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Lapstone Hill Tunnel – Detailed Site Investigation (DSI)

NSW Department of Industry, Lands & Water

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1. Introduction

1.1. Overview & Objective

The NSW Department of Industry, Lands & Water (DoI) owns land located off Barnett Street on the Greater Western Highway, Glenbrook. The site includes an area formerly used as a staging site for mushroom farming (the Mushroom Farm) and the Lapstone Hill Tunnel (the Tunnel), a former rail tunnel which runs 660 metres between its western entrance (the Western Portal) at the Mushroom Farm to the eastern entrance (the Eastern Portal).

The location of the site is provided in **Appendix A, Figure 1** and the general site configuration is shown in **Figure 2**.

Portions of the land have historically been subject to uncontrolled filling and have been used for various purposes, including mushroom farming and storage of munitions and mustard gas. The site has been included in the Scenic Eastern Escarpment Master Plan prepared by Blue Mountains City Council (Council), and DoI are in the process of generating a strategic land use plan for the future use of the site. The Lapstone Hill Tunnel is listed on the NSW State Heritage Register.

To support the development of a strategic land use plan for the site, including evaluating the potential for adaptive re-use of the Lapstone Hill Tunnel and adjacent lands for recreational purposes, DoI is undertaking preliminary environmental, heritage, geotechnical and structural engineering assessments. DoI is also seeking to complete access management and remediation works at the Eastern Portal of Lapstone Hill Tunnel.

To support these strategic objectives, Nation Partners was engaged by DoI to undertake a detailed site investigation (DSI) at the Site. For the purposes of this report, the 'Site' refers to the Mushroom Farm area, the Lapstone Hill Tunnel, and the Eastern Portal (and the associated cutting).

The site location is provided in **Figure 1**.

1.2. Objectives

The objectives of the DSI are:

» To identify and evaluate potential contamination and safety risks within the Site, including potential management and/or mitigation measures necessary to facilitate access and potential adaptive re-use for recreation and tourism purposes;

» To clearly identify management actions and/or control measures needed to facilitate the clean-up and remediation works required at the Eastern Portal; and

» To evaluate human health and environmental risks presented by contamination (if any), with regard to current and potential future land uses of the various portions of the Site.

1.3. Scope

In order to achieve the project objectives, Nation Partners has:

» Reviewed and assessed available historical information and data from previous site investigations;

» Completed a data gap assessment and a Sampling, Analysis and Quality Plan (SAQP);

» Inspected the site to identify potential sources of contamination;

» Collected and analysed representative soil and surface water samples;

» Assessed the laboratory analytical results against relevant environmental and health assessment criteria;

» Assessed the laboratory analytical results against the NSW EPA Waste Classification Guidelines; and

» Prepared this Detailed Site Investigation Report.

This DSI report details the scope of works undertaken at the Site and presents results, and interpretation of the data in the context of the future and current use of the Site.

1.4. Guidelines

Guidelines and standards endorsed by the NSW Environmental Protection Agency (EPA) have been adopted in the preparation of this report. These documents are listed on the NSW EPA website (www.epa.nsw.gov.au/clm/guidelines.htm) and, as at October 2017, comprise:

» Sampling Design Guidelines (NSW EPA, 1995)

» Guidelines for the NSW Site Auditor Scheme (3rd Edition) (NSW EPA 2017)

» Guidelines for the Assessment and Management of Groundwater Contamination (NSW EPA, 2007)

» Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (EPA, 2015)

» Guidelines for Consultants Reporting on Contaminated Sites (NSW EPA, 2011)

Other relevant standards and guidelines from Australian regulatory authorities and endorsed by the NSW EPA have been considered for this investigation, including:

» National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 No. 1 (NEPM, 2013)

» Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soils – Non-Volatile and Semi-Volatile Compounds (Australian Standard AS 4482.1-2005)

» Guide to the Sampling and Investigation of Potentially Contaminated Soils – Volatile Substances (Australian Standard AS 4482.2-1999)

1.5. Definitions

The following key definitions are adopted throughout this document for consistency and are clearly shown in **Figure 2.**

» **Site** – Refers to the landed owned by DoI comprising the Mushroom Farm, the Lapstone Hill Tunnel and the Eastern Portal.

» **Mushroom Farm** – Refers to Lot 1 DP196131 and Lot 7010 DP026604.

» **Tunnel** – Refers to the full extent of the Lapstone Hill Tunnel which is also referred to as the former Glenbrook Rail Tunnel (from the Western Portal through to the Eastern Portal).

» **Eastern Portal** – Refers to the Eastern Entrance of the Lapstone Hill Tunnel, and Part of Lot 9 DP1097785 which is downstream of the Portal and within the associated rail cutting.

» **Western Portal** – Refers to the Western Entrance of the Lapstone Hill Tunnel at the Mushroom Farm.

2. Site Characterisation

The Site, owned by DoI, is in a semi-rural area in the municipality of Blue Mountains City Council (**refer Figure 1**). The investigation area is comprised of the Mushroom Farm, the Lapstone Hill Tunnel, and the Eastern Portal (**see Figure 2**).

Current Site Owner:	Department of Industry (DoI)
Address:	Off Barnett St, Glenbrook
Location:	Approximately 62 kilometres west of Sydney's CBD
Legal Identification:	Mushroom Farm: » Lot 1 DP196131 » Lot 7010 DP1026604 Eastern Portal: » Lot 9 DP1097785
Site Area:	» Former Mushroom Farm Site: ~ 1.1 ha » Lapstone Hill Tunnel: 660m long » Eastern Portal: ~ 0.2 ha
Local Government Area:	City of Blue Mountains Council
Zoning:	» L.E.P. 2005 Regional Transport Corridor – Rail » L.E.P. 2005 Regional Transport Corridor Road – Existing » Draft L.E.P 2013 SP2 – Special Purpose (Rail) » Draft L.E.P. 2013 Proposed General Provision/s – Protected Area – Riparian Land (Clause 6.7) – Protected Area – Watercourse (Clause 6.7) – Protected Area – Ecological Buffer Area (Clause 6.6) – Groundwater Vulnerability – Moderately High (Clause 6.8) – Adjoins a SP2 – Special Purpose (Classified Road).
Site History Summary	The Tunnel and the Eastern Portal cutting was an operational rail line from 1892 until 1913, following which it was leased for the purposes of mushroom farming. From 1939 to 1946 the Tunnel was utilised by the Royal Australian Air Force (RAAF) for the storage of explosives and mustard gas. During this time the based of the Tunnel was concreted and the the Eastern Portal cutting was used for vehicle access and possibly for the maintenance of explosives stored in the Tunnel. Historic photos suggest that the eastern Portal cutting floor was improved during this time to allow for vehicle access. Following 1946 the Mushroom Farm and Tunnel reverted to use as a mushroom growing site while the Eastern Portal cutting fell into disuse. During 2016, mushroom farming in the Tunnel ceased and the Tunnel and Mushroom Farm were abandoned by the tenant. Significant volumes of rubbish and other refuse remained was abandoned on site. During 2016 DoI undertook clean up and demolition works on the Mushroom Farm area and have undertaken works to secure unauthorised access to the Tunnel. The Mushroom Farm area has been historically filled. It is unclear from available information, when this may have occurred.

3. Data Quality Objectives

This investigation was designed using the Data Quality Objective (DQO) process provided by the US EPA (2000, 2006) and endorsed in the Australian Standard AS4482. 102005 - *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soils* and the *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013* (NEPC, 2013).

The DQO process is a seven step planning approach used to establish performance criteria which can be used to determine whether data is of sufficient quality and quantity to support the goals of a study. To support investigation and accurate estimation of contaminant risks, the DQO process defines an analytical approach and data collection strategy that is effective and efficient. The DQOs have been outlined below:

Step 1. Define the problem

This step defines and describes the problem, identifies the planning team, develops the Conceptual Site Model and identifies the data needed, resources, restraints and deadlines of the project.

Objective:	Gather sufficient data to achieve the project objectives as listed in **Section 1.2**
Contamination Issue:	Historic site activities may have resulted in contamination on and in the vicinity of the Site. Recent investigations indicate that contamination may be present at concentrations which may inhibit proposed adaptive re-use. Insufficient data is available to make appropriately informed decisions with regards to contamination risks and further investigation was therefore required. Contaminating site activities and potential contaminants of concern have been described in Section 4.2.
Project Driver:	Proposed adaptive reuse of the Site, which may include development of assets and public access to the Site.
Project Team:	DoI-Lands Project Manager: Chris Wright Nation Partners Project Director: Luke Speechley Nation Partners Project Manager: Daniel Wedgwood Nation Partners Field Support: Alexandra Francis Nation Partners Technical Specialist: Chris Duesterberg

Conceptual Site Model (CSM):

The following CSM was developed based on the Site history, Site inspections and DoI advice regarding the current and future use of the Site.

Area	Source	Pathways	Receptors
Former Mushroom Farm Area	Uncontrolled fill and asbestos on the site surface	Dust / odour inhalation	Site contractors, trespassers, visitors during future potential use of site.
		Dermal contact / ingestion	Site contractors, trespassers, visitors during future potential use of site.
Lapstone Hill Tunnel	Historic storage of explosives and mustard gas.	Surface water runoff	Knapsack Gully and the downgradient environment.
		Inhalation of vapour / gas	Site contractors, trespassers, visitors during future potential use of site.
	Refuse and chemical storage	Dermal contact / ingestion	Site contractors, trespassers, visitors during future potential use of site.
Eastern Portal	Maintenance of explosives	Surface water runoff	Site contractors, trespassers, visitors during future potential use of site. Tunnel Gully.
		Inhalation of vapour / gas	
	Runoff from the Tunnel	Dermal contact / ingestion	

Resources and Project Timeframes:

The project resources/personnel have been listed above. The fieldworks investigations were completed during October 2017.

Regulatory Authorities & Local Government:	Stakeholders in the remediation of the site include the NSW Environmental Protection Authority (EPA) and the Blue Mountains City Council (Council). It is noted that the land is owned by DoI, however the long-term, management of the site and adaptive re-use works may become the responsibility of Council (to be determined). Council are therefore a critical stakeholder in the investigation outcomes.

Step 2. Identify the Decision

This step identifies the key questions and objectives of the study, alternative actions or outcomes that may result based on the outcomes.

Media of Concern	Are contaminant concentrations within soil or surface water at the site significantly above background levels? Are contaminants causing an unacceptable impact on the environment? Does a contaminant pose a human health or ecological risk to the receptors of concern? Is air quality within the tunnel suitable for the purposes of adaptive reuse?
Guidelines	The relevant guidelines, human health, environmental, air quality, asbestos and waste classification criteria have been described in **Section 5**.
End-use	Does the contamination affect the suitability of site for current and proposed use? Does the contamination (if present) warrant remediation and/or management action? If remediation and/or management action is required, what is the waste classification of the material(s) requiring management?

Step 3. Identify Information Inputs

This step is used to determine the types and sources of information needed to produce the desired estimates, specify performance or acceptance criteria, and determine the availability of appropriate sampling and analyses methods.

Site Condition	Previous environmental assessments and investigation data for the site (refer Section 4.1) Use of field investigation techniques to identify previously undocumented areas of contamination (e.g. detailed site walkovers and inspections, environmental sampling) Visual observations of the site, condition of soils and surface water. Visual observations of local flora and evidence of stress Visual observation of soil erosion or land instability
Target Media	Observations, descriptions, photographs, logging, and sample data to describe the type, extent, volume, distribution, and speciation of contaminated soils and surface water present. Air quality within the tunnel will also be assessed. Potential sources of contamination that are likely to have significantly impacted groundwater have not been identified on the site, therefore groundwater was not sampled.
Data Gaps	The data gaps were assessed in the *Lapstone Tunnel – Sampling Analysis and Quality Plan, Nation Partners, 2017* (SAQP)**.**
Investigation criteria:	The soil, surface and air quality objectives have been outlined in **Sections 5.1 to 0.**

Sampling and analysis methods:	Appropriate sampling and analysis methods have been identified for the site investigation, and are described in **Section 6.**

Step 4. Define the Boundaries of the Study

This step identifies the spatial and temporal features necessary for accurate estimation, the practical constraints, and the scale of estimation.

Spatial Limit:	The spatial layout of the site is described in **Section 2** and is shown in **Figure 2.**
Investigation Limit:	The limit of the investigation extent is the depth of sampling locations described in **Section 6.**
Constraints:	At the request of DoI and Council, areas of hardstand within some portions of the former Mushroom Farm area were not damaged. Given these areas could not be sampled or observed during the site investigation, the nature of material below these areas was inferred on the basis of nearby results. Access to some portions of the site were restricted by surface impediments such as rough/steep ground or vegetation.
Receptors of Concern:	The following potential receptors of concern were considered during the investigation: » Local/neighbouring residences; » Adjacent bush land (flora and fauna); » Knapsack Gully, Tunnel Gully; » Nearby Roads; » Site contractors, visitors, trespassers; and » Future site users which includes public access for recreation and tourism.

Step 5. Develop the Analytic Approach

A decision rule based on both qualitative and quantitative information describing the condition of the Site with measurable evaluation criteria.

Decision Rules	The decision rules have been developed based on the underlying project drivers and the corresponding objectives of the site investigation program. The investigation assessed the contamination status of soil, surface water and air quality against relevant human health and environmental criteria (Tunnel). A risk based approach was adopted for decision making on the basis of site observations, sample data and site use scenarios in accordance with the requirements of relevant guidelines. Decision rules include: » Does contamination at the site exceed the relevant guideline criteria? » If contamination does exceed the criteria, then a qualitative assessment of risk to current or future site users is required. » If contamination is present, then an assessment of the likely classification of waste for offsite disposal purposes is required. » If contamination is present, then recommendations regarding management options are required.

Step 6. Specify Performance or Acceptance Criteria

This step aims to specify the performance or acceptance criteria that data will need to achieve in order to minimise the possibility of making erroneous decisions or failing to keep uncertainty within acceptable limits and specify acceptable limits on estimated uncertainty.

Documentation and Data Completeness:	» Appropriate sampling locations are selected that cover all accessible areas of environmental / contamination concern » Sampling locations are adequately documented » Completion of field records chain of custody forms, lab test certificates from NATA registered laboratories » Samples analysed for all potential contaminants of concern
Data Comparability:	» Use of NATA certified laboratory using NEPM procedures » Use of NATA certified check laboratory » Use of appropriate sampling, storage and transportation of samples » It is noted that NATA procedures may not be possible on mushroom growing medium nor is the proposed air quality sampling NATA accredited.
Data Representativeness:	» Collection of representative data and information to comprehensively describe the type, extent, and volume of contamination and possible waste material as well as any remnant infrastructure (e.g. coordinates, photographs, descriptions) » Collection of representative samples from each sampling location » Collection of representative samples across the site » Use of appropriate techniques for the sampling, storage and transportation of samples
Precision for Sampling and Analysis:	» Collection of QA and QC samples at a minimum rate of 10% » Achieve laboratory QC criteria » matrix and surrogates return acceptable results » laboratory duplicates are within acceptable ranges » blind field duplicates are within acceptable ranges » laboratory limits of reporting (LORs) or practical quantification limits (PQLs) are within acceptable ranges
Accuracy for Sampling and Analysis:	» Use of appropriately trained and qualified field consultants » Lab QA and QC results within acceptable ranges » Achieve lab QC criteria

Step 7. Develop the Detailed Plan for Obtaining Data

This step combines all the information and outputs to design a sampling and analysis plan that will yield data that will best achieve the performance or acceptance criteria and identify constraints that will impact the sampling and analysis design. The sampling and analysis program has been described in **Section 6**.

4. Contamination Investigation

4.1. Summary of Previous Investigations and Assessments

Available and relevant site investigation reports associated with the Site have been listed and summarised in **Table 4.1.**

Table 4.1 – Site Investigation Summaries

<table>
<tr><th>Report</th><th>Key findings</th></tr>
<tr><td>Chemical Weapons and Railway Tunnels, 2008 (Australian Railway history)</td><td>The document provides a general history of the storage and handling of chemical weapons within railway tunnels in Australia. The following is considered relevant to the current investigation:
» Photos showing the storage/stockpiling of chemicals and chemical weapons at both the Eastern Portal and Western Portal of the Lapstone Hill Tunnel are provided;
» Weapons stored are identified as predominantly mustard gas and 65lb bombs;
» Weapons and chemicals were maintained and ‘vented’ at the Eastern Portal

The area leading up to the Eastern Portal appears to have been filled to facilitate truck access into the tunnel.</td></tr>
<tr><td>Lapstone Tunnel Contamination Assessment, 2016 (SESL)</td><td>The scope of the investigation was to undertake a site assessment at the Eastern Portal in order to:
» Evaluate the quality of the water and sediment within the water body;
» conduct air monitoring to provide evidence of airborne contaminants; and
» identify potential contaminants of concern via soil sampling.

The following sampling was conducted:
» soil samples were collected at two locations;
» three water samples were collected from within the tunnel (eastern extreme), immediately outside the tunnel, and downstream of the tunnel; and
» air quality was taken at the entrance to the tunnel.

Results indicated elevated levels of Polycyclic Aromatic Hydrocarbons (PAHs), Poly Chlorinated Biphenyls (PCB)s, heavy metals and Total Recoverable Hydrocarbons (TRHs) within a soil sample collected immediately adjacent to the Eastern Portal.

<table>
<tr><th colspan="5">Soil Samples</th></tr>
<tr><th>Sample Location</th><th>Total PAH (mg/kg)</th><th>Total PCB (mg/kg)</th><th>Zinc (mg/kg)</th><th>Total TRH (mg/kg)</th></tr>
<tr><td>NEPM HIL-A</td><td>3</td><td>1</td><td>7400</td><td>N/A</td></tr>
<tr><td>SP1</td><td>6.23</td><td>4.37</td><td>1152</td><td>BDL</td></tr>
<tr><td>SP2</td><td>0.32</td><td><0.2</td><td>469</td><td>210</td></tr>
</table>

The report conclusion suggests that surface water is not suitable for discharge to nearby surface water bodies due to the presence of contaminants exceeding relevant ANZECC (2000) Guideline criteria for protection of slightly to moderately disturbed ecosystems. Elevated nutrient levels and minor concentrations of E. Coli were also identified within all three surface water samples.</td></tr>
</table>

Water Monitoring Samples					
Sample Location	**Zinc (mg/L)**	**Ammonia Nitrogen (mg/L)**	**Total Nitrogen (mg/L)**	**Filterable Reactive Phosphate (mg/L)**	**E. coli (CFU/ 100mL)**
ANZECC 95% Upland Rivers / Primary Contact	**0.0008**	**0.9**	**0.25**	**0.03**	**150**
Tunnel	0.083	0.01	2.1	0.304	160
Outside Tunnel	0.101	0.01	1.8	0.304	20
Downstream	<0.01	0.12	2.5	0.332	20

Air quality results were considered acceptable, though it was noted that wind conditions were not ideal to capture emissions from the tunnel.

No data specific to the former use of the up-gradient tunnel for the storage of chemical weapons or explosives was collected as part of this assessment.

Contaminated Environmental Site Audit Assessment, 2016 (EnviroTech)

EnviroTech was engaged to conduct a detailed site inspection. For clarity, it is noted that the assessment was not an Audit under the Contaminated Lands Management Act (1997).

The assessment was conducted to:
» determine the potential human health and environmental risks associated with the former Mushroom Farm area; and
» to provide advice on managing contamination to allow future use of the site as a public area.

A comprehensive desktop review and a site visit was conducted.

Due to the observed presence of significant volumes of abandoned rubbish, refuse, chemical containers and general poor housekeeping, the results indicated high potential that contamination is present within the soils at the site, posing potential human health and environmental risks, and that the tunnel has a moderate potential for contamination.

The report suggested a detailed site investigation (DSI) be conducted.

Glenbrook – Contamination Technical Advice, 2017 (Nation Partners)

In 2017 Nation Partners was engaged to undertake a desktop assessment of available site data and and provide recommendations to facilitate proposed clean-up works and future beneficial reuse. The objectives of the review were to:
» Determine the technical adequacy of site investigations undertaken to date;
» Provide practical guidance with regards to the current recommendations;
» Provide clear guidance to allow;
  – the Lapstone Hill Tunnel Eastern Portal access management works to proceed;
  – the former Mushroom Farm to be redeveloped;
  – appropriate management of contamination with regards to human health, environmental and regulatory risk; and
» For the purposes of obtaining internal funding for future works, make a determination with regards to the known or suspected contamination status of the site(s).

The review identified that the reliability of the available data may not be sufficient to allow for appropriate management decisions and is not suitable nor sufficiently detailed for the design of remediation.

Analysis report: STC-722-12356 ASB 1, 2017 (ADE Consulting Group)	This report provides results associated with sampling for the identification of asbestos in an old boiler on the south-eastern portion of the site. Material within the boiler was found to be mostly ash, and did not contain asbestos. The results are as follows: » No Chrysotile asbestos found » No Amosite asbestos found » No Crocidolite asbestos found » No Synthetic Mineral Fibres found » Organic (non-asbestos) fibres found
Preliminary Geotechnical Assessment Lapstone Hill Tunnel, Great Western High (Rev0), 2017 (Douglas Partners)	Douglas Partners undertook a geotechnical investigation and concluded that the Tunnel is in relatively sound condition, and from a geotechnical perspective, could be opened to the public with some minor rectification and civil works, including: » Cleaning out and repair of drainage holes and installation of new drains at locations where seepage is evident in the tunnel walls; » Construction of a drainage system either side of the tunnel; and » Groundwater testing to assess whether treatment is required prior to releasing into the drainage system. Regular geotechnical and structural inspection of the tunnel should be conducted to monitor the integrity of the tunnel lining. Previous uses of the site may have left residual contamination in some parts of the tunnel, and Douglas Partners recommended that a separate environmental assessment be carried out to confirm its suitability for the proposed use.
Lapstone Hill Railway Tunnel (Glenbrook Tunnel) Heritage Assessment Preliminary Site Assessment Report, 2017 (ERM)	The report provides a brief description of the site history and the relevant legislation associated with heritage management. The report recommends that in order to remove the unsafe and non-heritage items from the Glenbrook Tunnel and undertake remediation, DoI should make an application to the Heritage Council for approval to carry out works on the heritage listed Glenbrook Tunnel. The report notes that based on the Standard Exemptions (Heritage Council 2008) it is unlikely that environmental remediation of the tunnel or the removal of fixtures within the tunnel meets the requirements of a standard exemption. In order to be considered acceptable under a standard exemption, works carried out at the site must be conducted without the removal of or damage to the existing fabric or the introduction of new materials (Heritage Council 2008: 10). ERM therefore recommends that the DoI submit a Section 60 application and accompanying paperwork such as a Statement of Heritage Impact (SoHI) to the Heritage Council.

4.2. Media and Contaminants of Concern

Based on the available data, the following potential contaminants and media of concern were identified for the three distinct portions of the site.

4.2.1. Former Mushroom Farm

Multiple activities that have historically occurred on the site have the potential to have resulted in contamination of soils. These include uncontrolled filling, demolition of structures containing hazardous materials and the storage and use of chemicals.

Site observations suggest that the presence of bonded asbestos is of concern with regards to the site surface and possibly in areas subject to bulk filling.

Potential sources of contamination that are likely to have significantly impacted groundwater have not been identified on the site. In addition, potential future land use scenarios do not include activities that would result

in exposure to, or extraction of, groundwater. Groundwater was therefore excluded from the scope of the proposed investigation.

No sources of surface water were evident on the site itself, however the adjacent surface water body (Knapsack Gully) is an important receptor of possible contamination originating from the site.

Soils are therefore identified as the most relevant media requiring investigation.

Contaminants of concern (CoCs) are:

» Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene and Xylene (BTEX), PAH ad heavy metals;

» Asbestos in soils and asbestos in materials;

» Nutrients (NH3, Total Keljdahl Nitrogen (TKN), Nitrate, Nitrite, Orthophosphate, Total Phosphorous);

» Pesticides.

4.2.2. Lapstone Hill Tunnel

Historic activities within the tunnel including the storage of explosives and mustard gas, as well as the current storage of mushroom growing medium have the potential to impact on air quality and the quality of surface water within the tunnel. If present, soils on the tunnel floor may also be contaminated, however volume is expected to be minimal. The nature and chemical quality of solid fertilisers and growing medium is unknown and requires investigation.

For the purposes of the investigation, surface water and air within the tunnel were the primary media of concern. Where significant soil/sediment was observed on the tunnel floor, this was also assessed. Mushroom growing medium was also assessed to allow a preliminary assessment of reuse potential.

CoCs within the Tunnel are:

» TRH, BTEX, PAH, heavy metals (including Antimony);

» Nutrients (NH3, TKN, Nitrate, Nitrite, Orthophosphate, Total Phosphorous);

» Pesticides;

» PCBs;

» Explosives; and

» Mustard gas (Thioglycol).

Air quality contaminants within the tunnel were identified as CO, CO2, CH4, H2S, O2, NH3 and Cl (a breakdown product of mustard gas).

4.2.3. Eastern Portal

Likely sources of contamination at the Eastern Portal are largely associated with the migration of contaminants from within the adjacent Tunnel, transport of munitions and chemicals into the tunnel and some possible uncontrolled filling. Historic sampling also suggests the presence of PAHs, PCBs, heavy metals and TRHs within soils adjacent to the portal.

The CoCs for the Eastern Portal were identified as:

» TRH, BTEX, PAH, heavy metals (including Antimony);

» Nutrients (NH3, TKN, Nitrate, Nitrite, Orthophosphate, Total Phosphorous);

» Pesticides;

» PCBs;

» Explosives; and

» Mustard gas (Thioglycol).

It is notable that the presence of some pathogens was previously identified within surface water. Pathogens are expected to be present within the water due to the presence of local fauna and can be managed during dewatering via standard construction methods. Due to the presence of a sewer main in the vicinity of the Eastern Portal and Lapstone Hill Tunnel, the presence of sewage within surface water may however impact on future adaptive reuse. Additional analysis of surface water was undertaken to determine the presence or absence of human related faecal matter within the surface water at the Eastern Portal.

5. Basis for Assessment

5.1. Contamination Assessment Criteria

Criteria identified in Table 5.1 have been adopted from Schedule B(1) 'Guideline on the Investigation Levels for Soil and Groundwater' of the *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013* (NEPC, 2013), which have been endorsed by the NSW EPA (herein referred to as the NEPM).

The NEPM guidelines define an 'Investigation Level' (IL) as the concentration of a contaminant above which further appropriate investigation and evaluation will be required.

An exceedance of an IL does not immediately imply that a risk exists. Exceedances of an IL will be used by this investigation to identify those contaminant(s) that should be further investigated, if required.

The NEPM guidelines provide IL's for the protection of human health (Health Investigation Levels - HILs), and for the protection of ecosystems (Ecological Investigation Levels - EILs).

Table 5.1 – SOIL Site Investigations Levels

	Health-Based Criteria[1] (mg/kg)		Environmental Criteria[2] (mg/kg)
Contaminant of Concern	**HIL(C)**	**HIL(D)**	**EIL[1]**
Heavy Metals			
Antimony	-	-	-
Arsenic	300	3000	40
Cadmium	90	900	-
Chromium[3]	300	3600	60[4]
Copper	17000	240 000	65[4]
Lead	600	1500	470[4]
Mercury	80	750	-
Nickel	1200	6000	5[4]
Zinc	30000	400000	-
Organochlorine Pesticides			
DDT+DDE+DDD	400	3600	3
Aldrin and Dieldrin	10	45	-
Chlordane	70	530	-
Endrin	20	100	-
HCB	10	80	-
Phenols			
Phenol	40000	240000	-
Pentachlorophenol	120	660	-
Cresols	4000	25000	-

[1] Generic land uses are described in detail in Schedule B7 Section 3, NEPM 2013.
[2] Conservatively the investigation has adopted criteria for 'areas of ecological significance'. If exceeded the criteria will be reassessed on a case by case basis applying less conservative criteria where appropriate.
[3] Value for chromium(VI) used for health-based criteria as a conservative measure; value for chromium(III) used for EIL
[4] Added Contaminant Limit (Table 1B(3)) NEPM

	Health-Based Criteria[1] (mg/kg)		Environmental Criteria[2] (mg/kg)
Contaminant of Concern	**HIL(C)**	**HIL(D)**	**EIL[1]**
PCB			
PCB	1	1	-
BTEX			
Benzene	NL	NL	10
Toluene	NL	NL	10
Ethylbenzene	NL	NL	1.5
Total Xylenes	NL	NL	1.6
TRH[5]			
F1[6]	700	700	125
F2[7]	1000	1000	25
F3 (C_{17}-C_{34})[8]	2500	3500	-
F4 (C_{35}-C_{40})[9]	10000	10000	-
PAHs			
Benzo(a)pyrene (as TEQ)	3	40	0.7
Total PAHs	300	4000	-
Naphthalene	-	-	10
Asbestos	Refer Section 5.2		

5.1.1. Health Investigation Levels (HILs)

Schedule B(1) of the NEPM provides a range of Health Investigation Levels (HILs) for a broad range of metals and organic substances. The HILs are applicable for assessing human health risk via all relevant pathways of exposure. The HILs are generic to all soil types and apply generally to a depth of up to 3 m below the surface for residential use. Site-specific conditions should determine the depth to which HILs apply for other land uses. They are intentionally conservative and are based on a reasonable worst-case scenario for four generic types of land uses.

HIL C is of primary consideration for adaptive reuse scenarios at the Site, while HIL D is more relevant to the current landuse scenario, where the site is accessed mainly for maintenance purposes.

- HIL C – public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves) which should be subject to a site-specific assessment where appropriate
- HIL D - commercial/industrial such as shops, offices, factories and industrial sites.

The HILs do not provide investigation levels for TRH and BTEXN, therefore the HSLs and management limits specified in the amended NEPM (NEPC, 2013) were adopted.

[5] TRH concentrations have been conservatively adopted as the HSL A for Sandy Soils between 0 and 1m depth (NEPM 2013). If exceeded, TRH will be re-assessed against the HSLs for the appropriate depth and nature of the media sampled.
[6] To obtain F1 subtract the sum of BTEX concentrations from the C6-C10 fraction.
[7] To obtain F2 subtract naphthalene from the >C10-C16 fraction
[8] Management Limits Table 1 B(7)
[9] Management Limits Table 1 B(7)

5.1.2. Environmental Investigation Levels (EILs)

EILs have been developed for selected metals and organic substances and are applicable for assessing risk to terrestrial ecosystems. EILs depend on specific soil physicochemical properties, land use scenarios and generally apply to the top 2m of soil.

5.1.3. Water Quality Objectives

The results of the surface water monitoring will be assessed against the freshwater ecosystem criteria outlined in the *Australia and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000) for protection of slightly to moderately disturbed ecosystems and as adopted in the NEPM (2013).

Table 5.2 – Water Site Investigations Levels

Contaminant of Concern	ANZECC Trigger Level ug/L
Heavy Metals	
Antimony	-
Arsenic	13 (as As(V))
Cadmium	0.2
Chromium	1
Copper	1.4
Lead	3.4
Mercury	0.06
Nickel	11
Zinc	8
Nutrients	
Ammonia	900
Nitrate	700
Organochlorine Pesticides	
DDT	0.006
Aldrin and Dieldrin	-
Chlordane	0.03
Endrin	0.01
PCB	
Arochlor 1242	0.3
Arochlor 1254	0.01
Total PCBs	–
BTEX	
Benzene	950
Total Xylenes	200 (p-xylene)
O-xylene	350
TRH[10]	
F1[11]	125

[10] TRH concentrations have been conservatively adopted as the HSL A for Sandy Soils between 0 and 1m depth (NEPM 2013). If exceeded, TRH will be re-assessed against the HSLs for the appropriate depth and nature of the media sampled.
[11] To obtain F1 subtract the sum of BTEX concentrations from the C6-C10 fraction.

Contaminant of Concern	ANZECC Trigger Level ug/L
F2[12]	25
PAHs	
Naphthalene	16

5.2. Asbestos

The NEPM provides specific guidance for the assessment of asbestos in soils based on the Western Australian Department of Health (DoH) Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia (WA DoH 2009). The DoH Guidelines identify three groups of asbestos contamination:

» ACM: asbestos which is bound in a matrix (in sound condition) which cannot pass through a 7 mm x 7 mm sieve;

» Fibrous Asbestos (FA): friable asbestos material, such as severely weathered ACM and loose fibrous material such as insulation products. FA is defined as asbestos material that is in a degraded condition such that it can be broken or crumbled by hand pressure; and

» Asbestos Fines (AF): includes free fibres of asbestos, small fibre bundles and ACM fragments that pass through a 7 mm x 7 mm sieve.

The HSLs for asbestos documented in NEPM 2013 have been adopted for the purposes of this assessment.

5.3. Air Quality Objectives

Results of the air quality sampling were assessed against relevant criteria from the *National Environment Protection (Ambient Air Quality) Measure* (Table 5.3) and the Workplace Exposure Standards for Airborne Contaminants (Safe Work Australia, 2013) (Table 5.4). The Safe Work Australia standards are not directly applicable to the recreational use of the site, however provide a reasonable assessment of likely risk associated with occasional and regulated access to the Tunnel (similar to the proposed beneficial reuse scenario).

Table 5.3. National Air Quality Standards

Pollutant	Concentration and averaging period
Carbon monoxide	9.0 ppm (parts per million) measured over an eight hour period

Table 5.4. Safe Work Australia Standards

Pollutant	TWA (ppm)	STEL (ppm)
CO	30	-
CO2	5000	30000
CH4	-	-
H2S	10	15

[12] To obtain F2 subtract naphthalene from the >C10-C16 fraction

NH3	25	35
Cl	1	-

5.4. Waste Classification Guidelines

For the purposes of providing preliminary classification of waste for offsite disposal, the concentrations of the chemicals in the samples analysed have been compared against the criteria outlined in Tables 1 and 2 of the '*Waste Classification Guidelines, Part 1: Classifying Waste'* NSW EPA (2014). The guidelines provide criteria for assessing the classification of material requiring offsite disposal, and to subsequently determine the most appropriate disposal location. The following classes of waste are defined in clause 49 of Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act):

» Special waste;

» Liquid waste;

» Hazardous waste;

» Restricted solid waste;

» General solid waste (putrescible); and

» General solid waste (non-putrescible).

The results of the soil sample analyses were compared against the maximum allowable concentrations for expected contaminants for disposal as General Solid Waste (GSW) or Restricted Solid Waste (RSW), as described in Table 1 of the guidelines. Where exceedances of Table 1 concentrations were observed additional analysis of the sample was undertaken via application of Toxicity Characteristic Leaching Procedure (TCLP) and analysis of the leachate. The TCLP results and total concentrations are then compared to Table 2 of the waste classification guidelines to provide a final determination of the classification.

6. Sampling and Analysis Program

6.1. Field Investigation

This section describes the soil sampling and analysis program undertaken by Nation Partners at the Site on October 17 and 18, 2017.

Mushroom Farm

The boundary of the investigation area associated with the Former Mushroom Farm is provided in Figure 3a.

Lapstone Hill Tunnel

The extent of investigation within the Tunnel was limited by the tunnel geometry (i.e. investigation occurred within the confines of the tunnel). Figure 4 provides an indication of the extent of the Tunnel.

Eastern Portal

The investigation at the Eastern Portal was undertaken within the well-defined cutting starting at the eastern extreme of the Tunnel and extended downgradient of the Eastern Portal as deemed necessary to facilitate achievement of project objectives (based on visual and olfactory observations, refer Figure 5 for sampling locations).

6.2. Sampling Methods

All sampling was undertaken by an experienced environmental engineer to ensure representative samples were collected, information was accurately recorded and quality control was maintained throughout the investigation.

Soil samples were collected through testpitting, handaugering and grab sampling. Detailed borelogs were developed for each testpit and handauger describing;

» the stratigraphy of the investigation area;

» sampling locations and depths; and

» field observations including visual and olfactory indications of contamination.

6.2.1. Mushroom Farm

13 testpit locations were selected, based on a judgmental sampling regime designed to allow a broad visual assessment of the nature and extent of contamination within the Mushroom Farm area, to allow collection of representative samples, and to avoid damaging hardstand / concrete slabs (as required by DoI and Council). Care was also taken to prevent damage to the erosion prevention walls and stockpiles.

A handauger was subsequently used to collect soil samples in 4 locations that were difficult to access (i.e. inaccessible for the testpitting excavator). Samples collected during handaugering were collected directly from the auger, from depths ranging between 0.1m and 0.5m.

At completion of intrusive sampling a detailed site walkover was conducted and a total of 7 additional surface samples of ACM were collected.

Testpit and handauger locations are shown on Figure 3a and surface ACM sample locations are shown in Figure 3b.

Targeted soil samples were selected for analysis from each sample location in accordance with the SAQP and based on visual/olfactory evidence of contamination.

No surface water or groundwater sampling was undertaken on the Mushroom Farm area.

6.2.2. Lapstone Hill Tunnel

Figure 4 indicates the Lapstone Hill Tunnel sampling locations.

Soil Sampling

Grab samples of loose, decomposing mushroom growing medium were collected at 2 locations within the Tunnel where significant volumes had accumulated. Limited soil or sediment was observed within the Tunnel.

Surface Water Sampling

Surface water samples were collected via grab sampling at regular intervals within the Tunnel. Samples were collected from running water where possible (samples T1, T2, T3, T4) and from pooled water at the eastern end of the Tunnel (sample T5). Care was taken not to disturb the water prior to sample collection.

Air Quality Sampling

To ensure that the works were completed safely and to assess risks associated with possible future access to the site, Nation Partners:

» Undertook initial remote monitoring of air quality within the tunnel for a period of 6 hours;

» Assessed the results from the initial remote monitoring for any indication of harmful gases that may have restricted or inhibited soil and water sampling within the tunnel; and

» Constantly monitored air quality during all access to the tunnel.

All work was completed by 2 field personnel, one of whom was solely responsible for monitoring air quality.

Air monitoring was undertaken via the use of a MX6 iBrid Portable Multi Gas Monitors calibrated to collect air quality data with appropriate range and resolution to assess the suitability of air within the tunnel. Target gases include CO, CO_2, CH_4, H_2S, O_2, NH_3 as well as Cl (a breakdown product of mustard gas).

6.2.3. Eastern Portal

Figure 5 indicates the Eastern Portal sampling locations.

Soil Sampling

Soil samples in the Eastern Portal area were collected via handauger. A total of 8 handaugers were completed.

Sampling locations were determined based on visual and olfactory observations, and where possible, were undertaken at a regular linear distance downgradient of the Eastern Portal entrance. Sample locations were selected to assess the vertical and horizontal extent of contamination (if any) associated with downgradient migration of contaminants.

Surface Water Sampling

Surface water was collected from the Eastern Portal using a grab sample technique. Sampling locations were identified during the site investigation to best achieve the project objectives.

» Sample EP1 – Was collected within ponded water at the Eastern Portal to best reflect the quality of water at this location and allow for an assessment of the impacts of inflow from the adjacent Tunnel.

» Sample EP2 and EP3 – Collected downgradient of the Eastern Portal to determine the extent of contamination (if any).

» Sample EPCW – Collected at soil sampling location EPC in order to assess the presence or absence of contaminants associated with observed hydrocarbon odours at this location.

6.2.4. Sampling Procedures

Laboratory supplied soil sample jars and dedicated water sampling containers were used to collect samples, ensuring the containers were filled to minimise headspace. The containers were labelled with sampling date and the following sample identification (ID):

» Sample method –Testpit (TP), Handauger (HA);

» Sample number; and

» Sample depth.

Samples were stored in ice-filled coolers for preservation prior to and during transportation to the NATA accredited laboratory. Samples were accompanied with chain of custody (COC) documentation to the project laboratories and were submitted within holding times appropriate to the analysis required.

Decontamination procedures were used during the soil sampling, including the use of new disposable gloves for the collection of each sample and the use of dedicated sampling containers provided by the laboratory.

6.3. Analytical Schedule

Based on the observations and required data density, samples were selected for laboratory analysis in accordance with Table 6.1. Samples not selected for analysis were transported to the laboratory and put on hold until such time as it was confirmed they were not required.

It is noted that no laboratory could be located that was able to test soil or water for the presence of Thiodiglycol (the main breakdown product of mustard gas).

Table 6.1 – Analytical Schedule

Material	Sample Locations	Sampling Method	Analytical Regime Number of samples analysed and laboratory schedule	
Mushroom Farm **SOIL**	17	13 Testpits & 4 Handauger	16	TRH, BTEX, PAH, 8 Metals (including Chromium speciation where necessary)
			4	Asbestos in soil
			2	Pesticides, Nutrients[13]
			1	PCBs
			2	TCLP
Mushroom Farm **ACM**	11 (4 in testpits and 7 surface)	Grab samples	6	ACM in solids
Lapstone Hill Tunnel **SOIL / SEDIMENT**	2	Grab samples	2	TRH, BTEX, PAH, 8 Metals, PCBs, Pesticides, pH, EC
			1	Nutrients, Explosives Suite
Lapstone Tunnel **SURFACE WATER**	5	Grab Samples	5	TRH, BTEX, PAH, 8 Metals (+ Antimony), Pesticides, PCBs, Explosives Suite, Field Parameters[14]
			1	Nutrients
Eastern Portal **SOIL / SEDIMENT**	5	Hand tools and/or grab samples	6	TRH, BTEX, PAH, 8 Metals (including additiona silica gel cleanup and re-assessment)
			4	PCBs
			1	ASLP and Explosives suite
			2	TCLP
Eastern Portal **SURFACE WATER**	4	Handauger	4	TRH, BTEX, 8 Metals, Field Parameters[2]
			2	Pesticides, PCBs, Nutrients, Explosives Suite
QA /QC	Collected and analysed at a minimum of 10%			

[13] TKN, NO2, NO3, Org N, NH3, Tot P, PO4-P
[14] Dissolved oxygen, pH, Redox potential, Total Dissolved Solids

7. Investigation Results

7.1. Field Observations

Borelogs were developed for each testpit and handauger sampling location, and have been provided in **Appendix C**.

7.1.1. Visual and Olfactory Indicators of Contamination

Mushroom Farm

Fill was noted to be present at all sampling locations across the Mushroom Farm site and extended to >2.5m below ground surface in some locations. The depth of fill increased with proximity to Knapsack Gully on the northern boundary of the site. Exposed rock and shallow fill profiles were present on the southern side of the site. The fill profile is indicative of a natural gradient sloping south to north towards the Knapsack Gully that was filled to allow for commercial uses of the site (i.e. mushroom farming). Visible embankments ranging from 0.8m to >3.0m of fill are present running parallel with Knapsack Gully and are reflective of the fill profile in adjacent testpits.

Visible ACM was observed to be present on the Site surface at numerous locations. A significant mass of ACM was observed to be present on the surface of the embankment skirting the northern boundary of the site and smaller fragments of ACM were intermittently observed on the remainder of the Site surface.

Physical contaminants were encountered in a number of locations during testpitting and included materials such as rubbish, ash, building materials, glass, plastic and possible Asbestos Containing Materials (ACM). Physical contaminants were observed within fill at the following testpit locations:

» TP1: demolition waste, bricks, lead flashing, terracotta, styrofoam, glass, possible ACM (increasing with depth)

» TP3: wood, cans

» TP4: broken terracotta, old pipe service @ 0.3m, some ash, possible slag, bricks

» TP5: some rubbish

» TP6: rubbish, glass, ash

» TP7: rubbish, glass, ash

» TP8: demolition waste, glass, brick, ceramics, polystyrene, old terracotta pipe

» TP9: some ash, terracotta fragments, steel bar

» TP10: possible ACM, terracotta pipe

» TP11: possible ACM

» TP12: some ash, minor class, plastic, bottles, polystyrene

» TP13: brick, some plastic, wiring, steel, terracotta

Significantly more anthropogenic waste was observed in TP1 than other testpits. The waste at TP1 appeared to consist largely of buried demolition materials and accounted for >90% of the volume of material in the ground from approximately 0.2m to 2.3m below ground surface. Significant volumes of possible ACM were noted to be present. The extent of the buried demolition waste was observed to be limited and was delineated as follows:

» to the east via the completion of TP12 which included fill similar to that observed at most locations on the Site (and included <5% demolition waste).

» To the north and west of TP1 the fill profile was visible as the embankment skirting the Tunnel Gully stream and adjacent stormwater outlet; and

» to the south existed the site access road, beyond which was observable natural rock formations at the Site surface.

The remainder of the testpits often included significant volumes of observable refuse and demolition waste however generally the estimated percentage of refuse and demolition waste did not exceed 5%.

Eastern Portal

The Eastern Portal entrance was characterised by thick vegetative cover and ponded water to a depth of approximately 0.5m. The ponded water extended for approximately 15m downgradient of the tunnel entrance beyond which surface water was only periodically visible. A thick layer of vegetation was present across the entirety of the cutting with surface water generally flowing within this layer of vegetation and within loose sediment and gravels beneath.

Sample EP-A was collected at the Eastern Portal tunnel entrance on solid ground adjacent to the pooled water. Soils at the surface at sample location EP-A were clayey, fine grained sands indicative of sediment with refusal occurring on sandstone at 0.55m. The remaining samples (EP-B, EP-C, EP-D) were collected along the centre-line of the cutting at regular intervals downgradient of the Eastern Portal tunnel entrance. All sample locations were saturated. The uppermost 0.2m at each locations was generally solely roots and vegetation, beneath which lay silty, dark brown saturated soils underlain by roadbase gravels and ballast observed at the refusal depth of 0.5m. Observed roadbase gravels and ballast are assumed to be associated with the ground level during use of the site by the RAAF for vehicle access and former railway uses. It is therefore assumed thatoverlying soils are associated with sedimentation that has occurred since the site was abandoned by the RAAF in 1946.

There was a strong hydrocarbon odour and a sheen at soil sampling location EP-C. Additional handaugers were subsequently undertaken at a location 5m upgradient (EP-C(a)) and 5m down gradient (EP-C(b)). There was no indication of a hydrocarbon odour or sheen 5m upgradient of EP-C, and only a slight hydrocarbon odour and no sheen approximately 5m downstream of EP-C.

Additional handaugers were completed at EP-E, EP-F and EP-G to assess the profile of soils within the cutting. The soil profile became gradually thinner between EP-E (refusal on roadbase gravels at 0.5m) to EP-G (refusal on roadbase gravels at 0.2m).

Lapstone Hill Tunnel

With the exception of the first 100m of the tunnel, the tunnel floor and walls were generally noted to be wet/saturated, with flowing surface water visibly increasing from west to east on the base of the tunnel. Flow at the eastern end of the tunnel (prior to the ponding of water at the Eastern Portal) was estimated to be in the order of 1-2L/minute[15].

The entire length of the tunnel included significant volumes of refuse likely to be associated with the former use of the tunnel for the commercial growing of mushrooms. The refuse included steel and wooden structures, various tools, paper, plastic, a pool chlorine container and many thousands of mushroom growing bags (small 1L plastic bags filled with sawdust with a characteristic red plastic nozzle). The bags were, in some locations, stockpiled and also generally strewn throughout the tunnel. The majority of the bags were in reasonable condition, however many had broken and were sitting within stagnant pools of water resulting in varying levels of decomposition.

[15] The estimated flow rate is indicative only and was based on visual observation of the main water flow path and brief assessment of the time to fill a 500mL sample bottle.

Electrical infrastructure, including a large switchboard at the Western Portal and multiple smaller switchboards were present along the length of the tunnel. The nature and age of the switchboards indicate the possible presence of asbestos within backing boards.

A slight hydrogen sulfide odour was noted at all times within the tunnel and became strong approaching the Eastern Portal.

Significant volumes of decomposing sawdust were noted to be present on the floor of the tunnel with increasing regularity and depth approaching the Eastern Portal.

At approximately 80m from Eastern Portal a large stack of white 'bulker bags' containing mushroom growing medium (saw dust) were observed. The bulker bags were stacked approximately 1.5-2m high and extended for approximately 50m along the length of the tunnel.

Small amounts of water were pooling at the western end of the bulker bags. Water was >0.2m deep at the eastern end of the bulker bags and was estimated to approach 0.5m in depth immediately prior to the Eastern Portal.

Table 7.1 describes the Lapstone Hill Tunnel sampling location, approximate flow rate, and other visual and olfactory observations made during sampling.

Table 7.1 – Tunnel sampling locations and observations

Sample Type	Sample Method	Sample ID	Sample Location	Water Flow Rate[16]	Notes / Observations
Surface water	Grab sample	T1	~100m from western portal	<1L/min	Upgradient of any significant sawdust stockpiles. Collected from right hand side of tunnel; white algae present
		T2	~200 m from western portal	Slightly > than T1	Upgradient of any significant sawdust stockpiles
		T3	~350 m from western portal	~ 1L/min	Black algae present
		T4	~450m from the western portal and 30m upgradient of bulker bags	~ 2L/min	Water had been flowing through significant sawdust stockpiles
		T5	~560m from the western portal and 40m from eastern portal	Ponded water.	Area characterized by deep sludge, H2S odour
Decomposing growing medium (sawdust)	Grab sample	TS1	~470m from the western portal and 10m upgradient of bulker bags	NA	Significant saturated sawdust piles.
		TS2	~560m from the western portal and 40m from eastern portal	NA	Ponded water/sludge with a high percentage of saturated and decomposing sawdust.

[16] The estimated flow rate is indicative only and was based on visual observation of the main water flow path and brief assessment of the time to fill a 500mL sample bottle.

7.2. Soil Laboratory Results

Sections 7.2.1 to Section 7.2.3 summarise the laboratory analytical results for the soil and water samples collected during the October 2017 investigation. Summary tables are provided in Appendix B and Lab Reports are provided as Appendix D.

7.2.1. Mushroom Farm Results: Soil

Table 7.2 summarises the exceedances of relevant investigation criteria and identifies important laboratory results on the Mushroom Farm area.

Table 7.2 – Tunnel sampling locations and observations

Appendix Reference	Appendix Reference	Result Summary
Human Health Screening Criteria	B1	One sample (TP4-0.1) recorded elevated levels of Total PAHs that exceeded the HIL-C.
Environmental Criteria	B1	Eight soil samples recorded concentrations of Nickel that exceeded the EILs, and two samples recorded concentrations of Copper that exceeded the EILs. In addition, one sample recorded elevated concentrations of Total Chromium (HA4-0.1) and exceeded the EIL. The EIL for Chromium refers to the more toxic Hexavalent Chromium (Cr(VI)) and the Total Chromium result includes both Cr(VI) and the less toxic trivalent form (Cr(III)). As such, addition laboratory analysis was undertaken on HA4-0.1 to speciate the chromium concentrations. The results indicate that the majority of the Chromium exists largely in the trivalent form (Cr(III)). The concentration of Cr(VI) was found to be below the EIL.
Waste Classification	B2 - Totals B9(a) - TCLP	The following samples recorded exceedances of the General Solid Waste threshold values in Table 1 *NSW EPA Waste Classification Guidelines Part 1: Classifying Waste* criteria: » TP2-0.3 (BaP) » TP4-0.1 (BaP and total PAHs) » TP5-0.3 (BaP and total PAHs) » TP8-0.1 (Copper) » HA4-0.1 (Chromium and Nickel) Where appropriate, additional TCLP analysis was undertaken on samples exhibiting exceedances of the Table 1 criteria. Table B9(a) summarises the relevant data, which have been compared against Table 2 of the *NSW EPA Waste Classification Guidelines Part 1: Classifying Waste.* Taking into account the TCLP data, with the exception of the following, all samples exhibited Contaminants of Concern (CoC) concentrations less than the criteria for General Solid Waste: » TP4-0.1 (BaP and total PAHs) – Hazardous Waste » TP5-0.3 (BaP and total PAHs) – Restricted Solid Waste » TP2-0.3 (BaP) – Restricted Solid Waste TCLP analysis was not conducted on TP2-(0.3) however due to the low concentrations of BaP present it is likely that additional TCLP analysis would allow classification as General Solid Waste.

		Possible ACM was observed within fill at multiple locations. Analysis of samples indicates the presence of asbestos within two of the four samples collected within the fill. ACM was also observed on the surface of large portions of the site. Soils containing ACM are classified as Special Waste. In addition, one sample recorded elevated concentrations of Total Chromium (HA4-0.1) which exceeded the Table 1 criteria for General Solid Waste. Additional laboratory analysis was undertaken on HA4-0.1 to speciate the chromium concentrations. The results indicate that the majority of the Chromium exists in the trivalent form (Cr(III)). The concentration of Cr(VI) was subsequently below the General Solid Waste criteria.
Asbestos	B3	A total of 11 ACM samples were collected during the course of the investigation. Six samples were scheduled for analysis and the following were found to contain asbestos: » TP10-ACM1 » TP12-ACM1 » ACM Surface 1 » ACM Surface 2

7.2.2. Lapstone Hill Tunnel: Soil and Air

Table 7.3 summarises the exceedances of relevant investigation criteria and identifies important laboratory results within the Lapstone Hill Tunnel.

Table 7.3 – Tunnel sampling locations and observations

Criteria	Appendix Reference	Result Summary
Human Health Screening Criteria	B4	TS1 and TS2 recorded analyte concentrations below all HIL-C and HIL-D criteria.
Environmental Criteria	B4	Both samples TS1 and TS2 recorded elevated levels of copper and elevated levels of nickel that exceeded the EILs.
Waste Classification	B5 - Totals B9(a) - TCLP	Both TS1 and TS2 returned nickel concentrations that exceeded the acceptable limit for GSW, and two samples returned BaP concentrations that exceeded the acceptable limit for RSW (against Table 1 *NSW EPA Waste Classification Guidelines Part 1: Classifying Waste* criteria). Additional TCLP analysis indicated low leachability for all contaminants and all concentrations were found to be below the criteria for General Solid Waste within Table 2 (*NSW EPA Waste Classification Guidelines Part 1: Classifying Waste*). The nature of the material is such that it would be classified as putrescible.
Asbestos	B3	No samples analysed
Air Quality	B6 (summary) Appendix E (full results)	The results indicate that concentrations of gases analysed within the Tunnel were within normal ranges for ambient air quality. Minor concentrations of H2S were recorded on a number of occasions however the maximum concentration was reported as 0.4ppm with a time weighted average of 0.0015ppm, well below the adopted criteria.

Australian Standard Leaching Procedure	B	Australian Standard Leaching Procedure (ASLP) was undertaken for Nickel and BaP on sample TS1. Results indicated that both contaminant concentrations were below the laboratory limit of reporting of 0.1mg/L within the resulting leachate. ASLP was undertaken to assess the leachability in conditions similar to those within the Tunnel (i.e. at near neutral pH conditions, as opposed to TCLP that assesses leachability in highly acidic conditions).

7.2.3. Eastern Portal: Soil

Table 7.4 summarises the exceedances of relevant investigation criteria and identifies important laboratory results within the Eastern Portal and associated cutting.

Table 7.4 – Tunnel sampling locations and observations

Criteria	Appendix Reference	Result Summary
Human Health Screening Criteria	B7	One of the five soil samples collected (EP-C-0.2) recorded elevated levels of TRH (F2) that exceeded NEPM Management Limits for Commercial/Industrial premises. The exceedance was observed in both the standard TRH analysis and the silica gel cleanup assessment, indicating that the petroleum related fraction of TRH exceeds the NEPM Management Limits.
Environmental Criteria	B7	The following EIL exceedances were noted: EP-A-0.4 – Nickel EP-B-0.3 – Nickel and Zinc EP-C-0.2 – Nickel and Zinc EP-D-0.15 – Nickel and Zinc
Waste Classification	B8 – Totals B9(a) TCLP	EP-C-0.2 (Lead and Nickel) and EP-B-0.3 (Nickel) exceeded the Table 1 concentrations for General Solid Waste (*NSW EPA Waste Classification Guidelines Part 1: Classifying Waste* criteria). Additional TCLP analysis indicated low leachability and all concentrations were found to be below the criteria for General Solid Waste within Table 2 (*NSW EPA Waste Classification Guidelines Part 1: Classifying Waste* criteria). TPH total concentrations initially exceeded the General Solid Waste however with Silica Gel Cleanup petroleum related TPH was found to comply with the criteria for General Solid Waste.
Asbestos	-	No asbestos analysis was undertaken.
Australian Standard Leaching Procedure	B9b	ASLP was undertaken for Copper and Lead on sample EP-C-0.2 and Nickel on sample EPB-0.3. Results indicated that all contaminants tested were below the laboratory limit of reporting of 0.1mg/L within the resulting leachate. ASLP was undertaken to assess the leachability of Copper and Lead in conditions similar to those within the Eastern Portal (i.e. at near neutral pH conditions, as opposed to TCLP that assesses leachability in highly acidic conditions).

7.3. Water Laboratory Results

7.3.1. Lapstone Hill Tunnel: Water

Table 7.5 summarises the exceedances of relevant investigation criteria and identifies important laboratory results within surface water samples collected within Lapstone Hill Tunnel.

Table 7.5 – Tunnel Water Results

Criteria	Appendix Reference	Result Summary
ANZECC criteria	B11	With the exception of the following, results were below the laboratory limit of reporting or the relevant criteria: » T2 – Exceeds the criteria for Cd, Cu, Pb, Ni, Zn and Hg » T4 – Exceeds the criteria for Cd, Cu, Pb, Ni, Zn » T5 – Exceeds the criteria for Cu, Pb, Zn It is noted that the LOR for Hg is greater than the ANZECC trigger value and as such the LOR is adopted as a practical limit for additional investigation.

7.3.2. Eastern Portal: Water

Table 7.6 summarises the exceedances of relevant investigation criteria and identifies important laboratory results within surface water samples collected at the Eastern Portal and associated cutting.

Table 7.6 – Eastern Portal Water Results

Criteria	Appendix Reference	Result Summary
ANZECC criteria	B10	With the exception of the following, all results were below the laboratory limit of reporting or the relevant ANZECC criteria: » EP1 and EP2 exceeded the criteria for zinc; » QC1 (a duplicate of EP1) exceeded the criteria for chromium; » EP1 exceeded the criteria for Nitrate as N.
Faecal Matter	Appendix F	Laboratory results indicated that faecal matter was below the detection limit for both human and animal waste in EP1. The reporting limit was 10ng/L.

8. Project QA/QC

Section 8 provides an overview of the quality assurance and quality control methods implemented during the course of the soil sampling and an evaluation of the achievement of project DQOs outlined in Section 3.

8.1. Field QA/QC

All fieldwork was conducted in general accordance with the guidelines presented in Section 3 and the protocols presented in the SAQP (Nation Partners, 2017), which are aimed at ensuring that all environmental samples are collected via a set of consistent and systematic methods.

8.2. Duplicate samples

Field duplicate samples were collected and submitted to the project analytical laboratory for analyses for contaminants of potential concern. The duplicate samples were collected and stored under the same conditions as the primary samples.

Of the samples submitted for analysis, samples were analysed for a comprehensive suite of contaminants of potential concern. 3 soil and 1 water field duplicate samples were analysed for quality control / quality assurance purposes

The overall duplicate soil sampling frequency for the comprehensive suite of analysis exceeded the required 10%.

The calculated RPD of primary and duplicate samples are summarised in Table 8.1. The laboratory analytical reports are included in Appendix D.

8.3. Summary evaluation of field QA/QC

An evaluation of the field quality control procedures (as outlined in Appendix V of the *NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme*) implemented during the course of this sampling, is provided in Table 8.1.

Table 8.1 Field QA/QC assessment

Criteria	Comments
Duplicate Sample Analysis Refer Appendix B12 for RPD Calculations	**SOIL Intra Lab QC Pairs** TP4-0.5/QC1 – RPD exceedances for Pb (37%), TRHC16-34 (135%) TP8-0.1/QC3 – No exceedances EPB-0.3/QC8 – RPD exceedances for multiple TRH fractions C16-40. RPD exceedances were reported for multiple TRH analytes at EPB-0.3/QC8 and to a lesser extent in TP4-0.5/QC1. An examination of the borelogs and a discussion with the laboratory indicates that the samples were of a significantly heterogeneous material. The variation in total concentration is considered likely to be associated with this heterogeneity. TRH results in both samples remain well below the relevant project criteria for all analytes. The result does not limit the suitability of the analytical data for the assessment, however does identify the need to consider material homogeneity when interpreting results and managing on-site risks. All higher concentration results occurred within the primary samples and have been conservatively adopted for the purposes of this assessment. **WATER Intra Lab QC Pairs** EP1/QC1 – No exceedances

All relevant media were assessed	Yes
Appropriateness of sampling strategy	The sampling strategy was generally consistent with the program outlined in the SAQP (Nation Partners, 2017) and was considered appropriate for assessment of potential contaminants of concern and to achieve project objectives. Sample locations were determined based on visual observation of the investigation area.
Sample collection, handling and transportation procedures	Each soil sample was collected using a new pair of disposable nitrile gloves. Samples were placed directly into dedicated sample jars provided by the laboratory and transported in a chilled contained to NATA accredited laboratories (SGS and ALS) for storage in refrigeration units. Soil samples were collected from the boreholes using push tubes, and as such cross contamination between holes was not considered a concern. Any tools used to remove soil from the push tube were washed between sample locations. Soil samples collected from testpits were collected from the testpit wall or from the centre of the excavator bucket to minimise disturbance. Grab samples were collected using clean gloves or were collected using hand tools cleaned between each use. The collection, handling, storage and transport of the soil samples were undertaken in accordance with the procedures outlined in the SAQP.
Sampling is representative of Site conditions	The type and number of samples collected during the course of investigation was considered representative of the soils in the investigation area.
Field QA/QC plan	Soil samples were placed into dedicated jars with minimal headspace to minimise the potential loss of volatiles. Water samples were placed into dedicated bottles with no headspace to prevent the loss of volatiles. Samples were stored under chilled conditions for transfer to the primary project lab, where they were stored under refrigerated conditions prior to analyses. The chain of custody (COC) forms and the sample receipt notification identified the samples collected, the requested analytical schedule and the date of collection.
Overall Field QA/QC Assessment	Appropriate field quality control procedures were maintained throughout the sampling program.

8.4. Evaluation of Laboratory QA/QC Results

Criteria	Comments
Appropriate methods used for sample analyses	Primary soil samples were analysed by ALS. ALS are accredited by the National Association of Testing Authorities (NATA) for the analyses undertaken. Samples analysed for the presence/absence of faecal matter were analysed at the Australian Water Quality Laboratory, however NATA accreditation is not available for this analysis. All relevant laboratory reports were NATA stamped and signed by a NATA signatory. Statistical data presented in the laboratory QA / QC reports were considered adequate in demonstrating the precision and accuracy of the methods used to analyse field samples.
Appropriate practical quantitative limits (PQLs)	All sample results were reported with PQLs appropriate for the soil investigation.

	PQLs were raised in some instances, however did not impact the outcome of the assessment.
Samples analysed within the appropriate holding times.	All samples were analysed within the appropriate holding times. The samples were kept refrigerated by the laboratory.
Laboratory QA / QC plan	Samples were sent to the laboratory under appropriate chain of custody conditions. All samples were received and analysed within specified laboratory holding times. The analytical methods used were appropriately documented in the laboratory reports. Laboratory QC samples included laboratory control samples, internal duplicates, matrix spike and matrix spike duplicates and method blanks. The types of QA / QC samples analysed by the laboratories for the documented samples were considered sufficient to assess the precision and accuracy of the laboratory methods used.
QC Outliers	QC outliers are presented in the laboratory report provided in **Appendix D.** Following review of the interpretive quality control reports, analytical results were considered acceptable and were not considered to cast doubt on the overall integrity of the data set for the purpose of this sampling program.
Overall Laboratory QA / QC Assessment	The statistical data presented in the laboratory QA / QC reports were generally considered adequate in demonstrating the precision and accuracy of the methods used to analyse field samples.

8.5. Summary QA/QC

Criteria	Results summary
Representativeness Expresses the degree which sample data accurately and precisely represents a characteristic of a population or an environmental condition.	Sampling/analytical densities were suitable to achieve project objectives.
Completeness Defined as the percentage of measurements made which are judged to be valid measurements.	Soil and surface water samples were analysed for the Contaminants of Concern in general accordance with the SAQP, resulting in sufficient data from which to draw conclusions about the efficacy of the investigation works. Samples were also collected from all areas nominated within the SAQP.
Comparability Is a qualitative parameter expressing the confidence with which one data set can be compared with another.	Consistent and repeatable sampling techniques and methods were utilised throughout the sampling program. ALS were used as the analytical laboratories throughout the duration of the project using NATA accredited methodologies outlined within the laboratory reports (Appendix D).

Sensitivity Measure of how different factors may impact on the results. Sensitivity investigates the robustness of the investigation.	For the purpose of this investigation process, the primary factors identified which may influence the sensitivity of the investigation results were: MATERIAL TYPE: The materials encountered during drilling generally comprised sand, clay and putrescible litter. Representative soil samples were collected from each material type for PID screening and laboratory analyses. INSTRUMENT SENSITIVITY: With consideration to the sample matrix, the PQLs were generally lower than the adopted screening criteria and the sensitivity of the analytical instrumentation was sufficient for the purpose of investigation.
Precision Measures the reproducibility of measurements under a given set of conditions.	The reproducibility of the data was assessed by the collection and analysis of duplicate sample pairs. A review of the results of field duplicate analyses is presented in **Table 8.1.** The results of the duplicate sampling program indicated that the results were considered appropriate for the purpose of this investigation. Laboratory duplicate samples were used to assess the precision of the laboratory data. Overall, the results of the duplicate analyses were considered acceptable for the purpose of the investigation.
Accuracy Measures the bias in a measurement system. Accuracy can be undermined by such factors as field contamination of samples, poor preservation of samples, poor sample preparation techniques and poor selection of analysis techniques by the analysing laboratory.	Overall, the statistical data presented in the laboratory QA / QC reports were generally considered adequate in demonstrating the precision and accuracy of the methods used to analyse field samples.

Based on the QA/QC procedures and results of the QA/QC assessment, the data collected is of suitable quality to achieve project objectives and allow an appropriate assessment of contamination risks associated with the Site.

9. Discussion

9.1. Mushroom Farm

Site observations and laboratory data indicate that contamination on the Mushroom Farm is associated with the presence of uncontrolled fill and the presence of ACM at the ground surface.

Data suggests the presence of significant volumes of fill in the northern portion of the Site. Testpits observed fill to depths exceeding 2.5m in proximity to the northern boundary of the site and the fill embankment was observed to be >3m in height in the north eastern portions of the site (bordering Knapsack Gully). Depth of fill was observed to increase with proximity to Knapsack Gully and is likely representative of uncontrolled filling undertaken historically to level portions of the site for use as a mushroom farm.

The easternmost portion of the site is significantly higher than the remainder of the site. Field observations suggest this is due to both uncontrolled filling and the natural terrain. Testpits in this portion of the site were constrained by the presence of the slab and depth of fill could not be confirmed, it is however likely that significant volumes of fill exist beneath the slab in this area.

Areas of the site to the south of the access road were generally not observed to have been subjected to significant filling.

Samples TP4-0.1 and TP5-0.3, collected within near surface fill, in the central-northern portion of the site both contained elevated concentrations of BaP (TEQ) and total PAHs which exceeded the HILC. BaP also exceeded the HILD at TP4-0.1. The exceedances are greater than 2.5 times the relevant HIL and are therefore considered to be hotspots.

All remaining chemical analysis indicated that contaminant concentrations were below the HILC.

Site observations indicate the presence of ACM on the site surface in multiple locations. ACM was observed in multiple bonded forms, with a particularly high concentration noted to be present on the fill embankment running on the northern boundary of the Site (refer to Figure 3b). ACM on the site surface was generally noted to be in reasonably poor condition and was highly fragmented suggesting that the presence of AF is also likely. Analysis of ACM samples collected from within the fill also indicates the presence of ACM within fill soils (however no fibres were observed in soil samples analysed).

The presence of elevated heavy metals and TRH concentrations exceeding the EILs in multiple fill samples indicate that surface fill on the Site may represent a risk to the local environment and the adjacent Knapsack Gully.

An overall assessment of the available site information indicates that the contamination at the site may represent a risk to current users of the Mushroom Farm (Council workers, maintenance workers as well as trespassers). This risk is largely associated with the significant presence of ACM on the Site surface and to a lesser extent the PAH and BaP hotspots identified within near surface soils. Based on these results, remediation and/or management actions to control risks are required.

Remediation of the Mushroom Farm area will be required in order to facilitate future development for recreational and public access uses. Remediation may take the form of removal of the contamination risk (i.e. excavation and offsite disposal of soils), placement of capping, site access restrictions and/or implementation of management plans.

It is further noted that stockpiles of woodchips are routinely stored on the Site. Where these stockpiles are excavated and transported to remote sites for beneficial reuse, the opportunity exists for small quantities of asbestos on the site surface to become mixed with the stockpiles and transported to sensitive offsite locations.

A preliminary waste classification indicates that, if necessary, the majority of the fill soils on the site can likely be disposed off-site as Special Waste (General Solid Waste with Asbestos), with some Restricted Solid Waste and Hazardous Waste also present. For clarity it is noted that there are no landfills in NSW currently licenced

to accept Hazardous Waste and as such if it is to be removed from the Site, it would require treatment (on-site or at a licenced off-site facility) prior to disposal.

In accordance with the Site history and the SAQP, no groundwater investigation was undertaken on the site. Site observations and analytical data support the original assessment from the SAQP that contamination at the site poses a low risk to groundwater.

9.2. Lapstone Hill Tunnel

The interior of the Tunnel contains a significant volume of refuse including metal frames, wood, tools, electrical supply infrastructure and multiple other forms of rubbish (herein referred to as 'refuse'). The Tunnel also includes a large volume of mushroom growing medium within both small 'bags' and within the larger bulker bags located toward the eastern end of the Tunnel.

Growing medium which has escaped containment (i.e. from bags or other storage containers) has accumulated in significant volumes at the eastern end of the Tunnel. The ponded water observed over the final 80m length of the Tunnel (closest to the Eastern Portal) was observed to be a mix of water and fully saturated sawdust. The sawdust was in varying states of decomposition. Samples TS1 and TS2 were both collected from this material.

Results indicate the presence of BaP (TEQ) at concentrations exceeding the HILC, but not the HILD criteria. The result suggests that the decomposing sawdust does not represent a significant risk to workers entering the Tunnel, however may represent a risk where public access is allowed for beneficial reuse.

Concentrations of Copper and Nickel within TS1 and TS2 are elevated above background levels and exceed the EIL indicating that these stockpiles of sawdust (not contained within a vessel) are unlikely to be suitable for beneficial reuse (via composting).

Samples of sawdust within bags and bulker bags were not collected, however multiple bags were opened and the contents observed. Observations indicate that there is no reason to believe that sawdust within bags and bulker bags is contaminated (where it is not in contact with water on the base of the Tunnel). The sawdust may therefore be suitable for recovery and reuse via composting at an offsite, licenced facility.

Surface water sampling indicates the presence of elevated concentrations of multiple dissolved heavy metals exceeding the ANZECC criteria for the protection of slightly to medertaly disturbed ecosystems as well exhibiting elevated concentrations of nutrients. The surface water appears to originate from seepage of groundwater into the tunnel from multiple fractures and weep points within the Tunnel walls. The flow of water was observed to increase steadily from east to west, with the downward gradient of the Tunnel. Water flowing on the floor of the Tunnel flows through multiple stockpiles of sawdust and other refuse before it exits the Tunnel at the Eastern Portal.

The source of the elevated concentrations of heavy metals within surface water samples cannot be confirmed. The concentrations may be reflective of background groundwater concentrations or associated with the extended contact between the water and refuse within the tunnel. Cu, Cd, Pb, Ni and Hg all exhibit reductions in concentration with proximity to the Eastern Portal (i.e. concentrations reduce from west to east) with Zinc exhibiting an increasing trend. It is unclear from the single round of data if this trend is statistically significant.

It is expected that the elevated nutrient concentrations within the surface water are associated with the significant stockpiles of decomposing mushroom growing medium within the waters flow path. Removal of the refuse and decomposing sawdust within the Tunnel may therefore act to significantly improve the quality of flowing water.

Mustard gas breakdown products were not able to be analysed, due to an inability to find a laboratory able to test samples of soil, water or air for the required chemicals of concern. Dissolved mustard gas will, through hydrolysis, form thiodiglycol (TDG). This process is quite rapid and TDG is microbiologically degradable by aerobic microorganisms and has low toxicity. Due to the extended period of time between the storage of Mustard Gas in the tunnel and the very moist environment observed, it is highly unlikely that any significant

concentrations of mustard gas components remain within the tunnel (unless present in sealed containers). A detailed inspection of refuse was however not possible, and it therefore cannot be confirmed that no containers or vessels remain from the former use of the tunnel for the storage of mustard gas.

Contaminants associated with explosives were not found to be present within any of the soil or water samples collected.

Refuse within the tunnel was not observed to contain likely ACM, however former switchboards located at regular intervals on the tunnel walls may include ACM in the backing board. The presence or absence of ACM within these boxes require assessment by a qualified hygienist prior to removal.

Preliminary waste classification data indicates that decomposing growth medium within the tunnel is likely classifiable as General Solid Waste (putrescible) for the purposes of offsite disposal.

There is no reason to suspect that the growth medium contained within bags and bulker bags are contaminated. The growth medium is therefore considered suitable for composting at an offsite licenced facility where it can be suitably separated from plastic contaminants (i.e. the bags).

Air quality analysis did not indicate the presence of significant concentrations of deleterious gases within ambient air within the tunnel. Minor spikes of H_2S were recorded, however noting the significant volumes of decomposing waste within the tunnel, this is to be expected. Air quality sampling indicated that air quality is not significantly impacted by the presence of refuse in the tunnel, and at all times air quality readings remained well below the exposure standards identified in Section 5.3. It is therefore expected that the cleaning of the Tunnel and preservation of appropriate ventilation at both the Western Portal and Eastern Portal will be sufficient to maintain air quality suitable for maintenance and future community/recreational uses.

Significant works within the Tunnel for the purposes of cleaning or remediating the Tunnel must consider air quality changes associated with the use of plant and machinery in an enclosed area.

Water within the tunnel, including water close to the Eastern Portal, exhibits concentrations of heavy metals which exceed the ANZECC Guidelines. As identified in Section 9.3, the vegetation in the Eastern Portal cutting provides sufficient polishing of water such that no exceedances are evident downstream (meaning that the current discharge of water from the Tunnel does not represent a significant environmental risk). However, pumping or other significant mobilisation of the ponded water to a downstream location would not be subject to the same polishing effect. As such ponded water within the Tunnel cannot be discharged/pumped direct to downstream waterways. High sediment loads are also expected to be present within these waters once pumped or mobilised.

Following clean out of the Tunnel, water exiting at the Eastern Portal would be representative of background groundwater conditions and would consequently be suitable for passive discharge.

9.3. Eastern Portal

The Eastern Portal and the adjacent cutting is significantly overgrown. From the Eastern Portal extending downgradient to sample location EP-E (approximately 100m) the base of the cutting is covered by a consistent 200mm of vegetation and roots. This is underlain by approximately 300mm of saturated, loose, silty/sandy mud followed by roadbase gravels and rail ballast. Downgradient of sample location EP-E, the depth of vegetation and soil gradually reduces.

Surface water is visible at the Eastern Portal and has a depth in the order of 0.5m. Visible surface water quickly disappears into the vegetation and loose sediments and is no longer visible at the site surface from approximately 15m downgradient of the Eastern Portal.

The observations are consistent with the Site history which indicates that the cutting was used by the Air Force for vehicle access to the Tunnel during World War 2, following which the cutting was abandoned. The shallow gradient and flow of nutrient rich water from the Tunnel have, over time, resulted in significant buildup of sediment and vegetation.

Laboratory results and site observations indicate that both Copper and Nickel is present in shallow soils at concentrations exceeding EILs, but remains below the corresponding HILC and HILD. The significant density of the vegetation and shallow gradient within the cutting results in a low velocity water flow. There is therefore limited opportunity for sediments to migrate significantly. In addition, ASLP data indicates that the metals present do not leach significantly under neutral conditions (conditions similar to those in the water within the cutting).

Site observations and laboratory analysis indicate the presence of elevated hydrocarbons at soil sample location EP-C. The sample exhibited a strong diesel odour and a sheen was visible during collection of the sample. The laboratory results indicate that the hydrocarbons are likely associated with a diesel or engine oil source. An inspection of the area did not indicate any obvious signs of vegetation stress, spills, containers or other chemical sources. Additional handaugers undertaken both immediately upgradient and downgradient of EP-C indicate that the extent of the contamination is likely to be limited. The concentrations of petroleum based TRH in soils at this location exceed the EILs and NEPM management limits; however, downgradient water samples do not indicate the presence of elevated hydrocarbons in surface water and as such the impact on the environment associated with the contamination hotspot is expected to be minor (where the contamination remains undisturbed).

Soil and groundwater results are generally in accordance with the results of sampling reported in SESL (2016), with the exception of the presence of PCBs in soil, which were not observed during this round of sampling.

Exceedances of ANZECC criteria in water within the cutting are generally associated with Zinc and Nitrate as N. Concentrations of these contaminants exhibit a significant reduction with distance from the Eastern portal (i.e. downgradient). All contaminants of concern were less than the limit of reporting in the most downgradient sample (EP3).

Both Zinc and Nitrate as N are significantly elevated within water samples collected within the Tunnel. Also, Zinc is not present within the soils at concentrations exceeding the EILs. Evidence therefore suggests that the elevated concentrations of Zinc and Nitrate are likely associated with the flow of water from the Tunnel and not a contaminant source in the cutting. The remaining contaminants evident in the Tunnel water samples are not elevated above the ANZECC crtiera within any samples in the Eastern Portal cutting and are therefore likely to have been diluted or otherwise removed via natural processes.

Cleaning of refuse and waste within the Tunnel will act to reduce contaminants within the cutting.

Waste classification results (adopting the silica gel cleanup outcomes) indicate that, if necessary, the soils within the cutting are likely to be suitable for offsite disposal as General Solid Waste.

10. Conclusions

The following broad conclusions are noted:

» The Mushroom Farm:

– Is subject to contamination which may represent a risk to current and future use of the site.

– If necessary, soils are likely to be largely classifiable as Special Waste (General Solid Waste with Asbestos) with some Restricted Solid Waste and Hazardous Waste also present.

» The Tunnel:

– The Tunnel is unlikely to represent a threat to human health or the environment in its current state and based on the current usage scenario (intermittent access for maintenance and testing).

– Concentrations of some contaminants and the presence of significant refuse mean that in its current state the Tunnel is unlikely to be suitable for opening to the public. Rectification and remediation in the form of the removal of refuse and mushroom growing medium are required to facilitate safe public access.

– Decomposing mushroom growing medium (sawdust) within the Tunnel which is in contact with the surface water is unsuitable for beneficial reuse and is likely classifiable as General Solid Waste (putrescible) for offsite disposal.

– Mushroom growing medium contained within bags or bulker bags is likely to be suitable for composting at an offsite licensed facility.

– Refuse and sawdust in the Tunnel is likely contributing to elevated concentrations of heavy metals and nutrients within surface water.

– Water exiting the Tunnel to the Eastern Portal exceeds some relevant ANZECC crtieria.

» The Eastern Portal and Cutting

– Soils within the Eastern Portal and associated cutting are unlikely to represent a significant risk to human health or the environment while left undisturbed.

– Surface waters at the Eastern Portal include some contaminants exceeding the ANZECC criteria, however the concentrations dissipate quickly with distance from the Tunnel. Surface waters discharging from the cutting (at a distance >150m) are not expected to represent an environmental risk in their current state.

» Surface Water

– Ponded water at the Eastern Portal and the Tunnel includes contaminants exceeding the ANZECC criteria. The water currently discharges to the downstream environment via the Eastern Portal cutting which provides sufficient polishing of the water such that ANZECC criteria are not exceeded at a distance of approximately 150m downstream.

– The current scenario does not represent a significant risk to the downstream environment.

– If ponded water is pumped or otherwise significantly mobilised, it is not suitable for direct discharge to the downstream environment.

– Ponded water does not represent a significant health and safety risk for workers and contamination risks can be suitably managed via controls to avoid significant ingestion during maintenance/remediation and future access management works.

» Contamination at the Site does not trigger the duty to report to the EPA under s.60 of the CLM Act (1997).

11. Recommendations

11.1. Mushroom Farm

The following actions are recommended for the Mushroom Farm area;

» In the short term, a detailed Operational Environmental Management Plan (OEMP) should be developed by a suitably qualified consultant to manage contamination risk associated with the presence of asbestos and contaminant hotspots on the site surface. The EMP will likely include measures to:

  – Restrict access to the site by trespassers and the public;

  – Control works on-site to prevent the exposure of workers to surface soil contamination; and

  – Control the use of the site to prevent the accidental export of asbestos off the Site.

» If a decision is made to proceed with the redevelopment of the Site for public access and recreational use, a Remediation Action Plan (RAP) will be required. The RAP should be developed in conjunction with the design of the recreational space to ensure that the remediation approach is optimised (by leaving contamination in-situ and capping contamination to reduce risk).

» If a decision is made not to proceed with the redevelopment of the Site, remediation may still be required if DoI wish to remove contamination risks and usage constraints (associated with the OEMP) at the site.

» the OEMP must remain in force until such time as the Site is remediated or the contamination risk is otherwise appropriately managed.

11.2. Lapstone Hill Tunnel

In order to make the site suitable for possible recreational, public access and to reduce the contamination of downstream waters, the following actions are recommended for the Lapstone Hill Tunnel:

» Refuse and mushroom growing medium are removed from the Tunnel.

  – Free stockpiles of growth medium are dewatered, classified and disposed offsite (likely as General Solid Waste (putrescible))

  – Growing medium contained within bags and/or bulker bags is recovered and recycled at a licenced offsite facility.

  – Refuse and other materials within the site are recovered, recycled and disposed (as appropriate and in accordance with relevant legislation).

  – The presence or absence of asbestos in switchboards is assessed by an appropriately qualified person and is subsequently managed, removed and disposed accordingly.

» Water ponding at the eastern end of the Tunnel should be managed in accordance with Section 11.3 and 11.4.

» No immediate action is necessary to manage minor surface water contamination risks.

Clean-up works within the Tunnel to remove refuse are unlikely to require the development of a RAP, however must incorporate an appropriately detailed Construction Environmental Management Plan to manage the minor risks associated with observed contamination, potential asbestos and to control the mobilisation of any contamination during the works and to manage any unexpected finds.

In accordance with ERM (2018), remediation of the Tunnel or the removal of fixtures within the Tunnel may require submission of a Section 60 application and Statement of Heritage Impact (SoHI) to the Heritage Council. This requirement may be a key consideration and constraint when determining the extent of proposed remediation/clean up in the Tunnel.

11.3. Eastern Portal

Wherever proposed access management works result in the removal of vegetation and soil from the Eastern Portal cutting:

» The vegetation should be stripped and composted;

» The soil will need to be dewatered, classified and disposed off-site (likely as General Solid Waste (non-putrescible)). If instead, the soil is to excavated and reused on-site (for any purpose), additional delineation, assessment and segregation of the TRH hotspot at EP-C will be necessary;

» The water ponding at the Eastern Portal will require treatment prior to discharge or will require offsite disposal (via sewer by agreement with Sydney Water or otherwise to a licenced facility); and

» Following suitable clean-up of the Tunnel and stripping/excavation of the Eastern Portal cutting, surface water will be representative of background groundwater conditions and can passively discharge to the downstream environment.

Where vegetation and soil does not need to be removed to facilitate access for beneficial reuse:

» No action is required to remediate the Eastern Portal or the cutting floor;

» Some additional drainage works may still be required adjacent to the Eastern Portal to prevent the ongoing ponding of water at this location; and

» Where the vegetation and cutting environment remains largely unaltered, no ongoing surface water management is required.

Works undertaken at the Eastern Portal are unlikely to require a RAP, however must incorporate an appropriately detailed Construction Environmental Management Plan to manage the minor risks associated with observed contamination, control the mobilisation of any contamination during the works and to manage any unexpected finds.

11.4. Eastern Portal Access Management

To facilitate the proposed access management works at the Eastern Portal the following is recommended:

» Prior to the start of bulk earthworks, minor drainage works are undertaken at the Eastern Portal to allow ponded water to dissipate/drain via the heavily vegetated portion of the downgradient cutting (thereby maintaining the observed polishing effect). Where this is not possible or practical the water is not suitable for direct discharge downstream and would require treatment or removal/disposal offsite.

» Where necessary, vegetation is stripped, composted and beneficially reused.

» Soils, decomposing mushroom growing medium and other materials are stripped, stockpiled, classified and disposed offsite (likely as General Solid Waste).

  – Where the Eastern Portal clean-up is completed in conjunction with the remediation of the Mushroom Farm, the option to transfer soils from the Eastern Portal to the Mushroom Farm for beneficial re-use should be explored.

» Stripping and disposal of soils should be limited to that necessary to implement the works.

» An appropriate CEMP is developed and implemented to:

  – manage the minor risks associated with observed contamination;

  – control the mobilisation of any contamination during the works;

  – manage any unexpected finds; and

  – prevent the unnecessary removal or destruction of downstream vegetation.

» Minor contamination related safety risks can be appropriately managed via standard construction practice including control measures to prevent ingestion of water and soil and appropriate unexpected finds protocols.

11.5. Remediation Action Plan

As previously stated, where redevelopment of the Mushroom Farm are proposed, a RAP will be required.

From a contamination perspective, a RAP is not strictly required for the clean-up works within the Lapstone Hill Tunnel and/or the access management works at the Eastern Portal. Environmental risks at these locations can be suitable managed via an appropriate CEMP.

However, where remediation of the Mushroom Farm, the clean-up of the Tunnel and access management works at the Eastern Portal are to proceed in parallel, it is recommended that the RAP incorporates all three areas. This will ensure that the remediation approach is optimised. The development of a RAP for the Tunnel and Eastern Portal will also act to ensure regulatory compliance during delivery.

12. Limitations

The sole purpose of this report is to present the results of the Site investigation in the form of a factual report (the 'Report') for the target investigation area as defined in this report at Glenbrook, NSW. This RAP has been prepared by Nation Partners for the sole use of the NSW Department of Primary Industries, Division of Agriculture (the 'Client') and in accordance with the scope of services developed and agreed between Nation Partners and the Client.

All reports and conclusions that deal with sub-surface conditions are based on interpretation and judgement of Site conditions at the time Site investigations were conducted, and as a result the description of Site conditions have inherent uncertainty attached to them. Conditions at the Site may have changed due to natural forces and/or operations on or near the Site. Any decisions based on the findings of the Report must take into account any subsequent changes in Site conditions and/or developments in legislative and regulatory requirements. Nation Partners accepts no liability to the Client for any loss and/or damage incurred as a result of a change in the Site conditions and/or regulatory/legislative framework since the date of the Report.

This Report should only be presented in full and should not be used to support any objective other than those detailed in the Report. In particular, the Report does not contain sufficient information to enable it to be used for any use other than the project specific requirements for which the Report was carried out. Nation Partners accepts no liability to the Client for any loss and/or damage incurred as a result of changes to the usage, size, design, layout, location or any other material change to the intended purpose contemplated under this Agreement. The Report is based on an interpretation of factual information available and the professional opinion and judgement of Nation Partners. Unless stated to the contrary, Nation Partners has not verified the accuracy or completeness of any information received from the Client or a third party for the purposes of preparing the Report. Nation Partners accepts no liability to the Client for any loss and/or damage incurred as a result of any inaccurate or incomplete information.

Any reliance on this Report by a third party shall be entirely at such party's own risk. Nation Partners provides no warranty or guarantee to any third party, express or implied, as to the information and/or professional advice indicated in the Report, and accepts no liability for or in respect of any use or reliance upon the Report by a third party.

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Appendices

Appendix A – Figures

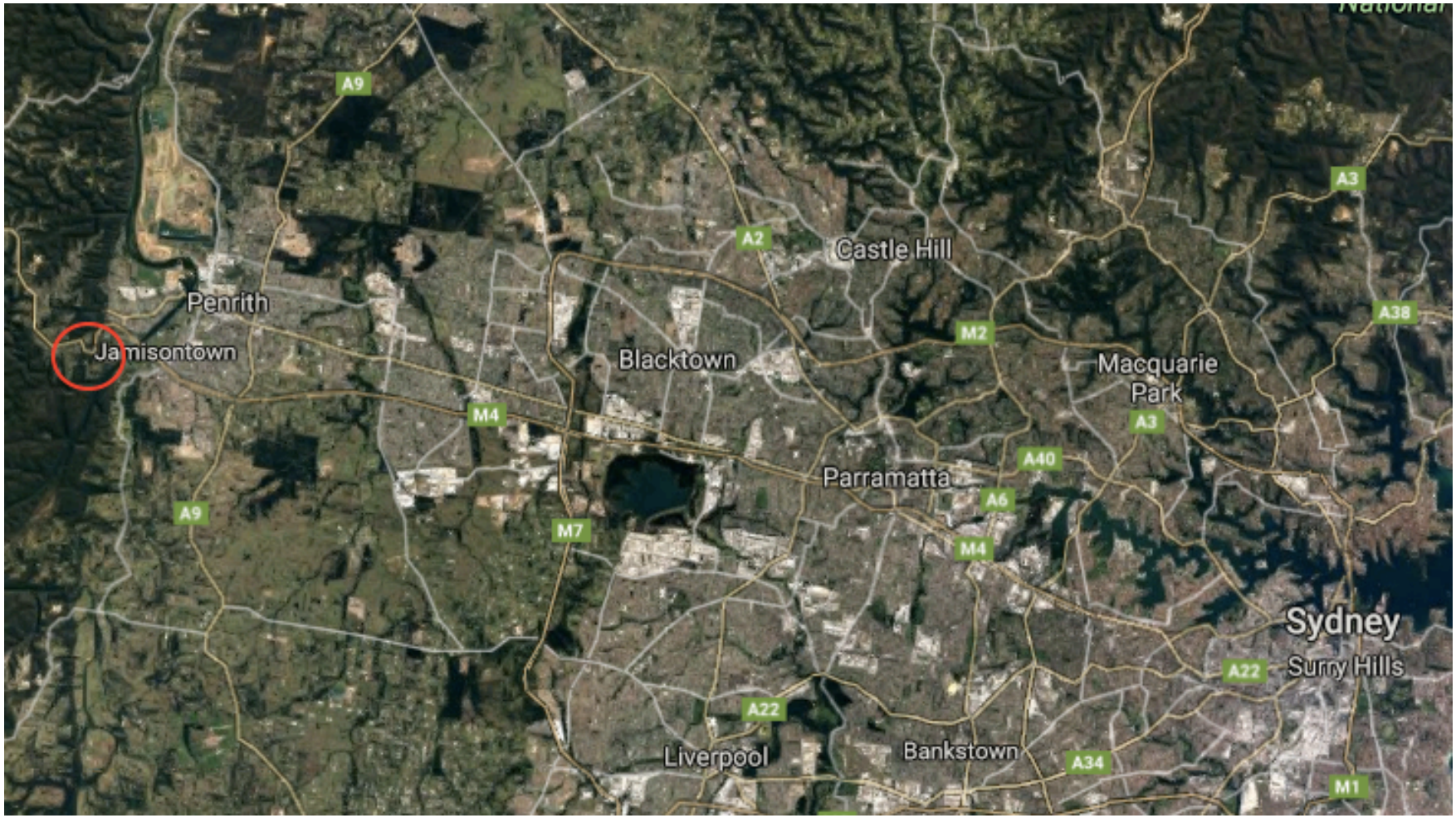

Figure 1: Site Location

Lapstone Tunnel DSI

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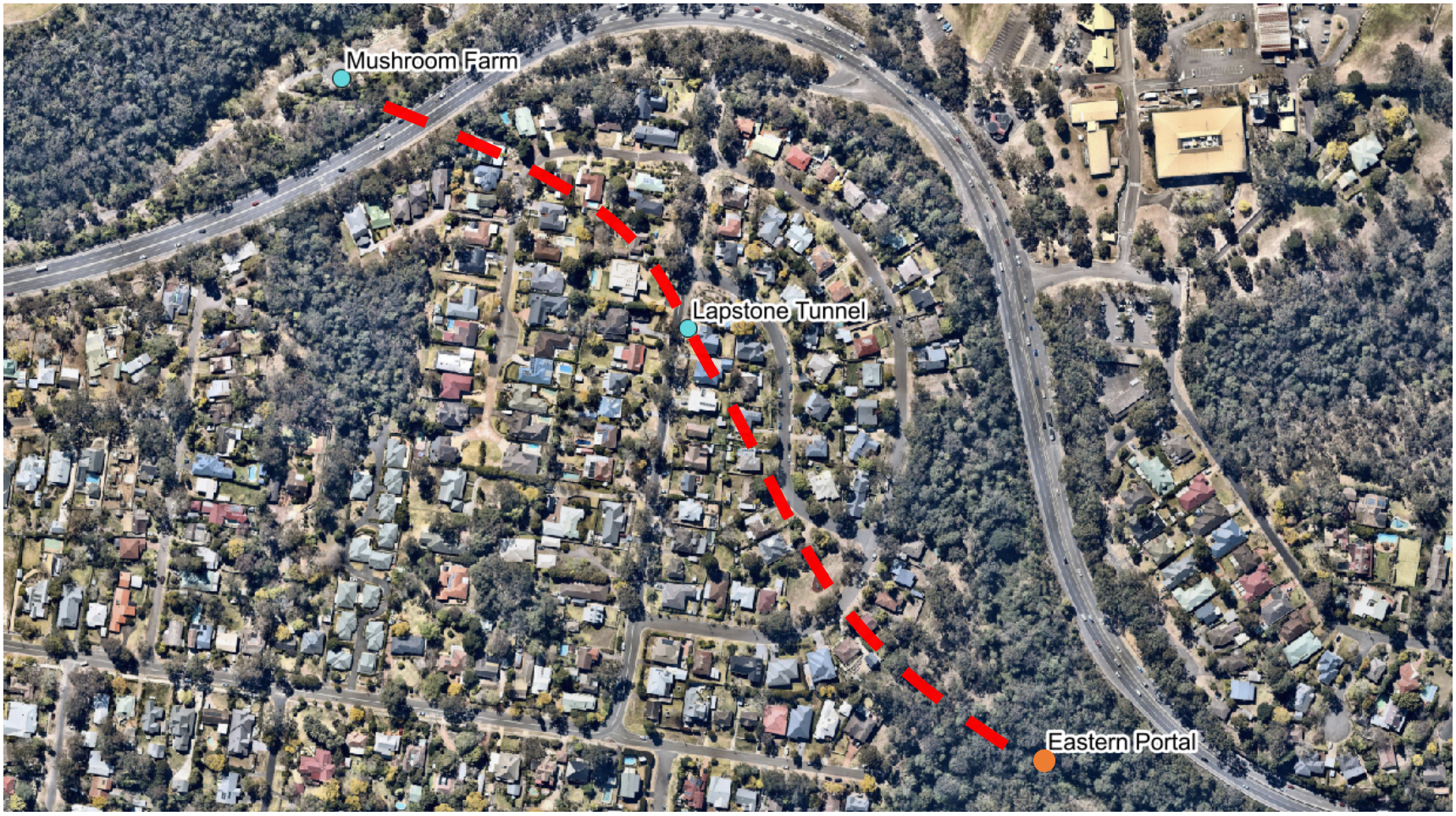

Figure 2: Site Layout

Lapstone Tunnel DSI

Legend

- Mushroom Farm
- Lapstone Tunnel
- Eastern Portal

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Figure 3a: Mushroom Farm Testpit and Handauger Sampling Locations

Lapstone Tunnel DSI

Legend

- Testpit Locations
- Handauger Locations
- Mushroom Farm Investigation Boundary

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Figure 3b: Mushroom Farm Surface ACM Locations

Lapstone Tunnel DSI

Legend

- Surface ACM Sampling Locations
- High Density Areas of Surface ACM

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Figure 4: Lapstone Hill Tunnel Sampling Locations

Lapstone Tunnel DSI

Legend

- Soil Sampling Locations
- Water Sampling Locations
- Approximate Location of Lapstone Hill Tunnel

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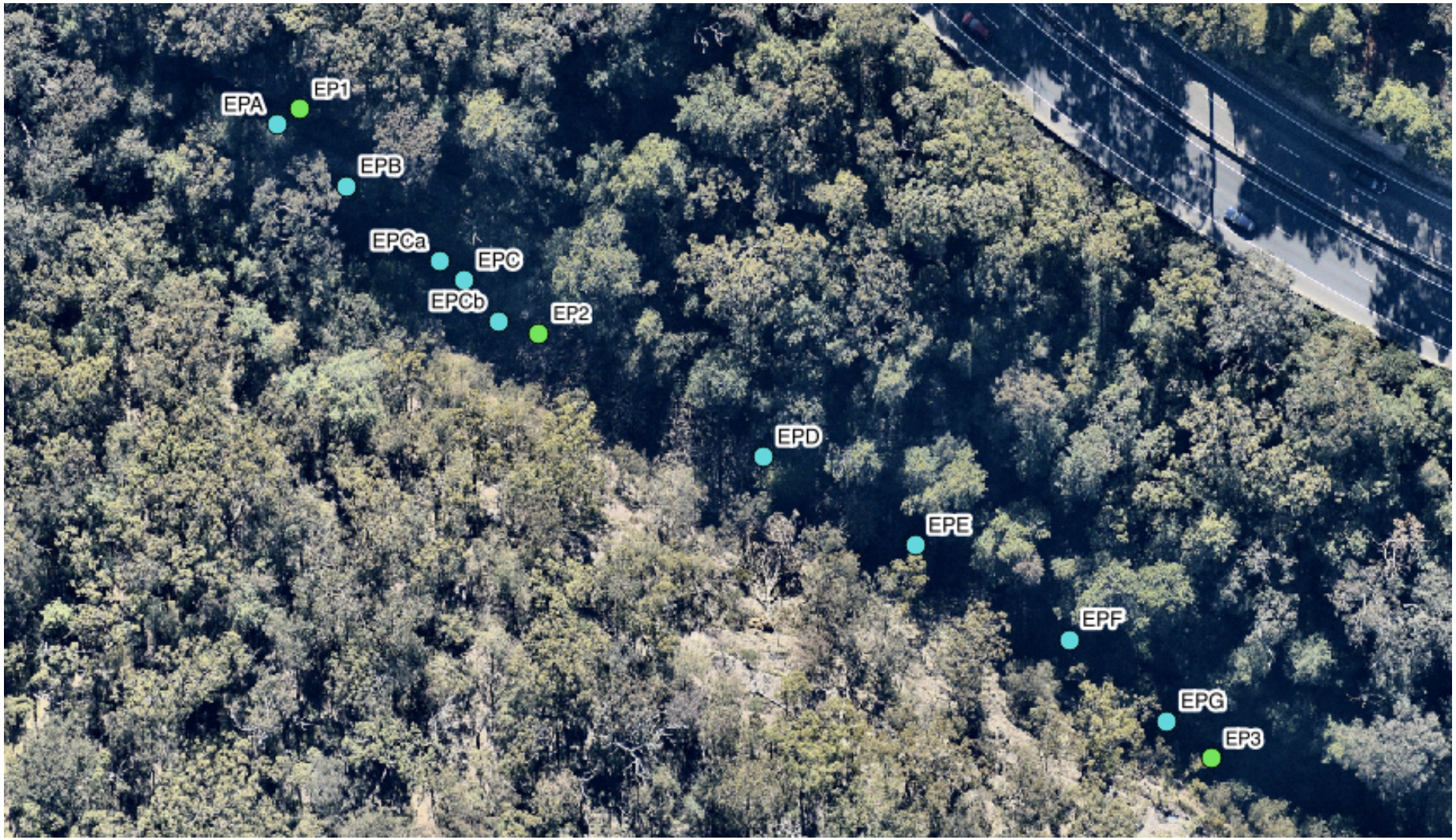

Figure 5: Eastern Portal Sampling Locations

Lapstone Tunnel DSI

Legend

- Water Sampling Locations
- Soil / Sediment Sampling Locations

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Appendix B – Data Summary Tables

Table B1 Mushroom Farm SOIL Assessment

						ALS Sample number:	ES1726194001	ES1726194003	ES1726194005	ES1726194007	ES1726194009	ES1726194010	ES1726194012	ES1726194016	ES1726194018	ES1726194019	ES1726194020	ES1726194022	ES1726194032	ES1726194034	ES1726194036	ES1726194038	ES1726194040	ES1726194041
						Sample ID	TP1-0.2	TP1-1.0	TP2-0.3	TP3-0.5	TP4-0.1	TP4-0.5	TP5-0.3	TP7-0.1	TP8-0.1	TP9-0.1	TP9-1.2	TP10-0.1	TP13-0.1	QC1	QC3	HA1-0.5	HA3-0.1	HA4-0.1
						Sample date:	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17
						Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte Name	**Units**	HILC	HILD	EIL	**Maximum**	**Reporting Limit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Moisture Content	%				37.4	1	10.6	15.4	10.7	14.5	14.9	22.1	15	10.7	37.4	8.5	5.9	29.7	22.3	17.1	19.3	25.8	20.9	17.9
Total Metals																								
Arsenic	mg/kg	300	3000	40	39	5	<5	5	<5	39	<5	10	<5	<5	<5	<5	<5	7	<5	9	<5	<5	<5	20
Cadmium	mg/kg	90	900	–	0	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium (III + VI)	mg/kg	300	3600	60	208	2	7	22	24	28	9	10	8	7	10	10	4	16	5	8	9	8	18	208
Copper	mg/kg	17000	240 000	65	121	5	10	34	26	31	10	121	22	12	20	10	9	22	<5	104	20	16	<5	44
Lead	mg/kg	600	1500	470	176	5	17	48	13	21	35	42	44	71	176	23	<5	42	12	29	144	31	7	14
Nickel	mg/kg	1200	6000	5	284	2	12	11	24	4	5	8	3	2	5	3	<2	10	<2	7	5	2	11	284
Zinc	mg/kg	30000	4E+05	–	508	5	66	302	89	105	116	27	84	152	508	88	<5	232	33	20	389	109	22	97
Mercury	mg/kg	80	750	–	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
Nutrients																								
Ammonia as N	mg/kg				0	20	----	<20	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Nitrite as N (Sol.)	mg/kg				0	0.1	----	<0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Nitrate as N (Sol.)	mg/kg				2.5	0.1	----	2.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Nitrite + Nitrate as N (Sol.)	mg/kg				2.5	0.1	----	2.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Total Kjeldahl Nitrogen as N	mg/kg				1520	20	----	1520	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Total Nitrogen as N	mg/kg				1520	20	----	1520	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Total Phosphorus as P	mg/kg				370	2	----	370	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Reactive Phosphorus as P	mg/kg				0	0.1	----	<0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
PCB's																								
Total Polychlorinated biphenyls	mg/kg	1	1	-	0	0.1	----	<0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Organochlorine Pesticides (OC)																								
alpha-BHC	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Hexachlorobenzene (HCB)	mg/kg	10	80	-	0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
beta-BHC	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
gamma-BHC	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
delta-BHC	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Heptachlor	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Aldrin	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Heptachlor epoxide	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Total Chlordane (sum)	mg/kg	70	530	-	0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
trans-Chlordane	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
alpha-Endosulfan	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
cis-Chlordane	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Dieldrin	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
4.4`-DDE	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Endrin	mg/kg	20	100	-	0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
beta-Endosulfan	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
4.4`-DDD	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Endrin aldehyde	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Endosulfan sulfate	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
4.4`-DDT	mg/kg				0	0.2	----	<0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	----
Endrin ketone	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Methoxychlor	mg/kg				0	0.2	----	<0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	----
Sum of DDD + DDE + DDT	mg/kg	400	3600	3	0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Sum of Aldrin + Dieldrin	mg/kg	10	45	-	0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Organophosphorus Pesticides (OP)																								
Dichlorvos	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Demeton-S-methyl	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Monocrotophos	mg/kg				0	0.2	----	<0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	----
Dimethoate	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Diazinon	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Chlorpyrifos-methyl	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Parathion-methyl	mg/kg				0	0.2	----	<0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	----
Malathion	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Fenthion	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Chlorpyrifos	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Parathion	mg/kg				0	0.2	----	<0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	----
Pirimphos-ethyl	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Bromophos-ethyl	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Fenamiphos	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Prothiofos	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Ethion	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Carbophenothion	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Azinphos Methyl	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Triazines																								
Atrazine	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----

Table B1 Mushroom Farm SOIL Assessment

						ALS Sample number:	ES1726194001	ES1726194003	ES1726194005	ES1726194007	ES1726194009	ES1726194010	ES1726194012	ES1726194016	ES1726194018	ES1726194019	ES1726194020	ES1726194022	ES1726194032	ES1726194034	ES1726194036	ES1726194038	ES1726194040	ES1726194041
						Sample ID	TP1-0.2	TP1-1.0	TP2-0.3	TP3-0.5	TP4-0.1	TP4-0.5	TP5-0.3	TP7-0.1	TP8-0.1	TP9-0.1	TP9-1.2	TP10-0.1	TP13-0.1	QC1	QC3	HA1-0.5	HA3-0.1	HA4-0.1
						Sample date:	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17
						Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte Name	**Units**	HILC	HILD	EIL	**Maximum**	**Reporting Limit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Simazine	mg/kg				0	0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Cypermethrins																								
Cypermethrins (total)	mg/kg				0	0.2	----	<0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	----
Polynuclear Aromatic Hydrocarbons (PAH)																								
Naphthalene	mg/kg				0	0.5	<0.5	<0.5	<0.5	<0.5	<4.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg				18.1	0.5	<0.5	<0.5	<0.5	<0.5	18.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	mg/kg				10	0.5	<0.5	<0.5	<0.5	<0.5	10	<0.5	1.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	mg/kg				33.3	0.5	<0.5	<0.5	<0.5	<0.5	33.3	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg				399	0.5	<0.5	<0.5	1.3	<0.5	399	0.9	28.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg				67.3	0.5	<0.5	<0.5	<0.5	<0.5	67.3	<0.5	7.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg				439	0.5	<0.5	0.7	4.3	<0.5	439	1.1	40	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.9	<0.5	<0.5
Pyrene	mg/kg				422	0.5	<0.5	0.7	3.7	<0.5	422	1	49.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.2	<0.5	<0.5
Benz(a)anthracene	mg/kg				138	0.5	<0.5	<0.5	1.2	<0.5	138	0.6	16.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5
Chrysene	mg/kg				128	0.5	<0.5	<0.5	1.1	<0.5	128	0.6	16.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5
Benzo(b+j)fluoranthene	mg/kg				169	0.5	<0.5	<0.5	1.5	<0.5	169	0.7	16.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg				61.7	0.5	<0.5	<0.5	0.6	<0.5	61.7	<0.5	5.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5
Benzo(a)pyrene	mg/kg				194	0.5	<0.5	<0.5	1.4	<0.5	194	<0.5	13.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.9	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	mg/kg				107	0.5	<0.5	<0.5	1	<0.5	107	<0.5	3.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5
Dibenz(a.h)anthracene	mg/kg				17.3	0.5	<0.5	<0.5	<0.5	<0.5	17.3	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	mg/kg				172	0.5	<0.5	<0.5	1.2	<0.5	172	<0.5	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5
Total PAHs	mg/kg	300	4000	-	2380	0.5	<0.5	1.4	17.3	<0.5	2380	4.9	206	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	13.9	<0.5	<0.5
Benzo(a)pyrene TEQ (zero)	mg/kg				262	0.5	<0.5	<0.5	1.8	<0.5	262	<0.5	19	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.4	<0.5	<0.5
Benzo(a)pyrene TEQ (half LOR)	mg/kg				262	0.5	0.6	0.6	2.1	0.6	262	0.7	19	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	2.7	0.6	0.6
Benzo(a)pyrene TEQ (LOR)	mg/kg	3	40		262	0.5	1.2	1.2	2.4	1.2	262	1.2	19	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	2.9	1.2	1.2
Total Petroleum Hydrocarbons (TPH)																								
C6 - C9 Fraction	mg/kg				0	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C14 Fraction	mg/kg				0	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15 - C28 Fraction	mg/kg				4510	100	<100	<100	<100	<100	4510	400	760	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29 - C36 Fraction	mg/kg				2550	100	130	220	180	<100	2550	190	360	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10 - C36 Fraction (sum)	mg/kg				7060	50	130	220	180	<50	7060	590	1120	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Total Recoverable Hydrocarbons - NEPM 2013 Fractions																								
C6 - C10 Fraction	mg/kg				0	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 Fraction minus BTEX (F1)	mg/kg	700	700	125	0	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C10 - C16 Fraction	mg/kg				190	50	<50	<50	<50	<50	190	70	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
>C16 - C34 Fraction	mg/kg				5900	100	120	240	180	<100	5900	520	980	<100	120	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	mg/kg				1740	100	160	240	240	<100	1740	130	250	<100	120	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	mg/kg				7830	50	280	480	420	<50	7830	720	1230	<50	240	<50	<50	<50	<50	<50	<50	<50	<50	<50
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	1000	1000	25	190	50	<50	<50	<50	<50	190	70	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
BTEXN																								
Benzene	mg/kg	NL	NL	10	0	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	NL	NL	10	0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	NL	NL	1.5	0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	mg/kg	NL	NL		0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	mg/kg				0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	mg/kg	NL	NL	1.6	0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of BTEX	mg/kg				0	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene	mg/kg	-	-	10	2	1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Identification of Asbestos in Soils (AS 4964 - 2004)																								
Asbestos Detected	g/kg				0	0.1	----	----	No	----	----	----	----	No	No	----	----	----	----	----	----	----	No	----
Asbestos Type	--				0		----	----	-	----	----	----	----	-	-	----	----	----	----	----	----	----	-	----
Sample weight (dry)	g				44	0.01	----	----	21.4	----	----	----	----	12.6	24.1	----	----	----	----	----	----	----	44	----
Description	--				0		----	----	d brown sandy s	----	----	----	----	d brown sandy s	d brown sandy s	----	----	----	----	----	----	----	d brown sandy s	----
APPROVED IDENTIFIER:	--				0		----	----	S.SPOONER	----	----	----	----	S.SPOONER	S.SPOONER	----	----	----	----	----	----	----	S.SPOONER	----

Table B2 Mushroom Farm Waste Classification

					ALS Sample number:	ES1726194001	ES1726194003	ES1726194005	ES1726194007	ES1726194009	ES1726194010	ES1726194012	ES1726194016	ES1726194018	ES1726194019	ES1726194020	ES1726194022	ES1726194032	ES1726194034	ES1726194036	ES1726194038	ES1726194040	ES1726194041
					Sample ID	TP1-0.2	TP1-1.0	TP2-0.3	TP3-0.5	TP4-0.1	TP4-0.5	TP5-0.3	TP7-0.1	TP8-0.1	TP9-0.1	TP9-1.2	TP10-0.1	TP13-0.1	QC1	QC3	HA1-0.5	HA3-0.1	HA4-0.1
					Sample date:	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17
					Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte Name	**Units**	GSW	RSW	**Max.**	**Reporting Limit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Moisture Content	%				1	10.6	15.4	10.7	14.5	14.9	22.1	15	10.7	37.4	8.5	5.9	29.7	22.3	17.1	19.3	25.8	20.9	17.9
Total Metals																							
Arsenic	mg/kg	100	400	39	5	<5	5	<5	39	<5	10	<5	<5	<5	<5	<5	7	<5	9	<5	<5	<5	20
Cadmium	mg/kg	20	80	0	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	100	400	208	2	7	22	24	28	9	10	8	7	10	10	4	16	5	8	9	8	18	208
Copper	mg/kg			121	5	10	34	26	31	10	121	22	12	20	10	9	22	<5	104	20	16	<5	44
Lead	mg/kg	100	400	176	5	17	48	13	21	35	42	44	71	176	23	<5	42	12	29	144	31	7	14
Nickel	mg/kg	40	160	284	2	12	11	24	4	5	8	3	2	5	3	<2	10	<2	7	5	2	11	284
Zinc	mg/kg			508	5	66	302	89	105	116	27	84	152	508	88	<5	232	33	20	389	109	22	97
Mercury	mg/kg	4	16	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
Nutrients																							
Ammonia as N	mg/kg				20	----	<20	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Nitrite as N (Sol.)	mg/kg				0.1	----	<0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Nitrate as N (Sol.)	mg/kg				0.1	----	2.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Nitrite + Nitrate as N (Sol.)	mg/kg				0.1	----	2.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Total Kjeldahl Nitrogen as N	mg/kg				20	----	1520	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Total Nitrogen as N	mg/kg				20	----	1520	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Total Phosphorus as P	mg/kg				2	----	370	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Reactive Phosphorus as P	mg/kg				0.1	----	<0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
PCB's																							
Total Polychlorinated biphenyls	mg/kg	50	50	0	0.1	----	<0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Organochlorine Pesticides (OC)																							
alpha-BHC	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Hexachlorobenzene (HCB)	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
beta-BHC	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
gamma-BHC	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
delta-BHC	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Heptachlor	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Aldrin	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Heptachlor epoxide	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Total Chlordane (sum)	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
trans-Chlordane	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
alpha-Endosulfan	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
cis-Chlordane	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Dieldrin	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
4,4`-DDE	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Endrin	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
beta-Endosulfan	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
4,4`-DDD	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Endrin aldehyde	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Endosulfan sulfate	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
4,4`-DDT	mg/kg				0.2	----	<0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	----
Endrin ketone	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Methoxychlor	mg/kg				0.2	----	<0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	----
Sum of DDD + DDE + DDT	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Sum of Aldrin + Dieldrin	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Organophosphorus Pesticides (OP)																							
Dichlorvos	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Demeton-S-methyl	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Monocrotophos	mg/kg				0.2	----	<0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	----
Dimethoate	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Diazinon	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Chlorpyrifos-methyl	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Parathion-methyl	mg/kg				0.2	----	<0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	----
Malathion	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Fenthion	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Chlorpyrifos	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Parathion	mg/kg				0.2	----	<0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	----
Pirimphos-ethyl	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Bromophos-ethyl	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Fenamiphos	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Prothiofos	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Ethion	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Carbophenothion	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Azinphos Methyl	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Triazines																							
Atrazine	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Simazine	mg/kg				0.05	----	<0.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.05	----
Cypermethrins																							
Cypermethrins (total)	mg/kg				0.2	----	<0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	----
Polynuclear Aromatic Hydrocarbons (PAH)																							
Naphthalene	mg/kg				0.5	<0.5	<0.5	<0.5	<0.5	<4.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg				0.5	<0.5	<0.5	<0.5	<0.5	18.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Table B2 Mushroom Farm Waste Classification

					ALS Sample number:	ES1726194001	ES1726194003	ES1726194005	ES1726194007	ES1726194009	ES1726194010	ES1726194012	ES1726194016	ES1726194018	ES1726194019	ES1726194020	ES1726194022	ES1726194032	ES1726194034	ES1726194036	ES1726194038	ES1726194040	ES1726194041
					Sample ID	TP1-0.2	TP1-1.0	TP2-0.3	TP3-0.5	TP4-0.1	TP4-0.5	TP5-0.3	TP7-0.1	TP8-0.1	TP9-0.1	TP9-1.2	TP10-0.1	TP13-0.1	QC1	QC3	HA1-0.5	HA3-0.1	HA4-0.1
					Sample date:	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17
					Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte Name	**Units**	GSW	RSW	Max.	**Reporting Limit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Acenaphthene	mg/kg				0.5	<0.5	<0.5	<0.5	<0.5	10	<0.5	1.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	mg/kg				0.5	<0.5	<0.5	<0.5	<0.5	33.3	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg				0.5	<0.5	<0.5	1.3	<0.5	399	0.9	28.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg				0.5	<0.5	<0.5	<0.5	<0.5	67.3	<0.5	7.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg				0.5	<0.5	0.7	4.3	<0.5	439	1.1	40	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.9	<0.5	<0.5
Pyrene	mg/kg				0.5	<0.5	0.7	3.7	<0.5	422	1	49.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.2	<0.5	<0.5
Benz(a)anthracene	mg/kg				0.5	<0.5	<0.5	1.2	<0.5	138	0.6	16.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5
Chrysene	mg/kg				0.5	<0.5	<0.5	1.1	<0.5	128	0.6	16.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5
Benzo(b+j)fluoranthene	mg/kg				0.5	<0.5	<0.5	1.5	<0.5	169	0.7	16.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg				0.5	<0.5	<0.5	0.6	<0.5	61.7	<0.5	5.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5
Benzo(a)pyrene	mg/kg	0.8	3.2	194	0.5	<0.5	<0.5	1.4	<0.5	194	<0.5	13.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.9	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	mg/kg				0.5	<0.5	<0.5	1	<0.5	107	<0.5	3.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5
Dibenz(a.h)anthracene	mg/kg				0.5	<0.5	<0.5	<0.5	<0.5	17.3	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	mg/kg				0.5	<0.5	<0.5	1.2	<0.5	172	<0.5	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5
Total PAH	mg/kg	200	800	2380	0.5	<0.5	1.4	17.3	<0.5	2380	4.9	206	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	13.9	<0.5	<0.5
Benzo(a)pyrene TEQ (zero)	mg/kg				0.5	<0.5	<0.5	1.8	<0.5	262	<0.5	19	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.4	<0.5	<0.5
Benzo(a)pyrene TEQ (half LOR)	mg/kg				0.5	0.6	0.6	2.1	0.6	262	0.7	19	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	2.7	0.6	0.6
Benzo(a)pyrene TEQ (LOR)	mg/kg				0.5	1.2	1.2	2.4	1.2	262	1.2	19	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	2.9	1.2	1.2
Total Petroleum Hydrocarbons (TPH)																							
C6 - C9 Fraction	mg/kg	650	2600	0	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C14 Fraction	mg/kg				50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15 - C28 Fraction	mg/kg				100	<100	<100	<100	<100	4510	400	760	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29 - C36 Fraction	mg/kg				100	130	220	180	<100	2550	190	360	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10 - C36 Fraction (sum)	mg/kg	10000	40000	7060	50	130	220	180	<50	7060	590	1120	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Total Recoverable Hydrocarbons - NEPM 2013 Fractions																							
C6 - C10 Fraction	mg/kg				10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 Fraction minus BTEX (F1	mg/kg				10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C10 - C16 Fraction	mg/kg				50	<50	<50	<50	<50	190	70	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
>C16 - C34 Fraction	mg/kg				100	120	240	180	<100	5900	520	980	<100	120	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	mg/kg				100	160	240	240	<100	1740	130	250	<100	120	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	mg/kg				50	280	480	420	<50	7830	720	1230	<50	240	<50	<50	<50	<50	<50	<50	<50	<50	<50
>C10 - C16 Fraction minus Naphtha	mg/kg				50	<50	<50	<50	<50	190	70	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
BTEXN																							
Benzene	mg/kg	10	40	0	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	288	1152	0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	600	2400	0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	mg/kg				0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	mg/kg				0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	mg/kg	1000	4000	0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of BTEX	mg/kg				0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene	mg/kg				1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Explosives																							
HMX	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
RDX	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.3.5-Trinitrobenzene	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.3-Dinitrobenzene	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Tetryl	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
2.4.6-TNT	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
4-Amino.2.6-DNT	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
2-Amino-4.6-DNT	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
4-& 2-AM-DNT(Isomeric Mixture)	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
2.4-Dinitrotoluene	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
2.6-Dinitrotoluene	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
2.4-& 2.6-DNT(Isomeric Mixture)	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Nitrobenzene	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
2-Nitrotoluene	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
3-Nitrotoluene	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
4-Nitrotoluene	mg/kg				0.1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Nitroglycerine	mg/kg				1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
PETN	mg/kg				1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Identification of Asbestos in Soils (AS 4964 - 2004)																							
Asbestos Detected	g/kg				0.1	----	----	No	----	----	----	----	No	No	----	----	----	----	----	----	----	No	----
Asbestos Type	--					----	----	-	----	----	----	----	-	-	----	----	----	----	----	----	----	-	----
Sample weight (dry)	g				0.01	----	----	21.4	----	----	----	----	12.6	24.1	----	----	----	----	----	----	----	44	----
Description	--					----	----	d brown sandy s	----	----	----	----	d brown sandy s	d brown sandy s	----	----	----	----	----	----	----	d brown sandy s	----
APPROVED IDENTIFIER:	--					----	----	S.SPOONER	----	----	----	----	S.SPOONER	S.SPOONER	----	----	----	----	----	----	----	S.SPOONER	----

Table B3 ACM Results

		Sample Name	ES1726194001	ES1726194003	ES1726194005	ES1726194007	ES1726194009	ES1726194010
		Sample ID	TP1-ACM2	TP10-ACM1	TP12-ACM1	HA2-ACM1	ACM SURFACE 1	ACM SURFACE 5
		Sample date:	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17
		Matrix	Soild	Soild	Soild	Soild	Soild	Soild
Analyte Name	**Units**	**Reporting Limit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Asbestos Detected	g/kg		No	Yes	Yes	No	Yes	Yes
Asbestos Type	--		-	Ch + Am + Cr	Ch	-	Ch	Ch
Sample weight (dry)	g		6.21	17.7	3.05	9.19	7.98	5.75
Description	--		A collection of synthetic mineral fibre insulation.	One piece of asbestos cement sheeting approximately 80 x 45 x 5mm.	One piece of asbestos cement sheeting approximately 25 x 20 x 4mm.	Two pieces of cement sheeting approximately 40 x 25 x 5mm.	One piece of asbestos cement sheeting approximately 50 x 40 x 4mm.	One piece of asbestos cement sheeting approximately 50 x 25 x 4mm.

Table B4a - Tunnel SOIL Assessment

						ALS Sample number:	ES1726194050	ES1726194049
						Sample ID	TS2	TS1
						Sample date:	18/10/17	18/10/17
						Matrix	Soil	Soil
Analyte Name	**Units**	HILC	HILD	EIL	**Maximum**	**Reporting Limit**	**Result**	**Result**
Moisture Content	%				89	1	89	77.6
Total Metals								
Arsenic	mg/kg	300	3000	40	7	5	7	6
Cadmium	mg/kg	90	900	–	1	1	<1	1
Chromium	mg/kg	300	3600	60	25	2	16	25
Copper	mg/kg	17000	240 000	65	148	5	102	148
Lead	mg/kg	600	1500	470	90	5	70	90
Nickel	mg/kg	1200	6000	5	72	2	46	72
Zinc	mg/kg	30000	4E+05	–	1690	5	1690	1690
Mercury	mg/kg	80	750	–	0.4	0.1	0.3	0.4
Nutrients								
Ammonia as N	mg/kg				100	20	100	----
Nitrite as N (Sol.)	mg/kg				0.5	0.1	0.5	----
Nitrate as N (Sol.)	mg/kg				3.7	0.1	3.7	----
Nitrite + Nitrate as N (Sol.)	mg/kg				4.2	0.1	4.2	----
Total Kjeldahl Nitrogen as N	mg/kg				14400	20	14400	----
Total Nitrogen as N	mg/kg				14400	20	14400	----
Total Phosphorus as P	mg/kg				8370	2	8370	----
Reactive Phosphorus as P	mg/kg				5	0.1	5	----
PCB's								
Total Polychlorinated biphenyls	mg/kg	1	1	-	0	0.1	<0.2	<0.1
Organochlorine Pesticides (OC)								
alpha-BHC	mg/kg				0	0.05	<0.12	<0.06
Hexachlorobenzene (HCB)	mg/kg	10	80	-	0	0.05	<0.12	<0.06
beta-BHC	mg/kg				0	0.05	<0.12	<0.06
gamma-BHC	mg/kg				0	0.05	<0.12	<0.06
delta-BHC	mg/kg				0	0.05	<0.12	<0.06
Heptachlor	mg/kg				0	0.05	<0.12	<0.06
Aldrin	mg/kg				0	0.05	<0.12	<0.06
Heptachlor epoxide	mg/kg				0	0.05	<0.12	<0.06
Total Chlordane (sum)	mg/kg	70	530	-	0	0.05	<0.12	<0.06
trans-Chlordane	mg/kg				0	0.05	<0.12	<0.06
alpha-Endosulfan	mg/kg				0	0.05	<0.12	<0.06
cis-Chlordane	mg/kg				0	0.05	<0.12	<0.06
Dieldrin	mg/kg				0	0.05	<0.12	<0.06
4.4`-DDE	mg/kg				0	0.05	<0.12	<0.06
Endrin	mg/kg	20	100	-	0	0.05	<0.12	<0.06
beta-Endosulfan	mg/kg				0	0.05	<0.12	<0.06
4.4`-DDD	mg/kg				0	0.05	<0.12	<0.06
Endrin aldehyde	mg/kg				0	0.05	<0.12	<0.06
Endosulfan sulfate	mg/kg				0	0.05	<0.12	<0.06
4.4`-DDT	mg/kg				0	0.2	<0.5	<0.3
Endrin ketone	mg/kg				0	0.05	<0.12	<0.06
Methoxychlor	mg/kg				0	0.2	<0.5	<0.3
Sum of DDD + DDE + DDT	mg/kg	400	3600	3	0	0.05	<0.12	<0.06
Sum of Aldrin + Dieldrin	mg/kg	10	45	-	0	0.05	<0.12	<0.06
Organophosphorus Pesticides (OP)								
Dichlorvos	mg/kg				0	0.05	<0.12	<0.06
Demeton-S-methyl	mg/kg				0	0.05	<0.12	<0.06
Monocrotophos	mg/kg				0	0.2	<0.5	<0.3
Dimethoate	mg/kg				0	0.05	<0.12	<0.06
Diazinon	mg/kg				0	0.05	<0.12	<0.06
Chlorpyrifos-methyl	mg/kg				0	0.05	<0.12	<0.06
Parathion-methyl	mg/kg				0	0.2	<0.5	<0.3
Malathion	mg/kg				0	0.05	<0.12	<0.06
Fenthion	mg/kg				0	0.05	<0.12	<0.06
Chlorpyrifos	mg/kg				0	0.05	<0.12	<0.06
Parathion	mg/kg				0	0.2	<0.5	<0.3
Pirimphos-ethyl	mg/kg				0	0.05	<0.12	<0.06
Bromophos-ethyl	mg/kg				0	0.05	<0.12	<0.06
Fenamiphos	mg/kg				0	0.05	<0.12	<0.06
Prothiofos	mg/kg				0	0.05	<0.12	<0.06
Ethion	mg/kg				0	0.05	<0.12	<0.06
Carbophenothion	mg/kg				0	0.05	<0.12	<0.06
Azinphos Methyl	mg/kg				0	0.05	<0.12	<0.06
Triazines								
Atrazine	mg/kg				0	0.05	<0.12	<0.06
Simazine	mg/kg				0	0.05	<0.12	<0.06
Cypermethrins								
Cypermethrins (total)	mg/kg				0	0.2	<0.5	<0.3
Polynuclear Aromatic Hydrocarbons (PAH)								
Naphthalene	mg/kg				0	0.5	<2.0	<1.0
Acenaphthylene	mg/kg				0	0.5	<2.0	<1.0
Acenaphthene	mg/kg				0	0.5	<2.0	<1.0
Fluorene	mg/kg				0	0.5	<2.0	<1.0
Phenanthrene	mg/kg				2.3	0.5	<2.0	2.3
Anthracene	mg/kg				1.1	0.5	<2.0	1.1
Fluoranthene	mg/kg				6.4	0.5	5.4	6.4
Pyrene	mg/kg				6.6	0.5	5.6	6.6

Table B4a - Tunnel SOIL Assessment

						ALS Sample number:	ES1726194050	ES1726194049
						Sample ID	TS2	TS1
						Sample date:	18/10/17	18/10/17
						Matrix	Soil	Soil
Analyte Name	**Units**	HILC	HILD	EIL	**Maximum**	**Reporting Limit**	**Result**	**Result**
Benz(a)anthracene	mg/kg				2.9	0.5	2.5	2.9
Chrysene	mg/kg				3	0.5	2.3	3
Benzo(b+j)fluoranthene	mg/kg				5.8	0.5	4.3	5.8
Benzo(k)fluoranthene	mg/kg				2.1	0.5	<2.0	2.1
Benzo(a)pyrene	mg/kg				4.2	0.5	3	4.2
Indeno(1.2.3.cd)pyrene	mg/kg				2.4	0.5	<2.0	2.4
Dibenz(a.h)anthracene	mg/kg				0	0.5	<2.0	<1.0
Benzo(g.h.i)perylene	mg/kg				3.2	0.5	<2.0	3.2
Total PAH	mg/kg	300	4000	-	40	0.5	23.1	40
Benzo(a)pyrene TEQ (zero)	mg/kg				5.6	0.5	3.7	5.6
Benzo(a)pyrene TEQ (half LOR)	mg/kg				5.8	0.5	4	5.8
Benzo(a)pyrene TEQ (LOR)	mg/kg				6.1	0.5	4.3	6.1
Total Petroleum Hydrocarbons (TPH)								
C6 - C9 Fraction	mg/kg				0	10	<10	<10
C10 - C14 Fraction	mg/kg				0	50	<110	<60
C15 - C28 Fraction	mg/kg				1080	100	1080	750
C29 - C36 Fraction	mg/kg				1460	100	1460	1250
C10 - C36 Fraction (sum)	mg/kg				2540	50	2540	2000
Silica Gel Cleanup (TPH)								
C10 - C14 Fraction	mg/kg						<110	----
C15 - C28 Fraction	mg/kg						<220	----
C29 - C36 Fraction	mg/kg						<220	----
C10 - C36 Fraction (sum)	mg/kg						<110	----
Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	mg/kg				0	10	<10	<10
C6 - C10 Fraction minus BTEX (F1	mg/kg	700	700	125	0	10	<10	<10
>C10 - C16 Fraction	mg/kg				0	50	<110	<60
>C16 - C34 Fraction	mg/kg				1910	100	1910	1570
>C34 - C40 Fraction	mg/kg				1380	100	1380	960
>C10 - C40 Fraction (sum)	mg/kg				3290	50	3290	2530
>C10 - C16 Fraction minus Naphtha	mg/kg	1000	1000	25	0	50	<110	<60
Silica Gel Cleanup (TRH)								
>C10 - C16 Fraction	mg/kg						<110	----
>C16 - C34 Fraction	mg/kg						<110	----
>C34 - C40 Fraction	mg/kg						<110	----
>C10 - C40 Fraction (sum)	mg/kg						<110	----
>C10 - C16 Fraction minus Naphtha	mg/kg						<110	----
BTEXN								
Benzene	mg/kg	NL	NL	10	0	0.2	<0.5	<0.2
Toluene	mg/kg	NL	NL	10	0	0.5	<0.5	<0.5
Ethylbenzene	mg/kg	NL	NL	1.5	0	0.5	<0.5	<0.5
meta- & para-Xylene	mg/kg	NL	NL		0	0.5	<0.5	<0.5
ortho-Xylene	mg/kg				0	0.5	<0.5	<0.5
Total Xylenes	mg/kg	NL	NL	1.6	0	0.5	<0.5	<0.5
Sum of BTEX	mg/kg				0	0.2	<0.2	<0.2
Naphthalene	mg/kg	-	-	10	0	1	<1	<1
Explosives								
HMX	mg/kg				0	0.1	<0.5	----
RDX	mg/kg				0	0.1	<0.5	----
1.3.5-Trinitrobenzene	mg/kg				0	0.1	<0.5	----
1.3-Dinitrobenzene	mg/kg				0	0.1	<0.5	----
Tetryl	mg/kg				0	0.1	<0.5	----
2.4.6-TNT	mg/kg				0	0.1	<0.5	----
4-Amino.2.6-DNT	mg/kg				0	0.1	<0.5	----
2-Amino-4.6-DNT	mg/kg				0	0.1	<0.5	----
4-& 2-AM-DNT(Isomeric Mixture)	mg/kg				0	0.1	<0.1	----
2.4-Dinitrotoluene	mg/kg				0	0.1	<0.5	----
2.6-Dinitrotoluene	mg/kg				0	0.1	<0.5	----
2.4-& 2.6-DNT(Isomeric Mixture)	mg/kg				0	0.1	<0.1	----
Nitrobenzene	mg/kg				0	0.1	<0.5	----
2-Nitrotoluene	mg/kg				0	0.1	<0.5	----
3-Nitrotoluene	mg/kg				0	0.1	<0.5	----
4-Nitrotoluene	mg/kg				0	0.1	<0.5	----
Nitroglycerine	mg/kg				0	1	<5	----
PETN	mg/kg				0	1	<5	----
Identification of Asbestos in Soils (AS 4964 - 2004)								
Asbestos Detected	g/kg				0	0.1	----	----
Asbestos Type	--				0		----	----
Sample weight (dry)	g				0	0.01	----	----
Description	--				0		----	----
APPROVED IDENTIFIER:	--				0		----	----

Table B5 - Tunnel SOIL Waste Classification

					ALS Sample number:	ES1726194050	ES1726194049
					Sample ID	TS2	TS1
					Sample date:	18/10/17	18/10/17
					Matrix	Soil	Soil
Analyte Name	**Units**	GSW	RSW	**Maximum**	**Reporting Limit**	**Result**	**Result**
Moisture Content	%				1	89	77.6
Total Metals							
Arsenic	mg/kg	100	400	7	5	7	6
Cadmium	mg/kg	20	80	1	1	<1	1
Chromium	mg/kg	100	400	25	2	16	25
Copper	mg/kg			148	5	102	148
Lead	mg/kg	100	400	90	5	70	90
Nickel	mg/kg	40	160	72	2	46	72
Zinc	mg/kg			1690	5	1690	1690
Mercury	mg/kg	4	16	0.4	0.1	0.3	0.4
				0			
Nutrients				0			
Ammonia as N	mg/kg			100	20	100	----
Nitrite as N (Sol.)	mg/kg			0.5	0.1	0.5	----
Nitrate as N (Sol.)	mg/kg			3.7	0.1	3.7	----
Nitrite + Nitrate as N (Sol.)	mg/kg			4.2	0.1	4.2	----
Total Kjeldahl Nitrogen as N	mg/kg			14400	20	14400	----
Total Nitrogen as N	mg/kg			14400	20	14400	----
Total Phosphorus as P	mg/kg			8370	2	8370	----
Reactive Phosphorus as P	mg/kg			5	0.1	5	----
				0			
PCB's				0			
Total Polychlorinated biphenyls	mg/kg	50	50	0	0.1	<0.2	<0.1
				0			
Organochlorine Pesticides (OC)				0			
alpha-BHC	mg/kg			0	0.05	<0.12	<0.06
Hexachlorobenzene (HCB)	mg/kg			0	0.05	<0.12	<0.06
beta-BHC	mg/kg			0	0.05	<0.12	<0.06
gamma-BHC	mg/kg			0	0.05	<0.12	<0.06
delta-BHC	mg/kg			0	0.05	<0.12	<0.06
Heptachlor	mg/kg			0	0.05	<0.12	<0.06
Aldrin	mg/kg			0	0.05	<0.12	<0.06
Heptachlor epoxide	mg/kg			0	0.05	<0.12	<0.06
Total Chlordane (sum)	mg/kg			0	0.05	<0.12	<0.06
trans-Chlordane	mg/kg			0	0.05	<0.12	<0.06
alpha-Endosulfan	mg/kg			0	0.05	<0.12	<0.06
cis-Chlordane	mg/kg			0	0.05	<0.12	<0.06
Dieldrin	mg/kg			0	0.05	<0.12	<0.06
4.4`-DDE	mg/kg			0	0.05	<0.12	<0.06
Endrin	mg/kg			0	0.05	<0.12	<0.06
beta-Endosulfan	mg/kg			0	0.05	<0.12	<0.06
4.4`-DDD	mg/kg			0	0.05	<0.12	<0.06
Endrin aldehyde	mg/kg			0	0.05	<0.12	<0.06
Endosulfan sulfate	mg/kg			0	0.05	<0.12	<0.06
4.4`-DDT	mg/kg			0	0.2	<0.5	<0.3
Endrin ketone	mg/kg			0	0.05	<0.12	<0.06
Methoxychlor	mg/kg			0	0.2	<0.5	<0.3
Sum of DDD + DDE + DDT	mg/kg			0	0.05	<0.12	<0.06
Sum of Aldrin + Dieldrin	mg/kg			0	0.05	<0.12	<0.06
				0			
Organophosphorus Pesticides (OP)				0			
Dichlorvos	mg/kg			0	0.05	<0.12	<0.06
Demeton-S-methyl	mg/kg			0	0.05	<0.12	<0.06
Monocrotophos	mg/kg			0	0.2	<0.5	<0.3
Dimethoate	mg/kg			0	0.05	<0.12	<0.06
Diazinon	mg/kg			0	0.05	<0.12	<0.06
Chlorpyrifos-methyl	mg/kg			0	0.05	<0.12	<0.06
Parathion-methyl	mg/kg			0	0.2	<0.5	<0.3
Malathion	mg/kg			0	0.05	<0.12	<0.06
Fenthion	mg/kg			0	0.05	<0.12	<0.06
Chlorpyrifos	mg/kg			0	0.05	<0.12	<0.06
Parathion	mg/kg			0	0.2	<0.5	<0.3
Pirimphos-ethyl	mg/kg			0	0.05	<0.12	<0.06
Bromophos-ethyl	mg/kg			0	0.05	<0.12	<0.06
Fenamiphos	mg/kg			0	0.05	<0.12	<0.06
Prothiofos	mg/kg			0	0.05	<0.12	<0.06
Ethion	mg/kg			0	0.05	<0.12	<0.06
Carbophenothion	mg/kg			0	0.05	<0.12	<0.06
Azinphos Methyl	mg/kg			0	0.05	<0.12	<0.06
				0			
Triazines				0			
Atrazine	mg/kg			0	0.05	<0.12	<0.06
Simazine	mg/kg			0	0.05	<0.12	<0.06
				0			
Cypermethrins				0			
Cypermethrins (total)	mg/kg			0	0.2	<0.5	<0.3
				0			
Polynuclear Aromatic Hydrocarbons (PAH)				0			
Naphthalene	mg/kg			0	0.5	<2.0	<1.0
Acenaphthylene	mg/kg			0	0.5	<2.0	<1.0
Acenaphthene	mg/kg			0	0.5	<2.0	<1.0
Fluorene	mg/kg			0	0.5	<2.0	<1.0
Phenanthrene	mg/kg			2.3	0.5	<2.0	2.3
Anthracene	mg/kg			1.1	0.5	<2.0	1.1
Fluoranthene	mg/kg			6.4	0.5	5.4	6.4
Pyrene	mg/kg			6.6	0.5	5.6	6.6

Table B5 - Tunnel SOIL Waste Classification

					ALS Sample number:	ES1726194050	ES1726194049
					Sample ID	TS2	TS1
					Sample date:	18/10/17	18/10/17
					Matrix	Soil	Soil
Analyte Name	**Units**	GSW	RSW	**Maximum**	**Reporting Limit**	**Result**	**Result**
Benz(a)anthracene	mg/kg			2.9	0.5	2.5	2.9
Chrysene	mg/kg			3	0.5	2.3	3
Benzo(b+j)fluoranthene	mg/kg			5.8	0.5	4.3	5.8
Benzo(k)fluoranthene	mg/kg			2.1	0.5	<2.0	2.1
Benzo(a)pyrene	mg/kg	0.8	3.2	4.2	0.5	3	4.2
Indeno(1.2.3.cd)pyrene	mg/kg			2.4	0.5	<2.0	2.4
Dibenz(a.h)anthracene	mg/kg			0	0.5	<2.0	<1.0
Benzo(g.h.i)perylene	mg/kg			3.2	0.5	<2.0	3.2
Total PAH	mg/kg	200	800	40	0.5	23.1	40
Benzo(a)pyrene TEQ (zero)	mg/kg			5.6	0.5	3.7	5.6
Benzo(a)pyrene TEQ (half LOR)	mg/kg			5.8	0.5	4	5.8
Benzo(a)pyrene TEQ (LOR)	mg/kg			6.1	0.5	4.3	6.1
				0			
Total Petroleum Hydrocarbons (TPH)				0			
C6 - C9 Fraction	mg/kg	650	2600	0	10	<10	<10
C10 - C14 Fraction	mg/kg			0	50	<110	<60
C15 - C28 Fraction	mg/kg			1080	100	1080	750
C29 - C36 Fraction				1460	100	1460	1250
C10 - C36 Fraction (sum)	mg/kg	10000	40000	2540	50	2540	2000
Silica Gel Cleanup (TPH)							
C10 - C14 Fraction	mg/kg				50	<110	----
C15 - C28 Fraction	mg/kg				100	<220	----
C29 - C36 Fraction	mg/kg				100	<220	----
C10 - C36 Fraction (sum)	mg/kg				50	<110	----
				0			
Total Recoverable Hydrocarbons - NEPM 2013 Fractions				0			
C6 - C10 Fraction	mg/kg			0	10	<10	<10
C6 - C10 Fraction minus BTEX (F1	mg/kg			0	10	<10	<10
>C10 - C16 Fraction	mg/kg			0	50	<110	<60
>C16 - C34 Fraction	mg/kg			1910	100	1910	1570
>C34 - C40 Fraction	mg/kg			1380	100	1380	960
>C10 - C40 Fraction (sum)	mg/kg			3290	50	3290	2530
>C10 - C16 Fraction minus Naphtha	mg/kg			0	50	<110	<60
Silica Gel Cleanup (TRH)							
>C10 - C16 Fraction	mg/kg				50	<110	----
>C16 - C34 Fraction	mg/kg				100	<110	----
>C34 - C40 Fraction	mg/kg				100	<110	----
>C10 - C40 Fraction (sum)	mg/kg				50	<110	----
>C10 - C16 Fraction minus Naphtha	mg/kg				50	<110	----
				0			
BTEXN				0			
Benzene	mg/kg	10	40	0	0.2	<0.5	<0.2
Toluene	mg/kg	288	1152	0	0.5	<0.5	<0.5
Ethylbenzene	mg/kg	600	2400	0	0.5	<0.5	<0.5
meta- & para-Xylene	mg/kg			0	0.5	<0.5	<0.5
ortho-Xylene	mg/kg			0	0.5	<0.5	<0.5
Total Xylenes	mg/kg	1000	4000	0	0.5	<0.5	<0.5
Sum of BTEX	mg/kg			0	0.2	<0.2	<0.2
Naphthalene	mg/kg			0	1	<1	<1
				0			
Explosives				0			
HMX	mg/kg			0	0.1	<0.5	----
RDX	mg/kg			0	0.1	<0.5	----
1.3.5-Trinitrobenzene	mg/kg			0	0.1	<0.5	----
1.3-Dinitrobenzene	mg/kg			0	0.1	<0.5	----
Tetryl	mg/kg			0	0.1	<0.5	----
2.4.6-TNT	mg/kg			0	0.1	<0.5	----
4-Amino.2.6-DNT	mg/kg			0	0.1	<0.5	----
2-Amino-4.6-DNT	mg/kg			0	0.1	<0.5	----
4-& 2-AM-DNT(Isomeric Mixture)	mg/kg			0	0.1	<0.1	----
2.4-Dinitrotoluene	mg/kg			0	0.1	<0.5	----
2.6-Dinitrotoluene	mg/kg			0	0.1	<0.5	----
2.4-& 2.6-DNT(Isomeric Mixture)	mg/kg			0	0.1	<0.1	----
Nitrobenzene	mg/kg			0	0.1	<0.5	----
2-Nitrotoluene	mg/kg			0	0.1	<0.5	----
3-Nitrotoluene	mg/kg			0	0.1	<0.5	----
4-Nitrotoluene	mg/kg			0	0.1	<0.5	----
Nitroglycerine	mg/kg			0	1	<5	----
PETN	mg/kg			0	1	<5	----
				0			
Identification of Asbestos in Soils (AS 4964 - 2004)				0			
Asbestos Detected	g/kg			0	0.1	----	----
Asbestos Type	--			0		----	----
Sample weight (dry)	g			0	0.01	----	----
Description	--			0		----	----
APPROVED IDENTIFIER:	--			0		----	----

Table B6 - Tunnel Air Quality Summary Results

	Temperature	Reading (Oxygen)	Reading (Hydrogen Sulfide)	TWA (Hydrogen Sulfide)	STEL (Hydrogen Sulfide)	Reading (Carbon Monoxide)	TWA (Carbon Monoxide)	STEL (Carbon Monoxide)	Reading (Methane)
Date	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17
Start time	7:43am	7:43am	7:43am	7:43am	7:43am	7:43am	7:43am	7:43am	7:43am
Finish time	10:320am	10:320am	10:320am	10:320am	10:320am	10:320am	10:320am	10:320am	10:320am
Number of Readings	454	454	454	454	454	454	454	454	454
Max Concentration	15	21	0.4	0.001458	0.046667	0	0	0	0
Min Concentration	12	20.9	0	0	0	0	0	0	0
Average Concentration	13.4	21.0	0.001542	0.000050	0.000470	0	0	0	0

	Reading (Chlorine)	TWA (Chlorine)	STEL (Chlorine)	Reading (Ammonia)	TWA (Ammonia)	STEL (Ammonia)	Reading (Carbon Dioxide)	TWA (Carbon Dioxide)	STEL (Carbon Dioxide)
Date	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17
Start time	7:37am	7:37am	7:37am	7:37am	7:37am	7:37am	7:37am	7:37am	7:37am
Finish time	10:30am	10:30am	10:30am	10:30am	10:30am	10:30am	10:30am	10:30am	10:30am
Number of Readings	448	448	448	1					
Max Concentration	0	0	0	1	0.02291667	0.4666667	0.12	0.01691667	0.04
Min Concentration	0	0	0	0	0.002083333	0	0.01	0.0000625	0.000666667
Average Concentration	0	0	0	0.024553571	0.015057662	0.01875	0.018125	0.008950056	0.01699256

Table B7 - Eastern Portal SOIL Assessment

						Sample Name	ES1726194052	ES1726194053	ES1726194054	ES1726194055	ES1726194056	ES1726194051
						Sample ID	EPA-0.4	EPB-0.3	EPC-0.2	EPD-0.15	QC8	EPA-0.1
						Sample date:	18/10/17	18/10/17	18/10/17	18/10/17	18/10/17	18/10/17
						Matrix	Soil	Soil	Soil	Soil	Soil	Soil
Analyte Name	**Units**	HILC	HILD	EIL	**Max.**	**Reporting Limit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Moisture Content	%				88.6	1	31.2	86.1	81.6	19.5	88.6	34.5
Total Metals												
Arsenic	mg/kg	300	3000	40	31	5	<5	20	31	<5	20	<5
Cadmium	mg/kg	90	900	–	3	1	<1	3	<1	<1	2	<1
Chromium	mg/kg	300	3600	60	20	2	8	17	20	8	18	6
Copper	mg/kg	17000	240 000	65	235	5	25	105	235	70	107	17
Lead	mg/kg	600	1500	470	236	5	44	85	236	51	88	26
Nickel	mg/kg	1200	6000	5	193	2	8	193	53	8	160	3
Zinc	mg/kg	30000	4E+05	–	2440	5	158	2440	574	126	1750	52
Mercury	mg/kg	80	750	–	0.4	0.1	<0.1	0.4	0.4	<0.1	0.4	<0.1
Nutrients												
Ammonia as N	mg/kg				0	20	----	----	----	----	----	----
Nitrite as N (Sol.)	mg/kg				0	0.1	----	----	----	----	----	----
Nitrate as N (Sol.)	mg/kg				0	0.1	----	----	----	----	----	----
Nitrite + Nitrate as N (Sol.)	mg/kg				0	0.1	----	----	----	----	----	----
Total Kjeldahl Nitrogen as N	mg/kg				0	20	----	----	----	----	----	----
Total Nitrogen as N	mg/kg				0	20	----	----	----	----	----	----
Total Phosphorus as P	mg/kg				0	2	----	----	----	----	----	----
Reactive Phosphorus as P	mg/kg				0	0.1	----	----	----	----	----	----
PCB's												
Total Polychlorinated biphenyls	mg/kg	1	1	-	0	0.1	<0.1	<0.2	<0.2	<0.1	<0.2	----
Organochlorine Pesticides (OC)												
alpha-BHC	mg/kg				0	0.05	----	----	----	----	----	----
Hexachlorobenzene (HCB)	mg/kg	10	80	-	0	0.05	----	----	----	----	----	----
beta-BHC	mg/kg				0	0.05	----	----	----	----	----	----
gamma-BHC	mg/kg				0	0.05	----	----	----	----	----	----
delta-BHC	mg/kg				0	0.05	----	----	----	----	----	----
Heptachlor	mg/kg				0	0.05	----	----	----	----	----	----
Aldrin	mg/kg				0	0.05	----	----	----	----	----	----
Heptachlor epoxide	mg/kg				0	0.05	----	----	----	----	----	----
Total Chlordane (sum)	mg/kg	70	530	-	0	0.05	----	----	----	----	----	----
trans-Chlordane	mg/kg				0	0.05	----	----	----	----	----	----
alpha-Endosulfan	mg/kg				0	0.05	----	----	----	----	----	----
cis-Chlordane	mg/kg				0	0.05	----	----	----	----	----	----
Dieldrin	mg/kg				0	0.05	----	----	----	----	----	----
4.4`-DDE	mg/kg				0	0.05	----	----	----	----	----	----
Endrin	mg/kg	20	100	-	0	0.05	----	----	----	----	----	----
beta-Endosulfan	mg/kg				0	0.05	----	----	----	----	----	----
4.4`-DDD	mg/kg				0	0.05	----	----	----	----	----	----
Endrin aldehyde	mg/kg				0	0.05	----	----	----	----	----	----
Endosulfan sulfate	mg/kg				0	0.05	----	----	----	----	----	----
4.4`-DDT	mg/kg				0	0.2	----	----	----	----	----	----
Endrin ketone	mg/kg				0	0.05	----	----	----	----	----	----
Methoxychlor	mg/kg				0	0.2	----	----	----	----	----	----
Sum of DDD + DDE + DDT	mg/kg	400	3600	3	0	0.05	----	----	----	----	----	----
Sum of Aldrin + Dieldrin	mg/kg	10	45	-	0	0.05	----	----	----	----	----	----
Organophosphorus Pesticides (OP)												
Dichlorvos	mg/kg				0	0.05	----	----	----	----	----	----
Demeton-S-methyl	mg/kg				0	0.05	----	----	----	----	----	----
Monocrotophos	mg/kg				0	0.2	----	----	----	----	----	----
Dimethoate	mg/kg				0	0.05	----	----	----	----	----	----
Diazinon	mg/kg				0	0.05	----	----	----	----	----	----
Chlorpyrifos-methyl	mg/kg				0	0.05	----	----	----	----	----	----
Parathion-methyl	mg/kg				0	0.2	----	----	----	----	----	----
Malathion	mg/kg				0	0.05	----	----	----	----	----	----
Fenthion	mg/kg				0	0.05	----	----	----	----	----	----
Chlorpyrifos	mg/kg				0	0.05	----	----	----	----	----	----
Parathion	mg/kg				0	0.2	----	----	----	----	----	----
Pirimphos-ethyl	mg/kg				0	0.05	----	----	----	----	----	----
Bromophos-ethyl	mg/kg				0	0.05	----	----	----	----	----	----
Fenamiphos	mg/kg				0	0.05	----	----	----	----	----	----
Prothiofos	mg/kg				0	0.05	----	----	----	----	----	----
Ethion	mg/kg				0	0.05	----	----	----	----	----	----
Carbophenothion	mg/kg				0	0.05	----	----	----	----	----	----
Azinphos Methyl	mg/kg				0	0.05	----	----	----	----	----	----
Triazines												
Atrazine	mg/kg				0	0.05	----	----	----	----	----	----
Simazine	mg/kg				0	0.05	----	----	----	----	----	----
Cypermethrins												
Cypermethrins (total)	mg/kg				0	0.2	----	----	----	----	----	----
Polynuclear Aromatic Hydrocarbons (PAH)												
Naphthalene	mg/kg				0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Acenaphthylene	mg/kg				0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Acenaphthene	mg/kg				0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Fluorene	mg/kg				0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Phenanthrene	mg/kg				0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Anthracene	mg/kg				0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Fluoranthene	mg/kg				5.8	0.5	<0.5	<2.0	5.8	<0.5	<2.0	<0.5
Pyrene	mg/kg				8.1	0.5	<0.5	<2.0	8.1	<0.5	<2.0	<0.5

Table B7 - Eastern Portal SOIL Assessment

						Sample Name	ES1726194052	ES1726194053	ES1726194054	ES1726194055	ES1726194056	ES1726194051
						Sample ID	EPA-0.4	EPB-0.3	EPC-0.2	EPD-0.15	QC8	EPA-0.1
						Sample date:	18/10/17	18/10/17	18/10/17	18/10/17	18/10/17	18/10/17
						Matrix	Soil	Soil	Soil	Soil	Soil	Soil
Analyte Name	**Units**	HILC	HILD	EIL	**Max.**	**Reporting Limit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Benz(a)anthracene	mg/kg				0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Chrysene	mg/kg				0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Benzo(b+j)fluoranthene	mg/kg				2.2	0.5	<0.5	<2.0	2.2	<0.5	<2.0	<0.5
Benzo(k)fluoranthene	mg/kg				0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Benzo(a)pyrene	mg/kg				0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Indeno(1.2.3.cd)pyrene	mg/kg				0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Dibenz(a.h)anthracene	mg/kg				0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Benzo(g.h.i)perylene	mg/kg				0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Total PAH	mg/kg	300	4000	-	16.1	0.5	<0.5	<1.0	16.1	<0.5	<1.0	<0.5
Benzo(a)pyrene TEQ (zero)	mg/kg				0	0.5	<0.5	<1.0	<1.0	<0.5	<1.0	<0.5
Benzo(a)pyrene TEQ (half LOR)	mg/kg				0.6	0.5	0.6	<1.0	<1.0	0.6	<1.0	0.6
Benzo(a)pyrene TEQ (LOR)	mg/kg				1.4	0.5	1.2	1.2	1.4	1.2	1.2	1.2
Total Petroleum Hydrocarbons (TPH)												
C6 - C9 Fraction	mg/kg				0	10	<10	<10	<10	<10	<10	<10
C10 - C14 Fraction	mg/kg				2230	50	<50	<110	2230	<50	<110	<50
C15 - C28 Fraction	mg/kg				12800	100	<100	540	12800	<100	<220	<100
C29 - C36 Fraction	mg/kg				1530	100	<100	790	1530	<100	<220	130
C10 - C36 Fraction (sum)	mg/kg				16600	50	<50	1330	16600	<50	<110	130
Silica Gel Cleanup (TPH)												
C10 - C14 Fraction	mg/kg						---	<110	730	----	----	----
C15 - C28 Fraction	mg/kg						---	<220	3410	----	----	----
C29 - C36 Fraction	mg/kg						---	<220	160	----	----	----
C10 - C36 Fraction (sum)	mg/kg						---	<110	4300	----	----	----
Total Recoverable Hydrocarbons - NEPM 2013 Fractions												
C6 - C10 Fraction	mg/kg				0	10	<10	<10	<10	<10	<10	<10
C6 - C10 Fraction minus BTEX (F1)	mg/kg	700	700	125	0	10	<10	<10	<10	<10	<10	<10
>C10 - C16 Fraction	mg/kg				5280	50	<50	<110	5280	<50	<110	<50
>C16 - C34 Fraction	mg/kg				10400	100	120	1050	10400	120	<110	120
>C34 - C40 Fraction	mg/kg				1080	100	<100	610	1080	<100	<110	140
>C10 - C40 Fraction (sum)	mg/kg				16800	50	120	1660	16800	120	<110	260
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	1000	1000	25	5280	50	<50	<110	5280	<50	<110	<50
Silica Gel Cleanup (TRH)												
>C10 - C16 Fraction	mg/kg						---	<110	1840	----	----	----
>C16 - C34 Fraction	mg/kg						---	<110	2490	----	----	----
>C34 - C40 Fraction	mg/kg						---	<110	<100	----	----	----
>C10 - C40 Fraction (sum)	mg/kg						---	<110	4330	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg						---	<110	1840	----	----	----
BTEXN												
Benzene	mg/kg	NL	NL	10	0	0.2	<0.2	<0.5	<0.5	<0.2	<0.5	<0.2
Toluene	mg/kg	NL	NL	10	0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	NL	NL	1.5	0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	mg/kg	NL	NL		0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	mg/kg				0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	mg/kg	NL	NL	1.6	0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of BTEX	mg/kg				0	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene	mg/kg	-	-	10	0	1	<1	<1	<1	<1	<1	<1
Explosives												
HMX	mg/kg				0	0.1	<0.1	----	----	----	----	----
RDX	mg/kg				0	0.1	<0.1	----	----	----	----	----
1.3.5-Trinitrobenzene	mg/kg				0	0.1	<0.1	----	----	----	----	----
1.3-Dinitrobenzene	mg/kg				0	0.1	<0.1	----	----	----	----	----
Tetryl	mg/kg				0	0.1	<0.1	----	----	----	----	----
2.4.6-TNT	mg/kg				0	0.1	<0.1	----	----	----	----	----
4-Amino.2.6-DNT	mg/kg				0	0.1	<0.1	----	----	----	----	----
2-Amino-4.6-DNT	mg/kg				0	0.1	<0.1	----	----	----	----	----
4-& 2-AM-DNT(Isomeric Mixture)	mg/kg				0	0.1	<0.1	----	----	----	----	----
2.4-Dinitrotoluene	mg/kg				0	0.1	<0.1	----	----	----	----	----
2.6-Dinitrotoluene	mg/kg				0	0.1	<0.1	----	----	----	----	----
2.4-& 2.6-DNT(Isomeric Mixture)	mg/kg				0	0.1	<0.1	----	----	----	----	----
Nitrobenzene	mg/kg				0	0.1	<0.1	----	----	----	----	----
2-Nitrotoluene	mg/kg				0	0.1	<0.1	----	----	----	----	----
3-Nitrotoluene	mg/kg				0	0.1	<0.1	----	----	----	----	----
4-Nitrotoluene	mg/kg				0	0.1	<0.1	----	----	----	----	----
Nitroglycerine	mg/kg				0	1	<1	----	----	----	----	----
PETN	mg/kg				0	1	<1	----	----	----	----	----
Identification of Asbestos in Soils (AS 4964 - 2004)												
Asbestos Detected	g/kg				0	0.1	----	----	----	----	----	----
Asbestos Type	--				0		----	----	----	----	----	----
Sample weight (dry)	g				0	0.01	----	----	----	----	----	----
Description	--				0		----	----	----	----	----	----
APPROVED IDENTIFIER:	--				0		----	----	----	----	----	----

Table B8 - Eastern Portal SOIL Waste Classification

					Sample Name	ES1726194052	ES1726194053	ES1726194054	ES1726194055	ES1726194056	ES1726194051
					Sample ID	EPA-0.4	EPB-0.3	EPC-0.2	EPD-0.15	QC8	EPA-0.1
					Sample date:	18/10/17	18/10/17	18/10/17	18/10/17	18/10/17	18/10/17
					Matrix	Soil	Soil	Soil	Soil	Soil	Soil
Analyte Name	**Units**	GSW	RSW	**Maximum**	**Reporting Limit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Moisture Content	%				1	31.2	86.1	81.6	19.5	88.6	34.5
Total Metals											
Arsenic	mg/kg	100	400	31	5	<5	20	31	<5	20	<5
Cadmium	mg/kg	20	80	3	1	<1	3	<1	<1	2	<1
Chromium	mg/kg	100	400	20	2	8	17	20	8	18	6
Copper	mg/kg			235	5	25	105	235	70	107	17
Lead	mg/kg	100	400	236	5	44	85	236	51	88	26
Nickel	mg/kg	40	160	193	2	8	193	53	8	160	3
Zinc	mg/kg			2440	5	158	2440	574	126	1750	52
Mercury	mg/kg	4	16	0.4	0.1	<0.1	0.4	0.4	<0.1	0.4	<0.1
Nutrients											
Ammonia as N	mg/kg				20	----	----	----	----	----	----
Nitrite as N (Sol.)	mg/kg				0.1	----	----	----	----	----	----
Nitrate as N (Sol.)	mg/kg				0.1	----	----	----	----	----	----
Nitrite + Nitrate as N (Sol.)	mg/kg				0.1	----	----	----	----	----	----
Total Kjeldahl Nitrogen as N	mg/kg				20	----	----	----	----	----	----
Total Nitrogen as N	mg/kg				20	----	----	----	----	----	----
Total Phosphorus as P	mg/kg				2	----	----	----	----	----	----
Reactive Phosphorus as P	mg/kg				0.1	----	----	----	----	----	----
PCB's											
Total Polychlorinated biphenyls	mg/kg	50	50	0	0.1	<0.1	<0.2	<0.2	<0.1	<0.2	----
Organochlorine Pesticides (OC)											
alpha-BHC	mg/kg				0.05	----	----	----	----	----	----
Hexachlorobenzene (HCB)	mg/kg				0.05	----	----	----	----	----	----
beta-BHC	mg/kg				0.05	----	----	----	----	----	----
gamma-BHC	mg/kg				0.05	----	----	----	----	----	----
delta-BHC	mg/kg				0.05	----	----	----	----	----	----
Heptachlor	mg/kg				0.05	----	----	----	----	----	----
Aldrin	mg/kg				0.05	----	----	----	----	----	----
Heptachlor epoxide	mg/kg				0.05	----	----	----	----	----	----
Total Chlordane (sum)	mg/kg				0.05	----	----	----	----	----	----
trans-Chlordane	mg/kg				0.05	----	----	----	----	----	----
alpha-Endosulfan	mg/kg				0.05	----	----	----	----	----	----
cis-Chlordane	mg/kg				0.05	----	----	----	----	----	----
Dieldrin	mg/kg				0.05	----	----	----	----	----	----
4.4`-DDE	mg/kg				0.05	----	----	----	----	----	----
Endrin	mg/kg				0.05	----	----	----	----	----	----
beta-Endosulfan	mg/kg				0.05	----	----	----	----	----	----
4.4`-DDD	mg/kg				0.05	----	----	----	----	----	----
Endrin aldehyde	mg/kg				0.05	----	----	----	----	----	----
Endosulfan sulfate	mg/kg				0.05	----	----	----	----	----	----
4.4`-DDT	mg/kg				0.2	----	----	----	----	----	----
Endrin ketone	mg/kg				0.05	----	----	----	----	----	----
Methoxychlor	mg/kg				0.2	----	----	----	----	----	----
Sum of DDD + DDE + DDT	mg/kg				0.05	----	----	----	----	----	----
Sum of Aldrin + Dieldrin	mg/kg				0.05	----	----	----	----	----	----
Organophosphorus Pesticides (OP)											
Dichlorvos	mg/kg				0.05	----	----	----	----	----	----
Demeton-S-methyl	mg/kg				0.05	----	----	----	----	----	----
Monocrotophos	mg/kg				0.2	----	----	----	----	----	----
Dimethoate	mg/kg				0.05	----	----	----	----	----	----
Diazinon	mg/kg				0.05	----	----	----	----	----	----
Chlorpyrifos-methyl	mg/kg				0.05	----	----	----	----	----	----
Parathion-methyl	mg/kg				0.2	----	----	----	----	----	----
Malathion	mg/kg				0.05	----	----	----	----	----	----
Fenthion	mg/kg				0.05	----	----	----	----	----	----
Chlorpyrifos	mg/kg				0.05	----	----	----	----	----	----
Parathion	mg/kg				0.2	----	----	----	----	----	----
Pirimphos-ethyl	mg/kg				0.05	----	----	----	----	----	----
Bromophos-ethyl	mg/kg				0.05	----	----	----	----	----	----
Fenamiphos	mg/kg				0.05	----	----	----	----	----	----
Prothiofos	mg/kg				0.05	----	----	----	----	----	----
Ethion	mg/kg				0.05	----	----	----	----	----	----
Carbophenothion	mg/kg				0.05	----	----	----	----	----	----
Azinphos Methyl	mg/kg				0.05	----	----	----	----	----	----
Triazines											
Atrazine	mg/kg				0.05	----	----	----	----	----	----
Simazine	mg/kg				0.05	----	----	----	----	----	----
Cypermethrins											
Cypermethrins (total)	mg/kg				0.2	----	----	----	----	----	----
Polynuclear Aromatic Hydrocarbons (PAH)											
Naphthalene	mg/kg				0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Acenaphthylene	mg/kg				0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Acenaphthene	mg/kg				0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Fluorene	mg/kg				0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Phenanthrene	mg/kg				0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Anthracene	mg/kg				0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Fluoranthene	mg/kg				0.5	<0.5	<2.0	5.8	<0.5	<2.0	<0.5
Pyrene	mg/kg				0.5	<0.5	<2.0	8.1	<0.5	<2.0	<0.5

Table B8 - Eastern Portal SOIL Waste Classification

					Sample Name	ES1726194052	ES1726194053	ES1726194054	ES1726194055	ES1726194056	ES1726194051
					Sample ID	EPA-0.4	EPB-0.3	EPC-0.2	EPD-0.15	QC8	EPA-0.1
					Sample date:	18/10/17	18/10/17	18/10/17	18/10/17	18/10/17	18/10/17
					Matrix	Soil	Soil	Soil	Soil	Soil	Soil
Analyte Name	**Units**	GSW	RSW	**Maximum**	**Reporting Limit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Benz(a)anthracene	mg/kg				0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Chrysene	mg/kg				0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Benzo(b+j)fluoranthene	mg/kg				0.5	<0.5	<2.0	2.2	<0.5	<2.0	<0.5
Benzo(k)fluoranthene	mg/kg				0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Benzo(a)pyrene	mg/kg	0.8	3.2	0	0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Indeno(1.2.3.cd)pyrene	mg/kg				0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Dibenz(a.h)anthracene	mg/kg				0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Benzo(g.h.i)perylene	mg/kg				0.5	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5
Total PAH	mg/kg	200	800	16.1	0.5	<0.5	<1.0	16.1	<0.5	<1.0	<0.5
Benzo(a)pyrene TEQ (zero)	mg/kg				0.5	<0.5	<1.0	<1.0	<0.5	<1.0	<0.5
Benzo(a)pyrene TEQ (half LOR)	mg/kg				0.5	0.6	<1.0	<1.0	0.6	<1.0	0.6
Benzo(a)pyrene TEQ (LOR)	mg/kg				0.5	1.2	1.2	1.4	1.2	1.2	1.2
Total Petroleum Hydrocarbons (TPH)											
C6 - C9 Fraction	mg/kg	650	2600	0	10	<10	<10	<10	<10	<10	<10
C10 - C14 Fraction	mg/kg				50	<50	<110	2230	<50	<110	<50
C15 - C28 Fraction	mg/kg				100	<100	540	12800	<100	<220	<100
C29 - C36 Fraction	mg/kg				100	<100	790	1530	<100	<220	130
C10 - C36 Fraction (sum)	mg/kg	10000	40000	16600	50	<50	1330	16600	<50	<110	130
Silica Gel Cleanup (TPH)											
C10 - C14 Fraction	mg/kg					----	<110	730	----	----	----
C15 - C28 Fraction	mg/kg					----	<220	3410	----	----	----
C29 - C36 Fraction	mg/kg					----	<220	160	----	----	----
C10 - C36 Fraction (sum)	mg/kg					----	<110	4300	----	----	----
Total Recoverable Hydrocarbons - NEPM 2013 Fractions											
C6 - C10 Fraction	mg/kg				10	<10	<10	<10	<10	<10	<10
C6 - C10 Fraction minus BTEX (F1	mg/kg				10	<10	<10	<10	<10	<10	<10
>C10 - C16 Fraction	mg/kg				50	<50	<110	5280	<50	<110	<50
>C16 - C34 Fraction	mg/kg				100	120	1050	10400	120	<110	120
>C34 - C40 Fraction	mg/kg				100	<100	610	1080	<100	<110	140
>C10 - C40 Fraction (sum)	mg/kg				50	120	1660	16800	120	<110	260
>C10 - C16 Fraction minus Naphtha	mg/kg				50	<50	<110	5280	<50	<110	<50
Silica Gel Cleanup (TRH)											
>C10 - C16 Fraction	mg/kg					----	<110	1840	----	----	----
>C16 - C34 Fraction	mg/kg					----	<110	2490	----	----	----
>C34 - C40 Fraction	mg/kg					----	<110	<100	----	----	----
>C10 - C40 Fraction (sum)	mg/kg					----	<110	4330	----	----	----
>C10 - C16 Fraction minus Naphtha	mg/kg					----	<110	1840	----	----	----
BTEXN											
Benzene	mg/kg	10	40	0	0.2	<0.2	<0.5	<0.5	<0.2	<0.5	<0.2
Toluene	mg/kg	288	1152	0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	600	2400	0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	mg/kg				0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	mg/kg				0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	mg/kg	1000	4000	0	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of BTEX	mg/kg				0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene	mg/kg				1	<1	<1	<1	<1	<1	<1
Explosives											
HMX	mg/kg				0.1	<0.1	----	----	----	----	----
RDX	mg/kg				0.1	<0.1	----	----	----	----	----
1.3.5-Trinitrobenzene	mg/kg				0.1	<0.1	----	----	----	----	----
1.3-Dinitrobenzene	mg/kg				0.1	<0.1	----	----	----	----	----
Tetryl	mg/kg				0.1	<0.1	----	----	----	----	----
2.4.6-TNT	mg/kg				0.1	<0.1	----	----	----	----	----
4-Amino.2.6-DNT	mg/kg				0.1	<0.1	----	----	----	----	----
2-Amino-4.6-DNT	mg/kg				0.1	<0.1	----	----	----	----	----
4-& 2-AM-DNT(Isomeric Mixture)	mg/kg				0.1	<0.1	----	----	----	----	----
2.4-Dinitrotoluene	mg/kg				0.1	<0.1	----	----	----	----	----
2.6-Dinitrotoluene	mg/kg				0.1	<0.1	----	----	----	---	----
2.4-& 2.6-DNT(Isomeric Mixture)	mg/kg				0.1	<0.1	----	----	----	----	----
Nitrobenzene	mg/kg				0.1	<0.1	----	----	----	----	----
2-Nitrotoluene	mg/kg				0.1	<0.1	----	----	----	----	----
3-Nitrotoluene	mg/kg				0.1	<0.1	----	----	----	----	----
4-Nitrotoluene	mg/kg				0.1	<0.1	----	----	----	----	----
Nitroglycerine	mg/kg				1	<1	----	----	----	----	----
PETN	mg/kg				1	<1	----	----	----	----	----
Identification of Asbestos in Soils (AS 4964 - 2004)											
Asbestos Detected	g/kg				0.1	----	----	----	----	----	----
Asbestos Type	--					----	----	----	----	----	----
Sample weight (dry)	g				0.01	----	----	----	----	----	----
Description	--					----	----	----	----	----	----
APPROVED IDENTIFIER:	--					----	----	----	----	----	----

Table B9(a) TCLP Data

							ALS Sample number:	ES1727998001	ES1727998002	ES1727998003	ES1727998004	ES1727998005	ES1727998006	ES1727998007
							Sample ID	TS1	TS2	EPC - 0.2	EPB-0.3	TP8-0.1	HA4-0.1	TP4-0.1
							Sample date:	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17	17/10/17
							Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte Name	**Units**	TCLP	SCC1	TCLP2	SCC2	**Max.**	**porting Limit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals														
Lead	mg/L	5	1500	20	6000	0	0.1	----	----	<0.1	----	<0.1	----	----
Nickel	mg/L	2	1050	8	4200	0.2	0.1	<0.1	<0.1	<0.1	0.2	----	<0.1	----
						0								
PAHs						0								
Naphthalene	Âµg/L					12.2	1	----	----	----	----	----	----	12.2
Acenaphthylene	Âµg/L					1.7	1	----	----	----	----	----	----	1.7
Acenaphthene	Âµg/L					5.7	1	----	----	----	----	----	----	5.7
Fluorene	Âµg/L					10.1	1	----	----	----	----	----	----	10.1
Phenanthrene	Âµg/L					27.3	1	----	----	----	----	----	----	27.3
Anthracene	Âµg/L					5.9	1	----	----	----	----	----	----	5.9
Fluoranthene	Âµg/L					8.7	1	----	----	----	----	----	----	8.7
Pyrene	Âµg/L					7.3	1	----	----	----	----	----	----	7.3
Benz(a)anthracene	Âµg/L					0	1	----	----	----	----	----	----	<1.0
Chrysene	Âµg/L					0	1	----	----	----	----	----	----	<1.0
Benzo(b+j)fluoranthene	Âµg/L					0	1	----	----	----	----	----	----	<1.0
Benzo(k)fluoranthene	Âµg/L					0	1	----	----	----	----	----	----	<1.0
Benzo(a)pyrene	Âµg/L					0	0.5	<0.5	<0.5	----	----	----	----	<0.5
Indeno(1.2.3.cd)pyrene	Âµg/L					0	1	----	----	----	----	----	----	<1.0
Dibenz(a.h)anthracene	Âµg/L					0	1	----	----	----	----	----	----	<1.0
Benzo(g.h.i)perylene	Âµg/L					0	1	----	----	----	----	----	----	<1.0
Sum of polycyclic aromatic hydrocarbons	Âµg/L	NA	200	NA	800	78.9	0.5	----	----	----	----	----	----	78.9
Benzo(a)pyrene TEQ (zero)	Âµg/L	0.04	10	0.16	23	0	0.5	----	----	----	----	----	----	<0.5

Table B9(b) ASLP Data

							ALS Sample number:	ES1726194001		
							Sample ID	TS1	EPC-0.2	EPB-0.3
							Sample date:	17/10/17	17/10/17	17/10/17
							Matrix	Soil	Soil	Soil
Analyte Name	**Units**	TCLP	SCC1	TCLP2	SCC2	**Max.**	**Reporting Limit**	**Result**	**Result**	**Result**
Copper	mg/L					**0**	0.1	----	<0.1	----
Lead	mg/L	5	1500	20	6000	**0**	0.1	----	<0.1	----
Nickel	mg/L	2	1050	8	4200	**0**	0.1	<0.1	----	<0.1
BaP	Âµg/L	0.04	10	0.16	23	**0**	0.5	<0.5	----	----

Table 10 - Tunnel WATER Assessment						
			Sample Name	ES1726194052	ES1726194053	ES1726194054
	1000		**Sample ID**	T2	T4	T5
			Sample date:	18/10/17	18/10/17	18/10/17
			Matrix	Water	Water	Water
Analyte Name	**Units**	**ANZECC (95%)**	**Reporting Limit**	**Result**	**Result**	**Result**
Metals						
Arsenic	mg/L	0.013	0.001	0.003	0.003	0.001
Cadmium	mg/L	0.0002	0.0001	0.0007	0.0002	0.0001
Chromium	mg/L	0.001	0.001	0.001	<0.001	<0.001
Copper	mg/L	0.0014	0.001	0.032	0.019	0.006
Lead	mg/L	0.0034	0.001	0.041	0.023	0.007
Nickel	mg/L	0.011	0.001	0.055	0.026	0.007
Zinc	mg/L	0.008	0.005	0.396	0.368	1.08
Mercury	mg/L	0.00006	0.0001	0.0002	<0.0001	<0.0001
		0				
Nutrients		0				
Ammonia as N	mg/L	0.9	0.01	----	----	0.03
Nitrite as N	mg/L	0	0.01	----	----	----
Nitrate as N	mg/L	0.7	0.01	----	----	----
Nitrite + Nitrate as N	mg/L	0	0.01	----	----	0.92
Total Kjeldahl Nitrogen as N	mg/L	0	0.1	----	----	0.3
Total Nitrogen as N	mg/L	0	0.1	----	----	1.2
Total Phosphorus as P	mg/L	0	0.01	----	----	0.37
Reactive Phosphorus as P	mg/L	0	0.01	----	----	----
Dissolved Oxygen	mg/L	0	0.1	----	----	----
Polychlorinated Biphenyls (PCB)						
Total Polychlorinated biphenyls	Âµg/L	0	1	----	----	<1
EP066S: PCB Surrogate		0				
Decachlorobiphenyl	%	0	0.1	----	----	98.1
Total Petroleum Hydrocarbons - Silica gel cleanup						
C10 - C14 Fraction	Âµg/L	0	50	<50	<50	<50
C15 - C28 Fraction	Âµg/L	0	100	<100	<100	<100
C29 - C36 Fraction	Âµg/L	0	50	<50	<50	<50
C10 - C36 Fraction (sum)	Âµg/L	0	50	<50	<50	<50
Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup						
>C10 - C16 Fraction	Âµg/L	0	100	<100	<100	<100
>C16 - C34 Fraction	Âµg/L	0	100	<100	<100	<100
>C34 - C40 Fraction	**Âµg/L**	0	100	<100	<100	<100
>C10 - C40 Fraction (sum)	Âµg/L	0	100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalen	Âµg/L	0	100	<100	<100	<100
Polynuclear Aromatic Hydrocarbons (PAH)						
Naphthalene	Âµg/L	0.016	1	<1.0	<1.0	<1.0
Acenaphthylene	Âµg/L	0	1	<1.0	<1.0	<1.0
Acenaphthene	Âµg/L	0	1	<1.0	<1.0	<1.0
Fluorene	Âµg/L	0	1	<1.0	<1.0	<1.0
Phenanthrene	Âµg/L	0	1	<1.0	<1.0	<1.0
Anthracene	Âµg/L	0	1	<1.0	<1.0	<1.0
Fluoranthene	Âµg/L	0	1	<1.0	<1.0	<1.0
Pyrene	Âµg/L	0	1	<1.0	<1.0	<1.0
Benz(a)anthracene	Âµg/L	0	1	<1.0	<1.0	<1.0
Chrysene	Âµg/L	0	1	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	Âµg/L	0	1	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	Âµg/L	0	1	<1.0	<1.0	<1.0
Benzo(a)pyrene	Âµg/L	0	0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	Âµg/L	0	1	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	Âµg/L	0	1	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	Âµg/L	0	1	<1.0	<1.0	<1.0
Sum of polycyclic aromatic hydrocar	**Âµg/L**	0	0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ (zero)	Âµg/L	0	0.5	<0.5	<0.5	<0.5
Phenolic Compound Surrogates						

Table 10 - Tunnel WATER Assessment						
			Sample Name	ES1726194052	ES1726194053	ES1726194054
	1000		**Sample ID**	T2	T4	T5
			Sample date:	18/10/17	18/10/17	18/10/17
			Matrix	Water	Water	Water
Analyte Name	**Units**	**ANZECC (95%)**	**Reporting Limit**	**Result**	**Result**	**Result**
Phenol-d6	**%**	0	0.1	26.4	23.2	25.3
2-Chlorophenol-D4	%	0	0.1	66.7	64.9	65.9
2.4.6-Tribromophenol	%	0	0.1	63.9	55.4	54.6
PAH Surrogates						
2-Fluorobiphenyl	%	0	0.1	91.4	88.2	92.4
Anthracene-d10	%	0	0.1	81.3	80.5	85.5
4-Terphenyl-d14	%	0	0.1	76	76.5	76.7
Total Petroleum Hydrocarbons (TPH)						
C6 - C9 Fraction	Âµg/L	0	20	<20	<20	<20
		0				
Total Recoverable Hydrocarbons (TRH) - NEPM 2013 Fractions						
C6 - C10 Fraction	Âµg/L	0	20	<20	<20	<20
C6 - C10 Fraction minus BTEX (F1)	Âµg/L	0.125	20	<20	<20	<20
BTEXN						
Benzene	Âµg/L	0.95	1	<1	<1	<1
Toluene	Âµg/L	0	2	<2	<2	<2
Ethylbenzene	Âµg/L	0	2	<2	<2	<2
meta- & para-Xylene	**Âµg/L**	0	2	<2	<2	<2
ortho-Xylene	Âµg/L	0	2	<2	<2	<2
Total Xylenes	Âµg/L	0	2	<2	<2	<2
Sum of BTEX	Âµg/L	0	1	<1	<1	<1
Naphthalene	Âµg/L	0	5	<5	<5	<5
TPH(V)/BTEX Surrogates						
1.2-Dichloroethane-D4	%	0	0.1	92.6	100	99
Toluene-D8	%	0	0.1	110	106	109
4-Bromofluorobenzene	%	0	0.1	107	106	108
Explosives						
HMX	Âµg/L	0	20	<20	<20	<20
RDX	Âµg/L	0	20	<20	<20	<20
1.3.5-Trinitrobenzene	Âµg/L	0	20	<20	<20	<20
1.3-Dinitrobenzene	**Âµg/L**	0	20	<20	<20	<20
Tetryl	Âµg/L	0	20	<20	<20	<20
2.4.6-TNT	Âµg/L	0	20	<20	<20	<20
4-Amino.2.6-DNT	Âµg/L	0	20	<20	<20	<20
2-Amino-4.6-DNT	Âµg/L	0	20	<20	<20	<20
4-& 2-AM-DNT(Isomeric Mixture)	Âµg/L	0	20	<20	<20	<20
2.4-Dinitrotoluene	Âµg/L	0	20	<20	<20	<20
2.6-Dinitrotoluene	**Âµg/L**	0	20	<20	<20	<20
2.4-& 2.6-DNT(Isomeric Mixture)	Âµg/L	0	20	<20	<20	<20
Nitrobenzene	Âµg/L	0	20	<20	<20	<20
2-Nitrotoluene	Âµg/L	0	20	<20	<20	<20
3-Nitrotoluene	Âµg/L	0	20	<20	<20	<20
4-Nitrotoluene	Âµg/L	0	20	<20	<20	<20
Nitroglycerine	Âµg/L	0	200	<200	<200	<200
PETN	Âµg/L	0	200	<200	<200	<200
EP203S: Explosives Surrogate						
o-Dinitrobenzene	%	0	0.1	100	100	108

Table 11 - Eastern Portal WATER Assessment

			Sample Name	ES1726194055	ES1726194056	ES1726194056	ES1726194056	ES1726194051
	1000		Sample ID	EPCW	EP1	EP2	EP3	QC1
			Sample date:	18/10/17	18/10/17	18/10/17	18/10/17	18/10/17
			Matrix	Water	Water	Water	Water	Water
Analyte Name	**Units**	**ANZECC (95%)**	**Reporting Limit**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals								
Arsenic	mg/L	0.013	0.001	----	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0002	0.0001	----	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	0.001	----	<0.001	<0.001	<0.001	0.002
Copper	mg/L	0.0014	0.001	----	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.0034	0.001	----	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.011	0.001	----	0.004	0.002	<0.001	0.004
Zinc	mg/L	0.008	0.005	----	0.104	0.041	<0.005	0.101
Mercury	mg/L	0.00006	0.0001	----	<0.0001	<0.0001	<0.0001	<0.0001
Nutrients								
Ammonia as N	mg/L	0.9	0.01	----	0.01	----	0.06	0.02
Nitrite as N	mg/L	0	0.01	----	<0.01	----	<0.01	<0.01
Nitrate as N	mg/L	0.7	0.01	----	0.8	----	0.02	0.78
Nitrite + Nitrate as N	mg/L	0	0.01	----	0.8	----	0.02	0.78
Total Kjeldahl Nitrogen as N	mg/L	0	0.1	----	0.5	----	0.3	0.5
Total Nitrogen as N	mg/L	0	0.1	----	1.3	----	0.3	1.3
Total Phosphorus as P	mg/L	0	0.01	----	0.2	----	0.08	0.27
Reactive Phosphorus as P	mg/L	0	0.01	----	0.02	----	0.01	0.02
Dissolved Oxygen	mg/L	0	0.1	----	10	10.6	10.2	----
Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	Âµg/L	0	1	----	<1	----	<1	<1
EP066S: PCB Surrogate		0						
Decachlorobiphenyl	%	0	0.1	----	97.7	----	97.2	96.8
Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	Âµg/L	0	50	----	<50	<50	<50	<50
C15 - C28 Fraction	Âµg/L	0	100	----	<100	<100	<100	<100
C29 - C36 Fraction	Âµg/L	0	50	----	<50	<50	<50	<50
C10 - C36 Fraction (sum)	Âµg/L	0	50	----	<50	<50	<50	<50
Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	Âµg/L	0	100	----	<100	<100	<100	<100
>C16 - C34 Fraction	Âµg/L	0	100	----	<100	<100	<100	<100
>C34 - C40 Fraction	**Âµg/L**	0	100	----	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	Âµg/L	0	100	----	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthal	Âµg/L	0	100	----	<100	<100	<100	<100
Polynuclear Aromatic Hydrocarbons (PAH)								
Naphthalene	Âµg/L	0.016	1	<7.2	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Acenaphthene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Fluorene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Phenanthrene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Anthracene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Fluoranthene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Pyrene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Chrysene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	Âµg/L	0	0.5	<7.2	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	Âµg/L	0	1	<7.2	<1.0	<1.0	<1.0	<1.0
Sum of polycyclic aromatic hydroc	**Âµg/L**	0	0.5	<7.2	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ (zero)	Âµg/L	0	0.5	<7.2	<0.5	<0.5	<0.5	<0.5
Phenolic Compound Surrogates								
Phenol-d6	**%**	0	0.1	ND	19.6	23.5	21.8	24.6
2-Chlorophenol-D4	%	0	0.1	ND	62.7	61.8	59.8	61.1
2.4.6-Tribromophenol	%	0	0.1	ND	49	51.9	46.1	46.4

Table 11 - Eastern Portal WATER Assessment

			Sample Name	ES1726194055	ES1726194056	ES1726194056	ES1726194056	ES1726194051
	1000		Sample ID	EPCW	EP1	EP2	EP3	QC1
			Sample date:	18/10/17	18/10/17	18/10/17	18/10/17	18/10/17
			Matrix	Water	Water	Water	Water	Water
Analyte Name	**Units**	**ANZECC (95%)**	**Reporting Limit**	**Result**	**Result**	**Result**	**Result**	**Result**
PAH Surrogates								
2-Fluorobiphenyl	%	0	0.1	ND	85.1	99.1	96.3	90.5
Anthracene-d10	%	0	0.1	ND	87	86.6	92	97.4
4-Terphenyl-d14	%	0	0.1	ND	85.9	82.9	80	80
		0						
Total Petroleum Hydrocarbons (TPH)								
C6 - C9 Fraction	Âµg/L	0	20	----	<20	<20	<20	<20
Total Recoverable Hydrocarbons (TRH) - NEPM 2013 Fractions								
C6 - C10 Fraction	Âµg/L	0	20	----	<20	<20	<20	<20
C6 - C10 Fraction minus BTEX (F1)	Âµg/L	0.125	20	----	<20	<20	<20	<20
BTEXN								
Benzene	Âµg/L	0.95	1	<1	<1	<1	<1	<1
Toluene	Âµg/L	0	2	<2	<2	<2	<2	<2
Ethylbenzene	Âµg/L	0	2	<2	<2	<2	<2	<2
meta- & para-Xylene	**Âµg/L**	0	2	<2	<2	<2	<2	<2
ortho-Xylene	Âµg/L	0	2	<2	<2	<2	<2	<2
Total Xylenes	Âµg/L	0	2	<2	<2	<2	<2	<2
Sum of BTEX	Âµg/L	0	1	<1	<1	<1	<1	<1
Naphthalene	Âµg/L	0	5	<5	<5	<5	<5	<5
TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	%	0	0.1	115	94.6	95.8	99.4	95.1
Toluene-D8	%	0	0.1	124	110	108	109	108
4-Bromofluorobenzene	%	0	0.1	115	105	105	107	103
Explosives								
HMX	Âµg/L	0	20	<20	<20	<20	----	----
RDX	Âµg/L	0	20	<20	<20	<20	----	----
1.3.5-Trinitrobenzene	Âµg/L	0	20	<20	<20	<20	----	----
1.3-Dinitrobenzene	**Âµg/L**	0	20	<20	<20	<20	----	----
Tetryl	Âµg/L	0	20	<20	<20	<20	----	----
2.4.6-TNT	Âµg/L	0	20	<20	<20	<20	----	----
4-Amino.2.6-DNT	Âµg/L	0	20	<20	<20	<20	----	----
2-Amino-4.6-DNT	Âµg/L	0	20	<20	<20	<20	----	----
4-& 2-AM-DNT(Isomeric Mixture)	Âµg/L	0	20	<20	<20	<20	----	----
2.4-Dinitrotoluene	Âµg/L	0	20	<20	<20	<20	----	----
2.6-Dinitrotoluene	**Âµg/L**	0	20	<20	<20	<20	----	----
2.4-& 2.6-DNT(Isomeric Mixture)	Âµg/L	0	20	<20	<20	<20	----	----
Nitrobenzene	Âµg/L	0	20	<20	<20	<20	----	----
2-Nitrotoluene	Âµg/L	0	20	<20	<20	<20	----	----
3-Nitrotoluene	Âµg/L	0	20	<20	<20	<20	----	----
4-Nitrotoluene	Âµg/L	0	20	<20	<20	<20	----	----
Nitroglycerine	Âµg/L	0	200	<200	<200	<200	----	----
PETN	Âµg/L	0	200	<200	<200	<200	----	----
EP203S: Explosives Surrogate								
o-Dinitrobenzene	%	0	0.1	91.6	117	99.2	----	----

Table B12 QA/QC Data

		ALS Sample number:		ES1726194010	ES1726194034			ES1726194018	ES1726194036			ES1726194053	ES1726194056	
		Sample ID		TP4-0.5	QC1			TP8-0.1	QC3			EPB-0.3	QC8	
		Sample date:		17/10/17	17/10/17			17/10/17	17/10/17			18/10/17	18/10/17	
		Matrix		Soil	Soil			Soil	Soil			Soil	Soil	
Analyte Name	**Units**	**Reporting Limit**		**Result**	**Result**			**Result**	**Result**			**Result**	**Result**	
Moisture Content	%	1		22.1	17.1			37.4	19.3			86.1	88.6	
Total Metals														
Arsenic	mg/kg	5		10	9	11%		<5	<5	0%		20	20	0%
Cadmium	mg/kg	1		<1	<1	0%		<1	<1	0%		3	2	50%
Chromium	mg/kg	2		10	8	22%		10	9	11%		17	18	6%
Copper	mg/kg	5		121	104	15%		20	20	0%		105	107	2%
Lead	mg/kg	5		42	29	37%		176	144	20%		85	88	3%
Nickel	mg/kg	2		8	7	13%		5	5	0%		193	160	21%
Zinc	mg/kg	5		27	20	30%		508	389	27%		2440	1750	39%
Mercury	mg/kg	0.1		<0.1	<0.1	0%		0.1	0.1	0%		0.4	0.4	0%
PCB's														
Total Polychlorinated biphenyls	mg/kg	0.1		----	----	NA		----	----	NA		<0.2	<0.2	0%
Decachlorobiphenyl (PCB surrogate)	%	0.1		----	----	NA		----	----	NA		78.6	92.6	15%
Polynuclear Aromatic Hydrocarbons (PAH)														
Naphthalene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<2.0	<2.0	0%
Acenaphthylene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<2.0	<2.0	0%
Acenaphthene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<2.0	<2.0	0%
Fluorene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<2.0	<2.0	0%
Phenanthrene	mg/kg	0.5		0.9	0.5	57%		<0.5	<0.5	0%		<2.0	<2.0	0%
Anthracene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<2.0	<2.0	0%
Fluoranthene	mg/kg	0.5		1.1	0.5	75%		<0.5	<0.5	0%		<2.0	<2.0	0%
Pyrene	mg/kg	0.5		1	0.5	67%		<0.5	<0.5	0%		<2.0	<2.0	0%
Benz(a)anthracene	mg/kg	0.5		0.6	0.5	18%		<0.5	<0.5	0%		<2.0	<2.0	0%
Chrysene	mg/kg	0.5		0.6	0.5	18%		<0.5	<0.5	0%		<2.0	<2.0	0%
Benzo(b+j)fluoranthene	mg/kg	0.5		0.7	0.5	33%		<0.5	<0.5	0%		<2.0	<2.0	0%
Benzo(k)fluoranthene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<2.0	<2.0	0%
Benzo(a)pyrene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<2.0	<2.0	0%
Indeno(1.2.3.cd)pyrene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<2.0	<2.0	0%
Dibenz(a.h)anthracene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<2.0	<2.0	0%
Benzo(g.h.i)perylene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<2.0	<2.0	0%
Sum of polycyclic aromatic hydrocarbons	mg/kg	0.5		4.9	0.5	163%		<0.5	<0.5	0%		<1.0	<1.0	0%
Benzo(a)pyrene TEQ (zero)	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<1.0	<1.0	0%
Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5		0.7	0.6	15%		0.6	0.6	0%		<1.0	<1.0	0%
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5		1.2	1.2	0%		1.2	1.2	0%		1.2	1.2	0%
Total Petroleum Hydrocarbons (TPH)														
C6 - C9 Fraction	mg/kg	10		<10	<10	0%		<10	<10	0%		<10	<10	0%
C10 - C14 Fraction	mg/kg	50		<50	<50	0%		<50	<50	0%		<110	<110	0%
C15 - C28 Fraction	mg/kg	100		400	100	120%		<100	<100	0%		540	220	**145%**
C29 - C36 Fraction	mg/kg	100		190	100	62%		<100	<100	0%		790	220	**259%**
C10 - C36 Fraction (sum)	mg/kg	50		590	50	169%		<50	<50	0%		1330	110	**1109%**
										0%				0%
Total Recoverable Hydrocarbons - NEPM 2013 Fractions										0%				0%
C6 - C10 Fraction	mg/kg	10		<10	<10	0%		<10	<10	0%		<10	<10	0%
C6 - C10 Fraction minus BTEX (F1)	mg/kg	10		<10	<10	0%		<10	<10	0%		<10	<10	0%
>C10 - C16 Fraction	mg/kg	50		70	50	33%		<50	<50	0%		<110	<110	0%
>C16 - C34 Fraction	mg/kg	100		520	100	**135%**		120	100	18%		1050	110	**855%**
>C34 - C40 Fraction	mg/kg	100		130	100	26%		120	100	18%		610	110	**455%**
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	50		70	50	33%		<50	<50	0%		<110	<110	0%
BTEXN														
Benzene	mg/kg	0.2		<0.2	<0.2	0%		<0.2	<0.2	0%		<0.5	<0.5	0%
Toluene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<0.5	<0.5	0%
Ethylbenzene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<0.5	<0.5	0%
meta- & para-Xylene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<0.5	<0.5	0%
ortho-Xylene	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<0.5	<0.5	0%
Total Xylenes	mg/kg	0.5		<0.5	<0.5	0%		<0.5	<0.5	0%		<0.5	<0.5	0%
Sum of BTEX	mg/kg	0.2		<0.2	<0.2	0%		<0.2	<0.2	0%		<0.2	<0.2	0%
Naphthalene	mg/kg	1		<1	<1	0%		<1	<1	0%		<1	<1	0%

Appendix C – Borelogs

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Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** TP1
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 2.3m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
				Road Base - sand, dark grey, dry, angular	
0.2		TP1-0.2		**Fill -** clayey sand, brown, dry 50% rubble, demo waste, bricks, lead flashing, terracotta, styrofoam, glass, possible ACM	
0.5					
1.0		TP1-ACM1(0.8m) TP1-1.0		Possible FA @ 1.0m	
1.5		TP1-ACM2		Increasing ACM	
				ACM throughout	
2.0				Sandstone boulders @ base	
2.3				EOH @2.3m	
2.5				(likely natural @2.3m)	
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

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Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** TP2
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.4m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
				Road base	
0.3				**Fill** - sandstone / clay / asphalt, mixed	
0.4				**Fill** - sand, medium grained, orange	
0.5				EOH @ 0.4m (refusal on sandstone)	
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

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Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** TP3
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 2.5m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.15				**Concrete**	
0.5		TP3 - 0.5		**Fill -** sand, gravel, cobbles, concrete, dark brown wood	
1.0					
1.1				**Fill -** crushed sandstone, cobbles, boulders, wood, cans, minor clay	
1.5					
2.0		TP3 - 2.0			
2.5				EOH @2.5m (likely residual sandstone @ base, hole abandoned due to collapse / danger)	
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** TP4
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 1.6m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.1		TP4 - 0.1		**Road Base -** sandy, dark grey, dry, angular	
0.5		TP4 - 0.5 QC1		**Fill -** sandy ckay, sandstone cobbles / doublders, broken terrracotta, old pipe serivce @ 0.3m, some ash, possible slag	
1.0					
1.5		TP4 - 1.5		Bricks at bottom	
1.6				EOH @1.6m (refusal on sandstone @ 1.6m)	
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** TP5
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 1.7m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.15				**Road Base -** sandy, dark grey, dry, angular	
0.5		TP5 - 0.3 QC2		**Fill -** sand, dark brown / black sand with gravels Some rubbish / ash / bottles	
0.6					
1.0		TP5 - 1.5		**Fill** - ripped sandstone, orange / red sand	
1.1				**Sand -** tan / brown, natural	
1.5		TP5 - 1.5		**Residual sandstone -** medium to coarse grain sand, some clay, some sandstone gravels	NOS
1.7					
2.0				EOH @1.7m (refusal on sandstone @ 1.7m)	
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** TP6
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 2.0m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.30		TP6 - 0.1		**Fill -** sand, dark brown, rubbish, grey road base, glass, ash, some clay	
0.5 1.0 1.5 2.0		TP6 - 1.3		**Fill** - ripped sandstone, coarse to medium grained, sandstone cobbles, boulders, tan / light grey	NOS
2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5				EOH @ 2.0m (refusal on assumed sandstone)	

Notes:

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Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** TP7
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 2.4m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.20		TP7 - 0.1		**Fill -** sand, dark brown, rubbish, grey road base, glass, ash, some clay	
0.5				**Fill** - ripped sandstone, coarse to medium grained, sandstone cobbles, boulders, tan / light grey	
1.0					
1.5					NOS
		TP7 - 1.8			
2.0		TP7 - 2.1		**Sand -** fine grained, brown, minor clay (likely associated with creek)	
2.5				EOH @ 2.4m	
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** TP8
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 1.3m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.20		TP8 - 0.1 QC3		**Fill -** sand, demolition waste (glass, brick, ceramics, polystyrene)	
0.5 1.0		TP8 - 0.7		**Fill** - sandstone cobbles, boulders, old terracotta pipe @0.3m (now broken)	
1.3 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5				EOH @ 1.3m (in fill - stopped to avoid damaging erosion controls)	

Notes:

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Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** TP9
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 2.2m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
		TP9 - 0.1		**Fill -** sand, fine grained, brown, some ash, terracotta fragments, with a steel bar	
0.30					
0.5				**Fill** - ripped sandstone, cobbles / boulders	
1.0		TP9 - 1.2			
1.3					
1.5					
2.0		TP9 - 2.1			
2.1				**Sand** - natural, coarse grained, orange	
2.2				EOH @ 2.2m (due to collapse)	
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** TP10
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 1.8m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.05				**Concrete Slab**	
0.15		TP10-0.1		**Fill** - sandy, grey, rounded gravels, possible ACM	
0.5		TP10-ACM1 TP10-0.3		**Fill** - ripped sandstone, cobbles / boulders, darker colour than previous, orange piping (now broken)	
1.0		TP10-1.0			
1.5					
2.0		TP10-1.8			
1.8				EOH @ 1.8m (in fill)	
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

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Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** TP11
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.1m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.10				**Topsoil** - grey / brown	
				Concrete Slab	
0.5				EOH @ 0.1m (refusal on concrete slab)	
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

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Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** TP12
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 2.4m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.1				**Top Soil** - grey / brown	
		TP12-0.3		**Fill** - ripped sandstone, light tan, some ash	
0.4					
0.5				**Fill** - sandstone, brown (darker than previous), sandstone boulders, some ash, some clay, minor glass, plastic, bottles, polystyrene	
1.0		TP12-1.0			
		TP12-ACM1			
1.5		TP12-1.4		Possible ACM @1.3	
		TP12-2.0			
2.0		TP12-ACM(2.0m)			
				NB: Natural material beginning @ 2.4m	
1.8					
2.5				EOH @ 2.4m (in natural material)	
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

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Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** TP13
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 1.9m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.1		TP13-0.1		**Top Soil** - grey / brown	
0.4		TP13-0.1		**Fill** - fine grained sand, sandstone cobbles / gravels, some clay, brick, some palstic, some wiring, steel, some terracota Sand blend @ 1.5m	
1.9				EOH @ 1.9m (refusal on sandstone boulders)	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5

Notes:

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Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** HA1
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.6m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.1		HA1-0.1		**Top Soil** - sandy, dark brown	
0.5		HA1-0.5		**Fill** - clayey sand, possible ash	
0.6				EOH @ 0.6m (refusal on sandstone cobbles)	
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

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Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** HA2
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.25m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
		HA2-ACM1(surface)		**Top Soil** - sandy, dark brown	NOS
0.25				EOH @ 0.25m (refusal on sandstone)	
0.5					
0.6					
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

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Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** HA3
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.2m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.2		HA3-0.1		**Fill** - sand, fine grained, brown, dry, some sandstone gravels	NOS
				EOH @ 0.2m (refusal on sandstone cobbles)	
0.5					
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

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Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No:** HA4
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.3m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.3		HA4-0.1		**Fill** - sand, fine grained, brown/grey, dry, sandstone gravels	NOS
0.5				EOH @ 0.3m (refusal on sandstone cobbles)	
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No: EPA**
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.3m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.5		EPA-0.1 EPA-0.4		**Sand** - clayey, fine grained, dark brown, roots, small piece of glass Getting darker, minor road base inclusions Saturated	Hydrogen sulphur odour
0.55				**Fill** - sandstone gravels	
1.0				EOH @ 0.55m (refusal on road base gravels)	Strong H2S odour
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

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Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No: EPB**
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.5m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.2				**Organic material** - plants, stems, leaves	
0.5		EPB-0.3 QC8		**Mud** - silty, brown, saturated	NOS
				EOH @ 0.5m (reached required depth)	
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No: EPC**
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.5m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.1				**Organic material** - plants, stems, leaves	
0.5		EPC (soil) EPCW (water)		**Mud** - silty, brown, saturated, sheen,	Strong hydrocarbon odour
				EOH @ 0.5m (reached required depth)	
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No: EPC (a)**
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.5m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.1				**Organic material** - plants, stems, leaves	
0.5				**Mud** - silty, brown, saturated	NOS
1.0				EOH @ 0.5m (reached required depth) NB: this is 5m upgradient of EPC	
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No: EPC (b)**
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.5m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.1				**Organic material** - plants, stems, leaves	
0.5				**Mud** - silty, brown, saturated	Slight hydrocarbon odour
1.0				EOH @ 0.5m (reached required depth) NB: this is 5m downgradient of EPC	
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No: EPD**
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.5m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.2				**Sand** - silty, dark brown, highly organic	
0.5				EOH @ 0.5m (refusal on roadbase)	NOS
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No: EPD**
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.2m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.2				**Clay** - silty, dark brown, highly organic	
0.5				EOH @ 0.5m (refusal on roadbase)	NOS
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No: EPE**
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.5m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.2				**Clay** - silty, dark brown, highly organic	
0.5				EOH @ 0.5m (refusal on roadbase)	NOS
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No: EPF**
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.3m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
				Sand - silty, dark brown, highly organic	~~NOS~~
0.3					
0.5				EOH @ 0.3m (refusal on roadbase)	
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No: EPG**
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.3m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.01				~~**Sand** - silty, dark brown, highly organic~~	
0.15				EOH @ 0.15m (refusal on roadbase)	
0.5					
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No: T1**
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.2m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.5		TS1		**Organic material -** largely composted, wet	
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

nation partners

Boring Log

Project Name: Lapstone Tunnel DSI		**Client:** Department of Industry	**Boring No: TS2**
Project No: 16073	**Date drilled:** 10/10/2017		~~**Drill Rig Type:**~~
Site Address: 37 Great Western Highway, Glenbrook	**Groundwater Depth:**	**Drilling Contractor:** DJM Excavations	~~**Diameter:**~~
	Elevation:		~~**Hammer Type:**~~
Logged By: DW / AF	**Total Depth:** 0.2m	**Bit Type:**	~~**Drill Crew:**~~

Depth (m)	Sample Type	Sample ID	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors	Contaminant Indicators
0.5		TS2		**Organic material** - composted and uncomposted material, saturated, dark grey, "sludge" NB: collected in same location as T5	H2S odour (did not show up on metre)
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					

Notes:

Appendix D – Laboratory Reports

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1726194**	Page	: 1 of 27
Client	: **NATION PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL WEDGWOOD	Contact	: Customer Services ES
Address	: Suite 209 50 Holt St Surry Hills 2010	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: NP10078 LAPSTONE TUNNEL	Date Samples Received	: 18-Oct-2017 18:00
Order number	: ----	Date Analysis Commenced	: 20-Oct-2017
C-O-C number	: ----	Issue Date	: 26-Oct-2017 15:16
Sampler	: Alexandra Francis, DANIEL WEDGWOOD		
Site	: ----		
Quote number	: SY/525/17		
No. of samples received	: 61		
No. of samples analysed	: 32		

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
- Descriptive 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*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Gerrad Morgan	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, 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.

- EP080: ES1726194_050 has high moisture contents.
- EP071: LOR of samples TS1, TS2,EPb-0.3 and QC8 raised due to the high amount of moisture content present.
- EP203 : LOR has been raised due to high amount of moisture present.
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Ch' Chrysotile (white asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EK061G: Poor matrix spike recovery for TKN due to sample heterogeneity. Confirmed by re-digestion and re-analysis.
- EP068: LOR for sample raised due to high amount of moisture present.
- EP075(SIM):Particular samples required dilution due to samples matrix interferences. LOR values have been adjusted accordingly.
- **EA200: As only one sample container was submitted for multiple tests, sub sampling was conducted on samples ES1726194 - 005, 016, 018 & 040 prior to Asbestos analysis. As this has the potential to understate detection, results should be scrutinised accordingly and NATA accreditation does not apply to analysis on these samples.**
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) 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.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP1-0.2	TP1-1.0	TP2-0.3	TP3-0.5	TP4-0.1
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-001	ES1726194-003	ES1726194-005	ES1726194-007	ES1726194-009
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		10.6	15.4	10.7	14.5	14.9
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		----	----	No	----	----
Asbestos Type	1332-21-4	-	--		----	----	-	----	----
Sample weight (dry)	----	0.01	g		----	----	21.4	----	----
APPROVED IDENTIFIER:	----	-	--		----	----	S.SPOONER	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	5	<5	39	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		7	22	24	28	9
Copper	7440-50-8	5	mg/kg		10	34	26	31	10
Lead	7439-92-1	5	mg/kg		17	48	13	21	35
Nickel	7440-02-0	2	mg/kg		12	11	24	4	5
Zinc	7440-66-6	5	mg/kg		66	302	89	105	116
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EK055: Ammonia as N									
Ammonia as N	7664-41-7	20	mg/kg		----	<20	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg		----	<0.1	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg		----	2.5	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg		----	2.5	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	20	mg/kg		----	1520	----	----	----
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg		----	1520	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg		----	370	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.1	mg/kg		----	<0.1	----	----	----
EP066: Polychlorinated Biphenyls (PCB)									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP1-0.2	TP1-1.0	TP2-0.3	TP3-0.5	TP4-0.1
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-001	ES1726194-003	ES1726194-005	ES1726194-007	ES1726194-009
					Result	Result	Result	Result	Result
EP066: Polychlorinated Biphenyls (PCB) - Continued									
Total Polychlorinated biphenyls	----	0.1	mg/kg		----	<0.1	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		----	<0.05	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		----	<0.05	----	----	----
beta-BHC	319-85-7	0.05	mg/kg		----	<0.05	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg		----	<0.05	----	----	----
delta-BHC	319-86-8	0.05	mg/kg		----	<0.05	----	----	----
Heptachlor	76-44-8	0.05	mg/kg		----	<0.05	----	----	----
Aldrin	309-00-2	0.05	mg/kg		----	<0.05	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		----	<0.05	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg		----	<0.05	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		----	<0.05	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		----	<0.05	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		----	<0.05	----	----	----
Dieldrin	60-57-1	0.05	mg/kg		----	<0.05	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		----	<0.05	----	----	----
Endrin	72-20-8	0.05	mg/kg		----	<0.05	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	<0.05	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		----	<0.05	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	<0.05	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	<0.05	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		----	<0.2	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		----	<0.05	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg		----	<0.2	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		----	<0.05	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		----	<0.05	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		----	<0.05	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		----	<0.05	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		----	<0.2	----	----	----
Dimethoate	60-51-5	0.05	mg/kg		----	<0.05	----	----	----
Diazinon	333-41-5	0.05	mg/kg		----	<0.05	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		----	<0.05	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		----	<0.2	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP1-0.2	TP1-1.0	TP2-0.3	TP3-0.5	TP4-0.1
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-001	ES1726194-003	ES1726194-005	ES1726194-007	ES1726194-009
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
Malathion	121-75-5	0.05	mg/kg		----	<0.05	----	----	----
Fenthion	55-38-9	0.05	mg/kg		----	<0.05	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		----	<0.05	----	----	----
Parathion	56-38-2	0.2	mg/kg		----	<0.2	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		----	<0.05	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		----	<0.05	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		----	<0.05	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg		----	<0.05	----	----	----
Ethion	563-12-2	0.05	mg/kg		----	<0.05	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg		----	<0.05	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		----	<0.05	----	----	----
EP068C: Triazines									
Atrazine	1912-24-9	0.05	mg/kg		----	<0.05	----	----	----
Simazine	122-34-9	0.05	mg/kg		----	<0.05	----	----	----
EP068D: Cypermethrins									
Cypermethrins(total)	52315-07-8	0.2	mg/kg		----	<0.2	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<4.0
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**18.1**
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**10.0**
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**33.3**
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	**1.3**	<0.5	**399**
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**67.3**
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	**0.7**	**4.3**	<0.5	**439**
Pyrene	129-00-0	0.5	mg/kg		<0.5	**0.7**	**3.7**	<0.5	**422**
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	**1.2**	<0.5	**138**
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	**1.1**	<0.5	**128**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	**1.5**	<0.5	**169**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	**0.6**	<0.5	**61.7**
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	**1.4**	<0.5	**194**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	**1.0**	<0.5	**107**
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**17.3**
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	**1.2**	<0.5	**172**
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	**1.4**	**17.3**	<0.5	**2380**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP1-0.2	TP1-1.0	TP2-0.3	TP3-0.5	TP4-0.1
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-001	ES1726194-003	ES1726194-005	ES1726194-007	ES1726194-009
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	1.8	<0.5	262
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	2.1	0.6	262
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	2.4	1.2	262
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	4510
C29 - C36 Fraction	----	100	mg/kg		130	220	180	<100	2550
^ C10 - C36 Fraction (sum)	----	50	mg/kg		130	220	180	<50	7060
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	190
>C16 - C34 Fraction	----	100	mg/kg		120	240	180	<100	5900
>C34 - C40 Fraction	----	100	mg/kg		160	240	240	<100	1740
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		280	480	420	<50	7830
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	190
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	1330-20-7	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	2
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	104	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	123	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	95.8	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP1-0.2	TP1-1.0	TP2-0.3	TP3-0.5	TP4-0.1
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-001	ES1726194-003	ES1726194-005	ES1726194-007	ES1726194-009
					Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		101	93.3	84.9	102	79.0
2-Chlorophenol-D4	93951-73-6	0.5	%		101	99.8	93.4	97.8	78.0
2.4.6-Tribromophenol	118-79-6	0.5	%		87.2	81.5	74.1	80.0	74.1
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		90.8	92.3	88.0	91.2	71.7
Anthracene-d10	1719-06-8	0.5	%		94.6	92.1	85.9	89.8	78.8
4-Terphenyl-d14	1718-51-0	0.5	%		91.8	95.9	82.6	100	79.7
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		107	106	107	125	118
Toluene-D8	2037-26-5	0.2	%		122	120	118	126	122
4-Bromofluorobenzene	460-00-4	0.2	%		113	114	111	86.4	83.4

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP4-0.5	TP5-0.3	TP7-0.1	TP8-0.1	TP9-0.1
			Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit	ES1726194-010	ES1726194-012	ES1726194-016	ES1726194-018	ES1726194-019
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	22.1	15.0	10.7	37.4	8.5
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	----	----	No	No	----
Asbestos Type	1332-21-4	-	--	----	----	-	-	----
Sample weight (dry)	----	0.01	g	----	----	12.6	24.1	----
APPROVED IDENTIFIER:	----	-	--	----	----	S.SPOONER	S.SPOONER	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	10	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	10	8	7	10	10
Copper	7440-50-8	5	mg/kg	121	22	12	20	10
Lead	7439-92-1	5	mg/kg	42	44	71	176	23
Nickel	7440-02-0	2	mg/kg	8	3	2	5	3
Zinc	7440-66-6	5	mg/kg	27	84	152	508	88
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
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	1.8	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	1.0	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	0.9	28.6	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	7.8	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	1.1	40.0	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	1.0	49.4	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	0.6	16.8	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	0.6	16.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	0.7	16.4	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	5.8	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	13.2	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3.9	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	1.3	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	4.0	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	4.9	206	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP4-0.5	TP5-0.3	TP7-0.1	TP8-0.1	TP9-0.1
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-010	ES1726194-012	ES1726194-016	ES1726194-018	ES1726194-019
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	**19.0**	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.7**	**19.0**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**19.0**	**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		**400**	**760**	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		**190**	**360**	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		**590**	**1120**	<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		**70**	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		**520**	**980**	<100	**120**	<100
>C34 - C40 Fraction	----	100	mg/kg		**130**	**250**	<100	**120**	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		**720**	**1230**	<50	**240**	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		**70**	<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	1330-20-7	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
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**85.3**	**80.0**	**84.4**	**78.0**	**81.6**
2-Chlorophenol-D4	93951-73-6	0.5	%		**97.3**	**93.6**	**96.4**	**90.7**	**90.1**
2.4.6-Tribromophenol	118-79-6	0.5	%		**74.7**	**72.9**	**76.7**	**73.7**	**71.3**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**101**	**103**	**95.6**	**84.6**	**91.4**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP4-0.5	TP5-0.3	TP7-0.1	TP8-0.1	TP9-0.1
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-010	ES1726194-012	ES1726194-016	ES1726194-018	ES1726194-019
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued									
Anthracene-d10	1719-06-8	0.5	%		91.3	93.4	91.8	85.0	88.3
4-Terphenyl-d14	1718-51-0	0.5	%		84.3	87.9	89.5	86.2	91.4
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		110	109	121	92.4	105
Toluene-D8	2037-26-5	0.2	%		106	107	124	93.5	104
4-Bromofluorobenzene	460-00-4	0.2	%		73.2	73.7	85.2	75.8	82.4

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP9-1.2	TP10-0.1	TP13-0.1	QC1	QC3
			Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit	ES1726194-020	ES1726194-022	ES1726194-032	ES1726194-034	ES1726194-036
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	5.9	29.7	22.3	17.1	19.3
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	7	<5	9	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	4	16	5	8	9
Copper	7440-50-8	5	mg/kg	9	22	<5	104	20
Lead	7439-92-1	5	mg/kg	<5	42	12	29	144
Nickel	7440-02-0	2	mg/kg	<2	10	<2	7	5
Zinc	7440-66-6	5	mg/kg	<5	232	33	20	389
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP9-1.2	TP10-0.1	TP13-0.1	QC1	QC3
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-020	ES1726194-022	ES1726194-032	ES1726194-034	ES1726194-036
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
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	1330-20-7	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
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**86.5**	**83.4**	**86.2**	**86.4**	**82.9**
2-Chlorophenol-D4	93951-73-6	0.5	%		**89.4**	**86.2**	**89.9**	**89.4**	**84.9**
2.4.6-Tribromophenol	118-79-6	0.5	%		**77.9**	**79.6**	**80.5**	**78.6**	**76.3**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**100**	**96.9**	**99.6**	**99.5**	**97.1**
Anthracene-d10	1719-06-8	0.5	%		**97.3**	**94.0**	**98.0**	**97.1**	**94.4**
4-Terphenyl-d14	1718-51-0	0.5	%		**95.3**	**91.4**	**93.6**	**93.7**	**91.3**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**116**	**108**	**100**	**102**	**112**
Toluene-D8	2037-26-5	0.2	%		**115**	**104**	**97.3**	**95.5**	**109**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP9-1.2	TP10-0.1	TP13-0.1	QC1	QC3
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-020	ES1726194-022	ES1726194-032	ES1726194-034	ES1726194-036
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%		**77.9**	**80.5**	**78.6**	**75.0**	**84.0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HA1-0.5	HA3-0.1	HA4-0.1	TS1	TS2
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-038	ES1726194-040	ES1726194-041	ES1726194-049	ES1726194-050
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		25.8	20.9	17.9	77.6	89.0
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		----	No	----	----	----
Asbestos Type	1332-21-4	-	--		----	-	----	----	----
Sample weight (dry)	----	0.01	g		----	44.0	----	----	----
APPROVED IDENTIFIER:	----	-	--		----	S.SPOONER	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	20	6	7
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	1	<1
Chromium	7440-47-3	2	mg/kg		8	18	208	25	16
Copper	7440-50-8	5	mg/kg		16	<5	44	148	102
Lead	7439-92-1	5	mg/kg		31	7	14	90	70
Nickel	7440-02-0	2	mg/kg		2	11	284	72	46
Zinc	7440-66-6	5	mg/kg		109	22	97	1690	1690
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	0.4	0.3
EK055: Ammonia as N									
Ammonia as N	7664-41-7	20	mg/kg		----	----	----	----	100
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg		----	----	----	----	0.5
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg		----	----	----	----	3.7
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg		----	----	----	----	4.2
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	20	mg/kg		----	----	----	----	14400
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg		----	----	----	----	14400
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg		----	----	----	----	8370
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.1	mg/kg		----	----	----	----	5.0
EP066: Polychlorinated Biphenyls (PCB)									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HA1-0.5	HA3-0.1	HA4-0.1	TS1	TS2
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-038	ES1726194-040	ES1726194-041	ES1726194-049	ES1726194-050
					Result	Result	Result	Result	Result
EP066: Polychlorinated Biphenyls (PCB) - Continued									
Total Polychlorinated biphenyls	----	0.1	mg/kg		----	----	----	<0.1	<0.2
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
beta-BHC	319-85-7	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
gamma-BHC	58-89-9	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
delta-BHC	319-86-8	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Heptachlor	76-44-8	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Aldrin	309-00-2	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Heptachlor epoxide	1024-57-3	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
^ Total Chlordane (sum)	----	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
trans-Chlordane	5103-74-2	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
alpha-Endosulfan	959-98-8	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
cis-Chlordane	5103-71-9	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Dieldrin	60-57-1	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
4.4`-DDE	72-55-9	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Endrin	72-20-8	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
4.4`-DDD	72-54-8	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
4.4`-DDT	50-29-3	0.2	mg/kg		----	<0.2	----	<0.3	<0.5
Endrin ketone	53494-70-5	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Methoxychlor	72-43-5	0.2	mg/kg		----	<0.2	----	<0.3	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Demeton-S-methyl	919-86-8	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Monocrotophos	6923-22-4	0.2	mg/kg		----	<0.2	----	<0.3	<0.5
Dimethoate	60-51-5	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Diazinon	333-41-5	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Parathion-methyl	298-00-0	0.2	mg/kg		----	<0.2	----	<0.3	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HA1-0.5	HA3-0.1	HA4-0.1	TS1	TS2
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-038	ES1726194-040	ES1726194-041	ES1726194-049	ES1726194-050
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
Malathion	121-75-5	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Fenthion	55-38-9	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Chlorpyrifos	2921-88-2	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Parathion	56-38-2	0.2	mg/kg		----	<0.2	----	<0.3	<0.5
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Bromophos-ethyl	4824-78-6	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Fenamiphos	22224-92-6	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Prothiofos	34643-46-4	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Ethion	563-12-2	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Carbophenothion	786-19-6	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Azinphos Methyl	86-50-0	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
EP068C: Triazines									
Atrazine	1912-24-9	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
Simazine	122-34-9	0.05	mg/kg		----	<0.05	----	<0.06	<0.12
EP068D: Cypermethrins									
Cypermethrins(total)	52315-07-8	0.2	mg/kg		----	<0.2	----	<0.3	<0.5
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<1.0	<2.0
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<1.0	<2.0
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<1.0	<2.0
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<1.0	<2.0
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	**2.3**	<2.0
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	**1.1**	<2.0
Fluoranthene	206-44-0	0.5	mg/kg		**1.9**	<0.5	<0.5	**6.4**	**5.4**
Pyrene	129-00-0	0.5	mg/kg		**2.2**	<0.5	<0.5	**6.6**	**5.6**
Benz(a)anthracene	56-55-3	0.5	mg/kg		**1.4**	<0.5	<0.5	**2.9**	**2.5**
Chrysene	218-01-9	0.5	mg/kg		**1.5**	<0.5	<0.5	**3.0**	**2.3**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		**2.0**	<0.5	<0.5	**5.8**	**4.3**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		**0.9**	<0.5	<0.5	**2.1**	<2.0
Benzo(a)pyrene	50-32-8	0.5	mg/kg		**1.9**	<0.5	<0.5	**4.2**	**3.0**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		**0.9**	<0.5	<0.5	**2.4**	<2.0
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<1.0	<2.0
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		**1.2**	<0.5	<0.5	**3.2**	<2.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		**13.9**	<0.5	<0.5	**40.0**	**23.1**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HA1-0.5	HA3-0.1	HA4-0.1	TS1	TS2
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-038	ES1726194-040	ES1726194-041	ES1726194-049	ES1726194-050
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		**2.4**	<0.5	<0.5	**5.6**	**3.7**
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**2.7**	**0.6**	**0.6**	**5.8**	**4.0**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**2.9**	**1.2**	**1.2**	**6.1**	**4.3**
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	<60	<110
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	**750**	**1080**
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	**1250**	**1460**
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	**2000**	**2540**
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	<60	<110
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	**1570**	**1910**
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	**960**	**1380**
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	**2530**	**3290**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<60	<110
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.5
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	1330-20-7	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
EP203A: Explosives									
HMX	2691-41-0	0.1	mg/kg		----	----	----	----	<0.5
RDX	----	0.1	mg/kg		----	----	----	----	<0.5
1.3.5-Trinitrobenzene	99-35-4	0.1	mg/kg		----	----	----	----	<0.5
1.3-Dinitrobenzene	99-65-0	0.1	mg/kg		----	----	----	----	<0.5
Tetryl	479-45-8	0.1	mg/kg		----	----	----	----	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HA1-0.5	HA3-0.1	HA4-0.1	TS1	TS2
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-038	ES1726194-040	ES1726194-041	ES1726194-049	ES1726194-050
					Result	Result	Result	Result	Result
EP203A: Explosives - Continued									
2.4.6-TNT	118-96-7	0.1	mg/kg		----	----	----	----	<0.5
4-Amino.2.6-DNT	19406-51-0	0.1	mg/kg		----	----	----	----	<0.5
2-Amino-4.6-DNT	35572-78-2	0.1	mg/kg		----	----	----	----	<0.5
4-& 2-AM-DNT(Isomeric Mixture)	----	0.1	mg/kg		----	----	----	----	<0.1
2.4-Dinitrotoluene	121-14-2	0.1	mg/kg		----	----	----	----	<0.5
2.6-Dinitrotoluene	606-20-2	0.1	mg/kg		----	----	----	----	<0.5
2.4-& 2.6-DNT(Isomeric Mixture)	51-28-5/606-20-2	0.1	mg/kg		----	----	----	----	<0.1
Nitrobenzene	98-95-3	0.1	mg/kg		----	----	----	----	<0.5
2-Nitrotoluene	88-72-2	0.1	mg/kg		----	----	----	----	<0.5
3-Nitrotoluene	99-08-1	0.1	mg/kg		----	----	----	----	<0.5
4-Nitrotoluene	99-99-0	0.1	mg/kg		----	----	----	----	<0.5
Nitroglycerine	55-63-0	1	mg/kg		----	----	----	----	<5
PETN	78-11-5	1	mg/kg		----	----	----	----	<5
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	----	----	91.9	91.5
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	130	----	108	123
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	115	----	94.4	109
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		91.8	85.6	83.4	84.6	84.5
2-Chlorophenol-D4	93951-73-6	0.5	%		94.8	84.4	81.5	81.6	88.9
2.4.6-Tribromophenol	118-79-6	0.5	%		85.3	71.1	70.6	73.8	81.4
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		107	100	101	102	86.5
Anthracene-d10	1719-06-8	0.5	%		104	87.0	82.4	85.5	90.5
4-Terphenyl-d14	1718-51-0	0.5	%		99.8	82.4	86.4	87.6	90.1
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		115	106	106	88.3	84.1
Toluene-D8	2037-26-5	0.2	%		111	104	102	83.3	89.4
4-Bromofluorobenzene	460-00-4	0.2	%		75.8	80.9	80.7	91.3	84.0
EP203S: Explosives Surrogate									
o-Dinitrobenzene	528-29-0	0.1	%		----	----	----	----	73.3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	EPA-0.1	EPA-0.4	EPB-0.3	EPC-0.2	EPD-0.15
			Client sampling date / time	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00
Compound	CAS Number	LOR	Unit	ES1726194-051	ES1726194-052	ES1726194-053	ES1726194-054	ES1726194-055
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	34.5	31.2	86.1	81.6	19.5
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	20	31	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	3	<1	<1
Chromium	7440-47-3	2	mg/kg	6	8	17	20	8
Copper	7440-50-8	5	mg/kg	17	25	105	235	70
Lead	7439-92-1	5	mg/kg	26	44	85	236	51
Nickel	7440-02-0	2	mg/kg	3	8	193	53	8
Zinc	7440-66-6	5	mg/kg	52	158	2440	574	126
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.4	0.4	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	<0.1	<0.2	<0.2	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<2.0	<2.0	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<2.0	<2.0	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<2.0	<2.0	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<2.0	<2.0	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<2.0	<2.0	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<2.0	<2.0	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<2.0	5.8	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<2.0	8.1	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<2.0	<2.0	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<2.0	<2.0	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<2.0	2.2	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<2.0	<2.0	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<2.0	<2.0	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<2.0	<2.0	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<2.0	<2.0	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<2.0	<2.0	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<1.0	16.1	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<1.0	<1.0	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	<1.0	<1.0	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.4	1.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	EPA-0.1	EPA-0.4	EPB-0.3	EPC-0.2	EPD-0.15
				Client sampling date / time	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-051	ES1726194-052	ES1726194-053	ES1726194-054	ES1726194-055
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<110	**2230**	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	**540**	**12800**	<100
C29 - C36 Fraction	----	100	mg/kg		**130**	<100	**790**	**1530**	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		**130**	<50	**1330**	**16600**	<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	<110	**5280**	<50
>C16 - C34 Fraction	----	100	mg/kg		**120**	**120**	**1050**	**10400**	**120**
>C34 - C40 Fraction	----	100	mg/kg		**140**	<100	**610**	**1080**	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		**260**	**120**	**1660**	**16800**	**120**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<110	**5280**	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.5	<0.5	<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	1330-20-7	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
EP203A: Explosives									
HMX	2691-41-0	0.1	mg/kg		----	<0.1	----	----	----
RDX	----	0.1	mg/kg		----	<0.1	----	----	----
1.3.5-Trinitrobenzene	99-35-4	0.1	mg/kg		----	<0.1	----	----	----
1.3-Dinitrobenzene	99-65-0	0.1	mg/kg		----	<0.1	----	----	----
Tetryl	479-45-8	0.1	mg/kg		----	<0.1	----	----	----
2.4.6-TNT	118-96-7	0.1	mg/kg		----	<0.1	----	----	----
4-Amino.2.6-DNT	19406-51-0	0.1	mg/kg		----	<0.1	----	----	----
2-Amino-4.6-DNT	35572-78-2	0.1	mg/kg		----	<0.1	----	----	----
4-& 2-AM-DNT(Isomeric Mixture)	----	0.1	mg/kg		----	<0.1	----	----	----
2.4-Dinitrotoluene	121-14-2	0.1	mg/kg		----	<0.1	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	EPA-0.1	EPA-0.4	EPB-0.3	EPC-0.2	EPD-0.15
				Client sampling date / time	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726194-051	ES1726194-052	ES1726194-053	ES1726194-054	ES1726194-055
					Result	Result	Result	Result	Result
EP203A: Explosives - Continued									
2.6-Dinitrotoluene	606-20-2	0.1	mg/kg		----	<0.1	----	----	----
2.4-& 2.6-DNT(Isomeric Mixture)	51-28-5/606-20-2	0.1	mg/kg		----	<0.1	----	----	----
Nitrobenzene	98-95-3	0.1	mg/kg		----	<0.1	----	----	----
2-Nitrotoluene	88-72-2	0.1	mg/kg		----	<0.1	----	----	----
3-Nitrotoluene	99-08-1	0.1	mg/kg		----	<0.1	----	----	----
4-Nitrotoluene	99-99-0	0.1	mg/kg		----	<0.1	----	----	----
Nitroglycerine	55-63-0	1	mg/kg		----	<1	----	----	----
PETN	78-11-5	1	mg/kg		----	<1	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	102	78.6	86.6	76.1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		83.6	87.3	83.5	87.4	90.8
2-Chlorophenol-D4	93951-73-6	0.5	%		83.7	90.6	84.0	88.7	93.2
2.4.6-Tribromophenol	118-79-6	0.5	%		77.2	77.8	75.0	77.4	83.6
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		95.4	100	91.6	90.8	96.2
Anthracene-d10	1719-06-8	0.5	%		88.0	93.0	83.2	91.3	92.4
4-Terphenyl-d14	1718-51-0	0.5	%		87.0	86.7	88.1	96.3	96.5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		73.5	92.8	75.6	74.0	99.8
Toluene-D8	2037-26-5	0.2	%		77.9	88.0	82.1	79.8	98.6
4-Bromofluorobenzene	460-00-4	0.2	%		80.1	88.9	81.2	78.4	93.6
EP203S: Explosives Surrogate									
o-Dinitrobenzene	528-29-0	0.1	%		----	75.0	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QC8	----	----	----	----
			Client sampling date / time	18-Oct-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1726194-056	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**88.6**	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**20**	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	**2**	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**18**	----	----	----	----
Copper	7440-50-8	5	mg/kg	**107**	----	----	----	----
Lead	7439-92-1	5	mg/kg	**88**	----	----	----	----
Nickel	7440-02-0	2	mg/kg	**160**	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**1750**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.4**	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.2	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<2.0	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<2.0	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<2.0	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<2.0	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<2.0	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<2.0	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<2.0	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<2.0	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<2.0	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<2.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<2.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<2.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<2.0	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<2.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<2.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<2.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<1.0	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<1.0	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	<1.0	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	QC8	----	----	----	----
				Client sampling date / time	18-Oct-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1726194-056	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<110	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<220	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<220	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<110	----	----	----	----
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		<110	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<110	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<110	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<110	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<110	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.5	----	----	----	----
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**	1330-20-7	0.5	mg/kg		<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**92.6**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**84.6**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**82.1**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**73.8**	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**90.5**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		**90.0**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**85.3**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	QC8	----	----	----	----
				Client sampling date / time	18-Oct-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1726194-056	--------	--------	--------	--------
					Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**74.3**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		**75.2**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**77.2**	----	----	----	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOLID)			Client sample ID	TP1-ACM2	TP10-ACM1	TP12-ACM1	HA2-ACM1	ACM SURFACE 1
			Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit	ES1726194-004	ES1726194-023	ES1726194-028	ES1726194-039	ES1726194-042
				Result	Result	Result	Result	Result
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**Yes**	**Yes**	**No**	**Yes**
Asbestos Type	1332-21-4	-	--	**-**	**Ch + Am + Cr**	**Ch**	**-**	**Ch**
Sample weight (dry)	----	0.01	g	**6.21**	**17.7**	**3.05**	**9.19**	**7.98**
APPROVED IDENTIFIER:	----	-	--	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**

Analytical Results

Sub-Matrix: SOLID (Matrix: SOLID)				Client sample ID	ACM SURFACE 5	----	----	----	----
				Client sampling date / time	17-Oct-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1726194-046	--------	--------	--------	--------
					Result	----	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos Detected	1332-21-4	0.1	g/kg		**Yes**	----	----	----	----
Asbestos Type	1332-21-4	-	--		**Ch**	----	----	----	----
Sample weight (dry)	----	0.01	g		**5.75**	----	----	----	----
APPROVED IDENTIFIER:	----	-	--		**G.MORGAN**	----	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	TP2-0.3 - 17-Oct-2017 00:00	Mid brown sandy soil.
EA200: Description	TP7-0.1 - 17-Oct-2017 00:00	Mid brown sandy soil.
EA200: Description	TP8-0.1 - 17-Oct-2017 00:00	Mid brown sandy soil.
EA200: Description	HA3-0.1 - 17-Oct-2017 00:00	Mid brown sandy soil.

Sub-Matrix: **SOLID**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples		
EA200: Description	TP1-ACM2 - 17-Oct-2017 00:00	A collection of synthetic mineral fibre insulation.
EA200: Description	TP10-ACM1 - 17-Oct-2017 00:00	One piece of asbestos cement sheeting approximately 80 x 45 x 5mm.
EA200: Description	TP12-ACM1 - 17-Oct-2017 00:00	One piece of asbestos cement sheeting approximately 25 x 20 x 4mm.
EA200: Description	HA2-ACM1 - 17-Oct-2017 00:00	Two pieces of cement sheeting approximately 40 x 25 x 5mm.
EA200: Description	ACM SURFACE 1 - 17-Oct-2017 00:00	One piece of asbestos cement sheeting approximately 50 x 40 x 4mm.
EA200: Description	ACM SURFACE 5 - 17-Oct-2017 00:00	One piece of asbestos cement sheeting approximately 50 x 25 x 4mm.

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
EP203S: Explosives Surrogate			
o-Dinitrobenzene	528-29-0	50	144

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1727660**	Page	: 1 of 2
Client	: **NATION PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL WEDGWOOD	Contact	: Customer Services ES
Address	: Suite 209 50 Holt St Surry Hills 2010	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: NP10078 LAPSTONE TUNNEL	Date Samples Received	: 18-Oct-2017 18:00
Order number	: ----	Date Analysis Commenced	: 20-Oct-2017
C-O-C number	: ----	Issue Date	: 13-Nov-2017 10:20
Sampler	: Alexandra Francis, DANIEL WEDGWOOD		
Site	: ----		
Quote number	: SY/525/17		
No. of samples received	: 3		
No. of samples analysed	: 3		

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

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*
Edwandy Fadjar	Organic Coordinator	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.

- EP071: LOR of samples TS2 and EPB-0.3 raised due to the high amount of moisture content present.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TS2 ES1726194-050	EPB-0.3 ES1726194-053	EPC-0.2 ES1726194-054	----	----
			Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1727660-001	ES1727660-002	ES1727660-003	--------	--------
				Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**87.2**	**87.0**	**76.5**	**----**	**----**
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	50	mg/kg	<110	<110	**1840**	**----**	**----**
>C16 - C34 Fraction	----	100	mg/kg	<110	<110	**2490**	**----**	**----**
>C34 - C40 Fraction	----	100	mg/kg	<110	<110	<100	**----**	**----**
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<110	<110	**4330**	**----**	**----**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<110	<110	**1840**	**----**	**----**
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup								
C10 - C14 Fraction	----	50	mg/kg	<110	<110	**730**	**----**	**----**
C15 - C28 Fraction	----	100	mg/kg	<220	<220	**3410**	**----**	**----**
C29 - C36 Fraction	----	100	mg/kg	<220	<220	**160**	**----**	**----**
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<110	<110	**4300**	**----**	**----**

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1727660**	Page	: 1 of 3
Client	: **NATION PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL WEDGWOOD	Contact	: Customer Services ES
Address	: Suite 209 50 Holt St Surry Hills 2010	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: NP10078 LAPSTONE TUNNEL	Date Samples Received	: 18-Oct-2017
Order number	: ----	Date Analysis Commenced	: 20-Oct-2017
C-O-C number	: ----	Issue Date	: 13-Nov-2017
Sampler	: Alexandra Francis, DANIEL WEDGWOOD		
Site	: ----		
Quote number	: SY/525/17		
No. of samples received	: 3		
No. of samples analysed	: 3		

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*
Edwandy Fadjar	Organic Coordinator	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 (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1224078)									
ES1727610-009	Anonymous	EA055: Moisture Content	----	1	%	6.9	7.1	2.61	No Limit
ES1727667-002	Anonymous	EA055: Moisture Content	----	1	%	8.9	8.8	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
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 1222894)								
EP071SG-S: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	99.7	80	116
EP071SG-S: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	99.6	85	115
EP071SG-S: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	99.6	75	123
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 1222894)								
EP071SG-S: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	97.3	89	109
EP071SG-S: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	94.1	84	112
EP071SG-S: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	100	71	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.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1727660**	Page	: 1 of 4
Client	: **NATION PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL WEDGWOOD	Telephone	: +61-2-8784 8555
Project	: NP10078 LAPSTONE TUNNEL	Date Samples Received	: 18-Oct-2017
Site	: ----	Issue Date	: 13-Nov-2017
Sampler	: Alexandra Francis, DANIEL WEDGWOOD	No. of samples received	: 3
Order number	: ----	No. of samples analysed	: 3

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

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°C)						
Soil Glass Jar - Unpreserved TS2 - ES1726194-050, EPB-0.3 - ES1726194-053, EPC-0.2 - ES1726194-054	----	----	----	06-Nov-2017	31-Oct-2017	**6**

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction (Silica Gel Clean Up)	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction (Silica Gel Clean Up)	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

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) TS2 - ES1726194-050, EPB-0.3 - ES1726194-053, EPC-0.2 - ES1726194-054	**17-Oct-2017**	**----**	----	----	**06-Nov-2017**	31-Oct-2017	×
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Soil Glass Jar - Unpreserved (EP071SG-S) TS2 - ES1726194-050, EPB-0.3 - ES1726194-053, EPC-0.2 - ES1726194-054	**17-Oct-2017**	**20-Oct-2017**	31-Oct-2017	✓	**09-Nov-2017**	29-Nov-2017	✓
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup							
Soil Glass Jar - Unpreserved (EP071SG-S) TS2 - ES1726194-050, EPB-0.3 - ES1726194-053, EPC-0.2 - ES1726194-054	**17-Oct-2017**	**20-Oct-2017**	31-Oct-2017	✓	**09-Nov-2017**	29-Nov-2017	✓

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
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	0	3	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	0	3	**0.00**	**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 7.1 and Table 1 (14 day holding time).
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	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.

Preparation Methods	Method	Matrix	Method Descriptions
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.

Fadi Soro

3/11/17
5.05p

From: Chloe Leong
Sent: Friday, 3 November 2017 5:00 PM
To: Fadi Soro
Subject: FW: RESULTS & EDD & INVOICE for ALS Workorder : ES1726194 | Your Reference: NP10078 LAPSTONE TUNNEL
Attachments: EN_222_17 - NATION PARTNERS.pdf

Hi Fadi,

1 2 3

Can you please arrange a re-batch for workorder ES1726194 samples 50, 53, 54 for TPH SG on standard TAT?

use extract.

Kind regards,

Chloe Leong
Client Services Officer, Environmental
Sydney

T +61 2 8784 8555 D +61 2 8784 8501
F +61 2 8784 8500
chloe.leong@alsglobal.com
277-289 Woodpark Road
Smithfield, NSW, 2164

Subscribe Training

New ALS office at Crows Nest is now open to receive samples!

We are keen for your feedback! Please click here for your 1 question survey

EnviroMail™ 115 - Rapid MALDI-TOF MS confirmation on standard and low level Legionella culture methods
EnviroMail™ 114 - Asbestos Fibre Identification by SEM/EDS
EnviroMail™ 113 - Amoeba Confirmation PCR
EnviroMail™ 112 - Algal Capabilities
EnviroMail™ 111 - Analysis of VOCs by Thermal Desorption Analysis
EnviroMail™ 110 - Identifying Hidden PFAS Chemicals in Environmental Samples and Firefighting Foams
Summary of all EnviroMails™ by Category

Environmental Division
Sydney
Work Order Reference
ES1727660

Telephone : + 61-2-8784 8555

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From: Chloe Leong **On Behalf Of** ALSEnviro Sydney
Sent: Friday, 3 November 2017 3:49 PM
To: 'Daniel Wedgwood' <dwedgwood@nationpartners.com.au>
Cc: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>; Samples Sydney <Samples.Sydney@alsglobal.com>
Subject: RE: RESULTS & EDD & INVOICE for ALS Workorder : ES1726194 | Your Reference: NP10078 LAPSTONE TUNNEL

Hi Daniel,

I'll arrange a re-batch for you on a standard TAT.

ALS are happy to provide you with our National Analytical Services and Charges Catalogue. Please feel free to distribute this within your team. For smaller sized projects you are more than welcome to use the quote number EN-222-17 on your COC documents. I would strongly recommend that for major and/or ongoing projects involving large analytical components or when you require special project variations such as enhanced LOR's, benchmark trials etc. that you do contact me for a project specific quote. This will allow us to understand your projects better and to provide you with personalised suites and also further cost savings.

In terms of having silica-gel clean up tested, please refer to the table below for pricing –

MATRIX	TEST PARAMETER	ALS Code	TECHNIQUE / METHOD REFERENCE	LIMIT OF REPORTING	PRICE PER SAMPLE ($) Ex. GST
SOIL	TRH (C10-C40) with Silica Gel Clean-up	EP071SG	USEPA 3510/8015, GC/FID	50-100 mg/kg	38.00
	ADMINISTRATION FEES:				40.00

Kind regards,

Chloe Leong
Client Services Officer, Environmental
Sydney

T +61 2 8784 8555 D +61 2 8784 8501
F +61 2 8784 8500
chloe.leong@alsglobal.com
277-289 Woodpark Road
Smithfield, NSW, 2164

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New ALS office at Crows Nest is now open to receive samples!

We are keen for your feedback! Please click here for your 1 question survey

EnviroMail™ 115 - Rapid MALDI-TOF MS confirmation on standard and low level Legionella culture methods
EnviroMail™ 114 - Asbestos Fibre Identification by SEM/EDS
EnviroMail™ 113 - Amoeba Confirmation PCR
EnviroMail™ 112 - Algal Capabilities
EnviroMail™ 111 - Analysis of VOCs by Thermal Desorption Analysis
EnviroMail™ 110 - Identifying Hidden PFAS Chemicals in Environmental Samples and Firefighting Foams
Summary of all EnviroMails™ by Category

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From: Daniel Wedgwood [mailto:dwedgwood@nationpartners.com.au]
Sent: Friday, 3 November 2017 2:36 PM
To: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>; Samples Sydney <Samples.Sydney@alsglobal.com>
Subject: Re: RESULTS & EDD & INVOICE for ALS Workorder : ES1726194 | Your Reference: NP10078 LAPSTONE TUNNEL

Hello,

Can I please request the following additional analysis on standard turnaround.

Silica Gel Cleanup & Analysis for TRH/TPH on soil samples TS2, EPB-0.3 and EPC-0.2.

Please confirm receipt of this request and price.

Regards,

Daniel Wedgwood
Senior Consultant
Environmental + safety advisory

m: 0427 735 064
e: dwedgwood@nationpartners.com.au
w: nationpartners.com.au

Suite 108, 50 Holt Street
Surry Hills NSW 2010

Instagram: @nationpartners
LinkedIn: @nationpartners

—

nation partners SOLUTIONS FOR COMPLEX PROJECTS

From: "angel-no-reply@alsglobal.com" <angel-no-reply@alsglobal.com>
Date: Thursday, 26 October 2017 at 3:19 pm
To: Daniel Wedgwood <dwedgwood@nationpartners.com.au>
Subject: RESULTS & EDD & INVOICE for ALS Workorder : ES1726194 | Your Reference: NP10078 LAPSTONE TUNNEL

ALS Environmental

Deliverables for ALS Workorder ES1726194

Project: NP10078 LAPSTONE TUNNEL

Dear DANIEL WEDGWOOD,

Please find enclosed the following deliverables for **ES1726194**:

- NP10078 LAPSTONE TUNNEL.ESDAT_ES1726194_0.Chemistry2e.CSV
- NP10078 LAPSTONE TUNNEL.ESDAT_ES1726194_0.Header.XML
- NP10078 LAPSTONE TUNNEL.ESDAT_ES1726194_0.Sample2e.CSV
- ES1726194_0_COA.pdf
- ES1726194_0_ENMRG.CSV
- ES1726194_0_QC.pdf
- ES1726194_0_QCI.pdf
- L572500_INV.pdf
- ES1726194_COC.pdf

Report Recipients

- DANIEL WEDGWOOD
  - NP10078 LAPSTONE TUNNEL.ESDAT_ES1726194_0.Chemistry2e.CSV (Email)
  - NP10078 LAPSTONE TUNNEL.ESDAT_ES1726194_0.Header.XML (Email)
  - NP10078 LAPSTONE TUNNEL.ESDAT_ES1726194_0.Sample2e.CSV (Email)
  - ES1726194_0_COA.pdf (Email)
  - ES1726194_0_ENMRG.CSV (Email)
  - ES1726194_0_QC.pdf (Email)
  - ES1726194_0_QCI.pdf (Email)
  - L572500_INV.pdf (Email)
  - ES1726194_COC.pdf (Email)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1727998**	Page	: 1 of 8
Amendment	: **1**		
Client	: **NATION PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL WEDGWOOD	Contact	: Customer Services ES
Address	: Suite 209 50 Holt St Surry Hills 2010	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: NP10078 LAPSTONE TUNNEL	Date Samples Received	: 07-Nov-2017 09:20
Order number	: ----	Date Analysis Commenced	: 09-Nov-2017
C-O-C number	: ----	Issue Date	: 17-Nov-2017 17:57
Sampler	: Alexandra Francis, DANIEL WEDGWOOD		
Site	: ----		
Quote number	: SY/525/17		
No. of samples received	: 10		
No. of samples analysed	: 10		

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*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Raymond Commodore	Instrument Chemist	Sydney Inorganics, 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.

- ED048G: LOR raised for Alkaline Hexavalent Chromium on various samples due to sample matrix.
- Amendment (15/11/2017): This report has been amended and re-released to allow the reporting of Total, (VI), (III) Chromium data to sample HA4-0.1.
- EG048G: Poor matrix spike recovery for Alkaline Hexavalent Chromium due to sample heterogeneity.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) 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.

Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)			Client sample ID	TS1	EPC-0.2	EPB-0.3	----	----
			Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1727998-008	ES1727998-009	ES1727998-010	--------	--------
				Result	Result	Result	----	----
EG005C: Leachable Metals by ICPAES								
Copper	7440-50-8	0.1	mg/L	----	<0.1	----	----	----
Lead	7439-92-1	0.1	mg/L	----	<0.1	----	----	----
Nickel	7440-02-0	0.1	mg/L	<0.1	----	<0.1	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**27.6**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	**61.9**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	**63.7**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**89.5**	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	**87.0**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	**90.5**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TS1	TS2	EPC-0.2	EPB-0.3	TP8-0.1
			Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit	ES1727998-001	ES1727998-002	ES1727998-003	ES1727998-004	ES1727998-005
				Result	Result	Result	Result	Result
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	**8.0**	**7.4**	**7.4**	**7.3**	**7.1**
After HCl pH	----	0.1	pH Unit	**3.6**	**1.8**	**1.8**	**1.9**	**1.8**
Extraction Fluid Number	----	1	-	**1**	**1**	**1**	**1**	**1**
Final pH	----	0.1	pH Unit	**5.0**	**5.0**	**5.0**	**5.0**	**4.9**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HA4-0.1	TP4-0.1	TS1	EPC-0.2	EPB-0.3
			Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
Compound	CAS Number	LOR	Unit	ES1727998-006	ES1727998-007	ES1727998-008	ES1727998-009	ES1727998-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**14.0**	----	----	----	----
EG005T: Total Metals by ICP-AES								
Chromium	7440-47-3	2	mg/kg	**195**	----	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	----	----	----	----
EG049: Trivalent Chromium								
Trivalent Chromium	16065-83-1	2	mg/kg	**195**	----	----	----	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	**7.2**	**8.5**	----	----	----
After HCl pH	----	0.1	pH Unit	**1.8**	**1.7**	----	----	----
Extraction Fluid Number	----	1	-	**1**	**1**	----	----	----
Final pH	----	0.1	pH Unit	**4.9**	**5.0**	----	----	----
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	----	**6.8**	**6.8**	**6.8**

Analytical Results

Sub-Matrix: **TCLP LEACHATE** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Client sample ID	TS1	TS2	EPC-0.2	EPB-0.3	TP8-0.1
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00	17-Oct-2017 00:00
					ES1727998-001	ES1727998-002	ES1727998-003	ES1727998-004	ES1727998-005
					Result	Result	Result	Result	Result
EG005C: Leachable Metals by ICPAES									
Lead	7439-92-1	0.1	mg/L		----	----	<0.1	----	<0.1
Nickel	7440-02-0	0.1	mg/L		<0.1	<0.1	<0.1	**0.2**	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		**25.7**	**27.1**	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		**64.8**	**67.6**	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		**77.5**	**73.7**	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		**91.0**	**90.3**	----	----	----
Anthracene-d10	1719-06-8	1.0	%		**84.6**	**82.8**	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		**86.7**	**83.5**	----	----	----

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	HA4-0.1	TP4-0.1	----	----	----
				Client sampling date / time	17-Oct-2017 00:00	17-Oct-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1727998-006	ES1727998-007	--------	--------	--------
					Result	Result	----	----	----
EG005C: Leachable Metals by ICPAES									
Nickel	7440-02-0	0.1	mg/L		<0.1	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		----	12.2	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L		----	1.7	----	----	----
Acenaphthene	83-32-9	1.0	µg/L		----	5.7	----	----	----
Fluorene	86-73-7	1.0	µg/L		----	10.1	----	----	----
Phenanthrene	85-01-8	1.0	µg/L		----	27.3	----	----	----
Anthracene	120-12-7	1.0	µg/L		----	5.9	----	----	----
Fluoranthene	206-44-0	1.0	µg/L		----	8.7	----	----	----
Pyrene	129-00-0	1.0	µg/L		----	7.3	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		----	<1.0	----	----	----
Chrysene	218-01-9	1.0	µg/L		----	<1.0	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		----	<1.0	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		----	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		----	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		----	<1.0	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		----	<1.0	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		----	<1.0	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		----	78.9	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		----	<0.5	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		----	24.3	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		----	63.9	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		----	78.3	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		----	85.2	----	----	----
Anthracene-d10	1719-06-8	1.0	%		----	69.8	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		----	78.7	----	----	----

Surrogate Control Limits

Sub-Matrix: **DI WATER LEACHATE**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112

Sub-Matrix: **TCLP LEACHATE**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1727998**	Page	: 1 of 4
Amendment	: **1**		
Client	: **NATION PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL WEDGWOOD	Contact	: Customer Services ES
Address	: Suite 209 50 Holt St Surry Hills 2010	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: NP10078 LAPSTONE TUNNEL	Date Samples Received	: 07-Nov-2017
Order number	: ----	Date Analysis Commenced	: 09-Nov-2017
C-O-C number	: ----	Issue Date	: 17-Nov-2017
Sampler	: Alexandra Francis, DANIEL WEDGWOOD		
Site	: ----		
Quote number	: SY/525/17		
No. of samples received	: 10		
No. of samples analysed	: 10		

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*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Raymond Commodore	Instrument Chemist	Sydney Inorganics, 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 (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1248166)									
EM1715552-003	Anonymous	EA055: Moisture Content	----	1	%	18.1	19.0	4.78	0% - 50%
ES1728448-008	Anonymous	EA055: Moisture Content	----	1	%	12.0	12.4	3.33	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 1248465)									
ES1728399-009	Anonymous	EG005T: Chromium	7440-47-3	2	mg/kg	35	36	3.59	0% - 50%
ES1728448-015	Anonymous	EG005T: Chromium	7440-47-3	2	mg/kg	13	14	0.00	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 1250447)									
ES1728626-001	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<4.0	<4.0	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005C: Leachable Metals by ICPAES (QC Lot: 1235386)									
ES1727964-001	Anonymous	EG005C: Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES1727998-009	EPC-0.2	EG005C: Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	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
EG005T: Total Metals by ICP-AES (QCLot: 1248465)								
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	95.3	76	128
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 1250447)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	40 mg/kg	101	68	114
EN33: TCLP Leach (QCLot: 1231267)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33: TCLP Leach (QCLot: 1231268)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----

Sub-Matrix: **WATER**

				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
EG005C: Leachable Metals by ICPAES (QCLot: 1235386)								
EG005C: Copper	7440-50-8	0.1	mg/L	<0.1	0.1 mg/L	96.7	86	114
EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	0.1 mg/L	93.4	80	118
EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	0.1 mg/L	93.3	83	115
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1235320)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	77.4	50	94
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	82.6	64	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	94.2	62	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	96.3	64	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	85.8	63	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	94.7	64	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	93.2	64	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	92.3	63	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	91.0	64	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	85.3	63	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	92.6	62	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	91.3	63	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	86.2	63	117

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1235320) - continued								
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	68.0	60	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	67.4	61	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	67.6	59	118

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**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 1248465)							
ES1728399-009	Anonymous	EG005T: Chromium	7440-47-3	50 mg/kg	84.0	70	130
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 1250447)							
ES1728626-001	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	40 mg/kg	# Not Determined	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005C: Leachable Metals by ICPAES (QCLot: 1235386)							
ES1727964-002	Anonymous	EG005C: Copper	7440-50-8	1 mg/L	109	70	130
		EG005C: Lead	7439-92-1	1 mg/L	102	70	130
		EG005C: Nickel	7440-02-0	1 mg/L	103	70	130

Fadi Soro

7/11/17
9:20

From: Chloe Leong on behalf of ALSEnviro Sydney
Sent: Tuesday, 7 November 2017 8:39 AM
To: Fadi Soro
Subject: FW: RESULTS & EDD & INVOICE for ALS Workorder : ES1726194 | Your Reference: NP10078 LAPSTONE TUNNEL

Hi Fadi,

Can you please arrange the re-batch below? I have confirmed for ASLP DI leach.

Kind regards,

Chloe Leong
Client Services Officer, Environmental
Sydney

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Smithfield, NSW, 2164

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From: Daniel Wedgwood [mailto:dwedgwood@nationpartners.com.au]
Sent: Tuesday, 7 November 2017 7:57 AM
To: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Cc: Samples Sydney <Samples.Sydney@alsglobal.com>
Subject: Re: RESULTS & EDD & INVOICE for ALS Workorder : ES1726194 | Your Reference: NP10078 LAPSTONE TUNNEL

Chloe,

We need the ASLP to be a best match for flowing surface water pH 7.5. I'd say DI is correct, but happy to hear if you have another recommendation.

Cheers,

Daniel Wedgwood
Senior Consultant
Environmental + safety advisory

m: 0427 735 064
e: dwedgwood@nationpartners.com.au
w: nationpartners.com.au

Suite 108, 50 Holt Street
Surry Hills NSW 2010

Instagram: @nationpartners
LinkedIn: @nationpartners

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From: Chloe Leong <Chloe.Leong@ALSGlobal.com> on behalf of ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Date: Monday, 6 November 2017 at 5:31 pm
To: Daniel Wedgwood <dwedgwood@nationpartners.com.au>, ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Cc: Samples Sydney <Samples.Sydney@alsglobal.com>
Subject: RE: RESULTS & EDD & INVOICE for ALS Workorder : ES1726194 | Your Reference: NP10078 LAPSTONE TUNNEL

Thanks Daniel, can you please confirm what extraction fluid you require for the ASLP leach? Would it be DI water?

Kind regards,

Chloe Leong
Client Services Officer, Environmental
Sydney

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chloe.leong@alsglobal.com
277-289 Woodpark Road
Smithfield, NSW, 2164

New ALS office at Crows Nest is now open to receive samples!

We are keen for your feedback! Please click here for your 1 question survey

EnviroMail™ 115 - Rapid MALDI-TOF MS confirmation on standard and low level Legionella culture methods
EnviroMail™ 114 - Asbestos Fibre Identification by SEM/EDS
EnviroMail™ 113 - Amoeba Confirmation PCR
EnviroMail™ 112 - Algal Capabilities
EnviroMail™ 111 - Analysis of VOCs by Thermal Desorption Analysis
EnviroMail™ 110 - Identifying Hidden PFAS Chemicals in Environmental Samples and Firefighting Foams
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From: Daniel Wedgwood [mailto:dwedgwood@nationpartners.com.au]
Sent: Monday, 6 November 2017 5:21 PM
To: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Cc: Samples Sydney <Samples.Sydney@alsglobal.com>
Subject: Re: RESULTS & EDD & INVOICE for ALS Workorder : ES1726194 | Your Reference: NP10078 LAPSTONE TUNNEL

Thanks Chloe,

Our quote for this job was **SY/525/17.**

I also need to order the following additional analysis (standard TAT):

TCLP and analysis for:

1 TS1 – Nickel & BaP
2 TS2 – Nickel & BaP
3 EPC-0.2 – Lead & Nickel
4 EPB-0.3 – Nickel
5 TP8-0.1 – Lead
6 HA4-0.1 – Nickel
7 TP4-0.1 – PAH

ASLP and analysis

8 TS1 – Nickel, BaP
9 EPC-0.2 - Lead, Copper
10 EPB-0.3 – Nickel

Other

HA4-0.1 - Chromium Speciation (need Chromium (VI), (III) & total).

Regards,

Daniel Wedgwood
Senior Consultant
Environmental + safety advisory

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ES1727660 #1-3 5706

5418 - 420

#49, 50, 54, 53, 18, 41, 9

From: Chloe Leong <Chloe.Leong@ALSGlobal.com> on behalf of ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Date: Friday, 3 November 2017 at 3:49 pm
To: Daniel Wedgwood <dwedgwood@nationpartners.com.au>
Cc: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>, Samples Sydney <Samples.Sydney@alsglobal.com>
Subject: RE: RESULTS & EDD & INVOICE for ALS Workorder : ES1726194 | Your Reference: NP10078 LAPSTONE TUNNEL

Hi Daniel,

I'll arrange a re-batch for you on a standard TAT.

ALS are happy to provide you with our National Analytical Services and Charges Catalogue. Please feel free to distribute this within your team. For smaller sized projects you are more than welcome to use the quote number EN-222-17 on your COC documents. I would strongly recommend that for major and/or ongoing projects involving large analytical components or when you require special project variations such as enhanced LOR's, benchmark trials etc. that you do contact me for a project specific quote. This will allow us to understand your projects better and to provide you with personalised suites and also further cost savings.

In terms of having silica-gel clean up tested, please refer to the table below for pricing –

MATRIX	TEST PARAMETER	ALS Code	TECHNIQUE / METHOD REFERENCE	LIMIT OF REPORTING	PRICE PER SAMPLE ($) EX. GST
	TRH (C10-C40) with Silica Gel Clean-up	EP071SG	USEPA 3510/8015, GC/FID	50-100 mg/kg	38.00
	ADMINISTRATION FEES:				40.00

Kind regards,

Chloe Leong
Client Services Officer, Environmental
Sydney

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chloe.leong@alsglobal.com
277-289 Woodpark Road

Smithfield, NSW, 2164

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New ALS office at Crows Nest is now open to receive samples!

We are keen for your feedback! Please click here for your 1 question survey

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From: Daniel Wedgwood [mailto:dwedgwood@nationpartners.com.au]
Sent: Friday, 3 November 2017 2:36 PM
To: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>; Samples Sydney <Samples.Sydney@alsglobal.com>
Subject: Re: RESULTS & EDD & INVOICE for ALS Workorder : ES1726194 | Your Reference: NP10078 LAPSTONE TUNNEL

Hello,

Can I please request the following additional analysis on standard turnaround.

Silica Gel Cleanup & Analysis for TRH/TPH on soil samples TS2, EPB-0.3 and EPC-0.2.

Please confirm receipt of this request and price.

Regards,

Daniel Wedgwood
Senior Consultant

Environmental + safety advisory

m: 0427 735 064
e: dwedgwood@nationpartners.com.au
w: nationpartners.com.au

Suite 108, 50 Holt Street
Surry Hills NSW 2010

Instagram: @nationpartners
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—

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From: "angel-no-reply@alsglobal.com" <angel-no-reply@alsglobal.com>
Date: Thursday, 26 October 2017 at 3:19 pm
To: Daniel Wedgwood <dwedgwood@nationpartners.com.au>
Subject: RESULTS & EDD & INVOICE for ALS Workorder : ES1726194 | Your Reference: NP10078 LAPSTONE TUNNEL

ALS Environmental

Deliverables for ALS Workorder ES1726194

Project: NP10078 LAPSTONE TUNNEL

Dear DANIEL WEDGWOOD,

Please find enclosed the following deliverables for **ES1726194**:

- NP10078 LAPSTONE TUNNEL.ESDAT_ES1726194_0.Chemistry2e.CSV
- NP10078 LAPSTONE TUNNEL.ESDAT_ES1726194_0.Header.XML
- NP10078 LAPSTONE TUNNEL.ESDAT_ES1726194_0.Sample2e.CSV
- ES1726194_0_COA.pdf
- ES1726194_0_ENMRG.CSV
- ES1726194_0_QC.pdf
- ES1726194_0_QCI.pdf
- L572500_INV.pdf
- ES1726194_COC.pdf

Report Recipients

- DANIEL WEDGWOOD
  - NP10078 LAPSTONE TUNNEL.ESDAT_ES1726194_0.Chemistry2e.CSV (Email)
  - NP10078 LAPSTONE TUNNEL.ESDAT_ES1726194_0.Header.XML (Email)
  - NP10078 LAPSTONE TUNNEL.ESDAT_ES1726194_0.Sample2e.CSV (Email)
  - ES1726194_0_COA.pdf (Email)
  - ES1726194_0_ENMRG.CSV (Email)
  - ES1726194_0_QC.pdf (Email)
  - ES1726194_0_QCI.pdf (Email)
  - L572500_INV.pdf (Email)
  - ES1726194_COC.pdf (Email)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1726102**	Page	: 1 of 11
Client	: **NATION PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL WEDGWOOD	Contact	: Customer Services ES
Address	: Suite 209 50 Holt St Surry Hills 2010	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: NP10078 LAPSTONE TUNNEL	Date Samples Received	: 18-Oct-2017 18:30
Order number	: ----	Date Analysis Commenced	: 18-Oct-2017
C-O-C number	: ----	Issue Date	: 27-Oct-2017 14:31
Sampler	: ALEX FRANCIS & DANIEL WEDGWOOD		
Site	: ----		
Quote number	: SY/525/17		
No. of samples received	: 10		
No. of samples analysed	: 8		

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*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Raymond Commodore	Instrument Chemist	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.

- EG035: Positive Hg result for ES1726102 #2 has been confirmed by reanalysis
- EP075(SIM) : Particular sample surrogate not determined due to samples matrix interferences.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) 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.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	T2	T4	T5	EPCW	EP1
			Client sampling date / time	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00
Compound	CAS Number	LOR	Unit	ES1726102-002	ES1726102-004	ES1726102-005	ES1726102-006	ES1726102-007
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	----	----	----	----	7.45
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	----	1220
EA075: Redox Potential								
Redox Potential	----	0.1	mV	----	----	----	----	122
pH Redox	----	0.01	pH Unit	----	----	----	----	6.73
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.001	----	<0.001
Cadmium	7440-43-9	0.0001	mg/L	0.0007	0.0002	0.0001	----	<0.0001
Chromium	7440-47-3	0.001	mg/L	0.001	<0.001	<0.001	----	<0.001
Copper	7440-50-8	0.001	mg/L	0.032	0.019	0.006	----	<0.001
Nickel	7440-02-0	0.001	mg/L	0.055	0.026	0.007	----	0.004
Lead	7439-92-1	0.001	mg/L	0.041	0.023	0.007	----	<0.001
Zinc	7440-66-6	0.005	mg/L	0.396	0.368	1.08	----	0.104
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	0.0002	<0.0001	<0.0001	----	<0.0001
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	----	0.03	----	0.01
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	----	----	----	----	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	----	----	----	----	0.80
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	0.92	----	0.80
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	0.3	----	0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	1.2	----	1.3
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	0.37	----	0.20
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	----	----	----	----	0.02
EP025: Oxygen - Dissolved (DO)								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T2	T4	T5	EPCW	EP1
				Client sampling date / time	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726102-002	ES1726102-004	ES1726102-005	ES1726102-006	ES1726102-007
					Result	Result	Result	Result	Result
EP025: Oxygen - Dissolved (DO) - Continued									
Dissolved Oxygen	----	0.1	mg/L		----	----	----	----	**10.0**
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	1	µg/L		----	----	<1	----	<1
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	----	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	<100
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	<7.2	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	<7.2	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	<0.5	<7.2	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	<7.2	<0.5

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T2	T4	T5	EPCW	EP1
				Client sampling date / time	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726102-002	ES1726102-004	ES1726102-005	ES1726102-006	ES1726102-007
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP203A: Explosives									
HMX	2691-41-0	20	µg/L		<20	<20	<20	<20	<20
RDX	----	20	µg/L		<20	<20	<20	<20	<20
1.3.5-Trinitrobenzene	99-35-4	20	µg/L		<20	<20	<20	<20	<20
1.3-Dinitrobenzene	99-65-0	20	µg/L		<20	<20	<20	<20	<20
Tetryl	479-45-8	20	µg/L		<20	<20	<20	<20	<20
2.4.6-TNT	118-96-7	20	µg/L		<20	<20	<20	<20	<20
4-Amino.2.6-DNT	19406-51-0	20	µg/L		<20	<20	<20	<20	<20
2-Amino-4.6-DNT	35572-78-2	20	µg/L		<20	<20	<20	<20	<20
4-& 2-AM-DNT(Isomeric Mixture)	----	20	µg/L		<20	<20	<20	<20	<20
2.4-Dinitrotoluene	121-14-2	20	µg/L		<20	<20	<20	<20	<20
2.6-Dinitrotoluene	606-20-2	20	µg/L		<20	<20	<20	<20	<20
2.4-& 2.6-DNT(Isomeric Mixture)	51-28-5/606-20-2	20	µg/L		<20	<20	<20	<20	<20
Nitrobenzene	98-95-3	20	µg/L		<20	<20	<20	<20	<20
2-Nitrotoluene	88-72-2	20	µg/L		<20	<20	<20	<20	<20
3-Nitrotoluene	99-08-1	20	µg/L		<20	<20	<20	<20	<20
4-Nitrotoluene	99-99-0	20	µg/L		<20	<20	<20	<20	<20
Nitroglycerine	55-63-0	200	µg/L		<200	<200	<200	<200	<200
PETN	78-11-5	200	µg/L		<200	<200	<200	<200	<200
EP066S: PCB Surrogate									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	T2	T4	T5	EPCW	EP1
				Client sampling date / time	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00
Compound	CAS Number	LOR	Unit		ES1726102-002	ES1726102-004	ES1726102-005	ES1726102-006	ES1726102-007
					Result	Result	Result	Result	Result
EP066S: PCB Surrogate - Continued									
Decachlorobiphenyl	2051-24-3	1	%		----	----	98.1	----	97.7
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		26.4	23.2	25.3	Not Determined	19.6
2-Chlorophenol-D4	93951-73-6	1.0	%		66.7	64.9	65.9	Not Determined	62.7
2.4.6-Tribromophenol	118-79-6	1.0	%		63.9	55.4	54.6	Not Determined	49.0
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		91.4	88.2	92.4	Not Determined	85.1
Anthracene-d10	1719-06-8	1.0	%		81.3	80.5	85.5	Not Determined	87.0
4-Terphenyl-d14	1718-51-0	1.0	%		76.0	76.5	76.7	Not Determined	85.9
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		92.6	100	99.0	115	94.6
Toluene-D8	2037-26-5	2	%		110	106	109	124	110
4-Bromofluorobenzene	460-00-4	2	%		107	106	108	115	105
EP203S: Explosives Surrogate									
o-Dinitrobenzene	528-29-0	20	%		100	100	108	91.6	117

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	EP2	EP3	QC1	----	----
				Client sampling date / time	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1726102-008	ES1726102-009	ES1726102-010	--------	--------
					Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.82	7.56	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		1350	1300	----	----	----
EA075: Redox Potential									
Redox Potential	----	0.1	mV		122	132	----	----	----
pH Redox	----	0.01	pH Unit		7.26	6.82	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	0.002	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		0.002	<0.001	0.004	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		0.041	<0.005	0.101	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		----	0.06	0.02	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		----	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		----	0.02	0.78	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		----	0.02	0.78	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	0.3	0.5	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		----	0.3	1.3	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		----	0.08	0.27	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		----	0.01	0.02	----	----
EP025: Oxygen - Dissolved (DO)									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	EP2	EP3	QC1	----	----
				Client sampling date / time	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1726102-008	ES1726102-009	ES1726102-010	--------	--------
					Result	Result	Result	----	----
EP025: Oxygen - Dissolved (DO) - Continued									
Dissolved Oxygen	----	0.1	mg/L		**10.6**	**10.2**	----	----	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	1	µg/L		----	<1	<1	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	EP2	EP3	QC1	----	----
				Client sampling date / time	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1726102-008	ES1726102-009	ES1726102-010	--------	--------
					Result	Result	Result	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP203A: Explosives									
HMX	2691-41-0	20	µg/L		<20	----	----	----	----
RDX	----	20	µg/L		<20	----	----	----	----
1.3.5-Trinitrobenzene	99-35-4	20	µg/L		<20	----	----	----	----
1.3-Dinitrobenzene	99-65-0	20	µg/L		<20	----	----	----	----
Tetryl	479-45-8	20	µg/L		<20	----	----	----	----
2.4.6-TNT	118-96-7	20	µg/L		<20	----	----	----	----
4-Amino.2.6-DNT	19406-51-0	20	µg/L		<20	----	----	----	----
2-Amino-4.6-DNT	35572-78-2	20	µg/L		<20	----	----	----	----
4-& 2-AM-DNT(Isomeric Mixture)	----	20	µg/L		<20	----	----	----	----
2.4-Dinitrotoluene	121-14-2	20	µg/L		<20	----	----	----	----
2.6-Dinitrotoluene	606-20-2	20	µg/L		<20	----	----	----	----
2.4-& 2.6-DNT(Isomeric Mixture)	51-28-5/606-20-2	20	µg/L		<20	----	----	----	----
Nitrobenzene	98-95-3	20	µg/L		<20	----	----	----	----
2-Nitrotoluene	88-72-2	20	µg/L		<20	----	----	----	----
3-Nitrotoluene	99-08-1	20	µg/L		<20	----	----	----	----
4-Nitrotoluene	99-99-0	20	µg/L		<20	----	----	----	----
Nitroglycerine	55-63-0	200	µg/L		<200	----	----	----	----
PETN	78-11-5	200	µg/L		<200	----	----	----	----
EP066S: PCB Surrogate									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	EP2	EP3	QC1	----	----
				Client sampling date / time	18-Oct-2017 00:00	18-Oct-2017 00:00	18-Oct-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1726102-008	ES1726102-009	ES1726102-010	--------	--------
					Result	Result	Result	----	----
EP066S: PCB Surrogate - Continued									
Decachlorobiphenyl	2051-24-3	1	%		----	97.2	96.8	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		23.5	21.8	24.6	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		61.8	59.8	61.1	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		51.9	46.1	46.4	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		99.1	96.3	90.5	----	----
Anthracene-d10	1719-06-8	1.0	%		86.6	92.0	97.4	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		82.9	80.0	80.0	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		95.8	99.4	95.1	----	----
Toluene-D8	2037-26-5	2	%		108	109	108	----	----
4-Bromofluorobenzene	460-00-4	2	%		105	107	103	----	----
EP203S: Explosives Surrogate									
o-Dinitrobenzene	528-29-0	20	%		99.2	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	29	129
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP203S: Explosives Surrogate			
o-Dinitrobenzene	528-29-0	55	133

Appendix E – Air Quality Data

Period	Location	Time	Temperature	Reading (Chl	TWA (Chlorin	STEL (Chlorin	Reading (Am	TWA (Ammo	STEL (Ammor	Reading (Car	TWA (Carbor	STEL (Carbon
1		17/10/17 7:37	11	0	0	0	1	0.00208333	0.06666667	0.03	6.25E-05	0.002
1		17/10/17 7:38	11	0	0	0	1	0.00416667	0.1333333	0.03	0.000125	0.004
1		17/10/17 7:39	12	0	0	0	1	0.00625	0.2	0.03	0.0001875	0.006
1		17/10/17 7:40	12	0	0	0	1	0.00833333	0.2666667	0.03	0.00025	0.008
1		17/10/17 7:41	12	0	0	0	1	0.01041667	0.3333333	0.03	0.0003125	0.01
1		17/10/17 7:42	12	0	0	0	1	0.0125	0.4	0.03	0.000375	0.012
1		17/10/17 7:43	12	0	0	0	0	0.0125	0.4	0.03	0.0004375	0.014
1		17/10/17 7:44	12	0	0	0	0	0.0125	0.4	0.03	0.0005	0.016
1		17/10/17 7:45	12	0	0	0	0	0.0125	0.4	0.03	0.0005625	0.018
1		17/10/17 7:46	12	0	0	0	1	0.01458333	0.4666667	0.03	0.000625	0.02
1		17/10/17 7:47	12	0	0	0	0	0.01458333	0.4666667	0.03	0.0006875	0.022
1		17/10/17 7:48	12	0	0	0	0	0.01458333	0.4666667	0.03	0.00075	0.024
1		17/10/17 7:49	12	0	0	0	0	0.01458333	0.4666667	0.03	0.0008125	0.026
1		17/10/17 7:50	12	0	0	0	0	0.01458333	0.4666667	0.03	0.000875	0.028
1		17/10/17 7:51	12	0	0	0	0	0.01458333	0.4666667	0.03	0.0009375	0.03
1		17/10/17 7:52	12	0	0	0	0	0.01458333	0.4	0.03	0.001	0.03
1		17/10/17 7:53	12	0	0	0	0	0.01458333	0.3333333	0.03	0.0010625	0.03
1		17/10/17 7:54	12	0	0	0	0	0.01458333	0.2666667	0.03	0.001125	0.03
1		17/10/17 7:55	12	0	0	0	0	0.01458333	0.2	0.03	0.0011875	0.03
1		17/10/17 7:56	12	0	0	0	0	0.01458333	0.1333333	0.03	0.00125	0.03
1		17/10/17 7:57	12	0	0	0	0	0.01458333	0.06666667	0.03	0.0013125	0.03
1		17/10/17 7:58	12	0	0	0	0	0.01458333	0.06666667	0.03	0.001375	0.03
1		17/10/17 7:59	12	0	0	0	0	0.01458333	0.06666667	0.03	0.0014375	0.03
1		17/10/17 8:00	12	0	0	0	0	0.01458333	0.06666667	0.03	0.0015	0.03
1		17/10/17 8:01	12	0	0	0	0	0.01458333	0	0.03	0.0015625	0.03
1		17/10/17 8:02	12	0	0	0	0	0.01458333	0	0.03	0.001625	0.03
1		17/10/17 8:03	12	0	0	0	0	0.01458333	0	0.03	0.0016875	0.03
1		17/10/17 8:04	12	0	0	0	0	0.01458333	0	0.03	0.00175	0.03
1		17/10/17 8:05	12	0	0	0	0	0.01458333	0	0.03	0.0018125	0.03
1		17/10/17 8:06	12	0	0	0	0	0.01458333	0	0.03	0.001875	0.03
1		17/10/17 8:07	12	0	0	0	0	0.01458333	0	0.03	0.0019375	0.03
1		17/10/17 8:08	12	0	0	0	0	0.01458333	0	0.03	0.002	0.03
1		17/10/17 8:09	12	0	0	0	0	0.01458333	0	0.03	0.0020625	0.03
1		17/10/17 8:10	12	0	0	0	0	0.01458333	0	0.03	0.002125	0.03
1		17/10/17 8:11	12	0	0	0	0	0.01458333	0	0.03	0.0021875	0.03
1		17/10/17 8:12	12	0	0	0	0	0.01458333	0	0.03	0.00225	0.03
1		17/10/17 8:13	12	0	0	0	0	0.01458333	0	0.03	0.0023125	0.03
1		17/10/17 8:14	12	0	0	0	0	0.01458333	0	0.03	0.002375	0.03
1		17/10/17 8:15	12	0	0	0	0	0.01458333	0	0.03	0.0024375	0.03
1		17/10/17 8:16	12	0	0	0	0	0.01458333	0	0.03	0.0025	0.03
1		17/10/17 8:17	12	0	0	0	0	0.01458333	0	0.03	0.0025625	0.03
1		17/10/17 8:18	12	0	0	0	0	0.01458333	0	0.03	0.002625	0.03
1		17/10/17 8:19	12	0	0	0	0	0.01458333	0	0.03	0.0026875	0.03
1		17/10/17 8:20	12	0	0	0	0	0.01458333	0	0.03	0.00275	0.03
1		17/10/17 8:21	12	0	0	0	0	0.01458333	0	0.03	0.0028125	0.03
1		17/10/17 8:22	12	0	0	0	0	0.01458333	0	0.03	0.002875	0.03
1		17/10/17 8:23	12	0	0	0	0	0.01458333	0	0.03	0.0029375	0.03
1		17/10/17 8:24	12	0	0	0	0	0.01458333	0	0.03	0.003	0.03
1		17/10/17 8:25	12	0	0	0	0	0.01458333	0	0.03	0.0030625	0.03
1		17/10/17 8:26	12	0	0	0	0	0.01458333	0	0.03	0.003125	0.03
1		17/10/17 8:27	12	0	0	0	0	0.01458333	0	0.03	0.0031875	0.03
1		17/10/17 8:28	12	0	0	0	0	0.01458333	0	0.03	0.00325	0.03
1		17/10/17 8:29	12	0	0	0	0	0.01458333	0	0.03	0.0033125	0.03
1		17/10/17 8:30	12	0	0	0	0	0.01458333	0	0.03	0.003375	0.03
1		17/10/17 8:31	12	0	0	0	0	0.01458333	0	0.03	0.0034375	0.03
1		17/10/17 8:32	12	0	0	0	0	0.01458333	0	0.02	0.00347917	0.02933333
1		17/10/17 8:33	12	0	0	0	0	0.01458333	0	0.01	0.0035	0.028
1		17/10/17 8:34	12	0	0	0	0	0.01458333	0	0.01	0.00352083	0.02666667
1		17/10/17 8:35	12	0	0	0	0	0.01458333	0	0.01	0.00354167	0.02533333
1		17/10/17 8:36	12	0	0	0	0	0.01458333	0	0.01	0.0035625	0.024
1		17/10/17 8:37	12	0	0	0	0	0.01458333	0	0.01	0.00358333	0.02266667
1		17/10/17 8:38	12	0	0	0	0	0.01458333	0	0.01	0.00360417	0.02133333
1		17/10/17 8:39	12	0	0	0	0	0.01458333	0	0.01	0.003625	0.02
1		17/10/17 8:40	12	0	0	0	0	0.01458333	0	0.01	0.00364583	0.01866667
1		17/10/17 8:41	12	0	0	0	0	0.01458333	0	0.01	0.00366667	0.01733333
1		17/10/17 8:42	12	0	0	0	0	0.01458333	0	0.01	0.0036875	0.016
1		17/10/17 8:43	12	0	0	0	0	0.01458333	0	0.01	0.00370833	0.01466667
1		17/10/17 8:44	12	0	0	0	0	0.01458333	0	0.01	0.00372917	0.01333333
1		17/10/17 8:45	12	0	0	0	0	0.01458333	0	0.01	0.00375	0.012
1		17/10/17 8:46	12	0	0	0	0	0.01458333	0	0.01	0.00377083	0.01066667
1		17/10/17 8:47	12	0	0	0	0	0.01458333	0	0.01	0.00379167	0.01
1		17/10/17 8:48	12	0	0	0	0	0.01458333	0	0.01	0.0038125	0.01
1		17/10/17 8:49	12	0	0	0	0	0.01458333	0	0.02	0.00385417	0.01066667
1		17/10/17 8:50	12	0	0	0	0	0.01458333	0	0.02	0.00389583	0.01133333
1		17/10/17 8:51	12	0	0	0	0	0.01458333	0	0.03	0.00395833	0.01266667
1		17/10/17 8:52	12	0	0	0	0	0.01458333	0	0.03	0.00402083	0.014
1		17/10/17 8:53	12	0	0	0	0	0.01458333	0	0.02	0.0040625	0.01466667
1		17/10/17 8:54	12	0	0	0	0	0.01458333	0	0.03	0.004125	0.016
1		17/10/17 8:55	12	0	0	0	0	0.01458333	0	0.03	0.0041875	0.01733333

1	17/10/17 8:56	12	0	0	0	0	0.01458333	0	0.03	0.00425	0.01866667
1	17/10/17 8:57	12	0	0	0	0	0.01458333	0	0.02	0.00429167	0.01933333
1	17/10/17 8:58	12	0	0	0	0	0.01458333	0	0.03	0.00435417	0.02066667
1	17/10/17 8:59	12	0	0	0	0	0.01458333	0	0.02	0.00439583	0.02133333
1	17/10/17 9:00	12	0	0	0	0	0.01458333	0	0.01	0.00441667	0.02133333
1	17/10/17 9:01	12	0	0	0	0	0.01458333	0	0.01	0.0044375	0.02133333
1	17/10/17 9:02	12	0	0	0	0	0.01458333	0	0.02	0.00447917	0.022
1	17/10/17 9:03	12	0	0	0	0	0.01458333	0	0.01	0.0045	0.022
1	17/10/17 9:04	12	0	0	0	0	0.01458333	0	0.03	0.0045625	0.02266667
1	17/10/17 9:05	12	0	0	0	0	0.01458333	0	0.03	0.004625	0.02333333
1	17/10/17 9:06	12	0	0	0	0	0.01458333	0	0.03	0.0046875	0.02333333
1	17/10/17 9:07	12	0	0	0	0	0.01458333	0	0.03	0.00475	0.02333333
1	17/10/17 9:08	12	0	0	0	0	0.01458333	0	0.03	0.0048125	0.024
1	17/10/17 9:09	12	0	0	0	0	0.01458333	0	0.03	0.004875	0.024
1	17/10/17 9:10	12	0	0	0	0	0.01458333	0	0.03	0.0049375	0.024
1	17/10/17 9:11	12	0	0	0	0	0.01458333	0	0.03	0.005	0.024
1	17/10/17 9:12	12	0	0	0	0	0.01458333	0	0.03	0.0050625	0.02466667
1	17/10/17 9:13	12	0	0	0	0	0.01458333	0	0.03	0.005125	0.02466667
1	17/10/17 9:14	12	0	0	0	0	0.01458333	0	0.03	0.0051875	0.02533333
1	17/10/17 9:15	12	0	0	0	0	0.01458333	0	0.03	0.00525	0.02666667
1	17/10/17 9:16	12	0	0	0	0	0.01458333	0	0.03	0.0053125	0.028
1	17/10/17 9:17	12	0	0	0	0	0.01458333	0	0.03	0.005375	0.02866667
1	17/10/17 9:18	12	0	0	0	0	0.01458333	0	0.03	0.0054375	0.03
1	17/10/17 9:19	12	0	0	0	0	0.01458333	0	0.03	0.0055	0.03
1	17/10/17 9:20	12	0	0	0	0	0.01458333	0	0.03	0.0055625	0.03
1	17/10/17 9:21	12	0	0	0	0	0.01458333	0	0.03	0.005625	0.03
1	17/10/17 9:22	12	0	0	0	0	0.01458333	0	0.03	0.0056875	0.03
1	17/10/17 9:23	12	0	0	0	0	0.01458333	0	0.03	0.00575	0.03
1	17/10/17 9:24	12	0	0	0	0	0.01458333	0	0.03	0.0058125	0.03
1	17/10/17 9:25	12	0	0	0	0	0.01458333	0	0.03	0.005875	0.03
1	17/10/17 9:26	12	0	0	0	0	0.01458333	0	0.03	0.0059375	0.03
1	17/10/17 9:27	12	0	0	0	0	0.01458333	0	0.03	0.006	0.03
1	17/10/17 9:28	12	0	0	0	0	0.01458333	0	0.03	0.0060625	0.03
1	17/10/17 9:29	12	0	0	0	0	0.01458333	0	0.03	0.006125	0.03
1	17/10/17 9:30	12	0	0	0	0	0.01458333	0	0.03	0.0061875	0.03
1	17/10/17 9:31	12	0	0	0	0	0.01458333	0	0.03	0.00625	0.03
1	17/10/17 9:32	12	0	0	0	0	0.01458333	0	0.03	0.0063125	0.03
1	17/10/17 9:33	12	0	0	0	0	0.01458333	0	0.03	0.006375	0.03
1	17/10/17 9:34	12	0	0	0	0	0.01458333	0	0.03	0.0064375	0.03
1	17/10/17 9:35	12	0	0	0	0	0.01458333	0	0.03	0.0065	0.03
1	17/10/17 9:36	12	0	0	0	0	0.01458333	0	0.03	0.0065625	0.03
1	17/10/17 9:37	12	0	0	0	0	0.01458333	0	0.03	0.006625	0.03
1	17/10/17 9:38	12	0	0	0	0	0.01458333	0	0.03	0.0066875	0.03
1	17/10/17 9:39	12	0	0	0	0	0.01458333	0	0.03	0.00675	0.03
1	17/10/17 9:40	12	0	0	0	0	0.01458333	0	0.03	0.0068125	0.03
1	17/10/17 9:41	12	0	0	0	0	0.01458333	0	0.03	0.006875	0.03
1	17/10/17 9:42	12	0	0	0	0	0.01458333	0	0.03	0.0069375	0.03
1	17/10/17 9:43	12	0	0	0	0	0.01458333	0	0.03	0.007	0.03
1	17/10/17 9:44	12	0	0	0	0	0.01458333	0	0.03	0.0070625	0.03
1	17/10/17 9:45	12	0	0	0	0	0.01458333	0	0.03	0.007125	0.03
1	17/10/17 9:46	12	0	0	0	0	0.01458333	0	0.03	0.0071875	0.03
1	17/10/17 9:47	12	0	0	0	0	0.01458333	0	0.03	0.00725	0.03
1	17/10/17 9:48	12	0	0	0	0	0.01458333	0	0.03	0.0073125	0.03
1	17/10/17 9:49	12	0	0	0	0	0.01458333	0	0.03	0.007375	0.03
1	17/10/17 9:50	12	0	0	0	0	0.01458333	0	0.03	0.0074375	0.03
1	17/10/17 9:51	12	0	0	0	0	0.01458333	0	0.03	0.0075	0.03
1	17/10/17 9:52	12	0	0	0	0	0.01458333	0	0.03	0.0075625	0.03
1	17/10/17 9:53	12	0	0	0	0	0.01458333	0	0.02	0.00760417	0.02933333
1	17/10/17 9:54	12	0	0	0	0	0.01458333	0	0.01	0.007625	0.028
1	17/10/17 9:55	12	0	0	0	0	0.01458333	0	0.01	0.00764583	0.02666667
1	17/10/17 9:56	12	0	0	0	0	0.01458333	0	0.01	0.00766667	0.02533333
1	17/10/17 9:57	12	0	0	0	0	0.01458333	0	0.01	0.0076875	0.024
1	17/10/17 9:58	12	0	0	0	0	0.01458333	0	0.01	0.00770833	0.02266667
1	17/10/17 9:59	12	0	0	0	0	0.01458333	0	0.01	0.00772917	0.02133333
1	17/10/17 10:00	12	0	0	0	0	0.01458333	0	0.01	0.00775	0.02
1	17/10/17 10:01	12	0	0	0	0	0.01458333	0	0.01	0.00777083	0.01866667
1	17/10/17 10:02	12	0	0	0	0	0.01458333	0	0.01	0.00779167	0.01733333
1	17/10/17 10:03	12	0	0	0	0	0.01458333	0	0.01	0.0078125	0.016
1	17/10/17 10:04	12	0	0	0	0	0.01458333	0	0.01	0.00783333	0.01466667
1	17/10/17 10:05	12	0	0	0	0	0.01458333	0	0.01	0.00785417	0.01333333
1	17/10/17 10:06	12	0	0	0	0	0.01458333	0	0.01	0.007875	0.012
1	17/10/17 10:07	12	0	0	0	0	0.01458333	0	0.01	0.00789583	0.01066667
1	17/10/17 10:08	12	0	0	0	0	0.01458333	0	0.01	0.00791667	0.01
1	17/10/17 10:09	12	0	0	0	0	0.01458333	0	0.01	0.0079375	0.01
1	17/10/17 10:10	12	0	0	0	0	0.01458333	0	0.01	0.00795833	0.01
1	17/10/17 10:11	12	0	0	0	0	0.01458333	0	0.01	0.00797917	0.01
1	17/10/17 10:12	12	0	0	0	0	0.01458333	0	0.01	0.008	0.01
1	17/10/17 10:13	12	0	0	0	0	0.01458333	0	0.01	0.00802083	0.01
1	17/10/17 10:14	12	0	0	0	0	0.01458333	0	0.01	0.00804167	0.01
1	17/10/17 10:15	12	0	0	0	0	0.01458333	0	0.01	0.0080625	0.01

1	17/10/17 10:16	12	0	0	0	0	0.01458333	0	0.01	0.00808333	0.01
1	17/10/17 10:17	12	0	0	0	0	0.01458333	0	0.01	0.00810417	0.01
1	17/10/17 10:18	12	0	0	0	0	0.01458333	0	0.01	0.008125	0.01
1	17/10/17 10:19	12	0	0	0	0	0.01458333	0	0.01	0.00814583	0.01
1	17/10/17 10:20	12	0	0	0	0	0.01458333	0	0.01	0.00816667	0.01
1	17/10/17 10:21	12	0	0	0	0	0.01458333	0	0.01	0.0081875	0.01
1	17/10/17 10:22	12	0	0	0	0	0.01458333	0	0.01	0.00820833	0.01
1	17/10/17 10:23	12	0	0	0	0	0.01458333	0	0.01	0.00822917	0.01
1	17/10/17 10:24	12	0	0	0	0	0.01458333	0	0.01	0.00825	0.01
1	17/10/17 10:25	12	0	0	0	0	0.01458333	0	0.01	0.00827083	0.01
1	17/10/17 10:26	12	0	0	0	0	0.01458333	0	0.01	0.00829167	0.01
1	17/10/17 10:27	12	0	0	0	0	0.01458333	0	0.01	0.0083125	0.01
1	17/10/17 10:28	12	0	0	0	0	0.01458333	0	0.01	0.00833333	0.01
1	17/10/17 10:29	12	0	0	0	0	0.01458333	0	0.01	0.00835417	0.01
1	17/10/17 10:30	12	0	0	0	0	0.01458333	0	0.01	0.008375	0.01
1	17/10/17 10:31	12	0	0	0	0	0.01458333	0	0.01	0.00839583	0.01
1	17/10/17 10:32	12	0	0	0	0	0.01458333	0	0.01	0.00841667	0.01
1	17/10/17 10:33	12	0	0	0	0	0.01458333	0	0.01	0.0084375	0.01
1	17/10/17 10:34	12	0	0	0	0	0.01458333	0	0.01	0.00845833	0.01
1	17/10/17 10:35	12	0	0	0	0	0.01458333	0	0.01	0.00847917	0.01
1	17/10/17 10:36	12	0	0	0	0	0.01458333	0	0.01	0.0085	0.01
1	17/10/17 10:37	12	0	0	0	0	0.01458333	0	0.01	0.00852083	0.01
1	17/10/17 10:38	12	0	0	0	0	0.01458333	0	0.01	0.00854167	0.01
1	17/10/17 10:39	12	0	0	0	0	0.01458333	0	0.01	0.0085625	0.01
1	17/10/17 10:40	12	0	0	0	0	0.01458333	0	0.01	0.00858333	0.01
1	17/10/17 10:41	12	0	0	0	0	0.01458333	0	0.01	0.00860417	0.01
1	17/10/17 10:42	12	0	0	0	0	0.01458333	0	0.01	0.008625	0.01
1	17/10/17 10:43	12	0	0	0	0	0.01458333	0	0.01	0.00864583	0.01
1	17/10/17 10:44	12	0	0	0	0	0.01458333	0	0.01	0.00866667	0.01
1	17/10/17 10:45	12	0	0	0	0	0.01458333	0	0.01	0.0086875	0.01
1	17/10/17 10:46	12	0	0	0	0	0.01458333	0	0.01	0.00870833	0.01
1	17/10/17 10:47	12	0	0	0	0	0.01458333	0	0.01	0.00872917	0.01
1	17/10/17 10:48	12	0	0	0	0	0.01458333	0	0.01	0.00875	0.01
1	17/10/17 10:49	12	0	0	0	0	0.01458333	0	0.01	0.00877083	0.01
1	17/10/17 10:50	12	0	0	0	0	0.01458333	0	0.01	0.00879167	0.01
1	17/10/17 10:51	12	0	0	0	0	0.01458333	0	0.01	0.0088125	0.01
1	17/10/17 10:52	12	0	0	0	0	0.01458333	0	0.01	0.00883333	0.01
1	17/10/17 10:53	12	0	0	0	0	0.01458333	0	0.01	0.00885417	0.01
1	17/10/17 10:54	12	0	0	0	0	0.01458333	0	0.01	0.008875	0.01
1	17/10/17 10:55	12	0	0	0	0	0.01458333	0	0.01	0.00889583	0.01
1	17/10/17 10:56	12	0	0	0	0	0.01458333	0	0.01	0.00891667	0.01
1	17/10/17 10:57	12	0	0	0	0	0.01458333	0	0.01	0.0089375	0.01
1	17/10/17 10:58	12	0	0	0	0	0.01458333	0	0.01	0.00895833	0.01
1	17/10/17 10:59	12	0	0	0	0	0.01458333	0	0.01	0.00897917	0.01
1	17/10/17 11:00	12	0	0	0	0	0.01458333	0	0.01	0.009	0.01
1	17/10/17 11:01	12	0	0	0	0	0.01458333	0	0.01	0.00902083	0.01
1	17/10/17 11:02	12	0	0	0	0	0.01458333	0	0.01	0.00904167	0.01
1	17/10/17 11:03	12	0	0	0	0	0.01458333	0	0.01	0.0090625	0.01
1	17/10/17 11:04	12	0	0	0	0	0.01458333	0	0.01	0.00908333	0.01
1	17/10/17 11:05	12	0	0	0	0	0.01458333	0	0.01	0.00910417	0.01
1	17/10/17 11:06	12	0	0	0	0	0.01458333	0	0.01	0.009125	0.01
1	17/10/17 11:07	12	0	0	0	0	0.01458333	0	0.01	0.00914583	0.01
1	17/10/17 11:08	12	0	0	0	0	0.01458333	0	0.01	0.00916667	0.01
1	17/10/17 11:09	12	0	0	0	0	0.01458333	0	0.01	0.0091875	0.01
1	17/10/17 11:10	12	0	0	0	0	0.01458333	0	0.01	0.00920833	0.01
1	17/10/17 11:11	12	0	0	0	0	0.01458333	0	0.01	0.00922917	0.01
1	17/10/17 11:12	12	0	0	0	0	0.01458333	0	0.01	0.00925	0.01
1	17/10/17 11:13	12	0	0	0	0	0.01458333	0	0.01	0.00927083	0.01
1	17/10/17 11:14	12	0	0	0	0	0.01458333	0	0.01	0.00929167	0.01
1	17/10/17 11:15	12	0	0	0	0	0.01458333	0	0.01	0.0093125	0.01
1	17/10/17 11:16	12	0	0	0	0	0.01458333	0	0.01	0.00933333	0.01
1	17/10/17 11:17	12	0	0	0	0	0.01458333	0	0.01	0.00935417	0.01
1	17/10/17 11:18	12	0	0	0	0	0.01458333	0	0.01	0.009375	0.01
1	17/10/17 11:19	12	0	0	0	0	0.01458333	0	0.01	0.00939583	0.01
1	17/10/17 11:20	12	0	0	0	0	0.01458333	0	0.01	0.00941667	0.01
1	17/10/17 11:21	12	0	0	0	0	0.01458333	0	0.01	0.0094375	0.01
1	17/10/17 11:22	12	0	0	0	0	0.01458333	0	0.01	0.00945833	0.01
1	17/10/17 11:23	12	0	0	0	0	0.01458333	0	0.01	0.00947917	0.01
1	17/10/17 11:24	12	0	0	0	0	0.01458333	0	0.01	0.0095	0.01
1	17/10/17 11:25	12	0	0	0	0	0.01458333	0	0.01	0.00952083	0.01
1	17/10/17 11:26	12	0	0	0	0	0.01458333	0	0.01	0.00954167	0.01
1	17/10/17 11:27	12	0	0	0	0	0.01458333	0	0.01	0.0095625	0.01
1	17/10/17 11:28	12	0	0	0	0	0.01458333	0	0.01	0.00958333	0.01
1	17/10/17 11:29	12	0	0	0	0	0.01458333	0	0.01	0.00960417	0.01
1	17/10/17 11:30	12	0	0	0	0	0.01458333	0	0.01	0.009625	0.01
1	17/10/17 11:31	12	0	0	0	0	0.01458333	0	0.01	0.00964583	0.01
1	17/10/17 11:32	12	0	0	0	0	0.01458333	0	0.01	0.00966667	0.01
1	17/10/17 11:33	12	0	0	0	0	0.01458333	0	0.01	0.0096875	0.01
1	17/10/17 11:34	12	0	0	0	0	0.01458333	0	0.01	0.00970833	0.01
1	17/10/17 11:35	12	0	0	0	0	0.01458333	0	0.01	0.00972917	0.01

1	17/10/17 11:36	12	0	0	0	0	0.01458333	0	0.01	0.00975	0.01
1	17/10/17 11:37	12	0	0	0	0	0.01458333	0	0.01	0.00977083	0.01
1	17/10/17 11:38	12	0	0	0	0	0.01458333	0	0.01	0.00979167	0.01
1	17/10/17 11:39	12	0	0	0	0	0.01458333	0	0.01	0.0098125	0.01
1	17/10/17 11:40	12	0	0	0	0	0.01458333	0	0.01	0.00983333	0.01
1	17/10/17 11:41	12	0	0	0	0	0.01458333	0	0.01	0.00985417	0.01
1	17/10/17 11:42	12	0	0	0	0	0.01458333	0	0.01	0.009875	0.01
1	17/10/17 11:43	12	0	0	0	0	0.01458333	0	0.01	0.00989583	0.01
1	17/10/17 11:44	12	0	0	0	0	0.01458333	0	0.01	0.00991667	0.01
1	17/10/17 11:45	12	0	0	0	0	0.01458333	0	0.01	0.0099375	0.01
1	17/10/17 11:46	12	0	0	0	0	0.01458333	0	0.01	0.00995833	0.01
1	17/10/17 11:47	12	0	0	0	0	0.01458333	0	0.01	0.00997917	0.01
1	17/10/17 11:48	12	0	0	0	0	0.01458333	0	0.01	0.01	0.01
1	17/10/17 11:49	12	0	0	0	0	0.01458333	0	0.01	0.01002083	0.01
1	17/10/17 11:50	12	0	0	0	0	0.01458333	0	0.01	0.01004167	0.01
1	17/10/17 11:51	12	0	0	0	0	0.01458333	0	0.01	0.0100625	0.01
1	17/10/17 11:52	12	0	0	0	0	0.01458333	0	0.01	0.01008333	0.01
1	17/10/17 11:53	12	0	0	0	0	0.01458333	0	0.01	0.01010417	0.01
1	17/10/17 11:54	12	0	0	0	0	0.01458333	0	0.01	0.010125	0.01
1	17/10/17 11:55	12	0	0	0	0	0.01458333	0	0.01	0.01014583	0.01
1	17/10/17 11:56	12	0	0	0	0	0.01458333	0	0.01	0.01016667	0.01
1	17/10/17 11:57	12	0	0	0	0	0.01458333	0	0.01	0.0101875	0.01
1	17/10/17 11:58	12	0	0	0	0	0.01458333	0	0.01	0.01020833	0.01
1	17/10/17 11:59	12	0	0	0	0	0.01458333	0	0.01	0.01022917	0.01
1	17/10/17 12:00	12	0	0	0	0	0.01458333	0	0.01	0.01025	0.01
1	17/10/17 12:01	12	0	0	0	0	0.01458333	0	0.01	0.01027083	0.01
1	17/10/17 12:02	12	0	0	0	0	0.01458333	0	0.01	0.01029167	0.01
1	17/10/17 12:03	12	0	0	0	0	0.01458333	0	0.01	0.0103125	0.01
1	17/10/17 12:04	12	0	0	0	0	0.01458333	0	0.01	0.01033333	0.01
1	17/10/17 12:05	12	0	0	0	0	0.01458333	0	0.01	0.01035417	0.01
1	17/10/17 12:06	12	0	0	0	0	0.01458333	0	0.01	0.010375	0.01
1	17/10/17 12:07	12	0	0	0	0	0.01458333	0	0.01	0.01039583	0.01
1	17/10/17 12:08	12	0	0	0	0	0.01458333	0	0.01	0.01041667	0.01
1	17/10/17 12:09	12	0	0	0	0	0.01458333	0	0.01	0.0104375	0.01
1	17/10/17 12:10	12	0	0	0	0	0.01458333	0	0.01	0.01045833	0.01
1	17/10/17 12:11	12	0	0	0	0	0.01458333	0	0.01	0.01047917	0.01
1	17/10/17 12:12	12	0	0	0	0	0.01458333	0	0.01	0.0105	0.01
1	17/10/17 12:13	12	0	0	0	0	0.01458333	0	0.01	0.01052083	0.01
1	17/10/17 12:14	12	0	0	0	0	0.01458333	0	0.01	0.01054167	0.01
1	17/10/17 12:15	12	0	0	0	0	0.01458333	0	0.01	0.0105625	0.01
1	17/10/17 12:16	12	0	0	0	0	0.01458333	0	0.01	0.01058333	0.01
1	17/10/17 12:17	12	0	0	0	0	0.01458333	0	0.01	0.01060417	0.01
1	17/10/17 12:18	12	0	0	0	0	0.01458333	0	0.01	0.010625	0.01
1	17/10/17 12:19	12	0	0	0	0	0.01458333	0	0.01	0.01064583	0.01
1	17/10/17 12:20	12	0	0	0	0	0.01458333	0	0.01	0.01066667	0.01
1	17/10/17 12:21	12	0	0	0	0	0.01458333	0	0.01	0.0106875	0.01
1	17/10/17 12:22	12	0	0	0	0	0.01458333	0	0.01	0.01070833	0.01
1	17/10/17 12:23	12	0	0	0	0	0.01458333	0	0.01	0.01072917	0.01
1	17/10/17 12:24	12	0	0	0	0	0.01458333	0	0.01	0.01075	0.01
1	17/10/17 12:25	12	0	0	0	0	0.01458333	0	0.01	0.01077083	0.01
1	17/10/17 12:26	12	0	0	0	0	0.01458333	0	0.01	0.01079167	0.01
1	17/10/17 12:27	12	0	0	0	0	0.01458333	0	0.01	0.0108125	0.01
1	17/10/17 12:28	12	0	0	0	0	0.01458333	0	0.01	0.01083333	0.01
1	17/10/17 12:29	12	0	0	0	0	0.01458333	0	0.01	0.01085417	0.01
1	17/10/17 12:30	12	0	0	0	0	0.01458333	0	0.01	0.010875	0.01
1	17/10/17 12:31	12	0	0	0	0	0.01458333	0	0.01	0.01089583	0.01
1	17/10/17 12:32	12	0	0	0	0	0.01458333	0	0.01	0.01091667	0.01
1	17/10/17 12:33	12	0	0	0	0	0.01458333	0	0.01	0.0109375	0.01
1	17/10/17 12:34	12	0	0	0	0	0.01458333	0	0.01	0.01095833	0.01
1	17/10/17 12:35	12	0	0	0	0	0.01458333	0	0.01	0.01097917	0.01
1	17/10/17 12:36	12	0	0	0	0	0.01458333	0	0.01	0.011	0.01
1	17/10/17 12:37	12	0	0	0	0	0.01458333	0	0.01	0.01102083	0.01
1	17/10/17 12:38	12	0	0	0	0	0.01458333	0	0.01	0.01104167	0.01
1	17/10/17 12:39	12	0	0	0	0	0.01458333	0	0.01	0.0110625	0.01
1	17/10/17 12:40	12	0	0	0	0	0.01458333	0	0.01	0.01108333	0.01
1	17/10/17 12:41	12	0	0	0	0	0.01458333	0	0.01	0.01110417	0.01
1	17/10/17 12:42	12	0	0	0	0	0.01458333	0	0.01	0.011125	0.01
1	17/10/17 12:43	12	0	0	0	0	0.01458333	0	0.01	0.01114583	0.01
1	17/10/17 12:44	12	0	0	0	0	0.01458333	0	0.01	0.01116667	0.01
1	17/10/17 12:45	12	0	0	0	0	0.01458333	0	0.01	0.0111875	0.01
1	17/10/17 12:46	12	0	0	0	0	0.01458333	0	0.01	0.01120833	0.01
1	17/10/17 12:47	12	0	0	0	0	0.01458333	0	0.01	0.01122917	0.01
1	17/10/17 12:48	12	0	0	0	0	0.01458333	0	0.01	0.01125	0.01
1	17/10/17 12:49	12	0	0	0	0	0.01458333	0	0.01	0.01127083	0.01
1	17/10/17 12:50	12	0	0	0	0	0.01458333	0	0.01	0.01129167	0.01
1	17/10/17 12:51	12	0	0	0	0	0.01458333	0	0.01	0.0113125	0.01
1	17/10/17 12:52	12	0	0	0	0	0.01458333	0	0.01	0.01133333	0.01
1	17/10/17 12:53	12	0	0	0	0	0.01458333	0	0.01	0.01135417	0.01
1	17/10/17 12:54	12	0	0	0	0	0.01458333	0	0.01	0.011375	0.01
1	17/10/17 12:55	12	0	0	0	0	0.01458333	0	0.01	0.01139583	0.01

1	17/10/17 12:56	12	0	0	0	0	0.01458333	0	0.01	0.01141667	0.01
1	17/10/17 12:57	12	0	0	0	0	0.01458333	0	0.01	0.0114375	0.01
1	17/10/17 12:58	12	0	0	0	0	0.01458333	0	0.01	0.01145833	0.01
1	17/10/17 12:59	12	0	0	0	0	0.01458333	0	0.01	0.01147917	0.01
1	17/10/17 13:00	12	0	0	0	0	0.01458333	0	0.01	0.0115	0.01
1	17/10/17 13:01	12	0	0	0	0	0.01458333	0	0.01	0.01152083	0.01
1	17/10/17 13:02	12	0	0	0	0	0.01458333	0	0.01	0.01154167	0.01
1	17/10/17 13:03	12	0	0	0	0	0.01458333	0	0.01	0.0115625	0.01
1	17/10/17 13:04	12	0	0	0	0	0.01458333	0	0.01	0.01158333	0.01
1	17/10/17 13:05	12	0	0	0	0	0.01458333	0	0.01	0.01160417	0.01
1	17/10/17 13:06	12	0	0	0	0	0.01458333	0	0.01	0.011625	0.01
1	17/10/17 13:07	12	0	0	0	0	0.01458333	0	0.01	0.01164583	0.01
1	17/10/17 13:08	12	0	0	0	0	0.01458333	0	0.01	0.01166667	0.01
1	17/10/17 13:09	12	0	0	0	0	0.01458333	0	0.01	0.0116875	0.01
1	17/10/17 13:10	12	0	0	0	0	0.01458333	0	0.01	0.01170833	0.01
1	17/10/17 13:11	12	0	0	0	0	0.01458333	0	0.01	0.01172917	0.01
1	17/10/17 13:12	12	0	0	0	0	0.01458333	0	0.01	0.01175	0.01
1	17/10/17 13:13	12	0	0	0	0	0.01458333	0	0.01	0.01177083	0.01
1	17/10/17 13:14	12	0	0	0	0	0.01458333	0	0.01	0.01179167	0.01
1	17/10/17 13:15	12	0	0	0	0	0.01458333	0	0.01	0.0118125	0.01
1	17/10/17 13:16	12	0	0	0	0	0.01458333	0	0.01	0.01183333	0.01
1	17/10/17 13:17	12	0	0	0	0	0.01458333	0	0.01	0.01185417	0.01
1	17/10/17 13:18	12	0	0	0	0	0.01458333	0	0.01	0.011875	0.01
1	17/10/17 13:19	12	0	0	0	0	0.01458333	0	0.03	0.0119375	0.01133333
1	17/10/17 13:20	12	0	0	0	0	0.01458333	0	0.02	0.01197917	0.012
1	17/10/17 13:21	12	0	0	0	0	0.01458333	0	0.01	0.012	0.012
1	17/10/17 13:22	12	0	0	0	0	0.01458333	0	0.01	0.01202083	0.012
1	17/10/17 13:23	12	0	0	0	0	0.01458333	0	0.01	0.01204167	0.012
1	17/10/17 13:24	12	0	0	0	0	0.01458333	0	0.01	0.0120625	0.012
1	17/10/17 13:25	12	0	0	0	0	0.01458333	0	0.01	0.01208333	0.012
1	17/10/17 13:26	12	0	0	0	0	0.01458333	0	0.01	0.01210417	0.012
1	17/10/17 13:27	12	0	0	0	0	0.01458333	0	0.01	0.012125	0.012
1	17/10/17 13:28	12	0	0	0	0	0.01458333	0	0.01	0.01214583	0.012
1	17/10/17 13:29	12	0	0	0	0	0.01458333	0	0.03	0.01220833	0.01333333
1	17/10/17 13:30	12	0	0	0	0	0.01458333	0	0.01	0.01222917	0.01333333
1	17/10/17 13:31	12	0	0	0	0	0.01458333	0	0.01	0.01225	0.01333333
1	17/10/17 13:32	12	0	0	0	0	0.01458333	0	0.01	0.01227083	0.01333333
1	17/10/17 13:33	12	0	0	0	0	0.01458333	0	0.01	0.01229167	0.01333333
1	17/10/17 13:34	12	0	0	0	0	0.01458333	0	0.01	0.0123125	0.012
1	17/10/17 13:35	12	0	0	0	0	0.01458333	0	0.01	0.01233333	0.01133333
1	17/10/17 13:36	12	0	0	0	0	0.01458333	0	0.01	0.01235417	0.01133333
1	17/10/17 13:37	12	0	0	0	0	0.01458333	0	0.01	0.012375	0.01133333
2	18/10/17 7:19	13	0	0	0	1	0.01666667	0.06666667	0.01	0.01239583	0.00066667
2	18/10/17 7:20	13	0	0	0	0	0.01666667	0.06666667	0.01	0.01241667	0.00133333
2	18/10/17 7:21	13	0	0	0	0	0.01666667	0.06666667	0.01	0.0124375	0.002
2	18/10/17 7:22	14	0	0	0	0	0.01666667	0.06666667	0.01	0.01245833	0.00266667
2	18/10/17 7:23	14	0	0	0	0	0.01666667	0.06666667	0.01	0.01247917	0.00333333
2	18/10/17 7:24	14	0	0	0	0	0.01666667	0.06666667	0.01	0.0125	0.004
2	18/10/17 7:25	14	0	0	0	0	0.01666667	0.06666667	0.03	0.0125625	0.006
2	18/10/17 7:26	14	0	0	0	0	0.01666667	0.06666667	0.03	0.012625	0.008
2	18/10/17 7:27	14	0	0	0	0	0.01666667	0.06666667	0.03	0.0126875	0.01
2	18/10/17 7:28	14	0	0	0	0	0.01666667	0.06666667	0.03	0.01275	0.012
2	18/10/17 7:29	14	0	0	0	0	0.01666667	0.06666667	0.02	0.01279167	0.01333333
2	18/10/17 7:30	14	0	0	0	0	0.01666667	0.06666667	0.03	0.01285417	0.01533333
2	18/10/17 7:31	14	0	0	0	0	0.01666667	0.06666667	0.03	0.01291667	0.01733333
2	18/10/17 7:32	14	0	0	0	0	0.01666667	0.06666667	0.03	0.01297917	0.01933333
2	18/10/17 7:33	14	0	0	0	0	0.01666667	0.06666667	0.04	0.0130625	0.022
2	18/10/17 7:34	14	0	0	0	0	0.01666667	0	0.03	0.013125	0.02333333
2	18/10/17 7:35	14	0	0	0	0	0.01666667	0	0.03	0.0131875	0.02466667
2	18/10/17 7:36	14	0	0	0	0	0.01666667	0	0.03	0.01325	0.026
2	18/10/17 7:37	14	0	0	0	0	0.01666667	0	0.03	0.0133125	0.02733333
2	18/10/17 7:38	14	0	0	0	0	0.01666667	0	0.03	0.013375	0.02866667
2	18/10/17 7:39	14	0	0	0	0	0.01666667	0	0.03	0.0134375	0.03
2	18/10/17 7:40	14	0	0	0	0	0.01666667	0	0.03	0.0135	0.03
2	18/10/17 7:41	14	0	0	0	0	0.01666667	0	0.03	0.0135625	0.03
2	18/10/17 7:42	14	0	0	0	0	0.01666667	0	0.03	0.013625	0.03
2	18/10/17 7:43	14	0	0	0	0	0.01666667	0	0.03	0.0136875	0.03
2	18/10/17 7:44	14	0	0	0	0	0.01666667	0	0.03	0.01375	0.03066667
2	18/10/17 7:45	14	0	0	0	0	0.01666667	0	0.03	0.0138125	0.03066667
2	18/10/17 7:46	14	0	0	0	0	0.01666667	0	0.02	0.01385417	0.03
2	18/10/17 7:47	14	0	0	0	0	0.01666667	0	0.01	0.013875	0.02866667
2	18/10/17 7:48	14	0	0	0	0	0.01666667	0	0.01	0.01389583	0.02666667
2	18/10/17 7:49	14	0	0	0	0	0.01666667	0	0.01	0.01391667	0.02533333
2	18/10/17 7:50	14	0	0	0	0	0.01666667	0	0.01	0.0139375	0.024
2	18/10/17 7:51	14	0	0	0	0	0.01666667	0	0.01	0.01395833	0.02266667
2	18/10/17 7:52	14	0	0	0	0	0.01666667	0	0.01	0.01397917	0.02133333
2	18/10/17 7:53	14	0	0	0	0	0.01666667	0	0.01	0.014	0.02
2	18/10/17 7:54	14	0	0	0	0	0.01666667	0	0.01	0.01402083	0.01866667
2	18/10/17 7:55	14	0	0	0	0	0.01666667	0	0.03	0.01408333	0.01866667
2	18/10/17 7:56	14	0	0	0	0	0.01666667	0	0.03	0.01414583	0.01866667

	2	18/10/17 7:57	14	0	0	0	0	0.01666667	0	0.01	0.01416667	0.01733333
	2	18/10/17 7:58	14	0	0	0	0	0.01666667	0	0.01	0.0141875	0.016
	2	18/10/17 7:59	14	0	0	0	0	0.01666667	0	0.01	0.01420833	0.01466667
	2	18/10/17 8:00	14	0	0	0	0	0.01666667	0	0.01	0.01422917	0.01333333
	2	18/10/17 8:01	14	0	0	0	0	0.01666667	0	0.01	0.01425	0.01266667
	2	18/10/17 8:02	14	0	0	0	0	0.01666667	0	0.07	0.01439583	0.01666667
	2	18/10/17 8:03	14	0	0	0	0	0.01666667	0	0.04	0.01447917	0.01866667
	2	18/10/17 8:04	14	0	0	0	0	0.01666667	0	0.01	0.0145	0.01866667
	2	18/10/17 8:05	14	0	0	0	0	0.01666667	0	0.01	0.01452083	0.01866667
	2	18/10/17 8:06	14	0	0	0	0	0.01666667	0	0.01	0.01454167	0.01866667
	2	18/10/17 8:07	14	0	0	0	0	0.01666667	0	0.01	0.0145625	0.01866667
	2	18/10/17 8:08	14	0	0	0	0	0.01666667	0	0.01	0.01458333	0.01866667
	2	18/10/17 8:09	14	0	0	0	0	0.01666667	0	0.01	0.01460417	0.01866667
	2	18/10/17 8:10	14	0	0	0	0	0.01666667	0	0.02	0.01464583	0.018
	2	18/10/17 8:11	14	0	0	0	0	0.01666667	0	0.03	0.01470833	0.018
	2	18/10/17 8:12	14	0	0	0	0	0.01666667	0	0.03	0.01477083	0.01933333
	2	18/10/17 8:13	14	0	0	0	0	0.01666667	0	0.01	0.01479167	0.01933333
	2	18/10/17 8:14	14	0	0	0	0	0.01666667	0	0.01	0.0148125	0.01933333
	2	18/10/17 8:15	14	0	0	0	0	0.01666667	0	0.01	0.01483333	0.01933333
	2	18/10/17 8:16	14	0	0	0	0	0.01666667	0	0.03	0.01489583	0.02066667
	2	18/10/17 8:17	14	0	0	0	0	0.01666667	0	0.03	0.01495833	0.018
	2	18/10/17 8:18	14	0	0	0	0	0.01666667	0	0.03	0.01502083	0.01733333
	2	18/10/17 8:19	14	0	0	0	0	0.01666667	0	0.03	0.01508333	0.01866667
	2	18/10/17 8:20	14	0	0	0	0	0.01666667	0	0.03	0.01514583	0.02
	2	18/10/17 8:21	14	0	0	0	0	0.01666667	0	0.03	0.01520833	0.02133333
	2	18/10/17 8:22	14	0	0	0	0	0.01666667	0	0.03	0.01527083	0.02266667
	2	18/10/17 8:23	13	0	0	0	0	0.01666667	0	0.03	0.01533333	0.024
	2	18/10/17 8:24	13	0	0	0	0	0.01666667	0	0.03	0.01539583	0.02533333
	2	18/10/17 8:25	13	0	0	0	0	0.01666667	0	0.03	0.01545833	0.026
	2	18/10/17 8:26	13	0	0	0	0	0.01666667	0	0.02	0.0155	0.02533333
	2	18/10/17 8:27	13	0	0	0	0	0.01666667	0	0.01	0.01552083	0.024
	2	18/10/17 8:28	13	0	0	0	0	0.01666667	0	0.01	0.01554167	0.024
	2	18/10/17 8:29	13	0	0	0	0	0.01666667	0	0.01	0.0155625	0.024
	2	18/10/17 8:30	13	0	0	0	0	0.01666667	0	0.01	0.01558333	0.024
	2	18/10/17 8:31	13	0	0	0	0	0.01666667	0	0.01	0.01560417	0.02266667
	2	18/10/17 8:32	13	0	0	0	1	0.01875	0.06666667	0.01	0.015625	0.02133333
	2	18/10/17 8:33	13	0	0	0	1	0.02083333	0.1333333	0.01	0.01564583	0.02
	2	18/10/17 8:34	14	0	0	0	1	0.02291667	0.2	0.01	0.01566667	0.01866667
	3	20/10/17 10:03	13	0	0	0	0	0.02291667	0	0.09	0.01585417	0.006
	3	20/10/17 10:04	13	0	0	0	0	0.02291667	0	0.12	0.01610417	0.014
	3	20/10/17 10:05	13	0	0	0	0	0.02291667	0	0.04	0.0161875	0.01666667
	3	20/10/17 10:06	13	0	0	0	0	0.02291667	0	0.04	0.01627083	0.01933333
	3	20/10/17 10:07	13	0	0	0	0	0.02291667	0	0.05	0.016375	0.02266667
	3	20/10/17 10:08	14	0	0	0	0	0.02291667	0	0.03	0.0164375	0.02466667
	3	20/10/17 10:09	14	0	0	0	0	0.02291667	0	0.03	0.0165	0.02666667
	3	20/10/17 10:10	14	0	0	0	0	0.02291667	0	0.03	0.0165625	0.02866667
	3	20/10/17 10:11	14	0	0	0	0	0.02291667	0	0.03	0.016625	0.03066667
	3	20/10/17 10:12	14	0	0	0	0	0.02291667	0	0.07	0.01677083	0.03533333
	3	20/10/17 10:13	14	0	0	0	0	0.02291667	0	0.07	0.01691667	0.04
Average							0.02455357	0.01505766	0.01875	0.018125	0.00895006	0.01699256
Max				0	0	0	1	0.02291667	0.4666667	0.12	0.01691667	0.04
Min								0.00208333	0	0.01	0.0000625	0.00066667

Period	Location	Time	Temperature	Reading (Oxy	Reading (Hyc	TWA (Hydrog	STEL (Hydrog	Reading (Carl	TWA (Carbon	STEL (Carbon	Reading (Met
	1	17/10/17 7:43	12	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:44	12	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:45	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:46	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:47	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:48	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:49	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:50	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:51	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:52	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:53	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:54	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:55	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:56	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:57	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:58	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 7:59	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:00	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:01	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:02	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:03	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:04	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:05	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:06	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:07	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:08	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:09	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:10	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:11	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:12	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:13	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:14	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:15	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:16	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:17	13	20.9	0	0	0	0	0	0	0
	1	17/10/17 8:18	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:19	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:20	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:21	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:22	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:23	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:24	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:25	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:26	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:27	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:28	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:29	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:30	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:31	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:32	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:33	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:34	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:35	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:36	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:37	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:38	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:39	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:40	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:41	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:42	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:43	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:44	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:45	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:46	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:47	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:48	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:49	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:50	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:51	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:52	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:53	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:54	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:55	13	21	0	0	0	0	0	0	0
	1	17/10/17 8:56	13	21	0	0	0	0	0	0	0

1	17/10/17 8:57	13	21	0	0	0	0	0	0	0
1	17/10/17 8:58	13	21	0	0	0	0	0	0	0
1	17/10/17 8:59	13	21	0	0	0	0	0	0	0
1	17/10/17 9:00	13	21	0	0	0	0	0	0	0
1	17/10/17 9:01	13	21	0	0	0	0	0	0	0
1	17/10/17 9:02	13	21	0	0	0	0	0	0	0
1	17/10/17 9:03	13	21	0	0	0	0	0	0	0
1	17/10/17 9:04	13	21	0	0	0	0	0	0	0
1	17/10/17 9:05	13	21	0	0	0	0	0	0	0
1	17/10/17 9:06	13	21	0	0	0	0	0	0	0
1	17/10/17 9:07	13	21	0	0	0	0	0	0	0
1	17/10/17 9:08	13	21	0	0	0	0	0	0	0
1	17/10/17 9:09	13	21	0	0	0	0	0	0	0
1	17/10/17 9:10	13	21	0	0	0	0	0	0	0
1	17/10/17 9:11	13	21	0	0	0	0	0	0	0
1	17/10/17 9:12	13	21	0	0	0	0	0	0	0
1	17/10/17 9:13	13	21	0	0	0	0	0	0	0
1	17/10/17 9:14	13	21	0	0	0	0	0	0	0
1	17/10/17 9:15	13	21	0	0	0	0	0	0	0
1	17/10/17 9:16	13	21	0	0	0	0	0	0	0
1	17/10/17 9:17	13	21	0	0	0	0	0	0	0
1	17/10/17 9:18	13	21	0	0	0	0	0	0	0
1	17/10/17 9:19	13	21	0	0	0	0	0	0	0
1	17/10/17 9:20	13	21	0	0	0	0	0	0	0
1	17/10/17 9:21	13	21	0	0	0	0	0	0	0
1	17/10/17 9:22	13	21	0	0	0	0	0	0	0
1	17/10/17 9:23	13	21	0	0	0	0	0	0	0
1	17/10/17 9:24	13	21	0	0	0	0	0	0	0
1	17/10/17 9:25	13	21	0	0	0	0	0	0	0
1	17/10/17 9:26	13	21	0	0	0	0	0	0	0
1	17/10/17 9:27	13	21	0	0	0	0	0	0	0
1	17/10/17 9:28	13	21	0	0	0	0	0	0	0
1	17/10/17 9:29	13	21	0	0	0	0	0	0	0
1	17/10/17 9:30	13	21	0	0	0	0	0	0	0
1	17/10/17 9:31	13	21	0	0	0	0	0	0	0
1	17/10/17 9:32	13	21	0	0	0	0	0	0	0
1	17/10/17 9:33	13	21	0	0	0	0	0	0	0
1	17/10/17 9:34	13	21	0	0	0	0	0	0	0
1	17/10/17 9:35	13	21	0	0	0	0	0	0	0
1	17/10/17 9:36	13	21	0	0	0	0	0	0	0
1	17/10/17 9:37	13	21	0	0	0	0	0	0	0
1	17/10/17 9:38	13	21	0	0	0	0	0	0	0
1	17/10/17 9:39	13	21	0	0	0	0	0	0	0
1	17/10/17 9:40	13	21	0	0	0	0	0	0	0
1	17/10/17 9:41	13	21	0	0	0	0	0	0	0
1	17/10/17 9:42	13	21	0	0	0	0	0	0	0
1	17/10/17 9:43	13	21	0	0	0	0	0	0	0
1	17/10/17 9:44	13	21	0	0	0	0	0	0	0
1	17/10/17 9:45	13	21	0	0	0	0	0	0	0
1	17/10/17 9:46	13	21	0	0	0	0	0	0	0
1	17/10/17 9:47	13	21	0	0	0	0	0	0	0
1	17/10/17 9:48	13	21	0	0	0	0	0	0	0
1	17/10/17 9:49	13	21	0	0	0	0	0	0	0
1	17/10/17 9:50	13	21	0	0	0	0	0	0	0
1	17/10/17 9:51	13	21	0	0	0	0	0	0	0
1	17/10/17 9:52	13	21	0	0	0	0	0	0	0
1	17/10/17 9:53	13	21	0	0	0	0	0	0	0
1	17/10/17 9:54	13	21	0	0	0	0	0	0	0
1	17/10/17 9:55	13	21	0	0	0	0	0	0	0
1	17/10/17 9:56	13	21	0	0	0	0	0	0	0
1	17/10/17 9:57	13	21	0	0	0	0	0	0	0
1	17/10/17 9:58	13	21	0	0	0	0	0	0	0
1	17/10/17 9:59	13	21	0	0	0	0	0	0	0
1	17/10/17 10:00	13	21	0	0	0	0	0	0	0
1	17/10/17 10:01	13	21	0	0	0	0	0	0	0
1	17/10/17 10:02	13	21	0	0	0	0	0	0	0
1	17/10/17 10:03	13	21	0	0	0	0	0	0	0
1	17/10/17 10:04	13	21	0	0	0	0	0	0	0
1	17/10/17 10:05	13	21	0	0	0	0	0	0	0
1	17/10/17 10:06	13	21	0	0	0	0	0	0	0
1	17/10/17 10:07	13	21	0	0	0	0	0	0	0
1	17/10/17 10:08	13	21	0	0	0	0	0	0	0
1	17/10/17 10:09	13	21	0	0	0	0	0	0	0
1	17/10/17 10:10	13	21	0	0	0	0	0	0	0
1	17/10/17 10:11	13	21	0	0	0	0	0	0	0

1	17/10/17 10:12	13	21	0	0	0	0	0	0	0
1	17/10/17 10:13	13	21	0	0	0	0	0	0	0
1	17/10/17 10:14	13	21	0	0	0	0	0	0	0
1	17/10/17 10:15	13	21	0	0	0	0	0	0	0
1	17/10/17 10:16	13	21	0	0	0	0	0	0	0
1	17/10/17 10:17	13	21	0	0	0	0	0	0	0
1	17/10/17 10:18	13	21	0	0	0	0	0	0	0
1	17/10/17 10:19	13	21	0	0	0	0	0	0	0
1	17/10/17 10:20	13	21	0	0	0	0	0	0	0
1	17/10/17 10:21	13	21	0	0	0	0	0	0	0
1	17/10/17 10:22	13	21	0	0	0	0	0	0	0
1	17/10/17 10:23	13	21	0	0	0	0	0	0	0
1	17/10/17 10:24	13	21	0	0	0	0	0	0	0
1	17/10/17 10:25	13	21	0	0	0	0	0	0	0
1	17/10/17 10:26	13	21	0	0	0	0	0	0	0
1	17/10/17 10:27	13	21	0	0	0	0	0	0	0
1	17/10/17 10:28	13	21	0	0	0	0	0	0	0
1	17/10/17 10:29	13	21	0	0	0	0	0	0	0
1	17/10/17 10:30	13	21	0	0	0	0	0	0	0
1	17/10/17 10:31	13	21	0	0	0	0	0	0	0
1	17/10/17 10:32	13	21	0	0	0	0	0	0	0
1	17/10/17 10:33	13	21	0	0	0	0	0	0	0
1	17/10/17 10:34	13	21	0	0	0	0	0	0	0
1	17/10/17 10:35	13	21	0	0	0	0	0	0	0
1	17/10/17 10:36	13	21	0	0	0	0	0	0	0
1	17/10/17 10:37	13	21	0	0	0	0	0	0	0
1	17/10/17 10:38	13	21	0	0	0	0	0	0	0
1	17/10/17 10:39	13	21	0	0	0	0	0	0	0
1	17/10/17 10:40	13	21	0	0	0	0	0	0	0
1	17/10/17 10:41	13	21	0	0	0	0	0	0	0
1	17/10/17 10:42	13	21	0	0	0	0	0	0	0
1	17/10/17 10:43	13	21	0	0	0	0	0	0	0
1	17/10/17 10:44	13	21	0	0	0	0	0	0	0
1	17/10/17 10:45	13	21	0	0	0	0	0	0	0
1	17/10/17 10:46	13	21	0	0	0	0	0	0	0
1	17/10/17 10:47	13	21	0	0	0	0	0	0	0
1	17/10/17 10:48	13	21	0	0	0	0	0	0	0
1	17/10/17 10:49	13	21	0	0	0	0	0	0	0
1	17/10/17 10:50	13	21	0	0	0	0	0	0	0
1	17/10/17 10:51	13	21	0	0	0	0	0	0	0
1	17/10/17 10:52	13	21	0	0	0	0	0	0	0
1	17/10/17 10:53	13	21	0	0	0	0	0	0	0
1	17/10/17 10:54	13	21	0	0	0	0	0	0	0
1	17/10/17 10:55	13	21	0	0	0	0	0	0	0
1	17/10/17 10:56	13	21	0	0	0	0	0	0	0
1	17/10/17 10:57	13	21	0	0	0	0	0	0	0
1	17/10/17 10:58	13	21	0	0	0	0	0	0	0
1	17/10/17 10:59	13	21	0	0	0	0	0	0	0
1	17/10/17 11:00	13	21	0	0	0	0	0	0	0
1	17/10/17 11:01	13	21	0	0	0	0	0	0	0
1	17/10/17 11:02	13	21	0	0	0	0	0	0	0
1	17/10/17 11:03	13	21	0	0	0	0	0	0	0
1	17/10/17 11:04	13	21	0	0	0	0	0	0	0
1	17/10/17 11:05	13	21	0	0	0	0	0	0	0
1	17/10/17 11:06	13	21	0	0	0	0	0	0	0
1	17/10/17 11:07	13	21	0	0	0	0	0	0	0
1	17/10/17 11:08	13	21	0	0	0	0	0	0	0
1	17/10/17 11:09	13	21	0	0	0	0	0	0	0
1	17/10/17 11:10	13	21	0	0	0	0	0	0	0
1	17/10/17 11:11	13	21	0	0	0	0	0	0	0
1	17/10/17 11:12	13	21	0	0	0	0	0	0	0
1	17/10/17 11:13	13	21	0	0	0	0	0	0	0
1	17/10/17 11:14	13	21	0	0	0	0	0	0	0
1	17/10/17 11:15	13	21	0	0	0	0	0	0	0
1	17/10/17 11:16	13	21	0	0	0	0	0	0	0
1	17/10/17 11:17	13	21	0	0	0	0	0	0	0
1	17/10/17 11:18	13	21	0	0	0	0	0	0	0
1	17/10/17 11:19	13	21	0	0	0	0	0	0	0
1	17/10/17 11:20	13	21	0	0	0	0	0	0	0
1	17/10/17 11:21	13	21	0	0	0	0	0	0	0
1	17/10/17 11:22	13	21	0	0	0	0	0	0	0
1	17/10/17 11:23	13	21	0	0	0	0	0	0	0
1	17/10/17 11:24	13	21	0	0	0	0	0	0	0
1	17/10/17 11:25	13	21	0	0	0	0	0	0	0
1	17/10/17 11:26	13	21	0	0	0	0	0	0	0

1	17/10/17 11:27	13	21	0	0	0	0	0	0	0
1	17/10/17 11:28	13	21	0	0	0	0	0	0	0
1	17/10/17 11:29	13	21	0	0	0	0	0	0	0
1	17/10/17 11:30	13	21	0	0	0	0	0	0	0
1	17/10/17 11:31	13	21	0	0	0	0	0	0	0
1	17/10/17 11:32	13	21	0	0	0	0	0	0	0
1	17/10/17 11:33	13	21	0	0	0	0	0	0	0
1	17/10/17 11:34	13	21	0	0	0	0	0	0	0
1	17/10/17 11:35	13	21	0	0	0	0	0	0	0
1	17/10/17 11:36	13	21	0	0	0	0	0	0	0
1	17/10/17 11:37	13	21	0	0	0	0	0	0	0
1	17/10/17 11:38	13	21	0	0	0	0	0	0	0
1	17/10/17 11:39	13	21	0	0	0	0	0	0	0
1	17/10/17 11:40	13	21	0	0	0	0	0	0	0
1	17/10/17 11:41	13	21	0	0	0	0	0	0	0
1	17/10/17 11:42	13	21	0	0	0	0	0	0	0
1	17/10/17 11:43	13	21	0	0	0	0	0	0	0
1	17/10/17 11:44	13	21	0	0	0	0	0	0	0
1	17/10/17 11:45	13	21	0	0	0	0	0	0	0
1	17/10/17 11:46	13	21	0	0	0	0	0	0	0
1	17/10/17 11:47	13	21	0	0	0	0	0	0	0
1	17/10/17 11:48	13	21	0	0	0	0	0	0	0
1	17/10/17 11:49	13	21	0	0	0	0	0	0	0
1	17/10/17 11:50	13	21	0	0	0	0	0	0	0
1	17/10/17 11:51	13	21	0	0	0	0	0	0	0
1	17/10/17 11:52	13	21	0	0	0	0	0	0	0
1	17/10/17 11:53	13	21	0	0	0	0	0	0	0
1	17/10/17 11:54	13	21	0	0	0	0	0	0	0
1	17/10/17 11:55	13	21	0	0	0	0	0	0	0
1	17/10/17 11:56	13	21	0	0	0	0	0	0	0
1	17/10/17 11:57	13	21	0	0	0	0	0	0	0
1	17/10/17 11:58	13	21	0	0	0	0	0	0	0
1	17/10/17 11:59	13	21	0	0	0	0	0	0	0
1	17/10/17 12:00	13	21	0	0	0	0	0	0	0
1	17/10/17 12:01	13	21	0	0	0	0	0	0	0
1	17/10/17 12:02	13	21	0	0	0	0	0	0	0
1	17/10/17 12:03	13	21	0	0	0	0	0	0	0
1	17/10/17 12:04	13	21	0	0	0	0	0	0	0
1	17/10/17 12:05	13	21	0	0	0	0	0	0	0
1	17/10/17 12:06	13	21	0	0	0	0	0	0	0
1	17/10/17 12:07	13	21	0	0	0	0	0	0	0
1	17/10/17 12:08	13	21	0	0	0	0	0	0	0
1	17/10/17 12:09	13	21	0	0	0	0	0	0	0
1	17/10/17 12:10	13	21	0	0	0	0	0	0	0
1	17/10/17 12:11	13	21	0	0	0	0	0	0	0
1	17/10/17 12:12	13	21	0	0	0	0	0	0	0
1	17/10/17 12:13	13	21	0	0	0	0	0	0	0
1	17/10/17 12:14	13	21	0	0	0	0	0	0	0
1	17/10/17 12:15	13	21	0	0	0	0	0	0	0
1	17/10/17 12:16	13	21	0	0	0	0	0	0	0
1	17/10/17 12:17	13	21	0	0	0	0	0	0	0
1	17/10/17 12:18	13	21	0	0	0	0	0	0	0
1	17/10/17 12:19	13	21	0	0	0	0	0	0	0
1	17/10/17 12:20	13	21	0	0	0	0	0	0	0
1	17/10/17 12:21	13	21	0	0	0	0	0	0	0
1	17/10/17 12:22	13	21	0	0	0	0	0	0	0
1	17/10/17 12:23	13	21	0	0	0	0	0	0	0
1	17/10/17 12:24	13	21	0	0	0	0	0	0	0
1	17/10/17 12:25	13	21	0	0	0	0	0	0	0
1	17/10/17 12:26	13	21	0	0	0	0	0	0	0
1	17/10/17 12:27	13	21	0	0	0	0	0	0	0
1	17/10/17 12:28	13	21	0	0	0	0	0	0	0
1	17/10/17 12:29	13	21	0	0	0	0	0	0	0
1	17/10/17 12:30	13	21	0	0	0	0	0	0	0
1	17/10/17 12:31	13	21	0	0	0	0	0	0	0
1	17/10/17 12:32	13	21	0	0	0	0	0	0	0
1	17/10/17 12:33	13	21	0	0	0	0	0	0	0
1	17/10/17 12:34	13	21	0	0	0	0	0	0	0
1	17/10/17 12:35	13	21	0	0	0	0	0	0	0
1	17/10/17 12:36	13	21	0	0	0	0	0	0	0
1	17/10/17 12:37	13	21	0	0	0	0	0	0	0
1	17/10/17 12:38	13	21	0	0	0	0	0	0	0
1	17/10/17 12:39	13	21	0	0	0	0	0	0	0
1	17/10/17 12:40	13	21	0	0	0	0	0	0	0
1	17/10/17 12:41	13	21	0	0	0	0	0	0	0

1	17/10/17 12:42	13	21	0	0	0	0	0	0	0
1	17/10/17 12:43	13	21	0	0	0	0	0	0	0
1	17/10/17 12:44	13	21	0	0	0	0	0	0	0
1	17/10/17 12:45	13	21	0	0	0	0	0	0	0
1	17/10/17 12:46	13	21	0	0	0	0	0	0	0
1	17/10/17 12:47	13	21	0	0	0	0	0	0	0
1	17/10/17 12:48	13	21	0	0	0	0	0	0	0
1	17/10/17 12:49	13	21	0	0	0	0	0	0	0
1	17/10/17 12:50	13	21	0	0	0	0	0	0	0
1	17/10/17 12:51	13	21	0	0	0	0	0	0	0
1	17/10/17 12:52	13	21	0	0	0	0	0	0	0
1	17/10/17 12:53	13	21	0	0	0	0	0	0	0
1	17/10/17 12:54	13	21	0	0	0	0	0	0	0
1	17/10/17 12:55	13	21	0	0	0	0	0	0	0
1	17/10/17 12:56	13	21	0	0	0	0	0	0	0
1	17/10/17 12:57	13	21	0	0	0	0	0	0	0
1	17/10/17 12:58	13	21	0	0	0	0	0	0	0
1	17/10/17 12:59	13	21	0	0	0	0	0	0	0
1	17/10/17 13:00	13	21	0	0	0	0	0	0	0
1	17/10/17 13:01	13	21	0	0	0	0	0	0	0
1	17/10/17 13:02	13	21	0	0	0	0	0	0	0
1	17/10/17 13:03	13	21	0	0	0	0	0	0	0
1	17/10/17 13:04	13	21	0	0	0	0	0	0	0
1	17/10/17 13:05	13	21	0	0	0	0	0	0	0
1	17/10/17 13:06	13	21	0	0	0	0	0	0	0
1	17/10/17 13:07	13	21	0	0	0	0	0	0	0
1	17/10/17 13:08	13	21	0	0	0	0	0	0	0
1	17/10/17 13:09	13	21	0	0	0	0	0	0	0
1	17/10/17 13:10	13	21	0	0	0	0	0	0	0
1	17/10/17 13:11	13	21	0	0	0	0	0	0	0
1	17/10/17 13:12	13	21	0	0	0	0	0	0	0
1	17/10/17 13:13	13	21	0	0	0	0	0	0	0
1	17/10/17 13:14	13	21	0	0	0	0	0	0	0
1	17/10/17 13:15	13	21	0	0	0	0	0	0	0
1	17/10/17 13:16	13	21	0	0	0	0	0	0	0
1	17/10/17 13:17	13	21	0	0	0	0	0	0	0
1	17/10/17 13:18	13	21	0	0	0	0	0	0	0
1	17/10/17 13:19	13	21	0	0	0	0	0	0	0
1	17/10/17 13:20	13	21	0	0	0	0	0	0	0
1	17/10/17 13:21	13	21	0	0	0	0	0	0	0
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1	17/10/17 13:23	13	21	0	0	0	0	0	0	0
1	17/10/17 13:24	13	21	0	0	0	0	0	0	0
1	17/10/17 13:25	13	21	0	0	0	0	0	0	0
1	17/10/17 13:26	13	21	0	0	0	0	0	0	0
1	17/10/17 13:27	13	21	0	0	0	0	0	0	0
1	17/10/17 13:28	13	21	0	0	0	0	0	0	0
1	17/10/17 13:29	13	21	0	0	0	0	0	0	0
1	17/10/17 13:30	13	21	0	0	0	0	0	0	0
1	17/10/17 13:31	13	21	0	0	0	0	0	0	0
1	17/10/17 13:32	13	21	0	0	0	0	0	0	0
1	17/10/17 13:33	13	21	0	0	0	0	0	0	0
1	17/10/17 13:34	13	21	0	0	0	0	0	0	0
1	17/10/17 13:35	14	20.9	0	0	0	0	0	0	0
1	17/10/17 13:36	14	21	0	0	0	0	0	0	0
1	17/10/17 13:37	14	20.9	0	0	0	0	0	0	0
1	17/10/17 13:38	14	20.9	0	0	0	0	0	0	0
1	17/10/17 13:39	14	20.9	0	0	0	0	0	0	0
1	17/10/17 13:40	14	20.9	0	0	0	0	0	0	0
1	17/10/17 13:41	14	20.9	0	0	0	0	0	0	0
1	17/10/17 13:42	14	20.9	0	0	0	0	0	0	0
1	17/10/17 13:43	14	20.9	0	0	0	0	0	0	0
1	17/10/17 13:44	14	20.9	0	0	0	0	0	0	0
2	18/10/17 7:25	13	21	0	0	0	0	0	0	0
2	18/10/17 7:26	13	21	0	0	0	0	0	0	0
2	18/10/17 7:27	14	21	0	0	0	0	0	0	0
2	18/10/17 7:28	14	21	0	0	0	0	0	0	0
2	18/10/17 7:29	14	21	0	0	0	0	0	0	0
2	18/10/17 7:30	14	21	0	0	0	0	0	0	0
2	18/10/17 7:31	14	21	0	0	0	0	0	0	0
2	18/10/17 7:32	14	21	0	0	0	0	0	0	0
2	18/10/17 7:33	15	21	0	0	0	0	0	0	0
2	18/10/17 7:34	15	21	0	0	0	0	0	0	0
2	18/10/17 7:35	15	20.9	0	0	0	0	0	0	0
2	18/10/17 7:36	15	20.9	0	0	0	0	0	0	0

2	18/10/17 7:37	15	20.9	0	0	0	0	0	0	0
2	18/10/17 7:38	15	21	0	0	0	0	0	0	0
2	18/10/17 7:39	15	21	0	0	0	0	0	0	0
2	18/10/17 7:40	15	21	0	0	0	0	0	0	0
2	18/10/17 7:41	15	21	0	0	0	0	0	0	0
2	18/10/17 7:42	15	21	0	0	0	0	0	0	0
2	18/10/17 7:43	15	21	0	0	0	0	0	0	0
2	18/10/17 7:44	15	21	0	0	0	0	0	0	0
2	18/10/17 7:45	15	21	0	0	0	0	0	0	0
2	18/10/17 7:46	15	21	0	0	0	0	0	0	0
2	18/10/17 7:47	15	21	0	0	0	0	0	0	0
2	18/10/17 7:48	15	21	0	0	0	0	0	0	0
2	18/10/17 7:49	15	21	0	0	0	0	0	0	0
2	18/10/17 7:50	15	21	0	0	0	0	0	0	0
2	18/10/17 7:51	15	21	0	0	0	0	0	0	0
2	18/10/17 7:52	15	21	0	0	0	0	0	0	0
2	18/10/17 7:53	15	21	0	0	0	0	0	0	0
2	18/10/17 7:54	15	21	0	0	0	0	0	0	0
2	18/10/17 7:55	15	21	0	0	0	0	0	0	0
2	18/10/17 7:56	15	21	0	0	0	0	0	0	0
2	18/10/17 7:57	15	21	0	0	0	0	0	0	0
2	18/10/17 7:58	15	21	0	0	0	0	0	0	0
2	18/10/17 7:59	15	21	0	0	0	0	0	0	0
2	18/10/17 8:00	15	21	0	0	0	0	0	0	0
2	18/10/17 8:01	15	21	0	0	0	0	0	0	0
2	18/10/17 8:02	15	21	0	0	0	0	0	0	0
2	18/10/17 8:03	15	21	0	0	0	0	0	0	0
2	18/10/17 8:04	15	21	0	0	0	0	0	0	0
2	18/10/17 8:05	15	21	0	0	0	0	0	0	0
2	18/10/17 8:06	15	21	0	0	0	0	0	0	0
2	18/10/17 8:07	15	21	0	0	0	0	0	0	0
2	18/10/17 8:08	15	21	0	0	0	0	0	0	0
2	18/10/17 8:09	15	21	0	0	0	0	0	0	0
2	18/10/17 8:10	15	21	0	0	0	0	0	0	0
2	18/10/17 8:11	15	21	0	0	0	0	0	0	0
2	18/10/17 8:12	15	21	0	0	0	0	0	0	0
2	18/10/17 8:13	15	21	0	0	0	0	0	0	0
2	18/10/17 8:14	15	21	0	0	0	0	0	0	0
2	18/10/17 8:15	15	21	0	0	0	0	0	0	0
2	18/10/17 8:16	15	21	0	0	0	0	0	0	0
2	18/10/17 8:17	15	21	0	0	0	0	0	0	0
2	18/10/17 8:18	15	21	0	0	0	0	0	0	0
2	18/10/17 8:19	15	21	0	0	0	0	0	0	0
2	18/10/17 8:20	15	21	0	0	0	0	0	0	0
2	18/10/17 8:21	15	21	0	0	0	0	0	0	0
2	18/10/17 8:22	15	21	0	0	0	0	0	0	0
2	18/10/17 8:23	15	21	0	0	0	0	0	0	0
2	18/10/17 8:24	15	21	0	0	0	0	0	0	0
2	18/10/17 8:25	15	21	0	0	0	0	0	0	0
2	18/10/17 8:26	15	21	0	0	0	0	0	0	0
2	18/10/17 8:27	15	21	0	0	0	0	0	0	0
2	18/10/17 8:28	15	21	0	0	0	0	0	0	0
2	18/10/17 8:29	15	21	0	0	0	0	0	0	0
2	18/10/17 8:30	15	21	0	0	0	0	0	0	0
2	18/10/17 8:31	15	21	0	0	0	0	0	0	0
2	18/10/17 8:32	15	21	0	0	0	0	0	0	0
2	18/10/17 8:33	15	21	0	0	0	0	0	0	0
2	18/10/17 8:34	15	21	0	0	0	0	0	0	0
2	18/10/17 8:35	15	21	0	0	0	0	0	0	0
2	18/10/17 8:36	15	21	0	0	0	0	0	0	0
2	18/10/17 8:37	15	21	0	0	0	0	0	0	0
2	18/10/17 8:38	15	20.9	0	0	0	0	0	0	0
2	18/10/17 8:39	15	20.9	0	0	0	0	0	0	0
2	18/10/17 8:40	15	20.9	0.1	0.00020833	0.00666667	0	0	0	0
2	18/10/17 8:41	15	20.9	0.2	0.000625	0.02	0	0	0	0
2	18/10/17 8:42	15	20.9	0.4	0.00145833	0.04666667	0	0	0	0
2	18/10/17 8:43	15	21	0	0.00145833	0.04666667	0	0	0	0
2	18/10/17 8:44	15	21	0	0.00145833	0.04666667	0	0	0	0
2	18/10/17 8:45	15	21	0	0.00145833	0.04666667	0	0	0	0
3	20/10/17 10:10	13	21	0	0.00145833	0	0	0	0	0
3	20/10/17 10:11	13	21	0	0.00145833	0	0	0	0	0
3	20/10/17 10:12	14	21	0	0.00145833	0	0	0	0	0
3	20/10/17 10:13	14	21	0	0.00145833	0	0	0	0	0
3	20/10/17 10:14	14	21	0	0.00145833	0	0	0	0	0
3	20/10/17 10:15	14	21	0	0.00145833	0	0	0	0	0

	3	20/10/17 10:16	14	21	0	0.00145833	0	0	0	0	0
	3	20/10/17 10:17	14	21	0	0.00145833	0	0	0	0	0
	3	20/10/17 10:18	14	21	0	0.00145833	0	0	0	0	0
	3	20/10/17 10:19	15	21	0	0.00145833	0	0	0	0	0
	3	20/10/17 10:20	15	20.9	0	0.00145833	0	0	0	0	0
Average			13.376652	20.9885463	0.00154185	5.00E-05	0.0004699	0	0	0	0
Max			15	21	0.4	0.00145833	0.04666667	0	0	0	0
Min			12	20.9	0	0	0	0	0	0	0

Appendix F – AWQL Report

Faecal Source Tracking (FST)

Customer Sample Description	**Nation Partners**
Sampling Point	**700032**
Sampled Date	**18/10/2017**
Sample ID	**2017-008-9256-01 (5149541)**

HOST SOURCE EVALUATION*

GENERAL faecal contamination could not be detected (Equivalent of <1 ng/L of detectable Faecal matter).

HUMAN faecal contamination could not be detected (Equivalent of <1 ng/L of detectable Faecal matter).

Host Faecal Input	Result
General Faecal Input	**BDL**
Human Faecal Input	**BDL**

Gene Units/L	Determination
$> 10^5$	High
$10^3 - 10^5$	Medium
$10^1 – 10^2$	Low
$<10^1$	Below Detection Limit (BDL)

Authorised: Eugene PRETORIUS (Life Sciences Technical Officer)

Endorsed: Gary HALLAS (Method Development Co-ordinator)

Note

1. DNA extraction performed using the MoBio PowerSoil® kit as per manufacturer's instructions. DNA extraction processes and sampling techniques can influence the types of vertebrates detected and reported. Standardisation of these practices is required for consistent and reliable results.
2. It is recommended that 1L samples are taken according to the AWQC DNA sampling criteria to minimise DNA contamination. The size of the water body, habitat of the defined species, month and period of collection, age of the sample, water flow and other hydrological factors need to be considered for the sampling and biodiverstiy estimations to be effective.
3. Faecal Source Tracking performed using qPCR (TaqMan) probes as per manufacturer's instructions. The LightCycler® software enables the identification of vertebrate organisms present in complex samples.
4. The AWQC report is an interpretation of the raw data output. The determination(s) and interpretative report produced is based on QC controls of targeted vertebrate DNA.
5. The source discrimination is not definitive. The determination(s) have been based on publication findings on host bacterial and cell specific markers/probes. In-house AWQC verification trials have confirmed the use for the gene targets selected against the host source. Evolutionary close relationships, Geographical, Ecological, Environmental and Historical epidemiology of possible host sources need to be recognised including any unique occurrences.