Preliminary contamination investigation

Lots 4 and 5, Hoskins Street, Nyngan NSW

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Summary report

Introduction
A residential subdivision is proposed for Lots 4 and 5 Section 11 DP758803 Hoskins Street, Nyngan NSW. Thirty lots are proposed. Land-use will change over the site from grazing to residential. Potential exists for contaminating activities to have been undertaken on the site.

An assessment is required to determine potential contamination on the site as part of the requirements for council to consider the application.

Scope
The scope was to identify past potentially contaminating activities, identify potential types of contamination, discuss the site condition, provide a preliminary assessment of site contamination and assess the need for further investigation to determine suitability for residential land-use. The scope of works included site inspection, soil sampling and analysis of the soil samples for contaminants of concern.

Summary
An inspection of the site was made on 24 May 2022. The site has a historical land-use comprising grazing. A suspected dam is visible on the site in aerial photographs from the decades of 1960's and 1970's.

Surface cover was generally 70% and comprised pasture grasses and broadleaved weedy species. Bare areas occurred in the north western, south western and eastern sections of the site. The north western bare area is associated with the location of the suspected former dam. The eastern bare area is located adjacent to a potential structure that was identified in the aerial photograph from 1963. Fill was observed in south western and north eastern sections of the site.

A small stockpile comprising grey sandy gravel was located in the southern section of the site. No foreign materials were observed in the stockpiles from visual inspection. A borehole containing water was observed in the southern section of the site associated with adjacent hoses and metal drums.

No other signs of visible contamination such as discolouration or staining was identified on the surface of the site. No signs of settlement or subsidence was identified on the site. No asbestos containing materials were observed on-site.

The soil sampling program included surface sampling on an approximate 30m grid pattern over the site and identified areas of environmental concern. The stockpile present on site was assessed and a soil sample was collected. Twelve composite soil samples were collected from the site, five discrete soil samples were collected from areas of environmental concern and one discrete soil sample was collected from the existing stockpile.

Samples from areas of environmental concern were collected from fil, bare areas across the site, stockpile and adjacent the borehole.

Stockpiled material comprised grey sandy gravel. The stockpile is classified as ENM.

The soil sampling program did not detect elevated levels of potential contaminants of concern across the site, potential areas of environmental concern or stockpile.

Recommendations
An unexpected finds protocol (Appendix 5) should be adopted to manage the backfill material.

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1. Introduction

A residential subdivision is proposed for Lots 4 and 5 Section 11 DP758803 Hoskins Street, Nyngan NSW. Thirty lots are proposed. Land-use will change over the site from grazing to residential. Potential exists for contaminating activities to have been undertaken on the site.

An assessment is required to determine potential contamination on the site as part of the requirements for council to consider the application.

2. Objectives

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

3. Scope of work

Envirowest Consulting Pty Ltd was commissioned by Bogan Shire Council to undertake a contamination assessment, in accordance with the contaminated land management planning guidelines, from the *Contaminated Land Management Act 1997* and the *State Environmental Policy No. 55 (SEPP 55)*, of Lots 4 and 5, Hoskins Street, Nyngan NSW. The scope was to identify past potentially contaminating activities, identify potential contamination types, discuss the site condition, provide a preliminary assessment of site contamination and assess the need for further investigation or suitability for residential land-use.

4. Site identification

Address	Lots 4 and 5 Hoskins Street Nyngan NSW
Deposited plans	Lots 4 and 5 DP758803
Latitude and longitude	-31.57^{o} 147.19^{o}
Geographic coordinates	55H E518552m S6506949m
Client	Bogan Shire Council
Owners	Bogan Shire Council
Current occupiers	Vacant
Investigation area	Approximately 3.6ha
Local government area	Bogan Shire Council
Current zoning	R1 – General Residential (Bogan LEP 2011)
Trigger for investigation	Change in land-use
Locality map	Figure 1

5. Site history

5.1 Land-uses

The site is located in a residential area (Figure 1) to the south of Nyngan and has a historical land-use of grazing. The site has been leased as a horse paddock and is currently vacant.

5.2 Summary of council records

The site is not mapped as (Bogan LEP 2011):

- heritage area
- biodiversity area
- groundwater vulnerable
- wetland

5.3 EPA contaminated sites list

The investigation area is not listed on the NSW EPA register of contaminated sites (8 July 2022) or sites notified to the EPA (7 July 2022).

Two sites are listed on the NSW EPA register of contaminated sites are located withing 1.5km from the investigation area. The sites are Caltex Service Stations located at 39-41 and 126 Pangee Street, respectively at 900m and 1.3km from the site. The EPA has completed the assessment of the sites and has determined that regulation under the CLM Act 1997 is not required. Contamination previously identified in both the service stations is not expected to have impacted the investigation area.

5.4 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
- Defence 3 Year Regional Contamination Investigation Program
- Airservices Australia National PFAS Management Program

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

5.5 Sources of information

Site inspection 24 May 2022 by Envirowest Consulting Pty Ltd
NSW EPA records of public notices under the CLM Act 1997
Soil and geological maps
Spatial information exchange historic parish maps
Historical aerial photographs (1963, 1972, 1990, 1994, 1998, 2004, 2016, 2018, 2018 and 2021) including NSW Government historical imagery and Google Earth
Bogan LEP 2011

5.6 Review of historic aerial photographs, maps and plans

5.6.1 Aerial photographs

Year	Visual observations on site	Surrounding area
1963	Land-use on-site is grazing, scattered trees are visible. A dam is visible in the north western section of the site. A suspected structure is visible in the south eastern section of the site with adjacent exposed soil.	Adjacent land-use is grazing and residential to the north. Several trees are visible to the west. Oatley Street and rural properties are evident to the south and Hoskins Street and the showground are visible to the east.
1972	Water level is apparently low in the dam. The potential structure is not visible.	Residential developments are visible to the north.
1990	The dam is not visible.	Oxley Street and residential developments are visible to the north, dwellings are visible in rural properties to the west and to the south.
1994	No obvious changes evident.	No obvious changes evident.
1998	No obvious changes evident.	Additional dwellings are visible to the north of the site.
2004	No obvious changes evident.	No obvious changes evident.
2016	A small structure is visible in the south western section of the site.	Additional dwellings are visible to the north of the site.
2019	The landscape is dry due to climatic stress.	No obvious changes evident.
2021	Vegetation regrowth is visible, residual bare areas remain on-site.	No obvious changes evident.

5.6.2 Parish maps review

Review of parish maps from 1884 to 1958 indicates that the site is located in the Parish of Nyngan, County of Oxley. The site is within the Village of Nyngan, Block 11. The block is subdivided in Lots 4 and 5. The maps from 1894 to 1929 depicts the owner as Mr WF Odman. Parish map from 1933 presents the inscription “Resumed for pound gazzete 10.5.1955” and map from 1958 depicts the area as “Acquired for public pound gazzete 10 June 1955”.

5.6.3 Web search

Research in historical newspapers identified news from 1951 reporting the erection of a public pound. News from 1952 informs about the dangerous of straying stock for motorists in the village of Nyngan. The news reports that representatives of administrative bodies of Nyngan, Canonbar and Bogan Shire discussed plans for the erection of a public pound.

Historical news from July 1955 informs about the opening of a public pound in allotments 4 and 5 in the suburban section 11, village of Nyngan.

5.7 Chronological list of site uses

Historical land-use of the site was grazing. The site was planned to be a public pound in 1950’s. A potential structure was visible in the aerial photograph from 1963. A dam is visible on-site in aerial photographs from 1963 and 1971 and has been filled before the decade of 90’s. The site has been leased as a horse paddock in recent years and is currently vacant.

5.8 Buildings and infrastructure

No buildings or infrastructure were observed on-site. A hitching post and a small horse trough were visible in the south western corner of the site. A borehole with a metal rim, hoses and a drum were observed in

the southern section of the site. The southern section of the site was fenced with a gate providing access from Hoskins Street.

A suspected structure was visible in the south eastern section of the site. The structure may be related to the existence of a public pound on-site. Evidences of the structure were not observed during the inspection.

5.9 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.

5.10 Relevant complaint history

None known

5.11 Previous investigations

None known

5.12 Historical neighbouring land-use

North – Grazing, residential, Oxley Street
South – Oatley Street, grazing, rural-residential
East – Hoskins Street, showground
West – Woodland, grazing, rural-residential

Historical neighbouring land-use and vacant nature of the site may have resulted in unauthorized disposal of materials on the site.

5.13 Contaminant sources

Potential exists for contaminating activities to have been undertaken on site which may impact on the suitability for the proposed land-use. Agricultural land-use may have resulted in application of pesticides in routine management of pastures. Fertilisers applied may contain heavy metal contaminants. No bio solids are known to have been applied to the site.

The stockpiling of soil and application of fill from unknown sources may have resulted in application of contaminants.

5.14 Contaminants of concern

Based on historical activities and site inspection the contaminants of concern on-site are:

- Heavy metals (arsenic, cadmium, chromium, copper, nickel, lead and zinc)

Contaminants of concern in the stockpiling and areas of environmental concern 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
- Foreign materials

5.15 Integrity assessment

The site history was obtained from a site inspection and 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 Felipe Canavez of Envirowest Consulting Pty Ltd on 24 May 2022.

6.2 Land-use

The lot is vacant.

6.3 Current neighbouring land-use

North – Oxley Street, residential
South – Oatley street, grazing, rural-residential
East – Hoskins Street, showground
West – Grazing, rural-residential, Dandaloo Street, residential

Historical neighbouring land-use and vacant nature of the site may have resulted in unauthorized disposal of materials on the site.

6.4 Surface cover and vegetation

Surface coverage on-site was approximately 70%. Bare areas were observed adjacent to the gate, in the southern section of the site and in the north eastern section of the site.

Predominant vegetation across the site consisted of pasture grasses, clover, saffron thistle, paspalum and Malva *sp.*

Scattered eucalypt trees were observed on-site.

6.5 Evidence of visible contamination

Bare areas were identified in the north eastern, southern and eastern sections of the site.

Fill was observed in the south western section and in the former dam location.

A small stockpile of grey sandy gravel was observed in the south western section. Stockpile volume is estimated in $2m^3$.

A borehole containing water and hoses was observed in the southern section. Borehole depth is unknown.

No other signs of visible contamination such as discolouration or staining was identified on the surface of the site. No signs of settlement or subsidence was identified on the site. No asbestos containing materials were observed on-site.

6.6 Topography

The site was generally level with inclinations of 0 to 1% south. Elevation across the site is 171m above sea level.

6.7 Soils and geology

Australian Soil Classification has the site mapped as a vertosol (MinView, v1.11), comprising clay soils with shrink/swell properties. Vertosols present strong cracking when dry and at depth have slickensides and/or lenticular peds (Soil Science Australia website, 2021).

The site is within the Carrabear Formation, blackplain facies, comprising very poorly sorted, unconsolidated pale grey to grey brown silt, clay and sand with occasional carbonate nodules (MinView, v1.11).

6.8 Water

6.8.1 Surface water

Surface water from the site partially infiltrates in the soil or flows into the roadside culvert.

6.8.2 Groundwater

Six registered water abstraction bores were identified within a 1.2km radius of the site on the NSW Government Water NSW website (2022). The bores are licensed for Public, recreation and monitoring. The standing water levels were between 9.3 and 25.9m and water bearing zones between 9m and 147m in sandy clay, silty sand and sand.

Groundwater No.	Date drilled	Location	SWL (m)	Use	Status
GW000823	1/08/1922	750m N	-	Public, municipal	Unknown
GW803042	3/11/2005	829m NE	11.6	-	Supply Obtained
GW023876	30/06/1982	876m NE	25.90	Recreation (groundwater)	Unknown
GW805229	8/08/2014	1068m NE	9.30	Monitoring bore	Equipped
GW805230	8/08/2014	1074m NE	12.4	Monitoring bore	Equipped
GW805228	8/08/2014	1095m NE	12.8	-	Equipped

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 (NSW SEED Portal accessed 8 July 2022).

The site is not mapped as a geological unit with asbestos potential (NSW SEED Portal accessed 8 July 2022).

6.10 Environmentally sensitive features or habitats

Bogan River is a permanent watercourse located approximately 1.7km west of the site. The Bogan River is a moderately disturbed aquatic ecosystem.

6.11 Integrity assessment

The site history was obtained from a site inspection 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

Potential exists for contaminating activities to have been undertaken on site which may impact on the suitability for the proposed land-use. The historical land-use may have resulted in contaminating activities to the site.

The stockpiling of soil and use of fill from unknown sources may have resulted in application of contaminants.

7.2 Contaminants of concern

Based on historical activities and site inspection the contaminants of concern in the general site are:

- Heavy metals (arsenic, cadmium, chromium, copper, nickel, lead and zinc)

Contaminants of concern in the stockpiling and potential areas of environmental concern 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
- Foreign materials

7.3 Potential receptors

The proposed land-use of the site is residential. The site has historically been used for grazing.

Human receptors include:

- Residents (adults and children)
- Visitors
- 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 on-site and 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 may potentially be receptors to soil contaminants through direct contact to soil which includes ingestion and dermal contact.

The contaminants of concern include heavy metals and hydrocarbons. Inhalation of soil material is considered a pathway for exposure and may occur as a result of vaporisation, 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.

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

The source receptor linkage to aquatic organisms and ecosystems is considered incomplete as the site is moderately vegetated and movement of sediments from the site is 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 will be re-established or hard surfaces constructed which will control sediment movement from the site.

The site is not mapped as a groundwater vulnerable area. Groundwater is identified as a potential receptor to contamination due to the borehole observed on-site that can potentially carry surface contamination to groundwater. Groundwater is identified at depths greater than 9m.

Source/contaminants	Transport	Potential exposure pathways	Receptors
☒ Areas of environmental concern (heavy metals, TRH, BTEXN, PAH, asbestos, foreign materials) ☒ Agriculture (heavy metals)	☒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 ☒Terrestrial flora and fauna ☐Aquatic flora and fauna

☒Potential, ☐unknown/unlikely

8. Data quality objectives (DQO)

8.1 State the problem

The site is a proposed residential subdivision. The property has historically been agricultural and vacant, with unknown past activities which may have resulted in contamination. Stockpiles from an unknown source have been stored on-site and have potential to contain contaminants. The site requires investigation to ensure suitability for the proposed land-use.

8.2 Identify the decision

The land-use proposed is residential and the levels of contaminants should be less than the thresholds listed in Section 11. The decision problem is, do the levels of potential contaminants exceed the assessment criteria listed in Section 11.

8.3 Identify the inputs decision

Investigations of the site is required to identify any potential contaminants from historical land-use.

8.4 Define the boundaries of the study

The investigation area comprises Lots 4 and 5 DP 758803 Hoskins Street, Nyngan NSW.

8.5 Develop a decision rule

The initial guidelines for soil were the health and ecological investigation levels for residential land-use (NEPC 1999).

If soil contamination was identified then the contaminant source and extent of contamination was determined.

8.6 Specify acceptable limits on the decision errors.

The 95% upper confidence limit of average levels of samples collected is less than the threshold levels and the results are less than 250% of relevant thresholds.

8.7 Optimize the design for obtaining data

Soil samples were collected from the general site on an approximate 30m grid pattern and combined to form composite samples for heavy metals analysis.

Soil samples collected from potential areas of environmental concern were analysed for heavy metals, total recoverable hydrocarbons (TRH (C6-C40)), benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN) and polycyclic aromatic hydrocarbons (PAH).

Soil samples were collected from the stockpile and analysed for heavy metals, total recoverable hydrocarbons (TRH (C6-C40)), benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN) and polycyclic aromatic hydrocarbons (PAH), pH and electrical conductivity.

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 sampling pattern was adopted to assess the probable location of contamination on- site.

A judgemental sampling pattern was adopted to assess potential areas of environmental concern and the existing stockpile.

9.1.2 Sampling locations

Discrete soil samples were collected from the site on an approximate 30m pattern. Four discrete samples collected and combined to form a composite soil sample. A total of 48 discrete soil samples were collected and combined to form 12 composite samples for analysis. The composite samples were analysed for heavy metals.

Five discrete samples were collected from potential areas of environmental concern. Samples were analysed for heavy metals and hydrocarbons.

One discrete sample was collected from the stockpile. Samples were analysed for heavy metals, hydrocarbons, pH and electrical conductivity.

The sampling locations are described in Figure 3.

9.1.3 Sampling density

The sampling density across the site can detect a potential hot spot across the site with a radius of 18m at a 95% level of confidence.

The sampling frequency is in accordance with the recommended by EPA (1995).

Density of samples collected from areas of environmental concern is expected to be sufficient to provide a preliminary indication of contamination.
The sampling locations are described in Figure 3.

9.1.4 Sampling depth

Soil samples were collected from the 0-100mm soil depth. Any heavy metals present are generally immobile and expected to be contained in the top 100mm of soil.

Samples from the stockpile were collected from 300mm below the stockpile surface to avoid risk of weathering.

9.2 Analytes

Composite soil samples were evaluated for arsenic, cadmium, chromium, copper, lead, nickel and zinc (Table 1). Heavy metals were identified as the contaminants of concern possibly present as a result of previous activities.

Soil samples collected from areas of environmental concern were analysed for arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury, TRH (C6-C40), BTEXN and PAH.

Soil samples collected from stockpile area were analysed for heavy metals, hydrocarbons, pH and electrical conductivity (EC).

9.3 Sampling methods

Soil samples were taken using a stainless-steel hand spade and a push corer. Soil was taken at each individual sampling location below the vegetative and detrital layer.

The soil was transferred to a clean plastic bag, mixed and transferred to a solvent rinsed glass jar with a Teflon lid. Four discrete samples were combined to create each composite sample for chemical analysis. Discrete soil samples were transferred directly to a solvent rinsed glass jar with a Teflon lid.

Stockpile sampling was undertaken by excavation using a shovel to reach a depth of 300mm and sampled directly from the stockpile with a stainless steel hand spade. Soil samples were 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. Sampling protocols are presented in Appendix 4.

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 30 metres. This sampling density will enable the detection of an area with an elevated concentration on a radius of 18m with a 95% confidence level.

The number of sampling locations was in accordance with the recommended density in the EPA sampling guidelines. Sampling density of areas of environmental concern is expected to be sufficient to enable preliminary characterisation.

Table 1. Schedule of samples and analyses

Sample ID	Type	Location	Discrete sample ID (Figure 3)	Analysis undertaken
BSC1C	Composite	General site	11, 12, 13, 14	Arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), zinc (Zn)
BSC2C	Composite	General site	21, 22, 23, 24	As, Cd, Cr, Cu, Pb, Ni, Zn
BSC3C	Composite	General site	31, 32, 33, 34	As, Cd, Cr, Cu, Pb, Ni, Zn
BSC4C	Composite	General site	41, 42, 43, 44	As, Cd, Cr, Cu, Pb, Ni, Zn
BSC5C	Composite	General site	51, 52, 53, 54	As, Cd, Cr, Cu, Pb, Ni, Zn
BSC6C	Composite	General site	61, 62, 63, 64	As, Cd, Cr, Cu, Pb, Ni, Zn
BSC7C	Composite	General site	71, 72, 73, 74	As, Cd, Cr, Cu, Pb, Ni, Zn
BSC8C	Composite	General site	81, 82, 83, 84	As, Cd, Cr, Cu, Pb, Ni, Zn
BSC9C	Composite	General site	91, 92, 93, 94	As, Cd, Cr, Cu, Pb, Ni, Zn
BSC10C	Composite	General site	101, 102, 103, 104	As, Cd, Cr, Cu, Pb, Ni, Zn

Sample ID	Type	Location	Discrete sample ID (Figure 3)	Analysis undertaken
BSC11C	Composite	General site	111, 112, 113, 114	As, Cd, Cr, Cu, Pb, Ni, Zn
BSC12C	Composite	General site	121, 122, 123, 124	As, Cd, Cr, Cu, Pb, Ni, Zn
HS1	Discrete	Fill - former dam	HS1	As, Cd, Cr, Cu, Pb, Ni, Zn, mercury (Hg), Total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAH)
HS2	Discrete	SW fill application area	HS2	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
HS3	Discrete	S bare area	HS3	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
HS4	Discrete	Borehole	HS4	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
HS5	Discrete	E bare area – former structure	HS5	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH
SP1	Discrete	Stockpile	SP1	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH

10.2 Field

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

Composite sampling was undertaken to reduce the cost of chemical analysis. Combining equal amounts from four discrete samples created the composite samples. A composite sample represents the average concentration of the sub-sample.

The rules for composite sampling were observed (EPA 1995). All composite samples were analysed for arsenic, cadmium, chromium, copper, lead, nickel and zinc.

Soil samples collected from identified potential areas of environmental concern were analysed for heavy metals, TRH, BTEXN and PAH.

Soil sample collected from the stockpile was analysed for heavy metals, TRH, BTEXN, PAH, EC and pH.

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 3).

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

One duplicate sample was collected. No field blank, rinsate, trip 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.

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.

Method blanks, matrix duplicates and laboratory control samples were within acceptance criteria. The quality assurance and quality control report is presented together with the laboratory report as Appendix 1.

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

11.1 General site and areas of environmental concern

The proposed land-use is residential. The laboratory results were assessed against the proposed land-use of residential (HIL A). The health-based investigation levels of contaminants in the soil for residential sites, for the substances for which criteria are available, are listed in Table 3, as recommended in the NEPC (1999).

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 4. 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.

Typical CEC value for the site is >20 to 30cmol(+)/kg, clay content of >30 to 40%, pH values of between 6.0 and 6.5 and organic carbon of 1 to 1.5% (NSW Government nd). The proposed land-use is residential (urban residential areas). The contaminants have been identified in the soil for at least two years and are considered aged.

EILs vary with land-use and apply to contaminants up to 2m depth below the surface. The ASC NEPM EIL calculation spreadsheet was used to determine the EIL. The EILs for residential land-use are listed in Table 2.

ESLs are dependent on land-use, soil types and are applicable to contaminants up to 2m below the surface. The appropriate ESL for the site is residential in fine soil as listed in Table 3.

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.

The investigation threshold was adjusted to enable the detection of an individual location being diluted in the composting process (EPA 1995). For composite sampling, the analyte result was divided against the number of discrete samples making up the composite. This is based on a worst-case scenario in which one sample has a high concentration whilst other discrete samples have zero concentration. This is a conservative approach.

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 2. EIL Calculation sheet, residential land-use

Analyte	Rationale	EIL (mg/kg)
Arsenic	Generic	100
Chromium (III)	Clay content 40%, aged	640
Copper	CEC 30cmol/kg, pH 6.5, organic carbon 1.5%	230
Lead	Generic	1,100
Nickel	CEC 30cmol/kg	350
Zinc	CEC 30cmol/kg, pH 6.5	670

EIL – Ecological investigation limit

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

Analyte	HIL A – Residential		EIL – Urban residential	
	Discrete	Composite	Discrete	Composite
Arsenic	100	25	100	25
Cadmium	20	5	-	-
Chromium (total)	100[1]	25[1]	640[2]	160[2]
Copper	6,000	1,500	230	57.5
Lead	300	75	1,100	275
Nickel	400	100	350	87.5
Zinc	7,400	1,850	670	167.5
Mercury	40	10	-	-
PAH	300	-	-	-
Carcinogenic PAH	3	-	-	-

[1] Threshold for Chromium (VI), [2] Threshold for Chromium (III), HIL- health investigation level, EIL- ecological investigation level.

Table 4. Soil assessment criteria – Hydrocarbons (mg/kg) (NEPC 1999) for residential land-use

Analyte	HSL Residential / clay soil 0m to <1m	EIL Residential	ESL Residential / fine soil	Management limits for TRH in soil / residential
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	-	-
Benzo(a)pyrene	-	-	0.7	-

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

12. Results and discussion

The site has historically been used for grazing. A dam is visible in the north eastern section of the site in aerial photographs from 1963 and 1972 and has been filled before the decade of 1990's. The site has been leased as a horse paddock in recent years and is currently vacant.

Moderate vegetation coverage was observed on-site. Surface coverage was approximately 70%. Three bare areas were observed, one in the former dam location to north west, one to the south and one to the east next to a former structure observed in historical aerial photographs. Fill was observed in the south western section and in the former dam location to north east.

Predominant vegetation across the site consisted of pasture grasses, clover, saffron thistle, paspalum and *Malva* spp.

No evidence of mines, sheep dips or mixing sheds were identified on the site from the review of site history or site inspection.
A small stockpile of grey sandy gravel was observed in the south western section of the site. A borehole containing water and hoses was observed in the southern section. Borehole depth is unknown.

Stockpiled material comprised grey sandy gravel, the estimated volume is 2m^3. No foreign materials were observed in the stockpile.

Low levels of heavy metals near environmental background levels and less than adopted thresholds for human health and environment were detected in soil samples collected from the general site (Table 6) and in the potential areas of environmental concern and stockpile (Table 7).

Levels of hydrocarbons in areas of environmental concern and stockpile were below the laboratory detection limits and thresholds adopted (Table 8). Levels of copper were above levels identified in samples collected across the site in the samples HS2 and SP1, collected from the fill application area and stockpile respectively. Levels of copper were below the thresholds adopted.

Table 6. Analytical results and threshold concentrations for metals (mg/kg) – general site

Sample ID	Type	Sampling points (Figure 3)	Arsenic	Cadmium	Chromium (total)	Copper	Lead	Nickel	Zinc
BSC1C	Composite	11, 12, 13, 14	4	<0.3	19	15	10	11	26
BSC2C	Composite	21, 22, 23, 24	5	<0.3	19	16	10	9.3	27
BSC3C	Composite	31, 32, 33, 34	3	<0.3	17	15	10	10	24
BSC4C	Composite	41, 42, 43, 44	3	<0.3	17	16	11	11	27
BSC5C	Composite	51, 52, 53, 54	5	<0.3	20	17	13	12	31
BSC6C	Composite	61, 62, 63, 64	4	<0.3	20	21	11	16	37
BSC7C	Composite	71, 72, 73, 74	4	<0.3	20	18	13	14	40
BSC8C	Composite	81, 82, 83, 84	4	<0.3	17	16	11	13	48
BSC9C	Composite	91, 92, 93, 94	4	<0.3	22	22	13	17	34
BSC10C	Composite	101, 102, 103, 104	5	<0.3	19	17	11	15	33
BSC11C	Composite	111, 112, 113, 114	5	<0.3	18	17	12	19	31
BSC12C	Composite	121, 122, 123, 124	4	<0.3	20	19	14	14	37
Health Investigation Levels- Residential land-use threshold (NEPC 1999)									
Discrete			*100*	*20*	*100*[1]	*6,000*	*300*	*400*	*7,400*
Composite			*25*	*5*	25[1]	*1,500*	*75*	*100*	*1,850*
Ecological Investigation Levels-* Urban residential and public open space land-use *threshold (NEPC 1999)									
Discrete			*100*	*-*	*640*[2]	*230*	*1,100*	*350*	*670*
Composite			*25*	*-*	*160*[2]	*57.5*	*275*	*87.5*	*167.5*

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

Table 7. Analytical results and threshold concentrations for metals (mg/kg) – areas of environmental concern

Sample ID	Location	Arsenic	Cadmium	Chromium (total)	Copper	Lead	Nickel	Zinc	Mercury
HS1	Fill from former dam	5	<0.3	17	14	11	12	25	<0.5
HS2	SW fill cover area	<1	<0.3	18	150	2	8.4	27	<0.5
HS3	S bare area	3	<0.3	16	13	9	8.3	22	<0.5
HS4	Borehole	3	<0.3	17	20	9	8.5	49	<0.5
HS5	Eastern bare area	3	<0.3	16	16	11	13	22	<0.5
SP1	Stockpile	1	<0.3	19	90	3	8.4	25	<0.05
Health Investigation Levels- Residential land-use threshold (NEPC 1999)									
		100	*20*	*100[1]*	*6,000*	*300*	*400*	*7,400*	*40*
Ecological Investigation Levels*- Urban residential and public open space land-use *threshold (NEPC 1999)									
		100	*-*	*640[2]*	*230*	*1,100*	*350*	*670*	*-*

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

Table 8. Analytical results and threshold concentrations for hydrocarbons (mg/kg) – areas of environmental concern

Sample ID		TRH (C6-10)	TRH (>C10-C16)	TRH (>C16-C34)	TRH (>C34-C40)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PAH	Carcinogenic PAH	Benzo(a)pyrene
HS1		<25	36	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
HS2		<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
HS3		<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
HS4		<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
HS5		<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
HS6		<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8	<0.3	<0.1
SP1		<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	<0.1	<0.8		<0.1
HSL – residential / clay soil	*0m to <1m*	50	280	NA	NA	0.7	480	NL	110	5	-	-	-
HIL A - Residential		-	-	-	-	-	-	-	-	-	300	3	-
EIL – residential		-	-	-	-	-	-	-	-	170	-	-	-
ESL – residential / fine soil		180	120	1,300	5,600	65	105	125	45	-	-	-	0.7
Management limits for TRH fractions in soil		800	1,000	3,500	10,000	-	-	-	-	-	-	-	-

NA – not applicable, NL – Not limiting

13. Site characterisation

13.1 Environmental contamination

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 site was made on 24 May 2022. The site has a historical land-use comprising grazing. A suspected dam is visible on the site in aerial photographs from the decades of 1960's and 1970's.

Surface cover was generally 70% and comprised pasture grasses and broadleaved weedy species. Bare areas occurred in the north western, south western and eastern sections of the site. The north western bare area is associated with the location of the suspected former dam. The eastern bare area is located adjacent to a potential structure that was identified in the aerial photograph from 1963. Fill was observed in south western and north eastern sections of the site.

A small stockpile comprising grey sandy gravel was located in the southern section of the site. No foreign materials were observed in the stockpiles from visual inspection. A borehole containing water was observed in the southern section of the site associated with adjacent hoses and metal drums.

No other signs of visible contamination such as discolouration or staining was identified on the surface of the site. No signs of settlement or subsidence was identified on the site. No asbestos containing materials were observed on-site.

The soil sampling program included surface sampling on an approximate 30m grid pattern over the site and identified areas of environmental concern. The stockpile present on site was assessed and a soil sample was collected. Twelve composite soil samples were collected from the site, five discrete soil samples were collected from areas of environmental concern and one discrete soil sample was collected from the existing stockpile.

Samples from areas of environmental concern were collected from fil, bare areas across the site, stockpile and adjacent the borehole.

Stockpiled material comprised grey sandy gravel. The stockpile is classified as ENM.

The soil sampling program did not detect elevated levels of potential contaminants of concern across the site, potential areas of environmental concern or stockpile.

14.2 Assumptions in reaching the conclusions

It is assumed the sampling sites are representative of the site. An accurate site history has been obtained.

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' within a radius of approximately 18m with a 95% level of confidence.

Subsurface characteristics of the dam backfill are not known.

14.4 Suitability for proposed use of the site

The site is suitable for proposed residential land-use.

14.5 Limitations and constraints on the use of the site

Nil

14.6 Recommendation for further work

An unexpected finds protocol (Appendix 5) should be adopted to manage the backfill material.

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)

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

NSW Government (nd) *eSpadev2* (https://www.environment.nsw.gov.au/eSpade2WebApp)

NSW Government (2022) *Naturally occurring asbestos* (datasets.seed.nsw.gov.au/dataset/naturally-occurring-asbestos)

NSW Government (2022a) *Acid sulfate soil risk* (https://datasets.seed.nsw.gov.au/dataset/acid-sulfate-soils-risk0196c)

Figures

Legend

Lot boundary

Approximate Scale 1: 4,200

0 42 84 168m

Figure 1. Locality map		
Lots 4 and 5, Hoskins Street, Nyngan NSW		
	Envirowest Consulting Pty Ltd	
Job: R14413c	Drawn by: FC	Date: 6/7/2022

Legend

- Investigation area
- Fence
- Fill
- Bare area
- Water bore

Approximate Scale 1: 1,800

0 18 36 72m

Figure 2. Site layout		
Lots 4 and 5, Hoskins Street, Nyngan NSW		
	Envirowest Consulting Pty Ltd	
Job: R14413c	Drawn by: FC	Date: 6/7/2022

Legend

- Investigation area
- Fence
- Fill
- Bare area
- Water bore

Approximate Scale 1: 1,800

0 18 36 72m

Figure 3. Sampling locations		
Lots 4 and 5, Hoskins Street, Nyngan NSW		
	Envirowest Consulting Pty Ltd	
Job: R14413c	Drawn by: FC	Date: 6/7/2022

Figure 4. Photographs of the site

Photograph taken looking west across the south eastern section of site.

Photograph taken looking north across the southern section of the site.

Photograph taken looking west across the north eastern section of site.

Photograph taken looking north east across the southern section of site.

Area containing grey sandy gravel fill in the south eastern corner of the site.

Bare area located in the southern section of the site.

Former dam location comprising fill of yellow clayey sand located in the north western section of the site.

Bore containing water located in the south eastern section of the site.

Appendices

Appendix 1. 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% AD.

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 and inter lab duplicates	Frequency of 5%, results to be within RPD or discussion required. Inter laboratory duplicates will be one sample per batch.
Field duplicates	Frequency of 5%, results to be within RPD or discussion required
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 30%

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 preliminary investigation program. Samples were collected on 24 May 2022. A total of 18 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
BSC1C, BSC2C, BSC3C, BSC4C, BSC5C, BSC6C, BRS7C, BRS8C, BRS9C, BRS10C, BRS11C, BRS12C	12	2	Arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), zinc (Zn)	24/5/2022	Soil	SE232496
HS1, HS2, HS3, HS4, HS5, SP1	6	0	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, Total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAH)	24/5/2022	Soil	SE232496

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 sample was collected for the investigation. The frequency was 11% which is above 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
BSC1C, BSC2C, BSC3C, BSC4C, BSC5C, BSC6C, BRS7C, BRS8C, BRS9C, BRS10C, BRS11C, BRS12C, HS1, HS2, HS3, HS4, HS5, SP1	18	2	11	24/5/2022	Soil	SE232496

Table A1. Relative differences for intra laboratory duplicates

	BS1C, BSDA				BS9C, BSDA2			
	BSC1C	BSCDA	Relative difference (%)	Pass/Fail	BSC9C	BSCDA2	Relative difference (%)	Pass/Fail
Arsenic	4	3	29	Pass	4	4	0	Pass
Cadmium	<0.3	<0.3	NA	-	<0.3	<0.3	NA	-
Chromium	19	18	5	Pass	22	20	10	Pass
Copper	15	15	0	Pass	22	18	20	Pass
Lead	10	10	0	Pass	13	14	7	Pass
Nickel	11	11	0	Pass	17	12	34	Pass
Zinc	26	27	4	Pass	34	36	6	Pass

NA – relative difference unable to be calculated as results are less than laboratory detection limit

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

- 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 for all samples was less than the criteria listed below:

Analyte	Maximum holding time
Metals	6 months
Mercury	28 days
BTEXN, TRH, 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. Holding time outliers were identified for EC, due to delay in the lab analysis. Outliers not expected to impact on conclusions. 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	No	Frequency of 5%, results to be within +/-40% or discussion required. RPD failed acceptance criteria due to sample heterogeneity.
Field duplicates (intra and inter laboratory)	Yes	Frequency of 5%, results to be within +/-30% or discussion required.
Laboratory prepared volatile trip spikes	NA	Frequency of 5%, results to be within +/-40% or discussion required. Not collected due to preliminary nature of investigation.

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	No	Not 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 2. Field sampling log

Client	Bogan Shire Council
Contact	Graeme Bourke
Job number	14413
Location	Lots 4 and 5, Hoskins Street, Nyngan NSW
Date	24 May 2022
Investigator	Felipe Canavez
Weather conditions	Clear and warm

Sample ID	Matrix	Date	Analysis required	Observations/comments
BSC1C	Soil	24/5/2022	Arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), zinc (Zn)	Composite of 11, 12, 13, 44
BSC2C	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 21, 22, 23, 24
BSC3C	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 31, 32, 33, 34
BSC4C	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 41, 42, 43, 44
BSC5C	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 51, 52, 53, 54
BSC6C	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 61, 62, 63, 64
BSC7C	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 71, 72, 73, 74
BSC8C	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 81, 82, 83, 84
BSC9C	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 91, 92, 93, 94
BSC10C	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 101, 102, 103, 104
BSC11C	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 111, 112, 113, 114
BSC12C	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 121, 122, 123, 124
HS1	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, mercury (Hg), Total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAH),	Fill area, former dam
HS2	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	Fill containing area to SW
HS3	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	Bare area southern section
HS4	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	Adjacent to borehole
HS5	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	E bare area
SP1	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, TRH, BTEXN, PAH	Grey sandy gravel stockpile
BSCDA	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn	Duplicate of BSC1C
BSCDA2	Soil	24/5/2022	As, Cd, Cr, Cu, Pb, Ni, Zn	Duplicate of BSC9C

Appendix 3. Soil analysis results – SGS report number SE232496

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Felipe Canavez
Client	ENVIROWEST CONSULTING PTY LIMITED
Address	PO BOX 8158 NSW 2800
Telephone	61 2 63614954
Facsimile	(Not specified)
Email	felipe@envirowest.net.au
Project	**14413**
Order Number	**14413**
Samples	32

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
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Email	au.environmental.sydney@sgs.com
SGS Reference	**SE232496 R0**
Date Received	27/5/2022
Date Reported	3/6/2022

COMMENTS

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

SIGNATORIES

Akheeqar BENIAMEEN
Chemist

Bennet LO
Senior Chemist

Dong LIANG
Metals/Inorganics Team Leader

Ly Kim HA
Organic Section Head

Shane MCDERMOTT
Inorganic/Metals Chemist

Teresa NGUYEN
Organic Chemist

VOC's in Soil [AN433] Tested: 27/5/2022

PARAMETER	UOM	LOR	HS1 SOIL - 24/5/2022 SE232496.025	HS2 SOIL - 24/5/2022 SE232496.026	HS3 SOIL - 24/5/2022 SE232496.027	HS4 SOIL - 24/5/2022 SE232496.028	HS5 SOIL - 24/5/2022 SE232496.029
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	SP1 SOIL - 24/5/2022 SE232496.032
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
Total Xylenes	mg/kg	0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6
Naphthalene (VOC)	mg/kg	0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 27/5/2022

PARAMETER	UOM	LOR	HS1 SOIL - 24/5/2022 SE232496.025	HS2 SOIL - 24/5/2022 SE232496.026	HS3 SOIL - 24/5/2022 SE232496.027	HS4 SOIL - 24/5/2022 SE232496.028	HS5 SOIL - 24/5/2022 SE232496.029
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	SP1 SOIL - 24/5/2022 SE232496.032
TRH C6-C9	mg/kg	20	<20
Benzene (F0)	mg/kg	0.1	<0.1
TRH C6-C10	mg/kg	25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 27/5/2022

PARAMETER	UOM	LOR	HS1 SOIL - 24/5/2022 SE232496.025	HS2 SOIL - 24/5/2022 SE232496.026	HS3 SOIL - 24/5/2022 SE232496.027	HS4 SOIL - 24/5/2022 SE232496.028	HS5 SOIL - 24/5/2022 SE232496.029
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	<45	<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	<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	SP1 SOIL - 24/5/2022 SE232496.032
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-C16	mg/kg	25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120
TRH C10-C36 Total	mg/kg	110	<110
TRH >C10-C40 Total (F bands)	mg/kg	210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 27/5/2022

PARAMETER	UOM	LOR	HS1 SOIL - 24/5/2022 SE232496.025	HS2 SOIL - 24/5/2022 SE232496.026	HS3 SOIL - 24/5/2022 SE232496.027	HS4 SOIL - 24/5/2022 SE232496.028	HS5 SOIL - 24/5/2022 SE232496.029
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	SP1 SOIL - 24/5/2022 SE232496.032
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(b&j)fluoranthene	mg/kg	0.1	<0.1
Benzo(k)fluoranthene	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
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8

OC Pesticides in Soil [AN420] Tested: 30/5/2022

PARAMETER	UOM	LOR	BSC14D SOIL - 24/5/2022 SE232496.013	BSC24D SOIL - 24/5/2022 SE232496.014	BSC34D SOIL - 24/5/2022 SE232496.015	BSC44D SOIL - 24/5/2022 SE232496.016	BSC54D SOIL - 24/5/2022 SE232496.017
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1	<1

OC Pesticides in Soil [AN420] Tested: 30/5/2022 (continued)

PARAMETER	UOM	LOR	BSC64D SOIL - 24/5/2022 SE232496.018	BSC73D SOIL - 24/5/2022 SE232496.019	BSC84D SOIL - 24/5/2022 SE232496.020	BSC94D SOIL - 24/5/2022 SE232496.021	BSC104D SOIL - 24/5/2022 SE232496.022
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1	<1

OC Pesticides in Soil [AN420] Tested: 30/5/2022 (continued)

PARAMETER	UOM	LOR	BSC114D SOIL - 24/5/2022 SE232496.023	BSC124D SOIL - 24/5/2022 SE232496.024
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1

pH in soil (1:5) [AN101] Tested: 30/5/2022

PARAMETER	UOM	LOR	SP1 SOIL - 24/5/2022 SE232496.032
pH	pH Units	0.1	**8.6**

Conductivity and TDS by Calculation - Soil [AN106] Tested: 30/5/2022

PARAMETER	UOM	LOR	SP1 SOIL - 24/5/2022 SE232496.032
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	**57**

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 2/6/2022

PARAMETER	UOM	LOR	BSC1C SOIL - 24/5/2022 SE232496.001	BSC2C SOIL - 24/5/2022 SE232496.002	BSC3C SOIL - 24/5/2022 SE232496.003	BSC4C SOIL - 24/5/2022 SE232496.004	BSC5C SOIL - 24/5/2022 SE232496.005
Arsenic, As	mg/kg	1	4	5	3	3	5
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.5	19	19	17	17	20
Copper, Cu	mg/kg	0.5	15	16	15	16	17
Lead, Pb	mg/kg	1	10	10	10	11	13
Nickel, Ni	mg/kg	0.5	11	9.3	10	11	12
Zinc, Zn	mg/kg	2	26	27	24	27	31

PARAMETER	UOM	LOR	BSC6C SOIL - 24/5/2022 SE232496.006	BSC7C SOIL - 24/5/2022 SE232496.007	BSC8C SOIL - 24/5/2022 SE232496.008	BSC9C SOIL - 24/5/2022 SE232496.009	BSC10C SOIL - 24/5/2022 SE232496.010
Arsenic, As	mg/kg	1	4	4	4	4	5
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.5	20	20	17	22	19
Copper, Cu	mg/kg	0.5	21	18	16	22	17
Lead, Pb	mg/kg	1	11	13	11	13	11
Nickel, Ni	mg/kg	0.5	16	14	13	17	15
Zinc, Zn	mg/kg	2	37	40	48	34	33

PARAMETER	UOM	LOR	BSC11C SOIL - 24/5/2022 SE232496.011	BSC12C SOIL - 24/5/2022 SE232496.012	HS1 SOIL - 24/5/2022 SE232496.025	HS2 SOIL - 24/5/2022 SE232496.026	HS3 SOIL - 24/5/2022 SE232496.027
Arsenic, As	mg/kg	1	5	4	5	<1	3
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.5	18	20	17	18	16
Copper, Cu	mg/kg	0.5	17	19	14	150	13
Lead, Pb	mg/kg	1	12	14	11	2	9
Nickel, Ni	mg/kg	0.5	19	14	12	8.4	8.3
Zinc, Zn	mg/kg	2	31	37	25	27	22

PARAMETER	UOM	LOR	HS4 SOIL - 24/5/2022 SE232496.028	HS5 SOIL - 24/5/2022 SE232496.029	BSCDA SOIL - 24/5/2022 SE232496.030	BSCDA2 SOIL - 24/5/2022 SE232496.031	SP1 SOIL - 24/5/2022 SE232496.032
Arsenic, As	mg/kg	1	3	3	3	4	1
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.5	17	16	18	20	19
Copper, Cu	mg/kg	0.5	20	16	15	18	90
Lead, Pb	mg/kg	1	9	11	10	14	3
Nickel, Ni	mg/kg	0.5	8.5	13	11	12	8.4
Zinc, Zn	mg/kg	2	49	22	27	36	25

Mercury in Soil [AN312] Tested: 2/6/2022

PARAMETER	UOM	LOR	HS1 SOIL - 24/5/2022 SE232496.025	HS2 SOIL - 24/5/2022 SE232496.026	HS3 SOIL - 24/5/2022 SE232496.027	HS4 SOIL - 24/5/2022 SE232496.028	HS5 SOIL - 24/5/2022 SE232496.029
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	SP1 SOIL - 24/5/2022 SE232496.032
Mercury	mg/kg	0.05	<0.05

Moisture Content [AN002] Tested: 30/5/2022

PARAMETER	UOM	LOR	BSC1C SOIL - 24/5/2022 SE232496.001	BSC2C SOIL - 24/5/2022 SE232496.002	BSC3C SOIL - 24/5/2022 SE232496.003	BSC4C SOIL - 24/5/2022 SE232496.004	BSC5C SOIL - 24/5/2022 SE232496.005
% Moisture	%w/w	1	11.1	8.4	9.3	8.2	17.9

PARAMETER	UOM	LOR	BSC6C SOIL - 24/5/2022 SE232496.006	BSC7C SOIL - 24/5/2022 SE232496.007	BSC8C SOIL - 24/5/2022 SE232496.008	BSC9C SOIL - 24/5/2022 SE232496.009	BSC10C SOIL - 24/5/2022 SE232496.010
% Moisture	%w/w	1	18.9	18.1	17.0	21.0	17.3

PARAMETER	UOM	LOR	BSC11C SOIL - 24/5/2022 SE232496.011	BSC12C SOIL - 24/5/2022 SE232496.012	BSC14D SOIL - 24/5/2022 SE232496.013	BSC24D SOIL - 24/5/2022 SE232496.014	BSC34D SOIL - 24/5/2022 SE232496.015
% Moisture	%w/w	1	13.9	18.8	12.2	15.1	9.7

PARAMETER	UOM	LOR	BSC44D SOIL - 24/5/2022 SE232496.016	BSC54D SOIL - 24/5/2022 SE232496.017	BSC64D SOIL - 24/5/2022 SE232496.018	BSC73D SOIL - 24/5/2022 SE232496.019	BSC84D SOIL - 24/5/2022 SE232496.020
% Moisture	%w/w	1	13.4	23.7	24.2	11.9	14.7

PARAMETER	UOM	LOR	BSC94D SOIL - 24/5/2022 SE232496.021	BSC104D SOIL - 24/5/2022 SE232496.022	BSC114D SOIL - 24/5/2022 SE232496.023	BSC124D SOIL - 24/5/2022 SE232496.024	HS1 SOIL - 24/5/2022 SE232496.025
% Moisture	%w/w	1	22.8	21.8	17.9	20.7	4.1

PARAMETER	UOM	LOR	HS2 SOIL - 24/5/2022 SE232496.026	HS3 SOIL - 24/5/2022 SE232496.027	HS4 SOIL - 24/5/2022 SE232496.028	HS5 SOIL - 24/5/2022 SE232496.029	BSCDA SOIL - 24/5/2022 SE232496.030
% Moisture	%w/w	1	1.7	5.0	18.7	7.6	11.9

PARAMETER	UOM	LOR	BSCDA2 SOIL - 24/5/2022 SE232496.031	SP1 SOIL - 24/5/2022 SE232496.032
% Moisture	%w/w	1	19.2	4.5

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040/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.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl2) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract of as received sample with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Salinity can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. Reference APHA 2510 B.
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).
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
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.

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STATEMENT OF QA/QC PERFORMANCE

SE232496 R0

CLIENT DETAILS

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Project	**14413**
Order Number	**14413**
Samples	32

LABORATORY DETAILS

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SGS Reference	**SE232496 R0**
Date Received	27 May 2022
Date Reported	03 Jun 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 with the exception of the following:

Analysis Date	Conductivity and TDS by Calculation - Soil	1 item
Duplicate	Volatile Petroleum Hydrocarbons in Soil	2 items

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	None
Samples received in correct containers	Yes	Sample counts by matrix	32 Soil
Date documentation received	27/5/2022	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	18.4C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

HOLDING TIME SUMMARY

SE232496 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

Conductivity and TDS by Calculation - Soil

Method: ME-(AU)-[ENV]AN106

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
SP1	SE232496.032	LB249741	24 May 2022	27 May 2022	31 May 2022	30 May 2022	31 May 2022	03 Jun 2022†

Mercury in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
HS1	SE232496.025	LB250074	24 May 2022	27 May 2022	21 Jun 2022	02 Jun 2022	21 Jun 2022	03 Jun 2022
HS2	SE232496.026	LB250074	24 May 2022	27 May 2022	21 Jun 2022	02 Jun 2022	21 Jun 2022	03 Jun 2022
HS3	SE232496.027	LB250074	24 May 2022	27 May 2022	21 Jun 2022	02 Jun 2022	21 Jun 2022	03 Jun 2022
HS4	SE232496.028	LB250074	24 May 2022	27 May 2022	21 Jun 2022	02 Jun 2022	21 Jun 2022	03 Jun 2022
HS5	SE232496.029	LB250074	24 May 2022	27 May 2022	21 Jun 2022	02 Jun 2022	21 Jun 2022	03 Jun 2022
SP1	SE232496.032	LB250074	24 May 2022	27 May 2022	21 Jun 2022	02 Jun 2022	21 Jun 2022	03 Jun 2022

Moisture Content

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BSC1C	SE232496.001	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC2C	SE232496.002	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC3C	SE232496.003	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC4C	SE232496.004	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC5C	SE232496.005	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC6C	SE232496.006	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC7C	SE232496.007	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC8C	SE232496.008	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC9C	SE232496.009	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC10C	SE232496.010	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC11C	SE232496.011	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC12C	SE232496.012	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC14D	SE232496.013	LB249880	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC24D	SE232496.014	LB249880	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC34D	SE232496.015	LB249880	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC44D	SE232496.016	LB249880	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC54D	SE232496.017	LB249880	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC64D	SE232496.018	LB249880	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC73D	SE232496.019	LB249880	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC84D	SE232496.020	LB249880	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC94D	SE232496.021	LB249880	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC104D	SE232496.022	LB249880	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC114D	SE232496.023	LB249880	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSC124D	SE232496.024	LB249880	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
HS1	SE232496.025	LB249722	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	04 Jun 2022	03 Jun 2022
HS2	SE232496.026	LB249722	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	04 Jun 2022	03 Jun 2022
HS3	SE232496.027	LB249722	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	04 Jun 2022	03 Jun 2022
HS4	SE232496.028	LB249722	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	04 Jun 2022	03 Jun 2022
HS5	SE232496.029	LB249722	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	04 Jun 2022	03 Jun 2022
BSCDA	SE232496.030	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
BSCDA2	SE232496.031	LB249881	24 May 2022	27 May 2022	07 Jun 2022	31 May 2022	05 Jun 2022	03 Jun 2022
SP1	SE232496.032	LB249722	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	04 Jun 2022	03 Jun 2022

OC Pesticides in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BSC14D	SE232496.013	LB249756	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	09 Jul 2022	03 Jun 2022
BSC24D	SE232496.014	LB249756	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	09 Jul 2022	03 Jun 2022
BSC34D	SE232496.015	LB249756	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	09 Jul 2022	03 Jun 2022
BSC44D	SE232496.016	LB249756	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	09 Jul 2022	03 Jun 2022
BSC54D	SE232496.017	LB249756	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	09 Jul 2022	03 Jun 2022
BSC64D	SE232496.018	LB249756	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	09 Jul 2022	03 Jun 2022
BSC73D	SE232496.019	LB249756	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	09 Jul 2022	03 Jun 2022
BSC84D	SE232496.020	LB249756	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	09 Jul 2022	03 Jun 2022
BSC94D	SE232496.021	LB249756	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	09 Jul 2022	03 Jun 2022
BSC104D	SE232496.022	LB249756	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	09 Jul 2022	03 Jun 2022
BSC114D	SE232496.023	LB249756	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	09 Jul 2022	03 Jun 2022
BSC124D	SE232496.024	LB249756	24 May 2022	27 May 2022	07 Jun 2022	30 May 2022	09 Jul 2022	03 Jun 2022

HOLDING TIME SUMMARY

SE232496 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

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
HS1	SE232496.025	LB249649	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	06 Jul 2022	03 Jun 2022
HS2	SE232496.026	LB249649	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	06 Jul 2022	03 Jun 2022
HS3	SE232496.027	LB249649	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	06 Jul 2022	03 Jun 2022
HS4	SE232496.028	LB249649	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	06 Jul 2022	03 Jun 2022
HS5	SE232496.029	LB249649	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	06 Jul 2022	03 Jun 2022
SP1	SE232496.032	LB249649	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	06 Jul 2022	03 Jun 2022

pH in soil (1:5)

Method: ME-(AU)-[ENV]AN101

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
SP1	SE232496.032	LB249741	24 May 2022	27 May 2022	31 May 2022	30 May 2022	31 May 2022	30 May 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
BSC1C	SE232496.001	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
BSC2C	SE232496.002	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
BSC3C	SE232496.003	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
BSC4C	SE232496.004	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
BSC5C	SE232496.005	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
BSC6C	SE232496.006	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
BSC7C	SE232496.007	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
BSC8C	SE232496.008	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
BSC9C	SE232496.009	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
BSC10C	SE232496.010	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
BSC11C	SE232496.011	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
BSC12C	SE232496.012	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
HS1	SE232496.025	LB250073	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
HS2	SE232496.026	LB250073	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
HS3	SE232496.027	LB250073	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
HS4	SE232496.028	LB250073	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
HS5	SE232496.029	LB250073	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
BSCDA	SE232496.030	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
BSCDA2	SE232496.031	LB250049	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 2022
SP1	SE232496.032	LB250073	24 May 2022	27 May 2022	20 Nov 2022	02 Jun 2022	20 Nov 2022	03 Jun 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
HS1	SE232496.025	LB249649	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	06 Jul 2022	03 Jun 2022
HS2	SE232496.026	LB249649	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	06 Jul 2022	03 Jun 2022
HS3	SE232496.027	LB249649	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	06 Jul 2022	03 Jun 2022
HS4	SE232496.028	LB249649	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	06 Jul 2022	03 Jun 2022
HS5	SE232496.029	LB249649	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	06 Jul 2022	03 Jun 2022
SP1	SE232496.032	LB249649	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	06 Jul 2022	03 Jun 2022

VOC's in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
HS1	SE232496.025	LB249650	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	07 Jun 2022	03 Jun 2022
HS2	SE232496.026	LB249650	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	07 Jun 2022	03 Jun 2022
HS3	SE232496.027	LB249650	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	07 Jun 2022	03 Jun 2022
HS4	SE232496.028	LB249650	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	07 Jun 2022	03 Jun 2022
HS5	SE232496.029	LB249650	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	07 Jun 2022	03 Jun 2022
SP1	SE232496.032	LB249650	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	07 Jun 2022	03 Jun 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
HS1	SE232496.025	LB249650	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	07 Jun 2022	03 Jun 2022
HS2	SE232496.026	LB249650	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	07 Jun 2022	03 Jun 2022
HS3	SE232496.027	LB249650	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	07 Jun 2022	03 Jun 2022
HS4	SE232496.028	LB249650	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	07 Jun 2022	03 Jun 2022
HS5	SE232496.029	LB249650	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	07 Jun 2022	03 Jun 2022
SP1	SE232496.032	LB249650	24 May 2022	27 May 2022	07 Jun 2022	27 May 2022	07 Jun 2022	03 Jun 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.

OC Pesticides in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	BSC14D	SE232496.013	%	60 - 130%	94
	BSC24D	SE232496.014	%	60 - 130%	93
	BSC34D	SE232496.015	%	60 - 130%	96
	BSC44D	SE232496.016	%	60 - 130%	102
	BSC54D	SE232496.017	%	60 - 130%	95
	BSC64D	SE232496.018	%	60 - 130%	99
	BSC73D	SE232496.019	%	60 - 130%	95
	BSC84D	SE232496.020	%	60 - 130%	94
	BSC94D	SE232496.021	%	60 - 130%	100
	BSC104D	SE232496.022	%	60 - 130%	99
	BSC114D	SE232496.023	%	60 - 130%	98
	BSC124D	SE232496.024	%	60 - 130%	97

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	HS1	SE232496.025	%	70 - 130%	86
	HS2	SE232496.026	%	70 - 130%	91
	HS3	SE232496.027	%	70 - 130%	89
	HS4	SE232496.028	%	70 - 130%	84
	HS5	SE232496.029	%	70 - 130%	84
	SP1	SE232496.032	%	70 - 130%	89
d14-p-terphenyl (Surrogate)	HS1	SE232496.025	%	70 - 130%	85
	HS2	SE232496.026	%	70 - 130%	92
	HS3	SE232496.027	%	70 - 130%	89
	HS4	SE232496.028	%	70 - 130%	87
	HS5	SE232496.029	%	70 - 130%	86
	SP1	SE232496.032	%	70 - 130%	91
d5-nitrobenzene (Surrogate)	HS1	SE232496.025	%	70 - 130%	84
	HS2	SE232496.026	%	70 - 130%	89
	HS3	SE232496.027	%	70 - 130%	87
	HS4	SE232496.028	%	70 - 130%	78
	HS5	SE232496.029	%	70 - 130%	83
	SP1	SE232496.032	%	70 - 130%	87

VOC's in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	HS1	SE232496.025	%	60 - 130%	93
	HS2	SE232496.026	%	60 - 130%	93
	HS3	SE232496.027	%	60 - 130%	83
	HS4	SE232496.028	%	60 - 130%	82
	HS5	SE232496.029	%	60 - 130%	89
	SP1	SE232496.032	%	60 - 130%	81
d4-1,2-dichloroethane (Surrogate)	HS1	SE232496.025	%	60 - 130%	92
	HS2	SE232496.026	%	60 - 130%	93
	HS3	SE232496.027	%	60 - 130%	82
	HS4	SE232496.028	%	60 - 130%	83
	HS5	SE232496.029	%	60 - 130%	89
	SP1	SE232496.032	%	60 - 130%	82
d8-toluene (Surrogate)	HS1	SE232496.025	%	60 - 130%	96
	HS2	SE232496.026	%	60 - 130%	96
	HS3	SE232496.027	%	60 - 130%	84
	HS4	SE232496.028	%	60 - 130%	84
	HS5	SE232496.029	%	60 - 130%	91
	SP1	SE232496.032	%	60 - 130%	81

Volatile Petroleum Hydrocarbons in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	HS1	SE232496.025	%	60 - 130%	93
	HS2	SE232496.026	%	60 - 130%	93
	HS3	SE232496.027	%	60 - 130%	83
	HS4	SE232496.028	%	60 - 130%	82
	HS5	SE232496.029	%	60 - 130%	89

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 %
Bromofluorobenzene (Surrogate)	SP1	SE232496.032	%	60 - 130%	81
d4-1,2-dichloroethane (Surrogate)	HS1	SE232496.025	%	60 - 130%	92
	HS2	SE232496.026	%	60 - 130%	93
	HS3	SE232496.027	%	60 - 130%	82
	HS4	SE232496.028	%	60 - 130%	83
	HS5	SE232496.029	%	60 - 130%	89
	SP1	SE232496.032	%	60 - 130%	82
d8-toluene (Surrogate)	HS1	SE232496.025	%	60 - 130%	96
	HS2	SE232496.026	%	60 - 130%	96
	HS3	SE232496.027	%	60 - 130%	84
	HS4	SE232496.028	%	60 - 130%	84
	HS5	SE232496.029	%	60 - 130%	91
	SP1	SE232496.032	%	60 - 130%	81

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.

Conductivity and TDS by Calculation - Soil

Method: ME-(AU)-[ENV]AN106

Sample Number	Parameter	Units	LOR	Result
LB249741.001	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	0.09

Mercury in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB250074.001	Mercury	mg/kg	0.05	<0.05

OC Pesticides in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB249756.001		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1
		Alpha BHC	mg/kg	0.1	<0.1
		Lindane	mg/kg	0.1	<0.1
		Heptachlor	mg/kg	0.1	<0.1
		Aldrin	mg/kg	0.1	<0.1
		Beta BHC	mg/kg	0.1	<0.1
		Delta BHC	mg/kg	0.1	<0.1
		Heptachlor epoxide	mg/kg	0.1	<0.1
		Alpha Endosulfan	mg/kg	0.2	<0.2
		Gamma Chlordane	mg/kg	0.1	<0.1
		Alpha Chlordane	mg/kg	0.1	<0.1
		p,p'-DDE	mg/kg	0.1	<0.1
		Dieldrin	mg/kg	0.2	<0.2
		Endrin	mg/kg	0.2	<0.2
		Beta Endosulfan	mg/kg	0.2	<0.2
		p,p'-DDD	mg/kg	0.1	<0.1
		p,p'-DDT	mg/kg	0.1	<0.1
		Endosulfan sulphate	mg/kg	0.1	<0.1
		Endrin Aldehyde	mg/kg	0.1	<0.1
		Methoxychlor	mg/kg	0.1	<0.1
		Endrin Ketone	mg/kg	0.1	<0.1
		Isodrin	mg/kg	0.1	<0.1
		Mirex	mg/kg	0.1	<0.1
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	82

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB249649.001		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)	%	-	98
		2-fluorobiphenyl (Surrogate)	%	-	101
		d14-p-terphenyl (Surrogate)	%	-	103

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

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

Sample Number	Parameter	Units	LOR

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.

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

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

Sample Number	Parameter	Units	LOR	Result
LB250049.001	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
LB250073.001	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

TRH (Total Recoverable Hydrocarbons) in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB249649.001	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
LB249650.001	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
	Surrogates	d4-1,2-dichloroethane (Surrogate)	%	-	124
		d8-toluene (Surrogate)	%	-	118
		Bromofluorobenzene (Surrogate)	%	-	106
	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
LB249650.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	d4-1,2-dichloroethane (Surrogate)	%	-	124

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

Conductivity and TDS by Calculation - Soil

Method: ME-(AU)-[ENV]AN106

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE232408.030	LB249741.014	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	230	280	31	20
SE232408.038	LB249741.025	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	190	200	31	2

Mercury in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE232651A.004	LB250074.014	Mercury	mg/kg	0.05	<0.05	<0.05	160	0

Moisture Content

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE232494.011	LB249722.011	% Moisture	%w/w	1	8.9	9.4	41	5
SE232495.015	LB249881.011	% Moisture	%w/w	1	17.1	16.1	36	6
SE232496.010	LB249881.022	% Moisture	%w/w	1	17.3	17.6	36	2
SE232496.017	LB249880.011	% Moisture	%w/w	1	23.7	22.0	34	7
SE232496.024	LB249880.019	% Moisture	%w/w	1	20.7	19.4	35	6
SE232496.029	LB249722.022	% Moisture	%w/w	1	7.6	7.7	43	2
SE232496.031	LB249881.027	% Moisture	%w/w	1	19.2	19.2	35	0
SE232496.032	LB249722.024	% Moisture	%w/w	1	4.5	5.0	51	10

OC Pesticides in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE232496.017	LB249756.014	Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	200	0
		Alpha BHC	mg/kg	0.1	<0.1	<0.1	200	0
		Lindane	mg/kg	0.1	<0.1	<0.1	200	0
		Heptachlor	mg/kg	0.1	<0.1	<0.1	200	0
		Aldrin	mg/kg	0.1	<0.1	<0.1	200	0
		Beta BHC	mg/kg	0.1	<0.1	<0.1	200	0
		Delta BHC	mg/kg	0.1	<0.1	<0.1	200	0
		Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	200	0
		o,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
		Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
		Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
		Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
		trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	200	0
		p,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
		Dieldrin	mg/kg	0.2	<0.2	<0.2	200	0
		Endrin	mg/kg	0.2	<0.2	<0.2	200	0
		o,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0
		o,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
		Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
		p,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0
		p,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
		Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	200	0
		Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	200	0
		Methoxychlor	mg/kg	0.1	<0.1	<0.1	200	0
		Endrin Ketone	mg/kg	0.1	<0.1	<0.1	200	0
		Isodrin	mg/kg	0.1	<0.1	<0.1	200	0
		Mirex	mg/kg	0.1	<0.1	<0.1	200	0
		Total CLP OC Pesticides	mg/kg	1	<1	<1	200	0
		Total OC VIC EPA	mg/kg	1	<1	<1	200	0
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.14	0.15	30	8

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE232494.012	LB249649.014	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

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 %
SE232494.012	LB249649.014		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	mg/kg	0.3	<0.3	<0.3	134	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	mg/kg	0.2	<0.2	<0.2	175	0
			Total PAH (18)	mg/kg	0.8	<0.8	<0.8	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.5	30	13
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	15
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	15
SE232496.032	LB249649.025		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	mg/kg	0.3	<0.3	<0.3	134	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	mg/kg	0.2	<0.2	<0.2	175	0
			Total PAH (18)	mg/kg	0.8	<0.8	<0.8	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.4	30	1
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.4	30	1
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.4	30	3

pH in soil (1:5)

Method: ME-(AU)-[ENV]AN101

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE232408.030	LB249741.014	pH	pH Units	0.1	8.3	8.0	31	4
SE232408.038	LB249741.025	pH	pH Units	0.1	4.6	4.6	32	0

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 %
SE232496.010	LB250049.014	Arsenic, As	mg/kg	1	5	5	49	1
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.5	19	20	33	5
		Copper, Cu	mg/kg	0.5	17	18	33	3
		Nickel, Ni	mg/kg	0.5	15	15	33	1
		Lead, Pb	mg/kg	1	11	11	39	1
		Zinc, Zn	mg/kg	2	33	34	36	5
SE232496.031	LB250049.019	Arsenic, As	mg/kg	1	4	4	54	13

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

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

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE232496.031	LB250049.019		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
			Chromium, Cr	mg/kg	0.5	20	20	32	1
			Copper, Cu	mg/kg	0.5	18	20	33	10
			Nickel, Ni	mg/kg	0.5	12	15	34	20
			Lead, Pb	mg/kg	1	14	13	37	5
			Zinc, Zn	mg/kg	2	36	33	36	10
SE232651A.004	LB250073.014		Arsenic, As	mg/kg	1	7	7	45	4
			Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	182	0
			Chromium, Cr	mg/kg	0.5	23	23	32	0
			Copper, Cu	mg/kg	0.5	23	21	32	9
			Nickel, Ni	mg/kg	0.5	8.2	7.8	36	5
			Lead, Pb	mg/kg	1	50	43	32	15
			Zinc, Zn	mg/kg	2	110	110	32	3

TRH (Total Recoverable Hydrocarbons) in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE232494.012	LB249649.014		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	200	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
SE232496.032	LB249649.025		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	200	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 %
SE232494.012	LB249650.014	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
			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	-	8.5	12.8	50	40
			d8-toluene (Surrogate)	mg/kg	-	8.7	12.4	50	35
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.3	11.0	50	27
		Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0
SE232496.032	LB249650.025	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
			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	8.4	50	3
			d8-toluene (Surrogate)	mg/kg	-	8.1	8.5	50	5
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.1	8.6	50	6
		Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	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

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE232494.012	LB249650.014		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	-	8.5	12.8	30	40 ②
			d8-toluene (Surrogate)	mg/kg	-	8.7	12.4	30	35 ②
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.3	11.0	30	27
		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
SE232496.032	LB249650.025		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	8.4	30	3
			d8-toluene (Surrogate)	mg/kg	-	8.1	8.5	30	5
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.1	8.6	30	6
		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.

Conductivity and TDS by Calculation - Soil

Method: ME-(AU)-[ENV]AN106

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB249741.002	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	NA	303	85 - 115	104

Mercury in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB250074.002	Mercury	mg/kg	0.05	0.20	0.2	70 - 130	98

OC Pesticides in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB249756.002		Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	89
		Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	86
		Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	81
		Dieldrin	mg/kg	0.2	<0.2	0.2	60 - 140	86
		Endrin	mg/kg	0.2	<0.2	0.2	60 - 140	92
		p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	86
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.14	0.15	40 - 130	90

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB249649.002		Naphthalene	mg/kg	0.1	4.1	4	60 - 140	102
		Acenaphthylene	mg/kg	0.1	3.8	4	60 - 140	95
		Acenaphthene	mg/kg	0.1	3.6	4	60 - 140	91
		Phenanthrene	mg/kg	0.1	3.9	4	60 - 140	96
		Anthracene	mg/kg	0.1	3.5	4	60 - 140	89
		Fluoranthene	mg/kg	0.1	3.6	4	60 - 140	89
		Pyrene	mg/kg	0.1	3.9	4	60 - 140	97
		Benzo(a)pyrene	mg/kg	0.1	4.5	4	60 - 140	111
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	87
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	91
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	88

pH in soil (1:5)

Method: ME-(AU)-[ENV]AN101

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB249741.003	pH	pH Units	0.1	7.4	7.415	98 - 102	100

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 %
LB250049.002	Arsenic, As	mg/kg	1	360	318.22	80 - 120	113
	Cadmium, Cd	mg/kg	0.3	5.3	4.81	70 - 130	110
	Chromium, Cr	mg/kg	0.5	42	38.31	80 - 120	110
	Copper, Cu	mg/kg	0.5	320	290	80 - 120	111
	Nickel, Ni	mg/kg	0.5	200	187	80 - 120	105
	Lead, Pb	mg/kg	1	93	89.9	80 - 120	103
	Zinc, Zn	mg/kg	2	290	273	80 - 120	106
LB250073.002	Arsenic, As	mg/kg	1	350	318.22	80 - 120	110
	Cadmium, Cd	mg/kg	0.3	5.1	4.81	70 - 130	106
	Chromium, Cr	mg/kg	0.5	38	38.31	80 - 120	100
	Copper, Cu	mg/kg	0.5	320	290	80 - 120	111
	Nickel, Ni	mg/kg	0.5	200	187	80 - 120	105
	Lead, Pb	mg/kg	1	93	89.9	80 - 120	103
	Zinc, Zn	mg/kg	2	290	273	80 - 120	105

TRH (Total Recoverable Hydrocarbons) in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB249649.002		TRH C10-C14	mg/kg	20	53	40	60 - 140	133
		TRH C15-C28	mg/kg	45	55	40	60 - 140	138
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	100
	TRH F Bands	TRH >C10-C16	mg/kg	25	55	40	60 - 140	138
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	118

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.

TRH (Total Recoverable Hydrocarbons) in Soil (continued)

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB249649.002	TRH F Bands	TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	105

VOC's in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB249650.002	Monocyclic	Benzene	mg/kg	0.1	4.8	5	60 - 140	96
	Aromatic	Toluene	mg/kg	0.1	4.7	5	60 - 140	93
		Ethylbenzene	mg/kg	0.1	5.0	5	60 - 140	100
		m/p-xylene	mg/kg	0.2	9.6	10	60 - 140	96
		o-xylene	mg/kg	0.1	5.2	5	60 - 140	104
	Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	12.2	10	70 - 130	122
		d8-toluene (Surrogate)	mg/kg	-	11.2	10	70 - 130	112
		Bromofluorobenzene (Surrogate)	mg/kg	-	10.8	10	70 - 130	108

Volatile Petroleum Hydrocarbons in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB249650.002		TRH C6-C10	mg/kg	25	75	92.5	60 - 140	81
		TRH C6-C9	mg/kg	20	67	80	60 - 140	84
	Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	12.2	10	70 - 130	122
		Bromofluorobenzene (Surrogate)	mg/kg	-	10.8	10	70 - 130	108
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	45	62.5	60 - 140	73

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%
SE232496.025	LB250074.004	Mercury	mg/kg	0.05	0.23	<0.05	0.2	105

OC Pesticides in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE232495.006	LB249756.004	Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	-	-
		Alpha BHC	mg/kg	0.1	<0.1	<0.1	-	-
		Lindane	mg/kg	0.1	<0.1	<0.1	-	-
		Heptachlor	mg/kg	0.1	0.2	<0.1	0.2	93
		Aldrin	mg/kg	0.1	0.2	<0.1	0.2	89
		Beta BHC	mg/kg	0.1	<0.1	<0.1	-	-
		Delta BHC	mg/kg	0.1	0.2	<0.1	0.2	86
		Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	-	-
		o,p'-DDE	mg/kg	0.1	<0.1	<0.1	-	-
		Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	-	-
		Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	-	-
		Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	-	-
		trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	-	-
		p,p'-DDE	mg/kg	0.1	<0.1	<0.1	-	-
		Dieldrin	mg/kg	0.2	<0.2	<0.2	0.2	89
		Endrin	mg/kg	0.2	<0.2	<0.2	0.2	95
		o,p'-DDD	mg/kg	0.1	<0.1	<0.1	-	-
		o,p'-DDT	mg/kg	0.1	<0.1	<0.1	-	-
		Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	-	-
		p,p'-DDD	mg/kg	0.1	<0.1	<0.1	-	-
		p,p'-DDT	mg/kg	0.1	0.2	<0.1	0.2	90
		Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	-	-
		Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	-	-
		Methoxychlor	mg/kg	0.1	<0.1	<0.1	-	-
		Endrin Ketone	mg/kg	0.1	<0.1	<0.1	-	-
		Isodrin	mg/kg	0.1	<0.1	<0.1	-	-
		Mirex	mg/kg	0.1	<0.1	<0.1	-	-
		Total CLP OC Pesticides	mg/kg	1	1	<1	-	-
		Total OC VIC EPA	mg/kg	1	1	<1	-	-
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.13	0.13	-	87

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE232493.001	LB249649.004	Naphthalene	mg/kg	0.1	3.9	<0.1	4	97
		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	3.6	<0.1	4	91
		Acenaphthene	mg/kg	0.1	3.5	<0.1	4	87
		Fluorene	mg/kg	0.1	<0.1	<0.1	-	-
		Phenanthrene	mg/kg	0.1	3.6	<0.1	4	91
		Anthracene	mg/kg	0.1	3.4	<0.1	4	84
		Fluoranthene	mg/kg	0.1	3.4	<0.1	4	85
		Pyrene	mg/kg	0.1	3.7	<0.1	4	92
		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	4.3	<0.1	4	106
		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	4.3	<0.2	-	-
		Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	4.4	<0.3	-	-
		Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	4.3	<0.2	-	-
		Total PAH (18)	mg/kg	0.8	29	<0.8	-	-

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.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE232493.001	LB249649.004	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.4	-	86
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.4	-	90
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.4	0.5	-	87

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%
SE232496.001	LB250049.004		Arsenic, As	mg/kg	1	48	4	50	87
			Cadmium, Cd	mg/kg	0.3	43	<0.3	50	86
			Chromium, Cr	mg/kg	0.5	63	19	50	89
			Copper, Cu	mg/kg	0.5	61	15	50	91
			Nickel, Ni	mg/kg	0.5	56	11	50	90
			Lead, Pb	mg/kg	1	53	10	50	85
			Zinc, Zn	mg/kg	2	71	26	50	89
SE232496.025	LB250073.004		Arsenic, As	mg/kg	1	47	5	50	84
			Cadmium, Cd	mg/kg	0.3	42	<0.3	50	84
			Chromium, Cr	mg/kg	0.5	59	17	50	84
			Copper, Cu	mg/kg	0.5	58	14	50	89
			Nickel, Ni	mg/kg	0.5	56	12	50	89
			Lead, Pb	mg/kg	1	52	11	50	82
			Zinc, Zn	mg/kg	2	69	25	50	88

TRH (Total Recoverable Hydrocarbons) in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE232493.001	LB249649.004		TRH C10-C14	mg/kg	20	50	<20	40	125
			TRH C15-C28	mg/kg	45	51	<45	40	128
			TRH C29-C36	mg/kg	45	<45	<45	40	103
			TRH C37-C40	mg/kg	100	<100	<100	-	-
			TRH C10-C36 Total	mg/kg	110	<110	<110	-	-
			TRH >C10-C40 Total (F bands)	mg/kg	210	<210	<210	-	-
		TRH F Bands	TRH >C10-C16	mg/kg	25	51	<25	40	128
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	47	<25	-	-
			TRH >C16-C34 (F3)	mg/kg	90	<90	<90	40	118
			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%
SE232493.001	LB249650.004	Monocyclic Aromatic	Benzene	mg/kg	0.1	3.9	<0.1	5	78
			Toluene	mg/kg	0.1	3.9	<0.1	5	77
			Ethylbenzene	mg/kg	0.1	4.1	<0.1	5	81
			m/p-xylene	mg/kg	0.2	8.0	<0.2	10	80
			o-xylene	mg/kg	0.1	4.3	<0.1	5	86
		Polycyclic	Naphthalene (VOC)	mg/kg	0.1	<0.1	<0.1	-	-
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	9.0	10.0	10	90
			d8-toluene (Surrogate)	mg/kg	-	9.2	9.3	10	92
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.9	9.3	10	89
		Totals	Total Xylenes	mg/kg	0.3	12	<0.3	-	-
			Total BTEX	mg/kg	0.6	24	<0.6	-	-

Volatile Petroleum Hydrocarbons in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE232493.001	LB249650.004		TRH C6-C10	mg/kg	25	62	<25	92.5	66
			TRH C6-C9	mg/kg	20	55	<20	80	68
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	9.0	10.0	10	90
			d8-toluene (Surrogate)	mg/kg	-	9.2	9.3	10	92
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.9	9.3	-	89
		VPH F Bands	Benzene (F0)	mg/kg	0.1	3.9	<0.1	-	-
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	38	<25	62.5	60

MATRIX SPIKE DUPLICATES

SE232496 R0

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.

SGS EHS Sydney COC

SE232496

Chain of Custody Form – Ref 14413

Ref:	**14413**
Investigator:	Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800
Telephone:	(02) 6361 4954
Email:	felipe@envirowest.net.au
Contact Person:	Felipe Canavez
Invoice:	accounts@envirowest.net.au
Laboratory:	SGS SYDNEY 16/33 Maddox Street ALEXANDRIA NSW 2015
Quotation #:	Envir_70119_2019
Courier/CN:	Grants Express

	Sample ID	Container*	Sampling Date/Time	Sample matrix: Water	Soil	Sludge	Sample preservation: Cool	HNO3/HCl	Unpre-served	Analysis (SGS Method Code): CL1T	CL10	OCP			
										CL1T (7 metals)	CL10 (TRH, BTEXN, PAH, 8 metals)	OCP	EC	pH	
1	BSC1C	A	24/05/2022		X		X		X	X					
2	BSC2C	A	24/05/2022		X		X		X	X					
3	BSC3C	A	24/05/2022		X		X		X	X					
4	BSC4C	A	24/05/2022		X		X		X	X					
5	BSC5C	A	24/05/2022		X		X		X	X					
6	BSC6C	A	24/05/2022		X		X		X	X					
7	BSC7C	A	24/05/2022		X		X		X	X					
8	BSC8C	A	24/05/2022		X		X		X	X					
9	BSC9C	A	24/05/2022		X		X		X	X					
10	BSC10C	A	24/05/2022		X		X		X	X					
11	BSC11C	A	24/05/2022		X		X		X	X					
12	BSC12C	A	24/05/2022		X		X		X	X					
13	BSC14D	A	24/05/2022		X		X		X			X			
14	BSC24D	A	24/05/2022		X		X		X			X			

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

Sampler name: Felipe Canavez
Date: 24/05/2022 Time: 13:00

Relinquished by: (print and signature) Virginia Bragg Date: 26/05/2022 Time 1300

Received by: (print and signature) Date 27/05/22 Time 7:20

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 14413

Ref:	**14413**		**Sample matrix**			**Sample preservation**			**Analysis**						
Investigator:	Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800								**SGS Method Code**						
Telephone:	(02) 6361 4954								**CL1T**	**CL10**	**OCP**				
Email:	felipe@envirowest.net.au														
Contact Person:	Felipe Canavez														
Invoice:	accounts@envirowest.net.au														
Laboratory:	SGS SYDNEY 16/33 Maddox Street ALEXANDRIA NSW 2015		Water	Soil	Sludge	Cool	HNO3/HCl	Unpre-served	CL1T (7 metals)	CL10 (TRH, BTEXN, PAH, 8 metals)	OCP	EC	pH		
Quotation #:	Envir_70119_2019														
Courier/CN:	Grants Express														
	Sample ID	**Container***	**Sampling Date/Time**												
15	BSC34D	A	24/05/2022		X		X				X				
16	BSC44D	A	24/05/2022		X		X				X				
17	BSC54D	A	24/05/2022		X		X				X				
18	BSC64D	A	24/05/2022		X		X				X				
19	BSC73D	A	24/05/2022		X		X				X				
20	BSC84D	A	24/05/2022		X		X				X				
21	BSC94D	A	24/05/2022		X		X				X				
22	BSC104D	A	24/05/2022		X		X				X				
23	BSC114D	A	24/05/2022		X		X				X				
24	BSC124D	A	24/05/2022		X		X				X				
25	HS1	A	24/05/2022		X		X			X					
26	HS2	A	24/05/2022		X		X			X					
27	HS3	A	24/05/2022		X		X			X					
28	HS4	A	24/05/2022		X		X			X					

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

Sampler name: Felipe Canavez
Date: 24/05/2022 Time: 13:00

Relinquished by: (print and signature) Virginia Bragg — Date: 26/05/2022 — Time 1200

Received by: (print and signature) — Date 27/05/22 — Time @ 7.20

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 14413

Ref:	**14413**		**Sample matrix**			**Sample preservation**			**Analysis**				
Investigator:	Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800								**SGS Method Code**				
Telephone:	(02) 6361 4954								**CL1T**	**CL10**	**OCP**		
Email:	felipe@envirowest.net.au												
Contact Person:	Felipe Canavez												
Invoice:	accounts@envirowest.net.au												
Laboratory:	SGS SYDNEY 16/33 Maddox Street ALEXANDRIA NSW 2015		Water	Soil	Sludge	Cool	HNO3/HCl	Unpre-served	CL1T (7 metals)	CL10 (TRH, BTEXN, PAH, 8 metals)	OCP	EC	pH
Quotation #:	Envir_70119_2019												
Courier/CN:	Grants Express												
Sample ID	**Container***	**Sampling Date/Time**											
29 HS5	A	24/05/2022		X		X		X		X			
30 BSCDA	A	24/05/2022		X		X		X	X				
31 BSCDA2	A	24/05/2022		X		X		X	X				
32 SP1	A	24/05/2022		X		X		X		X		X	X

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

Sampler name: Felipe Canavez
Date: 24/05/2022 Time: 13:00

Relinquished by: (print and signature) Virginia Bragg Date: 26/05/2022 Time 1200

Received by: (print and signature) Date Time 27/05/22 @ 7.20

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

Appendix 4. 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 5. Unidentified finds procedure

Unidentified finds procedure

1. Introduction

Residential land-use is proposed for Lots 4 and 5 Hoskins Street, Nyngan NSW.

A procedure is required describing the actions if potential contamination or hazards are encountered during demolition / soil disturbance / subdivision / excavation / construction activities.

2. Scope

Prepare a procedure to enable the identification and management of unexpected hazards identified during excavation works and/or construction activities.

3. Site identification

Lots 4 and 5 Hoskins Street, Nyngan NSW.

4. Responsible person

The landowner / site supervisor is responsible for implementation of the unexpected finds protocol. The landowner will appoint an environmental scientist to induct and provide information on hazard identification and responses to earthwork supervisors and personnel which may uncover unexpected hazards.

5. Identification of unexpected hazards

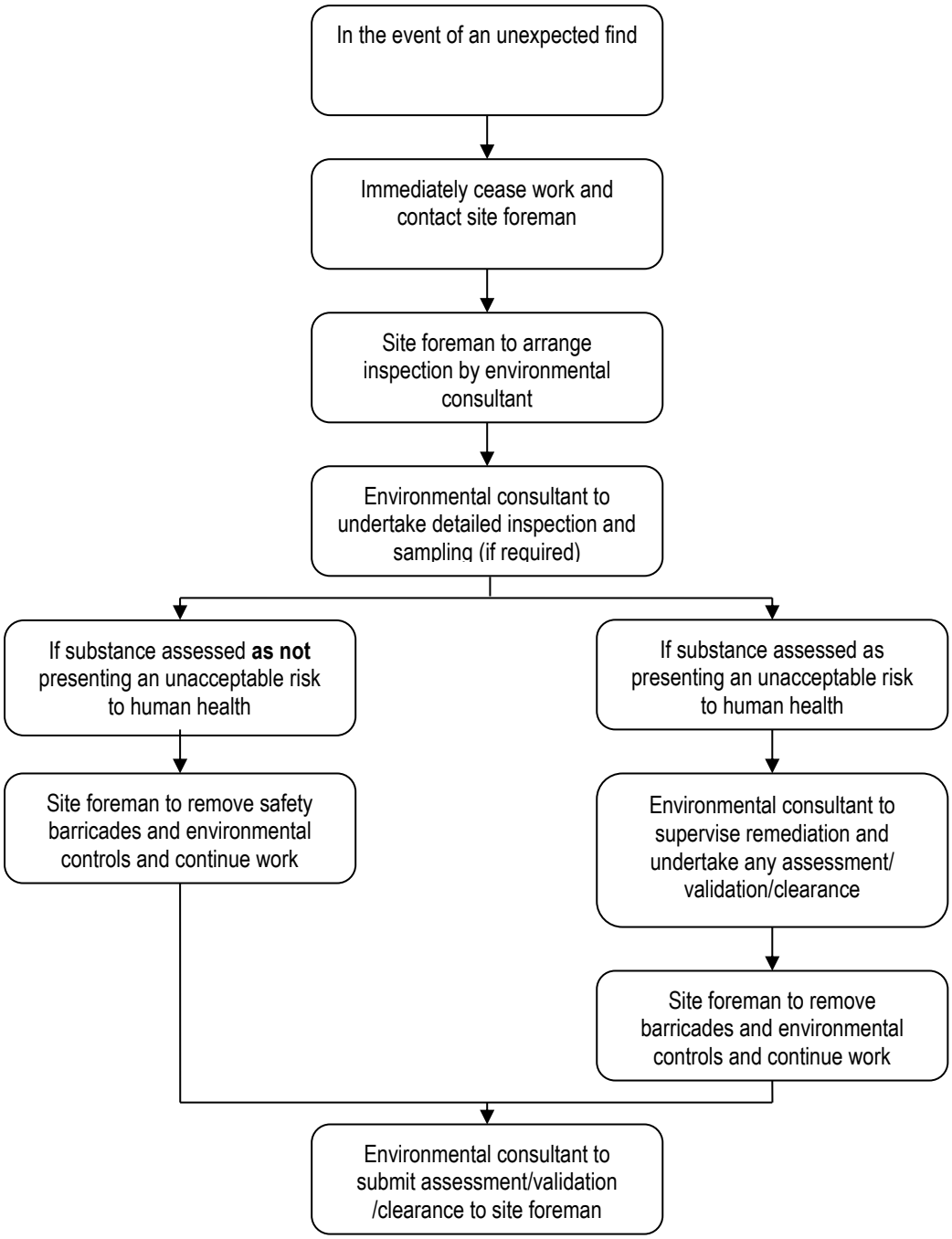
Potential hazards will be identified by appearance and odour include:

- A filled pit or gully
- Demolition waste
- Discoloured soil
- Oil/diesel/tar
- Sheens on water
- An offensive odour
- Asbestos cement sheeting
- Ash or slag
- Underground storage tank

6. Training and induction

All excavation/construction personnel are to be inducted on the identification of potential hazards. The induction can be undertaken at the time of general site induction and toolbox meetings. The training will include display of information to alert worker of potential hazards.

7. Procedure



8. Recommencement of works

The potential hazards will be assessed by the environmental scientist and a report prepared describing:

- Preliminary assessment of the contamination and need for clean-up
- Preparation of a remediation action plan
- All works to be undertaken in accordance with contaminated site regulations and guidelines
- Remediation works
- Validation of the remediation
- Works can commence on the potentially hazardous area after the environmental scientist has provided a clearance.

Information to assist workers in identifying hazards.

BE AWARE

UNEXPECTED HAZARDS MAY BE PRESENT

drums

asbestos

chemical bottles

blood stains

odour

ash / slag

demolition waste

if you <u>SEE</u> or <u>SMELL</u> anything unusual

<u>STOP WORK</u> & contact the Site Foreman

do not restart working before the area has been investigated and cleared by an Environmental Consultant