



Environmental Monitoring and Audit for Contaminated Mud Pit at Sha Chau (2009-2013) – Investigation Agreement No. CE 4/2009(EP)

16th Monthly Progress Report for Contaminated Mud Pits at Sha Chau – October 2010

Revision 0

22 November 2010

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Environmental Resources Management

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Agreement No. CE 4/2009 (EP) Environmental Monitoring and Audit for Contaminated Mud Pit at Sha Chau (2009-2013) - Investigation

<u>16th MONTHLY PROGRESS REPORT FOR CONTAMINATED MUD PITS</u> <u>AT SHA CHAU - October 2010</u>

1.1 BACKGROUND

Since 1992, the East of Sha Chau area has been the site of a series of dredged contaminated mud pits (CMPs) designed to provide confined marine disposal capacity for contaminated mud arising from the HKSAR's dredging and reclamation projects. CMP IVc is presently in operation for backfilling by contaminated mud and is anticipated to reach its capacity in 2011. A series of four newly constructed seabed pits at the East of Sha Chau area, CMP Va-d, will be provided for the disposal of contaminated mud after CMP IVc is full. Dredging operations are now taking place to construct CMP Vb. The environmental monitoring and audit (EM&A) programme for the CMPs at the East of Sha Chau area presently covers disposal and capping operations at CMP IV and dredging operations at CMP Vb.

1.2 **REPORTING PERIOD**

This *Monthly Progress Report* covers the monitoring period of October 2010.

1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES

No field sampling activities were scheduled in this monthly period for CMP IVc. For CMP V, sampling for *Impact Water Quality Monitoring during Dredging Operations* was conducted on 2, 5, 7, 9, 11, 13, 15, 18, 20 and 25 October 2010. A summary of field activities are presented in *Annex A*.

1.4 DETAILS OF OUTSTANDING SAMPLING AND / OR ANALYSIS

No outstanding sampling and laboratory analysis remained from October 2010.

1.5 BRIEF DISCUSSION OF THE MONITORING RESULTS

Results of *Impact Water Quality Monitoring during Dredging Operations* for October 2010 are presented for CMP V. Detailed results will be discussed in the relevant *Quarterly Reports*.

1.5.1 CMP V

Impact Water Quality Monitoring during Dredging Operations of CMP V – October 2010

Impact Water Quality Monitoring during Dredging Operations of CMP V was conducted for three times per week in October 2010. On each survey day, sampling was conducted during both mid-ebb and mid-flood tides at two Reference (Upstream) stations upstream and five Impact (Downstream) stations downstream of the dredging operations at CMP V. Monitoring was also conducted at the Ma Wan station. At each station, *in-situ* measurements of water quality parameters as well as water samples were taken from three depths in the water column (ie surface: 1 m below sea surface, mid-depth and bottom: 1 m above the seabed).

Monitoring results are presented in *Table B1* of *Annex B*. Generally, levels of Dissolved Oxygen (DO), Turbidity and Total Suspended Solids (TSS) complied with the Action and Limit Levels set in the *Baseline Monitoring Report* ⁽¹⁾. However, occasional exceedances of these levels are recorded for Turbidity and TSS (*Table B1* of *Annex B*). Student's t-tests were then employed to investigate any significant differences in levels of Turbidity and/or TSS between Reference (US1 and US2) and Impacts stations where exceedances of Action and Limit Levels were reported (*p-value = 0.05*).

With the exception of TSS levels recorded at impact station DS5 during the mid-ebb tide on 7 October and at station DS1 during the mid-flood tide on 25 October 2010, results of the statistical analysis did not show any significant differences in levels of Turbidity and TSS between Reference (US1 and US2) and Impact stations (*p*-value > 0.05; Table B1 of Annex B). It is thus considered that these exceedances are more likely to be caused by background fluctuation in water quality rather than indicating any adverse impacts from the dredging operations of CMP V. Although recordings of TSS were recorded at DS5 and DS1 above the levels recorded at the reference stations, these were isolated events and were tracked with future monitoring.

Overall, there appears to be no evidence of any unacceptable adverse water quality impacts arising from the dredging operations of CMP V at ESC.

1.6 ACTIVITIES SCHEDULED FOR THE NEXT MONTH

Impact Water Quality Monitoring during Dredging will be undertaken for CMP V in the next monitoring month. No monitoring will be conducted for the disposal operations of CMP IV in November 2010.

(¹) ERM (2009) Baseline Monitoring Report. Environmental Monitoring and Audit for Contaminated Mud Pit at Sha Chau (2009-2013) - Investigation. Agreement No. CE 4/2009(EP). Submitted to EPD in September 2009. The sampling schedule is presented in *Annex A*.

1.7 STUDY PROGRAMME

A summary of the Study programme is presented in Annex C.

Annex A

Sampling Schedule

Pit Specific Sediment Chemistry	Code	Frequency	J	09 A	S	0	Ν	D	J	F	М	Α	М	20 J	J	Α	S	0	Ν
Active-Pit			_	_					,					,					
	NCA 1 - 8 NCB 1 - 8	3 times per year 3 times per year		*				*		_	_	*				*			
Pit-Edge	CDA 1.9	2 timos non yoon		*				*				*				*			
	CPA 1-8 CPB 1-8	3 times per year 3 times per year		*				*			_	*				*			
Near-Pit	CNA 1 9	2 timos non yoon		*				*				*				*			
	CNA 1-8 CNB 1-8	3 times per year 3 times per year		*				*			_	*				*			
Cumulative Impact Sediment Chemistry			Τī	Α	S	0	N	D	т	F	M	Α	М	т	т	Α	S	0	N
Near-field Stations			J	A	3	0	IN	D	J	F	IVI	A	IVI	J	,	A	3	0	IN
	RNA 1-9 RNB 1-9	2 times per year		*				*								*			
Mid-field Stations	KIND 1-9	2 times per year		-				-			_					-			
	RMA 1-9	2 times per year		*				*								*			
Capped Pit Stations	RMB 1-9	2 times per year		-				^			_					Ŷ			
	RCA 1-9	2 times per year		*				*								*			
Far-Field Stations	RCB 1-9	2 times per year		-				^			_					Ŷ			
	RFA 1-9	2 times per year		*				*								*			
	RFB 1-9	2 times per year																	
Sediment Toxicity Tests			J	Α	S	0	Ν	D	J	F	Μ	Α	Μ	J	J	Α	S	0	Ν
Near-Field Stations	TCA	2 times per year		3				3			_					3			
	TCB	2 times per year		3				3								3			
Reference Stations	TRA	2 times per year	⊢	3	-			3							-	3	-	-	
	TRB	2 times per year 2 times per year		3				3								3			
					L												L	L	
Fissue/ Whole Body Sampling			J	Α	S	0	N	D	J	F	Μ	Α	Μ	J	J	Α	S	0	N
Near-Pit Stations	INA	2 times per year	\vdash	*	L	L			_	*					Ŀ	*	L	L	
Polonon oo Nonth	INB	2 times per year		*						*						*			
Reference North	TNA	2 times per year	\vdash	*	-		\vdash	-		*					-	*	-	⊢	\vdash
	TNB	2 times per year		*						*						*			
Reference South	TSA	2 times per year	\vdash	*	-	-		\vdash	_	*					-	*	-	-	
	TSB	2 times per year		*						*						*			
Demersal Trawling			T	Α	S	0	Ν	D	T	F	Μ	Α	М	I	I	Α	S	0	N
Near Pit Stations							.,	2	J					,	,				.,
	INA 1-5 INB 1-5	4 times per year 4 times per year	5	5 5					5 5	5 5					5	_			
Reference North	IND 1-5	4 times per year	5	5					5	5	_				5	5			
	TNA 1-5	4 times per year	5 5	5 5					5 5	5					5	_			
Reference South	TNB 1-5	4 times per year	5	5					5	5					5	5		-	
	TSA 1-5	4 times per year	5	5					5	5					5	5			
	TSB 1-5	4 times per year	5	5					5	5					5	3			
Capping			J	Α	S	0	Ν	D	J	F	Μ	Α	Μ	J	J	Α	S	0	Ν
Ebb Tide Impact Station Downcurrent					-												-	-	
	IPE1	4 times per year	3	3				3		3				3		3			
	IPE2 IPE3	4 times per year 4 times per year	3	3				3		3				3		3		-	
	IPE4	4 times per year	3	3				3		3				3		3			
Intermediate Station Downcurrent	PFC1	4 times per year	3	3				3		3				3		3		-	
	INE1	4 times per year	3	3				3		3				3		3			
	INE2 INE3	4 times per year 4 times per year	3	3				3		3				3		3		_	
	INE4	4 times per year	3	3				3		3				3		3			
Reference Station Upcurrent	INE5	4 times per year	3	3				3		3	_			3		3			
	RFE1	4 times per year	3	3				3		3				3		3			
	RFE2 RFE3	4 times per year 4 times per year	3	3	<u> </u>		\vdash	3		3				3	<u> </u>	3	<u> </u>	-	\vdash
	RFE4					-		3		3				3		3			
		4 times per year	3	3							_								
Flood Tide	RFE5	4 times per year 4 times per year	3 3	3				3		3				3		3		I	
	RFE5	4 times per year	3	_				3								3			
	RFE5 INF1	4 times per year 4 times per year	3	3				3		3				3		3			
	RFE5	4 times per year	3	_				3								3 3 3 3			
impact Station Downcurrent	RFE5 INF1 PFC2 INF3	4 times per year 4 times per year 4 times per year 4 times per year	3 3 3	3 3 3 3				3 3 3		3 3 3				3 3 3		3 3 3 3			
impact Station Downcurrent	RFE5 INF1 PFC2	4 times per year 4 times per year 4 times per year	3 3 3	3 3 3				3 3 3		3				3					
impact Station Downcurrent intermediate Station Downcurrent	RFE5 INF1 PFC2 INF3 IPF1	4 times per year 4 times per year 4 times per year 4 times per year 4 times per year	3 3 3 3 3	3 3 3 3 3				3 3 3 3 3		3 3 3 3				3 3 3 3					
impact Station Downcurrent intermediate Station Downcurrent	RFE5 INF1 PFC2 INF3 IPF1 IPF2	4 times per year 4 times per year	3 3 3 3 3 3 3	3 3 3 3 3 3 3				3 3 3 3 3 3 3		3 3 3 3 3 3				3 3 3 3 3		3			
impact Station Downcurrent intermediate Station Downcurrent	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2	4 times per year 4 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3 3				3 3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3				3 3 3 3 3 3 3 3 3 3 3 3		3			
impact Station Downcurrent intermediate Station Downcurrent	RFE5 INF1 INF3 IPF1 IPF2 IPF3 RFF1	4 times per year 4 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3				3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3				3 3 3 3 3 3 3 3		3 3 3 3			
mpact Station Downcurrent ntermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2	4 times per year 4 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3 3				3 3 3 3 3 3 3 3 3 3 3 3 3	J	3 3 3 3 3 3 3 3 3 3 3 3	M	A	M	3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3	S		N
Impact Station Downcurrent intermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring Ebb Tide	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2	4 times per year 4 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3	5	0	N	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	J	3 3 3 3 3 3 3 3 3 3 3 3 3 3	M	A	M	3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3	5	0	N
mpact Station Downcurrent intermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring Ebb Tide	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2 RFF3	4 times per year 4 times per year 2 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 ×	5	0	N	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	J	3 3 3 3 3 3 3 3 3 5 5 7 5 7 7 7 7 7 7 7	M	A	M	3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3 4 X	S	0	N
mpact Station Downcurrent intermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring Ebb Tide	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2 RFF3	4 times per year 4 times per year 2 times per year 2 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3	S	0	N	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	J	3 3 3 3 3 3 3 3 3 3 3 3 3 3	M	A	M	3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3	5		N
mpact Station Downcurrent intermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring Ebb Tide	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2 RFF3 IPE1 IPE2 IPE3 IPE4	4 times per year 4 times per year 2 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 ×	S		N	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	J	3 3 3 3 3 3 3 3 3 5 5 7 5 7 7 7 7 7 7 7	M	A	M	3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3 4 X	S		
Impact Station Downcurrent Intermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring Ebb Tide Impact Station Downcurrent	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2 RFF3 IPE1 IPE2 IPE3	4 times per year 4 times per year 2 times per year 2 times per year 2 times per year 2 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 ×	S		N	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 5 5 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8	M	A	M	3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3 4 X	5 5	0	N
Impact Station Downcurrent Intermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring Ebb Tide Impact Station Downcurrent	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2 RFF3 IPE1 IPE2 IPE3 IPE4 IPE5 INE1	4 times per year 4 times per year 2 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 ×	S		N	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 5 5 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8	M	A	M	3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3 4 X	S		N
Impact Station Downcurrent Intermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring Ebb Tide Impact Station Downcurrent	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2 RFF3 IPE1 IPE2 IPE3 IPE4 IPE5 INE1 INE2	4 times per year 4 times per year 2 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 ×	S			3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	J	3 3 3 3 3 3 3 3 3 3 5 5 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8	M	A	M	3 3 3 3 3 3 3 3 3 3 3 3	J	3 3 3 3 3 3 3 3 3 3 3 3 4 X	5 5	0	
Impact Station Downcurrent Intermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring Ebb Tide Impact Station Downcurrent	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2 RFF3 IPE1 IPE2 IPE3 IPE4 IPE5 INE1	4 times per year 4 times per year 2 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 ×	S		N	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	J	3 3 3 3 3 3 3 3 3 3 5 5 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8	M	A	M	3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3 4 X	S		
Impact Station Downcurrent Intermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring Ebb Tide Impact Station Downcurrent	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2 RFF3 IPE4 IPE3 IPE4 IPE5 INE1 INE2 INE1 INE2 INE3	4 times per year 4 times per year 2 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	5 			3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 5 8 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	M	A	M	3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	5 5		
Impact Station Downcurrent Intermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring Ebb Tide Impact Station Downcurrent	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2 RFF3 IPE1 IPE2 IPE3 IPE4 IPE5 INE1 INE2 INE3 INE4	4 times per year 4 times per year 2 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3				3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	M	A	M	3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	S		
Impact Station Downcurrent Intermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring Ebb Tide Impact Station Downcurrent	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2 RFF3 IPE4 IPE5 INE1 INE2 INE3 INE4 INE5 RFE1 RFE2	4 times per year 4 times per year 2 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	S		N	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	J	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	M		M	3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	S		
Flood Tide Impact Station Downcurrent Intermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring Ebb Tide Impact Station Downcurrent Intermediate Station Downcurrent Reference Station Upcurrent	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2 RFF3 IPE4 IPE3 IPE4 IPE5 INE1 INE2 INE3 INE4 INE5 RFE1	4 times per year 4 times per year 2 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	S S			3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	M	A	M	3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	S		
mpact Station Downcurrent intermediate Station Downcurrent Reference Station Upcurrent Routine Water Quality Monitoring Ebb Tide mpact Station Downcurrent intermediate Station Downcurrent	RFE5 INF1 PFC2 INF3 IPF1 IPF2 IPF3 RFF1 RFF2 RFF3 IPE4 IPE3 IPE4 IPE5 INE1 INE2 INE3 INE4 INE5 RFE1 RFE1 RFE1 RFE1 RFE1 RFE1 RFE2 RFE3	4 times per year 4 times per year 2 times per year	3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	S			3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	M	A	M	3 3 3 3 3 3 3 3 3 3 3 3		3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	S		

	KFE5	2 times per year									1
Flood Tide											
Impact Station Downcurrent											
	INF1	2 times per year	*			*			*		
	INF2	2 times per year	*			*			*		Γ
	INF3	2 times per year	*			*			*		
Intermediate Station Downcurrent											
	IPF1	2 times per year	*			*			*		
	IPF2	2 times per year	*			*			*		
	IPF3	2 times per year	*			*			*		
Reference Station Upcurrent											
	RFF1	2 times per year	*			*			*		
	RFF2	2 times per year	*			*			*		
	RFF3	2 times per year	*			*			*		

Water Column Profiling			J	Α	S	0	Ν	D	J	F	Μ	Α	Μ	J	J	Α	S	0	Ν	D
Plume Stations	WCP1	6 times per year	2	2				2	2	2				2	2	2				2
	WCP2	6 times per year	2	2				2	2	2				2	2	2				2

Benthic Recolonisation Studies			J	Α	S	0	Ν	D	J	F	Μ	Α	Μ	J	J	Α	s	0	Ν	D
Capped Contaminated Mud Pits																				
	CPA 1-3	2 times per year		3				3								3				3
	CPB 1-3	2 times per year		3				3								3				3
	CPC 1-3	2 times per year		3				3								3				3
Reference Stations																				
	RBA 1-3	2 times per year		3				3								3				3
	RBB 1-3	2 times per year		3				3								3				3
	RBC 1-3	2 times per year		3				3								3				3

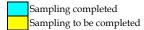
 $"\star"$ = Number of replicates depends on field catch or parameters



Annex A2 - East of Sha Chau Environmental Monitoring and Audit Sampling Schedule for CMP V (July 2009 - December 2010)

MW1

					20	09								2010					
Baseline Water Quality Monitoring			J	Α	S	0	Ν	D	J	F	Μ	Α	Μ	JJ	A	S	0	Ν	D
Near Field	ESC-WNAA		*	*															
	ESC-WNAB		*	*															
	ESC-WNAC		*	*															
	ESC-WNAD	To be surveyed 24 times (3 days per week during mid-flood and mid-ebb tide of	*	*															
	ESC-WNBA	each day) in the month prior to commencement of marine works	*	*															
	ESC-WNBB		*	*															
	ESC-WNBC		*	*															
	ESC-WNBD		*	*															
Mid Field	ESC-WMB		*	*				_											
Mid Field	ESC-WMB ESC-WMA	To be surveyed 24 times (3 days per week during mid-flood and mid-ebb tide of each day) in the month prior to commencement of marine works	*	*											_				
	ESC-WMA	each day) in the month prior to commencement of marme works													_				
F F 11			*	*															
Far Field	ESC-WFA	To be surveyed 24 times (3 days per week during mid-flood and mid-ebb tide of	Ŷ	*															
	ESC-WFB MW1	each day) in the month prior to commencement of marine works	° *	*											_				
	IVI VV I		-	î											_				
Reference Stations	ND /1		*	*						_					_	_		-	
Reference Stations	NM1 NM2		° *	*						_					_	_		-	
				*						_					_	_		-	
	NM3	To be surveyed 24 times (3 days per week during mid-flood and mid-ebb tide of each day) in the month prior to commencement of marine works	*	*						_					_	_		-	
	NM5	each day) in the month prior to commencement of marine works		*				_		_						_			
	NM6		^	^				-							-				
Water Column Profiling			J	Α	S	0		D	,	_	Μ	Α	Μ	JJ	A	S	0	Ν	D
Plume Stations	Upstream				2	2	_	2	2	2									
L	Downstream				2	2	2	2	2	2									
Water Quality Impact Monitoring for Dredging			т	Α	S	0	N	D	т	F	M	A	M	тт	A	S	0	Ν	D
Downcurrent Impact Stations	1		J	A	*	*	*	*	J *	г *	*	*	*	J J	A	. 3	*	*	*
Downcurrent impact stations	2				*	*	*	*	*	*	*	*	*	* *	*	*	*	*	*
	2				*	*	*	*	*	*	*	*	*	* *		*	*	*	*
	3		<u> </u>	$\left \right $	*	*	*		*		*			* *			*	*	*
	* 5			$\left \right $	*	*	*	*	*		*	*	*	* *		*	*	*	*
	5																		
Upcurrent Stations	1				*	*	*	*	*	*	*	*	*	* *	*	*	*	*	*
	2				*	*	*	*	*	*	*	*	*	* *	*	*	*	*	*
	-																		



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Annex B

Monitoring Results

Sampling Date	Tidal Period	Station	-	e DO Levels (mg/L)	Average Turbidity	Average TSS Leve
			Bottom	Surface and Mid Depth	Level (NTU)	(mg/L)
2010/10/02	ME	DS1	5.87	6.33	6.02	8.00
		DS2	5.83	6.19	6.72	8.00
		DS3	6.08	6.05	7.62	10.33
		DS4	6.00	5.96	8.48	16.17
		DS5	5.87	6.09	6.57	13.00
		MW1	5.09	5.36	2.58	4.67
		US1	5.70	6.35	4.25	6.67
		US2	5.70	6.37	4.32	7.33
	MF	DS1	5.91	7.51	9.46	15.50
		DS2	6.06	7.79	7.52	11.67
		DS3	6.26	7.73	8.01	15.17
		DS4	6.07	6.89	10.09	19.83
		DS5	6.15	7.09	9.86	14.17
		MW1	4.90	5.07	5.02	8.50
		US1	5.71	7.53	8.38	12.00
		US2	5.37	7.39	7.16	11.83
2010/10/05	ME	DS1	6.13	6.23	15.02	20.00
		DS2	6.12	6.25	12.86	15.50
		DS3	6.08	6.24	15.70	21.50
		DS4	6.15	6.26	12.68	20.00
		DS5	6.04	6.26	16.17	20.50
		MW1	5.16	5.18	5.89	8.83
		US1	6.11	6.24	9.20	17.33
		US2	6.10	6.28	8.58	12.00
	MF	DS1	5.84	5.63	12.50	13.67
		DS2	5.85	5.72	17.47	25.67
		DS3	5.52	5.48	19.61	25.83
		DS4	5.51	5.52	10.95	13.67
		DS5	5.41	5.52	10.28	14.67
		MW1	5.13	5.14	6.22	9.00
		US1	5.81	5.68	12.46	15.33
		US2	5.90	5.84	14.00	16.17
2010/10/07	ME	DS1	6.10	6.01	23.38	29.83
.010/10/07	IVIL	DS1 DS2	6.04	5.97		27.83
		DS2 DS3	6.04 5.97	5.97	24.36	27.83 26.33
		DS3 DS4	5.92	5.84	21.74 20.21	20.33
		DS4 DS5	6.03	5.92	26.50	38.33
		MW1			28.50 13.96	17.83
			5.22 6.26	5.20 6.11		
		US1	6.26	6.11 5.07	17.43	22.83
	ME	US2	6.08 E. (E	5.97	19.91	19.50
	MF	DS1	5.65 5.80	5.58 5.57	23.00	28.17
		DS2	5.89 5.61	5.57	<mark>29.10*</mark> 17.05	35.00
		DS3	5.61	5.57	17.95	19.33
		DS4	5.57	5.59	17.63	22.17
		DS5	5.60	5.60	13.16	13.67
		MW1	4.89	4.91	27.62	32.17
		US1	5.71	5.57	21.27	24.67
		US2	5.65	5.56	31.65	30.83
2010/10/09	ME	DS1	5.66	5.49	37.35*	64.00*
		DS2	5.48	5.46	51.39*	47.67*
		DS3	5.38	5.41	20.20	31.33
		DS4	5.42	5.47	14.48	20.67
		DS5	5.63	5.55	13.27	18.83

Sampling Date	Tidal Period	Station		e DO Levels mg/L)	Average Turbidity	Average TSS Level
			Bottom	Surface and Mid Depth	Level (NTU)	(mg/L)
		MW1	4.88	5.02	16.63	20.00
		US1	5.62	5.50	15.52	38.00
		US2	5.55	5.51	36.52	45.00
	MF	DS1	5.61	5.52	47.46*	62.83*
		DS2	5.55	5.53	21.80	30.67
		DS3	5.63	5.55	20.33	28.33
		DS4	5.54	5.53	26.41	32.50
		DS5	5.42	5.39	26.38	35.33
		MW1	5.18	5.16	18.54	28.00
		US1	5.60	5.53	29.88	41.00
		US2	5.59	5.53	48.20	67.83
2010/10/11	ME	DS1	5.85	5.82	10.82	11.50
		DS2	5.68	5.89	9.76	10.67
		DS3	5.73	5.92	9.92	13.17
		DS4	5.85	5.97	7.66	9.83
		DS5	5.74	6.04	7.61	8.17
		MW1	5.32	5.37	7.41	8.00
		US1	5.83	5.83	11.94	13.17
		US2	5.79	5.81	14.49	15.83
	MF	DS1	5.74	5.71	28.87*	28.67
		DS2	5.73	5.70	16.45	20.67
		DS3	5.72	5.70	16.22	19.17
		DS4	5.56	5.64	18.48	25.00
		DS5	5.44	5.48	16.48	19.50
		MW1	5.37	5.42	15.29	18.17
		US1	5.73	5.67	26.74	35.00
		US2	5.71	5.65	32.67	45.17
2010/10/13	ME	DS1	5.81	5.76	7.23	11.00
, ,		DS2	5.86	5.82	6.03	6.17
		DS3	5.49	5.70	8.57	7.67
		DS4	5.71	6.00	5.49	4.83
		DS5	5.90	5.96	6.21	5.17
		MW1	5.60	5.76	7.53	8.50
		US1	5.79	5.78	7.92	9.83
		US2	5.75	5.63	7.98	11.17
	MF	DS1	5.78	5.68	27.08	31.50
		DS2	5.72	5.68	17.02	19.33
		DS3	5.70	5.92	11.58	11.17
		DS4	5.54	5.62	12.99	18.17
		DS5	5.46	5.58	16.43	22.33
		MW1	5.61	5.72	8.70	8.00
		US1	5.74	5.73	19.41	26.00
		US2	5.75	5.88	10.98	10.83
2010/10/15	ME	DS1	5.33	5.49	7.31	10.00
		DS2	5.43	5.51	7.06	8.50
		DS3	5.48	5.59	9.86	13.17
		DS4	5.42	5.50	5.89	8.17
		DS5 DS5	5.44	5.49	4.88	6.50
		MW1	5.35	5.80	2.70	0.50 3.67
		US1	5.26	5.53	5.95	7.50
		US2	5.20	5.51	5.95	7.50 8.17
	MF	DS1	5.69	5.73	4.85	7.67
	IVII	DS1 DS2				
			5.33 5.38	5.71 5.58	6.49 7.14	10.17
		DS3	5.38 5.41	5.58 5.72	7.14	9.33
		DS4	5.41	5.73	6.96	9.50
		DS5	5.84	5.95	5.44	8.83

Sampling Date	Tidal Period	Station		æ DO Levels (mg/L)	Average Turbidity	Average TSS Level
			Bottom	Surface and Mid Depth	Level (NTU)	(mg/L)
		MW1	5.24	5.20	4.53	6.50
		US1	5.64	5.88	4.23	6.83
		US2	5.31	5.78	5.86	8.50
2010/10/18	ME	DS1	5.92	6.05	4.11	5.17
		DS2	5.91	6.05	4.08	5.50
		DS3	5.74	6.02	5.32	8.17
		DS4	5.85	6.17	5.43	10.17
		DS5	5.83	6.26	5.30	9.83
		MW1	5.18	5.20	3.11	6.83
		US1	5.90	6.14	3.62	5.17
		US2	5.90	6.18	3.77	5.33
	MF	DS1	6.20	6.27	9.00	12.83
		DS2	6.36	6.45	6.32	9.00
		DS3	6.32	6.56	5.78	9.50
		DS4	6.04	6.50	5.24	9.00
		DS5	6.03	6.63	6.95	12.00
		MW1	5.38	5.40	7.09	9.00
		US1	6.01	6.32	9.62	13.33
		US2	5.78	5.97	14.93	22.67
2010/10/20	ME	DS1	6.79	6.80	11.69	18.33
		DS2	6.57	6.62	14.20	19.67
		DS3	6.37	6.43	13.77	21.17
		DS4	6.40	6.42	13.12	23.67
		DS5	6.42	6.43	13.22	22.83
		MW1	5.71	5.69	5.54	8.50
		US1	6.71	6.71	11.11	17.50
		US2	6.57	6.50	10.52	17.50
	MF	DS1	6.68	6.65	16.37	20.83
		DS2	6.77	6.71	16.62	28.50
		DS3	6.97	6.93	11.50	16.33
		DS4	6.93	6.90	7.19	12.17
		DS5	6.60	6.60	8.02	12.67
		MW1	5.79	5.76	9.91	16.17
		US1	6.71	6.59	17.97	27.00
		US2	6.37	6.41	14.84	24.67
2010/10/25	ME	DS1	6.61	6.78	8.81	13.17
		DS2	6.57	6.67	9.97	15.67
		DS3	6.50	6.68	10.24	15.17
		DS4	6.51	6.61	9.34	13.33
		DS5	6.49	6.55	10.31	13.00
		MW1	5.96	5.91	11.62	15.83
		US1	6.68	6.71	8.66	10.83
		US2	6.51	6.60	10.14	14.00
	MF	DS1	6.31	6.29	24.61	38.17
		DS2	6.28	6.29	18.41	28.67
		DS3	6.35	6.28	18.70	25.17
		DS4	6.36	6.29	17.62	24.00
		DS5	6.25	6.26	19.68	26.50
		MW1	5.91	5.91	17.68	26.17
		US1	6.32	6.28	21.93	30.50
		US2	6.38	6.35	16.53	23.67

Notes:

1. Cell shaded yellow indicates value exceeding the Action Level criteria.

2. Cell shaded red indicates value exceeding the Limit Level criteria.

3. Asterisk indicates no significant difference between Reference station value (US1 and US2) and Impact station value where exceedance(s) is/are recorded.

4. Cell shaded grey indicates high TSS and Turbidity values recorded at Reference station (ie comparing with the Action and Limit Level criteria).

Annex C

Study Programme

