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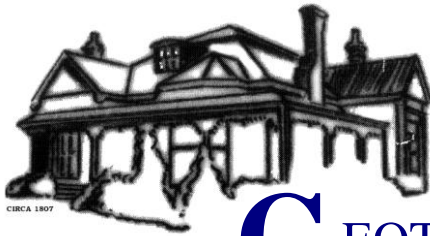


DETAILED CONTAMINATION ASSESSMENT

PROPOSED RESIDENTIAL SUBDIVISION DEVELOPMENT

**PART LOT 201 IN DP590247
STATION STREET, MENANGLE**

REPORT NO 14305/1-AA 18 JANUARY 2019



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Job No: 14305/1
Our Ref: 14305/1-AA
18 January 2019

Mirvac Homes (NSW) Pty Limited
C/- Calibre Group
Level 2, 2 Burbank Place
Norwest Business Park
BAULKHAM HILLS NSW 2153
Email: Nicole.Franklin@calibregroup.com

Attention: Ms N Franklin

Dear Madam

re: **Proposed Stages 1 Residential Subdivision
Part Lot 201 in DP590247
Station Street, Menangle
Detailed Contamination Assessment**

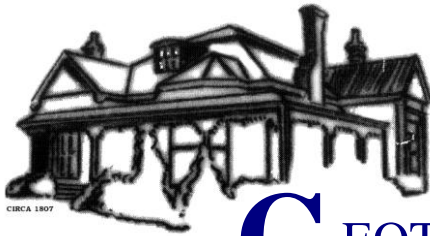
Further to the Preliminary Environmental Site Assessment (PESA) report prepared by Environmental Investigation Services (EIS) (Ref: E27284KBrpt dated 13 May 2014) for the proposed rezoning of 30 hectares (ha) land currently registered as Lots 201 and 202 in DP590247 and Lot 21 in DP581862, located at off Station Street, Menangle, letter prepared by Geotechnique Pty Ltd (Geotechnique) regarding the progress of detailed contamination assessment (DCA) for the above-mentioned site (Ref: 14305/1&2-L1 dated 7 November 218) and as requested, Geotechnique has completed a detailed contamination assessment (DCA) for part Lot 201 in DP590247 allocated for bulk earthworks for proposed stage 1 residential subdivision.

A brief of the outcome of the assessment was summarised in the Executive Summary.

If you have any questions, please do not hesitate to contact the undersigned.

Yours faithfully
GEOTECHNIQUE PTY LTD

ANWAR BARBHUYIA
Senior Associate
B.E (Civil), MEngSc (Enviro), MIEAust



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EXECUTIVE SUMMARY

Further to the Preliminary Environmental Site Assessment (PESA) report prepared by Environmental Investigation Services (EIS) (Ref: E27284KBrpt dated 13 May 2014) for the proposed rezoning of 30 hectares (ha) land currently registered as Lots 201 and 202 in DP590247 and Lot 21 in DP581862, located at off Station Street, Menangle, letter prepared by Geotechnique Pty Ltd (Geotechnique) regarding the progress of detailed contamination assessment (DCA) for the above-mentioned site (Ref: 14305/1&2-L1 dated 7 November 218), this executive summary presents a synopsis of a detailed contamination assessment (DCA) for the site carried out by Geotechnique for part Lot 201 in DP590247 allocated for bulk earthworks for proposed stage 1 residential subdivision (hereafter referred as the site).

The objective of the DCA was ascertain whether the open area of the site is likely to present a risk of harm to human health and/or the environment for the proposed development

In order to achieve the objective of this assessment, the scope of work included review of the PESA report, site reconnaissance, test pit excavation, soil sampling and testing and preparation of this report.

The findings of this DCA are summarised as follows:

- The site is mainly a cow pasture land.
- The site is proposed for residential subdivision development.
- The site is generally underlain by topsoil overlying natural clayey soil. Imported fill materials and site originated fill materials were encountered at a number of locations, underlain by natural clayey soil. The test pits did not reveal any visual evidence of asbestos or other indicators of significant contamination, such as staining, odours or significant foreign matter.
- All the laboratory test results satisfied the criteria for stating that the analytes selected are either not present i.e. concentrations less than laboratory limits of reporting, or present in the sampled soil at concentrations that do not pose a risk of hazard to human health or the environment under a "residential with access to soil" form of development form of development, with the exception of detection of elevated concentration asbestos fines (AF) and fibrous asbestos (FA) in the upper fill profile at one location, as shown on Drawing No 14305/1-AA3. Asbestos (AF and FA) presents a risk of harm to human health.

Based on this assessment, in our opinion, the site is considered suitable for the proposed residential subdivision development subject to implementation of the following recommendations, prior to bulk earthworks:

- Detailed sampling and testing in the vicinity of TP33 to delineate the extent of asbestos contamination.
- Excavation at TP28 to determine the full depth of fill, as refusal occurred during DCA on sandstone fill materials at 700mm depth. Testing might be required.
- Judgmental sampling and testing of soils beneath and/or in the vicinity of all the site features after demolition/removal/clearing. The purpose is to determine the contamination of soil beneath all the site features.

- Development of a remedial action plan (RAP) to remediate asbestos contaminated soil, plus any other contamination identified through the recommended additional sampling and testing, followed by appropriate validation.

It should be noted that since the site was used in the past for agricultural activities, there is potential for buried irrigation pipes to remain beneath the site surface. It is also possible that the pipes might be formed from bonded asbestos. If any asbestos pipes are uncovered, a suitably qualified asbestos removal contractor must be engaged to carry out removal.

If any suspect materials (identified by unusual staining, odour, discolouration or inclusions such as building rubble, asbestos sheets/pieces/pipes, ash material, etc.) between the sampling locations are encountered during any stage of future earthworks/site preparation, Unexpected Finds Management Protocol (Appendix C) should be implemented. In the event of contamination, detailed assessment, remediation and validation will be necessary.

For any materials to be excavated and removed from the site, it is recommended that waste classification of the materials, in accordance with the "Waste Classification Guidelines Part 1: Classifying Waste" (NSW EPA 2014), NSW EPA resource recovery exemptions and orders under the Protection of the Environment Operations (Waste) Regulation 2014, or NSW EPA Certification: Virgin excavated natural material is undertaken prior to disposal at an appropriately licensed landfill or potential re-use at other sites.

Any imported soil (fill) must be assessed by a qualified environmental consultant, prior to importation, to ensure suitability for the proposed use. In addition, the imported fill must not contain asbestos and ash, be free of unusual odour, not be discoloured and not acid sulphate soil or potential acid sulphate soil. The imported fill should either be virgin excavated natural material (VENM) or excavated natural material (ENM).

Reference should be made to Section 15.0 of the report and Appendix D, which set out details of the limitations of the assessment.

TABLE OF CONTENTS

	Page
1.0 INTRODUCTION -----	1
2.0 SCOPE OF WORK -----	2
3.0 SITE INFORMATION -----	2
4.0 TOPOGRAPHY, GEOLOGY & HYDROGEOLOGY -----	3
5.0 SUMMARY OF THE PESA REPORT -----	4
6.0 POTENTIAL FOR CONTAMINATION / CONCEPTUAL SITE MODEL -----	5
6.1 Potential Areas of Environmental Concern -----	5
6.2 Potentially Contaminated Media -----	7
6.3 Potential Migration -----	7
7.0 DATA QUALITY OBJECTIVES -----	8
8.0 SAMPLING & ANALYSIS PLAN AND SAMPLING METHODOLOGY -----	11
9.0 FIELD QUALITY ASSURANCE AND QUALITY CONTROL -----	13
9.1 Sampling Personnel -----	13
9.2 Decontamination Procedures -----	13
9.3 Rinsate -----	14
9.4 Trip Spike -----	14
9.5 Duplicate Samples -----	14
9.6 Inter-laboratory Duplicate (Split) Samples -----	15
10.0 LABORATORY QUALITY ASSESSMENT AND QUALITY CONTROL -----	16
11.0 QA/QC DATA EVALUATION -----	17
12.0 ASSESSMENT CRITERIA -----	18
13.0 FIELD & LABORATORY TEST RESULTS, ASSESSMENT & DISCUSSION -----	19
13.1 Field Results -----	19
13.2 Analytical Results -----	19
13.2.1 Metals (As, Cd, Cr, Cu, Pb, Hg, Ni & Zn)	19
13.2.2 TPH and BTEX	20
13.2.3 Polycyclic Aromatic Hydrocarbons (PAH)	20
13.2.4 Organochlorine Pesticides (OCP)	20
13.2.5 Polychlorinated Biphenyls (PCB)	20
13.2.6 Asbestos	20
14.0 CONCLUSION AND RECOMMENDATIONS -----	21
15.0 LIMITATIONS -----	22

14305/1-AA
Table of Contents continued

LIST OF REFERENCES

DRAWINGS

Drawing No 14305/1-AA1	Site Features
Drawing No 14305/1-AA2	Systematic Test Pit Locations
Drawing No 14305/1-AA3	Location of Concern

TABLES

Table A	Rinsate
Table B	Trip Spike
Tables C1 & C2	Duplicate Samples
Tables D1 & D2	Split Samples
Table E	Metals Test Results, Cation Exchange Capacity (CEC) & pH Test Results – Discrete Samples
Table F	Cation Exchange Capacity (CEC) and pH Test Results – Sub-samples
Table G	Metals, Cation Exchange Capacity (CEC) & pH Test Results – Composited Samples
Table H	Metals Test Results – Sub-samples
Table I	Total Recoverable Hydrocarbons (TRH) and BTEX Test Results – Discrete Samples
Table J	Polycyclic Aromatic Hydrocarbons (PAH) Test Results – Discrete Samples
Table K	Organochlorine Pesticides (OCP) & Polychlorinated Biphenyls (PCB) Test Results – Discrete Samples
Table L	Organochlorine Pesticides (OCP) Test Results – Composited Samples
Table M	Asbestos Test Results – Discrete Samples

APPENDICES

APPENDIX A	Table 1 – Test Pit Logs
APPENDIX B	SGS Environmental Services Analytical Reports and Envirolab Services Certificate of Analysis
APPENDIX C	Unexpected Finds Management Protocol
APPENDIX D	Environmental Notes

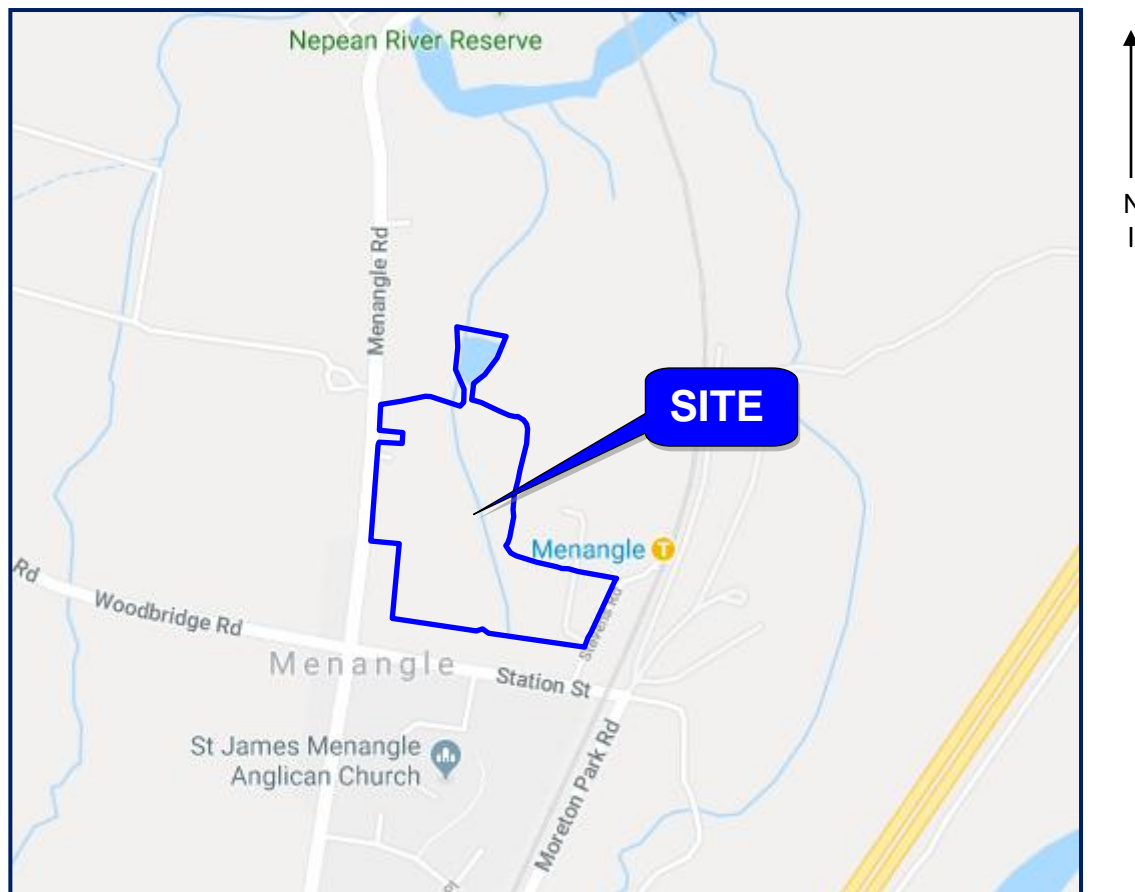
14305/1-AA

Part Lot 201 in DP590247 - Station Street, Menangle

1.0 INTRODUCTION

Further to the Preliminary Environmental Site Assessment (PESA) report prepared by Environmental Investigation Services (EIS) (Ref: E27284KBrpt dated 13 May 2014) for the proposed rezoning of 30 hectares (ha) land currently registered as Lots 201 and 202 in DP590247 and Lot 21 in DP581862, located at off Station Street, Menangle, letter prepared by Geotechnique Pty Ltd (Geotechnique) regarding the progress of detailed contamination assessment (DCA) for the above-mentioned site (Ref: 14305/1&2-L1 dated 7 November 218) and as requested, we have completed a detailed contamination assessment (DCA) for part Lot 201 in DP590247 allocated for bulk earthworks for proposed stage 1 residential subdivision (hereafter referred as the site). The location of the site is indicated on Figure 1 below:

FIGURE 1



Map Data ©2018 Google

The objective of the DCA was ascertain whether the open area of the site is likely to present a risk of harm to human health and/or the environment for the proposed development

This report was prepared generally in accordance with the NSW Environment Protection Authority (EPA), "Guidelines for Consultants Reporting on Contaminated Sites" – 2011, and to satisfy Managing Land Contamination: Planning Guidelines, State Environmental Planning Policy No. 55 – Remediation of Land.

2.0 SCOPE OF WORK

In order to achieve the objective of this assessment, the following scope of work was conducted in accordance with our fee proposal dated 28 May 2018 (Reference Q8475-AB):

- Review and summary of the PESA report prepared by EIS in 2014.
- An inspection by an Environmental Engineer from Geotechnique, to identify current site activities, site features and any visible or olfactory indicators of potential contamination.
- Soil sampling by the Environmental Engineer in accordance with a pre-determined systematic sampling plan for part of the open area of the site (previous market garden area), developed with reference to the NSW EPA *Sampling Design Guidelines* and aimed at ascertaining the presence of soil contaminants in the open area of the site.
- Chemical analysis by NATA accredited testing laboratories, in accordance with chains of custody prepared by Geotechnique.
- Implementation of industry standard quality assurance (QA) and quality control (QC) measures. QC samples were also forwarded to the testing laboratories.
- Assessment of the laboratory analytical results against current applicable guidelines.
- Assessment of field and laboratory QA and QC.
- Assessment of the contamination status of soil in part of the open area of the site (previous market garden area)
- Preparation of this report.

3.0 SITE INFORMATION

The site is located at Station Street, Menangle, in the local government area of Wollondilly Shire and is part of a parcel of land currently registered as Lot 201 in DP590247.

As shown on Drawing No 14305/1-AA1, the site is irregular in shape; covering an area of 10.55 hectares (ha).

At the time of site inspection as a part of DCA in October and December 2018, the site was mainly being used as a cow pasture. The site was accessed from Station Street to the south of the site and west of the railway line. The following features were noted within the site:

- A bitumen road diverted north off station street.
- The access gate was on the eastern portion of the cow pasture and a gravel driveway was at the entrance. The gravel driveway transitioned into a concrete driveway.
- A timber clad building with GI roof near the eastern boundary of the site.
- A dilapidated Galvanised Iron (GI) shed was also identified near to the eastern cow pasture entrance, and a second GI shed was close by with an above ground storage tank (AST) within the vicinity.
- Scrap timber, oil drums, and car wheels with tyres were observed near the dilapidated GI shed
- Multiple concrete troughs along the concrete driveway.
- Uneven ground surface near the driveway and within the eastern vicinity.

14305/1-AA
Part Lot 201 in DP590247 - Station Street, Menangle

- Depression areas, possible fill in centre of site with likely flow from south to north and along north eastern boundary.
- Concrete water trough near the western portion of the site.
- Fill area creating what appears to be a level driveway for the cow pasture from Menangle Road.
- Clad fibro building (dwelling) with GI roof close to the western boundary.
- Dilapidated GI structure near the dwelling with scrap metal and car tyres surrounding the structure.
- Uneven ground surface indicating fill area on the north western corner of the site.
- A dam occupied the northern most point of the site.
- A number of power poles were present on the site.

The site features are indicated on Drawing No 14305/1-AA1.

There was no petroleum hydrocarbon staining on the ground surface of the site that would indicate the potential for contamination. There were no signs of soil staining, plant distress or visible indicators of potential contamination. There were no olfactory indicators of potential contamination.

The site is bound to the north and east by cow pasture land, to the south by a vacant land and to the west by a vacant land and Menangle Road.

4.0 TOPOGRAPHY, GEOLOGY & HYDROGEOLOGY

In general, the site slopes towards the depression areas at the centre portion of the site.

PESA report indicates that the regional geological map of Wollongong shows that the site is underlain by Hawkesbury Sandstone with the sandstone being capped by the Ashfield Shales over higher lying western portion of the site.

Reference should be made to Table 1 in Appendix B for descriptions of the soils encountered during sampling for this assessment. Based on information from the sample locations, the sub-surface profile across the site is generalised as follows:

Topsoil	Silty clay, low to medium plasticity, brown, with root fibres, was encountered at most of the site, to a depths of 100mm to 400mm below the below the existing ground level (EGL), underlain by natural clayey soil.
Fill	<p><u>Type 1:</u> Gravelly shaley clay, low to medium plasticity, brown, was encountered at test pits TP23, TP32, TP38, TP39, TP51 and TP52 to depths of 200mm to 300mm, below the EGL, underlain by natural clayey soil;</p> <p><u>Type 2:</u> 200mm depth silty Sand, fine grained, grey, with bricks was encountered at test pit TP33, underlain by Type 3 fill;</p> <p><u>Type 3:</u> 400mm depth silty clay, high plasticity, red-brown, with gravel was encountered at test pit TP33, underlain by natural clayey soil;</p> <p><u>Type 4:</u> 600mm depth silty cay, low to medium plasticity, brown mottled dark grey, with inclusions of timber, concrete boulders and rusted metal stakes was encountered at test pit TP28, underlain by Type 5 fill;</p>

14305/1-AA

Part Lot 201 in DP590247 - Station Street, Menangle

	<p><u>Type 5:</u> 100mm depth sandstone, fine to medium grained, yellow was encountered at test pit TP28. Test pit was terminated at that depth (700mm below EGL) due to refusal of the excavator on sandstone fill materials;</p> <p><u>Type 6:</u> 500mm depth silty clay, low to medium plasticity, brown with sandstone boulder was encountered at test pit TP47, underlain by natural clayey soil;</p> <p><u>Type 7:</u> 500mm depth silty sand, fine grained, grey, with bricks concrete and scrap metal was encountered at test pit TP64, underlain by natural clayey soil;</p> <p>Based on the contents of the fill materials, the natural soil profiles and regional geological information, it appears that fill materials appears that fill materials Types 1, 3 and 6 could have originated from the site or region, whilst fill materials Type 2, 4, 5 and 7 might have been imported to the site.</p>
Natural Soil	Silty clay, high plasticity, red, yellow-brown with or without gravel, was encountered below topsoil or fill material across the site except for TP28 due to refusal of the excavator on sandstone fill materials.

There were no obvious ash materials, fibre-cement pieces and odour in the test pits.

Anticipated stormwater run-off would be towards the depression areas at the centre portion of the site, which may eventuate in the dam at the northern portion of the site. Nepean River is located about 350m to the north of the site.

5.0 SUMMARY OF THE PESA REPORT

A PESA report was prepared by Environmental Investigation Services (EIS) (Ref: E27284KBrpt dated 13 May 2014) for the proposed rezoning of 30 hectares (ha) land currently registered as Lots 201 and 202 in DP590247 and Lot 21 in DP581862, located at off Station Street, Menangle in 2014, as commissioned by Elton Consulting, on behalf of South West Developments P/L.

EIS carried out a review of site history information as part of the PESA. The review included historical aerial photographs, NSW Department of Lands records, Planning Certificate under Section 149 (2 & 5) of the Environmental Planning and Assessment Act 1979, Council records and records of WorkCover NSW. For details, reference should be made to Report E27284KBrpt.

Site history information revealed that Lots 201 was owned by Camden Park Estate Pty Ltd until the 1980s. Since then Lots 201 was owned by numerous companies. Aerial photos indicate that Lot 201 was predominantly vacant pastoral land. Part of Lot 201 was used for agriculture purposes between the 1950s and 1990s. Extraction activities were granted by Council in 1989 to Menangle Sand and Soil Supplies Pty Ltd for the extraction activities to the north section of Lot 201, which were outside the development area. The Section 149(2 & 5) Planning Certificate indicates no issues arising under the Contaminated Land Management Act 1997. A search of records held by WorkCover NSW did not locate any records of keeping dangerous goods at the site.

Based on the available information, EIS identified a number of areas of environmental concern (AEC), which are also indicated on Geotechnique Drawing No 14305/1-AA1.

14305/1-AA
Part Lot 201 in DP590247 - Station Street, Menangle

As a part of PESA, EIS also carried testing of soil samples from fifteen evenly spaced locations in the open area of the site. Sampling was not undertaken in inaccessible areas of the site such as beneath existing buildings. Groundwater samples were also analysed from four monitoring wells. Concentrations of analytes in the soil samples did not exceed Health Based Investigation Levels (HILs). Marginal elevations of zinc above the most conservative Ecological Investigation Levels (EIL) were detected in two surface fill samples. However, results were not considered to pose a risk to ecology. Ground water results indicate minor elevated Heavy Metals concentrations, which is very common in groundwater in shale formation.

The report concluded that EIS are of the opinion that the site is suitable for the proposed rezoning to allow for residential and commercial land uses. The report recommends to undertake additional sampling in the vicinity of the point source AEC to address the data gaps and also preparation of contingency plan for any unexpected finds during earthworks.

6.0 POTENTIAL FOR CONTAMINATION / CONCEPTUAL SITE MODEL

6.1 Potential Areas of Environmental Concern

Based on the preceding sections, areas of environmental concern (AEC) and associated contaminants of potential concern have been identified by Geotechnique and are presented in the following table:

Areas of Environmental Concern & Associated Contaminants of Potential Concern

Potential AEC	Rational / Details	Potential Contaminant ¹
The site	Part of the site was used for market garden activities between 1950s and 1990s, which indicate potential for applied agricultural chemicals and fertilisers. The use of agricultural chemicals and fertilisers could lead to Metals, Organophosphate Pesticides (OPP) and persistent Organochlorine Pesticides (OCP) contamination. The predicted persistence of OCP is less than 15 years, whilst the predicted persistence of OPP is typically less than one year; therefore OPP is not of concern.	Metals ² OCP
Site/region originated fill	Fill materials, originated from the site/region, was encountered within the site. Fill materials could have similar potential of concern as for the remainder of the site/region.	Metals ² OCP
The site	Imported fill materials was encountered at few test pit locations. As the source of fill materials is unknown, there is potential for the fill materials to be contaminated. There is a potential for the presence of imported fill material in the uneven ground surfaces, fill areas and depression areas.	Metals ³ Total Petroleum Hydrocarbons (TPH) Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX) Polycyclic Aromatic Hydrocarbons (PAH) OCP Polychlorinated Biphenyls (PCB)

14305/1-AA

Part Lot 201 in DP590247 - Station Street, Menangle

Potential AEC	Rational / Details	Potential Contaminant ¹
Timber clad building	In the surface soil surrounding the timber clad building, there is potential for metals and OCP contamination due to possible pest control.	Arsenic and Lead OCP
Clad/fibro building	In the surface soils surrounding the fibro building there is potential for metals and OCP contamination due to possible pest control. Fibro building may also contain asbestos.	Arsenic and Lead OCP Asbestos
GI features	In the surface soils surrounding the GI features, there is potential for metals contamination due to degradation of building materials, such as galvanised iron (GI) sheets, paint (if painted with lead based paint).	Lead and zinc
Scrap metals, rusted metal trough	There is potential for Metals contamination in the vicinity of scrap metals and rusted metal trough, resulting from degradation of the metals.	Metals ⁴
Oil drums	Soil in the vicinity of oil drums is potentially contaminated with lead and petroleum hydrocarbon due to possible oil leakage.	Lead TPH BTEX PAH Phenols
Driveway	Driveways are potentially contaminated with lead, resulting from exhaust residue associated with vehicle. In addition, there is potential for petroleum hydrocarbon contamination resulting from possible motor oil/fuel leaks.	Lead TPH BTEX PAH Phenols
In the vicinity of timber power poles	The most likely preservative chemicals in the treated timber poles are considered to be copper chrome arsenate (CCA) and creosote. As such, there is a potential for contaminants to leach from the power poles and accumulate in soils surrounding the poles.	Arsenic, copper and chromium OCP PAH Phenols
Dam	There is potential for contaminants to accumulate in dam water and sediment resulting from surface water run-off over the site and the adjoining property	Metals ² OCP

¹ The suite of potential contaminants identified will be reviewed subject to the findings of the excavated materials and added to if considered appropriate

² Metals suite includes arsenic, cadmium, copper, lead, mercury and zinc

³ Metals suite includes arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc

⁴ Metals suite includes cadmium, chromium, copper, lead, nickel and zinc

14305/1-AA
Part Lot 201 in DP590247 - Station Street, Menangle

6.2 Potentially Contaminated Media

Potentially contaminated media present at the site include:

- Fill material, topsoil and
- Natural Soils.

Based on the potential mobility of contaminants and their associated potential leachability through the soil / fill profile, vertical migration of contaminants from the fill material and/or topsoil into the underlying deeper natural soil might have occurred. As a result, the deeper natural soil is also considered to be potentially contaminated media.

Groundwater or perched water was not encountered during sampling to a maximum depth of about 700mm below EGL. If a substantial source of contamination is identified within the soil on-site, a groundwater assessment could be necessary.

Surface water is identified as a potentially contaminated medium as the surface run-off would generally follow the topography and eventuate in the depressions areas leading to the dam at the northern portion of the site and then may eventuate in the Nepean River which flows about 350m to the north of the site.

6.3 Potential Migration

Contaminants generally migrate from a site via a combination of windblown dust, rainwater infiltration, groundwater migration and surface water run-off. The potential for contaminants to migrate is a combination of:

- The nature of the contaminants (solid / liquid and mobility characteristics)
- The extent of the contaminants (isolated or widespread)
- The location of the contaminants (surface soils or at depth)
- The site topography, geology, hydrology and hydrogeology

Off-site impacts of contaminants in soil are generally governed by the transport media available and likely receptors. The most common transport medium is water, whilst receptors include initially uncontaminated soils, groundwater, surface waterbodies, humans, flora and fauna.

The potential contaminants identified as part of the site history review, site inspection and field sampling were generally in a solid form (e.g. metals, OCP, asbestos).

The site is grass, scattered trees or sealed by hard stand (buildings, sheds, paved driveway) across the surface. The potential for migration of contaminants via wind-blown dust is considered low as a result of the exposed soils within the site. The potential for migration of contamination via surface run-off is also expected to be minor. Some migration of contaminants via surface water may still occur in the event of heavy rain. Surface run-off would generally follow the topography and may flow in the centre portion of the site towards the depressions areas.

Migration of any soil contaminants to the deeper soil and/or groundwater regime would generally be via leaching from the contaminated soil, facilitated by infiltration of surface water. Given that the deeper natural soil beneath the site is relatively impermeable, the potential for any contaminants migrating from the contaminated soil to the groundwater table below is considered low.

14305/1-AA
Part Lot 201 in DP590247 - Station Street, Menangle

Sensitive receptors at the site under the current site conditions and in the immediate vicinity are considered to include site visitors who may come into contact with potentially contaminated media within the site.

7.0 DATA QUALITY OBJECTIVES

The data qualitative objectives (DQO) are qualitative and quantitative statements that specify the quality of the data required for the assessment. DQO must ensure that the data obtained is sufficient to characterise the contamination of a site and enable appropriate assessment of health and environmental risks for the current or proposed use. The DQO were developed for this assessment in accordance with NEPM 2013, as well as in accordance with the Australian Standard "*Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-volatile and semi-volatile compounds*" (AS4482.1-2005) and "*Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 2: Volatile substances*" (AS4482.2-1999). The DQO process adopted is outlined below:

State the Problem

The site was mainly a cow pasture land. Part of the site was used as market garden in the past. The site also contains fill material and many site features. As a result the potential exists for contamination to have occurred within the site in the past and presently.

The site is proposed for residential subdivision development.

The following key professional personnel were involved in the assessment:

Mr Anwar Barbhuyia	Senior Associate
Mr Saurabh Sapkota	Environmental Engineer

Identify the Decisions

The decisions to be made in completing the assessment are as follows:

- Does the site, or is the site, likely to present a risk of harm to human health or the environment?
- Is the site currently suitable for the proposed end use?
- Is there any potential for groundwater contamination?
- Are there any off-site migration issues to be considered?
- Is further investigation required to adequately address the abovementioned decisions?
- Is further investigation required to delineate the extent of contamination identified?
- Does the site require remediation to ensure suitability for the proposed end use?

Identify Inputs to the Decisions

The inputs into the decision process are as follows:

- Historical information (presented in Section 5.0).
- Site operations and observation details (presented in Section 3.0).
- Soil sampling at a density required to meet the NSW EPA "*Sampling Design Guidelines*" using an excavator in the previous market garden area.
- Soil profile information obtained through the sampling phase.
- Chemical and/or physical test data on analysed samples.

14305/1-AA

Part Lot 201 in DP590247 - Station Street, Menangle

- Assessment of test data / data sets against applicable soil investigation levels in the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM) and NSW Site Auditor Scheme (3rd Edition), 2017 (Section 12.0). For asbestos assessment, the assessed soil must not contain asbestos containing material (ACM) in excess of 0.01%w/w and surface soil within the site is free of visible ACM, and asbestos fines (AF) and fibrous asbestos (FA) in the soil is <0.001% w/w.

Define the Study Boundaries

The study boundary for this assessment is defined by the boundaries of the subject site, as shown on Drawing No 14305/1-AA1 and summarised in Section 3.0 of this report.

Develop a Decision Rule

The information obtained through this assessment will be used to characterise the site in terms of contamination issues and risk to human health and the environment. The decision rule in characterising the site will be as follows:

- Laboratory test results will be assessed individually.
- The assessment criteria are the NSW EPA produced and/or endorsed criteria, as specified in Section 12.0 of this report. For asbestos assessment, the assessed soil must not ACM in excess of 0.01%w/w and surface soil within the site is free of visible ACM, and AF and FA in the soil is <0.001% w/w.
- The site will be deemed to potentially contain contamination “hot spots” if any of the individual concentrations exceed the assessment criteria adopted or any presence of asbestos-cement pieces on the surface soil or presence of ACM in excess of 0.01%w/w in the assessed soil and/or detection of AF and FA in excess of 0.001%w/w in the assessed soil.
- Further investigation, remediation and/or management will be recommended if the site is found to be contaminated or containing contamination “hot spots”.

Laboratory test results will only be accepted and considered useable for this assessment under the following conditions:

- All laboratories used are accredited by NATA for the analyses undertaken.
- All detection limits set by the laboratories fall below the assessment criteria adopted.
- Analyte concentrations in the rinsate water sample should be less than laboratory detection limit or should not be detected significantly.
- The recovery of spike concentrations in the trip spike sample is sufficient so as not to impact on the reported concentrations of the soil samples when the same recovery is applied (BTEX only).
- The differences between the reported concentrations of analytes in the field duplicate samples and the corresponding original samples are within accepted limits (refer to Section 9.5).
- The differences between the reported concentrations of analytes in the inter-laboratory duplicate (split) samples and the corresponding original samples are within accepted limits (refer to Section 9.6).

14305/1-AA

Part Lot 201 in DP590247 - Station Street, Menangle

- The QA/QC protocols and results reported by the laboratories comply with the requirements of the NEPM 1999 “*Guideline on Laboratory Analysis of Potentially Contaminated Soils*” and Australian and New Zealand Environment and Conservation Council (ANZECC)-1996 “*Guidelines for the Laboratory Analysis of Contaminated Soils*”.

Specify Limits on Decision Errors

The limits on decision errors for this assessment are as follows:

- Soil sample numbers comply with those recommended in the NSW EPA sampling design guidelines, which have risk probabilities already incorporated. Sample numbers are therefore considered adequate for site characterisation.
- Analyte selection in the open area of the site is based on site history, site activities and the presence of fill materials. The possibility of any other potential contaminants that would be detected through field observation (through odours, staining, and colouring) might need to be included.
- The assessment criteria adopted from the guidelines stated in Section 12.0 have risk probabilities already incorporated.
- The acceptable limits for field and inter-laboratory duplicate (split) comparisons are outlined in Sections 9.5 and 9.6 of this report.
- The acceptance limits for laboratory QA/QC parameters are based on the laboratory reported acceptance limits and those stated in the NEPM 1999 “*Guideline on Laboratory Analysis of Potentially Contaminated Soils*” and ANZECC 1996 “*Guidelines for the Laboratory Analysis of Contaminated Soils*”.

Optimise the Design for Obtaining Data

- The procedures adopted for location and collection of environmental samples were developed prior to implementation, in accordance with NSW EPA guidelines and current industry practice. The sampling program was designed to ensure integrity of data collection during the assessment, including decontamination techniques, sample labelling, storage and chain of custody protocols.
- The analytical program was developed in theory prior to undertaking the sampling (based on site history and site activities) and refined on the basis of field observations (both surface and sub-surface) during the sampling phase. All potential contaminants have been covered within the open area of the site.
- Only laboratories accredited by NATA for the analyses undertaken were used for this assessment. The laboratory performance is assessed through review of statistics calculated for QA samples such as blanks, spikes, duplicates and surrogates.
- The field QA/QC protocols adopted are outlined in Section 9.0 of this report. The QA/QC program incorporates preparation of traceable documentation of procedures used in the sampling and analytical program and in data validation procedures.

14305/1-AA
Part Lot 201 in DP590247 - Station Street, Menangle

Data Quality Indicators

The performance of the assessment in achieving the DQO will be assessed through the application of Data Quality Indicators (DQI), defined as follows:

Precision	A quantitative measure of the variability (or reproducibility) of data;
Accuracy	A quantitative measure of the closeness of reported data to the "true" value;
Representativeness	The confidence (expressed qualitatively) that data is representative of each media present on the site;
Completeness	A measure of the amount of useable data from a data collection activity;
Comparability	The confidence (expressed qualitatively) that data can be considered equivalent for each sampling and analytical event.

Assessment of the data quality indicators is presented in Section 8.0 (sampling) and Section 11.0 (analysis) of this report.

8.0 SAMPLING & ANALYSIS PLAN AND SAMPLING METHODOLOGY

Sampling and analyses for the contamination assessment were carried out to obtain a reasonable assessment of the following:

1. Nature, location and likely distribution of soil contaminants beneath the site.
2. The risks that the contaminants (if present) pose to human health or the environment under the conditions of the proposed use.

The risk of harm to human health and the environment was determined through comparison of test results with EPA produced or endorsed criteria available at the time, as discussed in Section 12.0 of this report.

Soil sampling was carried out on 10 to 12 December 2018 by an Environmental Engineer from Geotechnique who was responsible for visually assessing the site, locating the nominated test pit locations, recovery of soil samples, preparation of samples for delivery to NATA accredited laboratories, and logging the sub-surface profile encountered at each test location.

Based on the "Sampling Design Guidelines for Contaminated Sites" 1995 EPA, eighty one (81) systematic sampling locations (TP1 to TP81) were adopted in the previous market garden area occupying 6.54ha, aimed at maximising coverage of the open area of the site. All locations were excavated by an excavator. The test pit locations are shown on Drawing No 14305/1-AA2.

The sampling procedures adopted were as follows:

- The test pits were excavated using an excavator, over the depth interval nominated by the Environmental Engineer. The representative soil sample was recovered directly from the excavator bucket using a stainless steel trowel.
- The trowel was decontaminated prior to use in order to prevent cross contamination (refer to Section 9.2 for details of the procedures for decontamination of the trowel).
- To minimise the potential loss of volatiles, the laboratory soil sample was immediately transferred to a labelled, laboratory supplied, 250ml glass jar and sealed with an airtight, Teflon screw top lid. The fully filled jar was then placed in a chilled container.

14305/1-AA

Part Lot 201 in DP590247 - Station Street, Menangle

- The recovered soil sample for asbestos analysis was transferred into a separate small plastic bag, which was placed inside a large plastic bag.

In order to ensure the analytical performance of the primary laboratory duplicate and split samples were prepared for analyses. Samples were kept in a labelled, laboratory supplied, glass jar (acid-washed and solvent-rinsed) and sealed with an airtight, Teflon screw top lid. The fully filled jar was placed in a chilled container.

A rinsate water sample was collected and placed in a glass bottle and a vial supplied by the laboratory at completion of each day sampling. The fully filled bottle and vial were labelled and placed in a chilled container.

At completion of field sampling, the chilled containers and large plastic bags were transported to our Penrith office. The chilled containers were then transferred to a refrigerator where the temperature was maintained below 4°C.

The chilled containers with the trip spike sample and large plastic bags were forwarded to the primary laboratory of SGS Environmental Services (SGS) and the secondary laboratory, Envirolab Service Pty Ltd (Envirolab), both NATA accredited. Chains of Custody (COC) were then forwarded to the laboratories.

On receipt of the samples and COC the laboratories returned the Sample Receipt Confirmation verifying the integrity of all samples received.

The soil profile encountered and described in Section 4.0 of this report did not reveal any visual (staining, dying) or olfactory indicators of potential contaminants. As a result and generally based on the potential for contamination mentioned in Section 6.0., the soil samples were analysed for Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc Total Recoverable Hydrocarbons (TRH), BTEX (Benzene, Toluene, Ethyl Benzene and Xylenes), Polycyclic Aromatic Hydrocarbons (PAH), Organochlorine Pesticides (OCP) and/or Polychlorinated Biphenyls (PCB). Imported fill samples were also analysed for asbestos for screening purposes.

The following table provides a list of the data quality indicators (refer to Section 7.0) for the soil sampling phase of the assessment and the methods adopted in ensuring that the data quality indicators were met.

DATA QUALITY INDICATOR	METHOD(S) OF ACHIEVEMENT
Completeness	<p>Good sampling coverage of site; sample numbers comply with NSW EPA sampling design guidelines.</p> <p>Representative coverage of potential contaminants in the open area of the site based on site history, site activities and the presence of fill materials.</p> <p>On site visual assessment of soils uncovered.</p> <p>Use of trained and qualified field staff (Section 9.1).</p> <p>Preparation of sample location plan.</p> <p>Preparation of soil profile logs.</p> <p>Preparation of chain of custody records.</p>

14305/1-AA
Part Lot 201 in DP590247 - Station Street, Menangle

DATA QUALITY INDICATOR	METHOD(S) OF ACHIEVEMENT
Comparability	Using appropriate techniques for sample recovery. Appropriate industry standard decontamination procedures adopted (Section 9.2). Experienced samplers used. Using appropriate sample storage and transportation methods.
Representativeness	Good sampling coverage of site; sample numbers comply with NSW EPA sampling design guidelines. Representative coverage of potential contaminants in the open area of the site based on site history, site activities and the presence of fill materials.
Precision and Accuracy	Rinsate blank water, trip spike, field duplicate, and inter-laboratory duplicate / split samples recovered or prepared (Section 9.3 to 9.6).

9.0 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

9.1 Sampling Personnel

Geotechnique undertook all the sampling associated with this assessment. An Environmental Engineer from Geotechnique (Saurabh Sapkota), nominated sampling positions based on the project brief prepared by the Project Manager, supervised (full time) the excavation of test pits, logged the soil profile encountered, recovered soil samples at a frequency determined by the sampling plan (project brief), and packed the samples (refer to Section 8.0).

Mr Sapkota has a Bachelor of Civil Engineering degree and has been employed by Geotechnique as an Environmental Engineer since 2014. At commencement of employment, Mr Sapkota underwent supervised training in Geotechnique procedures for sampling and logging.

9.2 Decontamination Procedures

As stated in Section 8.0 of this report, soil sampling was carried out using an excavator. The stainless steel trowel was used to transfer the soil sample from the excavator bulk sample to the laboratory supplied glass jar. The stainless steel trowel was decontaminated prior to use. As stated in Sections 9.5 and 9.6, a trowel was used to divide the soil sample into two portions to prepare duplicate/split samples. Decontamination of the trowel involved the following:

- Removal of soils adhering to the trowel by scrubbing with a brush;
- Washing the trowel thoroughly in a solution of phosphate free detergent (Decon 90) using brushes and disposable towels;
- Rinsing the trowel thoroughly with distilled water;
- Repeating the washing / rinsing steps and rinsing with water;
- Drying the trowel with a clean cloth.

A sample of the final rinsate water sample was recovered at completion of each day sampling.

14305/1-AA
Part Lot 201 in DP590247 - Station Street, Menangle

9.3 Rinsate

A rinsate water sample was recovered on completion of each of the three days of field works for soil sampling in order to identify possible cross contamination between the sampling locations. Therefore, three (3) rinsate water samples (RS1 to RS3) were recovered

The rinsate water sample was analysed for Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc). The test results for the rinsate water samples are summarised in Table A. The laboratory test results certificates are included in Appendix B.

As indicated in Table A concentrations of Metals, in the rinsate blank samples were either equal to or less than the laboratory detection limits, which indicates that adequate decontamination had been carried out in the field.

9.4 Trip Spike

Trip spike samples are obtained from the laboratory on a regular basis, prior to conducting field sampling where volatile substances are suspected. The samples are held in the Penrith Office of Geotechnique, at less than 4°C, for a period of not more than seven days. During the field work, the trip spike samples are kept in the chilled container with soil samples recovered from the site. The trip spike sample is then forwarded to the primary laboratory together with the soil samples recovered from the site.

The laboratory prepares the trip spike by adding a known amount of pure petrol standard to a clean sand sample. The sample is mixed thoroughly to ensure a relatively homogenous distribution of the spike throughout the sample. When the sample is submitted for analysis, the same procedure is adopted for testing as for the soil samples being analysed from the site.

The purpose of the trip spike is to detect any loss or potential loss of volatiles from the soil samples during field work, transportation, sample extraction or testing.

Two Trip spike samples (TS1 and TS2) were forwarded to the primary analytical laboratory with the samples collected from the site and were tested for BTEX. The test results for the trip spike samples, reported as a percentage recovery of the applied and known spike concentrations, are shown in Table B. The laboratory test results certificates are included in Appendix B.

As indicated in Table B, the results show a good recovery of the spike concentrations. Furthermore, all BTEX results were less than laboratory detection limits and there were no visible or olfactory indications of hydrocarbon contamination.

Based on the above, it is considered that any loss of volatiles from the recovered samples that might have occurred would not affect the outcome / conclusions of this report.

9.5 Duplicate Samples

A field duplicate sample was prepared in the field through the following processes:

- A larger than normal quantity of soil was recovered from the sample location selected for duplication.
- The sample was placed in a decontaminated stainless bowl and divided into two portions, using the decontaminated trowel.

14305/1-AA

Part Lot 201 in DP590247 - Station Street, Menangle

- One portion of the sub-sample was immediately transferred, using the decontaminated trowel, into a labelled, laboratory supplied, 250ml glass jar and sealed with an airtight, Teflon screw top lid. The fully filled jar was labelled as the duplicate sample and immediately placed in a chilled container.
- The remaining portion was stored in the same way and labelled as the original sample.

Duplicate samples were prepared on the basis of sample numbers recovered during the field work. The duplicate sample frequency was computed using the total number of samples analysed as part of this assessment. The duplicate sample frequencies computed are as follows:

Metals:	32 samples analysed;	2 duplicates;	6.3% frequency
TRH:	6 samples analysed;	1 duplicate;	17% frequency
BTEX:	6 samples analysed;	1 duplicate;	17% frequency
PAH:	6 samples analysed;	1 duplicate;	17% frequency
OCP	23 samples analysed	2 duplicates;	8.7% frequency
PCB	6 samples analysed	1 duplicate;	17% frequency

The duplicate frequency adopted complies with the NEPM, which recommends a duplicate frequency of at least 5%.

The laboratory test results are summarised in Tables C1 and C2. The laboratory test results certificates are included in Appendix B.

A comparison was made of the laboratory test results for the duplicate samples with the original samples and the Relative Percentage Differences (RPD) was computed to assess the accuracy of the laboratory test procedures. RPD within 30% are generally considered acceptable. However, this variation can be higher for organic analysis than for inorganics and for low concentrations of analytes.

As shown in Tables C1 and C2, the comparisons between the duplicate and corresponding original sample indicated generally acceptable RPD, with the exception of higher RPD of one metal in Table C2 due to the heterogeneity of samples. Therefore, the variation is not considered critical and the laboratory test data provided by SGS are of adequate accuracy and reliability for this assessment.

9.6 Inter-laboratory Duplicate (Split) Samples

The inter-laboratory duplicate (split) sample provides a check on the analytical performance of the primary laboratory. The split sample was prepared on the basis of sample numbers recovered during field work, and the analyses undertaken by the primary laboratory.

The split sample was prepared in the same manner as the duplicate sample. Reference should be made to Section 9.5.

Split samples were forwarded to the secondary laboratory of Envirolab.

14305/1-AA
Part Lot 201 in DP590247 - Station Street, Menangle

The split sample frequency was computed using the total number of samples analysed as part of this assessment. The split sample frequencies computed are as follows:

Metals:	32 samples analysed;	2 splits;	6.3% frequency
TRH:	6 samples analysed;	1 split;	17% frequency
BTEX:	6 samples analysed;	1 split;	17% frequency
PAH:	6 samples analysed;	1 split;	17% frequency
OCP	23 samples analysed	2 splits;	8.7% frequency
PCB	6 samples analysed	1 split;	17% frequency

The split sample frequency adopted complies with the NEPM, which recommends a frequency of 5%.

The results are also summarised in Tables D1 and D2. The laboratory test results certificates are included in Appendix B.

Based on Schedule B (3) of the NEPM the difference in the results between the split samples should generally be within 30% of the mean concentration determined by both laboratories, i.e., RPD should be within 30%. However, this variation can be higher for organic analysis than for inorganics and for low concentrations of analytes.

As shown in Tables D1 and D2, the comparisons between the split and corresponding original sample indicated generally acceptable RPD, with the exception of higher RPD for a number of metals in both tables, mainly due to the heterogeneity of samples. Therefore, the variations are not considered critical and the test results provided by the primary laboratory are deemed reliable for this assessment.

10.0 LABORATORY QUALITY ASSESSMENT AND QUALITY CONTROL

Geotechnique uses only laboratories accredited by the National Association of Testing Authorities (NATA) for chemical analyses. The laboratory must also incorporate quality laboratory management systems to ensure that trained analysts using validated methods and suitably calibrated equipment produce reliable results.

In addition to the quality control samples, the laboratory must also ensure that all analysts receive certification as to their competence in carrying out the analysis and participate in national and international proficiency studies.

SGS and Envirolab are accredited by NATA and operate Quality Systems designed to comply with ISO / IEC 17025.

The recovered discrete and composited soil samples were analysed within the allowable holding times, detailed in Schedule B (3) of The NEPM by the National Environment Protection Council (NEPC). It should be noted that there is no specific holding time for asbestos analysis. The rinsate samples were analysed within the allowable holding times for water detailed in Standard Methods for the Examination of Water and Wastewater (APHA).

The test methods adopted by the laboratories are indicated with the laboratory test results certificates. As part of the analytical run for the project, the laboratories included laboratory blanks, duplicate samples, laboratory control samples, matrix spikes and/or surrogate spikes.

14305/1-AA

Part Lot 201 in DP590247 - Station Street, Menangle

We have checked the QA/QC procedures and results adopted by the laboratories against the appropriate guidelines. The quality control sample numbers adopted by SGS and Envirolab are considered adequate for the analyses undertaken.

The methods used by SGS and Envirolab have been validated as recommended in the NEPM and ANZECC guidelines and endorsed by NATA.

The samples analysed for TRH (C₆–C₉) and/or BTEX were extracted by the purge and trap method recommended by the NSW EPA.

All reported laboratory Limits of Reporting (LOR) / Practical Quantitation Limits (PQL) were less than the assessment criteria adopted for each analyte or analyte group.

Overall, the quality control elements adopted by SGS and Envirolab indicate that the analytical data fall within acceptable levels of accuracy and precision for the analysis of soils. The analytical data provided are therefore considered to be reliable and useable for this assessment.

11.0 QA/QC DATA EVALUATION

The following table provides a list of the data quality indicators for the analytical phase of the assessment and the methods adopted in ensuring that the data quality indicators were met.

DATA QUALITY INDICATOR	METHOD(S) OF ACHIEVEMENT
Data Completeness	Laboratory sample receipt information received confirming receipt of samples intact and appropriate chain of custody. Analysis for all potential contaminants of concern in the open area of the site. NATA registered laboratory analytical reports / certificates of analysis provided.
Data Comparability	Use of NATA registered laboratories. Test methods consistent for each sample. Test methods comparable between primary and secondary laboratory. Acceptable Relative Percentage Differences between original samples and field duplicates and inter-laboratory duplicate / split samples.
Data Representativeness	Representative coverage of potential contaminants in the open areas of the site based on site history, site activities and the presence of fill materials. Adequate duplicate, split, trip spike and rinsate sample numbers. Adequate laboratory internal quality control and quality assurance methods, complying with the NEPM.
Data Precision and Accuracy	Acceptable concentrations in rinsate blank water samples. Acceptable recoveries of spike concentrations in trip spike samples. Acceptable RPD for duplicate comparison overall. Acceptable RPD for inter-laboratory duplicate / split sample comparison overall. Appropriate and validated laboratory test methods used. Adequate laboratory performance based on results of the blank samples, duplicates, surrogate spike samples, control samples and/or matrix spike samples.

Based on the above, it is considered that both laboratories complied with the quality assurance and quality control data quality indicators. As such, it is concluded that the laboratory test data obtained are reliable and useable for this assessment.

12.0 ASSESSMENT CRITERIA

Investigation levels and screening levels developed in the NEPM 2013 were used in this assessment, as follows:

- Risk-based HIL for a broad range of metals and organic substances. The HIL are applicable for assessing human health risk via all relevant pathways of exposure. The HIL as listed in Table 1A (1) of Schedule B1 "*Guideline on Investigation Levels for Soil and Groundwater*" are provided for different land uses.

The site is proposed for residential subdivision development. As such, with regard to human health, analytical results will be assessed against risk based HIL for *residential with garden/accessible soil* (HIL A).

- Health Screening Levels (HSL) for TPH fractions and Naphthalene are applicable for assessing human health risk via inhalation and direct contact pathways. The HSL depend on specific soil physicochemical properties, land use scenarios and the characteristics of building structures. The HSL listed in Table 1A(3) of Schedule B1 "*Guideline on Investigation Levels for Soil and Groundwater*" apply to different soil types and depths below surface to >4 m.

For this assessment, the analytical results were assessed against the available HSL for *residential with garden/accessible soil* (HSL A) for clay to depth of 0m to <1m and sand to depth of 0m to <1m.

- Ecological Screening Levels (ESL) for selected petroleum hydrocarbon compounds, TPH fractions and Benzo(a)Pyrene are applicable for assessing the risk to terrestrial ecosystems. ESL listed in Table 1B(6) of Schedule B1 "*Guideline on Investigation Levels for Soil and Groundwater*" broadly apply to coarse and fine-grained soils and various land uses and are generally applicable to the top 2m of soil.

The analytical result was assessed against the available ESL for *residential with garden/accessible soil* for fine-grained soil (clay) and coarse-grained soil (sand).

- Ecological Investigation Levels (EIL), a specific type of Soil Quality Guidelines (SQG) for selected metals, is applicable for assessing the risk to terrestrial ecosystems. EIL listed in Table 1B(1-5) of Schedule B1 "*Guideline on Investigation Levels for Soil and Groundwater*" depend on specific soil physicochemical properties and land use scenarios and generally apply to the top 2m of soil. For arsenic and lead, generic EIL are adopted, for *urban residential* land use for aged contamination. For other metals, where available, EIL are calculated using the EIL calculator developed by CSIRO for NEPC. Otherwise, where available, EIL are calculated using 30% effect concentration (EC30) or lowest observed effect concentrations (LOEC) toxicity data. EIL are the sum of the added contaminant limit (ACL) and the ambient background concentration (ABC).

For this assessment, the analytical results were assessed against the available SQG / EIL for *urban residential* land use for aged contamination in soil for low traffic volume.

For DDT and Naphthalene, generic EIL are adopted, for *urban residential* land use for fresh contaminants.

*14305/1-AA**Part Lot 201 in DP590247 - Station Street, Menangle*

In order to detect any potential "hot spots" of contamination within an individual composite soil sample, an Adjusted HIL A / EIL is recommended for assessment of results for individual composite samples, based on Method 1, Section 6 of the EPA "Sampling Design Guidelines" 1995. The Adjusted HIL A / EIL presented in the applicable tables were calculated by dividing the HIL A / EIL by three (i.e. three sub-samples comprised the composite). Individual composite samples were assessed against the Adjusted HIL A / EIL.

If the concentration of an analyte for a composite soil sample is in excess of the Adjusted EIL / HIL A, then all sub-samples of the failed composite samples will be analysed individually. The purpose of this is to detect potentially contaminated sub-samples within the failed composite sample.

For discrete soil samples, the individual concentrations of analytes were assessed against the HIL A / HSL A / ESL / EIL.

For asbestos, the assessed soil must not contain ACM in excess of 0.01%w/w and surface soil within the site is free of visible ACM, and AF and FA in the soil is <0.001% w/w.

The site will be deemed contaminated or containing contamination "hot spots" if the above criteria are unfulfilled. Further investigation, remediation and/or management will be recommended if the area of concern is found to be contaminated or containing contamination "hot spots".

The adopted assessment criteria for the soil samples are detailed in Tables E and G to M.

13.0 FIELD & LABORATORY TEST RESULTS, ASSESSMENT & DISCUSSION

13.1 Field Results

Details of the sub-surface conditions encountered during field work for this assessment are presented in Table 1 in Appendix B of this report. As discussed in Section 4.0, the general soil profile comprised topsoil overlying natural clayey soil. Imported fill materials and site originated fill materials were encountered at a number of locations, underlain by natural clayey soil.

The test pits did not reveal any visual evidence of asbestos or other indicators of significant contamination, such as staining, odours or significant foreign matter

13.2 Analytical Results

Reference may be made to Appendix B for the actual laboratory test results certificates from SGS. The test results are also presented in Tables E to M together with the assessment criteria adopted. A discussion of the test data is presented in the following sub-sections.

13.2.1 Metals (As, Cd, Cr, Cu, Pb, Hg, Ni & Zn)

The Metals test results for selected discrete soil samples are presented in Table E, and as shown, all concentrations of Metals were below the available relevant Ecological Investigation Level (EIL) and Health Investigation Levels (HIL) for residential development with garden/accessible soil (HIL A).

Test results of CEC and pH were adopted from Table F to calculate EIL in Table G.

The Metals test results for composited samples are presented in Table G and as indicated, all concentrations of Metals were below the relevant available Adjusted EIL and Adjusted HIL A, with the exception of the highlighted copper (Cu) and zinc (Zn) concentrations for Composite C4 and Zn concentration for Composite C25. As indicated in Table D2, Spilt Sample SS1 (the corresponding original sample is Composite C25) also has elevated Cu and nickel (Ni) concentrations.

The elevated Cu, Ni and Zn concentrations exceeded the relevant Adjusted EIL but were below the relevant Adjusted HIL A.

The sub-samples of the failed composite samples (C4 and C25) were therefore analysed for Cu, Ni and/or Zn and the test results are summarised in Table H.

As shown in Table H, all concentrations of Cu, Ni and Zn were below the relevant EIL and the HIL A.

13.2.2 TPH and BTEX

The TPH and BTEX test results for selected discrete soil samples are presented in Table I. As shown in Table I, the concentrations of F1 (TPH C6-C10 less BTEX), F2 (TPH >C10-C16 less Naphthalene), F3 (TPH >C16-C34), F4 (TPH >C34-C40) and BTEX were below the relevant Health Screening Levels A (HSL A) and / or Ecological Screening Levels (ESL) adopted. Moreover, almost all test results were below the laboratory limits of reporting (LOR).

13.2.3 Polycyclic Aromatic Hydrocarbons (PAH)

The PAH test results for selected discrete soil samples are presented in Table J and as shown, concentrations of Benzo(a)pyrene, Benzo(a)pyrene TEQ, Naphthalene and Total PAH were well below the relevant HIL A or ESL or HSL A or EIL adopted. Moreover, most of the test results were below the laboratory LOR.

13.2.4 Organochlorine Pesticides (OCP)

The OCP test results for selected discrete soil samples are presented in Table K and as indicated, all concentrations of OCP were well below the relevant HIL A. Concentrations of DDT were also below the EIL. Moreover, all test results were below the laboratory LOR.

The OCP test results for the composited samples are presented in Table L and as indicated, the concentrations of OCP were well below the relevant Adjusted HIL A. Concentrations of DDT were also below the Adjusted EIL. Moreover, all test results were below the laboratory LOR.

13.2.5 Polychlorinated Biphenyls (PCB)

The PCB test result for selected discrete soil sample is presented in Table K and as indicated the concentration of PCB was below the relevant HIL A adopted as well as below the laboratory LOR.

13.2.6 Asbestos

The asbestos test results for imported fill samples are presented in Table M and as indicated, AF and FA in excess of 0.001%w/w were found in the upper fill profile at test pit TP33, which presents a risk of harm to human health. ACM in excess of 0.01% was not detected in the analysed imported fill samples.

14305/1-AA
Part Lot 201 in DP590247 - Station Street, Menangle

14.0 CONCLUSION AND RECOMMENDATIONS

The data quality objectives outlined in the report have been satisfied. The findings of this detailed contamination assessment are summarised as follows:

- The site is mainly a cow pasture land.
- The site is proposed for residential subdivision development.
- The site is generally underlain by topsoil overlying natural clayey soil. Imported fill materials and site originated fill materials were encountered at a number of locations, underlain by natural clayey soil. The test pits did not reveal any visual evidence of asbestos or other indicators of significant contamination, such as staining, odours or significant foreign matter.
- As presented in summary tables (Tables E to M) and discussed in Section 13.2, all the laboratory test results satisfied the criteria for stating that the analytes selected are either not present i.e. concentrations less than laboratory limits of reporting, or present in the sampled soil at concentrations that do not pose a risk of hazard to human health or the environment under a “residential with access to soil” form of development form of development, with the exception of detection of elevated concentration asbestos fines (AF) and fibrous asbestos (FA) in the upper fill profile at one location, as shown on Drawing No 14305/1-AA3. Asbestos (AF and FA) presents a risk of harm to human health.

Based on this assessment, in our opinion, the site is considered suitable for the proposed residential subdivision development subject to implementation of the following recommendations, prior to bulk earthworks:

- Detailed sampling and testing in the vicinity of TP33 to delineate the extent of asbestos contamination.
- Excavation at TP28 to determine the full depth of fill, as refusal occurred during DCA on sandstone fill materials at 700mm depth. Testing might be required.
- Judgmental sampling and testing of soils beneath and/or in the vicinity of all the site features after demolition/removal/clearing. The purpose is to determine the contamination of soil beneath all the site features.
- Development of a remedial action plan (RAP) to remediate asbestos contaminated soil, plus any other contamination identified through the recommended additional sampling and testing, followed by appropriate validation.

It should be noted that since the site was used in the past for agricultural activities, there is potential for buried irrigation pipes to remain beneath the site surface. It is also possible that the pipes might be formed from bonded asbestos. If any asbestos pipes are uncovered, a suitably qualified asbestos removal contractor must be engaged to carry out removal.

If any suspect materials (identified by unusual staining, odour, discolouration or inclusions such as building rubble, asbestos sheets/pieces/pipes, ash material, etc.) between the sampling locations are encountered during any stage of future earthworks/site preparation, Unexpected Finds Management Protocol (Appendix C) should be implemented. In the event of contamination, detailed assessment, remediation and validation will be necessary.

For any materials to be excavated and removed from the site, it is recommended that waste classification of the materials, in accordance with the "Waste Classification Guidelines Part 1: Classifying Waste" (NSW EPA 2014), NSW EPA resource recovery exemptions and orders under the Protection of the Environment Operations (Waste) Regulation 2014, or NSW EPA Certification: Virgin excavated natural material is undertaken prior to disposal at an appropriately licensed landfill or potential re-use at other sites.

Any imported soil (fill) must be assessed by a qualified environmental consultant, prior to importation, to ensure suitability for the proposed use. In addition, the imported fill must not contain asbestos and ash, be free of unusual odour, not be discoloured and not acid sulphate soil or potential acid sulphate soil. The imported fill should either be virgin excavated natural material (VENM) or excavated natural material (ENM).

15.0 LIMITATIONS

Within the scope of work outlined in the fee proposals dated 28 May 2018 (Reference Q8475-AB), the services performed by Geotechnique were conducted in a manner consistent with the level of quality and skill generally exercised by members of the profession and consulting practice.

This report has been prepared for Mirvac Homes (NSW) Pty Limited through Calibre Group for the purposes stated within. Wollondilly Council may rely upon the report for development and/or construction application determinations. Reliance on this report by other parties shall be at such parties' sole risk as the report might not contain sufficient information for other purposes.

This report shall only be presented in full and may not be used to support any objective other than those set out in the report, except where written approval is provided by Geotechnique Pty Ltd.

The information in this report is considered accurate at completion of field sampling for this assessment (12 December 2018) in accordance with current site conditions. Any variations to the site form or use beyond the sampling date could nullify the conclusions stated.

Whilst investigations conducted at the site were carried out in accordance with current NSW guidelines the potential always exists for contaminated soils to be present between sampled locations.

Presented in Appendix D is a document entitled "Environmental Notes", which should be read in conjunction with this report.

LIST OF REFERENCES

- Australian Standard "Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-volatile and semi-volatile compounds" (AS4482.1-2005)*
- Australian Standard "Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 2: Volatile substances" (AS4482.2-1999)*
- Contaminated Land Management Act 1997*
- Contaminated Land Management Regulation 1998*
- Contaminated Sites: Guidelines for Assessing Former Orchard and Market Garden - NSW Department of Environment and Conservation (DEC) 2005*
- Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites – NSW Environment Protection Authority 2011*
- Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd Edition) –NSW EPA 2017*
- Contaminated Sites: Sampling Design Guidelines - NSW Environment Protection Authority 1995*
- Guidelines for the Laboratory Analysis of Contaminated Soils - Australian and New Zealand Environment and Conservation Council (ANZECC) 1996*
- Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land – Department of Urban Affairs and Planning / NSW Environment Protection Authority 1998*
- National Environment Protection (Assessment of Site Contamination) Measure – National Environmental Protection Council 2013*
- Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A – The Excavated Natural Material Exemption & Order 2014*
- Standard Methods for the Examination of Water and Wastewater – American Public Health Association (APHA) 2005*
- Waste Classification Guidelines Part 1: Classifying Waste - NSW DECC (November 2014)*

DRAWINGS

Drawing No 14305/1-AA1

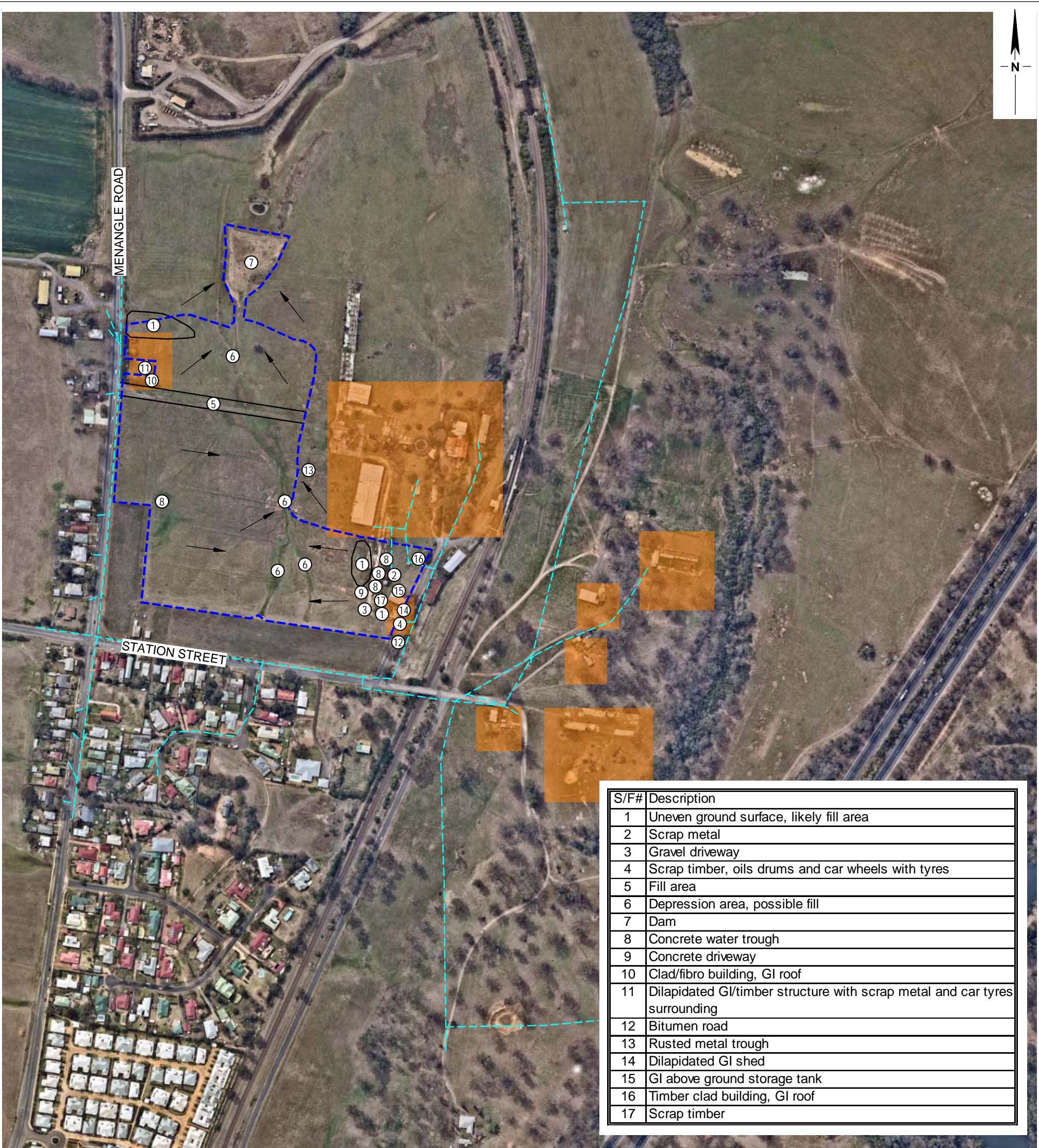
Site Features

Drawing No 14305/1-AA2

Systematic Test Pit Locations

Drawing No 14305/1-AA3

Location of Concern

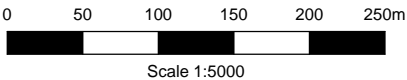


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LEGEND

- Area of Environmental Concern
(as identified by EIS Report Ref: E27284KBprt dated 13 May 2014)
- Slope
- Power Line
- Site Feature Number
- Approximate Extent of Bulk Earthworks

S/F#	Description
1	Uneven ground surface, likely fill area
2	Scrap metal
3	Gravel driveway
4	Scrap timber, oils drums and car wheels with tyres
5	Fill area
6	Depression area, possible fill
7	Dam
8	Concrete water trough
9	Concrete driveway
10	Clad/fibro building, GI roof
11	Dilapidated GI/timber structure with scrap metal and car tyres surrounding
12	Bitumen road
13	Rusted metal trough
14	Dilapidated GI shed
15	GI above ground storage tank
16	Timber clad building, GI roof
17	Scrap timber



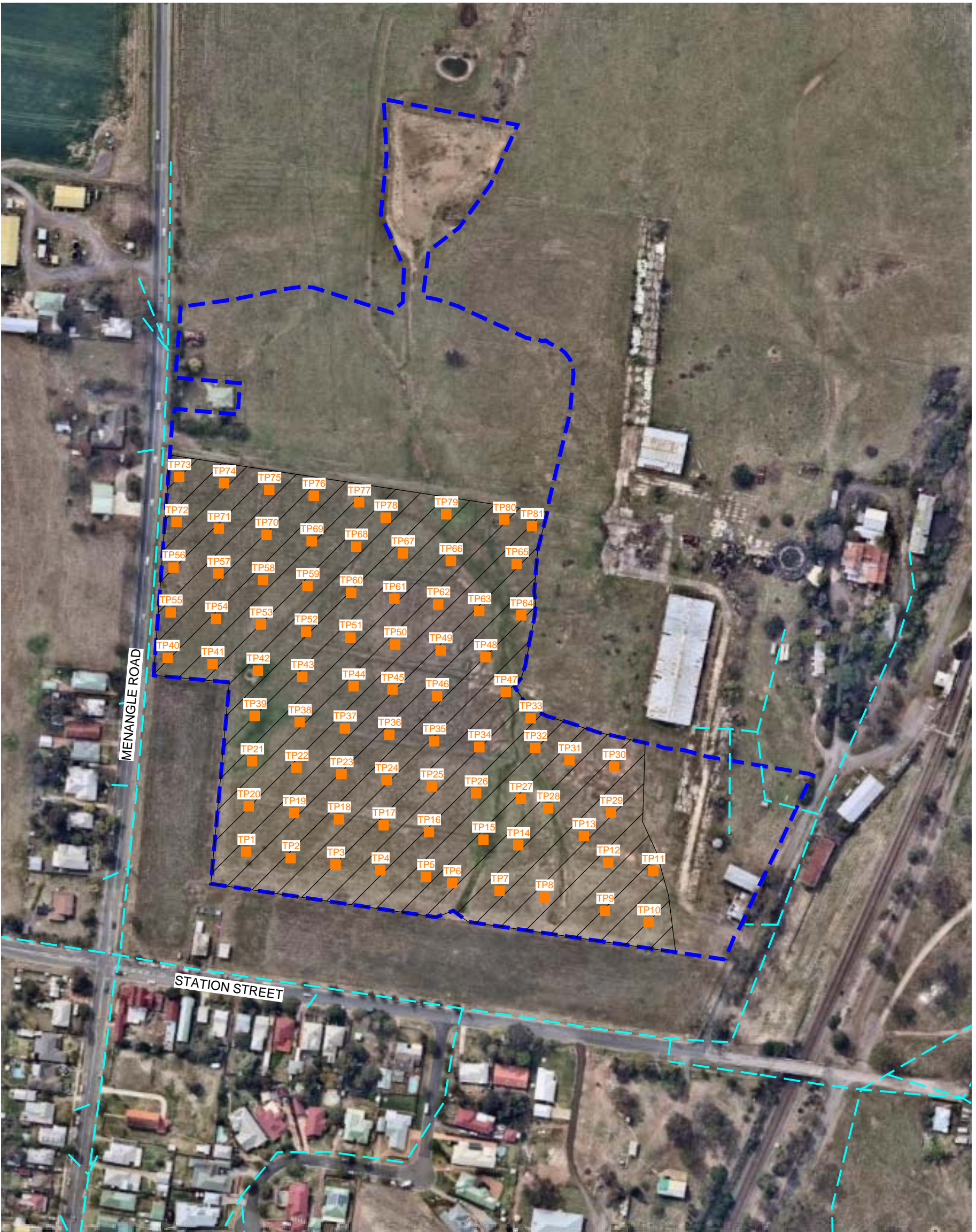
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Part Lot 201 in DP590247
Station Street
Menangle

Site Features - Stage 1

Drawing No: 14305/1-AA1
Job No: 14305/1
Drawn By: MH
Date: 6 November 2018
Checked By: JH/AB

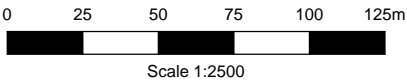
File Ref: 14305-1
Layers: 0, AA1




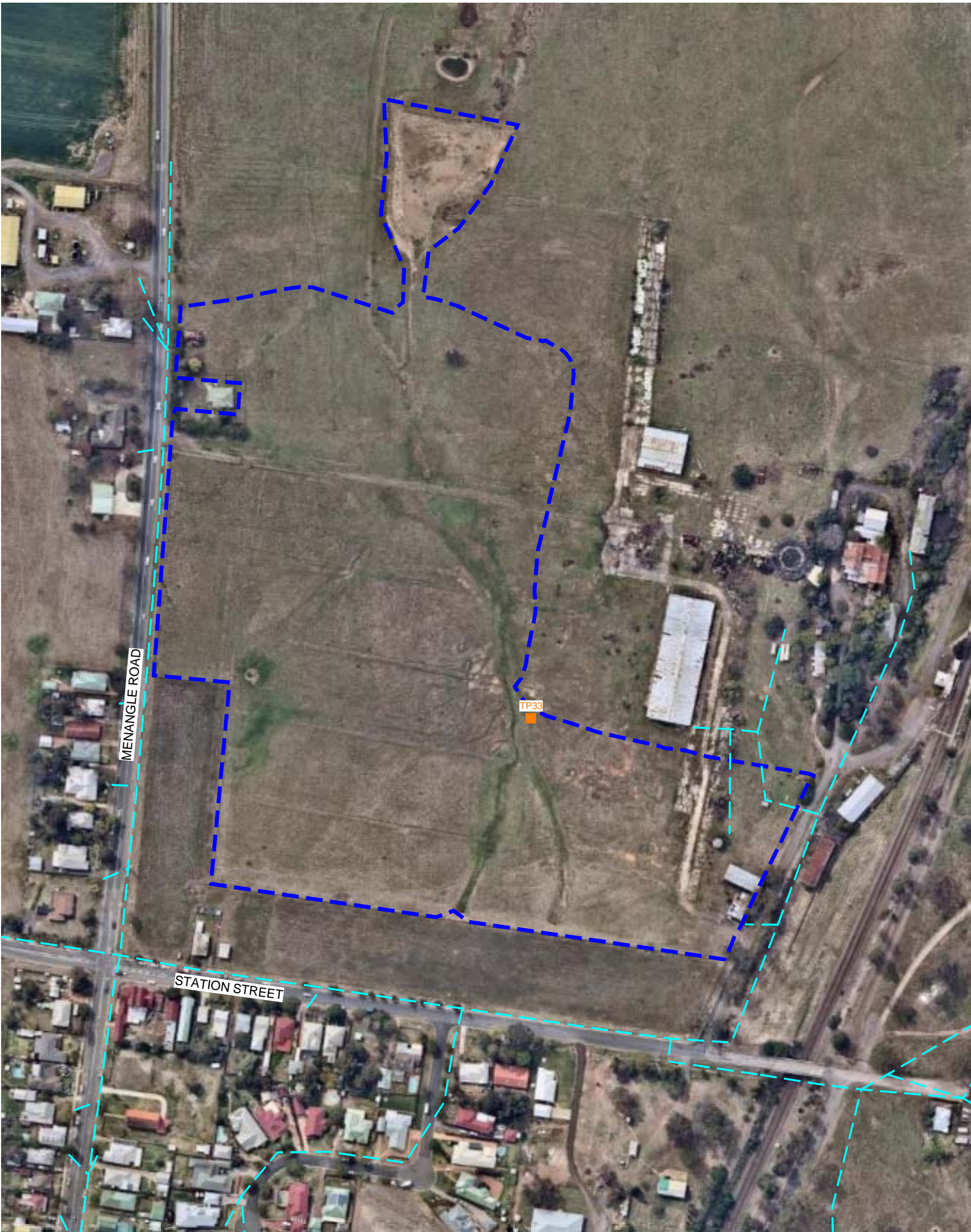
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LEGEND

- Power Line
- Approximate Extent of Bulk Earthworks
- Previous Market Garden Area
- Test Pit



 CONSULTING ENGINEERS	PO Box 880 Penrith NSW 2750 Tel: 02 4722 2700 Fax: 02 4722 2777 e-mail: info@geotech.com.au www.geotech.com.au	Part Lot 201 in DP590247 Station Street Menangle	Drawing No: 14305/1-AA2 Job No: 14305/1 Drawn By: MH Date: 17 December 2018 Checked By: AB
		Systematic Test Pit Locations - Stage 1	File Ref: 14305-1 Layers: 0, AA2



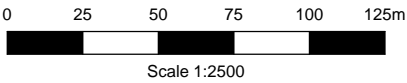
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LEGEND

- Power Line
- Approximate Extent of Bulk Earthworks
- Test Pit

Sample Location	Depth (m)	Contaminant	Concentration
TP33	0-0.2	Asbestos (<7mm AF/FA)	2.8% w/w
Assessment Criteria	0.001% w/w for AF & FA in soil		

Note:
AF / FA: Asbestos Fine / Fibrous Asbestos



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Part Lot 201 in DP590247
Station Street
Menangle

Location of Concern

Drawing No: 14305/1-AA3
Job No: 14305/1
Drawn By: MH
Date: 17 January 2019
Checked By: AB

File Ref: 14305-1
Layers: 0, AA3

TABLES

<i>Table A</i>	<i>Rinsate</i>
<i>Table B</i>	<i>Trip Spike</i>
<i>Tables C1 & C2</i>	<i>Duplicate Samples</i>
<i>Tables D1 & D2</i>	<i>Split Samples</i>
<i>Table E</i>	<i>Metals Test Results, Cation Exchange Capacity (CEC) & pH Test Results – Discrete Samples</i>
<i>Table F</i>	<i>Cation Exchange Capacity (CEC) and pH Test Results – Sub-samples</i>
<i>Table G</i>	<i>Metals, Cation Exchange Capacity (CEC) & pH Test Results – Compositated Samples</i>
<i>Table H</i>	<i>Metals Test Results – Sub-samples</i>
<i>Table I</i>	<i>Total Recoverable Hydrocarbons (TRH) and BTEX Test Results – Discrete Samples</i>
<i>Table J</i>	<i>Polycyclic Aromatic Hydrocarbons (PAH) Test Results – Discrete Samples</i>
<i>Table K</i>	<i>Organochlorine Pesticides (OCP) & Polychlorinated Biphenyls (PCB) Test Results – Discrete Samples</i>
<i>Table L</i>	<i>Organochlorine Pesticides (OCP) Test Results – Compositated Samples</i>
<i>Table M</i>	<i>Asbestos Test Results – Discrete Samples</i>

TABLE A
RINSATE
(Ref No: 14305/1-AA)

SAMPLE DATE	RS1 10/12/2018	RS2 11/12/2018	RS3 12/12/2018
METAL	(mg/L)	(mg/L)	(mg/L)
Arsenic	<0.02	<0.02	<0.02
Cadmium	0.001	<0.001	<0.001
Chromium	<0.005	<0.005	<0.005
Copper	<0.005	<0.005	<0.005
Lead	<0.02	<0.02	<0.02
Mercury	<0.0001	<0.0001	<0.0001
Nickel	<0.005	<0.005	<0.005
Zinc	<0.01	<0.01	<0.01

TABLE B
TRIP SPIKE
(Ref No: 14305/1-AA)

Sample	Sampling Date	BTEX			
		Benzene	Toluene	Ethylbenzene	Xylenes
TS1	10/12/2018	81%	85%	89%	93%
TS2	11/12/2018	85%	79%	83%	85%

Note : results are reported as percentage recovery of known spike concentrations

TABLE C1
DUPLICATE SAMPLE
(Ref No: 14305/1-AA)

ANALYTE	TP64 0.0-0.15 (m) mg/kg	DDS1 mg/kg	RELATIVE PERCENTAGE DIFFERENCES (RPD) %
Arsenic	7	7	0
Cadmium	<0.3	<0.3	-
Chromium	9.6	9.4	2
Copper	22	18	20
Lead	62	71	14
Mercury	<0.05	<0.05	-
Nickel	7	6.3	11
Zinc	73	69	6
TOTAL RECOVERABLE HYDROCARBONS (TRH)			
F1 (C6-C10 less BTEX)	<25	<25	-
F2 (>C10-C16)	<25	<25	-
F3 (>C16-C34)	<90	<90	-
F4 (>C34-C40)	<120	<120	-
BTEX			
Benzene	<0.1	<0.1	-
Toluene	<0.1	<0.1	-
Ethyl Benzene	<0.1	<0.1	-
Xylenes	<0.3	<0.3	-
POLYCYCLIC AROMATIC HYDROCARBONS			
Benzo(a)Pyrene TEQ	<0.3	<0.3	-
Total PAH	<0.8	<0.8	-
Naphthalene	<0.1	<0.1	-
Benzo(a)Pyrene	<0.1	<0.1	-
ORGANOCHLORINE PESTICIDES (OCP)			
Hexachlorobenzene (HCB)	<0.1	<0.1	-
Heptachlor	<0.1	<0.1	-
Aldrin+Dieldrin	<0.3	<0.3	-
Endrin	<0.2	<0.2	-
Methoxychlor	<0.1	<0.1	-
Mirex	<0.1	<0.1	-
Endosulfan (alpha, beta & sulphate)	<0.5	<0.5	-
DDD+DDE+DDT	<0.6	<0.6	-
Chlordane (alpha & gamma)	<0.2	<0.2	-
POLYCHLORINATED BIPHENYLS (PCB)			
Total PCB	<1	<1	-

TABLE C2
DUPLICATE SAMPLE
(Ref No: 14305/1-AA)

ANALYTE	C4	CDS1	RELATIVE PERCENTAGE DIFFERENCES (RPD)
	mg/kg	mg/kg	%
Arsenic	9	12	29
Cadmium	<0.3	<0.3	-
Chromium	16	15	6
Copper	58	45	25
Lead	42	69	49
Mercury	<0.05	0.05	-
Nickel	15	14	7
Zinc	98	110	12
ORGANOCHLORINE PESTICIDES (OCP)			
Hexachlorobenzene (HCB)	<0.1	<0.1	-
Heptachlor	<0.1	<0.1	-
Aldrin+Dieldrin	<0.3	<0.3	-
Endrin	<0.2	<0.2	-
Methoxychlor	<0.1	<0.1	-
Mirex	<0.1	<0.1	-
Endosulfan (alpha, beta & sulphate)	<0.5	<0.5	-
DDD+DDE+DDT	<0.6	<0.6	-
Chlordane (alpha & gamma)	<0.2	<0.2	-

TABLE D1
SPLIT SAMPLE
 (Ref No: 14305/1-AA)

ANALYTE	TP33 0.0-0.15 (m) mg/kg (SGS)	DSS1 mg/kg (ENVIROLAB)	RELATIVE PERCENTAGE DIFFERENCES (RPD) %
Arsenic	7	6	15
Cadmium	0.3	<0.4	-
Chromium	8.2	7	16
Copper	39	39	0
Lead	210	150	33
Mercury	<0.05	<0.1	-
Nickel	9.8	7	33
Zinc	380	260	38
TOTAL RECOVERABLE HYDROCARBONS (TRH)			
F1 (C6-C10 less BTEX)	<25	<25	-
F2 (>C10-C16)	<25	<50	-
F3 (>C16-C34)	170	<100	-
F4 (>C34-C40)	<120	<100	-
BTEX			
Benzene	<0.1	<0.2	-
Toluene	<0.1	<0.5	-
Ethyl Benzene	<0.1	<1	-
Xylenes	<0.3	<1	-
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)			
Benzo(a)Pyrene TEQ	0.7	<0.5	-
Total PAH	4.2	<0.05	-
Naphthalene	0.1	<1	-
Benzo(a)Pyrene	0.5	<0.05	-
ORGANOCHLORINE PESTICIDES (OCP)			
Hexachlorobenzene (HCB)	<0.1	<0.1	-
Heptachlor	<0.1	<0.1	-
Aldrin+Dieldrin	<0.3	<0.2	-
Endrin	<0.2	<0.1	-
Methoxychlor	<0.1	<0.1	-
Endosulfan (alpha (I), beta (II) & sulphate)	<0.5	<0.3	-
DDD+DDE+DDT	<0.6	<0.3	-
Chlordane (alpha & gamma)	<0.2	<0.2	-
POLYCHLORINATED BIPHENYLS (PCB)			
Total PCB	<1	<0.1	-

TABLE D2
SPLIT SAMPLE
(Ref No: 14305/1-AA)

ANALYTE	C25 mg/kg (SGS)	CSS1 mg/kg (ENVIROLAB)	RELATIVE PERCENTAGE DIFFERENCES (RPD)
			%
Arsenic	11	14	24
Cadmium	<0.3	<0.4	-
Chromium	17	25	38
Copper	34	52	42
Lead	25	30	18
Mercury	<0.05	<0.1	-
Nickel	11	20	58
Zinc	95	160	51
ORGANOCHLORINE PESTICIDES (OCP)			
Hexachlorobenzene (HCB)	<0.1	<0.1	-
Heptachlor	<0.1	<0.1	-
Aldrin+Dieldrin	<0.3	<0.2	-
Endrin	<0.2	<0.1	-
Methoxychlor	<0.1	<0.1	-
Endosulfan (alpha (I), beta (II) & sulphate)	<0.5	<0.3	-
DDD+DDE+DDT	<0.6	<0.3	-
Chlordane (alpha & gamma)	<0.2	<0.2	-

TABLE E
METAL, CATION EXCHANGE CAPACITY (CEC) & pH TEST RESULTS
DISCRETE SAMPLES
(Ref No: 14305/1-AA)

Sample Location	Depth (m)	METAL (mg/kg)								CEC (cmol _c /kg)	pH
		ARSENIC	CADMIUM	CHROMIUM (Total)	COPPER	LEAD	MERCURY	NICKEL	ZINC		
TP28	0.0-0.15	14	<0.3	28	90	38	<0.05	11	120	22	6.4
TP33	0.0-0.15	7	0.3	8.2	39	210	<0.05	9.8	380	34	7.9
TP33	0.2-0.35	8	<0.3	12	24	26	<0.05	4.3	46	12	6.7
TP47	0.0-0.15	8	<0.3	11	47	24	<0.05	9.9	110	21	6.8
TP64	0.0-0.15	7	<0.3	9.6	22	62	<0.05	7	73	16	8
TP65	0.0-0.15	11	<0.3	15	33	31	<0.05	10	100	26	7.1
TP66	0.0-0.15	13	<0.3	22	29	31	<0.05	8.6	49	-	-
Limit of Reporting (LOR)		1	0.3	0.3	0.5	1	0.05	0.5	2	0.02	0.1
DSS1		6.0	<0.4	7	39	150	<0.1	7	260		
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)											
Health-based Investigation Levels (HIL) A - ^a Residential A		100	20	100 ^c	6000	300	10 ^d	400	7400		
Ecological Investigation Levels (EIL) - ^b Urban residential		100 ^e	-	200 ^f	210	1200 ^g	-	190	540		

- Notes:
- a: Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake (no poultry)), also includes childcare centres, preschools and primary schools.
 - b: EIL of aged nickel & zinc were derived from calculation spreadsheet developed by CSIRO for NEPC; Old Suburb with Low Traffic; the lowest CEC=12 cmol_c/kg & pH=6.4; the assumed clay content=1 % were selected for derivation of EIL; a conservative approach.
 - EIL of aged copper = added contaminant limit (calculated based on the lowest of the pH and the lowest of the CEC) + ambient background concentration.
 - c: Chromium (VI)
 - d: Methyl Mercury
 - e: Generic EIL for aged arsenic
 - f: Chromium (III)
 - g: Generic added contaminant limit for aged lead + ambient background concentration; Old Suburb with Low Traffic.

TABLE F
CATION EXCHANGE CAPACITY (CEC) & pH TEST RESULTS
SUB-SAMPLES
(Ref No: 14305/1-AA)

Pg 1 of 2

Composite Number	Sub-sample	Depth (m)	CEC (cmol _c /kg)	pH
C1	TP1	0.0-0.15	14	6.5
	TP2	0.0-0.15	-	-
	TP3	0.0-0.15	-	-
C2	TP4	0.0-0.15	13	7.2
	TP5	0.0-0.15	-	-
	TP6	0.0-0.15	-	-
C3	TP7	0.0-0.15	8.7	6.6
	TP8	0.0-0.15	-	-
	TP12	0.0-0.1	-	-
C4	TP9	0.0-0.15	-	-
	TP10	0.0-0.15	-	-
	TP11	0.0-0.15	13	6.5
C5	TP13	0.0-0.15	-	-
	TP14	0.0-0.15	-	-
	TP15	0.0-0.15	11	6.7
C6	TP16	0.0-0.1	-	-
	TP17	0.0-0.15	-	-
	TP18	0.0-0.15	12	6.8
C7	TP19	0.0-0.15	-	-
	TP20	0.0-0.15	-	-
	TP21	0.0-0.15	10	6.7
C8	TP22	0.0-0.15	-	-
	TP24	0.0-0.15	-	-
	TP25	0.0-0.15	12	6.2
C9	TP23	0.0-0.15	-	-
	TP32	0.0-0.15	12	6.2
	TP38	0.0-0.15	-	-
C10	TP26	0.0-0.15	-	-
	TP27	0.0-0.15	9.2	6.8
	TP29	0.0-0.15	-	-
C11	TP30	0.0-0.15	8	5.1
	TP31	0.0-0.15	-	-
	TP34	0.0-0.15	-	-
C12	TP35	0.0-0.15	-	-
	TP36	0.0-0.15	-	-
	TP37	0.0-0.15	9.8	7.3
C13	TP39	0.0-0.15	-	-
	TP51	0.0-0.15	9.3	7.2
	TP52	0.0-0.15	-	-
Limit of Reporting (LOR)			0.02	0.1

TABLE F
CATION EXCHANGE CAPACITY (CEC) & pH TEST RESULTS
SUB-SAMPLES
(Ref No: 14305/1-AA)

Pg 2 of 2

Composite Number	Sub-sample	Depth (m)	CEC (cmol _c /kg)	pH
C14	TP40	0.0-0.15	11	6
	TP41	0.0-0.15	-	-
	TP42	0.0-0.15	-	-
C15	TP43	0.0-0.15	-	-
	TP44	0.0-0.15	-	-
	TP45	0.0-0.15	11	6.7
C16	TP46	0.0-0.15	-	-
	TP48	0.0-0.15	-	-
	TP49	0.0-0.15	5.7	6.6
C17	TP50	0.0-0.15	-	-
	TP62	0.0-0.15	11	6.4
	TP63	0.0-0.15	-	-
C18	TP53	0.0-0.15	-	-
	TP54	0.0-0.15	9.6	7.2
	TP55	0.0-0.15	-	-
C19	TP56	0.0-0.15	12	6.3
	TP57	0.0-0.15	-	-
	TP58	0.0-0.15	-	-
C20	TP59	0.0-0.15	-	-
	TP60	0.0-0.15	8.6	5.5
	TP61	0.0-0.15	-	-
C21	TP67	0.0-0.15	15	7.2
	TP68	0.0-0.15	-	-
	TP69	0.0-0.15	-	-
C22	TP70	0.0-0.15	12	6.8
	TP71	0.0-0.15	-	-
	TP72	0.0-0.15	-	-
C23	TP73	0.0-0.15	11	6.1
	TP74	0.0-0.15	-	-
	TP75	0.0-0.15	-	-
C24	TP76	0.0-0.15	7.7	7.2
	TP77	0.0-0.15	-	-
	TP78	0.0-0.15	-	-
C25	TP79	0.0-0.15	24	7.6
	TP80	0.0-0.15	-	-
	TP81	0.0-0.15	-	-
Limit of Reporting (LOR)			0.02	0.1

TABLE G
METAL, CATION EXCHANGE CAPACITY (CEC) & pH TEST RESULTS
COMPOSITED SAMPLES
(Ref No: 14305/1-AA)

Composite Number	Sub-sample	Depth (m)	METAL (mg/kg)@								CEC (cmol _c /kg)*	pH*
			ARSENIC	CADMIUM	CHROMIUM (Total)	COPPER	LEAD	MERCURY	NICKEL	ZINC		
C1	TP1	0.0-0.15	12	<0.3	23	27	36	<0.05	13	40	14	6.5
C2	TP4	0.0-0.15	11	<0.3	19	28	34	<0.05	13	45	13	7.2
C3	TP7	0.0-0.15	11	<0.3	22	35	42	0.06	12	70	8.7	6.6
C4	TP11	0.0-0.15	9	<0.3	16	58	42	<0.05	15	98	13	6.5
C5	TP15	0.0-0.15	12	<0.3	28	21	28	<0.05	6.8	30	11	6.7
C6	TP18	0.0-0.15	12	<0.3	17	28	26	<0.05	12	50	12	6.8
C7	TP21	0.0-0.15	10	<0.3	26	20	31	<0.05	8.8	24	10	6.7
C8	TP25	0.0-0.15	14	<0.3	18	26	33	<0.05	11	36	12	6.2
C9	TP32	0.0-0.15	8	<0.3	21	33	32	<0.05	13	63	12	6.2
C10	TP27	0.0-0.15	11	<0.3	22	23	26	<0.05	7.2	39	9.2	6.8
C11	TP30	0.0-0.15	14	<0.3	16	18	20	<0.05	5.6	23	8.0	5.1
C12	TP37	0.0-0.15	9	<0.3	21	18	35	<0.05	7.7	25	9.8	7.3
C13	TP51	0.0-0.15	9	<0.3	26	17	25	<0.05	7.8	20	9.3	7.2
C14	TP40	0.0-0.15	7	<0.3	28	17	25	<0.05	7.2	22	11	6
C15	TP45	0.0-0.15	10	<0.3	27	17	29	<0.05	7.7	19	11	6.7
C16	TP49	0.0-0.15	16	<0.3	25	21	27	<0.05	8.3	40	5.7	6.6
C17	TP62	0.0-0.15	11	<0.3	18	20	21	<0.05	7.6	27	11	6.4
C18	TP54	0.0-0.15	8	<0.3	25	17	31	<0.05	9.4	22	9.6	7.2
C19	TP56	0.0-0.15	8	<0.3	17	17	25	<0.05	6.5	24	12	6.3
C20	TP60	0.0-0.15	7	<0.3	19	14	26	<0.05	5.9	18	8.6	5.5
C21	TP67	0.0-0.15	10	<0.3	18	17	28	<0.05	7.3	30	15	7.2
C22	TP70	0.0-0.15	10	<0.3	15	18	21	<0.05	8.8	29	12	6.8
C23	TP73	0.0-0.15	9	<0.3	16	21	32	<0.05	10	40	11	6.1
C24	TP76	0.0-0.15	10	<0.3	17	26	36	<0.05	7.1	58	7.7	7.2
C25	TP79	0.0-0.15	11	<0.3	17	34	25	<0.05	11	95	24	7.6
Limit of Reporting (LOR)			1	0.3	0.3	0.5	1	0.05	0.5	2	0.02	0.1
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)												
Health-based Investigation Levels (HIL) A - ^a Residential A			100	20	100 ^e	6000	300	10 ^f	400	7400		
Adjusted HIL ^b			33	6.7	33	2000	100	3.3	133	2467		
Ecological Investigation Levels (EIL) - ^c Urban residential			100 ^g	-	410 ^h	110	1200 ⁱ	-	50	230		
Adjusted EIL ^d			33	-	137	37	400	-	17	77		

- Notes:
- a: Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake (no poultry)), also includes childcare centres, preschools and primary schools.
 - b: Adjusted HIL=HIL/3
 - c: EIL of aged nickel & zinc were derived from calculation spreadsheet developed by CSIRO for NEPC; Old Suburb with Low Traffic; the lowest CEC=5.7 cmol_c/kg & pH=5.1; the assumed clay content=10 % were selected for derivation of EIL; a conservative approach.
 - EIL of aged copper = added contaminant limit (calculated based on the lowest of the pH and the lowest of the CEC) + ambient background concentration.
 - d: Adjusted EIL=EIL/3
 - e: Chromium (VI)
 - f: Methyl Mercury
 - g: Generic EIL for aged arsenic
 - h: Chromium (III)
 - i: Generic added contaminant limit for aged lead + ambient background concentration; Old Suburb with Low Traffic.
 - @: Metals of composited sample
 - *: CEC & pH of sub-sample

TABLE H
METALS TEST RESULTS
SUB-SAMPLES
(Ref No: 14305/1-AA)

Composite Number	Sub-Sample	Depth (m)	COPPER (mg/kg)	NICKEL (mg/kg)	ZINC (mg/kg)
C4	TP9	0.0-0.15	50	-	110
	TP10	0.0-0.15	29	-	79
	TP11	0.0-0.15	41	-	140
C25	TP79	0.0-0.15	36	10	100
	TP80	0.0-0.15	51	15	150
	TP81	0.0-0.15	16	13	47
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)					
Health-based Investigation Levels (HIL) A - ^a Residential A			6000	400	7400
Ecological Investigation Level (EIL)			110	50	230

a: Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake (no poultry)), also includes childcare centres, preschools and primary schools.

TABLE I
TOTAL RECOVERABLE HYDROCARBONS (TRH) AND BTEX TEST RESULTS
DISCRETE SAMPLES
(Ref No: 14305/1-AA)

												NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)																					
Sample Location Depth (m) Soil type			TRH (mg/kg)					BTEX (mg/kg)				Health Screening Levels (HSL) A Low density residential						Ecological Screening Levels for fine-grained soil Urban residential						Ecological Screening Levels for coarse- grained soil Urban residential									
			F1	F2*	F2**	F3	F4	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES	F1	F2*	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES	F1	F2**	F3	F4	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES								
TP20	0.0-0.15	Clay	<25	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	50	280	0.7	480	NL	110	180	120	1300	5600	65	105	125	45	-	-	-	-	-	-	-	-
TP28	0.0-0.15	Clay	<25	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	50	280	0.7	480	NL	110	180	120	1300	5600	65	105	125	45	-	-	-	-	-	-	-	-
TP33	0.0-0.15	Sand	<25	<25	<25	170	<120	<0.1	<0.1	<0.1	<0.3	45	110	0.5	160	55	40	-	-	-	-	-	-	-	-	180	120	300	2800	50	85	70	105
TP33	0.2-0.35	Clay	<25	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	50	280	0.7	480	NL	110	180	120	1300	5600	65	105	125	45	-	-	-	-	-	-	-	-
TP47	0.0-0.15	Clay	<25	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	50	280	0.7	480	NL	110	180	120	1300	5600	65	105	125	45	-	-	-	-	-	-	-	-
TP64	0.0-0.15	Sand	<25	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	45	110	0.5	160	55	40	-	-	-	-	-	-	-	-	180	120	300	2800	50	85	70	105
Limit of Reporting (LOR)			25	25	25	90	120	0.1	0.1	0.1	0.3																						

Notes:

- F1: C6-C10 less BTEX
- F2*: >C10-C16 less Naphthalene
- F2**: >C10-C16
- F3: >C16-C34
- F4: >C34-C40
- NL: Not Limiting

TABLE J
POLYCYCLIC AROMATIC HYDROCARBONS (PAH) TEST RESULTS
DISCRETE SAMPLES
(Ref No: 14305/1-AA)

			NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)								
			PAH (mg/kg)				Health-based Investigation Levels (HIL) A - Residential A		Health Screening Level (HSL) A - Low density residential	Generic Ecological Investigation Level (EIL) - Urban residential	Ecological Screening Level (ESL) - Urban residential
			BaP TEQ	TOTAL PAHs	NAPHTHALENE	BENZO(a)PYRENE (BaP)	BaP TEQ	TOTAL PAHs	NAPHTHALENE	NAPHTHALENE	BENZO(a)PYRENE (BaP)
Sample Location	Depth (m)	Soil type	BaP TEQ	TOTAL PAHs	NAPHTHALENE	BENZO(a)PYRENE (BaP)	BaP TEQ	TOTAL PAHs	NAPHTHALENE	NAPHTHALENE	BENZO(a)PYRENE (BaP)
TP20	0.0-0.15	Clay	<0.3	<0.8	<0.1	<0.1	3	300	5	170	0.7
TP28	0.0-0.15	Clay	<0.3	<0.8	<0.1	<0.1	3	300	5	170	0.7
TP33	0.0-0.15	Sand	0.7	4.2	0.1	0.5	3	300	3	170	0.7
TP33	0.2-0.35	Clay	<0.3	<0.8	<0.1	<0.1	3	300	5	170	0.7
TP47	0.0-0.15	Clay	<0.3	<0.8	<0.1	<0.1	3	300	5	170	0.7
TP64	0.0-0.15	Sand	<0.3	<0.8	<0.1	<0.1	3	300	3	170	0.7
Limit of Reporting (LOR)			0.3	0.8	0.1	0.1					

Note: a: Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake (no poultry)), also includes childcare centres, preschools and primary schools.

TABLE K
ORGANOCHLORINE PESTICIDES (OCP) & POLYCHLORINATED BIPHENYLS (PCB) TEST RESULTS
DISCRETE SAMPLES
(Ref No: 14305/1-AA)

Sample Location	Depth (m)	OCP (mg/kg)										PCB (mg/kg)
		HEXACHLOROBENZENE (HCB)	HEPTACHLOR	ALDRIN+DIELDRIN	ENDRIN	METHOXYCHLOR	MIREX	ENDOSULFAN (alpha, beta & sulphate)	DDD+DDE+DDT	DDT	CHLORDANE (alpha & gamma)	
TP20	0.0-0.15	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP28	0.0-0.15	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP33	0.0-0.15	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP33	0.2-0.35	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP47	0.0-0.15	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP64	0.0-0.15	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP65	0.0-0.15	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	-
TP66	0.0-0.15	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	-
Limit of Reporting (LOR)		0.1	0.1	0.3	0.2	0.1	0.1	0.5	0.6	0.2	0.2	1
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)												1
Health-based Investigation Levels (HIL) A - Residential A ^a		10	6	6	10	300	10	270	240		50	
Ecological Investigation Levels (EIL) - Urban residential										180 ^b		

Notes: a: Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake (no poultry)), also includes childcare centres, preschools and primary schools.

b: Generic EIL for DDT

TABLE L
ORGANOCHLORINE PESTICIDES (OCP) TEST RESULTS
COMPOSITED SAMPLES
(Ref No: 14305/1-AA)

Composite Number	OCP (mg/kg)									
	HEXACHLOROBENZENE (HCB)	HEPTACHLOR	ALDRIN+DIELDRIN	ENDRIN	METHOXYCHLOR	MIREX	ENDOSULFAN (alpha, beta & sulfoxide)	DDD+DDE+DDT	DDT	CHLORDANE (alpha & gamma)
C1	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C3	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C4	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C6	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C8	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C9	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C11	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C13	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C14	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C16	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C18	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C19	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C21	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C23	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
C25	<0.1	<0.1	<0.3	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2
Limits of Reporting (LOR)	0.1	0.1	0.30	0.2	0.1	0.1	0.5	0.6	0.2	0.2
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)										
Health-based Investigation Levels (HIL) A - ^a Residential A	10	6	6	10	300	10	270	240		50
Adjusted HIL ^b	3	2	2	3	100	3	90	80		17
Ecological Investigation Level (EIL) - Urban residential										180 ^c
Adjusted EIL ^b										60

Notes: a: Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake (no poultry)), also includes childcare centres, preschools and primary schools.

b: Adjusted HIL=HIL/3;Adjusted EIL=EIL/3

c: Generic EIL for DDT

TABLE M
ASBESTOS TEST RESULTS
DISCRETE SAMPLES
(Ref No: 14305/1-AA)

Sample Location	Depth (m)	ASBESTOS (% w/w)	
Soil Sample	TP28 TP33 TP33 TP47 TP64	ACM (>7mm)	AF/FA (<7mm)
		<0.01	<0.001
		<0.01	2.8
		<0.01	<0.001
		<0.01	<0.001
		<0.01	<0.001
		<0.01	<0.001
Limits of Reporting (LOR)		0.01	0.001
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)			
Health Screening Levels ^a - Residential A		0.01	0.001
Fibro-cement Piece			

Notes: ACM: Asbestos Containing Material
AF: Asbestos Fines
FA: Fibrous Asbestos
a: Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake (no poultry)), also includes childcare centres, preschools and primary schools.

APPENDIX A



TABLE 1 - TEST PIT LOGS

Project	Proposed Stages 1 Residential Subdivision	Job No	14305/1
Location	Part Lot 201 in DP590247 - Station Street, Menangle	Refer to Drawing No	14305/1-AA2
Logged & Sampled by			SS

TABLE 1

Page 1 of 9

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP1	0-0.4	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.4-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP2	0-0.2	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP3	0-0.3	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP4	0-0.2	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP5	0-0.3	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP6	0-0.2	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP7	0-0.2	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP8	0-0.3	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP9	0-0.3	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, yellow-brown	
TP10	0-0.3	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, red	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW).

Project	Proposed Stages 1 Residential Subdivision	Job No	14305/1
Location	Part Lot 201 in DP590247 - Station Street, Menangle	Refer to Drawing No	14305/1-AA2
Logged & Sampled by			SS

TABLE 1

Page 2 of 9

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP11	0-0.2	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	Test pit excavated in gorge
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP12	0-0.1	0-0.1	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
TP13	0-0.2	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP14	0-0.3	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, yellow-brown	
TP15	0-0.3	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP16	0-0.1	0-0.1	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
TP17	0-0.3	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP18	0-0.3	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP19	0-0.3	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP20	0-0.3	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres and fine grained gravel	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW),

Project	Proposed Stages 1 Residential Subdivision	Job No	14305/1
Location	Part Lot 201 in DP590247 - Station Street, Menangle	Refer to Drawing No	14305/1-AA2
Logged & Sampled by			SS

TABLE 1

Page 3 of 9

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP21	0-0.3	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP22	0-0.25	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.25-0.5	NS			(CH) Silty CLAY, high plasticity, yellow-brown	
TP23	0-0.2	0-0.15	11/12/18	-	FILL/TOPSOIL: Gravelly (shale) Clay, low to medium plasticity, brown	
	0.2-0.7	0.25-0.35			(CH) Silty CLAY, high plasticity, red-brown with ironstone gravel	
TP24	0-0.2	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP25	0-0.2	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP26	0-0.2	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP27	0-0.2	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP28	0-0.6	0-0.15	11/12/18	-	FILL: Silty Clay, low to medium plasticity, brown mottled dark grey	Inclusion of timber, concrete boulders and rusted metal stakes Test pit excavated in gorge
		0.5-0.6		-		
	0.6-0.7	NS			FILL: Sandstone, fine to medium grained, yellow	
	0.7				Terminated due to refusal	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW),

Project	Proposed Stages 1 Residential Subdivision	Job No	14305/1
Location	Part Lot 201 in DP590247 - Station Street, Menangle	Refer to Drawing No	14305/1-AA2
Logged & Sampled by			SS

TABLE 1

Page 4 of 9

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP29	0-0.2	0-0.15	10/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP30	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
TP31	0-0.15	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.15-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP32	0-0.2	0-0.15	11/12/18	-	FILL/TOPSOIL: Gravelly (shale) Clay, low to medium plasticity, brown	
	0.2-0.5	0.25-0.35			(CH) Silty CLAY, high plasticity, red	
TP33	0-0.2	0-0.15	11/12/18	-	FILL: Silty Sand, fine grained, grey, with bricks, with root fibres	
	0.2-0.6	0.2-0.35		-	FILL: Silty Clay, high plasticity, red-brown, with gravel	
	0.6-0.9	0.65-0.75		-	(CH) Silty CLAY, high plasticity, yellow-brown	
TP34	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP35	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP36	0-0.3	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP37	0-0.3	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, yellow-brown	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW).

Project	Proposed Stages 1 Residential Subdivision	Job No	14305/1
Location	Part Lot 201 in DP590247 - Station Street, Menangle	Refer to Drawing No	14305/1-AA2
Logged & Sampled by			SS

TABLE 1

Page 5 of 9

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP38	0-0.3	0-0.15	11/12/18	-	FILL/TOPSOIL: Gravelly (shale) Clay, low to medium plasticity, brown	Z3
	0.3-0.6	0.35-0.45		-	(CH) Silty CLAY , high plasticity, yellow-brown	
TP39	0-0.3	0-0.15	11/12/18	-	FILL/TOPSOIL: Gravelly (shale) Clay, low to medium plasticity, brown	
	0.3-0.7	0.35-0.45		-	(CH) Silty CLAY, high plasticity, red mottled grey and yellow-brown	
TP40	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS		-	(CH) Silty CLAY, high plasticity, red	
TP41	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS		-	(CH) Silty CLAY , high plasticity, yellow-brown	
TP42	0-0.3	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS		-	(CH) Silty CLAY , high plasticity, yellow-brown	
TP43	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS		-	(CH) Silty CLAY, high plasticity, red	
TP44	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS		-	(CH) Silty CLAY , high plasticity, yellow-brown	
TP45	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS		-	(CH) Silty CLAY, high plasticity, red	
TP46	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS		-	(CH) Silty CLAY, high plasticity, red	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW),

Project	Proposed Stages 1 Residential Subdivision	Job No	14305/1
Location	Part Lot 201 in DP590247 - Station Street, Menangle	Refer to Drawing No	14305/1-AA2
Logged & Sampled by			SS

TABLE 1

Page 6 of 9

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP47	0-0.5	0-0.15	11/12/18	-	FILL: Silty Clay, low to medium plasticity, brown	Sandstone boulders in fill Test pit excavated in gorge
	0.5-1.1	0.55-0.65		-	(CH) Silty CLAY, high plasticity, grey, interbedded with shale and ironstone	
TP48	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS		-	(CH) Silty CLAY, high plasticity, red	
TP49	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS		-	(CH) Silty CLAY, high plasticity, red	
TP50	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS		-	(CH) Silty CLAY, high plasticity, red	
TP51	0-0.2	0-0.15	11/12/18	-	FILL/TOPSOIL: Gravelly (shale) Clay, low to medium plasticity, brown	
	0.2-0.6	0.25-0.35		-	(CH) Silty CLAY, high plasticity, yellow-brown	
TP52	0-0.2	0-0.15	11/12/18	-	FILL/TOPSOIL: Gravelly (shale) Clay, low to medium plasticity, brown	
	0.2-0.6	0.25-0.35		-	(CH) Silty CLAY, high plasticity, yellow-brown	
TP53	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS		-	(CH) Silty CLAY, high plasticity, yellow-brown	
TP54	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS		-	(CH) Silty CLAY, high plasticity, yellow-brown	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW),

Project	Proposed Stages 1 Residential Subdivision	Job No	14305/1
Location	Part Lot 201 in DP590247 - Station Street, Menangle	Refer to Drawing No	14305/1-AA2
Logged & Sampled by			SS

TABLE 1

Page 7 of 9

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP55	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP56	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP57	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP58	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP59	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, yellow-brown	
TP60	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
TP61	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP62	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP63	0-0.2	0-0.15	11/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, yellow-brown	
TP64	0-0.5	0-0.15	11/12/18	-	FILL: Silty Sand, fine grained, grey, with bricks concrete and scrap metal	
	0.5-0.8	0.55-0.65		-	(CH) Silty CLAY, high plasticity, red	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW).

Project	Proposed Stages 1 Residential Subdivision	Job No	14305/1
Location	Part Lot 201 in DP590247 - Station Street, Menangle	Refer to Drawing No	14305/1-AA2
Logged & Sampled by			SS

TABLE 1

Page 8 of 9

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP65	0-0.3	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP66	0-0.3	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
TP67	0-0.3	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, yellow-brown	
TP68	0-0.3	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, yellow-brown	
TP69	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP70	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP71	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
TP73	0-0.3	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP74	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP75	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW),

Project	Proposed Stages 1 Residential Subdivision	Job No	14305/1
Location	Part Lot 201 in DP590247 - Station Street, Menangle	Refer to Drawing No	14305/1-AA2
Logged & Sampled by			SS

TABLE 1

Page 9 of 9

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP75	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP76	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, yellow-brown	
TP77	0-0.3	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP78	0-0.3	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.3-0.5	NS			(CH) Silty CLAY, high plasticity, yellow-brown	
TP79	0-0.4	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.4-0.5	NS			(CH) Silty CLAY, high plasticity, yellow-brown	
TP80	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	
TP81	0-0.2	0-0.15	12/12/18	-	TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres	
	0.2-0.5	NS			(CH) Silty CLAY, high plasticity, red	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW),

APPENDIX B

LABORATORY TEST RESULTS REPORTS/CERTIFICATES

CLIENT DETAILS

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 Client **Geotechnique**
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 Facsimile **02 4722 6161**
 Email **anwar@geotech.com.au**

Project **14305-1 Menangle**
 Order Number **GEOTECH_LTGHVC_V1_2018**
 Samples **86**

LABORATORY DETAILS

Manager **Huong Crawford**
 Laboratory **SGS Alexandria Environmental**
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SGS Reference **SE187315 R0**
 Date Received **12/12/2018**
 Date Reported **19/12/2018**

COMMENTS

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

No respirable fibres detected in all soil samples using trace analysis technique.

Sample # 33:asbestos found in approx 16g fibrous material and loose in sample.

Asbestos analysed by Approved Identifier Ravee Sivasubramaniam.

SIGNATORIES



Akheequear Beniamen
 Chemist



Bennet Lo
 Senior Organic Chemist/Metals Chemist



Huong Crawford
 Production Manager



Kamrul Ahsan
 Senior Chemist



Ly Kim Ha
 Organic Section Head



Ravee Sivasubramaniam
 Hygiene Team Leader

VOC's in Soil [AN433] Tested: 13/12/2018

PARAMETER	UOM	LOR	TP20	TP28	TP33	TP33	TP47
			CLAY 0.0-0.15 10/12/2018 SE187315.020	CLAY 0.0-0.15 11/12/2018 SE187315.028	SAND 0.0-0.15 11/12/2018 SE187315.033	CLAY 0.2-0.35 11/12/2018 SE187315.034	CLAY 0.0-0.15 11/12/2018 SE187315.048
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	TP64	DDS1	TS1	TS2
			SAND 0.0-0.15 11/12/2018 SE187315.059	CLAY - 11/12/2018 SE187315.063	SAND - 11/12/2018 SE187315.066	SAND - 11/12/2018 SE187315.067
Benzene	mg/kg	0.1	<0.1	<0.1	[81%]	[85%]
Toluene	mg/kg	0.1	<0.1	<0.1	[85%]	[79%]
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	[89%]	[83%]
m/p-xylene	mg/kg	0.2	<0.2	<0.2	[93%]	[85%]
o-xylene	mg/kg	0.1	<0.1	<0.1	[93%]	[85%]
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: 13/12/2018

PARAMETER	UOM	LOR	TP20	TP28	TP33	TP33	TP47
			CLAY 0.0-0.15 10/12/2018 SE187315.020	CLAY 0.0-0.15 11/12/2018 SE187315.028	SAND 0.0-0.15 11/12/2018 SE187315.033	CLAY 0.2-0.35 11/12/2018 SE187315.034	CLAY 0.0-0.15 11/12/2018 SE187315.048
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	TP64	DDS1
			SAND 0.0-0.15 11/12/2018 SE187315.059	CLAY - 11/12/2018 SE187315.063
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: 13/12/2018

PARAMETER	UOM	LOR	TP20	TP28	TP33	TP33	TP47
			CLAY 0.0-0.15 10/12/2018 SE187315.020	CLAY 0.0-0.15 11/12/2018 SE187315.028	SAND 0.0-0.15 11/12/2018 SE187315.033	CLAY 0.2-0.35 11/12/2018 SE187315.034	CLAY 0.0-0.15 11/12/2018 SE187315.048
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	100	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	89	<45	55
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	170	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	190	<110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	<210	<210	<210

PARAMETER	UOM	LOR	TP64	DDS1
			SAND 0.0-0.15 11/12/2018 SE187315.059	CLAY - 11/12/2018 SE187315.063
TRH C10-C14	mg/kg	20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45
TRH C29-C36	mg/kg	45	<45	<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	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 13/12/2018

PARAMETER	UOM	LOR	TP20	TP28	TP33	TP33	TP47
			CLAY 0.0-0.15 10/12/2018 SE187315.020	CLAY 0.0-0.15 11/12/2018 SE187315.028	SAND 0.0-0.15 11/12/2018 SE187315.033	CLAY 0.2-0.35 11/12/2018 SE187315.034	CLAY 0.0-0.15 11/12/2018 SE187315.048
Naphthalene	mg/kg	0.1	<0.1	<0.1	0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	0.2	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	0.2	0.2	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	0.1	0.3	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	0.2	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	0.2	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	0.5	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	0.2	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	0.5	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	0.7	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	0.8	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2	<0.2	0.7	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	0.7	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	0.7	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	4.2	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	4.2	<0.8	<0.8

PARAMETER	UOM	LOR	TP64	DDS1
			SAND 0.0-0.15 11/12/2018 SE187315.059	CLAY - 11/12/2018 SE187315.063
Naphthalene	mg/kg	0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8

OC Pesticides in Soil [AN420] Tested: 13/12/2018

PARAMETER	UOM	LOR	TP20	TP28	TP33	TP33	TP47
			CLAY 0.0-0.15 10/12/2018 SE187315.020	CLAY 0.0-0.15 11/12/2018 SE187315.028	SAND 0.0-0.15 11/12/2018 SE187315.033	CLAY 0.2-0.35 11/12/2018 SE187315.034	CLAY 0.0-0.15 11/12/2018 SE187315.048
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: 13/12/2018 (continued)

PARAMETER	UOM	LOR	TP64	DDS1	C1	C3	C4
			SAND 0.0-0.15 11/12/2018 SE187315.059	CLAY - 11/12/2018 SE187315.063	SOIL - 10/12/2018 SE187315.068	SOIL - 10/12/2018 SE187315.070	SOIL - 10/12/2018 SE187315.071
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: 13/12/2018 (continued)

PARAMETER	UOM	LOR	C6	C8	C9	C11	C13
			SOIL - 10/12/2018 SE187315.073	SOIL - 11/12/2018 SE187315.075	SOIL - 11/12/2018 SE187315.076	SOIL - 11/12/2018 SE187315.078	SOIL - 11/12/2018 SE187315.080
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: 13/12/2018 (continued)

PARAMETER	UOM	LOR	C14	C16	C18	CDS1
			SOIL	SOIL	SOIL	SOIL
			11/12/2018 SE187315.081	11/12/2018 SE187315.083	11/12/2018 SE187315.085	11/12/2018 SE187315.086
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	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
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	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
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	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
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1

PCBs in Soil [AN420] Tested: 13/12/2018

PARAMETER	UOM	LOR	TP20	TP28	TP33	TP33	TP47
			CLAY 0.0-0.15 10/12/2018 SE187315.020	CLAY 0.0-0.15 11/12/2018 SE187315.028	SAND 0.0-0.15 11/12/2018 SE187315.033	CLAY 0.2-0.35 11/12/2018 SE187315.034	CLAY 0.0-0.15 11/12/2018 SE187315.048
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1	<1	<1

PARAMETER	UOM	LOR	TP64	DDS1
			SAND 0.0-0.15 11/12/2018 SE187315.059	CLAY - 11/12/2018 SE187315.063
Arochlor 1016	mg/kg	0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1

pH in soil (1:5) [AN101] Tested: 14/12/2018

PARAMETER	UOM	LOR	TP1	TP4	TP7	TP11	TP15
			CLAY	CLAY	CLAY	CLAY	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15
			10/12/2018	10/12/2018	10/12/2018	10/12/2018	11/12/2018
			SE187315.001	SE187315.004	SE187315.007	SE187315.011	SE187315.015
pH	pH Units	0.1	6.5	7.2	6.6	6.5	6.7

PARAMETER	UOM	LOR	TP18	TP21	TP25	TP27	TP28
			CLAY	CLAY	CLAY	CLAY	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15
			10/12/2018	11/12/2018	10/12/2018	10/12/2018	11/12/2018
			SE187315.018	SE187315.021	SE187315.025	SE187315.027	SE187315.028
pH	pH Units	0.1	6.8	6.7	6.2	6.8	6.4

PARAMETER	UOM	LOR	TP30	TP32	TP33	TP33	TP37
			CLAY	CLAY	SAND	CLAY	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15	0.2-0.35	0.0-0.15
			11/12/2018	11/12/2018	11/12/2018	11/12/2018	11/12/2018
			SE187315.030	SE187315.032	SE187315.033	SE187315.034	SE187315.038
pH	pH Units	0.1	5.1	6.2	7.9	6.7	7.3

PARAMETER	UOM	LOR	TP40	TP45	TP47	TP49	TP51
			CLAY	CLAY	CLAY	CLAY	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15
			11/12/2018	11/12/2018	11/12/2018	11/12/2018	11/12/2018
			SE187315.041	SE187315.046	SE187315.048	SE187315.050	SE187315.052
pH	pH Units	0.1	6.0	6.7	6.8	6.6	7.2

PARAMETER	UOM	LOR	TP54	TP62	TP64
			CLAY	CLAY	SAND
			0.0-0.15	0.0-0.15	0.0-0.15
			11/12/2018	11/12/2018	11/12/2018
			SE187315.055	SE187315.057	SE187315.059
pH	pH Units	0.1	7.2	6.4	8.0

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR) [AN122] Tested: 17/12/2018

PARAMETER	UOM	LOR	TP1	TP4	TP7	TP11	TP15
			CLAY 0.0-0.15 10/12/2018 SE187315.001	CLAY 0.0-0.15 10/12/2018 SE187315.004	CLAY 0.0-0.15 10/12/2018 SE187315.007	CLAY 0.0-0.15 10/12/2018 SE187315.011	CLAY 0.0-0.15 11/12/2018 SE187315.015
Exchangeable Sodium, Na	mg/kg	2	37	63	59	38	140
Exchangeable Sodium, Na	meq/100g	0.01	0.16	0.27	0.25	0.17	0.62
Exchangeable Sodium Percentage*	%	0.1	1.2	2.1	2.9	1.3	5.6
Exchangeable Potassium, K	mg/kg	2	740	1100	670	920	300
Exchangeable Potassium, K	meq/100g	0.01	1.9	2.8	1.7	2.4	0.78
Exchangeable Potassium Percentage*	%	0.1	13.6	21.4	19.7	18.7	7.0
Exchangeable Calcium, Ca	mg/kg	2	1400	1000	710	1400	1500
Exchangeable Calcium, Ca	meq/100g	0.01	6.9	5.2	3.6	7.0	7.5
Exchangeable Calcium Percentage*	%	0.1	49.1	39.4	41.0	55.8	66.7
Exchangeable Magnesium, Mg	mg/kg	2	620	600	390	370	280
Exchangeable Magnesium, Mg	meq/100g	0.02	5.1	4.9	3.2	3.0	2.3
Exchangeable Magnesium Percentage*	%	0.1	36.1	37.2	36.3	24.1	20.7
Cation Exchange Capacity	meq/100g	0.02	14	13	8.7	13	11

PARAMETER	UOM	LOR	TP18	TP21	TP25	TP27	TP28
			CLAY 0.0-0.15 10/12/2018 SE187315.018	CLAY 0.0-0.15 11/12/2018 SE187315.021	CLAY 0.0-0.15 10/12/2018 SE187315.025	CLAY 0.0-0.15 10/12/2018 SE187315.027	CLAY 0.0-0.15 11/12/2018 SE187315.028
Exchangeable Sodium, Na	mg/kg	2	26	81	100	54	47
Exchangeable Sodium, Na	meq/100g	0.01	0.11	0.35	0.45	0.23	0.21
Exchangeable Sodium Percentage*	%	0.1	1.0	3.5	3.8	2.5	0.9
Exchangeable Potassium, K	mg/kg	2	720	1100	920	500	230
Exchangeable Potassium, K	meq/100g	0.01	1.8	2.8	2.3	1.3	0.59
Exchangeable Potassium Percentage*	%	0.1	15.8	27.7	20.2	13.9	2.7
Exchangeable Calcium, Ca	mg/kg	2	1300	470	870	1000	3900
Exchangeable Calcium, Ca	meq/100g	0.01	6.4	2.3	4.4	5.0	19
Exchangeable Calcium Percentage*	%	0.1	54.6	23.1	37.6	54.0	87.7
Exchangeable Magnesium, Mg	mg/kg	2	410	560	540	330	240
Exchangeable Magnesium, Mg	meq/100g	0.02	3.3	4.6	4.5	2.7	1.9
Exchangeable Magnesium Percentage*	%	0.1	28.6	45.6	38.4	29.5	8.8
Cation Exchange Capacity	meq/100g	0.02	12	10	12	9.2	22

PARAMETER	UOM	LOR	TP30	TP32	TP33	TP33	TP37
			CLAY 0.0-0.15 11/12/2018 SE187315.030	CLAY 0.0-0.15 11/12/2018 SE187315.032	SAND 0.0-0.15 11/12/2018 SE187315.033	CLAY 0.2-0.35 11/12/2018 SE187315.034	CLAY 0.0-0.15 11/12/2018 SE187315.038
Exchangeable Sodium, Na	mg/kg	2	120	130	110	120	73
Exchangeable Sodium, Na	meq/100g	0.01	0.53	0.58	0.48	0.54	0.32
Exchangeable Sodium Percentage*	%	0.1	6.6	4.7	1.4	4.4	3.3
Exchangeable Potassium, K	mg/kg	2	960	990	1200	460	1000
Exchangeable Potassium, K	meq/100g	0.01	2.5	2.5	3.1	1.2	2.6
Exchangeable Potassium Percentage*	%	0.1	30.7	20.6	9.2	9.6	26.9
Exchangeable Calcium, Ca	mg/kg	2	340	830	5800	1500	680
Exchangeable Calcium, Ca	meq/100g	0.01	1.7	4.1	29	7.6	3.4
Exchangeable Calcium Percentage*	%	0.1	21.3	33.8	84.7	62.4	34.9
Exchangeable Magnesium, Mg	mg/kg	2	410	610	200	350	420
Exchangeable Magnesium, Mg	meq/100g	0.02	3.3	5.0	1.6	2.9	3.4
Exchangeable Magnesium Percentage*	%	0.1	41.4	40.8	4.8	23.6	34.9
Cation Exchange Capacity	meq/100g	0.02	8.0	12	34	12	9.8

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR) [AN122] Tested: 17/12/2018 (continued)

PARAMETER	UOM	LOR	TP40	TP45	TP47	TP49	TP51
			CLAY 0.0-0.15 11/12/2018 SE187315.041	CLAY 0.0-0.15 11/12/2018 SE187315.046	CLAY 0.0-0.15 11/12/2018 SE187315.048	CLAY 0.0-0.15 11/12/2018 SE187315.050	CLAY 0.0-0.15 11/12/2018 SE187315.052
Exchangeable Sodium, Na	mg/kg	2	36	120	230	27	24
Exchangeable Sodium, Na	meq/100g	0.01	0.16	0.50	0.98	0.12	0.10
Exchangeable Sodium Percentage*	%	0.1	1.5	4.7	4.7	2.1	1.1
Exchangeable Potassium, K	mg/kg	2	390	690	160	390	650
Exchangeable Potassium, K	meq/100g	0.01	0.99	1.8	0.41	1.0	1.7
Exchangeable Potassium Percentage*	%	0.1	9.1	16.6	2.0	17.6	18.0
Exchangeable Calcium, Ca	mg/kg	2	1200	750	3100	510	1000
Exchangeable Calcium, Ca	meq/100g	0.01	6.2	3.7	16	2.5	5.1
Exchangeable Calcium Percentage*	%	0.1	57.5	35.0	74.9	44.7	55.0
Exchangeable Magnesium, Mg	mg/kg	2	420	570	470	250	290
Exchangeable Magnesium, Mg	meq/100g	0.02	3.5	4.7	3.8	2.0	2.4
Exchangeable Magnesium Percentage*	%	0.1	32.0	43.6	18.4	35.7	25.9
Cation Exchange Capacity	meq/100g	0.02	11	11	21	5.7	9.3

PARAMETER	UOM	LOR	TP54	TP62	TP64
			CLAY 0.0-0.15 11/12/2018 SE187315.055	CLAY 0.0-0.15 11/12/2018 SE187315.057	SAND 0.0-0.15 11/12/2018 SE187315.059
Exchangeable Sodium, Na	mg/kg	2	53	50	34
Exchangeable Sodium, Na	meq/100g	0.01	0.23	0.22	0.15
Exchangeable Sodium Percentage*	%	0.1	2.4	1.9	0.9
Exchangeable Potassium, K	mg/kg	2	430	620	600
Exchangeable Potassium, K	meq/100g	0.01	1.1	1.6	1.5
Exchangeable Potassium Percentage*	%	0.1	11.4	13.9	9.6
Exchangeable Calcium, Ca	mg/kg	2	1000	1400	2300
Exchangeable Calcium, Ca	meq/100g	0.01	5.2	6.9	12
Exchangeable Calcium Percentage*	%	0.1	53.9	60.9	73.4
Exchangeable Magnesium, Mg	mg/kg	2	380	320	310
Exchangeable Magnesium, Mg	meq/100g	0.02	3.1	2.6	2.5
Exchangeable Magnesium Percentage*	%	0.1	32.3	23.2	16.0
Cation Exchange Capacity	meq/100g	0.02	9.6	11	16

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 14/12/2018

PARAMETER	UOM	LOR	TP28	TP33	TP33	TP47	TP64
			CLAY 0.0-0.15 11/12/2018 SE187315.028	SAND 0.0-0.15 11/12/2018 SE187315.033	CLAY 0.2-0.35 11/12/2018 SE187315.034	CLAY 0.0-0.15 11/12/2018 SE187315.048	SAND 0.0-0.15 11/12/2018 SE187315.059
Arsenic, As	mg/kg	1	14	7	8	8	7
Cadmium, Cd	mg/kg	0.3	<0.3	0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	28	8.2	12	11	9.6
Copper, Cu	mg/kg	0.5	90	39	24	47	22
Lead, Pb	mg/kg	1	38	210	26	24	62
Nickel, Ni	mg/kg	0.5	11	9.8	4.3	9.9	7.0
Zinc, Zn	mg/kg	2	120	380	46	110	73

PARAMETER	UOM	LOR	DDS1	C1	C2	C3	C4
			CLAY - 11/12/2018 SE187315.063	SOIL - 10/12/2018 SE187315.068	SOIL - 10/12/2018 SE187315.069	SOIL - 10/12/2018 SE187315.070	SOIL - 10/12/2018 SE187315.071
Arsenic, As	mg/kg	1	7	12	11	11	9
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	9.4	23	19	22	16
Copper, Cu	mg/kg	0.5	18	27	28	35	58
Lead, Pb	mg/kg	1	71	36	34	42	42
Nickel, Ni	mg/kg	0.5	6.3	13	13	12	15
Zinc, Zn	mg/kg	2	69	40	45	70	98

PARAMETER	UOM	LOR	C5	C6	C7	C8	C9
			SOIL - 10/12/2018 SE187315.072	SOIL - 10/12/2018 SE187315.073	SOIL - 10/12/2018 SE187315.074	SOIL - 11/12/2018 SE187315.075	SOIL - 11/12/2018 SE187315.076
Arsenic, As	mg/kg	1	12	12	10	14	8
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	28	17	26	18	21
Copper, Cu	mg/kg	0.5	21	28	20	26	33
Lead, Pb	mg/kg	1	28	26	31	33	32
Nickel, Ni	mg/kg	0.5	6.8	12	8.8	11	13
Zinc, Zn	mg/kg	2	30	50	24	36	63

PARAMETER	UOM	LOR	C10	C11	C12	C13	C14
			SOIL - 11/12/2018 SE187315.077	SOIL - 11/12/2018 SE187315.078	SOIL - 11/12/2018 SE187315.079	SOIL - 11/12/2018 SE187315.080	SOIL - 11/12/2018 SE187315.081
Arsenic, As	mg/kg	1	11	14	9	9	7
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	22	16	21	26	28
Copper, Cu	mg/kg	0.5	23	18	18	17	17
Lead, Pb	mg/kg	1	26	20	35	25	25
Nickel, Ni	mg/kg	0.5	7.2	5.6	7.7	7.8	7.2
Zinc, Zn	mg/kg	2	39	23	25	20	22

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 14/12/2018

PARAMETER	UOM	LOR	C15	C16	C17	C18	CDS1
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/12/2018 SE187315.082	11/12/2018 SE187315.083	11/12/2018 SE187315.084	11/12/2018 SE187315.085	11/12/2018 SE187315.086
Arsenic, As	mg/kg	1	10	16	11	8	12
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	27	25	18	25	15
Copper, Cu	mg/kg	0.5	17	21	20	17	45
Lead, Pb	mg/kg	1	29	27	21	31	69
Nickel, Ni	mg/kg	0.5	7.7	8.3	7.6	9.4	14
Zinc, Zn	mg/kg	2	19	40	27	22	110

Mercury in Soil [AN312] Tested: 14/12/2018

PARAMETER	UOM	LOR	TP28	TP33	TP33	TP47	TP64
			CLAY	SAND	CLAY	CLAY	SAND
			0.0-0.15	0.0-0.15	0.2-0.35	0.0-0.15	0.0-0.15
			11/12/2018	11/12/2018	11/12/2018	11/12/2018	11/12/2018
			SE187315.028	SE187315.033	SE187315.034	SE187315.048	SE187315.059
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	DDS1	C1	C2	C3	C4
			CLAY	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/12/2018	10/12/2018	10/12/2018	10/12/2018	10/12/2018
			SE187315.063	SE187315.068	SE187315.069	SE187315.070	SE187315.071
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	0.06	<0.05

PARAMETER	UOM	LOR	C5	C6	C7	C8	C9
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			10/12/2018	10/12/2018	10/12/2018	11/12/2018	11/12/2018
			SE187315.072	SE187315.073	SE187315.074	SE187315.075	SE187315.076
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	C10	C11	C12	C13	C14
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/12/2018	11/12/2018	11/12/2018	11/12/2018	11/12/2018
			SE187315.077	SE187315.078	SE187315.079	SE187315.080	SE187315.081
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	C15	C16	C17	C18	CDS1
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/12/2018	11/12/2018	11/12/2018	11/12/2018	11/12/2018
			SE187315.082	SE187315.083	SE187315.084	SE187315.085	SE187315.086
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	0.05

Moisture Content [AN002] Tested: 13/12/2018

PARAMETER	UOM	LOR	TP1	TP4	TP7	TP11	TP15
			CLAY	CLAY	CLAY	CLAY	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15
			10/12/2018	10/12/2018	10/12/2018	10/12/2018	11/12/2018
			SE187315.001	SE187315.004	SE187315.007	SE187315.011	SE187315.015
% Moisture	%w/w	0.5	16	17	12	16	19

PARAMETER	UOM	LOR	TP18	TP20	TP21	TP25	TP27
			CLAY	CLAY	CLAY	CLAY	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15
			10/12/2018	10/12/2018	11/12/2018	10/12/2018	10/12/2018
			SE187315.018	SE187315.020	SE187315.021	SE187315.025	SE187315.027
% Moisture	%w/w	0.5	9.8	16	20	13	12

PARAMETER	UOM	LOR	TP28	TP30	TP32	TP33	TP33
			CLAY	CLAY	CLAY	SAND	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.2-0.35
			11/12/2018	11/12/2018	11/12/2018	11/12/2018	11/12/2018
			SE187315.028	SE187315.030	SE187315.032	SE187315.033	SE187315.034
% Moisture	%w/w	0.5	33	16	16	9.4	13

PARAMETER	UOM	LOR	TP37	TP40	TP45	TP47	TP49
			CLAY	CLAY	CLAY	CLAY	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15
			11/12/2018	11/12/2018	11/12/2018	11/12/2018	11/12/2018
			SE187315.038	SE187315.041	SE187315.046	SE187315.048	SE187315.050
% Moisture	%w/w	0.5	15	14	17	20	6.9

PARAMETER	UOM	LOR	TP51	TP54	TP62	TP64	DDS1
			CLAY	CLAY	CLAY	SAND	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	-
			11/12/2018	11/12/2018	11/12/2018	11/12/2018	11/12/2018
			SE187315.052	SE187315.055	SE187315.057	SE187315.059	SE187315.063
% Moisture	%w/w	0.5	8.0	15	9.8	14	11

PARAMETER	UOM	LOR	C1	C2	C3	C4	C5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			10/12/2018	10/12/2018	10/12/2018	10/12/2018	10/12/2018
			SE187315.068	SE187315.069	SE187315.070	SE187315.071	SE187315.072
% Moisture	%w/w	0.5	15	15	15	15	14

PARAMETER	UOM	LOR	C6	C7	C8	C9	C10
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			10/12/2018	10/12/2018	11/12/2018	11/12/2018	11/12/2018
			SE187315.073	SE187315.074	SE187315.075	SE187315.076	SE187315.077
% Moisture	%w/w	0.5	14	19	14	9.9	11

Moisture Content [AN002] Tested: 13/12/2018 (continued)

			C11	C12	C13	C14	C15
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/12/2018	11/12/2018	11/12/2018	11/12/2018	11/12/2018
			SE187315.078	SE187315.079	SE187315.080	SE187315.081	SE187315.082
PARAMETER	UOM	LOR					
% Moisture	%w/w	0.5	16	12	15	14	14

			C16	C17	C18	CDS1
			SOIL	SOIL	SOIL	SOIL
			-	-	-	-
			11/12/2018	11/12/2018	11/12/2018	11/12/2018
			SE187315.083	SE187315.084	SE187315.085	SE187315.086
PARAMETER	UOM	LOR				
% Moisture	%w/w	0.5	9.3	11	14	15

Fibre Identification in soil [AN602] Tested: 18/12/2018

PARAMETER	UOM	LOR	TP28	TP33	TP33	TP47	TP64
			CLAY	SAND	CLAY	CLAY	SAND
			0.0-0.15	0.0-0.15	0.2-0.35	0.0-0.15	0.0-0.15
			11/12/2018	11/12/2018	11/12/2018	11/12/2018	11/12/2018
			SE187315.028	SE187315.033	SE187315.034	SE187315.048	SE187315.059
Asbestos Detected	No unit	-	No	Yes	No	No	No
Estimated Fibres*	%w/w	0.01	<0.01	>0.01	<0.01	<0.01	<0.01

Gravimetric Determination of Asbestos in Soil [AN605] Tested: 18/12/2018

PARAMETER	UOM	LOR	TP28	TP33	TP33	TP47	TP64
			CLAY 0.0-0.15 11/12/2018 SE187315.028	SAND 0.0-0.15 11/12/2018 SE187315.033	CLAY 0.2-0.35 11/12/2018 SE187315.034	CLAY 0.0-0.15 11/12/2018 SE187315.048	SAND 0.0-0.15 11/12/2018 SE187315.059
Total Sample Weight*	g	1	340	623	523	377	423
ACM in >7mm Sample*	g	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
AF/FA in >2mm to <7mm Sample*	g	0.0001	<0.0001	16.9	<0.0001	<0.0001	<0.0001
AF/FA in <2mm Sample*	g	0.0001	<0.0001	0.623	<0.0001	<0.0001	<0.0001
Asbestos in soil (>7mm ACM)*	%w/w	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Asbestos in soil (>2mm to <7mm AF/FA)*	%w/w	0.001	<0.001	2.7	<0.001	<0.001	<0.001
Asbestos in soil (<2mm AF/FA)*	%w/w	0.001	<0.001	0.10	<0.001	<0.001	<0.001
Asbestos in soil (<7mm AF/FA)*	%w/w	0.001	<0.001	2.8	<0.001	<0.001	<0.001
Fibre Type*	No unit	-	-	-	-	-	IS

Metals in Water (Dissolved) by ICPOES [AN320] Tested: 14/12/2018

PARAMETER	UOM	LOR	RS1	RS2
			WATER - 10/12/2018 SE187315.064	WATER - 11/12/2018 SE187315.065
Arsenic, As	mg/L	0.02	<0.02	<0.02
Cadmium, Cd	mg/L	0.001	0.001	<0.001
Chromium, Cr	mg/L	0.005	<0.005	<0.005
Copper, Cu	mg/L	0.005	<0.005	<0.005
Lead, Pb	mg/L	0.02	<0.02	<0.02
Nickel, Ni	mg/L	0.005	<0.005	<0.005
Zinc, Zn	mg/L	0.01	<0.01	<0.01

Mercury (dissolved) in Water [AN311(Perth)/AN312] Tested: 14/12/2018

			RS1	RS2
			WATER	WATER
			-	-
			10/12/2018	11/12/2018
			SE187315.064	SE187315.065
PARAMETER	UOM	LOR		
Mercury	mg/L	0.0001	<0.0001	<0.0001

METHOD

METHODOLOGY SUMMARY

- AN002** The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
- AN020** Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
- AN040/AN320** A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
- AN040** A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
- AN101** pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl₂) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
- AN122** Exchangeable Cations, CEC and ESP: Soil sample is extracted in 1M Ammonium Acetate at pH=7 (or 1M Ammonium Chloride at pH=7) with cations (Na, K, Ca & Mg) then determined by ICP OES/ICP MS and reported as Exchangeable Cations. For saline soils, these results can be corrected for water soluble cations and reported as Exchangeable cations in meq/100g or soil can be pre-treated (aqueous ethanol/aqueous glycerol) prior to extraction. Cation Exchange Capacity (CEC) is the sum of the exchangeable cations in meq/100g.
- AN122** The Exchangeable Sodium Percentage (ESP) is calculated as the exchangeable sodium divided by the CEC (all in meq/100g) times 100.
ESP can be used to categorise the sodicity of the soil as below:
- | | |
|-----------|----------------|
| ESP < 6% | non-sodic |
| ESP 6-15% | sodic |
| ESP >15% | strongly sodic |
- Method is referenced to Rayment and Lyons, 2011, sections 15D3 and 15N1.-
- AN311(Perth)/AN312** Mercury by Cold Vapour AAS in Waters: 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.
- 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
- AN320** Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
- AN320** Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
- AN403** Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
- AN403** Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoverable Hydrocarbons - Silica (TRH-Si) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
- AN403** The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
- AN420** (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).

AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC's are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic 'clues', which provide a reasonable degree of certainty, dispersion staining is a mandatory 'clue' for positive identification. If sufficient 'clues' are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
AN602	Fibres/material that cannot be unequivocally identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf) The fibres detected may or may not be asbestos fibres.
AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states:"Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."
AN602	The sample can be reported "no asbestos found at the reporting limit of 0.1 g/kg" (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if- <ul style="list-style-type: none"> (a) no trace asbestos fibres have been detected (i.e. no 'respirable' fibres): (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg: and (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.
AN605	This technique gravimetrically determines the mass of Asbestos Containing Material retained on a 7mm Sieve and assumes that 15% of this ACM is asbestos. This calculated asbestos weight is then calculated as a percentage of the total sample weight.
AN605	This technique also gravimetrically determines the mass of Fibrous Asbestos (FA) and Asbestos Fines (AF) Containing Material retained on and passing a 2mm sieve post 7mm sieving. Assumes that FA and AF are 100% asbestos containing. This calculated asbestos weight is then calculated as a percentage of the total sample weight. This does not include free fibres which are only observed by standard trace analysis as per AN 602.
AN605	Insofar as is technically feasible, this report is consistent with the analytical reporting recommendations in the Western Australian Department of Health Guidelines for the Assessment Remediation and Management of Asbestos - Contaminated Sites in Western Australia - May 2009.

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

SE187315 R0

CLIENT DETAILS

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Project 14305-1 Menangle
Order Number GEOTECH_LTGHVC_V1_2018
Samples 86

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SGS Reference SE187315 R0
Date Received 12 Dec 2018
Date Reported 19 Dec 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 with the exception of the following:

Duplicate	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	1 item
	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	1 item
Matrix Spike	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	3 items

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	84 Soil, 2 Water
Date documentation received	12/12/2018	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	4.5°C	Sufficient sample for analysis	Yes
Turnaround time requested	3 Days/ Standard		

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.

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]AN122

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP1	SE187315.001	LB163684	10 Dec 2018	12 Dec 2018	07 Jan 2019	17 Dec 2018	07 Jan 2019	19 Dec 2018
TP4	SE187315.004	LB163684	10 Dec 2018	12 Dec 2018	07 Jan 2019	17 Dec 2018	07 Jan 2019	19 Dec 2018
TP7	SE187315.007	LB163684	10 Dec 2018	12 Dec 2018	07 Jan 2019	17 Dec 2018	07 Jan 2019	19 Dec 2018
TP11	SE187315.011	LB163684	10 Dec 2018	12 Dec 2018	07 Jan 2019	17 Dec 2018	07 Jan 2019	19 Dec 2018
TP15	SE187315.015	LB163684	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP18	SE187315.018	LB163684	10 Dec 2018	12 Dec 2018	07 Jan 2019	17 Dec 2018	07 Jan 2019	19 Dec 2018
TP21	SE187315.021	LB163684	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP25	SE187315.025	LB163684	10 Dec 2018	12 Dec 2018	07 Jan 2019	17 Dec 2018	07 Jan 2019	19 Dec 2018
TP27	SE187315.027	LB163684	10 Dec 2018	12 Dec 2018	07 Jan 2019	17 Dec 2018	07 Jan 2019	19 Dec 2018
TP28	SE187315.028	LB163684	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP30	SE187315.030	LB163684	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP32	SE187315.032	LB163685	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP33	SE187315.033	LB163685	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP33	SE187315.034	LB163685	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP37	SE187315.038	LB163685	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP40	SE187315.041	LB163685	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP45	SE187315.046	LB163685	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP47	SE187315.048	LB163685	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP49	SE187315.050	LB163685	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP51	SE187315.052	LB163685	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP54	SE187315.055	LB163685	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP62	SE187315.057	LB163685	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018
TP64	SE187315.059	LB163685	11 Dec 2018	12 Dec 2018	08 Jan 2019	17 Dec 2018	08 Jan 2019	19 Dec 2018

Fibre Identification in soil

Method: ME-(AU)-[ENV]AN602

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP28	SE187315.028	LB163817	11 Dec 2018	12 Dec 2018	11 Dec 2019	18 Dec 2018	11 Dec 2019	19 Dec 2018
TP33	SE187315.033	LB163817	11 Dec 2018	12 Dec 2018	11 Dec 2019	18 Dec 2018	11 Dec 2019	19 Dec 2018
TP33	SE187315.034	LB163817	11 Dec 2018	12 Dec 2018	11 Dec 2019	18 Dec 2018	11 Dec 2019	19 Dec 2018
TP47	SE187315.048	LB163817	11 Dec 2018	12 Dec 2018	11 Dec 2019	18 Dec 2018	11 Dec 2019	19 Dec 2018
TP64	SE187315.059	LB163817	11 Dec 2018	12 Dec 2018	11 Dec 2019	18 Dec 2018	11 Dec 2019	19 Dec 2018

Gravimetric Determination of Asbestos in Soil

Method: ME-(AU)-[ENV]AN605

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP28	SE187315.028	LB163817	11 Dec 2018	12 Dec 2018	09 Jun 2019	18 Dec 2018	09 Jun 2019	19 Dec 2018
TP33	SE187315.033	LB163817	11 Dec 2018	12 Dec 2018	09 Jun 2019	18 Dec 2018	09 Jun 2019	19 Dec 2018
TP33	SE187315.034	LB163817	11 Dec 2018	12 Dec 2018	09 Jun 2019	18 Dec 2018	09 Jun 2019	19 Dec 2018
TP47	SE187315.048	LB163817	11 Dec 2018	12 Dec 2018	09 Jun 2019	18 Dec 2018	09 Jun 2019	19 Dec 2018
TP64	SE187315.059	LB163817	11 Dec 2018	12 Dec 2018	09 Jun 2019	18 Dec 2018	09 Jun 2019	19 Dec 2018

Mercury (dissolved) in Water

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RS1	SE187315.064	LB163548	10 Dec 2018	12 Dec 2018	07 Jan 2019	14 Dec 2018	07 Jan 2019	14 Dec 2018
RS2	SE187315.065	LB163548	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	14 Dec 2018

Mercury in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP28	SE187315.028	LB163600	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
TP33	SE187315.033	LB163600	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
TP33	SE187315.034	LB163600	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
TP47	SE187315.048	LB163600	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
TP64	SE187315.059	LB163600	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
DDS1	SE187315.063	LB163600	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
C1	SE187315.068	LB163600	10 Dec 2018	12 Dec 2018	07 Jan 2019	14 Dec 2018	07 Jan 2019	19 Dec 2018
C2	SE187315.069	LB163600	10 Dec 2018	12 Dec 2018	07 Jan 2019	14 Dec 2018	07 Jan 2019	19 Dec 2018
C3	SE187315.070	LB163600	10 Dec 2018	12 Dec 2018	07 Jan 2019	14 Dec 2018	07 Jan 2019	19 Dec 2018
C4	SE187315.071	LB163600	10 Dec 2018	12 Dec 2018	07 Jan 2019	14 Dec 2018	07 Jan 2019	19 Dec 2018
C5	SE187315.072	LB163600	10 Dec 2018	12 Dec 2018	07 Jan 2019	14 Dec 2018	07 Jan 2019	19 Dec 2018
C6	SE187315.073	LB163600	10 Dec 2018	12 Dec 2018	07 Jan 2019	14 Dec 2018	07 Jan 2019	19 Dec 2018
C7	SE187315.074	LB163600	10 Dec 2018	12 Dec 2018	07 Jan 2019	14 Dec 2018	07 Jan 2019	19 Dec 2018
C8	SE187315.075	LB163600	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
C9	SE187315.076	LB163600	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018

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 (continued)

Method: ME-(AU)-ENVJAN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
C10	SE187315.077	LB163600	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
C11	SE187315.078	LB163600	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
C12	SE187315.079	LB163600	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
C13	SE187315.080	LB163600	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
C14	SE187315.081	LB163601	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
C15	SE187315.082	LB163601	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
C16	SE187315.083	LB163601	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
C17	SE187315.084	LB163601	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
C18	SE187315.085	LB163601	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018
CDS1	SE187315.086	LB163601	11 Dec 2018	12 Dec 2018	08 Jan 2019	14 Dec 2018	08 Jan 2019	19 Dec 2018

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-ENVJAN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RS1	SE187315.064	LB163564	10 Dec 2018	12 Dec 2018	08 Jun 2019	14 Dec 2018	08 Jun 2019	14 Dec 2018
RS2	SE187315.065	LB163564	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	14 Dec 2018

Moisture Content

Method: ME-(AU)-ENVJAN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP1	SE187315.001	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP4	SE187315.004	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP7	SE187315.007	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP11	SE187315.011	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP15	SE187315.015	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP18	SE187315.018	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP20	SE187315.020	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP21	SE187315.021	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP25	SE187315.025	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP27	SE187315.027	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP28	SE187315.028	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP30	SE187315.030	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP32	SE187315.032	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP33	SE187315.033	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP33	SE187315.034	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP37	SE187315.038	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP40	SE187315.041	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP45	SE187315.046	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP47	SE187315.048	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP49	SE187315.050	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP51	SE187315.052	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP54	SE187315.055	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP62	SE187315.057	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
TP64	SE187315.059	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
DDS1	SE187315.063	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C1	SE187315.068	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C2	SE187315.069	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C3	SE187315.070	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C4	SE187315.071	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C5	SE187315.072	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C6	SE187315.073	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C7	SE187315.074	LB163519	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C8	SE187315.075	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C9	SE187315.076	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C10	SE187315.077	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C11	SE187315.078	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C12	SE187315.079	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C13	SE187315.080	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C14	SE187315.081	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C15	SE187315.082	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C16	SE187315.083	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C17	SE187315.084	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018
C18	SE187315.085	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018

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.

Moisture Content (continued)

Method: ME-(AU)-ENVJAN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
CDS1	SE187315.086	LB163519	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	18 Dec 2018	17 Dec 2018

OC Pesticides in Soil

Method: ME-(AU)-ENVJAN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP20	SE187315.020	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
TP28	SE187315.028	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
TP33	SE187315.033	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
TP33	SE187315.034	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
TP47	SE187315.048	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
TP64	SE187315.059	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
DDS1	SE187315.063	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C1	SE187315.068	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C3	SE187315.070	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C4	SE187315.071	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C6	SE187315.073	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C8	SE187315.075	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C9	SE187315.076	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C11	SE187315.078	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C13	SE187315.080	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C14	SE187315.081	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C16	SE187315.083	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C18	SE187315.085	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
CDS1	SE187315.086	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-ENVJAN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP20	SE187315.020	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
TP28	SE187315.028	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
TP33	SE187315.033	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
TP33	SE187315.034	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
TP47	SE187315.048	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
TP64	SE187315.059	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
DDS1	SE187315.063	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C1	SE187315.068	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C3	SE187315.070	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C4	SE187315.071	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C6	SE187315.073	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C8	SE187315.075	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C9	SE187315.076	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C11	SE187315.078	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C13	SE187315.080	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C14	SE187315.081	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C16	SE187315.083	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C18	SE187315.085	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
CDS1	SE187315.086	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018

PCBs in Soil

Method: ME-(AU)-ENVJAN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP20	SE187315.020	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
TP28	SE187315.028	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
TP33	SE187315.033	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
TP33	SE187315.034	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
TP47	SE187315.048	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
TP64	SE187315.059	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
DDS1	SE187315.063	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C1	SE187315.068	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C3	SE187315.070	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C4	SE187315.071	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C6	SE187315.073	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C8	SE187315.075	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C9	SE187315.076	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018

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.

PCBs in Soil (continued)

Method: ME-(AU)-ENVJAN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
C11	SE187315.078	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C13	SE187315.080	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C14	SE187315.081	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C16	SE187315.083	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
C18	SE187315.085	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018
CDS1	SE187315.086	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	18 Dec 2018

pH in soil (1:5)

Method: ME-(AU)-ENVJAN101

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP1	SE187315.001	LB163639	10 Dec 2018	12 Dec 2018	17 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP4	SE187315.004	LB163639	10 Dec 2018	12 Dec 2018	17 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP7	SE187315.007	LB163639	10 Dec 2018	12 Dec 2018	17 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP11	SE187315.011	LB163639	10 Dec 2018	12 Dec 2018	17 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP15	SE187315.015	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP18	SE187315.018	LB163639	10 Dec 2018	12 Dec 2018	17 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP21	SE187315.021	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP25	SE187315.025	LB163639	10 Dec 2018	12 Dec 2018	17 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP27	SE187315.027	LB163639	10 Dec 2018	12 Dec 2018	17 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP28	SE187315.028	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP30	SE187315.030	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP32	SE187315.032	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP33	SE187315.033	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP33	SE187315.034	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP37	SE187315.038	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP40	SE187315.041	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP45	SE187315.046	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP47	SE187315.048	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP49	SE187315.050	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP51	SE187315.052	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP54	SE187315.055	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP62	SE187315.057	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018
TP64	SE187315.059	LB163639	11 Dec 2018	12 Dec 2018	18 Dec 2018	14 Dec 2018	15 Dec 2018	14 Dec 2018

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

Method: ME-(AU)-ENVJAN040/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP28	SE187315.028	LB163602	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
TP33	SE187315.033	LB163602	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
TP33	SE187315.034	LB163602	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
TP47	SE187315.048	LB163602	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
TP64	SE187315.059	LB163602	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
DDS1	SE187315.063	LB163602	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
C1	SE187315.068	LB163602	10 Dec 2018	12 Dec 2018	08 Jun 2019	14 Dec 2018	08 Jun 2019	17 Dec 2018
C2	SE187315.069	LB163602	10 Dec 2018	12 Dec 2018	08 Jun 2019	14 Dec 2018	08 Jun 2019	17 Dec 2018
C3	SE187315.070	LB163602	10 Dec 2018	12 Dec 2018	08 Jun 2019	14 Dec 2018	08 Jun 2019	17 Dec 2018
C4	SE187315.071	LB163602	10 Dec 2018	12 Dec 2018	08 Jun 2019	14 Dec 2018	08 Jun 2019	17 Dec 2018
C5	SE187315.072	LB163602	10 Dec 2018	12 Dec 2018	08 Jun 2019	14 Dec 2018	08 Jun 2019	17 Dec 2018
C6	SE187315.073	LB163602	10 Dec 2018	12 Dec 2018	08 Jun 2019	14 Dec 2018	08 Jun 2019	17 Dec 2018
C7	SE187315.074	LB163602	10 Dec 2018	12 Dec 2018	08 Jun 2019	14 Dec 2018	08 Jun 2019	17 Dec 2018
C8	SE187315.075	LB163602	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
C9	SE187315.076	LB163602	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
C10	SE187315.077	LB163602	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
C11	SE187315.078	LB163602	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
C12	SE187315.079	LB163602	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
C13	SE187315.080	LB163602	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
C14	SE187315.081	LB163603	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
C15	SE187315.082	LB163603	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
C16	SE187315.083	LB163603	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
C17	SE187315.084	LB163603	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
C18	SE187315.085	LB163603	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018
CDS1	SE187315.086	LB163603	11 Dec 2018	12 Dec 2018	09 Jun 2019	14 Dec 2018	09 Jun 2019	17 Dec 2018

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.

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
TP20	SE187315.020	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
TP28	SE187315.028	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
TP33	SE187315.033	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
TP33	SE187315.034	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
TP47	SE187315.048	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
TP64	SE187315.059	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
DDS1	SE187315.063	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C1	SE187315.068	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C3	SE187315.070	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C4	SE187315.071	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C6	SE187315.073	LB163521	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C8	SE187315.075	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C9	SE187315.076	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C11	SE187315.078	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C13	SE187315.080	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C14	SE187315.081	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C16	SE187315.083	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
C18	SE187315.085	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018
CDS1	SE187315.086	LB163521	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	17 Dec 2018

VOC's in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP20	SE187315.020	LB163520	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TP28	SE187315.028	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TP33	SE187315.033	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TP33	SE187315.034	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TP47	SE187315.048	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TP64	SE187315.059	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
DDS1	SE187315.063	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TS1	SE187315.066	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TS2	SE187315.067	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018

Volatile Petroleum Hydrocarbons in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP20	SE187315.020	LB163520	10 Dec 2018	12 Dec 2018	24 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TP28	SE187315.028	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TP33	SE187315.033	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TP33	SE187315.034	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TP47	SE187315.048	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TP64	SE187315.059	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
DDS1	SE187315.063	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TS1	SE187315.066	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 2018
TS2	SE187315.067	LB163520	11 Dec 2018	12 Dec 2018	25 Dec 2018	13 Dec 2018	22 Jan 2019	19 Dec 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)	TP20	SE187315.020	%	60 - 130%	102
	TP28	SE187315.028	%	60 - 130%	101
	TP33	SE187315.033	%	60 - 130%	99
	TP33	SE187315.034	%	60 - 130%	100
	TP47	SE187315.048	%	60 - 130%	105
	TP64	SE187315.059	%	60 - 130%	107
	DDS1	SE187315.063	%	60 - 130%	100
	C1	SE187315.068	%	60 - 130%	107
	C3	SE187315.070	%	60 - 130%	103
	C4	SE187315.071	%	60 - 130%	108
	C6	SE187315.073	%	60 - 130%	104
	C8	SE187315.075	%	60 - 130%	105
	C9	SE187315.076	%	60 - 130%	104
	C11	SE187315.078	%	60 - 130%	105
	C13	SE187315.080	%	60 - 130%	109
	C14	SE187315.081	%	60 - 130%	104
	C16	SE187315.083	%	60 - 130%	103
	C18	SE187315.085	%	60 - 130%	104
	CDS1	SE187315.086	%	60 - 130%	105

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	TP20	SE187315.020	%	70 - 130%	100
	TP28	SE187315.028	%	70 - 130%	102
	TP33	SE187315.033	%	70 - 130%	104
	TP33	SE187315.034	%	70 - 130%	106
	TP47	SE187315.048	%	70 - 130%	104
	TP64	SE187315.059	%	70 - 130%	104
	DDS1	SE187315.063	%	70 - 130%	102
d14-p-terphenyl (Surrogate)	TP20	SE187315.020	%	70 - 130%	104
	TP28	SE187315.028	%	70 - 130%	104
	TP33	SE187315.033	%	70 - 130%	106
	TP33	SE187315.034	%	70 - 130%	110
	TP47	SE187315.048	%	70 - 130%	104
	TP64	SE187315.059	%	70 - 130%	106
	DDS1	SE187315.063	%	70 - 130%	104
d5-nitrobenzene (Surrogate)	TP20	SE187315.020	%	70 - 130%	92
	TP28	SE187315.028	%	70 - 130%	96
	TP33	SE187315.033	%	70 - 130%	94
	TP33	SE187315.034	%	70 - 130%	96
	TP47	SE187315.048	%	70 - 130%	94
	TP64	SE187315.059	%	70 - 130%	94
	DDS1	SE187315.063	%	70 - 130%	92

PCBs in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	TP20	SE187315.020	%	60 - 130%	102
	TP28	SE187315.028	%	60 - 130%	101
	TP33	SE187315.033	%	60 - 130%	99
	TP33	SE187315.034	%	60 - 130%	100
	TP47	SE187315.048	%	60 - 130%	105
	TP64	SE187315.059	%	60 - 130%	107
	DDS1	SE187315.063	%	60 - 130%	100

VOC's in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	TP20	SE187315.020	%	60 - 130%	75
	TP28	SE187315.028	%	60 - 130%	75
	TP33	SE187315.033	%	60 - 130%	73
	TP33	SE187315.034	%	60 - 130%	76
	TP47	SE187315.048	%	60 - 130%	85
	TP64	SE187315.059	%	60 - 130%	75

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 %
Bromofluorobenzene (Surrogate)	DDS1	SE187315.063	%	60 - 130%	77
	TS1	SE187315.066	%	60 - 130%	105
	TS2	SE187315.067	%	60 - 130%	92
d4-1,2-dichloroethane (Surrogate)	TP20	SE187315.020	%	60 - 130%	78
	TP28	SE187315.028	%	60 - 130%	94
	TP33	SE187315.033	%	60 - 130%	91
	TP33	SE187315.034	%	60 - 130%	87
	TP47	SE187315.048	%	60 - 130%	94
	TP64	SE187315.059	%	60 - 130%	118
	DDS1	SE187315.063	%	60 - 130%	97
	TS1	SE187315.066	%	60 - 130%	101
	TS2	SE187315.067	%	60 - 130%	94
d8-toluene (Surrogate)	TP20	SE187315.020	%	60 - 130%	83
	TP28	SE187315.028	%	60 - 130%	77
	TP33	SE187315.033	%	60 - 130%	88
	TP33	SE187315.034	%	60 - 130%	89
	TP47	SE187315.048	%	60 - 130%	91
	TP64	SE187315.059	%	60 - 130%	79
	DDS1	SE187315.063	%	60 - 130%	91
	TS1	SE187315.066	%	60 - 130%	99
	TS2	SE187315.067	%	60 - 130%	89
Dibromofluoromethane (Surrogate)	TP20	SE187315.020	%	60 - 130%	75
	TP28	SE187315.028	%	60 - 130%	89
	TP33	SE187315.033	%	60 - 130%	120
	TP33	SE187315.034	%	60 - 130%	79
	TP47	SE187315.048	%	60 - 130%	78
	TP64	SE187315.059	%	60 - 130%	118
	DDS1	SE187315.063	%	60 - 130%	109
	TS1	SE187315.066	%	60 - 130%	88
	TS2	SE187315.067	%	60 - 130%	127

Volatile Petroleum Hydrocarbons in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	TP20	SE187315.020	%	60 - 130%	75
	TP28	SE187315.028	%	60 - 130%	75
	TP33	SE187315.033	%	60 - 130%	73
	TP33	SE187315.034	%	60 - 130%	76
	TP47	SE187315.048	%	60 - 130%	85
	TP64	SE187315.059	%	60 - 130%	75
	DDS1	SE187315.063	%	60 - 130%	77
d4-1,2-dichloroethane (Surrogate)	TP20	SE187315.020	%	60 - 130%	78
	TP28	SE187315.028	%	60 - 130%	94
	TP33	SE187315.033	%	60 - 130%	91
	TP33	SE187315.034	%	60 - 130%	87
	TP47	SE187315.048	%	60 - 130%	94
	TP64	SE187315.059	%	60 - 130%	118
	DDS1	SE187315.063	%	60 - 130%	97
d8-toluene (Surrogate)	TP20	SE187315.020	%	60 - 130%	83
	TP28	SE187315.028	%	60 - 130%	77
	TP33	SE187315.033	%	60 - 130%	88
	TP33	SE187315.034	%	60 - 130%	89
	TP47	SE187315.048	%	60 - 130%	91
	TP64	SE187315.059	%	60 - 130%	79
	DDS1	SE187315.063	%	60 - 130%	91
Dibromofluoromethane (Surrogate)	TP20	SE187315.020	%	60 - 130%	75
	TP28	SE187315.028	%	60 - 130%	89
	TP33	SE187315.033	%	60 - 130%	120
	TP33	SE187315.034	%	60 - 130%	79
	TP47	SE187315.048	%	60 - 130%	78
	TP64	SE187315.059	%	60 - 130%	118
	DDS1	SE187315.063	%	60 - 130%	109

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.

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]AN122

Sample Number	Parameter	Units	LOR	Result
LB163684.001	Exchangeable Sodium, Na	mg/kg	2	0
	Exchangeable Potassium, K	mg/kg	2	0
	Exchangeable Calcium, Ca	mg/kg	2	0
	Exchangeable Magnesium, Mg	mg/kg	2	0
LB163685.001	Exchangeable Sodium, Na	mg/kg	2	0
	Exchangeable Potassium, K	mg/kg	2	0
	Exchangeable Calcium, Ca	mg/kg	2	0
	Exchangeable Magnesium, Mg	mg/kg	2	0

Mercury (dissolved) in Water

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

Sample Number	Parameter	Units	LOR	Result
LB163548.001	Mercury	mg/L	0.0001	<0.0001

Mercury in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB163600.001	Mercury	mg/kg	0.05	<0.05
LB163601.001	Mercury	mg/kg	0.05	<0.05

Metals in Water (Dissolved) by ICPOES

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

Sample Number	Parameter	Units	LOR	Result
LB163564.001	Arsenic, As	mg/L	0.02	<0.02
	Cadmium, Cd	mg/L	0.001	<0.001
	Chromium, Cr	mg/L	0.005	<0.005
	Copper, Cu	mg/L	0.005	<0.005
	Lead, Pb	mg/L	0.02	<0.02
	Nickel, Ni	mg/L	0.005	<0.005
	Zinc, Zn	mg/L	0.01	<0.01

OC Pesticides in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB163521.001	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)	%	-	104

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB163521.001	Naphthalene	mg/kg	0.1	<0.1
	2-methylnaphthalene	mg/kg	0.1	<0.1
	1-methylnaphthalene	mg/kg	0.1	<0.1

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

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

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

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

Sample Number	Parameter	Units	LOR	Result
LB163521.001	Acenaphthylene	mg/kg	0.1	<0.1
	Acenaphthene	mg/kg	0.1	<0.1
	Fluorene	mg/kg	0.1	<0.1
	Phenanthrene	mg/kg	0.1	<0.1
	Anthracene	mg/kg	0.1	<0.1
	Fluoranthene	mg/kg	0.1	<0.1
	Pyrene	mg/kg	0.1	<0.1
	Benzo(a)anthracene	mg/kg	0.1	<0.1
	Chrysene	mg/kg	0.1	<0.1
	Benzo(a)pyrene	mg/kg	0.1	<0.1
	Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
	Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
	Benzo(ghi)perylene	mg/kg	0.1	<0.1
	Total PAH (18)	mg/kg	0.8	<0.8
Surrogates	d5-nitrobenzene (Surrogate)	%	-	94
	2-fluorobiphenyl (Surrogate)	%	-	102
	d14-p-terphenyl (Surrogate)	%	-	102

PCBs in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB163521.001	Arochlor 1016	mg/kg	0.2	<0.2
	Arochlor 1221	mg/kg	0.2	<0.2
	Arochlor 1232	mg/kg	0.2	<0.2
	Arochlor 1242	mg/kg	0.2	<0.2
	Arochlor 1248	mg/kg	0.2	<0.2
	Arochlor 1254	mg/kg	0.2	<0.2
	Arochlor 1260	mg/kg	0.2	<0.2
	Arochlor 1262	mg/kg	0.2	<0.2
	Arochlor 1268	mg/kg	0.2	<0.2
	Total PCBs (Arochlors)	mg/kg	1	<1
Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	104

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

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

Sample Number	Parameter	Units	LOR	Result
LB163602.001	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
LB163603.001	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
LB163521.001	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
LB163520.001	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1
	Hydrocarbons	Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1
		m/p-xylene	mg/kg	0.2	<0.2

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

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

VOC's in Soil (continued)

Method: ME-(AU)-ENVJAN433

Sample Number	Parameter	Units	LOR	Result
LB163520.001	Monocyclic Aromatic	o-xylene	mg/kg	0.1
	Polycyclic VOCs	Naphthalene	mg/kg	0.1
	Surrogates	Dibromofluoromethane (Surrogate)	%	-
		d4-1,2-dichloroethane (Surrogate)	%	-
		d8-toluene (Surrogate)	%	-
		Bromofluorobenzene (Surrogate)	%	-
	Totals	Total BTEX	mg/kg	0.6

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-ENVJAN433

Sample Number	Parameter	Units	LOR	Result
LB163520.001	TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-
		d4-1,2-dichloroethane (Surrogate)	%	-
		d8-toluene (Surrogate)	%	-

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 %
SE187315.071	LB163600.014	Mercury	mg/kg	0.05	<0.05	<0.05	138	0
SE187315.080	LB163600.024	Mercury	mg/kg	0.05	<0.05	<0.05	200	0
SE187315.086	LB163601.010	Mercury	mg/kg	0.05	0.05	<0.05	132	6

Moisture Content

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187315.027	LB163519.011	% Moisture	%w/w	0.5	12	12	38	5
SE187315.050	LB163519.022	% Moisture	%w/w	0.5	6.9	7.3	44	5
SE187315.072	LB163519.033	% Moisture	%w/w	0.5	14	15	37	6
SE187315.082	LB163519.044	% Moisture	%w/w	0.5	14	14	37	1

OC Pesticides in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187315.048	LB163521.034	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
SE187315.080	LB163521.035	Total CLP OC Pesticides	mg/kg	1	<1	0	200	0
		Surrogates	mg/kg	-	0.16	0.157	30	0
		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

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.

OC Pesticides in Soil (continued)

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187315.080	LB163521.035	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	-	0.16	0.157	30	4

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187315.059	LB163521.032	Naphthalene	mg/kg	0.1	<0.1	0	200	0
		2-methylnaphthalene	mg/kg	0.1	<0.1	0	200	0
		1-methylnaphthalene	mg/kg	0.1	<0.1	0	200	0
		Acenaphthylene	mg/kg	0.1	<0.1	0	200	0
		Acenaphthene	mg/kg	0.1	<0.1	0	200	0
		Fluorene	mg/kg	0.1	<0.1	0	200	0
		Phenanthrene	mg/kg	0.1	<0.1	0.01	200	0
		Anthracene	mg/kg	0.1	<0.1	0	200	0
		Fluoranthene	mg/kg	0.1	<0.1	0.02	200	0
		Pyrene	mg/kg	0.1	<0.1	0.02	200	0
		Benzo(a)anthracene	mg/kg	0.1	<0.1	0.02	200	0
		Chrysene	mg/kg	0.1	<0.1	0.02	200	0
		Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	0.04	200	0
		Benzo(k)fluoranthene	mg/kg	0.1	<0.1	0.03	200	0
		Benzo(a)pyrene	mg/kg	0.1	<0.1	0.01	200	0
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	0.01	200	0
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	0	200	0
		Benzo(ghi)perylene	mg/kg	0.1	<0.1	0.01	200	0
		Carcinogenic PAHs, BaP TEQ <LOR=0	mg/kg	0.2	<0.2	0	200	0
		Carcinogenic PAHs, BaP TEQ <LOR=LOR	mg/kg	0.3	<0.3	0.242	134	0
	Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	mg/kg	0.2	<0.2	0.121	175	0	
	Total PAH (18)	mg/kg	0.8	<0.8	0	200	0	
Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.47	30	0	
	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.53	30	2	
	d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.55	30	4	

PCBs in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187315.048	LB163521.033	Arochlor 1016	mg/kg	0.2	<0.2	0	200	0
		Arochlor 1221	mg/kg	0.2	<0.2	0	200	0
		Arochlor 1232	mg/kg	0.2	<0.2	0	200	0
		Arochlor 1242	mg/kg	0.2	<0.2	0	200	0
		Arochlor 1248	mg/kg	0.2	<0.2	0	200	0
		Arochlor 1254	mg/kg	0.2	<0.2	0	200	0
		Arochlor 1260	mg/kg	0.2	<0.2	0	200	0
		Arochlor 1262	mg/kg	0.2	<0.2	0	200	0
		Arochlor 1268	mg/kg	0.2	<0.2	0	200	0
		Total PCBs (Arochlors)	mg/kg	1	<1	0	200	0
Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	0.157	30	0	

pH in soil (1:5)

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187315.015	LB163639.033	pH	pH Units	0.1	6.7	6.969	31	3
SE187315.038	LB163639.034	pH	pH Units	0.1	7.3	7.213	31	2

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

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

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.

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

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187315.071	LB163602.014	Arsenic, As	mg/kg	1	9	10	40	14
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	16	16	33	4
		Copper, Cu	mg/kg	0.5	58	41	31	35 @
		Nickel, Ni	mg/kg	0.5	15	14	33	7
		Lead, Pb	mg/kg	1	42	47	32	11
		Zinc, Zn	mg/kg	2	98	95	32	3
SE187315.080	LB163602.024	Arsenic, As	mg/kg	1	9	8	42	18
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	26	28	32	10
		Copper, Cu	mg/kg	0.5	17	17	33	1
		Nickel, Ni	mg/kg	0.5	7.8	8.1	36	3
		Lead, Pb	mg/kg	1	25	27	34	9
		Zinc, Zn	mg/kg	2	20	23	39	10
SE187315.086	LB163603.010	Arsenic, As	mg/kg	1	12	16	37	27
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	15	14	33	7
		Copper, Cu	mg/kg	0.5	45	42	31	6
		Nickel, Ni	mg/kg	0.5	14	14	34	1
		Lead, Pb	mg/kg	1	69	49	32	35 @
		Zinc, Zn	mg/kg	2	110	110	32	2

TRH (Total Recoverable Hydrocarbons) in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187315.059	LB163521.032	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 C10-C40 Total (F bands)	mg/kg	210	<210	0	200	0
		TRH F Bands	mg/kg	25	<25	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

VOC's in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187315.063	LB163520.014	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
			Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	5.4	5.3	50	3
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.8	4.4	50	9
			d8-toluene (Surrogate)	mg/kg	-	4.6	4.4	50	4
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.9	3.9	50	2
			Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200
			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 %	
SE187315.063	LB163520.014	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	-	5.4	5.3	30	3
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.8	4.4	30	9	
		d8-toluene (Surrogate)	mg/kg	-	4.6	4.4	30	4	
		Bromofluorobenzene (Surrogate)	mg/kg	-	3.9	3.9	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	

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.

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]JAN122

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163684.002	Exchangeable Sodium, Na	mg/kg	2	NA	72.68	80 - 120	103
	Exchangeable Potassium, K	mg/kg	2	NA	238.12	80 - 120	96
	Exchangeable Calcium, Ca	mg/kg	2	NA	692	80 - 120	91
	Exchangeable Magnesium, Mg	mg/kg	2	NA	134.2	80 - 120	94
LB163685.002	Exchangeable Sodium, Na	mg/kg	2	NA	72.68	80 - 120	100
	Exchangeable Potassium, K	mg/kg	2	NA	238.12	80 - 120	95
	Exchangeable Calcium, Ca	mg/kg	2	NA	692	80 - 120	89
	Exchangeable Magnesium, Mg	mg/kg	2	NA	134.2	80 - 120	93

Mercury in Soil

Method: ME-(AU)-[ENV]JAN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163600.002	Mercury	mg/kg	0.05	0.21	0.2	70 - 130	104
LB163601.002	Mercury	mg/kg	0.05	0.21	0.2	70 - 130	104

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]JAN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163564.002	Arsenic, As	mg/L	0.02	1.9	2	80 - 120	97
	Cadmium, Cd	mg/L	0.001	2.0	2	80 - 120	99
	Chromium, Cr	mg/L	0.005	2.0	2	80 - 120	98
	Copper, Cu	mg/L	0.005	2.0	2	80 - 120	100
	Lead, Pb	mg/L	0.02	2.0	2	80 - 120	99
	Nickel, Ni	mg/L	0.005	2.0	2	80 - 120	99
	Zinc, Zn	mg/L	0.01	2.0	2	80 - 120	101

OC Pesticides in Soil

Method: ME-(AU)-[ENV]JAN420

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163521.002	Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	118
	Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	115
	Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	112
	Dieldrin	mg/kg	0.2	0.2	0.2	60 - 140	118
	Endrin	mg/kg	0.2	0.2	0.2	60 - 140	106
	p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	107
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.16	0.15	40 - 130

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]JAN420

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %	
LB163521.002	Naphthalene	mg/kg	0.1	4.4	4	60 - 140	111	
	Acenaphthylene	mg/kg	0.1	5.0	4	60 - 140	125	
	Acenaphthene	mg/kg	0.1	4.5	4	60 - 140	112	
	Phenanthrene	mg/kg	0.1	4.7	4	60 - 140	119	
	Anthracene	mg/kg	0.1	4.5	4	60 - 140	112	
	Fluoranthene	mg/kg	0.1	4.3	4	60 - 140	108	
	Pyrene	mg/kg	0.1	4.7	4	60 - 140	118	
	Benzo(a)pyrene	mg/kg	0.1	4.9	4	60 - 140	121	
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	100
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	102
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	104

PCBs in Soil

Method: ME-(AU)-[ENV]JAN420

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163521.002	Arochlor 1260	mg/kg	0.2	0.4	0.4	60 - 140	102

pH in soil (1:5)

Method: ME-(AU)-[ENV]JAN101

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163639.003	pH	pH Units	0.1	7.4	7.415	98 - 102	100

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

Method: ME-(AU)-[ENV]JAN040/AN320

Sample Number	Parameter	Units	LOR
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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.

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES (continued)
Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163602.002	Arsenic, As	mg/kg	1	380	336.32	79 - 120	112
	Cadmium, Cd	mg/kg	0.3	420	416.6	69 - 131	102
	Chromium, Cr	mg/kg	0.3	40	35.2	80 - 120	113
	Copper, Cu	mg/kg	0.5	370	370.46	80 - 120	99
	Nickel, Ni	mg/kg	0.5	200	210.88	79 - 120	96
	Lead, Pb	mg/kg	1	100	107.87	79 - 120	96
	Zinc, Zn	mg/kg	2	320	301.27	80 - 121	105
LB163603.002	Arsenic, As	mg/kg	1	370	336.32	79 - 120	109
	Cadmium, Cd	mg/kg	0.3	420	416.6	69 - 131	102
	Chromium, Cr	mg/kg	0.3	36	35.2	80 - 120	101
	Copper, Cu	mg/kg	0.5	350	370.46	80 - 120	94
	Nickel, Ni	mg/kg	0.5	200	210.88	79 - 120	94
	Lead, Pb	mg/kg	1	99	107.87	79 - 120	91
	Zinc, Zn	mg/kg	2	300	301.27	80 - 121	101

TRH (Total Recoverable Hydrocarbons) in Soil
Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163521.002	TRH C10-C14	mg/kg	20	42	40	60 - 140	105
	TRH C15-C28	mg/kg	45	<45	40	60 - 140	108
	TRH C29-C36	mg/kg	45	<45	40	60 - 140	110
	TRH F Bands						
	TRH >C10-C16	mg/kg	25	42	40	60 - 140	105
	TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	113
	TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	110

VOC's in Soil
Method: ME-(AU)-[ENV]AN433

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163520.002	Monocyclic						
	Benzene	mg/kg	0.1	2.5	2.9	60 - 140	87
	Aromatic						
	Toluene	mg/kg	0.1	2.3	2.9	60 - 140	78
	Ethylbenzene	mg/kg	0.1	2.0	2.9	60 - 140	70
	m/p-xylene	mg/kg	0.2	3.8	5.8	60 - 140	66
	o-xylene	mg/kg	0.1	1.9	2.9	60 - 140	65
	Surrogates						
	Dibromofluoromethane (Surrogate)	mg/kg	-	4.0	5	60 - 140	79
	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.9	5	60 - 140	77
	d8-toluene (Surrogate)	mg/kg	-	4.8	5	60 - 140	96
	Bromofluorobenzene (Surrogate)	mg/kg	-	3.7	5	60 - 140	73

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163520.002	TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	78
	TRH C6-C9	mg/kg	20	<20	23.2	60 - 140	71
	Surrogates						
	Dibromofluoromethane (Surrogate)	mg/kg	-	4.0	5	60 - 140	79
	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.9	5	60 - 140	77
	d8-toluene (Surrogate)	mg/kg	-	4.8	5	60 - 140	96
	Bromofluorobenzene (Surrogate)	mg/kg	-	3.7	5	60 - 140	73
	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 (dissolved) in Water

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE187315.064	LB163548.004	Mercury	mg/L	0.0001	0.0071	<0.0001	0.008	90

Mercury in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE187315.028	LB163600.004	Mercury	mg/kg	0.05	0.22	<0.05	0.2	91
SE187315.081	LB163601.004	Mercury	mg/kg	0.05	0.21	<0.05	0.2	91

Metals in Water (Dissolved) by ICPOES

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE187315.064	LB163564.004	Arsenic, As	mg/L	0.02	1.9	<0.02	2	97
		Cadmium, Cd	mg/L	0.001	2.0	0.001	2	99
		Chromium, Cr	mg/L	0.005	1.9	<0.005	2	97
		Copper, Cu	mg/L	0.005	1.9	<0.005	2	97
		Lead, Pb	mg/L	0.02	2.0	<0.02	2	98
		Nickel, Ni	mg/L	0.005	2.0	<0.005	2	98
		Zinc, Zn	mg/L	0.01	2.0	<0.01	2	100

OC Pesticides in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Original	Spike	Recovery%
SE187370.003	LB163521.032	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	122
		Aldrin	mg/kg	0.1	<0.1	0.2	120
		Beta BHC	mg/kg	0.1	<0.1	-	-
		Delta BHC	mg/kg	0.1	<0.1	0.2	110
		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	124
		Endrin	mg/kg	0.2	<0.2	0.2	114
		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	78
		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	-	0.17	-	112

PCBs in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Original	Spike	Recovery%
SE187370.003	LB163521.032	Arochlor 1016	mg/kg	0.2	<0.2	-	-
		Arochlor 1221	mg/kg	0.2	<0.2	-	-
		Arochlor 1232	mg/kg	0.2	<0.2	-	-
		Arochlor 1242	mg/kg	0.2	<0.2	-	-
		Arochlor 1248	mg/kg	0.2	<0.2	-	-
		Arochlor 1254	mg/kg	0.2	<0.2	-	-
		Arochlor 1260	mg/kg	0.2	<0.2	0.4	120
		Arochlor 1262	mg/kg	0.2	<0.2	-	-

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.

PCBs in Soil (continued)

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

QC Sample	Sample Number	Parameter	Units	LOR	Original	Spike	Recovery%
SE187370.003	LB163521.032	Arochlor 1268	mg/kg	0.2	<0.2	-	-
		Total PCBs (Arochlors)	mg/kg	1	<1	-	-
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	113

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%
SE187315.028	LB163602.004	Arsenic, As	mg/kg	1	50	14	50	72
		Cadmium, Cd	mg/kg	0.3	40	<0.3	50	79
		Chromium, Cr	mg/kg	0.3	65	28	50	74
		Copper, Cu	mg/kg	0.5	110	90	50	48 @
		Nickel, Ni	mg/kg	0.5	46	11	50	70
		Lead, Pb	mg/kg	1	66	38	50	57 @
		Zinc, Zn	mg/kg	2	140	120	50	53 @
SE187315.081	LB163603.004	Arsenic, As	mg/kg	1	56	7	50	99
		Cadmium, Cd	mg/kg	0.3	48	<0.3	50	95
		Chromium, Cr	mg/kg	0.3	73	28	50	90
		Copper, Cu	mg/kg	0.5	67	17	50	101
		Nickel, Ni	mg/kg	0.5	53	7.2	50	91
		Lead, Pb	mg/kg	1	67	25	50	84
		Zinc, Zn	mg/kg	2	69	22	50	93

VOC's in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%	
SE187370.001	LB163520.004	Monocyclic	Benzene	mg/kg	0.1	2.6	<0.1	2.9	88	
			Aromatic	Toluene	mg/kg	0.1	3.2	<0.1	2.9	109
			Ethylbenzene	mg/kg	0.1	2.4	<0.1	2.9	84	
			m/p-xylene	mg/kg	0.2	4.5	<0.2	5.8	76	
			o-xylene	mg/kg	0.1	2.2	<0.1	2.9	75	
			Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	-	-
			Surrogates	Dibromofluoromethane (Surrogate)		mg/kg	-	3.6	4.0	-
		d4-1,2-dichloroethane (Surrogate)		mg/kg	-	3.8	3.7	-	75	
		d8-toluene (Surrogate)		mg/kg	-	5.7	4.2	-	114	
		Bromofluorobenzene (Surrogate)		mg/kg	-	3.9	3.5	-	79	
		Totals	Total Xylenes		mg/kg	0.3	6.7	<0.3	-	-
			Total BTEX		mg/kg	0.6	15	<0.6	-	-

Volatile Petroleum Hydrocarbons in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%	
SE187370.001	LB163520.004	TRH C6-C10	mg/kg	25	50	27	24.65	90	
		TRH C6-C9	mg/kg	20	40	22	23.2	81	
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.6	4.0	-	71
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.8	3.7	-	75	
		d8-toluene (Surrogate)	mg/kg	-	5.7	4.2	-	114	
		Bromofluorobenzene (Surrogate)	mg/kg	-	3.9	3.5	-	79	
		VPH F	Benzene (F0)	mg/kg	0.1	2.6	<0.1	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	35	27	7.25	103

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 : https://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022_QA_QC_Plan.pdf

- * NATA accreditation does not cover the performance of this service .
 - ** Indicative data, theoretical holding time exceeded.
 - 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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CLIENT DETAILS

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Project **14305-1 Menangle**
 Order Number **GEOTECH_LTGHVC_V1_2018**
 Samples 5

LABORATORY DETAILS

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 Laboratory SGS Alexandria Environmental
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 Alexandria NSW 2015

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

SGS Reference **SE187315 R0**
 Date Received 12 Dec 2018
 Date Reported 19 Dec 2018

COMMENTS

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

No respirable fibres detected in all soil samples using trace analysis technique.

Sample # 33:asbestos found in approx 16g fibrous material and loose in sample.

Asbestos analysed by Approved Identifier Ravee Sivasubramaniam .

SIGNATORIES



Akheeque Beniamen
Chemist



Bennet Lo
Senior Organic Chemist/Metals Chemis



Huong Crawford
Production Manager



Kamrul Ahsan
Senior Chemist



Ly Kim Ha
Organic Section Head



Ravee Sivasubramaniam
Hygiene Team Leader

RESULTS

Fibre Identification in soil

Method AN602

Laboratory Reference	Client Reference	Matrix	Sample Description	Date Sampled	Fibre Identification	Est.%w/w*
SE187315.028	TP28	Other	340g Clay,Sand,Soil, Rocks,Plant Matter	11 Dec 2018	No Asbestos Found Organic Fibres Detected	<0.01
SE187315.033	TP33	Other	623g Clay,Sand,Soil, Plant Matter,cement Mixture	11 Dec 2018	Amosite & Chrysotile Asbestos Found Organic Fibres Detected	>0.01
SE187315.034	TP33	Other	523g Clay,Rocks	11 Dec 2018	No Asbestos Found	<0.01
SE187315.048	TP47	Other	377g Clay,Soil,Plant Matter	11 Dec 2018	No Asbestos Found Organic Fibres Detected	<0.01
SE187315.059	TP64	Other	423g Clay,Soil,Rocks	11 Dec 2018	No Asbestos Found Organic Fibres Detected	<0.01

Gravimetric Determination of Asbestos in Soil [AN605] Tested: 18/12/2018

PARAMETER	UOM	LOR	TP28	TP33	TP33	TP47	TP64
			CLAY 0.0-0.15 11/12/2018 SE187315.028	SAND 0.0-0.15 11/12/2018 SE187315.033	CLAY 0.2-0.35 11/12/2018 SE187315.034	CLAY 0.0-0.15 11/12/2018 SE187315.048	SAND 0.0-0.15 11/12/2018 SE187315.059
Total Sample Weight*	g	1	340	623	523	377	423
ACM in >7mm Sample*	g	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
AF/FA in >2mm to <7mm Sample*	g	0.0001	<0.0001	16.9	<0.0001	<0.0001	<0.0001
AF/FA in <2mm Sample*	g	0.0001	<0.0001	0.623	<0.0001	<0.0001	<0.0001
Asbestos in soil (>7mm ACM)*	%w/w	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Asbestos in soil (>2mm to <7mm AF/FA)*	%w/w	0.001	<0.001	2.7	<0.001	<0.001	<0.001
Asbestos in soil (<2mm AF/FA)*	%w/w	0.001	<0.001	0.10	<0.001	<0.001	<0.001
Asbestos in soil (<7mm AF/FA)*	%w/w	0.001	<0.001	2.8	<0.001	<0.001	<0.001
Fibre Type*	No unit	-	-	-	-	-	IS

METHOD

METHODOLOGY SUMMARY

AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic 'clues', which provide a reasonable degree of certainty, dispersion staining is a mandatory 'clue' for positive identification. If sufficient 'clues' are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
AN602	Fibres/material that cannot be unequivocally identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf) The fibres detected may or may not be asbestos fibres.
AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states: "Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."
AN602	<p>The sample can be reported "no asbestos found at the reporting limit of 0.1 g/kg" (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if-</p> <ul style="list-style-type: none"> (a) no trace asbestos fibres have been detected (i.e. no 'respirable' fibres); (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg; and (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.
AN605	This technique gravimetrically determines the mass of Asbestos Containing Material retained on a 7mm Sieve and assumes that 15% of this ACM is asbestos. This calculated asbestos weight is then calculated as a percentage of the total sample weight.
AN605	This technique also gravimetrically determines the mass of Fibrous Asbestos (FA) and Asbestos Fines (AF) Containing Material retained on and passing a 2mm sieve post 7mm sieving. Assumes that FA and AF are 100% asbestos containing. This calculated asbestos weight is then calculated as a percentage of the total sample weight. This does not include free fibres which are only observed by standard trace analysis as per AN 602.
AN605	Insofar as is technically feasible, this report is consistent with the analytical reporting recommendations in the Western Australian Department of Health Guidelines for the Assessment Remediation and Management of Asbestos - Contaminated Sites in Western Australia - May 2009.

FOOTNOTES

Amosite	-	Brown Asbestos	NA	-	Not Analysed
Chrysotile	-	White Asbestos	LNR	-	Listed, Not Required
Crocidolite	-	Blue Asbestos	*	-	NATA accreditation does not cover the performance of this service .
Amphiboles	-	Amosite and/or Crocidolite	**	-	Indicative data, theoretical holding time exceeded.

(In reference to soil samples only) This report does not comply with the analytical reporting recommendations in the Western Australian Department of Health Guidelines for the Assessment and Remediation and Management of Asbestos Contaminated sites in Western Australia - May 2009.

Sampled by the client.

Where reported: 'Asbestos Detected': Asbestos detected by polarised light microscopy, including dispersion staining.

Where reported: 'No Asbestos Found': No Asbestos Found by polarised light microscopy, including dispersion staining.

Where reported: 'UMF Detected': Mineral fibres of unknown type detected by polarised light microscopy, including dispersion staining. Confirmation by another independent analytical technique may be necessary.

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos-containing bulk materials using polarised light microscopy. This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

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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1 LEMKO PLACE PENRITH NSW 2750

Tel: (02) 4722 2700

CHAIN OF CUSTODY

Results Required By: Normal Turnaround

Except pH Results Required By 3 days


Date:

Date: Monday 18 December 2018

Quote: GEOTEC_LTGHVC_V1_2018

TO: SGS UNIT 16, 33 MADDOX STREET ALEXANDRIA NSW 2015							Sampled By: SS																	Ref No: 14305/1				Project Manager: ANWAR BARBHUYIA									
Tel: 02 8594 0400							Location: Menangle																														
Location	Depth (m)	Date	Soil	Water	Material	Metals As Cd Cr Cu Pb Hg Ni Zn	pH	CEC	CL8 TRH BTEX PAH	CL10 Metals* TRH BTEX PAH	CL16 Metals* TRH BTEX PAH OC PCB	Be B Co Mn Se	Mn	Asbestos 0.001% w/w	Asbestos	BTEX	TRH & BTEX	PAH	OCP	OCP & PCB	Phenol	Cyanide	VOC	OC OP & PCB													
TP1	0.0-0.15	10/12/18	G		Clay		✓	✓																													
TP2	0.0-0.15	10/12/18	G		Clay																																
TP3	0.0-0.15	10/12/18	G		Clay																																
TP4	0.0-0.15	10/12/18	G		Clay		✓	✓																													
TP5	0.0-0.15	10/12/18	G		Clay																																
TP6	0.0-0.15	10/12/18	G		Clay																																
TP7	0.0-0.15	10/12/18	G		Clay		✓	✓																													
TP8	0.0-0.15	10/12/18	G		Clay																																
TP9	0.0-0.15	10/12/18	G		Clay																																
TP10	0.0-0.15	10/12/18	G		Clay																																
TP11	0.0-0.15	10/12/18	G		Clay		✓	✓																													
TP12	0.0-0.1	10/12/18	G		Clay																																
TP13	0.0-0.15	10/12/18	G		Clay																																
TP14	0.0-0.15	10/12/18	G		Clay																																
TP15	0.0-0.15	11/12/18	G		Clay		✓	✓																													
TP16	0.0-0.1	10/12/18	G		Clay																																
TP17	0.0-0.15	10/12/18	G		Clay																																
TP18	0.0-0.15	10/12/18	G		Clay		✓	✓																													

SGS EHS Alexandria Laboratory



SE187315 COC
Received: 12 – Dec – 2018

SGS EHS Alexandria Laboratory



SE187315 COC

Received: 12-Dec-2018

Tel: (02) 4722 2700

Results Required By: Normal Turnaround
Except pH Results Required By 3 days

Date: Monday 18 December 2018

Quote: GEOTEC_LTGHVC_V1_2018

[illegible]

Tel: (02) 4722 2700

Results Required By: Normal Turnaround
Except pH Results Required By 3 days

Date: Monday 18 December 2018

[illegible]

Tel: (02) 4722 2700

Results Required By: Normal Turnaround
Except pH Results Required By 3 days

Date: Monday 18 December 2018

[illegible]

GEOTECHNIQUE PTY LTD

1 LEMKO PLACE PENRITH NSW 2750

Tel: (02) 4722 2700

CHAIN OF CUSTODY

Results Required By: Normal Turnaround

Except pH Results Required By 3 days

Date:

Date: Monday 18 December 2018

Quote: GEOTEC_LTGHVC_V1_2018

TO: SGS UNIT 16, 33 MADDOX STREET ALEXANDRIA NSW 2015 Tel: 02 8594 0400							Sampled By: SS Ref No: 14305/1 Project Manager: ANWAR BARBHUYIA Location: Menangle																	
Location	Depth (m)	Date	Soil	Water	Material	Metals As Cd Cr Cu Pb Hg Ni Zn	pH	CEC	CL8 TRH BTEX PAH	CL10 Metals* TRH BTEX PAH	CL16 Metals* TRH BTEX PAH OC PCB	Be B Co Mn Se	Mn	Asbestos 0.001% w/w	Asbestos	BTEX	TRH & BTEX	PAH	OCP	OCP & PCB	Phenol	Cyanide	VOC	OCP OPP & PCB
X4		11/12/18	G		Clay																			
X5		11/12/18	G		Clay																			
X6		11/12/18	G		Clay																			
DDS1		11/12/18	G		Clay						✓													
RS1		10/01/18		WG/Vial		✓																		
RS2		11/12/18		WG/Vial		✓																		
TS1					Sand											✓								
TS2					Sand											✓								
Relinquished by							Received by																	
Name		Signature		Date		Name		Signature		Date														
ANWAR BARBHUYIA		AB		12/12/18		Natalie		N/A		12/12/18 @ 2pm														
WG: Water sample (glass bottle)			G			Soil sample (glass jar)			FCP			Fibro Cement Piece (plastic bag)			*: As, Cd, Cr, Cu, Pb, Hg, Ni & Zn (8 metals)									
WP: Water sample (plastic bottle)			P			Soil sample (plastic bag)			✓			Test required												

Results Required by: Normal Turnaround CHAIN OF CUSTODY Date:

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TO: SOS 1/11/16 33 MADDOCK STREET ALEXANDRIA NSW 2015 Tel: 02 8294 5400			Ref No.: 142051 Location: Menangle						
Composite	Sub-Sample	Depth (m)	Metals As Cd Cr Cu Pb Hg Ni Zn	OCF	OCF & PCB	Phenol	Cyanide		
C1	TP1	0.0-0.15							
	TP2	0.0-0.15	✓	✓					
	TP3	0.0-0.15							
C2	TP4	0.0-0.15							
	TP5	0.0-0.15	✓						
	TP6	0.0-0.15							
C3	TP7	0.0-0.15							
	TP8	0.0-0.15	✓	✓					
	TP12	0.0-0.1							
C4	TP9	0.0-0.15							
	TP10	0.0-0.15	✓	✓					
	TP11	0.0-0.15							
C5	TP13	0.0-0.15							
	TP14	0.0-0.15	✓						
	TP15	0.0-0.15							
C6	TP16	0.0-0.1							
	TP17	0.0-0.15	✓	✓					
	TP18	0.0-0.15							
C7	TP19	0.0-0.15							
	TP20	0.0-0.15	✓						
	TP21	0.0-0.15							
C8	TP22	0.0-0.15							
	TP24	0.0-0.15	✓	✓					
	TP25	0.0-0.15							
C9	TP23	0.0-0.15							
	TP32	0.0-0.15	✓	✓					
	TP38	0.0-0.15							
C10	TP26	0.0-0.15							
	TP27	0.0-0.15	✓						
	TP29	0.0-0.15							
C11	TP30	0.0-0.15							
	TP31	0.0-0.15	✓	✓					
	TP34	0.0-0.15							
C12	TP35	0.0-0.15							
	TP36	0.0-0.15	✓						
	TP37	0.0-0.15							
C13	TP39	0.0-0.15							
	TP51	0.0-0.15	✓	✓					
	TP52	0.0-0.15							
C14	TP40	0.0-0.15							
	TP41	0.0-0.15	✓	✓					
	TP42	0.0-0.15							
C15	TP43	0.0-0.15							
	TP44	0.0-0.15	✓						
	TP45	0.0-0.15							
C16	TP46	0.0-0.15							
	TP48	0.0-0.15	✓	✓					
	TP49	0.0-0.15							
C17	TP50	0.0-0.15							
	TP62	0.0-0.15	✓						
	TP63	0.0-0.15							
C18	TP53	0.0-0.15							
	TP54	0.0-0.15	✓	✓					
	TP55	0.0-0.15							
CDS1	X1								
	X2		✓	✓					
	X3								

Retrieved by:	
Name	Date
ANWAR BARBHUYA	12/12/18



SAMPLE RECEIPT ADVICE

SE187315

CLIENT DETAILS

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Project **14305-1 Menangle**
Order Number **GEOTECH_LTGHVC_V1_2018**
Samples 86

LABORATORY DETAILS

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Laboratory SGS Alexandria Environmental
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Alexandria NSW 2015

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

Samples Received Wed 12/12/2018
Report Due Wed 19/12/2018
SGS Reference **SE187315**

SUBMISSION DETAILS

This is to confirm that 86 samples were received on Wednesday 12/12/2018. Results are expected to be ready by COB Wednesday 19/12/2018. Please quote SGS reference SE187315 when making enquiries. Refer below for details relating to sample integrity upon receipt.

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	84 Soil, 2 Water
Date documentation received	12/12/2018	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	4.5°C	Sufficient sample for analysis	Yes
Turnaround time requested	3 Days/ Standard		

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

15 soil samples have been placed on hold.

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CLIENT DETAILS

Client **Geotechnique**

Project **14305-1 Menangle**

SUMMARY OF ANALYSIS

No.	Sample ID	Exchangeable Cations and Cation Exchange Capacity	OC Pesticides in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	PCBs in Soil	pH in soil (1:5)	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil
001	TP1 0.0-0.15	13	-	-	-	1	-	-	-
004	TP4 0.0-0.15	13	-	-	-	1	-	-	-
007	TP7 0.0-0.15	13	-	-	-	1	-	-	-
011	TP11 0.0-0.15	13	-	-	-	1	-	-	-
015	TP15 0.0-0.15	13	-	-	-	1	-	-	-
018	TP18 0.0-0.15	13	-	-	-	1	-	-	-
020	TP20 0.0-0.15	-	29	26	11	-	10	12	8
021	TP21 0.0-0.15	13	-	-	-	1	-	-	-

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

CLIENT DETAILS

Client **Geotechnique**

Project **14305-1 Menangle**

SUMMARY OF ANALYSIS

No.	Sample ID	Exchangeable Cations and Cation Exchange Capacity	OC Pesticides in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	PCBs in Soil	pH in soil (1:5)	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil
025	TP25 0.0-0.15	13	-	-	-	1	-	-	-
027	TP27 0.0-0.15	13	-	-	-	1	-	-	-
028	TP28 0.0-0.15	13	29	26	11	1	10	12	8
030	TP30 0.0-0.15	13	-	-	-	1	-	-	-
032	TP32 0.0-0.15	13	-	-	-	1	-	-	-
033	TP33 0.0-0.15	13	29	26	11	1	10	12	8
034	TP33 0.2-0.35	13	29	26	11	1	10	12	8
038	TP37 0.0-0.15	13	-	-	-	1	-	-	-
041	TP40 0.0-0.15	13	-	-	-	1	-	-	-
046	TP45 0.0-0.15	13	-	-	-	1	-	-	-
048	TP47 0.0-0.15	13	29	26	11	1	10	12	8

CONTINUED OVERLEAF

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CLIENT DETAILS

Client **Geotechnique**

Project **14305-1 Menangle**

SUMMARY OF ANALYSIS

No.	Sample ID	Exchangeable Cations and Cation Exchange Capacity	OC Pesticides in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	PCBs in Soil	pH in soil (1:5)	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil
050	TP49 0.0-0.15	13	-	-	-	1	-	-	-
052	TP51 0.0-0.15	13	-	-	-	1	-	-	-
055	TP54 0.0-0.15	13	-	-	-	1	-	-	-
057	TP62 0.0-0.15	13	-	-	-	1	-	-	-
059	TP64 0.0-0.15	13	29	26	11	1	10	12	8
063	DDS1	-	29	26	11	-	10	12	8
066	TS1	-	-	-	-	-	-	12	-
067	TS2	-	-	-	-	-	-	12	-
068	C1	-	29	-	-	-	-	-	-
070	C3	-	29	-	-	-	-	-	-
071	C4	-	29	-	-	-	-	-	-

CONTINUED OVERLEAF

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SAMPLE RECEIPT ADVICE

SE187315

CLIENT DETAILS

Client **Geotechnique**

Project **14305-1 Menangle**

SUMMARY OF ANALYSIS

No.	Sample ID	OC Pesticides in Soil
073	C6	29
075	C8	29
076	C9	29
078	C11	29
080	C13	29
081	C14	29
083	C16	29
085	C18	29
086	CDS1	29

CONTINUED OVERLEAF

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SAMPLE RECEIPT ADVICE

SE187315

CLIENT DETAILS

Client **Geotechnique**

Project **14305-1 Menangle**

SUMMARY OF ANALYSIS

No.	Sample ID	Moisture Content
001	TP1 0.0-0.15	1
004	TP4 0.0-0.15	1
007	TP7 0.0-0.15	1
011	TP11 0.0-0.15	1
015	TP15 0.0-0.15	1
018	TP18 0.0-0.15	1
020	TP20 0.0-0.15	1
021	TP21 0.0-0.15	1

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

CLIENT DETAILS

Client **Geotechnique**

Project **14305-1 Menangle**

SUMMARY OF ANALYSIS

No.	Sample ID	Fibre Identification in soil	Gravimetric Determination of Asbestos in Soil	Mercury in Soil	Moisture Content	Total Recoverable Elements in Soil/Waste
025	TP25 0.0-0.15	-	-	-	1	-
027	TP27 0.0-0.15	-	-	-	1	-
028	TP28 0.0-0.15	2	9	1	1	7
030	TP30 0.0-0.15	-	-	-	1	-
032	TP32 0.0-0.15	-	-	-	1	-
033	TP33 0.0-0.15	2	9	1	1	7
034	TP33 0.2-0.35	2	9	1	1	7
038	TP37 0.0-0.15	-	-	-	1	-
041	TP40 0.0-0.15	-	-	-	1	-
046	TP45 0.0-0.15	-	-	-	1	-
048	TP47 0.0-0.15	2	9	1	1	7

CONTINUED OVERLEAF

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Please indicate as soon as possible should your request differ from these details .

Testing as per this table shall commence immediately unless the client intervenes with a correction .

CLIENT DETAILS

Client **Geotechnique**

Project **14305-1 Menangle**

SUMMARY OF ANALYSIS

No.	Sample ID	Fibre Identification in soil	Gravimetric Determination of Asbestos in Soil	Mercury in Soil	Moisture Content	Total Recoverable Elements in Soil/Waste
050	TP49 0.0-0.15	-	-	-	1	-
052	TP51 0.0-0.15	-	-	-	1	-
055	TP54 0.0-0.15	-	-	-	1	-
057	TP62 0.0-0.15	-	-	-	1	-
059	TP64 0.0-0.15	2	9	1	1	7
063	DDS1	-	-	1	1	7
068	C1	-	-	1	1	7
069	C2	-	-	1	1	7
070	C3	-	-	1	1	7
071	C4	-	-	1	1	7
072	C5	-	-	1	1	7

CONTINUED OVERLEAF

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Testing as per this table shall commence immediately unless the client intervenes with a correction .

CLIENT DETAILS

Client **Geotechnique**

Project **14305-1 Menangle**

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury in Soil	Moisture Content	Total Recoverable Elements in Soil/Waste
073	C6	1	1	7
074	C7	1	1	7
075	C8	1	1	7
076	C9	1	1	7
077	C10	1	1	7
078	C11	1	1	7
079	C12	1	1	7
080	C13	1	1	7
081	C14	1	1	7
082	C15	1	1	7
083	C16	1	1	7
084	C17	1	1	7
085	C18	1	1	7
086	CDS1	1	1	7

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document. The numbers shown in the table indicate the number of results requested in each package. Please indicate as soon as possible should your request differ from these details . Testing as per this table shall commence immediately unless the client intervenes with a correction .



SAMPLE RECEIPT ADVICE

SE187315

CLIENT DETAILS

Client **Geotechnique**

Project **14305-1 Menangle**

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury (dissolved) in Water	Metals in Water (Dissolved) by ICPOES
064	RS1	1	7
065	RS2	1	7

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

CLIENT DETAILS

Contact **Anwar Barbhuyia**
 Client **Geotechnique**
 Address **P.O. Box 880
 PENRITH NSW 2751**

Telephone **02 4722 2700**
 Facsimile **02 4722 6161**
 Email **anwar@geotech.com.au**

Project **14305-1 Menangle-Additional**
 Order Number **GEOTECH_LTGHVC_V1_2018**
 Samples **86**

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 **SE187315A R0**
 Date Received **20/12/2018**
 Date Reported **24/12/2018**

COMMENTS

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

SIGNATORIES



Bennet Lo
 Senior Organic Chemist/Metals Chemist



Huong Crawford
 Production Manager

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 20/12/2018

PARAMETER	UOM	LOR	TP9	TP10	TP11
			CLAY 0.0-0.15 10/12/2018 SE187315A.009	CLAY 0.0-0.15 10/12/2018 SE187315A.010	CLAY 0.0-0.15 10/12/2018 SE187315A.011
Copper, Cu	mg/kg	0.5	50	29	41
Zinc, Zn	mg/kg	2	110	79	140

Moisture Content [AN002] Tested: 20/12/2018

			TP9	TP10
			CLAY	CLAY
			0.0-0.15	0.0-0.15
			10/12/2018	10/12/2018
			SE187315A.009	SE187315A.010
PARAMETER	UOM	LOR		
% Moisture	%w/w	0.5	15	15

TCLP (Toxicity Characteristic Leaching Procedure) for Metals [AN006] Tested: 20/12/2018

			TP33
			SAND
			0.0-0.15
			11/12/2018
			SE187315A.033
PARAMETER	UOM	LOR	
pH 1:20	pH Units	-	8.5
pH 1:20 plus HCL	pH Units	-	1.9
Extraction Solution Used	No unit	-	1
Mass of Sample Used*	g	-	13
Volume of ExtractionSolution Used*	mL	-	250
pH TCLP after 18 hours	pH Units	-	6.2



ANALYTICAL RESULTS

SE187315A R0

Metals in TCLP Extract by ICPOES [AN320] Tested: 21/12/2018

			TP33
			SAND
			0.0-0.15
			11/12/2018
			SE187315A.033
PARAMETER	UOM	LOR	
Lead, Pb	mg/L	0.02	<0.02

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.

AN006

Contaminants of interest in a waste material are leached out of the waste with a selected leaching solution under controlled conditions. The ratio of sample to extraction fluid is 100g to 2L (1 to 20 by mass). The concentration of each contaminant of interest is determined in the leachate by appropriate methods after separation from the sample by filtering. Base on USEPA 1311.

AN006

Extraction Fluid #1: This fluid is made by combining 128.6mL of dilute sodium hydroxide solution and 11.5mL glacial acetic acid with water and diluting to a volume of 2 litres. The pH of this fluid should be 4.93 ± 0.05 .

AN006

Extraction Fluid #2: This fluid is made by diluting 5.7mL glacial acetic acid with water to a volume of 1 litre. The pH of this fluid should be 2.88 ± 0.05 .

AN020

Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.

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.

AN320

Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components .

AN320

Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements . Reference APHA 3120 B.

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

SE187315A R0

CLIENT DETAILS

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Project **14305-1 Menangle-Additional**
Order Number **GEOTECH_LTGHVC_V1_2018**
Samples 86

LABORATORY DETAILS

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Laboratory SGS Alexandria Environmental
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Email au.environmental.sydney@sgs.com

SGS Reference **SE187315A R0**
Date Received 20 Dec 2018
Date Reported 24 Dec 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	4 Soil
Date documentation received	20/12/2018@11:36a	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	4.5°C	Sufficient sample for analysis	Yes
Turnaround time requested	Two Days		

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.

Metals in TCLP Extract by ICPOES

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP33	SE187315A.033	LB164071	11 Dec 2018	20 Dec 2018	09 Jun 2019	21 Dec 2018	09 Jun 2019	21 Dec 2018

Moisture Content

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP9	SE187315A.009	LB164025	10 Dec 2018	20 Dec 2018	24 Dec 2018	20 Dec 2018	25 Dec 2018	21 Dec 2018
TP10	SE187315A.010	LB164025	10 Dec 2018	20 Dec 2018	24 Dec 2018	20 Dec 2018	25 Dec 2018	21 Dec 2018
TP11	SE187315A.011	LB164025	10 Dec 2018	20 Dec 2018	24 Dec 2018	20 Dec 2018	25 Dec 2018	24 Dec 2018

TCLP (Toxicity Characteristic Leaching Procedure) for Metals

Method: ME-(AU)-[ENV]AN006

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP33	SE187315A.033	LB164020	11 Dec 2018	20 Dec 2018	09 Jun 2019	20 Dec 2018	09 Jun 2019	21 Dec 2018

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

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP9	SE187315A.009	LB164023	10 Dec 2018	20 Dec 2018	08 Jun 2019	20 Dec 2018	08 Jun 2019	21 Dec 2018
TP10	SE187315A.010	LB164023	10 Dec 2018	20 Dec 2018	08 Jun 2019	20 Dec 2018	08 Jun 2019	21 Dec 2018
TP11	SE187315A.011	LB164023	10 Dec 2018	20 Dec 2018	08 Jun 2019	20 Dec 2018	08 Jun 2019	21 Dec 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.

No surrogates were required for this job.

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.

Metals in TCLP Extract by ICPOES

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

Sample Number	Parameter	Units	LOR	Result
LB164071.001	Lead, Pb	mg/L	0.02	<0.02

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

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

Sample Number	Parameter	Units	LOR	Result
LB164023.001	Copper, Cu	mg/kg	0.5	-0.0375
	Zinc, Zn	mg/kg	2	0.054166666666667

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.

No duplicates were required for this job.

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.

Metals in TCLP Extract by ICPOES

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB164071.002	Lead, Pb	mg/L	0.02	2.0	2	80 - 120	101

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 %
LB164023.002	Copper, Cu	mg/kg	0.5	NA	370.46	80 - 120	95
	Zinc, Zn	mg/kg	2	NA	301.27	80 - 121	102

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.

No matrix spikes were required for this job.

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 : https://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022_QA_QC_Plan.pdf

- * NATA accreditation does not cover the performance of this service .
 - ** Indicative data, theoretical holding time exceeded.
 - 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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GEOTECHNIQUE PTY LTD

E-MAILED
20/12/12 @ 1.36

1 LEMKO PLACE PENRITH NSW 2750

Tel: (02) 4722 2700

CHAIN OF CUSTODY

Results Required By: 2 days

Date: Monday 24 December 2018

SGS Ref No: SE187315

Quote: GEOTEC_LTGHVC_V1 2018

[illegible]



SAMPLE RECEIPT ADVICE

SE187315A

CLIENT DETAILS

Contact Anwar Barbhuyia
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PENRITH NSW 2751

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Project **14305-1 Menangle-Additional**
Order Number **GEOTECH_LTGHVC_V1_2018**
Samples 86

LABORATORY DETAILS

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Email au.environmental.sydney@sgs.com

Samples Received Thu 20/12/2018
Report Due Mon 24/12/2018
SGS Reference **SE187315A**

SUBMISSION DETAILS

This is to confirm that 86 samples were received on Thursday 20/12/2018. Results are expected to be ready by COB Monday 24/12/2018. Please quote SGS reference SE187315A when making enquiries. Refer below for details relating to sample integrity upon receipt.

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	4 Soil
Date documentation received	20/12/2018@11:36am	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	4.5°C	Sufficient sample for analysis	Yes
Turnaround time requested	Two Days		

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

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SAMPLE RECEIPT ADVICE

SE187315A

CLIENT DETAILS

Client **Geotechnique**

Project **14305-1 Menangle-Additional**

SUMMARY OF ANALYSIS

No.	Sample ID	Moisture Content	Total Recoverable Elements in Soil/Waste
009	TP9 0.0-0.15	1	2
010	TP10 0.0-0.15	1	2
011	TP11 0.0-0.15	1	2

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .



SAMPLE RECEIPT ADVICE

SE187315A

CLIENT DETAILS

Client **Geotechnique**

Project **14305-1 Menangle-Additional**

SUMMARY OF ANALYSIS

No.	Sample ID	Metals in TCLP Extract by ICPOES	TCLP (Toxicity Characteristic Leaching
033	TP33 0.0-0.15	1	6

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

CLIENT DETAILS

Contact **Anwar Barbhuyia**
 Client **Geotechnique**
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 PENRITH NSW 2751**

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 Email **anwar@geotech.com.au**

Project **14305-1-1.2 Menangle**
 Order Number **GEOTEC_LTGHVC_V1_2018**
 Samples **31**

LABORATORY DETAILS

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 Alexandria NSW 2015**

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

SGS Reference **SE187421 R0**
 Date Received **13/12/2018**
 Date Reported **21/12/2018**

COMMENTS

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

SIGNATORIES



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 Senior Organic Chemist/Metals Chemist



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OC Pesticides in Soil [AN420] Tested: 17/12/2018

PARAMETER	UOM	LOR	TP65	TP66	C19	C21	C23
			CLAY 0.0-0.15 12/12/2018 SE187421.003	CLAY 0.0-0.15 12/12/2018 SE187421.004	CLAY - 12/12/2018 SE187421.025	CLAY - 12/12/2018 SE187421.027	CLAY - 12/12/2018 SE187421.029
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: 17/12/2018 (continued)

			C25
			CLAY
			-
			12/12/2018
			SE187421.031
PARAMETER	UOM	LOR	
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
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
Endrin	mg/kg	0.2	<0.2
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
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

pH in soil (1:5) [AN101] Tested: 18/12/2018

			TP56	TP60	TP65	TP67	TP70
			CLAY	CLAY	CLAY	CLAY	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15
			12/12/2018	12/12/2018	12/12/2018	12/12/2018	12/12/2018
PARAMETER	UOM	LOR	SE187421.001	SE187421.002	SE187421.003	SE187421.005	SE187421.006
pH	pH Units	0.1	6.3	5.5	7.1	7.2	6.8

			TP73	TP76	TP79
			CLAY	CLAY	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15
			12/12/2018	12/12/2018	12/12/2018
PARAMETER	UOM	LOR	SE187421.007	SE187421.008	SE187421.009
pH	pH Units	0.1	6.1	7.2	7.6

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR) [AN122] Tested: 18/12/2018

PARAMETER	UOM	LOR	TP56	TP60	TP65	TP67	TP70
			CLAY 0.0-0.15 12/12/2018 SE187421.001	CLAY 0.0-0.15 12/12/2018 SE187421.002	CLAY 0.0-0.15 12/12/2018 SE187421.003	CLAY 0.0-0.15 12/12/2018 SE187421.005	CLAY 0.0-0.15 12/12/2018 SE187421.006
Exchangeable Sodium, Na	mg/kg	2	37	180	100	84	33
Exchangeable Sodium, Na	meq/100g	0.01	0.16	0.76	0.44	0.36	0.14
Exchangeable Sodium Percentage*	%	0.1	1.3	8.9	1.7	2.4	1.2
Exchangeable Potassium, K	mg/kg	2	720	670	1200	640	730
Exchangeable Potassium, K	meq/100g	0.01	1.8	1.7	3.0	1.6	1.9
Exchangeable Potassium Percentage*	%	0.1	15.4	19.8	11.6	10.9	15.9
Exchangeable Calcium, Ca	mg/kg	2	1200	490	3200	1700	1300
Exchangeable Calcium, Ca	meq/100g	0.01	5.9	2.5	16	8.7	6.7
Exchangeable Calcium Percentage*	%	0.1	49.2	28.5	60.7	57.9	56.6
Exchangeable Magnesium, Mg	mg/kg	2	500	450	830	530	380
Exchangeable Magnesium, Mg	meq/100g	0.02	4.1	3.7	6.8	4.4	3.1
Exchangeable Magnesium Percentage*	%	0.1	34.1	42.8	26.0	28.9	26.3
Cation Exchange Capacity	meq/100g	0.02	12	8.6	26	15	12

PARAMETER	UOM	LOR	TP73	TP76	TP79
			CLAY 0.0-0.15 12/12/2018 SE187421.007	CLAY 0.0-0.15 12/12/2018 SE187421.008	CLAY 0.0-0.15 12/12/2018 SE187421.009
Exchangeable Sodium, Na	mg/kg	2	29	38	85
Exchangeable Sodium, Na	meq/100g	0.01	0.13	0.16	0.37
Exchangeable Sodium Percentage*	%	0.1	1.2	2.1	1.5
Exchangeable Potassium, K	mg/kg	2	530	340	640
Exchangeable Potassium, K	meq/100g	0.01	1.3	0.87	1.6
Exchangeable Potassium Percentage*	%	0.1	12.3	11.3	6.7
Exchangeable Calcium, Ca	mg/kg	2	1200	840	3300
Exchangeable Calcium, Ca	meq/100g	0.01	6.2	4.2	16
Exchangeable Calcium Percentage*	%	0.1	56.8	54.9	67.6
Exchangeable Magnesium, Mg	mg/kg	2	390	300	720
Exchangeable Magnesium, Mg	meq/100g	0.02	3.2	2.4	5.9
Exchangeable Magnesium Percentage*	%	0.1	29.7	31.6	24.2
Cation Exchange Capacity	meq/100g	0.02	11	7.7	24

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 17/12/2018

PARAMETER	UOM	LOR	TP65	TP66	C19	C20	C21
			CLAY 0.0-0.15 12/12/2018 SE187421.003	CLAY 0.0-0.15 12/12/2018 SE187421.004	CLAY - 12/12/2018 SE187421.025	CLAY - 12/12/2018 SE187421.026	CLAY - 12/12/2018 SE187421.027
Arsenic, As	mg/kg	3	11	13	8	7	10
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	15	22	17	19	18
Copper, Cu	mg/kg	0.5	33	29	17	14	17
Lead, Pb	mg/kg	1	31	31	25	26	28
Nickel, Ni	mg/kg	0.5	10	8.6	6.5	5.9	7.3
Zinc, Zn	mg/kg	0.5	100	49	24	18	30

PARAMETER	UOM	LOR	C22	C23	C24	C25
			CLAY - 12/12/2018 SE187421.028	CLAY - 12/12/2018 SE187421.029	CLAY - 12/12/2018 SE187421.030	CLAY - 12/12/2018 SE187421.031
Arsenic, As	mg/kg	3	10	9	10	11
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	15	16	17	17
Copper, Cu	mg/kg	0.5	18	21	26	34
Lead, Pb	mg/kg	1	21	32	36	25
Nickel, Ni	mg/kg	0.5	8.8	10	7.1	11
Zinc, Zn	mg/kg	0.5	29	40	58	95

Mercury in Soil [AN312] Tested: 17/12/2018

			TP65	TP66	C19	C20	C21
			CLAY	CLAY	CLAY	CLAY	CLAY
			0.0-0.15	0.0-0.15	-	-	-
			12/12/2018	12/12/2018	12/12/2018	12/12/2018	12/12/2018
PARAMETER	UOM	LOR	SE187421.003	SE187421.004	SE187421.025	SE187421.026	SE187421.027
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

			C22	C23	C24	C25
			CLAY	CLAY	CLAY	CLAY
			-	-	-	-
			12/12/2018	12/12/2018	12/12/2018	12/12/2018
PARAMETER	UOM	LOR	SE187421.028	SE187421.029	SE187421.030	SE187421.031
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05

Moisture Content [AN002] Tested: 17/12/2018

PARAMETER	UOM	LOR	TP56	TP60	TP65	TP66	TP67
			CLAY	CLAY	CLAY	CLAY	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15
			12/12/2018	12/12/2018	12/12/2018	12/12/2018	12/12/2018
			SE187421.001	SE187421.002	SE187421.003	SE187421.004	SE187421.005
% Moisture	%w/w	0.5	14	13	16	17	12

PARAMETER	UOM	LOR	TP70	TP73	TP76	TP79	C19
			CLAY	CLAY	CLAY	CLAY	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15	0.0-0.15	-
			12/12/2018	12/12/2018	12/12/2018	12/12/2018	12/12/2018
			SE187421.006	SE187421.007	SE187421.008	SE187421.009	SE187421.025
% Moisture	%w/w	0.5	13	14	11	26	1.5

PARAMETER	UOM	LOR	C20	C21	C22	C23	C24
			CLAY	CLAY	CLAY	CLAY	CLAY
			-	-	-	-	-
			12/12/2018	12/12/2018	12/12/2018	12/12/2018	12/12/2018
			SE187421.026	SE187421.027	SE187421.028	SE187421.029	SE187421.030
% Moisture	%w/w	0.5	13	10	13	15	15

PARAMETER	UOM	LOR	C25
			CLAY
			-
			12/12/2018
			SE187421.031
% Moisture	%w/w	0.5	18

Metals in Water (Dissolved) by ICPOES [AN320] Tested: 18/12/2018

			RS3
			WATER
			-
			12/12/2018
			SE187421.010
PARAMETER	UOM	LOR	
Arsenic, As	mg/L	0.02	<0.02
Cadmium, Cd	mg/L	0.001	<0.001
Chromium, Cr	mg/L	0.005	<0.005
Copper, Cu	mg/L	0.005	<0.005
Lead, Pb	mg/L	0.02	<0.02
Nickel, Ni	mg/L	0.005	<0.005
Zinc, Zn	mg/L	0.01	<0.01



ANALYTICAL RESULTS

SE187421 R0

Mercury (dissolved) in Water [AN311(Perth)/AN312] Tested: 17/12/2018

			RS3
			WATER
			-
			12/12/2018
			SE187421.010
PARAMETER	UOM	LOR	
Mercury	mg/L	0.0001	<0.0001

METHOD

METHODOLOGY SUMMARY

- AN002** The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
- AN020** Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
- AN040/AN320** A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
- AN040** A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
- AN101** pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl₂) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
- AN122** Exchangeable Cations, CEC and ESP: Soil sample is extracted in 1M Ammonium Acetate at pH=7 (or 1M Ammonium Chloride at pH=7) with cations (Na, K, Ca & Mg) then determined by ICP OES/ICP MS and reported as Exchangeable Cations. For saline soils, these results can be corrected for water soluble cations and reported as Exchangeable cations in meq/100g or soil can be pre-treated (aqueous ethanol/aqueous glycerol) prior to extraction. Cation Exchange Capacity (CEC) is the sum of the exchangeable cations in meq/100g.
- AN122** The Exchangeable Sodium Percentage (ESP) is calculated as the exchangeable sodium divided by the CEC (all in meq/100g) times 100.
ESP can be used to categorise the sodicity of the soil as below :
- | | |
|-----------|----------------|
| ESP < 6% | non-sodic |
| ESP 6-15% | sodic |
| ESP >15% | strongly sodic |
- Method is referenced to Rayment and Lyons, 2011, sections 15D3 and 15N1.-
- AN311(Perth)/AN312** Mercury by Cold Vapour AAS in Waters: 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.
- 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
- AN320** Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
- AN320** Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
- 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).

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

SE187421 R0

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Order Number GEOTEC_LTGHVC_V1_2018
Samples 31

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SGS Reference SE187421 R0
Date Received 13 Dec 2018
Date Reported 21 Dec 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 with the exception of the following:

Matrix Spike	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	2 items
	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	1 item

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	None
Samples received in correct containers	Yes	Sample counts by matrix	31 Soil, 1 Water
Date documentation received	18/12/2018@8:37ar	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	21.7°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

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.

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]AN122

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP56	SE187421.001	LB163799	12 Dec 2018	13 Dec 2018	09 Jan 2019	18 Dec 2018	09 Jan 2019	19 Dec 2018
TP60	SE187421.002	LB163799	12 Dec 2018	13 Dec 2018	09 Jan 2019	18 Dec 2018	09 Jan 2019	19 Dec 2018
TP65	SE187421.003	LB163799	12 Dec 2018	13 Dec 2018	09 Jan 2019	18 Dec 2018	09 Jan 2019	19 Dec 2018
TP67	SE187421.005	LB163799	12 Dec 2018	13 Dec 2018	09 Jan 2019	18 Dec 2018	09 Jan 2019	19 Dec 2018
TP70	SE187421.006	LB163799	12 Dec 2018	13 Dec 2018	09 Jan 2019	18 Dec 2018	09 Jan 2019	19 Dec 2018
TP73	SE187421.007	LB163799	12 Dec 2018	13 Dec 2018	09 Jan 2019	18 Dec 2018	09 Jan 2019	19 Dec 2018
TP76	SE187421.008	LB163799	12 Dec 2018	13 Dec 2018	09 Jan 2019	18 Dec 2018	09 Jan 2019	19 Dec 2018
TP79	SE187421.009	LB163799	12 Dec 2018	13 Dec 2018	09 Jan 2019	18 Dec 2018	09 Jan 2019	19 Dec 2018

Mercury (dissolved) in Water

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RS3	SE187421.010	LB163726	12 Dec 2018	13 Dec 2018	09 Jan 2019	17 Dec 2018	09 Jan 2019	18 Dec 2018

Mercury in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP65	SE187421.003	LB163744	12 Dec 2018	13 Dec 2018	09 Jan 2019	17 Dec 2018	09 Jan 2019	18 Dec 2018
TP66	SE187421.004	LB163744	12 Dec 2018	13 Dec 2018	09 Jan 2019	17 Dec 2018	09 Jan 2019	18 Dec 2018
C19	SE187421.025	LB163914	12 Dec 2018	13 Dec 2018	09 Jan 2019	19 Dec 2018	09 Jan 2019	20 Dec 2018
C20	SE187421.026	LB163914	12 Dec 2018	13 Dec 2018	09 Jan 2019	19 Dec 2018	09 Jan 2019	20 Dec 2018
C21	SE187421.027	LB163914	12 Dec 2018	13 Dec 2018	09 Jan 2019	19 Dec 2018	09 Jan 2019	20 Dec 2018
C22	SE187421.028	LB163914	12 Dec 2018	13 Dec 2018	09 Jan 2019	19 Dec 2018	09 Jan 2019	20 Dec 2018
C23	SE187421.029	LB163914	12 Dec 2018	13 Dec 2018	09 Jan 2019	19 Dec 2018	09 Jan 2019	20 Dec 2018
C24	SE187421.030	LB163914	12 Dec 2018	13 Dec 2018	09 Jan 2019	19 Dec 2018	09 Jan 2019	20 Dec 2018
C25	SE187421.031	LB163914	12 Dec 2018	13 Dec 2018	09 Jan 2019	19 Dec 2018	09 Jan 2019	20 Dec 2018

Metals in Water (Dissolved) by ICPOES

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RS3	SE187421.010	LB163788	12 Dec 2018	13 Dec 2018	10 Jun 2019	18 Dec 2018	10 Jun 2019	18 Dec 2018

Moisture Content

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP56	SE187421.001	LB163741	12 Dec 2018	13 Dec 2018	26 Dec 2018	17 Dec 2018	22 Dec 2018	18 Dec 2018
TP60	SE187421.002	LB163741	12 Dec 2018	13 Dec 2018	26 Dec 2018	17 Dec 2018	22 Dec 2018	18 Dec 2018
TP65	SE187421.003	LB163741	12 Dec 2018	13 Dec 2018	26 Dec 2018	17 Dec 2018	22 Dec 2018	18 Dec 2018
TP66	SE187421.004	LB163741	12 Dec 2018	13 Dec 2018	26 Dec 2018	17 Dec 2018	22 Dec 2018	18 Dec 2018
TP67	SE187421.005	LB163741	12 Dec 2018	13 Dec 2018	26 Dec 2018	17 Dec 2018	22 Dec 2018	18 Dec 2018
TP70	SE187421.006	LB163741	12 Dec 2018	13 Dec 2018	26 Dec 2018	17 Dec 2018	22 Dec 2018	18 Dec 2018
TP73	SE187421.007	LB163741	12 Dec 2018	13 Dec 2018	26 Dec 2018	17 Dec 2018	22 Dec 2018	18 Dec 2018
TP76	SE187421.008	LB163741	12 Dec 2018	13 Dec 2018	26 Dec 2018	17 Dec 2018	22 Dec 2018	18 Dec 2018
TP79	SE187421.009	LB163741	12 Dec 2018	13 Dec 2018	26 Dec 2018	17 Dec 2018	22 Dec 2018	18 Dec 2018
C19	SE187421.025	LB163916	12 Dec 2018	13 Dec 2018	26 Dec 2018	19 Dec 2018	24 Dec 2018	20 Dec 2018
C20	SE187421.026	LB163916	12 Dec 2018	13 Dec 2018	26 Dec 2018	19 Dec 2018	24 Dec 2018	20 Dec 2018
C21	SE187421.027	LB163916	12 Dec 2018	13 Dec 2018	26 Dec 2018	19 Dec 2018	24 Dec 2018	20 Dec 2018
C22	SE187421.028	LB163916	12 Dec 2018	13 Dec 2018	26 Dec 2018	19 Dec 2018	24 Dec 2018	20 Dec 2018
C23	SE187421.029	LB163916	12 Dec 2018	13 Dec 2018	26 Dec 2018	19 Dec 2018	24 Dec 2018	20 Dec 2018
C24	SE187421.030	LB163916	12 Dec 2018	13 Dec 2018	26 Dec 2018	19 Dec 2018	24 Dec 2018	20 Dec 2018
C25	SE187421.031	LB163916	12 Dec 2018	13 Dec 2018	26 Dec 2018	19 Dec 2018	24 Dec 2018	20 Dec 2018

OC Pesticides in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP65	SE187421.003	LB163739	12 Dec 2018	13 Dec 2018	26 Dec 2018	17 Dec 2018	26 Jan 2019	19 Dec 2018
TP66	SE187421.004	LB163739	12 Dec 2018	13 Dec 2018	26 Dec 2018	17 Dec 2018	26 Jan 2019	19 Dec 2018
C19	SE187421.025	LB163898	12 Dec 2018	13 Dec 2018	26 Dec 2018	19 Dec 2018	28 Jan 2019	21 Dec 2018
C21	SE187421.027	LB163898	12 Dec 2018	13 Dec 2018	26 Dec 2018	19 Dec 2018	28 Jan 2019	21 Dec 2018
C23	SE187421.029	LB163898	12 Dec 2018	13 Dec 2018	26 Dec 2018	19 Dec 2018	28 Jan 2019	21 Dec 2018
C25	SE187421.031	LB163898	12 Dec 2018	13 Dec 2018	26 Dec 2018	19 Dec 2018	28 Jan 2019	21 Dec 2018

pH in soil (1:5)

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP56	SE187421.001	LB163798	12 Dec 2018	13 Dec 2018	19 Dec 2018	18 Dec 2018	19 Dec 2018	18 Dec 2018
TP60	SE187421.002	LB163798	12 Dec 2018	13 Dec 2018	19 Dec 2018	18 Dec 2018	19 Dec 2018	18 Dec 2018

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.

pH in soil (1:5) (continued)

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP65	SE187421.003	LB163798	12 Dec 2018	13 Dec 2018	19 Dec 2018	18 Dec 2018	19 Dec 2018	18 Dec 2018
TP67	SE187421.005	LB163798	12 Dec 2018	13 Dec 2018	19 Dec 2018	18 Dec 2018	19 Dec 2018	18 Dec 2018
TP70	SE187421.006	LB163798	12 Dec 2018	13 Dec 2018	19 Dec 2018	18 Dec 2018	19 Dec 2018	18 Dec 2018
TP73	SE187421.007	LB163798	12 Dec 2018	13 Dec 2018	19 Dec 2018	18 Dec 2018	19 Dec 2018	18 Dec 2018
TP76	SE187421.008	LB163798	12 Dec 2018	13 Dec 2018	19 Dec 2018	18 Dec 2018	19 Dec 2018	18 Dec 2018
TP79	SE187421.009	LB163798	12 Dec 2018	13 Dec 2018	19 Dec 2018	18 Dec 2018	19 Dec 2018	18 Dec 2018

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

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP65	SE187421.003	LB163742	12 Dec 2018	13 Dec 2018	10 Jun 2019	17 Dec 2018	10 Jun 2019	18 Dec 2018
TP66	SE187421.004	LB163742	12 Dec 2018	13 Dec 2018	10 Jun 2019	17 Dec 2018	10 Jun 2019	18 Dec 2018
C19	SE187421.025	LB163912	12 Dec 2018	13 Dec 2018	10 Jun 2019	19 Dec 2018	10 Jun 2019	20 Dec 2018
C20	SE187421.026	LB163912	12 Dec 2018	13 Dec 2018	10 Jun 2019	19 Dec 2018	10 Jun 2019	20 Dec 2018
C21	SE187421.027	LB163912	12 Dec 2018	13 Dec 2018	10 Jun 2019	19 Dec 2018	10 Jun 2019	20 Dec 2018
C22	SE187421.028	LB163912	12 Dec 2018	13 Dec 2018	10 Jun 2019	19 Dec 2018	10 Jun 2019	20 Dec 2018
C23	SE187421.029	LB163912	12 Dec 2018	13 Dec 2018	10 Jun 2019	19 Dec 2018	10 Jun 2019	20 Dec 2018
C24	SE187421.030	LB163912	12 Dec 2018	13 Dec 2018	10 Jun 2019	19 Dec 2018	10 Jun 2019	20 Dec 2018
C25	SE187421.031	LB163912	12 Dec 2018	13 Dec 2018	10 Jun 2019	19 Dec 2018	10 Jun 2019	20 Dec 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)	TP65	SE187421.003	%	60 - 130%	88
	TP66	SE187421.004	%	60 - 130%	98
	C19	SE187421.025	%	60 - 130%	121
	C21	SE187421.027	%	60 - 130%	115
	C23	SE187421.029	%	60 - 130%	121
	C25	SE187421.031	%	60 - 130%	123

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.

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]AN122

Sample Number	Parameter	Units	LOR	Result
LB163799.001	Exchangeable Sodium, Na	mg/kg	2	0
	Exchangeable Potassium, K	mg/kg	2	0
	Exchangeable Calcium, Ca	mg/kg	2	0
	Exchangeable Magnesium, Mg	mg/kg	2	0

Mercury (dissolved) in Water

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

Sample Number	Parameter	Units	LOR	Result
LB163726.001	Mercury	mg/L	0.0001	<0.0001

Mercury in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB163744.001	Mercury	mg/kg	0.05	<0.05
LB163914.001	Mercury	mg/kg	0.05	<0.05

Metals in Water (Dissolved) by ICPOES

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

Sample Number	Parameter	Units	LOR	Result
LB163788.001	Arsenic, As	mg/L	0.02	<0.02
	Cadmium, Cd	mg/L	0.001	<0.001
	Chromium, Cr	mg/L	0.005	<0.005
	Copper, Cu	mg/L	0.005	<0.005
	Lead, Pb	mg/L	0.02	<0.02
	Nickel, Ni	mg/L	0.005	<0.005
	Zinc, Zn	mg/L	0.01	<0.01

OC Pesticides in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB163739.001	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)	%	-	103
LB163898.001	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

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.

OC Pesticides in Soil (continued)

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

Sample Number	Parameter	Units	LOR	Result
LB163898.001	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)	%	-	111

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

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

Sample Number	Parameter	Units	LOR	Result
LB163742.001	Arsenic, As	mg/kg	3	<3
	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	0.5	<0.5
LB163912.001	Arsenic, As	mg/kg	3	<3
	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	0.5	<0.5

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 (dissolved) in Water

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187421.010	LB163726.018	Mercury	µg/L	0.0001	<0.0001	<0.0001	200	0

Mercury in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187407.004	LB163744.022	Mercury	mg/kg	0.05	0.01547819410	0.0156002939	200	0
SE187421.028	LB163914.014	Mercury	mg/kg	0.05	<0.05	<0.05	190	0
SE187452.010	LB163744.014	Mercury	mg/kg	0.05	<0.05	<0.05	200	0
SE187471.006	LB163914.024	Mercury	mg/kg	0.05	<0.05	<0.05	200	0

Moisture Content

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187407.004	LB163741.027	% Moisture	%w/w	0.5	8.20685778529	0.0128755364	42	9
SE187421.009	LB163741.022	% Moisture	%w/w	0.5	26	26	34	0
SE187452.010	LB163741.011	% Moisture	%w/w	0.5	20	20	35	1
SE187466.002	LB163916.044	% Moisture	%w/w	0.5	5.69210866757	2.815533980	45	25
SE187471.002	LB163916.033	% Moisture	%w/w	0.5	NVL	5.3	51	27
SE187562.010	LB163916.011	% Moisture	%w/w	0.5	11.7	12.7	38	8

OC Pesticides in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187452.003	LB163739.024	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
SE187466.004	LB163898.023	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	-	0.15	0.156	30	1
		Hexachlorobenzene (HCB)	mg/kg	0.1	0	0	200	0
		Alpha BHC	mg/kg	0.1	0	0	200	0
		Lindane	mg/kg	0.1	0	0	200	0
		Heptachlor	mg/kg	0.1	0	0	200	0
		Aldrin	mg/kg	0.1	0.009	0.009	200	0
		Beta BHC	mg/kg	0.1	0	0	200	0
		Delta BHC	mg/kg	0.1	0	0	200	0
		Heptachlor epoxide	mg/kg	0.1	0	0	200	0
		o,p'-DDE	mg/kg	0.1	0	0	200	0
		Alpha Endosulfan	mg/kg	0.2	0	0	200	0
		Gamma Chlordane	mg/kg	0.1	0.009	0.01	200	0

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.

OC Pesticides in Soil (continued)

Method: ME-(AU)-[ENV]JAN420

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %	
SE187466.004	LB163898.023	Alpha Chlordane	mg/kg	0.1	0	0	200	0	
		trans-Nonachlor	mg/kg	0.1	0	0	200	0	
		p,p'-DDE	mg/kg	0.1	0	0	200	0	
		Dieldrin	mg/kg	0.2	0.082	0.087	148	0	
		Endrin	mg/kg	0.2	0	0	200	0	
		o,p'-DDD	mg/kg	0.1	0	0	200	0	
		o,p'-DDT	mg/kg	0.1	0	0	200	0	
		Beta Endosulfan	mg/kg	0.2	0	0	200	0	
		p,p'-DDD	mg/kg	0.1	0	0	200	0	
		p,p'-DDT	mg/kg	0.1	0	0	200	0	
		Endosulfan sulphate	mg/kg	0.1	0	0	200	0	
		Endrin Aldehyde	mg/kg	0.1	0	0	200	0	
		Methoxychlor	mg/kg	0.1	0	0	200	0	
		Endrin Ketone	mg/kg	0.1	0	0	200	0	
		Isodrin	mg/kg	0.1	0	0	200	0	
		Mirex	mg/kg	0.1	0	0	200	0	
		Surrogates	Total CLP OC Pesticides	mg/kg	1	0.091	0.097	200	0
Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg		-	0.186	0.182	30	2		
SE187471.002	LB163898.025	Hexachlorobenzene (HCB)	mg/kg	0.1	0	0	200	0	
		Alpha BHC	mg/kg	0.1	0	0	200	0	
		Lindane	mg/kg	0.1	0	0	200	0	
		Heptachlor	mg/kg	0.1	0	0	200	0	
		Aldrin	mg/kg	0.1	0	0	200	0	
		Beta BHC	mg/kg	0.1	0	0	200	0	
		Delta BHC	mg/kg	0.1	0	0	200	0	
		Heptachlor epoxide	mg/kg	0.1	0	0	200	0	
		o,p'-DDE	mg/kg	0.1	0	0	200	0	
		Alpha Endosulfan	mg/kg	0.2	0	0	200	0	
		Gamma Chlordane	mg/kg	0.1	0	0	200	0	
		Alpha Chlordane	mg/kg	0.1	0	0	200	0	
		trans-Nonachlor	mg/kg	0.1	0	0	200	0	
		p,p'-DDE	mg/kg	0.1	0	0	200	0	
		Dieldrin	mg/kg	0.2	0	0	200	0	
		Endrin	mg/kg	0.2	0	0	200	0	
		o,p'-DDD	mg/kg	0.1	0	0	200	0	
		o,p'-DDT	mg/kg	0.1	0	0	200	0	
		Beta Endosulfan	mg/kg	0.2	0	0	200	0	
		p,p'-DDD	mg/kg	0.1	0	0	200	0	
		p,p'-DDT	mg/kg	0.1	0	0	200	0	
		Endosulfan sulphate	mg/kg	0.1	0	0	200	0	
		Endrin Aldehyde	mg/kg	0.1	0	0	200	0	
		Methoxychlor	mg/kg	0.1	0	0	200	0	
		Endrin Ketone	mg/kg	0.1	0	0	200	0	
		Isodrin	mg/kg	0.1	0	0	200	0	
		Mirex	mg/kg	0.1	0	0	200	0	
		Surrogates	Total CLP OC Pesticides	mg/kg	1	0	0	200	0
			Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.17	0.17	30	0

pH in soil (1:5)

Method: ME-(AU)-[ENV]JAN101

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187421.006	LB163798.026	pH	pH Units	0.1	6.8	6.994	31	3
SE187448.005	LB163798.027	pH	pH Units	0.1	9.6	9.631	31	0

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

Method: ME-(AU)-[ENV]JAN040/AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187407.004	LB163742.022	Arsenic, As	mg/kg	3	2.55400994703.2008563992		65	22
		Cadmium, Cd	mg/kg	0.3	0.09411722950.0595434868		200	0
		Chromium, Cr	mg/kg	0.3	22.72202961323.4699952894		32	3
		Copper, Cu	mg/kg	0.5	10.01168770700.7424742883		35	7
		Nickel, Ni	mg/kg	0.5	10.81319256672.4170868466		34	14

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.

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

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187407.004	LB163742.022	Lead, Pb	mg/kg	1	13.35700213544.2645145791		37	7
		Zinc, Zn	mg/kg	0.5	11.61150705736.3992070595		32	25
SE187421.028	LB163912.014	Arsenic, As	mg/kg	3	10	10	40	3
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	15	16	33	8
		Copper, Cu	mg/kg	0.5	18	22	33	19
		Nickel, Ni	mg/kg	0.5	8.8	9.8	35	11
		Lead, Pb	mg/kg	1	21	29	34	29
		Zinc, Zn	mg/kg	0.5	29	37	36	23
SE187452.010	LB163742.014	Arsenic, As	mg/kg	3	5	4	54	14
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	11	10	35	4
		Copper, Cu	mg/kg	0.5	13	12	34	3
		Nickel, Ni	mg/kg	0.5	3.8	3.6	44	6
		Lead, Pb	mg/kg	1	21	20	35	8
SE187471.006	LB163912.024	Zinc, Zn	mg/kg	0.5	20	20	40	2
		Arsenic, As	mg/kg	3	4	5	51	23
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	9.2	10	35	9
		Copper, Cu	mg/kg	0.5	14	14	34	2
		Nickel, Ni	mg/kg	0.5	10	11	35	8
		Lead, Pb	mg/kg	1	15	15	37	4
		Zinc, Zn	mg/kg	0.5	37	36	35	2

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.

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]AN122

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163799.002	Exchangeable Sodium, Na	mg/kg	2	NA	72.68	80 - 120	100
	Exchangeable Potassium, K	mg/kg	2	NA	238.12	80 - 120	96
	Exchangeable Calcium, Ca	mg/kg	2	NA	692	80 - 120	89
	Exchangeable Magnesium, Mg	mg/kg	2	NA	134.2	80 - 120	93

Mercury in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163744.002	Mercury	mg/kg	0.05	0.19	0.2	70 - 130	96
LB163914.002	Mercury	mg/kg	0.05	0.19	0.2	70 - 130	95

Metals in Water (Dissolved) by ICPOES

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163788.002	Arsenic, As	mg/L	0.02	2.0	2	80 - 120	101
	Cadmium, Cd	mg/L	0.001	1.9	2	80 - 120	95
	Chromium, Cr	mg/L	0.005	1.9	2	80 - 120	96
	Copper, Cu	mg/L	0.005	2.0	2	80 - 120	99
	Lead, Pb	mg/L	0.02	1.9	2	80 - 120	95
	Nickel, Ni	mg/L	0.005	1.9	2	80 - 120	97
	Zinc, Zn	mg/L	0.01	2.0	2	80 - 120	99

OC Pesticides in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163739.002	Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	109
	Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	103
	Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	100
	Dieldrin	mg/kg	0.2	0.2	0.2	60 - 140	104
	Endrin	mg/kg	0.2	<0.2	0.2	60 - 140	92
	p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	95
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	-	0.15	0.15	40 - 130	101
LB163898.002	Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	114
	Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	112
	Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	102
	Dieldrin	mg/kg	0.2	0.2	0.2	60 - 140	108
	Endrin	mg/kg	0.2	<0.2	0.2	60 - 140	87
	p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	95
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	-	0.16	0.15	40 - 130	107

pH in soil (1:5)

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163798.003	pH	pH Units	0.1	7.4	7.415	98 - 102	100

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

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163742.002	Arsenic, As	mg/kg	3	360	336.32	79 - 120	107
	Cadmium, Cd	mg/kg	0.3	410	416.6	69 - 131	99
	Chromium, Cr	mg/kg	0.3	36	35.2	80 - 120	103
	Copper, Cu	mg/kg	0.5	330	370.46	80 - 120	89
	Nickel, Ni	mg/kg	0.5	200	210.88	79 - 120	94
	Lead, Pb	mg/kg	1	99	107.87	79 - 120	91
	Zinc, Zn	mg/kg	0.5	300	301.27	80 - 121	98
LB163912.002	Arsenic, As	mg/kg	3	320	336.32	79 - 120	95
	Cadmium, Cd	mg/kg	0.3	390	416.6	69 - 131	93
	Chromium, Cr	mg/kg	0.3	33	35.2	80 - 120	94
	Copper, Cu	mg/kg	0.5	300	370.46	80 - 120	81
	Nickel, Ni	mg/kg	0.5	190	210.88	79 - 120	89
	Lead, Pb	mg/kg	1	88	107.87	79 - 120	82
	Zinc, Zn	mg/kg	0.5	260	301.27	80 - 121	88

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%
SE187452.001	LB163744.004	Mercury	mg/kg	0.05	0.20	<0.05	0.2	91
SE187562.016	LB163914.004	Mercury	mg/kg	0.05	0.20	<0.05	0.2	84

OC Pesticides in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Original	Spike	Recovery%
SE187471.001	LB163898.024	Hexachlorobenzene (HCB)	mg/kg	0.1	0	-	-
		Alpha BHC	mg/kg	0.1	0	-	-
		Lindane	mg/kg	0.1	0	-	-
		Heptachlor	mg/kg	0.1	0	0.2	125
		Aldrin	mg/kg	0.1	0	0.2	122
		Beta BHC	mg/kg	0.1	0	-	-
		Delta BHC	mg/kg	0.1	0	0.2	109
		Heptachlor epoxide	mg/kg	0.1	0	-	-
		o,p'-DDE	mg/kg	0.1	0	-	-
		Alpha Endosulfan	mg/kg	0.2	0	-	-
		Gamma Chlordane	mg/kg	0.1	0	-	-
		Alpha Chlordane	mg/kg	0.1	0	-	-
		trans-Nonachlor	mg/kg	0.1	0	-	-
		p,p'-DDE	mg/kg	0.1	0	-	-
		Dieldrin	mg/kg	0.2	0	0.2	120
		Endrin	mg/kg	0.2	0	0.2	99
		o,p'-DDD	mg/kg	0.1	0	-	-
		o,p'-DDT	mg/kg	0.1	0	-	-
		Beta Endosulfan	mg/kg	0.2	0	-	-
		p,p'-DDD	mg/kg	0.1	0	-	-
		p,p'-DDT	mg/kg	0.1	0	0.2	98
		Endosulfan sulphate	mg/kg	0.1	0	-	-
		Endrin Aldehyde	mg/kg	0.1	0	-	-
		Methoxychlor	mg/kg	0.1	0	-	-
		Endrin Ketone	mg/kg	0.1	0	-	-
		Isodrin	mg/kg	0.1	0	-	-
		Mirex	mg/kg	0.1	0	-	-
		Total CLP OC Pesticides	mg/kg	1	0	-	-
Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.177	-	125	

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%
SE187452.001	LB163742.004	Arsenic, As	mg/kg	3	44	5	50	79
		Cadmium, Cd	mg/kg	0.3	42	<0.3	50	84
		Chromium, Cr	mg/kg	0.3	50	9.1	50	81
		Copper, Cu	mg/kg	0.5	52	10	50	85
		Nickel, Ni	mg/kg	0.5	44	4.3	50	80
		Lead, Pb	mg/kg	1	58	25	50	65 ☹
		Zinc, Zn	mg/kg	0.5	62	37	50	50 ☹
SE187562.016	LB163912.004	Arsenic, As	mg/kg	3	44	7	50	73
		Cadmium, Cd	mg/kg	0.3	41	<0.3	50	81
		Chromium, Cr	mg/kg	0.3	56	16	50	79
		Copper, Cu	mg/kg	0.5	59	22	50	74
		Nickel, Ni	mg/kg	0.5	52	13	50	79
		Lead, Pb	mg/kg	1	70	25	50	91
		Zinc, Zn	mg/kg	0.5	80	50	50	60 ☹

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 : https://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022_QA_QC_Plan.pdf

- * NATA accreditation does not cover the performance of this service .
 - ** Indicative data, theoretical holding time exceeded.
 - 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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1 LEMKO PLACE PENRITH NSW 2750

Tel: (02) 4722 2700

CHAIN OF CUSTODY

Results Required By: Normal Turnaround 4 days
Except pH Results Required By -

Date: Wednesday, 19 December 2018

Date:

Quote: GEOTEC_LTGHVC_V1_2018

TO: SGS UNIT 16, 33 MADDOX STREET ALEXANDRIA NSW 2015 Tel: 02 8594 0400							Sampled By: SS		Ref No: 14305/1 -1.2		Project Manager: ANWAR BARBHUYIA													
							Location: Menangle																	
Location	Depth (m)	Date	Soil	Water	Material	Metals As Cd Cr Cu Pb Hg Ni Zn	pH	CEC	CL8 TRH BTEX PAH	CL10 Metals* TRH BTEX PAH	CL16 Metals* TRH BTEX PAH OC PCB	Be B Co Mn Se	Mn	Asbestos 0.001% w/w	Asbestos	BTEX	TRH & BTEX	PAH	OCP	OCP & PCB	Phenol	Cyanide	VOC	OCP OPP & PCB
1 TP56	0.0-0.15	12/12/18	G		Clay		✓	✓																
11 TP57	0.0-0.15	12/12/18	G		Clay																			
12 TP58	0.0-0.15	12/12/18	G		Clay																			
13 TP59	0.0-0.15	12/12/18	G		Clay																			
2 TP60	0.0-0.15	12/12/18	G		Clay		✓	✓																
14 TP61	0.0-0.15	12/12/18	G		Clay																			
3 TP65	0.0-0.15	12/12/18	G		Clay	✓	✓	✓												✓				
4 TP66	0.0-0.15	12/12/18	G		Clay	✓														✓				
5 TP67	0.0-0.15	12/12/18	G		Clay		✓	✓																
15 TP68	0.0-0.15	12/12/18	G		Clay																			
16 TP69	0.0-0.15	12/12/18	G		Clay																			
6 TP70	0.0-0.15	12/12/18	G		Clay		✓	✓																
17 TP71	0.0-0.15	12/12/18	G		Clay																			
18 TP72	0.0-0.15	12/12/18	G		Clay																			
7 TP73	0.0-0.15	12/12/18	G		Clay		✓	✓																
19 TP74	0.0-0.15	12/12/18	G		Clay																			
20 TP75	0.0-0.15	12/12/18	G		Clay																			
8 TP76	0.0-0.15	12/12/18	G		Clay		✓	✓																

SGS EHS Alexandria Laboratory



SE187421 COC

Received: 13 - Dec - 2018

1 LEMKO PLACE PENRITH NSW 2750

Tel: (02) 4722 2700

CHAIN OF CUSTODY

Results Required By: Normal Turnaround 4 days
 Except pH Results Required By -

Date: Wednesday, 19 December 2018

Date:

Quote: GEOTEC_LTGHVC_V1_2018

TO: SGS UNIT 16, 33 MADDOX STREET ALEXANDRIA NSW 2015 Tel: 02 8594 0400							Sampled By: SS		Ref No: 14305/1 -1.2		Project Manager: ANWAR BARBHUYIA													
							Location: Menangle																	
Location	Depth (m)	Date	Soil	Water	Material	Metals As Cd Cr Cu Pb Hg Ni Zn	pH	CEC	CL8 TRH BTEX PAH	CL10 Metals* TRH BTEX PAH	CL16 Metals* TRH BTEX PAH OC PCB	Be B Co Mn Se	Mn	Asbestos 0.001% w/w	Asbestos	BTEX	TRH & BTEX	PAH	OCP	OCP & PCB	Phenol	Cyanide	VOC	OCP OPP & PCB
TP77	0.0-0.15	12/12/18	G		Clay																			
TP78	0.0-0.15	12/12/18	G		Clay																			
TP79	0.0-0.15	12/12/18	G		Clay		✓	✓																
TP80	0.0-0.15	12/12/18	G		Clay																			
TP81	0.0-0.15	12/12/18	G		Clay																			
X7		12/12/18	G		Clay																			
X8		12/12/18	G		Clay																			
X9		12/12/18	G		Clay																			
RS3		12/12/18		WG/Vial		✓																		
TS3					Sand																			
Relinquished by							Received by																	
Name		Signature		Date			Name		Signature		Date													
ANWAR BARBHUYIA		AB		13/12/18																				
WG: Water sample (glass bottle)							G		Soil sample (glass jar)		FCP		Fibro Cement Piece (plastic bag)		*: As, Cd, Cr, Cu, Pb, Hg, Ni & Zn (8 metals)									
WP: Water sample (plastic bottle)							P		Soil sample (plastic bag)		✓		Test required											



CHAIN OF CUSTODY

Results Required by: Normal Turnaround 4 days

Date: Wednesday, 19 December 2018

TO: SGS UNIT 16, 33 MADDOX STREET ALEXANDRIA NSW 2015 Tel: 02 8594 0400		Ref No.: 14305/1 Location: Menangle						
Composite	Sub-Sample	Depth (m)	Metals As Cd Cr Cu Pb Hg Ni Zn	OCP	OCP & PCB	Phenol	Cyanide	OCP, OPP & PCB
C19	1 TP56	0.0-0.15						
	11 TP57	0.0-0.15	✓	✓				
	12 TP58	0.0-0.15						
C20	13 TP59	0.0-0.15						
	2 TP60	0.0-0.15	✓					
	14 TP61	0.0-0.15						
C21	5 TP67	0.0-0.15						
	15 TP68	0.0-0.15	✓	✓				
	16 TP69	0.0-0.15						
C22	6 TP70	0.0-0.15						
	17 TP71	0.0-0.15	✓					
	18 TP72	0.0-0.15						
C23	7 TP73	0.0-0.15						
	19 TP74	0.0-0.15	✓	✓				
	20 TP75	0.0-0.15						
C24	8 TP76	0.0-0.15						
	21 TP77	0.0-0.15	✓					
	22 TP78	0.0-0.15						
C25	9 TP79	0.0-0.15						
	23 TP80	0.0-0.15	✓	✓				
	24 TP81	0.0-0.15						
Relinquished by								
Name	Signature	Date						
ANWAR BARBHUYIA	AB	13/12/18						



SAMPLE RECEIPT ADVICE

SE187421

CLIENT DETAILS

Contact Anwar Barbhuyia
Client Geotechnique
Address P.O. Box 880
PENRITH NSW 2751

Telephone 02 4722 2700
Facsimile 02 4722 6161
Email anwar@geotech.com.au

Project **14305-1-1.2 Menangle**
Order Number **GEOTEC_LTGHVC_V1_2018**
Samples 31

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

Samples Received Thu 13/12/2018
Report Due Fri 21/12/2018
SGS Reference **SE187421**

SUBMISSION DETAILS

This is to confirm that 31 samples were received on Thursday 13/12/2018. Results are expected to be ready by COB Friday 21/12/2018. Please quote SGS reference SE187421 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	None
Samples received in correct containers	Yes	Sample counts by matrix	31 Soil, 1 Water
Date documentation received	18/12/2018@8:37am	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	21.7°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

3 soil samples have been placed on hold.

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CLIENT DETAILS

Client **Geotechnique**

Project **14305-1-1.2 Menangle**

SUMMARY OF ANALYSIS

No.	Sample ID	Exchangeable Cations and Cation Exchange Capacity	Mercury in Soil	Moisture Content	OC Pesticides in Soil	pH in soil (1:5)	Total Recoverable Elements in Soil/Waste
001	TP56 0.0-0.15	13	-	1	-	1	-
002	TP60 0.0-0.15	13	-	1	-	1	-
003	TP65 0.0-0.15	13	1	1	29	1	7
004	TP66 0.0-0.15	-	1	1	29	-	7
005	TP67 0.0-0.15	13	-	1	-	1	-
006	TP70 0.0-0.15	13	-	1	-	1	-
007	TP73 0.0-0.15	13	-	1	-	1	-
008	TP76 0.0-0.15	13	-	1	-	1	-
009	TP79 0.0-0.15	13	-	1	-	1	-

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.

The numbers shown in the table indicate the number of results requested in each package.

Please indicate as soon as possible should your request differ from these details .

Testing as per this table shall commence immediately unless the client intervenes with a correction .



SAMPLE RECEIPT ADVICE

SE187421

CLIENT DETAILS

Client **Geotechnique**

Project **14305-1-1.2 Menangle**

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury in Soil	Moisture Content	OC Pesticides in Soil	Total Recoverable Elements in Soil/Waste
025	C19	1	1	29	7
026	C20	1	1	-	7
027	C21	1	1	29	7
028	C22	1	1	-	7
029	C23	1	1	29	7
030	C24	1	1	-	7
031	C25	1	1	29	7

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .



SAMPLE RECEIPT ADVICE

SE187421

CLIENT DETAILS

Client **Geotechnique**

Project **14305-1-1.2 Menangle**

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury (dissolved) in Water	Metals in Water (Dissolved) by ICPOES
010	RS3	1	7

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

CLIENT DETAILS

Contact **Anwar Barbhuyia**
 Client **Geotechnique**
 Address **P.O. Box 880
 PENRITH NSW 2751**

Telephone **02 4722 2700**
 Facsimile **02 4722 6161**
 Email **anwar@geotech.com.au**

Project **14305-1-1.2 Menangle - Additional**
 Order Number **GEOTEC_LTGHVC_V1_2018**
 Samples **31**

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 **SE187421A R0**
 Date Received **21/12/2018**
 Date Reported **24/12/2018**

COMMENTS

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

SIGNATORIES



Bennet Lo
 Senior Organic Chemist/Metals Chemist

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 21/12/2018

PARAMETER	UOM	LOR	TP79	TP80	TP81
			CLAY 0.0-0.15 12/12/2018 SE187421A.009	CLAY 0.0-0.15 12/12/2018 SE187421A.023	CLAY 0.0-0.15 12/12/2018 SE187421A.024
Copper, Cu	mg/kg	0.5	36	51	16
Nickel, Ni	mg/kg	0.5	10	15	13
Zinc, Zn	mg/kg	0.5	100	150	47

Moisture Content [AN002] Tested: 21/12/2018

			TP79	TP80	TP81
			CLAY	CLAY	CLAY
			0.0-0.15	0.0-0.15	0.0-0.15
			12/12/2018	12/12/2018	12/12/2018
			SE187421A.009	SE187421A.023	SE187421A.024
PARAMETER	UOM	LOR			
% Moisture	%w/w	0.5	27	17	13

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.

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

SE187421A R0

CLIENT DETAILS

Contact Anwar Barbhuyia
Client Geotechnique
Address P.O. Box 880
PENRITH NSW 2751

Telephone 02 4722 2700
Facsimile 02 4722 6161
Email anwar@geotech.com.au

Project **14305-1-1.2 Menangle - Additional**
Order Number **GEOTEC_LTGHVC_V1_2018**
Samples 31

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 **SE187421A R0**
Date Received 21 Dec 2018
Date Reported 24 Dec 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	None
Samples received in correct containers	Yes	Sample counts by matrix	3 Soil
Date documentation received	21/12/2018@10:14:21	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	21.7°C	Sufficient sample for analysis	Yes
Turnaround time requested	Next Day		

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.

Moisture Content

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP79	SE187421A.009	LB164139	12 Dec 2018	21 Dec 2018	26 Dec 2018	21 Dec 2018	26 Dec 2018	24 Dec 2018
TP80	SE187421A.023	LB164139	12 Dec 2018	21 Dec 2018	26 Dec 2018	21 Dec 2018	26 Dec 2018	24 Dec 2018
TP81	SE187421A.024	LB164139	12 Dec 2018	21 Dec 2018	26 Dec 2018	21 Dec 2018	26 Dec 2018	24 Dec 2018

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

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP79	SE187421A.009	LB164140	12 Dec 2018	21 Dec 2018	10 Jun 2019	21 Dec 2018	10 Jun 2019	24 Dec 2018
TP80	SE187421A.023	LB164140	12 Dec 2018	21 Dec 2018	10 Jun 2019	21 Dec 2018	10 Jun 2019	24 Dec 2018
TP81	SE187421A.024	LB164140	12 Dec 2018	21 Dec 2018	10 Jun 2019	21 Dec 2018	10 Jun 2019	24 Dec 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.

No surrogates were required for this job.

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

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

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

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

Sample Number	Parameter	Units	LOR	Result
LB164140.001	Copper, Cu	mg/kg	0.5	0.0291666666666667
	Nickel, Ni	mg/kg	0.5	-0.0875
	Zinc, Zn	mg/kg	0.5	0.216666666666667

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.

No duplicates were required for this job.

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.

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 %
LB164140.002	Copper, Cu	mg/kg	0.5	NA	370.46	80 - 120	87
	Nickel, Ni	mg/kg	0.5	NA	210.88	79 - 120	90
	Zinc, Zn	mg/kg	0.5	NA	301.27	80 - 121	96

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.

No matrix spikes were required for this job.

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 : https://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022_QA_QC_Plan.pdf

- * NATA accreditation does not cover the performance of this service .
 - ** Indicative data, theoretical holding time exceeded.
 - 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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E-MAILED
21/12/18 09:10:14 am

GEOTECHNIQUE PTY LTD

1 LEMKO PLACE PENRITH NSW 2750

Tel: (02) 4722 2700

CHAIN OF CUSTODY

Results Required By: 24 hrs

Date: Monday, 24 December 2018

Except pH Results Required By - SGS Ref No: SE18742

Quote: GEOTEC_LTGHVC V1 2018

[illegible]



SAMPLE RECEIPT ADVICE

SE187421A

CLIENT DETAILS

Contact Anwar Barbhuyia
Client Geotechnique
Address P.O. Box 880
PENRITH NSW 2751

Telephone 02 4722 2700
Facsimile 02 4722 6161
Email anwar@geotech.com.au

Project 14305-1-1.2 Menangle - Additional
Order Number GEOTEC_LTGHVC_V1_2018
Samples 31

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

Samples Received Fri 21/12/2018
Report Due Mon 24/12/2018
SGS Reference SE187421A

SUBMISSION DETAILS

This is to confirm that 31 samples were received on Friday 21/12/2018. Results are expected to be ready by COB Monday 24/12/2018. Please quote SGS reference SE187421A when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	None
Samples received in correct containers	Yes	Sample counts by matrix	3 Soil
Date documentation received	21/12/2018@10:14am	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	21.7°C	Sufficient sample for analysis	Yes
Turnaround time requested	Next Day		

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

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SAMPLE RECEIPT ADVICE

SE187421A

CLIENT DETAILS

Client **Geotechnique**

Project **14305-1-1.2 Menangle - Additional**

SUMMARY OF ANALYSIS

No.	Sample ID	Moisture Content	Total Recoverable Elements in Soil/Waste
009	TP79 0.0-0.15	1	3
023	TP80 0.0-0.15	1	3
024	TP81 0.0-0.15	1	3

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

CERTIFICATE OF ANALYSIS 207934

Client Details

Client	Geotechnique Pty Ltd
Attention	Anwar Barbhuyia
Address	PO Box 880, Penrith, NSW, 2751

Sample Details

Your Reference	<u>14305/1, Menangle</u>
Number of Samples	3 Soil
Date samples received	12/12/2018
Date completed instructions received	14/12/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	21/12/2018
Date of Issue	19/12/2018
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals
Steven Luong, Senior Chemist

Authorised By



Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		207934-3
Your Reference	UNITS	DSS1
Date Sampled		11/12/2018
Type of sample		Soil
Date extracted	-	17/12/2018
Date analysed	-	18/12/2018
TRH C ₆ - C ₉	mg/kg	<25
TRH C ₆ - C ₁₀	mg/kg	<25
vTPH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	75

svTRH (C10-C40) in Soil		
Our Reference		207934-3
Your Reference	UNITS	DSS1
Date Sampled		11/12/2018
Type of sample		Soil
Date extracted	-	17/12/2018
Date analysed	-	18/12/2018
TRH C ₁₀ - C ₁₄	mg/kg	<50
TRH C ₁₅ - C ₂₈	mg/kg	<100
TRH C ₂₉ - C ₃₆	mg/kg	<100
TRH >C ₁₀ -C ₁₆	mg/kg	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	90

PAHs in Soil		
Our Reference		207934-3
Your Reference	UNITS	DSS1
Date Sampled		11/12/2018
Type of sample		Soil
Date extracted	-	17/12/2018
Date analysed	-	18/12/2018
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate <i>p</i> -Terphenyl-d14	%	88

Organochlorine Pesticides in soil		
Our Reference		207934-3
Your Reference	UNITS	DSS1
Date Sampled		11/12/2018
Type of sample		Soil
Date extracted	-	17/12/2018
Date analysed	-	17/12/2018
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	103

PCBs in Soil		
Our Reference		207934-3
Your Reference	UNITS	DSS1
Date Sampled		11/12/2018
Type of sample		Soil
Date extracted	-	17/12/2018
Date analysed	-	17/12/2018
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCLMX	%	103

Acid Extractable metals in soil		
Our Reference		207934-3
Your Reference	UNITS	DSS1
Date Sampled		11/12/2018
Type of sample		Soil
Date prepared	-	17/12/2018
Date analysed	-	17/12/2018
Arsenic	mg/kg	6
Cadmium	mg/kg	<0.4
Chromium	mg/kg	7
Copper	mg/kg	39
Lead	mg/kg	150
Mercury	mg/kg	<0.1
Nickel	mg/kg	7
Zinc	mg/kg	260

Moisture		
Our Reference		207934-3
Your Reference	UNITS	DSS1
Date Sampled		11/12/2018
Type of sample		Soil
Date prepared	-	17/12/2018
Date analysed	-	18/12/2018
Moisture	%	10

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PCBs" is simply a sum of the positive individual PCBs.

Method ID	Methodology Summary
Org-012	<p>Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.</p> <p>For soil results:-</p> <ol style="list-style-type: none"> 1. 'EQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. <p>Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.</p>
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	<p>Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.</p> <p>Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.</p>

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			17/12/2018	[NT]	[NT]	[NT]	[NT]	17/12/2018	[NT]
Date analysed	-			18/12/2018	[NT]	[NT]	[NT]	[NT]	18/12/2018	[NT]
TRH C ₆ - C ₉	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	87	[NT]
TRH C ₆ - C ₁₀	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	87	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	87	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	86	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	87	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	87	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	77	[NT]	[NT]	[NT]	[NT]	81	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			17/12/2018	[NT]	[NT]	[NT]	[NT]	17/12/2018	[NT]
Date analysed	-			17/12/2018	[NT]	[NT]	[NT]	[NT]	17/12/2018	[NT]
TRH C ₁₀ - C ₁₄	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	129	[NT]
TRH C ₁₅ - C ₂₈	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	128	[NT]
TRH C ₂₉ - C ₃₆	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	130	[NT]
TRH >C ₁₀ -C ₁₆	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	129	[NT]
TRH >C ₁₆ -C ₃₄	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	128	[NT]
TRH >C ₃₄ -C ₄₀	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	130	[NT]
Surrogate o-Terphenyl	%		Org-003	91	[NT]	[NT]	[NT]	[NT]	93	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			17/12/2018	[NT]	[NT]	[NT]	[NT]	17/12/2018	[NT]
Date analysed	-			18/12/2018	[NT]	[NT]	[NT]	[NT]	18/12/2018	[NT]
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	91	[NT]
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	[NT]	[NT]	101	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	93	[NT]	[NT]	[NT]	[NT]	81	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			17/12/2018	[NT]	[NT]	[NT]	[NT]	17/12/2018	[NT]
Date analysed	-			17/12/2018	[NT]	[NT]	[NT]	[NT]	17/12/2018	[NT]
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	111	[NT]
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	80	[NT]
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	68	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	78	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	82	[NT]
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	79	[NT]
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	74	[NT]
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-005	105	[NT]	[NT]	[NT]	[NT]	109	[NT]

QUALITY CONTROL: PCBs in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			17/12/2018	[NT]	[NT]	[NT]	[NT]	17/12/2018	[NT]
Date analysed	-			17/12/2018	[NT]	[NT]	[NT]	[NT]	17/12/2018	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCLMX	%		Org-006	105	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			17/12/2018	[NT]	[NT]	[NT]	[NT]	17/12/2018	[NT]
Date analysed	-			17/12/2018	[NT]	[NT]	[NT]	[NT]	17/12/2018	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	91	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	84	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	84	[NT]

Result Definitions

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

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

SAMPLE RECEIPT ADVICE

Client Details

Client	Geotechnique Pty Ltd
Attention	Anwar Barbhuyia

Sample Login Details

Your reference	14305/1, Menangle
Envirolab Reference	207934
Date Sample Received	12/12/2018
Date Instructions Received	14/12/2018
Date Results Expected to be Reported	21/12/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	3 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	NA
Cooling Method	Not applicable
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie

Phone: 02 9910 6200
Fax: 02 9910 6201
Email: ahie@envirolab.com.au

Jacinta Hurst

Phone: 02 9910 6200
Fax: 02 9910 6201
Email: jhurst@envirolab.com.au

Analysis Underway, details on the following page:



Envirolab Services Pty Ltd

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Sample ID	VTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	PCBs in Soil	Acid Extractable metals in soil	On Hold
Z1							✓
Z2							✓
DSS1	✓	✓	✓	✓	✓	✓	

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

CERTIFICATE OF ANALYSIS 208065

Client Details

Client	Geotechnique Pty Ltd
Attention	Anwar Barbhuiya
Address	PO Box 880, Penrith, NSW, 2751

Sample Details

Your Reference	<u>14305/1, Menangle</u>
Number of Samples	3 Soil, 1 Composite
Date samples received	13/12/2018
Date completed instructions received	13/12/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	20/12/2018
Date of Issue	18/12/2018
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals

Authorised By



Jacinta Hurst, Laboratory Manager

Organochlorine Pesticides in soil		
Our Reference		208065-4
Your Reference	UNITS	CSS1
Composite Reference		1+2+3
Date Sampled		12/12/2018
Type of sample		Composite
Date extracted	-	14/12/2018
Date analysed	-	17/12/2018
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	91

Acid Extractable metals in soil		
Our Reference		208065-4
Your Reference	UNITS	CSS1
Composite Reference		1+2+3
Date Sampled		12/12/2018
Type of sample		Composite
Date prepared	-	14/12/2018
Date analysed	-	17/12/2018
Arsenic	mg/kg	14
Cadmium	mg/kg	<0.4
Chromium	mg/kg	25
Copper	mg/kg	52
Lead	mg/kg	30
Mercury	mg/kg	<0.1
Nickel	mg/kg	20
Zinc	mg/kg	160

Moisture		
Our Reference	UNITS	208065-4
Your Reference		CSS1
Composite Reference		1+2+3
Date Sampled		12/12/2018
Type of sample		Composite
Date prepared	-	14/12/2018
Date analysed	-	15/12/2018
Moisture	%	20

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			14/12/2018	[NT]	[NT]	[NT]	[NT]	14/12/2018	[NT]
Date analysed	-			17/12/2018	[NT]	[NT]	[NT]	[NT]	17/12/2018	[NT]
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	122	[NT]
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	87	[NT]
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	74	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	85	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	87	[NT]
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	84	[NT]
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-005	95	[NT]	[NT]	[NT]	[NT]	110	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			14/12/2018	[NT]	[NT]	[NT]	[NT]	14/12/2018	[NT]
Date analysed	-			17/12/2018	[NT]	[NT]	[NT]	[NT]	17/12/2018	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	103	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	114	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]

Result Definitions

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

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

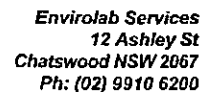
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.



Job No: 208065

Date Received: 13/12/18

Time Received: 16:52

Received by:

Temp. ~~Cool~~ Ambient

Cooling: Ice/Icepack

Security: Intact/Broken/None**Laboratory Test Request / Chain of Custody Record**

PENRITH NSW 2750

Tel: (02) 4722 2700

Page 1 of 2

TO: ENVIROLAB SERVICES PTY LD
12 ASHLEY STREET
CHATSWOOD NSW 2067

Sampling By:	SS
--------------	----

Ref No: 14305/1

PH: 02 9910 6200

Project Manager: AB

Location: Menangle

ATTN: MS AILEEN HIE

Results required by: NORMAL TURNAROUND TIME

[illegible]

Retinquished by

Received by

Name	Signature	Date	Name	Signature	Date
ANWAR BARBHUYIA	AB	13/12/2018	LILY NOTT	<i>[Signature]</i>	13/12/18 16:52

Legend:

WG Water sample, glass bottle

G Soil sample (glass jar)

P Soil sample (plastic bag)

WP Water sample, plastic bottle

✓ Test required

ENVIROLAB SERVICES

Sampling Date: 12/12/2018
Sampled by: SS
Project Manager: AB

Job No: 14305/1
Location: Menangle

Results Required by: Normal TAT

Page 2 of 2

Composite Sample	Sub-Samples	Analyte	
		Metals	OCP
④ CSS1	Z4 +Z5 + Z6	✓	✓

✓ Test required

Metals include arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni) and zinc (Zn)

OCP = Organochlorine Pesticides

208065

SAMPLE RECEIPT ADVICE

Client Details

Client	Geotechnique Pty Ltd
Attention	Anwar Barbhuyia

Sample Login Details

Your reference	14305/1, Menangle
Envirolab Reference	208065
Date Sample Received	13/12/2018
Date Instructions Received	13/12/2018
Date Results Expected to be Reported	20/12/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	3 Soil, 1 Composite
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	20.5
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie

Phone: 02 9910 6200
Fax: 02 9910 6201
Email: ahie@envirolab.com.au

Jacinta Hurst

Phone: 02 9910 6200
Fax: 02 9910 6201
Email: jhurst@envirolab.com.au

Analysis Underway, details on the following page:



Envirolab Services Pty Ltd

ABN 37 112 535 645

12 Ashley St Chatswood NSW 2067

ph 02 9910 6200 fax 02 9910 6201

customerservice@envirolab.com.au

www.envirolab.com.au

Sample ID	Organochlorine Pesticides in soil	Acid Extractable metals in soil	On Hold
Z4			✓
Z5			✓
Z6			✓
CSS1	✓	✓	

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

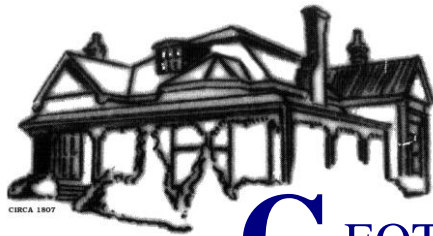
Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

APPENDIX C

UNEXPECTED FINDS MANAGEMENT PROTOCOL



GEOTECHNIQUE[®]
PTY LTD

ABN 64 002 841 063



UNEXPECTED FINDS MANAGEMENT PROTOCOL

PART LOT 201 IN DP590247 STATION STREET, MENANGLE

In the event that unexpected finds and/or suspect materials (identified by unusual staining, odour, discolouration or inclusions such as building rubble, asbestos sheeting/pieces/pipes, ash material, imported fill, etc.) are encountered during future earthworks/site preparation/demolitions or in between sampling locations, the following actions are to be undertaken.

Management of unexpected finds and/or suspect materials

If unexpected finds and/or suspect materials are encountered:

- Works are to be ceased.
- An Environmental consultant is to be engaged to take appropriate action.
- If contamination is identified, the contaminated materials must be disposed of at an EPA licensed landfill facility with an appropriate waste classification.

Management of bonded asbestos containing material (ACM)

If ACM is encountered, the following measures are implemented:

- Engage a Class B Licence for bonded asbestos contractor.
- Removal of the asbestos waste must be carried out in accordance with the requirements of the regulators, such as SafeWork NSW and NSW EPA.
- A competent personnel or a SafeWork NSW Licensed Asbestos Assessor or a Professional Hygienist should be engaged to provide a clearance certificate.

Management of friable asbestos within the soil

It is recommended that the following measures are implemented if friable asbestos is encountered:

- Engage a Class A licensed contractor for friable asbestos
- Removal of the asbestos waste must be carried out in accordance with the requirements of the regulators, such as SafeWork NSW and NSW EPA
- A SafeWork NSW Licensed Asbestos Assessor or a Professional Hygienist must be engaged to provide a clearance certificate

APPENDIX D

ENVIRONMENTAL NOTES

IMPORTANT INFORMATION REGARDING YOUR ENVIRONMENTAL SITE ASSESSMENT

These notes have been prepared by Geotechnique Pty Ltd, using guidelines prepared by the ASFE (Associated Soil and Foundation Engineers). The notes are offered to assist in the interpretation of your environmental site assessment report.

REASONS FOR AN ENVIRONMENTAL ASSESSMENT

Environmental site assessments are typically, though not exclusively, performed in the following circumstances:

- As a pre-acquisition assessment on behalf of either a purchaser or a vendor, when a property is to be sold
- As a pre-development assessment, when a property or area of land is to be redeveloped, or the land use has changed e.g. from a factory to a residential subdivision
- As a pre-development assessment of greenfield sites, to establish baseline conditions and assess environmental, geological and hydrological constraints to the development of e.g. a landfill
- As an audit of the environmental effects of previous and present site usage

Each circumstance requires a specific approach to the assessment of soil and groundwater contamination. In all cases the objective is to identify and if possible quantify the risks that unrecognised contamination poses to the ongoing proposed activity. Such risks may be both financial (clean-up costs or limitations in site use) and physical (health risks to site users or the public).

ENVIRONMENTAL SITE ASSESSMENT LIMITATIONS

Although information provided by an environmental site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment may not detect all contamination within a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which did not show signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant that may occur; only the most likely contaminants are screened.

AN ENVIRONMENTAL SITE ASSESSMENT REPORT IS BASED ON A UNIQUE SET OF PROJECT SPECIFIC FACTORS

In the following events and in order to avoid cost problems, you should ask your consultant to assess any changes in the conclusion and recommendations made in the assessment:

- When the nature of the proposed development is changed e.g. if a residential development is proposed, rather than a commercial development
- When the size or configuration of the proposed development is altered e.g. if a basement is added
- When the location or orientation of the proposed structure is modified
- When there is a change of land ownership, or
- For application to an adjacent site

ENVIRONMENTAL SITE ASSESSMENT FINDINGS ARE PROFESSIONAL ESTIMATES

Site assessment identifies actual sub-surface conditions only at those points where samples are taken, when they are taken. Data obtained from the sampling and subsequent laboratory analyses are interpreted by geologists, engineers or scientists and opinions are drawn about the overall sub-surface conditions, the nature and extent of contamination, the likely impact on any proposed development and appropriate remediation measures. Actual conditions may differ from those inferred, because no professional, no matter how qualified and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, however, steps can be taken to help minimise the impact. For this reason site owners should retain the services of their consultants throughout the development stages of the project in order to identify variances, conduct additional tests that may be necessary and to recommend solutions to problems encountered on site.

Soil and groundwater contamination is a field in which legislation and interpretation of legislation by government departments is changing rapidly. Whilst every attempt is made by Geotechnique Pty Ltd to be familiar with current policy, our interpretation of the investigation findings should not be taken to be that of the relevant authority. When approval from a statutory authority is required for a project, approval should be directly sought.

STABILITY OF SUB-SURFACE CONDITIONS

Sub-surface conditions can change by natural processes and site activities. As an environmental site assessment is based on conditions existing at the time of the investigation, project decisions should not be based on environmental site assessment data that may have been affected by time. The consultant should be requested to advise if additional tests are required.

ENVIRONMENTAL SITE ASSESSMENTS ARE PERFORMED FOR SPECIFIC PURPOSES AND CLIENTS

Environmental site assessments are prepared in response to a specific scope of work required to meet the specific needs of specific individuals e.g. an assessment prepared for a consulting civil engineer may not be adequate to a construction contractor or another consulting civil engineer.

An assessment should not be used by other persons for any purpose or by the client for a different purpose. No individual, other than the client, should apply an assessment, even for its intended purpose, without first conferring with the consultant. No person should apply an assessment for any purpose other than that originally contemplated, without first conferring with the consultant.

MISINTERPRETATION OF ENVIRONMENTAL SITE ASSESSMENTS

Costly problems can occur when design professionals develop plans based on misinterpretation of an environmental site assessment. In order to minimise problems, the environmental consultant should be retained to work with appropriate design professionals, to explain relevant findings and to review the adequacy of plans and specifications relative to contamination issues.

LOGS SHOULD NOT BE SEPARATED FROM THE REPORT

Borehole and test pit logs are prepared by environmental scientists, engineers or geologists, based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these would not be redrawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however, contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. Should this occur, delays and disputes, or unanticipated costs may result.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of sub-surface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations, such as contractors.

READ RESPONSIBILITY CLAUSES CLOSELY

An environmental site assessment is based extensively on judgement and opinion; therefore, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. In order to aid in prevention of this problem, model clauses have been developed for use in written transmittals. These are definitive clauses, designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment and you are encouraged to read them closely. Your consultant will be happy to give full and frank answers to any questions you may have.