kg	**24**	**16**	**16**	**25**	**----**
Copper	7440-50-8	5	mg/kg	**17**	**11**	**12**	**11**	**----**
Lead	7439-92-1	5	mg/kg	**10**	<5	<5	**18**	**----**
Nickel	7440-02-0	2	mg/kg	**8**	**8**	**10**	**6**	**----**
Zinc	7440-66-6	5	mg/kg	**143**	**25**	**32**	**34**	**----**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<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 - (Lindane)	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

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Sample ID	TP-06 Surface Soil	TP-07 Surface Soil	TP-08 Surface Soil	TP-09 Surface Soil	TP-10 Surface Soil
				Sampling date / time	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00
					ME2401269-006	ME2401269-007	ME2401269-008	ME2401269-009	ME2401269-010
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
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
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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP-06 Surface Soil	TP-07 Surface Soil	TP-08 Surface Soil	TP-09 Surface Soil	TP-10 Surface Soil
				Sampling date / time	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00	05-Aug-2024 00:00
Compound	CAS Number	LOR	Unit		ME2401269-006	ME2401269-007	ME2401269-008	ME2401269-009	ME2401269-010
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
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
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	----	----	----	**73.3**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	----	----	----	**79.0**

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	63	125
Toluene-D8	2037-26-5	67	124
4-Bromofluorobenzene	460-00-4	66	131

Inter-Laboratory Testing

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

(SOIL) EA055: Moisture Content

(SOIL) EG005(ED093)T: Total Metals by ICP-AES

(SOIL) EG035T: Total Recoverable Mercury by FIMS

(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) EA055: Moisture Content (Dried @ 105-110°C)

(SOIL) EP068A: Organochlorine Pesticides (OC)

(SOIL) EP068B: Organophosphorus Pesticides (OP)

(SOIL) EP068T: Organophosphorus Pesticide Surrogate

(SOIL) EP068S: Organochlorine Pesticide Surrogate