



Report

Remediation Action Plan

Proposed Rezoning to Rural Residential, 510 Beach Road, Berry

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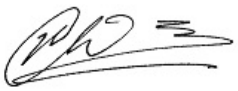
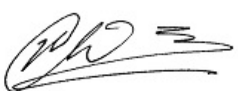
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Executive Summary

Enid and Richard Hall commissioned Network Geotechnics Pty Ltd (NG) to prepare a remediation action plan (RAP) for the property located at 510 Beach Road, Berry (the site). The RAP is to accompany a rezoning application to permit rural residential development at 510 Beach Road, Berry.

NG conducted a contamination assessment at the site in September 2017 (ref: G09/2571-Ar, dated 27 February 2018). The report made the following conclusions:

- Laboratory testing of soil samples and visual assessment identified three AECs that require remediation. These include soils surrounding the underground storage tank (UST) that are contaminated with petroleum hydrocarbon (TRH) and zinc (AEC 1), surface soils adjacent to the machinery shed which have hydrocarbon staining and odour (AEC 2) and burnt material on the soil surface that are impacted with zinc and lead (AEC 3);
- Dam water samples recorded concentrations of some heavy metals greater than the relevant trigger values. Therefore, the water may not be discharged to stormwater or creeks; and
- If demolition of existing structures is proposed, further testing should be carried out after the removal of sheds, dwellings and driveway areas for any residual contamination.

NG (2017) recommended that a RAP be prepared by a qualified environmental consultant, to allow the remediation of impacted soils at the site.

This report presents the remediation action plan that would allow the remediation of contaminated soils at the site.

This RAP proposes additional contamination testing beneath the existing shed/s and other structures to ascertain the contamination status in those areas in the event that structures are to be demolished. The results of the post-demolition assessment will be reported in a supplementary contamination assessment report, or an addendum to the RAP, depending the outcome of the results. The report will clearly outline the extent of remediation required. It will also specify any changes to the remediation strategy (if any).

The remediation objective is to render the site suitable for the proposed low density residential land use, from a contamination perspective. The preferred remediation strategy is excavation and offsite disposal.

Remediation excavations will be validated in accordance with the validation procedures outlined in this RAP. Remediation will be considered satisfactory when the specified validation requirements are met. A validation report will be prepared following the completion of the remediation and validation works, which will clearly state that the site is suitable for the proposed residential land use, from a contamination perspective.

NG recommends that this report be read in conjunction with the important information attached in Appendix A.

1.0 Introduction

Enid and Richard Hall commissioned Network Geotechnics Pty Ltd (NG) to prepare a remediation action plan (RAP) for the property located at 510 Beach Road, Berry (the site). The RAP is to accompany a rezoning application to permit rural residential development at 510 Beach Road, Berry

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- If demolition of existing structures is proposed, further testing should be carried out after the removal of sheds, dwellings and driveway areas for any residual contamination.

NG (2017) recommended that a RAP be prepared by a qualified environmental consultant, to allow the remediation of impacted soils at the site. This RAP provides a summary of the identified contamination, further assessment that is required, applicable remediation options, goals for remediating the identified contamination and the actions that must be carried out in order to meet these goals.

2.0 Remediation Objectives

The objective of the RAP is to describe the works that are necessary to remediate the site to a standard suitable for use as low density residential land use with access to soil, and to provide an appropriate scope of validation works sufficient to demonstrate that the site has been successfully remediated.

This RAP provides a strategy for site remediation which:

- Minimises impacts from the site contamination on the environment and on human health during and post construction/development;
- Maximise the protection of workers involved with remediation;
- Renders the site safe for the proposed land use; and
- Complies with applicable regulations including the NSW EPA Guidelines for Consultants Reporting on Contaminated Sites (2011) and National Environment Protection Measure (2013).

The remediation objectives will be deemed to have been achieved when a Validation Report is prepared, which demonstrates that the site has been remediated in accordance with the requirements of the RAP and states clearly that the site is suitable for the proposed low density residential land use.

3.0 Site Identification

The site is located to the south of Beach Road and is identified as 510 Beach Road, Berry (Lot 4 DP 834254). The site is bounded by:

- Rural residential properties to the east and west;
- Beach Road with rural properties to the north;
- Coomonderry Swamp to the south.

It is understood that the rear section of the lot is to be zoned for environmental conservation and is therefore not part of this investigation. The subject site covers a total area of approximately 56.4 hectares and is located in the Shoalhaven City Council area.

A plan of the site is included in Drawing No. G09/2571-1 in Appendix B.

4.0 Site History

A Stage 1 Contamination Assessment report, prepared by SEEC in 2015 (ref: 15000106-CA-01, dated: 13 July 2015) identified historical land use to include dairy farming up until approximately 1989. Since then the site has been used for cattle grazing. The site has also been used for residential purposes since the 1970s.

5.0 Site Condition and Surrounding Environment

5.1 Topography and Drainage

An east-west ridge runs through the site. The front portion of the site slopes to the north to north-east and the rear portion of the site slopes to the south-west.

Surface water runoff from the rear portion of the site would flow into Coomonderry Swamp – a SEPP14 Wetland. Runoff from the front portion of the site would flow into the two on-site dams and then into a culvert which flows under Beach Road into a dam on the adjacent property to the north.

5.2 Site Observations

A site inspection was carried out by a NG Environmental Scientist during fieldwork on 11 and 12 September 2017, which was conducted as part of the NG (2017) contamination assessment.

A gravel driveway was observed to lead to a brick, fibro and tile residence and a separate metal garage on concrete slab. To the east of the residence a pile of burnt timber and metal was observed.

Behind the garage, two metal sheds on concrete slabs were observed. The western shed was observed to be used for storing machinery and containers of oils. Oil staining was observed on the concrete and on the ground surface in front of the shed.

In front of the machinery sheds, an above ground storage tank (AST) was observed. Beneath the AST a fill point for an underground storage tank (UST) was observed. The two tanks (AST and UST) are understood to have contained either diesel or petrol but are no longer in use. The UST is understood to be still present on the site.

Behind the machinery sheds the disused dairy building was observed to be constructed of bricks and metal on concrete slab. Some paint was observed to be peeling from the building. The holding yard in front of the dairy was on bare ground.

A metal shed on ground was observed to the east of the dairy. It was observed that the shed is used for storing hay bales.

Two dams were observed further to the east. A disused dam which had become silted up over time was observed in the north-western corner of the site and another in the south-eastern corner of the site. An area of excavation was observed near the northern boundary.

A site plan is attached in Appendix B.

5.3 Sensitive Environments

The rear section of the site is occupied by the Coomonderry Swamp, which is a SEPP14 wetland. Surface water runoff from the southern portion of the site would flow into the swamp.

6.0 Geology & Hydrology

6.1 Geology

Reference to the 1:250,000 Wollongong Series geological map indicates the front portion of the site is underlain by Quaternary Alluvium which consists of alluvium, gravel, swamp deposits and sand dunes and the rear of the site is underlain by Shoalhaven Group Berry Formation which consists of siltstone, shale and sandstone.

6.2 Hydrology

The NSW Office of Water groundwater map indicates that there is one groundwater bore within 1km of the subject site. The groundwater bore (GW) is approximately 300m from the eastern boundary of the site and used for domestic purposes. The standing water level is 16m below ground level.

7.0 Summary of Previous Investigation

7.1 Stage 1 Contamination Assessment by SEEC

The Stage 1 Contamination Assessment by SEEC (ref: 15000106-CA-01, dated 13 July 2015) identified historical land use to include dairy farming up until approximately 1989. Since then the site has been used for cattle grazing. The site has also been used for residential purposes since the 1970s.

The Stage 1 report identified neighbouring sites to have been used for agricultural purposes up until the early 2000s when the sites to the east and west were rezoned for use as rural residential. The site to the north is part of a sand quarry. Based on these uses it is assessed that there is a low risk of contamination migration from neighbouring sites.

The Stage 1 report identified the following areas could be contaminated by past land use:

- Use of detergents in the dairy to clean the milking machines which may have run off in to the surrounding soils.
- The area surrounding and downslope of the AST and UST. Soils may be contaminated with TRH/BTEX/PAH and lead as a result of leaks or spillage from the tanks.
- The footprint of the homestead. This area is likely to have been treated for white ants and so could have residual organochlorine pesticides in the near-surface soil.
- The soils beneath and immediately outside the machinery sheds. These areas could be contaminated by fuel, oil or chemical spills from within the sheds. Contaminants of concern include TRH/BTEX/PAH, heavy metals and OC/OP pesticides.

The report recommended a soil investigation be undertaken in the areas identified to have a risk of contamination.

7.2 Stage 2 Contamination Assessment by NG

NG completed a Stage 2 Contamination Assessment report for the site (ref: G09/2571-Ar, dated 27 February 2018).

The objective of this investigation was to assess the risk of site contamination and the suitability of the site for the proposed rezoning from a contamination perspective.

The scope of work undertaken to achieve the objectives included:

- Design and implementation of a field sampling and laboratory testing program;
- Drilling of 30 boreholes across the site;
- Collection of soil samples at regular depth intervals;
- Analysis of soil and dam water samples for heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg), Total Recoverable Hydrocarbon, Benzene Toluene, Ethyl Benzene and Xylene and Polynuclear Aromatic Hydrocarbon (TRH/BTEX/PAH), Organochlorine and Organophosphate Pesticides (OC/OP) and asbestos presence; and

- Preparation of a Stage 2 Contamination Assessment report which includes recommendations for remediation.

7.2.1 Subsurface Conditions

Subsurface conditions encountered in NG (2017) boreholes are generalised in Table 1 and 2 below. Borehole logs are presented in Appendix C.

Table 1 Generalised Subsurface Lithology Encountered for BH4 to BH10, BH12, BH13, BH18 to BH30

Layer	Description	Depth to base of layer (m)
TOPSOIL	Silty CLAY, low plasticity, brown or grey brown	0.1 – 0.2
RESIDUAL	CLAY, medium to high plasticity, red brown or orange or red mottled grey or grey mottled orange, traces to some silt and gravel	0.35 - >1.5
ROCK	SHALE, extremely weathered, orange brown (BH21, BH26, BH27 only)	0.5 – 1.0

Table 2 Generalised Subsurface Lithology Encountered for BH1 to BH3, BH11, BH14 to BH17

Layer	Description	Depth to base of layer (m)
FILL	Sandy GRAVEL, medium to coarse grained, grey (BH1, BH2 and BH3 only)	0.5 - 1.0
FILL	Gravelly Silty CLAY, low to medium plasticity, grey (BH11 only)	0.2
FILL	Silty CLAY, low to medium plasticity, brown or grey mottled orange, traces of gravel (BH14, BH15, BH16, BH17 only)	0.2 - 0.7
RESIDUAL	CLAY, medium to high plasticity, red brown or orange or red mottled grey or grey mottled orange, traces to some silt and gravel	>1.5

7.2.2 Soil Analytical Results

The analytical results are summarised in Appendix D. The laboratory analytical certificates are attached in Appendix E.

A summary of the contamination found in the AECs is presented in Table 3.

Sample BH7 0.4-0.5 and BH7 0.9-1.0, which were adjacent to the AST/UST, were found to contain concentrations of TRH C16 to C34 (F3) greater than the ecological screening level (ESL) for fine grained soils. Sample BH7 0-0.1 was found to contain concentrations of zinc exceeding the ecological investigation level (EIL).

Surface soils adjacent to the machinery shed were found to have hydrocarbon staining and odour and were assessed to be aesthetically impacted.

An area of surface burnt material was found to contain concentrations of zinc greater than the EIL and lead greater than the HIL (sample BH13 0-0.1).

Laboratory test results from dam water found that the concentration of copper in DW1 and DW2 exceeded the trigger value. The concentration of total chromium exceeded the trigger value for chromium VI. Therefore, it was recommended that the water should not be discharged to stormwater or creeks.

NG recommended that a RAP be prepared by a qualified environmental consultant, to allow the remediation of impacted soils at the site.

8.0 Site Characterisation

Based on the results of the NG (2018) contamination assessment, the potential for widespread and unacceptable contamination to be present at the site is considered to be low. However, isolated areas of contamination were found in the AECs described in Table 3.

Table 3 Description of Contamination Present in AECs

AEC	Location and Contamination
AEC 1	- Soils in the vicinity of the UST/AST. - Sample BH7 0.4-0.5 and BH7 0.9-1.0 that contains elevated concentrations of TRH C16 to C34 (F3). - Sample BH7 0-0.1 that contains elevated concentrations of zinc.
AEC 2	Stained and odorous surface soils adjacent to the machinery shed
AEC 3	- Area of burnt material. - Sample BH13 contains concentrations of zinc greater than the EIL and lead greater than the HIL.

Based on the available laboratory test results and visual observations, NG considers that the volume of contaminated soils that will require remediation is likely to be less than 100m³. However, we note that if the UST or the AST has leaked significantly, this estimated volume of 100m³ of contaminated soils may be exceeded, potentially significantly.

The area occupied by the buildings and structures that are currently present on the site has not been investigated, and as such, the contamination status in those areas are not known. In the event that these buildings are to be demolished as part of the proposed development, intrusive investigation should take place within the footprints of the demolished structures.

9.0 Remediation Goals

The remediation objective is to render the site suitable for the proposed low density residential land use, from a contamination perspective, with minimal impact to human health or the environment.

9.1 Licences and Approvals

Relevant legislation associated with the site includes the Contaminated Land Management Act 1997, SEPP 55, the *Protection of the Environment Operations (Waste) Regulation 2014* and *Work Health and Safety Act and Regulation 2011*.

The proposed remediation works is likely to be classified as Category 2 remediation works, which does not require development consent, in accordance with the requirements of SEPP 55. However, given that the remediation works are required to render the site suitable for the proposed residential development, the required remediation works will likely be conditioned on the development consent for the proposed development.

9.2 Remediation Acceptance Criteria (RAC)

The following criteria will be used for assessment of remediation of soils in areas proposed for low density residential use:

- The Health Investigation Levels (HILs) and Health Screening Levels (HSLs) summarised in the following Table 5 to 7, which are extracted from Schedule B1 of the NEPM and Guidelines May 2013 are used for assessing the risk to human health.
- The Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) summarised in the following Table 8 and 9, which are extracted from Schedule B1 of the NEPM and Guidelines May 2013 are used for assessing the risk to human health.

Table 4 Health Investigation Levels for soil contaminants (mg/kg)

Chemical	Health-based investigation levels (mg/kg)
	Residential ¹ A
Metals and Inorganics	
Arsenic ²	100
Cadmium	20
Chromium (VI)	100
Copper	6000
Lead ³	300
Mercury (inorganic) ⁵	40
Methyl mercury ⁴	10
Nickel	400
Zinc	7400
Polycyclic Aromatic Hydrocarbons (PAHs)	
Carcinogenic PAHs (as BaP TEQ) ⁶	3
Total PAHs ⁷	300

Chemical	Health-based investigation levels (mg/kg)
	Residential ¹ A
Organochlorine Pesticides	
DDT+DDE+DDD	240
Aldrin and dieldrin	6
Chlordane	50
Endosulfan	270
Endrin	10
Heptachlor	6
HCB	10
Methoxychlor	300
Mirex	10
Toxaphene	20
Other Pesticides	
Atrazine	320
Chlorpyrifos	160
Bifenthrin	600

Table 5 Soil HSLs for vapour intrusion (mg/kg)

	HSL A & HSL B Low – high density residential				
CHEMICAL	0 m to <1 m	1 m to <2 m	2 m to <4m	4 m+	Soil saturation concentration (Csat)
SAND					
Toluene	160	220	310	540	560
Ethylbenzene	55	NL	NL	NL	64
Xylenes	40	60	95	170	300
Naphthalene	3	NL	NL	NL	9
Benzene	0.5	0.5	0.5	0.5	360
F1	45	70	110	200	950
F2	110	240	440	NL	560
SILT					
Toluene	390	NL	NL	NL	640
Ethylbenzene	NL	NL	NL	NL	69
Xylenes	95	210	NL	NL	330
Naphthalene	4	NL	NL	NL	10
Benzene	0.6	0.7	1	2	440
F1	40	65	100	190	910

	HSL A & HSL B				
	Low – high density residential				
F2	230	NL	NL	NL	570
CLAY					
Toluene	480	NL	NL	NL	630
Ethylbenzene	NL	NL	NL	NL	68
Xylenes	110	310	NL	NL	330
Naphthalene	5	NL	NL	NL	10
Benzene	0.7	1	2	3	430
F1	50	90	150	290	850
F2	280	NL	NL	NL	560

Table 6 Health screening levels for asbestos contamination in soil

	Health Screening Level (w/w)
Form of asbestos	Residential A
Bonded ACM	0.01%
Friable asbestos (FA) and asbestos fines (AF)	0.001%
All forms of asbestos	No visible asbestos for surface soil

Table 7 ESLs for TRH Fractions F1 – F4, BTEX and Benzo(a)pyrene in Soil

CHEMICAL	Soil texture	ESLs (mg/kg dry soil)
		Urban residential and public open space
F1 C₆-C₁₀	<i>Coarse/ Fine</i>	180*
F2 >C₁₀-C₁₆		120*
F3 >C₁₆-C₃₄	<i>Coarse</i>	300
	<i>Fine</i>	1300
F4 >C₃₄-C₄₀	<i>Coarse</i>	2800
	<i>Fine</i>	5600
Benzene	<i>Coarse</i>	50
	<i>Fine</i>	65
Toluene	<i>Coarse</i>	85
	<i>Fine</i>	105
Ethylbenzene	<i>Coarse</i>	70
	<i>Fine</i>	125
Xylenes	<i>Coarse</i>	105
	<i>Fine</i>	45
Benzo(a)pyrene	<i>Coarse</i>	0.7
	<i>Fine</i>	0.7

Table 9 EILs for contaminants in Soil

Chemical	Ecological investigation levels (mg/kg)
	Urban residential/public open space
Metals and Inorganics	
Arsenic	100
Chromium (III)	190
Copper	60
Lead	1100
Nickel	30
Zinc	110
Naphthalene	170
DDT	180

Notes:

1. The EIL is calculated from summing the Added Contaminant Limit (ACL) and the Ambient Background Concentration (ABC).
2. The EIL for soil is based on the most conservative CEC and pH as no results were available.

The subject site is proposed for residential use. Consequently, the issues of concern for contamination within the site are considered to be the risk of harm to human health and environmental impacts.

The validation test results for soils within the proposed residential lots will therefore be assessed against the available Health Investigation Levels (HIL) for Residential 'A' and Ecological Investigation Levels (EIL) for urban residential/public open space. Where the RAC vary between the human health and ecological based guidelines, the more conservative guidelines will be adopted as an initial screening measure.

9.3 Aesthetics

The aesthetic requirements for remediation and validation include ensuring that any material containing foreign materials such as construction waste, timber and vegetation and those heavily discoloured or odorous, are not visible to site users.

10.0 Remediation Strategy

10.1 Remediation Options

The preferred hierarchy of remediation options for contaminated soil in the NEPM (2013) is as follows:

1. On-site treatment of contamination
2. Off-site treatment of excavated soil (contamination)

If options 1 and 2 above are not practicable;

3. Consolidation and isolation of the soil by on-site containment
4. Removal of contaminated soil to an approved off-site facility

The NSW EPA Guidelines for the NSW Site Auditor Scheme (2017) offers no specific reference to a hierarchy of remediation options. However, it references the hierarchy set out in the NEPM (2013) for remediation of contaminated soil.

10.1.1 On-site treatment

Soils impacted with light fractions of petroleum hydrocarbons could be readily treated on site using land farming. Heavier fractions could also be treated by land farming, although the timeframe and the effort required will be greater. Land farming may not be applicable if such soils are also contaminated with asbestos or other recalcitrant contaminants such as heavy end TRH (C14 and longer chain lengths) and polynuclear aromatic hydrocarbons.

Soils impacted with heavy metals, heavy end TRH and polynuclear aromatic hydrocarbons can be treated on site using thermal and stabilisation techniques but is likely to be cost prohibitive for treatment of volumes less than say 5,000m³.

10.1.2 Removal of Contaminated Material to Landfill

TRH and heavy metal impacted soil may be excavated and disposed of at a licensed waste facility in accordance with its waste classification. Despite the cost of disposal of contaminated soil at landfill, this is the preferred option due to the likely small volume of material requiring remediation.

10.1.3 On-site containment

For the proposed residential subdivision, on-site containment of contaminated soils would involve excavating the contaminated material and burying it in another area of the site such as beneath a proposed road or a recreational area. Construction of a physical barrier system over contaminated filling would remove the exposure pathway to site users. However, we note that some planning authorities (Councils) do not permit onsite containment as a remediation strategy for residential developments. As such, NG recommends seeking advice from a qualified planning consultant if you wish to consider onsite containment.

A long-term site management plan may be required to be prepared and implemented where contaminated soils are retained on site, to ensure that it does not present a risk to the environment or human health. The site management plan will need to be legally enforceable, and Council may require notation to be placed on the title or the Section 149 certificate.

10.1 Preferred Remediation Strategy

The preferred remediation strategy is excavation and offsite disposal of TRH and heavy metal contaminated soils.

11.0 Implementation of Remediation Strategy

11.1 Interim Site Management Plan

It is assessed that an interim site management plan is not necessary.

11.2 Post-Demolition Contamination Assessment

It is understood, based on information supplied by the client, that it is uncertain as to whether the residence and sheds will be demolished. In the event that the buildings are to be demolished as part of the proposed development, further sampling and testing should be carried out beneath the shed/s and other structures (i.e. within the footprints) after demolition, to ascertain the contamination status of those areas that could not be accessed during NG (2018) assessment.

If demolition of the existing structures is carried out, an appropriate number of test pits will be excavated in the relevant areas and samples collected at regular depth intervals. Samples will be tested for contaminants of concern including petroleum hydrocarbon compounds, benzene, toluene, ethylbenzene and xylene, polynuclear aromatic hydrocarbons, pesticides, polychlorinated biphenyls, heavy metals and asbestos.

The results of the post-demolition assessment will be reported in a supplementary contamination assessment report, or an addendum to the RAP, depending the outcome of the results. The report will clearly outline the extent of remediation required. It will also specify any changes to the remediation strategy (if any).

11.3 Staging of Remediation Work

It is assessed that all remediation work will be carried out at the same time prior to the commencement of earthworks. However, it may be possible to mark out the areas requiring remediation so that earthworks and remediation can occur concurrently.

11.4 Excavation Strategy

Identified contaminated material will require excavation in order to be remediated. The material will be excavated to the lateral and vertical extent specified in Table 4 and based on visual and olfactory evidence including photo-ionisation detector (PID) readings for the remediation of TRH impacted soils. Visual and olfactory assessment will also be used to ensure aesthetically impacted material has been removed from the proposed remediation areas.

The validation sampling program will confirm that the identified contaminated material has been remediated. In the event that the first round of validation results indicate contamination is still present, excavation will continue until the excavation is satisfactorily validated.

11.5 Off Site Disposal

Unless otherwise determined, following the completion of the proposed additional assessment, the excavated impacted soils will require disposal to a licenced landfill, in accordance with the waste classification derived by the environmental consultant.

The contractor will maintain a truck register to record all waste material removed offsite for disposal to a land fill and retain receipts of waste disposal that are provided by the landfill, such that they can be reviewed by the environmental consultant and correlated with the truck register records. The disposal dockets are also required to be included in the validation report to demonstrate that the waste was legally disposed of.

11.6 Removal of UST and AST

11.6.1 UST Removal

The removal of the UST and the associated remediation and validation work will be conducted in line with the NSW DECCW (2010) "UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS" and "UPSS Technical Note: Site Validation Reporting". The following should be conducted, in addition to other requirements specified by NSW DECCW (2010):

- Any liquid present in the tank will be pumped out and disposed to a licensed liquid waste disposal facility.
- The UST will be de-gassed prior to UST removal works.
- Any fuel pipes should be disconnected and drained if necessary.
- Soil should be excavated to expose the width and length of the tank and stockpiled on an impermeable surface.
- When the tank is fully exposed it should be removed and placed on to a vehicle to be disposed of at an approved storage site. The disposal receipts should be provided to the environmental consultant for inclusion in the validation report.
- The environmental consultant will inspect the removed tank/s for evidence of corrosion damage and thus leakage.
- The soil directly below the tank and in contact with pipe work should be excavated and stockpiled on an impermeable surface.
- The excavation walls and bases should be examined by the Environmental Consultant for visual and olfactory evidence of hydrocarbon contamination, including Photo Ionisation Detector (PID) testing to assess whether further excavation is required.
- Excavation of the walls and bases should continue until there is no evidence of contamination. All excavated materials other than tank bedding materials should be stockpiled separately.
- All stockpiles should be sampled and tested to facilitate either offsite disposal or onsite treatment, depending on the project requirements and analytical results.
- Once the UST has been removed and validation samples indicate that the excavation is satisfactorily validated, the excavation may be backfilled with imported fill certified as Virgin Excavated Natural Materials (VENM) or uncontaminated material sourced from the site.

The remediation work should be carried out by an accredited contractor experienced in UST removal under the supervision of an Environmental Consultant.

11.6.2 AST Removal

The AST will be removed by the remediation contractor as follows:

- Any liquid present in the tank will be pumped out and disposed to a licensed liquid waste disposal facility.
- The AST will be de-gassed prior to AST removal works.
- Any fuel pipes should be disconnected and drained if necessary.
- The AST will be disposed to a licensed disposal facility and disposal receipts should be provided to the environmental consultant for inclusion in the validation report.
- The environmental consultant will inspect the removed tank/s and pipes for evidence of corrosion damage and thus leakage.
- The soil directly below the tank and the pipe work should be excavated and stockpiled on an impermeable surface.
- The excavation walls and bases should be examined by the Environmental Consultant for visual and olfactory evidence of hydrocarbon contamination, including PID testing to assess whether further excavation is required.
- Excavation of the walls and bases should continue until there is no evidence of contamination. All excavated materials should be stockpiled separately.
- All stockpiles should be sampled and tested to facilitate either offsite disposal or onsite treatment, depending on the project requirements and analytical results.
- Once the AST has been removed and validation samples indicate that the excavation is satisfactorily validated, the excavation may be backfilled with imported fill certified as VENM or uncontaminated material sourced from the site.

The remediation work should be carried out by an accredited contractor experienced in AST removal under the supervision of an Environmental Consultant.

11.7 Contingency Plan

In the event that significant additional contamination is uncovered during remediation work, NG considers that such additional contamination can be readily remediated using the previously mentioned remediation strategies. Consideration will be given to onsite treatment using land farming to treat hydrocarbon impacted soils.

11.8 Unexpected Finds Protocol

In the unlikely event that an unexpected hotspot of contamination is discovered during remediation works, the following procedure will be followed:

1. If unexpected contamination is revealed cease disturbance of the affected area and advise the Contractors Environmental Consultant (CEC).
2. CEC will assess the extent of contamination with the assistance of the contractor.
3. High risk areas will be isolated and secured against unintended access.
4. Warning signs will be erected where appropriate.
5. The area will be kept moist to prevent dust generation and may also be covered with plastic to prevent airborne spread of contamination.
6. Environmental controls (silt fences, temporary bunds, air monitoring etc) will be placed as appropriate.

7. A register of unexpected finds will be maintained. Record the extent of contamination for each unexpected find giving the following details. This information will be forwarded to all stake holders including owners, project managers and local authorities.

Name of officer reporting
Date and time of finds
Location (GPS coordinates, site plan)
UPF reference number
Description of contamination
Photographs
Temporary isolation/control measures adopted.
Comments by CEC if available

8. Once unexpected find is recorded the CEC shall initiate a preliminary evaluation and if required undertake sampling and testing.
9. A remediation procedure will be developed depending upon the proposed land use. If offsite disposal is required, a waste classification report will be prepared.
10. Once the site is remediated CEC shall provide clearance to the site.

12.0 Site Environmental Management Plan

There will be one main contractor (to be appointed by the client) experienced in undertaking remediation works.

It is the responsibility of the contractor to ensure that all necessary personal and environmental protection measures are in place in a manner safe to human and environmental health. The contractor will prepare a Construction Environmental Management Plan (CEMP) detailing all necessary environmental controls and monitoring necessary for the duration of the works.

Hours of Operation

Hours of operation will be subject to the conditions provided in the DA consent.

Site Access

Only the personnel inducted to the site will be allowed access to the site.

Noise Control

Some noise is likely to generate from the operation of earthmoving equipment and trucks. The work is expected to be conducted over several weeks.

The activities will be limited to the hours of operation specified in the DA. Where excessive noise is generated consideration will be made to review the machinery in use and substitute with less noisy machines where possible.

Emergency Response

All incidents causing loss of time or injury including potential injury will be recorded and informed to appropriate authorities including SafeWork NSW as appropriate.

A register of such incidents including corrective action if required will be maintained.

Community Consultation

The remediation contractor will prepare a communications and complaints handling protocol as part of the more detailed WHS plan. A sign shall be erected on the site fence with contact phone numbers for any public enquiries.

Dust Management and Suppression

A water cart will be used to control dust emissions if required.

It may also be necessary to cease work under windy conditions, cover exposed surfaces with jute mesh/ plastic sheeting, establishment and use of sprinkler systems and the implementation of speed limits to vehicles.

Imported Fill

If imported fill is required, it shall be certified as Virgin Excavated Natural Materials (VENM) and will be of quality suitable for the proposed residential development. A report certifying the material is VENM will be provided to the environmental consultant. A suitably qualified person such as an environmental consultant or geotechnician will inspect the material to ensure it matches the description provided in the report and is free of visible contamination.

Stockpiling of Contaminated Material

The following procedure shall be implemented for the stockpiling of contaminated material:

- Stockpiles will be placed on an impermeable surface such as plastic sheeting.
- All stockpiles will be labelled based on their origin.
- Stockpiles will either be sprayed with water or covered with Bidim A29 geotextile (or equivalent) or plastic sheeting to prevent the distribution of dust and asbestos particles.
- Should the stockpile remain in-situ for over 48 hours, suitable control measures such as silt fences or hay bales will be erected around each stockpile to prevent losses by surface erosion.

These procedures do not apply to stockpiles of non-contaminated material such as bricks, concrete, plastic and metal.

Soil and Water Management

Erosion and sediment control measures shall be erected based on Landcom Managing Urban Stormwater: Soils and Construction ("Blue Book"). Sediment fences shall be erected at the down gradient of all excavations where required. Any materials collected in sediment fences will be treated as contaminated waste and disposed of at landfill. In a storm event, the sediment control structures will be monitored, and adjustments made if required.

Groundwater Management

No remediation of groundwater is envisaged for the proposed remediation works at this stage. Furthermore, the excavations necessary for remediation will only be shallow and will not encounter any groundwater. Therefore, groundwater management is not necessary.

Decontamination Procedures

The Contractor shall reduce, as far as is practicable, the potential for contaminated soil to be tracked off the site through adherence on the tyres of vehicles. This could include a restriction on access to areas where contaminated soil is present, off-site vehicle movement during wet conditions, the manual cleaning of vehicle wheels prior to vehicles leaving the site, the use of a shaker bar and lead-in and lead-out crushed rock/ concrete.

Any machinery which comes into contact with the contaminated soil (e.g. excavators and compaction machinery) will be decontaminated prior to leaving contaminated areas. The machinery will be washed down in a bunded area in order to remove all contaminated soil.

13.0 Work Health & Safety

13.1 Personal Protective Equipment (PPE)

The remediation contractor shall prepare a health and safety plan (or a safe work method statement) to protect the health and safety of remediation staff, consultants and the public who may be impacted by the proposed remediation works. PPE likely required to be worn by all persons on site is as follows:

- Hard Hat
- Steel capped safety boots
- High visibility vest

In addition to the above PPE, rubber or nitrile gloves should be worn by any persons handling TRH or PAH impacted soils.

14.0 Community Relations Plan

The neighbouring properties and residents will be notified in writing, by the remediation contractor or its Principal, at least seven days prior to the commencement of remediation works. The notification will provide contact details on how and where to lodge complaints during the proposed remediation works.

Communication and complaints received for the remediation works will be reported to the Principal and the remediation contractor. All communications and complaints will be assessed, and an appropriate response, corrective and/or preventative action will be implemented (as necessary).

A communication and complaints register will be operated on site by the remediation contractor to ensure that concerns of local residences are recorded and addressed.

15.0 Validation

15.1 Validation of Remediated Areas

The validation sampling procedure summarised in Table 10 will be followed.

Table 10 Validation Sampling Procedure

Remediation Area	Sampling Procedure	Contaminants to be Tested
UST Remediation Works (AEC1)	- For the base of the tank pit excavation 1 sample per 5m x 5m grid with a minimum of 2 samples - For the walls of the excavation 1 sample per 5 lineal metres of wall, at every 1m depth of the wall or part there of - For the backfill sands and soil excavated from the tank pit or other excavations, samples at the rate of 1 sample per 25 m³ - For pipe excavation trenches, samples to be collected every 5 lineal metres on the base of the trench	- Lead, TRH, BTEX, PAH
AST Remediation Works (AEC 1)	- For the base of each excavation, 1 sample per 10m x10m grid or a minimum of 3 samples.	- Lead, TRH, BTEX, PAH
Stained surface soils near machinery shed (AEC 2)	- For the walls of the excavation 1 sample per 10 lineal metres of wall, or at least 4 sample locations at each excavation. If the depth of the excavation exceeds 0.5m, samples will be collected at two depths at each location.	- TRH, BTEX, PAH, heavy metals
Surface burnt material (AEC 3)	- No visibly stained or odorous soil.	- Heavy metals

If the results of the first round of validation are greater than the remediation acceptance criteria, excavation will continue, and the validation procedure repeated until the results are less than the remediation criteria. The consultant may wish to consider using a statistical approach to evaluating potential risks that may be posed by minor exceedances reported in the validation results.

15.1.2 Waste Classification

Contaminated soil that is required to be disposed at landfill is required to be waste classified in accordance with NSW EPA (2014) Guidelines. The results of the waste classification will be presented in the report that will be prepared following the completion of the proposed additional assessments.

15.1.3 Data Quality Objectives (DQOs)

The seven-step process for DQOs for remediation and validation purposes will include the following:

Step 1 Identify the Problem

The findings of the NG (2018) contamination assessment identified heavy metal and hydrocarbon contamination in surface soils and TRH contamination near a UST/AST. This material requires remediation to render the site suitable for the proposed residential development.

The preferred remediation strategy is off-site disposal as described above.

Step 2 Identify the Decisions

Laboratory test results for samples taken from the walls and floor of remediation excavations will need to meet the specified remediation acceptance criteria (RAC).

Step 3 Identify Inputs

The field observations and laboratory test results for the walls and floor of remediation excavations form the basis of whether the remediation has been completed successfully.

Visual observations by an Environmental Consultant at the completion of remediation will also assess whether the aesthetic requirements of remediation have been achieved.

Step 4 Project Boundaries

The boundary of the project for remediation and validation purposes is taken as the site boundary.

Step 5 Decision Rule

The site will be deemed to be remediated when all contaminated material has been disposed of appropriately and material treated on site has met the RAC.

All laboratory test results for samples taken from the walls and floor of remediation excavations will comply with the RAC and aesthetic requirements of remediation be achieved.

Step 6 Error Tolerances

Limit of reporting adopted by the NATA accredited testing laboratories are assessed to be adequate. Laboratory Quality Control reports will be reviewed to ensure they are adequate.

The accuracy and reproducibility of test results will be tested using QA/QC procedures as outlined in Section 16.2.

Step 7 Optimise Sample Design

Validation sampling density has been based on the NSW EPA *Contaminated Sites: Sampling Design Guidelines 1995* and current industry best practice.

15.2 Quality Assurance & Quality Control

15.2.1 Field Quality Assurance & Quality Control

Field quality assurance objectives are designed based on Australian Standard AS4482 and will comprise the following:

- Sample collection and dispatch to testing laboratory will be carried out by experienced environmental/civil engineers appropriately trained for such tests.
- Sampling tools will be decontaminated between each sample collection using distilled water, DECON 90 and a scrubbing brush.
- Samples for contamination testing other than asbestos will be placed in laboratory prepared glass jars with Teflon lined lid and capped immediately.
- Samples will be immediately placed in an esky with ice for transport to the laboratory.
- Chain of custody forms will be used in dispatching samples.
- Containers, sampling packaging and holding times will be checked prior to dispatch of samples and checked after samples were received by the laboratories.
- A trip blank and trip spike will be used per day of validation sampling, where volatile contaminants are being tested for.
- Analysis of 5% inter and intra laboratory duplicate samples for contaminants other than asbestos.

15.2.2 Laboratory Quality Assurance & Quality Control

Only NATA accredited laboratories will be used for testing. Certificates of analysis and quality control records will be reviewed for each batch of test results.

Specific elements that will be checked and assessed include the following:

- Preservation and storage of samples upon collection and during transport to the laboratory;
- Sample holding times;
- Use of appropriate analytical and field sampling procedures;
- Required limits of reporting;
- Frequency of conducting quality control measurements;
- Laboratory duplicate results;
- The occurrence of apparently unusual or anomalous results, e.g. laboratory results that appear to be inconsistent with field observations or measurements have been assessed.
- Inter and intra laboratory duplicate RPD will be less than 30%.

15.3 Validation Reporting

A validation report will be prepared by a suitably qualified environmental consultant in accordance with NSW OEH (2011) *Contaminated Sites Guidelines for Consultants Reporting on Contaminated Sites* at the completion of the remediation works programme.

The final validation report will outline the remediation works conducted, present the validation results, and make a clear statement that the site is suitable for the proposed residential land use.

16.0 References

1. NEPC, 1999. "National Environment Protection (Assessment of Site Contamination) Measures (NEPM) (amended in 2013)
2. NG, 2017. "Stage 2 Contamination Assessment, Proposed Rezoning to Rural Residential, 510 Beach Road, Berry" (ref: G09/2571-Ar, dated 27 February 2018)
3. SEEC, 2015. "Stage 1 Contamination Assessment, Proposed Rezoning of Part Lot 4 DP 834254, 510 Beach Road, Berry" (ref: 15000106-CA-01, dated 13 July 2015)
4. NSW EPA, 1995. "Sample Design Guidelines"

Network Geotechnics Pty Ltd

Appendix A

Information Sheets

Information About This Report

LIMITATIONS

Scope of Services: The report has been prepared in accordance with the scope of services set out in NG's Proposal under NG's Terms of Engagement, or as otherwise agreed with the Client. The scope of services may have been limited and/or amended by a range of factors including time, budget, access and site constraints.

Specific Purpose: The report is provided for the specific development and purpose as described in the report. The report may not contain sufficient information for developments or purposes other than that described in the report.

Currency of Information: The information in this report is considered accurate at the date of issue with regard to the current conditions of the site.

Reliance on Information: In preparing the report NG has necessarily relied upon information provided by the Client and/or their Agents. Such data may include surveys, analyses, designs, maps and plans. NG has not verified the accuracy or completeness of the data except as stated in this report.

Copyright and Reproduction: The contents of this document are and remain the intellectual property of NG. This document should only be used for the purpose for which it was commissioned and should not be used for other projects or by a third party. This report shall not be reproduced either totally or in part without the permission of NG. Where information from this report is to be included in contract documents or engineering specification for the project, the entire report should be included in order to minimise the likelihood of misinterpretation.

Construction Specifications: Unless otherwise stated, the report, or sections of the report, should not be used as part of a specification for a project, without review and agreement by NG.

Report Should Not be Separated: The report must be read in conjunction with the attached Information Sheets and any other explanatory notes and should be kept in its entirety without separation of individual pages or sections.

Review by Others: NG cannot be held responsible for interpretations or conclusions from review by others of this report or test data, which are not otherwise supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

GENERAL NOTES

Geotechnical and Environmental Reporting: Geotechnical and environmental reporting relies on the interpretation of factual information based on judgment and opinion and is far less exact than other engineering or design disciplines. Geotechnical and environmental reports are for a specific purpose, development and site as described in the report and may not contain sufficient information for other purposes, developments or sites (including adjacent sites) other than that described in the report.

Subsurface Conditions: Subsurface conditions can change with time and can vary between test locations. For example, the actual interface between the materials may be far more gradual or abrupt than indicated and contaminant presence may be affected by spatial and temporal patterns. Therefore, actual conditions in areas not sampled may differ from those predicted since no subsurface investigation, no matter how comprehensive, can reveal all subsurface details and anomalies. Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations can also affect subsurface conditions and thus the continuing adequacy of a geotechnical report. NG should be kept informed of any such events and should be retained to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Groundwater: Groundwater levels indicated on borehole and test pit logs are recorded at specific times. Depending on ground permeability, measured levels may or may not reflect actual levels if measured over a longer time period. Also, groundwater levels and seepage inflows may fluctuate with seasonal and environmental variations and construction activities.

Interpretation of Data: Data obtained from nominated discrete locations, subsequent laboratory testing and empirical or external sources are interpreted by trained professionals in order to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions in accordance with any relevant industry standards, guidelines or procedures.

Soil and Rock Descriptions: Soil and rock descriptions are based on AS 1726 – 1993, using visual and tactile assessment except at discrete locations where field and / or laboratory tests have been carried out. Refer to the accompanying soil and rock terms sheet for further information.

Further Advice: NG would be pleased to further discuss how any of the above issues could affect a specific project. We would also be pleased to provide further advice or assistance including:

- Assessment of suitability of designs and construction techniques;
- Contract documentation and specification;
- Construction control testing (earthworks, pavement materials, concrete);
- Construction advice (foundation assessments, excavation support).



Abbreviations, Notes & Symbols

SUBSURFACE INVESTIGATION

METHOD

Borehole Logs

AS#	Auger screwing (#-bit)
AD#	Auger drilling (#-bit)
B	Blank bit
V	V-bit
T	TC-bit
HA	Hand auger
R	Roller/tricone
W	Washbore
AH	Air hammer
AT	Air track
LB	Light bore push tube
MC	Macro core push tube
DT	Dual core push tube

Excavation Logs

BH	Backhoe/excavator bucket
NE	Natural exposure
HE	Hand excavation
X	Existing excavation

Cored Borehole Logs

NMLC	NMLC core drilling
NQ/HQ	Wireline core drilling

SUPPORT

Borehole Logs

C	Casing
M	Mud

Excavation Logs

S	Shoring
B	Benched

SAMPLING

B	Bulk sample
D	Disturbed sample
U#	Thin-walled tube sample (#mm diameter)
ES	Environmental sample
EW	Environmental water sample

FIELD TESTING

PP	Pocket penetrometer (kPa)
DCP	Dynamic cone penetrometer
PSP	Perth sand penetrometer
SPT	Standard penetration test
PBT	Plate bearing test
Su	Vane shear strength peak/residual (kPa) and vane size (mm)
N*	SPT (blows per 300mm)
Nc	SPT with solid cone
R	Refusal

*denotes sample taken

BOUNDARIES

————	Known
— — — —	Probable
.....	Possible

SOIL

MOISTURE CONDITION

D	Dry
M	Moist
W	Wet
Wp	Plastic Limit
WL	Liquid Limit
MC	Moisture Content

CONSISTENCY

VS	Very Soft
S	Soft
F	Firm
St	Stiff
VSt	Very Stiff
H	Hard
Fb	Friable

DENSITY INDEX

VL	Very Loose
L	Loose
MD	Medium Dense
D	Dense
VD	Very Dense

SW	Well graded sands and gravelly sands, little or no fines
SP	Poorly graded sands and gravelly sands, little or no fines
SM	Silty sand, sand-silt mixtures
SC	Clayey sand, sand-clay mixtures
ML	Inorganic silts of low plasticity, very fine sands, rock flour, silty or clayey fine sands
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays
OL	Organic silts and organic silty clays of low plasticity
MH	Inorganic silts of high plasticity
CH	Inorganic clays of high plasticity
OH	Organic clays of medium to high plasticity
PT	Peat muck and other highly organic soils

ROCK

WEATHERING

RS	Residual Soil
XW	Extremely Weathered
HW	Highly Weathered
MW	Moderately Weathered
DW*	Distinctly Weathered
SW	Slightly Weathered
FR	Fresh

*covers both HW & MW

STRENGTH

EL	Extremely Low
VL	Very Low
L	Low
M	Medium
H	High
VH	Very High
EH	Extremely High

ROCK QUALITY DESIGNATION (%)

$$= \frac{\text{sum of intact core pieces} > 100\text{mm}}{\text{total length of section being evaluated}} \times 100$$

CORE RECOVERY (%)

$$= \frac{\text{core recovered}}{\text{core lift}} \times 100$$

NATURAL FRACTURES

Type

JT	Joint
BP	Bedding plane
SM	Seam
FZ	Fractured zone
SZ	Shear zone
VN	Vein

Infill or Coating

Cn	Clean
St	Stained
Vn	Veneer
Co	Coating
Cl	Clay
Ca	Calcite
Fe	Iron oxide
Mi	Micaceous
Qz	Quartz

Shape

pl	Planar
cu	Curved
un	Undulose
st	Stepped
ir	Irregular

Roughness

pol	Polished
slk	Slickensided
smo	Smooth
rou	Rough

USCS SYMBOLS

GW	Well graded gravels and gravel-sand mixtures, little or no fines
GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
GM	Silty gravels, gravel-sand-silt mixtures
GC	Clayey gravels, gravel-sand-clay mixtures

Soil & Rock Terms

SOIL

MOISTURE CONDITION

Term	Description
Dry	Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through the hand.
Moist	Feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	As for moist, but with free water forming on hands when handled.

For cohesive soils, moisture content may also be described in relation to plastic limit (W_P) or liquid limit (W_L). [$>>$ much greater than, $>$ greater than, $<$ less than, $<<$ much less than].

CONSISTENCY

Term	c_u (kPa)	Term	c_u (kPa)
Very Soft	< 12	Very Stiff	100 - 200
Soft	12 - 25	Hard	> 200
Firm	25 - 50	Friable	-
Stiff	50 - 100		

DENSITY INDEX

Term	I_D (%)	Term	I_D (%)
Very Loose	< 15	Dense	65 - 85
Loose	15 - 35	Very Dense	> 85
Medium Dense	35 - 65		

PARTICLE SIZE

Name	Subdivision	Size (mm)
Boulders		> 200
Cobbles		63 - 200
Gravel	coarse	20 - 63
	medium	6 - 20
	fine	2.36 - 6
Sand	coarse	0.6 - 2.36
	medium	0.2 - 0.6
	fine	0.075 - 0.2
Silt & Clay		< 0.075

MINOR COMPONENTS

Term	Proportion by Mass coarse grained	fine grained
Trace	$\leq 5\%$	$\leq 15\%$
Some	5 - 2%	15 - 30%

SOIL ZONING

Layers	Continuous exposures
Lenses	Discontinuous layers of lenticular shape
Pockets	Irregular inclusions of different material

SOIL CEMENTING

Weakly	Easily broken up by hand
Moderately	Effort is required to break up the soil by hand

SOIL STRUCTURE

Massive	Coherent, with any partings both vertically and horizontally spaced at greater than 100mm
Weak	Peds indistinct and barely observable on pit face. When disturbed approx. 30% consist of peds smaller than 100mm
Strong	Peds are quite distinct in undisturbed soil. When disturbed $>60\%$ consists of peds smaller than 100mm

ROCK

SEDIMENTARY ROCK TYPE DEFINITIONS

Rock Type	Definition (more than 50% of rock consists of....)
Conglomerate	... gravel sized ($> 2\text{mm}$) fragments
Sandstone	... sand sized (0.06 to 2mm) grains
Siltstone	... silt sized ($<0.06\text{mm}$) particles, rock is not laminated
Claystone	... clay, rock is not laminated
Shale	... silt or clay sized particles, rock is laminated

STRENGTH

Term	Is50 (MPa)	Term	Is50 (MPa)
Extremely Low	< 0.03	High	1 - 3
Very Low	0.03 - 0.1	Very High	3 - 10
Low	0.1 - 0.3	Extremely High	> 10
Medium	0.3 - 1		

WEATHERING

Term	Description
Residual Soil	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident
Extremely Weathered	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded, in water. Fabric of original rock is still visible
Highly Weathered	Rock strength usually highly changed by weathering; rock may be highly discoloured
Moderately Weathered	Rock strength usually moderately changed by weathering; rock may be moderately discoloured
Distinctly Weathered	See 'Highly Weathered' or 'Moderately Weathered'
Slightly Weathered	Rock is slightly discoloured but shows little or no change of strength from fresh rock
Fresh	Rock shows no signs of decomposition or staining

NATURAL FRACTURES

Type	Description
Joint	A discontinuity or crack across which the rock has little or no tensile strength. May be open or closed
Bedding plane	Arrangement in layers of mineral grains of similar sizes or composition
Seam	Seam with deposited soil (infill), extremely weathered insitu rock (XW), or disoriented usually angular fragments of the host rock (crushed)
Shear zone	Zone with roughly parallel planar boundaries, of rock material intersected by closely spaced (generally $< 50\text{mm}$) joints and /or microscopic fracture (cleavage) planes
Vein	Intrusion of any shape dissimilar to the adjoining rock mass. Usually igneous

Shape	Description
Planar	Consistent orientation
Curved	Gradual change in orientation
Undulose	Wavy surface
Stepped	One or more well defined steps
Irregular	Many sharp changes in orientation

Infill or Coating	Description
Clean	No visible coating or discolouring
Stained	No visible coating but surfaces are discoloured
Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
Coating	Visible coating $\leq 1\text{mm}$ thick. Ticker soil material described as seam

Roughness	Description
Polished	Shiny smooth surface
Slickensided	Grooved or striated surface, usually polished
Smooth	Smooth to touch. Few or no surface irregularities
Rough	Many small surface irregularities (amplitude generally $< 1\text{mm}$). Feels like fine to coarse sandpaper

Note: soil and rock descriptions are generally in accordance with AS1726-1993 Geotechnical Site Investigations

Graphic Symbols Index

Soil		Rock		Water Measurements
	Fill		Sandstone	 Level at time of drilling
	Peat, Topsoil		Shale	 Level after drilling
	Clay		Clayey Shale	 Inflow
	Silty Clay		Siltstone	 Outflow
	Gravelly Clay		Conglomerate	
	Sandy Clay		Claystone	
	Silt		Dolerite, Basalt	
	Sandy Silt		Granite	
	Clayey Silt		Limestone	
	Gravelly Silt		Tuff	
	Gravel		Coarse grained Metamorphic	
	Sandy Gravel		Medium grained Metamorphic	
	Clayey Gravel		Fine grained Metamorphic	
	Silty Gravel		Coal	
	Sand			
	Gravelly Sand	Other		
	Silty Sand		Asphalt	
	Clayey Sand		Concrete	
			Brick	



Appendix B

Site Plan and Test Locations



12/9-15 Gundah Road,
MT KURING-GAI NSW 2080
Tel: (02) 8438 0300
Fax: (02) 8438 0310
Email: engineering@netgeo.com.au

Scale: On drawing

Date: 12/10/17

Drawn By: TPR

Drawing No: G09/2571-1

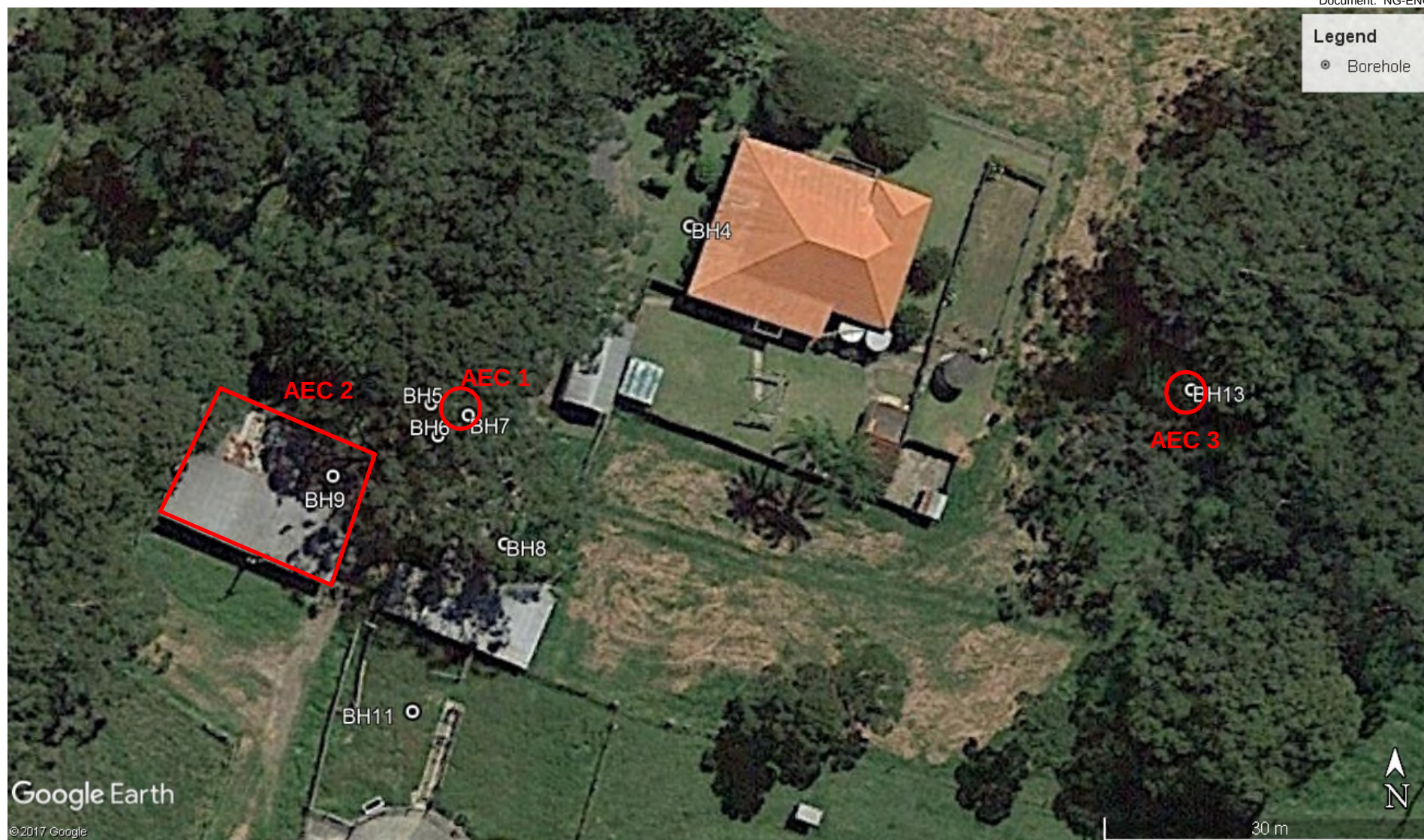
Client: Richard and Enid Hall

Project: Proposed Residential Subdivision

Location: 510 Beach Road, Berry

Sheet:
1 of 1

SITE PLAN



12/9-15 Gundah Road,
MT KURING-GAI NSW 2080
Tel: (02) 8438 0300
Fax: (02) 8438 0310
Email: engineering@netgeo.com.au

Scale: On drawing

Date: 12/10/17

Drawn By: TPR

Drawing No: G09/2571-2

Client: Richard and Enid Hall

Project: Proposed Residential Subdivision

Location: 510 Beach Road, Berry

Sheet:
1 of 1

SITE PLAN

Appendix C

Test Pit Logs

BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH01
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	
Borehole Diameter:	100(O.D.)	Inclination:	
		Bearing:	
		Datum:	

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				GP	Sandy GRAVEL, medium to coarse grained, grey	M		FILL
						CL/CI	Silty CLAY, low to medium plasticity, brown, some gravel	≥Wp		
		D				CI/CH	CLAY, medium to high plasticity, grey mottled orange, some silt			RESIDUAL
		D		1.0			BH01 Terminated at 1 m			
				2.0						



ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No: G09/2571

Hole No: BH02

Sheet: PAGE 1 / 1

Client: Richard Hall

Started: 11/09/17

Project: Proposed Residential Subdivision

Finished: 11/09/17

Location: 510 Beach Road, Berry
GPS (-)

Logged: TPR

Checked: VDS

Equipment Type: Dingo drill Rig

RL Surface:

Borehole Diameter: 100(O.D.)

Inclination:

Bearing:

Datum:

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/ relative density	comments notes, structure, and additional observations
ADT	None Encountered	D		1.0		GP	Sandy GRAVEL, medium to coarse grained, grey	M		FILL
						CL/CI	Silty CLAY, low to medium plasticity, brown, some gravel	≤Wp		
		D								
		D								
				2.0			BH02 Terminated at 1 m			

BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH03
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				GP	Sandy GRAVEL, medium to coarse grained, grey	M		FILL
						CL/CI	Silty CLAY, low to medium plasticity, brown, some gravel	≤Wp		
		D				-	SHALE, extremely weathered, orange and grey	-		RESIDUAL
		D		1.0			BH03 Terminated at 1 m			
				2.0						

BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH04
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL/CI	Silty CLAY, low to medium plasticity, brown	≥Wp		TOPSOIL
						CI/CH	CLAY, medium to high plasticity, red brown, some silt			
		D								RESIDUAL
		D		1.0		CL/CI	Silty CLAY, low to medium plasticity, orange mottled grey, some gravel			
							BH04 Terminated at 1 m			



Job No: G09/2571

Hole No: BH06

Sheet: PAGE 1 / 1

Client: Richard Hall

Started: 11/09/17

Project: Proposed Residential Subdivision

Finished: 11/09/17

Location: 510 Beach Road, Berry
GPS (-)

Logged: TPR

Checked: VDS

Equipment Type: Dingo drill Rig

RL Surface:

Borehole Diameter: 100(O.D.)

Inclination:

Bearing:

Datum:

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/ relative density	comments notes, structure, and additional observations
ADT	None Encountered	D								

Started:	11/09/17
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Finished:	11/09/17
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Checked:	VDS
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RL Surface:

Datum:

BOREHOLE LOG LOGS.GPJ NETWORK GEOTECHNICS PTY LTD GDT 9/25/17

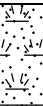
BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH08
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL/CI	Silty CLAY, low to medium plasticity, brown	≤Wp		TOPSOIL
						CI/CH	CLAY, medium to high plasticity, red-brown, some silt	≥Wp		RESIDUAL
		D								
				1.0		CL/CI	Silty CLAY, low to medium plasticity, grey mottled orange, some gravel			
		D								
							BH08 Terminated at 1 m			
				2.0						

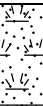
BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH09
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/ relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL/CI	Silty CLAY, low to medium plasticity, grey-brown, traces of gravel	≤Wp		TOPSOIL
						CI/CH	CLAY, medium to high plasticity, orange-brown	≥W		RESIDUAL
		D								
						CI/CH	CLAY, medium to high plasticity, red mottled brown, traces of gravel			
		D		1.0			BH09 Terminated at 1 m			
				2.0						

BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH10
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	
Borehole Diameter:	100(O.D.)	Inclination:	
		Bearing:	
		Datum:	

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL/CI	Silty CLAY, low to medium plasticity, brown	≥Wp		TOPSOIL
						CL/CI	Silty CLAY, low to medium plasticity, grey	>Wp		RESIDUAL
		D								
		D								
				1.0		CI/CH	CLAY, medium to high plasticity, grey mottled brown			
							BH10 Terminated at 1 m			
				2.0						

BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH11
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL/CI	Gravelly Silty CLAY, low to medium plasticity, grey	≤Wp		FILL
						CL/CI	Silty CLAY, low to medium plasticity, grey	>Wp		RESIDUAL
		D								
						CI/CH	CLAY, medium to high plasticity, orange-brown mottled grey, some silt	≥Wp		
		D		1.0						
				2.0			BH11 Terminated at 1 m			

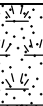
BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH12
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL/CI	Silty CLAY, low to medium plasticity, brown, traces of gravel	≥Wp		TOPSOIL
						CI/CH	Silty CLAY, medium to high plasticity, brown mottled orange			RESIDUAL
		D								
		D		1.0		CI/CH	Silty CLAY, medium to high plasticity, brown mottled orange			
							BH12 Terminated at 1 m			
				2.0						

Started:	11/09/17
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Finished:	11/09/17
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Checked:	VDS
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RL Surface:

Datum:

380REHOLE LOG LOGS.GPJ NETWORK GEOTECHNICS PTY LTD.GDT 9/25/17



Job No: G09/2571

Hole No: BH14

Sheet: PAGE 1 / 1

Client: Richard Hall

Started: 11/09/17

Project: Proposed Residential Subdivision

Finished: 11/09/17

Location: 510 Beach Road, Berry
GPS (-)

Logged: TPR

Checked: VDS

Equipment Type: Dingo drill Rig

RL Surface:

Borehole Diameter: 100(O.D.)

Inclination:

Bearing:

Datum:

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/ relative density	comments notes, structure, and additional observations	
ADT	None Encountered	D		1.0		CL/CI	Silty CLAY, low to medium plasticity, brown, traces of gravel	≥Wp		FILL	
		D									
							CI/CH	CLAY, medium to high plasticity, grey mottled orange, some silt			RESIDUAL
		D									
		D					CI/CH	CLAY, medium to high plasticity, grey, some silt		>Wp	
				2.0			BH14 Terminated at 1.5 m				

Borehole Diameter: 100(O.D.)	Inclination:	Bearing:	Datum:
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BOREHOLE LOG LOGS.GPJ NETWORK GEOTECHNICS PTY LTD.GDT 9/25/17

BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH16
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	
Borehole Diameter:	100(O.D.)	Inclination:	
		Bearing:	
		Datum:	

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL/CI	Silty CLAY, low to medium plasticity, brown	≥Wp		FILL
						CL/CI	Silty CLAY, low to medium plasticity, grey mottled orange			
		D						>Wp		RESIDUAL
						CI/CH	Silty CLAY, medium to high plasticity, grey			
		D		1.0						
		D								
				2.0			BH16 Terminated at 1.5 m			

BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH17
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	
Borehole Diameter:	100(O.D.)	Inclination:	
		Bearing:	
		Datum:	

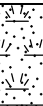
method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL/CI	Silty CLAY, low to medium plasticity, brown, traces of gravel	≥Wp		FILL
		D								
		D		1.0		CL/CI	Silty CLAY, low to medium plasticity, grey mottled orange			
						CI/CH	Silty CLAY, medium to high plasticity, grey	>Wp		RESIDUAL
		D								
				2.0			BH17 Terminated at 1.5 m			

BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH18
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	
Borehole Diameter:	100(O.D.)	Inclination:	
		Bearing:	
		Datum:	

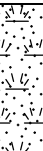
method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL	Silty CLAY, low plasticity, brown, traces of gravel	>Wp		TOPSOIL
						CI/CH	CLAY, medium to high plasticity, grey mottled orange-brown and red, some silt			RESIDUAL
		D								
		D								
				1.0			BH18 Terminated at 1 m			
				2.0						

BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH19
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	
Borehole Diameter:	100(O.D.)	Inclination:	
		Bearing:	
		Datum:	

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL	Silty CLAY, low plasticity, brown, traces of gravel	>Wp		TOPSOIL
						CI/CH	CLAY, medium to high plasticity, grey mottled orange-brown and red, some silt			RESIDUAL
		D								
							BH19 Terminated at 0.5 m			

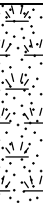
BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH20
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL	Silty CLAY, low plasticity, brown, traces of gravel	≥Wp		TOPSOIL
		D				CI/CH	CLAY, medium to high plasticity, grey mottled orange, some silt			RESIDUAL
		D		1.0			BH20 Terminated at 1 m			
				2.0						

BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH21
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	
Borehole Diameter:	100(O.D.)	Inclination:	
		Bearing:	
		Datum:	

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/ relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL	Silty CLAY, low plasticity, brown, traces of gravel	≤Wp		TOPSOIL
						CI/CH	CLAY, medium to high plasticity, grey mottled grey mottled orange, some silt			RESIDUAL
						-	SHALE, extremely weathered, orange brown	-		WEATHERED ROCK
	D						BH21 Terminated at 0.5 m			

BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH22
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	
Borehole Diameter:	100(O.D.)	Inclination:	
		Bearing:	
		Datum:	

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL	Silty CLAY, low plasticity, brown, traces of gravel	≤Wp		TOPSOIL
						CI/CH	CLAY, medium to high plasticity, grey mottled orange, some silt			RESIDUAL
		D								
							BH22 Terminated at 0.5 m			

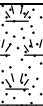
BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH23
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL	Silty CLAY, low plasticity, brown, traces of gravel	≥Wp		TOPSOIL
						CI/CH	CLAY, medium to high plasticity, grey mottled orange, some silt			RESIDUAL
		D								
							BH23 Terminated at 0.5 m			

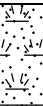
BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH24
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL	Silty CLAY, low plasticity, brown, traces of gravel	≥Wp		TOPSOIL
						CI/CH	CLAY, medium to high plasticity, grey mottled orange, some silt			RESIDUAL
		D								
							BH24 Terminated at 0.5 m			

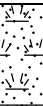
BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH25
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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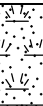
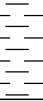
method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL	Silty CLAY, low plasticity, brown, traces of gravel	≥Wp		TOPSOIL
						CI/CH	CLAY, medium to high plasticity, grey mottled orange, some silt			RESIDUAL
		D								
							BH25 Terminated at 0.5 m			

BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH26
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	
Borehole Diameter:	100(O.D.)	Inclination:	
		Bearing:	
		Datum:	

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL	Silty CLAY, low plasticity, brown, traces of gravel	≥Wp		TOPSOIL
						CI/CH	CLAY, medium to high plasticity, grey mottled orange, some silt			RESIDUAL
		D								
						-	SHALE, extremely weathered, brown	-		WEATHERED ROCK
				1.0						
				2.0			BH26 Terminated at 1 m			

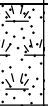
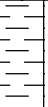
BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH27
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL	Silty CLAY, low plasticity, brown, traces of gravel	≥Wp		TOPSOIL
						-	SHALE, extremely weathered, brown	-		WEATHERED ROCK
		D								
							BH27 Terminated at 0.5 m			

BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH28
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL	Silty CLAY, low plasticity, brown, traces of gravel	≤Wp		TOPSOIL
						CI/CH	CLAY, medium to high plasticity, grey mottled orange, some silt			RESIDUAL
		D								
							BH28 Terminated at 0.5 m			

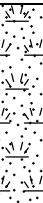
BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH29
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL	Silty CLAY, low plasticity, brown, traces of gravel	≤Wp		TOPSOIL
		D				-	SHALE, extremely weathered, brown	-		WEATHERED ROCK
							BH29 Terminated at 0.5 m			

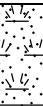
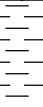
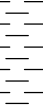
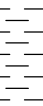
BOREHOLE LOG

ACN 069 211 561
Unit 12 7/15 Gundah Road Mt Kuring Gai
NSW 2080
02 84380300
02 84380310

Job No:	G09/2571
Hole No:	BH30
Sheet:	PAGE 1 / 1

Client:	Richard Hall	Started:	11/09/17
Project:	Proposed Residential Subdivision	Finished:	11/09/17
Location:	510 Beach Road, Berry GPS (-)	Logged:	TPR
		Checked:	VDS
Equipment Type:	Dingo drill Rig	RL Surface:	

Borehole Diameter:	100(O.D.)	Inclination:		Bearing:		Datum:	
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method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
ADT	None Encountered	D				CL	Silty CLAY, low plasticity, brown, traces of gravel	>Wp		TOPSOIL
						-	SHALE, extremely weathered, brown			
		D								
		D								
				1.0			BH30 Terminated at 1 m			
				2.0						WEATHERED ROCK

Appendix D

Summary of Laboratory Test Results

Column3			Description		
Analyte Name	Units	Trigger Value	Sample Date	DW1	DW2
			Matrix	12/9/2017	12/9/2017
			Reporting Limit	Water	Water
				Result	Result
Benzene	µg/L	950	0.5	<0.5	<0.5
Toluene	µg/L	ID	0.5	<0.5	<0.5
Ethylbenzene	µg/L	ID	0.5	<0.5	<0.5
m/p-xylene	µg/L	ID	1	<1	<1
o-xylene	µg/L	350	0.5	<0.5	<0.5
Total Xylenes	µg/L	-	1.5	<1.5	<1.5
Total BTEX	µg/L	-	3	<3	<3
Naphthalene	µg/L	16	0.5	<0.5	<0.5
TRH C6-C9	µg/L	-	40	<40	<40
Benzene (F0)	µg/L	-	0.5	<0.5	<0.5
TRH C6-C10	µg/L	-	50	<50	<50
TRH C6-C10 minus BTEX (F1)	µg/L	-	50	<50	<50
TRH C10-C14	µg/L	-	50	<50	<50
TRH C15-C28	µg/L	-	200	<200	<200
TRH C29-C36	µg/L	-	200	<200	<200
TRH C37-C40	µg/L	-	200	<200	<200
TRH >C10-C16 (F2)	µg/L	-	60	<60	<60
TRH >C16-C34 (F3)	µg/L	-	500	<500	<500
TRH >C34-C40 (F4)	µg/L	-	500	<500	<500
TRH C10-C36	µg/L	-	450	<450	<450
TRH C10-C40	µg/L	-	650	<650	<650
TRH >C10-C16 (F2) - Naphthalene	µg/L	-	60	<60	<60
Naphthalene	µg/L	16	0.1	<0.1	<0.1
2-methylnaphthalene	µg/L	-	0.1	<0.1	<0.1
1-methylnaphthalene	µg/L	-	0.1	<0.1	<0.1
Acenaphthylene	µg/L	-	0.1	<0.1	<0.1
Acenaphthene	µg/L	-	0.1	<0.1	<0.1
Fluorene	µg/L	-	0.1	<0.1	<0.1
Phenanthrene	µg/L	ID	0.1	<0.1	<0.1
Anthracene	µg/L	ID	0.1	<0.1	<0.1
Fluoranthene	µg/L	ID	0.1	<0.1	<0.1
Pyrene	µg/L	-	0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	-	0.1	<0.1	<0.1
Chrysene	µg/L	-	0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	µg/L	-	0.1	<0.1	<0.1
Benzo(k)fluoranthene	µg/L	-	0.1	<0.1	<0.1
Benzo(a)pyrene	µg/L	ID	0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	-	0.1	<0.1	<0.1
Dibenzo(ah)anthracene	µg/L	-	0.1	<0.1	<0.1
Benzo(ghi)perylene	µg/L	-	0.1	<0.1	<0.1
Total PAH (18)	µg/L	-	1	<1	<1
Hexachlorobenzene (HCB)	µg/L	-	0.1	<0.1	<0.1
Alpha BHC	µg/L	-	0.1	<0.1	<0.1
Lindane (gamma BHC)	µg/L	-	0.1	<0.1	<0.1
Heptachlor	µg/L	-	0.1	<0.1	<0.1
Aldrin	µg/L	-	0.1	<0.1	<0.1
Beta BHC	µg/L	-	0.1	<0.1	<0.1
Delta BHC	µg/L	-	0.1	<0.1	<0.1
Heptachlor epoxide	µg/L	-	0.1	<0.1	<0.1
o,p'-DDE	µg/L	-	0.1	<0.1	<0.1
Alpha Endosulfan	µg/L	-	0.1	<0.1	<0.1
Gamma Chlordane	µg/L	-	0.1	<0.1	<0.1
Alpha Chlordane	µg/L	-	0.1	<0.1	<0.1
trans-Nonachlor	µg/L	-	0.1	<0.1	<0.1
p,p'-DDE	µg/L	-	0.1	<0.1	<0.1
Dieldrin	µg/L	-	0.1	<0.1	<0.1
Endrin	µg/L	-	0.1	<0.1	<0.1
o,p'-DDD	µg/L	-	0.1	<0.1	<0.1
o,p'-DDT	µg/L	-	0.1	<0.1	<0.1
Beta Endosulfan	µg/L	-	0.1	<0.1	<0.1
p,p'-DDD	µg/L	-	0.1	<0.1	<0.1
p,p'-DDT	µg/L	-	0.1	<0.1	<0.1
Endosulfan sulphate	µg/L	-	0.1	<0.1	<0.1
Endrin aldehyde	µg/L	-	0.1	<0.1	<0.1
Methoxychlor	µg/L	-	0.1	<0.1	<0.1
Endrin ketone	µg/L	-	0.1	<0.1	<0.1
Isodrin	µg/L	-	0.1	<0.1	<0.1
Mirex	µg/L	-	0.1	<0.1	<0.1
Dichlorvos	µg/L	-	0.5	<0.5	<0.5
Dimethoate	µg/L	-	0.5	<0.5	<0.5
Diazinon (Dimpylate)	µg/L	-	0.5	<0.5	<0.5
Fenitrothion	µg/L	-	0.2	<0.2	<0.2
Malathion	µg/L	-	0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	-	0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	µg/L	-	0.2	<0.2	<0.2
Bromophos Ethyl	µg/L	-	0.2	<0.2	<0.2
Methidathion	µg/L	-	0.5	<0.5	<0.5
Ethion	µg/L	-	0.2	<0.2	<0.2
Azinphos-methyl	µg/L	-	0.2	<0.2	<0.2
Arsenic, As	µg/L	13	1	1	1
Cadmium, Cd	µg/L	0.3	0.1	<0.1	<0.1
Chromium, Cr	µg/L	ID	1	1	<1
Copper, Cu	µg/L	1.9	1	3	3
Lead, Pb	µg/L	5.2	1	<1	<1
Nickel, Ni	µg/L	14.6	1	1	1
Zinc, Zn	µg/L	10.6	5	<5	<5
Mercury	mg/L	-	0.0001	<0.0001	<0.0001

Appendix E

Laboratory Analytical Report, Chain of Custody and Sample Receipt Documents

CLIENT DETAILS

Contact **Thalia Park-Ross**
 Client **NETWORK GEOTECHNICS PTY LTD**
 Address **31 Anvil Rd
 Seven Hills
 NSW 2147**

Telephone **02 8438 0312 / 0411 112 824**
 Facsimile **02 8438 0310**
 Email **tparkross@netgeo.com.au**

Project **G09/2571**
 Order Number **G09/2571**
 Samples **2**

LABORATORY DETAILS

Manager **Adam Atkinson**
 Laboratory **SGS Melbourne EH&S**
 Address **10/585 Blackburn Road
 Notting Hill Victoria 3168**

Telephone **+61395743200**
 Facsimile **+61395743399**
 Email **Au.SampleReceipt.Melbourne@sgs.com**

SGS Reference **ME304135 R0**
 Date Received **15 Sep 2017**
 Date Reported **20 Sep 2017**

COMMENTS

Accredited for compliance with ISO/IEC 17025- Testing. NATA accredited laboratory 2562(14420).

SIGNATORIES



Chris Thurm
Chemist



Weiming Dai
Inorganic Supervisor

	Sample Number	ME304135.001	ME304135.002
	Sample Matrix	Soil	Soil
	Sample Date	12 Sep 2017	12 Sep 2017
	Sample Name	BH220 0.9 - 1.0	BH230 0.9 - 1.0
Parameter	Units	LOR	

Moisture Content Method: AN002 Tested: 18/9/2017

% Moisture*	%w/w	1	24.6	10.6
-------------	------	---	------	------

Metals in Solids Method: MA1400_1 Tested: 18/9/2017

Arsenic	mg/kg	2	<2	3
Cadmium	mg/kg	0.2	<0.2	<0.2
Chromium	mg/kg	2	6	11
Copper	mg/kg	2	3	16
Lead	mg/kg	2	7	8
Mercury	mg/kg	0.05	<0.05	<0.05
Nickel	mg/kg	2	<2	4
Zinc	mg/kg	2	2	26

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Metals in Solids Method: MA1400_1

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery	MSD %RPD
Arsenic	LB015702	mg/kg	2	<2	0%	107%	NA	NA
Cadmium	LB015702	mg/kg	0.2	<0.2	0%	107%	NA	NA
Chromium	LB015702	mg/kg	2	<2	0%	110%	NA	NA
Copper	LB015702	mg/kg	2	<2	0%	109%	NA	NA
Lead	LB015702	mg/kg	2	<2	2%	100%	NA	NA
Mercury	LB015702	mg/kg	0.05	<0.05	0%	100%	NA	NA
Nickel	LB015702	mg/kg	2	<2	0%	110%	NA	NA
Zinc	LB015702	mg/kg	2	<2	0%	100%	NA	NA

Moisture Content Method: ME-(AU)-(ENV)AN002

Parameter	QC Reference	Units	LOR	DUP %RPD
% Moisture*	LB015703	%w/w	1	6%

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.

MA1400_1

A weighed portion of as received sample is extracted in concentrated acid using microwave heating by the Microwave Digestion system. The sample and acid are placed in a microwave vessel (TFM), which is then capped and heated in the microwave unit. After cooling, the vessel contents are diluted with DI water, then filtered, centrifuged, or allowed to settle and analysed by ICP-MS.

FOOTNOTES

IS Insufficient sample for analysis.
LNR Sample listed, but not received.
* NATA accreditation does not cover the performance of this service.
** Indicative data, theoretical holding time exceeded.

LOR Limit of Reporting
↑↓ Raised or Lowered Limit of Reporting
QFH QC result is above the upper tolerance
QFL QC result is below the lower tolerance
- The sample was not analysed for this analyte
NVL Not Validated

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>

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client only. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law .

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		CHAIN OF CUSTODY & ANALYSIS REQUEST												Page <u>1</u> of <u>1</u>	
SGS Environmental Services Unit 16, 33 Maddox Street Alexandria NSW 2015 Telephone No: (02) 85940400 Facsimile No: (02) 85940499 Email: au.samplerreceipt.sydney@sgs.com		Company Name: Network Geotechnics Pty Ltd				Project Name/No: G09/2571									
		Address: Unit 12/9-15 Gundah Road, Mt Kuring-Gai				Purchase Order No:									
		NSW 2080				Results Required By: 21/9/17									
		Contact Name: Thalia				Telephone: 8438 0300									
						Facsimile: 8438 0310									
		Email Results: engineering@netgeo.com.au													

Client Sample ID	Date Sampled	Lab Sample ID	WATER	SOIL	PRESERVATIVE	NO OF CONTAINERS	8 Heavy Metals	TRH/BTEX/PAH	Total Phenols	PCB	OC/OP Pesticides	Ammonia/Nitrate	E Coli/T Coli/F Coli	Asbestos ID	CEC/pH	EC/pH	Chloride/Sulphate						
BH220 0.9-1.0	12/9/17			X		1	X																
BH230 0.9-1.0	12/9/17			X		1	X																

SGS Melbourne EHS

ME304135 COC
 Received: 15 – Sep – 2017

Relinquished By: Thalia		Date/Time: 13/9/17		Received By: <i>ALBERT MARCELLETTI</i>		Date/Time: <i>Fri 15/9/17, 11:00am</i>	
Relinquished By:		Date/Time:		Received By:		Date/Time:	
Samples Intact: Yes/ No		Temperature: Ambient / Chilled		Sample Cooler Sealed: Yes/ No		Laboratory Quotation No:	
		Comments:					



SAMPLE RECEIPT ADVICE

ME304135

CLIENT DETAILS

Contact Thalia Park-Ross
Client NETWORK GEOTECHNICS PTY LTD
Address 31 Anvil Rd
Seven Hills
NSW 2147

Telephone 02 8438 0312 / 0411 112 824
Facsimile 02 8438 0310
Email tparkross@netgeo.com.au

Project **G09/2571**
Order Number **G09/2571**
Samples 2

LABORATORY DETAILS

Manager Adam Atkinson
Laboratory SGS Melbourne EH&S
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Samples Received Fri 15/9/2017
Report Due Thu 21/9/2017
SGS Reference **ME304135**

SUBMISSION DETAILS

This is to confirm that 2 samples were received on Friday 15/9/2017. Results are expected to be ready by COB Thursday 21/9/2017. Please quote SGS reference ME304135 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	2
Date documentation received	15/9/2017	Type of documentation received	COC
Number of eskies/boxes received		Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	19C
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

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.



SAMPLE RECEIPT ADVICE

ME304135

CLIENT DETAILS

Client **NETWORK GEOTECHNICS PTY LTD**

Project **G09/2571**

SUMMARY OF ANALYSIS

No.	Sample ID	Metals in Solids	Moisture Content
001	BH220 0.9 - 1.0	8	1
002	BH230 0.9 - 1.0	8	1

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: Thalia Park-Ross
 Client: NETWORK GEOTECHNICS PTY LTD
 Address: 31 Anvil Rd
 Seven Hills
 NSW 2147

Telephone: 02 8438 0312 / 0411 112 824
 Facsimile: 02 8438 0310
 Email: tparkross@netgeo.com.au

Project: **G09-2571**
 Order Number: (Not specified)
 Samples: 33

LABORATORY DETAILS

Manager: Huong Crawford
 Laboratory Address: SGS Alexandria Environmental
 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: **SE170266 R0**
 Date Received: 14/9/2017
 Date Reported: 21/9/2017

COMMENTS

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

A portion of the sample supplied has been sub-sampled for asbestos due to large sample volume according to SGS In-house procedures. We therefore cannot guarantee that the sub-sample is representative of the entire sample supplied. SGS Environment, Health and Safety recommends supplying approximately 50-100g of sample in a separate container.

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

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

SIGNATORIES



Akheeque Beniamine
 Chemist



Bennet Lo
 Senior Organic Chemist/Metals Chemist



Dong Liang
 Metals/Inorganics Team Leader



Kamrul Ahsan
 Senior Chemist



Ly Kim Ha
 Organic Section Head



Ravee Sivasubramaniam
 Hygiene Team Leader

VOC's in Soil [AN433] Tested: 18/9/2017

PARAMETER	UOM	LOR	BH2 0-0.1	BH5 0-0.1	BH5 0.9-1.0	BH5 1.4-1.5	BH6 0.4-0.5
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/9/2017 SE170266.002	11/9/2017 SE170266.005	11/9/2017 SE170266.006	11/9/2017 SE170266.007	11/9/2017 SE170266.008
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	BH6 1.4-1.5	BH7 0-0.1	BH7 0.9-1.0	BH8 0-0.1	BH9 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/9/2017 SE170266.009	11/9/2017 SE170266.010	11/9/2017 SE170266.011	11/9/2017 SE170266.012	11/9/2017 SE170266.013
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	BH10 0-0.1	BH11 0-0.1	BH13 0-0.1	BH14 0.4-0.5	BH16 0.4-0.5
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/9/2017 SE170266.014	11/9/2017 SE170266.015	11/9/2017 SE170266.016	12/9/2017 SE170266.017	12/9/2017 SE170266.019
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	BH20 0.9-1.0	BH30 0.9-1.0	BH130 0.9-1.0	BH120 0.9-1.0	Trip Spike
			SOIL	SOIL	SOIL	SOIL	SOIL
			12/9/2017 SE170266.022	12/9/2017 SE170266.027	12/9/2017 SE170266.028	12/9/2017 SE170266.029	12/9/2017 SE170266.032
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	[85%]
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	[89%]
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	[84%]
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	[84%]
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	[86%]
Total Xylenes	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	-
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	-
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	-



ANALYTICAL RESULTS

SE170266 R0

VOC's in Soil [AN433] Tested: 18/9/2017 (continued)

			Trip Blank
			SOIL
			-
			12/9/2017
			SE170266.033
PARAMETER	UOM	LOR	
Benzene	mg/kg	0.1	<0.1
Toluene	mg/kg	0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2
o-xylene	mg/kg	0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 18/9/2017

PARAMETER	UOM	LOR	BH2 0-0.1	BH5 0-0.1	BH5 0.9-1.0	BH5 1.4-1.5	BH6 0.4-0.5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/9/2017 SE170266.002	11/9/2017 SE170266.005	11/9/2017 SE170266.006	11/9/2017 SE170266.007	11/9/2017 SE170266.008
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	BH6 1.4-1.5	BH7 0-0.1	BH7 0.9-1.0	BH8 0-0.1	BH9 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/9/2017 SE170266.009	11/9/2017 SE170266.010	11/9/2017 SE170266.011	11/9/2017 SE170266.012	11/9/2017 SE170266.013
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
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	BH10 0-0.1	BH11 0-0.1	BH13 0-0.1	BH14 0.4-0.5	BH16 0.4-0.5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/9/2017 SE170266.014	11/9/2017 SE170266.015	11/9/2017 SE170266.016	12/9/2017 SE170266.017	12/9/2017 SE170266.019
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
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	BH20 0.9-1.0	BH30 0.9-1.0	BH130 0.9-1.0	BH120 0.9-1.0
			SOIL	SOIL	SOIL	SOIL
			-	-	-	-
			12/9/2017 SE170266.022	12/9/2017 SE170266.027	12/9/2017 SE170266.028	12/9/2017 SE170266.029
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C9	mg/kg	20	<20	<20	<20	<20
TRH C6-C10	mg/kg	25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 18/9/2017

PARAMETER	UOM	LOR	BH2 0-0.1	BH5 0-0.1	BH5 0.9-1.0	BH5 1.4-1.5	BH6 0.4-0.5
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/9/2017 SE170266.002	11/9/2017 SE170266.005	11/9/2017 SE170266.006	11/9/2017 SE170266.007	11/9/2017 SE170266.008
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH C10-C40 Total	mg/kg	210	<210	<210	<210	<210	<210

PARAMETER	UOM	LOR	BH6 1.4-1.5	BH7 0-0.1	BH7 0.9-1.0	BH8 0-0.1	BH9 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/9/2017 SE170266.009	11/9/2017 SE170266.010	11/9/2017 SE170266.011	11/9/2017 SE170266.012	11/9/2017 SE170266.013
TRH C10-C14	mg/kg	20	<20	22	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	340	590	<45	<45
TRH C29-C36	mg/kg	45	<45	650	1500	<45	<45
TRH C37-C40	mg/kg	100	<100	110	320	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	<25	25	<25	<25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	770	1600	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	320	790	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	1000	2100	<110	<110
TRH C10-C40 Total	mg/kg	210	<210	1100	2400	<210	<210

PARAMETER	UOM	LOR	BH10 0-0.1	BH11 0-0.1	BH13 0-0.1	BH14 0.4-0.5	BH16 0.4-0.5
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/9/2017 SE170266.014	11/9/2017 SE170266.015	11/9/2017 SE170266.016	12/9/2017 SE170266.017	12/9/2017 SE170266.019
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH C10-C40 Total	mg/kg	210	<210	<210	<210	<210	<210



ANALYTICAL RESULTS

SE170266 R0

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 18/9/2017 (continued)

PARAMETER	UOM	LOR	BH20 0.9-1.0	BH30 0.9-1.0	BH130 0.9-1.0	BH120 0.9-1.0
			SOIL - 12/9/2017 SE170266.022	SOIL - 12/9/2017 SE170266.027	SOIL - 12/9/2017 SE170266.028	SOIL - 12/9/2017 SE170266.029
TRH C10-C14	mg/kg	20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	<25	<25	<25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110
TRH C10-C40 Total	mg/kg	210	<210	<210	<210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 18/9/2017

PARAMETER	UOM	LOR	BH2 0-0.1	BH5 0-0.1	BH5 0.9-1.0	BH5 1.4-1.5	BH6 0.4-0.5
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/9/2017 SE170266.002	11/9/2017 SE170266.005	11/9/2017 SE170266.006	11/9/2017 SE170266.007	11/9/2017 SE170266.008
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

PARAMETER	UOM	LOR	BH6 1.4-1.5	BH7 0-0.1	BH7 0.9-1.0	BH8 0-0.1	BH9 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/9/2017 SE170266.009	11/9/2017 SE170266.010	11/9/2017 SE170266.011	11/9/2017 SE170266.012	11/9/2017 SE170266.013
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 18/9/2017 (continued)

PARAMETER	UOM	LOR	BH10 0-0.1	BH11 0-0.1	BH13 0-0.1	BH14 0.4-0.5	BH16 0.4-0.5
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/9/2017 SE170266.014	11/9/2017 SE170266.015	11/9/2017 SE170266.016	12/9/2017 SE170266.017	12/9/2017 SE170266.019
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

PARAMETER	UOM	LOR	BH20 0.9-1.0	BH30 0.9-1.0	BH130 0.9-1.0	BH120 0.9-1.0
			SOIL	SOIL	SOIL	SOIL
			12/9/2017 SE170266.022	12/9/2017 SE170266.027	12/9/2017 SE170266.028	12/9/2017 SE170266.029
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8

OC Pesticides in Soil [AN420] Tested: 18/9/2017

PARAMETER	UOM	LOR	BH2 0-0.1	BH8 0-0.1	BH9 0-0.1	BH11 0-0.1	BH15 0-0.1
			SOIL - 11/9/2017 SE170266.002	SOIL - 11/9/2017 SE170266.012	SOIL - 11/9/2017 SE170266.013	SOIL - 11/9/2017 SE170266.015	SOIL - 12/9/2017 SE170266.018
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: 18/9/2017 (continued)

PARAMETER	UOM	LOR	BH17 0.4-0.5	BH19 0-0.1	BH25 0.4-0.5	BH29 0-0.1
			SOIL - 12/9/2017 SE170266.020	SOIL - 12/9/2017 SE170266.021	SOIL - 12/9/2017 SE170266.024	SOIL - 12/9/2017 SE170266.026
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

OP Pesticides in Soil [AN420] Tested: 18/9/2017

PARAMETER	UOM	LOR	BH2 0-0.1	BH8 0-0.1	BH9 0-0.1	BH11 0-0.1	BH15 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/9/2017 SE170266.002	11/9/2017 SE170266.012	11/9/2017 SE170266.013	11/9/2017 SE170266.015	12/9/2017 SE170266.018
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7	<1.7

PARAMETER	UOM	LOR	BH17 0.4-0.5	BH19 0-0.1	BH25 0.4-0.5	BH29 0-0.1
			SOIL	SOIL	SOIL	SOIL
			12/9/2017 SE170266.020	12/9/2017 SE170266.021	12/9/2017 SE170266.024	12/9/2017 SE170266.026
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7

Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 20/9/2017

PARAMETER	UOM	LOR	BH1 0-0.1	BH2 0-0.1	BH3 0-0.1	BH4 0-0.1	BH5 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/9/2017 SE170266.001	11/9/2017 SE170266.002	11/9/2017 SE170266.003	11/9/2017 SE170266.004	11/9/2017 SE170266.005
Arsenic, As	mg/kg	1	4	3	3	<1	<1
Cadmium, Cd	mg/kg	0.3	0.4	0.5	0.4	<0.3	0.3
Chromium, Cr	mg/kg	0.5	12	18	16	10	15
Copper, Cu	mg/kg	0.5	34	14	32	6.0	5.7
Lead, Pb	mg/kg	1	10	10	11	21	10
Nickel, Ni	mg/kg	0.5	4.9	4.0	7.5	1.8	2.0
Zinc, Zn	mg/kg	2	33	18	52	27	17

PARAMETER	UOM	LOR	BH5 0.9-1.0	BH5 1.4-1.5	BH6 0.4-0.5	BH6 1.4-1.5	BH7 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/9/2017 SE170266.006	11/9/2017 SE170266.007	11/9/2017 SE170266.008	11/9/2017 SE170266.009	11/9/2017 SE170266.010
Arsenic, As	mg/kg	1	2	2	2	2	<1
Cadmium, Cd	mg/kg	0.3	0.6	0.8	0.6	0.8	0.3
Chromium, Cr	mg/kg	0.5	35	35	33	34	10
Copper, Cu	mg/kg	0.5	11	11	14	13	7.3
Lead, Pb	mg/kg	1	15	14	15	15	31
Nickel, Ni	mg/kg	0.5	2.5	1.6	2.5	1.6	2.3
Zinc, Zn	mg/kg	2	23	15	27	18	320

PARAMETER	UOM	LOR	BH7 0.9-1.0	BH8 0-0.1	BH9 0-0.1	BH11 0-0.1	BH13 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			11/9/2017 SE170266.011	11/9/2017 SE170266.012	11/9/2017 SE170266.013	11/9/2017 SE170266.015	11/9/2017 SE170266.016
Arsenic, As	mg/kg	1	2	2	3	1	3
Cadmium, Cd	mg/kg	0.3	0.6	0.6	0.5	0.4	1.1
Chromium, Cr	mg/kg	0.5	34	25	21	17	16
Copper, Cu	mg/kg	0.5	9.8	14	4.8	30	49
Lead, Pb	mg/kg	1	16	37	14	14	330
Nickel, Ni	mg/kg	0.5	2.6	2.5	2.5	7.8	9.5
Zinc, Zn	mg/kg	2	67	85	14	110	280

PARAMETER	UOM	LOR	BH14 0.4-0.5	BH15 0-0.1	BH16 0.4-0.5	BH17 0.4-0.5	BH19 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			12/9/2017 SE170266.017	12/9/2017 SE170266.018	12/9/2017 SE170266.019	12/9/2017 SE170266.020	12/9/2017 SE170266.021
Arsenic, As	mg/kg	1	<1	<1	<1	<1	<1
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.5	11	10	11	4.4	3.5
Copper, Cu	mg/kg	0.5	3.0	5.7	8.0	3.0	1.9
Lead, Pb	mg/kg	1	8	10	10	5	3
Nickel, Ni	mg/kg	0.5	1.4	1.7	2.3	1.2	0.6
Zinc, Zn	mg/kg	2	7	12	13	5	3

Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 20/9/2017 (continued)

PARAMETER	UOM	LOR	BH20 0.9-1.0	BH22 0-0.1	BH25 0.4-0.5	BH27 0-0.1	BH29 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			- 12/9/2017 SE170266.022	- 12/9/2017 SE170266.023	- 12/9/2017 SE170266.024	- 12/9/2017 SE170266.025	- 12/9/2017 SE170266.026
Arsenic, As	mg/kg	1	3	6	1	5	2
Cadmium, Cd	mg/kg	0.3	0.9	0.9	0.5	0.7	0.6
Chromium, Cr	mg/kg	0.5	25	12	14	14	16
Copper, Cu	mg/kg	0.5	12	5.0	6.3	15	8.1
Lead, Pb	mg/kg	1	16	15	9	11	10
Nickel, Ni	mg/kg	0.5	2.8	1.8	1.5	6.1	6.5
Zinc, Zn	mg/kg	2	17	12	8	39	23

PARAMETER	UOM	LOR	BH30 0.9-1.0	BH130 0.9-1.0	BH120 0.9-1.0
			SOIL	SOIL	SOIL
			- 12/9/2017 SE170266.027	- 12/9/2017 SE170266.028	- 12/9/2017 SE170266.029
Arsenic, As	mg/kg	1	2	2	2
Cadmium, Cd	mg/kg	0.3	0.4	0.5	0.9
Chromium, Cr	mg/kg	0.5	21	21	21
Copper, Cu	mg/kg	0.5	26	25	11
Lead, Pb	mg/kg	1	10	10	12
Nickel, Ni	mg/kg	0.5	8.6	8.1	2.4
Zinc, Zn	mg/kg	2	50	49	15

Mercury in Soil [AN312] Tested: 20/9/2017

			BH1 0-0.1	BH2 0-0.1	BH3 0-0.1	BH4 0-0.1	BH5 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017
PARAMETER	UOM	LOR	SE170266.001	SE170266.002	SE170266.003	SE170266.004	SE170266.005
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

			BH5 0.9-1.0	BH5 1.4-1.5	BH6 0.4-0.5	BH6 1.4-1.5	BH7 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017
PARAMETER	UOM	LOR	SE170266.006	SE170266.007	SE170266.008	SE170266.009	SE170266.010
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

			BH7 0.9-1.0	BH8 0-0.1	BH9 0-0.1	BH11 0-0.1	BH13 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017
PARAMETER	UOM	LOR	SE170266.011	SE170266.012	SE170266.013	SE170266.015	SE170266.016
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

			BH14 0.4-0.5	BH15 0-0.1	BH16 0.4-0.5	BH17 0.4-0.5	BH19 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			12/9/2017	12/9/2017	12/9/2017	12/9/2017	12/9/2017
PARAMETER	UOM	LOR	SE170266.017	SE170266.018	SE170266.019	SE170266.020	SE170266.021
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

			BH20 0.9-1.0	BH22 0-0.1	BH25 0.4-0.5	BH27 0-0.1	BH29 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			12/9/2017	12/9/2017	12/9/2017	12/9/2017	12/9/2017
PARAMETER	UOM	LOR	SE170266.022	SE170266.023	SE170266.024	SE170266.025	SE170266.026
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

			BH30 0.9-1.0	BH130 0.9-1.0	BH120 0.9-1.0
			SOIL	SOIL	SOIL
			-	-	-
			12/9/2017	12/9/2017	12/9/2017
PARAMETER	UOM	LOR	SE170266.027	SE170266.028	SE170266.029
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05

Moisture Content [AN002] Tested: 19/9/2017

			BH1 0-0.1	BH2 0-0.1	BH3 0-0.1	BH4 0-0.1	BH5 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017
PARAMETER	UOM	LOR	SE170266.001	SE170266.002	SE170266.003	SE170266.004	SE170266.005
% Moisture	%w/w	0.5	9.5	11	9.5	12	11

			BH5 0.9-1.0	BH5 1.4-1.5	BH6 0.4-0.5	BH6 1.4-1.5	BH7 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017
PARAMETER	UOM	LOR	SE170266.006	SE170266.007	SE170266.008	SE170266.009	SE170266.010
% Moisture	%w/w	0.5	21	19	22	19	7.9

			BH7 0.9-1.0	BH8 0-0.1	BH9 0-0.1	BH10 0-0.1	BH11 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017
PARAMETER	UOM	LOR	SE170266.011	SE170266.012	SE170266.013	SE170266.014	SE170266.015
% Moisture	%w/w	0.5	21	19	10	20	19

			BH13 0-0.1	BH14 0.4-0.5	BH15 0-0.1	BH16 0.4-0.5	BH17 0.4-0.5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/9/2017	12/9/2017	12/9/2017	12/9/2017	12/9/2017
PARAMETER	UOM	LOR	SE170266.016	SE170266.017	SE170266.018	SE170266.019	SE170266.020
% Moisture	%w/w	0.5	19	15	19	17	11

			BH19 0-0.1	BH20 0.9-1.0	BH22 0-0.1	BH25 0.4-0.5	BH27 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			12/9/2017	12/9/2017	12/9/2017	12/9/2017	12/9/2017
PARAMETER	UOM	LOR	SE170266.021	SE170266.022	SE170266.023	SE170266.024	SE170266.025
% Moisture	%w/w	0.5	13	25	20	17	31

			BH29 0-0.1	BH30 0.9-1.0	BH130 0.9-1.0	BH120 0.9-1.0	Trip Blank
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			12/9/2017	12/9/2017	12/9/2017	12/9/2017	12/9/2017
PARAMETER	UOM	LOR	SE170266.026	SE170266.027	SE170266.028	SE170266.029	SE170266.033
% Moisture	%w/w	0.5	13	10	11	24	<0.5



ANALYTICAL RESULTS

SE170266 R0

Fibre Identification in soil [AN602] Tested: 20/9/2017

			BH1 0-0.1	BH3 0-0.1	BH13 0-0.1	BH14 0.4-0.5	BH15 0-0.1
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			11/9/2017	11/9/2017	11/9/2017	12/9/2017	12/9/2017
			SE170266.001	SE170266.003	SE170266.016	SE170266.017	SE170266.018
PARAMETER	UOM	LOR					
Asbestos Detected	No unit	-	No	No	No	No	No
Estimated Fibres*	%w/w	0.01	<0.01	<0.01	<0.01	<0.01	<0.01

			BH16 0.4-0.5	BH17 0.4-0.5
			SOIL	SOIL
			-	-
			12/9/2017	12/9/2017
			SE170266.019	SE170266.020
PARAMETER	UOM	LOR		
Asbestos Detected	No unit	-	No	No
Estimated Fibres*	%w/w	0.01	<0.01	<0.01

VOCs in Water [AN433] Tested: 15/9/2017

			DW1	DW2
			WATER	WATER
			-	-
			12/9/2017	12/9/2017
			SE170266.030	SE170266.031
PARAMETER	UOM	LOR		
Benzene	µg/L	0.5	<0.5	<0.5
Toluene	µg/L	0.5	<0.5	<0.5
Ethylbenzene	µg/L	0.5	<0.5	<0.5
m/p-xylene	µg/L	1	<1	<1
o-xylene	µg/L	0.5	<0.5	<0.5
Total Xylenes	µg/L	1.5	<1.5	<1.5
Total BTEX	µg/L	3	<3	<3
Naphthalene	µg/L	0.5	<0.5	<0.5



ANALYTICAL RESULTS

SE170266 R0

Volatile Petroleum Hydrocarbons in Water [AN433] Tested: 15/9/2017

			DW1	DW2
			WATER	WATER
			-	-
			12/9/2017	12/9/2017
			SE170266.030	SE170266.031
PARAMETER	UOM	LOR		
TRH C6-C9	µg/L	40	<40	<40
Benzene (F0)	µg/L	0.5	<0.5	<0.5
TRH C6-C10	µg/L	50	<50	<50
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50



ANALYTICAL RESULTS

SE170266 R0

TRH (Total Recoverable Hydrocarbons) in Water [AN403] Tested: 18/9/2017

			DW1	DW2
			WATER	WATER
			-	-
			12/9/2017	12/9/2017
PARAMETER	UOM	LOR	SE170266.030	SE170266.031
TRH C10-C14	µg/L	50	<50	<50
TRH C15-C28	µg/L	200	<200	<200
TRH C29-C36	µg/L	200	<200	<200
TRH C37-C40	µg/L	200	<200	<200
TRH >C10-C16 (F2)	µg/L	60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500
TRH C10-C36	µg/L	450	<450	<450
TRH C10-C40	µg/L	650	<650	<650
TRH >C10-C16 (F2) - Naphthalene	µg/L	60	<60	<60

PAH (Polynuclear Aromatic Hydrocarbons) in Water [AN420] Tested: 18/9/2017

PARAMETER	UOM	LOR	DW1	DW2
			WATER - 12/9/2017 SE170266.030	WATER - 12/9/2017 SE170266.031
Naphthalene	µg/L	0.1	<0.1	<0.1
2-methylnaphthalene	µg/L	0.1	<0.1	<0.1
1-methylnaphthalene	µg/L	0.1	<0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1	<0.1
Fluorene	µg/L	0.1	<0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1	<0.1
Anthracene	µg/L	0.1	<0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1	<0.1
Pyrene	µg/L	0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1	<0.1
Chrysene	µg/L	0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	µg/L	0.1	<0.1	<0.1
Benzo(k)fluoranthene	µg/L	0.1	<0.1	<0.1
Benzo(a)pyrene	µg/L	0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1	<0.1
Dibenzo(ah)anthracene	µg/L	0.1	<0.1	<0.1
Benzo(ghi)perylene	µg/L	0.1	<0.1	<0.1
Total PAH (18)	µg/L	1	<1	<1

OC Pesticides in Water [AN420] Tested: 18/9/2017

PARAMETER	UOM	LOR	DW1	DW2
			WATER - 12/9/2017 SE170266.030	WATER - 12/9/2017 SE170266.031
Hexachlorobenzene (HCB)	µg/L	0.1	<0.1	<0.1
Alpha BHC	µg/L	0.1	<0.1	<0.1
Lindane (gamma BHC)	µg/L	0.1	<0.1	<0.1
Heptachlor	µg/L	0.1	<0.1	<0.1
Aldrin	µg/L	0.1	<0.1	<0.1
Beta BHC	µg/L	0.1	<0.1	<0.1
Delta BHC	µg/L	0.1	<0.1	<0.1
Heptachlor epoxide	µg/L	0.1	<0.1	<0.1
o,p'-DDE	µg/L	0.1	<0.1	<0.1
Alpha Endosulfan	µg/L	0.1	<0.1	<0.1
Gamma Chlordane	µg/L	0.1	<0.1	<0.1
Alpha Chlordane	µg/L	0.1	<0.1	<0.1
trans-Nonachlor	µg/L	0.1	<0.1	<0.1
p,p'-DDE	µg/L	0.1	<0.1	<0.1
Dieldrin	µg/L	0.1	<0.1	<0.1
Endrin	µg/L	0.1	<0.1	<0.1
o,p'-DDD	µg/L	0.1	<0.1	<0.1
o,p'-DDT	µg/L	0.1	<0.1	<0.1
Beta Endosulfan	µg/L	0.1	<0.1	<0.1
p,p'-DDD	µg/L	0.1	<0.1	<0.1
p,p'-DDT	µg/L	0.1	<0.1	<0.1
Endosulfan sulphate	µg/L	0.1	<0.1	<0.1
Endrin aldehyde	µg/L	0.1	<0.1	<0.1
Methoxychlor	µg/L	0.1	<0.1	<0.1
Endrin ketone	µg/L	0.1	<0.1	<0.1
Isodrin	µg/L	0.1	<0.1	<0.1
Mirex	µg/L	0.1	<0.1	<0.1

OP Pesticides in Water [AN420] Tested: 18/9/2017

PARAMETER	UOM	LOR	DW1	DW2
			WATER - 12/9/2017 SE170266.030	WATER - 12/9/2017 SE170266.031
Dichlorvos	µg/L	0.5	<0.5	<0.5
Dimethoate	µg/L	0.5	<0.5	<0.5
Diazinon (Dimpylate)	µg/L	0.5	<0.5	<0.5
Fenitrothion	µg/L	0.2	<0.2	<0.2
Malathion	µg/L	0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	µg/L	0.2	<0.2	<0.2
Bromophos Ethyl	µg/L	0.2	<0.2	<0.2
Methidathion	µg/L	0.5	<0.5	<0.5
Ethion	µg/L	0.2	<0.2	<0.2
Azinphos-methyl	µg/L	0.2	<0.2	<0.2



ANALYTICAL RESULTS

SE170266 R0

pH in water [AN101] Tested: 15/9/2017

			DW1	DW2
			WATER	WATER
			-	-
			12/9/2017	12/9/2017
			SE170266.030	SE170266.031
PARAMETER	UOM	LOR		
pH**	No unit	-	6.0	6.0



ANALYTICAL RESULTS

SE170266 R0

Conductivity and TDS by Calculation - Water [AN106] Tested: 15/9/2017

			DW1	DW2
			WATER	WATER
			-	-
			12/9/2017	12/9/2017
			SE170266.030	SE170266.031
PARAMETER	UOM	LOR		
Conductivity @ 25 C	µS/cm	2	290	300



ANALYTICAL RESULTS

SE170266 R0

Metals in Water (Dissolved) by ICPOES [AN320] Tested: 19/9/2017

			DW1	DW2
			WATER	WATER
			-	-
			12/9/2017	12/9/2017
			SE170266.030	SE170266.031
PARAMETER	UOM	LOR		
Total Hardness by Calculation	mg CaCO3/L	5	37	46



ANALYTICAL RESULTS

SE170266 R0

Trace Metals (Dissolved) in Water by ICPMS [AN318] Tested: 20/9/2017

			DW1	DW2
			WATER	WATER
			-	-
			12/9/2017	12/9/2017
			SE170266.030	SE170266.031
PARAMETER	UOM	LOR		
Arsenic, As	µg/L	1	1	1
Cadmium, Cd	µg/L	0.1	<0.1	<0.1
Chromium, Cr	µg/L	1	1	<1
Copper, Cu	µg/L	1	3	3
Lead, Pb	µg/L	1	<1	<1
Nickel, Ni	µg/L	1	1	1
Zinc, Zn	µg/L	5	<5	<5



ANALYTICAL RESULTS

SE170266 R0

Mercury (dissolved) in Water [AN311(Perth)/AN312] Tested: 21/9/2017

			DW1	DW2
			WATER	WATER
			-	-
			12/9/2017	12/9/2017
			SE170266.030	SE170266.031
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 (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
- AN106** Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
- 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
- AN318** Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
- 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 Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
- AN403** The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
- AN420** (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-

- (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.

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:

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

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

The QC 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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14/9/17 @ 12:45

		CHAIN OF CUSTODY & ANALYSIS REQUEST															Page <u>1</u> of <u>11</u>								
SGS Environmental Services Unit 16, 33 Maddox Street Alexandria NSW 2015 Telephone No: (02) 85940400 Facsimile No: (02) 85940499 Email: au.samplerreceipt.sydney@sgs.com		Company Name: Network Geotechnics Pty Ltd					Project Name/No: G09/2571																		
		Address: Unit 12/9-15 Gundah Road, Mt Kuring-Gai					Purchase Order No:																		
		NSW 2080					Results Required By: 21/9/17																		
		Contact Name: Thalia					Telephone: 8438 0300																		
							Facsimile: 8438 0310																		
		Email Results: engineering@netgeo.com.au;																							
Client Sample ID	Date Sampled	Lab Sample ID	WATER	SOIL	PRESERVATIVE	NO OF CONTAINERS	8 Heavy Metals	TRH/BTEX/PAH	Total Phenols	PCB	OC/OP Pesticides	Ammonia/Nitrate	E Coli/T Coli/F Coli	Asbestos ID	CEC/pH	EC/pH	Chloride/Sulphate								
BH1 0-0.1	11/9/17	1		X		1	X							X											
BH1 0.4-0.5	11/9/17			X		1																			
BH1 0.9-1.0	11/9/17			X		1																			
BH2 0-0.1	11/9/17	2		X		1	X	X			X														
BH2 0.4-0.5	11/9/17			X		1																			
BH2 0.9-1.0	11/9/17			X		1																			
BH3 0-0.1	11/9/17	3		X		1	X							X											
BH3 0.4-0.5	11/9/17			X		1																			
BH3 0.9-1.0	11/9/17			X		1																			
Relinquished By: Thalia			Date/Time: 13/9/17					Received By: <i>[Signature]</i>					Date/Time: 13/09/17 @ 2:45												
Relinquished By:			Date/Time:					Received By:					Date/Time:												
Samples Intact: <u>Yes</u> / No			Temperature: Ambient / <u>Chilled</u>					Sample Cooler Sealed: Yes / No					Laboratory Quotation No:												
			Comments:																						

SGS EHS Alexandria Laboratory



SE170266 COC

Received: 14 - Sep - 2017



Page 2 of 11

Email Results: engineering@netgeo.com.au;

Ref: G09-2571 COC 1/ver.2/16.08.2007/Page 2 of 11



Page 3 of 11

Email Results: engineering@netgeo.com.au;

Comments:



Page 4 of 11

Email Results: engineering@netgeo.com.au;

Comments:



Page 5 of 11

Email Results: engineering@netgeo.com.au;

[illegible]

Laboratory Quotation No:

Comments:

Email: au.samplereceipt.sydney@sgs.com

Page 6 of 11

Email Results: engineering@netgeo.com.au;

[illegible]

Date/Time	
-----------	--

Laboratory Quotation No:

Comments:



Page 7 of 11

Email Results: engineering@netgeo.com.au;

Relinquished By: Thalia	Date/Time: 13/9/17	Received By: <i>[Signature]</i>	Date/Time: 13/09/17 @ 2:45
Relinquished By:	Date/Time:	Received By:	Date/Time:
Samples Intact: <i>9</i> Yes/ No	Temperature: Ambient / <i>9</i> Chilled	Sample Cooler Sealed: Yes/ No	Laboratory Quotation No:
Comments:			



SGS Environmental Services
Unit 16, 33 Maddox Street
Alexandria NSW 2015

Telephone No: (02) 85940400

Facsimile No: (02) 85940499

Email: au.samplerreceipt.sydney@sgs.com

CHAIN OF CUSTODY & ANALYSIS REQUEST

Page 8 of 11

Company Name: Network Geotechnics Pty Ltd

Address: Unit 12/9-15 Gundah Road, Mt Kuring-Gai

NSW 2080

Contact Name: Thalia

Project Name/No: G09/2571

Purchase Order No:

Results Required By: 21/9/17

Telephone: 8438 0300

Facsimile: 8438 0310

Email Results: engineering@netgeo.com.au

Client Sample ID	Date Sampled	Lab Sample ID	WATER	SOIL	PRESERVATIVE	NO OF CONTAINERS	8 Heavy Metals	TRH/BTEX/PAH	Total Phenols	PCB	OC/OP Pesticides	Ammonia/Nitrate	E Coli/T Coli/F Coli	Asbestos ID	CEC/pH	EC/pH	Chloride/Sulphate					
BH20 0-0.1	12/9/17			X		1																
BH20 0.4-0.5	12/9/17			X		1																
BH20 0.9-1.0	12/9/17	22		X		1	X	X														
BH21 0-0.1	12/9/17			X		1																
BH21 0.4-0.5	12/9/17			X		1																
BH22 0-0.1	12/9/17	23		X		1	X															
BH22 0.4-0.5	12/9/17			X		1																
BH23 0-0.1	12/9/17			X		1																
BH23 0.4-0.5	12/9/17			X		1																
Relinquished By: Thalia			Date/Time: 13/9/17					Received By: 					Date/Time: 13/09/17 @ 2:45									
Relinquished By:			Date/Time:					Received By:					Date/Time:									
Samples Intact: Yes/No			Temperature: Ambient / Chilled					Sample Cooler Sealed: Yes/ No					Laboratory Quotation No:									
			Comments:																			



SGS Environmental Services
Unit 16, 33 Maddox Street
Alexandria NSW 2015

Telephone No: (02) 85940400

Facsimile No: (02) 85940499

Email: au.samplerreceipt.sydney@sgs.com

CHAIN OF CUSTODY & ANALYSIS REQUEST

Page 9 of 11

Company Name: Network Geotechnics Pty Ltd

Address: Unit 12/9-15 Gundah Road, Mt Kuring-Gai

NSW 2080

Contact Name: Thalia

Project Name/No: G09/2571

Purchase Order No:

Results Required By: 21/9/17

Telephone: 8438 0300

Facsimile: 8438 0310

Email Results: engineering@netgeo.com.au

Client Sample ID	Date Sampled	Lab Sample ID	WATER	SOIL	PRESERVATIVE	NO OF CONTAINERS	8 Heavy Metals	TRH/BTEX/PAH	Total Phenols	PCB	OC/OP Pesticides	Ammonia/Nitrate	E Coli/T Coli/F Coli	Asbestos ID	CEC/pH	EC/pH	Chloride/Sulphate					
BH24 0-0.1	12/9/17			X		1																
BH24 0.4-0.5	12/9/17			X		1																
BH25 0-0.1	12/9/17			X		1																
BH25 0.4-0.5	12/9/17	24		X		1	X				X											
BH26 0-0.1	12/9/17			X		1																
BH26 0.4-0.5	12/9/17			X		1																
BH27 0-0.1	12/9/17	25		X		1	X															
BH27 0.4-0.5	12/9/17			X		1																
BH28 0-0.1	12/9/17			X		1																

Relinquished By: Thalia

Date/Time: 13/9/17

Received By: *[Signature]*

Date/Time: 13/09/17 @ 2:45

Relinquished By:

Date/Time:

Received By:

Date/Time:

Samples Intact: Yes/No

Temperature: Ambient / Chilled

Sample Cooler Sealed: Yes/ No

Laboratory Quotation No:

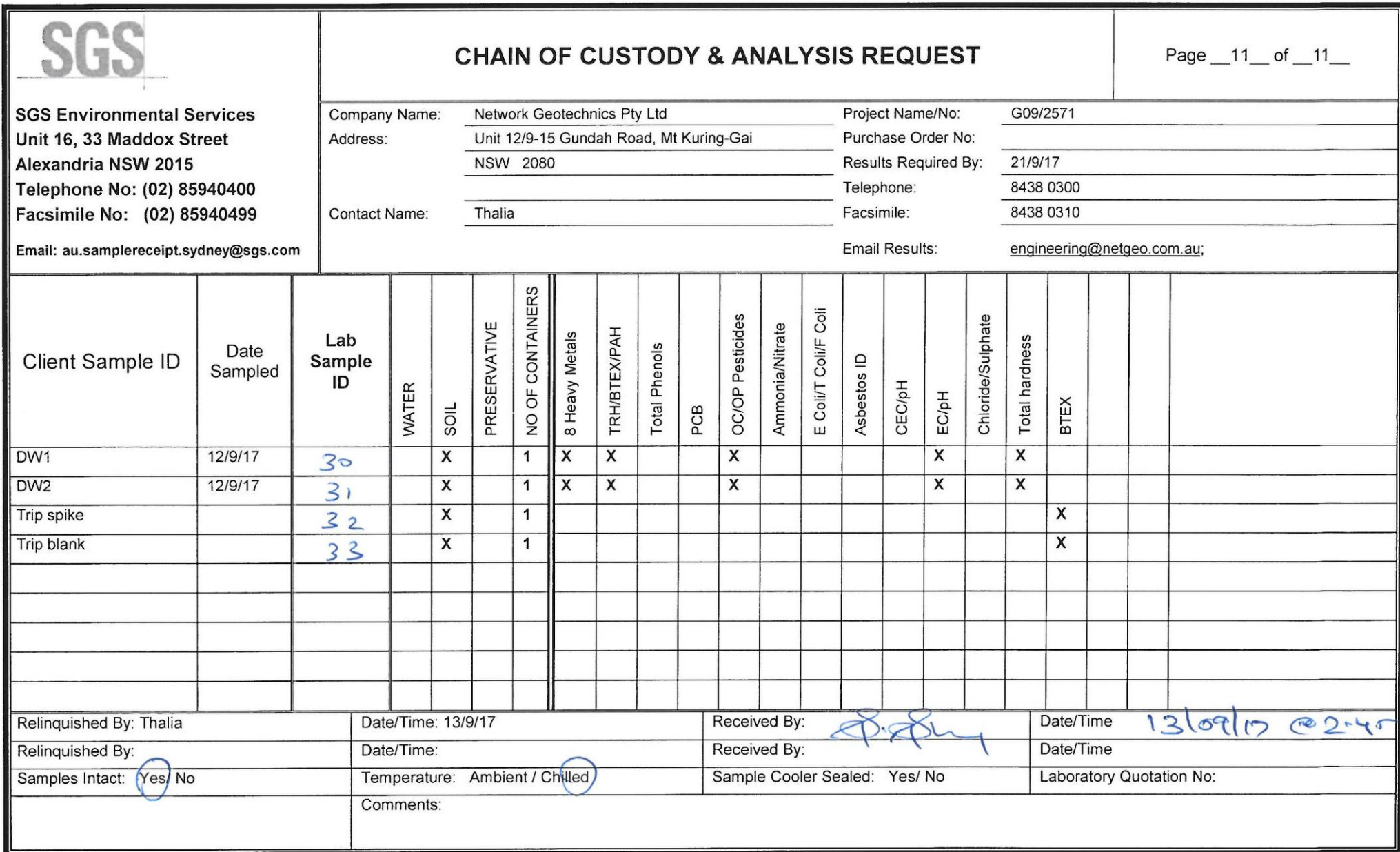
Comments:



Page 10 of 11

Email Results: engineering@netgeo.com.au;

Comments:



RE: G09/2571

Thalia Park-Ross <tparkross@netgeo.com.au >

Thu 14/09/2017 3:46 PM

To: AU.SampleReceipt.Sydney (Sydney) <AU.SampleReceipt.Sydney@sgs.com>;

Hi Emily,

The first set of photos is BH24 and second set is BH25.

Sorry for the mix up.

Regards,

Thalia Park-Ross | B Env Sci | Environmental Scientist | **NETWORK GEOTECHNICS**
e tparkross@netgeo.com.au | **p** (02) 8438 0300 | **m** 0431 501 761 | **f** (02) 8438 0310
w www.netgeo.com.au | **a** 31 Anvil Road, Seven Hills NSW 2147



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From: AU.SampleReceipt.Sydney (Sydney) [mailto:AU.SampleReceipt.Sydney@sgs.com]
Sent: Thursday, 14 September 2017 3:39 PM
To: Thalia Park-Ross
Subject: G09/2571

Dear Thalia,

2 sets of BH25 received.

BH24 not received.

Please advise which is the right BH25.

Thank You.

Regards,

Emily Yin

Environment, Health & Safety
Sample Receipt

SGS Australia Pty Ltd
Unit 16, 33 Maddox Street
Alexandria NSW 2015

Phone: +61 (0)2 8594 0400

Fax: +61 (0)2 8594 0499

E-mail: au.samplereceipt.sydney@sgs.com



SAMPLE RECEIPT ADVICE

SE170266

CLIENT DETAILS

Contact Thalia Park-Ross
Client NETWORK GEOTECHNICS PTY LTD
Address 31 Anvil Rd
Seven Hills
NSW 2147

Telephone 02 8438 0312 / 0411 112 824
Facsimile 02 8438 0310
Email tparkross@netgeo.com.au

Project **G09-2571**
Order Number (Not specified)
Samples 33

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 14/9/2017
Report Due Thu 21/9/2017
SGS Reference **SE170266**

SUBMISSION DETAILS

This is to confirm that 33 samples were received on Thursday 14/9/2017. Results are expected to be ready by COB Thursday 21/9/2017. Please quote SGS reference SE170266 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	31 Soil, 2 Water
Date documentation received	13/9/2017	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	13.5°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

60 soil samples have been placed on hold.
Asbestos will be sub sampled from the jar provided, as a separate bag was not supplied for analysis.

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

CLIENT DETAILS

Client **NETWORK GEOTECHNICS PTY LTD**

Project **G09-2571**

SUMMARY OF ANALYSIS

No.	Sample ID	OC Pesticides in Soil	OP Pesticides in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	Total Recoverable Metals in Soil/Waste	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil
001	BH1 0-0.1	-	-	-	7	-	-	-
002	BH2 0-0.1	29	14	26	7	10	12	8
003	BH3 0-0.1	-	-	-	7	-	-	-
004	BH4 0-0.1	-	-	-	7	-	-	-
005	BH5 0-0.1	-	-	26	7	10	12	8
006	BH5 0.9-1.0	-	-	26	7	10	12	8
007	BH5 1.4-1.5	-	-	26	7	10	12	8
008	BH6 0.4-0.5	-	-	26	7	10	12	8
009	BH6 1.4-1.5	-	-	26	7	10	12	8
010	BH7 0-0.1	-	-	26	7	10	12	8
011	BH7 0.9-1.0	-	-	26	7	10	12	8
012	BH8 0-0.1	29	14	26	7	10	12	8
013	BH9 0-0.1	29	14	26	7	10	12	8
014	BH10 0-0.1	-	-	26	-	10	12	8
015	BH11 0-0.1	29	14	26	7	10	12	8
016	BH13 0-0.1	-	-	26	7	10	12	8
017	BH14 0.4-0.5	-	-	26	7	10	12	8
018	BH15 0-0.1	29	14	-	7	-	-	-
019	BH16 0.4-0.5	-	-	26	7	10	12	8
020	BH17 0.4-0.5	29	14	-	7	-	-	-
021	BH19 0-0.1	29	14	-	7	-	-	-
022	BH20 0.9-1.0	-	-	26	7	10	12	8
023	BH22 0-0.1	-	-	-	7	-	-	-
024	BH25 0.4-0.5	29	14	-	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 .

CLIENT DETAILS

Client **NETWORK GEOTECHNICS PTY LTD**

Project **G09-2571**

SUMMARY OF ANALYSIS

No.	Sample ID	OC Pesticides in Soil	OP Pesticides in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	Total Recoverable Metals in Soil/Waste	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil
025	BH27 0-0.1	-	-	-	7	-	-	-
026	BH29 0-0.1	29	14	-	7	-	-	-
027	BH30 0.9-1.0	-	-	26	7	10	12	8
028	BH130 0.9-1.0	-	-	26	7	10	12	8
029	BH120 0.9-1.0	-	-	26	7	10	12	8
032	Trip Spike	-	-	-	-	-	12	-
033	Trip Blank	-	-	-	-	-	12	-

CONTINUED OVERLEAF

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

Client **NETWORK GEOTECHNICS PTY LTD**

Project **G09-2571**

SUMMARY OF ANALYSIS

No.	Sample ID	Fibre Identification in soil	Mercury in Soil	Moisture Content
001	BH1 0-0.1	2	1	1
002	BH2 0-0.1	-	1	1
003	BH3 0-0.1	2	1	1
004	BH4 0-0.1	-	1	1
005	BH5 0-0.1	-	1	1
006	BH5 0.9-1.0	-	1	1
007	BH5 1.4-1.5	-	1	1
008	BH6 0.4-0.5	-	1	1
009	BH6 1.4-1.5	-	1	1
010	BH7 0-0.1	-	1	1
011	BH7 0.9-1.0	-	1	1
012	BH8 0-0.1	-	1	1
013	BH9 0-0.1	-	1	1
014	BH10 0-0.1	-	-	1
015	BH11 0-0.1	-	1	1
016	BH13 0-0.1	2	1	1
017	BH14 0.4-0.5	2	1	1
018	BH15 0-0.1	2	1	1
019	BH16 0.4-0.5	2	1	1
020	BH17 0.4-0.5	2	1	1
021	BH19 0-0.1	-	1	1
022	BH20 0.9-1.0	-	1	1
023	BH22 0-0.1	-	1	1
024	BH25 0.4-0.5	-	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

SE170266

CLIENT DETAILS

Client **NETWORK GEOTECHNICS PTY LTD**

Project **G09-2571**

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury in Soil	Moisture Content	VOCs in Water	Volatile Petroleum Hydrocarbons in Water
025	BH27 0-0.1	1	1	-	-
026	BH29 0-0.1	1	1	-	-
027	BH30 0.9-1.0	1	1	-	-
028	BH130 0.9-1.0	1	1	-	-
029	BH120 0.9-1.0	1	1	-	-
030	DW1	-	-	12	8
031	DW2	-	-	12	8
033	Trip Blank	-	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 **NETWORK GEOTECHNICS PTY LTD**

Project **G09-2571**

SUMMARY OF ANALYSIS

No.	Sample ID	Conductivity and TDS by Calculation - Water	Mercury (dissolved) in Water	Metals in Water (Dissolved) by ICPOES	OC Pesticides in Water	OP Pesticides in Water	PAH (Polynuclear Aromatic Hydrocarbons) in Water	pH in water	Trace Metals (Dissolved) in Water by ICPMS	TRH (Total Recoverable Hydrocarbons) in Water
030	DW1	1	1	1	28	13	22	1	7	10
031	DW2	1	1	1	28	13	22	1	7	10

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 **Thalia Park-Ross**
 Client **NETWORK GEOTECHNICS PTY LTD**
 Address **31 Anvil Rd
 Seven Hills
 NSW 2147**

Telephone **02 8438 0312 / 0411 112 824**
 Facsimile **02 8438 0310**
 Email **tparkross@netgeo.com.au**

Project **G09-2571 Additional**
 Order Number **(Not specified)**
 Samples **35**

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 **SE170266A R0**
 Date Received **22/9/2017**
 Date Reported **27/9/2017**

COMMENTS

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

SIGNATORIES



Akheeagar Beniamene
 Chemist



Ly Kim Ha
 Organic Section Head

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 25/9/2017

			BH7 0.4-0.5	BH7 1.4-1.5
			SOIL	SOIL
			-	-
			12/9/2017	12/9/2017
			SE170266A.034	SE170266A.035
PARAMETER	UOM	LOR		
Benzene (F0)	mg/kg	0.1	<0.1	<0.1
TRH C6-C9	mg/kg	20	<20	<20
TRH C6-C10	mg/kg	25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25



ANALYTICAL RESULTS

SE170266A R0

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 25/9/2017

			BH7 0.4-0.5	BH7 1.4-1.5
			SOIL	SOIL
			-	-
			12/9/2017	12/9/2017
PARAMETER	UOM	LOR	SE170266A.034	SE170266A.035
TRH C10-C14	mg/kg	20	<20	<20
TRH C15-C28	mg/kg	45	530	<45
TRH C29-C36	mg/kg	45	1300	<45
TRH C37-C40	mg/kg	100	330	<100
TRH >C10-C16 (F2)	mg/kg	25	<25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	1400	<90
TRH >C34-C40 (F4)	mg/kg	120	750	<120
TRH C10-C36 Total	mg/kg	110	1800	<110
TRH C10-C40 Total	mg/kg	210	2100	<210



ANALYTICAL RESULTS

SE170266A R0

Moisture Content [AN002] Tested: 25/9/2017

			BH7 0.4-0.5	BH7 1.4-1.5
			SOIL	SOIL
			-	-
			12/9/2017	12/9/2017
			SE170266A.034	SE170266A.035
PARAMETER	UOM	LOR		
% Moisture	%w/w	0.5	7.4	19

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.

AN403

Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.

AN403

Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents .

AN403

The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.

AN433

VOCs and C6-C9/C6-C10 Hydrocarbons by GC-MS P&T: VOC's are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

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

Samples analysed as received.
Solid samples expressed on a dry weight basis.

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

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

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

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

Note that in terms of units of radioactivity:

- 1 Bq is equivalent to 27 pCi
- 37 MBq is equivalent to 1 mCi

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

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : <http://www.sgs.com.au/~media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf>

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STATEMENT OF QA/QC PERFORMANCE

SE170266A R0

CLIENT DETAILS

Contact Thalia Park-Ross
Client NETWORK GEOTECHNICS PTY LTD
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Seven Hills
NSW 2147

Telephone 02 8438 0312 / 0411 112 824
Facsimile 02 8438 0310
Email tparkross@netgeo.com.au

Project **G09-2571 Additional**
Order Number (Not specified)
Samples 35

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
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SGS Reference **SE170266A R0**
Date Received 22 Sep 2017
Date Reported 27 Sep 2017

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	TRH (Total Recoverable Hydrocarbons) in Soil	3 items
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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	2 Soil
Date documentation received	22/9/17@8:49am	Type of documentation received	Email
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	13.5°C	Sufficient sample for analysis	Yes
Turnaround time requested	Three 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.

Moisture Content

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH7 0.4-0.5	SE170266A.034	LB132927	12 Sep 2017	22 Sep 2017	26 Sep 2017	25 Sep 2017	30 Sep 2017	27 Sep 2017
BH7 1.4-1.5	SE170266A.035	LB132927	12 Sep 2017	22 Sep 2017	26 Sep 2017	25 Sep 2017	30 Sep 2017	27 Sep 2017

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
BH7 0.4-0.5	SE170266A.034	LB132926	12 Sep 2017	22 Sep 2017	26 Sep 2017	25 Sep 2017	04 Nov 2017	27 Sep 2017
BH7 1.4-1.5	SE170266A.035	LB132926	12 Sep 2017	22 Sep 2017	26 Sep 2017	25 Sep 2017	04 Nov 2017	27 Sep 2017

Volatile Petroleum Hydrocarbons in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH7 0.4-0.5	SE170266A.034	LB132929	12 Sep 2017	22 Sep 2017	26 Sep 2017	25 Sep 2017	04 Nov 2017	27 Sep 2017
BH7 1.4-1.5	SE170266A.035	LB132929	12 Sep 2017	22 Sep 2017	26 Sep 2017	25 Sep 2017	04 Nov 2017	27 Sep 2017

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

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

Volatile Petroleum Hydrocarbons In Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH7 0.4-0.5	SE170266A.034	%	60 - 130%	86
	BH7 1.4-1.5	SE170266A.035	%	60 - 130%	94
d4-1,2-dichloroethane (Surrogate)	BH7 0.4-0.5	SE170266A.034	%	60 - 130%	80
	BH7 1.4-1.5	SE170266A.035	%	60 - 130%	95
d8-toluene (Surrogate)	BH7 0.4-0.5	SE170266A.034	%	60 - 130%	79
	BH7 1.4-1.5	SE170266A.035	%	60 - 130%	78
Dibromofluoromethane (Surrogate)	BH7 0.4-0.5	SE170266A.034	%	60 - 130%	74
	BH7 1.4-1.5	SE170266A.035	%	60 - 130%	86

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.

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-ENVJAN403

Sample Number	Parameter	Units	LOR	Result
LB132926.001	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

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-ENVJAN433

Sample Number	Parameter	Units	LOR	Result
LB132929.001	TRH C6-C9	mg/kg	20	<20
	Dibromofluoromethane (Surrogate)	%	-	89
	d4-1,2-dichloroethane (Surrogate)	%	-	97
	d8-toluene (Surrogate)	%	-	78

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

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

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

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

Moisture Content

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE170602.008	LB132927.011	% Moisture	%w/w	0.5	5.1	4.7	51	9
SE170620.002	LB132927.033	% Moisture	%w/w	0.5	12	11	39	5

TRH (Total Recoverable Hydrocarbons) in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE170617.002	LB132926.014	TRH C10-C14	mg/kg	20	0	0	200	0
		TRH C15-C28	mg/kg	45	218	183	52	17
		TRH C29-C36	mg/kg	45	328	308	44	6
		TRH C37-C40	mg/kg	100	0	0	200	0
		TRH C10-C36 Total	mg/kg	110	546	491	51	11
		TRH C10-C40 Total	mg/kg	210	432	389	81	10
		TRH F Bands	mg/kg	25	0	0	200	0
		TRH >C10-C16 (F2)	mg/kg	25	-0.03	0	200	0
		TRH >C16-C34 (F3)	mg/kg	90	432	389	52	10
		TRH >C34-C40 (F4)	mg/kg	120	0	0	200	0
SE170620.001	LB132926.022	TRH C10-C14	mg/kg	20	NVL	<20	200	0
		TRH C15-C28	mg/kg	45	NVL	<45	200	0
		TRH C29-C36	mg/kg	45	NVL	<45	200	0
		TRH C37-C40	mg/kg	100	NVL	<100	200	0
		TRH C10-C36 Total	mg/kg	110	NVL	<110	200	0
		TRH C10-C40 Total	mg/kg	210	NVL	<210	200	0
		TRH F Bands	mg/kg	25	NVL	<25	200	0
		TRH >C10-C16 (F2)	mg/kg	25	NVL	<25	200	0
		TRH >C16-C34 (F3)	mg/kg	90	NVL	<90	200	0
		TRH >C34-C40 (F4)	mg/kg	120	NVL	<120	200	0

Volatile Petroleum Hydrocarbons in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE170620.002	LB132929.015	TRH C6-C10	mg/kg	25	<25	<25	200	0
		TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	mg/kg	-	3.6	4.0	30	12
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.3	4.5	30	5
		d8-toluene (Surrogate)	mg/kg	-	3.8	3.7	30	4
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.5	4.5	30	0
		VPH F Bands	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.

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB132926.002	TRH C10-C14	mg/kg	20	49	40	60 - 140	123
	TRH C15-C28	mg/kg	45	45	40	60 - 140	113
	TRH C29-C36	mg/kg	45	<45	40	60 - 140	78
	TRH F Bands	TRH >C10-C16 (F2)	25	47	40	60 - 140	118
		TRH >C16-C34 (F3)	90	<90	40	60 - 140	98
		TRH >C34-C40 (F4)	120	<120	20	60 - 140	70

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB132929.002	TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	89
	TRH C6-C9	mg/kg	20	<20	23.2	60 - 140	72
	Surrogates	Dibromofluoromethane (Surrogate)	-	4.2	5	60 - 140	83
		d4-1,2-dichloroethane (Surrogate)	-	4.6	5	60 - 140	92
		d8-toluene (Surrogate)	-	4.5	5	60 - 140	91
		Bromofluorobenzene (Surrogate)	-	4.2	5	60 - 140	84
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	25	<25	7.25	60 - 140	108

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.

TRH (Total Recoverable Hydrocarbons) in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE170614.001	LB132926.023	TRH C10-C14	mg/kg	20	47	<20	40	118
		TRH C15-C28	mg/kg	45	190	170	40	33 ⑥
		TRH C29-C36	mg/kg	45	100	89	40	28 ⑥
		TRH C37-C40	mg/kg	100	<100	<100	-	-
		TRH C10-C36 Total	mg/kg	110	330	260	-	-
		TRH C10-C40 Total	mg/kg	210	310	250	-	-
		TRH F Bands	mg/kg	25	47	<25	40	118
		TRH >C10-C16 (F2)	mg/kg	25	47	<25	-	-
		TRH >C10-C16 (F2) - Naphthalene	mg/kg	90	240	250	40	-5 ⑥
		TRH >C34-C40 (F4)	mg/kg	120	<120	<120	-	-

Volatile Petroleum Hydrocarbons in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE170266A.03 4	LB132929.004	TRH C6-C10	mg/kg	25	<25	<25	24.65	90
		TRH C6-C9	mg/kg	20	<20	<20	23.2	74
		Surrogates	mg/kg	-	4.0	3.7	-	79
		Dibromofluoromethane (Surrogate)	mg/kg	-	4.2	4.0	-	85
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.5	4.0	-	90
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.1	4.3	-	81
		VPH F	mg/kg	0.1	2.1	<0.1	-	-
		Bands	mg/kg	25	<25	<25	7.25	130
		TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	7.25	130

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

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

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

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

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

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

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

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

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22/09/2017

Mail - AU.SampleReceipt.Sydney@sgs.com

RE: Report Job SE170266, your reference G09-2571, order number

Thalia Park-Ross <tparkross@netgeo.com.au>

Fri 22/09/2017 8:49 AM

To: AU.SampleReceipt.Sydney (Sydney) <AU.SampleReceipt.Sydney@sgs.com>;

Hi, #34 BH7 0.4 - 0.5

Please test samples TP7 0.4-0.5 and TP7 1.4-1.5 for TRH.

Results by Tuesday 27/9/17 please. #35 BH7 1.4 - 1.5

Regards,

Thalia Park-Ross | B Env Sci | Environmental Scientist | NETWORK GEOTECHNICS
e tparkross@netgeo.com.au | p (02) 8438 0300 | m 0431 501 761 | f (02) 8438 0310
w www.netgeo.com.au | a 31 Anvil Road, Seven Hills NSW 2147

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-----Original Message-----

From: AU.Environmental.Sydney@SGS.com [mailto:AU.Environmental.Sydney@SGS.com]

Sent: Thursday, 21 September 2017 5:56 PM

To: Sydney Engineering; Thalia Park-Ross

Subject: Report Job SE170266, your reference G09-2571, order number

Dear Thalia,

Please find attached the report for SGS job SE170266, your reference G09-2571, order number .

-IMPORTANT INFORMATION ABOUT YOUR REPORT- To align with NEPM 1999 (2013), SGS Environmental has changed the way Silica Gel Clean-up of TRH extracts is reported. TPH Silica Gel has now become TRH – Silica. NEPM 1999(2013) seeks to clarify TRH and TPH in Schedule B3, 10.2.7.

If you have any questions or concerns, please don't hesitate to contact your SGS Client Services representative.

Regards,

Natalie Grove

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Message protected by MailGuard: e-mail anti-virus, anti-spam and content filtering.<http://www.mailguard.com.au>

SGS EHS Alexandria Laboratory



SE170266A COC
Received: 22-Sep-2017



SAMPLE RECEIPT ADVICE

SE170266A

CLIENT DETAILS

Contact Thalia Park-Ross
Client NETWORK GEOTECHNICS PTY LTD
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NSW 2147

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Facsimile 02 8438 0310
Email tparkross@netgeo.com.au

Project **G09-2571 Additional**
Order Number (Not specified)
Samples 35

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

Samples Received Fri 22/9/2017
Report Due Wed 27/9/2017
SGS Reference **SE170266A**

SUBMISSION DETAILS

This is to confirm that 35 samples were received on Friday 22/9/2017. Results are expected to be ready by COB Wednesday 27/9/2017. Please quote SGS reference SE170266A 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	2 Soil
Date documentation received	22/9/17@8:49am	Type of documentation received	Email
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	13.5°C	Sufficient sample for analysis	Yes
Turnaround time requested	Three 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

SE170266A

CLIENT DETAILS

Client **NETWORK GEOTECHNICS PTY LTD**

Project **G09-2571 Additional**

SUMMARY OF ANALYSIS

No.	Sample ID	Moisture Content	TRH (Total Recoverable Hydrocarbons) in Soil	Volatile Petroleum Hydrocarbons in Soil
034	BH7 0.4-0.5	1	10	8
035	BH7 1.4-1.5	1	10	8

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 .