

SERS

Site Environmental and
Remediation Services

Remediation and Validation Report (ARMIDALE HIGH SCHOOL, BUTLER STREET, ARMIDALE NSW 2350)

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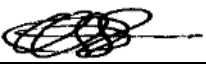
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Abbreviation	Details
mBgl	Metres Below ground level
CoC	Chain of Custody
CSM	Conceptual Site Model
DQO	Data Quality Objectives
ESLs	Ecological Screening Levels
HILs	Health Investigation Levels
HSLs	Health Screening Levels
LOR	Limit of Reporting
mAHD	Metres above Australian Height Datum
NEPC	National Environmental Protection Council
NEPM	National Environmental Protection Measure
NSW EPA	NSW Environmental Protection Agency
NSW DUAP	NSW Department of Urban Affairs and Planning
NSW DECCW	NSW Department of Environment, Climate Change and Water
LEP	LEP Local environmental plan
PCB	Polychlorinated biphenyls
RAP	Remediation Action Plan
RPD	Relative percentage differences
RVR	Remediation Validation Report
SERS	Site Environmental and Remediation Services Pty Ltd
TRH	Total recoverable hydrocarbons
OCPs	Organochlorine pesticides
BTEXN	Benzene, toluene, ethylbenzene, xylene and naphthalene



EXECUTIVE SUMMARY

Site Environmental and Remediation Services Pty Ltd (SERS) were engaged by Demex (the Client) to validate remediation works undertaken at Armidale High School located at Butler St, Armidale, NSW 2350 (the Site). The purpose of the remedial works was to remediate the Site from known soil contamination which poses health risks to human receptors. The Site is comprised of 6 lots with all areas requiring remediation (Lot 704 in DP75508, Lot 1 section 49 in DP758032 and Lot 1151 in DP821627).

Contamination on Site is inclusive of heavy metal contamination (Nickel) within the soils, present at the central portion of the Site within the footprint of former buildings E and D, however the source of contamination could not be attributed to the historical Site use. Additionally, as a result of historical illegal waste dumping at the Site, there is asbestos contamination within the soils at the south, south-west, east, central and north-central portions of the Site.

Groundwater bores identified within a 1 km radius of the Site were observed to be for monitoring purposes and not registered for domestic use. The closest ecological receptors were located up hydraulic gradient of the contaminated areas on Site, therefore negligible risk to ecological receptors is to be as a result of the on Site contamination.

This Remediation and Validation Report has been undertaken as per the Remedial Action Plan (RAP) developed by WSP (September 2018). It is the objective of this Remediation and Validation Report to document the soil remediation undertaken at the Site, and the work practices and environmental management techniques implemented during the process. It is the proponent's objective to retain the lots for continued use as a secondary school.

The objective of the remediation and validation works are as follows:

- Ensure concentrations of contaminants do not pose a risk to the current and future users of the Site;
- Ensure that the RAP has been implemented appropriately to successfully remediate the Site; and
- Ensure the Site is suitable for the current land use and zoning objectives (Secondary School).

All remedial works were undertaken in accordance with SERS Pty Ltd "*Sampling Analysis and Quality Plan 2019 (SAQP)*" and WSP *Remediation Action Plan 2019 (RAP)*. The Site remediation was based on the findings of WSP 2018, *Targeted soil contamination assessment* and SERS 2019, *SAQP* whereby contamination on Site was comprised of:

- Metals (Nickel exceeding HILs);
- PAHs; and
- Asbestos.

Validation sampling was conducted over two portions of the Site as follows:

- The centre section of the Site comprising of Lot 704 in DP755808 and Lot 1 section 49 in DP758032; and
- The southwest and southernmost section of the Site inclusive of Lot 704 in DP755808 and Lot 1151 in DP821627.



First round validation sampling of the areas requiring in-depth investigation (Lot 704, Lot 1 and Lot 1151) yielded results below the Residential criteria for asbestos as per (DoH, 2009) except in sample points SL6, SL7, SL10, SL16, SL17, SL19, SL22, SL27, SL33 and waste classification criteria for Nickel in (WC 18). Following the receipt of the results, further excavations were conducted in the vicinity of the sample points where exceedance were detected. Nickel contamination in soils identified in sample WC18 was excavated and impacted materials was appropriately disposed to a licensed waste facility. Validation samples obtained within Nickel impacted area yielded results below the applicable HIL.

Second round validation sampling yielded results below the Residential Criteria for asbestos with the exception of samples SL6, SL7, SL10, SL16, SL17 and SL19. Further excavations were undertaken and subsequent third round validation sampling results exceeded the assessment criteria in samples VS01, VS05, VS06 and VS13. These positively identified ACM contaminated areas were visually inspected following further excavations and a fourth round validation sampling exercise was undertaken. Laboratory results analysed following the fourth round validation sampling recorded no exceedances above the applicable criteria for asbestos in the area.

Validation sampling following the removal of asbestos contaminated soils in the unexcepted finds area (South section of Lot 704 and Northwest of Lot 1151) yielded results below the residential criteria for asbestos (DoH, 2009) with the exception of sample points V1, V4, V5, V6 and V7. Following the receipt of the results, further excavations were conducted in the vicinity of the sample points and second round validation sampling yielded results above the assessment criteria in sample SPV2A. The impacted area was visually inspected following further excavation works and third round validation sampling result(s) recorded no exceedance above the applicable criteria.

Based on the results of the investigation/validation, the Site has been suitably remediated for the current land use (Secondary School under Zoning R1 – General residential). All impacted areas were successfully remediated with the exception of contamination identified within the vicinity of the existing gymnasium and proposed new theatre in Lot 1, Section 49 in DP75082. It is noted that no authorisation has been granted to SERS to remediate these areas, hence only the western section of Lot 1, Section 49 in DP75082 has been remediated.

1 INTRODUCTION

1.1 Background

Site Environmental and Remediation Services Pty Ltd (SERS) have been engaged by Demex (the Client) to validate remediation works undertaken at Armidale High School located at Butler St, Armidale, NSW 2350 (the Site). The purpose of the remedial works is to remediate the Site from contamination which poses health risks to human health and to ensure the Site is suitable for ongoing use as a secondary school.

The Site has been used as a public high school since 1918 to the present day. The Site comprises several disused buildings which were previously identified as containing Asbestos Materials (ACM). The centre and eastern portions of the Site comprise school buildings, with paved car parking areas located along the eastern Site boundary and to the south of the school buildings. Entry to the Site is from the north-eastern corner along Lambs Avenue and from the eastern boundary with Butler Street at Mossman Street and Hargrave Street. Currently the Site comprises demolished buildings and vacant land, with the exception of Block B which remains in situ.

These buildings were demolished between March 2019 and May 2019. ACM was identified in a soil assessment report undertaken by WSP Australia Pty Ltd (WSP) in January 2018 (WSP 2018, Targeted soil contamination assessment, Armidale High School, Butler St, Armidale, NSW 2350) prior to the commencement of redevelopment work.

The assessment found contamination exceeding the health investigation levels (HILs) at four locations, identified as HA1, HA11, HA12 and HA18. Chrysotile and Amosite asbestos were detected at one sample location (HA1_0). Benzo(a)pyrene toxic equivalence quotient (BaP TEQ) was also detected in concentrations exceeding the health-based criteria in three samples. Benzo(a)pyrene was detected in concentrations exceeding the ecological criteria in seven samples and one QA/QC sample. Nickel was detected in four samples exceeding the ecological criteria. Zinc was detected in one sample exceeding the ecological criteria. Polycyclic Aromatic Hydrocarbons (PAHs) were detected in concentrations exceeding health criteria in shallow soils.

SERS undertook further Site assessments documented in SERS SAQP May 2019 to delineate previously identified contamination. Metal contamination (Nickel) was identified within the soils, present at the central portion of the Site within the footprint of former buildings E and D, however the source of contamination could not be attributed to the historical Site use. Additionally, asbestos contamination in soils was identified at the south, south-west, east, central and north-central portions of the Site. This was attributed to historical waste dumping at the Site and indicative of uncontrolled placement of fill material used to level the Site during the construction of the school.

Groundwater bores identified within a 1 km radius of the Site were observed to be for monitoring purposes and not registered for domestic use. The closest ecological receptors were located up gradient of the contaminated areas on Site, therefore it was determined that on Site contamination poses negligible risk to ecological receptors.

This Remediation and Validation Report (RVR) has been undertaken as per the Remediation Action Plan (RAP) developed by WSP 2018. It is the objective of this RVR to validate removed impacted materials and ensure the Site is suitable for the proposed land use and zoning objectives (Secondary School: R1 - General Residential). No change in land use has been proposed as part of this reporting, as it is the proponent's objective to retain the lots for continued use as a Secondary School.

The objective of the remediation and validation works are as follows:

- Ensure concentrations of contaminants do not pose a risk to the current and future users of the Site;
- Ensure that the RAP has been implemented appropriately to successfully remediate the Site; and
- Ensure the Site is suitable for the proposed land use and zoning objectives (Secondary School: R1 - General Residential).

1.2 Previous Investigations and Reporting

Previous contaminant investigations have been produced by GeoEnviro Consultancy Pty Ltd (GeoEnviro) 2017, and WSP 2018, The results of the previous investigations have been summarized in the following sections.

1.2.1 (GeoEnviro, 2017) Geotechnical, Salinity and Contamination Investigation Proposed Redevelopment, Armidale High School, Butler Street Armidale NSW.

A Geotechnical, Salinity and Contamination Investigation was undertaken at the Site by GeoEnviro in 2017. The investigation didn't identify any obvious signs of foreign fill material or building debris except for a thin layer of fill at two borehole locations. Soil samples were collected and analyzed from four boreholes for metals, organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs), total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAHs) and asbestos. The majority of the results were below laboratory reporting limits, and the Site criteria. PAHs were detected in two samples, however, did not exceed the Site criteria. GeoEnviro considered the PAHs likely to be due to leaching from the asphalt at the Site.

1.2.2 (WSP, 2018) Targeted soil contamination assessment, Armidale High School, Butler St, Armidale, NSW 2350.

ACM was identified in a soil assessment report undertaken by WSP Australia Pty Ltd (WSP) in January 2018 (WSP 2018, Targeted soil contamination assessment, Armidale High School, Butler St, Armidale, NSW 2350) prior to the commencement of redevelopment work.

The assessment found contamination exceeding the health investigation levels (HILs) at four locations, identified as HA1, HA11, HA12 and HA18. Chrysotile and Amosite asbestos was detected at one sample location (HA1_0). BaP TEQ was detected in concentrations exceeding the health-based criteria in three samples and the two QA/QC samples. Benzo(a)pyrene was detected in concentrations exceeding the ecological criteria in seven samples and one QA/QC sample. Nickel was detected in four samples exceeding the ecological criteria (HA5_0, HA6_0.5, HA7_0.7 and HA15_0). Zinc was detected in one sample exceeding the ecological criteria (HA1_0). PAHs were detected in concentrations exceeding health criteria in shallow soils.

1.3 Objective

The objective of the remediation and validation works are as follows:

- Ensure concentrations of contaminants do not pose a risk to the current and future users of the Site;
- Ensure that the RAP has been implemented appropriately to successfully remediate the Site; and
- Ensure the Site is suitable for the proposed land use and zoning objectives (Secondary School: R1 - General Residential).

1.4 Scope of Works

The Scope of works was undertaken in two processes, inclusive of the remedial works followed by validation sampling and analysis. These are further discussed within this section.

1.4.1 Remediation

Throughout the remedial works, the following scope was undertaken:

- The Site fencing was inspected to ensure that there was no unwarranted access into the Site during remedial works;
- A Site-specific Health and safety plan (HSEP) for the proposed activities was prepared;
- Excavation and scraping were undertaken by Demex Demolition and suitably licenced contractors;
 - Excavation and scraping works were undertaken in the vicinity of the contaminated areas, and stockpiles areas (to a minimum depth of approximately 0.2mbgl).
- Excavated impacted materials/soils were organised in stockpiles in the Northern portion of the Site on lot 704 and Lot 1 pending the removal of aggregates.

1.4.2 Validation

Throughout the validation works, the following scope was undertaken:

- Excavation and scraping remedial procedures were expected to remove contaminated soils to the required depths. As such, SERS sampled newly exposed soils at targeted depths and to a density as required by NSW EPA (1997) *Sampling Design Guidelines– Contaminated Sites* and NEPM 2013 *Schedule (B2) – Guideline on Site Characterization*;
- Excavation works were undertaken in the vicinity of the agricultural area situated south-west of the Site, and across the central section of the Site;
 - As determined by the area requiring an in-depth investigation, the recommended density of sampling using a systematic grid was 38 sample locations across impacted areas on Lot 704, Lot 1 and Lot 1151 (0.9ha area);
 - As determined by the area of unexpected finds requiring remediation, only newly exposed surface soils were sampled due to the nature of the contaminant of concern (ACM). The recommended density of sampling within the vicinity of the agricultural zone (0.15ha area) was 8 samples.
 - The recommended density of sampling in the area (0.03ha) within the vicinity of previously identified contamination in the paved carpark (*WSP TSA 2018 - HA18*) was 10 samples. Samples were obtained from the walls and the base of the test pits.
- Data assessment and reporting was conducted in accordance with the NSW EPA (1997) *Guidelines for Consultants Reporting on Contaminated Sites*.



2 SITE INFORMATION

2.1 General

The Site is bounded by Mann Street, which becomes Lambs Avenue, to the north, Butler Street to the east, Kentucky Street to the south and Miller, Barry and Steven Streets to the west. Low-density residential dwellings are present to the east and west. To the north is a light industrial/commercial zone with Armidale train station approximately 200m north and residential properties beyond. To the south are suburban residential properties. The majority of the Site consists of grass and other vegetation. The school buildings are located in the centre and eastern portion of the Site, with paved car park areas along the eastern boundary and to the south of the school buildings. Access roads enter the Site at the north-eastern corner from Lambs Avenue and from the eastern boundary with Butler Street at Mossman Street and Hargrave Street. The Site covers an area of approximately 18.38ha and consists of 7 lots. Historically, no other land use has been identified contrary to its current use as a secondary school. This investigation and validation plan have included the remediation of contaminated sections of Lot 704, Lot 1151 and Lot 1 on-site.

Information concerning the Site is summarised in Table 2-1.

Table 2-1 Site Details

Site Aspect	Details
Site name	Armidale High School
Address	Butler Street, Armidale, NSW 2350
Legal identification	— Lot 1 in deposited plan (DP) 196298 — Lot 1, Section 161 in DP 758032 — Lot 1151 in DP 821627 — Lot 704 in DP 755808 — Lots 1 and 2, Section 49 in DP 758032 — Lot 7005 in DP 1052246.
Local government area	Armidale Regional Council
Zoning	R1- general residential under the Armidale Dumaresq Local Environmental Plan 2012 (Armidale LEP)
Current Land Use	Secondary School
Proposed Site use	Secondary School
Land Size	18.38 hectares

2.2 Local Government Authority Information

The Site is situated within Armidale regional Council which operates under the Armidale Dumaresq Local Environmental Plan 2012 - Part 2 Clause 2.2 (Amendment No 10) Under this planning scheme the Site is zoned as General Residential.

2.3 Proposed development

It is the intention of the landowner to have the Site remediated as suitable for its ongoing use as a secondary school. There is no objective to rezone the Site in this application. Achieving this would entail validation sampling following remediation yielding analytical results below the assessment criteria for R1- General residential.

2.4 Environmental Setting

Details on the environmental setting at, and in the vicinity of the Site have been sourced from previous investigations and recent desktop reviews by SERS. These are summarised within this section.

2.4.1 Topography and hydrology

Based on a review of Google Earth Pro Imagery and NSW globe meta data, the Site generally slopes down to the north from approximately 1,030 metres in Australian Height Datum (mAHD) to 1,000 mAHD. The Site slopes from the gymnasium down towards the main sports oval in the north of the Site, and from the southern carpark and western buildings down towards the sports oval.

The nearest surface water bodies include an on-site dam located in the south-west section of the Site, a dam located in the Armidale Bicentennial Arboretum approximately 35 m south of the Site and a dam located approximately 250 m northwest of the Site.

2.4.2 Geology

The Site is underlain by Devonian-Carboniferous sedimentary rocks, comprising quartz-rich pebbly sandstone, conglomerate units deposited in fluvial (river) systems, and siltstone, mudstone and sandstone with lithic fragments, all of which were deposited 300 to 419 million years old (Geological Survey of NSW Department of Resources and Energy – Interactive Geological Map of NSW; <https://www.resourcesandenergy.nsw.gov.au/>; accessed 25 July 2019)

2.4.3 Hydrogeology

A review of the Department of Primary Industries registered groundwater bore database (allwaterdata.water.nsw.gov.au) conducted by WSP on 24 January 2018 identified 80 groundwater bores registered within a 1 km radius of the Site. The bores are located in three clusters; around a Telstra Site at 129 Allingham Street, the industrial zone north-west of the Site around the Rose Valley Steel Works on Mann Street and at the Lowes Petroleum fuel depot on McLennan Street. The majority of these wells were registered for monitoring. None of the bores were registered for domestic uses.

3 DATA QUALITY OBJECTIVES

The following data quality objectives (DQOs) are considered appropriate for the project, are consistent with the processes set out in Australian Standard (AS) 4482.1, the National Environmental Protection Council (NEPC) (2013) National Environmental Protection (Assessment of Site Contamination 2013) Measure - Schedule B2 and have been incorporated into the remediation and validation assessment as discussed throughout the remainder of this document.

3.1 The Issues

The general requirements of the remediation and validation works are as follows:

- To assess soil at the Site in order determine the nature and extent of existing contamination identified within previous assessments and therefore the extent of remediation required (if any).
- To ensure that soils across the Site have been suitably remediated from any potential contaminants; and
- To ensure that the Site is suitable for the proposed Site use being (current use as “Secondary School” - R1 General residential).

3.2 Outcomes

The required outcomes of this remediation and validation works are as follows:

- Identify the potential for contamination to be present at the Site following remediation and validation works (excavation of all uncontrolled fill material);
- Where contamination is present, its extent shall be determined. Soils shall be classified appropriately for potential reuse or disposal. If additional contamination is found onsite, further excavations will be undertaken to remove the contamination and this material will be stockpiled and waste classified for either reuse onsite or removal to landfill; and
- Determine if the Site is suitable for the proposed Site use being (current use as “Secondary School” - R1 General residential).

3.3 Decision Inputs Affecting Outcomes

There are a number of parameters that are likely to influence the outcomes of the remediation and validation works across the Site. These parameters are considered to be as follows:

- Distribution of potential contamination across the Site;
- The identification of potential receptors and the location of sensitive environments across the Site; and
- Applicable criteria for relevant contaminants.

3.4 Boundaries

The boundaries of the investigation are the Lot boundaries that define the Site. Approximate coordinates of the lot boundaries are as follows:

- North east corner: -30.51910026, 151.650276776;
- North central section: -30.518749045, 151.650952692;
- South section: -30.520523588, 151.650834675; and
- Southwest section: -30.519831139, 151.649917672

Refer to **Figure 4** for the location of the Site and the Site boundary.

3.5 Decision Rule

The decision rules for the remediation and validation works are based on the type and distribution of contamination across the Site and the results of the validation sampling. Assessment criteria were selected taking into consideration the proposed land use (Secondary School).

The relevant guidelines include the following:

- National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM; as amended 2013);
- NSW EPA 2014, Waste Classification Guidelines. Part 1: Classifying Waste;
- NSW Environmental Protection Agency (NSW EPA) 1997, Guidelines for Consultants Reporting on Contaminated Sites;
- NSW Department of Urban Affairs and Planning (NSW DUAP) 1998, Managing Land Contamination. Planning Guidelines SEPP 55 – Remediation of Land;
- Contaminated Land Management Act 1997 (NSW);
- NSW Department of Environment, Climate Change and Water (NSW DECCW) 2009, Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997; and
- Protection of the Environment Operations Act 1997 (POEO Act; NSW).

The adopted assessment criteria for soil specifically relate to health investigation levels (HILs) and health screening levels (HSLs) applicable for the current land use under the zoning as a secondary school for future Site users and the intrusive maintenance workers.

3.6 Decision Errors

The DQOs define how the quality of data collected throughout the remediation and validation works were to be assessed. These criteria are summarised in Table 3-1.



Table 3-1 Evaluation Criteria of Each Aspect of the Report

Data Quality Objectives	Evaluation Criteria
Documentation and data completeness	• Site conditions accurately described. • Sampling locations accurately described. • Completion of field notes, calibration certificates, chain-of-custody documentation and laboratory test certificates. • Samples collected where contamination has been identified within previous reports. • Samples are scheduled for all potential contaminants including Metals, PAHs and Asbestos.
Data comparability	• Use of appropriate techniques for sampling, storage and transport of samples. • Use of National Association of Testing Authorities (NATA) accredited primary and secondary laboratories.
Data representativeness	• Collection of representative samples from across the Site. • Use of appropriate techniques for sampling, storage and transport of samples.
Precision for sampling and analysis	• Use of properly trained and suitably qualified personnel during the works.



4 CONCEPTUAL SITE MODEL

4.1 Introduction

A conceptual Site model (CSM) has been developed using information from the previous investigations and information available on the Site.

4.1.1 Source-Pathway-Receptor Linkages

The EPA risk-based approach to contaminated site management requires that investigations be completed and a CSM developed to determine the source, nature and extent of contamination and potential impacts to human health and the environment. Development of a CSM is the standard preliminary step in the human health and ecological risk assessment process.

For a particular contaminant to present a risk to receptors, three components must be present:

- **Source** - A potentially hazardous substance that has been released into the environment
- **Receptors** - The human or ecological component potentially at risk of experiencing an adverse response following exposure to the source or derivatives of the source
- **Pathway** - A mechanism by which receptors can become exposed to the source or derivatives of the source.

If one of these three is missing from an exposure scenario, then there can be no unacceptable risk.

4.1.2 Site Sensitivity

Overall, the Site setting is considered to be of moderate environmental sensitivity, due to the following reason:

- The Site is zoned as R1 general residential in the Armidale LEP.

4.1.3 Sources of Contamination

It is considered, based on a review of the available desktop information and previous environmental investigations completed for the Site, that the potential sources of contamination that may pose a risk to human health and the environment are:

- Potential presence of ACM fragments and Asbestos fibre impacts to soils at the Site;
- Known presence of PAHs in soils at the Site; and
- Known presence of Metals in soils at the Site.

4.2 Potential Transport Mechanisms and Exposure Pathways

Potential transport mechanisms for the identified sources and the likelihood of these exposure pathways occurring is described in **Table 4-1**.



Table 4-1 Potential Transport Mechanisms and Exposure Pathways

Transport Mechanism	Exposure Pathway
Dust uplift from potentially contaminated area	Inhalation of airborne particles of contaminants
Site Personnel coming into physical contact with contaminated soils	Physical Contact

4.3 Potential Receptors

Potential receptors based on the current and ongoing use are described in **Table 4-2**.

Table 4-2 Potential Receptors

Potential Receptors	Description
On-site maintenance workers	Demolition works are occurring onsite. There is a potential for maintenance works requiring ground penetration activities to be undertaken on-site.
Current off-site users	Residential properties are located in the Sites surrounds.

4.4 Conceptual Site Model

The CSM is presented in **Table 4-3**. This summary includes an assessment of the likelihood of each identified source-pathway-receptor (SPR) linkage for both on-site and off-site receptors.

Table 4-3 Conceptual Site Model

Source	Receptor	Exposure Pathway	SPR Linkage	Summary
Potentially Impacted Soils	On-site workers	Inhalation of airborne particles of contaminants	Possible	Operations associated with the remediation of contaminated soils (excavation works) have the potential to impact the health of Site personnel. This can occur through contact with the contaminants by either inhalation, ingestion or physical contact, human receptors such as onsite workers, visitors and future Site users, may be subject to accumulation of airborne asbestos fibres and metals within the body where contaminant particles are above the criteria for human health.
	Off-site users	Inhalation of airborne particles of contaminants	Possible	
	On-site workers	Physical Contact	Possible	
	Future users of the Site	Inhalation of airborne particles Ingestion Physical Contact	Possible	

5 REMEDIATION PROGRAM

5.1 Description of Remediation Works

The remediation works were undertaken progressively between the 13th of May 2019 to the 26th of June 2019. The remediation works were completed by Demex and other licenced contractors, and included the following works:

- Excavations were undertaken in the areas deemed contaminated as listed within the RAP;
- Excavated materials were transported over compacted internal roads to the containment area north of Lot 704/DP755808 as deemed practicable for the Site immediately following excavation;
- Wetting down of materials occurred throughout the remedial works;
- Silt fencing was constructed around containment areas and cordoned off with appropriate warning signage;
- Wetting down of the contaminated materials within the containment area occurred throughout the period pending when approval for off-site disposal was granted;
- Validation and inspection sampling were undertaken when identified contaminants had been excavated and transported to the containment area, to ensure that contaminants had been fully removed from the indicated area;
- Where validation sampling yields resulted in exceedance of the assigned Site assessment criteria, further remedial works were undertaken whereby more volumes of soil were excavated under the supervision of the environmental consultant. Soil validation samples were collected for laboratory analysis and results were compared to the validation criteria to ensure suitable for the ongoing current land use of the Site;
- Validation sampling continued to occur until the areas as indicated in the RAP and SAQP had been remediated to a state deemed as decontaminated, following assessment against the applicable NEPM 2013 - Health Investigation Levels and (DoH, 2009) screening criteria for asbestos contamination in soils; and
- Impacts identified in fill material were removed and the areas were deemed contaminant free and suitable for ongoing use as a secondary school, a suitably qualified professional compiled a validation report for the area (this report).

Excavations were extended to the practical lateral and vertical extent of contamination as indicated within the SAQP (May 2019). Soils in the vicinity of the following sample points were previously identified in the RAP as requiring excavation to a minimum depth of **0.2m** or natural soil on Lot 1:

- HA18 (Benzo(a)pyrene) and;
- HA1 (PAHs) on Lot 1151.

Soils in the vicinity of the following sample points was excavated to a minimum depth of **0.15m** to a **5m** radius on Lot 704 and Lot 1151:

- V1 to V8 (Asbestos).

Soils in the vicinity of the following sample points were excavated to a minimum depth of **0.15m to a 5m** radius on Lot 704, Lot 1151 and Lot 1/section 49 in DP 758032:

- SL1 to SL38 (Asbestos); and
- WC 18 (Nickel).

All soils were removed in the vicinity of these sample points using a scraper and excavators. Most locations within the Site that had identified contamination were scraped to a minimum depth of approximately 0.15mbgl.

5.2 Validation

All validation works were supervised by a suitably qualified environmental consultant ((SQEC) with experience as per Schedule B9 of the NEPM (NEPC, 2011) *Competencies & Acceptance of Environmental Auditors and Related Professionals*. All SERS environmental scientists involved in the validation works hold qualifications as required by regulatory bodies in NSW.

5.2.1 Validation Sampling

Soil validation sampling included the following:

- Collection of 2 soil samples per 5 sample locations across the area requiring in-depth investigation for waste classification purposes;
- Collection of 5 primary validation soil samples per 4 sample locations in the immediate vicinity of Sample location HA1;
- Collection of 38 preliminary validation soil samples from the newly exposed surface soils following the removal of contaminated materials;
- Collection of one QA/QC sample alongside preliminary validation samples; and
- Collection of two QA/QC samples alongside validation soil samples and collection of one triplicate sample.

Samples were analysed by a NATA accredited laboratory for bonded asbestos fragments, Asbestos Fines (AF) and Fibrous Asbestos (FA); Metals, BTEXN, Benzo(a)pyrene, Total PAHs, and TRH for comparison with applicable NEPM (NEPC, 2013) criteria in soil.

5.2.2 Validation Sampling Methodology

Validation sampling was undertaken on a Site characterisation basis detecting circular hotspots by using a systemic sampling pattern. Systemic sampling patterns were applied to the remediation areas onsite due to the amount of sample points identified to have contamination within the TSA (WSP, 2018). The minimum sampling points required for Site characterisation was 38 as determined by the investigation area of the Site (approximately 2.5ha).

The sampling densities that were required as part of this RVR to verify the removal of the contamination are outlined in **Table 5-1**.



Table 5-1 Remediation Sampling Densities

Excavated Area	Sampling Rate
Sections of Lot704/DP755808, Lot1151/DP821627 and Lot1/49/DP7580232– approximately 2.5ha collectively	38 x Sampling Density Systematic sampling in a grid formation across area requiring in-depth investigation following excavation of contaminant materials.
Sections of Lot704/DP755808, Lot1151/DP821627 and Lot1/49/DP7580232– approximately 2.5ha collectively	5 x Sampling Density Undertake validation soil sampling at 5 sample locations at the Site across the areas requiring in-depth investigation for in-situ waste classification (determined via NSW EPA, waste classification guidelines – part 1 and NEPM 2013 sampling densities). Soil samples were taken from the base of the trenches following excavation to confirm that no contamination remains Systematic sampling in grid formation and on walls and base of excavation.
Sections of Lot704/DP755808, Lot1151/DP821627 and Lot1/49/DP7580232– approximately 1.2ha collectively	4x Sampling Density Undertake validation soil sampling at 4 sample locations at the Site in the immediate vicinity of Sample location HA1 (determined via identified contamination suites of selected COPC from previous investigations and NEPM, 2013 sampling densities). Systematic sampling in grid formation and on walls and base of excavation. to confirm that no contamination remains.

The depth of validation sampling was determined based on the delineation results of WSP's TSA 2018 and data gaps identified in SERS SAQP, 2019). Identified contaminants were removed to the required depth through excavation works. Validation samples were taken from newly exposed surface soils. Sample points have been outlined within **Figures** at the rear of this report.

5.2.3 Sample Labels

Each sample label included the following information:

- The samplers name;
- The unique sample number;
- The date of sampling; and
- The corresponding project numbers.

5.2.4 Chain of Custody

A chain of custody (COC) form was completed to accompany all samples sent to the laboratory for submission for analysis.

5.3 Regulatory Assessment Criteria

Soil samples were assessed against criteria adopted from the following guideline:

- NEPM (2013) Schedule B-1 Investigation Levels for Soil and Groundwater –Table 1A (3) Soil HSLs for vapour intrusion (in sand) – HSL C Recreational/Open space (mg/kg).
- NEPM (2013) Schedule B-1 Investigation Levels for Soil and Groundwater –Table 1A (3) Soil HSLs for vapour intrusion (in sand) – HSL A Low – high density residential (mg/kg).
- NEPM (2013) Schedule B-1 Investigation Levels for Soil and Groundwater–Table 1A (1) HILs for soil contaminants – Recreational C (mg/kg).
- NEPM (2013) Schedule B1 Health Screening Levels for Asbestos Contamination in Soil – Table 7.
- The CRC CARE Technical Report No. 10 (Friebel and Nadebaum, 2011) which provides HSLs for petroleum hydrocarbons specifically for vapour inhalation for intrusive maintenance workers in shallow trenches, and for direct contact were adopted.

5.3.1 Heavy Metals

Heavy metals identified onsite following previous investigations were inclusive of Nickel and Zinc. Concentration of these metals onsite were found to exceed the EILs for General residential zoned areas. The following criterium were outlined in **Table 5-2** below, were applied as per requirements of Schedule B1 of the NEPM.

Table 5-2 Assessment Criteria for Heavy Metals following remediation works

Chemical	NEPM 2013 - Health Investigation Levels (mg/kg) – Recreational C
Nickel	1,200
Zinc	30,000



5.3.2 Asbestos

Asbestos fragments were identified onsite in exceedance of the screening criteria for assessment of asbestos contamination in soils for the applicable land use and zoning; General Residential as outlined within (WA DoH, 2009 guidelines). The criteria applied during validation reporting has been outlined within **Table 5-3**.

Table 5-3 Assessment Criteria for Asbestos following remediation works

Contaminant	(DoH, 2009) for Asbestos Contamination in Soil (% w/w)
Bonded Asbestos	0.01%
Asbestos fines and friable asbestos	0.001%
Surficial asbestos (all forms)	Nonvisible

6 Results

6.1 Validation Samples - Area requiring in-depth investigation (23rd May 2019)

Validation sampling was undertaken at a density of 38 sample points to ensure that contamination over the area comprising sections of Lot 704 in DP 755808, Lot1 section 49 in 758032 and 1151 in DP821627 had been removed to a sufficient depth. Two QA/QC samples in the form of field duplicate samples were submitted alongside the primary samples to a NATA accredited laboratory for analysis.

All samples with the exception of asbestos yielded analyte concentrations for the COPC below the adopted criteria as outlined in NEPM (2013) for HSL-A, HSL-C, HIL C for the current land use under the zoning as a secondary school, with the exception of SL6, SL7, SL10, SL16, SL17, SL19,SL22,SL27,SL33.

Validation results have been included in **Appendix C – Laboratory Certificate of Analysis** at the end of this report.

6.2 Validation Sampling South of Pre-existing Block A and N (24th May 2019)

Previous investigations (WSP TSA 2018 and Geo Enviro 2017) indicated the presence of PAH impacts to soils within the vicinity of HA18. Elevated BaP TEQ concentration in sample point HA18 within the vicinity of previously existing carpark adjacent Block N was attributed to asphalt materials. Following demolition of all of the buildings on site except Block B, SERS undertook soil validation sampling at a density of 2 sample points within this area. No exceedances of the assigned health-based criteria were identified.

Two QA/QC samples in the form of field duplicates were submitted alongside the samples to a NATA accredited laboratory for analysis. All samples yielded analyte concentrations of COPC below the Site assessment criteria outlined in NEPM (2013) Schedule B1.

Validation results have been included in **Appendix C – Table 3** at the end of this report.

6.3 Validation Sampling Southwest of Block B (3rd June 2019)

Validation sampling was conducted southwest of Block B following the excavation of asbestos contaminated soil (to the north- central section of the Site) at a density of 3 sample points SL22, SL27 and SL33 to allow continuation of earthworks on Site. The samples were submitted to a NATA accredited laboratory for analysis.

Validation results have been included in **Appendix C – Laboratory Certificate of Analysis** at the end of this report.

6.4 Validation Sampling Northwest of Block B (13th June 2019)

Validation sampling was conducted following further excavation works in the vicinity of the area requiring in-depth investigation at a density of fourteen sample points to ensure that contamination as indicated in previous sampling on the 3rd of June 2019 was removed. One QA/QC sample in the form of a field duplicate was submitted alongside the samples to a NATA accredited laboratory for analysis.

All samples yielded analyte concentrations for the COPC “asbestos” below the adopted criteria, with the exception of VS06, VS13, VS01 and VS05. Validation results have been included in **Appendix C – Laboratory Certificate of Analysis** at the end of this report.

6.5 Validation Sampling Northwest of Block B (26th June 2019)

Validation sampling was conducted at a density of three sample points following further excavation works to ensure that contamination as indicated in previous sampling round on the 13th of June 2019 had been removed. Samples were submitted to a NATA accredited laboratory for analysis.

All samples yielded results of Asbestos below the health assessment criteria for applicable land use “Secondary School under zoning – General Residential”.

Validation results have been included in **Appendix C – Laboratory Certificate of Analysis** at the end of this report.

6.6 Validation Sampling Northwest of Block B (27th June 2019)

Validation sampling was undertaken on 23rd of May 2019 in the previously identified PAH impacted area, Nickel yielded concentrations below the adopted criteria as outlined in NEPM (2013) for HSL-A, HSL-C and HIL C, however exceeded the NSW (EPA 2014) Waste Classification Guidelines Part1 - criteria in one sample point (WC18). Further excavations were undertaken to remove contamination.

Validation results have been included in **Appendix C – Table 4** at the end of this report.

6.7 Validation Sampling of Agricultural Zone – Unexpected finds Area (3rd June 2019)

Following onsite identification of unexpected asbestos cement fragments across the Agricultural Zone area, excavation of topsoil (to varying depths of 0.15m to 4m) was undertaken to remove contamination. The excavation works were undertaken across the impacted area measuring approximately (0.15ha). Validation sampling was conducted following the excavation of the impacted area at a density of 8 samples to ensure potential contamination had been removed. Samples were submitted to a NATA accredited laboratory for analysis. Three samples returned results below the validation criteria therefore these areas were opened for continuation of works. Five samples analyte (Asbestos) yielded results above (DoH, 2009) screening criteria for the applicable land use, thus additional works were carried out. This is detailed in Section 6.8 below.

Validation results have been included in **Appendix C – Laboratory Certificate of Analysis**.

6.8 Validation Sampling of Agricultural Zone – Unexpected finds Area (25th June 2019)

Following assessment in Section 6.7, the validated areas were removed from the scope of works and the area was downsized. Further excavation works were undertaken in the remaining impacted area, impacted materials were placed into a stockpile.

Four validation samples were conducted in the area, including within the stockpile remaining in the SW corner of the exclusion zone. Three of four samples returned values below the screening criteria. Sampling results have been included in **Appendix C** – Laboratory Certificate of Analysis at the end of this report.

One sample yielded result for (Asbestos) analyte above the screening criteria for applicable land use, thus additional works were carried out. This is detailed in Section 6.9 below.

6.9 Validation Sampling of Agricultural Zone – Unexpected finds Area (29th June 2019)

Following assessment in Section 6.8, the validated areas were removed from the scope of works and the area was downsized. The impacted material was removed and a 0.1m scrape was undertaken beneath the removed stockpile area. Upon completion, two samples were obtained from the stockpile area and submitted to a NATA accredited laboratory for analysis. Both samples yielded results for COPC (Asbestos) below the health assessment criteria for the applicable land use. Validation results have been included in **Appendix C** at the end of this report.

6.10 QA/QC Review

QA/QC results are included within **Appendix D**. Based on the QA program, the following conclusions have been made:

- The collection and storage of samples was in compliance with applicable methods and delivered to the laboratory within appropriate holding times;
- All analytical methodologies were compliant with NATA accreditations;
- A review of LORs relative to the assessment criteria indicated that the LOR for the majority of analytes remained below the adopted assessment criteria;
- The review of analytical results in comparison to field evidence, previous environmental assessments and other references revealed no anomalies with the analytical data provided by the primary soil analytical results.

All determinants recorded laboratory duplicate relative percentage difference (RPDs) below 30% of the original samples, with the exception of the analyte outlined in **Table 6-1**.

Table 6-1 QA/QC Programme

Analyte	Field ID	QC ID	RPD
Nickel	SWC38 1.5	QA02	59

One RPD was observed at 59%, which was yielded by Nickel in the in-depth area validation sampling. Sampling methods strictly followed Schedule B (3) of the *National Environmental Protection Measure (NEPM) National*

Environmental Protection Council (NEPC), 1999 and the practices detailed in the AS4482.1 2005. The RPDs being produced were from low concentrations of analytes close to the detection limit of the analytical procedures employed, therefore SERS considers the RPD to be less indicative of the potential methodological problems and more representative of the inherent heterogeneity of soils.

7 REVISED CONCEPTUAL SITE MODEL

The following section provides a revised conceptual model for the Site as a result of remedial works (in the form soil removal) and the generic assessment of the analytical results in relation to their risk to ecological receptors and human health.

7.1 Sources of Contamination

It is considered, based on a review of the available desktop information and previous environmental investigations completed for the Site, that the potential sources of contamination that may pose a risk to human health and the environment are:

- Impacted soils at the Site.

Contaminants of potential concern (COPC) as a result of the potential sources of contamination and as indicated within previous environmental investigations (GeoEnviro, 2017 and WSP TSA, 2018) are inclusive of the following:

- Benzo(a)pyrene (PAHs);
- Metals (including Nickel and Zinc); and
- Asbestos.

7.2 Potential Transport Mechanisms and Exposure Pathways

Potential transport mechanisms for the identified sources and the likelihood of these exposure pathways occurring is described in **Table 7-1**.

Table 7-1 Potential Transport Mechanisms and Exposure Pathways

Transport Mechanism	Exposure Pathway
Dust uplift from potentially contaminated area	Inhalation of airborne particles of contaminants
Contaminated soils	Inhalation of airborne particles of contaminants
	Reaction to contaminants from physical contact
	Ingestion of Contaminated soil

7.3 Potential Receptors

Potential receptors based on the current and ongoing use are described in **Table 5-2**.

Table 7-2 Potential Receptors

Potential Receptors	Description
On-Site maintenance workers	Demolition works are occurring onsite. There is a potential for maintenance works requiring ground penetration activities to be undertaken on-site.
Current off-Site users	Residential properties are located in the Sites surrounds.

7.4 Reviewed Conceptual Site Model

The CSM is presented in **Table 7-3**. This summary includes an amended assessment of the likelihood of each identified source-pathway-receptor (SPR) linkage for both on-site and off-site receptors considering the removal of contamination as identified in previous environmental reports and throughout the remediation and validation process.

Table 7-3 Conceptual Site Model

Source	Receptor	Exposure Pathway	SPR Linkage	Amended SPR Linkage	Summary
Potentially Impacted Soils	On-site workers	Inhalation of airborne particles Ingestion Physical Contact	Possible	Removed	Identified contaminant points have been removed to concentrations below the adopted health assessment criteria for the Site. As such the risk of contamination identified from previous use of the Site and historical waste dumping practices has been removed.
	Off-site users	Inhalation of airborne particles of contaminants	Possible	Removed	
	On-site workers	Physical Contact	Possible	Removed	
	Future users of the Site	Inhalation of airborne particles Ingestion Physical Contact	Possible	Removed	

8 Conclusion and Recommendations

8.1 Conclusions

Results from the soil validation sampling indicated that scraping and excavation works had removed contaminated soils to sufficient depths as determined in reference to the Site investigation criteria adopted from NEPM (2013) based on the current land use under the zoning as “a secondary school”, the CRC CARE Technical Report No. 10 (Friebel and Nadebaum, 2011), and NSW EPA – waste classification guidelines part 1.

Initial soil validation sampling of the area requiring in-depth investigation as contained in section 3 of SERS SAQP 2019 yielded results in exceedance of the assigned screening criteria (asbestos only) at ten sample points (SL6, SL7, SL10, SL16, SL17, SL19, SL22, SL27, SL33 and (HILs) for “Nickel” in (WC18). Following the above exceedances, further excavation was undertaken in the area and subsequent validation sampling was conducted for asbestos only. The process was repeated following second and third round exceedances until the fourth round of validation sampling yielded no further exceedances above the applicable screening criteria (DoH, 2009). Nickel contamination in soils identified in sample (WC18) was excavated and impacted materials was appropriately disposed to a licensed waste facility. Validation samples obtained within impacted area yielded results below the applicable HIL.

Previous investigations have indicated the presence of PAH impacts to soils at the Site within the vicinity of HA1, HA11, HA12, HA18 and metals to soils within HA1. Elevated BaP TEQ concentration in sample point HA18 within the vicinity of previously existing carpark was attributed to asphalt materials. Following demolition of all buildings onsite except Block B, SERS was engaged to undertake Site remedial works and thus prepared a SAQP. Soil validation sampling was conducted, and no exceedances of assigned health-based criteria was identified within HA18.

The results of the remediation and validation report indicate that the soils onsite have been remediated to concentrations suitable for the current land use as “secondary School” without risk to human health.

8.2 Summary of information pertaining to the contamination on Site

At the completion of the Site remedial works, the soil validation results indicated all relevant analyte concentrations below the Health criteria (HILs and HSLs) as outlined within the NEPM (2013) with the exception of contamination identified within the vicinity of HA11 and HA12 as contained in WSP, RAP 2018. The following outstanding contamination remains onsite, and the extent is yet to be delineated pending approval to commence remedial works:

- PAH (BaP TEQ) exceeded the adopted health criteria in HA11 and HA12, situated Northwest of Lot 1 section 49 in DP758032.

Risks associated with these conditions have been not been discussed in this report and are noted to be outside the scope of this investigation.

End of Report

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FIGURES



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Site Environmental & Remediation Services (SERS)

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<http://sers.net.au>

TITLE:

Figure 1: First Round Validation Sampling

CLIENT:

156675 – Demex Demolition

SCALE:

NTS

ISSUE:

FINAL

PROJECT:

Armidale High School
Butler Street, Armidale NSW 2350

DRAWING No:

Figure 1

Key:

- Asbestos Sample Points
- Insitu Waste Classification and Asbestos Sample Points
- Investigation Area

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TITLE:

Figure 1A: PAHs Validation Sample Points

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SCALE:
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ISSUE:
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DRAWING No: Figure 1A

Key:

- PAHs Sample Points
- Investigation Area

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TITLE:

Figure 2: Second Round Validation Sampling

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SCALE:
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PROJECT:
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Butler Street, Armidale NSW 2350

DRAWING No: Figure 2

Key:

● Asbestos Sample Points

□ Investigation Area

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TITLE:

Figure 3: Third Round Validation Sampling

CLIENT:
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SCALE:
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ISSUE:
FINAL

PROJECT:
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DRAWING No: **Figure 3**

Key:

- Positive Sample Points
- Negative Sample Points
- Investigation Area

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TITLE:

Figure 4: Fourth Round Validation Sampling Location

CLIENT:
156675 – Demex Demolition

SCALE:
NTS

ISSUE:
FINAL

PROJECT:
Armidale High School
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DRAWING No: Figure 4

Key:

- Sample Points
- Remediation Area

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TITLE:

Figure 5: Former Block N and A - PAH investigation Area

CLIENT:

156675 – Demex Demolition

SCALE:

NTS

ISSUE:

FINAL

PROJECT:

Armidale High School
Butler Street, Armidale NSW 2350

DRAWING No:

Figure 5

Key:

- Sample Points
- Investigation Area

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TITLE:

Figure 6: Unexpected Finds Area (Agricultural Zone)

CLIENT:
156675 – Demex Demolition

SCALE:
NTS

ISSUE:
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Butler Street, Armidale NSW 2350

DRAWING No: **Figure 6**

Key:

- Sample Points
- Investigation Area

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APPENDICIES

APPENDIX A – OWNERSHIP DETAILS

NEW SOUTH WALES LAND REGISTRY SERVICES - CT INQUIRY

FOLIO: 1/49/758032

Status: NOT IN NSWLRS - DELIVERED

Edition No: 1 Date Issued: 24/8/1995 Status Date: 13/11/2012

Last Delivered To: 813E CROWN SOLICITORS OFFICE OF NSW

Issued By: DD 0431053

*** END OF SEARCH ***

APPENDIX B – TABULATED RESULTS

[illegible][illegible]

Field ID	LocCode	Sample_Depth_Range	Sampled_Date/Time	Matrix_Description															
SWC17.1.0	1		24/05/2019	0.4	<0.1	0.1	<0.1	0.2	0.4	<0.5	<0.5	<0.5	2.3	<25	<50	<100	<100		
SWC17.2.0	2		24/05/2019	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	0.05	<25	<50	<100	<100		
SWC21.0.5	0.5		24/05/2019	0.7	<0.1	0.1	<0.1	0.4	0.8	<0.5	<0.5	<0.5	4.1	<25	<50	<100	<100		
SWC21.2.0	2		24/05/2019	0.2	<0.1	<0.1	<0.1	0.2	0.2	<0.5	<0.5	<0.5	0.89	<25	<50	<100	<100		
SWC24.1.0	1		24/05/2019	0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.5	<0.5	<0.5	0.2	<25	<50	<100	<100		
SWC24.1.5	1.5		24/05/2019	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100		
SWC30.0.5	0.5		24/05/2019	0.4	<0.1	<0.1	<0.1	0.2	0.4	<0.5	<0.5	<0.5	0.2	<25	<50	<100	<100		
SWC30.1.0	1		24/05/2019	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100		
SWC38.1.5	1.5		24/05/2019	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100		
SWC38.2.0	2		24/05/2019	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100		

[illegible]

156675 - Armidale

[illegible]

Table 2 - Soil Analytical Results:PAH Validation

156675 - Armidale

					PAH/Phenols				TPH			
					Benz(a)pyrene TEQ (LOR)	Benz(a)pyrene TEQ calc (Zero)	PAH (Sum of positive)	Carcinogenic PAHs as B(a)P TPE	G-C9	C10-C14	C15-C28	C29-C36
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					0.5	0.5	0.05		25	50	100	100
HSL-C Direct Contact								3				
NEPM 2013 Table 1A(1) Hills Rec C Soil												
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand												
0-1m												
1-2m												
2-4m												
>4m												
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand												
0-1m												
1-2m												
2-4m												
>4m												

Field_ID	LocCode	Sample_Depth_Range	Sampled_Date-Time	Matrix_Description								
WC15		0	24/05/2019		<0.5	<0.5	3.1	0.294	<25	<50	<100	<100
WC15		0.5	24/05/2019		<0.5	<0.5	1.4	0.1675	<25	<50	<100	<100
WC15		1	24/05/2019		<0.5	<0.5	3.2	0.295	<25	<50	<100	<100
WC15		1.5	24/05/2019		<0.5	<0.5	1.5	0.1775	<25	<50	<100	<100
WC15		2	24/05/2019		<0.5	<0.5	<0.05	<0.172	<25	<50	<100	<100
WC16		0	24/05/2019		<0.5	<0.5	<0.05	<0.172	<25	<50	<100	<100
WC16		0.5	24/05/2019		1	0.9	9.6	0.813	<25	<50	<100	<100
WC16		1	24/05/2019		0.7	0.6	7.8	0.639	<25	<50	<100	<100
WC16		1.5	24/05/2019		0.6	0.5	6.4	0.527	<25	<50	<100	<100
WC16		2	24/05/2019		<0.5	<0.5	<0.05	<0.172	<25	<50	<100	<100
WC17		0	24/05/2019		<0.5	<0.5	0.3	<0.172	<25	<50	<100	<100
WC17		0.9	24/05/2019		2.4	2.4	17	2.126	<25	<50	<100	<100
WC17		1	24/05/2019		<0.5	<0.5	0.4	0.121	<25	<50	<100	<100
WC17		1.5	24/05/2019		<0.5	<0.5	0.4	0.121	<25	<50	<100	<100
WC17		2	24/05/2019		<0.5	<0.5	0.3	0.121	<25	<50	<100	<100
WC18		0	24/05/2019		<0.5	<0.5	2.8	0.395	<25	<50	<100	<100
WC18		0.9	24/05/2019		<0.5	<0.5	<0.05	<0.172	<25	<50	<100	<100
WC18		1	24/05/2019		<0.5	<0.5	<0.05	<0.172	<25	<50	<100	<100
WC18		1.9	24/05/2019		<0.5	<0.5	<0.05	<0.172	<25	<50	<100	<100
WC18		2	24/05/2019		<0.5	<0.5	<0.05	<0.172	<25	<50	<100	<100

Statistical Summary												
Number of Results	20	20	20	20	20	20	20	20	20	20	20	20
Number of Detects	4	4	13	12	0	0	0	0	0	0	0	0
Minimum Concentration	<0.5	<0.5	<0.05	0.121	<25	<50	<100	<100				
Minimum Detect	0.6	0.5	0.3	0.121	ND	ND	ND	ND				
Maximum Concentration	2.4	2.4	17	2.126	<25	<50	<100	<100				
Maximum Detect	2.4	2.4	17	2.126	ND	ND	ND	ND				
Average Concentration	0.44	0.42	2.7	0.32	13	25	50	50				
Median Concentration	0.25	0.25	0.4	0.121	12.5	25	50	50				
Standard Deviation	0.5	0.49	4.4	0.47	0	0	0	0				
Number of Guideline Exceedances	0	0	0	0	0	0	0	0				
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0				

			TRH							BTEX									
			C6-C10	C6-C10 less BTEX (F1)	C10-C16	F2-NAPHTHALENE	C16-C34	C34-C40	C10-C40 (Sum of Total)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene (Total)	Arsenic	Cadmium	Chromium (III+VI)	Copper
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			25	25	50	50	100	100	50	0.2	0.5	1	2	1	25	4	0.4	1	1
HSL-C Direct Contact			5100		3800		5300	7400		120	1800	5300			15,000				
NEPM 2013 Table 1A(1) HILs Rec C Soil																300	90		17,000
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand																			
0-1m				45		110				0.5	160	55			40				
1-2m				70		240				0.5	220	NL			60				
2-4m				110		440				0.5	310	NL			95				
>4m				200		NL				0.5	540	NL			170				
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand																			
0-1m				NL		NL				NL	NL	NL			NL				
1-2m				NL		NL				NL	NL	NL			NL				
2-4m				NL		NL				NL	NL	NL			NL				
>4m				NL		NL				NL	NL	NL			NL				
Field_ID	Sample_Depth_Range	Sampled_Date-Time	Matrix_Description																
South N. T0-0.5	24/05/2019	Soil	<25	<25	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<4	<0.4	59	25
South N. T0-0.5	24/05/2019	Soil	<25	<25	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<4	<0.4	53	23
South N. T0.5-1.0	24/05/2019	Soil	<25	<25	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<4	<0.4	55	23
South N. T1.0-1.5	24/05/2019	Soil	<25	<25	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<4	<0.4	54	22
South N. T1.5-2.0	24/05/2019	Soil	<25	<25	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<4	<0.4	53	24
South N. CQA1	24/05/2019	Soil	<25	<25	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<4	<0.4	46	22
North N. T0-0.5	24/05/2019	Soil	<25	<25	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<4	<0.4	67	26
North N. T0.5-1.0	24/05/2019	Soil	<25	<25	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<4	<0.4	58	24
North N. T1.0-1.5	25/05/2019	Soil	<25	<25	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<4	<0.4	60	23
North N. T1.5-2.0	25/05/2019	Soil	<25	<25	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<4	<0.4	50	22
North N. CQA2	24/05/2019	Soil	<25	<25	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<4	<0.4	58	21

					PAH													
	Lead	Mercury	Nickel	Zinc	Benzo(a)anthracene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(b)fluoranthene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(g,h,i)perylene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	1	0.1	1	1	0.2	0.1	0.1	0.1		0.1	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1
HSL-C Direct Contact																		1900
NEPM 2013 Table 1A(1) HILs Rec C Soil	600	80	1200	30,000														
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand																		
0-1m																		3
1-2m																		NL
2-4m																		NL
>4m																		NL
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand																		
0-1m																		NL
1-2m																		NL
2-4m																		NL
>4m																		NL

Field_ID	Sample_Depth_Range	Sampled_Date-Time	Matrix_Description																
South N. T0-0.5	24/05/2019	Soil	6	<0.1	41	34	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
South N. T0-0.5	24/05/2019	Soil	7	<0.1	37	32	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
South N. T0.5-1.0	24/05/2019	Soil	6	<0.1	36	37	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
South N. T1.0-1.5	24/05/2019	Soil	7	<0.1	30	30	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
South N. T1.5-2.0	24/05/2019	Soil	8	<0.1	57	38	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
South N. CQA1	24/05/2019	Soil	8	<0.1	61	30	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
North N. T0-0.5	24/05/2019	Soil	8	<0.1	45	34	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
North N. T0.5-1.0	24/05/2019	Soil	11	<0.1	40	39	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	0.1	<0.1	0.1	<0.1	0.2	<0.1	<0.1
North N. T1.0-1.5	25/05/2019	Soil	9	<0.1	39	34	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
North N. T1.5-2.0	25/05/2019	Soil	12	0.2	35	43	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
North N. CQA2	24/05/2019	Soil	13	<0.1	33	44	0.2	<0.1	<0.1	<0.1	0.4	0.2	0.2	0.1	0.3	<0.1	0.5	<0.1	0.1

	Phenanthrene	Pyrene	Benzo(a)pyrene TEQ calc(half)	Benzo(a)pyrene TEQ calc(LOR)	Benzo(a)pyrene TEQ calc(Zero)	PAHs (Sum of positives)	TPH			
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	C6 - C9	C10 - C14	C15 - C28	C29-C36
EQL	0.1	0.1	0.5	0.5	0.5	0.05	25	50	100	100
HSL-C Direct Contact										
NEPM 2013 Table 1A(1) HILs Rec C Soil										
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand										
0-1m										
1-2m										
2-4m										
>4m										
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand										
0-1m										
1-2m										
2-4m										
>4m										

Field_ID	Sample_Depth_Range	Sampled_Date-Time	Matrix_Description									
South N. T0-0.5	24/05/2019	Soil	<0.1	<0.1	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100
South N. T0-0.5	24/05/2019	Soil	<0.1	<0.1	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100
South N. T0.5-1.0	24/05/2019	Soil	<0.1	<0.1	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100
South N. T1.0-1.5	24/05/2019	Soil	<0.1	<0.1	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100
South N. T1.5-2.0	24/05/2019	Soil	<0.1	<0.1	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100
South N. CQA1	24/05/2019	Soil	<0.1	<0.1	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100
North N. T0-0.5	24/05/2019	Soil	<0.1	<0.1	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100
North N. T0.5-1.0	24/05/2019	Soil	0.1	0.2	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100
North N. T1.0-1.5	25/05/2019	Soil	<0.1	<0.1	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100
North N. T1.5-2.0	25/05/2019	Soil	<0.1	<0.1	<0.5	<0.5	<0.5	<0.05	<25	<50	<100	<100
North N. CQA2	24/05/2019	Soil	0.3	0.5	<0.5	<0.5	<0.5	2.6	<25	<50	<100	<100

APPENDIX C – LABORATORY CERTIFICATES OF ANALYSIS

**SERS**Site Environmental and
Remediation Services*Office Locations***Brisbane**95 Sandgate Road
Albion QLD 4010**Darwin**48 – 50 Smith Street
Darwin NT 0800**Melbourne**14/380 St Kilda Rd
Melbourne VIC 3004**Perth**281 Newcastle Street
Northbridge WA 6003**Sydney**5/2 Bennett Street
Mortlake NSW 2137**Phone**

1300 320 696

Email

reception@sers.net.au

LABORATORY FIBRE IDENTIFICATION CERTIFICATE OF ANALYSIS – SOIL ANALYSIS

Job Number	156675	Date Sampled	27 May 2019
Purchase Order Number	N/A	Sampled By	Carl Pump
Client	Demex	Address Of Sampling Site	Armidale High School, Butler Street, Armidale NSW 2350
Client Address	PO Box 5557, QLD 4218	Number Of Samples	41
Contact	Richard Todd	Date Received At Laboratory	27 May 2019
Telephone	1300 634 777	Date Analysed	29 May 2019
Email	richard@demex.com.au	Laboratory Location	SERS Laboratory Brisbane

SERS Lab Sample Number	Date Sampled	Location	Sample Weight (g)	Asbestos ID	Trace Analysis	Asbestos ID – DOH/NEPM**				
						ACM in >7mm (g)	AF (g)	FA (g)	Bonded ACM (%)	AF/FA (%)
ISS01	27/05/19	SL1	553	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS02	27/05/19	SL2	511	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS03	27/05/19	SL3	645	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS04	27/05/19	SL4	562	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS05	27/05/19	SL5	467	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS06	27/05/19	SL6	547	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001





SERS Lab Sample Number	Date Sampled	Location	Sample Weight (g)	Asbestos ID	Trace Analysis	Asbestos ID – DOH/NEPM**				
						ACM in >7mm (g)	AF (g)	FA (g)	Bonded ACM (%)	AF/FA (%)
ISS07	27/05/19	SL7	478	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS08	27/05/19	SL8	624	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS09	27/05/19	SL9	641	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS10	27/05/19	SL10	463	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS11	27/05/19	SL11	528	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS12	27/05/19	SL12	384	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS13	27/05/19	SL13	907	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS14	27/05/19	SL14	451	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS15	27/05/19	SL15	598	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS16	27/05/19	SL16	402	CHR detected in Fibre Cement Material ORG detected as Free Fibre	NADRL	0	0.057	0	<0.01	0.002



SERS Lab Sample Number	Date Sampled	Location	Sample Weight (g)	Asbestos ID	Trace Analysis	Asbestos ID – DOH/NEPM**				
						ACM in >7mm (g)	AF (g)	FA (g)	Bonded ACM (%)	AF/FA (%)
ISS17	27/05/19	SL17	356	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS18	27/05/19	SL18	598	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS19	27/05/19	SL19	469	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS20	27/05/19	SL20	430	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS21	27/05/19	SL21	458	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS22	27/05/19	SL22	512	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS23	27/05/19	SL23	443	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS24	27/05/19	SL24	444	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS25	27/05/19	SL25	545	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS26	27/05/19	SL26	683	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001



SERS Lab Sample Number	Date Sampled	Location	Sample Weight (g)	Asbestos ID	Trace Analysis	Asbestos ID – DOH/NEPM**				
						ACM in >7mm (g)	AF (g)	FA (g)	Bonded ACM (%)	AF/FA (%)
ISS27	27/05/19	SL27	539	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS28	27/05/19	SL28	510	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS30	27/05/19	SL30	489	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS31	27/05/19	SL31	461	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS32A	27/05/19	SL32	492	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
iSS32B	27/05/19	SL32	605	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS33	27/05/19	SL33	898	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS34	27/05/19	SL34	779	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS35	27/05/19	SL35	558	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS36	27/05/19	SL36	645	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001



SERS Lab Sample Number	Date Sampled	Location	Sample Weight (g)	Asbestos ID	Trace Analysis	Asbestos ID – DOH/NEPM**				
						ACM in >7mm (g)	AF (g)	FA (g)	Bonded ACM (%)	AF/FA (%)
ISS37	27/05/19	SL37	563	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
ISS38	27/05/19	SL38	724	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
QA01	27/05/19	QA01	397	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
QA02	27/05/19	QA02	680	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001

Legend	
NAD	No Asbestos Detected
NADRL	No Asbestos Detected at Reporting Limit of 0.1g/kg
CHR	Chrysotile Asbestos Detected
AMO	Amosite Asbestos Detected
CRO	Crocidolite Asbestos Detected
UMF	Unknown Mineral Fibres Detected
SMF	Synthetic Mineral Fibres Detected
ORG	Organic Fibres Detected

Method: Samples submitted to SERS laboratory for qualitative fibre identification are subjected to polarised light microscopy including dispersion staining technique. Examination of samples is completed in accordance with *AS4964-2004 Method for the qualitative identification of asbestos in bulk samples* and SERS in-house method *L/PR002 Fibre Identification*. Minimum of 500mL soil was analysed as recommended by "The Guidelines from the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia - May 2009", with a reporting limit of 0.1g/kg. If sub-sampling has been used, accuracy of the sample results may vary.

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Approved Identifier:

Sheralynn Seah (Laboratory Manager)

Approved Signatory:

Sheralynn Seah (Laboratory Manager)

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Mortlake NSW 2137**Phone**

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LABORATORY FIBRE IDENTIFICATION CERTIFICATE OF ANALYSIS – SOIL ANALYSIS

Job Number	156 675	Date Sampled	03 June 2019
Purchase Order Number	N/A	Sampled By	Ikem Onyene
Client	Demex	Address Of Sampling Site	Armidale High School, Butler Street, Armidale NSW 2350
Client Address	PO Box 5557, QLD 4218	Number Of Samples	6
Contact	Richard Todd	Date Received At Laboratory	03 June 2019
Telephone	1300 634 777	Date Analysed	06 June 2019
Email	richard@demex.com.au	Laboratory Location	SERS Laboratory Brisbane

SERS Lab Sample Number	Client Sample Number	Date Sampled	Depth	Sample Weight (g)	Asbestos ID	Trace Analysis	Asbestos ID – DOH/NEPM**				
							ACM in >7mm (g)	ACM in <7mm (g)	AF/FA (g)	Bonded ACM (%)	AF/FA (%)
001	V1-SL33	03/06/19	N/A	442	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	No Asbestos Detected	0	0	0	<0.01	<0.001
002	V2-SL33	03/06/19	N/A	463	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	No Asbestos Detected	0	0	0	<0.01	<0.001
003	V1-SL27	03/06/19	N/A	541	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	No Asbestos Detected	0	0	0	<0.01	<0.001
004	V2-SL27	03/06/19	N/A	710	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	No Asbestos Detected	0	0	0	<0.01	<0.001
005	V1-SL22	03/06/19	N/A	950	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	No Asbestos Detected	0	0	0	<0.01	<0.001
006	V2-SL22	03/06/19	N/A	682	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	No Asbestos Detected	0	0	0	<0.01	<0.001





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Legend	
NAD	No Asbestos Detected
CHR	Chrysotile Asbestos Detected
AMO	Amosite Asbestos Detected
CRO	Crocidolite Asbestos Detected
UMF	Unknown Mineral Fibres Detected
SMF	Synthetic Mineral Fibres Detected
ORG	Organic Fibres Detected

Method: Samples submitted to SERS laboratory for qualitative fibre identification are subjected to polarised light microscopy including dispersion staining techniques. Examination of samples is completed in accordance with *AS4964-2004 Method for the qualitative identification of asbestos in bulk samples* and SERS in-house method *LAB PR002 Fibre Identification*. Minimum of 500mL soil was analysed as recommended by "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009", with a reporting limit of 0.1g/kg. If sub-sampling has been used, accuracy of the sample results may vary.

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Approved Signatory:

Sally Ann Snook (Laboratory Analyst)

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Mortlake NSW 2137**Phone**

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LABORATORY FIBRE IDENTIFICATION CERTIFICATE OF ANALYSIS – SOIL ANALYSIS

Job Number	156 675	Date Sampled	13 June 2019
Purchase Order Number	N/A	Sampled By	As Received from Client
Client	Demex	Address Of Sampling Site	Armidale High School, Butler Street, Armidale NSW 2350
Client Address	PO Box 5557, QLD 4218	Number Of Samples	15
Contact	Richard Todd	Date Received At Laboratory	18 June 2019
Telephone	1300 634 777	Date Analysed	18 June 2019
Email	richard@demex.com.au	Laboratory Location	SERS Laboratory Brisbane

SERS Lab Sample Number	Location	Date Sampled	Sample Weight (g)	Asbestos ID	Trace Analysis	Asbestos ID – DOH/NEPM**				
						ACM in >7mm (g)	AF (g)	FA (g)	Bonded ACM (%)	AF/FA (%)
1	VS01	18/06/19	777	Asbestos detected at 1.7g/kg CHR, CRO detected in Fibre Cement Material ORG, SMF detected as Free Fibre	NADRL	8.576	0.077	0	0.165	<0.001
2	VS02	18/06/19	780	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
3	VS05	18/06/19	817	Asbestos detected at 2.1g/kg CHR, CRO detected in Fibre Cement Material ORG detected as Free Fibre	NADRL	11.485	0	0	0.211	<0.001
4	VS06	18/06/19	800	Asbestos detected at 3.0g/kg CHR, CRO detected in Fibre Cement Material ORG detected as Free Fibre	NADRL	16.095	0	0	0.302	<0.001
5	VS07	18/06/19	898	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
6	VS09	18/06/19	821	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001





SERS Lab Sample Number	Location	Date Sampled	Sample Weight (g)	Asbestos ID	Trace Analysis	Asbestos ID – DOH/NEPM**				
						ACM in >7mm (g)	AF (g)	FA (g)	Bonded ACM (%)	AF/FA (%)
7	VS10	18/06/19	884	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
8	VS11	18/06/19	849	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
9	VS13	18/06/19	826	Asbestos detected at 0.9g/kg CHR, AMO detected in Fibre Cement Material ORG, SMF detected as Free Fibre	NADRL	5.273	0.227	0	0.096	0.004
10	VS14	18/06/19	971	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
11	VS15	18/06/19	809	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
12	VS16	18/06/19	708	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
13	VS17	18/06/19	804	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
14	VS19	18/06/19	905	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
15	QA01	18/06/19	770	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001



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Legend	
NAD	No Asbestos Detected
NADRL	No Asbestos Detected at reporting limit of 0.1g/kg
CHR	Chrysotile Asbestos Detected
AMO	Amosite Asbestos Detected
CRO	Crocidolite Asbestos Detected
UMF	Unknown Mineral Fibres Detected
SMF	Synthetic Mineral Fibres Detected
ORG	Organic Fibres Detected

Method: Samples submitted to SERS laboratory for qualitative fibre identification are subjected to polarised light microscopy including dispersion staining techniques. Examination of samples is completed in accordance with *AS4964-2004 Method for the qualitative identification of asbestos in bulk samples* and SERS in-house method *LAB PR002 Fibre Identification*. Minimum of 500mL soil was analysed as recommended by "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009", with a reporting limit of 0.1g/kg. If sub-sampling has been used, accuracy of the sample results may vary.

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Approved Signatory:

Sally Ann Snook (Laboratory Analyst)

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LABORATORY FIBRE IDENTIFICATION CERTIFICATE OF ANALYSIS – SOIL ANALYSIS

Job Number	156675	Date Sampled	26 th June 2019
Purchase Order Number	N/A	Sampled By	Ikem Onyene
Client	Demex	Address Of Sampling Site	Armidale High School, Butler Street Armidale NSW 2350
Client Address	PO Box 5557, QLD 4218	Number Of Samples	3
Contact	Ben Frerker	Date Received At Laboratory	28 th June 2019
Telephone	0449 548 673	Date Analysed	28 th June 2019
Email	ben@demex.com.au	Laboratory Location	SERS Laboratory Brisbane

SERS Lab Sample Number	Client Sample Number	Date Sampled	Depth	Sample Weight (g)	Asbestos ID	Trace Analysis	Asbestos ID – DOH/NEPM**				
							ACM in >7mm (g)	ACM in <7mm (g)	AF/FA (g)	Bonded ACM (%)	AF/FA (%)
001	SPV1	24/06/19	N/A	875	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre CHR detected in Fibre Cement	Asbestos Not Detected	0	0	0	<0.01	<0.001
002	SPV2	24/06/19	N/A	889	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre CHR detected in Fibre Cement	Asbestos Not Detected	0	0.045	0	<0.01	<0.001
003	SPV3	24/06/19	N/A	930	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	Asbestos Not Detected	0	0	0	<0.01	<0.001





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Job Number 156675

Address Of Sampling Site Armidale High School

Client Demex

Legend	
NAD	No Asbestos Detected
CHR	Chrysotile Asbestos Detected
AMO	Amosite Asbestos Detected
CRO	Crocidolite Asbestos Detected
UMF	Unknown Mineral Fibres Detected
SMF	Synthetic Mineral Fibres Detected
ORG	Organic Fibres Detected

Method: Samples submitted to SERS laboratory for qualitative fibre identification are subjected to polarised light microscopy including dispersion staining techniques. Examination of samples is completed in accordance with *AS4964-2004 Method for the qualitative identification of asbestos in bulk samples* and SERS in-house method *LAB PR002 Fibre Identification*. Minimum of 500mL soil was analysed as recommended by "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009", with a reporting limit of 0.1g/kg. If sub-sampling has been used, accuracy of the sample results may vary.

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Sally Ann Snook (Laboratory Analyst)

Approved Signatory:

Sally Ann Snook (Laboratory Analyst)

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LABORATORY FIBRE IDENTIFICATION CERTIFICATE OF ANALYSIS – SOIL ANALYSIS

Job Number	156 675	Date Sampled	03 June 2019
Purchase Order Number	N/A	Sampled By	Ikem Onyene
Client	Demex	Address Of Sampling Site	Armidale High School, Butler Street, Armidale NSW 2350
Client Address	PO Box 5557, QLD 4218	Number Of Samples	8
Contact	Richard Todd	Date Received At Laboratory	03 June 2019
Telephone	1300 634 777	Date Analysed	06 June 2019
Email	richard@demex.com.au	Laboratory Location	SERS Laboratory Brisbane

SERS Lab Sample Number	Date Sampled	Location	Sample Weight (g)	Asbestos ID	Trace Analysis	Asbestos ID – DOH/NEPM**				
						ACM in >7mm (g)	AF (g)	FA (g)	Bonded ACM (%)	AF/FA (%)
001	03/06/19	Agricultural Area – V1	472	Asbestos detected at 1.6g/kg CHR, CRO Asbestos detected in Fibre Cement Material ORG detected as Free Fibre	NADRL	5.000	0.009	0	0.159	<0.001
002	03/06/19	Agricultural Area – V2	534	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
003	03/06/19	Agricultural Area – V3	716	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
004	03/06/19	Agricultural Area – V4	550	Asbestos detected at 0.7g/kg CHR, CRO Asbestos detected in Fibre Cement Material ORG detected as Free Fibre	NADRL	2.567	0	0	0.127	<0.001
005	03/06/19	Agricultural Area – V5	564	Asbestos detected at 0.9g/kg CHR, CRO Asbestos detected in Fibre Cement Material ORG detected as Free Fibre	NADRL	3.413	0	0	0.161	<0.001
006	03/06/19	Agricultural Area – V6	632	Asbestos detected at 0.4g/kg CHR, CRO Asbestos detected in Fibre Cement Material ORG detected as Free Fibre	NADRL	1.629	0	0	0.061	<0.001





SERS Lab Sample Number	Date Sampled	Location	Sample Weight (g)	Asbestos ID	Trace Analysis	Asbestos ID – DOH/NEPM**				
						ACM in >7mm (g)	AF (g)	FA (g)	Bonded ACM (%)	AF/FA (%)
007	03/06/19	Agricultural Area – V7	624	Asbestos detected at 0.3g/kg CHR, CRO Asbestos detected in Fibre Cement Material ORG detected as Free Fibre	NADRL	1.262	0	0	0.049	<0.001
008	03/06/19	Agricultural Area – V8	831	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001

Legend	
NAD	No Asbestos Detected
NADRL	No Asbestos Detected at Reporting Limit of 0.1g/kg
CHR	Chrysotile Asbestos Detected
AMO	Amosite Asbestos Detected
CRO	Crocidolite Asbestos Detected
UMF	Unknown Mineral Fibres Detected
SMF	Synthetic Mineral Fibres Detected
ORG	Organic Fibres Detected

Method: Samples submitted to SERS laboratory for qualitative fibre identification are subjected to polarised light microscopy including dispersion staining techniques. Examination of samples is completed in accordance with *AS4964-2004 Method for the qualitative identification of asbestos in bulk samples* and SERS in-house method *LAB PR002 Fibre Identification*. Minimum of 500mL soil was analysed as recommended by "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009", with a reporting limit of 0.1g/kg. If sub-sampling has been used, accuracy of the sample results may vary.

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Approved Signatory:

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Mortlake NSW 2137

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LABORATORY FIBRE IDENTIFICATION CERTIFICATE OF ANALYSIS – SOIL ANALYSIS

Job Number	156675	Date Sampled	25 June 2019
Purchase Order Number	N/A	Sampled By	Ikem Onyene
Client	Demex	Address Of Sampling Site	Armidale High School, Butler Street, Armidale NSW 2350
Client Address	PO Box 5557, QLD 4218	Number Of Samples	4
Contact	Richard Todd	Date Received At Laboratory	25 June 2019
Telephone	1300 634 777	Date Analysed	27 June 2019
Email	richard@demex.com.au	Laboratory Location	SERS Laboratory Brisbane

SERS Lab Sample Number	Client Sample Number	Date Sampled	Depth	Sample Weight (g)	Asbestos ID	Trace Analysis	Asbestos ID – DOH/NEPM**				
							ACM in >7mm (g)	ACM in <7mm (g)	AF/FA (g)	Bonded ACM (%)	AF/FA (%)
001	SPV1	25/06/19	N/A	765	No asbestos detected at reporting limit of 0.1g/kg NAD, ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
002	SPV1A	25/06/19	N/A	717	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
003	SPV2	25/06/19	N/A	613	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
004	SPV2A	25/06/19	N/A	745	CHR detected in Fibre Cement Material, CRO detected in Fibre Cement Material, ORG detected as Free Fibre	NADRL	0.677	0	0	<0.01	<0.001





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Job Number 156675

Address Of Sampling Site Armidale High School

Client Demex

Legend	
NAD	No Asbestos Detected
CHR	Chrysotile Asbestos Detected
AMO	Amosite Asbestos Detected
CRO	Crocidolite Asbestos Detected
UMF	Unknown Mineral Fibres Detected
SMF	Synthetic Mineral Fibres Detected
ORG	Organic Fibres Detected

Method: Samples submitted to SERS laboratory for qualitative fibre identification are subjected to polarised light microscopy including dispersion staining techniques. Examination samples is completed in accordance with *AS4964-2004 Method for the qualitative identification of asbestos in bulk samples* and SERS in-house method *LAB PR002 Fibre Identification*. Minimum of 500mL soil was analysed as recommended by "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia May 2009", with a reporting limit of 0.1g/kg. If sub-sampling has been used, accuracy of the sample results may vary.

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Mortlake NSW 2137**Phone**

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LABORATORY FIBRE IDENTIFICATION CERTIFICATE OF ANALYSIS – SOIL ANALYSIS

Job Number	156675	Date Sampled	29 June 2019
Purchase Order Number	N/A	Sampled By	Carl Kleinhaus
Client	Demex	Address Of Sampling Site	Armidale High School, Butler Street Armidale NSW 2350
Client Address	PO Box 5557, QLD 4218	Number Of Samples	2
Contact	Richard Todd	Date Received At Laboratory	29 June 2019
Telephone	1300 634 777	Date Analysed	02 July 2019
Email	richard@demex.com.au	Laboratory Location	SERS Laboratory Brisbane

SERS Lab Sample Number	Client Sample Number	Date Sampled	Depth	Sample Weight (g)	Asbestos ID	Trace Analysis	Asbestos ID – DOH/NEPM**				
							ACM in >7mm (g)	ACM in <7mm (g)	AF/FA (g)	Bonded ACM (%)	AF/FA (%)
SPV2B		29/06/19	N/A	718	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001
SPV3		29/06/19	N/A	691	No asbestos detected at reporting limit of 0.1g/kg ORG detected as Free Fibre	NADRL	0	0	0	<0.01	<0.001

Legend	
NAD	No Asbestos Detected
CHR	Chrysotile Asbestos Detected
AMO	Amosite Asbestos Detected
CRO	Crocidolite Asbestos Detected
UMF	Unknown Mineral Fibres Detected
SMF	Synthetic Mineral Fibres Detected
ORG	Organic Fibres Detected

Method: Samples submitted to SERS laboratory for qualitative fibre identification are subjected to polarised light microscopy including dispersion staining techniques. Examination samples is completed in accordance with *AS4964-2004 Method for the qualitative identification of asbestos in bulk samples* and SERS in-house method *LAB PR002 Fibre Identification*. Minimum of 500mL soil was analysed as recommended by "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia: May 2009", with a reporting limit of 0.1g/kg. If sub-sampling has been used, accuracy of the sample results may vary.

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Job Number 156675

Address Of Sampling Site Armidale High School

Client Demex



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Sally Ann Snook (Laboratory Analyst)

Approved Signatory:

Sally Ann Snook (Laboratory Analyst)

CERTIFICATE OF ANALYSIS 218426

Client Details

Client	SERS Pty Ltd
Attention	Ikem Onyene, Richard Southam
Address	95 Sandgate Rd, Albion, QLD, 4010

Sample Details

Your Reference	<u>156675</u>
Number of Samples	10 Soil
Date samples received	28/05/2019
Date completed instructions received	28/05/2019

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	30/05/2019
Date of Issue	30/05/2019
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Results Approved By

Jeremy Faircloth, Operations Manager, Sydney
Ken Nguyen, Reporting Supervisor
Steven Luong, Organics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil

Our Reference		218426-1	218426-2	218426-3	218426-4	218426-5
Your Reference	UNITS	South N. TP0_0.5	South N. TP0.5_1.0	South N. TP1.0_1.5	South N. TP1.5_2.0	South N. QA1
Depth		0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	-
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/05/2019	29/05/2019	29/05/2019	29/05/2019	29/05/2019
Date analysed	-	30/05/2019	30/05/2019	30/05/2019	30/05/2019	30/05/2019
TRH C ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
TRH C ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
vTPH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	103	125	108	71	82

vTRH(C6-C10)/BTEXN in Soil

Our Reference		218426-6	218426-7	218426-8	218426-9	218426-10
Your Reference	UNITS	North N. TP0_0.5	North N. TP0.5_1.0	North N. TP1.0_1.5	North N. TP1.5_2.0	North N. QA1
Depth		0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	-
Date Sampled		24/05/2019	24/05/2019	25/05/2019	25/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/05/2019	29/05/2019	29/05/2019	29/05/2019	29/05/2019
Date analysed	-	30/05/2019	30/05/2019	30/05/2019	30/05/2019	30/05/2019
TRH C ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
TRH C ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
vTPH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	83	85	69	69	85

svTRH (C10-C40) in Soil

Our Reference		218426-1	218426-2	218426-3	218426-4	218426-5
Your Reference	UNITS	South N. TP0_0.5	South N. TP0.5_1.0	South N. TP1.0_1.5	South N. TP1.5_2.0	South N. QA1
Depth		0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	-
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/05/2019	29/05/2019	29/05/2019	29/05/2019	29/05/2019
Date analysed	-	30/05/2019	30/05/2019	30/05/2019	30/05/2019	30/05/2019
TRH C ₁₀ - C ₁₄	mg/kg	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	mg/kg	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	mg/kg	<100	<100	<100	<100	<100
TRH >C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	83	84	83	83	82

svTRH (C10-C40) in Soil

Our Reference		218426-6	218426-7	218426-8	218426-9	218426-10
Your Reference	UNITS	North N. TP0_0.5	North N. TP0.5_1.0	North N. TP1.0_1.5	North N. TP1.5_2.0	North N. QA1
Depth		0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	-
Date Sampled		24/05/2019	24/05/2019	25/05/2019	25/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/05/2019	29/05/2019	29/05/2019	29/05/2019	29/05/2019
Date analysed	-	30/05/2019	30/05/2019	30/05/2019	30/05/2019	30/05/2019
TRH C ₁₀ - C ₁₄	mg/kg	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	mg/kg	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	mg/kg	<100	<100	<100	<100	<100
TRH >C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	84	82	81	82	82

PAHs in Soil						
Our Reference		218426-1	218426-2	218426-3	218426-4	218426-5
Your Reference	UNITS	South N. TP0_0.5	South N. TP0.5_1.0	South N. TP1.0_1.5	South N. TP1.5_2.0	South N. QA1
Depth		0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	-
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/05/2019	29/05/2019	29/05/2019	29/05/2019	29/05/2019
Date analysed	-	30/05/2019	30/05/2019	30/05/2019	30/05/2019	30/05/2019
Naphthalene	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+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate <i>p</i> -Terphenyl-d14	%	103	104	104	110	108

PAHs in Soil						
Our Reference		218426-6	218426-7	218426-8	218426-9	218426-10
Your Reference	UNITS	North N. TP0_0.5	North N. TP0.5_1.0	North N. TP1.0_1.5	North N. TP1.5_2.0	North N. QA1
Depth		0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	-
Date Sampled		24/05/2019	24/05/2019	25/05/2019	25/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/05/2019	29/05/2019	29/05/2019	29/05/2019	29/05/2019
Date analysed	-	30/05/2019	30/05/2019	30/05/2019	30/05/2019	30/05/2019
Naphthalene	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	0.3
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.2	<0.1	<0.1	0.5
Pyrene	mg/kg	<0.1	0.2	<0.1	<0.1	0.5
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Chrysene	mg/kg	<0.1	0.1	<0.1	<0.1	0.3
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	0.4
Benzo(a)pyrene	mg/kg	<0.05	0.1	<0.05	<0.05	0.2
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Total +ve PAH's	mg/kg	<0.05	0.81	<0.05	<0.05	2.6
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	111	106	93	100	105

Acid Extractable metals in soil

Our Reference		218426-1	218426-2	218426-3	218426-4	218426-5
Your Reference	UNITS	South N. TP0_0.5	South N. TP0.5_1.0	South N. TP1.0_1.5	South N. TP1.5_2.0	South N. QA1
Depth		0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	-
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	29/05/2019	29/05/2019	29/05/2019	29/05/2019	29/05/2019
Date analysed	-	29/05/2019	29/05/2019	29/05/2019	29/05/2019	29/05/2019
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	59	55	54	53	46
Copper	mg/kg	25	23	22	24	22
Lead	mg/kg	6	6	7	8	8
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	41	36	30	57	61
Zinc	mg/kg	34	37	30	38	30

Acid Extractable metals in soil

Our Reference		218426-6	218426-7	218426-8	218426-9	218426-10
Your Reference	UNITS	North N. TP0_0.5	North N. TP0.5_1.0	North N. TP1.0_1.5	North N. TP1.5_2.0	North N. QA1
Depth		0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	-
Date Sampled		24/05/2019	24/05/2019	25/05/2019	25/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	29/05/2019	29/05/2019	29/05/2019	29/05/2019	29/05/2019
Date analysed	-	29/05/2019	29/05/2019	29/05/2019	29/05/2019	29/05/2019
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	67	58	60	50	58
Copper	mg/kg	26	24	23	22	21
Lead	mg/kg	8	11	9	12	13
Mercury	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Nickel	mg/kg	45	40	39	35	33
Zinc	mg/kg	34	39	34	43	44

Moisture						
Our Reference	UNITS	218426-1	218426-2	218426-3	218426-4	218426-5
Your Reference		South N. TP0_0.5	South N. TP0.5_1.0	South N. TP1.0_1.5	South N. TP1.5_2.0	South N. QA1
Depth		0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	-
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	29/05/2019	29/05/2019	29/05/2019	29/05/2019	29/05/2019
Date analysed	-	30/05/2019	30/05/2019	30/05/2019	30/05/2019	30/05/2019
Moisture	%	18	22	17	17	16

Moisture						
Our Reference	UNITS	218426-6	218426-7	218426-8	218426-9	218426-10
Your Reference		North N. TP0_0.5	North N. TP0.5_1.0	North N. TP1.0_1.5	North N. TP1.5_2.0	North N. QA1
Depth		0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	-
Date Sampled		24/05/2019	24/05/2019	25/05/2019	25/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	29/05/2019	29/05/2019	29/05/2019	29/05/2019	29/05/2019
Date analysed	-	30/05/2019	30/05/2019	30/05/2019	30/05/2019	30/05/2019
Moisture	%	21	14	18	18	14

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	218426-2
Date extracted	-			29/05/2019	1	29/05/2019	29/05/2019		29/05/2019	29/05/2019
Date analysed	-			30/05/2019	1	30/05/2019	30/05/2019		30/05/2019	30/05/2019
TRH C ₆ - C ₉	mg/kg	25	Org-016	<25	1	<25	<25	0	118	116
TRH C ₆ - C ₁₀	mg/kg	25	Org-016	<25	1	<25	<25	0	118	116
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	109	90
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	123	105
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	118	104
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	119	105
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	112	98
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	125	1	103	106	3	127	126

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	218426-2
Date extracted	-			29/05/2019	1	29/05/2019	29/05/2019		29/05/2019	29/05/2019
Date analysed	-			29/05/2019	1	30/05/2019	30/05/2019		30/05/2019	30/05/2019
TRH C ₁₀ - C ₁₄	mg/kg	50	Org-003	<50	1	<50	<50	0	99	96
TRH C ₁₅ - C ₂₈	mg/kg	100	Org-003	<100	1	<100	<100	0	101	95
TRH C ₂₉ - C ₃₆	mg/kg	100	Org-003	<100	1	<100	<100	0	90	87
TRH >C ₁₀ -C ₁₆	mg/kg	50	Org-003	<50	1	<50	<50	0	99	96
TRH >C ₁₆ -C ₃₄	mg/kg	100	Org-003	<100	1	<100	<100	0	101	95
TRH >C ₃₄ -C ₄₀	mg/kg	100	Org-003	<100	1	<100	<100	0	90	87
Surrogate o-Terphenyl	%		Org-003	84	1	83	85	2	100	98

QUALITY CONTROL: PAHs in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	218426-2
Date extracted	-			29/05/2019	1	29/05/2019	29/05/2019		29/05/2019	29/05/2019
Date analysed	-			30/05/2019	1	30/05/2019	30/05/2019		30/05/2019	30/05/2019
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	111	108
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	100	92
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	102	100
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	105	102
Pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	113	106
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	124	122
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	<0.05	<0.05	0	103	104
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	113	1	103	100	3	111	113

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	218426-2
Date prepared	-			29/05/2019	1	29/05/2019	29/05/2019		29/05/2019	29/05/2019
Date analysed	-			29/05/2019	1	29/05/2019	29/05/2019		29/05/2019	29/05/2019
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	98	70
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	95	74
Chromium	mg/kg	1	Metals-020	<1	1	59	53	11	98	75
Copper	mg/kg	1	Metals-020	<1	1	25	23	8	97	92
Lead	mg/kg	1	Metals-020	<1	1	6	7	15	99	76
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	98	86
Nickel	mg/kg	1	Metals-020	<1	1	41	37	10	99	76
Zinc	mg/kg	1	Metals-020	<1	1	34	32	6	95	91

Result Definitions

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

Quality Control Definitions

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

CERTIFICATE OF ANALYSIS 220456

Client Details

Client	SERS Pty Ltd
Attention	Ikem Onyene
Address	95 Sandgate Rd, Albion, QLD, 4010

Sample Details

Your Reference	<u>156675</u>
Number of Samples	4 SOIL
Date samples received	27/06/2019
Date completed instructions received	27/06/2019

Analysis Details

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

Report Details

Date results requested by	27/06/2019
Date of Issue	27/06/2019
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Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Jaimie Loa-Kum-Cheung, Metals Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

Acid Extractable metals in soil				
Our Reference		220456-1	220456-2	220456-4
Your Reference	UNITS	SV1-2.25-Ni	SV2-2.25-Ni	V1-Ni-Skip
Depth		2.25	2.25	-
Date Sampled		26/06/2019	26/06/2019	26/06/2019
Type of sample		SOIL	SOIL	SOIL
Date prepared	-	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019	27/06/2019
Nickel	mg/kg	36	25	53

Moisture				
Our Reference		220456-1	220456-2	220456-4
Your Reference	UNITS	SV1-2.25-Ni	SV2-2.25-Ni	V1-Ni-Skip
Depth		2.25	2.25	-
Date Sampled		26/06/2019	26/06/2019	26/06/2019
Type of sample		SOIL	SOIL	SOIL
Date prepared	-	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019	27/06/2019
Moisture	%	19	16	16

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	[NT]
Date prepared	-			27/06/2019	[NT]	[NT]	[NT]	[NT]	27/06/2019	[NT]
Date analysed	-			27/06/2019	[NT]	[NT]	[NT]	[NT]	27/06/2019	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]

Result Definitions

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

Quality Control Definitions

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

CERTIFICATE OF ANALYSIS 218378

Client Details

Client	SERS Pty Ltd
Attention	Carl Pump
Address	95 Sandgate Rd, Albion, QLD, 4010

Sample Details

Your Reference	<u>155575</u>
Number of Samples	21 soil
Date samples received	28/05/2019
Date completed instructions received	28/05/2019

Analysis Details

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

Report Details

Date results requested by	28/05/2019
Date of Issue	28/05/2019
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Results Approved By

Ken Nguyen, Reporting Supervisor
Nick Sarlamis, Inorganics Supervisor
Steven Luong, Organics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil

Our Reference		218378-1	218378-2	218378-3	218378-4	218378-5
Your Reference	UNITS	WC15	WC15	WC15	WC15	WC15
Depth		0.0	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
TRH C ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
TRH C ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
vTPH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	93	98	99	117	108

vTRH(C6-C10)/BTEXN in Soil

Our Reference		218378-6	218378-7	218378-8	218378-9	218378-10
Your Reference	UNITS	WC16	WC16	WC16	WC16	WC16
Depth		0.0	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
TRH C ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
TRH C ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
vTPH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	107	126	114	94	82

vTRH(C6-C10)/BTEXN in Soil

Our Reference		218378-11	218378-12	218378-13	218378-14	218378-15
Your Reference	UNITS	WC17	WC17	WC17	WC17	WC17
Depth		0.0	0.9	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
TRH C ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
TRH C ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
vTPH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	96	96	82	61	104

vTRH(C6-C10)/BTEXN in Soil

Our Reference		218378-16	218378-17	218378-18	218378-19	218378-20
Your Reference	UNITS	WC18	WC18	WC18	WC18	WC18
Depth		0.0	0.9	1.0	1.9	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
TRH C ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
TRH C ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
vTPH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	92	63	78	70	63

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		218378-21
Your Reference	UNITS	QA01
Depth		-
Date Sampled		24/05/2019
Type of sample		soil
Date extracted	-	28/05/2019
Date analysed	-	28/05/2019
TRH C ₆ - C ₉	mg/kg	<25
TRH C ₆ - C ₁₀	mg/kg	<25
vTPH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	76

svTRH (C10-C40) in Soil						
Our Reference		218378-1	218378-2	218378-3	218378-4	218378-5
Your Reference	UNITS	WC15	WC15	WC15	WC15	WC15
Depth		0.0	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
TRH C ₁₀ - C ₁₄	mg/kg	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	mg/kg	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	mg/kg	<100	<100	<100	<100	<100
TRH >C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	88	86	84	83	83

svTRH (C10-C40) in Soil						
Our Reference		218378-6	218378-7	218378-8	218378-9	218378-10
Your Reference	UNITS	WC16	WC16	WC16	WC16	WC16
Depth		0.0	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
TRH C ₁₀ - C ₁₄	mg/kg	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	mg/kg	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	mg/kg	<100	<100	<100	<100	<100
TRH >C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	81	81	84	83	85

svTRH (C10-C40) in Soil

Our Reference		218378-11	218378-12	218378-13	218378-14	218378-15
Your Reference	UNITS	WC17	WC17	WC17	WC17	WC17
Depth		0.0	0.9	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
TRH C ₁₀ - C ₁₄	mg/kg	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	mg/kg	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	mg/kg	<100	<100	<100	<100	<100
TRH >C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	93	119	85	83	83

svTRH (C10-C40) in Soil

Our Reference		218378-16	218378-17	218378-18	218378-19	218378-20
Your Reference	UNITS	WC18	WC18	WC18	WC18	WC18
Depth		0.0	0.9	1.0	1.9	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
TRH C ₁₀ - C ₁₄	mg/kg	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	mg/kg	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	mg/kg	<100	<100	<100	<100	<100
TRH >C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	83	84	82	83	83

svTRH (C10-C40) in Soil		
Our Reference		218378-21
Your Reference	UNITS	QA01
Depth		-
Date Sampled		24/05/2019
Type of sample		soil
Date extracted	-	28/05/2019
Date analysed	-	28/05/2019
TRH C ₁₀ - C ₁₄	mg/kg	<50
TRH C ₁₅ - C ₂₈	mg/kg	<100
TRH C ₂₉ - C ₃₆	mg/kg	<100
TRH >C ₁₀ -C ₁₆	mg/kg	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	85

PAHs in Soil						
Our Reference		218378-1	218378-2	218378-3	218378-4	218378-5
Your Reference	UNITS	WC15	WC15	WC15	WC15	WC15
Depth		0.0	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Naphthalene	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	0.3	0.2	0.4	0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.6	0.3	0.6	0.3	<0.1
Pyrene	mg/kg	0.6	0.3	0.6	0.3	<0.1
Benzo(a)anthracene	mg/kg	0.3	0.1	0.3	0.2	<0.1
Chrysene	mg/kg	0.3	0.2	0.3	0.2	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.4	0.2	0.4	0.2	<0.2
Benzo(a)pyrene	mg/kg	0.2	0.1	0.2	0.1	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	0.2	<0.1	<0.1
Total +ve PAH's	mg/kg	3.1	1.4	3.2	1.5	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate <i>p</i> -Terphenyl-d14	%	126	128	136	126	124

PAHs in Soil						
Our Reference		218378-6	218378-7	218378-8	218378-9	218378-10
Your Reference	UNITS	WC16	WC16	WC16	WC16	WC16
Depth		0.0	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Naphthalene	mg/kg	<0.1	<0.1	0.2	0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.1	0.2	0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	0.1	0.2	0.1	<0.1
Phenanthrene	mg/kg	<0.1	1.3	1.3	1	<0.1
Anthracene	mg/kg	<0.1	0.3	0.3	0.2	<0.1
Fluoranthene	mg/kg	<0.1	1.9	1.5	1.2	<0.1
Pyrene	mg/kg	<0.1	1.8	1.4	1.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	0.7	0.6	0.5	<0.1
Chrysene	mg/kg	<0.1	0.9	0.6	0.5	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	1	0.8	0.7	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.65	0.5	0.4	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.3	0.2	0.2	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.4	0.3	0.2	<0.1
Total +ve PAH's	mg/kg	<0.05	9.6	7.8	6.4	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	0.9	0.6	0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	0.9	0.7	0.6	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	1	0.7	0.6	<0.5
Surrogate p-Terphenyl-d14	%	124	123	125	129	111

PAHs in Soil						
Our Reference		218378-11	218378-12	218378-13	218378-14	218378-15
Your Reference	UNITS	WC17	WC17	WC17	WC17	WC17
Depth		0.0	0.9	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.4	<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	1.7	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	0.4	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	2.4	0.1	0.2	0.1
Pyrene	mg/kg	0.1	2.6	0.2	0.2	0.1
Benzo(a)anthracene	mg/kg	<0.1	1.2	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	1.4	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	2.4	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	1.7	0.06	0.06	0.06
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.8	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	1.2	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	0.3	17	0.4	0.4	0.3
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	2.4	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	2.4	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	2.4	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	131	130	123	129	99

PAHs in Soil						
Our Reference		218378-16	218378-17	218378-18	218378-19	218378-20
Your Reference	UNITS	WC18	WC18	WC18	WC18	WC18
Depth		0.0	0.9	1.0	1.9	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Naphthalene	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	0.3	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.5	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.5	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.4	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.3	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	2.8	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	102	99	100	96	103

PAHs in Soil		
Our Reference		218378-21
Your Reference	UNITS	QA01
Depth		-
Date Sampled		24/05/2019
Type of sample		soil
Date extracted	-	28/05/2019
Date analysed	-	28/05/2019
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate <i>p</i> -Terphenyl-d14	%	98

Acid Extractable metals in soil

Our Reference		218378-1	218378-2	218378-3	218378-4	218378-5
Your Reference	UNITS	WC15	WC15	WC15	WC15	WC15
Depth		0.0	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Arsenic	mg/kg	5	8	7	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	65	120	77	77	72
Copper	mg/kg	20	11	14	13	20
Lead	mg/kg	18	17	18	15	12
Mercury	mg/kg	0.2	0.1	0.1	<0.1	<0.1
Nickel	mg/kg	27	14	19	20	37
Zinc	mg/kg	52	27	32	17	25

Acid Extractable metals in soil

Our Reference		218378-6	218378-7	218378-8	218378-9	218378-10
Your Reference	UNITS	WC16	WC16	WC16	WC16	WC16
Depth		0.0	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Arsenic	mg/kg	5	4	5	4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	67	95	45	73	54
Copper	mg/kg	15	52	94	25	17
Lead	mg/kg	22	64	55	47	14
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	22	22	23	24	36
Zinc	mg/kg	41	87	67	110	23

Acid Extractable metals in soil

Our Reference		218378-11	218378-12	218378-13	218378-14	218378-15
Your Reference	UNITS	WC17	WC17	WC17	WC17	WC17
Depth		0.0	0.9	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Arsenic	mg/kg	4	5	7	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	47	59	120	85	84
Copper	mg/kg	16	25	9	14	15
Lead	mg/kg	13	65	17	16	15
Mercury	mg/kg	<0.1	0.4	<0.1	<0.1	<0.1
Nickel	mg/kg	23	21	11	20	26
Zinc	mg/kg	40	94	21	28	29

Acid Extractable metals in soil

Our Reference		218378-16	218378-17	218378-18	218378-19	218378-20
Your Reference	UNITS	WC18	WC18	WC18	WC18	WC18
Depth		0.0	0.9	1.0	1.9	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Arsenic	mg/kg	6	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	50	100	66	85	73
Copper	mg/kg	24	15	13	19	16
Lead	mg/kg	29	11	13	16	13
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	26	33	30	46	37
Zinc	mg/kg	72	19	18	31	27

Acid Extractable metals in soil		
Our Reference		218378-21
Your Reference	UNITS	QA01
Depth		-
Date Sampled		24/05/2019
Type of sample		soil
Date prepared	-	28/05/2019
Date analysed	-	28/05/2019
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	59
Copper	mg/kg	19
Lead	mg/kg	14
Mercury	mg/kg	<0.1
Nickel	mg/kg	40
Zinc	mg/kg	20

Moisture						
Our Reference	UNITS	218378-1	218378-2	218378-3	218378-4	218378-5
Your Reference		WC15	WC15	WC15	WC15	WC15
Depth		0.0	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Moisture	%	3.2	7.1	8.5	9.2	29

Moisture						
Our Reference	UNITS	218378-6	218378-7	218378-8	218378-9	218378-10
Your Reference		WC16	WC16	WC16	WC16	WC16
Depth		0.0	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Moisture	%	22	12	14	11	18

Moisture						
Our Reference	UNITS	218378-11	218378-12	218378-13	218378-14	218378-15
Your Reference		WC17	WC17	WC17	WC17	WC17
Depth		0.0	0.9	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Moisture	%	17	12	9.0	12	8.9

Moisture						
Our Reference	UNITS	218378-16	218378-17	218378-18	218378-19	218378-20
Your Reference		WC18	WC18	WC18	WC18	WC18
Depth		0.0	0.9	1.0	1.9	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Moisture	%	9.4	16	18	17	18

Moisture		
Our Reference		218378-21
Your Reference	UNITS	QA01
Depth		-
Date Sampled		24/05/2019
Type of sample		soil
Date prepared	-	28/05/2019
Date analysed	-	28/05/2019
Moisture	%	17

Misc Soil - Inorg						
Our Reference	UNITS	218378-1	218378-2	218378-3	218378-4	218378-5
Your Reference		WC15	WC15	WC15	WC15	WC15
Depth		0.0	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Hexavalent Chromium, Cr ⁶⁺	mg/kg	<1	<1	<1	<1	<1

Misc Soil - Inorg						
Our Reference	UNITS	218378-6	218378-7	218378-8	218378-9	218378-10
Your Reference		WC16	WC16	WC16	WC16	WC16
Depth		0.0	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Hexavalent Chromium, Cr ⁶⁺	mg/kg	<1	<1	<1	<1	<1

Misc Soil - Inorg						
Our Reference	UNITS	218378-11	218378-12	218378-13	218378-14	218378-15
Your Reference		WC17	WC17	WC17	WC17	WC17
Depth		0.0	0.9	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Hexavalent Chromium, Cr ⁶⁺	mg/kg	<1	<1	<1	<1	<1

Misc Soil - Inorg						
Our Reference	UNITS	218378-16	218378-17	218378-18	218378-19	218378-20
Your Reference		WC18	WC18	WC18	WC18	WC18
Depth		0.0	0.9	1.0	1.9	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Hexavalent Chromium, Cr ⁶⁺	mg/kg	<1	<1	<1	<1	<1

Misc Soil - Inorg		
Our Reference		218378-21
Your Reference	UNITS	QA01
Depth		-
Date Sampled		24/05/2019
Type of sample		soil
Date prepared	-	28/05/2019
Date analysed	-	28/05/2019
Hexavalent Chromium, Cr ⁶⁺	mg/kg	<1

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-024	Hexavalent Chromium (Cr6+) - determined colourimetrically. Waters samples are filtered on receipt prior to analysis.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	218378-2
Date extracted	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Date analysed	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
TRH C ₆ - C ₉	mg/kg	25	Org-016	<25	1	<25	<25	0	95	92
TRH C ₆ - C ₁₀	mg/kg	25	Org-016	<25	1	<25	<25	0	95	92
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	84	82
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	95	91
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	99	96
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	99	96
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	93	90
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	125	1	93	114	20	104	104

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date extracted	-			[NT]	11	28/05/2019	28/05/2019		28/05/2019	[NT]
Date analysed	-			[NT]	11	28/05/2019	28/05/2019		28/05/2019	[NT]
TRH C ₆ - C ₉	mg/kg	25	Org-016	[NT]	11	<25	<25	0	128	[NT]
TRH C ₆ - C ₁₀	mg/kg	25	Org-016	[NT]	11	<25	<25	0	128	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	11	<0.2	<0.2	0	124	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	11	<0.5	<0.5	0	108	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	136	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	11	<2	<2	0	135	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	117	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	11	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	11	96	89	8	94	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	21	28/05/2019	28/05/2019		[NT]	[NT]
Date analysed	-			[NT]	21	28/05/2019	28/05/2019		[NT]	[NT]
TRH C ₆ - C ₉	mg/kg	25	Org-016	[NT]	21	<25	<25	0	[NT]	[NT]
TRH C ₆ - C ₁₀	mg/kg	25	Org-016	[NT]	21	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	21	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	21	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	21	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	21	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	21	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	21	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	21	76	71	7	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate		Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	218378-2
Date extracted	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Date analysed	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
TRH C ₁₀ - C ₁₄	mg/kg	50	Org-003	<50	1	<50	<50	0	110	87
TRH C ₁₅ - C ₂₈	mg/kg	100	Org-003	<100	1	<100	<100	0	114	91
TRH C ₂₉ - C ₃₆	mg/kg	100	Org-003	<100	1	<100	<100	0	115	107
TRH >C ₁₀ -C ₁₆	mg/kg	50	Org-003	<50	1	<50	<50	0	110	87
TRH >C ₁₆ -C ₃₄	mg/kg	100	Org-003	<100	1	<100	<100	0	114	91
TRH >C ₃₄ -C ₄₀	mg/kg	100	Org-003	<100	1	<100	<100	0	115	107
Surrogate o-Terphenyl	%		Org-003	102	1	88	87	1	109	86

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate		Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date extracted	-			[NT]	11	28/05/2019	28/05/2019		28/05/2019	[NT]
Date analysed	-			[NT]	11	28/05/2019	28/05/2019		28/05/2019	[NT]
TRH C ₁₀ - C ₁₄	mg/kg	50	Org-003	[NT]	11	<50	<50	0	80	[NT]
TRH C ₁₅ - C ₂₈	mg/kg	100	Org-003	[NT]	11	<100	<100	0	80	[NT]
TRH C ₂₉ - C ₃₆	mg/kg	100	Org-003	[NT]	11	<100	<100	0	84	[NT]
TRH >C ₁₀ -C ₁₆	mg/kg	50	Org-003	[NT]	11	<50	<50	0	80	[NT]
TRH >C ₁₆ -C ₃₄	mg/kg	100	Org-003	[NT]	11	<100	<100	0	80	[NT]
TRH >C ₃₄ -C ₄₀	mg/kg	100	Org-003	[NT]	11	<100	<100	0	84	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	11	93	96	3	79	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate		Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	21	28/05/2019	28/05/2019		[NT]	[NT]
Date analysed	-			[NT]	21	28/05/2019	28/05/2019		[NT]	[NT]
TRH C ₁₀ - C ₁₄	mg/kg	50	Org-003	[NT]	21	<50	<50	0	[NT]	[NT]
TRH C ₁₅ - C ₂₈	mg/kg	100	Org-003	[NT]	21	<100	<100	0	[NT]	[NT]
TRH C ₂₉ - C ₃₆	mg/kg	100	Org-003	[NT]	21	<100	<100	0	[NT]	[NT]
TRH >C ₁₀ -C ₁₆	mg/kg	50	Org-003	[NT]	21	<50	<50	0	[NT]	[NT]
TRH >C ₁₆ -C ₃₄	mg/kg	100	Org-003	[NT]	21	<100	<100	0	[NT]	[NT]
TRH >C ₃₄ -C ₄₀	mg/kg	100	Org-003	[NT]	21	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	21	85	83	2	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	218378-2
Date extracted	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Date analysed	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	110	110
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	88	88
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	0.3	0.7	80	98	98
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	0.6	1	50	103	112
Pyrene	mg/kg	0.1	Org-012	<0.1	1	0.6	1.1	59	109	122
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	0.3	0.4	29	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	0.3	0.6	67	120	92
Benzo(b,j,k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	0.4	0.6	40	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	0.2	0.4	67	76	117
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	0.1	0.2	67	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	0.1	0.3	100	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	97	1	126	128	2	109	111

QUALITY CONTROL: PAHs in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date extracted	-			[NT]	11	28/05/2019	28/05/2019		28/05/2019	[NT]
Date analysed	-			[NT]	11	28/05/2019	28/05/2019		28/05/2019	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	114	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	106	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	100	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	11	0.1	0.1	0	102	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	11	0.1	0.1	0	104	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	130	[NT]
Benzo(b,j,k)fluoranthene	mg/kg	0.2	Org-012	[NT]	11	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	11	<0.05	<0.05	0	104	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	11	131	131	0	98	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	21	28/05/2019	28/05/2019		[NT]	[NT]
Date analysed	-			[NT]	21	28/05/2019	28/05/2019		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	21	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	21	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	21	98	102	4	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	218378-2
Date prepared	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Date analysed	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Arsenic	mg/kg	4	Metals-020	<4	1	5	5	0	114	81
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	108	82
Chromium	mg/kg	1	Metals-020	<1	1	65	67	3	111	66
Copper	mg/kg	1	Metals-020	<1	1	20	16	22	107	92
Lead	mg/kg	1	Metals-020	<1	1	18	19	5	104	70
Mercury	mg/kg	0.1	Metals-021	<0.1	1	0.2	0.2	0	104	86
Nickel	mg/kg	1	Metals-020	<1	1	27	27	0	109	86
Zinc	mg/kg	1	Metals-020	<1	1	52	45	14	109	76

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date prepared	-			[NT]	11	28/05/2019	28/05/2019		28/05/2019	[NT]
Date analysed	-			[NT]	11	28/05/2019	28/05/2019		28/05/2019	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	11	4	<4	0	107	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	11	<0.4	<0.4	0	102	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	11	47	41	14	107	[NT]
Copper	mg/kg	1	Metals-020	[NT]	11	16	15	6	102	[NT]
Lead	mg/kg	1	Metals-020	[NT]	11	13	11	17	102	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	11	<0.1	<0.1	0	106	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	11	23	22	4	104	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	11	40	42	5	106	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	21	28/05/2019	28/05/2019		[NT]	[NT]
Date analysed	-			[NT]	21	28/05/2019	28/05/2019		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	21	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	21	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	21	59	69	16	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	21	19	18	5	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	21	14	10	33	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	21	40	28	35	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	21	20	21	5	[NT]	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	218378-2
Date prepared	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Date analysed	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Hexavalent Chromium, Cr ⁶⁺	mg/kg	1	Inorg-024	<1	1	<1	<1	0	103	#

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	28/05/2019	28/05/2019		[NT]	[NT]
Date analysed	-			[NT]	11	28/05/2019	28/05/2019		[NT]	[NT]
Hexavalent Chromium, Cr ⁶⁺	mg/kg	1	Inorg-024	[NT]	11	<1	<1	0	[NT]	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	21	28/05/2019	28/05/2019		[NT]	[NT]
Date analysed	-			[NT]	21	28/05/2019	28/05/2019		[NT]	[NT]
Hexavalent Chromium, Cr ⁶⁺	mg/kg	1	Inorg-024	[NT]	21	<1	<1	0	[NT]	[NT]

Result Definitions

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

Quality Control Definitions

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

MISC_INORG_CRVI

Low spike recovery was obtained for this sample. This is due to matrix interferences. However, an acceptable recovery was obtained for the LCS.

PAHs in Soil - The RPD for duplicate results is accepted due to the non homogenous nature of sample 2183478-1.

Acid Extractable Metals in Soil - Spike recovery for Cr in sample 2 at 66% which is outside lab acceptance criteria (70-130%), however, the LCS recovery is acceptable at 111%. Sample heterogeneity suspected.

CERTIFICATE OF ANALYSIS 218374

Client Details

Client	SERS Pty Ltd
Attention	Ikem Onyene, Carl Pump, Richard Southam
Address	95 Sandgate Rd, Albion, QLD, 4010

Sample Details

Your Reference	<u>156675</u>
Number of Samples	11 Soil
Date samples received	28/05/2019
Date completed instructions received	28/05/2019

Analysis Details

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

Report Details

Date results requested by	28/05/2019
Date of Issue	28/05/2019
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Ken Nguyen, Reporting Supervisor
Nick Sarlamis, Inorganics Supervisor
Steven Luong, Organics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil

Our Reference		218374-1	218374-2	218374-3	218374-4	218374-5
Your Reference	UNITS	SWC17 1.0	SWC17 2.0	SWC21 0.5	SWC21 2.0	SWC24 1.0
Depth		1.0	2.0	0.5	2.0	1.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
TRH C ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
TRH C ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
vTPH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	106	110	106	100	84

vTRH(C6-C10)/BTEXN in Soil

Our Reference		218374-6	218374-7	218374-8	218374-9	218374-10
Your Reference	UNITS	SWC24 1.5	SWC30 0.5	SWC30 1.0	SWC38 1.5	SWC38 2.0
Depth		1.5	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
TRH C ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
TRH C ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
vTPH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	103	93	118	117	115

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		218374-11
Your Reference	UNITS	QA02
Depth		-
Date Sampled		24/05/2019
Type of sample		Soil
Date extracted	-	28/05/2019
Date analysed	-	28/05/2019
TRH C ₆ - C ₉	mg/kg	<25
TRH C ₆ - C ₁₀	mg/kg	<25
vTPH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	114

svTRH (C10-C40) in Soil

Our Reference		218374-1	218374-2	218374-3	218374-4	218374-5
Your Reference	UNITS	SWC17 1.0	SWC17 2.0	SWC21 0.5	SWC21 2.0	SWC24 1.0
Depth		1.0	2.0	0.5	2.0	1.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
TRH C ₁₀ - C ₁₄	mg/kg	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	mg/kg	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	mg/kg	<100	<100	<100	<100	<100
TRH >C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	84	85	86	83	84

svTRH (C10-C40) in Soil

Our Reference		218374-6	218374-7	218374-8	218374-9	218374-10
Your Reference	UNITS	SWC24 1.5	SWC30 0.5	SWC30 1.0	SWC38 1.5	SWC38 2.0
Depth		1.5	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
TRH C ₁₀ - C ₁₄	mg/kg	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	mg/kg	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	mg/kg	<100	<100	<100	<100	<100
TRH >C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	83	85	85	85	93

svTRH (C10-C40) in Soil		
Our Reference		218374-11
Your Reference	UNITS	QA02
Depth		-
Date Sampled		24/05/2019
Type of sample		Soil
Date extracted	-	28/05/2019
Date analysed	-	28/05/2019
TRH C ₁₀ - C ₁₄	mg/kg	<50
TRH C ₁₅ - C ₂₈	mg/kg	<100
TRH C ₂₉ - C ₃₆	mg/kg	<100
TRH >C ₁₀ -C ₁₆	mg/kg	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	86

PAHs in Soil						
Our Reference		218374-1	218374-2	218374-3	218374-4	218374-5
Your Reference	UNITS	SWC17 1.0	SWC17 2.0	SWC21 0.5	SWC21 2.0	SWC24 1.0
Depth		1.0	2.0	0.5	2.0	1.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Naphthalene	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	0.2	<0.1	0.4	0.2	<0.1
Anthracene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.4	<0.1	0.7	0.2	0.1
Pyrene	mg/kg	0.4	<0.1	0.8	0.2	0.1
Benzo(a)anthracene	mg/kg	0.2	<0.1	0.4	<0.1	<0.1
Chrysene	mg/kg	0.3	<0.1	0.6	0.2	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.3	<0.2	0.6	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.2	0.05	0.3	0.1	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	0.2	<0.1	<0.1
Total +ve PAH's	mg/kg	2.3	0.05	4.1	0.89	0.2
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate <i>p</i> -Terphenyl-d14	%	98	104	105	100	100

PAHs in Soil						
Our Reference		218374-6	218374-7	218374-8	218374-9	218374-10
Your Reference	UNITS	SWC24 1.5	SWC30 0.5	SWC30 1.0	SWC38 1.5	SWC38 2.0
Depth		1.5	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Naphthalene	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	0.2	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.4	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	0.4	<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	0.3	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.1	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	1.8	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	100	101	100	104	99

PAHs in Soil		
Our Reference		218374-11
Your Reference	UNITS	QA02
Depth		-
Date Sampled		24/05/2019
Type of sample		Soil
Date extracted	-	28/05/2019
Date analysed	-	28/05/2019
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate <i>p</i> -Terphenyl-d14	%	105

Acid Extractable metals in soil

Our Reference		218374-1	218374-2	218374-3	218374-4	218374-5
Your Reference	UNITS	SWC17 1.0	SWC17 2.0	SWC21 0.5	SWC21 2.0	SWC24 1.0
Depth		1.0	2.0	0.5	2.0	1.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Arsenic	mg/kg	8	8	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	88	120	49	47	76
Copper	mg/kg	33	11	15	21	23
Lead	mg/kg	40	17	9	10	7
Mercury	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	23	13	26	31	92
Zinc	mg/kg	90	19	31	37	23

Acid Extractable metals in soil

Our Reference		218374-6	218374-7	218374-8	218374-9	218374-10
Your Reference	UNITS	SWC24 1.5	SWC30 0.5	SWC30 1.0	SWC38 1.5	SWC38 2.0
Depth		1.5	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	60	71	51	78	81
Copper	mg/kg	24	23	20	28	26
Lead	mg/kg	10	12	13	6	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	110	52	44	65	47
Zinc	mg/kg	20	36	44	30	29

Acid Extractable metals in soil				
Our Reference		218374-11	218374-12	218374-13
Your Reference	UNITS	QA02	SWC17 1.0 - [TRIPLICATE]	QA02 - [TRIPLICATE]
Depth		-	1.0	-
Date Sampled		24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019
Arsenic	mg/kg	<4	6	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	74	87	86
Copper	mg/kg	29	19	28
Lead	mg/kg	7	36	7
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	110	17	47
Zinc	mg/kg	28	70	31

Hexavalent Cr						
Our Reference		218374-1	218374-2	218374-3	218374-4	218374-5
Your Reference	UNITS	SWC17 1.0	SWC17 2.0	SWC21 0.5	SWC21 2.0	SWC24 1.0
Depth		1.0	2.0	0.5	2.0	1.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Hexavalent Chromium, Cr ⁶⁺	mg/kg	<1	<1	<1	<1	<1

Hexavalent Cr						
Our Reference		218374-6	218374-7	218374-8	218374-9	218374-10
Your Reference	UNITS	SWC24 1.5	SWC30 0.5	SWC30 1.0	SWC38 1.5	SWC38 2.0
Depth		1.5	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Hexavalent Chromium, Cr ⁶⁺	mg/kg	<1	<1	<1	<1	<10

Hexavalent Cr		
Our Reference		218374-11
Your Reference	UNITS	QA02
Depth		-
Date Sampled		24/05/2019
Type of sample		Soil
Hexavalent Chromium, Cr ⁶⁺	mg/kg	<1

Moisture						
Our Reference	UNITS	218374-1	218374-2	218374-3	218374-4	218374-5
Your Reference		SWC17 1.0	SWC17 2.0	SWC21 0.5	SWC21 2.0	SWC24 1.0
Depth		1.0	2.0	0.5	2.0	1.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Moisture	%	12	24	11	12	25

Moisture						
Our Reference	UNITS	218374-6	218374-7	218374-8	218374-9	218374-10
Your Reference		SWC24 1.5	SWC30 0.5	SWC30 1.0	SWC38 1.5	SWC38 2.0
Depth		1.5	0.5	1.0	1.5	2.0
Date Sampled		24/05/2019	24/05/2019	24/05/2019	24/05/2019	24/05/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Date analysed	-	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Moisture	%	18	20	22	25	27

Moisture		
Our Reference	UNITS	218374-11
Your Reference		QA02
Depth		-
Date Sampled		24/05/2019
Type of sample		Soil
Date prepared	-	28/05/2019
Date analysed	-	28/05/2019
Moisture	%	24

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-024	Hexavalent Chromium (Cr6+) - determined colourimetrically. Waters samples are filtered on receipt prior to analysis.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	218374-2
Date extracted	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Date analysed	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
TRH C ₆ - C ₉	mg/kg	25	Org-016	<25	1	<25	<25	0	91	91
TRH C ₆ - C ₁₀	mg/kg	25	Org-016	<25	1	<25	<25	0	91	91
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	87	90
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	88	90
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	92	89
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	94	93
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	96	89
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	67	1	106	108	2	104	106

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	28/05/2019	28/05/2019		[NT]	[NT]
Date analysed	-			[NT]	11	28/05/2019	28/05/2019		[NT]	[NT]
TRH C ₆ - C ₉	mg/kg	25	Org-016	[NT]	11	<25	<25	0	[NT]	[NT]
TRH C ₆ - C ₁₀	mg/kg	25	Org-016	[NT]	11	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	11	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	11	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	11	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	11	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	11	114	125	9	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	218374-2
Date extracted	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Date analysed	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
TRH C ₁₀ - C ₁₄	mg/kg	50	Org-003	<50	1	<50	<50	0	80	93
TRH C ₁₅ - C ₂₈	mg/kg	100	Org-003	<100	1	<100	<100	0	80	92
TRH C ₂₉ - C ₃₆	mg/kg	100	Org-003	<100	1	<100	<100	0	84	84
TRH >C ₁₀ -C ₁₆	mg/kg	50	Org-003	<50	1	<50	<50	0	80	93
TRH >C ₁₆ -C ₃₄	mg/kg	100	Org-003	<100	1	<100	<100	0	80	92
TRH >C ₃₄ -C ₄₀	mg/kg	100	Org-003	<100	1	<100	<100	0	84	84
Surrogate o-Terphenyl	%		Org-003	102	1	84	85	1	79	90

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	28/05/2019	28/05/2019		[NT]	[NT]
Date analysed	-			[NT]	11	28/05/2019	28/05/2019		[NT]	[NT]
TRH C ₁₀ - C ₁₄	mg/kg	50	Org-003	[NT]	11	<50	<50	0	[NT]	[NT]
TRH C ₁₅ - C ₂₈	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
TRH C ₂₉ - C ₃₆	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
TRH >C ₁₀ -C ₁₆	mg/kg	50	Org-003	[NT]	11	<50	<50	0	[NT]	[NT]
TRH >C ₁₆ -C ₃₄	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
TRH >C ₃₄ -C ₄₀	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	11	86	86	0	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	218374-2
Date extracted	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Date analysed	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	114	102
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	106	94
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	0.2	0.2	0	100	90
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	0.4	0.4	0	102	93
Pyrene	mg/kg	0.1	Org-012	<0.1	1	0.4	0.4	0	104	93
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	0.2	0.2	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	0.3	0.2	40	130	114
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	0.3	0.3	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	0.2	0.2	0	104	92
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	0.1	0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	97	1	98	97	1	98	96

QUALITY CONTROL: PAHs in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	28/05/2019	28/05/2019		[NT]	[NT]
Date analysed	-			[NT]	11	28/05/2019	28/05/2019		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	11	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	11	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	11	105	99	6	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	218374-2
Date prepared	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Date analysed	-			28/05/2019	1	28/05/2019	28/05/2019		28/05/2019	28/05/2019
Arsenic	mg/kg	4	Metals-020	<4	1	8	6	29	107	88
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	102	82
Chromium	mg/kg	1	Metals-020	<1	1	88	92	4	107	100
Copper	mg/kg	1	Metals-020	<1	1	33	19	54	102	93
Lead	mg/kg	1	Metals-020	<1	1	40	41	2	104	85
Mercury	mg/kg	0.1	Metals-021	<0.1	1	0.3	0.3	0	106	100
Nickel	mg/kg	1	Metals-020	<1	1	23	19	19	104	83
Zinc	mg/kg	1	Metals-020	<1	1	90	79	13	106	76

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	28/05/2019	28/05/2019		[NT]	[NT]
Date analysed	-			[NT]	11	28/05/2019	28/05/2019		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	11	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	11	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	11	74	84	13	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	11	29	27	7	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	11	7	7	0	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	11	110	44	86	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	11	28	31	10	[NT]	[NT]

QUALITY CONTROL: Hexavalent Cr							Duplicate		Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	218374-2
Hexavalent Chromium, Cr ⁶⁺	mg/kg	1	Inorg-024	<1	1	<1	<1	0	104	#

QUALITY CONTROL: Hexavalent Cr							Duplicate		Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Hexavalent Chromium, Cr ⁶⁺	mg/kg	1	Inorg-024	[NT]	11	<1	<1	0	[NT]	[NT]

Result Definitions

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

Quality Control Definitions

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

MISC_INORG_CR6

Low spike recovery was obtained for this sample. This is due to matrix interferences. However, an acceptable recovery was obtained for the LCS.

MISC_INORG_CR6: Hexavalent Chromium PQL has been raised due to high background colour of the sample matrix.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 218374-1 for Cu. Therefore a triplicate result has been issued as laboratory sample number 218374-12.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 218374-11 for Ni. Therefore a triplicate result has been issued as laboratory sample number 218374-13.

APPENDIX D – QA/QC PROGRAM TABULATED RESULTS

Table 4 - RPD Reporting

156675 - Armidale

Field Duplicates (SOIL)
Filter: Lab_Report_Nui

Lab Report Number	218374	218374	
Field ID	SWC38 1.5	QA02	RPD
Sampled Date/Time	24/05/2019	24/05/2019	

Chem_Gr	ChemNam	Units	EQL			
TRH	C6-C10	mg/kg	25	<25.0	<25.0	0
	C6-C10 (F	mg/kg	25	<25.0	<25.0	0
	C10-C16	mg/kg	50	<50.0	<50.0	0
	C10-C16 (f	mg/kg	50	<50.0	<50.0	0
	C16-C34	mg/kg	100	<100.0	<100.0	0
	C34-C40	mg/kg	100	<100.0	<100.0	0
	C10-C40 (f	mg/kg	50	<50.0	<50.0	0
BTEX	Benzene	mg/kg	0.2	<0.2	<0.2	0
	Toluene	mg/kg	0.5	<0.5	<0.5	0
	Ethylbenze	mg/kg	1	<1.0	<1.0	0
	Xylene (m	mg/kg	2	<2.0	<2.0	0
	Xylene (o)	mg/kg	1	<1.0	<1.0	0
	Xylene Tot	mg/kg	1	<1.0	<1.0	0
Inorganics	Moisture	%	0.1	25.0	24.0	4
Metals	Arsenic	mg/kg	4	<4.0	<4.0	0
	Cadmium	mg/kg	0.4	<0.4	<0.4	0
	Chromium	mg/kg	1	<1.0	<1.0	0
	Chromium	mg/kg	1	78.0	74.0	5
	Copper	mg/kg	1	28.0	29.0	4
	Lead	mg/kg	1	6.0	7.0	15
	Mercury	mg/kg	0.1	<0.1	<0.1	0
	Nickel	mg/kg	1	65.0	110.0	59
	Zinc	mg/kg	1	30.0	28.0	7
PAH	Benzo(b+j)	mg/kg	0.2	<0.2	<0.2	0
	Acenaphth	mg/kg	0.1	<0.1	<0.1	0
	Acenaphth	mg/kg	0.1	<0.1	<0.1	0
	Anthracene	mg/kg	0.1	<0.1	<0.1	0
	Benz(a)ant	mg/kg	0.1	<0.1	<0.1	0
	Benzo(a) p	mg/kg	0.05	<0.05	<0.05	0
	Benzo(g,h)	mg/kg	0.1	<0.1	<0.1	0
	Chrysene	mg/kg	0.1	<0.1	<0.1	0
	Dibenz(a,h)	mg/kg	0.1	<0.1	<0.1	0
	Fluoranth	mg/kg	0.1	<0.1	<0.1	0
	Fluorene	mg/kg	0.1	<0.1	<0.1	0
	Indeno(1,2	mg/kg	0.1	<0.1	<0.1	0
	Naphthal	mg/kg	1	<1.0	<1.0	0
	Naphthal	mg/kg	0.1	<0.1	<0.1	0
	Phenanthre	mg/kg	0.1	<0.1	<0.1	0
	Pyrene	mg/kg	0.1	<0.1	<0.1	0
	Benzo(a)py	mg/kg	0.5	<0.5	<0.5	0
	Benzo(a)py	mg/kg	0.5	<0.5	<0.5	0
	Benzo(a)py	mg/kg	0.5	<0.5	<0.5	0
	PAHs (Sun	mg/kg	0.05	<0.05	<0.05	0
TPH	C6-C9	mg/kg	25	<25.0	<25.0	0
	C10-C14	mg/kg	50	<50.0	<50.0	0
	C15-C28	mg/kg	100	<100.0	<100.0	0
	C29-C36	mg/kg	100	<100.0	<100.0	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 80 (1-10 x EQL); 50 (10-30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those