

Preliminary contamination investigation

Proposed public school at Lot 1 DP1253855, Estella Road
Estella NSW 2650



Ref: R9930c

Date: 6 August 2018

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Environmental
Geotechnical
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Interested authorities: City of Wagga Wagga

Report number: R9930c

Date: 6 August 2018

Summary report

Address: Proposed public school, Lot 1 DP1253855, Estella Road, Estella NSW

Date of works 20 July 2018

Main areas of concern

The current land-use of the investigation area is vacant with historical agricultural use of cropping and grazing. No buildings are known to have been located on the site. No fill material is known to have been applied to the site. The current and historic agricultural land-use may have resulted in application of pesticides.

Nature of works carried out

A preliminary soil investigation including desktop study, visual inspection and soil sampling was undertaken of the site.

Nature and extent of residual contamination

Nil

Risk factors

No health or ecological receptors are exposed to the identified or potential contamination.

Waste removed

No soil was removed as part of the preliminary contamination investigation.

Recommendations

Nil

Statement of suitability

The investigation area is suitable for the proposed change in land-use.

This is an accurate summary of the report titled: Preliminary contamination investigation – Proposed public school on Lot 1 DP1253855, Estella Road, Estella NSW (Report number R9930c)

Produced by: Envirowest Consulting Pty Ltd Dated: 6/8/2018

Name: Gregory Madafiglio CEnvP

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1. Introduction

A contamination assessment has been requested prior to construction of proposed public school on Lot 1 DP1253855, Estella Road. The site has had an agricultural land-use history of cropping and grazing. An investigation of the site is required to determine the soil contamination status and suitability for the proposed land-use.

A desktop study and a review of the available history were undertaken of the site. A walkover and site inspection for evidence of contamination from past activities was conducted on 20 July 2018. Soil samples were collected and analysed for metals, persistent pesticides and hydrocarbons.

2. Scope of work

Envirowest Consulting Pty Ltd was commissioned by Hayball to undertake a preliminary contamination investigation, 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)*, on Lot 1 DP1253855, Estella Road. The objective 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.

3. Site identification

Address	Lot 1 DP1253855 Estella Road Estella NSW 2650
Client	Hayball
Deposited plans	Lot 1 DP1253855
Locality map	Figure 1
Site plan	Figure 2
Photographs	Figure 3
Area	Approximately 3.0ha

4. Site history

4.1 Zoning

The site is zoned SP2 Infrastructure: Educational Establishment under the City of Wagga Wagga Local Environmental Plan (2010).

4.2 Land-use

The current land-use is vacant with historic agricultural land-use of cropping and grazing.

4.3 Summary of council records

None known

4.4 Sources of information

Site inspection 20 July 2019 by Dave Langston
 NSW EPA records of public notices under the CLM Act 1997
 Soil and geological maps
 City of Wagga Wagga LEP 2010
 Historical Parish maps

4.5 Chronological list of site uses

Aerial photography of the site indicated few changes between 1966 to 2018.

Year	Visual observations on site	Surrounding area
1966 (Figure 4)	South of a dirt access track with remnant vegetation along the northern perimeter of the site. Site is part of a holding which appears to be used for grazing or cropping	The land surrounding the site appears to be used for grazing of stock and cropping. Evidence of orchards is visible to the north east of the site. Woodland is present north of the site.
1980 (Figure 5)	Buildings start to appear on the current CSU site to the north. Road to the north of the investigation area is formed and investigation area is part of a larger cropping paddock.	Similar to previous aerial. Estella Road is formed and paddocks in the area are smaller in size. Residential development to the south of the site is expanding north.
1995 (Figure 6)	Increase in buildings on the CSU site. Investigation area has been reduced to its current size. Oval is located to the east	Construction of residential dwellings is ongoing to the south. Residential development has expanded to the south and north-west of the site.
2018 (Figure 7)	Site is as identified during site inspection. Recently been cropped with improved pasture or oats	Residential development has expanded east and south of the site. Construction of a residential subdivision has begun on the north eastern boundary of the site.

4.6 Buildings and infrastructure

No infrastructure is located on the site. The site has previously been used for agricultural land-uses.

4.7 Potential contaminants

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

- Heavy metals (arsenic, cadmium, chromium, copper, nickel, lead, zinc)
- Organochlorine pesticides (OCP)
- Total recoverable hydrocarbons (TRH)
- Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN)

4.8 Relevant complaint history

Nil

4.9 Contaminated site register

The investigation area is not listed on the NSW EPA register of contaminated sites.

4.10 Previous investigations

No previous contamination investigations are known to have been undertaken on the site.

4.11 Neighbouring land-use

North – Carpark, Charles Sturt University

South – Estella Road, Residential

East – Peter Hastie Oval, Charles Sturt University

West – Cropping paddock, Charles Sturt University

4.12 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.

5. Site condition and environment

5.1 Surface cover

The site is currently vacant and has been used for agricultural land-use. The site currently consists of improved pasture and native grasses with broadleaved weeds. Remnant native trees and eucalypts are located predominantly around the perimeter of the site.

Part of the vegetation around the perimeter has been mapped within the City of Wagga Wagga Terrestrial Biodiversity LEP.

5.2 Topography

The site is located on a mid-slope. Aspect is predominantly south and slopes are gently inclined and less than 8%. Elevation ranges between 223 and 235 metres above sea level. No groundwater seepage or discharge areas were observed on the site.

5.3 Soils and geology

The natural soil profile consists of brown to grey brown silty sand topsoil over brown/red, light brown to yellow brown sandy clay with increasing weathered gravel. Granite float is located upslope of the investigation area on the crest.

Review of the City of Wagga Wagga LEP (2010) indicates the site is not mapped as a salinity risk area.

The site is located within the East Bomen Soil Landscape. The soil landscape consists of undulating rises of Silurian Wantabadgery Granodiorite. Regolith consists of thick (>2m) clay sequences, with significant windblown (aeolian) clay deposited on most side slopes and in drainage depressions. The geological unit consists of Silurian aged Wantabadgery and Collingullie granites (Chen XY and McKane D, 1997).

5.4 Water

5.4.1 Surface water

No dams or drainage lines are located within the investigation area. Surface water flows south into the local stormwater system.

5.4.2 Groundwater

There was no evidence of seasonal groundwater identified from the drilling depth.

No bores are located within 500m of the site.

The site is located within the Mid Murrumbidgee Alluvium groundwater management area. The Mid Murrumbidgee groundwater management area consists of two deeper confined aquifers. The Lachlan Formation which is high yielding and good quality and the Cowra Formation which is generally lower yielding and of poorer quality. Close to half of the groundwater extraction was for town water use (Mitchell M 2009).

6. Conceptual site model

6.1 Sources of contamination

The historical agricultural land-uses including cropping and grazing of stock are a potential source of contamination. No infrastructure was identified on the site at time of inspection or historical review.

6.2 Contaminants of concern

The contaminants of concern identified from historical and current land-uses include:

- Heavy metals (arsenic, cadmium, chromium, copper, lead, nickel and zinc)
- Organochlorine pesticides (OCP)
- Total recoverable hydrocarbons (TRH)
- Benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN)

6.3 Potential receptors

The proposed land-use of the site is a school.

Human receptors include

- Student
- Staff
- Intrusive maintenance workers

Ecological receptors include

- Vegetation on the site and adjacent the site
- Aquatic receptors off-site

6.4 Exposure pathways

Pathways for exposure to contaminants are:

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

6.5 Source receptor linkages

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

The site is currently vacant with an agricultural land-use and human receptors to the investigation area are possible. Students, staff and construction workers of the site may have a risk of exposure if the

contaminants are present and the soil is disturbed. Intrusive maintenance workers may also have an increased risk of exposure to contaminants during soil disturbance.

Mobilisation of contaminants in groundwater is unlikely due to the depth to groundwater. No surface water flows are located on the site and mobilisation of contaminants are unlikely.

Potential contamination sources, exposure pathways and receptors are presented below.

Source/contaminants	Transport	Potential exposure pathways	Receptors
■ Heavy metals and OCP from agricultural land-use ■ Hydrocarbons from machinery	□ Air □ Surface water □ Groundwater □ Soil	■ Direct contact (ingestion and absorption) ■ Inhalation ■ Ingestion	■ Students/ staff ■ Intrusive maintenance workers ■ Terrestrial environment □ Aquatic environment

■ Potential, □ unknown/unlikely

7. Data quality objectives (DQO)

7.1 State the problem

A preliminary contamination assessment has been requested as part of due diligence. The site has historically been used for cropping and grazing stock. No infrastructure is located on site.

7.2 Identify the decision

The proposed land-use is a primary school. Sites where children are likely to be the most sensitive receptors are assessed against the residential land-use scenario. The levels of contaminants should be less than the thresholds listed in Section 10. The decision problem is, do the levels of potential contaminants exceed the assessment criteria listed in Section 10.

7.3 Identify the inputs decision

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

7.4 Define the boundaries of the study

The investigation area is Lot 1 DP1253855, Estella Road, Estella NSW.

7.5 Develop a decision rule

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

7.6 Specify acceptable limits on the decision errors.

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

7.7 Optimize the design for obtaining data

Soil sampling was undertaken as described in Section 8.

Quality assurance and quality control objective and indicators are described in Section 9.

8. Sampling analysis plan and sampling methodology

8.1 Sampling strategy

The main land-use was identified as cropping and grazing as part of a larger rural property.

8.1.1 Sampling design

A preliminary sampling pattern was adopted to assess the probable location of contamination on the site. Uniform management practices are expected to have occurred on the site. The site has been historically managed as part of a single unit and is expected to have been treated similarly.

8.1.2 Sampling locations

Discrete soil samples were collected from the site. Four surface samples were collected from 0-100mm across the site in addition to six boreholes drilled in the location of the proposed building and soil samples collected from 0 to 100mm and 500mm soil depth. The sampling locations are described in Figure 2.

8.1.3 Sampling density

The sampling frequency is less than the minimum recommended by EPA (1995) but justified due to the uniform management of the site. Uniform management practices have been undertaken on the site and the soil sampling and laboratory analysis is considered indicative of the site as a whole.

8.1.4 Sampling depth

Any heavy metals or persistent pesticides present are generally immobile and expected to be contained in the 0-100mm soil layer which was the target sampling depth. Borehole construction was undertaken to a depth of 500mm to investigate if fill has been used on site. Samples were collected from 400-500mm soil depth to characterise potential fill.

8.2 Analytes

All soil samples were evaluated for arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury, OCP, TRH and BTEXN as these were identified as the contaminants of concern possibly present as a result of previous activities.

8.3 Sampling methods

Surface soil samples were taken using a stainless steel hand shovel. Soil was taken at each individual sampling location below the vegetated and detrital layer.

Sub soil samples were taken using a Geoprobe 6610DT drilling rig fitted with a solid auger.

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, washing in detergent and tap water, rinsing in an organic solvent, rinsing with clean tap water and allowing to air dry or using a clean towel.

Table 1. Schedule of samples and analyses

Sample ID	Depth	Analysis undertaken
S1	0-100mm	Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Nickel (Ni), Zinc (Zn), Mercury (Hg), Organochlorine pesticides (OCP), total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes naphthalene (BTEXN)
S2	0-100mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
S3	0-100mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
S4	0-100mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
2-100	0-100mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
2-500	400-500mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
3-100	0-100mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
3-500	400-500mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
4-100	0-100mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
4-500	400-500mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
5-100	0-100mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
5-500	400-500mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
6-100	0-100mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
6-500	400-500mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
7-100	0-100mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN
7-500	400-500mm	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN

9. Quality assurance and quality control

9.1 Sampling design

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

Discrete soil samples were collected across the site at a depth of 0-100mm and 400-500mm.

The number of sampling locations is less than the recommended density in the EPA sampling guidelines but justified due to uniform management practices on the site. No “hot spots” smaller than the sampled grid are expected over the site.

9.2 Field

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

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 hand shovel. 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.

9.3 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 3.

9.4 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.

10. Assessment criteria

The proposed change in land-use from agricultural to a primary school. Sites where children are likely to be the most sensitive receptors are assessed against the residential land-use scenario. The laboratory results were assessed against the most sensitive land-use of residential (*HIL A*) as listed in Tables 2 and 3, as recommended in the NEPM (1999).

The NEPM (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 3. TRH>C16 have physical properties which make the TRH fractions non-volatile and therefore these TRH fractions are not applicable for vapour intrusion.

The site comprises red chromosols (red brown earths). Typical CEC values for red chromosol soils is 20.9cmol(+)/kg, pH values of 6.0, organic carbon of 1.5% and clay content of 53% (McKenzie et al. 2004). 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.

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.

EILs vary with land-use and apply to contaminants up to 2m depth below the surface. The EILs for residential and recreational 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 and 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 3.

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) and is not expected to occur in agricultural

sites. Chromium (VI) is reduced to chromium (III) when it comes into contact with organic matter in biota, soil and water. No threshold has been set for total chromium on agricultural sites as it is ubiquitous in the environment and is almost always present in the trivalent state (WHO 1998). Chromium (III) is poorly absorbed by any route therefore toxicity of chromium is mainly attributable to chromium (VI) (ATSDR 2013).

Table 2. Soil assessment criteria metals and OCPs (mg/kg)

Analyte	Residential land-use with access to soil threshold (NEPC 1999)	EIL – Urban residential and public open space (NEPC 1999)
Arsenic	100	100
Cadmium	20	-
Chromium (total)	-*	-
Copper	6,000	190
Lead	300	1,100
Nickel	400	270
Zinc	7,400	400
Mercury	40	-
OCP	-	-
DD's	240	180

* Not applicable due to low human toxicity of Cr(III) and non-industrial site

Table 3. Soil assessment criteria hydrocarbons (mg/kg)

Analyte	HSL Residential / clay soil 0m to <1m	ESL Residential/ recreational-fine soil	Management limits for TRH in soil – residential
TRH (C6-C10) (F1)	50	180	800
TRH (>C10-C16) (F2)	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	-	-

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

11. Results and discussion

11.1 Site walkover

The site was vacant at time of inspection and has historically been used for agricultural use of cropping and grazing. No infrastructure was located on site or fill material in the sampling locations.

11.2 Paddocks

The site consists of both pasture and native grasses with remnant eucalypt and natives around the perimeter of the investigation area. Bare areas were identified in the south of the investigation area paddocks and expected to be from climatic stress.

The levels of all metals, OCPs and hydrocarbons analysed in the paddock soil samples (Table 4 and 5) were not detected or at environmental background levels and below the residential land-use thresholds (NEPC 1999).

Table 4. Analytical results and threshold concentrations (mg/kg)

Sample ID	Depth (mm)	Arsenic	Cadmium	Chromium (total)	Copper	Lead	Nickel	Zinc	OCP DDT's	Mercury
S1	100	3	ND	14	6.4	10	4.8	16	ND	ND
S2	100	1	ND	18	6.3	9	5.2	12	ND	ND
S3	100	2	ND	14	7.3	9	5.7	15	ND	ND
S4	100	3	ND	15	6.2	10	4.9	13	ND	ND
2-100	100	2	ND	14	6.1	9	4.1	13	ND	ND
2-500	100	5	ND	28	15	14	8.6	22	ND	ND
3-100	100	2	ND	16	6.2	9	4.6	12	ND	ND
3-500	100	3	ND	25	15	13	8.2	18	ND	ND
4-100	100	2	ND	19	6.2	10	5.7	13	ND	ND
4-500	100	3	ND	25	13	12	8.1	19	ND	ND
5-100	100	2	ND	15	6.2	10	5.5	13	ND	ND
5-500	100	4	ND	24	12	11	8.0	19	ND	ND
6-100	100	2	ND	15	6.8	10	5.5	13	ND	ND
6-500	100	4	ND	23	11	12	7.3	17	ND	ND
7-100	100	2	ND	15	6.7	10	5.3	13	ND	ND
7-500	100	4	ND	25	13	12	7.9	18	ND	ND
Health Investigation Levels – Residential land-use threshold (NEPM 1999)										
		100	20	-*	6,000	300	400	7,400	-	40
Ecological Investigation Levels – Urban residential and public open space (NEPM 1999)										
		100	-	-	190	1,100	170	400	180	-

ND = not detected at the detection limit, * Not applicable due to low human toxicity of Cr(III) and non-industrial site

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

Sample id.	Depth	TRH (C6-C10)	TRH (>C10-C16)	TRH (>C16-C34)	TRH (>C34-C40)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
S1	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
S2	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
S3	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
S4	100	ND	ND	ND	210	ND	ND	ND	ND	ND
2-100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-500	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
3-100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
3-500	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-500	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
5-100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
5-500	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
6-100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
6-500	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
7-100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
7-500	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
HSL A– residential/recreational clay soil 0m to <1m		50	280	NA	NA	0.7	480	NL	110	NL
EIL – residential		-	-	-	-	-	-	-	-	170
ESL – residential/ recreational / fine soil		180	120	1,300	5,600	65	105	125	45	-
Management limits for TRH fractions in soil / residential		800	1,000	5,000	10,000	-	-	-	-	-

12. Site characterisation

12.1 Environmental contamination

No contamination was identified in the preliminary site investigation.

12.2 Chemical degradation production

No applicable. No contamination was identified in the preliminary site investigation.

12.3 Exposed population

12.3.1 Human health

No applicable. No contamination was identified in the preliminary site investigation.

12.3.2 Ecological impact

No applicable. No contamination was identified in the preliminary site investigation.

13. Conclusions and recommendations

13.1 Summary

An inspection of the site was made on 20 July 2018. The site is located north of the Wagga Wagga CBD and has an area of approximately 3ha.

The site consists of both pasture and native grasses with remnant native vegetation and eucalypt trees along the perimeter of the site. Bare areas of vegetation were identified in the southern section of the site and is expected to be from climatic stress.

The site has an agricultural land-use history of cropping and grazing. The site was vacant at time of inspection and no infrastructure was located on site.

The preliminary soil sampling program did not detect elevated levels of the contaminants of concern above adopted health investigation levels.

No areas of contamination were identified at the sampling locations.

13.2 Assumptions in reaching the conclusions

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

13.3 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 number of sampling locations is less than the recommended density in the EPA sampling guidelines but justified due to the uniform management practices on the site.

13.4 Suitability for proposed use of the site

The site is suitable for the proposed land-use.

13.5 Limitations and constraints on the use of the site

No constraints are recommended.

13.6 Recommendation for further work

Based on preliminary investigations the site is suitable for the proposed change in land-use. An unexpected finds protocol (Appendix 4) should be implemented if asbestos or other contaminants are suspected during works.

14. 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, it's 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.

This report, including data contained and its findings and conclusions, remains the intellectual property of Envirowest Consulting Pty Ltd. A licence to use the report for the specific purpose identified is granted for the persons identified in that section after full payment for the services involved in preparation of the report. This report should not be used by persons or for purposes other than those stated and should not be reproduced without the permission of Envirowest Consulting Pty Ltd.

15. References

Chen XY and McKane DJ (1997) *Soil Landscapes of the Wagga Wagga 1:100,000 Sheet* (Soil Conservation Service of NSW)

EPA (2017) *Contaminated Land Managements: Guidelines for the NSW Site Auditors Scheme* (3rd edition NSW Environment Protection Agency, Sydney)

Environment Protection Authority (1995) *Contaminated sites: Sampling Design Guidelines* (NSW Environment Protection Authority, Chatswood)

Mitchell, M (2009) Mid Murrumbidgee Alluvium. Groundwater Management Area 013: Gundagai to Narrandera. Groundwater Resources Status Report- 2007, NSW Department of Water and Energy, Sydney

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

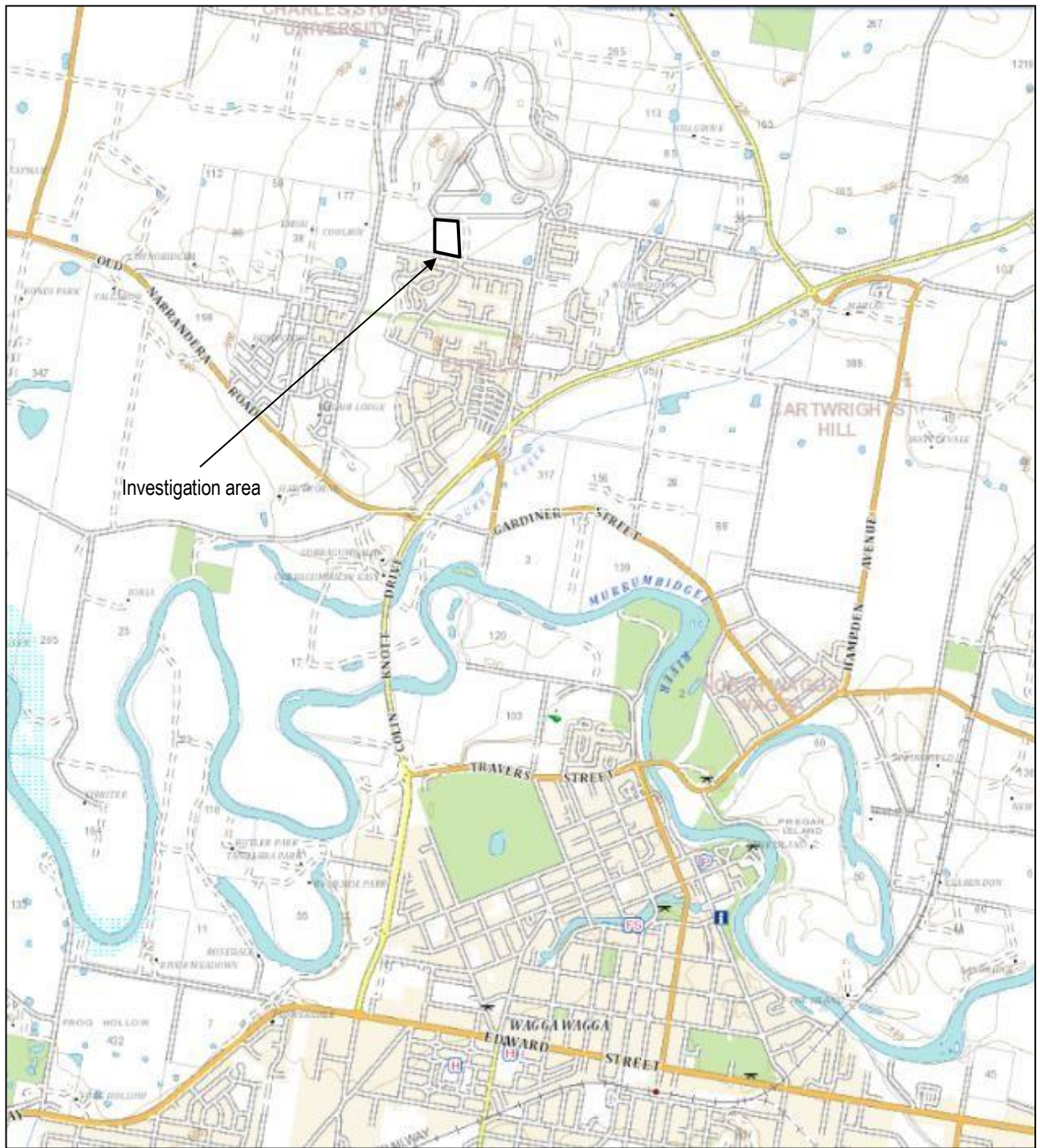


Figure 1: Locality map

Lot 1 DP1253855, Estella Road, Estella NSW

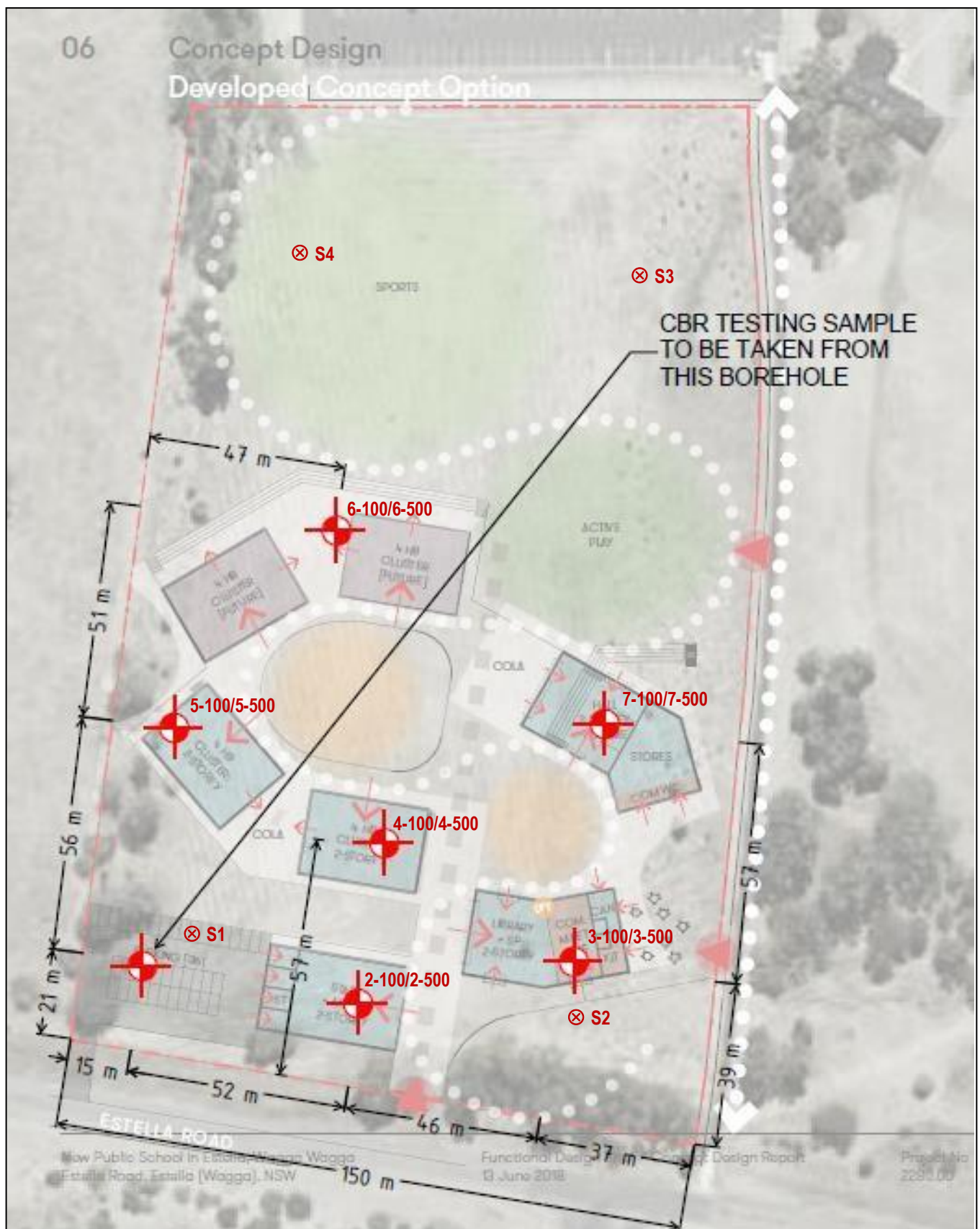


Envirowest Consulting Pty Ltd

Job: R9930c

Drawn by: DL

Date: 7/8/2018



Legend

- Slope
- ⊗ S1 Sample Location

Figure 2: Sampling locations

Lot 1 DP1253855, Estella Road, Estella NSW



Envirowest Consulting Pty Ltd

Job: R9930c

Drawn by: DL

Date: 7/8/2018

Figure 3. Photographs of the site



Looking west across paddock



Bare area located in the south of the investigation area

Figure 4. 1966 Historical aerial photograph



Figure 5. 1980 Historical aerial photograph



Figure 6. 1995 Historical aerial photograph



Figure 7. 2018 aerial photograph



Investigation area

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, PAH, TPH, PCB 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). A RPD analysis is calculated and compared to the practical quantitation limit (PQL) or absolute difference AD.

- Levels greater than 10 times the PQL the RPD is 50%
- Levels between 5 and 10 times the PQL the RPD is 75%
- Levels between 2 and 5 times the PQL the RPD is 100%
- Levels less than 2 times the PQL, the AD is less than 2.5 times the PQL

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 60% RPD for levels greater than 10 times the PQL 85% RPD for levels between 5 to 10 times the PQL 100% RPD at levels between 2 to 5 times the PQL Absolute difference, 3.5 times the PQL where levels are, 2 times PQL

1.5.2 Laboratory

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

- 60 to 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 batches was undertaken over the preliminary investigation program. Samples were collected on 20 July 2018. A total of seventeen 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 (NEPC 1999). A chain of custody form accompanied transport of the samples to the laboratory.

The samples were analysed at the laboratories of SGS, 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. (sampling location)	Number of samples	Duplicate	Analyses	Date collected	Substrate	Laboratory report
2-100, 2-500, 3-100, 3-500, 4-100, 4-500, 5-100, 5-500, 6-100, 6-500, 7-100, 7-500, S1, S2, S3, S4	16	1	As, Cd, Cr (total), Cu, Pb, Ni, Zn, Hg, OCP, TRH and BTEXN	20/7/2018	Soil	SE181858

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-C10)	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
OC Pesticides	Tumbler extraction of solids	USEPA SW 846-8270B
BTEX	Tumbler extraction of solids	USEPA SW 846-8260B

3. Field quality assurance and quality control

One intra laboratory duplicate sample was collected for the investigation. The frequency was greater than the recommended frequency of 5%. Table A5.1 outlines the samples collected and differences in replicate analyses. Relative differences were deemed to pass if they were within the acceptance limits of +/- 40% 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
2-100, 2-500, 3-100, 3-500, 4-100, 4-500, 5-100, 5-500, 6-100, 6-500, 7-100, 7-500, S1, S2, S3, S4	16	1	6	20/7/2018	Soil	SE181858

Table A5.1. Relative differences for intra laboratory duplicates

	2-100, DA	
	Relative difference (%)	Pass/Fail
Arsenic	66	Fail
Cadmium	NA	-
Chromium	13	Pass
Copper	8	Pass
Lead	10	Pass
Nickel	18	Pass
Zinc	0	Pass
OCP	NA	-

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 NEPC (1999). The time between collection and extraction for all samples was less than the criteria listed below:

Analyte	Maximum holding time
Metals, cyanide	6 months
OCP, TRH, PCB, BTEXN, PAH	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. No significant outliers exist for the sampling batches. 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) analysis

5.1 Completeness

A measure of the amount of usable data for a data collection activity (total to be greater than 95%).

The data set was found to be complete based on the scope of work. No critical areas of contamination were omitted from the data set.

5.1.1 Field

Consideration	Accepted	Comment
Locations to be sampled	Yes	In accordance with sampling methodology, described in the report. Sampling locations described in figures.
Depth to be sampled	Yes	In accordance with sampling methodology
SOP appropriate and compiled	Yes	In accordance with sampling methodology Sampled with stainless steel spade into lab prepared containers, decontamination between samples, latex gloves worn by sampler
Experienced sampler	Yes	Same soil sampler, environmental scientist
Documentation correct	Yes	Sampling log completed Chain of custody completed

5.1.2 Laboratory

Consideration	Accepted	Comment
Samples analysed	Yes	All critical samples analysed in accordance with chain of custody and analysis plan
Analytes	Yes	All analytes 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 report for each batch
Sample holding times	Yes	Metals less than 6 months. OCP, TRH, PCB, BTEX less than 14 days

5.2 Comparability

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

The data sets were found to be acceptable.

5.2.1 Field

Consideration	Accepted	Comment
SOP	Yes	Same sampling procedures used and sampled on one date
Experienced sampler	Yes	Experienced scientist
Climatic conditions	Yes	Described in field sampling log
Samples collected	Yes	Suitable size, storage and transport

5.2.2 Laboratory

Consideration	Accepted	Comment
Analytical methods	Yes	Same methods all samples, in accordance with NEPC(1999) or USEPA
PQL	Yes	Suitable for analytes
Same laboratory	Yes	SGS Environmental is NATA accredited for the test
Same units	Yes	-

5.3 Representativeness

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

The data sets were found to be acceptable.

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. No blanks analysed. 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).

The data sets were found to be acceptable.

5.4.1 Field

Consideration	Accepted	Comment
SOP	Yes	Complied
Field duplicates	Yes	Collected.

5.4.2 Laboratory

Consideration	Accepted	Comment
Laboratory and inter lab duplicates	Yes	Frequency greater than 5%, results to be within +/-40% or discussion required
Field duplicates	Yes	Frequency greater than 5%, results to be within +/-40% or discussion required
Laboratory prepared volatile trip spikes	NA	Not collected due to the preliminary nature of the investigation

5.5 Accuracy

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

The data sets were found to be acceptable.

5.5.1 Field

Consideration	Accepted	Comment
SOP	Yes	Complied
Field blanks	NA	Frequency greater than 5%, <5 times the PQL, PQL may be adjusted
Rinsate blanks	NA	Frequency greater than 5%, <5 times the PQL, PQL may be adjusted

5.5.2 Laboratory

Consideration	Accepted	Comment
Method blanks	Yes	Frequency greater than 5%, <5 times the PQL, PQL may be adjusted
Matrix spikes	Yes	Frequency greater than 5%, <5 times the PQL, PQL may be adjusted
Matrix duplicates	Yes	Frequency greater than 5%, <5 times the PQL, PQL may be adjusted
Surrogate spikes	Yes	Frequency greater than 5%, <5 times the PQL, PQL may be adjusted
Laboratory control samples	Yes	Frequency greater than 5%, <5 times the PQL, PQL may be adjusted
Laboratory prepared spikes	Yes	Frequency greater than 5%, <5 times the PQL, PQL may be adjusted

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

Sampling log

Client Hayball
 Contact Nadia Brogan
 Job number 9930
 Location Part of Lot 1 DP1253855, Estella Road, Estella NSW
 Date 20 July 2018
 Investigator(s) Dave Langston
 Weather conditions Overcast and light rain

Sample id	Matrix	Date	Analysis required	Observations/comments
S1	Soil	20/7/2018	Arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), zinc (Zn), mercury (Hg) organochlorine pesticides (OCP), , total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene, naphthalene (BTEXN)	
S2	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
S3	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
S4	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
2-100	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
2-500	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
3-100	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
3-500	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
4-100	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
4-500	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
5-100	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
5-500	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
6-100	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
6-500	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
7-100	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
7-500	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	
DA	Soil	20/7/2018	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, OCP, TRH, BTEXN	Dup of 2-100

Appendix 3. Soil analysis results report number SE181858

Chain of Custody Form – Ref 9930

Sheet 1 of 1

Ref: 9930 Investigator: Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800 Telephone: (02) 6361 4954 Email: david@envirowest.net.au Contact Person: Dave Langston Invoice: accounts@envirowest.net.au			Sample matrix Water Soil Sludge			Sample preservation Cool HNO3/HCl Unpre-served			Analysis				
SGS Method Code													
CL7													
Laboratory: SGS SYDNEY 16/33 Maddox Street ALEXANDRIA NSW 2015 Quotation #: Courier/CN:			Water	Soil	Sludge	Cool	HNO3/HCl	Unpre-served	TRH/BTEXN/ 8 Metals	OCP			
Sample ID	Container*	Sampling Date/Time											
2-100 / 1	A	20-7-2018		X		X		X	X	X			
2-500 / 2	A	20-7-2018		X		X		X	X	X			
3-100 / 3	A	20-7-2018		X		X		X	X	X			
3-500 / 4	A	20-7-2018		X		X		X	X	X			
4-100 / 5	A	20-7-2018		X		X		X	X	X			
4-500 / 6	A	20-7-2018		X		X		X	X	X			
5-100 / 7	A	20-7-2018		X		X		X	X	X			
5-500 / 8	A	20-7-2018		X		X		X	X	X			
6-100 / 9	A	20-7-2018		X		X		X	X	X			
6-500 / 10	A	20-7-2018		X		X		X	X	X			
7-100 / 11	A	20-7-2018		X		X		X	X	X			
7-500 / 12	A	20-7-2018		X		X		X	X	X			
S1 / 13	A	20-7-2018		X		X		X	X	X			
S2 / 14	A	20-7-2018		X		X		X	X	X			
S3 / 15	A	20-7-2018		X		X		X	X	X			
S4 / 16	A	20-7-2018		X		X		X	X	X			
DA / 17	A	20-7-2018		X		X		X	X	X			
Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.						Sampler name: Dave Langston Date : 20-7-2018 Time: 17:00							
Relinquished by: Dave Langston (print and signature) <i>[Signature]</i> Date 20-07-2018 Time 16:00						Received by: Nessa <i>[Signature]</i> Date 25/7/18 Time 9:30							

SGS EHS Alexandria Laboratory



SE181858 COC
 Received: 25-Jul-2018

Please return completed form to Envirowest Consulting, *A = Solvent rinsed glass jar with Teflon lined lid and green label

CLIENT DETAILS

Contact David Langston
Client ENVIROWEST CONSULTING PTY LIMITED
Address PO BOX 8158
ORANGE NSW 2800

Telephone 61 2 63614954
Facsimile (Not specified)
Email david@envirowest.net.au

Project **9930**
Order Number (Not specified)
Samples 17

LABORATORY DETAILS

Manager Huong Crawford
Laboratory SGS Alexandria Environmental
Address Unit 16, 33 Maddox St
Alexandria NSW 2015

Telephone +61 2 8594 0400
Facsimile +61 2 8594 0499
Email au.environmental.sydney@sgs.com

SGS Reference **SE181858 R0**
Date Received 25/7/2018
Date Reported 1/8/2018

COMMENTS

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

SIGNATORIES



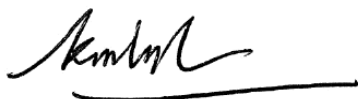
Akheeqar Beniamdeen
Chemist



Bennet Lo
Senior Organic Chemist/Metals Chemist



Dong Liang
Metals/Inorganics Team Leader



Ly Kim Ha
Organic Section Head

VOC's in Soil [AN433] Tested: 26/7/2018

PARAMETER	UOM	LOR	2-100	2-500	3-100	3-500	4-100
			SOIL	SOIL	SOIL	SOIL	SOIL
			20/7/2018 SE181858.001	20/7/2018 SE181858.002	20/7/2018 SE181858.003	20/7/2018 SE181858.004	20/7/2018 SE181858.005
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	4-500	5-100	5-500	6-100	6-500
			SOIL	SOIL	SOIL	SOIL	SOIL
			20/7/2018 SE181858.006	20/7/2018 SE181858.007	20/7/2018 SE181858.008	20/7/2018 SE181858.009	20/7/2018 SE181858.010
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	7-100	7-500	S1	S2	S3
			SOIL	SOIL	SOIL	SOIL	SOIL
			20/7/2018 SE181858.011	20/7/2018 SE181858.012	20/7/2018 SE181858.013	20/7/2018 SE181858.014	20/7/2018 SE181858.015
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	S4	DA
			SOIL	SOIL
			20/7/2018 SE181858.016	20/7/2018 SE181858.017
Benzene	mg/kg	0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 26/7/2018

PARAMETER	UOM	LOR	2-100	2-500	3-100	3-500	4-100
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			20/7/2018 SE181858.001	20/7/2018 SE181858.002	20/7/2018 SE181858.003	20/7/2018 SE181858.004	20/7/2018 SE181858.005
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	4-500	5-100	5-500	6-100	6-500
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			20/7/2018 SE181858.006	20/7/2018 SE181858.007	20/7/2018 SE181858.008	20/7/2018 SE181858.009	20/7/2018 SE181858.010
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	7-100	7-500	S1	S2	S3
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			20/7/2018 SE181858.011	20/7/2018 SE181858.012	20/7/2018 SE181858.013	20/7/2018 SE181858.014	20/7/2018 SE181858.015
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	S4	DA
			SOIL	SOIL
			-	-
			20/7/2018 SE181858.016	20/7/2018 SE181858.017
TRH C6-C9	mg/kg	20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 30/7/2018

PARAMETER	UOM	LOR	2-100	2-500	3-100	3-500	4-100
			SOIL	SOIL	SOIL	SOIL	SOIL
			- 20/7/2018 SE181858.001	- 20/7/2018 SE181858.002	- 20/7/2018 SE181858.003	- 20/7/2018 SE181858.004	- 20/7/2018 SE181858.005
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<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	4-500	5-100	5-500	6-100	6-500
			SOIL	SOIL	SOIL	SOIL	SOIL
			- 20/7/2018 SE181858.006	- 20/7/2018 SE181858.007	- 20/7/2018 SE181858.008	- 20/7/2018 SE181858.009	- 20/7/2018 SE181858.010
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	7-100	7-500	S1	S2	S3
			SOIL	SOIL	SOIL	SOIL	SOIL
			- 20/7/2018 SE181858.011	- 20/7/2018 SE181858.012	- 20/7/2018 SE181858.013	- 20/7/2018 SE181858.014	- 20/7/2018 SE181858.015
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

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 30/7/2018 (continued)

PARAMETER	UOM	LOR	S4	DA
			SOIL - 20/7/2018 SE181858.016	SOIL - 20/7/2018 SE181858.017
TRH C10-C14	mg/kg	20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45
TRH C29-C36	mg/kg	45	240	<45
TRH C37-C40	mg/kg	100	<100	<100
TRH >C10-C16	mg/kg	25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	210	<120
TRH C10-C36 Total	mg/kg	110	240	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210

OC Pesticides in Soil [AN420] Tested: 30/7/2018

PARAMETER	UOM	LOR	2-100	2-500	3-100	3-500	4-100
			SOIL	SOIL	SOIL	SOIL	SOIL
			20/7/2018 SE181858.001	20/7/2018 SE181858.002	20/7/2018 SE181858.003	20/7/2018 SE181858.004	20/7/2018 SE181858.005
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

OC Pesticides in Soil [AN420] Tested: 30/7/2018 (continued)

PARAMETER	UOM	LOR	4-500	5-100	5-500	6-100	6-500
			SOIL - 20/7/2018 SE181858.006	SOIL - 20/7/2018 SE181858.007	SOIL - 20/7/2018 SE181858.008	SOIL - 20/7/2018 SE181858.009	SOIL - 20/7/2018 SE181858.010
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

OC Pesticides in Soil [AN420] Tested: 30/7/2018 (continued)

PARAMETER	UOM	LOR	7-100	7-500	S1	S2	S3
			SOIL	SOIL	SOIL	SOIL	SOIL
			20/7/2018 SE181858.011	20/7/2018 SE181858.012	20/7/2018 SE181858.013	20/7/2018 SE181858.014	20/7/2018 SE181858.015
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

OC Pesticides in Soil [AN420] Tested: 30/7/2018 (continued)

PARAMETER	UOM	LOR	S4	DA
			SOIL - 20/7/2018 SE181858.016	SOIL - 20/7/2018 SE181858.017
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 Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 30/7/2018

PARAMETER	UOM	LOR	2-100	2-500	3-100	3-500	4-100
			SOIL	SOIL	SOIL	SOIL	SOIL
			20/7/2018 SE181858.001	20/7/2018 SE181858.002	20/7/2018 SE181858.003	20/7/2018 SE181858.004	20/7/2018 SE181858.005
Arsenic, As	mg/kg	1	2	5	2	3	2
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	14	28	16	25	19
Copper, Cu	mg/kg	0.5	6.1	15	6.2	15	6.2
Lead, Pb	mg/kg	1	9	14	9	13	10
Nickel, Ni	mg/kg	0.5	4.1	8.6	4.6	8.2	5.7
Zinc, Zn	mg/kg	2	13	22	12	18	13

PARAMETER	UOM	LOR	4-500	5-100	5-500	6-100	6-500
			SOIL	SOIL	SOIL	SOIL	SOIL
			20/7/2018 SE181858.006	20/7/2018 SE181858.007	20/7/2018 SE181858.008	20/7/2018 SE181858.009	20/7/2018 SE181858.010
Arsenic, As	mg/kg	1	3	2	4	2	4
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	25	15	24	15	23
Copper, Cu	mg/kg	0.5	13	6.2	12	6.8	11
Lead, Pb	mg/kg	1	12	10	11	10	12
Nickel, Ni	mg/kg	0.5	8.1	5.5	8.0	5.5	7.3
Zinc, Zn	mg/kg	2	19	13	19	13	17

PARAMETER	UOM	LOR	7-100	7-500	S1	S2	S3
			SOIL	SOIL	SOIL	SOIL	SOIL
			20/7/2018 SE181858.011	20/7/2018 SE181858.012	20/7/2018 SE181858.013	20/7/2018 SE181858.014	20/7/2018 SE181858.015
Arsenic, As	mg/kg	1	2	4	3	1	2
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	15	25	14	18	14
Copper, Cu	mg/kg	0.5	6.7	13	6.4	6.3	7.3
Lead, Pb	mg/kg	1	10	12	10	9	9
Nickel, Ni	mg/kg	0.5	5.3	7.9	4.8	5.2	5.7
Zinc, Zn	mg/kg	2	13	18	16	12	15

PARAMETER	UOM	LOR	S4	DA
			SOIL	SOIL
			20/7/2018 SE181858.016	20/7/2018 SE181858.017
Arsenic, As	mg/kg	1	3	1
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	15	16
Copper, Cu	mg/kg	0.5	6.2	6.6
Lead, Pb	mg/kg	1	10	10
Nickel, Ni	mg/kg	0.5	4.9	4.4
Zinc, Zn	mg/kg	2	13	15

Mercury in Soil [AN312] Tested: 30/7/2018

PARAMETER	UOM	LOR	2-100	2-500	3-100	3-500	4-100
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			20/7/2018 SE181858.001	20/7/2018 SE181858.002	20/7/2018 SE181858.003	20/7/2018 SE181858.004	20/7/2018 SE181858.005
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	4-500	5-100	5-500	6-100	6-500
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			20/7/2018 SE181858.006	20/7/2018 SE181858.007	20/7/2018 SE181858.008	20/7/2018 SE181858.009	20/7/2018 SE181858.010
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	7-100	7-500	S1	S2	S3
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			20/7/2018 SE181858.011	20/7/2018 SE181858.012	20/7/2018 SE181858.013	20/7/2018 SE181858.014	20/7/2018 SE181858.015
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	S4	DA
			SOIL	SOIL
			-	-
			20/7/2018 SE181858.016	20/7/2018 SE181858.017
Mercury	mg/kg	0.05	<0.05	<0.05

Moisture Content [AN002] Tested: 30/7/2018

PARAMETER	UOM	LOR	2-100	2-500	3-100	3-500	4-100
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			20/7/2018 SE181858.001	20/7/2018 SE181858.002	20/7/2018 SE181858.003	20/7/2018 SE181858.004	20/7/2018 SE181858.005
% Moisture	%w/w	0.5	13	11	14	9.0	8.2

PARAMETER	UOM	LOR	4-500	5-100	5-500	6-100	6-500
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			20/7/2018 SE181858.006	20/7/2018 SE181858.007	20/7/2018 SE181858.008	20/7/2018 SE181858.009	20/7/2018 SE181858.010
% Moisture	%w/w	0.5	9.0	11	8.7	13	9.1

PARAMETER	UOM	LOR	7-100	7-500	S1	S2	S3
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			20/7/2018 SE181858.011	20/7/2018 SE181858.012	20/7/2018 SE181858.013	20/7/2018 SE181858.014	20/7/2018 SE181858.015
% Moisture	%w/w	0.5	12	9.4	15	13	13

PARAMETER	UOM	LOR	S4	DA
			SOIL	SOIL
			-	-
			20/7/2018 SE181858.016	20/7/2018 SE181858.017
% Moisture	%w/w	0.5	11	14

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.
- 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 Petroleum Hydrocarbons (TPH) 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** 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.
		IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples 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:

- 1 Bq is equivalent to 27 pCi
- 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 criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/-/media/Local/Australia/Documents/_Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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STATEMENT OF QA/QC PERFORMANCE

SE181858 R0

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Order Number (Not specified)
Samples 17

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SGS Reference SE181858 R0
Date Received 25 Jul 2018
Date Reported 01 Aug 2018

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 and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

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

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	17 Soil
Date documentation received	25/7/2018	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	6.7°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		



HOLDING TIME SUMMARY

SE181858 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 sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Mercury in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
2-100	SE181858.001	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
2-500	SE181858.002	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
3-100	SE181858.003	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
3-500	SE181858.004	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
4-100	SE181858.005	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
4-500	SE181858.006	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
5-100	SE181858.007	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
5-500	SE181858.008	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
6-100	SE181858.009	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
6-500	SE181858.010	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
7-100	SE181858.011	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
7-500	SE181858.012	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
S1	SE181858.013	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
S2	SE181858.014	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
S3	SE181858.015	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
S4	SE181858.016	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018
DA	SE181858.017	LB153035	20 Jul 2018	25 Jul 2018	17 Aug 2018	30 Jul 2018	17 Aug 2018	01 Aug 2018

Moisture Content

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
2-100	SE181858.001	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
2-500	SE181858.002	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
3-100	SE181858.003	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
3-500	SE181858.004	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
4-100	SE181858.005	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
4-500	SE181858.006	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
5-100	SE181858.007	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
5-500	SE181858.008	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
6-100	SE181858.009	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
6-500	SE181858.010	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
7-100	SE181858.011	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
7-500	SE181858.012	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
S1	SE181858.013	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
S2	SE181858.014	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
S3	SE181858.015	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
S4	SE181858.016	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
DA	SE181858.017	LB152989	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018

OC Pesticides in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
2-100	SE181858.001	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
2-500	SE181858.002	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
3-100	SE181858.003	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
3-500	SE181858.004	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
4-100	SE181858.005	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
4-500	SE181858.006	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
5-100	SE181858.007	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
5-500	SE181858.008	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
6-100	SE181858.009	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
6-500	SE181858.010	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
7-100	SE181858.011	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
7-500	SE181858.012	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
S1	SE181858.013	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
S2	SE181858.014	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
S3	SE181858.015	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
S4	SE181858.016	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018
DA	SE181858.017	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	01 Aug 2018

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

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

Sample Name	Sample No.	QC Ref
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HOLDING TIME SUMMARY

SE181858 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 sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

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

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
2-100	SE181858.001	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
2-500	SE181858.002	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
3-100	SE181858.003	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
3-500	SE181858.004	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
4-100	SE181858.005	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
4-500	SE181858.006	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
5-100	SE181858.007	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
5-500	SE181858.008	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
6-100	SE181858.009	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
6-500	SE181858.010	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
7-100	SE181858.011	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
7-500	SE181858.012	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
S1	SE181858.013	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
S2	SE181858.014	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
S3	SE181858.015	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
S4	SE181858.016	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018
DA	SE181858.017	LB153058	20 Jul 2018	25 Jul 2018	16 Jan 2019	30 Jul 2018	16 Jan 2019	01 Aug 2018

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
2-100	SE181858.001	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
2-500	SE181858.002	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
3-100	SE181858.003	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
3-500	SE181858.004	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
4-100	SE181858.005	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
4-500	SE181858.006	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
5-100	SE181858.007	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
5-500	SE181858.008	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
6-100	SE181858.009	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
6-500	SE181858.010	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
7-100	SE181858.011	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
7-500	SE181858.012	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
S1	SE181858.013	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
S2	SE181858.014	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
S3	SE181858.015	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
S4	SE181858.016	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018
DA	SE181858.017	LB152980	20 Jul 2018	25 Jul 2018	03 Aug 2018	30 Jul 2018	08 Sep 2018	31 Jul 2018

VOC's in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
2-100	SE181858.001	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
2-500	SE181858.002	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
3-100	SE181858.003	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
3-500	SE181858.004	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
4-100	SE181858.005	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
4-500	SE181858.006	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
5-100	SE181858.007	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
5-500	SE181858.008	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
6-100	SE181858.009	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
6-500	SE181858.010	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
7-100	SE181858.011	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
7-500	SE181858.012	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
S1	SE181858.013	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
S2	SE181858.014	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
S3	SE181858.015	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
S4	SE181858.016	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
DA	SE181858.017	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018

Volatile Petroleum Hydrocarbons in Soil

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

Sample Name	Sample No.	QC Ref
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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 sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Volatile Petroleum Hydrocarbons in Soil (continued)

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
2-100	SE181858.001	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
2-500	SE181858.002	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
3-100	SE181858.003	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
3-500	SE181858.004	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
4-100	SE181858.005	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
4-500	SE181858.006	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
5-100	SE181858.007	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
5-500	SE181858.008	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
6-100	SE181858.009	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
6-500	SE181858.010	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
7-100	SE181858.011	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
7-500	SE181858.012	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
S1	SE181858.013	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
S2	SE181858.014	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
S3	SE181858.015	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
S4	SE181858.016	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018
DA	SE181858.017	LB152853	20 Jul 2018	25 Jul 2018	03 Aug 2018	26 Jul 2018	04 Sep 2018	30 Jul 2018

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 identifier 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)	2-100	SE181858.001	%	60 - 130%	78
	2-500	SE181858.002	%	60 - 130%	77
	3-100	SE181858.003	%	60 - 130%	79
	3-500	SE181858.004	%	60 - 130%	78
	4-100	SE181858.005	%	60 - 130%	77
	4-500	SE181858.006	%	60 - 130%	76
	5-100	SE181858.007	%	60 - 130%	79
	5-500	SE181858.008	%	60 - 130%	76
	6-100	SE181858.009	%	60 - 130%	78
	6-500	SE181858.010	%	60 - 130%	75
	7-100	SE181858.011	%	60 - 130%	78
	7-500	SE181858.012	%	60 - 130%	71
	S1	SE181858.013	%	60 - 130%	91
	S2	SE181858.014	%	60 - 130%	79
	S3	SE181858.015	%	60 - 130%	81
	S4	SE181858.016	%	60 - 130%	81
	DA	SE181858.017	%	60 - 130%	73

VOC's in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	2-100	SE181858.001	%	60 - 130%	73
	2-500	SE181858.002	%	60 - 130%	72
	3-100	SE181858.003	%	60 - 130%	73
	3-500	SE181858.004	%	60 - 130%	85
	4-100	SE181858.005	%	60 - 130%	71
	4-500	SE181858.006	%	60 - 130%	73
	5-100	SE181858.007	%	60 - 130%	73
	5-500	SE181858.008	%	60 - 130%	75
	6-100	SE181858.009	%	60 - 130%	72
	6-500	SE181858.010	%	60 - 130%	73
	7-100	SE181858.011	%	60 - 130%	84
	7-500	SE181858.012	%	60 - 130%	71
	S1	SE181858.013	%	60 - 130%	71
	S2	SE181858.014	%	60 - 130%	75
	S3	SE181858.015	%	60 - 130%	73
	S4	SE181858.016	%	60 - 130%	75
	DA	SE181858.017	%	60 - 130%	72
d4-1,2-dichloroethane (Surrogate)	2-100	SE181858.001	%	60 - 130%	91
	2-500	SE181858.002	%	60 - 130%	92
	3-100	SE181858.003	%	60 - 130%	95
	3-500	SE181858.004	%	60 - 130%	93
	4-100	SE181858.005	%	60 - 130%	96
	4-500	SE181858.006	%	60 - 130%	96
	5-100	SE181858.007	%	60 - 130%	95
	5-500	SE181858.008	%	60 - 130%	93
	6-100	SE181858.009	%	60 - 130%	95
	6-500	SE181858.010	%	60 - 130%	92
	7-100	SE181858.011	%	60 - 130%	94
	7-500	SE181858.012	%	60 - 130%	96
	S1	SE181858.013	%	60 - 130%	95
	S2	SE181858.014	%	60 - 130%	95
	S3	SE181858.015	%	60 - 130%	93
	S4	SE181858.016	%	60 - 130%	91
	DA	SE181858.017	%	60 - 130%	95
d8-toluene (Surrogate)	2-100	SE181858.001	%	60 - 130%	81
	2-500	SE181858.002	%	60 - 130%	82
	3-100	SE181858.003	%	60 - 130%	81
	3-500	SE181858.004	%	60 - 130%	80
	4-100	SE181858.005	%	60 - 130%	82
	4-500	SE181858.006	%	60 - 130%	84
	5-100	SE181858.007	%	60 - 130%	80

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 identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
d8-toluene (Surrogate)	5-500	SE181858.008	%	60 - 130%	82
	6-100	SE181858.009	%	60 - 130%	82
	6-500	SE181858.010	%	60 - 130%	80
	7-100	SE181858.011	%	60 - 130%	80
	7-500	SE181858.012	%	60 - 130%	84
	S1	SE181858.013	%	60 - 130%	77
	S2	SE181858.014	%	60 - 130%	80
	S3	SE181858.015	%	60 - 130%	78
	S4	SE181858.016	%	60 - 130%	79
	DA	SE181858.017	%	60 - 130%	80
Dibromofluoromethane (Surrogate)	2-100	SE181858.001	%	60 - 130%	122
	2-500	SE181858.002	%	60 - 130%	90
	3-100	SE181858.003	%	60 - 130%	86
	3-500	SE181858.004	%	60 - 130%	78
	4-100	SE181858.005	%	60 - 130%	122
	4-500	SE181858.006	%	60 - 130%	115
	5-100	SE181858.007	%	60 - 130%	120
	5-500	SE181858.008	%	60 - 130%	124
	6-100	SE181858.009	%	60 - 130%	95
	6-500	SE181858.010	%	60 - 130%	75
	7-100	SE181858.011	%	60 - 130%	120
	7-500	SE181858.012	%	60 - 130%	122
	S1	SE181858.013	%	60 - 130%	108
	S2	SE181858.014	%	60 - 130%	112
	S3	SE181858.015	%	60 - 130%	100
	S4	SE181858.016	%	60 - 130%	100
	DA	SE181858.017	%	60 - 130%	99

Volatile Petroleum Hydrocarbons in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	2-100	SE181858.001	%	60 - 130%	73
	2-500	SE181858.002	%	60 - 130%	72
	3-100	SE181858.003	%	60 - 130%	73
	3-500	SE181858.004	%	60 - 130%	85
	4-100	SE181858.005	%	60 - 130%	71
	4-500	SE181858.006	%	60 - 130%	73
	5-100	SE181858.007	%	60 - 130%	73
	5-500	SE181858.008	%	60 - 130%	75
	6-100	SE181858.009	%	60 - 130%	72
	6-500	SE181858.010	%	60 - 130%	73
	7-100	SE181858.011	%	60 - 130%	84
	7-500	SE181858.012	%	60 - 130%	71
	S1	SE181858.013	%	60 - 130%	71
	S2	SE181858.014	%	60 - 130%	75
	S3	SE181858.015	%	60 - 130%	73
	S4	SE181858.016	%	60 - 130%	75
	DA	SE181858.017	%	60 - 130%	72
d4-1,2-dichloroethane (Surrogate)	2-100	SE181858.001	%	60 - 130%	91
	2-500	SE181858.002	%	60 - 130%	92
	3-100	SE181858.003	%	60 - 130%	95
	3-500	SE181858.004	%	60 - 130%	93
	4-100	SE181858.005	%	60 - 130%	96
	4-500	SE181858.006	%	60 - 130%	96
	5-100	SE181858.007	%	60 - 130%	95
	5-500	SE181858.008	%	60 - 130%	93
	6-100	SE181858.009	%	60 - 130%	95
	6-500	SE181858.010	%	60 - 130%	92
	7-100	SE181858.011	%	60 - 130%	94
	7-500	SE181858.012	%	60 - 130%	96
	S1	SE181858.013	%	60 - 130%	95
	S2	SE181858.014	%	60 - 130%	95

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 identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Volatile Petroleum Hydrocarbons in Soil (continued)

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
d4-1,2-dichloroethane (Surrogate)	S3	SE181858.015	%	60 - 130%	93
	S4	SE181858.016	%	60 - 130%	91
	DA	SE181858.017	%	60 - 130%	95
d8-toluene (Surrogate)	2-100	SE181858.001	%	60 - 130%	81
	2-500	SE181858.002	%	60 - 130%	82
	3-100	SE181858.003	%	60 - 130%	81
	3-500	SE181858.004	%	60 - 130%	80
	4-100	SE181858.005	%	60 - 130%	82
	4-500	SE181858.006	%	60 - 130%	84
	5-100	SE181858.007	%	60 - 130%	80
	5-500	SE181858.008	%	60 - 130%	82
	6-100	SE181858.009	%	60 - 130%	82
	6-500	SE181858.010	%	60 - 130%	80
	7-100	SE181858.011	%	60 - 130%	80
	7-500	SE181858.012	%	60 - 130%	84
	S1	SE181858.013	%	60 - 130%	77
	S2	SE181858.014	%	60 - 130%	80
	S3	SE181858.015	%	60 - 130%	78
	S4	SE181858.016	%	60 - 130%	79
	DA	SE181858.017	%	60 - 130%	80
Dibromofluoromethane (Surrogate)	2-100	SE181858.001	%	60 - 130%	122
	2-500	SE181858.002	%	60 - 130%	90
	3-100	SE181858.003	%	60 - 130%	86
	3-500	SE181858.004	%	60 - 130%	78
	4-100	SE181858.005	%	60 - 130%	122
	4-500	SE181858.006	%	60 - 130%	115
	5-100	SE181858.007	%	60 - 130%	120
	5-500	SE181858.008	%	60 - 130%	124
	6-100	SE181858.009	%	60 - 130%	95
	6-500	SE181858.010	%	60 - 130%	75
	7-100	SE181858.011	%	60 - 130%	120
	7-500	SE181858.012	%	60 - 130%	122
	S1	SE181858.013	%	60 - 130%	108
	S2	SE181858.014	%	60 - 130%	112
	S3	SE181858.015	%	60 - 130%	100
	S4	SE181858.016	%	60 - 130%	100
	DA	SE181858.017	%	60 - 130%	99

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

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

Mercury in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB153035.001	Mercury	mg/kg	0.05	<0.05

OC Pesticides in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB152980.001	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)	%	-	77

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

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

Sample Number	Parameter	Units	LOR	Result
LB153058.001	Arsenic, As	mg/kg	1	<1
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.3	<0.3
	Copper, Cu	mg/kg	0.5	<0.5
	Nickel, Ni	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Zinc, Zn	mg/kg	2	<2.0

TRH (Total Recoverable Hydrocarbons) in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB152980.001	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
LB152853.001	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	mg/kg	0.1	<0.1
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	88
		d4-1,2-dichloroethane (Surrogate)	%	-	97
		d8-toluene (Surrogate)	%	-	91
		Bromofluorobenzene (Surrogate)	%	-	98
Totals	Total BTEX	mg/kg	0.6	<0.6	



METHOD BLANKS

SE181858 R0

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.

Volatile Petroleum Hydrocarbons in Soil				Method: ME-(AU)-[ENV]AN433	
Sample Number		Parameter	Units	LOR	Result
LB152853.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	101
		d4-1,2-dichloroethane (Surrogate)	%	-	82
		d8-toluene (Surrogate)	%	-	99

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

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: $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

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 identifier 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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE181858.010	LB153035.014	Mercury	mg/kg	0.05	<0.05	<0.05	200	0
SE181859.002	LB153035.024	Mercury	mg/kg	0.05	0.00674561860.0071810122		200	0

Moisture Content

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE181858.006	LB152989.022	% Moisture	%w/w	0.5	9.0	9.3	41	3
SE181858.016	LB152989.033	% Moisture	%w/w	0.5	11	13	38	11
SE182001.007	LB152989.044	% Moisture	%w/w	0.5	17.04857928506.3307852675		36	4
SE182003.008	LB152989.011	% Moisture	%w/w	0.5	22	19	35	14

OC Pesticides in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE181858.006	LB152980.027	Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	0	200	0
		Alpha BHC	mg/kg	0.1	<0.1	0	200	0
		Lindane	mg/kg	0.1	<0.1	0	200	0
		Heptachlor	mg/kg	0.1	<0.1	0	200	0
		Aldrin	mg/kg	0.1	<0.1	0	200	0
		Beta BHC	mg/kg	0.1	<0.1	0	200	0
		Delta BHC	mg/kg	0.1	<0.1	0	200	0
		Heptachlor epoxide	mg/kg	0.1	<0.1	0	200	0
		o,p'-DDE	mg/kg	0.1	<0.1	0	200	0
		Alpha Endosulfan	mg/kg	0.2	<0.2	0	200	0
		Gamma Chlordane	mg/kg	0.1	<0.1	0	200	0
		Alpha Chlordane	mg/kg	0.1	<0.1	0	200	0
		trans-Nonachlor	mg/kg	0.1	<0.1	0	200	0
		p,p'-DDE	mg/kg	0.1	<0.1	0	200	0
		Dieldrin	mg/kg	0.2	<0.2	0	200	0
		Endrin	mg/kg	0.2	<0.2	0	200	0
		o,p'-DDD	mg/kg	0.1	<0.1	0	200	0
		o,p'-DDT	mg/kg	0.1	<0.1	0	200	0
		Beta Endosulfan	mg/kg	0.2	<0.2	0	200	0
		p,p'-DDD	mg/kg	0.1	<0.1	0	200	0
		p,p'-DDT	mg/kg	0.1	<0.1	0	200	0
		Endosulfan sulphate	mg/kg	0.1	<0.1	0	200	0
		Endrin Aldehyde	mg/kg	0.1	<0.1	0	200	0
		Methoxychlor	mg/kg	0.1	<0.1	0	200	0
		Endrin Ketone	mg/kg	0.1	<0.1	0	200	0
		Isodrin	mg/kg	0.1	<0.1	0	200	0
		Mirex	mg/kg	0.1	<0.1	0	200	0
		Total CLP OC Pesticides	mg/kg	1	<1	0	200	0
Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.11	0.115	30	1	

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 %
SE181858.010	LB153058.014	Arsenic, As	mg/kg	1	4	4	56	6
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	23	23	32	0
		Copper, Cu	mg/kg	0.5	11	12	34	3
		Nickel, Ni	mg/kg	0.5	7.3	7.5	37	3
		Lead, Pb	mg/kg	1	12	13	38	9
		Zinc, Zn	mg/kg	2	17	18	41	2
SE181859.002	LB153058.024	Arsenic, As	mg/kg	1	0.79325135831.3700060483		122	31
		Cadmium, Cd	mg/kg	0.3	-0.04175007140.0043770161		200	0
		Chromium, Cr	mg/kg	0.3	9.621072029912.1243346774		35	23
		Copper, Cu	mg/kg	0.5	3.0616719092 4.2063125		44	31
		Nickel, Ni	mg/kg	0.5	2.09678136812.6831108870		51	25
		Lead, Pb	mg/kg	1	6.95834524837.5284677419		44	8
		Zinc, Zn	mg/kg	2	5.91459346107.2176995967		60	20

TRH (Total Recoverable Hydrocarbons) in Soil

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

Original	Duplicate	Parameter	Units	LOR
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Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

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: $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

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 identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

TRH (Total Recoverable Hydrocarbons) in Soil (continued)

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %	
SE181858.006	LB152980.027	TRH C10-C14	mg/kg	20	<20	0	200	0	
		TRH C15-C28	mg/kg	45	<45	0	200	0	
		TRH C29-C36	mg/kg	45	<45	0	200	0	
		TRH C37-C40	mg/kg	100	<100	0	200	0	
		TRH C10-C36 Total	mg/kg	110	<110	0	200	0	
		TRH F Bands	TRH C10-C40 Total (F bands)	mg/kg	210	<210	0	200	0
			TRH >C10-C16	mg/kg	25	<25	0	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	0	200	0
			TRH >C16-C34 (F3)	mg/kg	90	<90	0	200	0
		TRH >C34-C40 (F4)	mg/kg	120	<120	0	200	0	
SE182000.001	LB152980.028	TRH C10-C14	mg/kg	20	0	0	200	0	
		TRH C15-C28	mg/kg	45	0	0	200	0	
		TRH C29-C36	mg/kg	45	0	0	200	0	
		TRH C37-C40	mg/kg	100	0	0	200	0	
		TRH C10-C36 Total	mg/kg	110	0	0	200	0	
		TRH F Bands	TRH C10-C40 Total (F bands)	mg/kg	210	0	0	200	0
			TRH >C10-C16	mg/kg	25	0	0	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	0	0	200	0
			TRH >C16-C34 (F3)	mg/kg	90	0	0	200	0
		TRH >C34-C40 (F4)	mg/kg	120	0	0	200	0	

VOC's in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE181858.008	LB152853.014	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
			Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	200
		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	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	6.2	6.2	50	0
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.7	4.8	50	3
			d8-toluene (Surrogate)	mg/kg	-	4.1	4.1	50	1
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.8	3.8	50	2
		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
SE181858.017	LB152853.024	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
			Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	200
		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	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.9	4.9	50	0
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.8	4.9	50	4
			d8-toluene (Surrogate)	mg/kg	-	4.0	4.1	50	2
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.6	3.9	50	7
		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

Volatile Petroleum Hydrocarbons in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %	
SE181858.008	LB152853.014	TRH C6-C10	mg/kg	25	<25	<25	200	0	
		TRH C6-C9	mg/kg	20	<20	<20	200	0	
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	6.2	6.2	30	0
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.7	4.8	30	3
			d8-toluene (Surrogate)	mg/kg	-	4.1	4.1	30	1
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.8	3.8	30	2
		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
SE181858.017	LB152853.024	TRH C6-C10	mg/kg	25	<25	<25	200	0	
		TRH C6-C9	mg/kg	20	<20	<20	200	0	
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.9	4.9	30	0
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.8	4.9	30	4

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

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: $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

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 identifier 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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE181858.017	LB152853.024	Surrogates	d8-toluene (Surrogate)	mg/kg	-	4.0	4.1	30	2
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.6	3.9	30	7
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0

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

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

Mercury in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB153035.002	Mercury	mg/kg	0.05	0.19	0.2	70 - 130	95

OC Pesticides in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB152980.002	Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	83
	Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	84
	Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	76
	Dieldrin	mg/kg	0.2	<0.2	0.2	60 - 140	82
	Endrin	mg/kg	0.2	<0.2	0.2	60 - 140	85
	p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	76
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.11	0.15	40 - 130

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 %
LB153058.002	Arsenic, As	mg/kg	1	320	336.32	79 - 120	97
	Cadmium, Cd	mg/kg	0.3	440	416.6	69 - 131	107
	Chromium, Cr	mg/kg	0.3	37	35.2	80 - 120	106
	Copper, Cu	mg/kg	0.5	360	370.46	80 - 120	97
	Nickel, Ni	mg/kg	0.5	200	210.88	79 - 120	93
	Lead, Pb	mg/kg	1	97	107.87	79 - 120	90
	Zinc, Zn	mg/kg	2	280	301.27	80 - 121	93

TRH (Total Recoverable Hydrocarbons) in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %	
LB152980.002	TRH C10-C14	mg/kg	20	34	40	60 - 140	85	
	TRH C15-C28	mg/kg	45	<45	40	60 - 140	88	
	TRH C29-C36	mg/kg	45	<45	40	60 - 140	90	
	TRH F Bands	TRH >C10-C16	mg/kg	25	31	40	60 - 140	78
	TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	98	
	TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	85	

VOC's in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB152853.002	Monocyclic	Benzene	mg/kg	0.1	2.4	2.9	60 - 140	83
	Aromatic	Toluene	mg/kg	0.1	2.5	2.9	60 - 140	87
		Ethylbenzene	mg/kg	0.1	1.9	2.9	60 - 140	65
		m/p-xylene	mg/kg	0.2	7.2	5.8	60 - 140	124
		o-xylene	mg/kg	0.1	2.2	2.9	60 - 140	74
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.6	5	60 - 140	92
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.5	5	60 - 140	90
		d8-toluene (Surrogate)	mg/kg	-	4.8	5	60 - 140	95
		Bromofluorobenzene (Surrogate)	mg/kg	-	5.5	5	60 - 140	111

Volatile Petroleum Hydrocarbons in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %	
LB152853.002	TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	84	
	TRH C6-C9	mg/kg	20	<20	23.2	60 - 140	73	
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.8	5	60 - 140	76
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.8	5	60 - 140	96
		d8-toluene (Surrogate)	mg/kg	-	6.1	5	60 - 140	123
		Bromofluorobenzene (Surrogate)	mg/kg	-	5.1	5	60 - 140	101
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	94

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 identifier 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%
SE181858.001	LB153035.004	Mercury	mg/kg	0.05	0.19	<0.05	0.2	94

OC Pesticides in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Original	Spike	Recovery%
SE181858.002	LB152980.026	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	0.2	90
		Aldrin	mg/kg	0.1	<0.1	0.2	92
		Beta BHC	mg/kg	0.1	<0.1	-	-
		Delta BHC	mg/kg	0.1	<0.1	0.2	82
		Heptachlor epoxide	mg/kg	0.1	<0.1	-	-
		o,p'-DDE	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	-	-
		trans-Nonachlor	mg/kg	0.1	<0.1	-	-
		p,p'-DDE	mg/kg	0.1	<0.1	-	-
		Dieldrin	mg/kg	0.2	<0.2	0.2	91
		Endrin	mg/kg	0.2	<0.2	0.2	96
		o,p'-DDD	mg/kg	0.1	<0.1	-	-
		o,p'-DDT	mg/kg	0.1	<0.1	-	-
		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	0.2	84
		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	-	-
		Total CLP OC Pesticides	mg/kg	1	<1	-	-
Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.12	-	77	

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%
SE181858.001	LB153058.004	Arsenic, As	mg/kg	1	45	2	50	85
		Cadmium, Cd	mg/kg	0.3	47	<0.3	50	93
		Chromium, Cr	mg/kg	0.3	59	14	50	91
		Copper, Cu	mg/kg	0.5	57	6.1	50	102
		Nickel, Ni	mg/kg	0.5	50	4.1	50	92
		Lead, Pb	mg/kg	1	54	9	50	89
		Zinc, Zn	mg/kg	2	59	13	50	91

TRH (Total Recoverable Hydrocarbons) in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Original	Spike	Recovery%
SE181858.002	LB152980.026	TRH C10-C14	mg/kg	20	<20	40	120
		TRH C15-C28	mg/kg	45	<45	40	105
		TRH C29-C36	mg/kg	45	<45	40	90
		TRH C37-C40	mg/kg	100	<100	-	-
		TRH C10-C36 Total	mg/kg	110	<110	-	-
		TRH C10-C40 Total (F bands)	mg/kg	210	<210	-	-
		TRH F Bands	mg/kg	25	<25	40	110
		TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	-	-
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	98
		TRH >C34-C40 (F4)	mg/kg	120	<120	-	-

VOC's in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR
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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 identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE181855.003	LB152853.004	Monocyclic	Benzene	mg/kg	0.1	2.8	<0.1	2.9	96
			Aromatic	Toluene	mg/kg	0.1	3.0	<0.1	2.9
			Ethylbenzene	mg/kg	0.1	2.4	<0.1	2.9	80
			m/p-xylene	mg/kg	0.2	6.3	<0.2	5.8	107
			o-xylene	mg/kg	0.1	2.9	<0.1	2.9	100
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.1	5.3	-	82
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.8	4.4	-	96
			d8-toluene (Surrogate)	mg/kg	-	6.3	5.8	-	125
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.7	5.6	-	113
		Totals	Total Xylenes	mg/kg	0.3	9.2	<0.3	-	-
			Total BTEX	mg/kg	0.6	17	<0.6	-	-

Volatile Petroleum Hydrocarbons in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%	
SE181855.003	LB152853.004	TRH C6-C10	mg/kg	25	26	<25	24.65	104	
		TRH C6-C9	mg/kg	20	21	<20	23.2	90	
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.1	5.3	-	82
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.8	4.4	-	96
			d8-toluene (Surrogate)	mg/kg	-	6.3	5.8	-	125
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.7	5.6	-	113
		VPH F	Benzene (F0)	mg/kg	0.1	2.8	<0.1	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	7.25	117



MATRIX SPIKE DUPLICATES

SE181858 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

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: $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

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 identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

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 : http://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.
-	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 Analytical Report comments for further information.

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Appendix 4. Unexpected finds protocol

1. Introduction

Investigations have been undertaken including boreholes, soil sampling and analysis to evaluate the contamination status of Lot 1 DP1253855, Estella Road, Estella NSW.

A procedure is required describing the actions if potential contamination or hazards are encountered during 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

Lot 1 DP1253855, Estella Road, Estella NSW.

4. Responsible person

The landowner is responsible for implementation of the unexpected finds protocol. The land owner 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

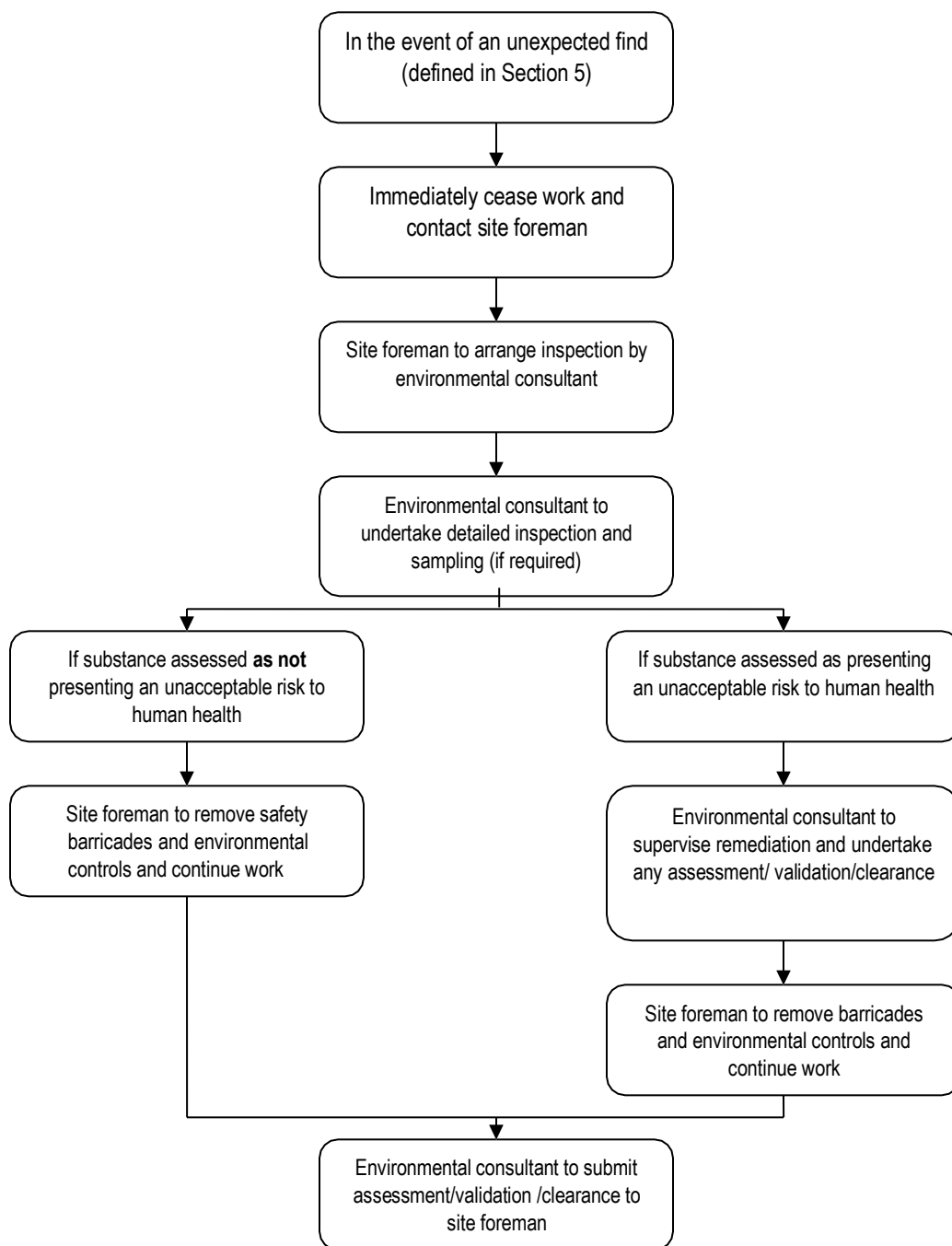
Potential hazards will be identified by appearance and odour and include:

- 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 the poster below 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 cleanup
- 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.

BE AWARE UNEXPECTED HAZARDS MAY BE PRESENT



drums



asbestos



chemical bottles



blood stains



odour



ash / slag

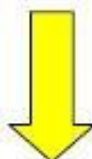


demolition waste

if you SEE or SMELL anything unusual



STOP WORK & contact the Site Foreman



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