CONTRACT NO. SPW 25/2018
ENVIRONMENTAL TEAM FOR
RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS – SITE PREPARATION AND ACCESS TUNNEL CONSTRUCTION

UNDER ENVIRONMENTAL PERMIT NO. EP-533/2017

CONTAMINATION ASSESSMENT REPORT AND REMEDIATION ACTION PLAN FOR THE EXISTING DSD STAFF QUARTER
REVISION 2.2

CLIENT:

DRAINAGE SERVICES DEPARTMENT

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8 February 2021

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Contract No. SPW 01/2020
Independent Environmental Checker for Relocation of Sha Tin Sewage Treatment Works to Caverns – Site Preparation and Access Tunnel Construction

Environmental Permit No. EP-533/2017

EP Conditions 1.9 & 2.21 – Contamination Assessment Report and Remediation Action Plan for the Existing DSD Staff Quarters Site at Sha Tin Sewage Treatment Works (Revision 2.2)

8 February 2021
By Email

Dear Sir,

I refer to the Contamination Assessment Report and Remediation Action Plan for the Existing DSD Staff Quarters Site at Sha Tin Sewage Treatment Works (Revision 2.2) under the captioned Project, as stipulated under Section 5.1.1.1 of the EM&A Manual and Condition 2.21 of Environmental Permit (EP) No. EP-533/2017, which was certified by the Environmental Team Leader (ETL) on 8 February 2021.

I have no comment on the captioned submission and hereby verify it in accordance with EP Conditions 1.9 and 2.21.

Should you have any queries regarding the captioned or require any further information, please contact the undersigned at 2828 5875.

Yours faithfully
for MOTT MACDONALD HONG KONG LIMITED

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1. Introduction

1.1 Background

1.1.1 Drainage Services Department (DSD) is the owner of the Existing Staff Quarter (The Site) nearby the Sha Tin Sewage Treatment Works (STSTW). DSD intended to decommission the Existing Staff Quarter to construct a temporary site office in the Site.

1.1.2 A Contamination Assessment Plan (CAP) was prepared for the existing STSTW in the appendices of the approved EIA (AEIAR-202/2016 - Sha Tin Cavern Sewage Treatment Works). The Site is included in the assessment area of this CAP. Section 7.1.1.4 of the CAP stated that "*since STSTW will continue to work for quite some time, the change in operation which lead to any new or relocation of contamination hotspots or occurrence of spillage or accident is not foreseeable.*" As the CAP was prepared in 2016, a Supplementary Contamination Assessment Plan (SCAP) shall be prepared to conduct a review to confirm the findings in the EIA CAP at the concerned site is still valid after 4 years of approval of the EIA CAP. As stipulated in Condition 2.21 of the Environmental Permit (EP no.: EP-533/2017) (the EP), detailed assessment of land contamination shall be carried out before the construction the commencement of demolition/construction of the Project when access to the concerned site(s) identified in Appendix 6.01 of the approved EIA Report (Register No. AEIA-202/2016) is available.

1.1.3 A Supplementary Contamination Assessment Plan (SCAP) was prepared to identify the potential land contamination issues at the Site for partial fulfilment of Condition 2.21 of the EP and recommended to conduct Site Investigation (SI) at ENV-G01 (2) to identify potential land contamination issues.

1.1.4 Lam Environmental Services Limited (LES) has been appointed by DSD to prepare this Contamination Assessment Report and Remediation Action Plan (CAR & RAP) in according to the approved SCAP for partial fulfilment of Condition 2.21 of the EP. This CAR & RAP only covers the assessment of the Existing DSD Staff Quarter Site and subsequent land contamination assessment for the existing STSTW will be submitted prior to demolition. Site location map is shown in ***Figure 1-1***.

1.2 Environmental Legislation and Standards

1.2.1 The CAR was prepared with reference to the following relevant legislations, documents and guidelines that are applicable to land contamination assessment and remediation in Hong Kong:

- Guidance Note for Contaminated Land Assessment and Remediation, issued on 15 August 2007 by the Environmental Protection Department (EPD) (the Guidance Note).

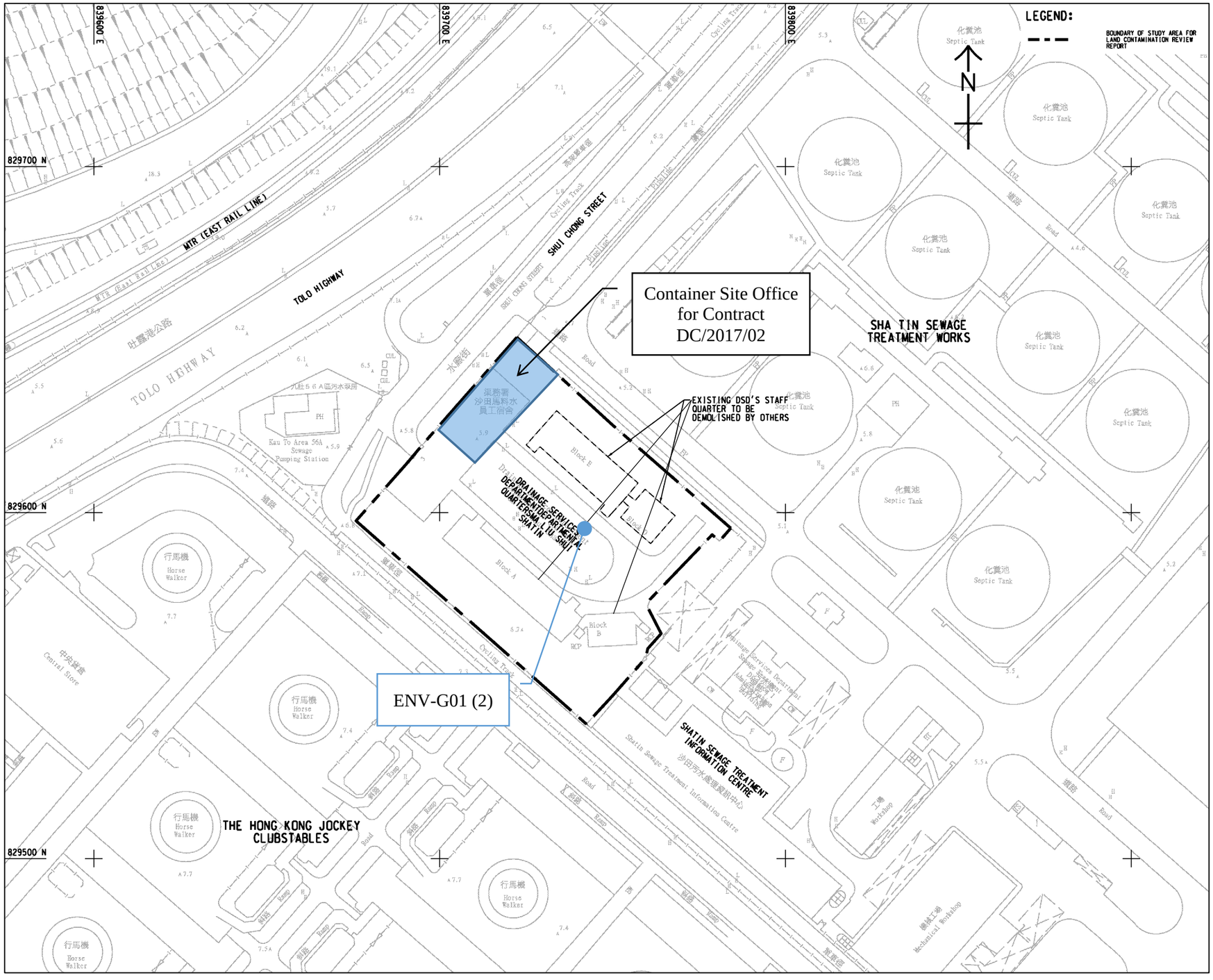
- Guidance Manual for Use of Risk-Based Remediation Goals (RBRG) for Contaminated Land Management, published in December 2007 by EPD (the Guidance Manual).
- Practice Guide for Investigation and Remediation of Contaminated Land, published in August 2011 by EPD (the Practice Guide).

1.3 Future Land Use and Land Use Scenarios of the Site

1.3.1 Refer to the CAP, the existing STSTW would be used for housing development or other beneficial uses to improve the community and environment and the Urban Residential Land Use Scenario is adopted as the criteria for this type of land uses.

1.3.2 The future land use of the Site will be similar to the future land use of existing STSTW and the criteria of Urban Residential Land Use Scenario is considered applicable.

Figure 1-1 Site Location Map



2. Review of the Approved SCAP

2.1 Conclusion of the SCAP

2.1.1 In the SCAP, site appraisal was conducted to identify potential land contamination sources/ hotspot in the Site by site inspection on 28 July 2020, review of aerial photos, obtaining information from government departments and interview with the land owner. Also, the findings on land contamination issues prior to 2016 from EIA CAP was also reviewed to obtain the information prior to 2016 for the Site. Based on the findings of the CAP for the Site and this SCAP, no land contaminating source/hotspot/activities were observed at the study area and the findings in the EIA CAP at the study area is considered valid.

2.1.2 However, one grid sample point was proposed in the grid (ENV-G01) in the CAP, which is within the Site, to study the vertical profile of possible contamination within the existing DSD Staff Quarters. After reviewing the actual site conditions, an alternative grid sampling point – ENV-G01 (2) for grid sampling point – ENV-G01 was proposed due to site constraint and indicated in the location plan in the SCAP to represent ENV-G01. Location of ENV-G01 (2) is shown in ***Figure 1-1***.

2.1.3 All sampling and testing requirement specified in the CAP for sampling at ENV-G01 (2) shall be followed. The sampling point and Chemicals of Concern (CoCs) proposed in the approved CAP and the SCAP agreed by the EPD are extracted as below ***Table 2-1***.

Table 2-1 Summary of Sampling Points & CoCs proposed in the SCAP at the Site

Sampling Location ID	Sampling and Testing Rationale	Sampling Method	Sample Matrix/ Depth[1]		Parameters to be Tested
ENV-G01 (2)	Grid Sampling point for the DSD Staff Quarters	Borehole drilling to 2m below the groundwater table or 6m bgs	Soil	i. 0.5m bgs ii. 1.5m bgs iii. 3.0m bgs iv. GW level or 6m bgs[3]	PCR, VOC, SVOC, Metals[2]
			GW	If present[3]	PCR, VOC, SVOC, Mercury

Remark:

1. bgs refers to below ground surface; GW refers to groundwater
2. Metals refers to Antimony, Arsenic, Barium, Cadmium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Tin, Zinc, Mercury, Chromium (III) and Chromium (VI);
3. The deepest depth of sampling should be above/ near groundwater table or 6m bgs, whichever is shallower. Groundwater sample would only be collected if encountered.
4. All sampling and testing requirement specified in the CAP shall be followed for sampling at ENV-G01 (2).

3. Contamination Assessment Report (CAR)

3.1 Introduction

3.1.1 SI work was conducted by DSD's appointed contractor (Teamway Engineering Limited) at ENV-G01 (2) during 5-7 November 2020 under supervision of the Land Contamination Specialist. This section reports the assessment methodology and assessment results of the SI at ENV-G01 (2). Soil and groundwater sampling were conducted following the sampling locations and sampling methodology proposed in the SCAP and chemical analysis was conducted in an HOKLAS accredited laboratory accordingly. The laboratory results were compared to the relevant RBRG criteria to determine whether remediation is required for the Site.

3.1.2 With reference to the Section 3.8.1 of the Practice Guide, the laboratory results were also compared to the relevant soil saturation limits (Csat) and groundwater solubility limits in the Guidance Manual for indicating the potential presence of NAPLs in soil and groundwater.

3.2 Sampling Method and Depth of Sampling

Soil Sampling at ENV-G01 (2)

3.2.1 A borehole was developed by DSD's contractor using dry rotary drilling on 5 November 2020.

3.2.2 A 0.5m x 0.5m x 1.5m in depth inspection pits was developed by manual method to identify any underground utilities at ENV-G01 (2) for safety reasons and a disturbed soil was collected at depth of 0.5m bgs from the inspection pit by using stainless steel spade and shovel. Soil sample was collected from the inspection pit and put into a glass sample container provided by the laboratory.

3.2.3 Boreholes sampling was conducted by dry rotary drilling from 1.5m bgs. When the drill rig reached the target depths, undisturbed U76 soil samples were collected from 1.5m, 3.0m, 5.0m and 6m bgs. A total of 5 soil samples were collected and soil samples summary is provided at ***Appendix A***.

3.2.4 After sampling, the collected soil samples were stored in a cool box with ice-pack to maintain a temperature of between 0°C and 4°C. All soil samples were properly labelled and sent to the HOKLAS accredited laboratory with Chain-of-Custody form on the same day of sample collection.

3.2.5 Strata logging for the borehole was conducted by a qualified geologist during drilling/digging at ENV-G01 (2). The strata log and photo records of SI works were provided in ***Appendix B*** and ***Appendix C***.

Groundwater Sampling and Free Product Measurement

3.2.6 Groundwater was not encountered during the borehole development and soil sampling on 5 November 2020. After one day of recharging, groundwater recharged and groundwater level

was found at around 2.13m bgs. Groundwater sampling well was also installed at ENV-G01 (2) on 6 November 2020 for groundwater sampling on 7 November 2020.

3.2.7 The monitoring well was purged 3 times in order to remove fine-grained materials and to freshly refill representative groundwater samples. Groundwater sample was collected using Teflon bailer and decanted immediately into the sample containers prepared by HOKLAS accredited laboratory to minimise agitation and volatilization of VOCs from the samples. Non-aqueous Phase Liquid (NAPL) or free product layer floating on top of the groundwater was not observed during sampling. After sample collection, samples were stored in a cool box with ice-pack to maintain a temperature of between 0°C and 4°C. All samples were properly labelled and sent to the HOKLAS accredited laboratory with Chain-of-Custody form on the same day of sample collection. Groundwater samples summary and photo records of SI works were provided at ***Appendix A*** and ***Appendix C***.

3.3 Sampling, Handling and Transport of Samples

3.3.1 All sampling equipment was thoroughly decontaminated by washing with phosphate-free detergent and rinsed with distilled/deionised water prior to sampling and between drilling, digging and sampling event to prevent cross contamination of samples.

3.3.2 Following sampling, samples was stored in a cool box at a temperature of between 0°C and 4°C and transported to the HOKLAS accredited laboratory within the sample retention time, as advised by the laboratory.

3.4 Quality Assurance and Quality Control (QA/QC) Procedures

3.4.1 A total of 8 field QA/QC samples were collected as below:

- 1 duplicate soil sample and 1 duplicate groundwater sample for analysis of same parameters as shown in ***Table 2-1***.
- 2 field blank for analysis of same parameters as shown in ***Table 2-1***.
- 2 equipment sample for analysis of same parameters as shown in ***Table 2-1***.
- 2 trip blank sample for analysis of petroleum carbon ranges C6-C8.

3.4.2 QAQC samples summary is provided at ***Appendix A*** and the summary of laboratory results for QA/QC samples are presented in ***Appendix D***.

3.5 Laboratory Result and Interpretation

3.5.1 A HOKLAS accredited laboratory (ALS Technichem (HK) Pty Limited) was appointed for samples analysis. The schedule for laboratory analysis is listed in ***Table 3-1***:

Table 3-1 Parameters, Reporting Limits and Reference Methods for Laboratory Analysis

Parameters	Soil Reporting Limit (mg/kg)	Reference Test Method	Groundwater Reporting Limit (µg/L)	Reference Test Method
SVOCs				
Acenaphthene	0.5	USEPA 8270	2	USEPA 8270
Acenaphthylene	0.5		2	
Anthracene	0.5		2	
Benzo(a)anthracene	0.5		NA	
Benzo(a)pyrene	0.5		NA	
Benzo(b)fluoranthene	0.5		1	
Benzo(g,h,i)perylene	0.5		NA	
Benzo(k)fluoranthene	0.5		NA	
bis-(2-Ethylhexyl)phthalate	5		NA	
Chrysene	0.5		1	
Dibenzo(a,h)anthracene	0.5		NA	
Fluoranthene	0.5		2	
Fluorene	0.5		2	
Hexachlorobenzene	0.2		4	
Indeno(1,2,3-cd)pyrene	0.5		NA	
Naphthalene	0.5		2	
Phenanthrene	0.5		2	
Phenol	0.5		NA	
Pyrene	0.5		2	
VOCs				
Acetone	50	USEPA 8260	500	USEPA 8260
Bromodichloromethane	0.1		5	
2-Butanone	5		50	
Chloroform	0.04		5	
Methyl tert-Butyl Ether	0.5		5	
Methylene Chloride	0.5		50	
Styrene	0.5		5	
Tetrachloroethene	0.04		5	
Trichloroethene	0.1		5	
Benzene	0.2		5	
Toluene	0.5		5	
Ethylbenzene	0.5		5	
Xylenes	2		20	
Metals				
Antimony	1	USEPA 6020A	NA	NA
Arsenic	1		NA	NA
Barium	1		NA	NA
Cadmium	0.2		NA	NA
Chromium III^	1	By calculation	NA	NA
Chromium VI	1	USEPA 3060 APHA 3500 Cr: D	NA	NA
Cobalt	1	USEPA	NA	NA

Parameters	Soil Reporting Limit (mg/kg)	Reference Test Method	Groundwater Reporting Limit (µg/L)	Reference Test Method
Copper	1	6020A	NA	NA
Lead	1		NA	NA
Manganese	1		NA	NA
Mercury	0.05		0.5	USEPA 6020A
Molybdenum	1		NA	NA
Nickel	1		NA	NA
Tin	1		NA	NA
Zinc	1		NA	NA
Petroleum Carbon Ranges (PCRs)				
C6 - C8	5	USEPA 8015/8260	20	USEPA 8015/8260
C9 - C16	200		500	
C17 - C35	500		500	

Notes:

1. NA = Not Applicable
2. ^ Chromium III is quantified by calculation based on Chromium VI and Total Chromium measured under HOKLAS accredited methods.

3.5.2 The laboratory results are summarised in ***Appendix D***. The full laboratory report and chain of custody records are provided in ***Appendix E***.

3.5.3 According to the laboratory result, Metal (Lead) in the soil samples collected at ENV-G01 (2) at 1.5m bgs and 3.0m bgs were tested exceeded RBRGs - Urban Residential Land Use Scenario criteria. All other soil and groundwater samples collected at ENV-G01 (2) were tested within RBRGs criteria of all scenarios. As no trace of NAPL is observed at ENV-G01 (2) and all tested parameters in the soil/groundwater samples were within Csat/solubility limit, the remediation goal shall refer to the RBRGs criteria and NAPL removal to soil saturation limit or solubility limit criterion is not necessary at ENV-G01 (2).

4. Remediation Action Plan (RAP)

4.1 Introduction

4.1.1 Further to the above CAR in ***Section 3***, the site investigation at ENV-G01 (2) identified lead exceedances for the soil samples collected at 1.5m and 3.0m and all tested parameters in the soil/groundwater samples were within Csat/solubility limit. Remediation is deemed required for the soil in ENV-G01 (2), therefore, this Remediation Action Plan (RAP) is prepared in accordance to the Practice Guide to provide guidance of remediation works at ENV-G01 (2).

4.2 Remediation Objective

4.2.1 The objectives of this Remediation Action Plan (RAP) are as follows:

- To propose remediation/decontamination method(s) for contaminated soil and groundwater;
- To propose a procedures to confirm the contamination extent and completed remediation/ decontamination of contaminated soil and groundwater; and
- To provide guidelines regarding handling and/or disposal of remediated/decontaminated soil.

4.3 Extent of the Lead Contamination at ENV-G01(2)

4.3.1 Soil samples collected at 1.5m – 1.95m bgs and 3.0m – 3.45m bgs were tested exceeded RBRGs - Urban Residential Land Use Scenario criteria and remediation is required. To confine the area of contaminated soil for remediation, a 5m x 5m horizontal square centred at the borehole ENV-G01 (2) is adopted as initial contamination zone. The vertical extent of initial contamination zone is assumed to be 0.5m above and below the sampling depth with contamination identified for conservation estimation. Based on the above estimation approach, the extent of initial contamination has been estimated and summarised in ***Table 4-1*** below and shown and ***Figure 4-1***.

Table 4-1 Estimated Volumes of Initial Contamination Zone

Borehole ID	Sample ID	Sample Depth (m below surface)	Contaminant	Estimated Contamination Extent		
				Vertical Extent (m below surface)	Horizontal Area (m^2)	Volume * (m^3)
ENV-G01(2)	ENV-G01(2) (1.5m-1.95m)	1.5m-1.95m	Metal (Lead)	1.0m to 3.95m (2.95m thickness)	5m x 5m ($25m^2$)	~74
	ENV-G01(2) (3.0m-3.45m)	3.0m – 3.45m				

Remark:

1. The estimated volume of contaminated soil does not calculated the bulking factor of the soil and is an estimation of the minimum contaminated soil to be excavated.

4.3.2 This initial contamination zone will be further refined by confirmatory testing at the excavation boundaries. If there are any exceedances tested for the samples collected at the initial contamination zone, the remediation area shall be extended for at least 1m horizontally to the side or at least 0.5m vertically above or below until the samples collected at the excavation boundaries within the remediation target. All the confirmatory sampling and QA/QC testing shall be sent to HOKLAS laboratories for analysis. The detail sampling schedule and sampling location are indicated in ***Table 4-2*** and ***Figure 4-1***.

Table 4-2 Sampling Schedule of Confirmatory Test at ENV-G01 (2)

<table>
<tr><th>Sample ID*</th><th>Type of Samples</th><th>Sample Depth (m below surface)</th><th>Testing parameter</th><th>If tested exceedance, additional sample should be collected at least</th></tr>
<tr><td>ENV-G01(2) (T)</td><td>Centre top</td><td>1.0m</td><td rowspan="11">Lead</td><td>0.5m vertically above</td></tr>
<tr><td>ENV-G01(2) (B)</td><td>Centre bottom</td><td>3.95m</td><td>0.5m vertically below</td></tr>
<tr><td>ENV-G01(2) (ET)</td><td rowspan="9">Side Wall</td><td rowspan="5">1.5m</td><td rowspan="9">1m horizontally to the side</td></tr>
<tr><td>ENV-G01(2) (ST)</td></tr>
<tr><td>ENV-G01(2) (WT)</td></tr>
<tr><td>ENV-G01(2) (NT)</td></tr>
<tr><td>ENV-G01(2) (EB)</td><td rowspan="4">3.0m</td></tr>
<tr><td>ENV-G01(2) (SB)</td></tr>
<tr><td>ENV-G01(2) (WB)</td></tr>
<tr><td>ENV-G01(2) (NB)</td></tr>
</table>

Remarks:

If exceedance is recorded in any confirmatory sample, additional samples shall be collected and the contamination zone shall be extended for at least 1m horizontally to the side or at least 0.5m vertically above or below until the samples collected at the excavation boundaries within the RBRG criteria.

4.3.3 The schedule for laboratory analysis and the criteria for the confirmatory samples are listed in in below ***Table 4-3.***

Table 4-3 Laboratory Analysis Schedule for Soil/Groundwater Confirmatory Sampling at ENV-G01 (2)

Parameter	Reference Test Method	Reporting Limit (mg/kg)	RBRGs (mg/kg)
Lead	USEPA 6020A or similar method*	1	258

Note:

*Alternative testing methods with accreditation by HOKLAS or its Mutual Recognition

Arrangement partners are also accepted.

4.4 QA/QC Procedures for Confirmatory Test

4.4.1 All the confirmatory sampling and QA/QC testing shall be sent to HOKLAS laboratories for analysis.

4.4.2 For the field QA/QC samples, the followings shall be followed during confirmatory sampling:

- 1 duplicate soil sample per 20 samples and for analysis of same parameters as shown in ***Table 4-3***.
- 1 field blank per 20 samples for analysis of same parameters as shown in ***Table 4-3***.
- 1 equipment sample shall be collected per 20 samples for analysis of same parameters as shown in ***Table 4-3***.

4.5 Evaluation and Selection of Remediation Technique

4.5.1 Various remediation methods for metal contaminated soil were reviewed and evaluated to select the most appropriate remediation method. Selection of remediation method were based on from a technical, environmental and legislative consideration and below factors suggested in the Practical Guide were also considered:

- Nature and level of contamination;
- Extent of contamination;
- Site constraints;
- Time available for remediation; and
- Site characteristics.

4.5.2 The comparison and evaluation of soil and groundwater remediation options are presented in below ***Table 4-4.***

Table 4-4 Recommended Remediation Options for Lead Contaminated Soil

Remediation Method	Descriptions	Applicability	Limitations/Remarks
Excavation and Landfill Disposal	Ex-situ method whereby contaminated soil was excavated and directly disposal to landfill.	• Most simple and quickest method. • Applicable to all waste or mixture that meet land disposal restriction treatment standards. • Common practice for shallow, highly-contaminated soils. • Higher certainty of success.	• Pre-treatment may be required for contaminated soil to meet landfill disposal criteria (TCLP) • Landfill space is limited and valuable. • Need to import clean backfill materials • Least desirable

Remediation Method	Descriptions	Applicability	Limitations/Remarks
			management option.
Soil Washing	Ex-situ soil separation processes to remove contaminants by washing the contaminated soil with water-based solution.	• Applicable to treat low permeability soil contaminated with heavy metals.	• Effectiveness of the treatment will depend on soil particle size. • Require further treatment and disposal for residuals • Require large space for equipment. • Less common method in Hong Kong. • Costly.
Electro Kinetic Separation	In-situ remediation uses electrochemical and electro kinetic process to remove metals from soil.	• Applicable to treat low permeability soil contaminated with heavy metals.	• Effectiveness of the treatment will depend moisture content and conductivity in soil. • Less common method in Hong Kong. • Costly. • Require further treatment and disposal for residuals.
Solidification/ Stabilization (S/S)	Mixing contaminated soil with binding agent, e.g. cement to immobilise contaminants in soil.	• Applicable to treat low permeability soil contaminated with heavy metals. • Limits the solubility or mobility of the contaminants in the solidified mixture.	• Effectiveness of the treatment reduces with the presence of organic contaminants. • Soil sorting is necessary before the treatment to remove large boulders, which will intervene mixing process.

4.5.3 Refer to the remediation options provided in ***Table 4-4***, cement solidification/ stabilization (S/S) followed by on-site backfilling is the most practical and cost-effective method to treat the lead contaminated soil at ENV-G01 (2) and hence is adopted in this RAP.

4.6 Proposed Remediation Process for ENV-G01 (2)

4.6.1 Prior to the cement S/S for soil remediation, a pilot test shall be conducted to obtain the optimal mixing ratio of cement and contaminated soil at ENV-G01 (2) in order to fulfil the treatment target. The ratios and procedures of the pilot test shall be proposed by the Remediation Contractor.

4.6.2 The contaminated soil shall be properly excavated and transferred to a designated treatment area within the Site for remediation. Detail excavation plan and design drawings for planned excavations in the contamination zone shall be proposed by the Remediation Contractor. Underground utilities shall be identified by the Contractor prior to the excavation. If large boulders (i.e. larger than 50mm diameter) were excavated, it shall be screened out to avoid intervening the mixing process. As the large boulder is considered unlikely to be contaminated by heavy metals, Steam-clean at 60°C to remove the surface soil and backfill the large boulders with the remediated soil is considered acceptable.

4.6.3 Workers, vehicles, instruments, and equipment shall be properly decontaminated prior to leaving the site.

4.6.4 Confirmatory sampling shall be conducted after excavation of initial contamination zone to confirm the extent of contamination at ENV-G01 (2) as described in ***Section 4.3***.

4.6.5 The screened contaminated soil shall be transferred to a designated treatment area within the Site and the treatment area shall be confined for carrying out the S/S treatment and temporary storage of stockpile. Tentative stockpiling and treatment area layout plan is provided in ***Figure 4-2*** for reference, however, the actual stockpile location shall be proposed by the Remediation Contractor and approved by the Engineer. During the S/S treatment, cement (or other equivalent binding agent), water and/or other additives(s) (such as fly ash, lime, soluble silicates and clays) should be added to the contaminated soils in the optimal ratio identified from the pilot test to form a solid mixture. Uniform mixing of the solid mixture shall be taken by using a skip (or other equivalent) at the designated treatment area to minimise the potential for leaching during the solidification process and ensure properly mixing.

4.7 Verification Sampling and Test during Remediation Process

4.7.1 Solidified soils are required to meet the Toxicity Characteristic Leaching Procedure (TCLP) and unconfined compressive strength (UCS) tests requirements for on-site backfilling. According to the Practice Guide, criteria for treated soil from cement S/S remediation method to be reused on-site as fill material shall be agreed upon with EPD in advance. The Universal Treatment Standards (UTS) is considered as a suitable criteria and proposed as the criteria in the RAP. As only lead was tested exceeding RBRGs criteria, only TCLP test for lead is considered sufficient. The treated soil shall be able to achieve the UCS of not less than 1MPa with reference

to the USEPA guidelines (1986) – "Handbook of Stabilization/ Solidification of Hazardous Wastes, EPD/540/2-86-001". It is proposed that the sampling frequency of 1 sample per 10m^3 of treated soil shall be collected for TCLP and UCS verification testing. Proposed criteria of UTS and UCS testing for remediated soil and the proposed sampling frequency are summarised in below ***Table 4-5***.

Table 4-5 Proposed Criteria of UTS and UCS Testing and Sampling Frequency for Remediated Soil

Parameter	Sampling Frequency	Proposed Criteria
Toxicity Characteristics Leaching Procedure (TCLP) Test – Lead	1 sample per 10m^3 of remediated soil	0.75 mg/L
Unconfined Compressive Strength (UCS)		Not less than 1 MPa

4.7.2 If all verification samples are tested fulfilling the proposed criteria in ***Table 4-5***, the remediated soil can be backfilled on-site at ENV-G01 (2) with below requirement:

- The remediated soil should be backfilled below 0.5m thick of clean fill.
- The solidified materials shall be broken into mass with maximum size of 250mm for backfilling or reuse on-site.
- Not used for any structural or landscaping purposes.

4.8 QA/QC Procedures for Verification Sampling and Test during Remediation Process

4.8.1 For the field QA/QC samples, the followings shall be followed during verification sampling:

- 1 duplicate soil sample per 20 verification samples collected for verification test and for analysis of same parameters as shown in ***Table 4-5***.
- 1 field blank per 20 verification samples for analysis of same parameters as shown in ***Table 4-3***.
- 1 equipment sample shall be collected per 20 samples for analysis of same parameters as shown in ***Table 4-3***.

4.9 Cross-Contamination Prevention Measures

4.9.1 In order to prevent cross-contamination between the clean soil and contaminated soil, the clean soil and contamination soil shall be excavated and placed at different designated location on-site with proper labeling. Tentative stockpile layout plan is provided in ***Figure 4-2*** for reference, however, the actual stockpile location shall be proposed by the Remediation Contractor and approved by the Engineer. Stockpiles shall be covered by impervious sheeting and the contaminated soil stockpiles shall be also surrounded by sandbags/water absorbing material.

4.9.2 The excavation equipment should not in contact with the contaminated soil within approximate 0.3m to avoid cross-contamination. The equipment shall be decontaminated properly before handling of clean soil and after handling the contamination soil.

4.10 Sampling, Handling and Transport of Samples

4.10.1 All sampling equipment should be thoroughly decontaminated by washing with phosphate-free detergent and rinsed with distilled/deionised water prior to sampling and between drilling, digging and sampling event to prevent cross contamination of samples.

4.10.2 Following sampling, samples should be stored in a cool box at a temperature of between 0°C and 4°C and transported to the laboratory within the sample retention time, as advised by the laboratory.

4.11 Implementation of the RAP

4.11.1 The remediation works shall be commenced after the approval of this CAR-RAP by the EPD. The excavation, confirmatory sampling works and verification sampling works shall be supervised by a Remediation Specialist to ensure complete removal of contaminated soil.

4.11.2 After completion of remediation, a Remediation Report (RR) should be prepared and submitted to EPD by the Remediation Specialist to report the detail of remediation process and the test results to ensure the remediated soil has been treated properly to fulfil the treatment targets. According to the Practise Guide, the content of the RR should include:

- Background information, including background of the project, regulatory and other requirements, site future land use and land use scenarios, summary of on-site contamination;
- Description of remediation programme carried out including additional investigation, pilot testing, remediation, monitoring and measurements;
- Verification test results including field observations, samples laboratory test results, QA/QC results;
- Conclusions and recommendations (if applicable); and
- Laboratory analytical results, chain-of-custody, site photographs/maps and other referenced documents can be attached as annexes of the RR.

4.11.3 No construction works or development of the Site should be carried out prior to agreement of the RR by the EPD.

4.12 Environmental Mitigation Measures and Safety Measures

4.12.1 In order to control the potential environmental impacts arising from the handling of contaminated materials, the following environmental mitigation measures are recommended to be implemented during the remediation process:

- Stockpiles shall be covered with impervious sheeting to prevent contaminated runoff from contaminated soils;

- Vehicle including the wheels shall be properly washed prior to leaving the Site;
- Vehicles containing any excavated materials shall be properly covered to limit dust generation or contaminated runoff;
- Speed control shall be implemented for the vehicle carrying contaminated materials to prevent leakage; and
- Excavation shall be carried out during dry season as far as practicable to minimise contaminated runoff.

4.12.2 In order to control the potential adverse effects on health and safety of construction workers arising from the remediation work, the Occupation Safety and Health Ordinance (OSHO) (Chapter 509) and its subsidiary Regulations should be followed by all site personnel working on the site at all times. In addition, health and safety measures recommended at below but not limited shall be implemented:

- Develop site health and safety plan;
- Appoint site safety personnel;
- Works designed and supervised by competent persons;
- Set up a list of safety measures for site workers;
- Provide written information and training on safety for site workers;
- Provide personal protective equipment (PPE) (e.g. goggles, face mask, gloves and coverall) to site workers if necessary;
- Barricade the site area;
- Communicate with other working on site;
- Conduct utility survey prior to excavation; and
- Check for explosive/flammable gases.

Figure 4-1 Location Plan of Initial Contamination Zone and Sampling Locations of Confirmatory Test

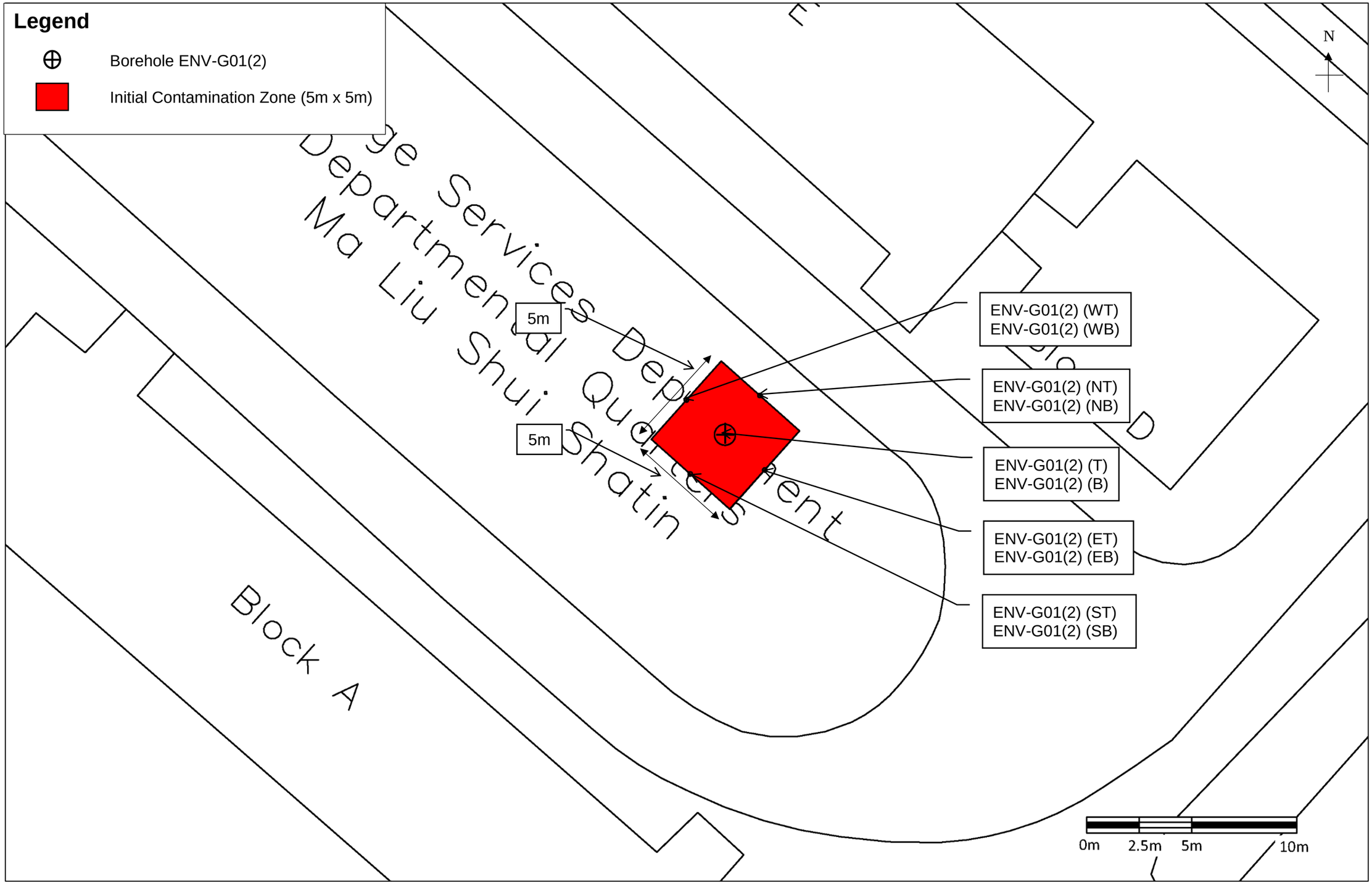
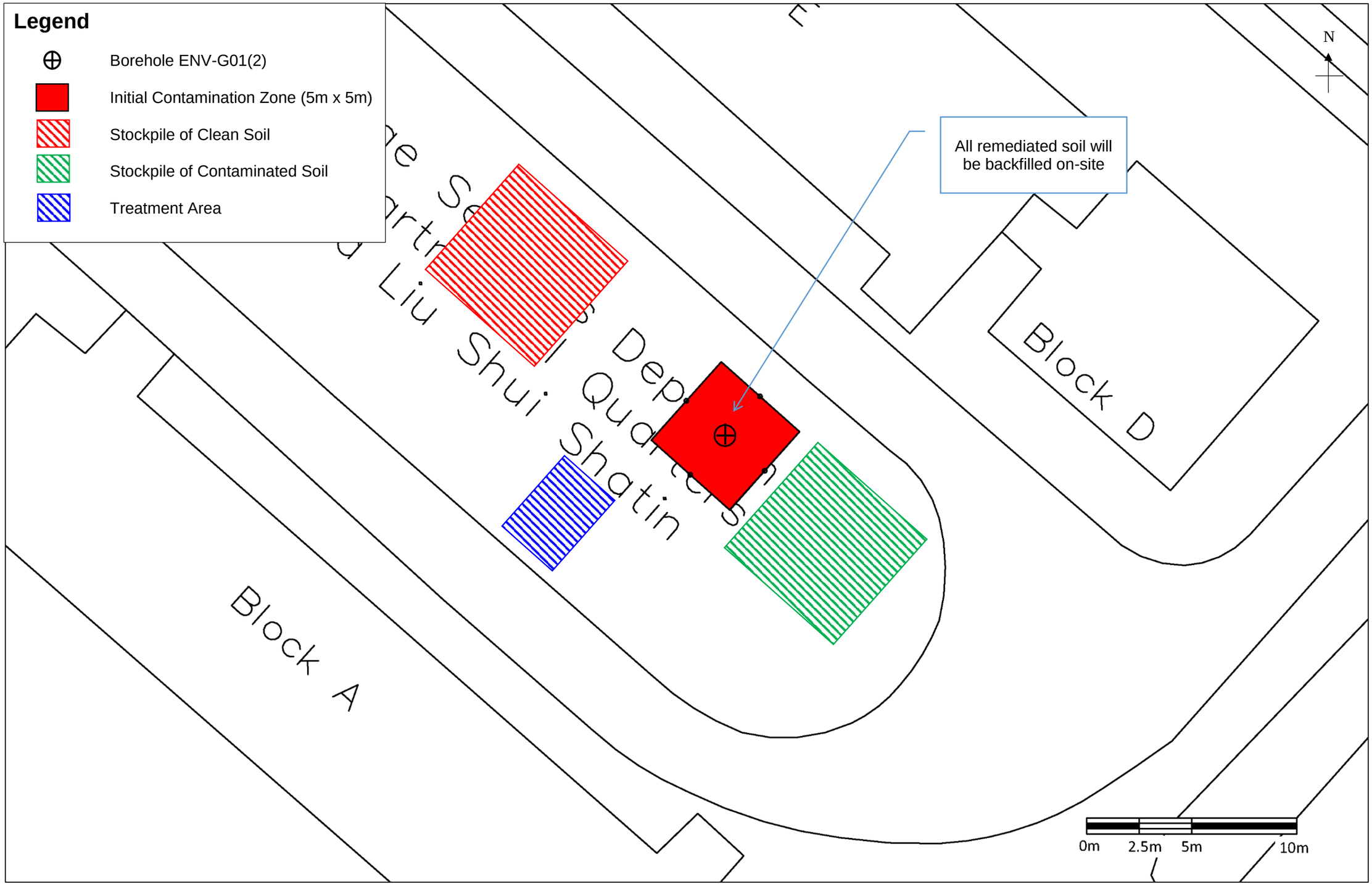


Figure 4-2 Tentative Stockpiles and Treatment Area Layout Plan



5. Conclusion

CAR

5.1.1 SI work was conducted by DSD's contractor (Teamway Engineering Limited) at ENV-G01 (2) during 5-7 November 2020 under the supervision of the Land Contamination Specialist. Soil and groundwater sampling at ENV-G01 (2) were conducted following the sampling locations and sampling methodology proposed in the approved SCAP and chemical analysis was conducted in an accredited laboratory accordingly.

5.1.2 According to the laboratory result, Metal (Lead) in the soil samples collected at ENV-G01 (2) at 1.5m bgs and 3.0m bgs were tested exceeded RBRGs - Urban Residential Land Use Scenario criteria. All other soil and groundwater samples collected at ENV-G01 (2) were tested within RBRGs criteria of all scenarios. As no trace of NAPL was observed at ENV-G01 (2) and all tested parameters in the soil/groundwater samples were within Csat/solubility limit, the remediation goal shall refer to the RBRGs criteria. NAPL removal to soil saturation limit or solubility limit criterion is not necessary at ENV-G01 (2).

5.1.3 The extent of the contamination zone will be refined by confirmatory test discussed in the RAP.

RAP

5.1.4 Further to the above CAR in ***Section 3***, the site investigation at ENV-G01 (2) identified lead exceedances for the soil samples collected at 1.5m and 3.0m. Remediation is deemed required for the soil in ENV-G01 (2), therefore, this Remediation Action Plan (RAP) is prepared in accordance to the Practice Guide to provide guidance of remediation works at ENV-G01 (2).

5.1.5 To confine the area of contaminated soil for remediation, a 5m x 5m horizontal square centred at the borehole ENV-G01 (2) is adopted as initial contamination zone. The vertical extent of initial contamination zone is assumed to be 0.5m above and below the sampling depth with contamination identified for conservation estimation.

5.1.6 This initial contamination zone will be further refined by confirmatory testing at the excavation boundaries. If there are any exceedances tested for the samples collected at the initial contamination zone, the remediation area shall be extended for at least 1m horizontally to the side and/or at least 0.5m vertically above or below until the samples collected at the excavation boundaries within the remediation target.

5.1.7 Various remediation methods for metal contaminated soil were reviewed and evaluated. Cement solidification/ stabilization (S/S) followed by on-site backfilling is the most practical and cost-effective method to treat the lead contaminated soil at ENV-G01 (2) and hence is adopted in this RAP. All remediated soil will be backfilled on-site at ENV-G01 (2).

5.1.8 Prior to the cement S/S for soil remediation, a pilot test shall be conducted to obtain the optimal mixing ratio of cement and contaminated soil at ENV-G01 (2) in order to fulfil the treatment target. The ratios and procedures of the pilot test shall be proposed by the Remediation

Contractor.

5.1.9 Solidified soils are required to meet the Toxicity Characteristic Leaching Procedure (TCLP) and unconfined compressive strength (UCS) tests requirements for on-site backfilling. It is proposed that the sampling frequency of 1 sample per $10m^3$ of treated soil shall be collected for TCLP and UCS verification testing.

5.1.10 The remediation works shall be commenced after the approval of this CAR-RAP by the EPD. The excavation, confirmatory sampling works and verification sampling works shall be supervised by a Remediation Specialist to ensure complete removal of contaminated soil.

5.1.11 After completion of remediation, a Remediation Report (RR) shall be prepared and submitted to EPD by the Remediation Specialist to report the detail of remediation process and the test results to ensure the remediated soil has been treated properly to fulfil the treatment targets. No construction works or development of the Site should be carried out prior to agreement of the RR by the EPD.

Appendix A

Sampling Schedule and Samples Summary

Borehole ID	Sample ID	Sampling Dates	Type of samples	Sample Depth (m below surface)	Smell	Moist	Non-Aqueous Phase Liquid (NAPL) Observed?	Analysis Parameters*	Exceed RBRG Criteria (Y/N)
Soil Samples									
ENV-G01 (2)	ENV-G01(2) (0.5m)	5/11/2020	Disturbed sample	0.5m	No	Dry	No	PCR, VOC, SVOC, Metals	N
	ENV-G01(2) (1.5m-1.95m)		Undisturbed U76 sample	1.5m –1.95m		Dry			Y (Lead, RBRG for Urban Residential)
	ENV-G01(2) (3.0m-3.45m)			3.0m –3.45m		Moist			Y (Lead, RBRG for Urban Residential)
	*ENV-G01(2) (5.0m-5.45m)			5.0m – 5.45m		Moist			N
	ENV-G01(2) (6.0m-6.45m)			6.0m – 6.45m		Moist			N
Groundwater Sample									
ENV-G01 (2)	ENV-G01(2) GW	7/11/2020	-	2.13m	No	Moist	No	PCR, VOC, SVOC, Mercury	N

Remarks:

* :

Tested Metals including Antimony, Arsenic, Barium, Cadmium, Cobalt, Copper, Lead, Manganese, Molybdenum, Nickel, Tin, Zinc, Mercury, Chromium (III) and Chromium (VI)

Tested VOC Parameters including Acetone, Benzene, Bromodichloromethane, 2-Butanone, Chloroform, Ethylbenzene, Methyl tert-Butyl Ether, Methylene Chloride, Styrene, Tetrachloroethene, Toluene, Trichloroethene and Xylenes (Total).

Tested SVOCs Parameters including Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, bis-(2-Ethylhexyl)phthalate, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Fluorene, Hexachlorobenzene, Indeno(1,2,3-cd)pyrene, Naphthalene, Phenanthrene, Phenol and Pyrene.

Tested Petroleum Carbon Ranges parameters including PCR C6 - C8, C9 - C16 and C17 - C35.

Borehole ID	Type of QA/QC Sample	Sample ID	Sampling Dates	Sample Depth (m below soil)	Analysis Parameters*
QA/QC Sample					
ENV-G01 (2)	Duplicate sample	ENV-G01(2) (0.5m) (Dup)	5/11/2020	0.5m	PCR, VOC, SVOC, Metals
ENV-G01 (2)	Duplicate sample	ENV-G01(2) GW (Dup)	7/11/2020	2.13m	PCR, VOC, SVOC, Mercury
-	Trip Blank	SOIL-TB1	5/11/2020	-	PCR C6-C8
-	Trip Blank	GW-TB1	7/11/2020	-	PCR C6-C8
-	Equipment Blank	SOIL-EQ1	5/11/2020	-	PCR, VOC, SVOC, Metals
-	Equipment Blank	GW-EQ1	7/11/2020	-	PCR, VOC, SVOC, Mercury
-	Field Blank	SOIL-FB1	5/11/2020	-	PCR, VOC, SVOC, Metals
-	Field Blank	GW-FB1	7/11/2020	-	PCR, VOC, SVOC, Mercury

Remarks:

* :

Tested Metals including Mercury

Tested VOC Parameters including Acetone, Benzene, Bromodichloromethane, 2-Butanone, Chloroform, Ethylbenzene, Methyl tert-Butyl Ether, Methylene Chloride, Styrene, Tetrachloroethene, Toluene, Trichloroethene and Xylenes (Total).

Tested SVOCs Parameters including Acenaphthene, Acenaphthylene, Anthracene, Benzo(b)fluoranthene, Chrysene, Fluoranthene, Fluorene, Hexachlorobenzene, Naphthalene, Phenanthrene and Pyrene.

Tested Petroleum Carbon Ranges parameters including PCR C6 - C8, C9 - C16 and C17 - C35.

Appendix B

Strata Log Record

Teemway Engineering Ltd.

DRILLHOLE RECORD

Contract No.: DC/2018/05
Hole No.: ENV-G01(2)
Sheet: 1 of 1
Date: 05.11.2020 to 07.11.2020

Project: Relocation of Sha Tine Sewage Treatment works at Caverns - Site preparation and Access Tunnel Construction (DC/2018/05)

Method: ROTARY	Co-ordinates: E: 839739.794 N: 829593.649	Rock Corebit:
Machine Optr.: WAH		Hole Dia: HX
Flushing Medium: NIL	Orientation: VERTICAL	Ground Level: +6.60 mPD

Drilling Progress	Casing Depth/Size	Water Level/Time	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	Rock Quality Designation %	Fracture Index	Tests	Samples No.	Samples Type	Samples Depth	Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
05/11									A	Inspection Pit	0.50	+6.60	0.00			Loose, dark brown, silty fine to coarse SAND. (FILL)
											1.50	+5.10	1.50			Firm, dark brown, sandy silty CLAY.(FILL)
		2.13m 07/11							1		1.95					
	HX										3.00					
									2		3.45					
											5.00	+1.60	5.00			Firm, dark brown, sandy silty CLAY. (FILL)
									3		5.45					
											6.00					
05/11									4		6.45	+0.15	6.45			End of hole at depth of 6.45m.

- Small disturbed sample
- Large disturbed sample
- SPT liner sample
- U76 undisturbed sample
- Mazier sample
- P/S Piston sample
- Water table
- Standard Penetration Test
- Permeability test
- Piezometer tip
- Standpipe tip
- Vane shear test

Logged by: M.Y. LEE
Date: 13-11-2020
Checked by: LIU
Date: 13-11-2020

Remarks:
1. Soil sample collected at 0.50m, 1.50m, 3.00m, 5.00m & 6.00m bgl.
2. Groundwater well installed at depth of 6.00m bgl.
3. Groundwater sample collected on 07/11/2020.

Appendix C

Photo Records of SI Works

Photo 1 – Using phosphate-free detergent for sampling equipment decontamination

Photo 2 – Decontamination of sampling equipment

Photo 3 – Decontamination of sampling equipment

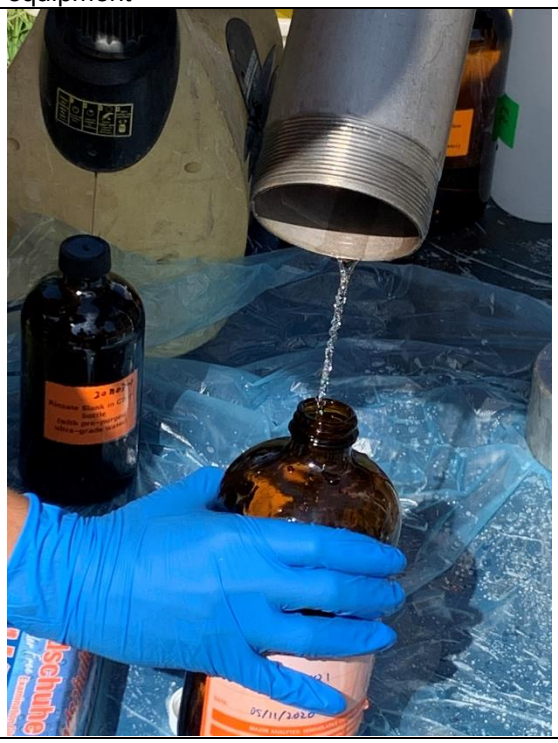


Photo 4 – Sampling of Equipment Blank

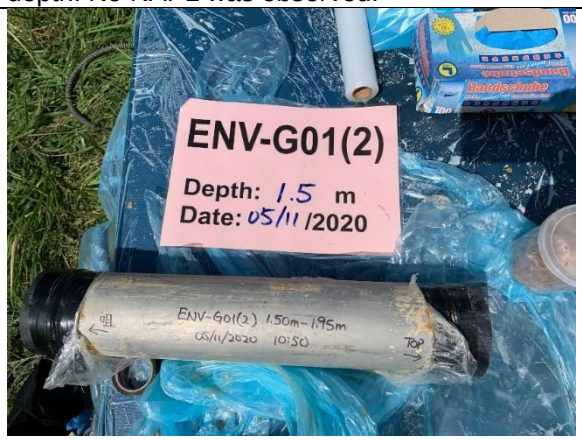
	
Photo 5 – Sampling of Field Blank	**Photo 6** – Sampling of ENV-G01 (2) at 0.5m depth. No NAPL was observed.
	
Photo 7 – Sampling of ENV-G01 (2) at 0.5m depth. No NAPL was observed.	**Photo 8** – Undisturbed soil sample collected at 1.5m at ENV-G01(2)

Photo 9 – Undisturbed soil sample collected at 1.5m at ENV-G01(2). No smell and NAPL were observed.

Photo 10 – Undisturbed soil sample collected at 3.0m at ENV-G01(2).

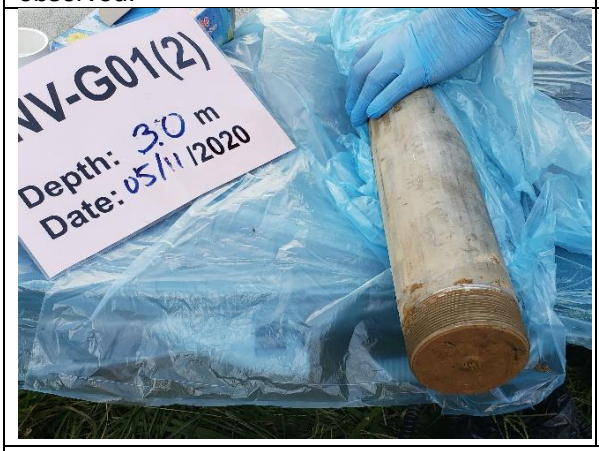


Photo 11 – Undisturbed soil sample collected at 3.0m at ENV-G01(2). No smell and NAPL were observed.

Photo 12 – Undisturbed soil sample collected at 5.0m at ENV-G01(2). No smell and NAPL were observed.

	
Photo 13 – Groundwater Monitoring Well at 2.13m at ENV-G01(2)	**Photo 14** – Groundwater Sampling at 2.13m at ENV-G01(2). No smell and NAPL were observed.
	**Not Used**
Photo 15 – Groundwater Sampling at 2.13m at ENV-G01(2). No smell and NAPL were observed.	**Not Used.**

Appendix D

Laboratory Result Summary

						VOCs												
						Acetone	Benzene	Bromodichloromethane	2-Butanone	Chloroform	Ethylbenzene	Methyl tert-Butyl Ether	Methylene Chloride	Styrene	Tetrachloroethene	Toluene	Trichloroethene	Xylenes (Total)
					Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
					LOR (ALS)	50	0.2	0.1	5	0.04	0.5	0.5	0.5	0.5	0.04	0.5	0.1	2
Adopted assessment criteria																		
RBRG 2007 Table 2.1 RBRGs for Soil - Urban Residential						9590.000	0.704	0.317	10000.000	0.132	709.000	6.880	1.300	3220.000	0.101	1440.000	0.523	95.000
RBRG 2007 Table 2.1 Soil Saturation Limit (Csat)						***	336.000	1030.000	***	1100.000	138.000	2380.000	921.000	497.000	97.100	235.000	488.000	150.000
Sampling Gird in CAP	**Sample ID**	**Sample Depth (m below soil)**	**Sample Date**	**Unit (Soil description)**	**Lab Report**													
ENV-G01	ENV-G01(2) (0.5m)	0.5m	5/11/2020	Fill (Loose, dark brown)	HK2042575-AC	<50	<0.2	<0.1	<5	<0.04	<0.5	<0.5	<0.5	<0.5	<0.04	<0.5	<0.1	<2.0
ENV-G01	ENV-G01(2) (0.5m) (Dup)	0.5m	5/11/2020	Fill (Loose, dark brown)	HK2042575-AD	<50	<0.2	<0.1	<5	<0.04	<0.5	<0.5	<0.5	<0.5	<0.04	<0.5	<0.1	<2.0
RPD						*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*
ENV-G01	ENV-G01(2) (1.5m-1.95m)	1.5m - 1.95m	5/11/2020	Fill (Firm, dark brown)	HK2042575-AC	<50	<0.2	<0.1	<5	<0.04	<0.5	<0.5	<0.5	<0.5	<0.04	<0.5	<0.1	<2.0
ENV-G01	ENV-G01(2) (3.0m-3.45m)	3.0m - 3.45m	5/11/2020	Fill (Firm, dark brown)	HK2042575-AC	<50	<0.2	<0.1	<5	<0.04	<0.5	<0.5	<0.5	<0.5	<0.04	<0.5	<0.1	<2.0
ENV-G01	ENV-G01(2) (5.0m-5.45m)	5.0m - 5.45m	5/11/2020	Fill (Firm, dark brown)	HK2042575-AC	<50	<0.2	<0.1	<5	<0.04	<0.5	<0.5	<0.5	<0.5	<0.04	<0.5	<0.1	<2.0
ENV-G01	ENV-G01(2) (6.0m-6.45m)	6.0m - 6.45m	5/11/2020	Fill (Firm, dark brown)	HK2042575-AC	<50	<0.2	<0.1	<5	<0.04	<0.5	<0.5	<0.5	<0.5	<0.04	<0.5	<0.1	<2.0

Sample criteria

Sample concentration exceeds RBRG criteria

OAOC Criteria

Relative percentage difference (RPD) exceeds acceptance criteria as follows:
-If results is less than 5 times laboratory LOR, then any RPD is acceptable
-If result is greater than 5 times laboratory LOR, then RPD of less than 50% is acceptable

Abbreviations

RBRG 2007 Enviornmental Protection Department 2007, Guidance Manual for Use of Risk-Based Remediation Goals for Contaminated Land Management
NA Not applicable
ND Not detected
NL Non limiting
NC Not calculated
- Not tested
LOR Limit of reporting
RPD Relative percentage difference
*** Indicates that the Csat value exceeds the 'ceiling limit' therefore the RBRG applies.

						SVOCs																
						Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	bis-(2-Ethylhexyl)phthalate	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Hexachlorobenzene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Phenol	Pyrene
					Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
					LOR (ALS)	0.05	0.05	0.2	0.5	0.5	0.5	0.5	0.5	5	0.5	0.5	0.5	0.5	0.2	0.5	0.5	0.5	0.5	0.5
Adopted assessment criteria																						
RBRG 2007 Table 2.1 RBRGs for Soil - Urban Residential						3510.000	2340.000	10000.000	12.000	1.200	9.880	1800.000	120.000	30.000	871.000	1.200	2400.000	2380.000	0.243	12.000	182.000	10000.000	10000.000	1800.000
RBRG 2007 Table 2.1 Soil Saturation Limit (Csat)						60.200	19.800	2.560	NA	NA	NA	NA	NA	NA	NA	NA	NA	54.700	NA	NA	125.000	28.000	7260.000	NA
Sampling Gird in CAP	**Sample ID**	**Sample Depth (m below soil)**	**Sample Date**	**Unit (Soil description)**	**Lab Report**																			
ENV-G01	ENV-G01(2) (0.5m)	0.5m	5/11/2020	Fill (Loose, dark brown)	HK2042575-AC	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<5.00	<0.500	<0.500	<0.500	<0.500	<0.200	<0.500	<0.500	<0.500	<0.50	<0.500
ENV-G01	ENV-G01(2) (0.5m) (Dup)	0.5m	5/11/2020	Fill (Loose, dark brown)	HK2042575-AD	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<5.00	<0.500	<0.500	<0.500	<0.500	<0.200	<0.500	<0.500	<0.500	<0.50	<0.500
RPD						NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
ENV-G01	ENV-G01(2) (1.5m-1.95m)	1.5m - 1.95m	5/11/2020	Fill (Firm, dark brown)	HK2042575-AC	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<5.00	<0.500	<0.500	<0.500	<0.500	<0.200	<0.500	<0.500	<0.500	<0.50	<0.500
ENV-G01	ENV-G01(2) (3.0m-3.45m)	3.0m - 3.45m	5/11/2020	Fill (Firm, dark brown)	HK2042575-AC	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<5.00	<0.500	<0.500	<0.500	<0.500	<0.200	<0.500	<0.500	<0.500	<0.50	<0.500
ENV-G01	ENV-G01(2) (5.0m-5.45m)	5.0m - 5.45m	5/11/2020	Fill (Firm, dark brown)	HK2042575-AC	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<5.00	<0.500	<0.500	<0.500	<0.500	<0.200	<0.500	<0.500	<0.500	<0.50	<0.500
ENV-G01	ENV-G01(2) (6.0m-6.45m)	6.0m - 6.45m	5/11/2020	Fill (Firm, dark brown)	HK2042575-AC	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<5.00	<0.500	<0.500	<0.500	<0.500	<0.200	<0.500	<0.500	<0.500	<0.50	<0.500

Sample criteria

Sample concentration exceeds RBRG criteria

OAOC Criteria

Relative percentage difference (RPD) exceeds acceptance criteria as follows:
-If results is less than 5 times laboratory LOR, then any RPD is acceptable
-If result is greater than 5 times laboratory LOR, then RPD of less than 50% is acceptable

Abbreviations

RBRG 2007 Enviornmental Protection Department 2007, Guidance Manual for Use of Risk-Based Remediation Goals for Contaminated Land Management
NA Not applicable
ND Not detected
NL Non limiting
NC Not calculated
- Not tested
LOR Limit of reporting
RPD Relative percentage difference
*** Indicates that the Csat value exceeds the 'ceiling limit' therefore the RBRG applies.

						Metals														Petroleum Carbon Ranges		
						Antimony	Chromium VI	Chromium III	Arsenic	Barium	Cadmium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Tin	Zinc	C6 - C8	C9 - C16	C17 - C35
					Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
					LOR (ALS)	1	1	1	1	1	0.2	1	1	1	1	0.05	1	1	1	1	5	200	500
Adopted assessment criteria																						
RBRG 2007 Table 2.1 RBRGs for Soil - Urban Residential						29.500	221.000	10000.000	22.100	10000.000	73.800	1480.000	2950.000	258.000	10000.000	11.000	369.000	1480.000	10000.000	10000.000	1410.000	2240.000	10000.000
RBRG 2007 Table 2.1 Soil Saturation Limit (Csat)						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1000.000	3000.000	5000.000
Sampling Gird in CAP	**Sample ID**	**Sample Depth (m below soil)**	**Sample Date**	**Unit (Soil description)**	**Lab Report**																	
ENV-G01	ENV-G01(2) (0.5m)	0.5m	5/11/2020	Fill (Loose, dark brown)	HK2042575-AC	<1	<1.0	1.3	3	10.3	<0.2	2.7	<1	101	296	<0.05	2	1	1.6	38	<5	<200	<500
ENV-G01	ENV-G01(2) (0.5m) (Dup)	0.5m	5/11/2020	Fill (Loose, dark brown)	HK2042575-AD	<1	<1.0	1.8	3	14.9	<0.2	3.2	1	141	384	<0.05	2	1	2.3	43	<5	<200	<500
RPD						*NC*	*NC*	*32*	*0*	*37*	*NC*	*17*	*NC*	*33*	*26*	*NC*	*0*	*0*	*36*	*12*	*NC*	*NC*	*NC*
ENV-G01	ENV-G01(2) (1.5m-1.95m)	1.5m - 1.95m	5/11/2020	Fill (Firm, dark brown)	HK2042575-AC	<1	<1.0	8.8	3	40.7	0.3	6.3	18	281	558	<0.05	3	5	22	105	<5	<200	<500
ENV-G01	ENV-G01(2) (3.0m-3.45m)	3.0m - 3.45m	5/11/2020	Fill (Firm, dark brown)	HK2042575-AC	<1	<1.0	7.3	1	24.8	<0.2	2.5	33	379	459	<0.05	2	4	22	98	<5	<200	<500
ENV-G01	ENV-G01(2) (5.0m-5.45m)	5.0m - 5.45m	5/11/2020	Fill (Firm, dark brown)	HK2042575-AC	<1	<1.0	4.9	3	33.9	<0.2	12.8	11	156	387	<0.05	2	3	9.6	48	<5	<200	<500
ENV-G01	ENV-G01(2) (6.0m-6.45m)	6.0m - 6.45m	5/11/2020	Fill (Firm, dark brown)	HK2042575-AC	<1	<1.0	2.9	4	151	<0.2	1.6	14	184	955	<0.05	2	1	1.6	23	<5	<200	<500

Sample criteria

Sample concentration exceeds RBRG criteria

OAOC Criteria

Relative percentage difference (RPD) exceeds acceptance criteria as follows:
-If results is less than 5 times laboratory LOR, then any RPD is acceptable
-If result is greater than 5 times laboratory LOR, then RPD of less than 50% is acceptable

Abbreviations

RBRG 2007 Enviornmental Protection Department 2007, Guidance Manual for Use of Risk-Based Remediation Goals for Contaminated Land Management
NA Not applicable
ND Not detected
NL Non limiting
NC Not calculated
- Not tested
LOR Limit of reporting
RPD Relative percentage difference
*** Indicates that the Csat value exceeds the 'ceiling limit' therefore the RBRG applies.

					VOCs												
					Acetone	Benzene	Bromodichloromethane	2-Butanone	Chloroform	Ethylbenzene	Methyl tert-Butyl Ether	Methylene Chloride	Styrene	Tetrachloroethene	Toluene	Trichloroethene	Xylenes (Total)
Units					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR (ALS)					500	5	5	50	5	5	5	50	5	5	5	5	20
Adopted assessment criteria																	
RBRG 2007 Table 2.2 RBRGs for Groundwater - Urban Residential					10000000	3860	2220	10000000	956	1020000	153000	19000	3020000	250	5110000	1210	112000
RBRG 2007 Table 2.2 Groundwater Solubility Limit					***	1750000	6740000	***	7920000	169000	***	***	310000	200000	526000	1100000	175000
Sampling Gird in CAP	**Sample ID**	**Sample Depth (m below soil)**	**Sample Date**	**Lab Report**													
ENV-G01	ENV-G01(2) GW	2.13m	7/11/2020	HK2042872	<500	<5	<5	<50	<5	<5	<5	<50	<5	<5	<5	<5	<20
ENV-G01	ENV-G01(2) GW (Dup)	2.13m	7/11/2020	HK2042871	<500	<5	<5	<50	<5	<5	<5	<50	<5	<5	<5	<5	<20
RPD					NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Sample criteria

Sample concentration exceeds RBRG criteria

QAQC Criteria

Relative percentage difference (RPD) exceeds acceptance criteria as follows:
-If results is less than 5 times laboratory LOR, then any RPD is acceptable
-If result is greater than 5 times laboratory LOR, then RPD of less than 50% is acceptable

Abbreviations

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ND Not detected
NL Non limiting
NC Not calculated
- Not tested
LOR Limit of reporting
RPD Relative percentage difference
*** Indicates that the solubility limit exceeds the 'ceiling limit' therefore the RBRG applies

					SVOCs											Metals	Petroleum Carbon Ranges		
					Acenaphthene	Acenaphthylene	Anthracene	Benzo(b)fluoranthene	Chrysene	Fluoranthene	Fluorene	Hexachlorobenzene	Naphthalene	Phenanthrene	Pyrene	Mercury	C6 - C8	C9 - C16	C17 - C35
				Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
				LOR (ALS)	2	2	2	1	1	2	2	4	2	2	2	0.5	20	500	500
Adopted assessment criteria																			
RBRG 2007 Table 2.2 RBRGs for Groundwater - Urban Residential					10000000	1410000	10000000	539	58100	10000000	10000000	58.9	61700	10000000	10000000	486	82200	714000	12800
RBRG 2007 Table 2.2 Groundwater Solubility Limit					4240	3930	43.4	1.5	1.6	206	1980	6200	31000	1000	135	NA	5230	2800	2800
Sampling Gird in CAP	**Sample ID**	**Sample Depth (m below soil)**	**Sample Date**	**Lab Report**															
ENV-G01	ENV-G01(2) GW	2.13m	7/11/2020	HK2042872	<2	<2	<2	<1	<1	<2	<2	<4	<2	<2	<2	<0.5	<20	<200	<500
ENV-G01	ENV-G01(2) GW (Dup)	2.13m	7/11/2020	HK2042871	<2	<2	<2	<1	<1	<2	<2	<4	<2	<2	<2	<0.5	<20	<200	500
RPD					*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*

Sample criteria

Sample concentration exceeds RBRG criteria

QAQC Criteria

Relative percentage difference (RPD) exceeds acceptance criteria as follows:
-If results is less than 5 times laboratory LOR, then any RPD is acceptable
-If result is greater than 5 times laboratory LOR, then RPD of less than 50% is acceptable

Abbreviations

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				VOCs												
				Acetone	Benzene	Bromodichloromethane	2-Butanone	Chloroform	Ethylbenzene	Methyl tert-Butyl Ether	Methylene Chloride	Styrene	Tetrachloroethene	Toluene	Trichloroethene	Xylenes (Total)
			Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
			LOR (ALS)	500	5	5	50	5	5	5	50	5	5	5	5	20
Adopted assessment criteria																
RBRG 2007 Table 2.2 RBRGs for Groundwater - Urban Residential				10000000	3860	2220	10000000	956	1020000	153000	19000	3020000	250	5110000	1210	112000
RBRG 2007 Table 2.2 Groundwater Solubility Limit				***	1750000	6740000	***	7920000	169000	***	***	310000	200000	526000	1100000	175000
Sampling Gird in CAP	**Sample ID**	**Sample Date**	**Lab Report**													
Trip Blank	SOIL-TB1	5/11/2020	HK2042575-AD	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Blank	SOIL-FB1	5/11/2020	HK2042575-AD	<500	<5	<5	<50	<5	<5	<5	<50	<5	<5	<5	<5	<20
Equipment Blank	SOIL-EQ1	5/11/2020	HK2042575-AD	<500	<5	<5	<50	<5	<5	<5	<50	<5	<5	<5	<5	<20
Trip Blank	GW-TB1	5/11/2020	HK2042871	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Blank	GW-FB1	5/11/2020	HK2042871	<500	<5	<5	<50	<5	<5	<5	<50	<5	<5	<5	<5	<20
Equipment Blank	GW-EQ1	5/11/2020	HK2042871	<500	<5	<5	<50	<5	<5	<5	<50	<5	<5	<5	<5	<20

Sample criteria

Sample concentration exceeds RBRG criteria

QAQC Criteria

Relative percentage difference (RPD) exceeds acceptance criteria as follows:
-If results is less than 5 times laboratory LOR, then any RPD is acceptable
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				SVOCs											Metals	Petroleum Carbon Ranges		
				Acenaphthene	Acenaphthylene	Anthracene	Benzo(b)fluoranthene	Chrysene	Fluoranthene	Fluorene	Hexachlorobenzene	Naphthalene	Phenanthrene	Pyrene	Mercury	C6 - C8	C9 - C16	C17 - C35
			Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
			LOR (ALS)	2	2	2	1	1	2	2	4	2	2	2	0.5	20	500	500
Adopted assessment criteria																		
RBRG 2007 Table 2.2 RBRGs for Groundwater - Urban Residential				10000000	1410000	10000000	539	58100	10000000	10000000	59	61700	10000000	10000000	486	82200	714000	12800
RBRG 2007 Table 2.2 Groundwater Solubility Limit				4240	3930	43.4	1.5	1.6	206	1980	6200	31000	1000	135	NA	5230	2800	2800
Sampling Gird in CAP	**Sample ID**	**Sample Date**	**Lab Report**															
Trip Blank	SOIL-TB1	5/11/2020	HK2042575-AD	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	-
Field Blank	SOIL-FB1	5/11/2020	HK2042575-AD	<2	<2	<2	<1	<1	<2	<2	<4	<2	<2	<2	<0.5	<20	<500	<500
Equipment Blank	SOIL-EQ1	5/11/2020	HK2042575-AD	<2	<2	<2	<1	<1	<2	<2	<4	<2	<2	<2	<0.5	<20	<500	<500
Trip Blank	GW-TB1	5/11/2020	HK2042871	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	-
Field Blank	GW-FB1	5/11/2020	HK2042871	<2	<2	<2	<1	<1	<2	<2	<4	<2	<2	<2	<0.5	<20	<500	<500
Equipment Blank	GW-EQ1	5/11/2020	HK2042871	<2	<2	<2	<1	<1	<2	<2	<4	<2	<2	<2	<0.5	<20	<500	<500

Sample criteria

Sample concentration exceeds RBRG criteria

QAQC Criteria

Relative percentage difference (RPD) exceeds acceptance criteria as follows:
-If results is less than 5 times laboratory LOR, then any RPD is acceptable
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LOR Limit of reporting
RPD Relative percentage difference
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Appendix E

Laboratory Report and Chain of Custody Records

CERTIFICATE OF ANALYSIS

Client	: TEEMWAY ENGINEERING LTD	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 14
Contact	: MR THOMAS YEUNG	Contact	: Richard Fung	Work Order	: HK2042575-AC
Address	: RM 1008, 10/F, CHEVALIER COMMERCIAL CENTRE, 8 WANG HOI ROAD, KOWLOON BAY, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong	Amendment	: 1
E-mail	: works@teemway.com	E-mail	: richard.fung@alsglobal.com		
Telephone	: +852 2796 2268	Telephone	: +852 2610 1044		
Facsimile	: +852 2796 2217	Facsimile	: +852 2610 2021		
Project	: DECONTAMINATION WORKS OF GROUNDWATER AND SOIL FOR RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS SITE PREPARATION AND ACCESS TUNNEL CONSTRUCTION (CONTRACT NO. DC/2018/05)			Date Samples Received	: 05-Nov-2020
Order number	: ----	Quote number	: HKE/1680/2020_V2	Issue Date	: 18-Nov-2020
C-O-C number	: H022734-H022735			No. of samples received	: 5
Site	: ----			No. of samples analysed	: 5

Hong Kong Accreditation Service (HKAS) has accredited this laboratory, ALS Technichem (HK) Pty Ltd (Reg. No. HOKLAS 066) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories.

This document has been signed by those names that appear on this report and are the authorised signatories.

Signatories	*Position*	*Authorised results for*
Anh Ngoc Huynh .	Senior Chemist	Organics_ENV
Chan Ka Yu , Karen	Manager - Organics	Organics_ENV
Chan Siu Ming , Vico	Manager - Inorganics	Inorganics
Leung Chak Cheong , Mike	Senior Chemist	Metals_ENV

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. 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. Testing period is from 05-Nov-2020 to 16-Nov-2020.

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific Comments for Work Order: HK2042575

Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in chilled condition. The result(s) related only to the item(s) tested.

Sample information (Project name, Sample ID, Sampling date/time, etc., if any) is provided by client.

Result(s) of soil/sediment sample(s) was / were reported on dry weight basis.

This is an amendment of the Certificate of Analysis.

The testing(s) for sample HK2042575-006 has been changed from test code EP074_SR to EP071HK_SR.

EP070 is the numeric code for internal use. Test method for C6-C9 Fraction of TPH is EP071.

Sample(s) as received, digested by In-house method E-ASTM D3974-09 prior to determination of metals. The In-house method is developed based on ASTM D3974-09 method.

Sample(s) as received, digested by In-house method E-3060 prior to the determination of Hexavalent Chromium (Cr6+). The In-house method is developed based on USEPA method 3060A.

Analytical Results

Sub-Matrix: SOIL			Client sample ID	ENV-G01(2) 0.5m	ENV-G01(2) 1.50m-1.95m	ENV-G01(2) 3.00m-3.45m	ENV-G01(2) 5.00m-5.45m	ENV-G01(2) 6.00m-6.45m
			Client sampling date / time	05-Nov-2020 09:30	05-Nov-2020 10:50	05-Nov-2020 14:30	05-Nov-2020 16:00	05-Nov-2020 16:40
Compound	CAS Number	LOR	Unit	HK2042575-001	HK2042575-002	HK2042575-003	HK2042575-004	HK2042575-005
EA/ED: Physical and Aggregate Properties								
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	16.2	19.0	18.2	20.2	15.8
EG: Metals and Major Cations								
EG020: Antimony	7440-36-0	1	mg/kg	<1	<1	<1	<1	<1
EG020: Arsenic	7440-38-2	1	mg/kg	3	3	1	3	4
EG020: Barium	7440-39-3	1.0	mg/kg	10.3	40.7	24.8	33.9	151
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	0.3	<0.2	<0.2	<0.2
EG020: Cobalt	7440-48-4	1.0	mg/kg	2.7	6.3	2.5	12.8	1.6
EG020: Copper	7440-50-8	1	mg/kg	<1	18	33	11	14
EG020: Lead	7439-92-1	1	mg/kg	101	281	379	156	184
EG020: Manganese	7439-96-5	1.0	mg/kg	296	558	459	387	955
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EG020: Molybdenum	7439-98-7	1	mg/kg	2	3	2	2	2
EG020: Nickel	7440-02-0	1	mg/kg	1	5	4	3	1
EG020: Tin	7440-31-5	1.0	mg/kg	1.6	22.0	22.0	9.6	1.6
EG020: Zinc	7440-66-6	1	mg/kg	38	105	98	48	23
EG049: Trivalent Chromium	16065-83-1	1.0	mg/kg	1.3	8.8	7.3	4.9	2.9
EG3060: Hexavalent Chromium	18540-29-9	1.0	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs)								
EP076HK: Naphthalene	91-20-3	0.500	mg/kg	<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Acenaphthylene	208-96-8	0.500	mg/kg	<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Acenaphthene	83-32-9	0.500	mg/kg	<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Fluorene	86-73-7	0.500	mg/kg	<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Phenanthrene	85-01-8	0.500	mg/kg	<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Anthracene	120-12-7	0.500	mg/kg	<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Fluoranthene	206-44-0	0.500	mg/kg	<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Pyrene	129-00-0	0.500	mg/kg	<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Benz(a)anthracene	56-55-3	0.500	mg/kg	<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Chrysene	218-01-9	0.500	mg/kg	<0.500	<0.500	<0.500	<0.500	<0.500

Sub-Matrix: SOIL				Client sample ID	ENV-G01(2) 0.5m	ENV-G01(2) 1.50m-1.95m	ENV-G01(2) 3.00m-3.45m	ENV-G01(2) 5.00m-5.45m	ENV-G01(2) 6.00m-6.45m
				Client sampling date / time	05-Nov-2020 09:30	05-Nov-2020 10:50	05-Nov-2020 14:30	05-Nov-2020 16:00	05-Nov-2020 16:40
Compound	CAS Number	LOR	Unit		HK2042575-001	HK2042575-002	HK2042575-003	HK2042575-004	HK2042575-005
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued									
EP076HK: Benzo(b)fluoranthene	205-99-2	0.500	mg/kg		<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Benzo(k)fluoranthene	207-08-9	0.500	mg/kg		<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Benzo(a)pyrene	50-32-8	0.500	mg/kg		<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	0.500	mg/kg		<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Dibenz(a.h)anthracene	53-70-3	0.500	mg/kg		<0.500	<0.500	<0.500	<0.500	<0.500
EP076HK: Benzo(g.h.i)perylene	191-24-2	0.500	mg/kg		<0.500	<0.500	<0.500	<0.500	<0.500
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate									
EP076HK: Phenol	108-95-2	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
EP076HK: Hexachlorobenzene (HCB)	118-74-1	0.200	mg/kg		<0.200	<0.200	<0.200	<0.200	<0.200
EP076HK: Bis(2-ethylhexyl)phthalate	117-81-7	5.00	mg/kg		<5.00	<5.00	<5.00	<5.00	<5.00
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH)									
EP070HK_SR: C6 - C8 Fraction	----	5	mg/kg		<5	<5	<5	<5	<5
EP071HK_SR: C9 - C16 Fraction	----	200	mg/kg		<200	<200	<200	<200	<200
EP071HK_SR: C17 - C35 Fraction	----	500	mg/kg		<500	<500	<500	<500	<500
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH)									
EP074_SR: Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
EP074_SR: Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
EP074_SR: Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
EP074_SR: Styrene	100-42-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
EP074_SR: ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
EP074_SR: Xylenes (Total)	----	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
EP-074_SR-B: Oxygenated Compounds									
EP074_SR: 2-Propanone (Acetone)	67-64-1	50	mg/kg		<50	<50	<50	<50	<50
EP074_SR: 2-Butanone (MEK)	78-93-3	5	mg/kg		<5	<5	<5	<5	<5
EP-074_SR-E: Halogenated Aliphatics									
EP074_SR: Methylene chloride	75-09-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
EP074_SR: Trichloroethene	79-01-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1

Sub-Matrix: SOIL				Client sample ID	ENV-G01(2) 0.5m	ENV-G01(2) 1.50m-1.95m	ENV-G01(2) 3.00m-3.45m	ENV-G01(2) 5.00m-5.45m	ENV-G01(2) 6.00m-6.45m
				Client sampling date / time	05-Nov-2020 09:30	05-Nov-2020 10:50	05-Nov-2020 14:30	05-Nov-2020 16:00	05-Nov-2020 16:40
Compound	CAS Number	LOR	Unit		HK2042575-001	HK2042575-002	HK2042575-003	HK2042575-004	HK2042575-005
EP-074_SR-E: Halogenated Aliphatics - Continued									
EP074_SR: Tetrachloroethene	127-18-4	0.04	mg/kg		<0.04	<0.04	<0.04	<0.04	<0.04
EP-074_SR-G: Trihalomethanes (THM)									
EP074_SR: Chloroform	67-66-3	0.04	mg/kg		<0.04	<0.04	<0.04	<0.04	<0.04
EP074_SR: Bromodichloromethane	75-27-4	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP-074_SR-I: Methyl-tert-butyl Ether									
EP074_SR: Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates									
EP076HK: 2-Fluorobiphenyl	321-60-8	0.1	%		72.6	77.2	77.4	77.5	77.2
EP076HK: 4-Terphenyl-d14	1718-51-0	0.1	%		65.4	74.1	72.4	70.7	74.4
EP-080_SRS: TPH(Volatile)/BTEX Surrogate									
EP070HK_SR: Dibromofluoromethane	1868-53-7	0.1	%		94.4	94.0	99.9	96.9	90.2
EP070HK_SR: Toluene-D8	2037-26-5	0.1	%		99.7	99.6	100	99.6	99.7
EP070HK_SR: 4-Bromofluorobenzene	460-00-4	0.1	%		96.0	95.8	99.3	95.5	94.7
EP-074_SR-S: VOC Surrogates									
EP074_SR: Dibromofluoromethane	1868-53-7	0.1	%		94.4	94.0	99.9	96.9	90.2
EP074_SR: Toluene-D8	2037-26-5	0.1	%		99.7	99.6	100	99.6	99.7
EP074_SR: 4-Bromofluorobenzene	460-00-4	0.1	%		96.0	95.8	99.3	95.5	94.7

Laboratory Duplicate (DUP) Report

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 3352677)								
HK2042470-001	Anonymous	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	40.2	39.4	1.88
EG: Metals and Major Cations (QC Lot: 3351021)								
HK2042575-002	ENV-G01(2) 1.50m-1.95m	**EG020: Mercury**	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.00
		EG020: Cadmium	7440-43-9	0.2	mg/kg	0.3	<0.2	0.00
		EG020: Barium	7440-39-3	0.5	mg/kg	40.7	43.5	6.73
		EG020: Cobalt	7440-48-4	0.5	mg/kg	6.3	6.0	4.13
		EG020: Manganese	7439-96-5	0.5	mg/kg	558	546	2.23
		EG020: Tin	7440-31-5	0.5	mg/kg	22.0	22.7	3.44
		EG020: Antimony	7440-36-0	1	mg/kg	<1	<1	0.00
		EG020: Arsenic	7440-38-2	1	mg/kg	3	3	0.00
		EG020: Copper	7440-50-8	1	mg/kg	18	17	5.91
		EG020: Lead	7439-92-1	1	mg/kg	281	264	6.36
		EG020: Molybdenum	7439-98-7	1	mg/kg	3	2	0.00
		EG020: Nickel	7440-02-0	1	mg/kg	5	4	0.00
		EG020: Zinc	7440-66-6	1	mg/kg	105	110	4.96
EG: Metals and Major Cations (QC Lot: 3351024)								
HK2042390-002	Anonymous	**EG3060: Hexavalent Chromium**	18540-29-9	0.5	mg/kg	<1.0	<1.0	0.00
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3351168)								
HK2042575-001	ENV-G01(2) 0.5m	**EP076HK: Naphthalene**	91-20-3	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Acenaphthylene	208-96-8	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Acenaphthene	83-32-9	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Fluorene	86-73-7	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Phenanthrene	85-01-8	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Anthracene	120-12-7	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Fluoranthene	206-44-0	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Pyrene	129-00-0	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Benz(a)anthracene	56-55-3	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Chrysene	218-01-9	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Benzo(b)fluoranthene	205-99-2	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Benzo(k)fluoranthene	207-08-9	50	µg/kg	<0.500 mg/kg	<500	0.00

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3351168) - Continued								
HK2042575-001	ENV-G01(2) 0.5m	**EP076HK: Benzo(a)pyrene**	50-32-8	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Dibenz(a.h)anthracene	53-70-3	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Benzo(g.h.i)perylene	191-24-2	50	µg/kg	<0.500 mg/kg	<500	0.00
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate (QC Lot: 3351168)								
HK2042575-001	ENV-G01(2) 0.5m	**EP076HK: Bis(2-ethylhexyl)phthalate**	117-81-7	1000	µg/kg	<5.00 mg/kg	<5000	0.00
		EP076HK: Hexachlorobenzene (HCB)	118-74-1	50	µg/kg	<0.200 mg/kg	<200	0.00
		EP076HK: Phenol	108-95-2	500	µg/kg	<0.50 mg/kg	<500	0.00
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3351169)								
HK2042575-001	ENV-G01(2) 0.5m	**EP071HK_SR: C9 - C16 Fraction**	----	200	mg/kg	<200	<200	0.00
		EP071HK_SR: C17 - C35 Fraction	----	500	mg/kg	<500	<500	0.00
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3351176)								
HK2042575-001	ENV-G01(2) 0.5m	**EP070HK_SR: C6 - C8 Fraction**	----	5	mg/kg	<5	<5	0.00
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 3351177)								
HK2042575-001	ENV-G01(2) 0.5m	**EP074_SR: Benzene**	71-43-2	0.1	mg/kg	<0.2	<0.2	0.00
		EP074_SR: Toluene	108-88-3	0.2	mg/kg	<0.5	<0.5	0.00
		EP074_SR: Ethylbenzene	100-41-4	0.2	mg/kg	<0.5	<0.5	0.00
		EP074_SR: Styrene	100-42-5	0.2	mg/kg	<0.5	<0.5	0.00
		EP074_SR: ortho-Xylene	95-47-6	0.2	mg/kg	<0.5	<0.5	0.00
		EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	0.4	mg/kg	<1.0	<1.0	0.00
		EP074_SR: Xylenes (Total)	----	1	mg/kg	<2.0	<2.0	0.00
EP-074_SR-B: Oxygenated Compounds (QC Lot: 3351177)								
HK2042575-001	ENV-G01(2) 0.5m	**EP074_SR: 2-Propanone (Acetone)**	67-64-1	2	mg/kg	<50	<50	0.00
		EP074_SR: 2-Butanone (MEK)	78-93-3	2	mg/kg	<5	<5	0.00
EP-074_SR-E: Halogenated Aliphatics (QC Lot: 3351177)								
HK2042575-001	ENV-G01(2) 0.5m	**EP074_SR: Tetrachloroethene**	127-18-4	0.04	mg/kg	<0.04	<0.04	0.00
		EP074_SR: Trichloroethene	79-01-6	0.1	mg/kg	<0.1	<0.1	0.00
		EP074_SR: Methylene chloride	75-09-2	0.5	mg/kg	<0.5	<0.5	0.00
EP-074_SR-G: Trihalomethanes (THM) (QC Lot: 3351177)								
HK2042575-001	ENV-G01(2) 0.5m	**EP074_SR: Chloroform**	67-66-3	0.04	mg/kg	<0.04	<0.04	0.00

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report: LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-074_SR-G: Trihalomethanes (THM) (QC Lot: 3351177) - Continued								
HK2042575-001	ENV-G01(2) 0.5m	**EP074_SR: Bromodichloromethane**	75-27-4	0.1	mg/kg	<0.1	<0.1	0.00
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 3351177)								
HK2042575-001	ENV-G01(2) 0.5m	**EP074_SR: Methyl tert-Butyl Ether (MTBE)**	1634-04-4	0.2	mg/kg	<0.5	<0.5	0.00

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: **SOIL**

Method: Compound	CAS Number	Method Blank (MB) Report: LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report: Spike Concentration	Spike Recovery (%): LCS	DCS	Recovery Limits(%): Low	High	RPD (%): Value	Control Limit
EG: Metals and Major Cations (QC Lot: 3351021)											
EG020: Antimony	7440-36-0	1	mg/kg	<1	5 mg/kg	97.6	----	85.0	110	----	----
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	99.9	----	85.0	106	----	----
EG020: Barium	7440-39-3	0.5	mg/kg	<0.5	5 mg/kg	104	----	85.0	111	----	----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	0.25 mg/kg	92.6	----	88.0	108	----	----
EG020: Cobalt	7440-48-4	0.5	mg/kg	<0.5	5 mg/kg	102	----	85.0	110	----	----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	107	----	88.0	113	----	----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	98.8	----	90.0	110	----	----
EG020: Manganese	7439-96-5	0.5	mg/kg	<0.5	5 mg/kg	94.1	----	85.0	111	----	----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	104	----	85.0	109	----	----
EG020: Molybdenum	7439-98-7	1	mg/kg	<1	5 mg/kg	91.9	----	85.0	110	----	----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	104	----	86.0	111	----	----
EG020: Tin	7440-31-5	0.5	mg/kg	<0.5	5 mg/kg	99.0	----	86.0	109	----	----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	105	----	87.0	115	----	----
EG: Metals and Major Cations (QC Lot: 3351024)											
EG3060: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	12.5 mg/kg	96.9	----	85.0	115	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3351168)											
EP076HK: Naphthalene	91-20-3	50	µg/kg	<50	25 µg/kg	91.0	----	68.0	140	----	----
EP076HK: Acenaphthylene	208-96-8	50	µg/kg	<50	25 µg/kg	85.3	----	70.0	139	----	----
EP076HK: Acenaphthene	83-32-9	50	µg/kg	<50	25 µg/kg	85.5	----	65.0	138	----	----
EP076HK: Fluorene	86-73-7	50	µg/kg	<50	25 µg/kg	81.4	----	67.0	139	----	----
EP076HK: Phenanthrene	85-01-8	50	µg/kg	<50	25 µg/kg	86.8	----	70.0	143	----	----

Matrix: SOIL

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3351168) - Continued											
EP076HK: Anthracene	120-12-7	50	µg/kg	<50	25 µg/kg	87.3	----	69.0	142	----	----
EP076HK: Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	84.6	----	70.0	140	----	----
EP076HK: Pyrene	129-00-0	50	µg/kg	<50	25 µg/kg	82.9	----	69.0	137	----	----
EP076HK: Benz(a)anthracene	56-55-3	50	µg/kg	<50	25 µg/kg	107	----	64.0	135	----	----
EP076HK: Chrysene	218-01-9	50	µg/kg	<50	25 µg/kg	115	----	68.0	139	----	----
EP076HK: Benzo(b)fluoranthene	205-99-2	50	µg/kg	<50	25 µg/kg	59.4	----	59.0	133	----	----
EP076HK: Benzo(k)fluoranthene	207-08-9	50	µg/kg	<50	25 µg/kg	61.7	----	57.0	141	----	----
EP076HK: Benzo(a)pyrene	50-32-8	50	µg/kg	<50	25 µg/kg	57.8	----	54.0	131	----	----
EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	50	µg/kg	<50	25 µg/kg	65.1	----	40.0	121	----	----
EP076HK: Dibenz(a.h)anthracene	53-70-3	50	µg/kg	<50	25 µg/kg	65.7	----	40.0	125	----	----
EP076HK: Benzo(g.h.i)perylene	191-24-2	50	µg/kg	<50	25 µg/kg	61.8	----	36.0	134	----	----
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate (QC Lot: 3351168)											
EP076HK: Phenol	108-95-2	500	µg/kg	<500	25 µg/kg	81.3	----	73.0	142	----	----
EP076HK: Hexachlorobenzene (HCB)	118-74-1	50	µg/kg	<50	25 µg/kg	94.6	----	70.0	143	----	----
EP076HK: Bis(2-ethylhexyl)phthalate	117-81-7	1000	µg/kg	<1000	25 µg/kg	104	----	51.0	148	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3351169)											
EP071HK_SR: C9 - C16 Fraction	----	200	mg/kg	<200	31.5 mg/kg	103	----	83.0	105	----	----
EP071HK_SR: C17 - C35 Fraction	----	500	mg/kg	<500	67.5 mg/kg	92.0	----	65.0	120	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3351176)											
EP070HK_SR: C6 - C8 Fraction	----	5	mg/kg	<5	4.5 mg/kg	94.1	----	81.0	118	----	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 3351177)											
EP074_SR: Benzene	71-43-2	0.1	mg/kg	<0.1	0.25 mg/kg	92.2	----	79.0	122	----	----
EP074_SR: Toluene	108-88-3	0.2	mg/kg	<0.2	0.25 mg/kg	91.2	----	79.0	123	----	----
EP074_SR: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	0.25 mg/kg	91.6	----	80.0	121	----	----
EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	0.4	mg/kg	<0.4	0.5 mg/kg	93.1	----	80.0	120	----	----
EP074_SR: Styrene	100-42-5	0.2	mg/kg	<0.2	0.25 mg/kg	91.4	----	79.0	125	----	----
EP074_SR: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	0.25 mg/kg	92.5	----	77.0	125	----	----
EP074_SR: Xylenes (Total)	----	1	mg/kg	<1.0	0.75 mg/kg	92.9	----	80.0	121	----	----
EP-074_SR-B: Oxygenated Compounds (QC Lot: 3351177)											

Matrix: **SOIL**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EP-074_SR-B: Oxygenated Compounds (QC Lot: 3351177) - Continued											
EP074_SR: 2-Propanone (Acetone)	67-64-1	2	mg/kg	<2	2.5 mg/kg	110	----	73.0	122	----	----
EP074_SR: 2-Butanone (MEK)	78-93-3	2	mg/kg	<2	2.5 mg/kg	107	----	76.0	125	----	----
EP-074_SR-E: Halogenated Aliphatics (QC Lot: 3351177)											
EP074_SR: Methylene chloride	75-09-2	0.5	mg/kg	<0.5	0.25 mg/kg	96.0	----	72.0	123	----	----
EP074_SR: Trichloroethene	79-01-6	0.1	mg/kg	<0.1	0.25 mg/kg	90.9	----	79.0	122	----	----
EP074_SR: Tetrachloroethene	127-18-4	0.04	mg/kg	<0.04	0.25 mg/kg	95.4	----	79.0	122	----	----
EP-074_SR-G: Trihalomethanes (THM) (QC Lot: 3351177)											
EP074_SR: Chloroform	67-66-3	0.04	mg/kg	<0.04	0.25 mg/kg	108	----	79.0	121	----	----
EP074_SR: Bromodichloromethane	75-27-4	0.1	mg/kg	<0.1	0.25 mg/kg	95.1	----	77.0	124	----	----
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 3351177)											
EP074_SR: Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.2	mg/kg	<0.2	0.25 mg/kg	88.2	----	74.0	127	----	----

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 3351021)										
HK2042575-001	ENV-G01(2) 0.5m	**EG020: Antimony**	7440-36-0	5 mg/kg	97.3	----	75.0	125	----	----
		EG020: Arsenic	7440-38-2	5 mg/kg	94.7	----	75.0	125	----	----
		EG020: Barium	7440-39-3	5 mg/kg	102	----	75.0	125	----	----
		EG020: Cadmium	7440-43-9	0.25 mg/kg	98.1	----	75.0	125	----	----
		EG020: Cobalt	7440-48-4	5 mg/kg	90.1	----	75.0	125	----	----
		EG020: Copper	7440-50-8	5 mg/kg	98.1	----	75.0	125	----	----
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	----	75.0	125	----	----
		EG020: Manganese	7439-96-5	5 mg/kg	# Not Determined	----	75.0	125	----	----
		EG020: Mercury	7439-97-6	0.1 mg/kg	86.6	----	75.0	125	----	----
		EG020: Molybdenum	7439-98-7	5 mg/kg	90.6	----	75.0	125	----	----
		EG020: Nickel	7440-02-0	5 mg/kg	95.5	----	75.0	125	----	----
		EG020: Tin	7440-31-5	5 mg/kg	98.8	----	75.0	125	----	----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	----	75.0	125	----	----
EG: Metals and Major Cations (QC Lot: 3351024)										
HK2042390-001	Anonymous	**EG3060: Hexavalent Chromium**	18540-29-9	12.5 mg/kg	97.8	----	75.0	125	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3351168)										
HK2042575-003	ENV-G01(2) 3.00m-3.45m	**EP076HK: Naphthalene**	91-20-3	250 µg/kg	81.7	----	50.0	130	----	----
		EP076HK: Acenaphthylene	208-96-8	250 µg/kg	76.3	----	50.0	130	----	----
		EP076HK: Acenaphthene	83-32-9	250 µg/kg	80.0	----	50.0	130	----	----
		EP076HK: Fluorene	86-73-7	250 µg/kg	77.0	----	50.0	130	----	----
		EP076HK: Phenanthrene	85-01-8	250 µg/kg	72.4	----	50.0	130	----	----
		EP076HK: Anthracene	120-12-7	250 µg/kg	72.4	----	50.0	130	----	----
		EP076HK: Fluoranthene	206-44-0	250 µg/kg	69.9	----	50.0	130	----	----
		EP076HK: Pyrene	129-00-0	250 µg/kg	67.9	----	50.0	130	----	----

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report: Spike Concentration	Spike Recovery (%): MS	Spike Recovery (%): MSD	Recovery Limits (%): Low	Recovery Limits (%): High	RPD (%): Value	RPD (%): Control Limit
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3351168) - Continued										
HK2042575-003	ENV-G01(2) 3.00m-3.45m	**EP076HK: Benz(a)anthracene**	56-55-3	250 µg/kg	104	----	50.0	130	----	----
		EP076HK: Chrysene	218-01-9	250 µg/kg	107	----	50.0	130	----	----
		EP076HK: Benzo(b)fluoranthene	205-99-2	250 µg/kg	52.3	----	50.0	130	----	----
		EP076HK: Benzo(k)fluoranthene	207-08-9	250 µg/kg	52.1	----	50.0	130	----	----
		EP076HK: Benzo(a)pyrene	50-32-8	250 µg/kg	54.3	----	50.0	130	----	----
		EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	250 µg/kg	67.1	----	50.0	130	----	----
		EP076HK: Dibenz(a.h)anthracene	53-70-3	250 µg/kg	80.0	----	50.0	130	----	----
		EP076HK: Benzo(g.h.i)perylene	191-24-2	250 µg/kg	67.2	----	50.0	130	----	----
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate (QC Lot: 3351168)										
HK2042575-003	ENV-G01(2) 3.00m-3.45m	**EP076HK: Phenol**	108-95-2	250 µg/kg	69.7	----	50.0	130	----	----
		EP076HK: Hexachlorobenzene (HCB)	118-74-1	250 µg/kg	88.7	----	50.0	130	----	----
		EP076HK: Bis(2-ethylhexyl)phthalate	117-81-7	250 µg/kg	116	----	50.0	130	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3351169)										
HK2042575-002	ENV-G01(2) 1.50m-1.95m	**EP071HK_SR: C9 - C16 Fraction**	----	31.5 mg/kg	108	----	50.0	130	----	----
		EP071HK_SR: C17 - C35 Fraction	----	67.5 mg/kg	97.8	----	50.0	130	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3351176)										
HK2042575-002	ENV-G01(2) 1.50m-1.95m	**EP070HK_SR: C6 - C8 Fraction**	----	4.5 mg/kg	105	----	50.0	130	----	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 3351177)										
HK2042575-003	ENV-G01(2) 3.00m-3.45m	**EP074_SR: Benzene**	71-43-2	0.25 mg/kg	111	----	50.0	130	----	----
		EP074_SR: Toluene	108-88-3	0.25 mg/kg	104	----	50.0	130	----	----
		EP074_SR: Ethylbenzene	100-41-4	0.25 mg/kg	106	----	50.0	130	----	----
		EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	0.5 mg/kg	107	----	50.0	130	----	----
		EP074_SR: Styrene	100-42-5	0.25 mg/kg	112	----	50.0	130	----	----
		EP074_SR: ortho-Xylene	95-47-6	0.25 mg/kg	106	----	50.0	130	----	----
		EP074_SR: Xylenes (Total)	----	0.75 mg/kg	106	----	50.0	130	----	----
EP-074_SR-B: Oxygenated Compounds (QC Lot: 3351177)										
HK2042575-003	ENV-G01(2) 3.00m-3.45m	**EP074_SR: 2-Propanone (Acetone)**	67-64-1	2.5 mg/kg	101	----	50.0	130	----	----
		EP074_SR: 2-Butanone (MEK)	78-93-3	2.5 mg/kg	103	----	50.0	130	----	----

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report: Spike Concentration	Spike Recovery (%): MS	Spike Recovery (%): MSD	Recovery Limits (%): Low	Recovery Limits (%): High	RPD (%): Value	RPD (%): Control Limit
EP-074_SR-E: Halogenated Aliphatics (QC Lot: 3351177)										
HK2042575-003	ENV-G01(2) 3.00m-3.45m	**EP074_SR: Methylene chloride**	75-09-2	0.25 mg/kg	98.8	----	50.0	130	----	----
		EP074_SR: Trichloroethene	79-01-6	0.25 mg/kg	110	----	50.0	130	----	----
		EP074_SR: Tetrachloroethene	127-18-4	0.25 mg/kg	108	----	50.0	130	----	----
EP-074_SR-G: Trihalomethanes (THM) (QC Lot: 3351177)										
HK2042575-003	ENV-G01(2) 3.00m-3.45m	**EP074_SR: Chloroform**	67-66-3	0.25 mg/kg	112	----	50.0	130	----	----
		EP074_SR: Bromodichloromethane	75-27-4	0.25 mg/kg	104	----	50.0	130	----	----
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 3351177)										
HK2042575-003	ENV-G01(2) 3.00m-3.45m	**EP074_SR: Methyl tert-Butyl Ether (MTBE)**	1634-04-4	0.25 mg/kg	114	----	50.0	130	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%): Low	Recovery Limits (%): High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
EP-080_SRS: TPH(Volatile)/BTEX Surrogate			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117
4-Bromofluorobenzene	460-00-4	74	121
EP-074_SR-S: VOC Surrogates			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117
4-Bromofluorobenzene	460-00-4	74	121

CHAIN OF CUSTODY DOCUMENTATION

H 022734

ALS Laboratory Group

CLIENT: TEEMWAY	SAMPLER:
ADDRESS / OFFICE:	MOBILE:
PROJECT MANAGER (PM): Thomas YEUNG	PHONE
PROJECT ID: Relocation of Sha Tin Sewage Treatment Works to Caverns - Site Preparation and Access Tunnel Construction (DC/2018/05)	EMAIL REPORT TO:
SITE: P.O. NO.:	EMAIL INVOICE TO: (if different to report)
RESULTS REQUIRED (Date): QUOTE NO.:	**ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No (N/A)
SAMPLE TEMPERATURE
CHILLED: (Yes) No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

Notes: e.g. Highly contaminated samples
e.g. "High PAHs expected"
Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		METALS (FULL LIST)	PCRs	VOCs	SVOCs									
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles													
1.	ENV-G01(2) 0.5m	S	05/11/20	0930	JAR	1	✓	✓	✓	✓									
2.	ENV-G01(2) 1.50m-1.95m	S	05/11/20	10:50	U76	1	✓	✓	✓	✓									
3.	ENV-G01(2) 3.00m-3.45m	S	05/11/20	1430	U76	1	✓	✓	✓	✓									
4.	ENV-G01(2) 5.00m-5.45m	S	05/11/20	1600	U76	1	✓	✓	✓	✓									
5.	ENV-G01(2) 6.00m-6.45m	S	05/11/20	1640	U76	1	✓	✓	✓	✓									

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: Thomas YEUNG	Date: 05/11/2020	Name:	Date: 5/11/20	Con' Note No:
Of: TEEMWAY	Time: 1650	Of: ALS (HK)	Time: 1800	
Name:	Date:	Name:	Date:	Transport Co:
Of:	Time:	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Client	: TEEMWAY ENGINEERING LTD	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 22
Contact	: MR THOMAS YEUNG	Contact	: Richard Fung	Work Order	: HK2042575-AD
Address	: RM 1008, 10/F, CHEVALIER COMMERCIAL CENTRE, 8 WANG HOI ROAD, KOWLOON BAY, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong	Amendment	: 1
E-mail	: works@teemway.com	E-mail	: richard.fung@alsglobal.com		
Telephone	: +852 2796 2268	Telephone	: +852 2610 1044		
Facsimile	: +852 2796 2217	Facsimile	: +852 2610 2021		
Project	: DECONTAMINATION WORKS OF GROUNDWATER AND SOIL FOR RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS SITE PREPARATION AND ACCESS TUNNEL CONSTRUCTION (CONTRACT NO. DC/2018/05)			Date Samples Received	: 05-Nov-2020
Order number	: ----	Quote number	: HKE/1680/2020_V2	Issue Date	: 18-Nov-2020
C-O-C number	: H022734-H022735			No. of samples received	: 4
Site	: ----			No. of samples analysed	: 4

Hong Kong Accreditation Service (HKAS) has accredited this laboratory, ALS Technichem (HK) Pty Ltd (Reg. No. HOKLAS 066) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories.

This document has been signed by those names that appear on this report and are the authorised signatories.

Signatories	*Position*	*Authorised results for*
Anh Ngoc Huynh .	Senior Chemist	Organics_ENV
Chan Ka Yu , Karen	Manager - Organics	Organics_ENV
Chan Siu Ming , Vico	Manager - Inorganics	Inorganics
Leung Chak Cheong , Mike	Senior Chemist	Metals_ENV

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. 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. Testing period is from 05-Nov-2020 to 18-Nov-2020.

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific Comments for Work Order: HK2042575

Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in chilled condition. The result(s) related only to the item(s) tested.

Sample information (Project name, Sample ID, Sampling date/time, etc., if any) is provided by client.

Result(s) of soil/sediment sample(s) was / were reported on dry weight basis.

This is an amendment of the Certificate of Analysis.

The testing(s) for sample HK2042575-006 has been changed from test code EP074_SR to EP071HK_SR.

Water sample(s) were filtered prior to dissolved metal analysis.

EP070 is the numeric code for internal use. Test method for C6-C9 Fraction of TPH is EP071.

Sample(s) as received, digested by In-house method E-ASTM D3974-09 prior to determination of metals. The In-house method is developed based on ASTM D3974-09 method.

Sample(s) as received, digested by In-house method E-3060 prior to the determination of Hexavalent Chromium (Cr6+). The In-house method is developed based on USEPA method 3060A.

Analytical Results

Sub-Matrix: SOIL			Client sample ID	ENV-G01(2) 0.5m (DUP)	---	---	---	---
			Client sampling date / time	05-Nov-2020 09:30	----	----	----	----
Compound	CAS Number	LOR	Unit	HK2042575-009	-------	-------	-------	-------
EA/ED: Physical and Aggregate Properties								
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	15.9	---	---	---	---
EG: Metals and Major Cations								
EG020: Antimony	7440-36-0	1	mg/kg	<1	---	---	---	---
EG020: Arsenic	7440-38-2	1	mg/kg	3	---	---	---	---
EG020: Barium	7440-39-3	1.0	mg/kg	14.9	---	---	---	---
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	---	---	---	---
EG020: Cobalt	7440-48-4	1.0	mg/kg	3.2	---	---	---	---
EG020: Copper	7440-50-8	1	mg/kg	1	---	---	---	---
EG020: Lead	7439-92-1	1	mg/kg	141	---	---	---	---
EG020: Manganese	7439-96-5	1.0	mg/kg	384	---	---	---	---
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	---	---	---	---
EG020: Molybdenum	7439-98-7	1	mg/kg	2	---	---	---	---
EG020: Nickel	7440-02-0	1	mg/kg	1	---	---	---	---
EG020: Tin	7440-31-5	1.0	mg/kg	2.3	---	---	---	---
EG020: Zinc	7440-66-6	1	mg/kg	43	---	---	---	---
EG049: Trivalent Chromium	16065-83-1	1.0	mg/kg	1.8	---	---	---	---
EG3060: Hexavalent Chromium	18540-29-9	1.0	mg/kg	<1.0	---	---	---	---
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs)								
EP076HK: Naphthalene	91-20-3	0.500	mg/kg	<0.500	---	---	---	---
EP076HK: Acenaphthylene	208-96-8	0.500	mg/kg	<0.500	---	---	---	---
EP076HK: Acenaphthene	83-32-9	0.500	mg/kg	<0.500	---	---	---	---
EP076HK: Fluorene	86-73-7	0.500	mg/kg	<0.500	---	---	---	---
EP076HK: Phenanthrene	85-01-8	0.500	mg/kg	<0.500	---	---	---	---
EP076HK: Anthracene	120-12-7	0.500	mg/kg	<0.500	---	---	---	---
EP076HK: Fluoranthene	206-44-0	0.500	mg/kg	<0.500	---	---	---	---
EP076HK: Pyrene	129-00-0	0.500	mg/kg	<0.500	---	---	---	---
EP076HK: Benz(a)anthracene	56-55-3	0.500	mg/kg	<0.500	---	---	---	---
EP076HK: Chrysene	218-01-9	0.500	mg/kg	<0.500	---	---	---	---

Sub-Matrix: SOIL				Client sample ID	ENV-G01(2) 0.5m (DUP)	----	----	----	----
				Client sampling date / time	05-Nov-2020 09:30	----	----	----	----
Compound	CAS Number	LOR	Unit		HK2042575-009	-------	-------	-------	-------
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued									
EP076HK: Benzo(b)fluoranthene	205-99-2	0.500	mg/kg		<0.500	----	----	----	----
EP076HK: Benzo(k)fluoranthene	207-08-9	0.500	mg/kg		<0.500	----	----	----	----
EP076HK: Benzo(a)pyrene	50-32-8	0.500	mg/kg		<0.500	----	----	----	----
EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	0.500	mg/kg		<0.500	----	----	----	----
EP076HK: Dibenz(a.h)anthracene	53-70-3	0.500	mg/kg		<0.500	----	----	----	----
EP076HK: Benzo(g.h.i)perylene	191-24-2	0.500	mg/kg		<0.500	----	----	----	----
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate									
EP076HK: Phenol	108-95-2	0.50	mg/kg		<0.50	----	----	----	----
EP076HK: Hexachlorobenzene (HCB)	118-74-1	0.200	mg/kg		<0.200	----	----	----	----
EP076HK: Bis(2-ethylhexyl)phthalate	117-81-7	5.00	mg/kg		<5.00	----	----	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH)									
EP070HK_SR: C6 - C8 Fraction	----	5	mg/kg		<5	----	----	----	----
EP071HK_SR: C9 - C16 Fraction	----	200	mg/kg		<200	----	----	----	----
EP071HK_SR: C17 - C35 Fraction	----	500	mg/kg		<500	----	----	----	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH)									
EP074_SR: Benzene	71-43-2	0.2	mg/kg		<0.2	----	----	----	----
EP074_SR: Toluene	108-88-3	0.5	mg/kg		<0.5	----	----	----	----
EP074_SR: Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	----	----	----	----
EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	1.0	mg/kg		<1.0	----	----	----	----
EP074_SR: Styrene	100-42-5	0.5	mg/kg		<0.5	----	----	----	----
EP074_SR: ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	----	----	----	----
EP074_SR: Xylenes (Total)	----	2.0	mg/kg		<2.0	----	----	----	----
EP-074_SR-B: Oxygenated Compounds									
EP074_SR: 2-Propanone (Acetone)	67-64-1	50	mg/kg		<50	----	----	----	----
EP074_SR: 2-Butanone (MEK)	78-93-3	5	mg/kg		<5	----	----	----	----
EP-074_SR-E: Halogenated Aliphatics									
EP074_SR: Methylene chloride	75-09-2	0.5	mg/kg		<0.5	----	----	----	----
EP074_SR: Trichloroethene	79-01-6	0.1	mg/kg		<0.1	----	----	----	----

Sub-Matrix: SOIL				Client sample ID	ENV-G01(2) 0.5m (DUP)	----	----	----	----
				Client sampling date / time	05-Nov-2020 09:30	----	----	----	----
Compound	CAS Number	LOR	Unit		HK2042575-009	-------	-------	-------	-------
EP-074_SR-E: Halogenated Aliphatics - Continued									
EP074_SR: Tetrachloroethene	127-18-4	0.04	mg/kg		<0.04	----	----	----	----
EP-074_SR-G: Trihalomethanes (THM)									
EP074_SR: Chloroform	67-66-3	0.04	mg/kg		<0.04	----	----	----	----
EP074_SR: Bromodichloromethane	75-27-4	0.1	mg/kg		<0.1	----	----	----	----
EP-074_SR-I: Methyl-tert-butyl Ether									
EP074_SR: Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.5	mg/kg		<0.5	----	----	----	----
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates									
EP076HK: 2-Fluorobiphenyl	321-60-8	0.1	%		75.8	----	----	----	----
EP076HK: 4-Terphenyl-d14	1718-51-0	0.1	%		68.2	----	----	----	----
EP-080_SRS: TPH(Volatile)/BTEX Surrogate									
EP070HK_SR: Dibromofluoromethane	1868-53-7	0.1	%		89.8	----	----	----	----
EP070HK_SR: Toluene-D8	2037-26-5	0.1	%		98.6	----	----	----	----
EP070HK_SR: 4-Bromofluorobenzene	460-00-4	0.1	%		93.9	----	----	----	----
EP-074_SR-S: VOC Surrogates									
EP074_SR: Dibromofluoromethane	1868-53-7	0.1	%		89.8	----	----	----	----
EP074_SR: Toluene-D8	2037-26-5	0.1	%		98.6	----	----	----	----
EP074_SR: 4-Bromofluorobenzene	460-00-4	0.1	%		93.9	----	----	----	----

Sub-Matrix: WATER			Client sample ID	SOIL-TB1	SOIL-FB1	SOIL-EQ1	----	----
			Client sampling date / time	05-Nov-2020	05-Nov-2020 10:30	05-Nov-2020 10:30	----	----
Compound	CAS Number	LOR	Unit	HK2042575-006	HK2042575-007	HK2042575-008	-------	-------
EG: Metals and Major Cations - Filtered								
EG020: Antimony	7440-36-0	1	µg/L	----	<1	<1	----	----
EG020: Arsenic	7440-38-2	10	µg/L	----	<10	<10	----	----
EG020: Barium	7440-39-3	1	µg/L	----	<1	<1	----	----
EG020: Cadmium	7440-43-9	0.2	µg/L	----	<0.2	<0.2	----	----
EG020: Cobalt	7440-48-4	1	µg/L	----	<1	<1	----	----
EG020: Copper	7440-50-8	1	µg/L	----	<1	<1	----	----
EG020: Lead	7439-92-1	1	µg/L	----	<1	<1	----	----
EG020: Manganese	7439-96-5	1	µg/L	----	<1	<1	----	----
EG020: Mercury	7439-97-6	0.5	µg/L	----	<0.5	<0.5	----	----
EG020: Molybdenum	7439-98-7	1	µg/L	----	<1	<1	----	----
EG020: Nickel	7440-02-0	1	µg/L	----	<1	<1	----	----
EG020: Tin	7440-31-5	1	µg/L	----	<1	<1	----	----
EG020: Zinc	7440-66-6	10	µg/L	----	<10	<10	----	----
EG049: Trivalent Chromium	16065-83-1	20	µg/L	----	<20	<20	----	----
EG050: Hexavalent Chromium	18540-29-9	20	µg/L	----	<20	<20	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs)								
EP076HK: Naphthalene	91-20-3	2.0	µg/L	----	<2.0	<2.0	----	----
EP076HK: Acenaphthylene	208-96-8	2.0	µg/L	----	<2.0	<2.0	----	----
EP076HK: Acenaphthene	83-32-9	2.0	µg/L	----	<2.0	<2.0	----	----
EP076HK: Fluorene	86-73-7	2.0	µg/L	----	<2.0	<2.0	----	----
EP076HK: Phenanthrene	85-01-8	2.0	µg/L	----	<2.0	<2.0	----	----
EP076HK: Anthracene	120-12-7	2.0	µg/L	----	<2.0	<2.0	----	----
EP076HK: Fluoranthene	206-44-0	2.0	µg/L	----	<2.0	<2.0	----	----
EP076HK: Pyrene	129-00-0	2.0	µg/L	----	<2.0	<2.0	----	----
EP076HK: Benz(a)anthracene	56-55-3	2.0	µg/L	----	<2.0	<2.0	----	----
EP076HK: Chrysene	218-01-9	1.0	µg/L	----	<1.0	<1.0	----	----
EP076HK: Benzo(b)fluoranthene	205-99-2	1.0	µg/L	----	<1.0	<1.0	----	----
EP076HK: Benzo(k)fluoranthene	207-08-9	2.0	µg/L	----	<2.0	<2.0	----	----
EP076HK: Benzo(a)pyrene	50-32-8	2.0	µg/L	----	<2.0	<2.0	----	----
EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	2.0	µg/L	----	<2.0	<2.0	----	----

Sub-Matrix: WATER			Client sample ID	SOIL-TB1	SOIL-FB1	SOIL-EQ1	----	----
			Client sampling date / time	05-Nov-2020	05-Nov-2020 10:30	05-Nov-2020 10:30	----	----
Compound	CAS Number	LOR	Unit	HK2042575-006	HK2042575-007	HK2042575-008	-------	-------
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued								
EP076HK: Dibenz(a.h)anthracene	53-70-3	2.0	µg/L	----	<2.0	<2.0	----	----
EP076HK: Benzo(g.h.i)perylene	191-24-2	2.0	µg/L	----	<2.0	<2.0	----	----
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate								
EP076HK: Phenol	108-95-2	2.0	µg/L	----	<2.0	<2.0	----	----
EP076HK: Hexachlorobenzene (HCB)	118-74-1	4.0	µg/L	----	<4.0	<4.0	----	----
EP076HK: Bis(2-ethylhexyl)phthalate	117-81-7	20.0	µg/L	----	<20.0	<20.0	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH)								
EP070HK_SR: C6 - C8 Fraction	----	20	µg/L	<20	<20	<20	----	----
EP071HK_SR: C9 - C16 Fraction	----	500	µg/L	----	<500	<500	----	----
EP071HK_SR: C17 - C35 Fraction	----	500	µg/L	----	<500	<500	----	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH)								
EP074_SR: Benzene	71-43-2	5.0	µg/L	----	<5.0	<5.0	----	----
EP074_SR: Toluene	108-88-3	5.0	µg/L	----	<5.0	<5.0	----	----
EP074_SR: Ethylbenzene	100-41-4	5.0	µg/L	----	<5.0	<5.0	----	----
EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	10	µg/L	----	<10	<10	----	----
EP074_SR: Styrene	100-42-5	5.0	µg/L	----	<5.0	<5.0	----	----
EP074_SR: ortho-Xylene	95-47-6	5.0	µg/L	----	<5.0	<5.0	----	----
EP074_SR: Xylenes (Total)	----	20	µg/L	----	<20	<20	----	----
EP-074_SR-B: Oxygenated Compounds								
EP074_SR: 2-Propanone (Acetone)	67-64-1	500	µg/L	----	<500	<500	----	----
EP074_SR: 2-Butanone (MEK)	78-93-3	50	µg/L	----	<50	<50	----	----
EP-074_SR-E: Halogenated Aliphatics								
EP074_SR: Methylene chloride	75-09-2	50	µg/L	----	<50	<50	----	----
EP074_SR: Trichloroethene	79-01-6	5.0	µg/L	----	<5.0	<5.0	----	----
EP074_SR: Tetrachloroethene	127-18-4	5.0	µg/L	----	<5.0	<5.0	----	----
EP-074_SR-G: Trihalomethanes (THM)								
EP074_SR: Chloroform	67-66-3	5.0	µg/L	----	<5.0	<5.0	----	----
EP074_SR: Bromodichloromethane	75-27-4	5.0	µg/L	----	<5.0	<5.0	----	----
EP-074_SR-I: Methyl-tert-butyl Ether								

Sub-Matrix: WATER			Client sample ID	SOIL-TB1	SOIL-FB1	SOIL-EQ1	----	----
			Client sampling date / time	05-Nov-2020	05-Nov-2020 10:30	05-Nov-2020 10:30	----	----
Compound	CAS Number	LOR	Unit	HK2042575-006	HK2042575-007	HK2042575-008	-------	-------
EP-074_SR-I: Methyl-tert-butyl Ether - Continued								
EP074_SR: Methyl tert-Butyl Ether (MTBE)	1634-04-4	5.0	µg/L	----	<5.0	<5.0	----	----
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates								
EP076HK: 2-Fluorobiphenyl	321-60-8	0.1	%	----	90.6	90.9	----	----
EP076HK: 4-Terphenyl-d14	1718-51-0	0.1	%	----	82.3	86.4	----	----
EP-080_SRS: TPH(Volatile)/BTEX Surrogate								
EP070HK_SR: Dibromofluoromethane	1868-53-7	0.1	%	103	101	107	----	----
EP070HK_SR: Toluene-D8	2037-26-5	0.1	%	101	101	103	----	----
EP070HK_SR: 4-Bromofluorobenzene	460-00-4	0.1	%	91.4	91.7	91.1	----	----
EP-074_SR-S: VOC Surrogates								
EP074_SR: Dibromofluoromethane	1868-53-7	0.1	%	----	101	107	----	----
EP074_SR: Toluene-D8	2037-26-5	0.1	%	----	101	103	----	----
EP074_SR: 4-Bromofluorobenzene	460-00-4	0.1	%	----	91.7	91.1	----	----

Laboratory Duplicate (DUP) Report

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 3352677)								
HK2042470-001	Anonymous	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	40.2	39.4	1.88
EG: Metals and Major Cations (QC Lot: 3351021)								
HK2042575-002	Anonymous	**EG020: Mercury**	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.00
		EG020: Cadmium	7440-43-9	0.2	mg/kg	0.3	<0.2	0.00
		EG020: Barium	7440-39-3	0.5	mg/kg	40.7	43.5	6.73
		EG020: Cobalt	7440-48-4	0.5	mg/kg	6.3	6.0	4.13
		EG020: Manganese	7439-96-5	0.5	mg/kg	558	546	2.23
		EG020: Tin	7440-31-5	0.5	mg/kg	22.0	22.7	3.44
		EG020: Antimony	7440-36-0	1	mg/kg	<1	<1	0.00
		EG020: Arsenic	7440-38-2	1	mg/kg	3	3	0.00
		EG020: Copper	7440-50-8	1	mg/kg	18	17	5.91
		EG020: Lead	7439-92-1	1	mg/kg	281	264	6.36
		EG020: Molybdenum	7439-98-7	1	mg/kg	3	2	0.00
		EG020: Nickel	7440-02-0	1	mg/kg	5	4	0.00
		EG020: Zinc	7440-66-6	1	mg/kg	105	110	4.96
EG: Metals and Major Cations (QC Lot: 3351024)								
HK2042390-002	Anonymous	**EG3060: Hexavalent Chromium**	18540-29-9	0.5	mg/kg	<1.0	<1.0	0.00
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3351168)								
HK2042575-001	Anonymous	**EP076HK: Naphthalene**	91-20-3	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Acenaphthylene	208-96-8	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Acenaphthene	83-32-9	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Fluorene	86-73-7	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Phenanthrene	85-01-8	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Anthracene	120-12-7	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Fluoranthene	206-44-0	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Pyrene	129-00-0	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Benz(a)anthracene	56-55-3	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Chrysene	218-01-9	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Benzo(b)fluoranthene	205-99-2	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Benzo(k)fluoranthene	207-08-9	50	µg/kg	<0.500 mg/kg	<500	0.00

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report: LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3351168) - Continued								
HK2042575-001	Anonymous	**EP076HK: Benzo(a)pyrene**	50-32-8	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Dibenz(a.h)anthracene	53-70-3	50	µg/kg	<0.500 mg/kg	<500	0.00
		EP076HK: Benzo(g.h.i)perylene	191-24-2	50	µg/kg	<0.500 mg/kg	<500	0.00
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate (QC Lot: 3351168)								
HK2042575-001	Anonymous	**EP076HK: Bis(2-ethylhexyl)phthalate**	117-81-7	1000	µg/kg	<5.00 mg/kg	<5000	0.00
		EP076HK: Hexachlorobenzene (HCB)	118-74-1	50	µg/kg	<0.200 mg/kg	<200	0.00
		EP076HK: Phenol	108-95-2	500	µg/kg	<0.50 mg/kg	<500	0.00
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3351169)								
HK2042575-001	Anonymous	**EP071HK_SR: C9 - C16 Fraction**	----	200	mg/kg	<200	<200	0.00
		EP071HK_SR: C17 - C35 Fraction	----	500	mg/kg	<500	<500	0.00
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3351176)								
HK2042575-001	Anonymous	**EP070HK_SR: C6 - C8 Fraction**	----	5	mg/kg	<5	<5	0.00
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 3351177)								
HK2042575-001	Anonymous	**EP074_SR: Benzene**	71-43-2	0.1	mg/kg	<0.2	<0.2	0.00
		EP074_SR: Toluene	108-88-3	0.2	mg/kg	<0.5	<0.5	0.00
		EP074_SR: Ethylbenzene	100-41-4	0.2	mg/kg	<0.5	<0.5	0.00
		EP074_SR: Styrene	100-42-5	0.2	mg/kg	<0.5	<0.5	0.00
		EP074_SR: ortho-Xylene	95-47-6	0.2	mg/kg	<0.5	<0.5	0.00
		EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	0.4	mg/kg	<1.0	<1.0	0.00
		EP074_SR: Xylenes (Total)	----	1	mg/kg	<2.0	<2.0	0.00
EP-074_SR-B: Oxygenated Compounds (QC Lot: 3351177)								
HK2042575-001	Anonymous	**EP074_SR: 2-Propanone (Acetone)**	67-64-1	2	mg/kg	<50	<50	0.00
		EP074_SR: 2-Butanone (MEK)	78-93-3	2	mg/kg	<5	<5	0.00
EP-074_SR-E: Halogenated Aliphatics (QC Lot: 3351177)								
HK2042575-001	Anonymous	**EP074_SR: Tetrachloroethene**	127-18-4	0.04	mg/kg	<0.04	<0.04	0.00
		EP074_SR: Trichloroethene	79-01-6	0.1	mg/kg	<0.1	<0.1	0.00
		EP074_SR: Methylene chloride	75-09-2	0.5	mg/kg	<0.5	<0.5	0.00
EP-074_SR-G: Trihalomethanes (THM) (QC Lot: 3351177)								
HK2042575-001	Anonymous	**EP074_SR: Chloroform**	67-66-3	0.04	mg/kg	<0.04	<0.04	0.00

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report: LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-074_SR-G: Trihalomethanes (THM) (QC Lot: 3351177) - Continued								
HK2042575-001	Anonymous	**EP074_SR: Bromodichloromethane**	75-27-4	0.1	mg/kg	<0.1	<0.1	0.00
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 3351177)								
HK2042575-001	Anonymous	**EP074_SR: Methyl tert-Butyl Ether (MTBE)**	1634-04-4	0.2	mg/kg	<0.5	<0.5	0.00

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report: LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Filtered (QC Lot: 3351035)								
HK2042501-001	Anonymous	**EG020: Cadmium**	7440-43-9	0.2	µg/L	<0.2	<0.2	0.00
		EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	<0.5	0.00
		EG020: Antimony	7440-36-0	1	µg/L	1	1	0.00
		EG020: Arsenic	7440-38-2	1	µg/L	4	3	0.00
		EG020: Barium	7440-39-3	1	µg/L	11	12	0.00
		EG020: Cobalt	7440-48-4	1	µg/L	<1	<1	0.00
		EG020: Copper	7440-50-8	1	µg/L	13	12	12.7
		EG020: Lead	7439-92-1	1	µg/L	3	2	0.00
		EG020: Manganese	7439-96-5	1	µg/L	<1	2	0.00
		EG020: Molybdenum	7439-98-7	1	µg/L	2	2	0.00
		EG020: Nickel	7440-02-0	1	µg/L	2	2	0.00
		EG020: Tin	7440-31-5	1	µg/L	<1	<1	0.00
		EG020: Zinc	7440-66-6	10	µg/L	<10	<10	0.00
EG: Metals and Major Cations - Filtered (QC Lot: 3366512)								
HK2042575-008	SOIL-EQ1	**EG050: Hexavalent Chromium**	18540-29-9	20	µg/L	<20	<20	0.00

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: **SOIL**

Method: Compound	CAS Number	Method Blank (MB) Report: LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report: Spike Concentration	Spike Recovery (%): LCS	DCS	Recovery Limits(%): Low	High	RPD (%): Value	Control Limit
EG: Metals and Major Cations (QC Lot: 3351021)											
EG020: Antimony	7440-36-0	1	mg/kg	<1	5 mg/kg	97.6	----	85.0	110	----	----
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	99.9	----	85.0	106	----	----

Matrix: **SOIL**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 3351021) - Continued											
EG020: Barium	7440-39-3	0.5	mg/kg	<0.5	5 mg/kg	104	----	85.0	111	----	----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	0.25 mg/kg	92.6	----	88.0	108	----	----
EG020: Cobalt	7440-48-4	0.5	mg/kg	<0.5	5 mg/kg	102	----	85.0	110	----	----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	107	----	88.0	113	----	----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	98.8	----	90.0	110	----	----
EG020: Manganese	7439-96-5	0.5	mg/kg	<0.5	5 mg/kg	94.1	----	85.0	111	----	----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	104	----	85.0	109	----	----
EG020: Molybdenum	7439-98-7	1	mg/kg	<1	5 mg/kg	91.9	----	85.0	110	----	----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	104	----	86.0	111	----	----
EG020: Tin	7440-31-5	0.5	mg/kg	<0.5	5 mg/kg	99.0	----	86.0	109	----	----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	105	----	87.0	115	----	----
EG: Metals and Major Cations (QC Lot: 3351024)											
EG3060: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	12.5 mg/kg	96.9	----	85.0	115	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3351168)											
EP076HK: Naphthalene	91-20-3	50	µg/kg	<50	25 µg/kg	91.0	----	68.0	140	----	----
EP076HK: Acenaphthylene	208-96-8	50	µg/kg	<50	25 µg/kg	85.3	----	70.0	139	----	----
EP076HK: Acenaphthene	83-32-9	50	µg/kg	<50	25 µg/kg	85.5	----	65.0	138	----	----
EP076HK: Fluorene	86-73-7	50	µg/kg	<50	25 µg/kg	81.4	----	67.0	139	----	----
EP076HK: Phenanthrene	85-01-8	50	µg/kg	<50	25 µg/kg	86.8	----	70.0	143	----	----
EP076HK: Anthracene	120-12-7	50	µg/kg	<50	25 µg/kg	87.3	----	69.0	142	----	----
EP076HK: Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	84.6	----	70.0	140	----	----
EP076HK: Pyrene	129-00-0	50	µg/kg	<50	25 µg/kg	82.9	----	69.0	137	----	----
EP076HK: Benz(a)anthracene	56-55-3	50	µg/kg	<50	25 µg/kg	107	----	64.0	135	----	----
EP076HK: Chrysene	218-01-9	50	µg/kg	<50	25 µg/kg	115	----	68.0	139	----	----
EP076HK: Benzo(b)fluoranthene	205-99-2	50	µg/kg	<50	25 µg/kg	59.4	----	59.0	133	----	----
EP076HK: Benzo(k)fluoranthene	207-08-9	50	µg/kg	<50	25 µg/kg	61.7	----	57.0	141	----	----
EP076HK: Benzo(a)pyrene	50-32-8	50	µg/kg	<50	25 µg/kg	57.8	----	54.0	131	----	----
EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	50	µg/kg	<50	25 µg/kg	65.1	----	40.0	121	----	----
EP076HK: Dibenz(a.h)anthracene	53-70-3	50	µg/kg	<50	25 µg/kg	65.7	----	40.0	125	----	----
EP076HK: Benzo(g.h.i)perylene	191-24-2	50	µg/kg	<50	25 µg/kg	61.8	----	36.0	134	----	----

Matrix: **SOIL**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate (QC Lot: 3351168)											
EP076HK: Phenol	108-95-2	500	µg/kg	<500	25 µg/kg	81.3	----	73.0	142	----	----
EP076HK: Hexachlorobenzene (HCB)	118-74-1	50	µg/kg	<50	25 µg/kg	94.6	----	70.0	143	----	----
EP076HK: Bis(2-ethylhexyl)phthalate	117-81-7	1000	µg/kg	<1000	25 µg/kg	104	----	51.0	148	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3351169)											
EP071HK_SR: C9 - C16 Fraction	----	200	mg/kg	<200	31.5 mg/kg	103	----	83.0	105	----	----
EP071HK_SR: C17 - C35 Fraction	----	500	mg/kg	<500	67.5 mg/kg	92.0	----	65.0	120	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3351176)											
EP070HK_SR: C6 - C8 Fraction	----	5	mg/kg	<5	4.5 mg/kg	94.1	----	81.0	118	----	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 3351177)											
EP074_SR: Benzene	71-43-2	0.1	mg/kg	<0.1	0.25 mg/kg	92.2	----	79.0	122	----	----
EP074_SR: Toluene	108-88-3	0.2	mg/kg	<0.2	0.25 mg/kg	91.2	----	79.0	123	----	----
EP074_SR: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	0.25 mg/kg	91.6	----	80.0	121	----	----
EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	0.4	mg/kg	<0.4	0.5 mg/kg	93.1	----	80.0	120	----	----
EP074_SR: Styrene	100-42-5	0.2	mg/kg	<0.2	0.25 mg/kg	91.4	----	79.0	125	----	----
EP074_SR: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	0.25 mg/kg	92.5	----	77.0	125	----	----
EP074_SR: Xylenes (Total)	----	1	mg/kg	<1.0	0.75 mg/kg	92.9	----	80.0	121	----	----
EP-074_SR-B: Oxygenated Compounds (QC Lot: 3351177)											
EP074_SR: 2-Propanone (Acetone)	67-64-1	2	mg/kg	<2	2.5 mg/kg	110	----	73.0	122	----	----
EP074_SR: 2-Butanone (MEK)	78-93-3	2	mg/kg	<2	2.5 mg/kg	107	----	76.0	125	----	----
EP-074_SR-E: Halogenated Aliphatics (QC Lot: 3351177)											
EP074_SR: Methylene chloride	75-09-2	0.5	mg/kg	<0.5	0.25 mg/kg	96.0	----	72.0	123	----	----
EP074_SR: Trichloroethene	79-01-6	0.1	mg/kg	<0.1	0.25 mg/kg	90.9	----	79.0	122	----	----
EP074_SR: Tetrachloroethene	127-18-4	0.04	mg/kg	<0.04	0.25 mg/kg	95.4	----	79.0	122	----	----
EP-074_SR-G: Trihalomethanes (THM) (QC Lot: 3351177)											
EP074_SR: Chloroform	67-66-3	0.04	mg/kg	<0.04	0.25 mg/kg	108	----	79.0	121	----	----
EP074_SR: Bromodichloromethane	75-27-4	0.1	mg/kg	<0.1	0.25 mg/kg	95.1	----	77.0	124	----	----
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 3351177)											
EP074_SR: Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.2	mg/kg	<0.2	0.25 mg/kg	88.2	----	74.0	127	----	----

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations - Filtered (QC Lot: 3351035)											
EG020: Antimony	7440-36-0	1	µg/L	<1	50 µg/L	94.6	----	89.0	110	----	----
EG020: Arsenic	7440-38-2	1	µg/L	<1	50 µg/L	96.2	----	85.0	112	----	----
EG020: Barium	7440-39-3	1	µg/L	<1	50 µg/L	94.7	----	85.0	111	----	----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	5 µg/L	96.6	----	85.0	111	----	----
EG020: Cobalt	7440-48-4	1	µg/L	<1	50 µg/L	96.0	----	85.0	113	----	----
EG020: Copper	7440-50-8	1	µg/L	<1	50 µg/L	100	----	85.0	113	----	----
EG020: Lead	7439-92-1	1	µg/L	<1	50 µg/L	95.2	----	85.0	113	----	----
EG020: Manganese	7439-96-5	1	µg/L	<1	50 µg/L	96.2	----	85.0	114	----	----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	2 µg/L	96.6	----	85.0	115	----	----
EG020: Molybdenum	7439-98-7	1	µg/L	<1	50 µg/L	94.1	----	89.0	110	----	----
EG020: Nickel	7440-02-0	1	µg/L	<1	50 µg/L	95.4	----	85.0	113	----	----
EG020: Tin	7440-31-5	1	µg/L	<1	50 µg/L	94.7	----	88.0	110	----	----
EG020: Zinc	7440-66-6	10	µg/L	<10	50 µg/L	101	----	85.0	113	----	----
EG: Metals and Major Cations - Filtered (QC Lot: 3366512)											
EG050: Hexavalent Chromium	18540-29-9	20	µg/L	<20	100 µg/L	98.4	----	80.0	106	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3353731)											
EP076HK: Naphthalene	91-20-3	0.1	µg/L	<0.1	0.5 µg/L	90.8	----	60.0	119	----	----
EP076HK: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	0.5 µg/L	85.7	----	50.0	118	----	----
EP076HK: Acenaphthene	83-32-9	0.1	µg/L	<0.1	0.5 µg/L	88.0	----	57.0	119	----	----
EP076HK: Fluorene	86-73-7	0.1	µg/L	<0.1	0.5 µg/L	85.0	----	53.0	121	----	----
EP076HK: Phenanthrene	85-01-8	0.1	µg/L	<0.1	0.5 µg/L	88.9	----	54.0	124	----	----
EP076HK: Anthracene	120-12-7	0.1	µg/L	<0.1	0.5 µg/L	89.7	----	50.0	123	----	----
EP076HK: Fluoranthene	206-44-0	0.1	µg/L	<0.1	0.5 µg/L	86.5	----	50.0	130	----	----
EP076HK: Pyrene	129-00-0	0.1	µg/L	<0.1	0.5 µg/L	84.0	----	50.0	130	----	----
EP076HK: Benz(a)anthracene	56-55-3	0.1	µg/L	<0.1	0.5 µg/L	100	----	50.0	128	----	----
EP076HK: Chrysene	218-01-9	0.1	µg/L	<0.1	0.5 µg/L	106	----	55.0	130	----	----
EP076HK: Benzo(b)fluoranthene	205-99-2	0.1	µg/L	<0.1	0.5 µg/L	54.1	----	50.0	130	----	----
EP076HK: Benzo(k)fluoranthene	207-08-9	0.1	µg/L	<0.1	0.5 µg/L	51.7	----	50.0	130	----	----
EP076HK: Benzo(a)pyrene	50-32-8	0.1	µg/L	<0.1	0.5 µg/L	51.5	----	50.0	130	----	----
EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L	<0.1	0.5 µg/L	72.7	----	50.0	104	----	----

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3353731) - Continued											
EP076HK: Dibenz(a.h)anthracene	53-70-3	0.1	µg/L	<0.1	0.5 µg/L	58.4	----	50.0	105	----	----
EP076HK: Benzo(g.h.i)perylene	191-24-2	0.1	µg/L	<0.1	0.5 µg/L	63.2	----	50.0	111	----	----
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate (QC Lot: 3353731)											
EP076HK: Phenol	108-95-2	5	µg/L	<5.0	0.5 µg/L	84.7	----	50.0	124	----	----
EP076HK: Hexachlorobenzene (HCB)	118-74-1	4	µg/L	<4.0	0.5 µg/L	95.0	----	63.0	130	----	----
EP076HK: Bis(2-ethylhexyl)phthalate	117-81-7	10	µg/L	<10.0	0.5 µg/L	124	----	50.0	130	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3353732)											
EP071HK_SR: C9 - C16 Fraction	----	0.5	mg/L	<0.5	0.21 mg/L	84.5	----	65.0	123	----	----
EP071HK_SR: C17 - C35 Fraction	----	0.5	mg/L	<0.5	0.45 mg/L	91.1	----	59.0	113	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3355705)											
EP070HK_SR: C6 - C8 Fraction	----	0.02	mg/L	<0.02	0.03 mg/L	101	----	74.0	117	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3371192)											
EP070HK_SR: C6 - C8 Fraction	----	0.02	mg/L	<0.02	0.03 mg/L	101	----	74.0	117	----	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 3355704)											
EP074_SR: Benzene	71-43-2	0.5	µg/L	<0.5	2 µg/L	108	----	80.0	119	----	----
EP074_SR: Toluene	108-88-3	0.5	µg/L	<0.5	2 µg/L	92.8	----	79.0	120	----	----
EP074_SR: Ethylbenzene	100-41-4	0.5	µg/L	<0.5	2 µg/L	95.2	----	79.0	122	----	----
EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	1	µg/L	<1	4 µg/L	92.2	----	72.0	124	----	----
EP074_SR: Styrene	100-42-5	0.5	µg/L	<0.5	2 µg/L	96.5	----	74.0	121	----	----
EP074_SR: ortho-Xylene	95-47-6	0.5	µg/L	<0.5	2 µg/L	96.3	----	78.0	120	----	----
EP074_SR: Xylenes (Total)	----	2	µg/L	<2	6 µg/L	93.6	----	77.0	121	----	----
EP-074_SR-B: Oxygenated Compounds (QC Lot: 3355704)											
EP074_SR: 2-Propanone (Acetone)	67-64-1	5	µg/L	<5	20 µg/L	110	----	73.0	126	----	----
EP074_SR: 2-Butanone (MEK)	78-93-3	5	µg/L	<5	20 µg/L	109	----	79.0	123	----	----
EP-074_SR-E: Halogenated Aliphatics (QC Lot: 3355704)											
EP074_SR: Methylene chloride	75-09-2	5	µg/L	<5	2 µg/L	118	----	70.0	124	----	----
EP074_SR: Trichloroethene	79-01-6	0.5	µg/L	<0.5	2 µg/L	108	----	81.0	121	----	----
EP074_SR: Tetrachloroethene	127-18-4	0.5	µg/L	<0.5	2 µg/L	93.9	----	76.0	120	----	----

Matrix: **WATER**

		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EP-074_SR-G: Trihalomethanes (THM) (QC Lot: 3355704)											
EP074_SR: Chloroform	67-66-3	0.5	µg/L	<0.5	2 µg/L	92.1	----	81.0	121	----	----
EP074_SR: Bromodichloromethane	75-27-4	0.5	µg/L	<0.5	2 µg/L	109	----	74.0	127	----	----
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 3355704)											
EP074_SR: Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.5	µg/L	<0.5	2 µg/L	108	----	70.0	130	----	----

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 3351021)										
HK2042575-001	Anonymous	**EG020: Antimony**	7440-36-0	5 mg/kg	97.3	----	75.0	125	----	----
		EG020: Arsenic	7440-38-2	5 mg/kg	94.7	----	75.0	125	----	----
		EG020: Barium	7440-39-3	5 mg/kg	102	----	75.0	125	----	----
		EG020: Cadmium	7440-43-9	0.25 mg/kg	98.1	----	75.0	125	----	----
		EG020: Cobalt	7440-48-4	5 mg/kg	90.1	----	75.0	125	----	----
		EG020: Copper	7440-50-8	5 mg/kg	98.1	----	75.0	125	----	----
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	----	75.0	125	----	----
		EG020: Manganese	7439-96-5	5 mg/kg	# Not Determined	----	75.0	125	----	----
		EG020: Mercury	7439-97-6	0.1 mg/kg	86.6	----	75.0	125	----	----
		EG020: Molybdenum	7439-98-7	5 mg/kg	90.6	----	75.0	125	----	----
		EG020: Nickel	7440-02-0	5 mg/kg	95.5	----	75.0	125	----	----
		EG020: Tin	7440-31-5	5 mg/kg	98.8	----	75.0	125	----	----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	----	75.0	125	----	----
EG: Metals and Major Cations (QC Lot: 3351024)										
HK2042390-001	Anonymous	**EG3060: Hexavalent Chromium**	18540-29-9	12.5 mg/kg	97.8	----	75.0	125	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3351168)										
HK2042575-003	Anonymous	**EP076HK: Naphthalene**	91-20-3	250 µg/kg	81.7	----	50.0	130	----	----
		EP076HK: Acenaphthylene	208-96-8	250 µg/kg	76.3	----	50.0	130	----	----
		EP076HK: Acenaphthene	83-32-9	250 µg/kg	80.0	----	50.0	130	----	----
		EP076HK: Fluorene	86-73-7	250 µg/kg	77.0	----	50.0	130	----	----
		EP076HK: Phenanthrene	85-01-8	250 µg/kg	72.4	----	50.0	130	----	----
		EP076HK: Anthracene	120-12-7	250 µg/kg	72.4	----	50.0	130	----	----
		EP076HK: Fluoranthene	206-44-0	250 µg/kg	69.9	----	50.0	130	----	----
		EP076HK: Pyrene	129-00-0	250 µg/kg	67.9	----	50.0	130	----	----

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report: Spike Concentration	Spike Recovery (%): MS	Spike Recovery (%): MSD	Recovery Limits (%): Low	Recovery Limits (%): High	RPD (%): Value	RPD (%): Control Limit
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3351168) - Continued										
HK2042575-003	Anonymous	**EP076HK: Benz(a)anthracene**	56-55-3	250 µg/kg	104	----	50.0	130	----	----
		EP076HK: Chrysene	218-01-9	250 µg/kg	107	----	50.0	130	----	----
		EP076HK: Benzo(b)fluoranthene	205-99-2	250 µg/kg	52.3	----	50.0	130	----	----
		EP076HK: Benzo(k)fluoranthene	207-08-9	250 µg/kg	52.1	----	50.0	130	----	----
		EP076HK: Benzo(a)pyrene	50-32-8	250 µg/kg	54.3	----	50.0	130	----	----
		EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	250 µg/kg	67.1	----	50.0	130	----	----
		EP076HK: Dibenz(a.h)anthracene	53-70-3	250 µg/kg	80.0	----	50.0	130	----	----
		EP076HK: Benzo(g.h.i)perylene	191-24-2	250 µg/kg	67.2	----	50.0	130	----	----
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate (QC Lot: 3351168)										
HK2042575-003	Anonymous	**EP076HK: Phenol**	108-95-2	250 µg/kg	69.7	----	50.0	130	----	----
		EP076HK: Hexachlorobenzene (HCB)	118-74-1	250 µg/kg	88.7	----	50.0	130	----	----
		EP076HK: Bis(2-ethylhexyl)phthalate	117-81-7	250 µg/kg	116	----	50.0	130	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3351169)										
HK2042575-002	Anonymous	**EP071HK_SR: C9 - C16 Fraction**	----	31.5 mg/kg	108	----	50.0	130	----	----
		EP071HK_SR: C17 - C35 Fraction	----	67.5 mg/kg	97.8	----	50.0	130	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3351176)										
HK2042575-002	Anonymous	**EP070HK_SR: C6 - C8 Fraction**	----	4.5 mg/kg	105	----	50.0	130	----	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 3351177)										
HK2042575-003	Anonymous	**EP074_SR: Benzene**	71-43-2	0.25 mg/kg	111	----	50.0	130	----	----
		EP074_SR: Toluene	108-88-3	0.25 mg/kg	104	----	50.0	130	----	----
		EP074_SR: Ethylbenzene	100-41-4	0.25 mg/kg	106	----	50.0	130	----	----
		EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	0.5 mg/kg	107	----	50.0	130	----	----
		EP074_SR: Styrene	100-42-5	0.25 mg/kg	112	----	50.0	130	----	----
		EP074_SR: ortho-Xylene	95-47-6	0.25 mg/kg	106	----	50.0	130	----	----
		EP074_SR: Xylenes (Total)	----	0.75 mg/kg	106	----	50.0	130	----	----
EP-074_SR-B: Oxygenated Compounds (QC Lot: 3351177)										
HK2042575-003	Anonymous	**EP074_SR: 2-Propanone (Acetone)**	67-64-1	2.5 mg/kg	101	----	50.0	130	----	----
		EP074_SR: 2-Butanone (MEK)	78-93-3	2.5 mg/kg	103	----	50.0	130	----	----

Matrix: **SOIL**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number		MS	MSD	Low	High	Value	Control Limit
EP-074_SR-E: Halogenated Aliphatics (QC Lot: 3351177)										
HK2042575-003	Anonymous	**EP074_SR: Methylene chloride**	75-09-2	0.25 mg/kg	98.8	----	50.0	130	----	----
		EP074_SR: Trichloroethene	79-01-6	0.25 mg/kg	110	----	50.0	130	----	----
		EP074_SR: Tetrachloroethene	127-18-4	0.25 mg/kg	108	----	50.0	130	----	----
EP-074_SR-G: Trihalomethanes (THM) (QC Lot: 3351177)										
HK2042575-003	Anonymous	**EP074_SR: Chloroform**	67-66-3	0.25 mg/kg	112	----	50.0	130	----	----
		EP074_SR: Bromodichloromethane	75-27-4	0.25 mg/kg	104	----	50.0	130	----	----
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 3351177)										
HK2042575-003	Anonymous	**EP074_SR: Methyl tert-Butyl Ether (MTBE)**	1634-04-4	0.25 mg/kg	114	----	50.0	130	----	----

Matrix: **WATER**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number		MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations - Filtered (QC Lot: 3351035)										
HK2042480-002	Anonymous	**EG020: Antimony**	7440-36-0	50 µg/L	94.4	----	75.0	125	----	----
		EG020: Arsenic	7440-38-2	50 µg/L	98.5	----	75.0	125	----	----
		EG020: Barium	7440-39-3	50 µg/L	82.4	----	75.0	125	----	----
		EG020: Cadmium	7440-43-9	5 µg/L	95.9	----	75.0	125	----	----
		EG020: Cobalt	7440-48-4	50 µg/L	95.6	----	75.0	125	----	----
		EG020: Copper	7440-50-8	50 µg/L	99.1	----	75.0	125	----	----
		EG020: Lead	7439-92-1	50 µg/L	97.3	----	75.0	125	----	----
		EG020: Manganese	7439-96-5	50 µg/L	96.5	----	75.0	125	----	----
		EG020: Mercury	7439-97-6	2 µg/L	101	----	75.0	125	----	----
		EG020: Molybdenum	7439-98-7	50 µg/L	94.9	----	75.0	125	----	----
		EG020: Nickel	7440-02-0	50 µg/L	96.4	----	75.0	125	----	----
		EG020: Tin	7440-31-5	50 µg/L	96.2	----	75.0	125	----	----
		EG020: Zinc	7440-66-6	50 µg/L	98.9	----	75.0	125	----	----
EG: Metals and Major Cations - Filtered (QC Lot: 3366512)										
HK2042575-007	SOIL-FB1									

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report: Spike Concentration	Spike Recovery (%): MS	Spike Recovery (%): MSD	Recovery Limits (%): Low	Recovery Limits (%): High	RPD (%): Value	RPD (%): Control Limit
EG: Metals and Major Cations - Filtered (QC Lot: 3366512) - Continued										
HK2042575-007	SOIL-FB1	**EG050: Hexavalent Chromium**	18540-29-9	100 µg/L	98.5	----	75.0	125	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%): Low	Recovery Limits (%): High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
EP-080_SRS: TPH(Volatile)/BTEX Surrogate			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117
4-Bromofluorobenzene	460-00-4	74	121
EP-074_SR-S: VOC Surrogates			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117
4-Bromofluorobenzene	460-00-4	74	121

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%): Low	Recovery Limits (%): High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
EP-080_SRS: TPH(Volatile)/BTEX Surrogate			
Dibromofluoromethane	1868-53-7	86	118
Toluene-D8	2037-26-5	88	110
4-Bromofluorobenzene	460-00-4	86	115
EP-074_SR-S: VOC Surrogates			
Dibromofluoromethane	1868-53-7	86	118

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP-074_SR-S: VOC Surrogates - Continued			
Toluene-D8	2037-26-5	88	110
4-Bromofluorobenzene	460-00-4	86	115

CHAIN OF CUSTODY DOCUMENTATION

022735

ALS Laboratory Group

CLIENT: TEEMWAY	SAMPLER:
ADDRESS / OFFICE:	MOBILE:
PROJECT MANAGER (PM): Thomas YEUNG	PHONE
PROJECT ID: Relocation of Sha Tin Sewage Treatment Works to Caverns - Site Preparation and Access Tunnel Construction (P.O.No.: PG/2018/05)	EMAIL REPORT TO:
SITE:	EMAIL INVOICE TO: (if different to report)
RESULTS REQUIRED (Date): QUOTE NO.:	ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

SAMPLE INFORMATION (note: S = Soil, W=Water) | CONTAINER INFORMATION

ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles	METALS (FULL LIST)	PCRs	VOCs	SVOCs	PCRs (C6-C8)									Notes: e.g. Highly contaminated samples e.g. "High PAHs expected" Extra volume for QC or trace LORs etc.
	SOIL - TB1	W	05/11/20		BOTTLE	2				~~✓~~	✓									
	SOIL - FB1	W	05/11/20	1030	BOTTLE	5	✓	✓	✓	✓										
	SOIL - EQ1	W	05/11/20	1030	BOTTLE	5	✓	✓	✓	✓										
	TMW-G01(2) 0.5m (DUP)	S	05/11/20	0930	JAR	1	✓	✓	✓	✓										

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name:	Date: 05/11/2020	Name:	Date: 5/11/20	Con' Note No:
Of: TEEMWAY Thomas YEUNG	Time: 16:50	Of: ALS (HK)	Time: 1500	
Name:	Date:	Name:	Date:	Transport Co:
Of:	Time:	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Client	: TEEMWAY ENGINEERING LTD	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 7
Contact	: MR THOMAS YEUNG	Contact	: Richard Fung	Work Order	: HK2042872
Address	: RM 1008, 10/F, CHEVALIER COMMERCIAL CENTRE, 8 WANG HOI ROAD, KOWLOON BAY, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: works@teemway.com	E-mail	: richard.fung@alsglobal.com		
Telephone	: +852 2796 2268	Telephone	: +852 2610 1044		
Facsimile	: +852 2796 2217	Facsimile	: +852 2610 2021		
Project	: DECONTAMINATION WORKS OF GROUNDWATER AND SOIL FOR RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS SITE PREPARATION AND ACCESS TUNNEL CONSTRUCTION (CONTRACT NO. DC/2018/05)			Date Samples Received	: 07-Nov-2020
Order number	: ----	Quote number	: HKE/1680/2020_V2	Issue Date	: 16-Nov-2020
C-O-C number	: H022736			No. of samples received	: 1
Site	: ----			No. of samples analysed	: 1

Hong Kong Accreditation Service (HKAS) has accredited this laboratory, ALS Technichem (HK) Pty Ltd (Reg. No. HOKLAS 066) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories.

This document has been signed by those names that appear on this report and are the authorised signatories.

Signatories	*Position*	*Authorised results for*
 Anh Ngoc Huynh .	Senior Chemist	Organics_ENV
 Chan Ka Yu , Karen	Manager - Organics	Organics_ENV
 Leung Chak Cheong , Mike	Senior Chemist	Metals_ENV

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. 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. Testing period is from 07-Nov-2020 to 16-Nov-2020.

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific Comments for Work Order: HK2042872

Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in chilled condition. The result(s) related only to the item(s) tested.

Sample information (Project name, Sample ID, Sampling date/time, etc., if any) is provided by client.

Water sample(s) were filtered prior to dissolved metal analysis.

EP070 is the numeric code for internal use. Test method for C6-C9 Fraction of TPH is EP071.

Analytical Results

Sub-Matrix: WATER			Client sample ID	ENV-G01(2) GW	---	---	---	---
			Client sampling date / time	07-Nov-2020 10:00	----	----	----	----
Compound	CAS Number	LOR	Unit	HK2042872-001	-------	-------	-------	-------
EG: Metals and Major Cations - Filtered								
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	---	---	---	---
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs)								
EP076HK: Naphthalene	91-20-3	2.0	µg/L	<2.0	---	---	---	---
EP076HK: Acenaphthylene	208-96-8	2.0	µg/L	<2.0	---	---	---	---
EP076HK: Acenaphthene	83-32-9	2.0	µg/L	<2.0	---	---	---	---
EP076HK: Fluorene	86-73-7	2.0	µg/L	<2.0	---	---	---	---
EP076HK: Phenanthrene	85-01-8	2.0	µg/L	<2.0	---	---	---	---
EP076HK: Anthracene	120-12-7	2.0	µg/L	<2.0	---	---	---	---
EP076HK: Fluoranthene	206-44-0	2.0	µg/L	<2.0	---	---	---	---
EP076HK: Pyrene	129-00-0	2.0	µg/L	<2.0	---	---	---	---
EP076HK: Chrysene	218-01-9	1.0	µg/L	<1.0	---	---	---	---
EP076HK: Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	---	---	---	---
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate								
EP076HK: Hexachlorobenzene (HCB)	118-74-1	4.0	µg/L	<4.0	---	---	---	---
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH)								
EP070HK_SR: C6 - C8 Fraction	----	20	µg/L	<20	---	---	---	---
EP071HK_SR: C9 - C16 Fraction	----	500	µg/L	<500	---	---	---	---
EP071HK_SR: C17 - C35 Fraction	----	500	µg/L	<500	---	---	---	---
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH)								
EP074_SR: Benzene	71-43-2	5.0	µg/L	<5.0	---	---	---	---
EP074_SR: Toluene	108-88-3	5.0	µg/L	<5.0	---	---	---	---
EP074_SR: Ethylbenzene	100-41-4	5.0	µg/L	<5.0	---	---	---	---
EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	10	µg/L	<10	---	---	---	---
EP074_SR: Styrene	100-42-5	5.0	µg/L	<5.0	---	---	---	---
EP074_SR: ortho-Xylene	95-47-6	5.0	µg/L	<5.0	---	---	---	---
EP074_SR: Xylenes (Total)	----	20	µg/L	<20	---	---	---	---
EP-074_SR-B: Oxygenated Compounds								

Sub-Matrix: WATER				Client sample ID	ENV-G01(2) GW	---	---	---	---
				Client sampling date / time	07-Nov-2020 10:00	----	----	----	----
Compound	CAS Number	LOR	Unit		HK2042872-001	-------	-------	-------	-------
EP-074_SR-B: Oxygenated Compounds - Continued									
EP074_SR: 2-Propanone (Acetone)	67-64-1	500	µg/L		<500	---	---	---	---
EP074_SR: 2-Butanone (MEK)	78-93-3	50	µg/L		<50	---	---	---	---
EP-074_SR-E: Halogenated Aliphatics									
EP074_SR: Methylene chloride	75-09-2	50	µg/L		<50	---	---	---	---
EP074_SR: Trichloroethene	79-01-6	5.0	µg/L		<5.0	---	---	---	---
EP074_SR: Tetrachloroethene	127-18-4	5.0	µg/L		<5.0	---	---	---	---
EP-074_SR-G: Trihalomethanes (THM)									
EP074_SR: Chloroform	67-66-3	5.0	µg/L		<5.0	---	---	---	---
EP074_SR: Bromodichloromethane	75-27-4	5.0	µg/L		<5.0	---	---	---	---
EP-074_SR-I: Methyl-tert-butyl Ether									
EP074_SR: Methyl tert-Butyl Ether (MTBE)	1634-04-4	5.0	µg/L		<5.0	---	---	---	---
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates									
EP076HK: 2-Fluorobiphenyl	321-60-8	0.1	%		125	---	---	---	---
EP076HK: 4-Terphenyl-d14	1718-51-0	0.1	%		126	---	---	---	---
EP-080_SRS: TPH(Volatile)/BTEX Surrogate									
EP070HK_SR: Dibromofluoromethane	1868-53-7	0.1	%		94.0	---	---	---	---
EP070HK_SR: Toluene-D8	2037-26-5	0.1	%		102	---	---	---	---
EP070HK_SR: 4-Bromofluorobenzene	460-00-4	0.1	%		92.8	---	---	---	---
EP-074_SR-S: VOC Surrogates									
EP074_SR: Dibromofluoromethane	1868-53-7	0.1	%		94.0	---	---	---	---
EP074_SR: Toluene-D8	2037-26-5	0.1	%		102	---	---	---	---
EP074_SR: 4-Bromofluorobenzene	460-00-4	0.1	%		92.8	---	---	---	---

Laboratory Duplicate (DUP) Report

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Filtered (QC Lot: 3355149)								
HK2042871-003	Anonymous	**EG020: Mercury**	7439-97-6	0.5	µg/L	<0.5	<0.5	0.00

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations - Filtered (QC Lot: 3355149)											
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	2 µg/L	104	----	85.0	115	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3353731)											
EP076HK: Naphthalene	91-20-3	0.1	µg/L	<0.1	0.5 µg/L	90.8	----	60.0	119	----	----
EP076HK: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	0.5 µg/L	85.7	----	50.0	118	----	----
EP076HK: Acenaphthene	83-32-9	0.1	µg/L	<0.1	0.5 µg/L	88.0	----	57.0	119	----	----
EP076HK: Fluorene	86-73-7	0.1	µg/L	<0.1	0.5 µg/L	85.0	----	53.0	121	----	----
EP076HK: Phenanthrene	85-01-8	0.1	µg/L	<0.1	0.5 µg/L	88.9	----	54.0	124	----	----
EP076HK: Anthracene	120-12-7	0.1	µg/L	<0.1	0.5 µg/L	89.7	----	50.0	123	----	----
EP076HK: Fluoranthene	206-44-0	0.1	µg/L	<0.1	0.5 µg/L	86.5	----	50.0	130	----	----
EP076HK: Pyrene	129-00-0	0.1	µg/L	<0.1	0.5 µg/L	84.0	----	50.0	130	----	----
EP076HK: Chrysene	218-01-9	0.1	µg/L	<0.1	0.5 µg/L	106	----	55.0	130	----	----
EP076HK: Benzo(b)fluoranthene	205-99-2	0.1	µg/L	<0.1	0.5 µg/L	54.1	----	50.0	130	----	----
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate (QC Lot: 3353731)											
EP076HK: Hexachlorobenzene (HCB)	118-74-1	4	µg/L	<4.0	0.5 µg/L	95.0	----	63.0	130	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3353732)											
EP071HK_SR: C9 - C16 Fraction	----	0.5	mg/L	<0.5	0.21 mg/L	84.5	----	65.0	123	----	----
EP071HK_SR: C17 - C35 Fraction	----	0.5	mg/L	<0.5	0.45 mg/L	91.1	----	59.0	113	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3355705)											
EP070HK_SR: C6 - C8 Fraction	----	0.02	mg/L	<0.02	0.03 mg/L	101	----	74.0	117	----	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 3355704)											
EP074_SR: Benzene	71-43-2	0.5	µg/L	<0.5	2 µg/L	108	----	80.0	119	----	----

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 3355704) - Continued											
EP074_SR: Toluene	108-88-3	0.5	µg/L	<0.5	2 µg/L	92.8	----	79.0	120	----	----
EP074_SR: Ethylbenzene	100-41-4	0.5	µg/L	<0.5	2 µg/L	95.2	----	79.0	122	----	----
EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	1	µg/L	<1	4 µg/L	92.2	----	72.0	124	----	----
EP074_SR: Styrene	100-42-5	0.5	µg/L	<0.5	2 µg/L	96.5	----	74.0	121	----	----
EP074_SR: ortho-Xylene	95-47-6	0.5	µg/L	<0.5	2 µg/L	96.3	----	78.0	120	----	----
EP074_SR: Xylenes (Total)	----	2	µg/L	<2	6 µg/L	93.6	----	77.0	121	----	----
EP-074_SR-B: Oxygenated Compounds (QC Lot: 3355704)											
EP074_SR: 2-Propanone (Acetone)	67-64-1	5	µg/L	<5	20 µg/L	110	----	73.0	126	----	----
EP074_SR: 2-Butanone (MEK)	78-93-3	5	µg/L	<5	20 µg/L	109	----	79.0	123	----	----
EP-074_SR-E: Halogenated Aliphatics (QC Lot: 3355704)											
EP074_SR: Methylene chloride	75-09-2	5	µg/L	<5	2 µg/L	118	----	70.0	124	----	----
EP074_SR: Trichloroethene	79-01-6	0.5	µg/L	<0.5	2 µg/L	108	----	81.0	121	----	----
EP074_SR: Tetrachloroethene	127-18-4	0.5	µg/L	<0.5	2 µg/L	93.9	----	76.0	120	----	----
EP-074_SR-G: Trihalomethanes (THM) (QC Lot: 3355704)											
EP074_SR: Chloroform	67-66-3	0.5	µg/L	<0.5	2 µg/L	92.1	----	81.0	121	----	----
EP074_SR: Bromodichloromethane	75-27-4	0.5	µg/L	<0.5	2 µg/L	109	----	74.0	127	----	----
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 3355704)											
EP074_SR: Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.5	µg/L	<0.5	2 µg/L	108	----	70.0	130	----	----

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations - Filtered (QC Lot: 3355149)										
HK2042871-002	Anonymous	**EG020: Mercury**	7439-97-6	2 µg/L	101	----	75.0	125	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
EP-080_SRS: TPH(Volatile)/BTEX Surrogate			
Dibromofluoromethane	1868-53-7	86	118
Toluene-D8	2037-26-5	88	110
4-Bromofluorobenzene	460-00-4	86	115
EP-074_SR-S: VOC Surrogates			
Dibromofluoromethane	1868-53-7	86	118
Toluene-D8	2037-26-5	88	110
4-Bromofluorobenzene	460-00-4	86	115

CHAIN OF CUSTODY DOCUMENTATION

H 022736

ALS Laboratory Group

CLIENT: TEEMWAY	SAMPLER:
ADDRESS / OFFICE:	MOBILE:
PROJECT MANAGER (PM): Thomas YEUNG	PHONE
PROJECT ID: Relocation of Sha Tin Sewage Treatment Works to Caverns - Site	EMAIL REPORT TO:
SITE: Preparation and Access Tunnel Construction (DC/2018/05) P.O. NO.:	EMAIL INVOICE TO: (if different to report)
RESULTS REQUIRED (Date): QUOTE NO.:	ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY

COOLER SEAL (circle appropriate)

Intact: Yes No (N/A)

SAMPLE TEMPERATURE

CHILLED: (Yes) No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

Notes: e.g. Highly contaminated samples
e.g. "High PAHs expected"
Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		MERCURY	PCBs	VOCs	SVOCs									
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles													
1	ENV-601(2) GW	W	07/11/20	10:00	BOTTLE	5	✓	✓	✓	✓									

RELINQUISHED BY:

Name:	Thomas YEUNG	Date:	07/11/2020
Of:	TEEMWAY	Time:	10:30
Name:		Date:	
Of:		Time:	

RECEIVED BY

Name:	[illegible]	Date:	7/11/20
Of:	ALS (HK)	Time:	11:25
Name:	Alvo	Date:	07/11/20
Of:	ALS (HK)	Time:	11:25

METHOD OF SHIPMENT

Con' Note No:

Transport Co:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.

ALS Laboratory Group

WHITE - LAB COPY
YELLOW - CUSTOMER COPY
PINK - BOOK COPY

CERTIFICATE OF ANALYSIS

Client	: TEEMWAY ENGINEERING LTD	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 7
Contact	: MR THOMAS YEUNG	Contact	: Richard Fung	Work Order	: HK2042871
Address	: RM 1008, 10/F, CHEVALIER COMMERCIAL CENTRE, 8 WANG HOI ROAD, KOWLOON BAY, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong	Amendment	: 1
E-mail	: works@teemway.com	E-mail	: richard.fung@alsglobal.com		
Telephone	: +852 2796 2268	Telephone	: +852 2610 1044		
Facsimile	: +852 2796 2217	Facsimile	: +852 2610 2021		
Project	: DECONTAMINATION WORKS OF GROUNDWATER AND SOIL FOR RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS SITE PREPARATION AND ACCESS TUNNEL CONSTRUCTION (CONTRACT NO. DC/2018/05)			Date Samples Received	: 07-Nov-2020
Order number	: ----	Quote number	: HKE/1680/2020_V2	Issue Date	: 18-Nov-2020
C-O-C number	: H038270			No. of samples received	: 4
Site	: ----			No. of samples analysed	: 4

Hong Kong Accreditation Service (HKAS) has accredited this laboratory, ALS Technichem (HK) Pty Ltd (Reg. No. HOKLAS 066) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories.

This document has been signed by those names that appear on this report and are the authorised signatories.

Signatories	*Position*	*Authorised results for*
Anh Ngoc Huynh .	Senior Chemist	Organics_ENV
Chan Ka Yu , Karen	Manager - Organics	Organics_ENV
Leung Chak Cheong , Mike	Senior Chemist	Metals_ENV

General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. 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. Testing period is from 07-Nov-2020 to 18-Nov-2020.

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific Comments for Work Order: HK2042871

Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in chilled condition. The result(s) related only to the item(s) tested.

Sample information (Project name, Sample ID, Sampling date/time, etc., if any) is provided by client.

This is an amendment of the Certificate of Analysis.

The testing(s) for sample HK2042871-001 has been changed from test code EP074_SR to EP070HK_SR.

Water sample(s) were filtered prior to dissolved metal analysis.

EP070 is the numeric code for internal use. Test method for C6-C9 Fraction of TPH is EP071.

Analytical Results

Sub-Matrix: WATER				Client sample ID	GW-TB1	GW-FB1	GW-EQ1	ENV-G01(2) GW (DUP)	----
				Client sampling date / time	07-Nov-2020	07-Nov-2020 09:30	07-Nov-2020 09:30	07-Nov-2020 10:00	----
Compound	CAS Number	LOR	Unit		HK2042871-001	HK2042871-002	HK2042871-003	HK2042871-004	----------
EG: Metals and Major Cations - Filtered									
EG020: Mercury	7439-97-6	0.5	µg/L		----	<0.5	<0.5	<0.5	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs)									
EP076HK: Naphthalene	91-20-3	2.0	µg/L		----	<2.0	<2.0	<2.0	----
EP076HK: Acenaphthylene	208-96-8	2.0	µg/L		----	<2.0	<2.0	<2.0	----
EP076HK: Acenaphthene	83-32-9	2.0	µg/L		----	<2.0	<2.0	<2.0	----
EP076HK: Fluorene	86-73-7	2.0	µg/L		----	<2.0	<2.0	<2.0	----
EP076HK: Phenanthrene	85-01-8	2.0	µg/L		----	<2.0	<2.0	<2.0	----
EP076HK: Anthracene	120-12-7	2.0	µg/L		----	<2.0	<2.0	<2.0	----
EP076HK: Fluoranthene	206-44-0	2.0	µg/L		----	<2.0	<2.0	<2.0	----
EP076HK: Pyrene	129-00-0	2.0	µg/L		----	<2.0	<2.0	<2.0	----
EP076HK: Chrysene	218-01-9	1.0	µg/L		----	<1.0	<1.0	<1.0	----
EP076HK: Benzo(b)fluoranthene	205-99-2	1.0	µg/L		----	<1.0	<1.0	<1.0	----
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate									
EP076HK: Hexachlorobenzene (HCB)	118-74-1	4.0	µg/L		----	<4.0	<4.0	<4.0	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH)									
EP070HK_SR: C6 - C8 Fraction	----	20	µg/L		<20	<20	<20	<20	----
EP071HK_SR: C9 - C16 Fraction	----	500	µg/L		----	<500	<500	<500	----
EP071HK_SR: C17 - C35 Fraction	----	500	µg/L		----	<500	<500	500	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH)									
EP074_SR: Benzene	71-43-2	5.0	µg/L		----	<5.0	<5.0	<5.0	----
EP074_SR: Toluene	108-88-3	5.0	µg/L		----	<5.0	<5.0	<5.0	----
EP074_SR: Ethylbenzene	100-41-4	5.0	µg/L		----	<5.0	<5.0	<5.0	----
EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	10	µg/L		----	<10	<10	<10	----
EP074_SR: Styrene	100-42-5	5.0	µg/L		----	<5.0	<5.0	<5.0	----
EP074_SR: ortho-Xylene	95-47-6	5.0	µg/L		----	<5.0	<5.0	<5.0	----
EP074_SR: Xylenes (Total)	----	20	µg/L		----	<20	<20	<20	----
EP-074_SR-B: Oxygenated Compounds									

Sub-Matrix: WATER				Client sample ID	GW-TB1	GW-FB1	GW-EQ1	ENV-G01(2) GW (DUP)	----
				Client sampling date / time	07-Nov-2020	07-Nov-2020 09:30	07-Nov-2020 09:30	07-Nov-2020 10:00	----
Compound	CAS Number	LOR	Unit		HK2042871-001	HK2042871-002	HK2042871-003	HK2042871-004	-------
EP-074_SR-B: Oxygenated Compounds - Continued									
EP074_SR: 2-Propanone (Acetone)	67-64-1	500	µg/L		----	<500	<500	<500	----
EP074_SR: 2-Butanone (MEK)	78-93-3	50	µg/L		----	<50	<50	<50	----
EP-074_SR-E: Halogenated Aliphatics									
EP074_SR: Methylene chloride	75-09-2	50	µg/L		----	<50	<50	<50	----
EP074_SR: Trichloroethene	79-01-6	5.0	µg/L		----	<5.0	<5.0	<5.0	----
EP074_SR: Tetrachloroethene	127-18-4	5.0	µg/L		----	<5.0	<5.0	<5.0	----
EP-074_SR-G: Trihalomethanes (THM)									
EP074_SR: Chloroform	67-66-3	5.0	µg/L		----	<5.0	<5.0	<5.0	----
EP074_SR: Bromodichloromethane	75-27-4	5.0	µg/L		----	<5.0	<5.0	<5.0	----
EP-074_SR-I: Methyl-tert-butyl Ether									
EP074_SR: Methyl tert-Butyl Ether (MTBE)	1634-04-4	5.0	µg/L		----	<5.0	<5.0	<5.0	----
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates									
EP076HK: 2-Fluorobiphenyl	321-60-8	0.1	%		----	102	113	129	----
EP076HK: 4-Terphenyl-d14	1718-51-0	0.1	%		----	94.0	110	118	----
EP-080_SRS: TPH(Volatile)/BTEX Surrogate									
EP070HK_SR: Dibromofluoromethane	1868-53-7	0.1	%		101	99.9	95.0	91.8	----
EP070HK_SR: Toluene-D8	2037-26-5	0.1	%		101	101	102	101	----
EP070HK_SR: 4-Bromofluorobenzene	460-00-4	0.1	%		91.0	90.5	92.6	91.4	----
EP-074_SR-S: VOC Surrogates									
EP074_SR: Dibromofluoromethane	1868-53-7	0.1	%		----	99.9	95.0	91.8	----
EP074_SR: Toluene-D8	2037-26-5	0.1	%		----	101	102	101	----
EP074_SR: 4-Bromofluorobenzene	460-00-4	0.1	%		----	90.5	92.6	91.4	----

Laboratory Duplicate (DUP) Report

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Filtered (QC Lot: 3355149)								
HK2042871-003	GW-EQ1	**EG020: Mercury**	7439-97-6	0.5	µg/L	<0.5	<0.5	0.00

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations - Filtered (QC Lot: 3355149)											
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	2 µg/L	104	----	85.0	115	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 3353731)											
EP076HK: Naphthalene	91-20-3	0.1	µg/L	<0.1	0.5 µg/L	90.8	----	60.0	119	----	----
EP076HK: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	0.5 µg/L	85.7	----	50.0	118	----	----
EP076HK: Acenaphthene	83-32-9	0.1	µg/L	<0.1	0.5 µg/L	88.0	----	57.0	119	----	----
EP076HK: Fluorene	86-73-7	0.1	µg/L	<0.1	0.5 µg/L	85.0	----	53.0	121	----	----
EP076HK: Phenanthrene	85-01-8	0.1	µg/L	<0.1	0.5 µg/L	88.9	----	54.0	124	----	----
EP076HK: Anthracene	120-12-7	0.1	µg/L	<0.1	0.5 µg/L	89.7	----	50.0	123	----	----
EP076HK: Fluoranthene	206-44-0	0.1	µg/L	<0.1	0.5 µg/L	86.5	----	50.0	130	----	----
EP076HK: Pyrene	129-00-0	0.1	µg/L	<0.1	0.5 µg/L	84.0	----	50.0	130	----	----
EP076HK: Chrysene	218-01-9	0.1	µg/L	<0.1	0.5 µg/L	106	----	55.0	130	----	----
EP076HK: Benzo(b)fluoranthene	205-99-2	0.1	µg/L	<0.1	0.5 µg/L	54.1	----	50.0	130	----	----
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate (QC Lot: 3353731)											
EP076HK: Hexachlorobenzene (HCB)	118-74-1	4	µg/L	<4.0	0.5 µg/L	95.0	----	63.0	130	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3353732)											
EP071HK_SR: C9 - C16 Fraction	----	0.5	mg/L	<0.5	0.21 mg/L	84.5	----	65.0	123	----	----
EP071HK_SR: C17 - C35 Fraction	----	0.5	mg/L	<0.5	0.45 mg/L	91.1	----	59.0	113	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3355705)											
EP070HK_SR: C6 - C8 Fraction	----	0.02	mg/L	<0.02	0.03 mg/L	101	----	74.0	117	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 3371192)											
EP070HK_SR: C6 - C8 Fraction	----	0.02	mg/L	<0.02	0.03 mg/L	101	----	74.0	117	----	----

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 3355704)											
EP074_SR: Benzene	71-43-2	0.5	µg/L	<0.5	2 µg/L	108	----	80.0	119	----	----
EP074_SR: Toluene	108-88-3	0.5	µg/L	<0.5	2 µg/L	92.8	----	79.0	120	----	----
EP074_SR: Ethylbenzene	100-41-4	0.5	µg/L	<0.5	2 µg/L	95.2	----	79.0	122	----	----
EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	1	µg/L	<1	4 µg/L	92.2	----	72.0	124	----	----
EP074_SR: Styrene	100-42-5	0.5	µg/L	<0.5	2 µg/L	96.5	----	74.0	121	----	----
EP074_SR: ortho-Xylene	95-47-6	0.5	µg/L	<0.5	2 µg/L	96.3	----	78.0	120	----	----
EP074_SR: Xylenes (Total)	----	2	µg/L	<2	6 µg/L	93.6	----	77.0	121	----	----
EP-074_SR-B: Oxygenated Compounds (QC Lot: 3355704)											
EP074_SR: 2-Propanone (Acetone)	67-64-1	5	µg/L	<5	20 µg/L	110	----	73.0	126	----	----
EP074_SR: 2-Butanone (MEK)	78-93-3	5	µg/L	<5	20 µg/L	109	----	79.0	123	----	----
EP-074_SR-E: Halogenated Aliphatics (QC Lot: 3355704)											
EP074_SR: Methylene chloride	75-09-2	5	µg/L	<5	2 µg/L	118	----	70.0	124	----	----
EP074_SR: Trichloroethene	79-01-6	0.5	µg/L	<0.5	2 µg/L	108	----	81.0	121	----	----
EP074_SR: Tetrachloroethene	127-18-4	0.5	µg/L	<0.5	2 µg/L	93.9	----	76.0	120	----	----
EP-074_SR-G: Trihalomethanes (THM) (QC Lot: 3355704)											
EP074_SR: Chloroform	67-66-3	0.5	µg/L	<0.5	2 µg/L	92.1	----	81.0	121	----	----
EP074_SR: Bromodichloromethane	75-27-4	0.5	µg/L	<0.5	2 µg/L	109	----	74.0	127	----	----
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 3355704)											
EP074_SR: Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.5	µg/L	<0.5	2 µg/L	108	----	70.0	130	----	----

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations - Filtered (QC Lot: 3355149)										
HK2042871-002	GW-FB1	**EG020: Mercury**	7439-97-6	2 µg/L	101	----	75.0	125	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
EP-080_SRS: TPH(Volatile)/BTEX Surrogate			
Dibromofluoromethane	1868-53-7	86	118
Toluene-D8	2037-26-5	88	110
4-Bromofluorobenzene	460-00-4	86	115
EP-074_SR-S: VOC Surrogates			
Dibromofluoromethane	1868-53-7	86	118
Toluene-D8	2037-26-5	88	110
4-Bromofluorobenzene	460-00-4	86	115

CHAIN OF CUSTODY DOCUMENTATION

038270

ALS Laboratory Group

CLIENT: TEEMWAY	SAMPLER:
ADDRESS / OFFICE:	MOBILE:
PROJECT MANAGER (PM): Thomas YEUNG	PHONE
PROJECT ID: Relocation of Sha Tin Sewage Treatment Works to Caverns - Site Preparation and Access Tunnel Construction (DC/2018/05) P.O. NO.:	EMAIL REPORT TO:
SITE:	EMAIL INVOICE TO: (if different to report)
RESULTS REQUIRED (Date): QUOTE NO.:	ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY

COOLER SEAL (circle appropriate)

Intact: Yes No (N/A)

SAMPLE TEMPERATURE

CHILLED: (Yes) No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

Notes: e.g. Highly contaminated samples
e.g. "High PAHs expected"
Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		DISSOLVED MERCURY	PCBs	VOCs	SVOCs	PCBs (C6 - C8)								
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles													
	GW - TB1	W	07/11/20		BOTTLE	2			✓		✓								
	GW - FB1	W	07/11/20	0930	BOTTLE	5	✓	✓	✓	✓									
	GW - EB1	W	07/11/20	0930	BOTTLE	5	✓	✓	✓	✓									
	ENV-G01(2)GW (DUP)	W	07/11/20	10:00	BOTTLE	5	✓	✓	✓	✓									

RELINQUISHED BY:			RECEIVED BY			METHOD OF SHIPMENT
Name: Thomas YEUNG	Date: 07/11/2020		Name:	Date: 7/11/20		Con' Note No:
Of: TEEMWAY	Time: 10:30		Of: ALS (HK)	Time: 11:35		
Name:	Date:		Name:	Date:		Transport Co:
Of:	Time:		Of:	Time:		

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.