本署檔號 OUR REF: (15) in EP2/N7/75 pt.2
來函檔號 YOUR REF: 180579-0365
電話 TEL. NO.: 2835 1335
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Black & Veatch Hong Kong Limited
25/F, Millennium City 6,
392 Kwun Tong Road, Hong Kong
(Attn: Colin H.K. Chan) By Fax: 2601 3988

19 November 2015

Dear Mr. Chan

Agreement No. CE 63/2012(DS)
Expansion of Sha Tau Kok Sewage Treatment Works, Phase 1 –
Investigation, Design and Construction
Sediment Sampling and Testing Plan (Issue 3)

I refer to your letter dated 10.112015 enclosed the subject document.

We have no comment on the submitted Sediment Sampling and Testing Plan (Issue 3) from the waste management point of view.

Yours faithfully,

(Ms Holy TO)
Assistant Environmental Protection Officer
for Director of Environmental Protection

c.c.
External
CE/CM, DSD (Attn: Mr. Oliver Au-Yeung) Fax: 2827 8526
Internal
S(TC)3 Fax: 2305 0453
E(SI)51 Fax: 2519 0572

BLACK & VEATCH
Building a world of difference.

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OUR REF 180579-0365

YOUR REF (8) in EP2/N7/75 pt.2

DATE 10 November 2015

Environmental Protection Department
27/F, Southorn Centre,
130 Hennessy Road,
Wanchai, Hong Kong

URGENT

For the attention of Ms. Holy To

Dear Sir/Madam,

Agreement No. CE 63/2012 (DS)
Expansion of Sha Tau Kok Sewage Treatment Works, Phase 1
- Investigation, Design and Construction
Sediment Sampling and Testing Plan (Issue 3)

We refer to your fax ref. (8) in EP2/N7/75 pt.2 dated 2 October 2015 providing comments on Issue 1 of the above captioned document and our email on 29 October 2015 regarding the change in sample collecting method. We are pleased to enclose the revised Sediment Sampling and Testing Plan (Issue 3) for your review.

Should you have any queries, please do not hesitate to contact our Mr. Benjamin Yeung at 26087505.

Yours faithfully,
For and on behalf of
BLACK & VEATCH HONG KONG LIMITED

COLIN H. K. CHAN
DEPUTY PROJECT MANAGER

MC
Encl.

c.c.
CE/CM, DSD	- attn.: Mr. Oliver Au-Yeung
MFC/CEDD	- attn.: Mr. Derek Lau
EPD/MDS	- attn.: Ms. Ruby Hung
EPD/SIG	- attn.: Mr. Albert Chan

Agreement No. CE 63/2012 (DS) Expansion of Sha Tau Kok Sewage Treatment Works, Phase 1 – Investigation, Design and Construction

Sediment Sampling and Testing

180579/B&V/072/Issue 3

Report Authorized For Issue By:	For and on Behalf of Black & Veatch Hong Kong Limited

Black & Veatch Hong Kong Limited
25/F, Millennium City 6
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Drainage Services Department
Consultants Management Division
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Wan Chai, Hong Kong

November 2015

DOCUMENT CONTROL			Agreement No. CE 63/2012 (DS) Expansion of Sha Tau Kok Sewage Treatment Works, Phase 1 – Investigation, Design and Construction	No. **180579**
AMENDMENT RECORD				Prepared by: **B&V**
Sediment Sampling and Testing Plan			Client: DSD	Initials: MC
				Date: November 2015

Pages	Date:	Issue No.	Description:	Initials:
All	September 2015	Issue 1	Submission to EPD	MC
All	October 2015	Issue 2	Revised report to EPD	MC
All	November 2015	Issue 3	Revised report to EPD	MC

*The Registered Recipient is responsible for destroying or marking as 'superseded' all superseded documents.

CONTENTS

Drawings No.	**Title**
180579/B&V/GL/001	Proposed Layout Plan
180579/B&V/SQR/001	Location Plan of Sediment Sampling

Appendices

Appendix A	EPD Sediment Quality Data
Appendix B	Location of Reference Sample RS1
Appendix C	Responses to Comments

List of Tables

	Name	Signature	Date
Prepared	Manuel Chua		10 Nov 2015
Checked	Benjamin Yeung		10 Nov 2015
Reviewed	Colin Chan		10-11-15

1. INTRODUCTION

1.1 Background

1.1.1 Drainage Services Department (DSD) is undertaking a project named Expansion of Sha Tau Kok Sewage Treatment Works, Phase 1 – Investigation, Design and Construction (the Project) under Agreement No. CE 63/2012 (DS). The Project is to expand the treatment capacity of the existing Sha Tau Kok Sewage Treatment Works (STKSTW) from 1,660 m^3/day to 10,000 m^3/day in 2 phases.

1.1.2 The Project is a Designated Project (DP) under the Environmental Impact Assessment Ordinance (EIAO) (Cap 499). The Environmental Impact Assessment (EIA) Study Brief (No. ESB-253/2012) has been issued by EPD on 17 December 2012.

1.1.3 In June 2013, Black & Veatch Hong Kong Limited (B&V) was commissioned by DSD as the consultant for this Project.

1.1.4 In accordance with Appendix E, para. 3(i) of ESB-253/2012, a Sediment Sampling and Testing Plan (SSTP) is prepared for fulfilling the EIA Study of the Project. This SSTP presents the review of existing sediment data and provides a proposal for sampling and chemical testing of the sediment for approval by EPD. A separate SSTP/Sediment Quality Report in accordance with ETWB TC(W) No. 34/2002 – Management of Dredged/Excavated Sediment will be prepared when applying for the dumping permit under the Dumping at Sea Ordinance (DASO). The rationale for sediment removal / disposal will be agreed with Marine Fill Committee (MFC) of CEDD.

1.2 Scope of Works

1.2.1 The works for this Project in Sha Tau Kok mainly comprises of the following items and the layout plan is shown in **Drawing no. 180579/B&V/GL/001.**

a) Increase the treatment capacity of Sha Tau Kok Sewage Treatment Works (STKSTW) to 5,000 m^3/day at Average Dry Weather Flow (ADWF) by 2020, with suitable allowance to cater for a further increase of treatment capacity to 10,000 m^3/day at ADWF after 2030 in Phase 2.

b) Construct a temporary sewage treatment plant (TSTP).

c) Demolish the existing Sha Tau Kok Sewage Pumping Station (STKSPS) and decommission the rising main between STKSPS and STKSTW.

d) Construct a new gravity sewer.

e) Decommission the existing submarine outfall and construct a new one.

1.2.2 The existing submarine outfall is inadequate to cope with the increased sewage flow in the future after expansion of the STKSTW. In addition, the existing submarine outfall is discharging near-shore of Starling Inlet which may lead to unacceptable water quality impact to surrounding marine water sensitive receivers including the nearby Sha Tau Kok Fish Culture Zone. A new

submarine outfall is required to be constructed to discharge the treated effluent further from shore within Starling Inlet. The discharge point of the proposed submarine outfall will be located in the water near Ah Kung Au.

1.2.3 The proposed submarine outfall of 1.7 km long and diameter of 450 mm will be constructed by trenchless method under the seabed of Starling Inlet to minimize the need for marine sediment dredging works. A diffuser is proposed at the discharge location. Localised excavation of marine sediment is required to facilitate its construction. Based on the engineering design, the existing seabed will be exposed for a length of approximately 54m by excavation method. The trapezoidal trench will be approximately 22m top wide (3m bottom wide) and 4.5m deep. The total volume of marine sediment requiring disposal is expected to be about 3,040 m^3. The location of the proposed excavation area is shown in **Drawing no. 180579/B&V/SQR/001**.

1.3 Rationale for Sediment Removal

Need for Sediment Removal

1.3.1 The existing submarine outfall is inadequate to cope with the increased sewage flow in the future. Construction of a new submarine outfall with larger capacity is necessary to discharge the treated effluent. A diffuser is required to allow proper water mixing at the discharge point. The submarine outfall will be constructed using Horizontal Directional Drilling (HDD), a trenchless technology to avoid the need to dredge the sediment along the entire length of the submarine outfall. No sediment will be generated along the submarine outfall. However, a localized excavation of a small area is inevitably required to retrieve the drill bit and to facilitate the construction of the diffuser. The removal of sediment at the diffuser works area is therefore necessary.

Consideration on Possible Reduce / Reuse of the Excavated Sediment

Reduce

1.3.2 Various construction methods for the construction of the submarine outfall have been considered. The use of conventional dredging method will generate about 40,000 m^3 of sediment while Tunnel Boring Machine (TBM) will generate about 7,500 m^3 of sediment. With the use of the proposed HDD, only a localized dredging of a small area is required to retrieve the drill bit and construction of the diffuser. The excavation area (54m (L) x 22m (W) x 4.5m (D)) has been minimized based on the optimal diffuser design including the number of discharge ports and the adequate working space required for worker safety during construction. The amount of sediment requiring excavation (about 3,040 m^3) has been reduced to the absolute minimum.

Reuse

1.3.3 The design of the STKSTW expansion has been optimized to avoid encroaching into the nearby government land. All the works including a temporary sewage

treatment plant will be constructed within the limit of the existing STKSTW. As such, there is no space available on-site to store, handle or reuse the excavated sediment.

1.3.4 The Project will generate fill material rather than requiring fill material.

1.3.5 If the sediment were to be reused in STKSTW, additional handling is required at the Sha Tau Kok (STK) pier thereby generating additional construction traffic to transport the wet sediment to the STKSTW. This will generate additional environmental and traffic nuisance to the STK residents. Potential impact to the nearby STK Fish Culture Zone will also increase due to the additional handling of sediment. Due to the severe space constraint and potential nuisance generated, the reuse of sediment within STKSTW is considered not practicable.

1.3.6 The potential to reuse the sediment as filling material after construction of the outfall diffuser has been considered. The void space after constructing the diffuser will need to be filled with armour rock / rock fill to provide protection measure to the diffuser. Reusing the sediment at the works site is not feasible.

1.3.7 Based on our understanding from DSD, there are currently no DSD projects or works contract requiring marine sediment as fill material. Reusing the sediment in other DSD projects or works site is not possible.

1.3.8 Some government departments have conducted trial on using marine sediment to manufacture paving blocks. Such technique requires land to set up handling and manufacturing areas. As space is not available at STKSTW, this option is considered not practicable.

1.4 Previous Sediment Quality Information

EPD Sediment Monitoring Data between 2009 and 2013

1.4.1 The closest EPD sediment monitoring in the vicinity of the proposed marine excavation location is station MS1 in Starling Inlet in the Mirs Bay Water Control Zone (see **Drawing no. 180579/B&V/SQR/001**). MS1 is located about 450 m away from the proposed submarine outfall diffuser. The results of the seabed sediment testing at MS1 between 2009 and 2013 extracted from EPD's Marine Water Quality in Hong Kong are shown in **Appendix A**. Based on the sediment quality data at station MS1, the average concentration of all contaminants are below the Lower Chemical Exceedance Level (LCEL) except for a slight exceedance for silver. Thus Category 'L' sediment and Category 'M" sediment are likely present.

1.5 Anticipated Disposal Requirements

1.5.1 Based on the above historic sediment quality information, it is tentatively anticipated that marine disposal at Type 1 – Open Sea Disposal, Type 1 – Open Sea Disposal (Dedicated Sites) or Type 2 – Confined Marine Disposal may be required subject to further chemical testing (and biological screening if required). Nonetheless, the final disposal arrangement shall be determine

based on the sediment characterisation in accordance with ETWB TC(W) No. 34/2002.

2. PROPOSED SEDIMENT SAMPLING AND CHEMICAL TESTING

2.1 General

2.1.1 The proposed sediment sampling and testing arrangements comply with the requirements stipulated in ETWB TC(W) No. 34/2002 – Management of Dredged/Excavated Sediment.

2.2 Project Schedule

2.2.1 The tentative schedules for carrying out the sampling and testing of the marine sediment and excavation works are shown in ***Table 1*** below.

Table 1 - Schedule of Works

Activities	Tentative Schedule
Sediment sampling	Mid November 2015
Chemical testing	Mid November 2015
Submission of preliminary sediment quality report	End November 2015
Biological testing	TBA
Sediment excavation works	3rd quarter of 2017

2.3 Proposed Sampling

2.3.1 Sediment sampling will be conducted by contractor. B&V will provide technical supervision during sampling. The laboratory testing works will be conducted by a HOKLAS laboratory.

2.3.2 With reference to the nearby EPD sediment monitoring location, while most of the sediment is expected with low level of contamination, some slight exceedance was noted. Surface sampling followed by vertical profile sampling is recommended. One (1) sampling location is proposed. The location of the proposed sampling location and area to be excavated are shown in **Figure 180579/B&V/SQR/001**. The sampling locations coordinates are shown in **Table 2**.

2.3.3 In preparation of any required biological screening, a reference sample (RS1) will be collected by grab sample at Port Shelter in Sai Kung (850234E, 820057N) as shown in **Appendix B**. This will be confirmed once chemical testing results are available.

Table 2 – Data for Proposed Sampling Locations

Sample Location	Easting	Northing	Sample Depth	No. of Samples
S1	842478.1	845003.8	Surface (grab sample) 0m-0.3m below seabed	1
			0.3m-0.9m below seabed	1
RS1	850234	820057	Surface (grab sample)	1

3. SAMPLING AND TESTING DETAILS

3.1 Sampling Procedures

3.1.1 At the sampling location, surface grab sample will be taken using Van Veen Grab Sampler lowered from a boat. For sampling below seabed level, gravity coring will be used. The sampling tube will be manually driven from the boat into the seabed to obtain the sediment sample at the required depth.

3.2 Sediment Sample

3.2.1 The surface grab sample will be transferred to sampling containers (sampling bottles and heavy duty plastic bags) provided by the laboratory.

3.2.2 Sampling will be repeated at the immediate adjacent location to ensure the sample size is sufficient to conduct the necessary chemical test and, if required, biological test.

3.2.3 The sampling tube will be sealed with close fitting lids / caps at both ends of the sampling tubes.

3.2.4 All samples will be labelled immediately after being taken. Each sample will be clearly labelled, where appropriate, with "top", "bottom" and sample identity (e.g. sampling number, location, depth and date). The samples will be placed in cool box which will be capable of storing the samples at 4 °C or lower without freezing before delivery to the laboratory.

3.3 Sample Handling and Storage

3.3.1 No sub-sample will be retrieved on site. The whole sample handling process will be promptly carried out under controlled conditions in the laboratory to avoid cross contamination. All samples will be delivered to the testing laboratory at the end of each working day. All samples will be handled under chain of custody protocols and relinquished to the laboratory representatives at locations specified by the laboratory.

3.3.2 The following sampling bottle and pre-treatment methods will be used and followed after the samples are delivered to the laboratory for testing.

Table 3 - Types of Sampling Bottles and Pre-treatment Methods

Parameters to be tested	Sampling Bottle	Pre-treatment Procedure
Metal and Metalloid	High density polyethylene bottles*	USEPA SW-846+ Chapter 3
Organic	Wide mouth Borosilicate glass bottles with Teflon lined lid*	USEPA SW-846 Chapter 4

+ Test methods for evaluating solid waste: physical / chemical methods, SW-846, 3rd edition, USEPA.
* Heavy duty plastic bags may be used for the storage of sediment sample for testing metals, metalloid and biological response.

3.3.3 All sampling container will be labelled for ease of reference. The collected samples will be kept at 4 °C in the dark and not be frozen after the samples are collected from the seabed and during transportation of the sample from the sampling site to the laboratory for testing.

3.3.4 The maximum holding time is 2 weeks for chemical tests and 8 weeks for biological tests.

3.4 Decontamination Procedures

3.4.1 Sampling equipment used during the course of the investigation will be decontaminated by manual washing and water rinsing before and after each sampling event. All disposable equipment will be discarded after each use.

3.5 Testing Plan and Methods

3.5.1 The following sediment sample size from each sampling location will be subject to analysis by HOKLAS accredited laboratory for analytical methods as required for this assignment (***Table 4***).

Table 4 – Sediment Sampling Plan

Sample Depth	Sample Type	Sample Size (*)
Surface (0m-0.3m)	Grab sample	At least 7 litres
0.3m-0.9m	Sampling tube	

(*) – Sample sizes required for the testing of metals & metalloid, organic and biological response are 0.5, 0.5 and 6 litres respectively

3.5.2 Only surface sample will be obtained at reference point RS1 with size of 18 litres.

3.5.3 All samples will be tested for all the contaminants, and with analytical methods given in ***Table 5***. Alternative analytical methods with HOKLAS accreditation (or an equivalent national accreditation in the case of overseas laboratories) that will produce equivalent or better results/reporting limits may be proposed by the laboratory and used subject to approval by EPD.

Table 5 – Analytical Methods

Parameters	Preparation Method US EPA Method	Determination Method US EPA Method	Reporting Limit
Metals (mg/kg dry wt.)			
Cadmium (Cd)	3050B	6020A or 7000A or 7131A	0.2
Chromium (Cr)	3050B	6010C or 7000A or 7190	8
Copper (Cu)	3050B	6010C or 7000A or 7210	7
Mercury (Hg)	7471A	7471A	0.05
Nickel (Ni)	3050B	6010C or 7000A or 7520	4
Lead (Pb)	3050B	6010C or 7000A or 7420	8
Silver (Ag)	3050B	6020A or 7000A or 7761	0.1
Zinc (Zn)	3050B	6010C or 7000A or 7950	20
Metalloid (mg/kg dry wt.)			
Arsenic (As)	3050B	6020A or 7000A or 7061A	1
Organic-PAHs (µg/kg dry wt.)			
Low Molecular Weight PAHs+	3550B or 3540C and 3630C	8260B or 8270C	55
High Molecular Weight PAHs++	3550B or 3540C and 3630C	8260B or 8270C	170
Organic-non-PAHs (µg/kg dry wt.)			
Total PCBs+++	3550B or 3540C and 3665A	8082	3
Organometallics (µgTBT/L in interstitial water)			
Tributyltin	Krone et al. (1989)* – GC/MS UNEP/IOC/IAEA**	Krone et al. (1989)* – GC/MS UNEP/IOC/IAEA**	0.015

Notes:

(i) The reporting limits shown in this table are the most stringent limits which will be specified by DEP. Project proponents should consult DEP on the required limits in the preparation of proposals for sampling and chemical testing of the sediment.

(ii) Other equivalent methods may be used subject to the approval of DEP.

\+ Low molecular weight PAHs include acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene

++ High molecular weight PAHs include benzo[a]anthracene, benzo[a]pyrene, chrysene, dibenzo[a,h]anthracene, fluoranthene, pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, indeno[1,2,3-c,d]pyrene and benzo[g,h,i]perylene

+++ The reporting limit is for individual PCB congeners. Total PCBs include 2,4' diCB, 2,2',5 triCB, 2,4,4' triCB, 2,2',3,5' tetraCB, 2,2',5,5' tetraCB, 2,3',4,4' tetraCB, 3,3',4,4' tetraCB, 2,2',4,5,5' pentaCB, 2,3,3',4,4' pentaCB, 2,3',4,4',5 pentaCB, 3,3',4,4',5 pentaCB, 2,2',3,3',4,4' hexaCB, 2,2',3,4,4',5' hexaCB, 2,2',4,4',5,5' hexaCB, 3,3'4,4',5,5' hexaCB, 2,2',3,3',4,4',5 heptaCB, 2,2',3,4,4',5,5' heptaCB, 2,2',3,4',5,5',6 heptaCB (ref: the "summation" column of Table 9.3 of *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual (The Inland Testing Manual)* published by USEPA).

* Krone et al. (1989), A method for analysis of butyltin species and measurement of butyltins in sediment and English Sole livers from Puget Sound, Marine Environmental Research 27 (1989) 1-18. Interstitial water to obtained by centrifuging the sediment and collecting the overlying water.

** UNEP/ICO/IAEA refers to IAEA's Marine Environment Laboratory reference methods. These methods are available free of charge from UNEP/Water or Marine Environmental Studies Laboratory at IAEA's Marine Environment Laboratory. Interstitial water to be obtained by centrifuging the sediment and collecting the overlying water.

3.5.4 The laboratory testing works will be conducted by a HOKLAS accredited laboratory.

3.6 Timetable

3.6.1 The anticipated timetable for taking sample, carrying out the tests and producing the Sediment Quality Report for chemical and biological screening (if necessary) is provided in ***Table 1***.

3.6.2 Upon approval of the Sediment Sampling and Testing Plan by EPD, sediment sampling followed by chemical testing will be conducted. A Preliminary Sediment Quality Report (PSQR) will then be submitted to EPD. The PSQR will include the sampling details, the chemical testing results, quality control records, proposed classification and delineation of sediment according to ETWB TCW No. 34/2002.

3.6.3 If Category M sediment and/or certain Category H sediment are found in the sediment, a biological screening in accordance to ETWB TCW No. 34/2002 will be conducted.

END OF TEXT

DRAWINGS

840 600 E
840 800 E
841 000 E
841 200 E
845 200 N
845 000 N
844 800 N

N

SHA HO ROAD
SHUN HING STREET
SHA TAU KOK CHUEN
SHA TAU KOK ROAD-SHEK CHUNG AU
SHA TAU KOK ROAD – SHEK CHUNG AU
SHUN LUNG STREET
STARLING INLET

CONNECT TO PUBLIC SEWER
CONNECT TO PUBLIC SEWER
PROPOSED DEMOLITION OF SHA TAU KOK SEWAGE PUMPING STATION
PROPOSED GRAVITY SEWER
SHA TAU KOK SEWER TREATMENT WORKS
PROPOSED EXPANSION OF SHA TAU KOK SEWAGE TREATMENT WORKS
PROPOSED TEMPORARY SEWAGE TREATMENT PLANT
PROPOSED SUBMARINE OUTFALL
DECOMMISSION OF EXISTING EFFLUENT OUTFALL

LEGEND:

- PROPOSED EXPANSION OF SEWAGE TREATMENT WORKS
- PROPOSED DEMOLITION OF SEWAGE PUMPING STATION
- PROPOSED SEWER BY TRENCHLESS METHOD
- PROPOSED GRAVITY SEWER
- RM — DECOMMISSION OF EXISTING RISING MAIN

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	JW	HTL	SZ	HTL	
Date	AUG2015	AUG2015	AUG2015	AUG2015	

Approved

PRELIMINARY

Agreement no.

CE 63/2012 (DS)

Contract title

EXPANSION OF SHA TAU KOK SEWAGE TREATMENT WORKS, PHASE 1 - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing title

PROPOSED LAYOUT PLAN

Drawing no.: 180579/B&V/GL/001

Revision: –

Scale: A1 1 : 1000 A3 1 : 2000

香港特別行政區政府渠務署
THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date = 8/28/2015

CAD Filename = Y:\Daily Work\20150828J\180579-B&V-GL-001.dgn

840 000 E | 841 000 E | 842 000 E | 841 000 E

846 000 N | 845 000 N | 844 000 N | 843 000 N

AREA TO BE DREDGED		
POINTS	COORDINATES	
	EASTING	NORTHING
A	842448.985	845002.307
B	842497.900	845025.182
C	842458.304	844982.379
D	842507.220	845005.254
SEDIMENT SAMPLING STATION		
SAMPLE NUMBER	COORDINATES	
	EASTING	NORTHING
S1	842478.102	845003.780

N

BOUNDARY OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

EXISTING ø250mm EFFLUENT OUTFALL

PROPOSED 450mm DIAMETER SUBMARINE OUTFALL

ZOOM 'A'

AREA TO BE DREDGED

PROPOSED DIFFUSER

MS1

SHA TAU KOK FISH CULTURE ZONE

SHA TAU KOK

SHA TAU KOK HOI

TAI WAN

SHA TAU KOK RIVER

Sheung Tam Shui Hang

Ha Tam Shui Hang

Kong Ha Kok

Tsoi Yuen

Police Post

Sha Tau Kok

Sha Tau Kok Chuen

Tsiu Hang

Muk Min Tau

Sewage Treatment Works

Yim Liu Ha

San Tsuen

Nga Yiu Tau

Tong To

Tong To Ping Tsuen

Fung Hang

Kuk Po San Uk Ha

Kuk Po Lo Wai

KUK PO

Yi To

Sam To

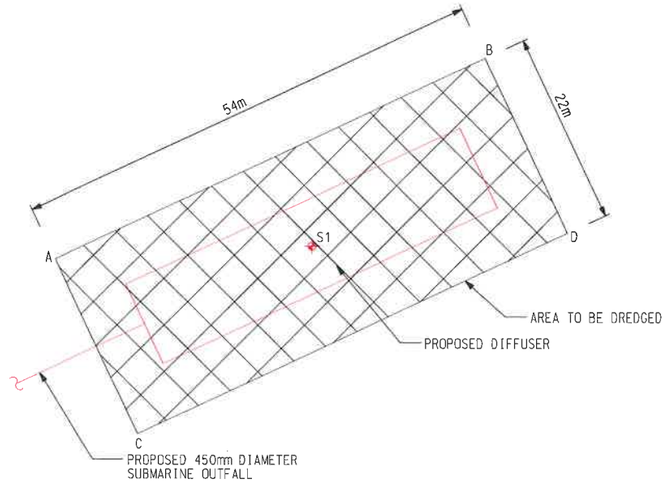
Sze To

Ng To

Yung Shue Au

YUNG SHUE AU WAN

AH KUNG WAN



ZOOM 'A'

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	JW	HTL	SZ	HTL
Date	SEP2015	SEP2015	SEP2015	SEP2015

Approved

PRELIMINARY

Agreement no.

CE 63/2012 (DS)

Contract title

EXPANSION OF SHA TAU KOK SEWAGE TREATMENT WORKS, PHASE 1 – INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing title

LOCATION PLAN OF SEDIMENT SAMPLING

Drawing no.: 180579/B&V/SQR/001

Revision: –

Scale: A1 1 : 7000 A3 1 : 14000

香港特別行政區政府渠務署
THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date = 9/21/2015

CAD Filename = Y:\Daily Work\20150921h\180579-B&V-SQR-001.dgn

APPENDIX A
EPD Sediment Quality Data
(Excerpts from EPD's Marine Water Quality in Hong Kong in 2009-2013)

Summary statistics for bottom sediment quality in the Port Shelter and Mirs Bay WCZs, 2005 - 2009

Parameter	Inner Port Shelter	Outer Port Shelter		Starling Inlet	Crooked Island		Port Island	Mirs Bay (North)
	PS3	PS5	PS6	MS1	MS2	MS7	MS17	MS3
Number of samples	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**
Particle Size Fractionation <63µm (%w/w)	87 (58 - 96)	58 (34 - 92)	79 (66 - 91)	86 (64 - 95)	84 (21 - 99)	92 (83 - 99)	89 (77 - 98)	88 (82 - 96)
Electrochemical Potential (mV)	-240 ((-308) - (-180))	-148 ((-240) - (-94))	-175 ((-252) - (-73))	-278 ((-372) - (-215))	-332 ((-368) - (-298))	-342 ((-368) - (-306))	-243 ((-295) - (-184))	-237 ((-327) - (-117))
Total Solids (%w/w)	36 (33 - 41)	53 (38 - 63)	49 (46 - 53)	40 (36 - 44)	32 (31 - 35)	30 (27 - 33)	35 (33 - 41)	42 (31 - 54)
Total Volatile Soilds (%w/w)	11.6 (8.5 - 14.0)	7.8 (4.7 - 10.0)	8.4 (7.2 - 11.0)	7.5 (6.4 - 11.0)	9.2 (7.5 - 15.0)	10.3 (8.9 - 15.0)	9.2 (7.6 - 15.0)	8.4 (5.1 - 12.0)
Chemical Oxygen Demand (mg/kg)	18000 (14000 - 20000)	12000 (9900 - 14000)	13000 (11000 - 15000)	18000 (14000 - 23000)	17000 (13000 - 20000)	18000 (16000 - 20000)	17000 (15000 - 20000)	16000 (11000 - 19000)
Total Carbon (%w/w)	1.2 (1.0 - 1.4)	1.8 (0.9 - 3.0)	1.3 (1.1 - 1.4)	0.7 (0.6 - 0.8)	0.6 (0.5 - 0.7)	0.7 (0.6 - 0.9)	0.8 (0.7 - 1.0)	0.8 (0.5 - 1.1)
Ammonical Nitrogen (mg/kg)	6.36 (0.10 - 14.00)	5.14 (1.30 - 11.00)	6.5 (2.40 - 9.10)	8.82 (2.60 - 18.00)	13.54 (7.10 - 20.00)	9.0 (4.80 - 14.00)	5.47 (0.75 - 10.00)	4.96 (<0.05 - 10.00)
Total Kjeldahl Nitrogen (mg/kg)	550 (280 - 680)	370 (210 - 570)	420 (210 - 580)	450 (290 - 600)	600 (520 - 670)	630 (340 - 730)	660 (590 - 770)	440 (290 - 660)
Total Phosphorus (mg/kg)	170 (87 - 210)	150 (83 - 200)	170 (89 - 230)	160 (95 - 250)	180 (170 - 180)	190 (140 - 210)	210 (180 - 250)	160 (110 - 220)
Total Sulphide (mg/kg)	44 (4.1 - 270.0)	6.6 (0.7 - 15.0)	12 (0.5 - 36.0)	74 (11.0 - 170.0)	70 (8.0 - 190.0)	24 (1.8 - 82.0)	36 (1.1 - 180.0)	11 (1.9 - 25.0)
Total Cyanide (mg/kg)	0.1 (<0.1 - 0.2)	<0.1 (<0.1 - <0.1)	0.1 (<0.1 - 0.1)	0.2 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)
Arsenic (mg/kg)	5.8 (4.8 - 6.5)	3.8 (0.2 - 5.2)	5.9 (5.2 - 6.6)	8.4 (6.9 - 9.3)	6.8 (5.7 - 7.9)	6.4 (5.8 - 7.6)	6.2 (4.4 - 7.3)	6.2 (5.0 - 7.1)
Cadmium (mg/kg)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	0.3 (0.2 - 0.5)	0.3 (0.1 - 0.3)	0.2 (0.1 - 0.4)	0.1 (<0.1 - 0.1)	<0.1 (<0.1 - <0.1)
Chromium (mg/kg)	27 (20 - 34)	22 (13 - 31)	26 (22 - 30)	30 (26 - 35)	36 (33 - 39)	34 (31 - 39)	33 (25 - 38)	29 (19 - 33)
Copper (mg/kg)	22 (18 - 29)	10 (6 - 16)	12 (10 - 14)	34 (23 - 42)	21 (14 - 23)	20 (16 - 22)	16 (12 - 19)	12 (10 - 15)
Lead (mg/kg)	36 (30 - 40)	26 (15 - 38)	31 (26 - 35)	49 (41 - 56)	46 (39 - 51)	43 (38 - 51)	44 (28 - 50)	35 (24 - 39)
Mercury (mg/kg)	0.09 (0.07 - 0.11)	0.05 (<0.05 - 0.05)	<0.05 (<0.05 - <0.05)	0.08 (0.06 - 0.10)	0.06 (<0.05 - 0.06)	0.07 (0.06 - 0.09)	0.06 (<0.05 - 0.07)	0.06 (<0.05 - 0.13)
Nickel (mg/kg)	19 (15 - 23)	16 (9 - 24)	20 (16 - 24)	19 (16 - 24)	24 (21 - 27)	24 (22 - 27)	25 (18 - 30)	21 (13 - 25)
Silver (mg/kg)	0.2 (<0.2 - 0.3)	<0.2 (<0.2 - <0.2)	<0.2 (<0.2 - <0.2)	1.2 (0.6 - 1.4)	0.3 (<0.2 - 0.5)	0.2 (<0.2 - 0.3)	0.2 (<0.2 - 0.2)	<0.2 (<0.2 - <0.2)
Zinc (mg/kg)	100 (73 - 130)	67 (29 - 93)	77 (53 - 90)	110 (92 - 140)	110 (92 - 120)	100 (82 - 120)	100 (77 - 120)	80 (51 - 96)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4]	90 (90 - 90)	90 (90 - 90)	90 (90 - 90)	91 (90 - 100)	90 (90 - 90)	90 (90 - 94)	90 (90 - 90)	91 (90 - 97)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	53 (24 - 77)	26 (17 - 34)	27 (20 - 40)	52 (28 - 190)	35 (24 - 51)	49 (28 - 71)	38 (29 - 54)	31 (20 - 67)

Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.
4. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.
5. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.
6. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

Summary statistics for bottom sediment quality in the Port Shelter and Mirs Bay WCZs, 2006 – 2010

Parameter	Inner Port Shelter	Outer Port Shelter		Starling Inlet	Crooked Island		Port Island	Mirs Bay
	PS3	PS5	PS6	MS1	MS2	MS7	MS17	(North) MS3
Number of samples	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**
Particle Size Fractionation <63 μm (%w/w)	87 (58 - 96)	62 (24 - 92)	79 (66 - 91)	85 (64 - 93)	85 (21 - 99)	91 (83 - 99)	89 (77 - 95)	87 (78 - 96)
Electrochemical Potential (mV)	-202 ((-294) - (-39))	-127 ((-240) - (-21))	-144 ((-252) - (-65))	-254 ((-346) - (-121))	-287 ((-368) - (-109))	-337 ((-368) - (-306))	-221 ((-295) - (-63))	-217 ((-327) - (-113))
Total Solids (%w/w)	37 (33 - 41)	52 (38 - 63)	51 (46 - 55)	41 (36 - 45)	32 (31 - 34)	30 (27 - 35)	35 (33 - 39)	45 (38 - 58)
Total Volatile Soilds (%w/w)	11.0 (8.5 - 14.0)	7.8 (4.7 - 10.0)	7.9 (6.4 - 11.0)	7.5 (6.4 - 11.0)	9.1 (7.5 - 15.0)	10.0 (8.9 - 15.0)	9.3 (7.8 - 15.0)	7.6 (4.0 - 12.0)
Chemical Oxygen Demand (mg/kg)	18000 (14000 - 20000)	12000 (9900 - 14000)	13000 (11000 - 15000)	17000 (14000 - 23000)	16000 (13000 - 20000)	17000 (16000 - 20000)	16000 (15000 - 19000)	14000 (9900 - 19000)
Total Carbon (%w/w)	1.2 (1.0 - 1.4)	1.9 (0.9 - 3.7)	1.3 (1.1 - 1.5)	0.7 (0.6 - 0.8)	0.6 (0.5 - 0.8)	0.7 (0.6 - 0.9)	0.8 (0.6 - 1.0)	0.7 (0.5 - 1.1)
Ammonical Nitrogen (mg/kg)	5.10 (0.10 - 11.00)	6.40 (1.30 - 11.00)	6.40 (2.40 - 9.10)	6.80 (0.13 - 15.00)	11.00 (0.07 - 20.00)	9.60 (4.80 - 14.00)	5.20 (0.23 - 10.00)	4.80 (0.05 - 10.00)
Total Kjeldahl Nitrogen (mg/kg)	540 (280 - 680)	400 (210 - 680)	430 (210 - 580)	420 (290 - 510)	580 (460 - 670)	600 (340 - 730)	640 (590 - 720)	430 (290 - 510)
Total Phosphorus (mg/kg)	170 (87 - 210)	160 (83 - 210)	180 (89 - 230)	150 (95 - 180)	180 (150 - 190)	180 (140 - 210)	200 (180 - 220)	150 (110 - 170)
Total Sulphide (mg/kg)	16 (4 - 41)	6 (1 - 14)	7 (1 - 24)	53 (11 - 130)	49 (8 - 160)	23 (2 - 96)	20 (1 - 84)	13 (2 - 25)
Total Cyanide (mg/kg)	0.1 (0.1 - 0.2)	0.1 (0.1 - 0.2)	<0.1 (0.1 - <0.1)	0.2 (0.1 - 0.2)	0.2 (0.1 - 0.2)	0.2 (0.1 - 0.2)	0.1 (0.1 - 0.2)	0.1 (0.1 - 0.2)
Arsenic (mg/kg)	5.8 (4.8 - 6.3)	4.1 (0.2 - 5.6)	5.8 (5.2 - 6.5)	8.2 (6.9 - 9.2)	6.8 (5.7 - 7.9)	6.6 (5.8 - 7.6)	6.4 (5.6 - 7.3)	6.3 (5.0 - 7.3)
Cadmium (mg/kg)	<0.1 (0.1 - <0.1)	<0.1 (0.1 - <0.1)	<0.1 (0.1 - <0.1)	0.3 (0.2 - 0.5)	0.3 (0.1 - 0.3)	0.2 (0.1 - 0.5)	<0.1 (0.1 - <0.1)	<0.1 (0.1 - <0.1)
Chromium (mg/kg)	27 (20 - 34)	22 (13 - 31)	25 (21 - 30)	29 (25 - 35)	36 (33 - 39)	35 (31 - 39)	34 (29 - 38)	29 (19 - 35)
Copper (mg/kg)	21 (16 - 26)	11 (6 - 16)	11 (9 - 14)	32 (23 - 42)	21 (14 - 23)	20 (16 - 23)	17 (15 - 19)	13 (10 - 17)
Lead (mg/kg)	36 (30 - 41)	27 (15 - 38)	30 (26 - 35)	48 (41 - 56)	46 (39 - 51)	44 (38 - 51)	46 (40 - 50)	35 (24 - 42)
Mercury (mg/kg)	0.08 (0.07 - 0.11)	<0.05 (0.05 - <0.05)	<0.05 (0.05 - <0.05)	0.07 (0.06 - 0.10)	0.05 (0.05 - 0.06)	0.06 (0.06 - 0.07)	0.06 (0.05 - 0.07)	0.06 (0.05 - 0.13)
Nickel (mg/kg)	18 (15 - 23)	17 (9 - 24)	19 (15 - 24)	18 (16 - 24)	24 (21 - 27)	24 (22 - 27)	26 (21 - 30)	20 (13 - 24)
Silver (mg/kg)	0.2 (0.2 - 0.3)	<0.2 (0.2 - <0.2)	<0.2 (0.2 - <0.2)	1.1 (0.6 - 1.4)	0.3 (0.2 - 0.5)	0.2 (0.2 - 0.3)	<0.2 (0.2 - <0.2)	<0.2 (0.2 - <0.2)
Zinc (mg/kg)	97 (73 - 130)	68 (29 - 93)	73 (53 - 90)	110 (88 - 140)	110 (92 - 120)	100 (82 - 120)	100 (87 - 120)	78 (51 - 96)
Total Polychlorinated Biphenyls (PCBs) (μg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (μg/kg) [4]	90 (90 - 90)	90 (90 - 94)	90 (90 - 94)	91 (90 - 100)	90 (90 - 90)	91 (90 - 100)	90 (90 - 90)	91 (90 - 97)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (μg/kg) [5] [6]	54 (24 - 82)	27 (17 - 34)	25 (20 - 40)	53 (28 - 190)	38 (25 - 51)	61 (28 - 170)	36 (29 - 44)	28 (19 - 67)

Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.
4. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.
5. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.
6. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

Summary statistics for bottom sediment quality in the Port Shelter and Mirs Bay WCZs, 2007 - 2011

Parameter	Inner Port Shelter	Outer Port Shelter		Starling Inlet	Crooked Island		Port Island	Mirs Bay
	PS3	PS5	PS6	MS1	MS2	MS7	MS17	(North) MS3
Number of samples	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**
Particle Size Fractionation <63µm (%w/w)	87 (58 - 94)	59 (24 - 92)	73 (48 - 91)	86 (64 - 95)	91 (76 - 99)	92 (83 - 96)	87 (77 - 94)	78 (45 - 93)
Electrochemical Potential (mV)	-211 (-310 - -39)	-158 (-381 - -21)	-174 (-378 - -65)	-246 (-367 - -121)	-265 (-367 - -109)	-332 (-368 - -277)	-215 (-295 - -63)	-218 (-371 - -113)
Total Solids (%w/w)	37 (35 - 41)	51 (38 - 63)	52 (46 - 55)	40 (36 - 45)	33 (31 - 34)	30 (27 - 35)	35 (32 - 41)	47 (38 - 61)
Total Volatile Soilds (%w/w)	10.7 (8.5 - 12.0)	7.6 (4.7 - 10.0)	7.3 (6.4 - 8.3)	7.1 (6.4 - 7.8)	8.3 (7.5 - 9.4)	9.5 (8.9 - 11.0)	8.6 (7.8 - 9.3)	6.5 (3.1 - 8.9)
Chemical Oxygen Demand (mg/kg)	17300 (14000 - 20000)	11690 (9900 - 14000)	12100 (11000 - 14000)	15200 (11000 - 19000)	15200 (13000 - 17000)	16500 (13000 - 19000)	15300 (13000 - 18000)	12790 (9900 - 17000)
Total Carbon (%w/w)	1.2 (1.0 - 1.4)	1.9 (0.9 - 3.7)	1.4 (1.1 - 1.6)	0.7 (0.6 - 0.8)	0.6 (0.5 - 0.8)	0.7 (0.6 - 0.9)	0.8 (0.6 - 1.0)	0.7 (0.5 - 1.1)
Ammonical Nitrogen (mg/kg)	5.0 (0.1 - 11.0)	6.5 (1.3 - 11.0)	11.3 (0.4 - 60.0)	6.3 (0.1 - 13.0)	9.9 (0.1 - 20.0)	9.5 (4.8 - 14.0)	4.4 (0.2 - 7.1)	5.3 (1.4 - 10.0)
Total Kjeldahl Nitrogen (mg/kg)	560 (340 - 680)	420 (210 - 680)	440 (210 - 580)	440 (290 - 520)	560 (460 - 610)	600 (340 - 710)	640 (580 - 740)	410 (250 - 510)
Total Phosphorus (mg/kg)	170 (110 - 210)	160 (83 - 210)	190 (89 - 230)	160 (95 - 190)	170 (150 - 190)	180 (140 - 210)	200 (180 - 220)	150 (100 - 170)
Total Sulphide (mg/kg)	14 (4 - 41)	8 (1 - 23)	16 (1 - 98)	44 (11 - 120)	31 (1 - 69)	24 (2 - 96)	13 (1 - 35)	17 (2 - 54)
Total Cyanide (mg/kg)	0.1 (0.1 - 0.2)	0.1 (0.1 - 0.2)	<0.1 (0.1 - <0.1)	0.2 (0.1 - 0.2)	0.2 (0.1 - 0.2)	0.2 (0.1 - 0.2)	0.2 (0.1 - 0.2)	0.1 (0.1 - 0.2)
Arsenic (mg/kg)	5.7 (4.8 - 6.3)	4.1 (0.2 - 5.6)	5.7 (5.2 - 6.5)	8.2 (6.9 - 9.2)	7.1 (5.7 - 7.9)	6.7 (5.8 - 7.6)	6.3 (5.6 - 6.9)	6.3 (5.0 - 7.3)
Cadmium (mg/kg)	<0.1 (0.1 - <0.1)	<0.1 (0.1 - <0.1)	<0.1 (0.1 - <0.1)	0.3 (0.1 - 0.4)	0.3 (0.1 - 0.3)	0.2 (0.1 - 0.5)	<0.1 (0.1 - <0.1)	<0.1 (0.1 - <0.1)
Chromium (mg/kg)	26 (20 - 34)	22 (13 - 31)	24 (20 - 30)	28 (25 - 32)	36 (33 - 39)	35 (31 - 39)	33 (29 - 38)	27 (19 - 35)
Copper (mg/kg)	20 (12 - 25)	11 (6 - 16)	11 (9 - 14)	29 (20 - 39)	21 (14 - 23)	20 (16 - 26)	16 (14 - 19)	13 (10 - 17)
Lead (mg/kg)	36 (30 - 41)	28 (15 - 38)	30 (26 - 35)	47 (41 - 56)	46 (39 - 51)	43 (38 - 48)	44 (40 - 49)	34 (24 - 42)
Mercury (mg/kg)	0.08 (0.07 - 0.10)	0.05 (0.05 - 0.06)	<0.05 (0.05 - <0.05)	0.07 (0.06 - 0.10)	0.06 (0.05 - 0.07)	0.07 (0.06 - 0.09)	0.06 (0.05 - 0.07)	0.06 (0.05 - 0.13)
Nickel (mg/kg)	18 (15 - 21)	16 (9 - 24)	18 (15 - 22)	18 (16 - 20)	24 (21 - 25)	24 (22 - 27)	24 (21 - 28)	19 (13 - 23)
Silver (mg/kg)	0.2 (0.2 - 0.3)	<0.2 (0.2 - <0.2)	<0.2 (0.2 - <0.2)	0.9 (0.5 - 1.4)	0.3 (0.2 - 0.5)	0.2 (0.2 - 0.3)	<0.2 (0.2 - <0.2)	<0.2 (0.2 - <0.2)
Zinc (mg/kg)	91 (69 - 130)	66 (29 - 93)	66 (51 - 82)	100 (88 - 130)	100 (92 - 120)	100 (82 - 120)	96 (87 - 110)	74 (51 - 96)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4]	96 (90 - 140)	93 (90 - 110)	94 (90 - 130)	96 (90 - 140)	91 (90 - 100)	98 (90 - 160)	93 (90 - 110)	92 (90 - 100)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	60 (38 - 82)	28 (19 - 36)	25 (20 - 40)	55 (28 - 190)	40 (25 - 51)	69 (28 - 170)	36 (29 - 44)	28 (18 - 67)

Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.
4. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.
5. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.
6. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

Summary statistics for bottom sediment quality in the Port Shelter and Mirs Bay WCZs, 2008 – 2012

Parameter	Inner Port Shelter	Outer Port Shelter		Starling Inlet	Crooked Island		Port Island	Mirs Bay (North)
	PS3	PS5	PS6	MS1	MS2	MS7	MS17	MS3
Number of samples	10	10	10	10	10	10	10	10
Particle Size Fractionation <63µm (%w/w)	87 (58 - 95)	57 (24 - 89)	74 (48 - 91)	87 (64 - 97)	93 (85 - 99)	93 (83 - 98)	89 (80 - 94)	71 (13 - 90)
Electrochemical Potential (mV)	-219 (-311 - -39)	-178 (-381 - -21)	-195 (-378 - -65)	-223 (-367 - -106)	-229 (-367 - -105)	-315 (-364 - -266)	-183 (-275 - -63)	-191 (-371 - -95)
Total Solids (%w/w)	37 (35 - 41)	50 (39 - 63)	50 (38 - 55)	39 (36 - 45)	33 (32 - 36)	29 (27 - 35)	35 (29 - 41)	49 (38 - 61)
Total Volatile Soilds (%w/w)	10.7 (8.5 - 12.0)	7.7 (4.7 - 10.0)	7.5 (6.4 - 9.4)	7.2 (6.4 - 7.8)	8.1 (7.5 - 8.9)	9.6 (8.9 - 11.0)	8.7 (7.8 - 10.0)	6.1 (3.1 - 8.8)
Chemical Oxygen Demand (mg/kg)	16900 (14000 - 20000)	11490 (9900 - 14000)	12000 (10000 - 14000)	14200 (11000 - 17000)	14400 (11000 - 16000)	15800 (13000 - 19000)	14800 (12000 - 18000)	11890 (9900 - 16000)
Total Carbon (%w/w)	1.2 (1.0 - 1.4)	1.9 (1.0 - 3.7)	1.3 (0.9 - 1.6)	0.7 (0.5 - 0.8)	0.7 (0.5 - 0.8)	0.7 (0.6 - 0.9)	0.8 (0.6 - 1.0)	0.7 (0.5 - 1.1)
Ammonical Nitrogen (mg/kg)	5.6 (0.1 - 11.0)	7.2 (2.4 - 11.0)	12.4 (0.4 - 60.0)	5.7 (0.1 - 12.0)	8.4 (0.1 - 20.0)	9.4 (4.8 - 14.0)	5.4 (0.2 - 11.0)	7.1 (1.4 - 25.0)
Total Kjeldahl Nitrogen (mg/kg)	630 (410 - 850)	500 (320 - 700)	530 (400 - 740)	480 (350 - 620)	560 (460 - 630)	630 (530 - 710)	640 (580 - 740)	430 (250 - 510)
Total Phosphorus (mg/kg)	190 (130 - 220)	180 (120 - 210)	210 (180 - 230)	170 (140 - 190)	180 (150 - 200)	190 (180 - 210)	200 (190 - 220)	160 (100 - 200)
Total Sulphide (mg/kg)	18 (4 - 41)	14 (1 - 35)	19 (1 - 98)	37 (11 - 87)	31 (1 - 69)	35 (2 - 96)	22 (1 - 88)	20 (2 - 54)
Total Cyanide (mg/kg)	0.1 (0.1 - 0.2)	0.1 (0.1 - 0.2)	<0.1 (<0.1 - 0.1)	0.2 (0.1 - 0.2)	0.2 (0.1 - 0.2)	0.2 (0.1 - 0.2)	0.2 (0.1 - 0.2)	0.1 (0.1 - 0.2)
Arsenic (mg/kg)	5.8 (4.8 - 6.3)	4.2 (0.2 - 5.6)	5.8 (5.6 - 6.5)	8.1 (6.9 - 8.9)	7.2 (5.7 - 7.9)	6.6 (5.8 - 7.4)	6.4 (5.7 - 7.0)	5.8 (3.8 - 7.3)
Cadmium (mg/kg)	<0.1 (<0.1 - 0.1)	<0.1 (<0.1 - 0.1)	<0.1 (<0.1 - 0.1)	0.2 (0.1 - 0.4)	0.3 (0.1 - 0.4)	0.3 (0.1 - 0.5)	<0.1 (<0.1 - 0.1)	<0.1 (<0.1 - 0.1)
Chromium (mg/kg)	27 (22 - 34)	22 (13 - 31)	24 (20 - 30)	27 (19 - 32)	35 (27 - 39)	35 (32 - 39)	34 (30 - 38)	27 (19 - 35)
Copper (mg/kg)	21 (12 - 26)	11 (6 - 15)	11 (9 - 14)	26 (17 - 39)	22 (19 - 23)	20 (16 - 26)	16 (14 - 19)	12 (7 - 17)
Lead (mg/kg)	36 (31 - 44)	27 (15 - 34)	30 (26 - 35)	45 (34 - 52)	46 (39 - 51)	43 (38 - 48)	43 (40 - 47)	32 (24 - 42)
Mercury (mg/kg)	0.08 (0.06 - 0.10)	0.05 (0.05 - 0.06)	<0.05 (<0.05 - 0.05)	0.07 (0.06 - 0.08)	0.06 (0.05 - 0.07)	0.07 (0.06 - 0.09)	0.06 (0.05 - 0.07)	0.06 (0.05 - 0.13)
Nickel (mg/kg)	18 (15 - 21)	16 (9 - 20)	18 (15 - 21)	17 (12 - 20)	23 (18 - 25)	23 (21 - 27)	24 (22 - 28)	18 (13 - 23)
Silver (mg/kg)	0.2 (0.2 - 0.3)	<0.2 (<0.2 - 0.2)	<0.2 (<0.2 - 0.2)	0.8 (0.4 - 1.3)	0.3 (0.2 - 0.5)	0.2 (0.2 - 0.3)	<0.2 (<0.2 - 0.2)	<0.2 (<0.2 - 0.2)
Zinc (mg/kg)	91 (69 - 130)	64 (29 - 92)	65 (51 - 82)	95 (69 - 110)	100 (87 - 120)	97 (82 - 120)	94 (87 - 110)	68 (51 - 89)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4]	99 (90 - 140)	94 (90 - 110)	96 (90 - 130)	97 (90 - 140)	92 (90 - 100)	100 (90 - 160)	95 (90 - 110)	94 (90 - 100)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	58 (35 - 82)	29 (19 - 36)	27 (20 - 40)	57 (28 - 190)	41 (31 - 51)	69 (28 - 170)	41 (31 - 65)	29 (18 - 67)

Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.
4. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.
5. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.
6. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

Summary statistics for bottom sediment quality in the Port Shelter and Mirs Bay WCZs, 2009 – 2013

Parameter	Inner Port Shelter PS3	Outer Port Shelter PS5	Outer Port Shelter PS6	Starling Inlet MS1	Crooked Island MS2	Port Island MS7	Port Island MS17	Mirs Bay (North) MS3
Number of samples	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**
Particle Size Fractionation <63µm (%w/w)	80 (12 - 95)	58 (24 - 85)	71 (48 - 89)	88 (64 - 97)	93 (85 - 99)	92 (83 - 98)	89 (80 - 94)	69 (13 - 90)
Electrochemical Potential (mV)	-219 (-376 - -39)	-191 (-397 - -21)	-197 (-382 - -65)	-196 (-367 - -106)	-211 (-367 - -105)	-308 (-364 - -235)	-170 (-277 - -63)	-167 (-371 - -95)
Total Solids (%w/w)	36 (32 - 40)	50 (39 - 62)	49 (38 - 55)	39 (36 - 45)	33 (32 - 36)	29 (26 - 35)	35 (29 - 41)	47 (36 - 61)
Total Volatile Soilds (%w/w)	11.0 (10.0 - 12.0)	8.0 (5.5 - 10.0)	7.8 (6.4 - 9.4)	7.3 (6.5 - 7.8)	8.3 (7.5 - 9.5)	9.9 (9.0 - 11.0)	8.9 (7.9 - 10.0)	6.4 (3.1 - 8.5)
Chemical Oxygen Demand (mg/kg)	16200 (10000 - 20000)	10800 (7400 - 14000)	11500 (9600 - 14000)	14300 (11000 - 17000)	14600 (11000 - 18000)	15400 (13000 - 19000)	13600 (8400 - 18000)	11900 (9900 - 14000)
Total Carbon (%w/w)	1.2 (1.0 - 1.4)	1.7 (1.0 - 3.7)	1.3 (0.9 - 1.6)	0.7 (0.5 - 0.8)	0.7 (0.5 - 0.8)	0.8 (0.6 - 0.9)	0.8 (0.6 - 1.1)	0.7 (0.6 - 1.1)
Ammonical Nitrogen (mg/kg)	5.50 (0.10 - 11.00)	6.90 (2.40 - 11.00)	12.40 (0.40 - 60.00)	6.40 (0.10 - 12.00)	8.10 (0.10 - 20.00)	10.10 (7.30 - 14.00)	6.50 (0.20 - 11.00)	7.20 (1.40 - 25.00)
Total Kjeldahl Nitrogen (mg/kg)	630 (310 - 850)	540 (340 - 710)	570 (400 - 740)	520 (350 - 620)	580 (460 - 680)	660 (530 - 800)	660 (580 - 770)	480 (250 - 610)
Total Phosphorus (mg/kg)	190 (160 - 220)	190 (120 - 230)	220 (180 - 250)	180 (140 - 200)	180 (150 - 200)	190 (170 - 210)	210 (190 - 220)	170 (100 - 220)
Total Sulphide (mg/kg)	26 (7 - 69)	19 (4 - 35)	25 (2 - 98)	47 (11 - 88)	48 (1 - 150)	57 (2 - 180)	30 (1 - 88)	36 (6 - 170)
Total Cyanide (mg/kg)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	<0.1 (<0.1 - 0.1)	0.2 (0.1 - 0.2)	0.2 (0.1 - 0.2)	0.2 (0.1 - 0.2)	0.2 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)
Arsenic (mg/kg)	5.6 (3.6 - 6.3)	4.5 (3.2 - 5.6)	5.9 (5.2 - 6.7)	8.1 (6.9 - 9.1)	7.4 (5.7 - 8.6)	6.9 (6.2 - 7.8)	6.3 (5.1 - 7.0)	5.6 (3.8 - 7.3)
Cadmium (mg/kg)	<0.1 (<0.1 - 0.1)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	0.2 (0.1 - 0.3)	0.3 (0.1 - 0.4)	0.3 (<0.1 - 0.5)	<0.1 (<0.1 - 0.1)	<0.1 (<0.1 - <0.1)
Chromium (mg/kg)	25 (16 - 29)	21 (14 - 28)	24 (20 - 30)	27 (19 - 31)	34 (27 - 38)	34 (32 - 38)	32 (26 - 35)	26 (19 - 35)
Copper (mg/kg)	20 (10 - 26)	11 (6 - 15)	11 (9 - 14)	24 (17 - 32)	22 (19 - 24)	21 (17 - 26)	16 (12 - 17)	12 (7 - 17)
Lead (mg/kg)	35 (21 - 44)	27 (18 - 34)	30 (26 - 35)	44 (34 - 51)	46 (39 - 50)	44 (41 - 48)	43 (40 - 47)	30 (20 - 42)
Mercury (mg/kg)	0.08 (0.06 - 0.10)	0.05 (<0.05 - 0.06)	<0.05 (<0.05 - <0.05)	0.06 (<0.05 - 0.07)	0.06 (<0.05 - 0.07)	0.07 (0.06 - 0.09)	0.06 (<0.05 - 0.07)	<0.05 (<0.05 - <0.05)
Nickel (mg/kg)	17 (11 - 19)	15 (10 - 20)	18 (15 - 21)	17 (12 - 20)	23 (18 - 25)	24 (21 - 27)	23 (18 - 25)	18 (13 - 23)
Silver (mg/kg)	0.2 (<0.2 - 0.3)	<0.2 (<0.2 - 0.2)	<0.2 (<0.2 - <0.2)	0.6 (0.4 - 1.1)	0.3 (0.2 - 0.4)	0.2 (<0.2 - 0.3)	<0.2 (<0.2 - <0.2)	<0.2 (<0.2 - <0.2)
Zinc (mg/kg)	85 (55 - 100)	61 (43 - 83)	64 (51 - 82)	93 (69 - 110)	100 (87 - 110)	98 (92 - 110)	91 (75 - 99)	66 (51 - 89)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4]	120 (90 - 230)	95 (90 - 110)	98 (90 - 130)	100 (90 - 140)	110 (90 - 210)	120 (90 - 220)	100 (90 - 160)	98 (90 - 130)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	68 (32 - 160)	32 (18 - 78)	32 (18 - 91)	63 (30 - 190)	49 (32 - 81)	79 (53 - 170)	42 (31 - 65)	28 (18 - 62)

Note: 1 Data presented are arithmetic means ; data in brackets indicate ranges.

2 All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.

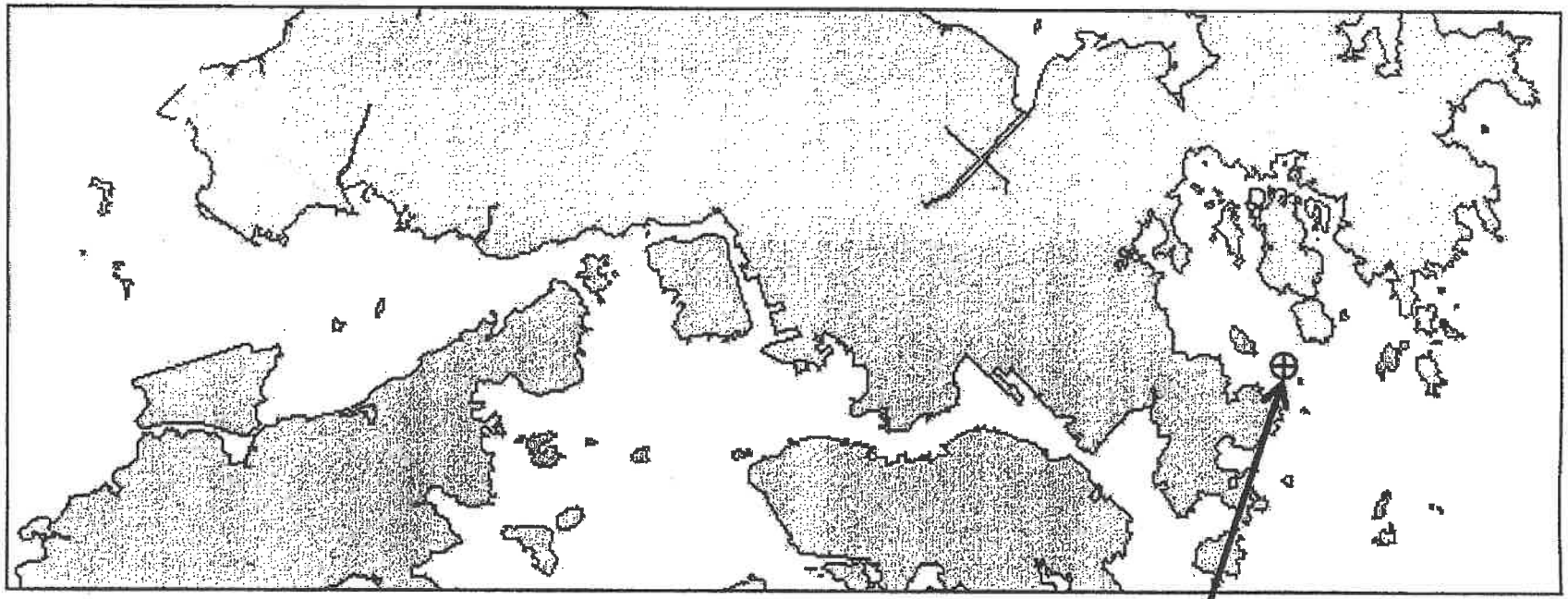
3 Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

4 Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.

5 High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.

6 Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

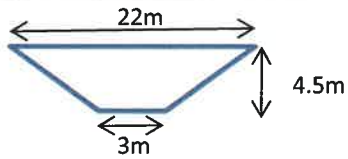
APPENDIX B
Location of Reference Sample RS1



Proposed Reference Sediment Sampling Point
(E850234 / N820057)

APPENDIX C
Responses to Comments

1. Comment from EPD, fax Ref. (8) in EP2/N7/75 pt.2 dated 2 October 2015.

Comments	Parties Responsible	Responses
I refer to your letter dated 23.9.2015 enclosed the subject documents. Please find our comments for the captioned documents in the attached Annex 1.	B&V	Noted.
1) Section 1.1.4: Please clarify whether this report is prepared for the purpose of the EIA study as per the study brief requirement [please also see item (9) below]. According to ETWB TC(W) No. 34/2002, Marine Fill Committee (MFC) is not the party responsible for approval of SSTP. Please revise the text accordingly.	B&V	Noted and text revised.
2) Sections 1.2.3 and 1.3.2: Please provide further information on the relationship between the estimated excavation sediment volume 3,040 m^3 and the excavation area (54m X 22m x 4.5m). In addition, the estimated volume of 3,040 m^3 marine sediments does not tally with the estimated volume provided in the draft EIA report dated Aug. 2015 (i.e. 3,850 m^3).	B&V	Please be advised that the latest estimated volume of sediment based on the latest engineering design is 3,040 m^3 which will supersede the previous volume stated in the draft EIA. The latest estimation is based on a trapezoid trench as shown below: top width = 22m, bottom width = 3m, depth = 4.5m, length = 54m.  $\frac{(22+3)\ x\ 4.5}{2}\ x\ 54$

Comments	Parties Responsible	Responses
3) Section 1.3.1: The consultants should clarify whether marine sediment will be generated along the entire length of the submarine outfall by HDD trenchless technology. If affirmative, please clarify the respective handling arrangement.	B&V	With the use of HDD, no marine sediment will be generated along the length of the submarine outfall.
4) Section 1.4.1: Based on the sediment quality data at station MS1 (Appendix A), the average concentration of all contaminants are below the Lower Chemical Exceedance Level (LCEL) except a slight exceedance for silver. Thus Category 'L' sediment and Category 'M' sediments are likely present. Please revise the last two sentences accordingly.	B&V	Noted and revised.
5) Section 1.5.1: Same as item (3) above, please review this section accordingly. In may be pre-mature to anticipate the disposal arrangement before characterisation of the sediment arising by the proposed sampling and testing.	B&V	This section is to provide the anticipated disposal requirements as per Section 13 of ETWB TCW No. 34/2002. A new sentence has been added to state the disposal arrangement shall be determine based on the sediment characterisation in accordance with ETWB TC(W) No. 34/2002.
6) Table 1: Please review the proposed schedule which seems not realistic.	B&V	Noted and amended. Subject to approval of the SSTP, the sediment sampling and chemical testing is tentatively aimed at October 2015.
7) Section 2.3.2 and Table 2: The sample location i.d. of Table 2 (e.g. S01) do not tally with the sample location i.d. in Figure 180579/B&V/SQR/001 (e.g. S1). Please also clarify whether only surface samples will be	B&V	Noted and sampling location changed to S1. As low level of contamination is expected in the sediment, surface sample is proposed. This is following the recommended sampling arrangement in ETWB TC(W) No. 34/2002.

Comments	Parties Responsible	Responses
taken [please see item (4) above].		
8) Table 5: Please check and proofread the caption of Table 5 and the determination method.	B&V	Noted and revised.
9) The project proponent (PP)/consultants should note that this SSTP and related submission will only serve the purpose of fulfilling the EIA Study for this Project under the EIAO, TM and SB. They would be required to submit separate sediment sampling and testing plan/Sediment Quality Report to EPD's TCO when applying for the dumping permit under DASO. They would also need to provide the rationale for sediment removal/disposal to the Marine Fill Committee (MFC) for agreement in accordance with ETWB TC(W) No. 34/2002. Please state the above requirement clearly in the text as appropriate and insert new sections for the forthcoming tasks if the SSTP is approved.	B&V	Noted and Section 1.1.4 has been amended.

土木工程拓展署
CEDD Civil Engineering and Development Department
Web site 網址 : http://www.cedd.gov.hk
E-mail 電子郵件 : fwlau@cedd.gov.hk
Telephone 電話 : 2762 5539
Facsimile 傳真 : 2714 0113
Our reference 本署檔號 : (1CX4H-01) in FM 4/1C/70A
Your reference 來函檔號 : 180579-0375

土木工程處
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101 Princess Margaret Road,
Kowloon, Hong Kong

Black & Veatch Hong Kong Limited
25/F, Millennium City 6,
392 Kwun Tong Road,
Hong Kong
(Attention: Mr. Colin H. K. Chan

22 December 2015

BY FAX: 2601 3988

Dear Sir,

Agreement No. CE 63/2012 (DS)
Expansion of Sha Tau Kok Sewage Treatment Works, Phase 1
- Investigation, Design and Construction
Rationale for Sediment Removal

We refer to your letter of the above quoted reference dated 9 December 2015.

2. We have no further comment on your rationale for sediment removal.

3. The quantity of each category of sediment is subject to the results of Sediment Quality Report (SQR). Please let us know when you have obtained the agreement from EPD on the SQR and provide us with a detailed calculation showing the volume of each category of sediment to be removed before we can proceed further to allocate sediment disposal space.

Yours faithfully,

(Derek Lau)
for Secretary, Marine Fill Committee
Civil Engineering and Development Department

c.c.	CE/CM, DSD	(Attn: Mr. Oliver Au-Yeung)	Fax: 2827 8526
	EPD/EAD	(Attn: Ms. Holy To)	Fax: 2591 0558
	EPD/MDS	(Attn: Ms. Ruby Hung)	Fax: 2305 0453

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OUR REF 180579-0375
YOUR REF (1A35S-01) IN FM 4/1C/70A
DATE 9 December 2015

Secretary, Marine Fill Committee
Civil Engineering and Development Department
Civil Engineering and Development Building,
101 Princess Margaret Road,
Homantin, Kowloon

For the attention of Mr. Derek LAU

Dear Sir,

Agreement No. CE 63/2012 (DS)
Expansion of Sha Tau Kok Sewage Treatment Works, Phase 1
- Investigation, Design and Construction
Rationale for Sediment Removal

We refer to your fax (ref. (1A35S-01) in FM 4/1C/70A) dated 22 June 2015 requesting to provide detailed justifications to demonstrate the need for sediment removal and the considerations on possible reducing / reusing / treatment of excavated sediment. Please find enclosed our responses-to-comments. The rationale for sediment removal has been further elaborated in Section 1.3 of the Sediment Sampling and Testing Plan (SSTP) [report ref. 180579/B&V/072/Issue 3] which was submitted to EPD and copied to you vide our letter (ref. 180759-0365) dated 10 November 2015. Your agreement on the rationale to excavate and dispose sediment during construction of the Project is greatly appreciated.

Should you have any queries, please do not hesitate to contact our Mr. Benjamin Yeung at 26087505.

Yours faithfully,
For and on behalf of
BLACK & VEATCH HONG KONG LIMITED

COLIN H. K. CHAN
DEPUTY PROJECT MANAGER

MC
Encl. (Response to comment)

c.c. CE/CM, DSD - attn.: Mr. Oliver Au-Yeung
EPD/EAD - attn.: Ms. Holy To
EPD/MDS - attn.: Ms. Ruby Hung
EPD/SIG - attn.: Mr. Albert Chan

CKH/CC/MC/180579/14.0000

Agreement No. CE 63/2012(DS)
Expansion of Sha Tau Kok Sewage Treatment Works, Phase 1 – Investigation, Design and Construction

Rationale for Sediment Removal

Responses to Comments

Comments were received from following authorities:

1. **Responses to Comments from Secretary, Marine Fill Committee, Civil Engineering and Development Department, fax ref. (1A35S-01) in FM 4/1C/70a dated 22 June 2015.**

Comment	Response
We refer to your letter under reference dated 15 June 2015.	
2. Please note that sediment removal should not be taken for granted. With reference to ETWB Technical Circular (Works) No. 34/2002 "Management for Dredged/Excavated Sediment", you have to provide detailed justifications to demonstrate the need for removal of sediment of such quantity and the considerations on possible reducing/reusing/treatment dredged/excavated sediment. The Marine Fill Committee will scrutinize applications, taking into account factors including the practicality of performance specifications, completeness of risk management strategies, and comprehensiveness of option assessments including consideration of new technology. Only when there are cogent reasons for dredging will the Marine Fill Committee consider allocating precious limited disposal space.	Noted. We have provided our further explanations on the need for removal of sediment and the considerations on possible reduction / reuse / treatment of sediment in Section 1.3 of the Sediment Sampling and Testing Plan (Issue 3).
3. In this connection, you are requested to refer to the "Final Report on Assessment of Management Options" posted on the Internet at: http://www.cedd.gov.hk/eng/services/fill management/doc/Final Report on Assess ment of Management Options (Rev A).pdf.	Noted. We have reviewed the concerned report in the considerations of possible reduction / reuse / treatment of sediment in Section 1.3 of the Sediment Sampling and Testing Plan (Issue 3).
4. Your attention is also drawn to the Housing Department's green treatment of marine mud (綠化海泥) and Marine Mud Made Materials (MMMM) (海泥再造磚), as well as the Drainage Services Department's 善用海底泥. The relevant news can be found from the following web pages. If you are interested in the MMMM, please advise us and we shall provide you with further technical details. http://hk.apple.nextmedia.com/news/art/20110914/15612174; http://orientaldaily.on.cc/cnt/news/20110914/00176_008.html; http://orientaldaily.on.cc/cnt/news/20121227/00176_033.html?pubdate=20121227; and	Noted. We have reviewed the concerned report in the considerations of possible reduction / reuse / treatment of sediment in Section 1.3 of the Sediment Sampling and Testing Plan (Issue 3).

	http://hk.apple.nextmedia.com/news/art/20121201/18086554; http://www.dsd.gov.hk/TC/Files/publications_publicity/newsletter/news70/DSD_p10_HTML.html.	
5.	You mentioned that reusing the 3,850 m^3 sediment is not preferred due to the limited works area of the project. However, in view of the precious limited space of disposal facilities, please reconsider if beneficial reuse of the dredged sediment can be adopted as it only requires a small space.	We have carefully reviewed the Project area and scope, and concluded it is not practicable to reuse the excavated sediment in this Project. The rationales are provided in Section 1.3 of the Sediment Sampling and Testing Plan (Issue 3).