



CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 9
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Project	: AGREEMENT NO CE32_2014(HY) ELEVATED PEDESTRIAN CORRIDOR IN YUEN LONG TOWN CONNECTING WITH LONG PING	Quote number	: HK/1393/2014	Date Samples Received	: 15-MAR-2016
Order number	: GE/2014/21.24			Issue Date	: 01-APR-2016
C-O-C number	: H031547			No. of samples received	: 1
Site	: ----			No. of samples analysed	: 1

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

Signatories	Position	Authorised results for
Chan Ka Yu, Karen	Manager - Organics	Organics
Wong Wing, Kenneth	Manager - Metals	Inorganics



General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. 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. The completion date of analysis is: 30-MAR-2016

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: HK1610860

Project Name: Agreement No. CE32/2014(HY) Elevated Pedestrian Corridor in Yuen Long Town connecting with Long Ping Station - Investigation, Design and Construction.

Sample(s) were received in a chilled condition.

Soil sample(s) analysed on an as received basis. Result(s) reported on a dry weight basis.

Soil 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.

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.

Low and High M.W. PAHs results (Method: EP076HK) are not HOKLAS accredited. Low M.W. PAHs is sum of Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene; High M.W. PAHs is sum of Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1.2.3.cd)pyrene, Dibenz(a,h)anthracene, Benzo(g,h,i)perylene.



Analytical Results

Sub-Matrix: SOIL

Client sample ID

S1-EH1 (3.0-3.9M)

Client sampling date / time

[15-MAR-2016]

Compound	CAS Number	LOR	Unit	HK1610860-001				
EA/ED: Physical and Aggregate Properties								
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	20.7				
EG: Metals and Major Cations								
EG020: Arsenic	7440-38-2	1	mg/kg	6				
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2				
EG020: Chromium	7440-47-3	1	mg/kg	9				
EG020: Copper	7440-50-8	1	mg/kg	4				
EG020: Lead	7439-92-1	1	mg/kg	29				
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05				
EG020: Nickel	7440-02-0	1	mg/kg	3				
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1				
EG020: Zinc	7440-66-6	1	mg/kg	34				
EP-065: PCB Single Congeners								
PCB 8	34883-43-7	3	µg/kg	<3				
PCB 18	37680-65-2	3	µg/kg	<3				
PCB 28	7012-37-5	3	µg/kg	<3				
PCB 44	41464-39-5	3	µg/kg	<3				
PCB 52	35693-99-3	3	µg/kg	<3				
PCB 66	32598-10-0	3	µg/kg	<3				
PCB 77	32598-13-3	3	µg/kg	<3				
PCB 101	37680-73-2	3	µg/kg	<3				
PCB 105	32598-14-4	3	µg/kg	<3				
PCB 118	31508-00-6	3	µg/kg	<3				
PCB 126	57465-28-8	3	µg/kg	<3				
PCB 128	38380-07-3	3	µg/kg	<3				
PCB 138	35065-28-2	3	µg/kg	<3				
PCB 153	35065-27-1	3	µg/kg	<3				
PCB 169	32774-16-6	3	µg/kg	<3				
PCB 170	35065-30-6	3	µg/kg	<3				
PCB 180	35065-29-3	3	µg/kg	<3				
PCB 187	52663-68-0	3	µg/kg	<3				
Total Polychlorinated biphenyls	----	18	µg/kg	<18				
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs)								
Naphthalene	91-20-3	50	µg/kg	<50				
Acenaphthylene	208-96-8	50	µg/kg	<50				
Acenaphthene	83-32-9	50	µg/kg	<50				
Fluorene	86-73-7	50	µg/kg	<50				
Phenanthrene	85-01-8	50	µg/kg	<50				
Anthracene	120-12-7	50	µg/kg	<50				



Sub-Matrix: SOIL			Client sample ID	S1-EH1 (3.0-3.9M)				
			Client sampling date / time	[15-MAR-2016]				
Compound	CAS Number	LOR	Unit	HK1610860-001				
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued								
Fluoranthene	206-44-0	150	µg/kg	<150				
Pyrene	129-00-0	150	µg/kg	<150				
Benz(a)anthracene	56-55-3	150	µg/kg	<150				
Chrysene	218-01-9	150	µg/kg	<150				
Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150				
Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150				
Benzo(a)pyrene	50-32-8	150	µg/kg	<150				
Indeno(1.2.3.cd)pyrene	193-39-5	150	µg/kg	<150				
Dibenz(a,h)anthracene	53-70-3	150	µg/kg	<150				
Benzo(g,h,i)perylene	191-24-2	150	µg/kg	<150				
Low M.W. PAHs	----	550	µg/kg	<550				
High M.W. PAHs	----	1700	µg/kg	<1700				
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	95.4				
4-Terphenyl-d14	1718-51-0	0.1	%	105				
EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	59.5				



Sub-Matrix: INTERSTITIAL WATER				Client sample ID	S1-EH1 (3.0-3.9M)			
				Client sampling date / time	[15-MAR-2016]			
Compound	CAS Number	LOR	Unit	HK1610860-001				
EP-390: Triorganotins								
Tributyltin	56573-85-4	0.015	µg TBT /L	0.058				

Laboratory Duplicate (DUP) Report

Matrix: SOIL				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 4160593)								
HK1610357-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	20.9	20.0	4.2
HK1610844-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	12.1	11.0	9.3
EG: Metals and Major Cations (QC Lot: 4162515)								
HK1610999-001	Anonymous	EG020: Silver	7440-22-4	0.1	mg/kg	0.3	0.3	0.0
		EG020: Mercury	7439-97-6	0.5	mg/kg	<0.5	<0.5	0.0
		EG020: Arsenic	7440-38-2	1	mg/kg	<1	<1	0.0
		EG020: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	14	14	0.0
		EG020: Lead	7439-92-1	1	mg/kg	21	21	0.0
		EG020: Nickel	7440-02-0	1	mg/kg	7	7	0.0
		EG020: Copper	7440-50-8	10	mg/kg	20	22	0.0
		EG020: Zinc	7440-66-6	10	mg/kg	15	15	0.0
HK1611197-051	Anonymous	EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Arsenic	7440-38-2	1	mg/kg	4	4	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	47	53	10.9
		EG020: Copper	7440-50-8	1	mg/kg	12	12	0.0
		EG020: Lead	7439-92-1	1	mg/kg	6	6	0.0
		EG020: Nickel	7440-02-0	1	mg/kg	61	64	5.0
		EG020: Zinc	7440-66-6	1	mg/kg	31	34	10.1
EP-065: PCB Single Congeners (QC Lot: 4160992)								
HK1610860-001	S1-EH1 (3.0-3.9M)	Total Polychlorinated biphenyls	----	18	µg/kg	<18	<18	0.0
		PCB 8	34883-43-7	3	µg/kg	<3	<3	0.0
		PCB 18	37680-65-2	3	µg/kg	<3	<3	0.0
		PCB 28	7012-37-5	3	µg/kg	<3	<3	0.0
		PCB 44	41464-39-5	3	µg/kg	<3	<3	0.0
		PCB 52	35693-99-3	3	µg/kg	<3	<3	0.0
		PCB 66	32598-10-0	3	µg/kg	<3	<3	0.0
		PCB 77	32598-13-3	3	µg/kg	<3	<3	0.0
		PCB 101	37680-73-2	3	µg/kg	<3	<3	0.0
		PCB 105	32598-14-4	3	µg/kg	<3	<3	0.0
		PCB 118	31508-00-6	3	µg/kg	<3	<3	0.0
		PCB 126	57465-28-8	3	µg/kg	<3	<3	0.0



Matrix: SOIL				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-065: PCB Single Congeners (QC Lot: 4160992) - Continued								
HK1610860-001	S1-EH1 (3.0-3.9M)	PCB 128	38380-07-3	3	µg/kg	<3	<3	0.0
		PCB 138	35065-28-2	3	µg/kg	<3	<3	0.0
		PCB 153	35065-27-1	3	µg/kg	<3	<3	0.0
		PCB 169	32774-16-6	3	µg/kg	<3	<3	0.0
		PCB 170	35065-30-6	3	µg/kg	<3	<3	0.0
		PCB 180	35065-29-3	3	µg/kg	<3	<3	0.0
		PCB 187	52663-68-0	3	µg/kg	<3	<3	0.0
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 4160993)								
HK1610860-001	S1-EH1 (3.0-3.9M)	Fluoranthene	206-44-0	150	µg/kg	<150	<150	0.0
		Pyrene	129-00-0	150	µg/kg	<150	<150	0.0
		Benz(a)anthracene	56-55-3	150	µg/kg	<150	<150	0.0
		Chrysene	218-01-9	150	µg/kg	<150	<150	0.0
		Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150	<150	0.0
		Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150	<150	0.0
		Benzo(a)pyrene	50-32-8	150	µg/kg	<150	<150	0.0
		Indeno(1.2.3.cd)pyrene	193-39-5	150	µg/kg	<150	<150	0.0
		Dibenz(a,h)anthracene	53-70-3	150	µg/kg	<150	<150	0.0
		Benzo(g,h,i)perylene	191-24-2	150	µg/kg	<150	<150	0.0
		High M.W. PAHs	----	1700	µg/kg	<1700	<1700	0.0
		Naphthalene	91-20-3	50	µg/kg	<50	<50	0.0
		Acenaphthylene	208-96-8	50	µg/kg	<50	<50	0.0
		Acenaphthene	83-32-9	50	µg/kg	<50	<50	0.0
		Fluorene	86-73-7	50	µg/kg	<50	<50	0.0
Phenanthrene	85-01-8	50	µg/kg	<50	<50	0.0		
Anthracene	120-12-7	50	µg/kg	<50	<50	0.0		
Low M.W. PAHs	----	550	µg/kg	<550	<550	0.0		

Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-390: Triorganotins (QC Lot: 4166804)								
HK1610860-001	S1-EH1 (3.0-3.9M)	Tributyltin	56573-85-4	6	ngSn/L	24	24	0.0

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

Matrix: SOIL				Method Blank (MB) Report		Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 4162515)											
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	89.8	----	75	111	----	----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	101	----	79	109	----	----
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	92.3	----	81	123	----	----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	98.5	----	79	109	----	----



Matrix: SOIL		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 4162515) - Continued											
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	91.0	----	81	109	----	----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	87.0	----	75	113	----	----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	104	----	77	111	----	----
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	91.2	----	75	113	----	----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	97.2	----	80	122	----	----
EP-065: PCB Single Congeners (QC Lot: 4160992)											
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	72.8	----	55	111	----	----
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	70.3	----	58	105	----	----
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	75.8	----	63	105	----	----
PCB 44	41464-39-5	3	µg/kg	<3	5 µg/kg	71.6	----	61	111	----	----
PCB 52	35693-99-3	3	µg/kg	<3	5 µg/kg	72.3	----	61	111	----	----
PCB 66	32598-10-0	3	µg/kg	<3	5 µg/kg	75.3	----	62	111	----	----
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	72.7	----	59	114	----	----
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	64.6	----	54	117	----	----
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	68.7	----	60	115	----	----
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	67.8	----	55	117	----	----
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	67.2	----	65	112	----	----
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	66.7	----	62	116	----	----
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	65.5	----	58	117	----	----
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	64.2	----	58	117	----	----
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	83.7	----	74	111	----	----
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	76.2	----	70	112	----	----
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	74.4	----	67	114	----	----
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	63.7	----	58	118	----	----
Total Polychlorinated biphenyls	----	18	µg/kg	<18	----	----	----	----	----	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 4160993)											
Naphthalene	91-20-3	25	µg/kg	<50	500 µg/kg	90.0	----	71	116	----	----
Acenaphthylene	208-96-8	25	µg/kg	<50	500 µg/kg	81.4	----	52	112	----	----
Acenaphthene	83-32-9	25	µg/kg	<50	500 µg/kg	87.0	----	71	112	----	----
Fluorene	86-73-7	25	µg/kg	<50	500 µg/kg	90.6	----	72	109	----	----
Phenanthrene	85-01-8	25	µg/kg	<50	500 µg/kg	102	----	74	115	----	----
Anthracene	120-12-7	25	µg/kg	<50	500 µg/kg	70.4	----	50	112	----	----
Fluoranthene	206-44-0	25	µg/kg	<50	500 µg/kg	116	----	71	118	----	----
Pyrene	129-00-0	25	µg/kg	<50	500 µg/kg	116	----	72	119	----	----
Benz(a)anthracene	56-55-3	25	µg/kg	<50	500 µg/kg	80.8	----	68	109	----	----
Chrysene	218-01-9	25	µg/kg	<50	500 µg/kg	115	----	78	117	----	----
Benzo(b)fluoranthene	205-99-2	25	µg/kg	<50	500 µg/kg	102	----	63	121	----	----
Benzo(k)fluoranthene	207-08-9	25	µg/kg	<50	500 µg/kg	100	----	74	123	----	----
Benzo(a)pyrene	50-32-8	25	µg/kg	<50	500 µg/kg	84.7	----	58	112	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	25	µg/kg	<50	500 µg/kg	104	----	61	129	----	----



Matrix: SOIL		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 4160993) - Continued											
Dibenz(a,h)anthracene	53-70-3	25	µg/kg	<50	500 µg/kg	90.2	----	58	129	----	----
Benzo(g,h,i)perylene	191-24-2	25	µg/kg	<50	500 µg/kg	85.2	----	52	135	----	----
Low M.W. PAHs	----	550	µg/kg	<550	----	----	----	----	----	----	----
High M.W. PAHs	----	1700	µg/kg	<1700	----	----	----	----	----	----	----

Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
EP-390: Triorganotins (QC Lot: 4166804)											
Tributyltin	56573-85-4	5	ngSn/L	<5	100 ngSn/L	105	----	70	130	----	----

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

Matrix: SOIL				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 4162515)										
HK1610999-001	Anonymous	EG020: Arsenic	7440-38-2	5 mg/kg	104	----	75	125	----	----
		EG020: Cadmium	7440-43-9	5 mg/kg	94.4	----	75	125	----	----
		EG020: Chromium	7440-47-3	5 mg/kg	97.0	----	75	125	----	----
		EG020: Copper	7440-50-8	5 mg/kg	# Not Determined	----	75	125	----	----
		EG020: Lead	7439-92-1	5 mg/kg	82.0	----	75	125	----	----
		EG020: Mercury	7439-97-6	0.1 mg/kg	81.7	----	75	125	----	----
		EG020: Nickel	7440-02-0	5 mg/kg	80.0	----	75	125	----	----
		EG020: Silver	7440-22-4	50 mg/kg	87.0	----	75	125	----	----
		EG020: Zinc	7440-66-6	5 mg/kg	80.0	----	75	125	----	----

Matrix: WATER				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EP-390: Triorganotins (QC Lot: 4166804)										
HK1610860-001	S1-EH1 (3.0-3.9M)	Tributyltin	56573-85-4	100 ngSn/L	94.4	----	70	130	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates			
2-Fluorobiphenyl	321-60-8	50	130



Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates - Continued			
4-Terphenyl-d14	1718-51-0	50	130
EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate			
Decachlorobiphenyl	2051-24-3	50	130