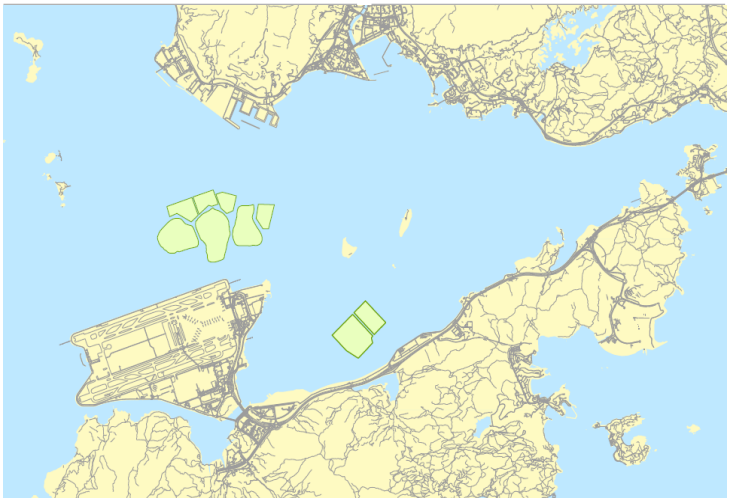

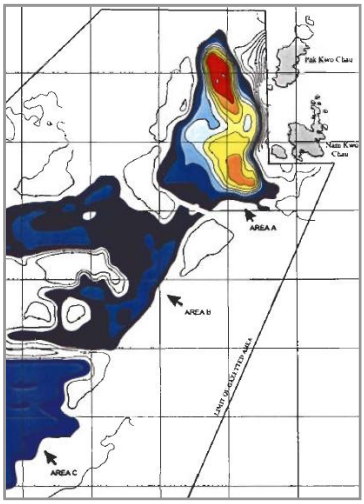

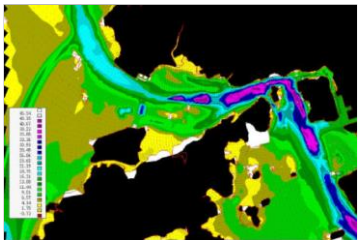

CEDD 土木工程拓展署
Civil Engineering and Development Department

Environmental Monitoring and Audit for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau (2012-2017) – Investigation

Agreement No. CE 23/2012(EP)

37th Monthly Progress Report for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau – September 2015

Draft (Revision 0)

14 October 2015

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Client:	Project No:
Civil Engineering and Development Department (CEDD)	0175086
Summary: This document presents the 37th monthly progress report for Contaminated Mud Pits at the South of The Brothers and at East Sha Chau.	Date: 14 October 2015 Approved by:  Craig A. Reid *Partner*

Revision	Description	By	Checked	Approved	Date
v0	37th Monthly Progress Report for ESC CMPs and SB CMPs	EL	JT	CAR	14/10/15

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Dredging, Management and Capping of Contaminated Sediment Disposal Facility to the South of The Brothers

Environmental Certification Sheet
EP-427/2011/A

Reference Document/Plan

Document/~~Plan~~ to be ~~Certified~~/ Verified:	37th Monthly Progress Report for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau – September 2015
Date of Report:	14 October 2015
Date prepared by ET:	14 October 2015
Date received by IA:	14 October 2015

Reference EP Condition

Environmental Permit Condition: Condition No.: 4.4

4 hard copies and 1 electronic copy of monthly EM&A Report shall be submitted to the Director within 2 weeks after the end of the reporting month. The EM&A Reports shall include a summary of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit Levels). The submissions shall be certified by the ET Leader and verified by the Independent Auditor. Additional copies of the submission shall be provided to the Director upon request by the Director.

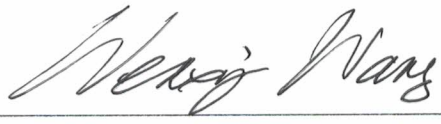
ET Certification

I hereby certify that the above referenced document/~~plan~~ complies with the above referenced condition of EP-427/2011/A

Craig A. Reid,
Environmental Team Leader:  Date: 14/10/2015

IA Verification

I hereby verify that the above referenced document/~~plan~~ complies with the above referenced condition of EP-427/2011/A

Dr Wang Wen Xiong,
Independent Auditor:  Date: 14/10/2015

CONTENTS

ANNEXES

Agreement No. CE 23/2012 (EP)
Environmental Monitoring and Audit
for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau (2012-2017) - Investigation

37TH MONTHLY PROGRESS REPORT FOR SEPTEMBER 2015

1.1 BACKGROUND

1.1.1 Since early 1990s, contaminated sediment (1) arising from various construction works (e.g. dredging and reclamation projects) in Hong Kong has been disposed of at a series of seabed pits at East of Sha Chau (ESC). In late 2008, a review indicated that the existing and planned facilities at ESC would not be able to meet the disposal demand after 2012. In order to meet this demand, the Hong Kong Special Administrative Region Government (HKSARG) decided to implement a new contained aquatic disposal (CAD) (2) facility at the South of The Brothers (SB CMPs) which had been under consideration for a number of years.

1.1.2 The environmental acceptability of the construction and operation of the Project had been confirmed by findings of the associated Environmental Impact Assessment (EIA) study completed in 2005 under *Agreement No. CE 12/2002(EP)* (3). The Director of Environmental Protection (DEP) approved this EIA report under the *Environmental Impact Assessment Ordinance* (*Cap. 499*) (*EIAO*) in September 2005 (*EIA Register No.: AEIAR-089/2005*).

1.1.3 In accordance with the EIA recommendation, prior to commencement of construction works for the SB CMPs, the Civil Engineering and Development Department (CEDD) undertook a detailed review and update of the EIA findings for the SB site (4). Findings of the EIA review undertaken in 2009/ 2010 confirmed that the construction and operation of the SB site had been predicted to be environmentally acceptable.

(1) According to the Management Framework of Dredged/ Excavated Sediment of ETWB TC(W) No. 34/2002, contaminated sediment in general shall mean those sediment requiring Type 2 – Confined Marine Disposal as determined according to this TC(W).

(2) CAD options may involve use of excavated borrow pits, or may involve purpose-built excavated pits. CAD sites are those which involve filling a seabed pit with contaminated mud and capping it with uncontaminated material such that the original seabed level is restored and the contaminated material is isolated from the surrounding marine environment.7

(3) Detailed Site Selection Study for a Proposed Contaminated Mud Disposal Facility within the Airport East/ East of Sha Chau Area (Agreement No. CE 12/2002(EP))

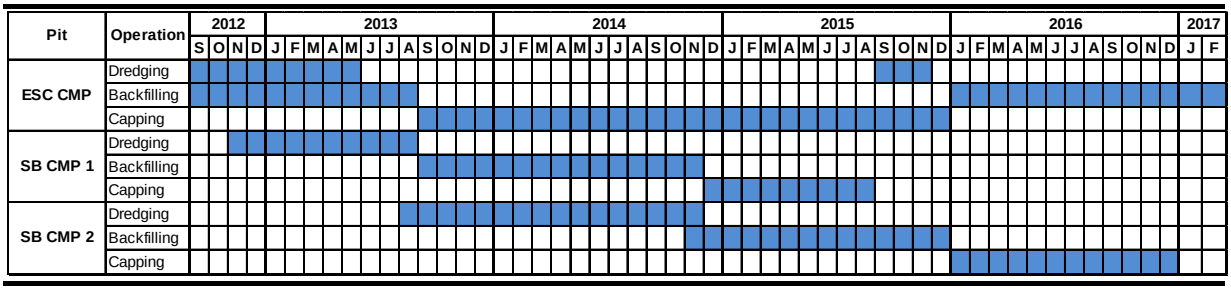
(4) Under the CEDD study *Contaminated Sediment Disposal Facility to the South of The Brothers (Agreement No. FM 2/2009)*

1.1.4 *Environmental Permits (EPs)* (*EP-312/2008/A* and *EP-427/2011A*) were issued by the Environmental Protection Department (EPD) to the CEDD, the Permit Holder, on 28 November 2008 for ESC CMP V and on 23 December 2011 for SB CMPs, respectively. Under the requirements of the *EPs*, an Environmental Monitoring and Audit (EM&A) programme as set out in the EM&A Manuals (1) (2) is required to be implemented for the CMPs.

1.1.5 The present EM&A programme under *Agreement No. CE 23/2012 (EP)* covers the dredging, disposal and capping operations of the SB CMPs as well as ESC CMPs. Detailed works schedule for both CMPs is shown in *Figure 1.1*. In September 2015, the following works were being undertaken at the CMPs:

- Dredging operation at ESC CMP Vd;
- Capping operations at ESC CMP Va; and
- Disposal of contaminated mud at SB CMP 2.

Figure 1.1 Works Schedule for ESC CMPs and SB CMPs



1.2 REPORTING PERIOD

1.2.1 This *37th Monthly Progress Report* covers the EM&A activities for the reporting month of September 2015.

1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES

1.3.1 The following monitoring activities have been undertaken for ESC CMPs in September 2015:

- *Impact Water Quality Monitoring during Dredging Operations of ESC CMPs* was undertaken on 24, 26, 28 and 30 September 2015.

(1) ERM (2012) Environmental Monitoring and Audit (EM&A) Manual. Final First Review. Environmental Monitoring and Audit for Contaminated Mud Pits to the South of the Brothers and at East Sha Chau (2012-2017) – Investigation. Agreement No. CE 23/2012(EP). Submitted to EPD in November 2012.

(2) ERM (2010) Environmental Monitoring and Audit (EM&A) Manual. Final Second Review. Environmental Monitoring and Audit for Contaminated Mud Pit at Sha Chau (2009-2013) – Investigation. Agreement No. CE 4/2009(EP). Submitted to EPD in November 2010.

1.3.2 The following monitoring activities have been undertaken for SB CMPs in September 2015:

- *Pit Specific Sediment Chemistry of CMP 2* was undertaken on 1 September 2015; and
- *Water Column Profiling of CMP 2* was undertaken on 2 September 2015.

1.4 DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS

1.4.1 No outstanding sampling remained for September 2015.

1.4.2 A summary of field activities conducted are presented in *Annex A*. The following laboratory analyses were still in progress during the preparation of this monthly report and hence are not presented in this monthly report:

- Laboratory analyses of sediment samples collected for *Cumulative Impact Sediment Chemistry of SB CMP 2* in August 2015; and
- Laboratory analyses of sediment samples collected for *Pit Specific Sediment Chemistry of SB CMP 2* in September 2015.

1.5 BRIEF DISCUSSION OF THE MONITORING RESULTS FOR ESC CMPS

1.5.1 Brief discussion of the monitoring results of the *Impact Water Quality Monitoring during Dredging Operations of ESC CMP Vd* conducted in September 2015 is presented below.

1.5.2 Impact Water Quality Monitoring during Dredging Operations of ESC CMP Vd – 24 to 30 September 2015

1.5.3 Dredging operation of ESC CMP Vd commenced on 8 September 2015 and dredging activities were not carried out on 15, 16, 17 and 19 September 2015. *Impact Water Quality Monitoring during Dredging Operations of ESC CMP Vd* was conducted three times per week in September 2015 starting from 24 September 2015. On each survey day, monitoring was conducted during both mid-ebb and mid-flood tides at two Reference (Upstream) stations and five Impact (Downstream) stations of the dredging operations at ESC CMP Vd. Monitoring was also conducted at one Sensitive Receiver Station situated in Ma Wan. A total of eight (8) stations were monitored and locations of the sampling stations are shown in *Figure 1.2*.

1.5.4 Monitoring results are presented in *Table B1* of *Annex B*. Daily dredging volume in September 2015 is reported in *Annex C*. Levels of Dissolved Oxygen (DO), Turbidity and Suspended Solid (SS) generally complied with the Action and Limit Levels (see *Table B2* of *Annex B* for details) set in the *Baseline Monitoring Report* (1), except for the following occasion of exceedances discussed in *Table 1.1* below.

1.5.5 As presented in *Table 1.1*, the results indicated that the dredging operations at ESC CMP Vd did not appear to cause any unacceptable deterioration in water quality during this reporting period. Therefore, no further action, except for those recommended in the Environmental Permit (*EP-312/2008/A*), are considered necessary for the dredging operations.

(1) ERM (2009). Draft Second Review of the EM&A Manual. Under Agreement No. CE 4/2009 (EP) EM&A for Contaminated Mud Pit at Sha Chau (2009-2013) – Investigation

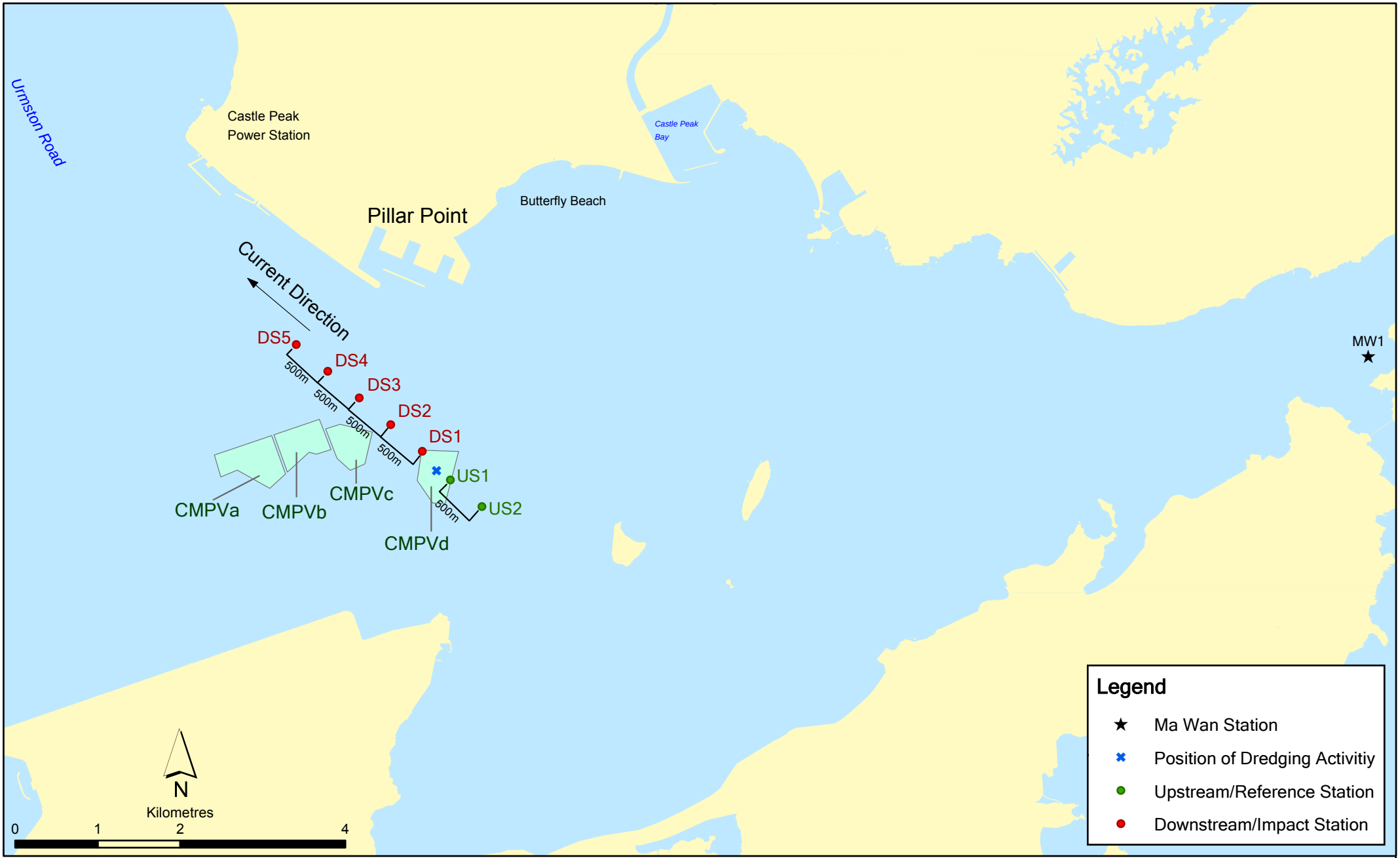


Figure 1.2

Indicative Dredging Impact Sampling Stations for CMPVd

Note: The locations of sampling stations will be determined on site based on current direction and position of dredging activities.

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Table 1.1 Details of Exceedances Recorded for Impact Water Quality Monitoring during Dredging Operations of ESC CMP Vd between 24 and 30 September 2015

Date	Tide	Parameter	Station	Type	Remarks
26 September 2015	Mid-Ebb	Turbidity	DS2	Action	These exceedances were not considered as indicating any unacceptable impacts from the dredging operations to Water Sensitive Receivers (WSRs) outside the works area due to the following reason: • Stations DS2 and DS3 are located further away from the works area of CMP Vd when compared to station DS1 at which the levels of Turbidity did not exceed the Action and Limit Levels during the same tidal period.
28 September 2015	Mid-Flood	Turbidity	DS2	Limit	
28 September 2015	Mid-Flood	Turbidity	DS3	Action	
28 September 2015	Mid-Ebb	Turbidity	DS1	Action	It is suspected that the non-compliance of Turbidity was related to the dredging activities at CMP Vd. Linear Regression Analysis was carried out and there was no spatial trend of increasing turbidity with proximity to the pit due to dredging activities. Moreover, level of Turbidity in Sensitive Receiver station (MW1) did not exceed the Action and Limit Level. Therefore, it is considered that the high levels of Turbidity were localized around the dredging location. In addition, levels of suspended solid (SS) at all stations complied with the Action and Limit levels. Therefore, it is considered that the dredging operations did not cause adverse water quality impact in terms of SS levels, which are more representative to determine the effects of dredging operation to nearby sensitive receivers (e.g. fisheries). The Contractor was informed on the exceedances and ensured the proper execution of the good dredging practice measures, e.g. reduced operations speed of the dredger and tightly closed the grab during translocating the dredged material from the seabed to the barge. Subsequent water quality monitoring on 30 September 2015 indicated that DO, Turbidity and SS levels at all stations complied with the Action and Limit levels.
28 September 2015	Mid-Ebb	Turbidity	DS2	Action	
28 September 2015	Mid-Ebb	Turbidity	DS3	Action	
28 September 2015	Mid-Ebb	Turbidity	DS4	Limit	
28 September 2015	Mid-Ebb	Turbidity	DS5	Limit	

1.6 BRIEF DISCUSSION OF THE MONITORING RESULTS FOR SB CMPS

1.6.1 Brief discussion of the monitoring results of the following activities for SB CMPs is presented in this *37th Monthly Progress Report*:

- *Pit Specific Sediment Chemistry* of CMP 2 in August 2015; and
- *Water Column Profiling* of CMP 2 in September 2015;

1.6.2 Pit Specific Sediment Chemistry of CMP 2 – August 2015

1.6.3 Monitoring locations for *Pit Specific Sediment Chemistry for CMP 2* are shown in *Figure 1.3*. A total of six (6) monitoring stations were sampled in August 2015.

1.6.4 Copper exceeded the Upper Chemical Exceedance Level (UCEL) at Active Pit stations SB-NPBA and SB-NPBB (*Figure 1* of *Annex D*). Mercury exceeded the Lower Chemical Exceedance Level (LCEL) at Active Pit station SB-NPBB and Near Pit station SB-NNBA (*Figure 2* of *Annex D*). Exceedances of UCEL were also recorded for Silver at Active Pit station SB-NPBA (*Figure 2* of *Annex D*). The concentrations of other inorganic contaminants (Arsenic, Cadmium, Chromium, Nickel, Lead and Zinc) were lower than the LCEL at all stations (*Figures 1* and *2* of *Annex D*).

1.6.5 Higher Copper and Silver concentrations were recorded within the Active Pit station only which were receiving contaminated mud during the reporting month. Higher Mercury concentrations were recorded at one Active Pit station and one Near Pit station while the stations between them, Pit Edge stations, was recorded with lower concentration. Therefore, there is no evidence indicating any dispersal of contaminants from the active pit due to the disposal activities.

1.6.6 For organic contaminants, the concentrations of Total Organic Carbon (TOC) were similar at all stations, except lower concentration was recorded in Pit Edge station NEBB (*Figure 3* of *Annex D*). Tributyltin (TBT) concentrations were observed to be higher at Active Pit station SB-NPBA (*Figure 4* of *Annex D*). Low and High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs), Total Polychlorinated Biphenyls (PCBs), 4,4'-dichlorodiphenyldichloroethylene (DDE) and Total dichlorodiphenyltrichloroethane (DDT) concentrations were below the limit of reporting at most stations, except High MW PAHs at Active Pit stations SB-NPBA and SB-NPBB and Low MW PAHs at Active Pit station SB-NPBB (*Figure 5* of *Annex D*).

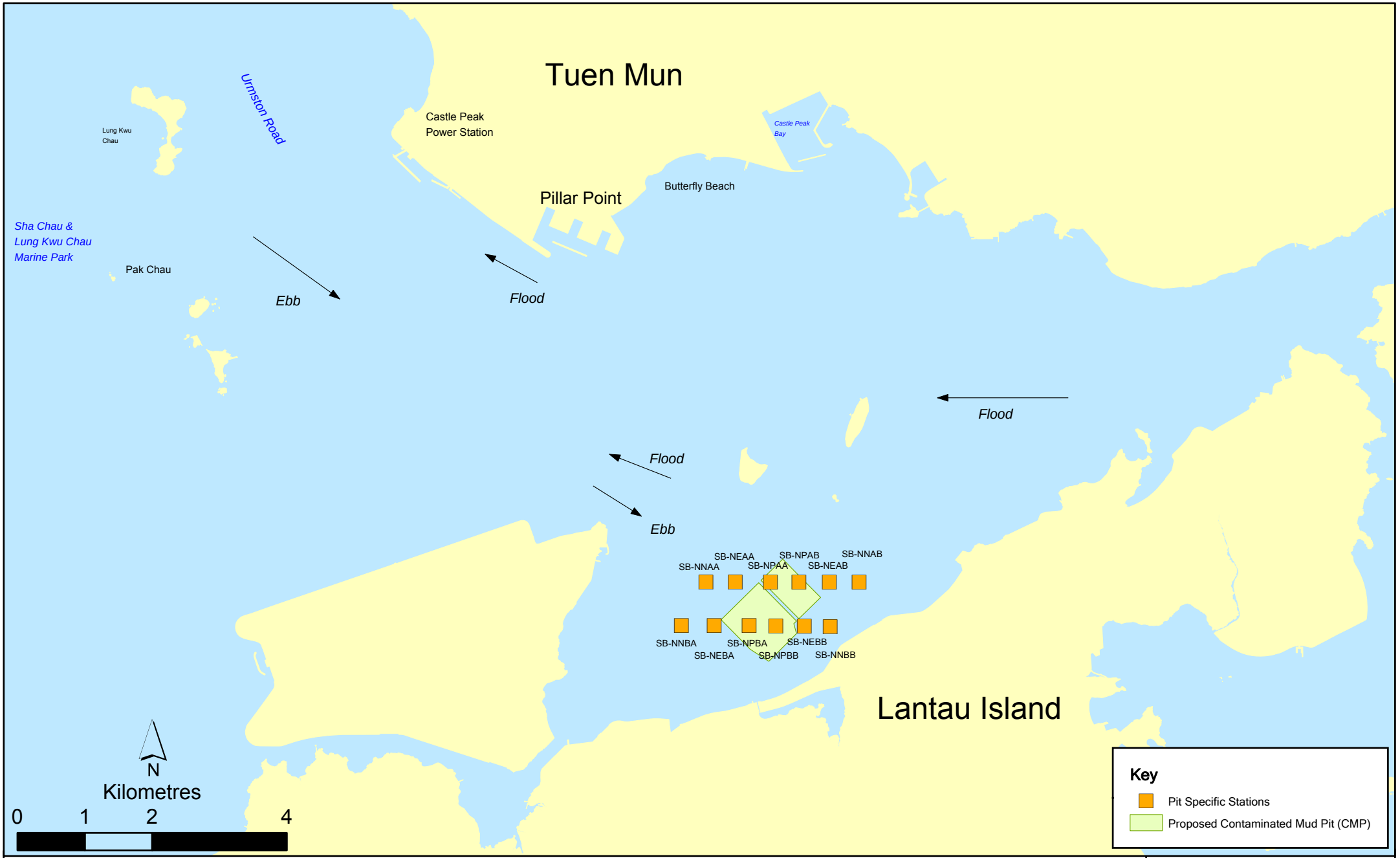

Figure 1.3

Pit Specific Sediment Quality Monitoring Stations for South Brothers Facility

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1.6.7 Overall, there is no evidence indicating any unacceptable environmental impacts to sediment quality as a result of the contaminated mud disposal operations at CMP 2 in August 2015. Statistical analysis will be undertaken and presented in the quarterly report to investigate whether there are any unacceptable impacts in the area caused by the contaminated mud disposal.

1.6.8 Water Column Profiling of CMP 2 – September 2015

1.6.9 *Water Column Profiling* was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 2 September 2015. The monitoring results have been assessed for compliance with the Water Quality Objectives (WQOs) set by Environmental Protection Department (EPD). This consists of a review of the EPD routine water quality monitoring data for the wet season period (April to October) of 2004 - 2013 from stations in the Northwestern Water Control Zone (WCZ), where the CMPs are located (1). For Salinity, the averaged value obtained from the Reference stations was used for the basis as the WQO. Levels of DO and Turbidity were also assessed for compliance with the Action and Limit Levels (see *Table B3* of *Annex B* for details).

In-situ Measurements

1.6.10 Analyses of results for September 2015 indicated that levels of Salinity, DO and pH complied with the WQOs at both Downstream and Upstream stations (*Table B4* of *Annex B*). In addition, DO and Turbidity at all stations complied with the Action and Limit Levels (*Tables B3* and *B4* of *Annex B*).

Laboratory Measurements for SS

1.6.11 Analyses of results for September 2015 indicated that the SS levels at both Upstream and Downstream stations complied with the WQO. Both Upstream and Downstream stations also complied with the Action and Limit Levels (*Tables B3 and B4* of *Annex B*).

Overall, the monitoring results indicated that the mud disposal operation at CMP 2 did not appear to cause any deterioration in water quality during this reporting period.

1.7 ACTIVITIES SCHEDULED FOR THE NEXT MONTH

1.7.1 The following monitoring activities will be conducted in the next monthly period of October 2015 for SB CMPs:

- *Pit Specific Sediment Chemistry of CMP 2;*
- *Routine Water Quality Monitoring of CMP 2;* and
- *Water Column Profiling of CMP 2.*

1.7.2 The following monitoring activities will be conducted in the next monthly period of October 2015 for ESC CMPs:

- *Impact Monitoring during Dredging Operations of ESC CMP Vd.*

1.7.3 The sampling schedule is presented in *Annex A*.

1.8 STUDY PROGRAMME

1.8.1 A summary of the Study programme is presented in *Annex E.*

Annex A

Sampling Schedule

Annex A1 - Environmental Monitoring and Audit Sampling Schedule for East of Sha Chau (September 2012 - February 2017)

		2012				2013												2014												2015												2016												2017	
Pit Specific Sediment Chemistry	**Code**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**
Active-Pit																																																					
	ESC-NPDA	*	*	*	*	*	*	*	*	*	*	*	*																													*	*	*	*	*	*	*	*	*	*	*	*	*	*
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Pit-Edge																																																					
	ESC-NEDA	*	*	*	*	*	*	*	*	*	*	*	*																													*	*	*	*	*	*	*	*	*	*	*	*	*	*
	ESC-NEDB	*	*	*	*	*	*	*	*	*	*	*	*																													*	*	*	*	*	*	*	*	*	*	*	*	*	*
Near-Pit																																																					
	ESC-NNDA	*	*	*	*	*	*	*	*	*	*	*	*																													*	*	*	*	*	*	*	*	*	*	*	*	*	*
	ESC-NNDB	*	*	*	*	*	*	*	*	*	*	*	*																													*	*	*	*	*	*	*	*	*	*	*	*	*	*

Cumulative Impact Sediment Chemistry	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**
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ESC-RNB				*		*				*		*																														*					*					*		*
Mid-field Stations																																																						
ESC-RMA				*		*				*		*																														*					*					*		*
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Capped Pit Stations																																																						
ESC-RCA				*		*				*		*																														*					*					*		*
ESC-RCB				*		*				*		*																														*					*					*		*
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Sediment Toxicity Tests	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**
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Ma Wan Station																																																						
MW1						*						*																														*							*					*

Tissue/ Whole Body Sampling	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**
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ESC-TSA						*						*																														*							*					*
ESC-TSB						*						*																														*							*					*

Demersal Trawling	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**
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ESC-TNB					*	*					*	*																													*	*					*	*					*	*
ESC-TSA					*	*					*	*																													*	*					*	*					*	*
ESC-TSB					*	*					*	*																													*	*					*	*					*	*

Water Column Profiling		**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**
Plume Stations	WCP1	*	*	*	*	*	*	*	*	*	*	*	*																													*	*	*	*	*	*	*	*	*	*	*	*	*	*
	WCP2	*	*	*	*	*	*	*	*	*	*	*	*																													*	*	*	*	*	*	*	*	*	*	*	*	*	*

Annex A1 - Environmental Monitoring and Audit Sampling Schedule for East of Sha Chau (September 2012 - February 2017)

	2012				2013												2014												2015												2016												2017	
Benthic Recolonisation Studies	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Capped Contaminated Mud Pits IVa-c																																																			
ESC-CPA				*								*				*								*				*								*				*								*				*		
ESC-CPB				*								*				*								*				*								*				*								*				*		
ESC-CPC				*								*				*								*				*								*				*								*				*		
Reference Stations																																																					
ESC-RBA				*								*				*								*				*								*				*								*				*		
ESC-RBB				*								*				*								*				*								*				*								*				*		
ESC-RBC				*								*				*								*				*								*				*								*				*		

Impact Monitoring for Dredging	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Upstream/Reference Stations																																																						
US1	*	*	*	*	*	*	*	*	*																												*	*	*																
US2	*	*	*	*	*	*	*	*	*																												*	*	*																
Downstream/Impact Stations																																																						
DS1	*	*	*	*	*	*	*	*	*																												*	*	*																
DS2	*	*	*	*	*	*	*	*	*																												*	*	*																
DS3	*	*	*	*	*	*	*	*	*																												*	*	*																
DS4	*	*	*	*	*	*	*	*	*																												*	*	*																
DS5	*	*	*	*	*	*	*	*	*																												*	*	*																
Ma Wan Station																																																						
MW1	*	*	*	*	*	*	*	*	*																												*	*	*																

Capping	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Ebb Tide																																																					
Impact Station																																																						
ESC-IPE1																*		*				*		*				*					*		*				*																
ESC-IPE2																*		*				*		*				*					*		*				*																
ESC-IPE3																*		*				*		*				*					*		*				*																
ESC-IPE4																*		*				*		*				*					*		*				*																
ESC-IPE5																*		*				*		*				*					*		*				*																
Intermediate Station																																																					
ESC-INE1																*		*				*		*				*					*		*				*																
ESC-INE2																*		*				*		*				*					*		*				*																
ESC-INE3																*		*				*		*				*					*		*				*																
ESC-INE4																*		*				*		*				*					*		*				*																
ESC-INE5																*		*				*		*				*					*		*				*																
Reference Station																																																					
ESC-RFE1																*		*				*		*				*					*		*				*																
ESC-RFE2																*		*				*		*				*					*		*				*																
ESC-RFE3																*		*				*		*				*					*		*				*																
ESC-RFE4																*		*				*		*				*					*		*				*																
ESC-RFE5																*		*				*		*				*					*		*				*																
Ma Wan Station																																																					
MW1																*		*				*		*				*					*		*				*																
Flood Tide																																																					
Impact Station																																																					
ESC-IPF1																*		*				*		*				*					*		*				*																
ESC-IPF2																*		*				*		*				*					*		*				*																
ESC-IPF3																*		*				*		*				*					*		*				*																
Intermediate Station																																																					
ESC-INF1																*		*				*		*				*					*		*				*																
ESC-INF2																*		*				*		*				*					*		*				*																
ESC-INF3																*		*				*		*				*					*		*				*																
Reference Station																																																					
ESC-RFF1																*		*				*		*				*					*		*				*																
ESC-RFF2																*		*				*		*				*					*		*				*																
ESC-RFF3																*		*				*		*				*					*		*				*																
Ma Wan Station																																																					
MW1																*		*				*		*				*					*		*				*																

Annex A1 - Environmental Monitoring and Audit Sampling Schedule for East of Sha Chau (September 2012 - February 2017)

		2012				2013												2014												2015												2016												2017	
Routine Water Quality Monitoring		S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Ebb Tide																																																				
Impact Station																																																					
	ESC-IPE1		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-IPE2		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-IPE3		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-IPE4		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-IPE5		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
Intermediate Station																																																						
	ESC-INE1		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-INE2		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-INE3		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-INE4		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-INE5		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
Reference Station																																																						
	ESC-RFE1		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-RFE2		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-RFE3		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-RFE4		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-RFE5		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
Ma Wan Station																																																					
	MW1		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
Flood Tide																																																				
Impact Station																																																					
	ESC-IPF1		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-IPF2		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-IPF3		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
Intermediate Station																																																						
	ESC-INF1		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-INF2		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-INF3		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
Reference Station																																																						
	ESC-RFF1		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-RFF2		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
	ESC-RFF3		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*
Ma Wan Station																																																					
	MW1		*	*		*	*		*	*		*	*																														*	*		*	*		*	*		*	*		*	*

Annex A2 - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (July 2012 - February 2017)

Baseline Monitoring Prior to Dredging	Code	Frequency	2012 J	A	S	O	N	D	2013 J	F	M	A	M	J	J	A	S	O	N	D	2014 J	F	M	A	M	J	J	A	S	O	N	D	2015 J	F	M	A	M	J	J	A	S	O	N	D	2016 J	F	M	A	M	J	J	A	S	O	N	D	2017 J	F
Far Field Stations																																																																	
	SB-WFA	3 days per week for 4 weeks	*	*																																																															
	SB-WFB	3 days per week for 4 weeks	*	*																																																															
Mid Field Stations																																																																			
	SB-WMA	3 days per week for 4 weeks	*	*																																																																
	SB-WMB	3 days per week for 4 weeks	*	*																																																															
Near Field Stations																																																																		
	SB-WNAA	3 days per week for 4 weeks	*	*																																																															
	SB-WNAB	3 days per week for 4 weeks	*	*																																																														
	SB-WNBA	3 days per week for 4 weeks	*	*																																																														
	SB-WNBB	3 days per week for 4 weeks	*	*																																																														
Reference Stations																																																																	
	NM1	3 days per week for 4 weeks	*	*																																																														
	NM2	3 days per week for 4 weeks	*	*																																																													
	NM3	3 days per week for 4 weeks	*	*																																																													
	NM5	3 days per week for 4 weeks	*	*																																																													
	NM6	3 days per week for 4 weeks	*	*																																																													
Sensitive Receiver Stations																																																																
	MW1	3 days per week for 4 weeks	*	*																																																													
	THB1	3 days per week for 4 weeks	*	*																																																													
	THB2	3 days per week for 4 weeks	*	*																																																													
	WSR45C	3 days per week for 4 weeks	*	*																																																													
	WSR46	3 days per week for 4 weeks	*	*																																																													

Impact Monitoring for Dredging			J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Upstream Stations																																																																
	US1	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																																
	US2	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																																
Downstream Stations																																																														
	DS1	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																																
	DS2	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																																
	DS3	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																																
	DS4	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																																
	DS5	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																																
Sensitive Receiver Stations																																																															
	MW1	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																																
	THB1	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																																
	THB2	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																																
	WSR45C	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																																
	WSR46	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																																

Pit Specific Sediment Chemistry			J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
SB CMP 1 Active																																																														
Near-Pit																																																														
	SB-NNAA	Monthly														12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																																
	SB-NNAB	Monthly														12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																																
Pit-Edge																																																														
	SB-NEAA	Monthly														12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																																
	SB-NEAB	Monthly														12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																																
Active-Pit																																																														
	SB-NPAA	Monthly														12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																																
	SB-NPAB	Monthly														12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																																
SB CMP 2 Active																																																													
Near-Pit																																																																
	SB-NNBA	Monthly																													12	12	12	12	12	12	12	12	12	12	12	12																								
	SB-NNBB	Monthly																													12	12	12	12	12	12	12	12	12	12	12	12																								
Pit-Edge																																																														
	SB-NEBA	Monthly																													12	12	12	12	12	12	12	12	12	12	12	12																								
	SB-NEBB	Monthly																													12	12	12	12	12	12	12	12	12	12	12	12																								
Active-Pit																																																														
	SB-NPBA	Monthly																													12	12	12	12	12	12	12	12	12	12	12	12																								
	SB-NPBB	Monthly																													12	12	12	12	12	12	12	12	12	12	12	12																								

Annex A2 - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (July 2012 - February 2017)

			2012						2013												2014												2015												2016												2017	
Cumulative Impact Sediment Chemistry			J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Near-field Stations																																																						
	SB-RNA	4 times per year													12				12		12				12		12				12		12				12		12				12													
	SB-RNB	4 times per year													12				12		12				12		12				12		12				12		12				12													
Mid-field Stations																																																						
	SB-RMA	4 times per year													12				12		12				12		12				12		12				12		12				12													
	SB-RMB	4 times per year													12				12		12				12		12				12		12				12		12				12													
Far-Field Stations																																																					
	SB-RFA	4 times per year													12				12		12				12		12				12		12				12		12				12													
	SB-RFB	4 times per year													12				12		12				12		12				12		12				12		12				12													
Capped Pit Stations																																																					
	SB-RCA	4 times per year													12				12		12				12		12				12		12				12		12				12													
	SB-RCB	4 times per year													12				12		12				12		12				12		12				12		12				12													
Sensitive Receiver Stations																																																					
	MW1	4 times per year													12				12		12				12		12				12		12				12		12				12													
	THB1	4 times per year													12				12		12				12		12				12		12				12		12				12													
	THB2	4 times per year													12				12		12				12		12				12		12				12		12				12													

			2012						2013												2014												2015												2016												2017	
Sediment Toxicity Tests			J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
SB CMP 1 Active																																																					
Reference																																																						
	SB-TRA	2 times per year													5							5						5																												
	SB-TRB	2 times per year													5							5						5																												
Near-Field																																																					
	SB-TAA	2 times per year													5							5						5																												
	SB-TAB	2 times per year													5							5						5																												
Sensitive Receiver Stations																																																					
	MW1	2 times per year													5							5						5																												
	THB1	2 times per year													5							5						5																												
	THB2	2 times per year													5							5						5																												
SB CMP 2 Active																																																					
Reference																																																						
	SB-TRA	2 times per year																																5						5																
	SB-TRB	2 times per year																																5						5																
Near-Field																																																					
	SB-TBA	2 times per year																																5						5																
	SB-TBB	2 times per year																																5						5																
Sensitive Receiver Stations																																																					
	MW1	2 times per year																																5						5																
	THB1	2 times per year																																5						5																
	THB2	2 times per year																																5						5																

			2012						2013												2014												2015												2016												2017	
Tissue/ Whole Body Sampling			J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Near-Pit Stations																																																					
	SB-INA	2 times per year																				*						*						*						*																
	SB-INB	2 times per year																				*						*						*						*																
Reference North																																																					
	TNA	2 times per year																				*						*						*						*																
	TNB	2 times per year																				*						*						*						*																
Reference South																																																					
	TSA	2 times per year																				*						*						*						*																
	TSB	2 times per year																				*						*						*						*																

			2012						2013												2014												2015												2016												2017	
Demersal Trawling			J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Impact																																																					
	SB-INA 1-5	4 times per year													5						5	5					5	5					5	5					5	5																
	SB-INB 1-5	4 times per year													5						5	5					5	5					5	5					5	5																
Reference North																																																					
	TNA 1-5	4 times per year													5						5	5					5	5					5	5					5	5																
	TNB 1-5	4 times per year													5						5	5					5	5					5	5					5	5																
Reference South																																																					
	TSA 1-5	4 times per year													5						5	5					5	5					5	5					5	5																
	TSB 1-5	4 times per year													5						5	5					5	5					5	5					5	5																

Annex A2 - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (July 2012 - February 2017)

			2012						2013												2014												2015												2016												2017	
Routine Water Quality Monitoring			**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**
Ebb Tide																																																										
Impact Stations Downcurrent																																																										
	SB-IPE1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-IPE2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-IPE3	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-IPE4	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-IPE5	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Intermediate Stations Downcurrent																																																										
	SB-INE1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-INE2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-INE3	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-INE4	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-INE5	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Reference Stations Upcurrent																																																										
	SB-RFE1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-RFE2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-RFE3	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-RFE4	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-RFE5	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Sensitive Receiver Stations																																																										
	MW1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	THB1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	THB2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	WSR45C	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	WSR46	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Flood Tide																																																										
Impact Stations Downcurrent																																																										
	SB-IPF1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-IPF2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-IPF3	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Intermediate Stations Downcurrent																																																										
	SB-INF1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-INF2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-INF3	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Reference Stations Upcurrent																																																										
	SB-RFF1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-RFF2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-RFF3	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Sensitive Receiver Stations																																																										
	MW1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	THB1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	THB2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	WSR45C	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	WSR46	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															

Water Column Profiling			**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**
Plume Stations	WCP1	Monthly														4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4														
	WCP2	Monthly														4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4														

Annex A2 - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (July 2012 - February 2017)

			2012						2013												2014												2015												2016												2017	
Capping Water Quality Monitoring			J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Ebb Tide																																																					
Impact Stations Downcurrent																																																						
	SB-IPE1	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-IPE2	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-IPE3	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-IPE4	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-IPE5	4 times per year																													3		3				3		3				3		3				3		3				3		
Intermediate Stations Downcurrent																																																					
	SB-INE1	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-INE2	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-INE3	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-INE4	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-INE5	4 times per year																													3		3				3		3				3		3				3		3				3		
Reference Stations Upcurrent																																																					
	SB-RFE1	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-RFE2	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-RFE3	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-RFE4	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-RFE5	4 times per year																													3		3				3		3				3		3				3		3				3		
Sensitive Receiver Stations																																																					
	MW1	4 times per year																													3		3				3		3				3		3				3		3				3		
	THB1	4 times per year																													3		3				3		3				3		3				3		3				3		
	THB2	4 times per year																													3		3				3		3				3		3				3		3				3		
	WSR45C	4 times per year																													3		3				3		3				3		3				3		3				3		
	WSR46	4 times per year																													3		3				3		3				3		3				3		3				3		
Flood Tide																																																					
Impact Stations Downcurrent																																																					
	SB-IPF1	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-IPF2	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-IPF3	4 times per year																													3		3				3		3				3		3				3		3				3		
Intermediate Stations Downcurrent																																																					
	SB-INF1	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-INF2	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-INF3	4 times per year																													3		3				3		3				3		3				3		3				3		
Reference Stations Upcurrent																																																					
	SB-RFF1	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-RFF2	4 times per year																													3		3				3		3				3		3				3		3				3		
	SB-RFF3	4 times per year																													3		3				3		3				3		3				3		3				3		
Sensitive Receiver Stations																																																					
	MW1	4 times per year																													3		3				3		3				3		3				3		3				3		
	THB1	4 times per year																													3		3				3		3				3		3				3		3				3		
	THB2	4 times per year																													3		3				3		3				3		3				3		3				3		
	WSR45C	4 times per year																													3		3				3		3				3		3				3		3				3		
	WSR46	4 times per year																													3		3				3		3				3		3				3		3				3		

Benthic Recolonisation Studies			J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Capped Contaminated Mud Pits																																																									
	SB-CPA	2 times per year																																																									
	SB-CPB	2 times per year																																																								
Reference Stations																																																									
	RBA	2 times per year																																																									
	RBB	2 times per year																																																									
	RBC	2 times per year																																																									

Notes:
"*" = Number of replicates depends on parameters
Naming of stations are tentative only and will be subjected to changes

Annex B

Water Quality Monitoring Results

Table B1 *Summary Table of DO, Turbidity and SS Levels Recorded between 24 and 30 September 2015*

Sampling Date	Tidal Period	Station	Average DO Levels (mg/L)		Average Turbidity Level (NTU)	Average SS Level (mg/L)
			Bottom	Surface and Mid Depth		
2014/9/24	Mid-Ebb	DS1	4.98	6.10	6.57	11.05
		DS2	4.94	6.53	5.52	6.75
		DS3	4.95	6.16	6.65	7.22
		DS4	5.06	6.05	4.72	4.85
		DS5	4.82	6.11	5.53	6.92
		US1	4.62	5.49	9.51	9.88
		US2	4.41	5.34	10.81	10.83
		MW1	5.01	5.79	3.32	4.18
	Mid-Flood	DS1	4.74	4.65	9.21	9.18
		DS2	5.19	4.50	16.50	6.93
		DS3	5.33	5.63	9.24	7.15
		DS4	5.13	6.55	7.37	7.20
		DS5	4.57	6.46	6.85	11.78
		US1	5.36	6.19	6.55	6.65
		US2	5.37	5.94	10.43	7.83
		MW1	5.07	7.03	6.00	8.08
2014/9/26	Mid-Ebb	DS1	5.19	5.65	27.41	23.85
		DS2	5.14	5.83	34.80	36.05
		DS3	5.32	6.03	18.11	21.48
		DS4	5.38	5.83	20.64	15.95
		DS5	5.42	5.93	20.12	21.93
		US1	5.21	6.07	8.65	7.67
		US2	5.07	5.88	11.97	12.40
		MW1	4.78	5.16	7.43	9.50
	Mid-Flood	DS1	5.55	5.53	15.55	22.17
		DS2	4.94	5.53	13.59	16.25
		DS3	5.13	5.55	12.36	21.73
		DS4	5.22	5.73	10.34	17.20
		DS5	5.35	5.75	8.98	12.55
		US1	5.21	5.70	37.11	24.52
		US2	5.38	5.76	18.74	19.12
		MW1	4.72	4.85	11.34	14.27
2015/9/28	Mid-Ebb	DS1	4.85	5.16	33.08	21.90
		DS2	4.91	5.12	31.16	24.98
		DS3	4.79	4.98	37.48	27.65
		DS4	4.71	4.96	55.58	20.30
		DS5	4.70	5.10	42.98	25.45
		US1	4.85	5.09	14.81	11.55
		US2	4.80	4.99	14.19	13.50
		MW1	4.47	4.56	6.88	9.57
	Mid-Flood	DS1	4.51	4.88	27.12	16.47
		DS2	4.43	4.73	45.45	29.25
		DS3	4.50	4.93	34.84	28.28
		DS4	4.45	4.83	28.73	22.42
		DS5	4.62	5.00	16.12	22.10
		US1	4.87	5.09	34.74	22.08
		US2	4.94	4.93	17.82	28.32
		MW1	4.41	4.45	13.05	29.08

Sampling Date	Tidal Period	Station	Average DO Levels (mg/L)		Average Turbidity Level (NTU)	Average SS Level (mg/L)
			Bottom	Surface and Mid Depth		
2015/9/30	Mid-Ebb	DS1	4.76	5.12	10.64	13.47
		DS2	4.76	5.14	14.14	13.93
		DS3	4.89	5.32	8.44	9.47
		DS4	4.61	5.04	11.41	17.03
		DS5	4.61	5.01	11.13	13.63
		US1	5.07	5.23	37.85	14.18
		US2	4.94	5.13	22.01	17.63
		MW1	4.75	4.96	7.61	10.92
	Mid-Flood	DS1	4.67	4.90	31.85	23.53
		DS2	4.65	4.86	27.39	20.35
		DS3	4.66	4.86	20.49	22.92
		DS4	4.62	4.84	23.92	18.43
		DS5	4.63	4.75	27.20	17.80
		US1	4.62	4.84	41.38	20.12
		US2	4.66	4.89	43.18	25.77
		MW1	4.74	4.82	14.60	16.30

Notes:

1. Please refer to Table C2 below for the Action and Limit Levels for dredging activities.
2. Cell shaded yellow indicated value exceeding the Action Level criteria.
3. Cell shaded red indicated value exceeding the Limit Level criteria.

Table B2 Action and Limit Levels of Water Quality for Dredging, Backfilling and Capping Activities at ESC CMPs

Parameter	Action Level	Limit Level
Dissolved Oxygen (DO) (1)	Surface and Mid-depth (2) 5%-ile of baseline data for surface and middle layer = **3.76 mg L^{-1}** and Significantly less than the reference stations mean DO (at the same tide of the same day)	Surface and Mid-depth (2) 1%-ile of baseline data for surface and middle layer = **3.11 mg L^{-1}** (3) and Significantly less than the reference stations mean DO (at the same tide of the same day)
	Bottom 5%-ile of baseline data for bottom layers = **2.96 mg L^{-1}** and Significantly less than the reference stations mean DO (at the same tide of the same day)	Bottom The average of the impact station readings are **<2 mg/L^{-1}** and Significantly less than the reference stations mean DO (at the same tide of the same day)
Depth-averaged Suspended Solids (SS) (4) (5)	95%-ile of baseline data for depth average = **37.88 mg L^{-1}** and 120% of control station's SS at the same tide of the same day	99%-ile of baseline data for depth average = **61.92 mg L^{-1}** and 130% of control station's SS at the same tide of the same day
Depth-averaged Turbidity (Tby) (4) (5)	95%-ile of baseline data = **28.14 NTU** and 120% of control station's Tby at the same tide of the same day	99%-ile of baseline data = **38.32 NTU** and 130% of control station's Tby at the same tide of the same day

Notes:

(1) For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.

(2) The Action and Limit Levels for DO for Surface & Middle layers were calculated from the combined pool of baseline surface layer data and baseline middle layer data.

(3) Given the Action Level for DO for Surface & Middle layers has already been lower than 4 mg L^{-1}, it is proposed to set the Limit Level at 3.11 mg L^{-1} which is the first percentile of the baseline data.

(4) "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.

(5) For turbidity and SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

Table B3 Action and Limit Levels of Water Quality for Dredging, Backfilling and Capping Activities for SB CMPs

Parameter	Action Level	Limit Level
Dissolved Oxygen (DO) (1)	Surface and Mid-depth (2) The average of the impact, WSR 45C and WSR 46 station readings are < 5%-ile of baseline data for surface and middle layer = **4.32 mg L^{-1}** and Significantly less than the reference stations mean DO (at the same tide of the same day)	Surface and Mid-depth (2) The average of the impact, WSR 45C and WSR 46 station readings are **< 4 mg L^{-1}** and Significantly less than the reference stations mean DO (at the same tide of the same day)
	Bottom The average of the impact, WSR 45C and WSR 46 station readings are < 5%-ile of baseline data for bottom layers = **3.12 mg L^{-1}** and Significantly less than the reference stations mean DO (at the same tide of the same day)	Bottom The average of the impact station, WSR 45C and WSR 46 readings are **< 2 mg L^{-1}** and Significantly less than the reference stations mean DO (at the same tide of the same day)
Depth-averaged Suspended Solids (SS) (3) (4)	The average of the impact, WSR 45C and WSR 46 station readings are > 95%-ile of baseline data for depth average = **21.60 mg L^{-1}** and 120% of control station's SS at the same tide of the same day	The average of the impact, WSR 45C and WSR 46 station readings are > 99%-ile of baseline data for depth average = **40.10 mg L^{-1}** and 130% of control station's SS at the same tide of the same day
Depth-averaged Turbidity (Tby) (3) (4)	The average of the impact, WSR 45C and WSR 46 station readings are > 95%-ile of baseline data = **25.04 NTU** and 120% of control station's Tby at the same tide of the same day	The average of the impact, WSR 45C and WSR 46 station readings are > 99%-ile of baseline data = **32.68 NTU** and 130% of control station's Tby at the same tide of the same day

Notes:

(1) For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.

(2) The Action and Limit Levels for DO for Surface & Middle layers were calculated from the combined pool of baseline surface layer data and baseline middle layer data.

(3) "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.

(4) For turbidity and SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

Table B4 Water Column Profiling Results for SB CMP 2 in September 2015

Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%)	Dissolved Oxygen (mg L^{-1})	pH (mg L^{-1})	Suspended Solids (mg L^{-1})
WCP 1 (Downstream)	26.78	26.59	13.09	64.10	4.42	7.74	10.08
WCP 2 (Upstream)	26.86	26.42	12.60	66.61	4.59	7.70	10.70
WQO (wet season)	N/A	23.85-29.06#	N/A	N/A	>4	6.5-8.5	11.6

Note:
#Not exceeding 10% of natural ambient level which is the result obtained from the Reference Station.
Cell shaded grey indicate value exceeding the WQO.

Annex C

Dredging Record for ESC CMP Vd in September 2015

Table C1 Dredging Record at ESC CMP Vd

Date	Daily Dredging Volume (m^3)	Weekly Dredging Volume (m^3) (From Sunday to Saturday)
01-Sep-2015	0	0
02-Sep-2015	0	
03-Sep-2015	0	
04-Sep-2015	0	
05-Sep-2015	0	
06-Sep-2015	0	12,350
07-Sep-2015	0	
08-Sep-2015	1,950	
09-Sep-2015	2,600	
10-Sep-2015	2,600	
11-Sep-2015	2,600	
12-Sep-2015	2,600	
13-Sep-2015	2,600	5,200
14-Sep-2015	650	
15-Sep-2015	0	
16-Sep-2015	0	
17-Sep-2015	0	
18-Sep-2015	1,950	
19-Sep-2015	0	
20-Sep-2015	1,300	18,200
21-Sep-2015	3,250	
22-Sep-2015	2,600	
23-Sep-2015	2,600	
24-Sep-2015	3,250	
25-Sep-2015	1,950	
26-Sep-2015	3,250	
27-Sep-2015	2,600	11,050
28-Sep-2015	3,250	
29-Sep-2015	2,600	
30-Sep-2015	2,600	

Annex D

Graphical Presentations

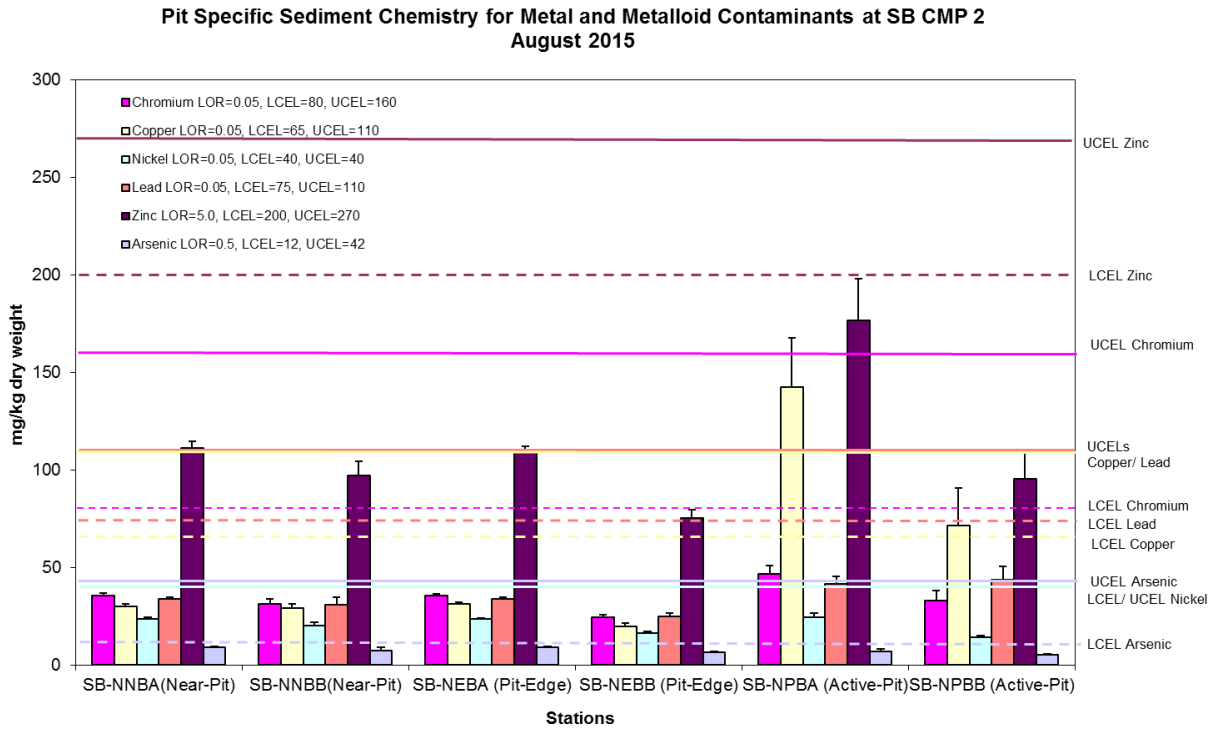

Figure 1: Concentration of Metals (Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in August 2015.

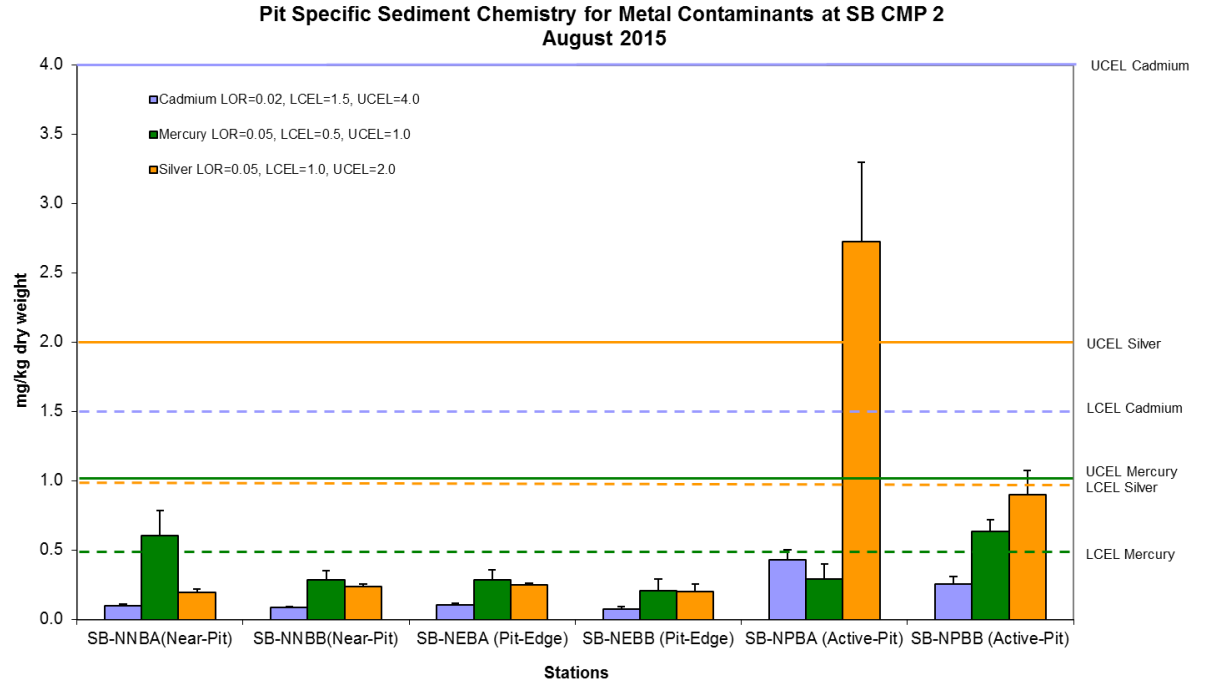

Figure 2: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in August 2015.

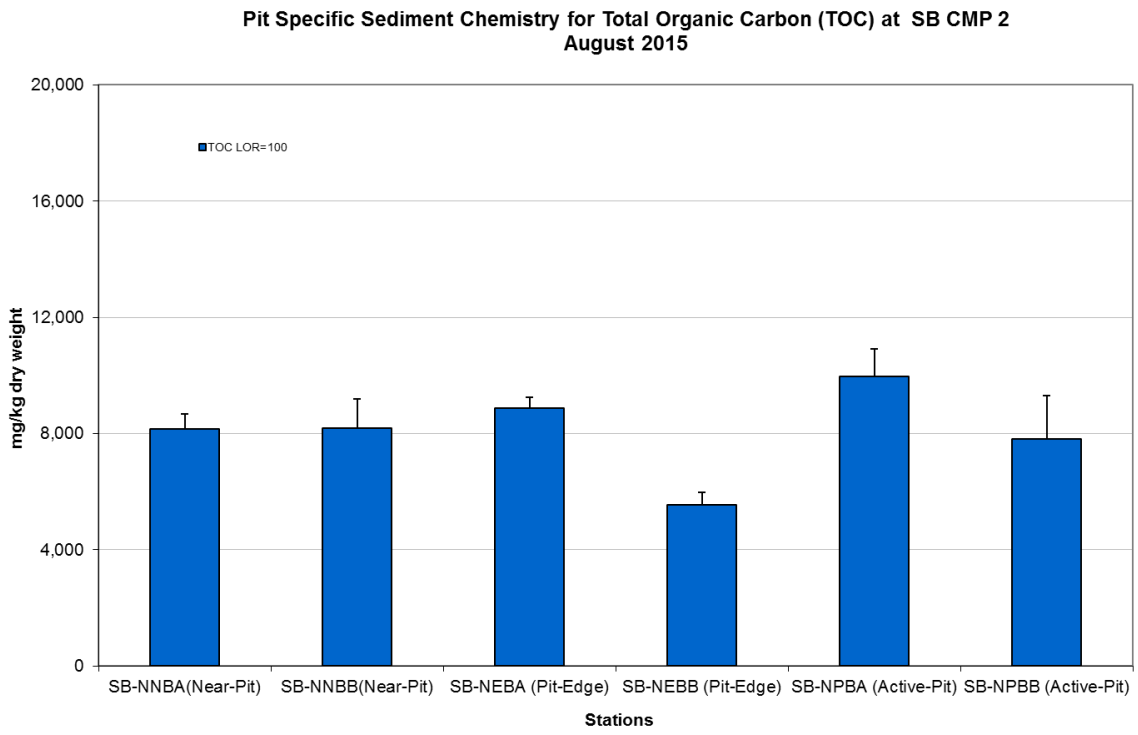

Figure 3: Concentration of Total Organic Carbon (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in August 2015.

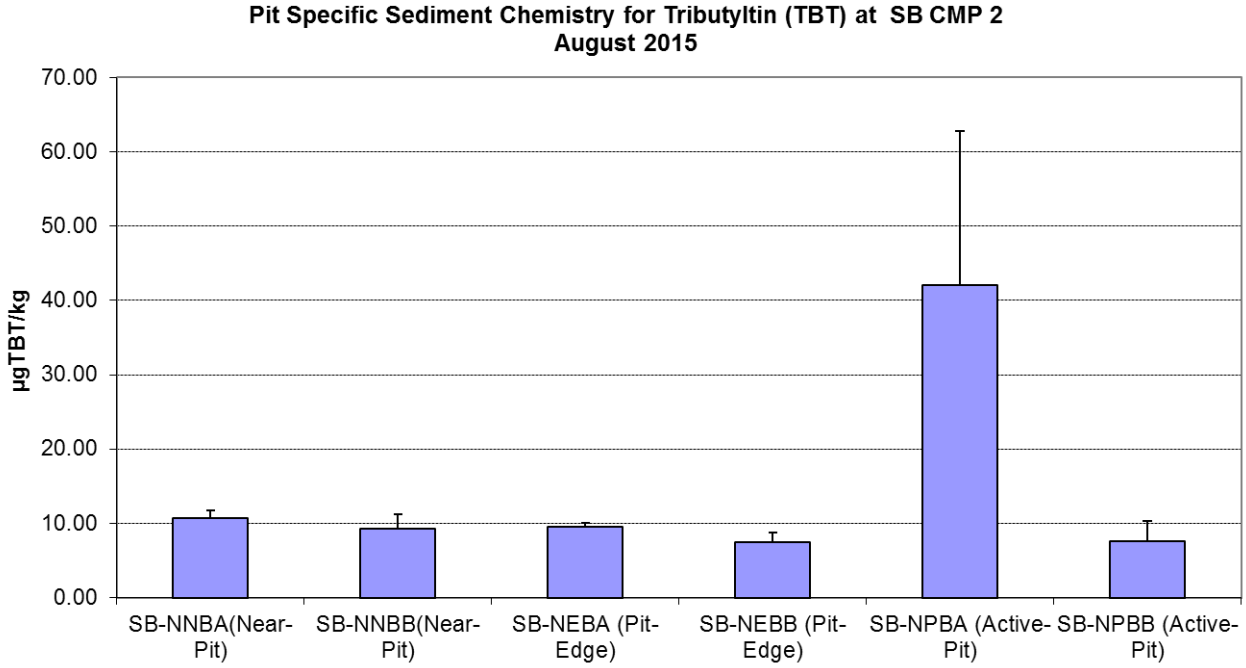

Figure 4: Concentration of Tributyltin (µg TBT/kg; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in August 2015.

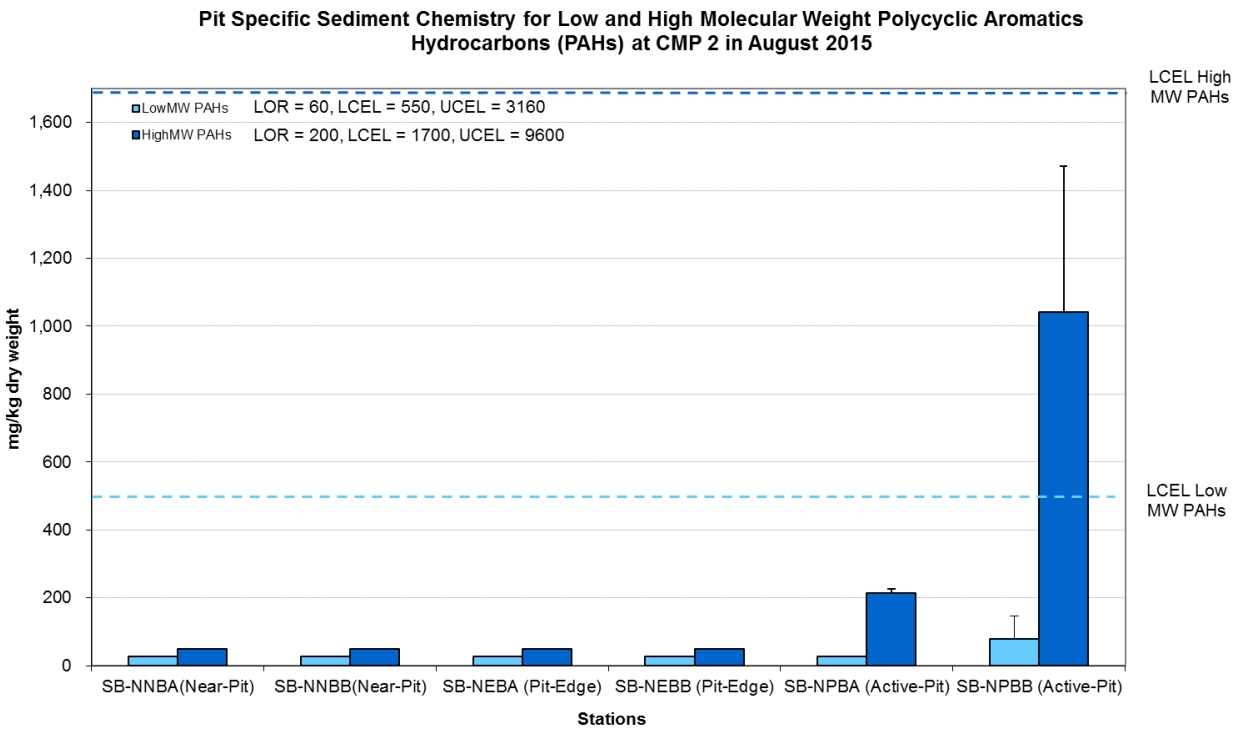

Figure 5: Concentration of Low and High Molecular Weight Polycyclic Aromatics Hydrocarbons (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in August 2015.

Annex E

Study Programme

Task Name	2012	2013	2014	2015	2016	2017
	M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J
Project Commencement	9/5					
For South Brothers CMPs and East of Sha Chau CMPs						
Submission of Draft Inception Report & Draft Programme	9/18					
Submission of Final Inception Report & Final Programme	10/2					
Submission of Draft EM&A Manual (First Review)	9/18					
Submission of Final EM&A Manual (First Review)	10/2					
Submission of Draft EM&A Manual (Second Review)	10/30					
Submission of Final EM&A Manual (Second Review)	11/27					
Submission of Subsequent EM&A Manual Updates						
Submission of Draft Operations Manual		12/31				
Submission of Final Operations Manual		1/14				
Submission of Operations Manual Updates						
Monitoring Contracts						
Regular Site Inspections of CMP Contractors						
Participate in Liaison Group Meetings/ Consultations as required by CEDD						
Submission of Report on Dredging & Capping Operations						
Submission of Monthly Progress Report						
Submission of Quarterly EM&A Report						
Submission of Annual Review Report						
Submission of Annual Risk Assessment Report						
Submission of Draft Final Report						3/20
Submission of the Final Report						4/14
Submission of Draft Executive Summary Report						4/14
Submission of Final Executive Summary Report						4/28
For East Tung Lung Chau Disposal Facility						
Submission of Monitoring Results & Monthly EM&A Progress Report						
Submission of Initial Review Report (assume disposal commences in November 2012)		2/15				
Submission of Quarterly EM&A Report						
Submission of Annual Report						
Alternative / Modified Capping Design						
Submission of Investigation Report		2/5				
Submission of Quarterly Report						
Submission of Annual Report						
Submission of Draft Final Report						3/20
Submission of the Final Report						4/14
Baseline Pelagic and Demersal Fisheries Survey						
Baseline Shrimp Trawl & Hang Trawl Surveys, twice before SB CMPs dredging						
Submission of Baseline Pelagic and Demersal Fisheries Survey Report	11/20					

Study Programme	Task	Milestone	Summary	Rolled Up Task	Rolled Up Milestone

Agreement No. CE 23/2012 (EP) Environmental Monitoring and Audit for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau (2012-2017) - Investigation