MOTT MACDONALD

Expansion of Hong Kong International Airport into a Three-Runway System

Contamination Assessment Report for Terminal 2 Emergency Power Supply System No.1 (Volume 2)

April 2020

Airport Authority Hong Kong

Mott MacDonald
3/F International Trade Tower
348 Kwun Tong Road
Kwun Tong
Kowloon
Hong Kong

T +852 2828 5757
F +852 2827 1823
mottmac.hk

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April 2020

This Contamination Assessment Report for
Terminal 2 Emergency Power Supply System No.1 (Volume 2)
has been reviewed and certified by
the Environmental Team Leader (ETL)
In accordance with EP Condition 1.9 of the
Environmental Permit
No. EP-489/2014 and Section 7 of
Supplementary Contamination Assessment Plan (August 2018)

Certified by: 

Terence Kong
Environmental Team Leader (ETL)
Mott MacDonald Hong Kong Limited

Date 21 April 2020

AECOM
8/F, Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Road, Shatin, Hong Kong
香港新界沙田鄉事會路 138 號新城市中央廣場第 2 座 8 樓
www.aecom.com
+852 3922 9000 tel
+852 2317 7609 fax

Our Ref : 60440482/C/JCHL200421

By Email

Airport Authority Hong Kong
HKIA Tower, 1 Sky Plaza Road
Hong Kong International Airport
Lantau, Hong Kong

Attn: Mr. Lawrence Tsui, Principal Manager

21 April 2020

Dear Sir,

Contract No. 3102
3RS Independent Environmental Checker Consultancy Services

Contamination Assessment Report for Terminal 2 Emergency Power Supply System No.1 (Volume 2)

Reference is made to the ET's submission of Contamination Assessment Report for Terminal 2 Emergency Power Supply System No.1 (Volume 2) under Section 7 of Supplementary Contamination Assessment Plan and Condition 2.32 (iv) of the Environmental Permit No. EP-489/2014. The subject report was certified by the ET Leader on 21 April 2020.

We would like to inform you that we have no adverse comment on the captioned submission and verify the captioned submission in accordance with the requirement stipulated in Condition 1.9 of EP-489/2014.

Should you have any query, please feel free to contact the undersigned at 3922 9376.

Yours faithfully,
AECOM Asia Co. Ltd.

Jackel Law
Independent Environmental Checker

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Appendices

1 Introduction

1.1 Background

The Environmental Impact Assessment (EIA) Report (Register No.: AEIAR-185/2014) prepared for the "Expansion of Hong Kong International Airport into a Three-Runway System" (the project) has been approved by the Director of Environmental Protection, and an Environmental Permit (EP) (Permit No.: EP-489/2014) has been issued for the project under the Environmental Impact Assessment Ordinance. As part of the EIA study, a Contamination Assessment Plan (CAP) (hereafter referred to as the Approved CAP) was prepared and presented as Appendix 11.1 of the approved EIA Report. In accordance to Section 8.1.1.1 of the Updated Environmental Monitoring and Audit (EM&A) Manual, which was submitted under Condition 3.1 of the EP, and Section 11.10.1.2 of the EIA Report, six areas (i.e. fuel tank room within Terminal 2 (T2) building, fuel tank room to the west of Civil Aviation Department (CAD) antenna farm, seawater pump house, switching station, pumping station and fire training facility), were inaccessible for site reconnaissance at the time of preparing the EIA Report.

According to Sections 11.5.4.14 and 11.5.4.37 of the EIA Report, it is anticipated that any potential land contamination concern related to possible leakage/ spillage of fuel in the fuel tank room within T2 building and fuel tank room to the west of CAD antenna farm will not cause any insurmountable impact. Furthermore, as mentioned in Sections 11.5.4.38, 11.5.4.47 and 11.5.4.50 of the EIA Report, the seawater pump house, switching station, pumping station and fire training facility are not identified as potential contaminative land use types as given in Table 2.3 of the Practice Guide for Investigation and Remediation of Contaminated Land, hence no potential land contamination along these areas are anticipated.

As part of the ongoing detailed design of the project, relocation of the switching station is no longer required for the modification of existing North Runway. Hence site appraisal process for land contamination potential at the switching station is considered not necessary. Further site reconnaissance was conducted at the remaining five assessment areas (i.e. the fuel tank room within T2 building, fuel tank room to the west of CAD antenna farm, seawater pump house, pumping station and fire training facility) in third quarter of 2016 and May 2017.

Further review on the as-built drawings when taking into account the latest design details of T2 Expansion project and planned site investigation (SI), as well as follow-up site reconnaissance at T2 building have been undertaken in January 2018 and February 2018 (i.e. fuel tanks and generators within the building). Findings and consideration of assessment results after EIA stage have been summarized in the Supplementary Contamination Assessment Plan (SCAP) being approved in August 2018.

To match with the construction programme, decommissioning/ demolition of the Emergency Power Supply System No.1 (hereafter referred as EPSS1) at T2 northern section was scheduled in 2019 and 2020. Mott MacDonald Hong Kong Limited (MMHK), as the project's Environmental Team, was appointed by Airport Authority Hong Kong (AAHK) to prepare the Contamination Assessment Report (CAR) for Terminal 2 Emergency Power Supply System No.1 (Volume 1 and Volume 2) to partially fulfil the SCAP's recommendation.

Environmental Protection Department (EPD) expressed no further comments on 2 March 2020 for the CAR for Terminal 2 Emergency Power Supply System No.1 (Volume 1), covering BH1, BH3, BH4, partial segment of BH2. In early 2020, CAR for Terminal 2 Emergency Power Supply System No.1 (Volume 2) are prepared to include the remaining segment of BH2 under the EPSS1.

The scope of this CAR is presented in **Section 1.2**. The recommendations for the EPSS1 as stipulated in the SCAP are fulfilled and documented in the CAR for Terminal 2 Emergency Power Supply System No.1 (Volume 1) (hereinafter known as "CAR T2 EPPS1 Vol.1") and CAR for Terminal 2 Emergency Power Supply System No.1 (Volume 2) (hereinafter known as "CAR T2 EPPS1 Vol.2").

CAR(s) for the remaining areas of the Project Site will be submitted to EPD for endorsement in accordance with the SCAP and the updated Implementation Schedule of Land Contamination – Construction Phase is given in **Appendix A**.

1.2 Scope of this CAR

T2 building of the Hong Kong International Airport comprises northern and southern sections, where each section consists of number of Emergency Generator Rooms and Fuel Tank Rooms.

The Emergency Power Supply System No.1 was located at northern section of T2 Building as shown in **Appendix B**. This set of emergency power supply system comprises underground and above-ground section, with the following identified potential land contamination sources listed in **Table 1.1** below,

Table 1.1: Identified Potential Land Contamination Source of Emergency Power Supply System No.1

Potential Land Contamination Source Reference ID	Descriptions	CAR Documentation Status	Location
Underground Section			
BH1	A 2,500 L underground fuel tank	• In CAR T2 EPPS1 Vol.1	Please refer to **Appendix C**
BH2	53 m-in-length underground fuel pipelines connecting the 2,500 L underground fuel tank (i.e. BH1) and the 450 L above-ground fuel tank (i.e. BH3)	• Segment running from BH1 to sampling point BH2-S3, and segment at BH2-S6, were documented in CAR T2 EPPS1 Vol.1 • Remaining segment to be documented in CAR T2 EPPS1 Vol.2 (This report)	
Above-ground Section			
BH4	An emergency generator at Emergency Generator Room, connected to 450 L above-ground fuel tank (i.e. BH3)	• In CAR T2 EPPS1 Vol.1	
BH3	A 450 L above-ground fuel tank at Emergency Generator Room	• In CAR T2 EPPS1 Vol.1	

The scope of the agreed CAR T2 EPPS1 Vol.1 included the above-ground section (i.e. BH3 and BH4), and also the underground section (i.e. BH1, segment of BH2 running from BH1 to BH2-S3, and segment at BH2-S6). Enhanced SI results for the underground section, with the record checking and final Inspection findings the above-ground section confirmed that no land contamination issues at the above-ground section (i.e. BH3 and BH4) and the underground section (i.e. BH1, segment of BH2 running from BH1 to BH2-S3 and segment at BH2-S6).

Hence, the scope of this CAR, for T2 EPPS1 Vol. 2, is as follows,

- Partial portion of BH2, which includes:
  - Segment running from sampling point BH2-S3 to BH2-S6 (including. BH2-S4, BH2-S5);

- Segment running from sampling point BH2-S6 to BH3 (including BH2-S7); and
- BH2-S3 and BH2-S6 as reference points (which enhanced SI results were presented in CAR T2 EPPS1 Vol. 1).

The sampling points BH2-S4, BH2-S5 and BH2-S7 were planned in accordance with the approved SCAP.

Graphical illustration of the scope of this CAR is presented in **Appendix C**.

1.3 Objective

According to the approved SCAP, the Emergency Power Supply System No. 1 located in northern section of the T2 building have been identified as the potential land contamination source, which being proposed in EIA Report as sampling locations.

This Contamination Assessment Report for Terminal 2 Emergency Power Supply System No.1 (Volume 2) has been prepared to present the procedures and laboratory testing of enhanced SI for segment of BH2, which runs from sampling point BH2-S3 to BH3 (i.e. segments running from sampling point BH2-S3 to BH2-S6, BH2-S6 to BH3, while BH2-S3 and BH2-S6 as reference points), under the scope presented in **Section 1.2**. The testing results have been interpreted based on the Guidance Manual for Use of Risk Based Remediation Goals (RBRGs) for Contaminated Land Management (Guidance Manual).

2 Summary of Sampling and Testing Strategy

2.1 Proposed Sampling Method in the SCAP

2.1.1 Proposed Sampling Method of BH2

According to the approved SCAP, grab sampling was proposed for the concerned underground facilities of T2 Building (i.e. BH2 in this CAR). The proposed sampling and testing plan in the SCAP, including the parameters to be tested, sampling locations and sampling depths are extracted and presented in **Table 2.1**. Sand samples shall be grabbed manually during decommissioning/demolition process of concerned underground pipeline trench. The whole sampling process shall be under the supervision of on-site contamination specialist.

Sampling Selection of Underground Fuel Pipelines (i.e. BH2)

Sand and soil samples should be collected as follows:

- Sand samples should be taken at every curvature of pipelines inside the concrete trench;
- Additional sampling points inside the concrete trench are set depending on length of pipeline segment (from curvature/connection to curvature):
  - If pipeline segment is ≤10 m, additional sample is considered not required;
  - If pipeline segment is >10 m and ≤20 m, one sample shall be taken at segment mid-point;
  - If pipeline segment is >20 m and ≤30 m, samples shall be collected at 2 points which are evenly spaced with each other and segment ends.
- Soil samples should be taken right underneath concrete trench at every curvature.

Sampling point annotation and indicative sampling point locations of BH2 extracted from the SCAP are presented in **Table 2.2** and **Appendix D**.

Table 2.1: Enhanced Sampling and Testing Plan for BH2 of Emergency Power Supply System No.1 in T2 Building

Proposed Sampling Locations	Sample Matrix		Sampling Point Annotation	Parameters to be Tested[1 & 2]				Rationale of Sampling
				Heavy Metals	PCRs[3]	VOCs[3]	SVOCs[3]	
BH2[4]	Sand[5]	At the level of fuel pipelines	BH2S1 - BH2S7	Lead only	✓	BTEX[6] and MTBE[7]	PAHs[8]	Confirm no diesel leakage from underground fuel pipelines
	Soil	Right underneath concrete/brick trench	BH2S1, BH2S2, BH2S3, BH2S6	Lead only	✓	BTEX[6] and MTBE[7]	PAHs[8]	Confirm no leaked diesel (if any) penetrate the concrete /brick trench

Remarks:

[1] ✓ = testing proposed.

[2] Having reviewed the potentially polluting activities of the site (use of diesel fuel) and S2.4.3 of Practice Guide, it is recommended to analyse the key COCs (i.e. Lead, PCRs, BTEX, MTBE and PAHs) of "Petrol Filling Station" which is the most relevant land use type for the case of T2. The concerned diesel tanks and pipelines are used for storage and transfer of diesel fuel only and only diesel fuel is used for the generator. It is noted BTEX, MTBE and Lead present in gasoline but unlikely to be found in diesel fuel.

[3] PCRs = Petroleum Carbon Ranges; VOCs = Volatile Organic Chemicals; SVOCs = Semi-volatile Organic Chemicals;

[4] Exact sampling locations will be identified on site during the removal of sand/soil during fuel tank and pipelines decommissioning/ demolition.

[5] All sand samples will be collected within the concrete chamber or concrete/brick trench.

[6] BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes.

[7] MTBE = Methyl Tert-Butyl Ether.

[8] Polyaromatic hydrocarbons (PAHs) in the RBRGs include, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene.

Table 2.2: Sampling Point Annotation of Underground Fuel Pipeline BH2

Proposed Sampling Locations	Annotation of Sampling Point	Type of Sampling Point (Curvature / Additional)	Figure No.
BH2	BH2-S1[1]	Curvature	
	BH2-S2[1]	Curvature	
	BH2-S3[2]	Curvature	
	BH2-S4	Additional	**Appendix D**
	BH2-S5	Additional	
	BH2-S6[2]	Curvature	
	BH2-S7	Additional	

Remarks:
[1] Not within the scope of this CAR. BH2-S1 and BH2-S2 enhanced SI results were presented in CAR T2 EPPS1 Vol.1.
[2] BH2-S3 and BH2-S6 enhanced SI results were presented in CAR T2 EPPS1 Vol.1. The enhanced SI result of these 2 sampling points are taken as reference in the CAR T2 EPPS1 Vol.2 (this CAR).

2.2 Assessment Criteria

The chemicals of concern (COCs) listed in EPD's Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management were referred to when proposing the analytical parameters listed in **Table 2.1**. According to Section 5.3 of the SCAP, categories of Industrial has been adopted for evaluating the contamination level of T2 building.

3 Site Investigation

3.1 Soil Sampling

3.1.1 Underground Fuel Pipeline BH2

Soil sampling of the following sampling points were scheduled and carried out by Mott MacDonald HK Limited on 16 March 2020,

- BH2-S4 and BH2-S5, which located at BH2 segment between sampling point BH2-S3 and BH2-S6;
- BH2-S7, which located at BH2 segment between sampling point BH2-S6 to BH3.

For the reference sampling points BH2-S3 and BH2-S6, the sampling were carried out by Mott MacDonald HK Limited on 4 November 2019 and 14 November 2019 respectively.

3.1.1.1 BH2 Segment between Sampling Point BH2-S3 and BH2-S6

As per on-site inspection, it was observed that the concrete trench running from BH2-S3 to BH2-S6, including sampling points BH2-S4 and BH2-S5, were filled with concrete rather than sand, which differs from the as-built drawings. Hence no sand samples could be taken at the level of fuel pipelines within the concrete trench at the sampling points BH2-S4 and BH2-S5.

With reference to the on-site observations as presented in **Appendix E**, no cracks on the concrete-trench nor oil stains were identified at the vicinity of sampling points BH2-S4 and BH2-S5. Due to safety concerns of excavation during the time of on-site observation, site photos at the sides and bottom of BH2-S4 and BH2-S5 could not be taken on 16 March 2020. In addition, taking into consideration of the laboratory testing results of the 2 reference points, BH2-S3 and BH2-S6, which were presented in CAR T2 EPPSA Vol. 1 with all tested parameters below the value of Risk-Based Remediation Goals (RBRGs) for Industrial, it is confirmed that no diesel leakage from the underground fuel pipelines laid in concrete-trench running from BH2-S3 and BH2-S6.

To err on a conservative side, additional site photo records at BH2-S4 and BH2-S5 will be provided to EPD upon demolition works at BH2-S4 and BH2-S5 as detailed in **Section 3.1.2**.

3.1.1.2 BH2 Segment between Sampling Point BH2-S6 and BH3

According to site observation, it was observed that most of the underground fuel pipelines running from BH2-S6 to BH3, including sampling points BH2-S7, was laid inside the concrete trench, except a segment of underground fuel pipelines with 1 meter in length running between BH2-S7 and BH2-S6 was not laid inside the concrete trench.

Underground Fuel Pipelines Segment with No-Concrete-Trench

For the no-concrete-trench segment of underground fuel pipelines with 1 meter in length running between BH2-S7 and BH2-S6, to confirm no diesel leakage from underground fuel pipelines, 1 soil sample was taken right underneath the particular segment (i.e. NCTS2). Based on the sampling point selection strategy in the SCAP (i.e. If pipeline segment is $\leqslant$10 m, additional sample is considered not required;), together with the site observations where no oil stains being identified in the vicinity of NCTS2, and reference to the laboratory testing result of soil sample BH2-S6 (which were presented in CAR T2 EPPSA Vol. 1 with all tested parameters below the value of RBRGs for Industrial), it is considered that 1 sample collected at the depth right

underneath the pipeline is deemed to be sufficient to represent and confirm if any diesel leakage from the 1m no-concrete-trench segment.

No ground water was observed during soil sampling of NCTS2.

Underground Fuel Pipelines Segment Laid inside the Concrete Trench (including BH2-S7)

For the underground fuel pipelines segment laid inside the concrete trench (including BH2-S7), as revealed on-site, the concrete trench was filled with concrete instead of sand, which differs from the as-built drawings. Hence no sand samples could be taken at the level of fuel pipelines within the concrete trench at the sampling points BH2-S7. With reference to the on-site observations as presented in **Appendix E**, no cracks on the concrete-trench nor oil stains were identified at the vicinity of sampling points BH2-S7. Due to safety concerns of excavation during the time of on-site observation, site photos at the sides and bottom of BH2-S7 could not be taken on 16 March 2020. Also, through taking into account the laboratory testing results of NCTS2 (refer to **Section 4.1.1**) which is near to the location of BH2-S7, it is confirmed that no diesel leakage from the underground fuel pipelines laid in concrete-trench running from the underground fuel pipelines segment laid inside the concrete trench.

To err on a conservative side, additional site photo records at BH2-S7 will be provided to EPD upon demolition works at BH2-S7 as detailed in **Section 3.1.2**.

Site observations during sampling are illustrated in **Appendix E**. The actual sampling point of underground pipeline BH2 is presented in **Table 3.1** and **Appendix F**. All soil sample was analyzed in accordance with the analysis schedules detailed in **Table 2.1**.

Table 3.1: Summary of Sampling Point of BH2 in This CAR

Sampling Locations	Sampling Point	Type of Sampling Point (Curvature/ Additional/ No-concrete-trench Segment)	Sampling Date
BH2	NCTS2	No-concrete-trench Segment	16 March 2020

3.1.2 Additional Photo Record Upon Demolition Works

To err on a conservative side, additional site photo records at the sides and bottom of BH2-S4, BH2-S5 and BH2-S7 will be submitted to EPD upon demolition at the 3 specific sampling points to reaffirm the conclusion drawn in **Sections 3.1.1.1** and **3.1.1.2** that no diesel leakage from the underground fuel pipes.

In case that sign of diesel leakage is spotted during the demolition works, agreement from EPD shall be sought for sampling strategy and subsequent SI shall be arranged in accordance with the agreed sampling plan. CAR will be submitted for the subsequent SI and if remediation required, Remediation Action Plan and Remediation Report will also be prepared.

3.2 Decontamination Procedures

Before excavation/ sampling, all equipment in contact with the ground were thoroughly decontaminated between each excavation and sampling event to minimise the potential for cross contamination. The equipment should be decontaminated by steam cleaning or high-pressure hot water jet, then washed by phosphate-free detergent and finally rinsed by distilled water. During decontamination procedures and sampling, disposable latex gloves were worn to prevent the transfer of contaminants from other sources.

3.3 Quality Assurance (QA) / Quality Control (QC) Procedure

3.3.1 QA/QC Procedure

The soil samples taken were placed in sample containers provided by the HOKLAS laboratory. Sufficient sample size was collected for the laboratory analysis. Samples were marked with sampling date, sampling identification number and sampling depth with appropriate chain-of-custody form. Following sampling, samples were stored in a cool box at a temperature between 0^{o}C and 4^{o}C and transported to the laboratory immediately after completion of the sampling.

The chain-of-custody records are given in **Appendix G**.

3.3.2 QA/QC Analysis

In this enhanced SI programme, QA/QC samples were collected in accordance to the frequency proposed in the SCAP as follows, with a Chain of Custody protocol adopted:

- One equipment blank per 20 samples for full suite analysis*;
- One field blank per 20 samples for full suite analysis*;
- One duplicate sample per 20 samples for full suite analysis*; and
- One trip blank per trip for the analysis of volatile parameters#.

Note:

* For the purposes of this enhanced SI programme, the following parameters were tested in a 'full suite analysis' –

1) Heavy Metals: Lead only.
2) PCRs: C6-C8; C9-C16; C17-C35.
3) VOCs: Benzene, Toluene, Ethylbenzene, Xylenes and Methyl Tert-Butyl Ether.
4) SVOCs: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene.

\# For the purposes of this Project, the following parameters would be tested in the analysis of 'volatile parameters' – Benzene, Toluene, Ethylbenzene, Xylenes, Methyl Tert-Butyl Ether and C6-C8.

The duplicate, equipment blank and field blank samples were collected on 16 Mar 2020 during the sampling for NCTS2.

The laboratory results for QA/QC samples are presented in **Appendix H**.

All testing parameters were not detected (below the limit of reporting) in all blank samples obtained. QA/QC procedures for sample collection and preparation are considered acceptable.

4 Interpretation of Laboratory Testing Results

4.1 Soil Contamination

4.1.1 Underground Fuel Pipeline BH2

A total of 1 soil sample was collected within the scope of this CAR at BH2 for laboratory testing. The testing results are summarised in **Table 4.1** and the testing reports are presented in **Appendix H**. The testing results of all parameters indicated that the soil sample from NCTS2 was below the value of Risk-Based Remediation Goals (RBRGs) for Industrial.

Table 4.1: Laboratory Testing Results of Soil Sample at BH2

Compound	Concentration (mg/kg)	
	NCTS2	RBRGs for Industrial
Heavy Metals		
Lead	26	2290
PCRs		
C6 - C8	<5	C6 - C8: 10,000 C9 - C16: 10,000 C17 - C35: 10,000
C9 - C16	<200	
C17 - C35	<500	
VOCs		
Benzene	<0.2	9.21
Toluene	<0.5	10,000
Ethylbenzene	<0.5	8,240
Xylenes (Total)	<2.0	1,230
Methyl tert-Butyl Ether	<0.2	70.1
SVOCs		
Naphthalene	<0.500	453
Acenaphthylene	<0.500	10,000
Acenaphthene	<0.500	10,000
Fluorene	<0.500	10,000
Phenanthrene	<0.500	10,000
Anthracene	<0.500	10,000
Fluoranthene	<0.500	10,000
Pyrene	<0.500	10,000
Benz(a)anthracene	<0.500	91.8
Chrysene	<0.500	1140
Benzo(b)fluoranthene	<0.500	17.8
Benzo(k)fluoranthene	<0.500	918
Benzo(a)pyrene	<0.500	9.18
Indeno(1.2.3.cd)pyrene	<0.500	91.8
Dibenz(a.h)anthracene	<0.500	9.18
Benzo(g.h.i)perylene	<0.500	10,000

5 Conclusion

Enhanced SI programme was conducted for the segment of BH2 running from sampling point BH2-S3 to BH2-S6, and segment running from BH2-S6 to BH3 in March 2020. During the enhanced SI programme, it was observed that the concrete trench of the concerned BH2 segment is filled with concrete instead of sand, which was differ from the as-built drawing. Hence no sand samples could be taken at the level of fuel pipelines within the concrete trench at the planned sampling points as in the SCAP (i.e. BH2-S4, BH2-S5 and BH2-S7). A total of 1 soil sample at underground fuel pipelines segment with no-concrete-trench (i.e. NCTS2) was collected and testing of CoCs was undertaken. From the testing results, the sample collected at NCTS2 was below the RBRGs standard for industrial. In addition to the site photo record at BH2-S4, BH2-S5 and BH2-S7, it is considered that there are no land contamination issues at the segment BH2 running from BH2-S3 to BH3, and therefore remediation works are not required.

To err on a conservative side, additional site photo records at sides and bottom of BH2-S4, BH2-S5 and BH2-S7 will be submitted to EPD upon demolition works at the 3 specific sampling points to reaffirm the conclusion drawn in **Sections 3.1.1.1** and **3.1.1.2** that no diesel leakage from the underground fuel pipes. In case that sign of diesel leakage is spotted during the demolition works, agreement from EPD shall be sought for sampling strategy and subsequent SI shall be arranged in accordance with the agreed sampling plan, and CAR will be submitted to investigate any remediation actions is required. Remediation Action Plan and Remediation Report will also be prepared if remediations is needed.

Appendices

A. Updated Implementation Schedule of Land Contamination – Construction Phase

Table C.1: Implementation Schedule (Extracted)

EIA Ref.	EM &A Ref.	EP Condi-tion	Environmental Protection Measures	Location / Duration of measures Timing of completion of measures	Implementation Agent	Implementation Stage D e s C O	Mitigation Measures Implemented?^ Yes No
Land Contamination – Construction Phase							
11.10.1.2 to 11.10.1.3	8.1	2.32	For areas inaccessible during site reconnaissance survey: ▪ Further site reconnaissance would be conducted once the areas are accessible in order to identify any land contamination concern for the areas. ▪ Subject to further site reconnaissance findings, a supplementary Contamination Assessment Plan (CAP) for additional site investigation (SI) (if necessary) may be prepared and submitted to EPD for endorsement prior to the commencement of SI at these areas. ▪ After completion of SI, the Contamination Assessment Report (CAR) will be prepared and submitted to EPD for approval prior to start of the proposed construction works at the golf course, the underground and above-ground fuel storage tank areas, emergency power generation units, airside petrol filling station and fuel tank room. ▪ Should remediation be required, Remediation Action Plan (RAP) and Remediation Report (RR) will be prepared for EPD's approval prior to commencement of the proposed remediation and any construction works respectively.	Project Site Area inaccessible during site reconnaissance / Q1 2020 onwards	AAHK/ Contractor	✓	
11.8.1.2	8.1	-	If contaminated soil is identified, the following mitigation measures are for the excavation and transportation of contaminated materials (if any): ▪ To minimize the incidents of construction workers coming in contact with any contaminated materials, bulk earth-moving excavation equipment should be employed; ▪ Contact with contaminated materials can be minimised by wearing appropriate clothing and personal protective equipment such as gloves and masks (especially when working directly with contaminated material), provision of washing facilities and prohibition of smoking and eating on site; ▪ Stockpiling of contaminated excavated materials on site should be avoided as far as possible; ▪ The use of any contaminated soil for landscaping purpose should be avoided unless pre-treatment was carried out;	Project Site Area / Q1 2020 onwards	Contractor		✓

	▪ Vehicles containing any excavated materials should be suitably covered to reduce dust emissions and/or release of contaminated wastewater; ▪ Truck bodies and tailgates should be sealed to prevent any discharge; ▪ Only licensed waste haulers should be used to collect and transport contaminated material to treatment/disposal site and should be equipped with tracking system to avoid fly tipping; ▪ Speed control for trucks carrying contaminated materials should be exercised. 8km/h is the recommended speed limit; ▪ Strictly observe all relevant regulations in relation to waste handling, such as Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354) and obtain all necessary permits where required; and ▪ Maintain records of waste generation and disposal quantities and disposal arrangements.	

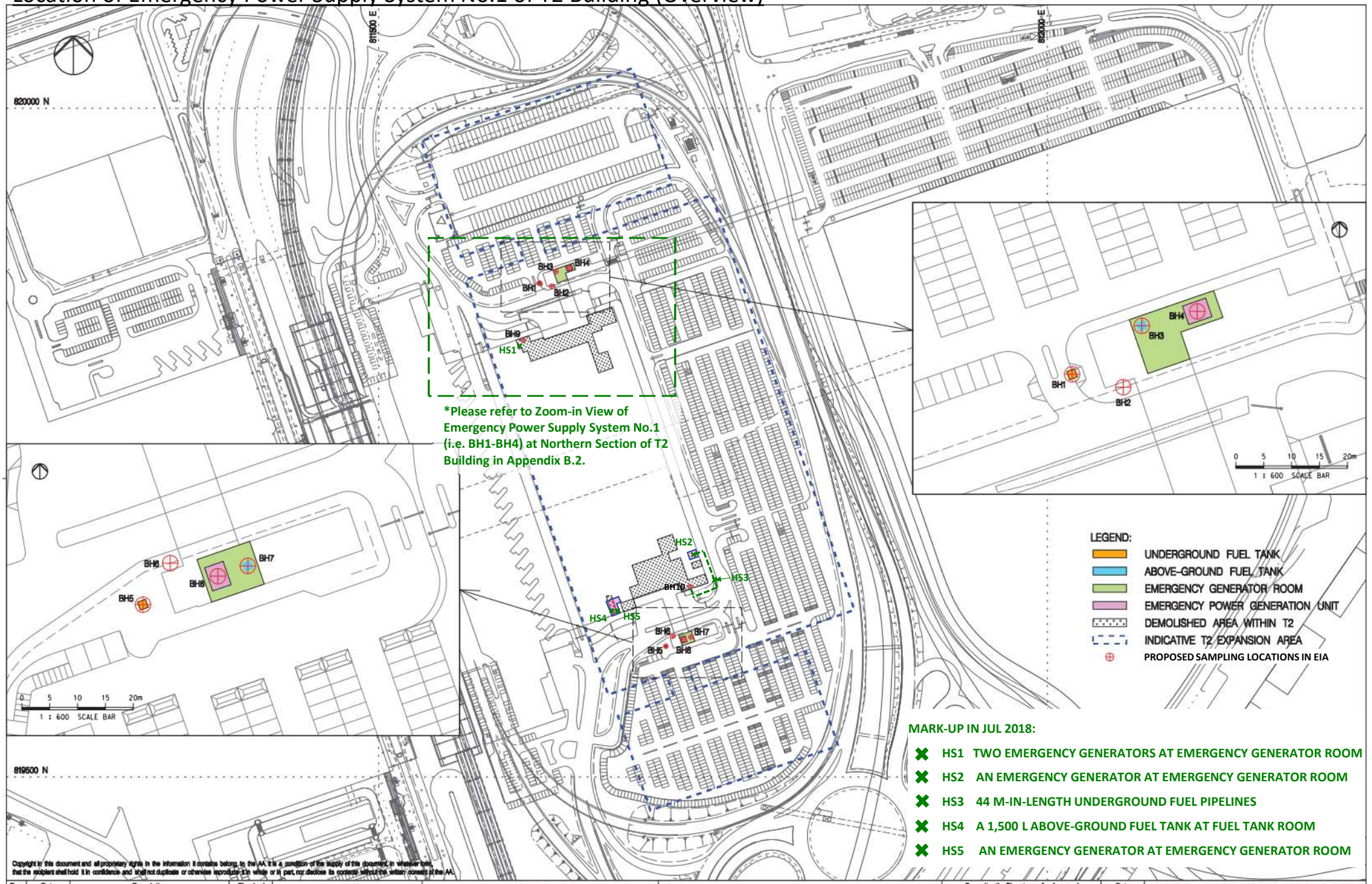
B. Location of Emergency Power Supply System No.1 of T2 Building Proposed SI Locations for Expansion of T2 Building

B.1 Location of Emergency Power Supply System No.1 of T2 Building (Overview)

B.2 Location of Emergency Power Supply System No.1 of T2 Building (Zoom-in View of Northern Section of T2 Building)

Appendix B.1

Location of Emergency Power Supply System No.1 of T2 Building (Overview)



MARK-UP IN JUL 2018:

- ✖ **HS1 TWO EMERGENCY GENERATORS AT EMERGENCY GENERATOR ROOM**
- ✖ **HS2 AN EMERGENCY GENERATOR AT EMERGENCY GENERATOR ROOM**
- ✖ **HS3 44 M-IN-LENGTH UNDERGROUND FUEL PIPELINES**
- ✖ **HS4 A 1,500 L ABOVE-GROUND FUEL TANK AT FUEL TANK ROOM**
- ✖ **HS5 AN EMERGENCY GENERATOR AT EMERGENCY GENERATOR ROOM**

Rev.	Date	Description	Checked
A	23OCT13	FIRST ISSUE	EC
B	21NOV13	GENERAL REVISION	AM
C	17DEC13	GENERAL REVISION	AM

HONG KONG INTERNATIONAL AIRPORT 香港國際機場

Mott MacDonald
In association with
ARUP
Atkins China Limited
Clymene Enterprises
Deltares
Ecosystems Limited
SDA Marine Limited
Urbis Limited
URS Limited

Title: PROPOSED SAMPLING LOCATIONS FOR EXPANSION OF T2 BUILDING

Consultant's Signatures for Approval		Date
Design	AM	23OCT13
Checkers	AM	23OCT13
Design Supervisor	EC	21MAR14
Authorised Representative	AFK	21MAR14

EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM

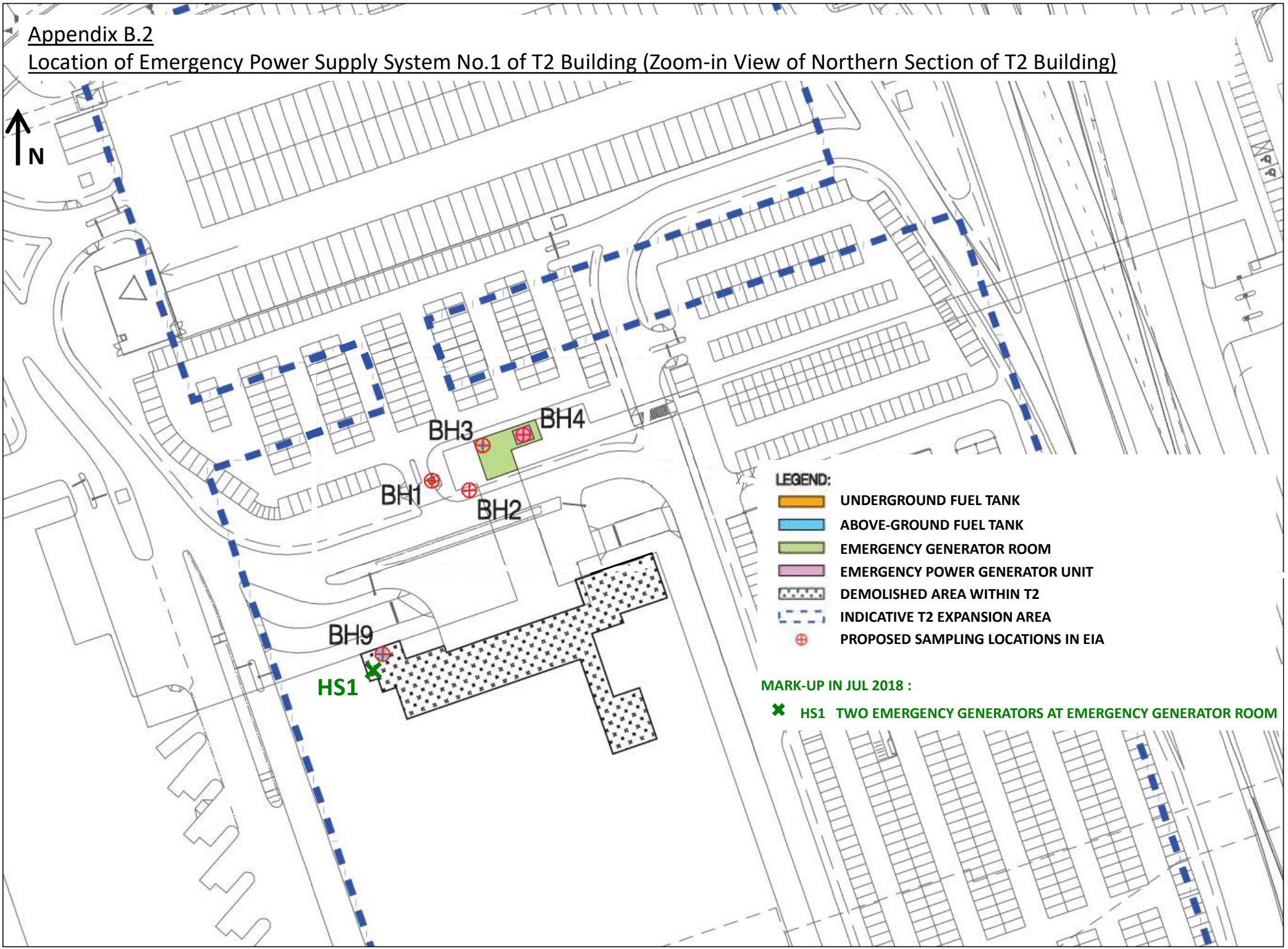
Drawing No. MCL / P132 / EIA / 11-014

Scale at A3: 1 : 2500

Rev. C

Appendix B.2

Location of Emergency Power Supply System No.1 of T2 Building (Zoom-in View of Northern Section of T2 Building)



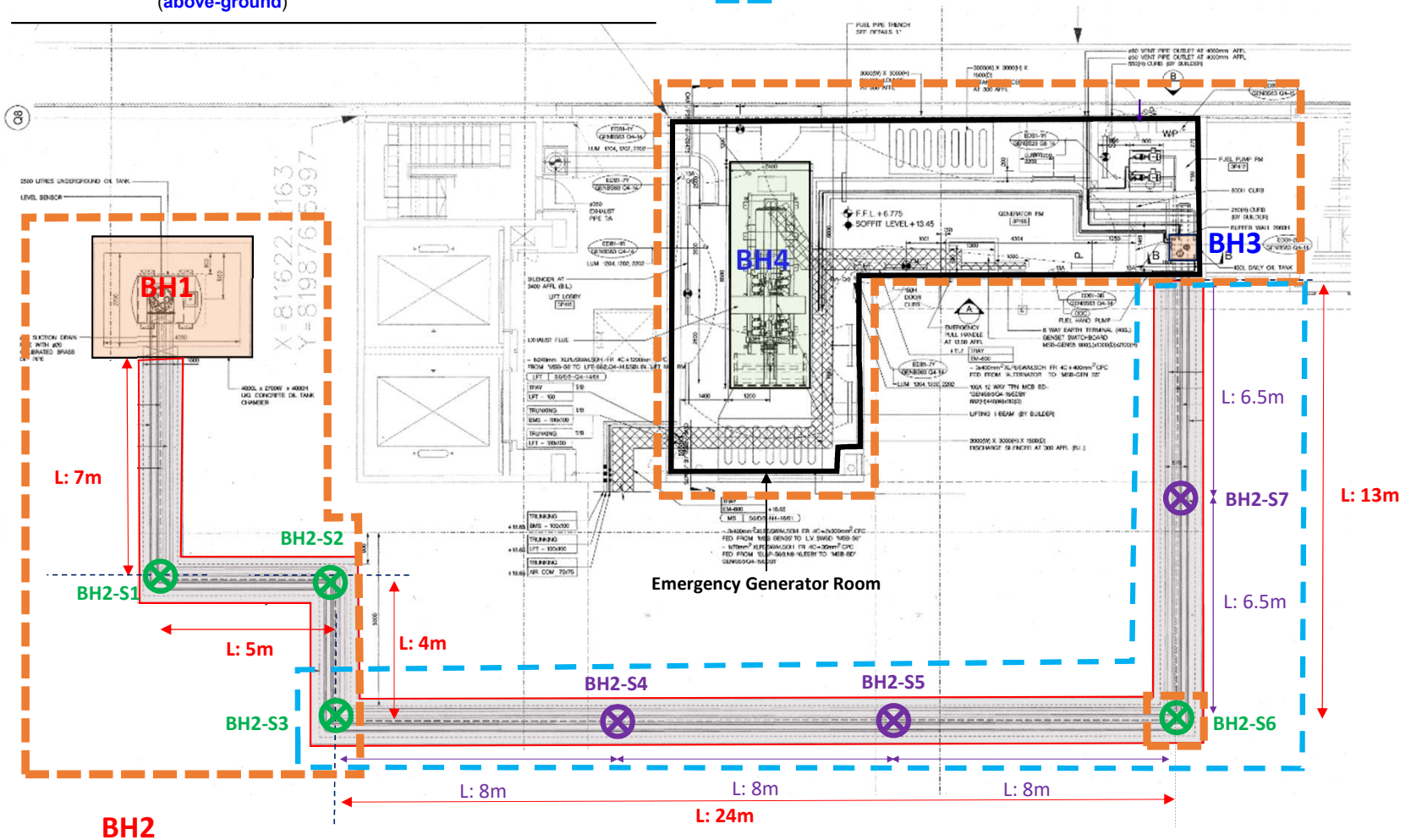
C. Identified Potential Land Contaminated Source of Emergency Power Supply System No.1 (EPSS1) in SCAP

Appendix C Identified Potential Land Contaminated Source of Emergency Power Supply System No.1 (EPSS1) in SCAP

Reference ID	Description
BH1	A 2,500 L **underground** fuel tank
BH3	A 450 L **above-ground** fuel tank at Emergency Generator Room
BH2	53 m-in-length **underground** fuel pipelines connecting the 2,500 L underground fuel tank (i.e. BH1) and the 450 L above-ground fuel tank (i.e. BH3)
BH4	An emergency generator at Emergency Generator Room (**above-ground**)

LEGEND:

- Curvature Sampling Point - Indicative Sampling Point Selection of Underground Pipeline Trench of EPSS1 (i.e. **BH2**) in SCAP
- Additional Sampling Point - Indicative Sampling Point Selection of Underground Pipeline Trench of EPSS1 (i.e. **BH2**) in SCAP
- Scope of Contamination Assessment Report (CAR) for T2 EPSS1 Vol. 1
- Scope of the CAR for T2 EPSS1 Vol. 2 (this CAR)



Total Length: Approx. 53 m

D. Indicative Sampling Point Selection of BH2 - BH2-S4, BH2-S5, BH2-S7 in SCAP

Appendix D Indicative Sampling Point Selection of BH2 - BH2-S4, BH2-S5, BH2-S7 in SCAP

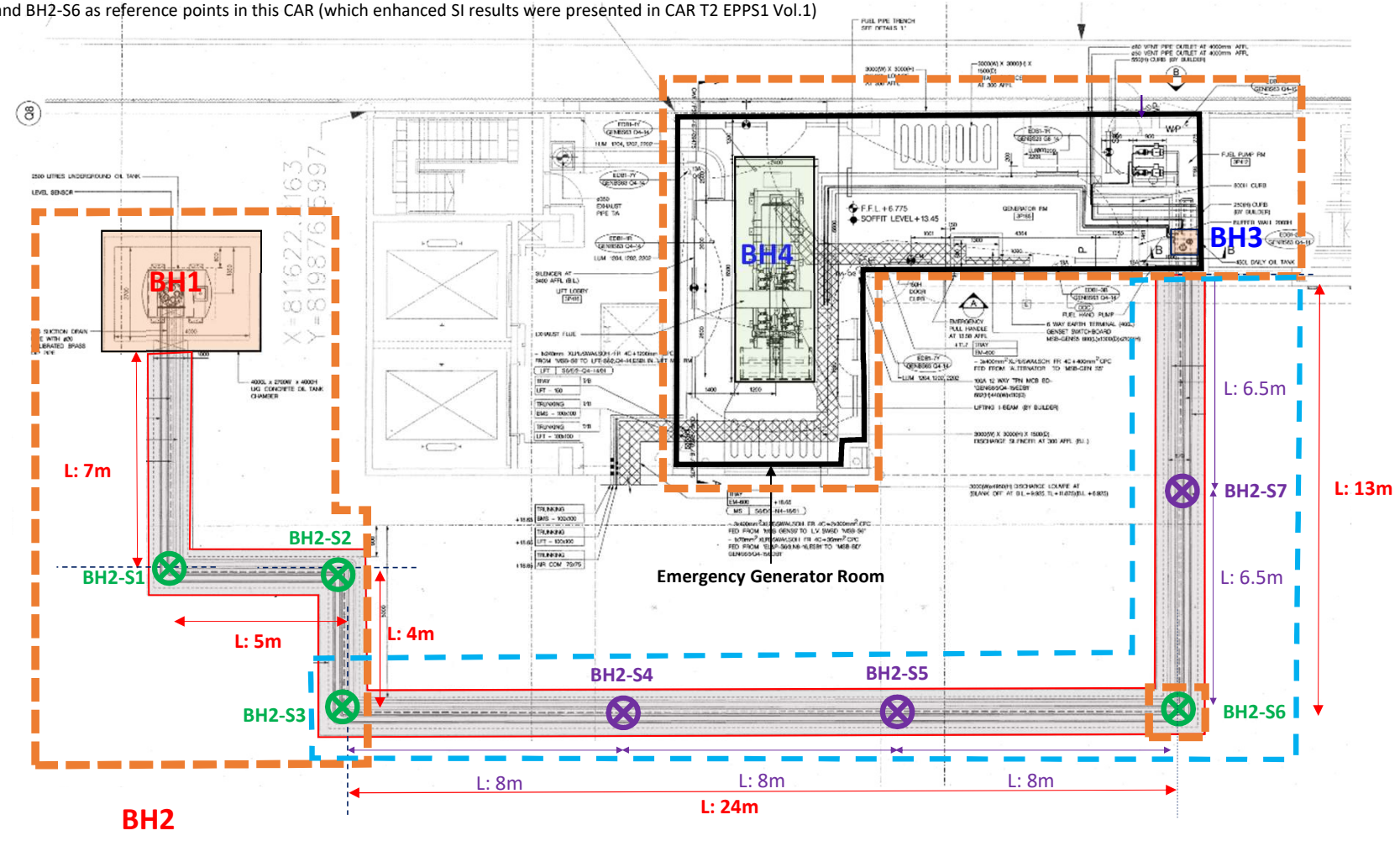
Annotation of Sampling Point	Type of Sampling Point (Curvature/ Additional)	Sample		Remarks
		At the level of fuel pipelines (Within Concrete Trench)	Right underneath concrete trench	
BH2-S1	Curvature	Sand	Soil	Presented under Contamination Assessment Report (CAR) T2 EPSS1 Vol. 1
BH2-S2	Curvature		Soil	
BH2-S3[1]	Curvature		Soil	
BH2-S6[1]	Curvature		Soil	
BH2-S4	Additional	Sand	-	Under the scope of CAR T2 EPSS1 Vol. 2 (this CAR)
BH2-S5	Additional		-	
BH2-S7	Additional		-	

LEGEND:

- Curvature Sampling Point - Indicative Sampling Point Selection of Underground Pipeline Trench of EPSS1 (i.e. **BH2**) in SCAP
- Additional Sampling Point - Indicative Sampling Point Selection of Underground Pipeline Trench of EPSS1 (i.e. **BH2**) in SCAP
- Scope of Contamination Assessment Report (CAR) T2 EPSS1 Vol. 1
- Scope of CAR T2 EPSS1 Vol. 2 (this CAR)

Remark:

[1] BH2-S3 and BH2-S6 as reference points in this CAR (which enhanced SI results were presented in CAR T2 EPPS1 Vol.1)



Total Length: Approx. 53 m

E. Site Photo Record of Underground Pipeline Trench of EPSS1 at BH2 - BH2-S4, BH2-S5, BH2-S7

E.1 Site Photo Record of Underground Pipeline Trench of EPSS1 at BH2 - BH2-S4, BH2-S5, BH2-S7 (Layout)

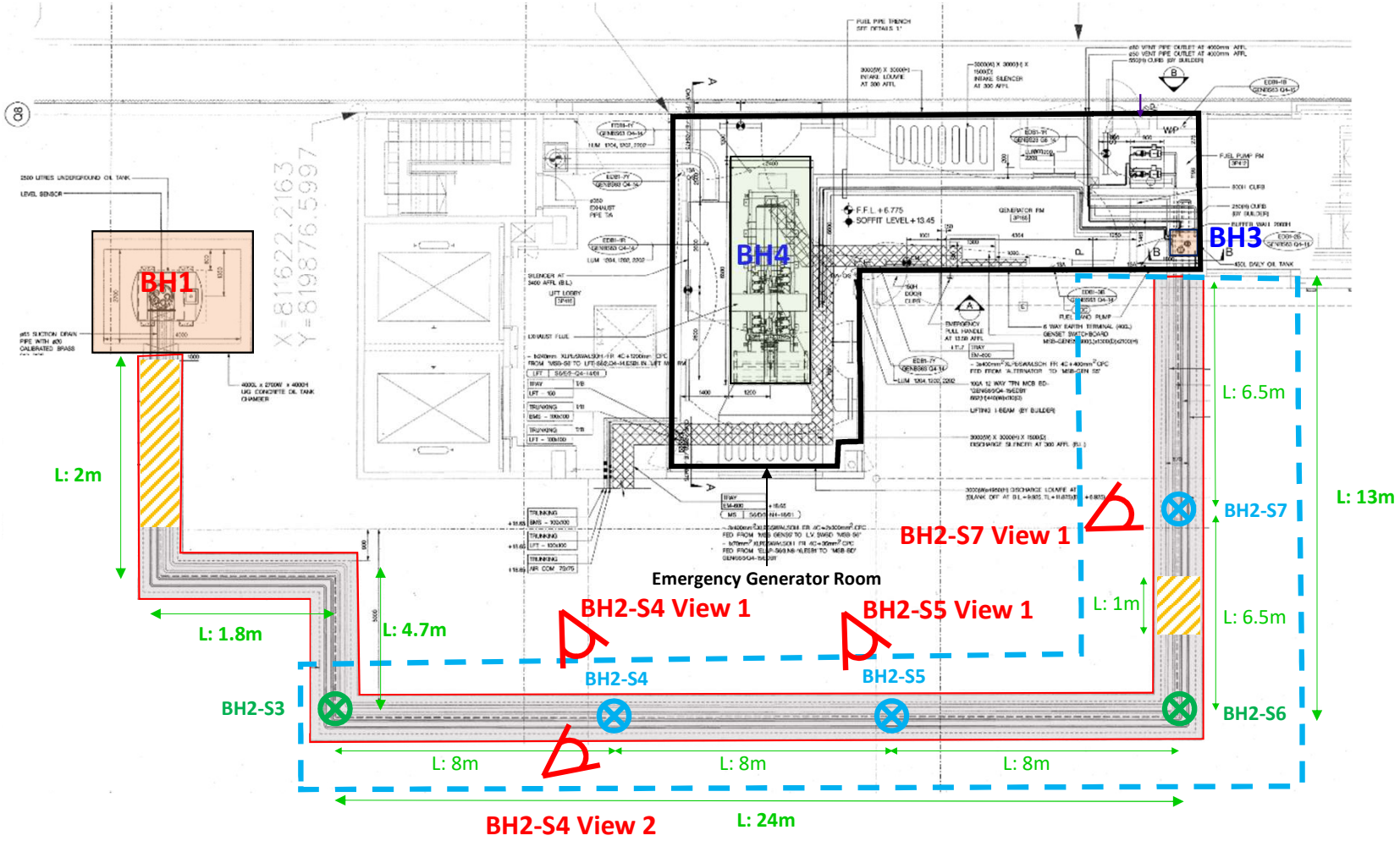
E.2 Site Photo Record of Underground Pipeline Trench of EPSS1 at BH2 - BH2-S4, BH2-S5, BH2-S7 (Photo Record)

Appendix E.1 Site Photo Record of Underground Pipeline Trench of EPSS1 at BH2 - BH2-S4, BH2-S5, BH2-S7 (Layout)

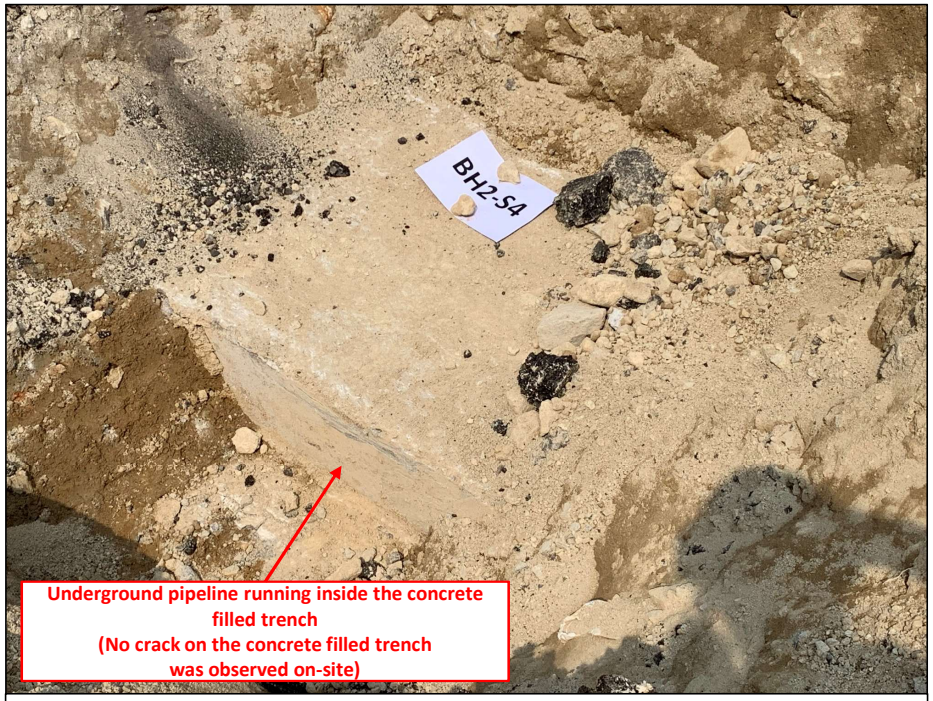
Annotation of Sampling Point	Type of Sampling Point	Sampling Elevation	Type of Sample	Remarks
BH2-S3	Curvature	Right underneath concrete trench corner	Soil	Reference point for CAR T2 EPSS1 Vol. 2 (this CAR)
BH2-S6	Curvature	Right underneath concrete trench corner	Soil	
BH2-S4	Additional	At the level of fuel pipelines within the concrete trench	Sand	Same sampling point selection in SCAP Sand sampling was not possible with concrete trench filled with concrete instead of sand
BH2-S5	Additional			
BH2-S7	Additional			

LEGEND:

- BH2-S3 and BH2-S6 reference point, results presented in CAR T2 EPSS1 Vol.1
- Actual Sampling Point
- TEXT On-site Measurement of Underground Pipeline/Concrete Trench
- Segment of underground pipeline not laid in concrete trench
- Scope of CAR for T2 EPSS1 Vol. 2 (this CAR)



Appendix E.2 Site Photo Record of Underground Pipeline Trench of EPSS1 at **BH2 - BH2-S4, BH2-S5, BH2-S7** (Photo Record)



BH2-S4 View 1

BH2-S4 View 2

BH2-S5 View 1

BH2-S7 View 1

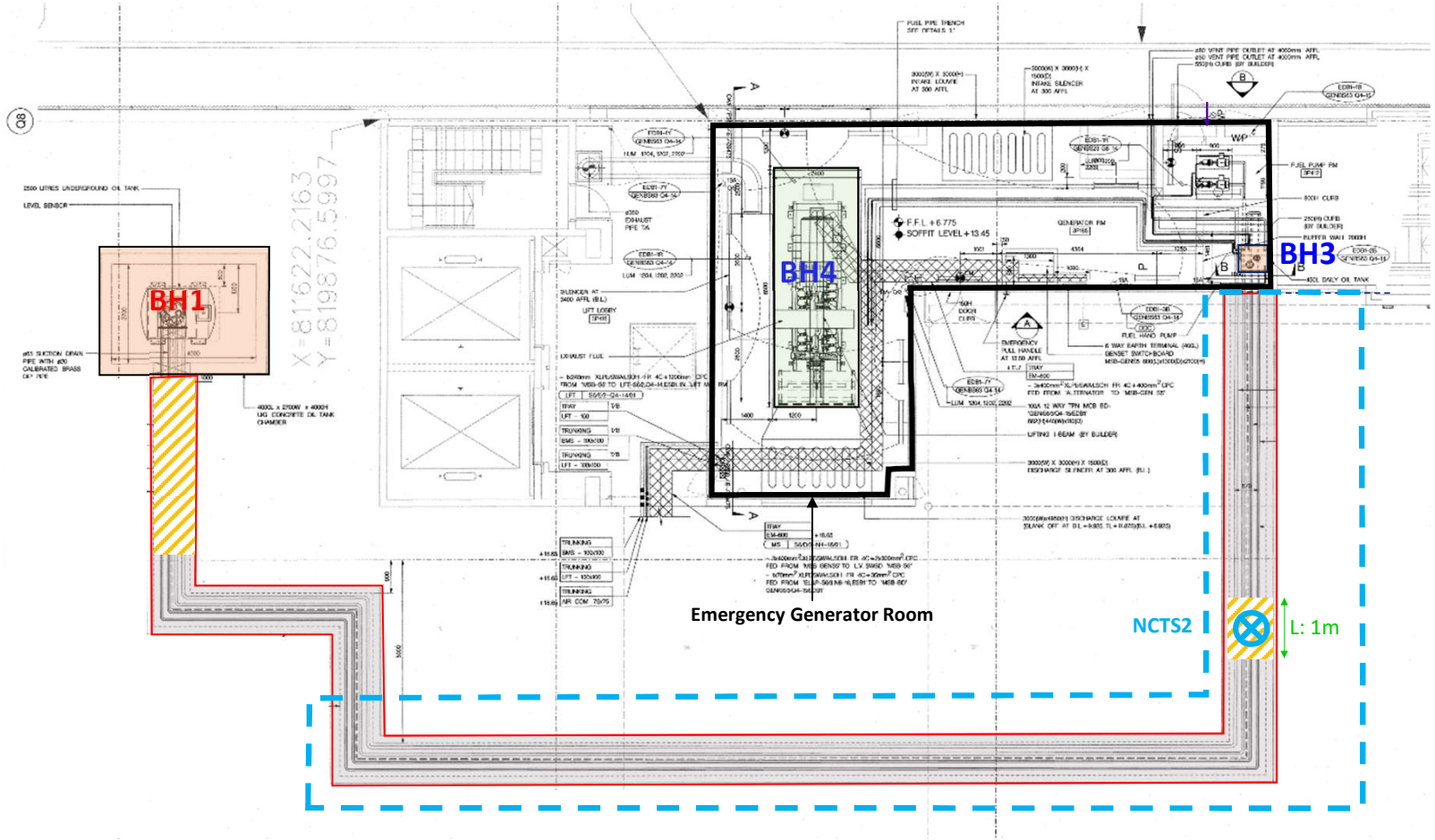
F. Actual Sampling Point of Underground Pipeline Trench of EPSS1 (i.e. NCTS2)

Appendix F Actual Sampling Point of Underground Pipeline Trench of EPSS1 at NCTS2

Annotation of Sampling Point	Type of Sampling Point	Sampling Elevation	Type of Sample	Remarks
NCTS2	Newly added according to on-site condition	Right underneath the segment of underground pipeline	Soil	Newly added according to on-site condition (Segment of underground pipeline not laid in concrete trench)

LEGEND:

- Actual Sampling Point
- TEXT — On-site Measurement of Underground Pipeline
- Segment of underground pipeline not laid in concrete trench
- Scope of CAR T2 EPPS1 Vol.2 (this CAR)



G. Chain-of-Custody Record

CHAIN OF CUSTODY DOCUMENTATION

H 014977

ALS Laboratory Group

CLIENT: Mott MacDonald HK Limited
ADDRESS / OFFICE: Mott MacDonald, 3/F International Trade Tower, 348 Kwun Tong Road, Kowloon, HK
PROJECT MANAGER (PM): Thomas Chan
PROJECT ID: Soil Testing at Hong Kong Airport
SITE: Contract No. 3503 T2 Foundation & Sw
P.O. NO.:
RESULTS REQUIRED (Date):
QUOTE NO.: HKE/1861C/2018

SAMPLER:
MOBILE: 9307 9680 (Liz Lo)
PHONE 2828 5751 (Liz Lo)
EMAIL REPORT TO: liz.lo@mottmac.com
EMAIL INVOICE TO: (if different to report)

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		Lead	TPH	BETX	MTBE	PAH	C6-C8						
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles												
1	Trip Blank	W	16/3/2020		Vials	2			✓	✓		✓						
2	Equipment Blank	W	16/3/2020		1xAmber, 2xVials	2x plastic	✓	✓	✓	✓	✓							
3	Field Blank	W	16/3/2020		1xAmber, 2xVials	2x plastic	✓	✓	✓	✓	✓							
4	NCTS2	S	16/3/2020		Glass Jar	1	✓	✓	✓	✓	✓							
5	NCTS2(Duplicate)	S	16/3/2020		Glass Jar	1	✓	✓	✓	✓	✓							

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: Thomas Chan	Date: 16/3/2020	Name: Karen	Date: 16/3/20	Con' Note No:
Of: Mott MacDonald	Time:	Of: ALS (HK)	Time: 17:30	
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.

H. Laboratory Testing Results of Underground Pipeline Trench of EPSS1 (i.e. NCTS2)

CERTIFICATE OF ANALYSIS

Client	: MOTT MACDONALD HONG KONG LIMITED	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 13
Contact	: THOMAS CHAN	Contact	: Richard Fung	Work Order	: HK2009791
Address	: 3/F INTERNATIONAL TRADE TOWER, 348 KWUN TONG ROAD, KWUN TONG, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: thomas.chan@mottmac.com	E-mail	: richard.fung@alsglobal.com		
Telephone	: +852 2828 5933	Telephone	: +852 2610 1044		
Facsimile	: +852 2828 1823	Facsimile	: +852 2610 2021		
Project	: SOIL TESTING AT HONG KONG AIRPORT			Date Samples Received	: 16-Mar-2020
Order number	: ----	Quote number	: HKE/1861c/2018_V2	Issue Date	: 25-Mar-2020
C-O-C number	: H014977			No. of samples received	: 5
Site	: CONTRACT NO. C3503 TERMINAL 2 FOUNDATION AND SUBSTRUCTURE WORKS			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 Siu Ming , Vico	Manager - Inorganics	Inorganics
Wong Wing , Kenneth	Manager - Metals	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 16-Mar-2020 to 24-Mar-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: HK2009791

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.

The result(s) of soil sample(s) was / were reported on dry weight basis.

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.

Analytical Results

Sub-Matrix: SOIL			Client sample ID	NCTS2	NCTS2 (Duplicate)	----	----	----
			Client sampling date / time	16-Mar-2020	16-Mar-2020	----	----	----
Compound	CAS Number	LOR	Unit	HK2009791-004	HK2009791-005	-------	-------	-------
EA/ED: Physical and Aggregate Properties								
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	4.4	4.5	----	----	----
EG: Metals and Major Cations								
EG020: Lead	7439-92-1	1	mg/kg	26	28	----	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs)								
EP076HK: Naphthalene	91-20-3	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Acenaphthylene	208-96-8	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Acenaphthene	83-32-9	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Fluorene	86-73-7	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Phenanthrene	85-01-8	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Anthracene	120-12-7	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Fluoranthene	206-44-0	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Pyrene	129-00-0	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Benz(a)anthracene	56-55-3	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Chrysene	218-01-9	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Benzo(b)fluoranthene	205-99-2	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Benzo(k)fluoranthene	207-08-9	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Benzo(a)pyrene	50-32-8	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Dibenz(a.h)anthracene	53-70-3	0.500	mg/kg	<0.500	<0.500	----	----	----
EP076HK: Benzo(g.h.i)perylene	191-24-2	0.500	mg/kg	<0.500	<0.500	----	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH)								
EP070HK_SR: C6 - C8 Fraction	----	5	mg/kg	<5	<5	----	----	----
EP071HK_SR: C9 - C16 Fraction	----	200	mg/kg	<200	<200	----	----	----
EP071HK_SR: C17 - C35 Fraction	----	500	mg/kg	<500	<500	----	----	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH)								
EP074_SR: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
EP074_SR: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	----	----
EP074_SR: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	----	----

Sub-Matrix: SOIL			Client sample ID	NCTS2	NCTS2 (Duplicate)	----	----	----
			Client sampling date / time	16-Mar-2020	16-Mar-2020	----	----	----
Compound	CAS Number	LOR	Unit	HK2009791-004	HK2009791-005	-------	-------	-------
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) - Continued								
EP074_SR: meta- & para-Xylene	108-38-3 106-42-3	1.0	mg/kg	<1.0	<1.0	----	----	----
EP074_SR: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	----	----
EP074_SR: Xylenes (Total)	----	2.0	mg/kg	<2.0	<2.0	----	----	----
EP-074_SR-I: Methyl-tert-butyl Ether								
EP074_SR: Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.2	mg/kg	<0.2	<0.2	----	----	----
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates								
EP076HK: 2-Fluorobiphenyl	321-60-8	0.1	%	75.8	81.5	----	----	----
EP076HK: 4-Terphenyl-d14	1718-51-0	0.1	%	79.9	84.2	----	----	----
EP-080_SRS: TPH(Volatile)/BTEX Surrogate								
EP070HK_SR: Dibromofluoromethane	1868-53-7	0.1	%	92.8	92.7	----	----	----
EP070HK_SR: Toluene-D8	2037-26-5	0.1	%	93.7	102	----	----	----
EP070HK_SR: 4-Bromofluorobenzene	460-00-4	0.1	%	104	108	----	----	----
EP-074_SR-S: VOC Surrogates								
EP074_SR: Dibromofluoromethane	1868-53-7	0.1	%	92.8	92.7	----	----	----
EP074_SR: Toluene-D8	2037-26-5	0.1	%	93.7	102	----	----	----
EP074_SR: 4-Bromofluorobenzene	460-00-4	0.1	%	104	108	----	----	----

Sub-Matrix: WATER			Client sample ID	Trip Blank	Equipment Blank	Field Blank	----	----
			Client sampling date / time	16-Mar-2020	16-Mar-2020	16-Mar-2020	----	----
Compound	CAS Number	LOR	Unit	HK2009791-001	HK2009791-002	HK2009791-003	-------	-------
EG: Metals and Major Cations - Filtered								
EG020: Lead	7439-92-1	1	µg/L	----	<1	<1	----	----
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	1.0	µg/L	----	<1.0	<1.0	----	----
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	----	----
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-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	<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: 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	----	----

Sub-Matrix: WATER			Client sample ID	Trip Blank	Equipment Blank	Field Blank	----	----
			Client sampling date / time	16-Mar-2020	16-Mar-2020	16-Mar-2020	----	----
Compound	*CAS Number*	*LOR*	*Unit*	HK2009791-001	HK2009791-002	HK2009791-003	-------	-------
EP-074_SR-I: Methyl-tert-butyl Ether								
EP074_SR: Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.5	µg/L	<0.5	<0.5	<0.5	----	----
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates								
EP076HK: 2-Fluorobiphenyl	321-60-8	0.1	%	----	**55.9**	**71.2**	----	----
EP076HK: 4-Terphenyl-d14	1718-51-0	0.1	%	----	**76.8**	**86.6**	----	----
EP-080_SRS: TPH(Volatile)/BTEX Surrogate								
EP070HK_SR: Dibromofluoromethane	1868-53-7	0.1	%	**96.0**	**96.0**	**98.4**	----	----
EP070HK_SR: Toluene-D8	2037-26-5	0.1	%	**94.2**	**93.0**	**95.1**	----	----
EP070HK_SR: 4-Bromofluorobenzene	460-00-4	0.1	%	**108**	**110**	**108**	----	----
EP-074_SR-S: VOC Surrogates								
EP074_SR: Dibromofluoromethane	1868-53-7	0.1	%	**96.0**	**96.0**	**98.4**	----	----
EP074_SR: Toluene-D8	2037-26-5	0.1	%	**94.2**	**93.0**	**95.1**	----	----
EP074_SR: 4-Bromofluorobenzene	460-00-4	0.1	%	**108**	**110**	**108**	----	----

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: 2922433)								
HK2009782-011	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	13.5	13.5	0.00
HK2009946-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	15.2	15.8	3.89
EG: Metals and Major Cations (QC Lot: 2919201)								
HK2009784-026	Anonymous	EG020: Lead	7439-92-1	1	mg/kg	10	12	19.1
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2914108)								
HK2009471-001	Anonymous	EP076HK: Naphthalene	91-20-3	50	µg/kg	<50	<50	0.00
		EP076HK: Acenaphthylene	208-96-8	50	µg/kg	<50	<50	0.00
		EP076HK: Acenaphthene	83-32-9	50	µg/kg	<50	<50	0.00
		EP076HK: Fluorene	86-73-7	50	µg/kg	<50	<50	0.00
		EP076HK: Phenanthrene	85-01-8	50	µg/kg	<50	<50	0.00
		EP076HK: Anthracene	120-12-7	50	µg/kg	<50	<50	0.00
		EP076HK: Fluoranthene	206-44-0	50	µg/kg	<50	<50	0.00
		EP076HK: Pyrene	129-00-0	50	µg/kg	<50	<50	0.00
		EP076HK: Benz(a)anthracene	56-55-3	50	µg/kg	<50	<50	0.00
		EP076HK: Chrysene	218-01-9	50	µg/kg	<50	<50	0.00
		EP076HK: Benzo(b)fluoranthene	205-99-2	50	µg/kg	<50	<50	0.00
		EP076HK: Benzo(k)fluoranthene	207-08-9	50	µg/kg	<50	<50	0.00
		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	<50	<50	0.00
		EP076HK: Dibenz(a.h)anthracene	53-70-3	50	µg/kg	<50	<50	0.00
		EP076HK: Benzo(g.h.i)perylene	191-24-2	50	µg/kg	<50	<50	0.00
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 2916873)								
HK2009757-001	Anonymous	C9 - C16 Fraction	----	200	mg/kg	428	441	2.96
		C17 - C35 Fraction	----	500	mg/kg	1700	1720	0.984
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 2916874)								
HK2009757-001	Anonymous	C6 - C8 Fraction	----	5	mg/kg	<5	<5	0.00
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 2917791)								
HK2009791-004	NCTS2	Benzene	71-43-2	0.1	mg/kg	<0.2	<0.2	0.00
		Toluene	108-88-3	0.2	mg/kg	<0.5	<0.5	0.00
		Ethylbenzene	100-41-4	0.2	mg/kg	<0.5	<0.5	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-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 2917791) - Continued								
HK2009791-004	NCTS2	ortho-Xylene	95-47-6	0.2	mg/kg	<0.5	<0.5	0.00
		meta- & para-Xylene	108-38-3 106-42-3	0.4	mg/kg	<1.0	<1.0	0.00
		Xylenes (Total)	----	1	mg/kg	<2.0	<2.0	0.00
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 2917791)								
HK2009791-004	NCTS2	Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.2	mg/kg	<0.2	<0.2	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: 2919217)								
HK2009784-002	Anonymous	EG020: Lead	7439-92-1	1	µg/L	<1	<1	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: 2919201)											
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	93.2	----	90.0	110	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2914108)											
EP076HK: Naphthalene	91-20-3	50	µg/kg	<50	25 µg/kg	105	----	68.0	119	----	----
EP076HK: Acenaphthylene	208-96-8	50	µg/kg	<50	25 µg/kg	111	----	59.0	123	----	----
EP076HK: Acenaphthene	83-32-9	50	µg/kg	<50	25 µg/kg	104	----	68.0	121	----	----
EP076HK: Fluorene	86-73-7	50	µg/kg	<50	25 µg/kg	108	----	70.0	128	----	----
EP076HK: Phenanthrene	85-01-8	50	µg/kg	<50	25 µg/kg	104	----	69.0	125	----	----
EP076HK: Anthracene	120-12-7	50	µg/kg	<50	25 µg/kg	110	----	35.0	131	----	----
EP076HK: Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	106	----	72.0	128	----	----
EP076HK: Pyrene	129-00-0	50	µg/kg	<50	25 µg/kg	104	----	70.0	128	----	----
EP076HK: Benz(a)anthracene	56-55-3	50	µg/kg	<50	25 µg/kg	105	----	46.0	142	----	----
EP076HK: Chrysene	218-01-9	50	µg/kg	<50	25 µg/kg	102	----	55.0	134	----	----
EP076HK: Benzo(b)fluoranthene	205-99-2	50	µg/kg	<50	25 µg/kg	79.8	----	59.0	136	----	----

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: 2914108) - Continued											
EP076HK: Benzo(k)fluoranthene	207-08-9	50	µg/kg	<50	25 µg/kg	74.8	----	68.0	126	----	----
EP076HK: Benzo(a)pyrene	50-32-8	50	µg/kg	<50	25 µg/kg	65.0	----	30.0	126	----	----
EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	50	µg/kg	<50	25 µg/kg	63.4	----	55.0	133	----	----
EP076HK: Dibenz(a.h)anthracene	53-70-3	50	µg/kg	<50	25 µg/kg	61.9	----	52.0	134	----	----
EP076HK: Benzo(g.h.i)perylene	191-24-2	50	µg/kg	<50	25 µg/kg	56.5	----	45.0	144	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 2916873)											
C9 - C16 Fraction	----	200	mg/kg	<200	31.5 mg/kg	88.7	----	73.0	114	----	----
C17 - C35 Fraction	----	500	mg/kg	<500	67.5 mg/kg	81.7	----	71.0	115	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 2916874)											
C6 - C8 Fraction	----	5	mg/kg	<5	4.5 mg/kg	99.1	----	87.0	122	----	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 2917791)											
Benzene	71-43-2	0.1	mg/kg	<0.1	0.25 mg/kg	89.9	----	84.0	123	----	----
Toluene	108-88-3	0.2	mg/kg	<0.2	0.25 mg/kg	93.9	----	82.0	122	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	0.25 mg/kg	88.9	----	86.0	123	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.4	mg/kg	<0.4	0.5 mg/kg	90.6	----	84.0	118	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	0.25 mg/kg	91.2	----	84.0	125	----	----
Xylenes (Total)	----	1	mg/kg	<1.0	0.75 mg/kg	90.8	----	86.0	119	----	----
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 2917791)											
Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.2	mg/kg	<0.2	0.25 mg/kg	88.8	----	72.0	120	----	----

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: 2919217)											
EG020: Lead	7439-92-1	1	µg/L	<1	50 µg/L	98.1	----	85.0	113	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2910880)											
EP076HK: Naphthalene	91-20-3	0.1	µg/L	<0.1	0.5 µg/L	105	----	19.0	144	----	----
EP076HK: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	0.5 µg/L	110	----	32.0	140	----	----

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: 2910880) - Continued											
EP076HK: Acenaphthene	83-32-9	0.1	µg/L	<0.1	0.5 µg/L	106	----	13.0	153	----	----
EP076HK: Fluorene	86-73-7	0.1	µg/L	<0.1	0.5 µg/L	108	----	35.0	151	----	----
EP076HK: Phenanthrene	85-01-8	0.1	µg/L	<0.1	0.5 µg/L	106	----	49.0	128	----	----
EP076HK: Anthracene	120-12-7	0.1	µg/L	<0.1	0.5 µg/L	101	----	60.0	103	----	----
EP076HK: Fluoranthene	206-44-0	0.1	µg/L	<0.1	0.5 µg/L	108	----	65.0	131	----	----
EP076HK: Pyrene	129-00-0	0.1	µg/L	<0.1	0.5 µg/L	107	----	64.0	131	----	----
EP076HK: Benz(a)anthracene	56-55-3	0.1	µg/L	<0.1	0.5 µg/L	108	----	66.0	142	----	----
EP076HK: Chrysene	218-01-9	0.1	µg/L	<0.1	0.5 µg/L	106	----	78.0	144	----	----
EP076HK: Benzo(b)fluoranthene	205-99-2	0.1	µg/L	<0.1	0.5 µg/L	114	----	67.0	144	----	----
EP076HK: Benzo(k)fluoranthene	207-08-9	0.1	µg/L	<0.1	0.5 µg/L	104	----	73.0	139	----	----
EP076HK: Benzo(a)pyrene	50-32-8	0.1	µg/L	<0.1	0.5 µg/L	108	----	64.0	127	----	----
EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L	<0.1	0.5 µg/L	125	----	62.0	141	----	----
EP076HK: Dibenz(a.h)anthracene	53-70-3	0.1	µg/L	<0.1	0.5 µg/L	118	----	59.0	136	----	----
EP076HK: Benzo(g.h.i)perylene	191-24-2	0.1	µg/L	<0.1	0.5 µg/L	122	----	56.0	147	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 2914598)											
C6 - C8 Fraction	----	0.02	mg/L	<0.02	0.03 mg/L	107	----	59.0	136	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 2924950)											
C9 - C16 Fraction	----	0.5	mg/L	<0.5	0.21 mg/L	89.0	----	80.0	114	----	----
C17 - C35 Fraction	----	0.5	mg/L	<0.5	0.45 mg/L	80.4	----	59.0	123	----	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 2914597)											
Benzene	71-43-2	0.5	µg/L	<0.5	2 µg/L	106	----	83.0	131	----	----
Toluene	108-88-3	0.5	µg/L	<0.5	2 µg/L	96.7	----	76.0	130	----	----
Ethylbenzene	100-41-4	0.5	µg/L	<0.5	2 µg/L	96.4	----	79.0	130	----	----
meta- & para-Xylene	108-38-3 106-42-3	1	µg/L	<1	4 µg/L	96.7	----	84.0	118	----	----
ortho-Xylene	95-47-6	0.5	µg/L	<0.5	2 µg/L	98.9	----	79.0	130	----	----
Xylenes (Total)	----	2	µg/L	<2	6 µg/L	97.4	----	82.0	123	----	----
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 2914597)											
Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.5	µg/L	<0.5	2 µg/L	112	----	64.0	135	----	----

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: 2919201)										
HK2009784-025	Anonymous	**EG020: Lead**	7439-92-1	50 mg/kg	83.5	----	75.0	125	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2914108)										
HK2009474-001	Anonymous	**EP076HK: Naphthalene**	91-20-3	250 µg/kg	81.3	----	50.0	130	----	----
		EP076HK: Acenaphthylene	208-96-8	250 µg/kg	86.3	----	50.0	130	----	----
		EP076HK: Acenaphthene	83-32-9	250 µg/kg	81.0	----	50.0	130	----	----
		EP076HK: Fluorene	86-73-7	250 µg/kg	83.0	----	50.0	130	----	----
		EP076HK: Phenanthrene	85-01-8	250 µg/kg	75.6	----	50.0	130	----	----
		EP076HK: Anthracene	120-12-7	250 µg/kg	84.7	----	50.0	130	----	----
		EP076HK: Fluoranthene	206-44-0	250 µg/kg	68.0	----	50.0	130	----	----
		EP076HK: Pyrene	129-00-0	250 µg/kg	70.0	----	50.0	130	----	----
		EP076HK: Benz(a)anthracene	56-55-3	250 µg/kg	76.0	----	50.0	130	----	----
		EP076HK: Chrysene	218-01-9	250 µg/kg	69.8	----	50.0	130	----	----
		EP076HK: Benzo(b)fluoranthene	205-99-2	250 µg/kg	61.8	----	50.0	130	----	----
		EP076HK: Benzo(k)fluoranthene	207-08-9	250 µg/kg	58.8	----	50.0	130	----	----
		EP076HK: Benzo(a)pyrene	50-32-8	250 µg/kg	51.6	----	50.0	130	----	----
		EP076HK: Indeno(1.2.3.cd)pyrene	193-39-5	250 µg/kg	52.9	----	50.0	130	----	----
		EP076HK: Dibenz(a.h)anthracene	53-70-3	250 µg/kg	51.3	----	50.0	130	----	----
		EP076HK: Benzo(g.h.i)perylene	191-24-2	250 µg/kg	52.0	----	50.0	130	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 2916873)										
HK2009759-001	Anonymous	**C9 - C16 Fraction**	----	31.5 mg/kg	# Not Determined	----	50.0	130	----	----
		C17 - C35 Fraction	----	67.5 mg/kg	# Not Determined	----	50.0	130	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 2916874)										
HK2009759-001	Anonymous	**C6 - C8 Fraction**	----	4.5 mg/kg	106	----	50.0	130	----	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 2917791)										
HK2009791-005	NCTS2 (Duplicate)	**Benzene**	71-43-2	0.25 mg/kg	81.6	----	50.0	130	----	----
		Toluene	108-88-3	0.25 mg/kg	86.2	----	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-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 2917791) - Continued										
HK2009791-005	NCTS2 (Duplicate)	**Ethylbenzene**	100-41-4	0.25 mg/kg	94.5	----	50.0	130	----	----
		meta- & para-Xylene	108-38-3 106-42-3	0.5 mg/kg	99.1	----	50.0	130	----	----
		ortho-Xylene	95-47-6	0.25 mg/kg	96.5	----	50.0	130	----	----
		Xylenes (Total)	----	0.75 mg/kg	98.3	----	50.0	130	----	----
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 2917791)										
HK2009791-005	NCTS2 (Duplicate)	**Methyl tert-Butyl Ether (MTBE)**	1634-04-4	0.25 mg/kg	93.3	----	50.0	130	----	----

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: 2919217)										
HK2009784-001	Anonymous	**EG020: Lead**	7439-92-1	50 µg/L	98.0	----	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*	*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