Detailed contamination investigation

New residential units, 49 Court Street, Balranald NSW

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Summary report

Background

Four studio apartment cabins are proposed for 49 Court Street, Balranald NSW. Preliminary contamination investigations undertaken by Envirowest Consulting Pty Ltd (report 15067c) identified soil stockpiles on-site used for leveling works and evidence of vehicles accessing the site.

A Detailed Contamination Investigation is required to complete the data gaps, determine soil contamination status and suitability for the proposed land-use.

Objectives of investigation

The objective of the investigation was to compete the data gaps to determine suitability of the site for the proposed land-use.

Scope

The scope was to identify past potentially contaminating activities, identify potential contamination, undertake sampling and analysis program to assess the site for the the potential contaminants of concern. The works included site inspection, review of available information, soil sampling, analysis, comparison with adopted criteria for the proposed land-use.

Summary

An inspection of the investigation area was made on 1 December 2022. The investigation area was vacant maintained lawn. The historical land-use of the investigation area is vacant. Building sand was stockpiled in a small area on the site. Soil from hospital excavations containing trace concrete rubble was stockpiled on the site during construction of the adjacent Balranald Multipurpose Health Service (MPS).

Vegetation cover on the site was complete and dominated by fescue lawn and weeds. Trace concrete cobbles were scattered across the investigation area. No asbestos containing materials were observed. A slight raised soil mound was identified in the former stockpile footprint. The mound is expected to be the levelled former stockpiles from hospital excavations. Surface sand was observed in a small area in the eastern section of the investigation area. No evidence of building, mines or contaminating activities were identified in the investigation area.

The investigation included sampling of the site at 13 loations over the 0.4ha. Boreholes were drilled to a depth of 300mm and the soil profile described. Soils samples were collected at the 0-100mm depth in each borehole and 200mm-300mm depth at one borehole. The soil samples were analysed for the contaminants of concern which included heavy metals, total petroleum hydrocarbons (TRH C6-C40) and polycyclic aromatic hydrocarbons (PAH).

The soil was is red brown clayey sand to 120-170mm over red brown sandy clay to 300mm. All soil profiles were uniform with dry soil on the surface and moist in the sandy clay subsoil. Some surface layers contain trace gravel and rock. Concrete cobbles were observed on the surface at several locations. It was reported some crushed concrete was buried in the site from past hospital footing excavations. The extent is not known however based on surface observations and boreholes not expected to be significant.

The soil sampling program did not detect elevated levels of assessed contamininats. The levels of all analytes were below adopted thesholds for residential land-use with access to the soil.

Recommendations

The data gaps have been completed and theinvestigation area is suitable for proposed residential land-use.

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1. Introduction

Four studio apartment cabins are proposed for 49 Court Street, Balranald NSW. Preliminary contamination investigations undertake by Envirowest Consulting Pty Ltd (report 15067c) identified soil stockpiles were levelled and evidence of vehicles accessing the site.

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2. Objectives

The objective of the investigation was to compete the data gaps to determine suitability of the site for the proposed land-use.

3. Scope of work

Envirowest Consulting Pty Ltd was commissioned by CWPM to undertake a detailed contamination investigation, in accordance with the contaminated land management planning guidelines, of 49 Court Street, Balranald NSW. The scope of works included site inspection, review of available information, soil sampling, analysis, comparistion with adopted criteria for the proposed land-use.

4. Site identification

Address	Part 49 Court Street Balranald NSW
Deposited plans	Part Lot 2 DP792299
Latitude and longitude	-34.6436^{o} 143.5678^{o}
Geographic coordinates	54H E735355m S6163475m
Client	CWPM
Owner	Balranald MPS
Current occupier	Vacant
Area	Part Lot - 7,133m^2 Investigation area – approximately 4,000m^2
Local government area	Balranald Shire Council
Current zoning	RU5 – Village (Balranald LEP 2010)
Trigger for investigation	New studio apartment cabins
Locality map	Figure 1

5. Site history

5.1 Land-uses

The site is maintained open space adjacent to the Balranald Multipurpose Service. Proposed land-use is residential unit for health workers.

5.2 Summary of council records

A planning certificate was obtained for 49 Court Street, Balranald NSW. Balranald Shire Council has not received notice under the *Contaminated Land Management Act 1997* that the land is:

- subject to a management order
- subject of an approved voluntary management proposal
- subject to an ongoing maintenance order
- subject to a site audit statement.

Council records do not have sufficient information about previous use of the land to determine whether the land is contaminated.

Balranald Local Environmental Plan (2010) has the site mapped as:

- Groundwater vulnerability
- Bushfire prone land

5.3 EPA databases

The site is not listed on the NSW EPA register of contaminated sites (20 December 2022) or sites notified to the EPA (8 December 2022).

No sites listed on NSW EPA register of contaminated sites or sites notified to the EPA have been identified within 1km of the site.

5.4 Safework NSW Storage of hazardous chemicals

An application for a site search for schedule 11 hazardous chemicals on premise was submitted to SafeWork NSW.

The resulting file was related to the Balranald Shire Council Water Supply Pumping Station which is located downslope and south of the site. Hazardous chemicals stored at the water supply pumping station are not expected to be impacting on the contamination status of the site.

No schedule 11 hazardous chemicals are known to have been stored on the site.

5.5 POEO public register

The site is not listed on the NSW EPA POEO public register.

One license listed on NSW EPA POEO public register have been identified within 1km of the site. The license (3222) for miscellaneous licensed discharge to waters is issued to Balranald Shire Council for the Balranald Water Treatment Works located at 36 Court Street, Balranald NSW. The license was surrendered in 2007. Discharge to waters is not expected to have impacted on the contamination status of the site. Surrended

5.6 Other government agency databases

The site is not listed on the following databases:

- National Liquid Fuel Facilities database
- The NSW Government PFAS Investigation Program
- Defence PFAS Investigation Program
- Defence PFAS Management Program
- Airservices Australia National PFAS Management Program

Two petrol stations are listed on the national liquid fuel facilities database as occurring within 1km of the site. The petrol stations are located approximately 400m and 550m north west of the site along Market Street. Potential contamination originating from the petrol stations is not expected to be impacting on the site due to expected groundwater flow direction.

No additional sites listed on government agency databases have been identified within 1km of the site.

5.7 Sources of information

NSW EPA records of public notices under the CLM Act 1997
Soil and geological maps
Historical aerial photographs including NSW Government historical imagery and Google Earth
Google street maps
Balranald LEP 2010
Balranald Shire Council
Discussions with Gavin Llyod long time maintance/groundsman

5.8 Review of historic aerial photographs, maps and plans

5.8.1 Aerial photographs

Year	Comment
1955	The site is vacant, located on the verge of village development. A tree line is evident in the west. The assumed Balranald hospital is adjacent to the south east. Rural land is located to the east.
1965	The site appears vacant. No significant changes to surrounding land.
1973	Two tracks traverse the site. A track traverses the site east to south and north to south.
1991	The east to south track provides access to the ambulance station from Market Street.The track traversing noth to south is no longer evident. The assumed Balranald ambulance station has been constructed on surrounding land to the south. A shed has been constructed on surrounding land to the north east. Infrastructure including sheds, tracks and ponds are evident on surrounding land to the south.
1997	Vegetation on the site is green and track is less evident.
2003	The track is evident. A fenced yard with small shed is located on surrounding land to the east. Market Street is asphalt.
2006	No significant changes to the site.
2011	Bare areas are evident in the south east. The Balranald Multipurpose Service has replaced the Balranald hospitalon surrounding land to the south east. An asphalt carpark, access and gardens are located on surrounding land to the east. Additional shed built on surrounding land to the east.
2015	No significant changes to the site. Vegetation appears consistent.
2017	No significant changes to the site. Vegetation is green and consistent.
2020	Bare areas are evident in the south east. Hardstand is evident on surrounding land to the east.

5.8.2 Google maps street view

Year	Comment
04/2010	Two soil stockpiles are evident on the western section of site. An access road to the Balranald Multipurpose Service construction site is evident in the west.
12/2019	Stockpiles are no longer evident. Construction of the Balranald Multipurpose Service has been completed. The investigation area appears uniform and partially vegetated, vegetation appears dry.
08/2022	The investigation area is well vegetated.

5.8.3 Topographic maps

The current topographic map (Six Maps) depicts the site as vacant. Buildings with the notation multipurpose service are depicted to the south east.

5.8.4 Historical parish maps

The site is situated in the parish of Balranald, county of Caira and review of the applicable historical parish maps was undertaken. On the Town of Balranald and adjoining lands map dated 14th December 1971 and all available town maps the site carries the notation *Additions to Site for Hospital Dedicated 20th August '86*.

5.8.5 Title deeds

A search of title deeds was not considered necessary as historic parish maps provided information on historic site ownership.

5.9 Chronological list of site uses

Review of historical parish maps suggest the site was dedicated to the hospital in 1886. Review of aerial images suggest the site is vacant open space additional to the Balranald Hospital site. A track on the site provided access to the Balranald Ambulance station prior to the redevelopment of the hospital site which was completed in February 2011.

A construction access was located in the east and south of the site in 2010 during works on the Balranald Multipurpose Service.

Soil material from unknown sources but expected to originate from the Balranald hospital redevelopment was stockpiled on the site in 2010 site imagery. Two stockpiles are evident. Stockpiles are not evident on the site in subsequent aerial imagery.

No mines, sheep dips, mixing sheds, underground storage tanks (UST) or contaminating industrial activities have been identified as occurring on the site from the site history.

5.10 Heritage listings

The site is not listed on the following government heritage databases:

- Commonwealth Heritage List
- National Heritage List
- State Heritage Register
- Local Environmental Plan (Balranald LEP 2012)
- National Map Database

The site is identified as being within 1km of three general items on the Balranald LEP (2012) heritage map. The sites include Dippo Ceremonial Ground (I4), Aboriginal cemetery (I1) and fire station (I2). The historical sites are not expected to have impacted on the contamination status of the site.

No items listed on the Commonwealth Heritage List, National Heritage List or State Heritage Register are located within 1km of the site.

5.11 Buildings and infrastructure

No buildings or infrastursture are located on the investigation area.

5.12 Spills, losses or discharges

No records for spills or losses on the site were available. No records for discharges to land, water or air were available.

5.13 Relevant complaint history

None expected

5.14 Previous investigations

5.14.1 Envirowest Consulting Pty Ltd (2022) *Preliminiary contamination investigation, 49 Court Street, Balranald NSW* (R15067c)

A desktop investigation was undertaken by reviewing aerial photographs, available databases, published information and council records for evidence of contamination.

The site is maintained open space adjacent to the Balranald Multipurpose Service. Historical access tracks and a construction access were located in the eastern section. No agricultural land-use was identified from the site history.

Vehicles accessing the site may have leaked oils and fuels. No evidence of mines, sheep dips, mixing sheds or contaminating industrial activities were identified at the site from review of the site history.

Soil stockpiles were identified in 2010 from site imagery. Stockpiled soil appears to be retained on-site for leveling works. Material may be sourced from the Balranald hospital redevelopment and the contamation staust is unknown. Potential contamination sources are buildings materials and ash.

The report made the following recommendations:
The site is potentially suitable for the proposed land-use after investigation of the material used for site leveling is undertaken. Material investigations include visual inspections for ash and building materials including cement sheeting. Surface soil sampling in a systematic pattern over the material and analysis for heavy metals. If ash is visually identified analysis for PAH is recommended.

Visual inspections for surfce staining should be underataken from vehicles accessing the site.

5.15 Discussions with owner representative

Mr Gavin Llyod long term maintenance/ groundsman indicated the site was always vacant. A small area of building sand was identified in the inspection which was remnant from the hospital redevelopment activities. Mr Lloyd also reported excavated soil from the hospital was stockpile on the site and later levelled into a shallow mound. The excavated soil contained trace amounts of cobble sized concrete. No large pieces of concrete slab or footing wer reported to have been buried.

5.16 Historical neighbouring land-use

North –Market Street and Balranald SES rescue
South –Court Street and Anzac Park
East – Balranald Health Service, carpark
West – Sturt Highway and Motel

Historical land-uses are not expected to have resulted in application contaminates to the site.

5.17 Contaminant sources

Contamination sources identified in the preliminary contamination assessment were:

- Oils, lubricants and fuels may have leaked from vehicles traversing the site.
- Soil material from unknown sources stockpiled on-site in 2010. Stockpiled material appears to be retained on-site for site leveling works.

5.18 Contaminants of concern

Based on historical activities the contaminants of concern associated with stockpile/fill material and vehiles are:

- Heavy metals (arsenic, cadmium, chromium, copper, nickel, lead, zinc and mercury)
- Total recoverable hydrocarbons (TRH)
- Benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN)
- Polycyclic aromatic hydrocarbons (PAH)
- Asbestos

5.19 Integrity assessment

The site history was obtained from history review. The information is consistent with the current site condition and to the best of the assessor's knowledge is accurate.

6. Site condition and surrounding environment

6.1 Site inspection

The site was inspected by Greg Madafiglio of Envirowest Consulting Pty Ltd on 1 December 2022.

6.2 Land-use

The site was vacant maintained lawn on the day of inspection.

6.3 Current neighbouring land-use

North – Balranald Rescue Squad
South – ANZAC park
East – Balranald Multipurpose Service, carpark
West – Motel

6.4 Surface cover and vegetation

The surface was completed covered in vegetation with no bare areas. Species included a dominant fescue lawn with weeds including barley grass, wild oats, marshmellow, charlock, sowthistle, hoary cress, native medic, gazania garden escapes (flowering) and capeweed. The vegetation was partially desiccated due to a change in seasons.

6.5 Evidence of visible contamination

Trace concrete fragments was observed scattered on the soil surface in the mound are near the centre of the site. The concrete cobble are reminants contained in excavated soil from the old hospital infrastructure. The soil mound was up to 200mm above the surrounding areas and contained similar vegetation as the other areas on the site. No other building materials were observed in the mound soil. No evidence of contamination was observed in the mound or other areas on the site.

6.6 Topography

The morphology on-site is a lower slope to flat. The site is very gently inclined slope of 0 to 1% to the south west towards the Murrumbidgee River. Elevation is approximately 66 metres above sea level.

6.7 Soils and geology

The site is classified as Calcarosols under the Australian Soil Classification system. Calcarosols are composed of calcium carbonate throughout the A and B horizons, notably in the subsoil. Geotechcnial investigation on the site ave identied the locality is underlain by crystal sands which are source of Zurcon.

6.8 Water

6.8.1 Surface water

Surface water is expected to infiltrate or flow to the Balranald stormwater system. The southern part of the site is located 260m to the Murrumbidgee River. The Murrumbidgee River is a major irrigation, recreational and ecological water source which is considered moderately distruved due to impacts from agricultural runoff.

6.8.2 Groundwater

No groundwater bores were located on the site. One registered groundwater bore identified within 500m of the site on the NSW Government Water NSW website (2020). The intended purpose of the bore is test bore. A water-bearing zone (WBZ) was recorded from 18m to 21m with a standing water level of 12.6m.

No.	Date drilled	Location	SWL (m)	Use	Status
GW409409	2009	150m S	12.6	Test bore	-

6.9 Evidence of possible naturally occurring contaminants

No natural sources of PAH were identified.

The site is not mapped as an acid sulphate soil risk (State Government of NSW and Department of Planning, Industry and Environment 1998).

The site is not mapped as a geological unit with asbestos potential (State Government of NSW and Department of Regional New South Wales 2015).

6.10 Environmentally sensitive features or habitats

The site is identified as an area of groundwater vulnerability on the Groundwater Vulnerability Map (Balranald LEP 2010).

The site is located in the village of Balranald, NSW and no additional environmentally sensitive features or habitats are located on the site.

Land to the east and south of the site is identified as wetlands on the Waterways Map (Balranald LEP 2010).

6.11 Integrity assessment

The site history was obtained from a and history review. The information is consistent with the current site condition and to the best of the assessor's knowledge is accurate.

7. Conceptual site model

7.1 Contaminant sources

Contamination sources identified in the preliminary contamination assessment were:

- Oils, lubricants and fuels may have leaked from vehicles traversing the site.
- Stockpiled soil from the hospital redevelopment that has been retained on the site

7.2 Contaminants of concern

Based on historical activities the contaminants of concern associated with stockpiled/fill material and vehicles are:

- Heavy metals (arsenic, cadmium, chromium, copper, nickel, lead and zinc)
- Total recoverable hydrocarbons (TRH)
- Benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN)
- Polycyclic aromatic hydrocarbons (PAH)
- Asbestos

7.3 Potential receptors

The proposed land-use of the site is residential. The land-use history of the site is open space adjacent to the Balranald Multipurpose Service.

Human receptors include:

- Residents (adults and children)
- Visitors (adults and children)
- Site workers
- Construction workers
- Intrusive maintenance workers

Ecological receptors include

- Flora and fauna on the site and adjacent to the site
- Aquatic flora and fauna receptors off-site

7.4 Exposure pathways

Pathways for exposure to contaminants are:

- Dermal contact following soil disturbance
- Ingestion and inhalation after soil disturbance
- Surface water and sediment runoff into waterways
- Leaching of contaminants into the groundwater
- Direct contact of flora and fauna with the soil

7.5 Source receptor linkages

Potential source pathway receptor linkages are identified to enable evaluation of any adverse impact on human health or ecology.

The proposed land-use of the site is residential and human receptors to the investigation area are likely. Proposed users of the site may have a risk of exposure if contaminants are present and the soil is disturbed. Residents, visitors, construction workers and intrusive maintenance workers to the site may potentially be receptors to soil contaminants through direct contact to soil which includes ingestion and dermal contact.

Inhalation may occur as a result of soil disturbance and dust production. Major soil disturbance before and after the development of the site is considered unlikely. Soil disturbance during construction and development of the site is expected to be accompanied by erosion control measures which will reduce the incidence of dust production.

Vegetation on the site may be potential receptors to soil contamination through direct uptake of contaminants.

Disturbance of soil containing asbestos may result in release of asbestos fibres impacting on-site workers and the surrounding public.

The source receptor linkage to aquatic organisms and ecosystems is considered incomplete. The site is well vegetated and movement of sediments from the site in unlikely. During construction work it is expected that erosion control measures will be implemented and movement of sediment off site will be unlikely. Following development of the site it is expected that vegetation or hard surfaces will be re-established which will control sediment movement from the site.

The site is located in an area of groundwater vulnerability. Groundwater is not identified as a potential receptor to contamination. Contaminants are expected to originate from the soil surface or fill placed on the site for levelling and groundwater levels in the locality are expected at depths greater than 10m below the soil surface.

Source/contaminants	Transport	Potential exposure pathways	Receptors
☐ Stockpiled/fill material Heavy metals PAH Asbestos	☐Wind ☐Sedimentation ☐Groundwater ☐Surface water ☐Volatilisation	☒Direct contact (ingestion and absorption) (human and environment) ☒Inhalation ☐Runoff ☐Leaching	☒Residents (adults and children) ☒Visitors (adults and children) ☒Construction workers ☒Intrusive maintenance workers ☒Vegetation ☐Aquatic receptors
☐ Vehicles Heavy metals TRH BTEXN	☐Wind ☐Sedimentation ☐Groundwater ☐Surface water ☐Volatilisation	☒Direct contact (ingestion and absorption) (human and environment) ☐Inhalation ☐Runoff ☐Leaching	☒Residents (adults and children) ☒Visitors (adults and children) ☒Construction workers ☒Intrusive maintenance workers ☒Vegetation ☐Aquatic receptors

☒Potential, ☐unknown/unlikely

8. Data quality objectives (DQO)

8.1 State the problem

Investigations are required to compete the data gaps from the preliminary contamintain investigation.

8.2 Identify the decision

The proposed land-use is residential. The decision problem is, do the levels of potential contaminants exceed the assessment criteria.

8.3 Identify the inputs decision

Investigation of the site is required to identify any potential contaminants from historical land-use. The inputs include:

- Field observation of aesthetic impacts or visible contamination
- Desccription of the soil profile
- Soil samples and analysis from the investigation area

8.4 Define the boundaries of the study

The investigation area is part 49 Court Street, Balranald NSW (Figure 2)

8.5 Develop a decision rule

Data collected for the purpose of the contamination investigation must be sufficiently accurate to be representative. The accuracy will be assessed by determination of:

- Current and historical land-use to describe potential contamination sources
- Site setting, potential receptors and pathways
- Soil samples to characterise potential contamination and analysis at accredited laboratories.

The adopted criteria is suitability for residential land-use and includes the thresholds listed in Schedule B1 of the NEPM (1999) *Guideline on Investigation Levels for Soil and Groundwater*. The data must be sufficient representatives to identify the extent of contamination and if further sampling and analysis is needed to delineate the nature and extent of contamination.

The decision rule for the investigation are:

- If the contamination levels were less than the adopted levels are potential risks low and acceptable
- If the levels were equal or greater that the investigations levels will exceedances affect the suitability for the proposed land-use.

8.6 Specify acceptable limits on the decision errors.

A decision error in the context of the decision rule would lead to either underestimation or over estimation of the risk level associated with the property. Decision errors include:

- Limitations in available site history information
- Constraints associated with the ability to access certain areas of a site
- Errors in the sampling plan
- Data quality including comparability, representativeness and accuracy for data collection and analysis
- Analytic data validation

Where sample analysis is undertaken the quality of the data collect was assessed on a range of factors including:

- Documentation and data completeness
- Reference to relevant guidance documents
- Consistency of methodology

- Data quality including comparability, representativeness and accuracy for data collection and analysis
- Analytical data validation
- The 95% upper confidence interval of average levels of samples collected is less than the threshold levels, the results are less than 250% of relevant thresholds and the standard deviation is less than 50% of the assessment criteria.

8.7 Optimize the design for obtaining data

The methodology present in sections 9 and 10 presents a framework for the contamination investigation which has been designed to meet the scope objectives and the nominated DQO.

Optimisation of the data collection process was informed by a review of historical information and observations made at the time of site inspection. The sampling was used to inform the potential contamination status of the site. The scope of work was undertaken to a level of accuracy and confidence in the ASC NEPM (NEPC 1999).

Analytes included heavy metals, TRH (C6-C40), BTEXN and PAH. Asbestos was identied by visual inspection for the presence of fibrous cement sheeting.

9. Sampling analysis plan and sampling methodology

9.1 Sampling strategy

9.1.1 Sampling design

Visual inspections were undertaken over the site for indicators of contamination.

A systematic (probabilistic) sampling pattern was adopted to assess the probable location of contamination on the general site.

A judgemental sampling pattern was adopted to assess potential areas of environmental concern at the location of the soil mound.

9.1.2 Sampling locations

A site inspection was underataken for evidence of contaminating activities. Boreholes were drilled on the site on an approximate 20m grid pattern to enable the soil profile to be described including the presence of fill (Figure 3). Soil samples were collected for analysis of heavy metals, TRH (C6-C40), BTEXN and PAH from each borehole at the 0-100mm depth.

9.1.3 Sampling density

The sampling density can detect a potential hot spot across the site with a radius of 12m at a 95% level of confidence.

The sampling frequency is greater than the minimum recommended by EPA (2022).

The number of samples collected from areas of environmental concern are expected to be sufficient to enable preliminary assessment.

9.1.4 Sampling depth

Boreholes were drilled on the site up to 300mm into natural soil. Soil samples were collected from the 0mm to 100mm soil layer to enable assessment of volatile hydrocarbons. One sample was collected from

the 200-300mm depth. The contamation source inculdign fill is expected to be present on the surface at highest concenttaion. Heavy metals and other contamints of concern are generally immobile and expected to be contained in the 0 to 100mm soil layer. Potential contaminants are expected to originate from the soil surface.

Duplicaste samples were collected at the 0-100mm and 200-300mm depth for field screening with a PID for volatile organic compounds (VOC) with a Minirae photoionisation detector (PID)

9.2 Analytes

Soil samples collected from the site were evaluated for arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury, TRH (C6-C40), BTEXN and PAH. Duplicate samples were collected for evaluation of volatile organic compound (VOC) with a Minirae photoionization detector (PID).

9.3 Sampling methods

Soil samples were taken using a power auger and stainless steel hand shovel. Soil was collected at each individual sampling location below the vegetative and detrital layer and transferred directly to a solvent rinsed glass jar with a Teflon lid.

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. Soil sampling protocols are outlined in Appendix 5.

Soil samples was collected with a power auger at the required depth and transferred to a solvent rinsed glass jar with a Teflon lid new glass container with a stainless-steel hand shovel. Duplicate samples were collected for field evaluation of VOC with a Minirae PID using the headspace method. The soil samples were placed into Ziploc plastic bags seal and vapour allowed to equalise over 5 to 10 minutes prior to piercing the bag and measuring the level of VOC.

10. Quality assurance and quality control

10.1 Sampling design

The sampling program is intended to provide data as to the presence and levels of contaminants.

Soil samples were collected on a systematic grid pattern of approximately 20 metres. This sampling density will enable the detection of an area with an elevated concentration on a radius of 12m with a 95% confidence level.

The number of sampling locations is greater than with the recommended density in the EPA sampling guidelines.

10.2 Field

The collection of samples was undertaken in accordance with accepted standard protocols (NEPC 1999).

Samples were analysed for arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury, TRH (C6-C40), BTEXN and PAH.

Sampling equipment was decontaminated between each sampling event. The appropriate storage conditions and duration were observed between sampling and analysis. A chain of custody form accompanied the samples to the laboratory (Appendix 4).

A single sampler was used to collect the samples using standard methods. Soil collected was a fresh sample from the auger. After collection the samples were immediately placed in new glass sampling jars and placed in a cooler.

One inter and intra lab duplicate sample were collected. A rinsate and trip blank were submitted for analysis. No field blank,or matrix spikes were submitted for analysis. Some samples from all batches did not contain contaminants which confirm the absence of cross contamination during transport and storage.

A field sampling log is presented in Appendix 2.

Table 1. Schedule of samples and analyses

Sample ID	Decription (Figure 3)	Depth (mm)	Analysis undertaken
BH1	BH1	50-100	Arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), zinc (Zn) mercury (Hg), Total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAH)
BH2	BH2	50-100	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
BH3	BH3	50-100	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
BH4	BH4	50-100	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
BH5	BH5	50-100	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
BH6	BH6	50-100	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
BH7	BH7	50-100	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
BH8	BH8	50-100	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
BH9	BH9	50-100	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
BH10	BH10	50-100	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
BH11	BH11	50-100	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
BH12	BH12	50-100	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
BH13	BH13	50-100	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
BH14	BH4	200-300	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH

10.3 Laboratory

Chemical analysis was conducted by SGS Laboratories, Alexandria, which is NATA accredited for the tests undertaken. The laboratories have quality assurance and quality control programs in place, which include internal replication and analysis of spike samples and recoveries. Triplicate samples were anlaysed at the laboratory of ALS Environmental as part of the quality control program.

Method blanks, matrix duplicates, rinates and laboratory control samples were within acceptance criteria. The quality assurance and quality control report is presented together with the laboratory report as Appendix 4.

10.4 Data evaluation

The laboratory quality control report indicates the data variability is within acceptable industry limits. The data is considered representative and usable for the purposes of the investigation. Data quality indicators are presented in Appendix 1.

11. Assessment criteria

The main reference for environmental site assessment in Australia is the ASC NEPM (NEPC 1999 rev 2013). This document includes criteria for use in evaluating potential risk to human health and ecosystems from chemical impacts, which are presented as generic investigation levels and screening levels appropriate to a Tier 1 risk-based assessment applicable for site assessment. The application of the investigation levels and screening levels is subject to a range of limitations, and their selection and use must be in the context of a conceptual site model (CSM) relating to the nature and distribution of impacts and potential exposure pathways.

The proposed land-use is residential and appropriate initial criteria are described in *Guideline on Investigation Levels for Soil and Groundwater* (NEPC 1999).

The criteria lists health investigation levels (HIL) for a range of land-uses. The appropriate initial comparison for the site is residential (HIL A).

The NEPC (1999) also provides health screening levels (HSL) for hydrocarbons in soil. The HSLs have been developed to be protective of human health for soil types, depths below surface and apply to exposure to hydrocarbons through the predominant vapour exposure pathway. The appropriate HSL for the site is listed in Table 5. TRH>16 have physical properties which make the TRH fractions non-volatiles and therefore these TRH fractions are not applicable for vapour intrusion.

Ecological investigation levels (EIL) have been developed for the protection of terrestrial ecosystems for selected metals and organic substances in the soil in the guideline (NEPC 1999). Ecological screening levels (ESL) assess the risk to terrestrial ecosystems from petroleum hydrocarbons in the soil. The EILs and ESLs consider the properties of the soil and contaminants and the capacity of the local ecosystem to accommodate increases in contaminant levels.

A soil sample was collected and has been assessed to provide an indication of typical cation exchange capacity (CEC), pH, organic carbon and clay content for soils on the site. The adopted CEC for determination of ecological investigation levels is 13.2cmol/kg, pH of 7.5 and organic carbon of 0.8 % (Appendix 4). Typical clay content for the site of 30% to 40% (eSPADEv2.2). The proposed land-use is residential. The contaminants have been identified in the soil for at least two years and are considered aged. The ASC NEPM EIL calculation spreadsheet was used to determine the EIL. Default values for ambient background concentrations were adopted.

Management limits have been developed to assess petroleum hydrocarbons following evaluation of human health and ecological risks (NEPC 1999). Management limits are applicable as screening levels after consideration of relevant ESLs and HSLs. The appropriate management limit for the site is listed in Table 4.

Table 2. EIL Calculation sheet, residential land-use

Analyte	Rationale	EIL (mg/kg)
Arsenic	Generic	100
Chromium (III)	Clay content 30%	580
Copper	CEC 13.2cmol/kg, pH 7.5, organic carbon 0.8%	220
Lead	Generic	1,100
Nickel	CEC 13.2cmol/kg	210
Zinc	CEC 13.2cmol/kg, pH 7.5	580
Naphthalene	Generic	170

Chromium is analysed as total chromium which is the sum of chromium (III) and chromium (VI). Chromium (VI) is a potential contaminant from industrial processes including ferrochrome production, electroplating, pigment production and tanning (WHO 1998). Chromium (VI) is reduced to chromium (III) when it comes into contact with organic matter in biota, soil and water. Chromium in the environment is present in the trivalent state (WHO 1998).

Table 3. Soil assessment criteria – Hydrocarbons (mg/kg) (NEPC 1999) for residential land-use

Analyte	HIL A Residential	HSL A Residential (clay soil)	EIL Residential	ESL Residential (fine soil)	Management limits Residential (fine soil)
		0m to <1m			
Arsenic	100	-	100	-	-
Cadmium	20	-	-	-	-
Chromium (total)	100[1]	-	580	-	-
Copper	6,000	-	220	-	-
Lead	300	-	1,100	-	-
Nickel	400	-	210	-	-
Zinc	7,400	-	580	-	-
Mercury	40	-	-	-	-
TRH (C6-C10)	-	50	-	180	800
TRH (>C10-C16)	-	280	-	120	1,000
TRH (>C16-C34)	-	NA	-	1,300	3,500
TRH (>C34-C40)	-	NA	-	5,600	10,000
Benzene	-	0.7	-	65	-
Toluene	-	480	-	105	-
Ethylbenzene	-	NL	-	125	-
Xylenes	-	110	-	45	-
Naphthalene	-	5	170	-	-
PAH (total)	300	-	-	-	-
Carcinogenic PAH	3	-	-	-	-
Benzo(a)pyrene	-	-	-	0.7	-

HSL – health screening level, EIL – ecological investigation level, ESL – ecological screening level, NL – non limiting, NA – not applicable

The threshold for asbestos is nil on the surface.

Table 4. Generalised soil VOC criteria

Volatile organic compounds (VOC)	Description
<10ppm	Negligible
10 to 20ppm	Very low, laboratory analysis considered
20 to 60ppm	Low, laboratory analysis considered
60 to 300ppm	Moderate, laboratory analysis
>300ppm	Significant, laboratory analysis

12. Results and discussion

12.1 Visual inspection

The investigation area was vacant maintained lawn at the time of inspection. The historical land-use of the investigation area is vacant. Surface sand was located in former building sand stockpiles utalised in the construction of the adjacent Balranald Multipurpose Service.

The site was compiled vegetation Vegetation cover on the site was 100% dominated by fescue lawn and weeds. Trace concrete fragments were scattered across the investigation area. No cement sheeting or abestos containing material was observed on the surface or in the soil profiles.

No evidence of fill was observed except in the area with the mound at the location of the former stockpile foorprint. No significant VOC were observed from field screening of the samples with a PID. The level of VOC ranged from was 0 to 2ppm in all samples which is considered background.

A slight mound was identified in the former stockpile footprint from soil excavated from adjacent areas building works. Several small concrete cobbles and trace gravel was observed on the mound surface however the soil has similar appearance to natural. No other foreign materials were observed in the mound or other areas on the site. Surface sand was observed in a small area which was the remnant footprint from a stockpile previously used as part of buding activities. No other indicators of contaminating activities were identified at the investigation area.

12.2 Anaytical results

The level of all heavy metals, TRH, BTEXN and PAH in soil samples collected were less than adopted thresholds for human health and environment (Table 5 and 6). TRH(C16-C34) was detected at very low levels and below adopted threshold in soil samples BH6, BH7, BH8, BH9, BH10 and BH11 collected from the eastern section of the investigation area which may have previouls been used as a carpark. Other fractions of TRH, BTEXN and PAH were not observed in the soil samples.

Samples collected from the mound area BH4, BH12, BH13 has similar level of analytes as other samples indicated the soil is natural. No indictators of heavy metal or hydrocarbon contamination in the samples was indicated from the testing undertaken.

Table 5. Analytical results and threshold concentrations for metals (mg/kg)

mSample ID	Depth (mm)	Arsenic	Cadmium	Chromium (total)	Copper	Lead	Nickel	Zinc	Mercury
BH1	0-100	3	<0.3	8.4	6.0	10	6.0	36	<0.05
BH2	0-100	6	<0.3	17	15	20	14	55	<0.05
BH3	0-100	3	<0.3	14	12	36	9.6	81	<0.05
BH4	0-100	2	<0.3	12	12	41	12*	84	0.08
BH5	0-100	3	<0.3	13	12	37	9.3	120	0.05
BH6	0-100	5	<0.3	17	14	15	13	65	<0.05
BH7	0-100	3	<0.3	12	12	19	8.9	74	<0.05
BH8	0-100	5	<0.3	18	14	15	14	41	<0.05
BH9	0-100	4	<0.3	15	13	13	11	51	<0.05
BH10	0-100	3	<0.3	14	11	12	10	32	<0.05
BH11	0-100	5	<0.3	14	14	10	11	43	<0.05
BH12	0-100	2	<0.3	11	10	25	7.1	51	<0.05
BH13	0-100	3	<0.3	11	11	27	8.4	51	<0.05
BH14	200-300	5	<0.3	15	14	15	13	35	<0.05
HIL A – Residential		*100*	*20*	*100[1]*	*6,000*	*300*	*400*	*7,400*	*40*
EIL – Urban residential		*100*	*-*	*580[2]*	*220*	*1,100*	*210*	*580*	*-*

[1] Chromium (VI), [2] Chromium (III)

Table 6. Analytical results and threshold concentrations for hydrocarbons (mg/kg)

Sample ID	Depth (mm)	TRH (C6-10)	TRH (>C10-C16)	TRH (>C16-C34)	TRH (>C34-C40)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PAH	Carcinogenic PAH	Benzo(a)pyrene
BH1	0-100	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
BH2	0-100	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
BH3	0-100	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
BH4	0-100	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
BH5	0-100	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
BH6	0-100	<25	<25	96	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
BH7	0-100	<25	<25	95	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
BH8	0-100	<25	<25	110	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
BH9	0-100	<25	<25	98	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
BH10	0-100	<25	<25	100	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
BH11	0-100	<25	<25	110	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
BH12	0-100	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
BH13	0-100	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
BH14	200-300	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
HSL A – Residential (clay soil)													
	0m to <1m	*50*	*280*	*NA*	*NA*	*0.7*	*480*	*NL*	*110*	*5*	*-*	*-*	*-*
HIL A – Residential													
		-	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*300*	*3*	*-*
EIL – Urban residential													
		-	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*170*	*-*	*-*	*-*
ESL – residential (fine soi)													
		180	*120*	*1,300*	*5,600*	*65*	*105*	*125*	*45*	*-*	*-*	*-*	*0.7*
Management limits – Residential (fine soil)													
		800	*1,000*	*3,500*	*10,000*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*

NA – not applicable, NL – Not limiting

13. Site characterisation

13.1 Environmental contamination

Not applicable as no contamination was detected.

13.2 Chemical degradation production

Not applicable as no contamination was detected.

13.3 Exposed population

Not applicable as no contamination was detected.

14. Conclusions and recommendations

14.1 Summary

An inspection of the investigation area was made on 1 December 2022. The investigation area was vacant maintained lawn. The historical land-use of the investigation area is vacant. Building sand was stockpiled in a small area on the site. Soil from hospital excavations containing trace concrete rubble was stockpiled on the site during construction of the adjacent Balranald Multipurpose Health Service (MPS).

Vegetation cover on the site was complete and dominated by fescue lawn and weeds. Trace concrete cobbles were scattered across the investigation area. No asbestos containing materials were observed. A slight raised soil mound was identified in the former stockpile footprint. The mound is expected to be the levelled former stockpiles from hospital excavations. Surface sand was observed in a small area in the eastern section of the investigation area. No evidence of building, mines or contaminating activities were identified in the investigation area.

The investigation included sampling of the site at 13 loations over the 0.4ha. Boreholes were drilled to a depth of 300mm and the soil profile described. Soils samples were collected at the 0-100mm depth in each borehole and 200mm-300mm depth at one borehole. The soil samples were analysed for the contaminants of concern which included heavy metals, total petroleum hydrocarbons (TRH C6-C40) and polycyclic aromatic hydrocarbons (PAH).

The soil was is red brown clayey sand to 120-170mm over red brown sandy clay to 300mm. All soil profiles were uniform with dry soil on the surface and moist in the sandy clay subsoil. Some surface layers contain trace gravel and rock. Concrete cobbles were observed on the surface at several locations. It was reported some crushed concrete was buried in the site from past hospital footing excavations. The extent is not known however based on surface observations and boreholes not expected to be significant.

The soil sampling program did not detect elevated levels of assessed contamininats. The levels of all analytes were below adopted thesholds for residential land-use with access to the soil.

14.2 Assumptions in reaching the conclusions

It is assumed the sampling sites are representative of the site. An accurate history has been obtained and typical management practices were adopted.

14.3 Extent of uncertainties

The analytical data relate only to the locations sampled. Soil conditions can vary both laterally and vertically and it cannot be excluded that unidentified contaminants may be present. The sampling density was designed to detect a ‘hot spot’ with a radius of approximately 12m and with a 95% level of confidence.

14.4 Suitability for proposed use of the site

The investigation area is suitable for proposed residential land-use.

14.5 Limitations and constraints on the use of the site

No constraints are recommended.

14.6 Recommendation for further work

The data gaps have been completed and no significant uncertainties in the conceptual site model are present. The investigation area is suitable for proposed residential land-use.

15. Report limitations and intellectual property

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

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

16. References

Environment Protection Authority (2020) *Consultants reporting on contaminated land* (NSW Environment Protection Authority, Chatswood)

EPA (2017) *Contaminated Sites: Guidelines for the NSW Site Auditors Scheme* (NSW Department of Environment and Conservation, Chatswood)

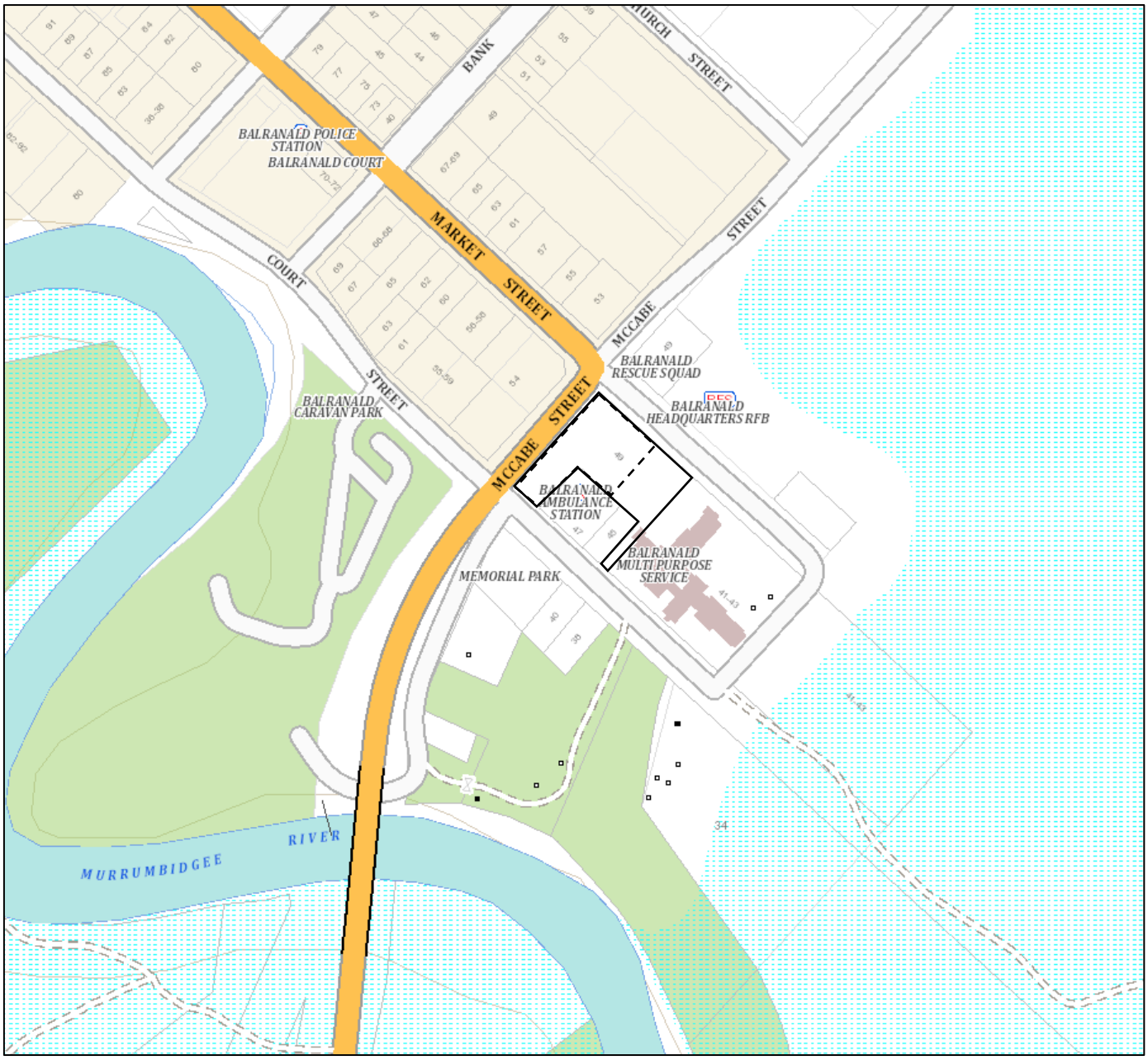
eSPADEv2.2 (https://www.environment.nsw.gov.au/eSpade2WebApp)

NEPC (1999 revised 2013) *National Environment Protection (Assessment of Site Contamination) Measure 1999* (National Environment Protection Council Service Corporation, Adelaide)

State Government of NSW and Department of Regional New South Wales (2015) *Naturally occurring asbestos,* viewed December 2022 (datasets.seed.nsw.gov.au/dataset/naturally-occurring-asbestos)

State Government of NSW and Department of Planning, Industry and Environment (1998) *Acid sulphate soils risk,* viewed December 2022 (datasets.seed.nsw.gov.au/dataset/ acid-sulfate-soils-risk0196c)

Figures



Legend

—— Lot boundary

- - - - Investigation area

Figure 1. Locality map		
49 Court Street, Balranald NSW		
	Envirowest Consulting Pty Ltd	
Job: R15067c1	Drawn by: TS	Date: 19/12/2022

Legend

- Investigation area
- Mound
- Sand on surface
- Conrete fragment on surface

Approximate Scale 1: 1000

0 10 20 40m

Figure 2. Investigaiton area and surface dscriptions		
49 Court Street, Balranald NSW		
	Envirowest Consulting Pty Ltd	
Job: R15067c1	Drawn by: TS	Date: 19/12/2022

Legend

- – – - Investigation area
- Mound
- ⊗BH1 Borehole location

Approximate Scale 1: 1000

0 10 20 40m

Figure 3. Site layout and borehole locations		
49 Court Street, Balranald NSW		
	Envirowest Consulting Pty Ltd	
Job: R15067c	Drawn by: TS	Date: 19/11/2022

Figure 4. Photographs of the site

Looking south from Market Street

Looking north from Court Street

Looking east from Sturt Highway

Looking east from the Sturt Highway

Concrete fragment on surface

Slight mound in centre of the site.

Appendices

Appendix 1. Soil sampling protocols

1. Sampling

The samples will be collected from the auger tip, mattock, hand auger or excavator bucket immediately on withdrawal.

The time between retrieval of the sample and sealing of the sample container will be kept to a minimum.

The material will be collected using single use disposal gloves or a stainless-steel spade which represented material which has not been exposed to the atmosphere prior to sampling.

All sampling jars will be filled as close to the top as possible to minimise the available airspace within the jar.

2. Handling, containment and transport

Daily sampling activities will be recorded including sampling locations, numbers, observations, measurements, sampler, date and time and weather condition.

The sampling jars will be new sterile glass jars fitted with plastic lid and airtight Teflon seals, supplied by the laboratories for the purpose of collecting soil samples for analysis. Sample containers will be marked indelibly with the sample ID code to waterproof labels affixed to the body of the container.

All samples will be removed from direct sunlight as soon as possible after sampling and placed in insulated containers. Samples will be stored in a refrigerator at 4°C prior to transportation to the laboratory in insulated containers with ice bricks in accordance with AS4482.1.

Handling and transportation to the laboratory will be accompanied with a chain of custody form to demonstrate the specimens are properly received, documents, processed and stored.

Maximum holding time for extraction (AS4482.1) are:

Analyte	Maximum holding time
Metals	6 months
Mercury	28 days
Sulfate	7 days
Organic carbon	7 days
OCP, OPP, PCB	14 days
TRH, BTEX, PAH, phenols	14 days

3. Decontamination of sampling equipment

Sampling tools will be decontaminated between sampling locations by

- Removing soil adhering to the sampling equipment by scraping, brushing or wiping
- Washing with a phosphate-free detergent
- Rinsing thoroughly with clean water
- Repeating if necessary
- Collect rinsate per sampling time and preserve according to AS 2031.1
- Dry equipment with disposable towels or air

Appendix 2. Sample analysis, quality assurance and quality control (QAQC) report

1. Data quality indicators (DQI) requirements

1.1 Completeness

A measure of the amount of usable data for a data collection activity. Greater than 95% of the data must be reliable based on the quality objectives. Where greater than two quality objectives have less reliability than the acceptance criterion the data may be considered with uncertainty.

1.1.1 Field

Consideration	Requirement
Locations and depths to be sampled	Described in the sampling plan. The acceptance criterion is 95% data retrieved compared with proposed. Acceptance criterion is 100% in crucial areas.
SOP appropriate and compiled	Described in the sampling plan.
Experienced sampler	Sampler or supervisor
Documentation correct	Sampling log and chain of custody completed

1.1.2 Laboratory

Consideration	Requirement
Samples analysed	Number according to sampling and quality plan
Analytes	Number according to sampling and quality plan
Methods	EPA or other recognised methods with suitable PQL
Sample documentation	Complete including chain of custody and sample description
Sample holding times	Metals 6 months, OCP 14 days

1.2 Comparability

The confidence that data may be considered to be equivalent for each sampling and analytical event. The data must show little or no inconsistencies with results and field observations.

1.2.1 Field

Consideration	Requirement
SOP	Same sampling procedures to be used
Experienced sampler	Sampler or supervisor
Climatic conditions	Described as may influence results
Samples collected	Sample medium, size, preparation, storage, transport

1.2.2 Laboratory

Consideration	Requirement
Analytical methods	Same methods, approved methods
PQL	Same
Same laboratory	Justify if different
Same units	Justify if different

1.3 Representativeness

The confidence (expressed qualitatively) that data are representative of each media present on the site.

1.3.1 Field

Consideration	Requirement
Appropriate media sampled	Sampled according to sampling and quality plan or in accordance with the EPA (1995) sampling guidelines.
All media identified	Sampling media identified in the sampling and quality plan. Where surface water bodies on the site sampled.

1.3.2 Laboratory

Consideration	Requirement
Samples analysed	Blanks

1.4 Precision

A quantitative measure of the variability (or reproduced of the data). Is measured by standard deviation or relative percent difference (RPD). An RPD analysis is calculated and compared to the adopted criteria of 30%.

Data not conforming to the acceptance criterion will be examined for determination of suitability for the purpose of site characterisation.

1.4.1 Field

Consideration	Requirement
Field duplicates	Frequency of 5%, results to be within RPD or discussion required indicate the appropriateness of SOP

1.4.2 Laboratory

Consideration	Requirement
Laboratory duplicates	Frequency of 5%, results to be within RPD or discussion required.
Field duplicates	Frequency of 5%, results to be within RPD or discussion required. Inter laboratory duplicates will be one sample per batch.
Laboratory prepared volatile trip spikes	One per sampling batch, results to be within RPD or discussion required

1.5 Accuracy

A quantitative measure of the closeness of the reported data to the true value.

1.5.1 Field

Consideration	Requirement
SOP	Complied
Inter laboratory duplicates	Frequency of 5%. Analysis criterion 60% RPD for levels greater than 10 times the PQL 85% RPD for levels between 5 to 10 times the PQL 100% RPD at levels between 2 to 5 times the PQL Absolute difference, 3.5 times the PQL where levels are, 2 times PQL

1.5.2 Laboratory

Recovery data (surrogates, laboratory control samples and matrix spikes) data subject to the following control limits:

- 60-140% acceptable data
- 20-60% discussion required, may be considered acceptable
- 10-20% data should considered as estimates
- 10% data should be rejected

Consideration	Requirement
Field blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Rinsate blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Method blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Matrix spikes	Frequency of 5%, results to be within +/-40% or discussion required

Matrix duplicates	Sample injected with a known concentration of contaminants with tested. Frequency of 5%, results to be within +/-40% or discussion required
Surrogate spikes	QC monitoring spikes to be added to samples at the extraction process in the laboratory where applicable. Surrogates are closely related to the organic target analyte and not normally found in the natural environment. Frequency of 5%, results to be within +/-40% or discussion required
Laboratory control samples	Externally prepared reference material containing representative analytes under investigation. These will be undertaken at one per batch. It is to be within +/-40% or discussion required
Laboratory prepared spikes	Frequency of 5%, results to be within +/-40% or discussion required

2. Laboratory analysis summary

One analysis batch was undertaken over the additional investigation program. Samples were collected on 1 December 2022. A total of 14 samples were submitted for analytical testing. The samples were collected in the field by an environmental scientist from Envirowest Consulting Pty Ltd, placed into laboratory prepared receptacles as recommended in NEPM (1999). The samples preservation and storage was undertaken using standard industry practices. A chain of custody form accompanied transport of the samples to the laboratory.

The samples were analysed at the laboratories of SGS laboratories, Alexandria NSW which is National Association of Testing Authorities (NATA) accredited for the tests undertaken. The analyses undertaken, number of samples tested and methods are presented in the following tables:

Laboratory analysis schedule

Sample id.	Number of samples	Duplicate	Analyses	Date collected	Substrate	Laboratory report
BH1, BH2,BH3, BH4, BH5, BH6, BH7, BH8, BH9, BH10, BH11, BH12, BH13, BH14	14	2	Arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), zinc (Zn) mercury (Hg), Total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAH)	01/12/2022	Soil	SE240159

Analytical methods

Analyte	Extraction	Laboratory methods
Metals	USEPA 200.2 Mod	APHA USEPA SW846-6010
Chromium (III)	-	APHA 3500 CR-A&B & 3120 and USEPA SW846-3060A
Chromium (VI)	USEPA SW846-3060A	USEPA SW846-3060A
Mercury	USEPA 200.2 Mod	APHA 3112
TRH(C6-C9)	USPEA SW846-5030A	USPEA SW 846-8260B
TRH(C10-C40), PAH	Tumbler extraction of solids	USEPA SW 846-8270B
PCB	Tumbler extraction of solids	USEPA SW 846-8270B
BTEX	Tumbler extraction of solids	USEPA SW 846-8260B
OC Pesticides	Tumbler extraction of solids	USEPA SW 846-8270B

3. Field quality assurance and quality control

One intra laboratory duplicate and one inter laborator duplicate sample were collected for the investigation. The frequency was 5% which was in accordance with the recommended frequency of 5%.

Table A1 outlines the samples collected and differences in replicate analyses. Relative differences were deemed to pass if they were within the acceptance limits of +/- 30% for replicate analyses or less than 5 times the detection limit.

Field duplicate frequency

Sample id.	Number of samples	Duplicate	Frequency (%)	Date collected	Substrate	Laboratory report
BH1, BH2,BH3, BH4, BH5, BH6, BH7, BH8, BH9, BH10, BH11, BH12, BH13, BH14	14	2	14	01/12/2022	Soil	SE235564

Table A1. Relative differences for intra laboratory duplicates

	BH4, BHDA			
	BH4	BHDA	Relative difference (%)	Pass/Fail
Arsenic	2	2	0	Pass
Cadmium	<0.3	<0.3	NA	-
Chromium	12	12	0	Pass
Copper	12	12	0	Pass
Lead	41	34	19	Pass
Nickel	8.6	8.3	4	Pass
Zinc	84	81	4	Pass
Mercury	0.08	0.05	46	Pass*
Benzene	<0.1	<0.1	NA	-
Toluene	<0.1	<0.1	NA	-
Ethlbenzene	<0.1	<0.1		
Xylenes	<0.3	<0.3	NA	-
Napthalene	<0.1	<0.1	NA	-
TRH C6-C9	<20	<20	NA	-
TRH C10-40	<210	<210	NA	-
PAH (total)	<0.8	<0.8	NA	-

NA – relative difference unable to be calculated as results are less than laboratory detection limit, [1] Result less than 5 times the detection limit, [2] where an exceedance has occurred the higher result was used in the results

Table A2. Relative differences for inter laboratory duplicates

	BH4, BH4(ALS)			
	BH4	BH4(ALS)	Relative difference (%)	Pass/Fail
Arsenic	2	<5	NA	-
Cadmium	<0.3	<1	NA	-
Chromium	12	15	22	Pass
Copper	12	15	22	Pass
Lead	41	33	22	Pass
Nickel	8.6	12	33	Fail
Zinc	84	80	5	Pass
Mercury	0.08	<0.1	NA	-
Benzene	<0.1	<0.2	NA	-
Toluene	<0.1	<0.5	NA	-
Ethlbenzene	<0.1	<0.5	NA	-
Xylenes	<0.3	<0.5	NA	-
Napthalene	<0.1	1	NA	-
TRH C6-C9	<20	<10	NA	-
TRH C10-40	<210	<50	NA	-
PAH (total)	<0.8	<0.5	NA	-

NA – relative difference unable to be calculated as results are less than laboratory detection limit, [1] Result less than 5 times the detection limit, [2] where an exceedance has occurred the higher result was used in the results

Table A3. Trip blank and rinsate

Sample ID	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Mercury
Trip blank	<5mg/kg	<1 mg/kg	<2 mg/kg	<5 mg/kg	<5 mg/kg	<2 mg/kg	<5 mg/kg	<0.1 mg/kg
Rinsate	<1µg/L	<0.1 µg/L	<1 µg/L	<1 µg/L	<1 µg/L	<1 µg/L	<5 µg/L	-

Trip blanks and rinsate results are within acceptable limits and confirmed sample integrity. Additionally:

- The fieldwork was completed within a short time period and consistent methods were used for soil sampling.
- Soil samples were placed in insulated cooled containers after sampling to ensure preservation during transport and storage.
- The samples were placed in single use jars using clean sampling tools and disposable gloves from material not in contact with other samples. This reduces the likelihood of cross contamination.
- Samples in the analysis batch contain analytes below the level of detection. It is considered unlikely that contamination has occurred as a result of transport and handling.

4. Laboratory quality assurance and quality control

Sample holding times are recommended in NEPM (1999). The time between collection and extraction was generally less than the criteria listed below:

Analyte	Maximum holding time
Metals	6 months
Mercury	28 days
BTEXN, TRH, PAH, OCP, OPP	14 days

The laboratory interpretative reports are presented with individual laboratory report. Assessment is made of holding time, frequency of control samples and quality control samples. The laboratory report also contains a detailed description of preparation methods and analytical methods.

The results, quality report, interpretative report and chain of custody are presented in the attached appendices. The quality report contains the laboratory duplicates, spikes, laboratory control samples, blanks and where appropriate matrix spike recovery (surrogate).

5. Data quality indicators (DQI)

5.1 Completeness

A measure of the amount of usable data for a data collection activity (total to be greater than 90%)

5.1.1 Field

Consideration	Accepted	Comment
Locations to be sampled	Yes	In accordance with sampling methodology, described in the report.
SOP appropriate and compiled	Yes	In accordance with sampling methodology
Experienced sampler	Yes	Environmental scientist
Documentation correct	Yes	Chain of custody completed

5.1.2 Laboratory

Consideration	Accepted	Comment
Samples analysed	Yes	In accordance with chain of custody and analysis plan.
Analytes	Yes	In accordance with chain of custody and analysis plan.
Methods	Yes	Analysed in NATA accredited laboratory with recognised methods and suitable PQL
Sample documentation	Yes	Completed including chain of custody and sample results and quality results
Sample holding times	Yes	Metals < 6 months Mercury < 28 days OCP, OPP, PAH, TRH, PCB, BTEXN < 14 days

5.2 Comparability

The confidence that data may be considered to be equivalent for each sampling and analytical event.

5.2.1 Field

Consideration	Accepted	Comment
SOP	Yes	Same sampling procedures used and sampled on one date
Experienced sampler	Yes	Experienced environmental scientist
Climatic conditions	Yes	Sampling log
Samples collected	Yes	Suitable size and storage

5.2.2 Laboratory

Consideration	Accepted	Comment
Analytical methods	Yes	Same methods all samples
PQL	Yes	Suitable for analytes
Same laboratory	Yes	-
Same units	Yes	-

5.3 Representativeness

The confidence (expressed qualitatively) that data are representative of each media present on the site.

5.3.1 Field

Consideration	Accepted	Comment
Appropriate media sampled	Yes	Sampled according to sampling and quality plan
All media identified	Yes	Soil sampling media identified in the sampling and quality plan

5.3.2 Laboratory

Consideration	Accepted	Comment
Samples analysed	Yes	Undertaken in NATA accredited laboratory. Samples in the analysis batch contain analytes below the level of detection. It is considered unlikely that contamination has occurred as a result of transport and handling.

5.4 Precision

A quantitative measure of the variability (or reproduced of the data)

5.4.1 Field

Consideration	Accepted	Comment
SOP	Yes	Complied
Field duplicates	Yes	Collected

5.4.2 Laboratory

Consideration	Accepted	Comment
Laboratory duplicates	Yes	Frequency of 5%, results to be within +/-40% or discussion required
Field duplicates (intra and inter laboratory)	No	Frequency of 5%, results to be within +/-30% or discussion required. Exccedances occur, not expected to impact results. Higher results reported.
Laboratory prepared volatile trip spikes	NA	Frequency of 5%, results to be within +/-30% or discussion required.

5.5 Accuracy

A quantitative measure of the closeness of the reported data to the true value

5.5.1 Field

Consideration	Accepted	Comment
SOP	Yes	Complied
Field blanks	Yes	Collected

5.5.2 Laboratory

Consideration	Accepted	Comment
Method blanks	Yes	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Matrix spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required.
Matrix duplicates	Yes	Frequency of 5%, results to be within +/-40% or discussion required.
Surrogate spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required.
Laboratory control samples	Yes	Frequency of 5%, results to be within +/-40% or discussion required.
Laboratory prepared spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required.

No trip blanks, field spikes or sample rinsates were submitted for analysis. This is not considered to create significant uncertainty in the analysis results because of the following rationale:

- The fieldwork methods used for soil sampling were consistent throughout the project with all in situ samples collected from material which had not been subject to exposure.
- The fieldwork was completed within a short time period and consistent methods were used for soil sampling.
- Soil samples were placed in insulated cooled containers as quickly as possible, with the containers filled to minimize headspace. The sample containers were sealed immediately after the sample was collected and chilled in an esky containing ice.
- The samples were stored in a refrigerator and transported with ice bricks to ensure preservation during transport and storage.
- The samples were placed in single use jars using clean sampling tools and disposable gloves from material not in contact with other samples. This reduces the likelihood of cross contamination.
- Samples in the analysis batches contained analytes below the level of detection. It is considered unlikely that contamination has occurred as a result of transport and handling.

6. Conclusion

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 investigation.

Appendix 3. Field sampling log

Sampling log

Client	CWPM
Contact	Steven Bird
Job number	15067
Location	49 Court Street, Balranald
Date	1 December 2022
Investigator	Greg Madafiglio
Weather conditions	Warm sunny

Sample ID	Matrix	Date	Analysis required	Observations/comments
BH1	Soil	1/12/2022	Arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), zinc (Zn) mercury (Hg), Total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAH)	0-100mm
BH2	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	0-100mm
BH3	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	0-100mm
BH4	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	0-100mm
BH4(200)	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	200-300mm
BH5	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	0-100mm
BH6	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	0-100mm
BH7	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	0-100mm
BH8	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	0-100mm
BH9	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	0-100mm
BH10	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	0-100mm
BH11	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	0-100mm
BH12	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	0-100mm
BH13	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	0-100mm
BHDA	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	Duplicate of BH4
Rinsate	Water	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg	0-100mm
BH4	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	Inter lab duplicate to ALS
Blank	Soil	1/12/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg	

Appendix 4. Boreholgs

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9 Cameron Place Orange NSW

Phone: 02 6361 4954

Engineering Log - Borehole

Borehole No: BH1

UTM	:	**Driller Rig**	: Hand auger	**Job Number**	: 15067
Easting	: 0.0	**Driller Supplier**	: Envirowest Consulting	**Client**	: CWPM
Northing	: 0.0	**Logged By**	: Greg Madafiglio	**Project**	: Balranald
RL	: N/A	**Reviewed By**	:	**Location**	: 49 Court Street, Balranald NSW
Total Depth	: 0.3m	**Date**	: 01/12/2022		

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Samples: Environmental sample	Remark
			Natural		SC	Clayey SAND (SC) : medium dense, medium plasticity, red brown, medium grained, with medium sized gravel, dry, (granite) .	D	BH1	
		0.19	Natural		CL-CI	Sandy CLAY (CL-CI) : firm, low to medium plasticity, red brown, medium grained sand, w ≈ pl,	w ≈ PL		
		0.5				**BH1 Terminated at 0.3m**			

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Engineering Log - Borehole

Borehole No: BH2

UTM	:	Driller Rig	: Hand auger	Job Number	: 15067
Easting	: 0	Driller Supplier	: Envirowest Consulting	Client	: CWPM
Northing	: 0	Logged By	: Greg Madafiglio	Project	: Balranald
RL	: N/A	Reviewed By	:	Location	: 49 Court Street, Balranald NSW
Total Depth	: 0.3m	Date	: 01/12/2022		

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Samples: Environmental sample	Remark
			Natural		SC	Clayey SAND (SC) : medium dense, medium plasticity, red brown, medium grained, dry,	D	BH2	
		0.15	Natural		CL-CI	Sandy CLAY (CL-CI) : firm, low to medium plasticity, red brown, medium grained sand, w ≈ pl,	w ≈ PL		
		0.5				**BH2 Terminated at 0.3m**			

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Engineering Log - Borehole

Borehole No: BH3

UTM	:	Driller Rig	: Hand auger	Job Number	: 15067
Easting	: 0	Driller Supplier	: Envirowest Consulting	Client	: CWPM
Northing	: 0	Logged By	: Greg Madafiglio	Project	: Balranald
RL	: N/A	Reviewed By	:	Location	: 49 Court Street, Balranald NSW
Total Depth	: 0.3m	Date	: 01/12/2022		

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Samples: Environmental sample	Remark
			Natural		SC	Clayey SAND (SC) : medium dense, medium plasticity, red brown, fine grained, dry,	D	BH3	
		0.2	Natural		CL-CI	Sandy CLAY (CL-CI) : firm, low to medium plasticity, red brown, medium grained sand, w ≈ pl,	w ≈ PL		
						BH3 Terminated at 0.3m			
		0.5							

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Engineering Log - Borehole

Borehole No: BH4

UTM	:	**Driller Rig**	: Hand auger	**Job Number**	: 15067
Easting	: 0	**Driller Supplier**	: Envirowest Consulting	**Client**	: CWPM
Northing	: 0	**Logged By**	: Greg Madafiglio	**Project**	: Balranald
RL	: N/A	**Reviewed By**	:	**Location**	: 49 Court Street, Balranald NSW
Total Depth	: 0.3m	**Date**	: 01/12/2022		

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Samples: Environmental sample	Remark
			Natural		SC	Clayey SAND (SC) : medium dense, medium plasticity, red brown, fine grained, dry, (natural appearance with concrete ranging in size from 0.01mm to 0.1mm. no other foreign materials) .	D	BH4	
		0.18	Natural		CL-CI	Sandy CLAY (CL-CI) : firm, low to medium plasticity, red brown, medium grained sand, w ≈ pl, (white mottles) .	w ≈ PL		
		0.5				**BH4 Terminated at 0.3m**			

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Engineering Log - Borehole

Borehole No: BH5

UTM	:	**Driller Rig**	: Hand auger	**Job Number**	: 15067
Easting	: 0	**Driller Supplier**	: Envirowest Consulting	**Client**	: CWPM
Northing	: 0	**Logged By**	: Greg Madafiglio	**Project**	: Balranald
RL	: N/A	**Reviewed By**	:	**Location**	: 49 Court Street, Balranald NSW
Total Depth	: 0.3m	**Date**	: 01/12/2022		

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Samples: Environmental sample	Remark
			Natural		SC	Clayey SAND (SC) : medium dense, medium plasticity, red brown, medium grained, dry,	D	BH5	
		0.18	Natural		CL-CI	Sandy CLAY (CL-CI) : firm, low to medium plasticity, red brown, medium grained sand, w ≈ pl,	w ≈ PL		
		0.5				**BH5 Terminated at 0.3m**			

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Engineering Log - Borehole

Borehole No: BH6

UTM	:	**Driller Rig**	: Hand auger	**Job Number**	: 15067
Easting	: 0	**Driller Supplier**	: Envirowest Consulting	**Client**	: CWPM
Northing	: 0	**Logged By**	: Greg Madafiglio	**Project**	: Balranald
RL	: N/A	**Reviewed By**	:	**Location**	: 49 Court Street, Balranald NSW
Total Depth	: 0.3m	**Date**	: 01/12/2022		

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Samples: Environmental sample	Remark
			Natural		SC	Clayey SAND (SC) : medium dense, medium plasticity, red brown, medium grained, trace medium sized gravel, dry, (glassy mineral) .	D	BH6	
		0.15	Natural		CL-CI	Sandy CLAY (CL-CI) : firm, low to medium plasticity, red brown, medium grained sand, w ≈ pl,	w ≈ PL		
		0.5				**BH6 Terminated at 0.3m**			

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Engineering Log - Borehole

Borehole No: BH7

UTM	:	Driller Rig	: Hand auger	Job Number	: 15067
Easting	: 0	Driller Supplier	: Envirowest Consulting	Client	: CWPM
Northing	: 0	Logged By	: Greg Madafiglio	Project	: Balranald
RL	: N/A	Reviewed By	:	Location	: 49 Court Street, Balranald NSW
Total Depth	: 0.3m	Date	: 01/12/2022		

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Samples: Environmental sample	Remark
			Natural		SC	Clayey SAND (SC) : medium dense, medium plasticity, red brown, medium grained, trace medium sized gravel, dry,	D	BH7	
		0.15	Natural		CL-CI	Sandy CLAY (CL-CI) : firm, low to medium plasticity, red brown, medium grained sand, w ≈ pl,	w ≈ PL		
		0.5				**BH7 Terminated at 0.3m**			

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Engineering Log - Borehole

Borehole No: BH8

UTM	:	Driller Rig	: Hand auger	Job Number	: 15067
Easting	: 0	Driller Supplier	: Envirowest Consulting	Client	: CWPM
Northing	: 0	Logged By	: Greg Madafiglio	Project	: Balranald
RL	: N/A	Reviewed By	:	Location	: 49 Court Street, Balranald NSW
Total Depth	: 0.3m	Date	: 01/12/2022		

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Samples	Remark
			Natural		SC	Clayey SAND (SC) : medium dense, medium plasticity, red brown, medium grained, trace medium sized gravel, dry,	D		
		0.15	Natural		CL-CI	Sandy CLAY (CL-CI) : firm, low to medium plasticity, red brown, medium grained sand, w ≈ pl,	w ≈ PL		
		0.5				**BH8 Terminated at 0.3m**			

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Engineering Log - Borehole

Borehole No: BH9

UTM	:	Driller Rig	: Hand auger	Job Number	: 15067
Easting	: 0	Driller Supplier	: Envirowest Consulting	Client	: CWPM
Northing	: 0	Logged By	: Greg Madafiglio	Project	: Balranald
RL	: N/A	Reviewed By	:	Location	: 49 Court Street, Balranald NSW
Total Depth	: 0.3m	Date	: 01/12/2022		

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Samples: Environmental sample	Remark
			Natural		SC	Clayey SAND (SC) : medium dense, medium plasticity, red brown, medium grained, trace medium sized gravel, moist, (white/grey gravel) .	M	BH9	On edge of carpark, bore, water runoff near electricity poles *4
		0.12	Natural		CL-CI	Sandy CLAY (CL-CI) : firm, low to medium plasticity, red brown, medium grained sand, w ≈ pl,	w ≈ PL		
		0.5				**BH9 Terminated at 0.3m**			

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Engineering Log - Borehole

Borehole No: BH10

UTM	:	**Driller Rig**	: Hand auger	**Job Number**	: 15067
Easting	: 0	**Driller Supplier**	: Envirowest Consulting	**Client**	: CWPM
Northing	: 0	**Logged By**	: Greg Madafiglio	**Project**	: Balranald
RL	: N/A	**Reviewed By**	:	**Location**	: 49 Court Street, Balranald NSW
Total Depth	: 0.3m	**Date**	: 01/12/2022		

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Samples: Environmental sample	Remark
			Natural		SC	Clayey SAND (SC) : medium dense, medium plasticity, red brown, medium grained, trace medium sized gravel, dry, (woodchip) .	D	BH10	
		0.2	Natural		CL-CI	Sandy CLAY (CL-CI) : firm, low to medium plasticity, red brown, medium grained sand, w ≈ pl,	w ≈ PL		
		0.5				**BH10 Terminated at 0.3m**			

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Engineering Log - Borehole

Borehole No: BH11

UTM	:	Driller Rig	: Hand auger	Job Number	: 15067
Easting	: 0	Driller Supplier	: Envirowest Consulting	Client	: CWPM
Northing	: 0	Logged By	: Greg Madafiglio	Project	: Balranald
RL	: N/A	Reviewed By	:	Location	: 49 Court Street, Balranald NSW
Total Depth	: 0.12m	Date	: 01/12/2022		

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Samples: Environmental sample	Remark
			Natural		SC	Clayey SAND (SC) : dense, medium plasticity, red brown, medium grained, trace fine sized gravel, dry,	D	BH11	
		0.5				**BH11 refusal at 0.12m (Hard)**			

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Engineering Log - Borehole

Borehole No: BH12

UTM	:	Driller Rig	: Hand auger	Job Number	: 15067
Easting	: 0	Driller Supplier	: Envirowest Consulting	Client	: CWPM
Northing	: 0	Logged By	: Greg Madafiglio	Project	: Balranald
RL	: N/A	Reviewed By	:	Location	: 49 Court Street, Balranald NSW
Total Depth	: 0.3m	Date	: 01/12/2022		

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Samples: Environmental sample	Remark
			Natural		SC	Clayey SAND (SC) : medium dense, medium plasticity, red brown, medium grained, trace medium sized gravel, dry,	D	BH12	
		0.23	Natural		CL-CI	Sandy CLAY (CL-CI) : firm, low to medium plasticity, red brown, medium grained sand, w ≈ pl,	w ≈ PL		
		0.5				**BH12 Terminated at 0.3m**			

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Engineering Log - Borehole

Borehole No: BH13

UTM	:	Driller Rig	: Hand auger	Job Number	: 15067
Easting	: 0	Driller Supplier	: Envirowest Consulting	Client	: CWPM
Northing	: 0	Logged By	: Greg Madafiglio	Project	: Balranald
RL	: N/A	Reviewed By	:	Location	: 49 Court Street, Balranald NSW
Total Depth	: 0.3m	Date	: 01/12/2022		

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Samples: Environmental sample	Remark
			Natural		CL-CI	Sandy CLAY (CL-CI) : firm, low to medium plasticity, red brown, medium grained sand, trace medium sized gravel, w ≈ pl, (some rocks 0.28mm) .	w ≈ PL	BH13	
		0.28	Natural		CL-CI	Sandy CLAY (CL-CI) : firm, low to medium plasticity, red brown light brown, medium grained sand, w ≈ pl,	w ≈ PL		
		0.5				**BH13 Terminated at 0.3m**			

Appendix 5.

Envirowest Consulting Pty Ltd ABN 18 103 955 246 trading as

Envirowest Testing Services

• 9 Cameron Place, PO Box 8158, Orange NSW 2800 • Tel (02) 6361 4954 •
• Email admin@envirowest.net.au • Web www.envirowest.net.au •

Environmental
Geotechnical
Asbestos
Services

CALIBRATION CERTIFICATE

Equipment Description

Brand: RAE Systems

Type: MiniRAE
Model: PGM 7350

Item	Test	Pass	Fail	Comments
Battery	Type (NiCd, NiMH, Dry cell, Li Ion)	✓		NiCd
	Charger/Ext power			
Switch/keypad	Operation	✓		
Display	Operation	✓		
Filters	Condition			
Pump	Motor	✓		
	Bearings			
	Flow	✓		
	Valves, Diaphragm			
PCB/Electronics	Condition			
Connectors	Condition	✓		
Sensors	PID lamp	✓		
	PID sensor			
	THP sensor			
Alarms	Audible			
	Alarm code	✓		Standard
Other tests				

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specification:

Sensor	Date	Calibration gas and concentration	CF	CV	Certified	Gas bottle No.	Instrument reading	
							before	after
PID		Isobutylene 100ppm	1		Internal	80	100	100

CF=conversion factor, C=compensated value; CV=CF*span gas

Calibrated by: G Madafiglio

Signed: G Madafiglio
Date: 12 November 2022

Next Calibration due on: 12 November 2023

Appendix 6. Soil analysis results – SGS report number SE240159, ALS Environmental report number ES2243874 and chain of custody forms

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Greg Madafiglio
Client	ENVIROWEST CONSULTING PTY LIMITED
Address	PO BOX 8158 ORANGE NSW 2800
Telephone	61 2 63614954
Facsimile	(Not specified)
Email	greg@envirowest.net.au
Project	**15067**
Order Number	**15067**
Samples	16

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE240159 R0**
Date Received	6/12/2022
Date Reported	14/12/2022

COMMENTS

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

SIGNATORIES

Dong LIANG
Metals/Inorganics Team Leader

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VOC's in Soil [AN433] Tested: 9/12/2022

PARAMETER	UOM	LOR	BH1 SOIL - 1/12/2022 SE240159.001	BH2 SOIL - 1/12/2022 SE240159.002	BH3 SOIL - 1/12/2022 SE240159.003	BH4 SOIL - 1/12/2022 SE240159.004	BH5 SOIL - 1/12/2022 SE240159.005
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes*	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX*	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene (VOC)*	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	BH6 SOIL - 1/12/2022 SE240159.006	BH7 SOIL - 1/12/2022 SE240159.007	BH8 SOIL - 1/12/2022 SE240159.008	BH9 SOIL - 1/12/2022 SE240159.009	BH10 SOIL - 1/12/2022 SE240159.010
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes*	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX*	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene (VOC)*	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	BH11 SOIL - 1/12/2022 SE240159.011	BH12 SOIL - 1/12/2022 SE240159.012	BH13 SOIL - 1/12/2022 SE240159.013	BH14 SOIL - 1/12/2022 SE240159.014	BHDA SOIL - 1/12/2022 SE240159.015
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes*	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX*	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene (VOC)*	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 9/12/2022

PARAMETER	UOM	LOR	BH1 SOIL - 1/12/2022 SE240159.001	BH2 SOIL - 1/12/2022 SE240159.002	BH3 SOIL - 1/12/2022 SE240159.003	BH4 SOIL - 1/12/2022 SE240159.004	BH5 SOIL - 1/12/2022 SE240159.005
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	BH6 SOIL - 1/12/2022 SE240159.006	BH7 SOIL - 1/12/2022 SE240159.007	BH8 SOIL - 1/12/2022 SE240159.008	BH9 SOIL - 1/12/2022 SE240159.009	BH10 SOIL - 1/12/2022 SE240159.010
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	BH11 SOIL - 1/12/2022 SE240159.011	BH12 SOIL - 1/12/2022 SE240159.012	BH13 SOIL - 1/12/2022 SE240159.013	BH14 SOIL - 1/12/2022 SE240159.014	BHDA SOIL - 1/12/2022 SE240159.015
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 9/12/2022

PARAMETER	UOM	LOR	BH1 SOIL - 1/12/2022 SE240159.001	BH2 SOIL - 1/12/2022 SE240159.002	BH3 SOIL - 1/12/2022 SE240159.003	BH4 SOIL - 1/12/2022 SE240159.004	BH5 SOIL - 1/12/2022 SE240159.005
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	**76**	**51**	<45	**69**
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH >C10-C40 Total (F bands)	mg/kg	210	<210	<210	<210	<210	<210

PARAMETER	UOM	LOR	BH6 SOIL - 1/12/2022 SE240159.006	BH7 SOIL - 1/12/2022 SE240159.007	BH8 SOIL - 1/12/2022 SE240159.008	BH9 SOIL - 1/12/2022 SE240159.009	BH10 SOIL - 1/12/2022 SE240159.010
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	**51**
TRH C29-C36	mg/kg	45	**80**	**70**	**90**	**76**	**65**
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	**96**	**95**	**110**	**98**	**100**
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	**120**
TRH >C10-C40 Total (F bands)	mg/kg	210	<210	<210	<210	<210	<210

PARAMETER	UOM	LOR	BH11 SOIL - 1/12/2022 SE240159.011	BH12 SOIL - 1/12/2022 SE240159.012	BH13 SOIL - 1/12/2022 SE240159.013	BH14 SOIL - 1/12/2022 SE240159.014	BHDA SOIL - 1/12/2022 SE240159.015
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	**52**	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	**73**	**50**	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	**110**	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	**120**	<110	<110	<110	<110
TRH >C10-C40 Total (F bands)	mg/kg	210	<210	<210	<210	<210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 9/12/2022

PARAMETER	UOM	LOR	BH1 SOIL - 1/12/2022 SE240159.001	BH2 SOIL - 1/12/2022 SE240159.002	BH3 SOIL - 1/12/2022 SE240159.003	BH4 SOIL - 1/12/2022 SE240159.004	BH5 SOIL - 1/12/2022 SE240159.005
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0*	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR*	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

PARAMETER	UOM	LOR	BH6 SOIL - 1/12/2022 SE240159.006	BH7 SOIL - 1/12/2022 SE240159.007	BH8 SOIL - 1/12/2022 SE240159.008	BH9 SOIL - 1/12/2022 SE240159.009	BH10 SOIL - 1/12/2022 SE240159.010
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0*	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR*	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 9/12/2022 (continued)

PARAMETER	UOM	LOR	BH11 SOIL - 1/12/2022 SE240159.011	BH12 SOIL - 1/12/2022 SE240159.012	BH13 SOIL - 1/12/2022 SE240159.013	BH14 SOIL - 1/12/2022 SE240159.014	BHDA SOIL - 1/12/2022 SE240159.015
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0*	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR*	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 12/12/2022

PARAMETER	UOM	LOR	BH1 SOIL - 1/12/2022 SE240159.001	BH2 SOIL - 1/12/2022 SE240159.002	BH3 SOIL - 1/12/2022 SE240159.003	BH4 SOIL - 1/12/2022 SE240159.004	BH5 SOIL - 1/12/2022 SE240159.005
Arsenic, As	mg/kg	1	3	6	3	2	3
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.5	8.4	17	14	12	13
Copper, Cu	mg/kg	0.5	6.0	15	12	12	12
Lead, Pb	mg/kg	1	10	20	36	41	37
Nickel, Ni	mg/kg	0.5	6.0	14	9.6	8.6	9.3
Zinc, Zn	mg/kg	2	36	55	81	84	120

PARAMETER	UOM	LOR	BH6 SOIL - 1/12/2022 SE240159.006	BH7 SOIL - 1/12/2022 SE240159.007	BH8 SOIL - 1/12/2022 SE240159.008	BH9 SOIL - 1/12/2022 SE240159.009	BH10 SOIL - 1/12/2022 SE240159.010
Arsenic, As	mg/kg	1	5	3	5	4	3
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.5	17	12	18	15	14
Copper, Cu	mg/kg	0.5	14	12	14	13	11
Lead, Pb	mg/kg	1	15	19	15	13	12
Nickel, Ni	mg/kg	0.5	13	8.9	14	11	10
Zinc, Zn	mg/kg	2	65	74	41	51	32

PARAMETER	UOM	LOR	BH11 SOIL - 1/12/2022 SE240159.011	BH12 SOIL - 1/12/2022 SE240159.012	BH13 SOIL - 1/12/2022 SE240159.013	BH14 SOIL - 1/12/2022 SE240159.014	BHDA SOIL - 1/12/2022 SE240159.015
Arsenic, As	mg/kg	1	5	2	3	5	2
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.5	14	11	11	15	12
Copper, Cu	mg/kg	0.5	14	10	11	14	12
Lead, Pb	mg/kg	1	10	25	27	15	34
Nickel, Ni	mg/kg	0.5	11	7.1	8.4	13	8.3
Zinc, Zn	mg/kg	2	43	51	51	35	81

Mercury in Soil [AN312] Tested: 12/12/2022

PARAMETER	UOM	LOR	BH1 SOIL - 1/12/2022 SE240159.001	BH2 SOIL - 1/12/2022 SE240159.002	BH3 SOIL - 1/12/2022 SE240159.003	BH4 SOIL - 1/12/2022 SE240159.004	BH5 SOIL - 1/12/2022 SE240159.005
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	**0.08**	**0.05**

PARAMETER	UOM	LOR	BH6 SOIL - 1/12/2022 SE240159.006	BH7 SOIL - 1/12/2022 SE240159.007	BH8 SOIL - 1/12/2022 SE240159.008	BH9 SOIL - 1/12/2022 SE240159.009	BH10 SOIL - 1/12/2022 SE240159.010
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	BH11 SOIL - 1/12/2022 SE240159.011	BH12 SOIL - 1/12/2022 SE240159.012	BH13 SOIL - 1/12/2022 SE240159.013	BH14 SOIL - 1/12/2022 SE240159.014	BHDA SOIL - 1/12/2022 SE240159.015
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	**0.05**

Moisture Content [AN002] Tested: 9/12/2022

PARAMETER	UOM	LOR	BH1 SOIL - 1/12/2022 SE240159.001	BH2 SOIL - 1/12/2022 SE240159.002	BH3 SOIL - 1/12/2022 SE240159.003	BH4 SOIL - 1/12/2022 SE240159.004	BH5 SOIL - 1/12/2022 SE240159.005
% Moisture	%w/w	1	4.4	9.9	9.9	6.6	6.2

PARAMETER	UOM	LOR	BH6 SOIL - 1/12/2022 SE240159.006	BH7 SOIL - 1/12/2022 SE240159.007	BH8 SOIL - 1/12/2022 SE240159.008	BH9 SOIL - 1/12/2022 SE240159.009	BH10 SOIL - 1/12/2022 SE240159.010
% Moisture	%w/w	1	10.9	6.9	14.0	9.4	6.1

PARAMETER	UOM	LOR	BH11 SOIL - 1/12/2022 SE240159.011	BH12 SOIL - 1/12/2022 SE240159.012	BH13 SOIL - 1/12/2022 SE240159.013	BH14 SOIL - 1/12/2022 SE240159.014	BHDA SOIL - 1/12/2022 SE240159.015
% Moisture	%w/w	1	8.2	5.4	7.7	15.6	6.5

Trace Metals (Total) in Water by ICPMS [AN022/AN318] Tested: 13/12/2022

PARAMETER	UOM	LOR	RINSATE WATER - 1/12/2022 SE240159.016
Total Arsenic	µg/L	1	<1
Total Cadmium	µg/L	0.1	<0.1
Total Chromium	µg/L	1	<1
Total Copper	µg/L	1	<1
Total Nickel	µg/L	1	<1
Total Lead	µg/L	1	<1
Total Zinc	µg/L	5	<5

Mercury (total) in Water [AN311(Perth) /AN312] Tested: 7/12/2022

PARAMETER	UOM	LOR	RINSATE WATER - 1/12/2022 SE240159.016
Total Mercury	mg/L	0.0001	<0.0001

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN022/AN318	Following acid digestion of un filtered sample, determination of elements at trace level in waters by ICP-MS technique, referenced to USEPA 6020B and USEPA 200.8 (5.4).
AN022	The water sample is digested with Nitric Acid and made up to the original volume similar to APHA3030E.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN311(Perth) /AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions taken from unfiltered sample are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoverable Hydrocarbons - Silica (TRH-Si) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D). Total PAH calculated from individual analyte detections at or above the limit of reporting.
AN420	Carcinogenic PAHs may be expressed as Benzo(a)pyrene equivalents by applying the BaP toxicity equivalence factor (NEPM 1999, June 2013, B7). These can be reported as the individual PAHs and as a sum of carcinogenic PAHs. The sum is reported three ways, the first assuming all <LOR results are zero, the second assuming all < LOR results are half the LOR and the third assuming all <LOR results are the LOR.
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
**	Indicative data, theoretical holding time exceeded.	NVL	Not validated.	LOR	Limit of Reporting.
***	Indicates that both * and ** apply.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

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

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

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

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

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

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

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

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

Chain of Custody Form – Ref 15067

Ref:	15067		**Sample matrix**			**Sample preservation**			**Analysis**						
Investigator:	Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800								**SGS Method Code**						
Telephone:	(02) 6361 4954								**CL10**	**CL2**					
Email:	greg@envirowest.net.au														
Contact Person:	Greg Madafiglio														
Invoice:	accounts@envirowest.net.au														
Laboratory:	SGS SYDNEY 16/33 Maddox Street ALEXANDRIA NSW 2015		Water	Soil	Sludge	Cool	HNO3/ HCl	Unpre-served	8Metals, TRH, BTEXN, PAH	8 METALS					
Quotation #:	Envir_70119_2019														
Courier/CN:	Grants Express														
	Sample ID	**Container***	**Sampling Date/Time**												
1	BH1	A	01/12/2022		X		X			X					
2	BH2	A	01/12/2022		X		X			X					
3	BH3	A	01/12/2022		X		X			X					
4	BH4	A	01/12/2022		X		X			X					
5	BH5	A	01/12/2022		X		X			X					
6	BH6	A	01/12/2022		X		X			X					
7	BH7	A	01/12/2022		X		X			X					
8	BH8	A	01/12/2022		X		X			X					
9	BH9	A	01/12/2022		X		X			X					
10	BH10	A	01/12/2022		X		X			X					
11	BH11	A	01/12/2022		X		X			X					
12	BH12	A	01/12/2022		X		X			X					

SGS EHS Sydney COC

SE240159

Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.	Sampler name: Greg Madafiglio Date: 01/12/2022 Time: 1500
Relinquished by: (print and signature) Virginia Bragg Date: 05/12/2022 Time 1000	Received by: (print and signature) B. Subaran Date 06/12/22 Time @ 7.30

Please return completed form to Envirowest Consulting, *A = Solvent rinsed glass jar with Teflon lined lid and green label, B= Plastic with green label, C= Amber with green label, D= Vial with white label, E= Plastic with red label

Chain of Custody Form – Ref 15067

Ref:	**15067**		**Sample matrix**			**Sample preservation**			**Analysis**					
Investigator:	Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800								**SGS Method Code**					
Telephone:	(02) 6361 4954								**CL10**	**CL2**				
Email:	greg@envirowest.net.au													
Contact Person:	Greg Madafiglio													
Invoice:	accounts@envirowest.net.au													
Laboratory:	SGS SYDNEY 16/33 Maddox Street ALEXANDRIA NSW 2015		Water	Soil	Sludge	Cool	HNO3/ HCl	Unpre-served	8Metals, TRH, BTEXN, PAH	8 METALS				
Quotation #:	Envir_70119_2019													
Courier/CN:	Grants Express													
Sample ID	**Container***	**Sampling Date/Time**												
13 BH13	A	01/12/2022		X		X			X					
14 BH14	A	01/12/2022		X		X			X					
15 BHDA	A	01/12/2022		X		X			X					
16 RINSATE	A	01/12/2022	X			X				X				

Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.

Sampler name: Greg Madafiglio
Date: 01/12/2022 Time: 1500

Relinquished by: (print and signature) Virginia Bragg Date: 05/12/2022 Time 1000

Received by: (print and signature) B. Subaraj Date 06/12/22 Time @ 7:30

Please return completed form to Envirowest Consulting, *A = Solvent rinsed glass jar with Teflon lined lid and green label, B= Plastic with green label, C= Amber with green label, D= Vial with white label, E= Plastic with red label

STATEMENT OF QA/QC PERFORMANCE

SE240159 R0

CLIENT DETAILS

Contact	Greg Madafiglio
Client	ENVIROWEST CONSULTING PTY LIMITED
Address	PO BOX 8158 ORANGE NSW 2800
Telephone	61 2 63614954
Facsimile	(Not specified)
Email	greg@envirowest.net.au
Project	**15067**
Order Number	**15067**
Samples	16

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE240159 R0**
Date Received	06 Dec 2022
Date Reported	14 Dec 2022

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met (within the SGS Alexandria Environmental laboratory).

SAMPLE SUMMARY

Sample counts by matrix	15 Soil , 1 Water	Type of documentation received	COC
Date documentation received	6/12/2022	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	16.9C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

HOLDING TIME SUMMARY

SE240159 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

Mercury (total) in Water

Method: ME-(AU)-[ENV]AN311(Perth) /AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RINSATE	SE240159.016	LB265933	01 Dec 2022	06 Dec 2022	29 Dec 2022	07 Dec 2022	29 Dec 2022	07 Dec 2022

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1	SE240159.001	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BH2	SE240159.002	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BH3	SE240159.003	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BH4	SE240159.004	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BH5	SE240159.005	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BH6	SE240159.006	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BH7	SE240159.007	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BH8	SE240159.008	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BH9	SE240159.009	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BH10	SE240159.010	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BH11	SE240159.011	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BH12	SE240159.012	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BH13	SE240159.013	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BH14	SE240159.014	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022
BHDA	SE240159.015	LB266588	01 Dec 2022	06 Dec 2022	29 Dec 2022	12 Dec 2022	29 Dec 2022	14 Dec 2022

Moisture Content

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1	SE240159.001	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BH2	SE240159.002	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BH3	SE240159.003	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BH4	SE240159.004	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BH5	SE240159.005	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BH6	SE240159.006	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BH7	SE240159.007	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BH8	SE240159.008	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BH9	SE240159.009	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BH10	SE240159.010	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BH11	SE240159.011	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BH12	SE240159.012	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BH13	SE240159.013	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BH14	SE240159.014	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022
BHDA	SE240159.015	LB266380	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	14 Dec 2022	13 Dec 2022

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1	SE240159.001	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH2	SE240159.002	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH3	SE240159.003	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH4	SE240159.004	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH5	SE240159.005	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH6	SE240159.006	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH7	SE240159.007	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH8	SE240159.008	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH9	SE240159.009	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH10	SE240159.010	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH11	SE240159.011	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH12	SE240159.012	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH13	SE240159.013	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH14	SE240159.014	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BHDA	SE240159.015	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1	SE240159.001	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022
BH2	SE240159.002	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022
BH3	SE240159.003	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022

HOLDING TIME SUMMARY

SE240159 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES (continued)

Method: ME-(AU)-[ENV]AN040/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH4	SE240159.004	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022
BH5	SE240159.005	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022
BH6	SE240159.006	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022
BH7	SE240159.007	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022
BH8	SE240159.008	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022
BH9	SE240159.009	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022
BH10	SE240159.010	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022
BH11	SE240159.011	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022
BH12	SE240159.012	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022
BH13	SE240159.013	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022
BH14	SE240159.014	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022
BHDA	SE240159.015	LB266583	01 Dec 2022	06 Dec 2022	30 May 2023	12 Dec 2022	30 May 2023	14 Dec 2022

Trace Metals (Total) in Water by ICPMS

Method: ME-(AU)-[ENV]AN022/AN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RINSATE	SE240159.016	LB266599	01 Dec 2022	06 Dec 2022	30 May 2023	13 Dec 2022	30 May 2023	13 Dec 2022

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1	SE240159.001	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH2	SE240159.002	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH3	SE240159.003	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH4	SE240159.004	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH5	SE240159.005	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH6	SE240159.006	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH7	SE240159.007	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH8	SE240159.008	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH9	SE240159.009	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH10	SE240159.010	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH11	SE240159.011	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH12	SE240159.012	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH13	SE240159.013	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BH14	SE240159.014	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022
BHDA	SE240159.015	LB266381	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	18 Jan 2023	13 Dec 2022

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1	SE240159.001	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH2	SE240159.002	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH3	SE240159.003	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH4	SE240159.004	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH5	SE240159.005	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH6	SE240159.006	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH7	SE240159.007	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH8	SE240159.008	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH9	SE240159.009	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH10	SE240159.010	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH11	SE240159.011	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH12	SE240159.012	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH13	SE240159.013	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH14	SE240159.014	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BHDA	SE240159.015	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1	SE240159.001	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH2	SE240159.002	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH3	SE240159.003	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH4	SE240159.004	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH5	SE240159.005	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH6	SE240159.006	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022

HOLDING TIME SUMMARY

SE240159 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH7	SE240159.007	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH8	SE240159.008	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH9	SE240159.009	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH10	SE240159.010	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH11	SE240159.011	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH12	SE240159.012	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH13	SE240159.013	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BH14	SE240159.014	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022
BHDA	SE240159.015	LB266384	01 Dec 2022	06 Dec 2022	15 Dec 2022	09 Dec 2022	15 Dec 2022	13 Dec 2022

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	BH1	SE240159.001	%	70 - 130%	89
	BH2	SE240159.002	%	70 - 130%	91
	BH3	SE240159.003	%	70 - 130%	102
	BH4	SE240159.004	%	70 - 130%	91
	BH5	SE240159.005	%	70 - 130%	101
	BH6	SE240159.006	%	70 - 130%	92
	BH7	SE240159.007	%	70 - 130%	91
	BH8	SE240159.008	%	70 - 130%	93
	BH9	SE240159.009	%	70 - 130%	96
	BH10	SE240159.010	%	70 - 130%	99
	BH11	SE240159.011	%	70 - 130%	99
	BH12	SE240159.012	%	70 - 130%	96
	BH13	SE240159.013	%	70 - 130%	93
	BH14	SE240159.014	%	70 - 130%	84
	BHDA	SE240159.015	%	70 - 130%	91
d14-p-terphenyl (Surrogate)	BH1	SE240159.001	%	70 - 130%	90
	BH2	SE240159.002	%	70 - 130%	93
	BH3	SE240159.003	%	70 - 130%	93
	BH4	SE240159.004	%	70 - 130%	86
	BH5	SE240159.005	%	70 - 130%	93
	BH6	SE240159.006	%	70 - 130%	95
	BH7	SE240159.007	%	70 - 130%	92
	BH8	SE240159.008	%	70 - 130%	97
	BH9	SE240159.009	%	70 - 130%	97
	BH10	SE240159.010	%	70 - 130%	93
	BH11	SE240159.011	%	70 - 130%	100
	BH12	SE240159.012	%	70 - 130%	104
	BH13	SE240159.013	%	70 - 130%	84
	BH14	SE240159.014	%	70 - 130%	102
	BHDA	SE240159.015	%	70 - 130%	93
d5-nitrobenzene (Surrogate)	BH1	SE240159.001	%	70 - 130%	102
	BH2	SE240159.002	%	70 - 130%	87
	BH3	SE240159.003	%	70 - 130%	90
	BH4	SE240159.004	%	70 - 130%	100
	BH5	SE240159.005	%	70 - 130%	96
	BH6	SE240159.006	%	70 - 130%	105
	BH7	SE240159.007	%	70 - 130%	105
	BH8	SE240159.008	%	70 - 130%	105
	BH9	SE240159.009	%	70 - 130%	105
	BH10	SE240159.010	%	70 - 130%	95
	BH11	SE240159.011	%	70 - 130%	93
	BH12	SE240159.012	%	70 - 130%	101
	BH13	SE240159.013	%	70 - 130%	104
	BH14	SE240159.014	%	70 - 130%	99
	BHDA	SE240159.015	%	70 - 130%	102

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH1	SE240159.001	%	60 - 130%	84
	BH2	SE240159.002	%	60 - 130%	84
	BH3	SE240159.003	%	60 - 130%	83
	BH4	SE240159.004	%	60 - 130%	85
	BH5	SE240159.005	%	60 - 130%	88
	BH6	SE240159.006	%	60 - 130%	84
	BH7	SE240159.007	%	60 - 130%	87
	BH8	SE240159.008	%	60 - 130%	83
	BH9	SE240159.009	%	60 - 130%	87
	BH10	SE240159.010	%	60 - 130%	87
	BH11	SE240159.011	%	60 - 130%	83
	BH12	SE240159.012	%	60 - 130%	88
	BH13	SE240159.013	%	60 - 130%	83

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH14	SE240159.014	%	60 - 130%	80
	BHDA	SE240159.015	%	60 - 130%	85
d4-1,2-dichloroethane (Surrogate)	BH1	SE240159.001	%	60 - 130%	86
	BH2	SE240159.002	%	60 - 130%	79
	BH3	SE240159.003	%	60 - 130%	82
	BH4	SE240159.004	%	60 - 130%	83
	BH5	SE240159.005	%	60 - 130%	82
	BH6	SE240159.006	%	60 - 130%	78
	BH7	SE240159.007	%	60 - 130%	82
	BH8	SE240159.008	%	60 - 130%	76
	BH9	SE240159.009	%	60 - 130%	81
	BH10	SE240159.010	%	60 - 130%	82
	BH11	SE240159.011	%	60 - 130%	82
	BH12	SE240159.012	%	60 - 130%	84
	BH13	SE240159.013	%	60 - 130%	83
	BH14	SE240159.014	%	60 - 130%	80
	BHDA	SE240159.015	%	60 - 130%	84
d8-toluene (Surrogate)	BH1	SE240159.001	%	60 - 130%	85
	BH2	SE240159.002	%	60 - 130%	82
	BH3	SE240159.003	%	60 - 130%	84
	BH4	SE240159.004	%	60 - 130%	86
	BH5	SE240159.005	%	60 - 130%	85
	BH6	SE240159.006	%	60 - 130%	81
	BH7	SE240159.007	%	60 - 130%	87
	BH8	SE240159.008	%	60 - 130%	81
	BH9	SE240159.009	%	60 - 130%	84
	BH10	SE240159.010	%	60 - 130%	85
	BH11	SE240159.011	%	60 - 130%	83
	BH12	SE240159.012	%	60 - 130%	86
	BH13	SE240159.013	%	60 - 130%	83
	BH14	SE240159.014	%	60 - 130%	79
	BHDA	SE240159.015	%	60 - 130%	85

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH1	SE240159.001	%	60 - 130%	84
	BH2	SE240159.002	%	60 - 130%	84
	BH3	SE240159.003	%	60 - 130%	83
	BH4	SE240159.004	%	60 - 130%	85
	BH5	SE240159.005	%	60 - 130%	88
	BH6	SE240159.006	%	60 - 130%	84
	BH7	SE240159.007	%	60 - 130%	87
	BH8	SE240159.008	%	60 - 130%	83
	BH9	SE240159.009	%	60 - 130%	87
	BH10	SE240159.010	%	60 - 130%	87
	BH11	SE240159.011	%	60 - 130%	83
	BH12	SE240159.012	%	60 - 130%	88
	BH13	SE240159.013	%	60 - 130%	83
	BH14	SE240159.014	%	60 - 130%	80
	BHDA	SE240159.015	%	60 - 130%	85
d4-1,2-dichloroethane (Surrogate)	BH1	SE240159.001	%	60 - 130%	86
	BH2	SE240159.002	%	60 - 130%	79
	BH3	SE240159.003	%	60 - 130%	82
	BH4	SE240159.004	%	60 - 130%	83
	BH5	SE240159.005	%	60 - 130%	82
	BH6	SE240159.006	%	60 - 130%	78
	BH7	SE240159.007	%	60 - 130%	82
	BH8	SE240159.008	%	60 - 130%	76
	BH9	SE240159.009	%	60 - 130%	81
	BH10	SE240159.010	%	60 - 130%	82
	BH11	SE240159.011	%	60 - 130%	82

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
d4-1,2-dichloroethane (Surrogate)	BH12	SE240159.012	%	60 - 130%	84
	BH13	SE240159.013	%	60 - 130%	83
	BH14	SE240159.014	%	60 - 130%	80
	BHDA	SE240159.015	%	60 - 130%	84
d8-toluene (Surrogate)	BH1	SE240159.001	%	60 - 130%	85
	BH2	SE240159.002	%	60 - 130%	82
	BH3	SE240159.003	%	60 - 130%	84
	BH4	SE240159.004	%	60 - 130%	86
	BH5	SE240159.005	%	60 - 130%	85
	BH6	SE240159.006	%	60 - 130%	81
	BH7	SE240159.007	%	60 - 130%	87
	BH8	SE240159.008	%	60 - 130%	81
	BH9	SE240159.009	%	60 - 130%	84
	BH10	SE240159.010	%	60 - 130%	85
	BH11	SE240159.011	%	60 - 130%	83
	BH12	SE240159.012	%	60 - 130%	86
	BH13	SE240159.013	%	60 - 130%	83
	BH14	SE240159.014	%	60 - 130%	79
	BHDA	SE240159.015	%	60 - 130%	85

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result
LB266588.001	Mercury	mg/kg	0.05	<0.05

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB266381.001		Naphthalene	mg/kg	0.1	<0.1
		2-methylnaphthalene	mg/kg	0.1	<0.1
		1-methylnaphthalene	mg/kg	0.1	<0.1
		Acenaphthylene	mg/kg	0.1	<0.1
		Acenaphthene	mg/kg	0.1	<0.1
		Fluorene	mg/kg	0.1	<0.1
		Phenanthrene	mg/kg	0.1	<0.1
		Anthracene	mg/kg	0.1	<0.1
		Fluoranthene	mg/kg	0.1	<0.1
		Pyrene	mg/kg	0.1	<0.1
		Benzo(a)anthracene	mg/kg	0.1	<0.1
		Chrysene	mg/kg	0.1	<0.1
		Benzo(a)pyrene	mg/kg	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
		Benzo(ghi)perylene	mg/kg	0.1	<0.1
		Total PAH (18)	mg/kg	0.8	<0.8
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	117
		2-fluorobiphenyl (Surrogate)	%	-	97
		d14-p-terphenyl (Surrogate)	%	-	101

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result
LB266583.001	Arsenic, As	mg/kg	1	<1
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.5	<0.5
	Copper, Cu	mg/kg	0.5	<0.5
	Nickel, Ni	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Zinc, Zn	mg/kg	2	<2.0

Trace Metals (Total) in Water by ICPMS

Method: ME-(AU)-[ENV]AN022/AN318

Sample Number	Parameter	Units	LOR	Result
LB266599.001	Total Arsenic	µg/L	1	<1
	Total Cadmium	µg/L	0.1	<0.1
	Total Chromium	µg/L	1	<1
	Total Copper	µg/L	1	<1
	Total Lead	µg/L	1	<1
	Total Nickel	µg/L	1	<1
	Total Zinc	µg/L	5	<5

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB266381.001	TRH C10-C14	mg/kg	20	<20
	TRH C15-C28	mg/kg	45	<45
	TRH C29-C36	mg/kg	45	<45
	TRH C37-C40	mg/kg	100	<100
	TRH C10-C36 Total	mg/kg	110	<110

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB266384.001	Monocyclic Aromatic Hydrocarbons	Benzene	mg/kg	0.1	<0.1
		Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1
		m/p-xylene	mg/kg	0.2	<0.2
		o-xylene	mg/kg	0.1	<0.1
	Polycyclic VOCs	Naphthalene (VOC)*	mg/kg	0.1	<0.1

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB266384.001	Surrogates	d4-1,2-dichloroethane (Surrogate)	%	-	72
		d8-toluene (Surrogate)	%	-	101
		Bromofluorobenzene (Surrogate)	%	-	82
	Totals	Total BTEX*	mg/kg	0.6	<0.6

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB266384.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	d4-1,2-dichloroethane (Surrogate)	%	-	72

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

Mercury (total) in Water

Method: ME-(AU)-[ENV]AN311(Perth) /AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE240159.016	LB265933.007	Total Mercury	µg/L	0.0001	<0.0001	0.0000	200	86

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE240159.010	LB266588.014	Mercury	mg/kg	0.05	<0.05	<0.05	200	0
SE240160.041	LB266588.024	Mercury	mg/kg	0.05	<0.05	<0.05	200	0

Moisture Content

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE240159.007	LB266380.011	% Moisture	%w/w	1	6.9	6.8	45	2
SE240159.015	LB266380.020	% Moisture	%w/w	1	6.5	6.9	45	7

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE240159.007	LB266381.014		Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthylene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthene	mg/kg	0.1	<0.1	<0.1	200	0
			Fluorene	mg/kg	0.1	<0.1	<0.1	200	0
			Phenanthrene	mg/kg	0.1	<0.1	<0.1	200	0
			Anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Chrysene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=0*	mg/kg	0.2	<0.2	<0.2	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	mg/kg	0.2	<0.2	<0.2	175	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR*	mg/kg	0.3	<0.3	<0.3	134	0
			Total PAH (18)	mg/kg	0.8	<0.8	<0.8	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.4	30	18
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.4	30	5
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	3
SE240159.015	LB266381.023		Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthylene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthene	mg/kg	0.1	<0.1	<0.1	200	0
			Fluorene	mg/kg	0.1	<0.1	<0.1	200	0
			Phenanthrene	mg/kg	0.1	<0.1	<0.1	200	0
			Anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Chrysene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE240159.015	LB266381.023		Carcinogenic PAHs, BaP TEQ <LOR=0*	mg/kg	0.2	<0.2	<0.2	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	mg/kg	0.2	<0.2	<0.2	175	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR*	mg/kg	0.3	<0.3	<0.3	134	0
			Total PAH (18)	mg/kg	0.8	<0.8	<0.8	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.6	30	10
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	4
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	4

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE240159.010	LB266583.014	Arsenic, As	mg/kg	1	3	5	55	45
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.5	14	14	34	2
		Copper, Cu	mg/kg	0.5	11	11	35	4
		Nickel, Ni	mg/kg	0.5	10	13	34	24
		Lead, Pb	mg/kg	1	12	11	39	9
		Zinc, Zn	mg/kg	2	32	30	36	5
SE240160.041	LB266583.024	Arsenic, As	mg/kg	1	2	3	67	19
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.5	11	14	34	32
		Copper, Cu	mg/kg	0.5	11	11	35	6
		Nickel, Ni	mg/kg	0.5	7.7	9.2	36	18
		Lead, Pb	mg/kg	1	24	33	33	31
		Zinc, Zn	mg/kg	2	180	170	31	4

Trace Metals (Total) in Water by ICPMS

Method: ME-(AU)-[ENV]AN022/AN318

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE240406.003	LB266599.021	Total Arsenic	µg/L	1	0.05	0.047	200	0
		Total Cadmium	µg/L	0.1	0.002	0.014	200	0
		Total Chromium	µg/L	1	0.451	0.498	200	0
		Total Copper	µg/L	1	2.359	2.346	58	1
		Total Lead	µg/L	1	0.216	0.259	200	0
		Total Zinc	µg/L	5	3.973	4.161	138	0

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE240159.007	LB266381.014		TRH C10-C14	mg/kg	20	<20	<20	200	0
			TRH C15-C28	mg/kg	45	<45	<45	141	0
			TRH C29-C36	mg/kg	45	70	77	91	9
			TRH C37-C40	mg/kg	100	<100	<100	200	0
			TRH C10-C36 Total	mg/kg	110	<110	<110	180	0
			TRH >C10-C40 Total (F bands)	mg/kg	210	<210	<210	200	0
		TRH F Bands	TRH >C10-C16	mg/kg	25	<25	<25	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	200	0
			TRH >C16-C34 (F3)	mg/kg	90	95	97	124	2
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	200	0
SE240159.015	LB266381.023		TRH C10-C14	mg/kg	20	<20	<20	200	0
			TRH C15-C28	mg/kg	45	<45	<45	200	0
			TRH C29-C36	mg/kg	45	<45	<45	151	0
			TRH C37-C40	mg/kg	100	<100	<100	200	0
			TRH C10-C36 Total	mg/kg	110	<110	<110	200	0
			TRH >C10-C40 Total (F bands)	mg/kg	210	<210	<210	200	0
		TRH F Bands	TRH >C10-C16	mg/kg	25	<25	<25	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	200	0
			TRH >C16-C34 (F3)	mg/kg	90	<90	<90	200	0
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	200	0

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE240159.007	LB266384.014	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
			Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE240159.007	LB266384.014	Monocyclic	o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene (VOC)*	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	8.2	7.8	50	5
			d8-toluene (Surrogate)	mg/kg	-	8.7	8.0	50	8
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.7	8.1	50	7
		Totals	Total BTEX*	mg/kg	0.6	<0.6	<0.6	200	0
			Total Xylenes*	mg/kg	0.3	<0.3	<0.3	200	0
SE240159.015	LB266384.023	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene (VOC)*	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	8.4	8.3	50	2
			d8-toluene (Surrogate)	mg/kg	-	8.5	8.5	50	0
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.5	8.3	50	3
		Totals	Total BTEX*	mg/kg	0.6	<0.6	<0.6	200	0
			Total Xylenes*	mg/kg	0.3	<0.3	<0.3	200	0

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE240159.007	LB266384.014		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	8.2	7.8	30	5
			d8-toluene (Surrogate)	mg/kg	-	8.7	8.0	30	8
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.7	8.1	30	7
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0
SE240159.015	LB266384.023		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	8.4	8.3	30	2
			d8-toluene (Surrogate)	mg/kg	-	8.5	8.5	30	0
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.5	8.3	30	3
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB266588.002	Mercury	mg/kg	0.05	0.19	0.2	70 - 130	95

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB266381.002		Naphthalene	mg/kg	0.1	4.4	4	60 - 140	111
		Acenaphthylene	mg/kg	0.1	4.5	4	60 - 140	112
		Acenaphthene	mg/kg	0.1	4.3	4	60 - 140	108
		Phenanthrene	mg/kg	0.1	4.3	4	60 - 140	108
		Anthracene	mg/kg	0.1	4.1	4	60 - 140	102
		Fluoranthene	mg/kg	0.1	4.5	4	60 - 140	111
		Pyrene	mg/kg	0.1	4.8	4	60 - 140	120
		Benzo(a)pyrene	mg/kg	0.1	4.1	4	60 - 140	102
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	90
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	95
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	93

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB266583.002	Arsenic, As	mg/kg	1	340	318.22	80 - 120	108
	Cadmium, Cd	mg/kg	0.3	3.8	4.81	70 - 130	78
	Chromium, Cr	mg/kg	0.5	39	38.31	80 - 120	102
	Copper, Cu	mg/kg	0.5	310	290	80 - 120	108
	Nickel, Ni	mg/kg	0.5	190	187	80 - 120	101
	Lead, Pb	mg/kg	1	95	89.9	80 - 120	106
	Zinc, Zn	mg/kg	2	280	273	80 - 120	103

Trace Metals (Total) in Water by ICPMS

Method: ME-(AU)-[ENV]AN022/AN318

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB266599.002	Total Arsenic	µg/L	1	21	20	80 - 120	106
	Total Cadmium	µg/L	0.1	20	20	80 - 120	102
	Total Chromium	µg/L	1	21	20	80 - 120	103
	Total Copper	µg/L	1	21	20	80 - 120	104
	Total Lead	µg/L	1	20	20	80 - 120	98
	Total Nickel	µg/L	1	20	20	80 - 120	98
	Total Zinc	µg/L	5	21	20	80 - 120	104

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB266381.002		TRH C10-C14	mg/kg	20	48	40	60 - 140	120
		TRH C15-C28	mg/kg	45	46	40	60 - 140	115
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	95
	TRH F Bands	TRH >C10-C16	mg/kg	25	48	40	60 - 140	120
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	105
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	110

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB266384.002	Monocyclic Aromatic	Benzene	mg/kg	0.1	3.4	5	60 - 140	69
		Toluene	mg/kg	0.1	3.9	5	60 - 140	77
		Ethylbenzene	mg/kg	0.1	3.7	5	60 - 140	75
		m/p-xylene	mg/kg	0.2	7.1	10	60 - 140	71
		o-xylene	mg/kg	0.1	3.7	5	60 - 140	73
	Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	7.9	10	70 - 130	79
		d8-toluene (Surrogate)	mg/kg	-	10.8	10	70 - 130	108
		Bromofluorobenzene (Surrogate)	mg/kg	-	9.0	10	70 - 130	90

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB266384.002		TRH C6-C10	mg/kg	25	66	92.5	60 - 140	72
		TRH C6-C9	mg/kg	20	59	80	60 - 140	74
	Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	7.9	10	70 - 130	79
		Bromofluorobenzene (Surrogate)	mg/kg	-	9.0	10	70 - 130	90

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB266384.002	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	44	62.5	60 - 140	71

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE240159.001	LB266588.004	Mercury	mg/kg	0.05	0.22	<0.05	0.2	102

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE240158.005	LB266381.004		Naphthalene	mg/kg	0.1	4.2	<0.1	4	105
			2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	-	-
			1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	-	-
			Acenaphthylene	mg/kg	0.1	4.2	<0.1	4	104
			Acenaphthene	mg/kg	0.1	4.3	<0.1	4	108
			Fluorene	mg/kg	0.1	<0.1	<0.1	-	-
			Phenanthrene	mg/kg	0.1	4.1	<0.1	4	102
			Anthracene	mg/kg	0.1	3.9	<0.1	4	97
			Fluoranthene	mg/kg	0.1	4.6	<0.1	4	114
			Pyrene	mg/kg	0.1	4.3	<0.1	4	106
			Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	-	-
			Chrysene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(a)pyrene	mg/kg	0.1	3.3	<0.1	4	83
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	-	-
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=0*	TEQ (mg/kg)	0.2	3.3	<0.2	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	TEQ (mg/kg)	0.2	3.4	<0.2	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR*	TEQ (mg/kg)	0.3	3.5	<0.3	-	-
			Total PAH (18)	mg/kg	0.8	33	<0.8	-	-
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.5	-	88
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.4	-	93
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.4	0.5	-	83

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE240159.001	LB266583.004	Arsenic, As	mg/kg	1	53	3	50	99
		Cadmium, Cd	mg/kg	0.3	43	<0.3	50	87
		Chromium, Cr	mg/kg	0.5	56	8.4	50	96
		Copper, Cu	mg/kg	0.5	55	6.0	50	98
		Nickel, Ni	mg/kg	0.5	52	6.0	50	93
		Lead, Pb	mg/kg	1	56	10	50	92
		Zinc, Zn	mg/kg	2	82	36	50	93

Trace Metals (Total) in Water by ICPMS

Method: ME-(AU)-[ENV]AN022/AN318

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE240159.016	LB266599.004	Total Arsenic	µg/L	1	22	<1	20	109
		Total Cadmium	µg/L	0.1	21	<0.1	20	107
		Total Chromium	µg/L	1	22	<1	-	-
		Total Copper	µg/L	1	22	<1	20	108
		Total Lead	µg/L	1	21	<1	20	104
		Total Nickel	µg/L	1	21	<1	20	103
		Total Zinc	µg/L	5	22	<5	20	101

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE240158.005	LB266381.004		TRH C10-C14	mg/kg	20	59	<20	40	137
			TRH C15-C28	mg/kg	45	57	<45	40	125
			TRH C29-C36	mg/kg	45	52	<45	40	101
			TRH C37-C40	mg/kg	100	<100	<100	-	-
			TRH C10-C36 Total	mg/kg	110	170	<110	-	-
			TRH >C10-C40 Total (F bands)	mg/kg	210	<210	<210	-	-
		TRH F	TRH >C10-C16	mg/kg	25	59	<25	40	137
		Bands	TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	59	<25	-	-

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

TRH (Total Recoverable Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN403

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE240158.005	LB266381.004	TRH F	TRH >C16-C34 (F3)	mg/kg	90	<90	<90	40	95
		Bands	TRH >C34-C40 (F4)	mg/kg	120	<120	<120	-	-

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE240158.005	LB266384.004	Monocyclic	Benzene	mg/kg	0.1	3.3	<0.1	5	66
		Aromatic	Toluene	mg/kg	0.1	4.0	<0.1	5	80
			Ethylbenzene	mg/kg	0.1	4.0	<0.1	5	80
			m/p-xylene	mg/kg	0.2	7.6	<0.2	10	75
			o-xylene	mg/kg	0.1	4.0	<0.1	5	80
		Polycyclic	Naphthalene (VOC)*	mg/kg	0.1	<0.1	<0.1	-	-
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	7.0	7.1	10	70
			d8-toluene (Surrogate)	mg/kg	-	8.9	9.3	10	89
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.0	8.3	10	80
		Totals	Total BTEX*	mg/kg	0.6	23	<0.6	-	-
			Total Xylenes*	mg/kg	0.3	12	<0.3	-	-

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE240158.005	LB266384.004		TRH C6-C10	mg/kg	25	68	<25	92.5	73
			TRH C6-C9	mg/kg	20	63	<20	80	78
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	7.0	7.1	10	70
			d8-toluene (Surrogate)	mg/kg	-	8.9	9.3	10	89
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.0	8.3	-	80
		VPH F	Benzene (F0)	mg/kg	0.1	3.3	<0.1	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	45	<25	62.5	71

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: https://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
***	Indicates that both * and ** apply.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.
①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to relevant report comments for further information.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2243874**	Page	: 1 of 6
Client	: **ENVIROWEST CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR GREG MADAFIGLIO	Contact	: Customer Services ES
Address	: 9 CAMERON PLACE PO BOX 8158 ORANGE NSW, AUSTRALIA 2800	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 63614954	Telephone	: +61-2-8784 8555
Project	: 15067	Date Samples Received	: 06-Dec-2022 08:00
Order number	: 15067	Date Analysis Commenced	: 06-Dec-2022
C-O-C number	: 15067	Issue Date	: 13-Dec-2022 15:36
Sampler	: ----		
Site	: 15067		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		

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*
Alex Rossi	Organic Chemist	Sydney Inorganics, Smithfield, NSW
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

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

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

- ALS is not NATA accredited for the analysis of Exchangeable Cations on Alkaline Soils when performed under ALS Method ED006.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH4	BLANK	BH3	----	----
			Sampling date / time	01-Dec-2022 00:00	14-Jan-2022 00:00	02-Dec-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2243874-001	ES2243874-002	ES2243874-003	--------	--------
				Result	Result	Result	----	----
EA001: pH in soil using 0.01M CaCl extract								
pH (CaCl2)	----	0.1	pH Unit	----	----	7.5	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	----	----	8.6	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	----	129	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	----	----	5.0	----	----
Moisture Content	----	1.0	%	4.8	3.1	----	----	----
ED006: Exchangeable Cations on Alkaline Soils								
Exchangeable Calcium	----	0.2	meq/100g	----	----	8.8	----	----
Exchangeable Magnesium	----	0.2	meq/100g	----	----	2.4	----	----
Exchangeable Potassium	----	0.2	meq/100g	----	----	2.0	----	----
Exchangeable Sodium	----	0.2	meq/100g	----	----	<0.2	----	----
Cation Exchange Capacity	----	0.2	meq/100g	----	----	13.2	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Iron	7439-89-6	0.005	%	----	----	1.38	----	----
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	15	<2	----	----	----
Copper	7440-50-8	5	mg/kg	15	<5	----	----	----
Lead	7439-92-1	5	mg/kg	33	<5	----	----	----
Nickel	7440-02-0	2	mg/kg	12	<2	----	----	----
Zinc	7440-66-6	5	mg/kg	80	<5	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	----	----	1.3	----	----
Total Organic Carbon	----	0.5	%	----	----	0.8	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH4	BLANK	BH3	----	----
				Sampling date / time	01-Dec-2022 00:00	14-Jan-2022 00:00	02-Dec-2022 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2243874-001	ES2243874-002	ES2243874-003	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<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	----	----	----	----
^ >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	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH4	BLANK	BH3	----	----
				Sampling date / time	01-Dec-2022 00:00	14-Jan-2022 00:00	02-Dec-2022 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2243874-001	ES2243874-002	ES2243874-003	--------	--------
					Result	Result	Result	----	----
EP080: BTEXN - Continued									
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	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**87.2**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**95.5**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**58.5**	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**95.8**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		**94.7**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**98.6**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**97.3**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		**99.2**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**96.1**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Chain of Custody Form – Ref 15067

Ref: 15067
Investigator: Envirowest Consulting
9 Cameron Place
PO Box 8158
ORANGE NSW 2800
Telephone: (02) 6361 4954

Email: greg@envirowest.net.au
Contact Person: Greg Madafiglio
Invoice: accounts@envirowest.net.au

Laboratory: Australian Laboratory Services
277 Woodpark Road
SMITHFIELD NSW 2164

Quotation #:
Courier/CN: EN/222/20

Sample ID	Container*	Sampling Date/Time	Sample matrix: Water	Soil	Sludge	Sample preservation: Cool	HNO3/HCl	Unpreserved	Analysis: Method Code S26 TRH, PAH,8 METALS	S2 8 METALS	P22 CEC,Ph,FOC,CLAY,pH,EC		
BH4	A	01/12/2022		X		X		X	X				
BLANK	A	01/12/2022		X		X		X		X			
BH3	A(LARGE)	01/12/2022		X		X		X			X		

HT

Environmental Division
Sydney
Work Order Reference
ES2243874

Telephone : +61-2-8784 8555

Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.

Sampler name: Greg Madafiglio
Date: 01/12/2022 Time: 11:00

Relinquished by: (print and signature) Virginia Bragg Date 05/12/2022 Time 16:00

Received by: (print and signature) Date 6/12/22 Time 8am

Please return completed form to Envirowest Consulting; A = Solvent rinsed glass jar with Teflon lined lid and green label, B= Plastic with green label, C= Amber with green label, D= Vial with white label, E= Plastic with red label

QUALITY CONTROL REPORT

Work Order	: **ES2243874**	Page	: 1 of 9
Client	: **ENVIROWEST CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR GREG MADAFIGLIO	Contact	: Customer Services ES
Address	: 9 CAMERON PLACE PO BOX 8158 ORANGE NSW, AUSTRALIA 2800	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 63614954	Telephone	: +61-2-8784 8555
Project	: 15067	Date Samples Received	: 06-Dec-2022
Order number	: 15067	Date Analysis Commenced	: 06-Dec-2022
C-O-C number	: 15067	Issue Date	: 13-Dec-2022
Sampler	: ----		
Site	: 15067		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		

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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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*
Alex Rossi	Organic Chemist	Sydney Inorganics, Smithfield, NSW
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
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
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4749894)									
ES2243644-035	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	39	37	3.7	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	79	74	6.7	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	5	5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	19	17	8.1	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	9	8	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	40	37	6.7	No Limit
		EG005T: Iron	7439-89-6	50	mg/kg	49800	47000	5.9	0% - 20%
ES2243644-052	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	38	38	0.0	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	42	46	9.2	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	7	7	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	15	16	8.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	20	21	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	22	24	9.2	No Limit
		EG005T: Iron	7439-89-6	50	mg/kg	30500	31100	1.9	0% - 20%
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4756507)									
ES2243873-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	24	24	0.0	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	12	11	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	11	11	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	16	24	36.2	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4756507) - continued									
ES2243873-001	Anonymous	EG005T: Iron	7439-89-6	50	mg/kg	35600	32800	8.2	0% - 20%
EA001: pH in soil using 0.01M CaCl extract (QC Lot: 4757148)									
ES2243874-003	BH3	EA001: pH (CaCl2)	----	0.1	pH Unit	7.5	7.4	0.0	0% - 20%
EA002: pH 1:5 (Soils) (QC Lot: 4749899)									
EW2205609-006	Anonymous	EA002: pH Value	----	0.1	pH Unit	7.2	6.5	9.6	0% - 20%
ES2243820-010	Anonymous	EA002: pH Value	----	0.1	pH Unit	6.3	6.0	4.9	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 4749896)									
ES2243820-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	78	81	4.5	0% - 20%
ES2243820-010	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	78	73	7.5	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4749904)									
ES2243820-006	Anonymous	EA055: Moisture Content	----	0.1	%	8.2	7.9	3.8	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4756508)									
ES2243873-003	Anonymous	EA055: Moisture Content	----	0.1	%	1.1	1.3	14.9	No Limit
ED006: Exchangeable Cations on Alkaline Soils (QC Lot: 4758705)									
ES2243874-003	BH3	ED006: Exchangeable Calcium	----	0.2	meq/100g	8.8	9.3	5.9	0% - 20%
		ED006: Exchangeable Magnesium	----	0.2	meq/100g	2.4	2.5	4.6	0% - 50%
		ED006: Exchangeable Potassium	----	0.2	meq/100g	2.0	2.0	0.0	0% - 50%
		ED006: Exchangeable Sodium	----	0.2	meq/100g	<0.2	<0.2	0.0	No Limit
		ED006: Cation Exchange Capacity	----	0.2	meq/100g	13.2	13.9	5.2	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4756506)									
ES2243873-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP004: Organic Matter (QC Lot: 4751297)									
ES2243874-003	BH3	EP004: Organic Matter	----	0.5	%	1.3	1.3	0.0	No Limit
		EP004: Total Organic Carbon	----	0.5	%	0.8	0.8	0.0	No Limit
ES2243993-002	Anonymous	EP004: Organic Matter	----	0.5	%	0.9	1.0	0.0	No Limit
		EP004: Total Organic Carbon	----	0.5	%	0.5	0.6	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4754853)									
ES2243899-005	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4754853) - continued									
ES2243899-005	Anonymous	EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
ES2243873-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4754852)									
ES2243899-005	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES2243873-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4755249)									
ES2243835-061	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES2243835-097	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4754852)									
ES2243899-005	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES2243873-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4755249)									
ES2243835-061	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES2243835-097	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080: BTEXN (QC Lot: 4755249)									
ES2243835-061	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
ES2243835-097	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4749894)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	95.6	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	114	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	109	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	105	89.0	111
EG005T: Iron	7439-89-6	50	mg/kg	<50	31660 mg/kg	99.0	89.0	112
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	103	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	100	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	92.5	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4756507)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	102	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	123	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	106	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	105	89.0	111
EG005T: Iron	7439-89-6	50	mg/kg	<50	31660 mg/kg	104	89.0	112
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	102	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	101	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	94.2	66.0	133
EA002: pH 1:5 (Soils) (QCLot: 4749899)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.8	101
				----	7 pH Unit	101	98.8	101
EA010: Conductivity (1:5) (QCLot: 4749896)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	97.5	92.0	108
ED006: Exchangeable Cations on Alkaline Soils (QCLot: 4758705)								
ED006: Exchangeable Calcium	----	0.2	meq/100g	<0.2	2.5 meq/100g	97.6	80.0	110
ED006: Exchangeable Magnesium	----	0.2	meq/100g	<0.2	4.17 meq/100g	98.5	80.0	110
ED006: Exchangeable Potassium	----	0.2	meq/100g	<0.2	1.28 meq/100g	105	80.0	110
ED006: Exchangeable Sodium	----	0.2	meq/100g	<0.2	2.17 meq/100g	103	80.0	110
ED006: Cation Exchange Capacity	----	0.2	meq/100g	<0.2	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4756506)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	96.0	70.0	125
EP004: Organic Matter (QCLot: 4751297)								
EP004: Organic Matter	----	0.5	%	<0.5	2.53 %	85.0	82.0	98.0
EP004: Total Organic Carbon	----	0.5	%	<0.5	1.46 %	85.6	81.0	99.0

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4754853)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	90.2	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	91.3	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	102	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	97.7	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	104	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	96.0	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	102	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	93.4	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	104	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	102	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	95.7	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	96.1	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	99.1	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	71.6	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	72.9	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	76.6	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4754852)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	94.4	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	96.0	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	98.0	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4755249)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	106	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4754852)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	99.7	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	91.5	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	102	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4755249)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	108	68.4	128
EP080: BTEXN (QCLot: 4755249)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	110	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	105	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	106	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	106	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	106	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	102	63.0	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4749894)							
ES2243644-035	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	89.8	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	95.6	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	86.9	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	96.9	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	94.6	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	74.6	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	91.1	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4756507)							
ES2243873-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	92.3	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	92.1	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	82.3	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	93.3	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	90.5	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	91.1	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	89.8	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4756506)							
ES2243873-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	106	70.0	130
EP004: Organic Matter (QCLot: 4751297)							
ES2243874-003	BH3	EP004: Organic Matter	----	0.63 %	86.1	70.0	130
		EP004: Total Organic Carbon	----	0.36 %	88.1	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4754853)							
ES2243873-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	96.2	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	99.3	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4754852)							
ES2243873-001	Anonymous	EP071: C10 - C14 Fraction	----	480 mg/kg	95.3	73.0	137
		EP071: C15 - C28 Fraction	----	3100 mg/kg	109	53.0	131
		EP071: C29 - C36 Fraction	----	2060 mg/kg	109	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4755249)							
ES2243835-061	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	89.2	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4754852)							
ES2243873-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	94.5	73.0	137
		EP071: >C16 - C34 Fraction	----	4320 mg/kg	113	53.0	131

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4754852) - continued							
ES2243873-001	Anonymous	EP071: >C34 - C40 Fraction	----	890 mg/kg	106	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4755249)							
ES2243835-061	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	88.9	70.0	130
EP080: BTEXN (QCLot: 4755249)							
ES2243835-061	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	88.3	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	86.7	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	88.7	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	88.0	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	92.2	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	86.9	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2243874**	Page	: 1 of 7
Client	: **ENVIROWEST CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR GREG MADAFIGLIO	Telephone	: +61-2-8784 8555
Project	: 15067	Date Samples Received	: 06-Dec-2022
Site	: 15067	Issue Date	: 13-Dec-2022
Sampler	: ----	No. of samples received	: 3
Order number	: 15067	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°C)						
Soil Glass Jar - Unpreserved						
BLANK	----	----	----	08-Dec-2022	28-Jan-2022	**314**
EG005(ED093)T: Total Metals by ICP-AES						
Soil Glass Jar - Unpreserved						
BLANK	08-Dec-2022	13-Jul-2022	**148**	12-Dec-2022	13-Jul-2022	**152**
EG035T: Total Recoverable Mercury by FIMS						
Soil Glass Jar - Unpreserved						
BLANK	08-Dec-2022	11-Feb-2022	**300**	12-Dec-2022	11-Feb-2022	**304**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA001: pH in soil using 0.01M CaCl extract							
Soil Glass Jar - Unpreserved (EA001)							
BH3	**02-Dec-2022**	**09-Dec-2022**	09-Dec-2022	✓	**09-Dec-2022**	09-Dec-2022	✓
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
BH3	**02-Dec-2022**	**07-Dec-2022**	09-Dec-2022	✓	**07-Dec-2022**	07-Dec-2022	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
BH3	**02-Dec-2022**	**07-Dec-2022**	09-Dec-2022	✓	**07-Dec-2022**	04-Jan-2023	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
BH4	**01-Dec-2022**	**----**	----	----	**08-Dec-2022**	15-Dec-2022	✓
Soil Glass Jar - Unpreserved (EA055)							
BH3	**02-Dec-2022**	**----**	----	----	**06-Dec-2022**	16-Dec-2022	✓
Soil Glass Jar - Unpreserved (EA055)							
BLANK	**14-Jan-2022**	**----**	----	----	**08-Dec-2022**	28-Jan-2022	×

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED006: Exchangeable Cations on Alkaline Soils							
Soil Glass Jar - Unpreserved (ED006)							
BH3	**02-Dec-2022**	**09-Dec-2022**	30-Dec-2022	✓	**09-Dec-2022**	30-Dec-2022	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
BH4	**01-Dec-2022**	**08-Dec-2022**	30-May-2023	✓	**12-Dec-2022**	30-May-2023	✓
Soil Glass Jar - Unpreserved (EG005T)							
BH3	**02-Dec-2022**	**06-Dec-2022**	31-May-2023	✓	**08-Dec-2022**	31-May-2023	✓
Soil Glass Jar - Unpreserved (EG005T)							
BLANK	**14-Jan-2022**	**08-Dec-2022**	13-Jul-2022	×	**12-Dec-2022**	13-Jul-2022	×
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
BH4	**01-Dec-2022**	**08-Dec-2022**	29-Dec-2022	✓	**12-Dec-2022**	29-Dec-2022	✓
Soil Glass Jar - Unpreserved (EG035T)							
BLANK	**14-Jan-2022**	**08-Dec-2022**	11-Feb-2022	×	**12-Dec-2022**	11-Feb-2022	×
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
BH3	**02-Dec-2022**	**07-Dec-2022**	30-Dec-2022	✓	**07-Dec-2022**	30-Dec-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
BH4	**01-Dec-2022**	**09-Dec-2022**	15-Dec-2022	✓	**12-Dec-2022**	18-Jan-2023	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
BH4	**01-Dec-2022**	**08-Dec-2022**	15-Dec-2022	✓	**13-Dec-2022**	15-Dec-2022	✓
Soil Glass Jar - Unpreserved (EP071)							
BH4	**01-Dec-2022**	**09-Dec-2022**	15-Dec-2022	✓	**12-Dec-2022**	18-Jan-2023	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)							
BH4	**01-Dec-2022**	**08-Dec-2022**	15-Dec-2022	✓	**13-Dec-2022**	15-Dec-2022	✓
Soil Glass Jar - Unpreserved (EP071)							
BH4	**01-Dec-2022**	**09-Dec-2022**	15-Dec-2022	✓	**12-Dec-2022**	18-Jan-2023	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
BH4	**01-Dec-2022**	**08-Dec-2022**	15-Dec-2022	✓	**13-Dec-2022**	15-Dec-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH in soil using a 0.01M CaCl2 extract	EA001	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	27	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Organic Matter	EP004	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH in soil using a 0.01M CaCl2 extract	EA001	SOIL	In house: Referenced to Rayment and Lyons 4B3 (mod.) or 4B4 (mod.) 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations on Alkaline Soils	ED006	SOIL	In house: Referenced to Soil Survey Test Method C5. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with alcoholic ammonium chloride at pH 8.5. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil.
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.

Preparation Methods	Method	Matrix	Method Descriptions
pH in soil using a 0.01M CaCl2 extract	EA001-PR	SOIL	In house: Referenced to Rayment and Lyons 4B1, 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method (Alkaline Soils)	ED006PR	SOIL	In house: Referenced to Rayment and Lyons method 15C1.
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.