STAGE 1 PRELIMINARY SITE INVESTIGATION (PSI)

2514 ILLAWARRA HIGHWAY
LOT 7 DEPOSITED PLAN 259137
CALDERWOOD, NSW, 2527

Prepared For:	**AV Jennings Pty Ltd**
Project Number:	**ENRS1426**
Date:	**11th December 2020**

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Record of Distribution

Copies	Report No. & File Name	Status	Date	Prepared for:
1 x PDF	ENRS1426_AV Jennings_2514 Illawarra Hwy_PSI_r1e1	Rev.1.Ed.1	13th Jan. 2020	AV Jennings Pty Ltd
1 x PDF	ENRS1426_AV Jennings_2514 Illawarra Hwy_PSI_r1e2	Rev.1.Ed.2	23rd Apr. 2020	AV Jennings Pty Ltd
1 x PDF	ENRS1426_AV Jennings_2514 Illawarra Hwy_PSI_r1e3	Rev.1.Ed.3	11th Dec. 2020	AV Jennings Pty Ltd

EXECUTIVE SUMMARY

Environment & Natural Resource Solutions (ENRS Pty Ltd) were commissioned as independent environmental consultants in December 2019 by *AV Jennings Pty Ltd* (the client) to conduct a Stage 1 Preliminary Site Assessment (PSI) to assess the premises located at 2514 Illawarra Highway Calderwood, NSW, 2527 (herein referred to as the Site).

ENRS understands this PSI is required for due diligence purposes to assess the potential for ground contamination at the Site and to document the Site suitability for the future residential land use consistent with NSW State Environmental Planning Policy No. 55 (SEPP55).

This report documents the results of site inspections, a Stage 1 Preliminary Site Investigation of available Site history records, supported by targeted soil investigations and National Association of Testing Authorities (NATA) accredited laboratory analysis. The Site assessment was conducted in general accordance with National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1), and the guidelines made and approved under Section 105 of the *Contaminated Land Management Act* 1997 (the Act), namely the Guidelines for Consultants Reporting on Contaminated Sites (OEH;2011); and the Guidelines for the Assessment and Management of Groundwater contamination (DEC;2007).

The aim of the project was to collate and review historical records of the Site and undertake targeted soil sampling to assess if the Site will pose no unacceptable risk to human health or to the environment. This information has been used to outline recommendations for further investigations, if any, and provide a statement regarding the suitability of the Site for the proposed future residential land use to address Development Approval (DA) conditions issued by *Shellharbour City Council* (Council).

The scope of work for the project comprised the following tasks:

- Review available Site history records incorporating previous investigation reports (where available), proposed development plans, publicly available data (including aerial photographs, geological maps, topographical maps, and registered groundwater bore database) to identify any past or present potentially contaminating activities and or any potential Areas of Environmental Concern (AECs);
- Site walkover to inspect for potential sources of contamination or uncontrolled Fill (18/12/2019);
- Test Pit investigations and hand auger soil sampling (18/12/2019);
- Drilling investigations, monitoring Well installation and soil sampling within area of environmental concern (AEC) associated with Underground Petroleum Storage Tanks (UPSS) identified during the preliminary site inspection (18/02/2020);
- Submit selected soil samples to a NATA accredited laboratory for analysis;
- Compare NATA analysis results against NSW EPA endorsed Site Assessment Criteria (SAC);
- Document investigation results and prepare a Stage 1 PSI report with a statement of Site suitability and recommendations for additional investigation works or ongoing environmental management, if required; and

- Secondary Site inspection (09/12/2020) to confirm Site conditions were consistent with those documented in the initial Stage 1 PSI.

Based on the available information reviewed during the scope of works the following conclusions and recommendations are provided:

- The Site history records indicated that the Site has been used for rural/agricultural purposes for an extended period of time;
- The Site walkover and inspections conducted on the 18th December 2019 confirmed the Site layout was consistent with the documented history and land use;
- The Areas of Environmental Concern (AECs) identified during this investigation included;
  - AEC01 – Potential for historical weathering of building materials (heavy metal-based paints and asbestos materials) in soil adjacent and underlying building areas;
  - AEC02 – Potential for residual impacts on soil from agricultural land use;
  - AEC03 – Underground Petroleum Storage System (UPSS) (2x USTs and bowsers);
  - AEC04 – Stockpiled, uncontrolled soil/Fill.
- Review of available online acid sulphate soil datasets identified that the Site presents a *LOW* risk of potential acid sulphate soils. If further proposals are to include earthworks, soil materials should be subject to visual screening for PASS indicators including grey mottled soils, rotten egg smell and oxidising soils or field testing conducted by a suitably qualified person in accordance with NSW Acid Sulphate Soils Management Advisory Committee (ASSMAC;1998) guidelines;
- The asbestos cement fragment identified on the ground surface adjacent the detached carport was considered to be an isolated fragment Contamination due to uncontrolled asbestos containing materials (ACM) was not observed to be widespread and does not represent broader ground conditions at the Site. ENRS recommends that all future Site works be conducted in accordance with a Site specific Unexpected Finds Protocol (UFP). ENRS note the asbestos fragment identified was collected and removed from Site pending future laboratory identification if required;
- The results of laboratory analysis report slight detections of heavy metals and heavy fraction (C10-40) Total Recoverable Hydrocarbons (TRH) within the shallow topsoil. ENRS note that these reported detections are below the adopted Site Assessment Criteria and are likely due to a history agricultural land usage;
- ENRS recommend the UPSS infrastructure located on the Site be formally decommissioned and validated in accordance with the revised NSW Underground Petroleum Storage Systems Regulations (EPA;2014) and the UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS (DECCW;2019) prior to the proposed residential development;
- With the exception of stockpile sample SP1, results for all other CoPCs as reported by the NATA accredited laboratory were below the adopted Site Assessment Criteria. The soil results are considered satisfactory and the Site is considered to pose little to no risk to site users or the surrounding environment;

- Site conditions observed during a follow up inspection (09/12/2020) were consistent with those observed and documented in the initial Stage 1 PSI.
- ENRS recommend the Site is considered capable of being made suitable for the proposed landuse following the decommissioning and validation of UPSS infrastructure;
- This assessment did not identify any environmental issues or evidence of gross contamination to trigger the need for any further assessment based on the proposed land use;
- Should any change in Site conditions, proposed land use or incident occur which causes a potential environmental impact, a suitable environmental professional should be engaged to further assess the Site and consider requirements for any additional assessment; and
- This report must be read in conjunction with the attached Statement of Limitations.

TABLE OF CONTENTS

LIST OF TABLES, FIGURES & APPENDICES

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 BACKGROUND

Environment & Natural Resource Solutions (ENRS Pty Ltd) were commissioned as independent environmental consultants in December 2019 by *AV Jennings Pty Ltd* (the client) to conduct a Stage 1 Preliminary Site Assessment (PSI) to assess the premises located at 2514 Illawarra Highway Calderwood, NSW, 2527 (herein referred to as the Site).

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1.2 OBJECTIVES

The aim of the project was to collate and review historical records of the Site and undertake targeted soil sampling to assess if the Site will pose no unacceptable risk to human health or to the environment. This information has been used to outline recommendations for further investigations, if any, and provide a statement regarding the suitability of the Site for the proposed future residential land use to address Development Approval (DA) conditions issued by *Shellharbour City Council* (Council).

1.3 SCOPE OF WORK

The scope of work for the project comprised the following tasks:

- Review available Site history records incorporating previous investigation reports (where available), proposed development plans, publicly available data (including aerial photographs, geological maps, topographical maps, and registered groundwater bore database) to identify any past or present potentially contaminating activities and or any potential Areas of Environmental Concern (AECs);
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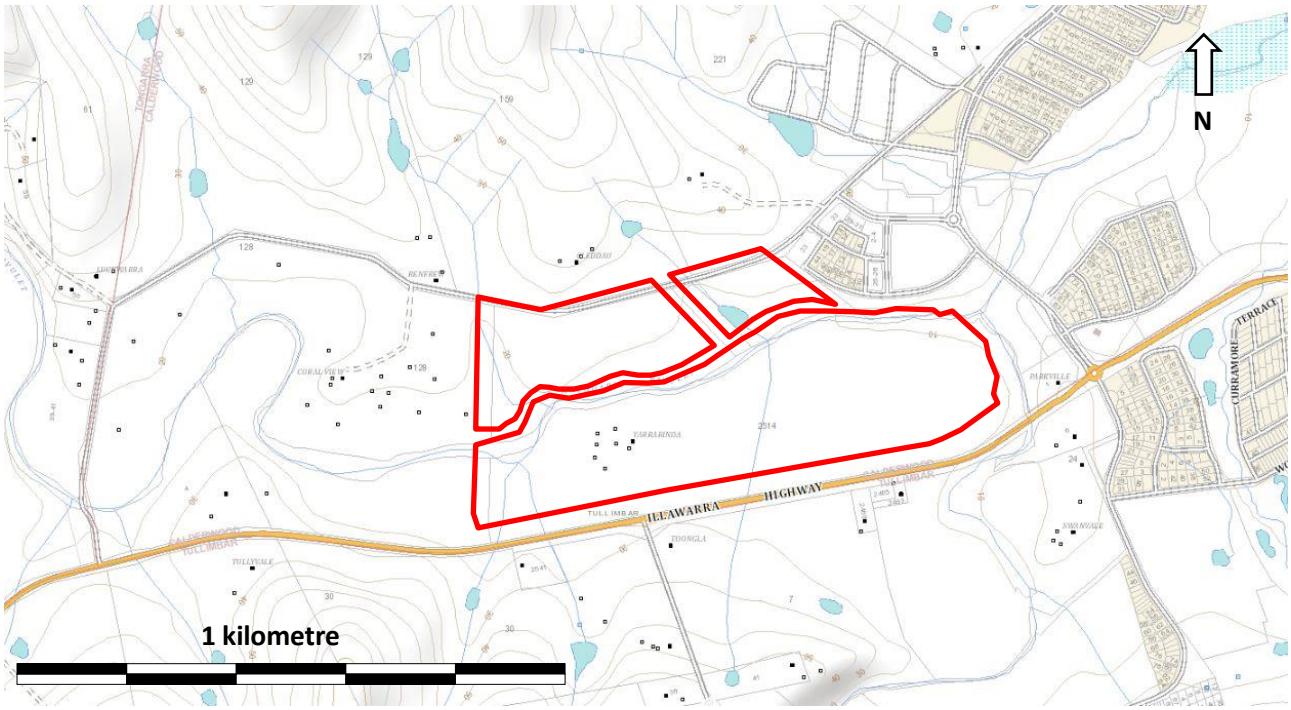
- Submit selected soil samples to a NATA accredited laboratory for analysis;
- Compare NATA analysis results against NSW EPA endorsed Site Assessment Criteria (SAC); and
- Document investigation results and prepare a Stage 1 PSI report with a statement of Site suitability and recommendations for additional investigation works or ongoing environmental management, if required.

2.0 SITE DESCRIPTION

2.1 SITE IDENTIFICATION

The Site is located on the north side of the Illawarra Highway, between North Macquarie Road and Escarpment Drive, as shown in **Figure 1**. The key features required to identify the Site are presented in **Table 1**.

Figure 1: Site Location Map



Source: www.maps.six.nsw.gov.au(cited 13/01/2020)

Table 1: Site Identification

SITE	DESCRIPTION
Street Address	2514 Illawarra Highway, Calderwood, NSW 2527
Lot / Deposited Plan	7 / 259137
Area	~46 Ha or ~460,000 m^2
Current Zoning	RU1 Primary Production
Local Government Area	Shellharbour City Council

2.2 SITE LAYOUT

The following points outline the Site layout and activities identified at the time of this investigation. Site layout plans are provided in **Figure 4** and **Figure 5** with a photographic record of Site conditions provided in **Appendix C**. In general, the site was characterised by a rural landscape serviced by a single residential dwelling and associated sheds/agricultural infrastructure. The following points summarise the features present at the property:

- One (1) single story residential dwelling was present in the south-west of the Site, accessed via the Illawarra Highway;
- Several additional structures and a large hardstand area were also present immediately to the west, north-west of the residential dwelling. These structures included:
  - One (1) large machinery shed with two (2) attached silos;
  - One (1) equipment set-down area with Underground Petroleum Storage System (UPSS);
  - One (1) detached garage comprising timber, corrugated iron and asbestos cement sheeting;
  - Four (4) air-conditioned sheds previously used for mushroom farming;
  - One (1) large poultry shed, and
  - One (1) large workshop area.
- Two (2) paddocks to the east and south-east of the residential dwelling were being used as a Christmas Tree farm, with one (1) small outbuilding/administration building adjacent to the paddock;
- The Site is divided by Macquarie Rivulet, which runs west to east throughout the Site.
- Two (2) sets of powerlines were present within the Site, one (1) running north-west to south-east adjacent the Sites structures, and one (1) running primarily west to east, parallel with Macquarie Rivulet;
- One (1) portion of crown land divided the northern section of the Site into two (2) separate areas. This area was visually inspected as part of the PSI, comprised a copse of healthy trees and was absent of any visual signs of gross contamination; and
- The remainder of the Site comprised of open grassed paddocks and livestock fences.

2.3 SURROUNDING ENVIRONMENT

The Site was comprised of RU1 Primary Production zoned land. The following adjacent uses have been identified during site inspections and from review of aerial photography:

Table 2: Surrounding Land Use

North:	Major Development zone (currently operating as agricultural/residential land)
East:	MD Major Development zoned land currently being developed into housing estates
South:	RU1 Primary Production zoned land
West:	MD Major Development zoned land onto RU1 Primary Production zoned land.

2.3.1 Sensitive Receptors

The nearest sensitive receptors include:

- Site users;
- Macquarie Rivulet environs;
- Neighbouring residential properties; and
- Shallow unconfined groundwater aquifers within the underlying unconsolidated sediments.

2.4 TOPOGRAPHY

A review of the Site topography was conducted with reference to the current series topographic map sheets (9028-4N Robertson, 9028-1N Albion Park) supported by Site inspections.

Site elevations range between 10 m and 30 m AHD. From the Illawarra Highway, the Site slopes steadily downgradient to the north towards Macquarie Rivulet. From North Macquarie Road, the Site slopes steadily downgradient to the south, similarly towards Macquarie Rivulet. The southeast of the Site is largely level as is characteristic of a river floodplain.

2.5 GEOLOGY

A review of the geological setting was conducted with reference to the Wollongong 1:250,000 Geological series sheet (Wollongong Sheet S1 56-9). The mapped geology shows the Site is mostly underlain by the Quarternary (Qal) sequence and surrounded by the Gerringong Volcanics, part of the Permian Shoalhaven Group. The Quaternary sediments are characterised by alluvium, gravel, swamp deposits, and sand dunes while the Gerringong Volcanics are comprised of latite and trachytic tuff. Ground conditions encountered during Site works comprised sandy clays overlying weathered sandstone and were consistent with mapped geology.

2.6 HYDROGEOLOGY

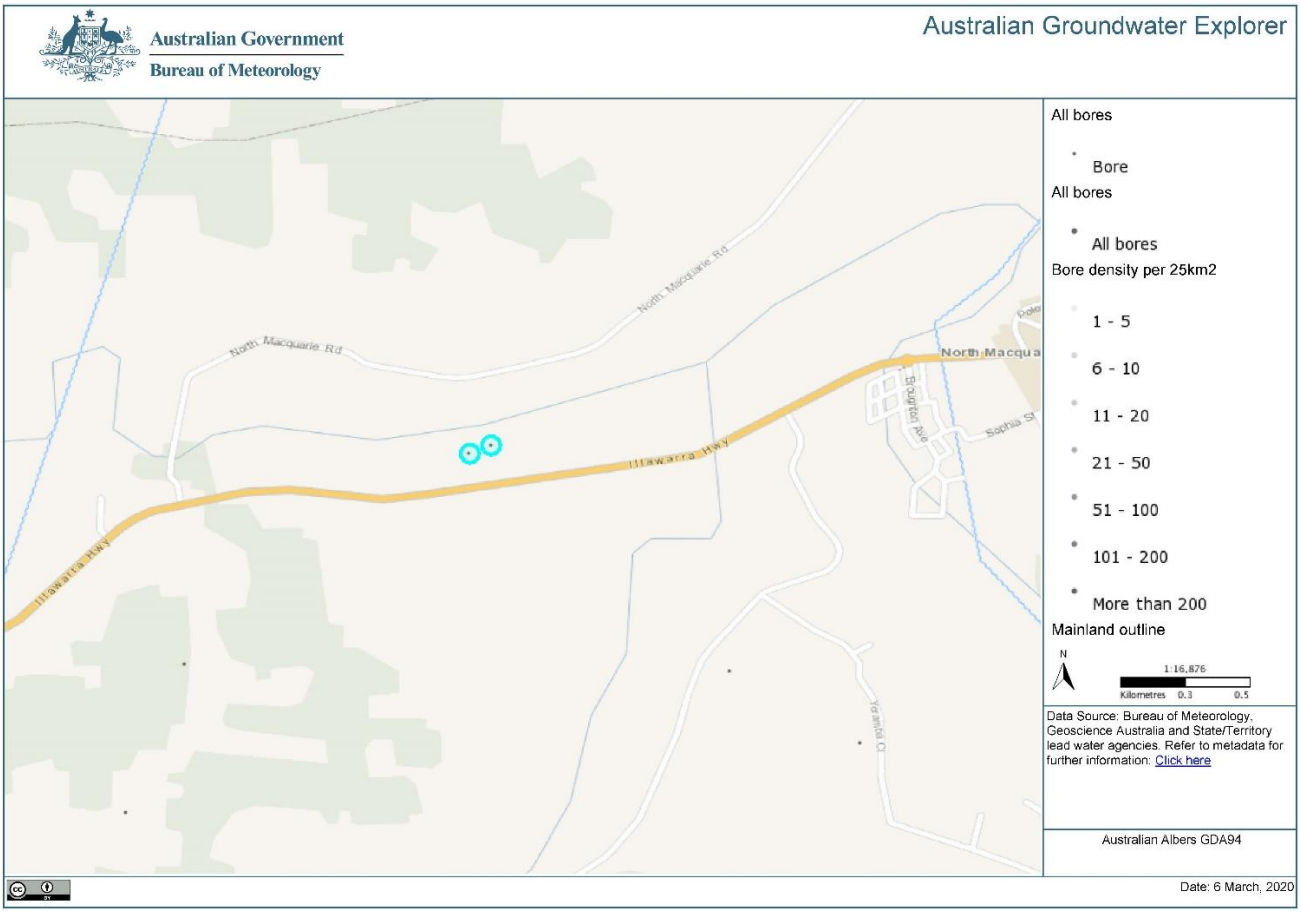
Based on the Site geology groundwater in the area is expected to be associated with the following aquifer systems;

- *Shallow unconfined* systems hosted in the unconsolidated soil, clay and sand, often ephemeral in response to rainfall recharge, and a shallow groundwater table expected to be less than 5-10 metres; and
- *Deep dual porosity aquifer (fractured and porous rock)* systems hosted in the underlying rock sequences with low to moderate yields, elevated salinity and standing water levels generally deeper than 20 metres

Site works encountered groundwater in sand with gravel at depths of approximately 7 mbgl in BH01 and BH04. Boreholes were converted to Monitoring Wells MW01 and MW02 respectively, to a maximum depth of 8.5 m in MW02. Field observations did not identify any visual or olfactory evidence of groundwater contamination to trigger further sampling or testing.

Review of the BOM Australian Groundwater Explorer identified two (2) groundwater bores within a one (1) kilometre radius of the Site (refer to **Figure 3**). Both bores (GW038648 and GW108663) are located within the Site boundary. In the absence of nearby registered users, the Site activities are considered unlikely to impact existing groundwater users in the area.

Figure 2: BOM Groundwater Explorer



Source: http://www.bom.gov.au/water/groundwater/explorer/map.shtml (cited 06/03/2020)

2.7 POTENTIAL ACID SULPHATE SOILS ASSESSMENT (PASSA)

A desktop assessment for Potential Acid Sulphate in Soil (PASS) was conducted with reference to the eSPADE online Acid Sulphate Soil Risk maps (NSW Gov. SEED datasets). The Site is mapped in an area classed as *'Not Assessed'*. Similarly, the immediate surrounding areas are mapped as '*Not Assessed*'. The nearest area of mapped PASS is classified as *'Low Probability'* (yellow) and is located approximately 1.2 km to the northeast of the Site (refer to **Figure 3**).

Based on the absence of mapped PASS in the subject area, the Site is considered to present a low risk for PASS. It is recommended future earthworks, namely within Macquarie Rivulet be supported by visual screening for PASS indicators including grey mottled soils, rotten egg smell

and oxidising soils or field testing conducted by a suitably qualified person in accordance with NSW Acid Sulphate Soils Management Advisory Committee (ASSMAC;1998) guidelines.

Figure 3: eSPADE/SEED Potential Acid Sulphate Soil Map

Source: environment.nsw.gov.au/eSpade2WebApp (cited 26/02/2020)

3.0 SITE HISTORY

3.1 PREVIOUS REPORTS

ENRS understands the Site has not previously been the Subject of any environmental or geotechnical assessments. Hence, no former reports were available for review at the time of this assessment.

3.2 HISTORICAL TITLES

A search of prior and cancelled land titles was undertaken to document the timeline of previous landowners and their occupation which can provide an indication of potential contaminating activities associated with previous land use. A summary of historical titles is provided in **Table 3** with a record of titles attached in **Appendix A**.

The available records document the current owners (JB and HC Pyers) have held the property since circa 1981 during which time the Site has operated as a farm.

Table 3: Summary of Historical Titles

Date	Owner	Occupation
01/05/1833	David Johnston and John Paul	Not recorded
29/06/1981 - present	John Barry Pyers and Helen Catherine Pyers as joint tenants	Not recorded

3.3 HISTORICAL AERIAL IMAGERY

Historical aerial photographs of the Site area were reviewed to identify potential contaminating land use and relevant changes in site conditions. Copies of the imagery are provided in **Appendix B**. The key observations made from the review of aerial photography are summarised in the **Table 4**.

Table 4: Summary of Historical Aerial Photography

Year	Description of Site condition and surrounding land use
1963	Site comprised largely of open paddocks, characteristic of agricultural landuse. One (1) residential dwelling, one (1) detached garage and three (3) sheds were present in the centre of the Site. Small sheds, presumed to shelter livestock, were present immediately west of the main area of development within the Site. Vegetation was present alongside both banks of Macquarie Rivulet and the property driveway.
1970	Small sheds to shelter livestock appear to have been removed. Some additional vegetation alongside paddock fences present.
1980	Two (2) sheds situated to the west of the residential dwelling were no longer present.
1990	Four sheds have been constructed to the west of the residential dwelling. Areas adjacent sheds appeared to be populated with (presumed) agricultural equipment. One area of development, potentially a holding yard, was present further west of the main development alongside Macquarie Rivulet.
2006	Workshop area constructed to the north of the residential dwelling. Areas surrounding sheds and farming infrastructure appear to have been concreted. Additional vegetation was present surrounding the sheds and residential dwelling. Area of development (potentially holding yard) alongside Macquarie Rivulet has been removed. Christmas tree farm was constructed and located west of the residential dwelling.
2010	Paddock to the south-east of the residential dwelling has been cleared and additional Christmas tree farm constructed. Holding yard constructed to the south-west of residential dwelling.
2016	Two small sheds west of the residential dwelling removed. Remainder of Site relatively unchanged.
2020	Small outbuilding near Christmas Tree farm was constructed

3.4 NSW EPA RECORDS

A search of the NSW EPA Contaminated Land register was conducted to assess the potential for contaminated land in the area. The search did not identify any records of significantly contaminated land with the Shellharbour City Council area. The search results are provided below.

Search results

Your search for: Name (site, occupier, owner, recipient): Calderwood
LGA: SHELLHARBOUR CITY COUNCIL
Notice Type: Declaration of Significantly Contaminated Land
Date from: 01 Jan 1960
Date to: 26 Feb 2020

did not find any records in our database.

3.5 SAFEWORK NSW DANGEROUS GOODS RECORDS

A registered search of SafeWork NSW records for licences to keep dangerous goods was not conducted as part of this report as it was not practical to gain Site owner consent at the time of reporting. Review of historical Site records, Site inspection/s, and targeted borehole sampling was considered adequate to identify potential contamination related to the USTs.

3.5.1 UPSS Records

A Site walkover was conducted by ENRS on the **18th December 2019** to inspect for potential Underground Petroleum Storage Systems (UPSS). The inspection identified two (2) fuel bowsers on a hardstand set down area, indicating the potential for underground storage tanks (USTs) within the Site. Interviews with current landowners confirmed the presence of two (2) USTs on the Site which were further delineated by a Ground Penetrating Radar (GPR) survey on **13th February 2020**. Information gained during the Site inspections and provided by the landowner indicates the following Underground Storage Tanks (USTs) are present at the Site:

- Tank 1: 10,000 L UST previously used to store petrol. UST is no longer in service.
- Tank 2: 20,000 L UST used to store diesel. UST remains in service.

Anecdotal information provided by the landowner indicates that Tank 1 is largely empty and no longer in use, however the UST has not been decommissioned. ENRS also understand that Tank 2 has not been refilled to its capacity for an extended period of time as commercial operation of the farm has slowed over recent years and the full capacity not required. No other records of loss monitoring or tank integrity testing were available for review during this assessment.

3.6 UNDERGROUND SERVICE PLANS

The location of underground services can provide conduits and preferential pathways for contaminant migration into or from a Site. Service excavations and trenches may also comprise historical Fill which may require management as waste.

A Dial Before You Dig (DBYD) search was undertaken to compile underground service plans:

- One (1) Telstra major cable/fibre optic network was identified to be present on the site branching from the Illawarra highway and extending north to the residential dwelling on Site. The service line was not physically assessed as part of this investigation. However, it is considered unlikely to present a risk to the Site as no evidence of any major cutting or filling was visible on the ground surface at the time of this assessment.

3.7 SITE HISTORY SUMMARY

Review of the available records and available historical data indicates the Site has been used for commercial agricultural purposes for an extended period of time. Two (2) UPSS were identified during the Site inspection. The Site is considered unlikely to be impacted by any surrounding potentially contaminating activities. The primary Areas of Environmental Concern (AECs) identified during this Stage 1 PSI and the site history review are:

- **AEC01** – Historical weathering of potentially hazardous building materials;

- **AEC02** – Shallow soil contamination from ongoing commercial agricultural landuse;
- **AEC03** – Ground contamination from on-Site UPSS;
- **AEC04** – Unknown Stockpiled material with laboratory reported detections of heavy fraction hydrocarbons (TRH C16-C34);

4.0 SITE CHARACTERISATION (SUMMARY)

At the time of this investigation the Site was still being utilised for residential and agricultural purposes. The Site was characterised by the following infrastructure:

- one (1) single story residential dwelling;
- one (1) detached wooden garage/shed in poor condition;
- four (4) insulated sheds with attached air conditioning systems;
- one (1) large poultry shed;
- one (1) large machinery shed/workshop with attached insulated compartment;
- one (1) small outbuilding adjacent to the paddocks being utilised as a Christmas Tree farm;
- one (1) large shed presumably containing farm machinery;
- two (2) silos in poor condition attached and surrounded by hardstand area. The hardstand areas were being used as a set-down area for agricultural equipment as well as cattle yards; and
- Two (2) fuel bowsers and two (2) USTs were also present on the Site.

The remainder of the Site comprised open paddocks being used for agricultural purposes. Site drainage and groundwater flow direction is inferred to mimic the surrounding topographic relief towards Macquarie Rivulet which bisects the Site.

5.0 CONCEPTUAL SITE MODEL

The NSW EPA contaminated sites guidelines reference the *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)*. The ASC NEPM (2013) recommends a tiered approach to risk assessment of ground contamination and the development of an appropriate Conceptual Site Model (CSM). The CSM describes the source(s) of contamination, the pathway(s) by which contaminants may migrate through the various environmental media, and the populations (receptors, human or ecological) that may potentially be exposed. The following sub-sections outlines the key elements of the CSM subject of this assessment. A CSM highlighting the below information is provide in **Figure 6**.

5.1 SOURCES / POTENTIAL CONTAMINANTS

Based on the documented Site history and site inspections the Areas of Environmental Concern (AEC) and Contaminants of Potential Concern (CoPC) are outlined in **Table 5**.

Table 5: AECs & Contaminants of Potential Concern (CoPC)

AEC	Historical Activities	CoPC
AEC01 – Soil Adjacent Buildings	Weathering of potentially hazardous heavy metal-based paints and asbestos materials form the residential dwelling and sheds.	• Heavy Metals (lead, zinc chromate as Cr, arsenic, cadmium); • Asbestos.
AEC02 – Agricultural Soils	Ongoing commercial agricultural landuse	• Heavy Metals: • Total Recoverable Hydrocarbons (TRHs). • Benzene, Toluene, Ethylbenzene, Xylenes (BTEX). • Polycyclic Aromatic Hydrocarbons (PAHs) • Polychlorinated Biphenols (PCBs), • Pesticides - Organochlorine (OCPs) and Organophosphate (OPPs)
AEC03 – on Site UPSS	Storage of petroleum and diesel within on Site UPSS	• TRHs • BTEX • Lead
AEC04 – Unknown Soil Stockpile	Stockpiling of uncontrolled soils.	• Asbestos • Heavy Metals • TRHs • BTEX • PAHs • PCBs • Pesticides (OCPs and OPPs)

Source: based on Table J1, Appendix J, in AS4482.1 (2005).

5.2 PATHWAYS

Given the primary source of potential contamination is associated with the Site's agricultural landuse and presence of USTs, the primary contaminant migration and exposure pathways comprise:

- Dermal exposure to surface and near surface contaminants;
- Inhalation and/ or ingestion of dust or air bound contaminants for surface soils;
- Leaching and migration of contaminants through the vadose zone; and
- Migration in shallow groundwater – characterised by a low hydraulic gradient in unconfined alluvial sediments.

5.3 RECEPTORS

The receptors comprise:

- Human health – dermal / ingestion / inhalation - excavations, dust, fibres and soil gas / vapour) – commercial workers; and
- Shallow soil, stormwater and groundwater – vertical and lateral migration of contaminants (if any) and connectivity with waterways.

6.0 SITE ASSESSMENT CRITERIA

6.1 REFERENCE GUIDELINES

ENRS have adopted the most appropriate criteria in accordance with current state and national guidelines. Where available, Australian and NSW EPA endorsed guidelines have been referenced in preference to international standards.

6.1.1 National Environment Protection Measure (NEPM)

The NSW EPA has endorsed the use of the Health Investigation Levels (HILs) documented in the *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)* 'Schedule B (1) Guideline on the Investigation Levels for Soil and Groundwater'. The NEPM provide a framework for risk-based assessment of soil and groundwater contamination. HILs are provided for four (4) land use categories:

Table 6: Summary of NEPM Land use Categories

NEPM	Description of Land use Categories
HIL A	Residential A with garden/accessible soil also includes children's day care centres, preschools and primary schools.
HIL B	Residential B with minimal opportunities for soil access; includes buildings with fully and permanently paved yard space such as high-rise buildings and apartments.
HIL C	Recreational C includes public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and unpaved footpaths.
HIL D	Commercial/industrial D includes premises such as shops, offices, factories and industrial sites.

Given the current and proposed ongoing land use, the relevant Site Assessment Criteria is **ASC NEPM (2013) HIL 'A'** for residential with garden/accessible soil.

In addition to the HILs the amended ASC NEPM (2013) provides the following Site Assessment Criteria (SAC):

- ***Management Limits (ML)*** for petroleum hydrocarbon compounds (Table 1 B (7));
- ***Health Screening Levels*** (**HSLs**) potential vapour intrusion (Table 1A [4]) should be selected based on the; land use; medium (sand, silt, clay); and depth.

- ***Groundwater Investigation Levels*** (**GILs**) should be applied based on the receiving environment and groundwater resources. GILs are provided in NEPM Table 1C for; Fresh Waters; Marine Waters; and Drinking Water; and
- ***Ecological Investigation Levels*** (***EILs***) and Ecological Screening Levels (ESLs) for common contaminants in the top 2 m of soil based on three (3) generic land use settings; areas of ecological significance; urban residential areas and public open space; and commercial and industrial land uses.

Table 7: Site Assessment Criteria for Residential A Land use

		Units	NEPM 'A'	NEPM EIL/ESL (Urban / residential)	HIL A/B Management Limits	Maintenance Worker
Polycyclic Aromatic Hydrocarbons	Naphthalene	mg/Kg	-	170	-	29,000 [E]
	BaP TEQ	mg/Kg	3	3 is acceptable noting basis of NEPM ESL is rescinded	-	-
	Total PAHs	mg/Kg	300	300	-	-
Metals & Metalloids	Arsenic	mg/Kg	100	100	-	-
	Cadmium	mg/Kg	20	-	-	-
	Chromium	mg/Kg	100	-	-	-
	Copper	mg/Kg	6,000	800 at pH of 8	-	-
	Lead	mg/Kg	300	1100	-	-
	Mercury	mg/Kg	40	-	-	-
	Nickel	mg/Kg	400	-	-	-
	Zinc	mg/Kg	7,400	-	-	-
Phenolics	T.Phenols	mg/Kg	3000	-	-	-
BTEX	Benzene	mg/Kg	-	65	-	1,100 [E]
	Toluene	mg/Kg	-	105	-	120,000 [E]
	Ethyl benzene	mg/Kg	-	125	-	85,000 [E]
	m+p-Xylene	mg/Kg	-	45	-	130,000 [E]
	o-Xylene	mg/Kg	-	45	-	130,000 [E]
Total Recoverable Hydrocarbons	F1 TRH C6-C10	mg/Kg	-	180	800	82,000 [E]
	F2 TRH C10-C16	mg/Kg	-	120	1,000	62,000 [E]
	F3 TRH C16-C34	mg/Kg	-	-	3,500	85,000 [E]
	F4 TRH C34-C40	mg/Kg	-	-	10,000	120,000 [E]
Pesticides	DDT+DDE+DDD	mg/Kg	240	180	-	
	Aldrin and dieldrin	mg/Kg	6	-	-	
	Chlordane	mg/Kg	50	-	-	
	Endosulfan	mg/Kg	270	-	-	
	Endrin	mg/Kg	10	-	-	
	Heptachlor	mg/Kg	6	-	-	

[A] NEPM (2013) Health Investigation Levels for soil contaminants *Table 1A (1).*
[B] NEPM (2013) Soil *EILs Table 1B (5).*
[C] NEPM (2013) Management limits for TRH compounds in FINE soil Table 1 B(7).
[D] NEPM (2013) Ecological Screening Levels (ESL) for TRH, BTEX & BaP compounds in soil Table 1 B(6).
[E] CRC Care (2011) Technical Report No.10 (Table A4 Soil Health Screening Levels for Direct Contact)

6.2 ASBESTOS IN SOIL CRITERIA

The ASC NEPM (2013) *Schedule B2 - Guideline on site characterisation* documents Health Screening Levels (HSLs) for asbestos levels in soil adopted from the Western Australian Guidelines for the Assessment Remediation and Management of Asbestos contaminated sites in Western Australia (WA Gov;2009). The Guidelines only apply to asbestos materials in soils, they do not apply to asbestos or asbestos containing materials present in buildings, structures, functional pipelines etc. The NEPM guidelines define three (3) primary forms of asbestos in soil:

- ***Asbestos*** Containing ***Material*** (***ACM)*** – non-friable matrix material generally observed as stable fragments in soil unless subjected to aggressive disturbance, prolonged saturation or fire;
- ***Fibrous Asbestos*** (***FA)*** – friable and fibrous material. Friable asbestos materials are those that can be crumbled, pulverised or reduced to powder by hand pressure when dry; and
- ***Asbestos*** Fines (***AF)*** – sub-7mm material including free fibre. Respirable asbestos fibres are generally greater than five micrometres long and no wider than 3 micrometres.

Table 8: Health Screening Levels for Asbestos in Soil (NEPM 2013)

Form of asbestos	Health Screening Level (HSL) (w/w%)			
	Residential A[1]	Residential B[2]	Recreational C[3]	Commercial/ Industrial D[4]
Bonded ACM	0.01%	0.04%	0.02%	0.05%
FA and AF (friable asbestos)	0.001%			
All forms of asbestos	No visible asbestos for surface soil			

1. Residential A with garden/accessible soil also includes children's day care centres, preschools and primary schools.
2. Residential B with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.
3. Recreational C includes public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and unpaved footpaths.
4. Commercial/Industrial D includes premises such as shops, offices, factories and industrial sites.

6.3 WASTE CLASSIFICATION CRITERIA

Liquid and non-liquid waste designated for disposal shall be assessed in accordance with the NSW EPA Waste Classification Guidelines (EPA;2014). Guidelines are defined for the specific contaminant concentration (SCC) and the toxicity characteristics leaching procedure (TCLP). To establish soil waste classification using both SCC and TCLP, the test values for each chemical contaminant must be compared with the threshold values set in Table 2 of the guidelines:

Table 9: Waste Classification Criteria

Classification	SCC value	TCLP value
General solid waste	≤ SCC1	≤ TCLP1
Restricted solid waste	≤ SCC2	≤ TCLP2
Hazardous waste	> SCC2	> TCLP2
Special Waste (Asbestos Waste)	Positive Detection for Asbestos	

7.0 SAMPLING METHODOLOGY

7.1 SOIL SAMPLING

7.1.1 Soil Sample Locations

Soil sample locations were selected with consideration of the ASC NEPM (2013) Schedule B2 Section 6, guidelines on Sampling Design (NEPC;2013) as well as the sample density guidelines provided in Table E1 AS4482.1(2005). Given the preliminary nature of this assessment a targeted sampling regime was considered appropriate. Sample locations targeted the potential areas of environmental concern identified in **Table 5**. ***A total of twelve (12) sample locations*** were tested during the investigation program which is considered adequate to identify potential hotspots or AECs targeted during this investigation.

Sampling locations were limited to accessible areas at the time of this investigation and concentrated to the area immediately surrounding AEC's. Shallow test pits were advanced by manual excavation. Boreholes surrounding the UST were drilled using solid flight augers. Final soil sample locations were selected in the field with consideration of the following criteria and are illustrated in **Figure 4** and **Figure 5**:

- Target AECs;
- Investigate areas of potential Fill, current and former building areas;
- Down-gradient and up-gradient boundaries;
- Targeted sampling of Site area; and
- Accessible ground and safe standing conditions for drilling works.

7.1.2 Soil Sample Method

Samples were collected in general accordance with the principals described in AS4482.1- 2005: Guide to sampling and investigation of potentially contaminated soil (Part 1: Non-volatile and semi-volatile compounds) and AS4482.2-1999: Guide to sampling and investigation of potentially contaminated soil (Part 2: Volatile compounds).

Soil logging procedures followed a systematic and standardised format providing a classification of the soil group based on particle size and structure. Field observations were conducted to detect potential soil contamination, if any, and to distinguish between soil composition, condition and structure.

7.1.3 Soil Sampling Depths

Sample depths were selected with consideration of ground conditions observed during investigations. Samples were generally obtained near the surface to provide preliminary indications of any contaminants which may be present at the Site. During targeted drilling investigations surrounding the Sites UPSS samples were obtained at depths adjacent to the USTs (0.5 mbgl, 1.5 mbgl) as well as depths below the base of the tanks (2.5 mbgl, 3.5 mbgl and 5.0 mbgl).

7.1.4 Sample Preservation

All samples were collected in general accordance with industry standard QA/QC procedures. Discrete soil samples were collected with disposable sterile gloves and placed directly into laboratory supplied 250 mL jars and immediately stored on ice. Sample containers were individually labelled with sample identification clearly marked on the container and sealed lid.

7.1.5 Selection of Samples for Analysis

All samples taken were analysed for the suite of analytes as outlined in **Table 5**. The sample program was considered adequate to identify and assess any potential contamination surrounding the AECs.

8.0 DATA & QUALITY CONTROL PROCEDURES

8.1 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQO) are required to define the quality and quantity of data needed to support management decisions. The process for establishing DQO's is documented by Australian Standard: AS 4482.1-2005 and referenced by the National Environment Protection (Assessment of Site Contamination) Measure (NEPC;2013). The DQO's for the investigation were to obtain representative data to allow a high-quality environmental assessment of:

1. The location, nature, and degree of ground contamination at the Site (if any);
2. The risks posed to human health and the environment, including potential future users of the Site; and
3. The requirements for any further investigative works.

The assessment was conducted to a standard consistent with generally accepted and current professional consulting practice for such an investigation. The evaluation criteria adopted for the investigation are summarised in **Table 10**.

Table 10: Data Quality Objectives

DQO	Evaluation Criteria
Documentation completeness	Completion of field records, chain of custody documentation, laboratory test certificates from NATA-accredited laboratories.

DQO	Evaluation Criteria
Data comparability	Use of appropriate techniques for the sampling, storage and transportation of samples. Use of NATA accredited laboratory using NEPM endorsed procedures.
Data representativeness	Adequate sampling coverage of all areas of environmental concern at the Site, and selection of representative samples.
Precision and accuracy for sampling and analysis	Use properly trained and qualified field personnel and achieve laboratory QC criteria.

8.2 FIELD QUALITY ASSURANCE & QUALITY CONTROL

The Quality Assurance and Quality Control (QA/QC) protocols used during the fieldwork are provided in **Table 11**. Refer to **Appendix D** (Soil) for sample Chain of Custody (COC) documentation. A summary of Relative Percent Differences (RPD) between primary samples, blind field duplicates and interlaboratory duplicates is provided in Table 14.

Table 11: Field QA/QC

Protocol	Description
Sampling Team	Site personnel comprised only experienced and qualified environmental professionals trained in conducting site contamination investigations.
Sample Method	Samples obtained in laboratory prepared bottles with preservatives appropriate for the required analysis.
Sample Equipment	All sample equipment disposed or decontaminated between sample sites.
Field Screening	Visual and manual inspection of sample materials for potential contamination recorded on field sheets.
Chain of Custody Forms	All samples logged and transferred under appropriately completed Chain of Custody (COC) forms with Sample Receipts issued by the laboratory.
Blind Field Duplicate	At least one (1) blind field duplicate collected per 20 samples and submitted for analysis accompanied by COC forms.
Intra Laboratory duplicate	At least 1 per 20 samples
Trip blank/spike	At least 1 per batch submission

8.3 LABORATORY ANALYTICAL METHODS

Analysis of primary samples was conducted by Australian Laboratory Services (ALS). ALS is NATA accredited for the selected analysis. Laboratory QA/QC results are detailed in the Laboratory reports contained in **Appendix D**.

8.4 QA/QC DISCUSSION

A summary of the Data Quality performance is provided in

Table 12. The laboratory was NATA accredited and the Practical Quantitation Limits (PQL) also referred to as Limit of Reporting (LOR) were within the acceptable levels for the investigation criteria. Laboratory certificates of analysis provided in **Appendix D** indicate that for the samples collected during the scope of works, sampling techniques, transport procedures and laboratory analysis were satisfactory.

Analysis of Relative Percent Differences (RPD) of blind duplicates samples was undertaken as part of this assessment. Results were generally reported within the acceptance criteria documented in Table 4 of AS4482.1-2005, the RPD for inorganics was set at <30% and for organics set at <50%. RPD Results are summarised in **Table 14.** Variations outside the accepted criteria may be attributed to the heterogenous natural of the soil composition encountered at the Site.

In summary, the QA/QC indicators either all complied with the required standards or showed variations that would have no significant effect on the quality of the data or the conclusions of this assessment. It is therefore concluded that, for the purposes of this study, the QA/QC results are valid, and the quality of the ***data is acceptable for use in this assessment***.

Table 12: Data Quality Objectives and Criteria

Objective	Performance	Status
Documentation completeness	➢ Completion of field records; ➢ Chain of custody (COC) documentation; ➢ Equipment calibration certificates; ➢ NATA Laboratory Sample Receipt Notification (SRN); and ➢ NATA laboratory Certificate of Analysis (COA).	✓
Data comparability	➢ Use of appropriate techniques for the sampling, storage and transportation of sample media; ➢ Use of NATA certified laboratory using NEPM endorsed procedures; and ➢ Comparison with previous site information, if any.	✓
Data representativeness	➢ Adequate sampling coverage of Site area, AEC's, down gradient and upgradient boundaries; ➢ Selection of representative samples from each sampling location; and ➢ Analysis for CoPC.	✓
Precision and accuracy for sampling and analysis	➢ Use only trained and qualified field personnel; ➢ Calibration certificates for field equipment; ➢ Appropriate sampling and field techniques; ➢ Decontamination procedures; ➢ Achieve laboratory QC criteria; and ➢ Achieve QAQC requirements for RPDs and Recovery	✓

9.0 INVESTIGATION RESULTS

The following sections present the results of the Environmental Site Assessment. ENRS consultants carried out hand auger soil sampling on the ***18th December 2019*** and borehole construction and sampling on the ***18th February 2020.***

9.1 ANALYTICAL RESULTS (SOIL)

Laboratory Certificates of Analysis (COA) are contained in **Appendix D**. Upon receipt the results were tabulated and compared against the adopted SAC to identify any exceedance or AECs. A summary of the soil results is provided in **Table 13**.

9.1.1 Benzene Toluene Ethylbenzene Xylene (BTEX)

BTEX compounds are volatile compounds commonly found in petroleum products and are typically found together at contaminated sites.

Results for BTEX were reported at concentrations below the laboratory Limit of Reporting (LOR) and the adopted Site Assessment Criteria (SAC). The results are considered satisfactory.

9.1.2 Total Recoverable Hydrocarbons (TRH)

Laboratory testing was conducted for light fraction (C6-10) and heavy fraction (C10-40) Total Recoverable Hydrocarbons (TRH). Light fractions are generally associated with petrol whilst middle to heavy fractions are an indication of diesel or kerosene.

Results for light fraction TRH C6-C10 hydrocarbons were reported below the laboratory LOR and the SAC.

Results for heavy fraction TRH(C10-C40) hydrocarbons reported one (1) exceedance of the SAC in stockpile sample SP1 (4330 mg/kg >SAC Management Limit 3500 mg/kg). Heavy fraction (TRH C10-C40) hydrocarbons were also detected in sample TP04/0.1, however results were reported below the adopted SAC.

ENRS note the exceedance reported in sample SP1 was from a small stockpile of material on Site which is considered an isolated area which may be land farmed or disposed as waste, and is unlikely to be indicative of gross ground contamination. Hence, the results are considered satisfactory.

9.1.3 Polycyclic Aromatic Hydrocarbons (PAHs)

Polycyclic Aromatic Hydrocarbons (PAHs) are formed by the incomplete combustion of coal, oil, petrol, wood, or other organic materials. Major sources of PAHs include asphalt roads, road tar, coal, coal tar, and fires of all types.

Results for PAHs were reported at concentrations below the below the laboratory LOR and the SAC. The results are considered satisfactory.

9.1.4 Heavy Metals and Metalloids

Screening was conducted for eight (8) selected heavy metals and metalloids. Concentrations of arsenic, cadmium, chromium, copper, mercury, nickel and zinc were all reported at concentrations below the SAC. Hence, the results are considered satisfactory.

9.1.5 Organochlorine Pesticides (OCPs)

OCPs are characteristically very stable. Since they were first introduced into Australia in the mid-1940s, OCPs have been used in many commercial products. Commonly used OCPs were DDT, lindane, chlordane, dieldrin, aldrin and heptachlor.

Results for OCPs were reported below the LOR which is considered satisfactory.

9.1.6 Organophosphate Pesticides

OPPs are synthetic, more water soluble and have higher degradation rates than OCPs. OPPs may interfere with the nervous system and cause development or reproductive harm, as well as endocrine disruption. Results for OPPs were reported below the laboratory LOR which is considered satisfactory.

9.2 ASBESTOS CONTAINING MATERIAL

9.2.1 Visual Observations

During the preliminary Site inspection, a walkover was conducted by a Licenced Asbestos Assessor (LAA) and Competent Person to inspect for potential fragments of asbestos on the ground surface. One (1) fragment of asbestos cement sheeting greater than 7 mm in bonded form was observed on the ground surface adjacent the detached carport. Asbestos cement sheeting was also observed as construction packers within the carport.

A hazardous materials building survey of the carport and remaining structures on Site was not conducted and was outside the scope of work. If the buildings are to be demolished it is recommended the buildings be subject to a standalone hazardous materials (HAZMAT) survey, and the soil underlying and adjacent the buildings be subject to waste classification or re-assessed for asbestos in soil concentrations to consider if the soil is suitable for re-instatement on Site.

9.3 GROUNDWATER CONDITIONS

Drilling investigations intersected moist sand and drill cuttings at depths below 7 m in boreholes BH01 and BH04. These bores were converted to groundwater monitoring bores with a maximum depth of 8.5 m in BH04 (MW02). The final depth to groundwater was gauged to be 7 m below ground level. Drill cuttings and NATA laboratory soil results from BH01 and BH04 reported levels of CoPC below the relevant SAC, and no visual or olfactory evidence of ground contamination was identified to trigger any further groundwater investigations.

Whilst this investigation did not identify evidence of ground contamination, the presence of USTs at the Site requires secondary leak detection monitoring in accordance with the NSW Government UPSS Regulations (2014), Part 4, Section 21. The Wells should be inspected every six (6) months in accordance with the written instructions of a duly qualified person to assess for contamination by hydrocarbons.

10.0 ENVIRONMENTAL SITE ASSESSMENT

10.1 AEC01 – SOIL ADJACENT BUILDINGS

AEC01 was identified during the PSI based on the potential for historical weathering of building materials located on Site including heavy metal based paints and asbestos containing materials. Visual inspection during Site inspections identified most structures to be in fair condition with minimal weathering of building materials.

One (1) fragment of asbestos cement sheeting was observed on the ground surface adjacent the detached carport, with asbestos cement packers observed in the carport's construction. Asbestos identified in this location is considered limited to the carport and immediately surrounding ground surface and is not likely to represent the conditions of the larger Site area. The fragment was collect and removed from Site for assessment purposes.

Weathering of heavy metal based paints was assessed via targeted shallow soil sampling immediately downgradient of, and adjacent to the residential structure. Sample **TP5/0.1** reported levels of lead below the Site Assessment Criteria (SAC). Hence, the results are satisfactory.

Whilst this assessment did not identify gross ground contamination it is recommended, if the buildings are demolished the shallow soil immediately adjacent and underlying buildings be subject to waste classification if disposed off-site or re-assessed for asbestos in soil concentrations to consider if the soil is suitable for re-instatement on Site.

10.2 AEC02 – AGRICULTURAL SOILS

AEC02 comprised potential shallow soil contamination as a result of ongoing commercial agricultural landuse. Six (6) targeted soil samples were taken in shallow topsoil across the Site and analysed for a range of Contaminants of Potential Concern (CoPC) including OCPs, OPPs, PCBs, Phenols, BTEX, TRH, PAHs and eight heavy metals / metalloids. All samples reported levels of CoPC below the Site Assessment Criteria. Sample TP4/0.1, located downgradient of the Sites workshop area, reported slightly elevated concentrations of heavy fraction (C10 – C40) hydrocarbons compared to remaining samples from across the Site. ENRS note that detections of hydrocarbons are likely due to surface runoff from the workshop area and that concentrations of hydrocarbons were reported below the adopted SAC (TP4/0.1:1180mg/kg < SAC EIL/ESL1300 mg/kg). Hence, the results are considered satisfactory. It is recommended any future earthworks at the Site be supported by an Unexpected Find protocol with stop, notify and assessment procedures should any other visual or olfactory evidence of potential ground contamination be identified in the area.

10.3 AEC03 - UPSS

AEC03 comprised potential ground contamination from on Site Underground Petroleum Storage Systems (UPSS). In total, the Sites UPSS was identified to comprise two (2) Bowers and two (2) Underground Storage Tanks (USTs). ENRS undertook intrusive ground sampling surrounding the UPSS to identify and delineate any associate contamination. In total, five (5) boreholes were advanced adjacent to, and downgradient of the UPSS, to a maximum investigation depth of 8.5 mbgl. No visual or olfactory evidence of UPSS related contamination was identified during

drilling. Laboratory results for BTEX, TRHs and lead reported concentrations below either the LOR or the adopted SAC in all samples.

Based on the results of this investigation, UPSS infrastructure on Site is unlikely to have caused gross levels of ground contamination. It is recommended the Site manager ensure operation of the UPSS be conducted in accordance with the UPSS Regulations (2014).

10.4 AEC04 – SOIL STOCKPILE

AEC04 comprised a stockpile of soil estimated to total approximately 15 m^3. Sample SP1 reported levels of heavy fraction (C10 – C40) hydrocarbons in exceedance of HSL 'A' management limits (SP1 4330 mg/kg > HSL A management limits 3500 mg/kg). Given the small size of the stockpile, remediation via excavation and off-Site disposal is considered appropriate. Alternatively the material may be land farmed and re-assessed for suitability to be re-instated on Site. Additional samples will be required from the stockpile to provide a waste classification certificate in line with NSW EPA Waste Classification Guidelines.

Based on the limited quantity of stockpiled material and the relatively minor level of the exceedance it is considered unlikely that the stockpiled material is indicative of gross levels of ground contamination at the Site. It is recommended the stockpile be established with suitable environmental controls pending disposal or remediation, including placement on hardstand or two layers of 200 micron plastic with bunding and sediment and erosion controls, or covering.

11.0 CONCLUSIONS & RECOMMENDATIONS

Based on the available information reviewed during the scope of works the following conclusions and recommendations are provided:

- The Site history records indicated that the Site has been used for rural/agricultural purposes for an extended period of time;
- The Site walkover and inspections conducted on the 18th December 2019 confirmed the Site layout was consistent with the documented history and land use;
- The Areas of Environmental Concern (AECs) identified during this investigation included;
  - AEC01 – Potential for historical weathering of building materials (heavy metal-based paints and asbestos materials) in soil adjacent and underlying building areas;
  - AEC02 – Potential for residual impacts on soil from agricultural land use;
  - AEC03 – Underground Petroleum Storage System (UPSS) (2x USTs and bowsers);
  - AEC04 – Stockpiled, uncontrolled soil/Fill.
- Review of available online acid sulphate soil datasets identified that the Site presents a *LOW* risk of potential acid sulphate soils. If further proposals are to include earthworks, soil materials should be subject to visual screening for PASS indicators including grey mottled soils, rotten egg smell and oxidising soils or field testing conducted by a suitably qualified person in accordance with NSW Acid Sulphate Soils Management Advisory Committee (ASSMAC;1998) guidelines;

- The asbestos cement fragment identified on the ground surface adjacent the detached carport was considered to be an isolated fragment Contamination due to uncontrolled asbestos containing materials (ACM) was not observed to be widespread and does not represent broader ground conditions at the Site. ENRS recommends that all future Site works be conducted in accordance with a Site specific Unexpected Finds Protocol (UFP). ENRS note the asbestos fragment identified was collected and removed from Site pending future laboratory identification if required;
- The results of laboratory analysis report slight detections of heavy metals and heavy fraction (C10-40) Total Recoverable Hydrocarbons (TRH) within the shallow topsoil. ENRS note that these reported detections are below the adopted Site Assessment Criteria and are likely due to a history agricultural land usage;
- ENRS recommend the UPSS infrastructure located on the Site be formally decommissioned and validated in accordance with the revised NSW Underground Petroleum Storage Systems Regulations (EPA;2014) and the UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS (DECCW;2019) prior to the proposed residential development;
- With the exception of stockpile sample SP1, results for all other CoPCs as reported by the NATA accredited laboratory were below the adopted Site Assessment Criteria. The soil results are considered satisfactory and the Site is considered to pose little to no risk to site users or the surrounding environment;
- Site conditions observed during a follow up inspection (09/12/2020) were consistent with those observed and documented in the initial Stage 1 PSI.
- ENRS recommend the Site is considered capable of being made suitable for the proposed landuse following the decommissioning and validation of UPSS infrastructure;
- This assessment did not identify any environmental issues or evidence of gross contamination to trigger the need for any further assessment based on the proposed land use;
- Should any change in Site conditions, proposed land use or incident occur which causes a potential environmental impact, a suitable environmental professional should be engaged to further assess the Site and consider requirements for any additional assessment; and
- This report must be read in conjunction with the attached Statement of Limitations.

12.0 REFERENCES

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13.0 LIMITATIONS

This report and the associated services performed by ENRS are in accordance with the scope of services set out in the contract between ENRS and the Client. The scope of services was defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to Site.

ENRS derived the data in this report primarily from visual inspections, and, limited sample collection and analysis made on the dates indicated. In preparing this report, ENRS has relied upon, and presumed accurate, certain information provided by government authorities, the Client and others identified herein. The report has been prepared on the basis that while ENRS believes all the information in it is deemed reliable and accurate at the time of preparing the report, it does not warrant its accuracy or completeness and to the full extent allowed by law excludes liability in contract, tort or otherwise, for any loss or damage sustained by the Client arising from or in connection with the supply or use of the whole or any part of the information in the report through any cause whatsoever.

Limitations also apply to analytical methods used in the identification of substances (or parameters). These limitations may be due to non-homogenous material being sampled (i.e. the sample to be analysed may not be representative), low concentrations, the presence of 'masking' agents and the restrictions of the approved analytical technique. As such, non-statistically significant sampling results can only be interpreted as 'indicative' and not used for quantitative assessments.

The data, findings, observations, conclusions and recommendations in the report are based solely upon the state of Site at the time of the investigation. The passage of time, manifestation of latent conditions or impacts of future events (e.g. changes in legislation, scientific knowledge, land uses, etc) may render the report inaccurate. In those circumstances, ENRS shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of the report.

This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the provisions of the agreement between ENRS and the Client. ENRS accepts no liability or responsibility whatsoever and expressly disclaims any responsibility for or in respect of any use of or reliance upon this report by any third party or parties.

This report is to be independently reviewed by NSW Site Auditor Brad May of *Epic Environmental* prior to issuing to the local authority.

It is the responsibility of the Client to accept if the Client so chooses any recommendations contained within and implement them in an appropriate, suitable and timely manner.

TABLES

ENRS
ENVIRONMENT & NATURAL RESOURCE SOLUTIONS

Table 13: Total Concentration Results - Soil
AV Jennings: 2514 Illawarra Highway, Calderwood

Analyte				Organochlorine Pesticides (OCP)					Total PCB's	Organophosphate Pesticides (OPP)	Total Phenols	BTEX					Total Recoverable Hydrocarbons							Polycyclic Aromatic Hydrocarbons (PAHs)				Metals / Metalloids								Asbestos		< ASC NEPM Suitability for Re-Use On Site
				Aldrin	Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Total PCB's	Organophosphate Pesticides (OPP)	Total Phenols	Benzene	Toluene	Ethyl benzene	m+p-Xylene	o-Xylene	TRH C6-C9	TRH C10-C36	F1 TRH C6-C10	F2 TRH C10-C16	F3 TRH C16-C34	F4 TRH C34-C40	Total TRH C10-C40	Naphthalene	Benzo(a)pyrene	Benzo(a)pyrene TEQ	Total Positive PAHs	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	FA & AF (Friable Asbestos)	Bonded ACM	
Site Assessment Criteria - NEPM (2013) Soil Investigation Levels (mg/Kg)																																					
HIL 'A' (Resi.,Prim. Sch. & Accessible Soil)				6	6	50	240	6	1	-	3000	-	-	-	-	-	-	-	-	-	-	-	-	-	3	300	100	20	100	6000	300	40	400	7400			
HSL 'A' & 'B'	SAND	0-1m		-	-	-	-	-	-	-	-	0.5	160	55	40	40	-	-	45	110	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	0.001%	0.01%	
		1-2m		-	-	-	-	-	-	-	-	0.5	220	NL	60	60	-	-	70	240	-	-	-	NL	-	-	-	-	-	-	-	-	-	-	-			
		2-4m		-	-	-	-	-	-	-	-	0.5	310	NL	95	95	-	-	110	440	-	-	-	NL	-	-	-	-	-	-	-	-	-	-	-			
		>4m		-	-	-	-	-	-	-	-	0.5	540	NL	170	170	-	-	200	NL	-	-	-	NL	-	-	-	-	-	-	-	-	-	-	-			
	SILT	0-1m		-	-	-	-	-	-	-	-	0.6	390	95	95	NL	-	-	40	230	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-			
		1-2m		-	-	-	-	-	-	-	-	0.7	NL	210	210	NL	-	-	65	NL	-	-	-	NL	-	-	-	-	-	-	-	-	-	-	-			
		2-4m		-	-	-	-	-	-	-	-	1	NL	NL	NL	NL	-	-	100	NL	-	-	-	NL	-	-	-	-	-	-	-	-	-	-	-			
		>4m		-	-	-	-	-	-	-	-	2	NL	NL	NL	NL	-	-	190	NL	-	-	-	NL	-	-	-	-	-	-	-	-	-	-	-			
	CLAY	0-1m		-	-	-	-	-	-	-	-	0.7	480	NL	110	110	-	-	50	280	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-			
		1-2m		-	-	-	-	-	-	-	-	1	NL	NL	310	310	-	-	90	NL	-	-	-	NL	-	-	-	-	-	-	-	-	-	-	-			
		2-4m		-	-	-	-	-	-	-	-	2	NL	NL	NL	NL	-	-	150	NL	-	-	-	NL	-	-	-	-	-	-	-	-	-	-	-			
		>4m		-	-	-	-	-	-	-	-	3	NL	NL	NL	NL	-	-	290	NL	-	-	-	NL	-	-	-	-	-	-	-	-	-	-	-			
Management Limits (Resi., parkland & public space)		Coarse		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700	1000	2500	10000	-	-	-	-	-	-	-	-	-	-	-	-			
		Fine		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	800	1000	3500	10000	-	-	-	-	-	-	-	-	-	-	-	-	-			
EIL/ESL (Urban residential & public space)		Coarse		-	-	-	180	-	-	-	-	50	85	70	105	105	-	-	180	120	300	2800	-	170	-	3	300	100	-	-	800(pH8)	1100	-	-	-			
		Fine		-	-	-	180	-	-	-	-	65	105	125	45	45	-	-	180	120	1300	5600	-	170	-	3	300	100	-	-	800(pH8)	1100	-	-	-			
Total Concentrations - PQL				0.05	0.05	0.05	0.05	0.05	0.1	0.05	0.5	0.2	0.5	0.5	0.5	0.5	10	50	10	50	100	100	50	0.05	0.05	0.05	0.05	5	1	2.0	5	5	0.1	2	5	0.001		
Area	**ID (m)**	**Depth (m)**	**Date**	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	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	% w/w		
2514 Illawarra Highway, Calderwood	TP01/0.1	0.1	18/12/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**17**	**24**	**19**	<0.1	**3**	**81**	None Observed		
	TP02/0.1	0.1	18/12/2019	----	----	----	----	----	----	<0.05	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**9**	**25**	**6**	<0.1	**7**	**113**			
	TP03/0.1	0.1	18/12/2019	----	----	----	----	----	----	<0.05	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**14**	**23**	**10**	<0.1	**10**	**227**			<NEPM 'A' = suitable for re-use on Site
	TP04/0.1	0.1	18/12/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**1500**	<10	<50	**1180**	**720**	**1900**	<0.5	<0.5	**1.2**	<0.5	<5	<1	**19**	**59**	**40**	<0.1	**9**	**308**			
	TP5/0.1	0.1	18/12/2019	----	----	----	----	----	----	<0.05	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**12**	**43**	**17**	<0.1	**9**	**143**			
	TP6/0.1	0.1	18/12/2019	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	**1.2**	<0.5	<5	<1	**20**	**28**	**13**	<0.1	**16**	**53**			
	SP1	0.1	18/12/2019	<0.25	<0.25	<0.25	<0.25	<0.25	<0.1	<0.05	**1.6**	<0.2	<0.5	<0.5	<0.5	<0.5	<10	**5440**	<10	**80**	**4330**	**1450**	**5860**	<0.5	<0.5	**1.2**	<0.5	<5	<1	**4**	**30**	<5	<0.1	**4**	**288**			> NEPM 'A'
	BH01/0.5	0.5	18/02/2020	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	----	----	----	----	----	----	----	----	**12**	----	----	----			
	BH01/1.5	1.5	18/02/2020	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	----	----	----	----	----	----	----	----	**8**	----	----	----			
	BH02/0.5	0.5	18/02/2020	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	----	----	----	----	----	----	----	----	**16**	----	----	----			
	BH02/1.5	1.5	18/02/2020	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	----	----	----	----	----	----	----	----	**10**	----	----	----			
	BH03/0.5	0.5	18/02/2020	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	----	----	----	----	----	----	----	----	**11**	----	----	----			<NEPM 'A' = suitable for re-use on Site
	BH03/1.5	1.5	18/02/2020	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	----	----	----	----	----	----	----	----	**7**	----	----	----			
	BH04/0.5	0.5	18/02/2020	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	----	----	----	----	----	----	----	----	**24**	----	----	----			
	BH04/1.5	1.5	18/02/2020	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	----	----	----	----	----	----	----	----	**9**	----	----	----			
	BH05/0.5	0.5	18/02/2020	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	----	----	----	----	----	----	----	----	**12**	----	----	----			
	BH05/1.5	1.5	18/02/2020	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	----	----	----	----	----	----	----	----	**8**	----	----	----			
95% Upper Confidence Limit Calculations (mg/Kg)																																						
Number of samples				4	4	4	4	4	4	7	4	17	17	17	17	17	17	17	17	17	17	17	17	7	7	7	7	7	7	7	7	17	7	7	7	-	-	
Maximum				0.13	0.13	0.13	0.13	0.13	0.05	0.03	1.60	0.10	0.25	0.25	0.25	0.25	5.0	5440	5.0	80	4330	1450	5860	0.25	0.25	1.20	0.25	2.5	0.5	20.0	59	40.00	0.05	16.00	308.00	-	-	
Minimum				0.03	0.03	0.03	0.03	0.03	0.05	0.03	0.25	0.10	0.25	0.25	0.25	0.25	5.0	25	5.0	25	50	50	25	0.25	0.25	1.20	0.25	2.50	0.50	4.0	23.0	2.5	0.05	3.0	53.0	-	-	
Standard deviation				0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00	#####	0.00	13	1057	367	1459	0.00	0.00	0.00	0.00	0.00	0.00	5.74	13.26	8.64	0.00	4.31	101.43	-	-	
Coefficient of Variation				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.15	0.00	0.00	0.00	0.00	0.00	0.00	3.11	0.00	0.5	2.9	2.1	3.0	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.40	0.65	0.00	0.52	0.59	--	-	<NEPM 'A' = suitable for re-use on Site
t statistic at a=0.05				2.35	2.35	2.35	2.35	2.35	2.35	1.94	2.35	1.75	1.75	1.75	1.75	1.75	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.75	1.94	1.94	1.94	-	-	
Average				0.05	0.05	0.05	0.05	0.05	0.05	0.03	0.59	0.10	0.25	0.25	0.25	0.25	5	430	5	28	368	172	479	0.25	0.25	1.20	0.25	2.50	0.50	13.57	33.14	13.21	0.05	8.29	173.29	-	-	
95% UCL average				**0.109**	**0.109**	**0.109**	**0.109**	**0.109**	**0.05**	**0.03**	**1.38**	**0.10**	**0.25**	**0.25**	**0.25**	**0.25**	**5.0**	**997**	**5.0**	**34**	**816**	**327**	**1096**	**0.25**	**0.25**	**1.20**	**0.25**	**2.5**	**0.5**	**17.8**	**42.9**	**16.9**	**0.1**	**11.5**	**247.8**	No Asbestos Detected		

Notes: Basis for NEPM (2013) ESL for B(a)P has been rescindered. Recommend application of HSL 'A' 3 mg/kg pending publication of updated ESL.

ENVIRONMENT & NATURAL RESOURCE SOLUTIONS

Table 14: Summary of Relative Percent Differences in Soil Samples

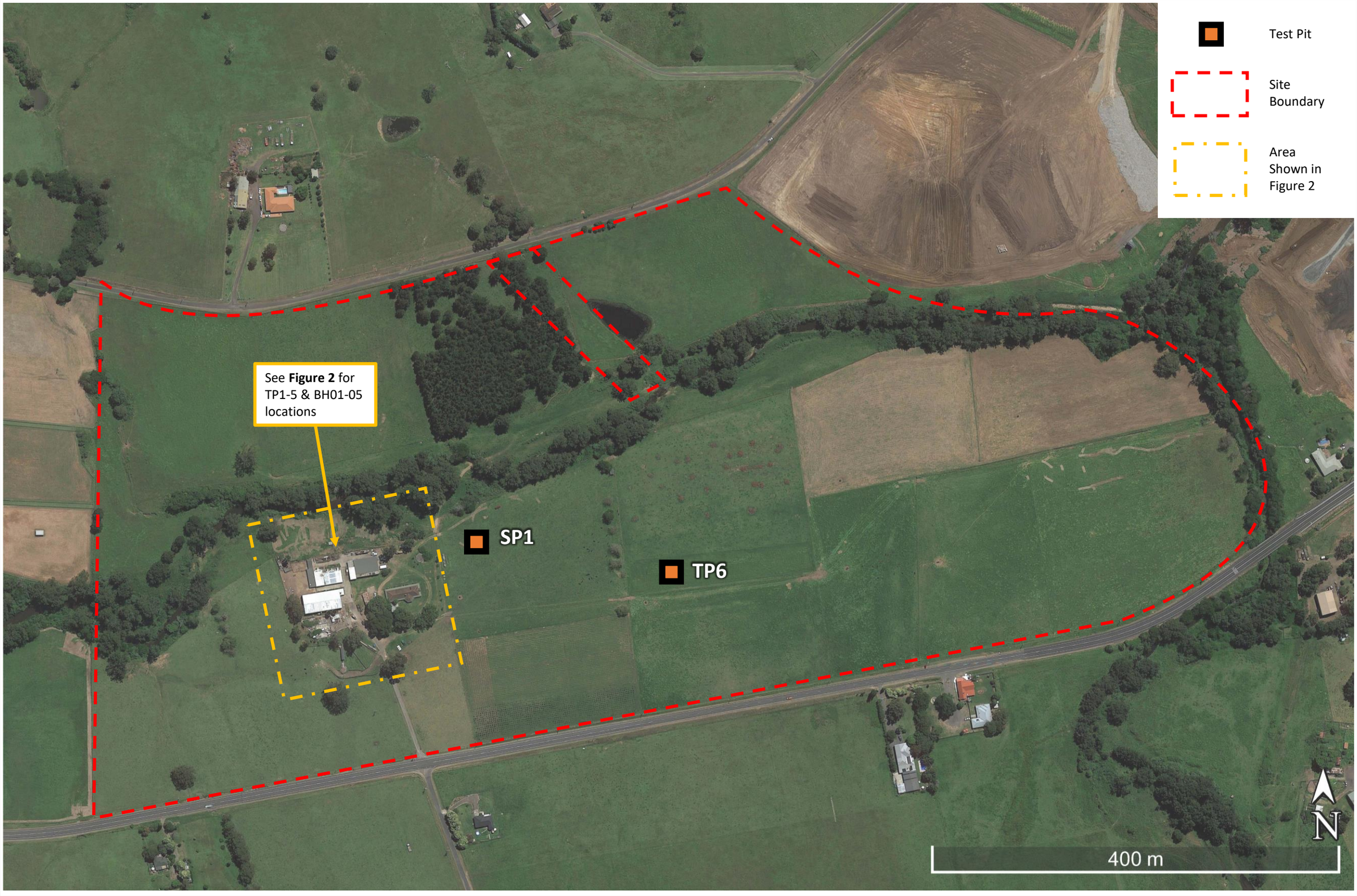
ANALYTE	*Laboratory PQL / LOR*	Primary Sample ID: BH05/1.5	Blind Field Duplicate Sample	RPD %
Lead	5	8	10	22%
Naphthalene	0.5	<1	<1	0%
Benzene	0.2	<0.2	<0.2	0%
Toluene	0.5	<0.5	<0.5	0%
Ethyl benzene	0.5	<0.5	<0.5	0%
m+p-Xylene	0.5	<0.5	<0.5	0%
o-Xylene	0.5	<0.5	<0.5	0%
F1 TRH C6-C10	10	<10	<10	0%
F2 TRH C10-C16	50	<50	<50	0%
F3 TRH C16-C34	100	<100	<100	0%
F4 TRH C34-C40	100	<100	<100	0%
Total TRH C10-C40	50	<50	<50	0%

Acceptance criteria for Inorganics RPD<30%
Acceptance criteria for Organics RPD<50%

(AS4482.1-2005) RPD Calculation Method = $\frac{\text{D1-D2}}{\text{Mean Result}} \times 100$

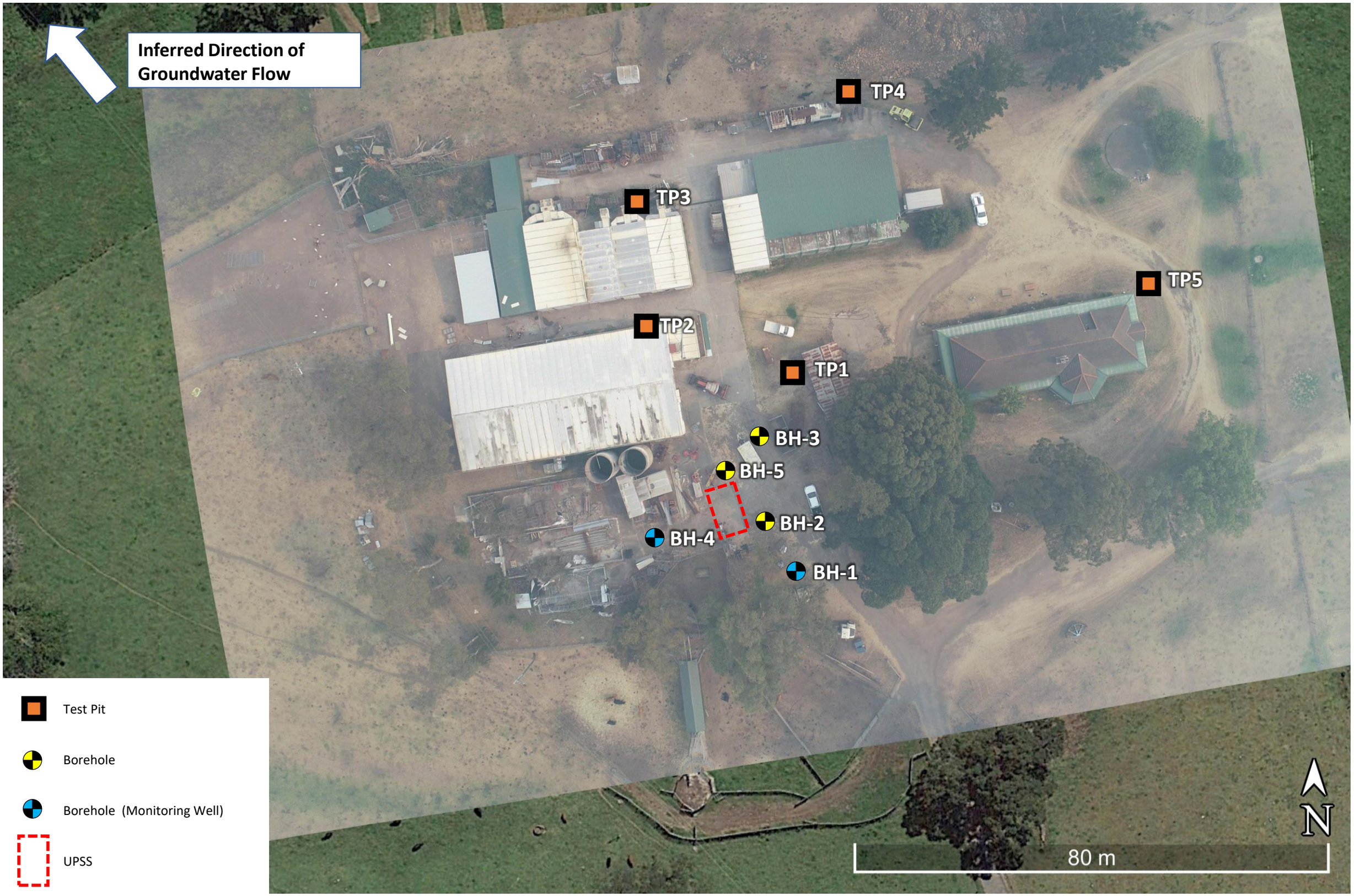
Results below detection limit were assumed to be equal to the PQL/LOR for RPD calculations
Results above the acceptance criteria were assessed to be disregarded if results were <5 x PQL/LOR

Figures



ENRS
Environment & Natural Resource Solutions
108 Jerry Bailey Road, Shoalhaven Heads, NSW, 2535
Tel: 02 4448 5490 Fax: 02 90374708 projects@enrs.com.au
www.enrs.com.au

Client:	**A.V. Jennings**	Drawn:	**CA**	Figure:	**4**
Project:	**ENRS1426**	Source:	**GoogleEarth**	Date:	**28/02/2020**
Location:	**2514 Illawarra Highway, Calderwood, NSW 2527**	Scale:	**Scale Bar**	Title:	**Site plan – Test Pit Locations**
		Status:	**Rev 1**		



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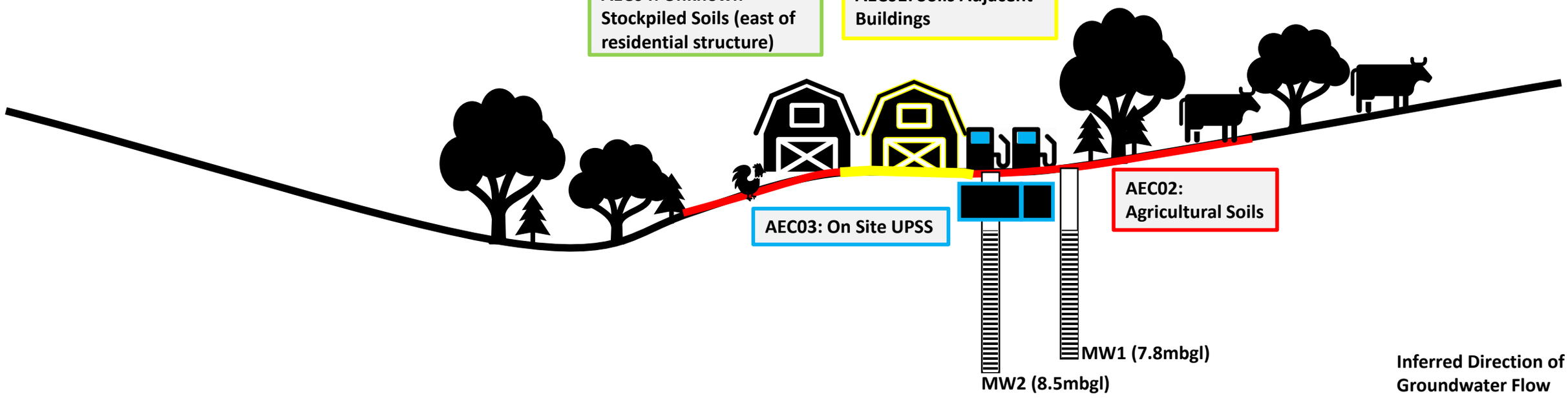
Client:	**A.V. Jennings**	Drawn:	**CA**	Figure:	**5**
Project:	**ENRS1426**	Source:	**GoogleEarth**	Date:	**28/02/2020**
Location:	**2514 Illawarra Highway, Calderwood, NSW 2527**	Scale:	**Scale Bar**	Title:	**Site Plan – Test Pit and Bore Hole Locations**
		Status:	**Rev 1**		

AEC04: Unknown Stockpiled Soils (east of residential structure)

AEC01: Soils Adjacent Buildings



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www.enrs.com.au

Client:	**A.V. Jennings**	Drawn:	**CA**	Figure:	**6**
Project:	**ENRS1426**	Source:	**GoogleEarth**	Date:	**28/02/2020**
Location:	**2514 Illawarra Highway, Calderwood, NSW 2527**	Scale:	**Scale Bar**	Title:	**Site Plan – Test Pit and Bore Hole Locations**
		Status:	**Rev 1**		

APPENDICES

Appendix A

Torrens Title Search Results

CERTIFICATE ORDER SUMMARY

Transaction Details

Date:	06/03/2020 12:13
Order No.	61316167
Certificate No:	94460673
Your Reference:	ENRS1426
Certificate Ordered:	NSW LRS - Copy of Cancelled Title - Cancelled Title CT14209-35
Available:	Y
Size (KB):	195
Number of Pages:	4
Scan Date and Time:	21/12/2010 07:58

14209035

NEW SOUTH WALES

[redacted]ICATE OF TITLE

16911. [redacted]AL PROPERTY ACT, 1900

Appln Nos. 2177, 2236 & 189..

IVA No. 34057

Prior Titles Vol. 2383 Fol. 211
Vol. 9764 Fol. 66
Vol. 12098 Fol. 119

CANCELLED Vol. 14209 Fol. 35

EDITION ISSUED

SEE AUTO FOLIO 19 8 1980

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

Registrar General.

(Page 1) Vol. 14209 Fol. 35

ESTATE AND LAND REFERRED TO

S

Estate in Fee Simple in Lot 7 in Deposited Plan 259137 at Albion Park in the Municipality of Shellharbour Parishes of Calderwood and Jamberoo and County of Camden being part of Portion 9 Parish of Calderwood granted to David Johnston on 1-5-1833 and part of Portion 2 Parish of Jamberoo granted to John Paul on 1-5-1833.

FIRST SCHEDULE

~~CUSTOM CREDIT CORPORATION LIMITED as to the land comprised in Book 3078 No. 407 and IMPROVED PASTURES PTY. LIMITED as to the land formerly comprised in Certificates of Title Volume 2383 Folio 211, Volume 9764 Folio 66 and Volume 12098 Folio 119.~~

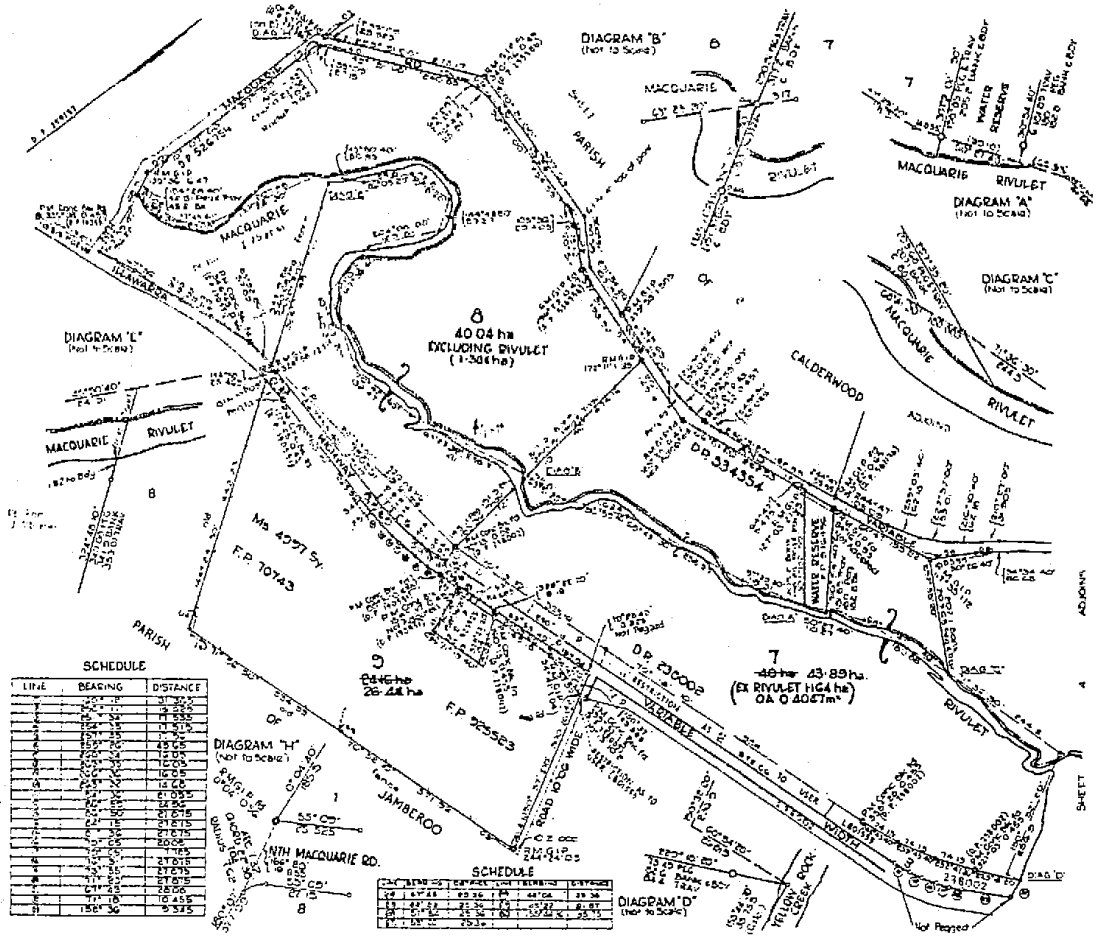
SECOND SCHEDULE

GRM

1. Reservations and conditions, if any, contained in the Crown Grants above referred to.
2. CAUTION. The land within described is held subject to any subsisting interest (as defined in Section 28A Real Property Act, 1900) as to the land comprised in Book 3078 No. 407.
3. RT L801553P Restriction on user (See Section 27E (6) Main Roads Act, 1924 affecting the land shown so burdened in Deposited Plan 259137).
4. ~~N63662 Mortgage to Custom Credit Corporation Limited of the land formerly comprised in Certificates of Title Volume 2383 Folio 211 and Volume 9764 Folio 66.~~ Discharged S530570
5. ~~N66125 Mortgage to Custom Credit Corporation Limited of the land formerly comprised in Certificate of Title Volume 12098 Folio 119.~~ Discharged S530570
6. ~~P965047 Mortgage to Custom Credit Corporation Limited of the land formerly comprised in Certificate of Title Volume 12098 Folio 119.~~ Discharged S530570
7. ~~P965047 Mortgage affected by Q109425 (Variation of Mortgage).~~ Cancelled S530570
8. ~~P977858 Mortgage to Custom Credit Corporation Limited of the land formerly comprised in Certificates of Title Volume 2383 Folio 211 and Volume 9764 Folio 66.~~ Discharged S530570
9. ~~P977858 Mortgage affected by Q109426 (Variation of Mortgage).~~ Cancelled S530570
10. ~~R919567 Caveat by the Registrar General as to the land comprised in Book 3078 No. 407.~~ Withdrawn S530571

PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES



FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	REGISTERED	Signature of Registrar General
John Barry Pyers and Helen Catherine Pyers as joint tenants by Transfer S530571 and Transfer S530572.	Registered	29-6-1981.		

CANCELLED

SEE AUTO FOLIO

S.530571 o/m
S —
S —
S —

T21764 M/R

SECOND SCHEDULE (continued)

INSTRUMENT NATURE	INSTRUMENT NUMBER	PARTICULARS	REGISTERED	Signature of Registrar General	CANCELLATION	
CV S530571 P Covenant	Covenant	Registered 29-6-1981.				
MX S530573 P	Mortgage	to Bank of New South Wales. Registered 29-6-1981.				
MX T21764 P	Mortgage	to Bank of New South Wales. Registered 3-5-1982.				

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

Vol. 14209 Fol. 35

Vol. 14209 Fol. 35

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	INSTRUMENT		REGISTERED	Signature of Registrar General
	NATURE	NUMBER		

SEE AUTO FOLIO

SECOND SCHEDULE (continued)

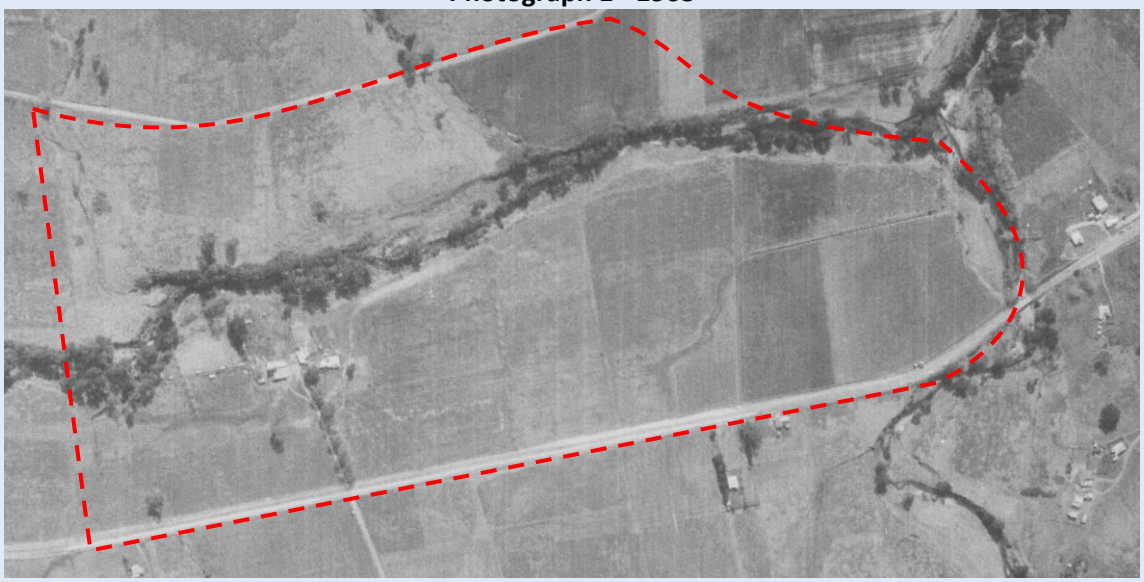
INSTRUMENT		PARTICULARS	REGISTERED	Signature of Registrar General	CANCELLATION	
NATURE	NUMBER					

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

Appendix B

Historical Aerial Photography

Photograph 1 - 1963



Photograph 2 - 1963

Photograph 3 - 1970

Photograph 4 - 1980

Photograph 5 - 1990

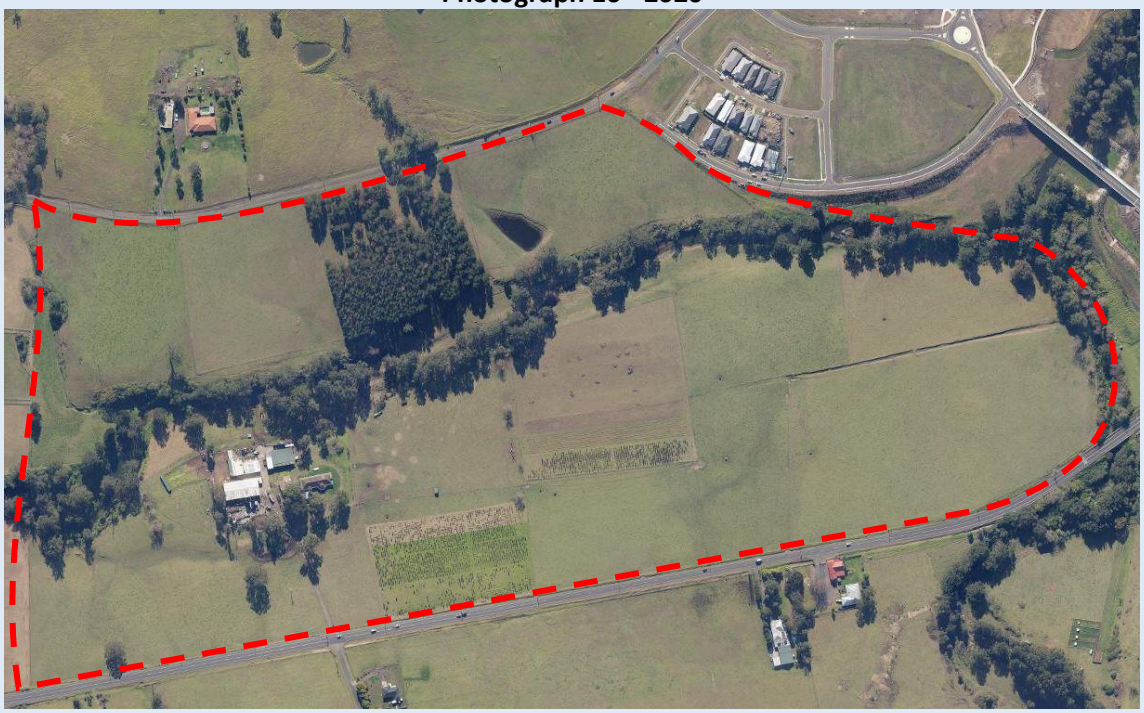
Photograph 6 - 2006

Photograph 7 - 2010

Photograph 8 - 2016

Photograph 9 - 2020

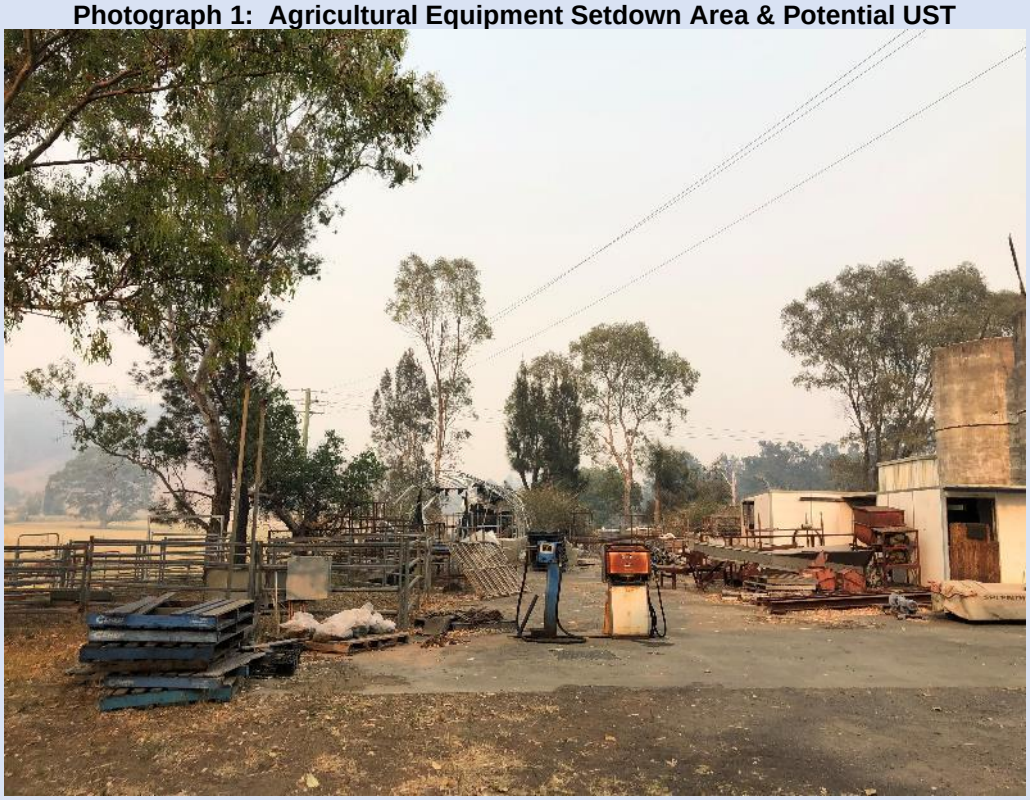
Photograph 10 - 2020



Appendix C

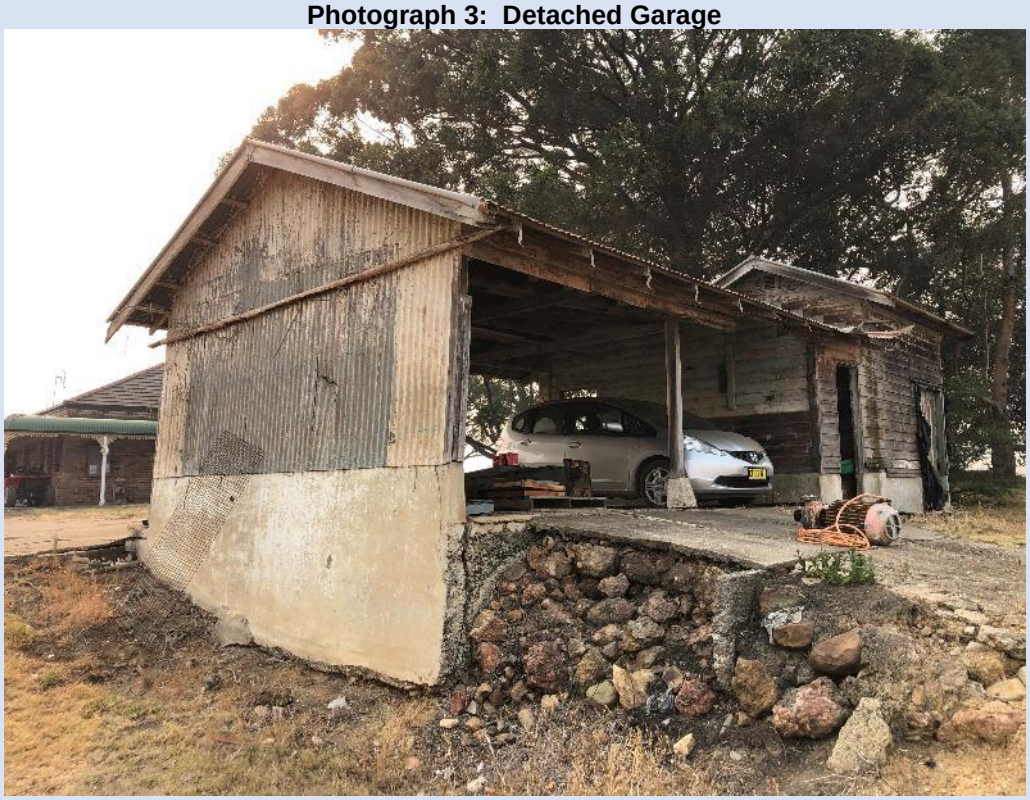
Photographic Record of Site Conditions

Photograph 1: Agricultural Equipment Setdown Area & Potential UST

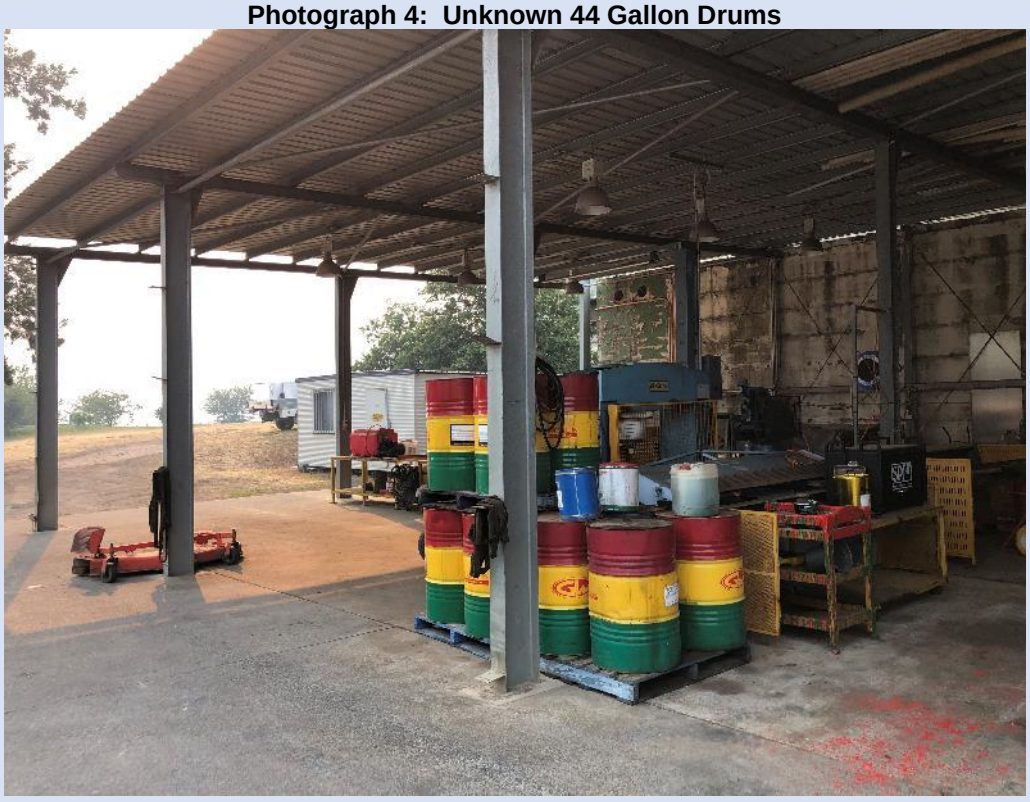


Photograph 2: Site Looking North

Photograph 3: Detached Garage



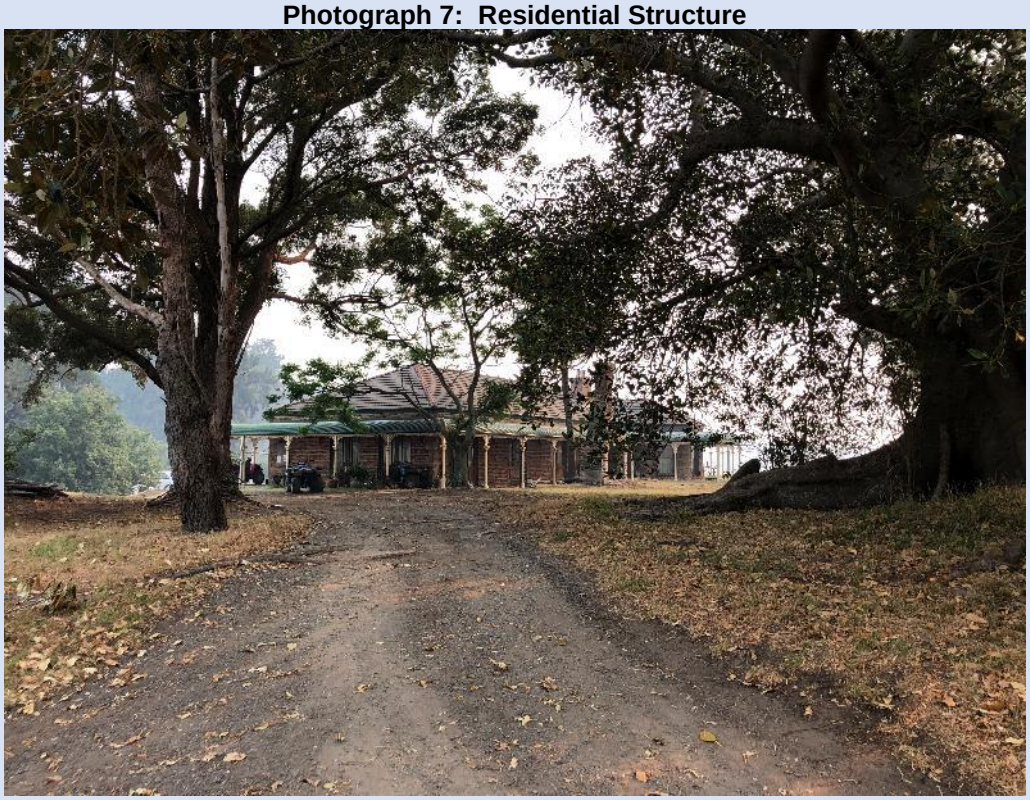
Photograph 4: Unknown 44 Gallon Drums



Photograph 5: 44 Gallon Drums and Used Car Batteries

Photograph 6: Workshop Area

Photograph 7: Residential Structure



Photograph 8: Uncontrolled Soil Stockpile

Photograph 9: Surrounding Agricultural Land

Photograph 10: Christmas Tree Farm

Appendix D

Laboratory Certificates of Analysis (COA)
& Chain of Custody (COC)

7/1/19

Chain of Custody

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 02 4423 2063 E: nowra@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT:	ENRS	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☒ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE:	108 Jerry Bailey Road, Shoalhaven Heads		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes / No / N/A
PROJECT:	ENRS1426	PO No.:	ALS QUOTE No.: EN/222/17	Free ice / frozen ice bricks present upon receipt?	Yes / No / N/A
SITE DESCRIPTION:	2514 Illawarra Highway	ENRS Project Number:	ENRS1426	Random Sample Temperature on Receipt:	21.6 °C
PROJECT MANAGER:	lab@enrs.com.au	CONTACT PH: 0403 526 292	Chain of Custody	Other comment:	
SAMPLER:	CA	SAMPLER MOBILE: 0478 725 692 (CA)	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7		
COC Emailed to ALS?	YES	EDD FORMAT (or default):	RELINQUISHED BY: Chris Allen DATE/TIME: 20/12/2019	RECEIVED BY: JUSTIN DATE/TIME: 23/12/19 1.25pm	RELINQUISHED BY: DATE/TIME:
Email Reports to:	lab@enrs.com.au;				RECEIVED BY: DATE/TIME:
Email Invoice to (default to PM if no addresses):	accounts@enrs.com.au				
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:					

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION	ANALYSIS REQUIRED Including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	S-26 (C6-C40, BTEXN, PAH, 8HM)	S-19	BTEX	TCLP (Pb)	TCLP (PAH's)	ASLP S2 (DI Water)		HOLD - 60 DAYS REQUIRED	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	TP01/0.1	18/12/2019	Soil	Unpreserved Glass		1							
2	TP02/0.1	18/12/2019	Soil	Unpreserved Glass	1								
3	TP03/0.1	18/12/2019	Soil	Unpreserved Glass	1								
4	TP04/0.1	18/12/2019	Soil	Unpreserved Glass		1							
5	TP5/0.1	18/12/2019	Soil	Unpreserved Glass	1								
6	TP6/0.1	18/12/2019	Soil	Unpreserved Glass		1							
7	SP1	18/12/2019	Soil	Unpreserved Glass		1							
				TOTAL	3	4	0	0	0	0	0	0	

Environmental Division
Sydney
Work Order Reference
ES1942581

Telephone : +61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1942581**	Page	: 1 of 13
Client	: **ENVIRONMENT & NATURAL RESOURCE SOLUTIONS**	Laboratory	: Environmental Division Sydney
Contact	: LAB ENRS	Contact	: Aneta Prosaroski
Address	: 25 River Rd Shoalhaven Heads 2535	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9037 4708	Telephone	: +61 2 4225 3125
Project	: ENRS1426	Date Samples Received	: 23-Dec-2019 13:25
Order number	: ----	Date Analysis Commenced	: 23-Dec-2019
C-O-C number	: ----	Issue Date	: 06-Jan-2020 10:41
Sampler	: chris Allen		
Site	: 2514 Illawarra Highway		
Quote number	: EN/222		
No. of samples received	: 7		
No. of samples analysed	: 7		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP071: Results of sample SP1 have been confirmed by re-extraction and re-analysis.
- EP068 : Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP01/0.1	TP02/0.1	TP03/0.1	TP04/0.1	TP5/0.1
			Client sampling date / time	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00
Compound	CAS Number	LOR	Unit	ES1942581-001	ES1942581-002	ES1942581-003	ES1942581-004	ES1942581-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	4.9	2.5	4.2	6.4	7.4
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	17	9	14	19	12
Copper	7440-50-8	5	mg/kg	24	25	23	59	43
Lead	7439-92-1	5	mg/kg	19	6	10	40	17
Nickel	7440-02-0	2	mg/kg	3	7	10	9	9
Zinc	7440-66-6	5	mg/kg	81	113	227	308	143
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	----	<0.1	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	----	<0.05	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	----	<0.05	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	----	<0.05	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	----	<0.05	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	----	<0.05	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	----	<0.05	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	----	<0.05	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	----	<0.05	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	<0.05	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	----	<0.05	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	----	<0.05	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	----	<0.05	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	----	<0.05	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	----	----	<0.05	----
Endrin	72-20-8	0.05	mg/kg	<0.05	----	----	<0.05	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	----	<0.05	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	<0.05	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	----	----	<0.05	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	----	<0.05	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	----	<0.05	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP01/0.1	TP02/0.1	TP03/0.1	TP04/0.1	TP5/0.1
				Client sampling date / time	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00
Compound	CAS Number	LOR	Unit		ES1942581-001	ES1942581-002	ES1942581-003	ES1942581-004	ES1942581-005
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	----	----	<0.2	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	----	----	<0.05	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	----	----	<0.2	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	----	----	<0.05	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	----	----	<0.05	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	----	----	<0.05	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	----	----	<0.05	----
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	----	----	<0.2	----
Dimethoate	60-51-5	0.05	mg/kg		<0.05	----	----	<0.05	----
Diazinon	333-41-5	0.05	mg/kg		<0.05	----	----	<0.05	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	----	----	<0.05	----
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	----	----	<0.2	----
Malathion	121-75-5	0.05	mg/kg		<0.05	----	----	<0.05	----
Fenthion	55-38-9	0.05	mg/kg		<0.05	----	----	<0.05	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	----	----	<0.05	----
Parathion	56-38-2	0.2	mg/kg		<0.2	----	----	<0.2	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	----	----	<0.05	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	----	----	<0.05	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	----	----	<0.05	----
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	----	----	<0.05	----
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	----	----	<0.05	----
Ethion	563-12-2	0.05	mg/kg		<0.05	----	----	<0.05	----
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	----	----	<0.05	----
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	----	----	<0.05	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		<0.5	----	----	<0.5	----
2-Chlorophenol	95-57-8	0.5	mg/kg		<0.5	----	----	<0.5	----
2-Methylphenol	95-48-7	0.5	mg/kg		<0.5	----	----	<0.5	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	----	----	<1	----
2-Nitrophenol	88-75-5	0.5	mg/kg		<0.5	----	----	<0.5	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg		<0.5	----	----	<0.5	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg		<0.5	----	----	<0.5	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg		<0.5	----	----	<0.5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP01/0.1	TP02/0.1	TP03/0.1	TP04/0.1	TP5/0.1
				Client sampling date / time	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00
Compound	CAS Number	LOR	Unit		ES1942581-001	ES1942581-002	ES1942581-003	ES1942581-004	ES1942581-005
					Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds - Continued									
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		<0.5	----	----	<0.5	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg		<0.5	----	----	<0.5	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg		<0.5	----	----	<0.5	----
Pentachlorophenol	87-86-5	2	mg/kg		<2	----	----	<2	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	**580**	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	**920**	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	**1500**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP01/0.1	TP02/0.1	TP03/0.1	TP04/0.1	TP5/0.1
				Client sampling date / time	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00
Compound	CAS Number	LOR	Unit		ES1942581-001	ES1942581-002	ES1942581-003	ES1942581-004	ES1942581-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	**1180**	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	**720**	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	**1900**	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**127**	----	----	**105**	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**116**	----	----	**117**	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**65.7**	----	----	**107**	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**92.2**	**94.4**	**96.2**	**90.5**	**94.8**
2-Chlorophenol-D4	93951-73-6	0.5	%		**92.3**	**92.8**	**95.2**	**90.4**	**94.0**
2.4.6-Tribromophenol	118-79-6	0.5	%		**70.3**	**63.5**	**78.4**	**79.4**	**78.1**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**97.5**	**100**	**102**	**96.7**	**100**
Anthracene-d10	1719-06-8	0.5	%		**88.6**	**91.2**	**93.0**	**87.0**	**92.2**
4-Terphenyl-d14	1718-51-0	0.5	%		**84.2**	**87.1**	**90.2**	**85.2**	**87.8**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**129**	**115**	**118**	**127**	**122**
Toluene-D8	2037-26-5	0.2	%		**106**	**96.2**	**94.6**	**105**	**103**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP01/0.1	TP02/0.1	TP03/0.1	TP04/0.1	TP5/0.1
				Client sampling date / time	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00	18-Dec-2019 00:00
Compound	CAS Number	LOR	Unit		ES1942581-001	ES1942581-002	ES1942581-003	ES1942581-004	ES1942581-005
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%		**106**	**96.6**	**95.2**	**103**	**100**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP6/0.1	SP1	----	----	----
			Client sampling date / time	18-Dec-2019 00:00	18-Dec-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1942581-006	ES1942581-007	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**11.8**	**12.8**	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	**20**	**4**	----	----	----
Copper	7440-50-8	5	mg/kg	**28**	**30**	----	----	----
Lead	7439-92-1	5	mg/kg	**13**	<5	----	----	----
Nickel	7440-02-0	2	mg/kg	**16**	**4**	----	----	----
Zinc	7440-66-6	5	mg/kg	**53**	**288**	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.25	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.25	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.25	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.25	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.25	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.25	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.25	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.25	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.25	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.25	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.25	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.25	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.25	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.25	----	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.25	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.25	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.25	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.25	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.25	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.25	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP6/0.1	SP1	----	----	----
			Client sampling date / time	18-Dec-2019 00:00	18-Dec-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1942581-006	ES1942581-007	--------	--------	--------
				Result	Result	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<1.0	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.25	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<1.0	----	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.25	----	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.25	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.25	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.25	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<1.0	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.25	----	----	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.25	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.25	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<1.0	----	----	----
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.25	----	----	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.25	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.25	----	----	----
Parathion	56-38-2	0.2	mg/kg	<0.2	<1.0	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.25	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.25	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.25	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.25	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.25	----	----	----
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.25	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.25	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.25	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	**1.6**	----	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	----	----	----
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	**5**	----	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	----	----	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	----	----	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	----	----	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP6/0.1	SP1	----	----	----
				Client sampling date / time	18-Dec-2019 00:00	18-Dec-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1942581-006	ES1942581-007	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)A: Phenolic Compounds - Continued									
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		<0.5	<0.5	----	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg		<0.5	<0.5	----	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg		<0.5	<0.5	----	----	----
Pentachlorophenol	87-86-5	2	mg/kg		<2	<2	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	**3170**	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	**2270**	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	**5440**	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP6/0.1	SP1	----	----	----
			Client sampling date / time	18-Dec-2019 00:00	18-Dec-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1942581-006	ES1942581-007	--------	--------	--------
				Result	Result	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	80	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	4330	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	1450	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	5860	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	80	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	----	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	113	109	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	117	91.8	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	69.2	84.9	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	87.8	97.3	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	86.8	97.7	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	66.7	80.8	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	96.8	105	----	----	----
Anthracene-d10	1719-06-8	0.5	%	86.6	95.3	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	82.4	85.9	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	119	113	----	----	----
Toluene-D8	2037-26-5	0.2	%	97.8	105	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP6/0.1	SP1	----	----	----
				Client sampling date / time	18-Dec-2019 00:00	18-Dec-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1942581-006	ES1942581-007	--------	--------	--------
					Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%		**95.1**	**97.5**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

CHAIN OF CUSTODY

ALS Laboratory: *please tick* →

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☐BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
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☐NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
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☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG Unit 1 Raton Street Drive North Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ENRS		TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	☑ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE: 108 Jerry Bailey Rd			
PROJECT: ENRS/426	PROJECT NO.:	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle) COC: (1) 2 3 4 5 6 7 / OF: 1 (2) 3 4 5 6 7
ORDER NUMBER:	PURCHASE ORDER NO.:	COUNTRY OF ORIGIN:	
PROJECT MANAGER: CA	CONTACT PH:		
SAMPLER: CA	SAMPLER MOBILE: 0478 725 892	RELINQUISHED BY: [signature] DATE/TIME: 18/2/20	RECEIVED BY: [signature] DATE/TIME: 18/2/20 14:00
COC Emailed to ALS? (YES / (NO))	EDD FORMAT (or default):		
Email Reports to (will default to PM if no other addresses are listed): lab@enrs.com.au			
Email Invoice to (will default to PM if no other addresses are listed): accounts@enrs.com.au			

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comment:			

RELINQUISHED BY:	RECEIVED BY:
DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).		Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	S-6	Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	BH01/0.5	18/2/20	soil	unpreserved glass		1		
	BH01/1.5	↓	↓	↓		1		
	BH01/2.5						1	
	BH02/0.5					1		
	BH02/1.5					1		
	BH02/2.5						1	
	BH02/3.5						1	
	BH03/0.5					1		
	BH03/1.5					1		
	BH03/2.5						1	
	BH03/5.0						1	
	BH04/0.5	✓	✓	✓		1		
					TOTAL	7	5	

Environmental Division
Wollongong
Work Order Reference
EW2000893

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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WOLLONGONG Unit 1 Ralph Black Drive North Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ENRS	TURNAROUND REQUIREMENTS: ☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE:	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes / No / N/A
PROJECT: ENRS/1426 PROJECT NO.:	ALS QUOTE NO.:	Free ice / frozen ice bricks present upon receipt?	Yes / No / N/A
ORDER NUMBER: PURCHASE ORDER NO.:	COUNTRY OF ORIGIN:	Random Sample Temperature on Receipt:	°C
PROJECT MANAGER: CA CONTACT PH:	COC SEQUENCE NUMBER (Circle) COC: 1 (2) 3 4 5 6 7	Other comment:	
SAMPLER: CA SAMPLER MOBILE: 0478 725 892	OF: 1 (2) 3 4 5 6 7		
COC Emailed to ALS? (YES / (NO)) EDD FORMAT (or default):			
Email Reports to (will default to PM if no other addresses are listed): lab@enrs.com.au			
Email Invoice to (will default to PM if no other addresses are listed): account@enrs.com.au			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME: 18/2/20	DATE/TIME: 18/2/20 14:00	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	5-6		Hold						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	BH04/1.5	18/2/20	Soil	unpreserved		1								
	BH04/2.5			glass				1						
	Dup 1/2.5							1						
	BH04/3.5							1						
	BH05/0.5					1								
	BH05/1.5					1								
	Dup 2/1.5	↓	↓	↓		1								
				TOTAL		4		3						

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2000893**	Page	: 1 of 6
Client	: **ENVIRONMENT & NATURAL RESOURCE SOLUTIONS**	Laboratory	: Environmental Division NSW South Coast
Contact	: chris Allen	Contact	: Aneta Prosaroski
Address	: 25 River Rd Shoalhaven Heads 2535	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: ENRS1426	Date Samples Received	: 18-Feb-2020 15:25
Order number	: ----	Date Analysis Commenced	: 19-Feb-2020
C-O-C number	: ----	Issue Date	: 25-Feb-2020 13:05
Sampler	: chris Allen		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 19		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH01/0.5	BH01/1.5	BH02/0.5	BH02/1.5	BH03/0.5
			Client sampling date / time	18-Feb-2020 00:00	18-Feb-2020 00:00	18-Feb-2020 00:00	18-Feb-2020 00:00	18-Feb-2020 00:00
Compound	CAS Number	LOR	Unit	EW2000893-001	EW2000893-002	EW2000893-004	EW2000893-005	EW2000893-008
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	25.8	13.7	25.5	14.2	15.4
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	12	8	16	10	11
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	88.5	84.3	94.8	94.8	79.6
Toluene-D8	2037-26-5	0.2	%	99.0	93.6	103	98.6	87.9
4-Bromofluorobenzene	460-00-4	0.2	%	84.8	81.1	90.1	88.4	82.3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH03/1.5	BH04/0.5	BH04/1.5	BH05/0.5	BH05/1.5
			Client sampling date / time	18-Feb-2020 00:00	18-Feb-2020 00:00	18-Feb-2020 00:00	18-Feb-2020 00:00	18-Feb-2020 00:00
Compound	CAS Number	LOR	Unit	EW2000893-009	EW2000893-012	EW2000893-013	EW2000893-017	EW2000893-018
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	10.0	26.9	14.9	19.4	13.8
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	7	24	9	12	8
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	92.6	89.5	89.8	96.0	95.4
Toluene-D8	2037-26-5	0.2	%	102	95.3	97.1	95.7	99.4
4-Bromofluorobenzene	460-00-4	0.2	%	89.3	83.6	85.9	81.3	85.8

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Dup2/1.5	----	----	----	----
				Client sampling date / time	18-Feb-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2000893-019	--------	--------	--------	--------
					Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		**13.0**	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Lead	7439-92-1	5	mg/kg		**10**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	----	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**77.7**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		**104**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**106**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Appendix E

Laboratory QA/QC Documentation

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1942581**	Page	: 1 of 11
Client	: **ENVIRONMENT & NATURAL RESOURCE SOLUTIONS**	Laboratory	: Environmental Division Sydney
Contact	: LAB ENRS	Contact	: Aneta Prosaroski
Address	: 25 River Rd Shoalhaven Heads 2535	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9037 4708	Telephone	: +61 2 4225 3125
Project	: ENRS1426	Date Samples Received	: 23-Dec-2019
Order number	: ----	Date Analysis Commenced	: 23-Dec-2019
C-O-C number	: ----	Issue Date	: 06-Jan-2020
Sampler	: chris Allen		
Site	: 2514 Illawarra Highway		
Quote number	: EN/222		
No. of samples received	: 7		
No. of samples analysed	: 7		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2783667)									
ES1942416-009	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	6	24.4	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	6	24.6	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	45	7	145	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	16	10	45.3	No Limit
ES1942416-019	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	3	3	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	3	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	6	23.9	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	8	47.4	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2783670)									
ES1942416-009	Anonymous	EA055: Moisture Content	----	0.1	%	<1.0	<1.0	0.00	No Limit
ES1942581-001	TP01/0.1	EA055: Moisture Content	----	0.1	%	4.9	4.7	5.13	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2783668)									
ES1942416-009	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1942416-019	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 2784134)									
ES1942549-027	Anonymous	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2784133)									
ES1942549-027	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2784133) - continued									
ES1942549-027	Anonymous	EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 2784133)									
ES1942549-027	Anonymous	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)A: Phenolic Compounds (QC Lot: 2784132)									
ES1942581-005	TP5/0.1	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
ES1942549-027	Anonymous	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2784132)									
ES1942581-005	TP5/0.1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2784132) - continued									
ES1942581-005	TP5/0.1	EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1942549-027	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2782851)									
ES1942417-007	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1942489-050	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2784131)									
ES1942581-005	TP5/0.1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1942549-027	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2782851)									
ES1942417-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1942489-050	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2784131)									
ES1942581-005	TP5/0.1	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2784131) - continued									
ES1942581-005	TP5/0.1	EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1942549-027	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 2782851)									
ES1942417-007	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1942489-050	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2783667)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	102	86.0	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	100	83.0	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	103	76.0	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	101	86.0	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	98.4	80.0	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	106	87.0	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	113	80.0	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2783668)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	97.2	70.0	105
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2784134)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	94.0	62.0	126
EP068A: Organochlorine Pesticides (OC) (QCLot: 2784133)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	76.8	69.0	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	83.4	65.0	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	109	67.0	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	111	68.0	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.6	65.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	83.4	67.0	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	113	69.0	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	108	62.0	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	87.5	63.0	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	92.2	66.0	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	92.6	64.0	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	90.6	66.0	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	97.6	67.0	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	105	67.0	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	90.1	69.0	115
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	97.4	69.0	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	91.9	56.0	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	80.8	62.0	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	95.3	66.0	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	87.5	64.0	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	100	54.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2784133)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2784133) - continued								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	97.4	59.0	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	93.5	62.0	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	63.1	54.0	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	76.3	67.0	119
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	92.4	70.0	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	105	72.0	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	95.2	68.0	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	70.6	68.0	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	92.9	69.0	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	91.8	76.0	118
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	106	64.0	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	97.4	70.0	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	111	69.0	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	98.2	66.0	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	75.8	68.0	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	92.9	62.0	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	98.9	68.0	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	84.9	65.0	127
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	84.3	41.0	123
EP075(SIM)A: Phenolic Compounds (QCLot: 2784132)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	6 mg/kg	103	71.0	125
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	6 mg/kg	104	72.0	124
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	6 mg/kg	98.5	71.0	123
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	12 mg/kg	105	67.0	127
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	6 mg/kg	92.9	54.0	114
EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	6 mg/kg	# 63.8	68.0	126
EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	6 mg/kg	99.7	66.0	120
EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	6 mg/kg	99.6	70.0	120
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	6 mg/kg	96.0	70.0	116
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	6 mg/kg	100	54.0	114
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	6 mg/kg	104	60.0	114
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	12 mg/kg	# 75.2	10.0	57.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2784132)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	103	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	109	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	101	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	109	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	108	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	102	77.0	127

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2784132) - continued								
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	113	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	114	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	101	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	102	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	100	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	108	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	109	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	108	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	110	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	107	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2782851)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	107	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2784131)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	107	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	109	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	103	71.0	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2782851)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	110	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2784131)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	110	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	106	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	76.9	63.0	131
EP080: BTEXN (QCLot: 2782851)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	95.6	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	92.0	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	93.7	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	96.4	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	99.8	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	106	63.0	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Matrix Spike (MS) Report		
Spike	SpikeRecovery(%)	Recovery Limits (%)

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2783667)							
ES1942416-009	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	101	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	91.7	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	94.8	70.0	130
		EG005T: Copper	7440-50-8	250 mg/kg	99.0	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	70.1	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	90.1	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	86.9	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2783668)							
ES1942416-009	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	108	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2784134)							
ES1942549-027	Anonymous	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	101	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 2784133)							
ES1942549-027	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	103	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	119	70.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	92.5	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	91.2	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	86.3	70.0	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	95.9	70.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2784133)							
ES1942549-027	Anonymous	EP068: Diazinon	333-41-5	0.5 mg/kg	91.4	70.0	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	87.5	70.0	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	105	70.0	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	98.6	70.0	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	87.5	70.0	130
EP075(SIM)A: Phenolic Compounds (QCLot: 2784132)							
ES1942549-027	Anonymous	EP075(SIM): Phenol	108-95-2	10 mg/kg	107	70.0	130
		EP075(SIM): 2-Chlorophenol	95-57-8	10 mg/kg	106	70.0	130
		EP075(SIM): 2-Nitrophenol	88-75-5	10 mg/kg	74.1	60.0	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	10 mg/kg	95.8	70.0	130
		EP075(SIM): Pentachlorophenol	87-86-5	10 mg/kg	21.8	20.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2784132)							
ES1942549-027	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	98.6	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	110	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2782851)							
ES1942417-007	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	97.7	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2784131)							

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2784131) - continued							
ES1942549-027	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	102	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	120	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	127	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2782851)							
ES1942417-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	89.9	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2784131)							
ES1942549-027	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	113	73.0	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	122	53.0	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	117	52.0	132
EP080: BTEXN (QCLot: 2782851)							
ES1942417-007	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	79.3	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	79.4	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	85.7	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	85.2	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	85.8	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	89.5	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1942581**	Page	: 1 of 6
Client	: **ENVIRONMENT & NATURAL RESOURCE SOLUTIONS**	Laboratory	: Environmental Division Sydney
Contact	: LAB ENRS	Telephone	: +61 2 4225 3125
Project	: ENRS1426	Date Samples Received	: 23-Dec-2019
Site	: 2514 Illawarra Highway	Issue Date	: 06-Jan-2020
Sampler	: chris Allen	No. of samples received	: 7
Order number	: ----	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP075(SIM)A: Phenolic Compounds	QC-2784132-002	----	**2.4-Dimethylphenol**	105-67-9	63.8 %	68.0-126%	**Recovery less than lower control limit**
EP075(SIM)A: Phenolic Compounds	QC-2784132-002	----	**Pentachlorophenol**	87-86-5	75.2 %	10.0-57.0%	**Recovery greater than upper control limit**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
TP01/0.1, TP02/0.1, TP03/0.1, TP04/0.1, TP5/0.1, TP6/0.1, SP1	**18-Dec-2019**	**----**	----	----	**23-Dec-2019**	01-Jan-2020	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
TP01/0.1, TP02/0.1, TP03/0.1, TP04/0.1, TP5/0.1, TP6/0.1, SP1	**18-Dec-2019**	**24-Dec-2019**	15-Jun-2020	✓	**27-Dec-2019**	15-Jun-2020	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
TP01/0.1, TP02/0.1, TP03/0.1, TP04/0.1, TP5/0.1, TP6/0.1, SP1	**18-Dec-2019**	**24-Dec-2019**	15-Jan-2020	✓	**27-Dec-2019**	15-Jan-2020	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066)							
TP01/0.1, TP04/0.1, TP6/0.1, SP1	**18-Dec-2019**	**24-Dec-2019**	01-Jan-2020	✓	**30-Dec-2019**	02-Feb-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068)							
TP01/0.1, TP04/0.1, TP6/0.1, SP1	**18-Dec-2019**	**24-Dec-2019**	01-Jan-2020	✓	**30-Dec-2019**	02-Feb-2020	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068)							
TP01/0.1, TP04/0.1, TP6/0.1, SP1	**18-Dec-2019**	**24-Dec-2019**	01-Jan-2020	✓	**30-Dec-2019**	02-Feb-2020	✓
EP075(SIM)A: Phenolic Compounds							
Soil Glass Jar - Unpreserved (EP075(SIM))							
TP01/0.1, TP04/0.1, TP6/0.1, SP1	**18-Dec-2019**	**24-Dec-2019**	01-Jan-2020	✓	**30-Dec-2019**	02-Feb-2020	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
TP01/0.1, TP02/0.1, TP03/0.1, TP04/0.1, TP5/0.1, TP6/0.1, SP1	**18-Dec-2019**	**24-Dec-2019**	01-Jan-2020	✓	**30-Dec-2019**	02-Feb-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
TP01/0.1, TP02/0.1, TP03/0.1, TP04/0.1, TP5/0.1, TP6/0.1, SP1	**18-Dec-2019**	**23-Dec-2019**	01-Jan-2020	✓	**30-Dec-2019**	01-Jan-2020	✓
Soil Glass Jar - Unpreserved (EP071)							
TP01/0.1, TP02/0.1, TP03/0.1, TP04/0.1, TP5/0.1, TP6/0.1, SP1	**18-Dec-2019**	**24-Dec-2019**	01-Jan-2020	✓	**27-Dec-2019**	02-Feb-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)							
TP01/0.1, TP02/0.1, TP03/0.1, TP04/0.1, TP5/0.1, TP6/0.1, SP1	**18-Dec-2019**	**23-Dec-2019**	01-Jan-2020	✓	**30-Dec-2019**	01-Jan-2020	✓
Soil Glass Jar - Unpreserved (EP071)							
TP01/0.1, TP02/0.1, TP03/0.1, TP04/0.1, TP5/0.1, TP6/0.1, SP1	**18-Dec-2019**	**24-Dec-2019**	01-Jan-2020	✓	**27-Dec-2019**	02-Feb-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
TP01/0.1, TP02/0.1, TP03/0.1, TP04/0.1, TP5/0.1, TP6/0.1, SP1	**18-Dec-2019**	**23-Dec-2019**	01-Jan-2020	✓	**30-Dec-2019**	01-Jan-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 6.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EW2000893**	Page	: 1 of 6
Client	: **ENVIRONMENT & NATURAL RESOURCE SOLUTIONS**	Laboratory	: Environmental Division NSW South Coast
Contact	: chris Allen	Contact	: Aneta Prosaroski
Address	: 25 River Rd Shoalhaven Heads 2535	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: ENRS1426	Date Samples Received	: 18-Feb-2020
Order number	: ----	Date Analysis Commenced	: 19-Feb-2020
C-O-C number	: ----	Issue Date	: 25-Feb-2020
Sampler	: chris Allen		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 19		
No. of samples analysed	: 11		

ilac-MRA NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2872027)									
ES2005991-009	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	748	697	7.05	0% - 20%
EW2000906-007	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	23	22	0.00	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2871042)									
ES2005311-016	Anonymous	EA055: Moisture Content	----	0.1	%	3.3	3.2	3.81	0% - 20%
EW2000893-008	BH03/0.5	EA055: Moisture Content	----	0.1	%	15.4	15.8	2.32	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2867187)									
ES2005601-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EW2000893-001	BH01/0.5	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2867356)									
ES2005552-021	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EW2000893-013	BH04/1.5	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2867911)									
ES2005603-004	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EW2000893-019	Dup2/1.5	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2867187)									
ES2005601-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EW2000893-001	BH01/0.5	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2867356)									
ES2005552-021	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2867356) - continued									
ES2005552-021	Anonymous	EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EW2000893-013	BH04/1.5	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2867911)									
ES2005603-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EW2000893-019	Dup2/1.5	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 2867187)									
ES2005601-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EW2000893-001	BH01/0.5	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 2867911)									
ES2005603-004	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EW2000893-019	Dup2/1.5	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2872027)								
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	99.2	80.0	114
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2867187)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	95.6	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2867356)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	106	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	110	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	107	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2867911)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	72.4	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2867187)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	96.5	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2867356)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	109	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	109	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	105	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2867911)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	75.2	68.4	128
EP080: BTEXN (QCLot: 2867187)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	103	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	104	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	101	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	102	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	98.8	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	94.7	63.0	119
EP080: BTEXN (QCLot: 2867911)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	97.6	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	92.7	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	93.5	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	93.0	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	94.8	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	96.8	63.0	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2872027)							
ES2005991-009	Anonymous	EG005T: Lead	7439-92-1	250 mg/kg	87.3	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2867187)							
ES2005601-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	86.9	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2867356)							
ES2005552-021	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	103	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	110	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	118	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2867911)							
EW2000893-019	Dup2/1.5	EP080: C6 - C9 Fraction	----	32.5 mg/kg	96.7	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2867187)							
ES2005601-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	85.7	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2867356)							
ES2005552-021	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	105	73.0	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	118	53.0	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	111	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2867911)							
EW2000893-019	Dup2/1.5	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	94.7	70.0	130
EP080: BTEXN (QCLot: 2867187)							
ES2005601-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	95.1	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	93.0	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	93.0	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	91.1	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	91.8	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	86.6	70.0	130
EP080: BTEXN (QCLot: 2867911)							
EW2000893-019	Dup2/1.5	EP080: Benzene	71-43-2	2.5 mg/kg	92.9	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	94.4	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	96.0	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	94.4	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	95.4	70.0	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080: BTEXN (QCLot: 2867911) - continued							
EW2000893-019	Dup2/1.5	EP080: Naphthalene	91-20-3	2.5 mg/kg	93.4	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EW2000893**	Page	: 1 of 5
Client	: **ENVIRONMENT & NATURAL RESOURCE SOLUTIONS**	Laboratory	: Environmental Division NSW South Coast
Contact	: chris Allen	Telephone	: +61 2 4225 3125
Project	: ENRS1426	Date Samples Received	: 18-Feb-2020
Site	: ----	Issue Date	: 25-Feb-2020
Sampler	: chris Allen	No. of samples received	: 19
Order number	: ----	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
BH01/0.5, BH01/1.5, BH02/0.5, BH02/1.5, BH03/0.5, BH03/1.5, BH04/0.5, BH04/1.5, BH05/0.5, BH05/1.5, Dup2/1.5	**18-Feb-2020**	**----**	----	----	**20-Feb-2020**	03-Mar-2020	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
BH01/0.5, BH01/1.5, BH02/0.5, BH02/1.5, BH03/0.5, BH03/1.5, BH04/0.5, BH04/1.5, BH05/0.5, BH05/1.5, Dup2/1.5	**18-Feb-2020**	**20-Feb-2020**	16-Aug-2020	✓	**21-Feb-2020**	16-Aug-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
BH01/0.5, BH01/1.5, BH02/0.5, BH02/1.5, BH03/0.5, BH03/1.5, BH04/0.5, BH04/1.5, BH05/0.5, BH05/1.5, Dup2/1.5	**18-Feb-2020**	**19-Feb-2020**	03-Mar-2020	✓	**19-Feb-2020**	03-Mar-2020	✓
Soil Glass Jar - Unpreserved (EP080)							
BH01/0.5, BH01/1.5, BH02/0.5, BH02/1.5, BH03/0.5, BH03/1.5, BH04/0.5, BH04/1.5, BH05/0.5, BH05/1.5	**18-Feb-2020**	**20-Feb-2020**	03-Mar-2020	✓	**20-Feb-2020**	03-Mar-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)							
BH01/0.5, BH01/1.5, BH02/0.5, BH02/1.5, BH03/0.5, BH03/1.5, BH04/0.5, BH04/1.5, BH05/0.5, BH05/1.5, Dup2/1.5	**18-Feb-2020**	**19-Feb-2020**	03-Mar-2020	✓	**19-Feb-2020**	03-Mar-2020	✓
Soil Glass Jar - Unpreserved (EP080)							
BH01/0.5, BH01/1.5, BH02/0.5, BH02/1.5, BH03/0.5, BH03/1.5, BH04/0.5, BH04/1.5, BH05/0.5, BH05/1.5	**18-Feb-2020**	**20-Feb-2020**	03-Mar-2020	✓	**20-Feb-2020**	03-Mar-2020	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
Dup2/1.5	**18-Feb-2020**	**19-Feb-2020**	03-Mar-2020	✓	**19-Feb-2020**	03-Mar-2020	✓
Soil Glass Jar - Unpreserved (EP080)							
BH01/0.5, BH01/1.5, BH02/0.5, BH02/1.5, BH03/0.5, BH03/1.5, BH04/0.5, BH04/1.5, BH05/0.5, BH05/1.5	**18-Feb-2020**	**20-Feb-2020**	03-Mar-2020	✓	**20-Feb-2020**	03-Mar-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 6.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

Appendix F

Borelogs

ENVIRONMENT & NATURAL RESOURCE SOLUTIONS

108 JERRY BAILEY ROAD ABN: 68 600 154 596
SHOALHAVEN HEADS NSW 2535
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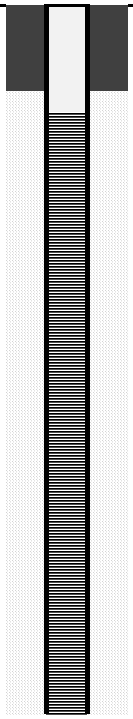
ENVIRONMENTAL BOREHOLE CONSTRUCTION LOG

BORE NUMBER: 01 (MW01)

PROJECT No:	ENRS1426	**DATE DRILLED:**		18/02/2020
LOCATION:	2514 Illawarra Highway, Calderwood	**LOGGED BY:**		CA
CLIENT:	AV Jennings	**DRILLED BY:**		Total Drilling
SURFACE RL:	-	**DRILL METHOD:**		Solid Flight Auger
EASTING:	292548	**HOLE DIAMETER:**		125mm
NORTHING:	6171665	**DEPTH:**		8.0m

Depth Metres	Well Log	Construction	Sample ID	PID	SPT	Moisture	Graphic Log	Description
								Ground Surface
0.0		0 - 0.1: Torque locking enviro plug 0 - 0.2: Cement, gatic cover 0.2 - 0.6: Bentonite sanitary seal 0.0 - 1.0: 50mm PVC casing 0.6 - 8.0: Graded gravel pack 1.0 - 8.0: Slotted 50mm PVC screen						0 - 0.2: SILTY SAND, brown 0:2 - 0.5: CLAY, tan w/ traces of gravelly sand
0.5			BH01/0.5					0.5 - 1.5: CLAY, mottled grey/tan/red w/ gravelly sand, yellow
1.0								
1.5			BH01/1.5					1.5 - 2.5: CLAY, mottled grey/tan/red, w/ increasing gravelly sand. Becoming yellow SAND with sandstone gravel
2.0								
2.5			BH01/2.5					
3.0								
3.5								
4.0								
4.5								
5.0								2.5 - 8.0: SAND, yellow, with sandstone gravel. Becoming mosit at 7mbgl.
5.5								
6.0								
6.5								
7.0								
7.5								
8.0		8.0: Push on end cap						BH terminated at target depth
8.5								
9.0								
9.5								
10.0								
10.5								
11.0								

Notes:
Moisture: (D) Dry (M) Moist (W) Wet
Consistency: (VS) Very Soft (S) Soft (F) Firm(St) Stiff (VSt) Very Stiff (H) Hard (Fb) Friable
Density Index: (VL) Very Loose (L) (MD) Medium Dense (VD) Very Dense

ENVIRONMENT & NATURAL RESOURCE SOLUTIONS

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ENVIRONMENTAL BOREHOLE CONSTRUCTION LOG

BORE NUMBER: 02

PROJECT No:	ENRS1426	**DATE DRILLED:**	18/02/2020
LOCATION:	2514 Illawarra Highway, Calderwood	**LOGGED BY:**	CA
CLIENT:	AV Jennings	**DRILLED BY:**	Total Drilling
SURFACE RL:	-	**DRILL METHOD:**	Solid Flight Auger
EASTING:	292542	**HOLE DIAMETER:**	125mm
NORTHING:	6171674	**DEPTH:**	4.5m

Depth Metres	Well Log	Construction	Sample ID	PID	SPT	Moisture	Graphic Log	Description
								Ground Surface
0.0		No Well Constructed						0 - 0.2: SILTY SAND, brown
0.5			BH02/0.5					0:2 - 0.5: CLAY, tan w/ traces of gravelly sand
1.0								0.5 - 1.5: CLAY, mottled grey/tan/red w/ gravelly sand, yellow
1.5			BH02/1.5					
2.0								
2.5			BH02/2.5					1.5 - 4.5: SAND, yellow, with sandstone gravel.
3.0								
3.5			BH02/3.5					
4.0								
4.5								BH terminated at target depth
5.0								
5.5								
6.0								
6.5								
7.0								
7.5								
8.0								
8.5								
9.0								
9.5								
10.0								
10.5								
11.0								

Notes:
Moisture: (D) Dry (M) Moist (W) Wet
Consistency: (VS) Very Soft (S) Soft (F) Firm(St) Stiff (VSt) Very Stiff (H) Hard (Fb) Friable
Density Index: (VL) Very Loose (L) (MD) Medium Dense (VD) Very Dense

ENVIRONMENT & NATURAL RESOURCE SOLUTIONS

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ENVIRONMENTAL BOREHOLE CONSTRUCTION LOG

BORE NUMBER: 03

PROJECT No:	ENRS1426	**DATE DRILLED:**	18/02/2020
LOCATION:	2514 Illawarra Highway, Calderwood	**LOGGED BY:**	CA
CLIENT:	AV Jennings	**DRILLED BY:**	Total Drilling
SURFACE RL:	-	**DRILL METHOD:**	Solid Flight Auger
EASTING:	292546	**HOLE DIAMETER:**	125mm
NORTHING:	6171680	**DEPTH:**	6.0m

Depth Metres	Well Log	Construction	Sample ID	PID	SPT	Moisture	Graphic Log	Description
0.0		No Well Constructed						**Ground Surface**
								0.0 - 0.1: BITUMEN
0.5			BH03/0.5					0.2 - 0.5: CLAY, mottled grey/tan/red w/ gravelly sand, yellow
1.0								0.5 - 1.5: Sandy CLAY, grey, w/ gravelly sand, yellow. Becoming sand, yellow w/ sandstone gravel
1.5			BH03/1.5					1.5 - 2.5: SAND, grey, w/ sandstone gravel
2.0								
2.5			BH03/2.5					2.5 - 5.0: SAND, tan, w/ sandstone gravel
3.0								
3.5								
4.0								
4.5								
5.0			BH03/5.0					5.0 - 6.0: SAND, tan-red, w/sandstone gravel.
5.5								
6.0								6.0: Refusal w/ TC bit
6.5								
7.0								
7.5								
8.0								
8.5								
9.0								
9.5								
10.0								
10.5								
11.0								

Notes:
Moisture: (D) Dry (M) Moist (W) Wet
Consistency: (VS) Very Soft (S) Soft (F) Firm(St) Stiff (VSt) Very Stiff (H) Hard (Fb) Friable
Density Index: (VL) Very Loose (L) (MD) Medium Dense (VD) Very Dense

ENVIRONMENT & NATURAL RESOURCE SOLUTIONS

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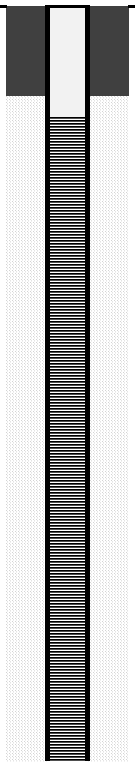
ENVIRONMENTAL BOREHOLE CONSTRUCTION LOG

BORE NUMBER: 04 (MW02)

PROJECT No:	ENRS1426	**DATE DRILLED:**		18/02/2020	
LOCATION:	2514 Illawarra Highway, Calderwood	**LOGGED BY:**		CA	
CLIENT:	AV Jennings	**DRILLED BY:**		Total Drilling	
SURFACE RL:	-	**DRILL METHOD:**		Solid Flight Auger	
EASTING:	292548	**HOLE DIAMETER:**		125mm	
NORTHING:	6171665	**DEPTH:**		8.5m	

Depth Metres	Well Log	Construction	Sample ID	PID	SPT	Moisture	Graphic Log	Description
								Ground Surface
0.0		0 - 0.1: Torque locking enviro plug 0 - 0.2: Cement, gatic cover 0.2 - 0.8: Bentonite sanitary seal 0.0 - 1.0: 50mm PVC casing 0.8 - 8.5: Graded gravel pack 1.0 - 8.5: Slotted 50mm PVC screen						0 - 0.2: SILTY SAND, brown 0:2 - 0.5: CLAY, tan w/ traces of gravelly sand
0.5			BH04/0.5					0.5 - 1.5: CLAY, mottled grey/tan/red w/ gravelly sand, yellow
1.0								
1.5			BH04/1.5					1.5 - 2.5: CLAY, mottled grey/tan/red, w/ increasing gravelly sand. Becoming yellow SAND with sandstone gravel
2.0								
2.5			BH04/2.5					
3.0								
3.5			BH04/3.5					
4.0								
4.5								
5.0								2.5 - 8.0: SAND, yellow, with sandstone gravel. Becoming mosit at 7mbgl.
5.5								
6.0								
6.5								
7.0								
7.5								
8.0								
8.5		8.5: Push on end cap						8.0 - 8.5: SAND, grey with sandstone gravel. BH terminated at target depth
9.0								
9.5								
10.0								
10.5								
11.0								

Notes:
Moisture: (D) Dry (M) Moist (W) Wet
Consistency: (VS) Very Soft (S) Soft (F) Firm(St) Stiff (VSt) Very Stiff (H) Hard (Fb) Friable
Density Index: (VL) Very Loose (L) (MD) Medium Dense (VD) Very Dense

ENVIRONMENT & NATURAL RESOURCE SOLUTIONS

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ENVIRONMENTAL BOREHOLE CONSTRUCTION LOG

BORE NUMBER: 05

PROJECT No:	ENRS1426	**DATE DRILLED:**	18/02/2020
LOCATION:	2514 Illawarra Highway, Calderwood	**LOGGED BY:**	CA
CLIENT:	AV Jennings	**DRILLED BY:**	Total Drilling
SURFACE RL:	-	**DRILL METHOD:**	Hand Auger
EASTING:	292538	**HOLE DIAMETER:**	125mm
NORTHING:	6171683	**DEPTH:**	1.5m

Depth Metres	Well Log	Construction	Sample ID	PID	SPT	Moisture	Graphic Log	Description
								Ground Surface
0.0		No Well Constructed						0 - 0.2: SILTY SAND, brown
0.5			BH5/0.5					0:2 - 0.5: CLAY, tan w/ traces of gravelly sand
1.0								0.5 - 1.5: CLAY, mottled grey/tan/red w/ gravelly sand, yellow
1.5			BH5/1.5					Auger refusal in stiff clay
2.0								
2.5								
3.0								
3.5								
4.0								
4.5								
5.0								
5.5								
6.0								
6.5								
7.0								
7.5								
8.0								
8.5								
9.0								
9.5								
10.0								
10.5								
11.0								

Notes:
Moisture: (D) Dry (M) Moist (W) Wet
Consistency: (VS) Very Soft (S) Soft (F) Firm(St) Stiff (VSt) Very Stiff (H) Hard (Fb) Friable
Density Index: (VL) Very Loose (L) (MD) Medium Dense (VD) Very Dense