








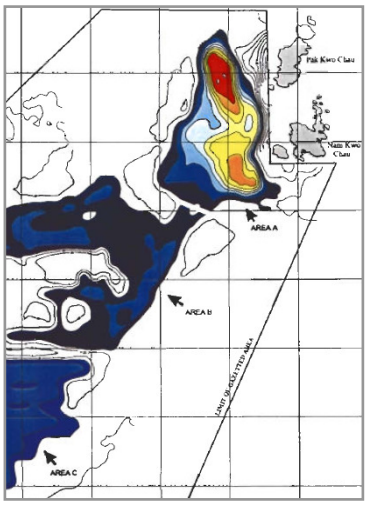

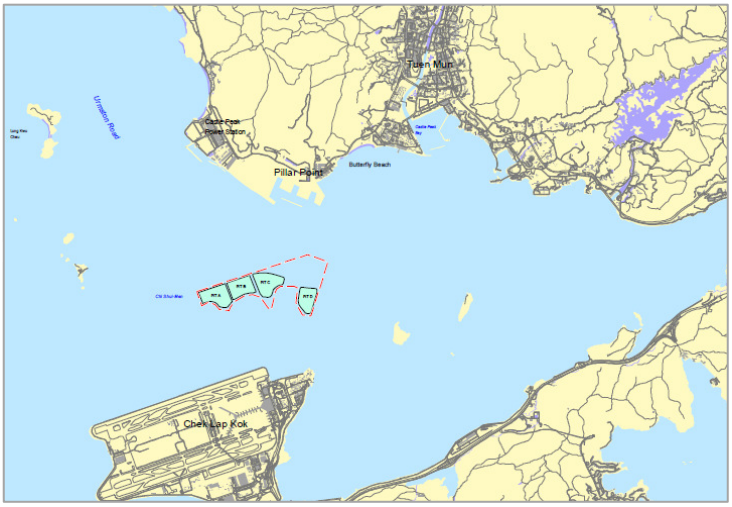

土木工程拓展署
Civil Engineering and Development Department

Environmental Monitoring and Audit for Contaminated Mud Pit at Sha Chau (2009-2013) – Investigation

Agreement No. CE 4/2009(EP)

10th Monthly Progress Report for Contaminated Mud Pits at Sha Chau – April 2010

Revision 0

17 May 2010

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Environmental Monitoring and Audit for Contaminated Mud Pit at Sha Chau (2009-2013) – Investigation

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Revision 0

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Client:	Project No:
Civil Engineering and Development Department (CEDD)	0103262
Summary: This document presents progress of monitoring works on contaminated mud pits at Sha Chau in April 2010 under Agreement No. CE 4/2009 (EP).	Date: 17 May 2010 Approved by:  *Dr Robin Kennish* *Director*

Revision	Description	By	Checked	Approved	Date
0	10th Monthly Progress Report for CMP – Revision 0	SL	CAR	RK	17/05/10

Distribution

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

10th MONTHLY PROGRESS REPORT FOR CONTAMINATED MUD PITS AT SHA CHAU - April 2010

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 2010. 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 Va. The environmental monitoring and audit (EM&A) programme for the CMPs at the East of Sha Chau area presently covers disposal operations at CMP IVc and dredging operations at CMP V.

1.2 REPORTING PERIOD

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

1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES

For CMP IVc, sampling for *Pit Specific Sediment Chemistry Monitoring* was conducted on 21 April 2010. For CMP V, sampling for *Impact Monitoring during Dredging Operations* was conducted on 20 April 2010. A summary of field activities are presented in *Annex A*.

A summary of laboratory analysis results submitted by the Contractor in this reporting month is presented on *Table 1.1*.

Table 1.1 ***Summary of laboratory analysis results submitted by the Contractor during the reporting month***

Key Task	Monitoring Component	Results Received from the Contractor
CMP V		
Water Sampling and Chemical Analysis	Impact Monitoring during Dredging Operations	April's sampling: *20 April 2010*

1.4 DETAILS OF OUTSTANDING SAMPLING AND / OR ANALYSIS

No outstanding sampling and laboratory analysis remained from April 2010.

1.5 BRIEF DISCUSSION OF THE MONITORING RESULTS

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

1.5.1 CMP V

Impact Monitoring during Dredging Operations of CMP V – April 2010

Impact Monitoring during Dredging Operations of CMP V was conducted on 20 April 2010. 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 were taken as well as water samples from three depths in the water column (surface (1m below sea surface), mid-depth and bottom (1m above the seabed)).

Monitoring results are presented in *Figures 1* to *4* of *Annex B*. Levels of DO, depth-average Turbidity and TSS complied with the Action and Limit Levels set in the *Baseline Monitoring Report* [1] (*Tables B1* and *B2* of *Annex B*).

1.6 ACTIVITIES SCHEDULED FOR THE NEXT MONTH

No monitoring activity will be conducted for CMP IVc. *Impact Monitoring during Dredging Operations* for CMP V are scheduled in the next monthly period of May 2010. The sampling schedule is presented in *Annex A*.

[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.

1.7 STUDY PROGRAMME

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

Annex A

Sampling Schedule

Annex A1 - East of Sha Chau Environmental Monitoring and Audit Sampling Schedule for CMP IVc (July 2009 - May 2010)

			2009						2010					
Pit Specific Sediment Chemistry	**Code**	**Frequency**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**
Active-Pit													
	NCA 1 - 8	3 times per year		*				*				*	
	NCB 1 - 8	3 times per year		*				*				*	
Pit-Edge													
	CPA 1-8	3 times per year		*				*				*	
	CPB 1-8	3 times per year		*				*				*	
Near-Pit													
	CNA 1-8	3 times per year		*				*				*	
	CNB 1-8	3 times per year		*				*				*	

Cumulative Impact Sediment Chemistry			**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**
Near-field Stations													
	RNA 1-9	2 times per year		*				*					
	RNB 1-9	2 times per year		*				*					
Mid-field Stations													
	RMA 1-9	2 times per year		*				*					
	RMB 1-9	2 times per year		*				*					
Capped Pit Stations													
	RCA 1-9	2 times per year		*				*					
	RCB 1-9	2 times per year		*				*					
Far-Field Stations													
	RFA 1-9	2 times per year		*				*					
	RFB 1-9	2 times per year		*				*					

Sediment Toxicity Tests			**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**
Near-Field Stations													
	TCA	2 times per year		3				3					
	TCB	2 times per year		3				3					
Reference Stations													
	TRA	2 times per year		3				3					
	TRB	2 times per year		3				3					

Tissue/ Whole Body Sampling			**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**
Near-Pit Stations													
	INA	2 times per year		*						*			
	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		*						*			

Demersal Trawling			**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**
Near Pit Stations													
	INA 1-5	4 times per year	5	5					5	5			
	INB 1-5	4 times per year	5	5					5	5			
Reference North													
	TNA 1-5	4 times per year	5	5					5	5			
	TNB 1-5	4 times per year	5	5					5	5			
Reference South													
	TSA 1-5	4 times per year	5	5					5	5			
	TSB 1-5	4 times per year	5	5					5	5			

Capping			**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**
Ebb Tide													
Impact Station Downcurrent													
	IPE1	4 times per year	3	3				3		3			
	IPE2	4 times per year	3	3				3		3			
	IPE3	4 times per year	3	3				3		3			
	IPE4	4 times per year	3	3				3		3			
	PFC1	4 times per year	3	3				3		3			
Intermediate Station Downcurrent													
	INE1	4 times per year	3	3				3		3			
	INE2	4 times per year	3	3				3		3			
	INE3	4 times per year	3	3				3		3			
	INE4	4 times per year	3	3				3		3			
	INE5	4 times per year	3	3				3		3			
Reference Station Upcurrent													
	RFE1	4 times per year	3	3				3		3			
	RFE2	4 times per year	3	3				3		3			
	RFE3	4 times per year	3	3				3		3			
	RFE4	4 times per year	3	3				3		3			
	RFE5	4 times per year	3	3				3		3			
Flood Tide													
Impact Station Downcurrent													
	INF1	4 times per year	3	3				3		3			
	PFC2	4 times per year	3	3				3		3			
	INF3	4 times per year	3	3				3		3			
Intermediate Station Downcurrent													
	IPF1	4 times per year	3	3				3		3			
	IPF2	4 times per year	3	3				3		3			
	IPF3	4 times per year	3	3				3		3			
Reference Station Upcurrent													
	RFF1	4 times per year	3	3				3		3			
	RFF2	4 times per year	3	3				3		3			
	RFF3	4 times per year	3	3				3		3			

Routine Water Quality Monitoring			**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**
Ebb Tide													
Impact Station Downcurrent													
	IPE1	2 times per year		*						*			
	IPE2	2 times per year		*						*			
	IPE3	2 times per year		*						*			
	IPE4	2 times per year		*						*			
	IPE5	2 times per year		*						*			
Intermediate Station Downcurrent													
	INE1	2 times per year		*						*			
	INE2	2 times per year		*						*			
	INE3	2 times per year		*						*			
	INE4	2 times per year		*						*			
	INE5	2 times per year		*						*			
Reference Station Upcurrent													
	RFE1	2 times per year		*						*			
	RFE2	2 times per year		*						*			
	RFE3	2 times per year		*						*			
	RFE4	2 times per year		*						*			
	RFE5	2 times per year		*						*			
Flood Tide													
Impact Station Downcurrent													
	INF1	2 times per year		*						*			
	INF2	2 times per year		*						*			
	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**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**
Plume Stations	WCP1	6 times per year	2	2				2	2	2			
	WCP2	6 times per year	2	2				2	2	2			

Benthic Recolonisation Studies			**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**
Capped Contaminated Mud Pits													
	CPA 1-3	2 times per year		3				3					
	CPB 1-3	2 times per year		3				3					
	CPC 1-3	2 times per year		3				3					
Reference Stations													
	RBA 1-3	2 times per year		3				3					
	RBB 1-3	2 times per year		3				3					
	RBC 1-3	2 times per year		3				3					

"*" = Number of replicates depends on field catch or parameters

Sampling completed

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

			2009						2010				
Baseline Water Quality Monitoring			J	A	S	O	N	D	J	F	M	A	M
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	To be surveyed 24 times (3 days per week during mid-flood and mid-ebb tide of	*	*									
	ESC-WMA	each day) in the month prior to commencement of marine works	*	*									
Far Field	ESC-WFA	To be surveyed 24 times (3 days per week during mid-flood and mid-ebb tide of	*	*									
	ESC-WFB	each day) in the month prior to commencement of marine works	*	*									
	MW1		*	*									
Reference Stations	NM1		*	*									
	NM2		*	*									
	NM3	To be surveyed 24 times (3 days per week during mid-flood and mid-ebb tide of	*	*									
	NM5	each day) in the month prior to commencement of marine works	*	*									
	NM6		*	*									

Water Column Profiling		J	A	S	O	N	D	J	F	M	A	M
Plume Stations	Upstream			2	2	2	2	2	2			
	Downstream			2	2	2	2	2	2			

Water Quality Impact Monitoring for Dredging		J	A	S	O	N	D	J	F	M	A	M
Downcurrent Impact Stations	1			*	*	*	*	*	*	*	*	*
	2			*	*	*	*	*	*	*	*	*
	3			*	*	*	*	*	*	*	*	*
	4			*	*	*	*	*	*	*	*	*
	5			*	*	*	*	*	*	*	*	*
Upcurrent Stations	1			*	*	*	*	*	*	*	*	*
	2			*	*	*	*	*	*	*	*	*
	MW1			*	*	*	*	*	*	*	*	*

Sampling completed
Sampling to be completed

Annex B

Monitoring Results

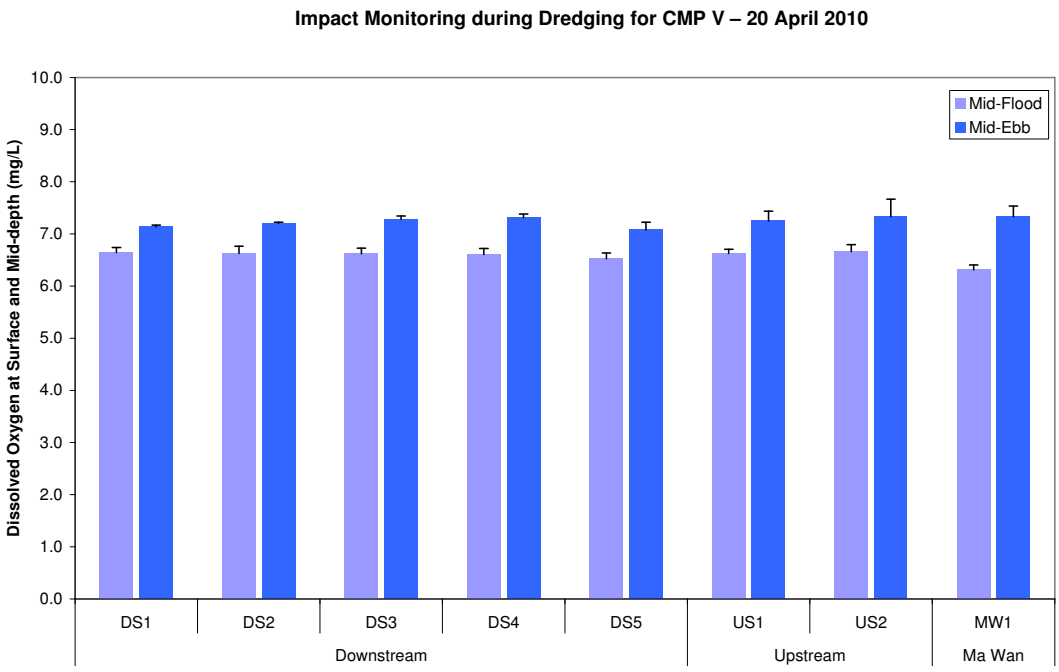

Figure 1: Surface and Mid Depth Averaged DO Level (mean ± SD) at Downstream (DS1, DS2, DS3, DS4 and DS5 stations), Upstream (US1 and US2 stations) and Ma Wan (MW1 station) during Impact Monitoring for Dredging on 20 April 2010.

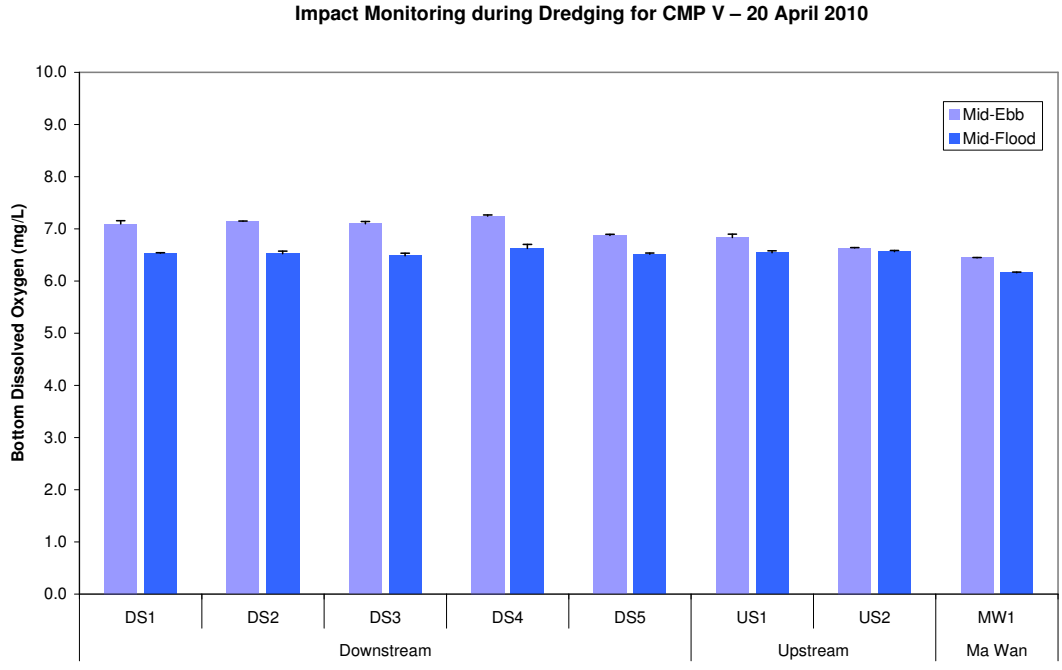

Figure 2: Bottom DO Level (mean ± SD) at Downstream (DS1, DS2, DS3, DS4 and DS5 stations), Upstream (US1 and US2 stations) and Ma Wan (MW1 station) during Impact Monitoring for Dredging on 20 April 2010.

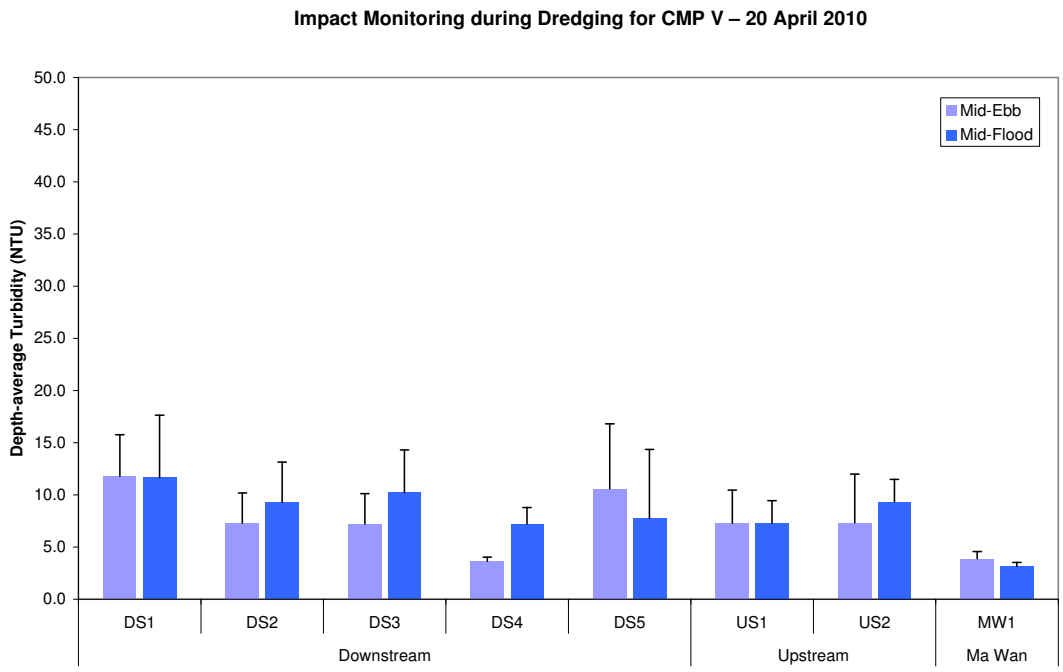

Figure 3: Depth-average Turbidity (mean ± SD) at Downstream (DS1, DS2, DS3, DS4 and DS5 stations), Upstream (US1 and US2 stations) and Ma Wan (MW1 station) during Impact Monitoring for Dredging on 20 April 2010.

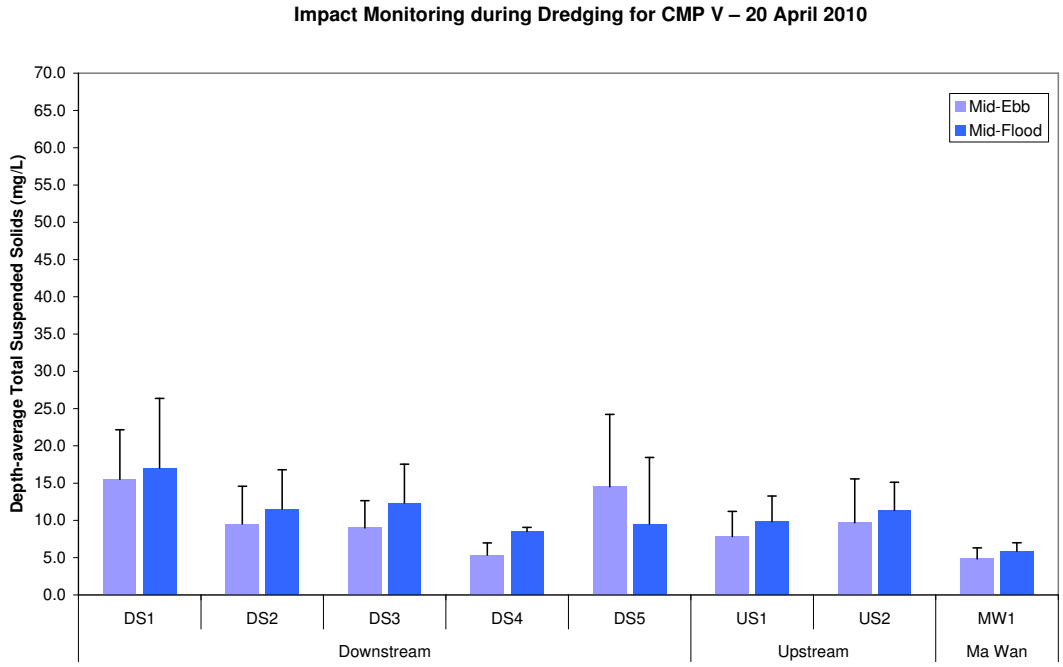

Figure 4: Depth-average Suspended Solids (mean ± SD) at Downstream (DS1, DS2, DS3, DS4 and DS5 stations), Upstream (US1 and US2 stations) and Ma Wan (MW1 station) during Impact Monitoring for Dredging on 20 April 2010.

Table B1: Impact Water Quality Monitoring for Dredging Activities during Mid-ebb Tide for 20 April 2010

Station	Downstream (Impact)		
Time (hh:mm)	16:06-16:48		
Monitoring Depth (m)	Depth Average	Surface and Middle	Bottom
D.O. (mg/L)	N/A	7.20	7.09
Turbidity (NTU)	8.10	N/A	N/A
SS (mg/L)	10.77	N/A	N/A
Remarks	Dredging works were observed.		

Station	Upstream (Reference)		
Time (hh:mm)	15:45-16:00		
Monitoring Depth (m)	Depth Average	Surface and Middle	Bottom
D.O. (mg/L)	N/A	7.29	6.74
Turbidity (NTU)	7.31	N/A	N/A
SS (mg/L)	8.75	N/A	N/A
Remarks	Dredging works were observed.		

Station	Ma Wan		
Time (hh:mm)	17:35-17:40		
Monitoring Depth (m)	Depth Average	Surface and Middle	Bottom
D.O. (mg/L)	N/A	6.51	6.45
Turbidity (NTU)	3.88	N/A	N/A
SS (mg/L)	4.83	N/A	N/A
Remarks			

Compliance with Action and Limit Levels

	Action Level		Limit Level					
Parameter	Impact Stations	Comparison between I and R [(a)]	Mean Value at Impact Stations	Comparison between I and R [(a)]	Mean Value at Impact Stations	Mean Value at Reference Stations	Compliance with Action level	Compliance with Limit Level
DO (Bottom)	< 2.96	R significantly greater than I (t-test, p < 0.05)	< 2.00	R significantly greater than I (t-test, p < 0.05)	7.09	6.74	Y	Y
DO (Surface and Mid Depth)	< 3.76	R significantly greater than I (t-test, p < 0.05)	< 3.11	R significantly greater than I (t-test, p < 0.05)	7.20	7.29	Y	Y
Turbidity (Depth-averaged)	> 28.14	I ≥ 1.2 R (8.77)	> 38.32	I ≥ 1.3 R (9.50)	8.10	7.31	Y	Y
SS (Depth-averaged)	> 37.88	I ≥ 1.2 R (10.50)	> 61.92	I ≥ 1.3 R (11.38)	10.77	8.75	Y	Y

Table B2: Impact Water Quality Monitoring for Dredging Activities during Mid-flood Tide for 20 April 2010

Station	Downstream (Impact)		
Time (hh:mm)	09:52 - 10:35		
Monitoring Depth (m)	Depth Average	Surface and Middle	Bottom
D.O. (mg/L)	N/A	6.60	6.54
Turbidity (NTU)	9.22	N/A	N/A
SS (mg/L)	11.77	N/A	N/A
Remarks	Dredging works were observed.		

Station	Upstream (Reference)		
Time (hh:mm)	10:40 - 10:53		
Monitoring Depth (m)	Depth Average	Surface and Middle	Bottom
D.O. (mg/L)	N/A	6.64	6.56
Turbidity (NTU)	8.31	N/A	N/A
SS (mg/L)	10.58	N/A	N/A
Remarks	Dredging works were observed.		

Station	Ma Wan		
Time (hh:mm)	08:22 - 08:27		
Monitoring Depth (m)	Depth Average	Surface and Middle	Bottom
D.O. (mg/L)	N/A	6.31	6.16
Turbidity (NTU)	3.15	N/A	N/A
SS (mg/L)	5.83	N/A	N/A
Remarks			

Compliance with Action and Limit Levels

Parameter	Action Level		Limit Level		Mean Value at Impact Stations	Mean Value at Reference Stations	Compliance with Action level	Compliance with Limit Level
	Mean Value at Impact Stations	Comparison between I and R [(a)]	Mean Value at Impact Stations	Comparison between I and R [(a)]				
DO (Bottom)	< 2.96	R significantly greater than I (t-test, $p < 0.05$)	< 2.00	R significantly greater than I (t-test, $p < 0.05$)	6.54	6.6	Y	Y
DO (Surface and Mid Depth)	< 3.76	R significantly greater than I (t-test, $p < 0.05$)	< 3.11	R significantly greater than I (t-test, $p < 0.05$)	6.60	6.64	Y	Y
Turbidity (Depth-averaged)	> 28.14	I ≥ 1.2 R (9.97)	> 38.32	I ≥ 1.3 R (10.80)	9.22	8.31	Y	Y
SS (Depth-averaged)	> 37.88	I ≥ 1.2 R (12.70)	> 61.92	I ≥ 1.3 R (13.76)	11.77	10.58	Y	Y

Note: (a) I = Impact; R = Reference Stations

Annex C

Study Programme

ID	Task Name
1	**Project Commencement**
2	
3	**For CMP IV and New Facility at East Sha Chau**
4	
5	Submission of Draft Inception Report & Draft Programme
6	Submission of Final Inception Report & Final Programme
7	Submission of Draft Operations Manual
8	Submission of Final Operations Manual
9	**Submission of Operations Manual Updates**
17	Submission of Draft Monitoring And Audit Manual (Rev 1)
18	Submission of Final Monitoring And Audit Manual (Rev 1)
19	Submission of Draft Monitoring And Audit Manual (Rev 2)
20	Submission of Final Monitoring And Audit Manual (Rev 2)
21	**Submission of EM&A Manual Updates**
29	
30	**Monitoring Contract Works**
31	Prepare Draft Letters of Invitation, Gazette Documents & Tender Documents
32	Submission of Draft Tender Documents
33	Submission of Draft Gazette Documents
34	Submission of Final Tender Documents
35	Submission of Final Gazette Documents
36	Tendering and Tender Assessment
37	Prepare Contact Documents
38	Submission of Contract Documents
39	Administrate and Supervise Contracted Field and Laboratory Works
40	**Submission of Report on Dredging & Capping Operations**
49	**Monthly Progress Report**
101	**Quarterly EM&A Reports**
115	**Submission of Annual Review Report**
120	**Submission of Annual Risk Assessment Report**
125	**Submission of Draft Final Report**
126	**Submission of the Final Report**
127	**Submission of Draft Executive Summary Report**
128	**Submission of Final Executive Summary Reports**
129	
130	**For East Tung Lung Chau Disposal Facility**
131	
132	**Submission of Monitoring Results & Monthly EM&A Progress Report**
133	October 2009
134	November 2009
135	December 2009
136	January 2010

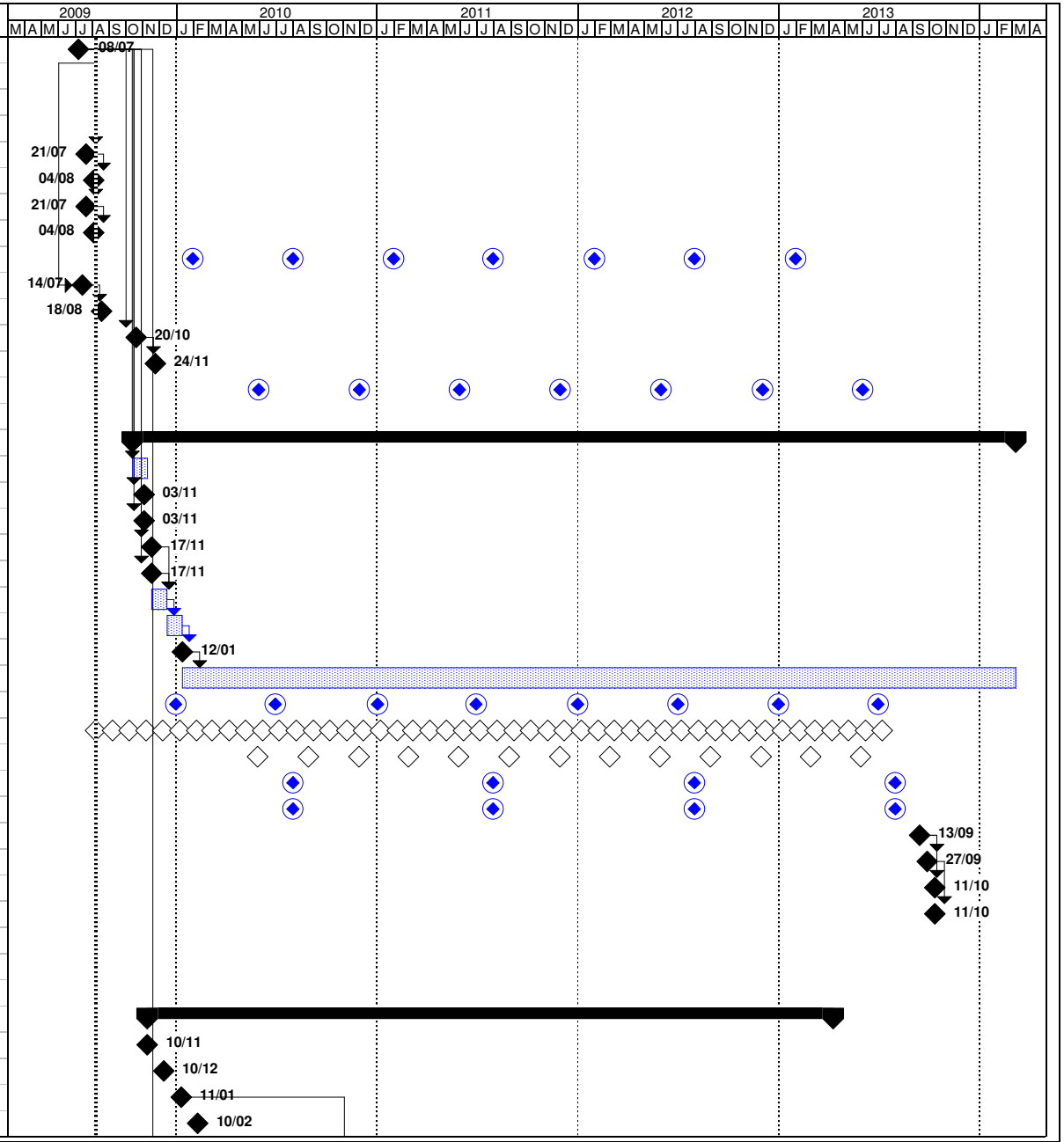

Figure 4.1 - Study Programme

Task | Milestone | Rolled Up Task
Progress | Summary | Rolled Up Milestone

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

ID	Task Name
137	February 2010
138	March 2010
139	October 2010
140	November 2010
141	December 2010
142	January 2011
143	February 2011
144	March 2011
145	October 2011
146	November 2011
147	December 2011
148	January 2012
149	February 2012
150	March 2012
151	October 2012
152	November 2012
153	December 2012
154	January 2013
155	February 2013
156	March 2013
157	**Submission of Initial Review Report**
158	**Submission of Quarterly EM&A Report**
159	Quarter 1 2010
160	Quarter 2 2010
161	Quarter 3 2011
162	Quarter 4 2011
163	Quarter 5 2012
164	Quarter 2 2012
165	Quarter 1 2013
166	**Submission of Annual Report**
167	Annual Report 1 2010
168	Annual Report 2 2011
169	Annual Report 3 2012
170	
171	**Alternative / Modified Capping Design**
172	
173	**Submission of Investigation Report**
174	**Submission of Annual Report**
175	Capping Design Annual Report 2010
176	Capping Design Annual Report 2011
177	Capping Design Annual Report 2012

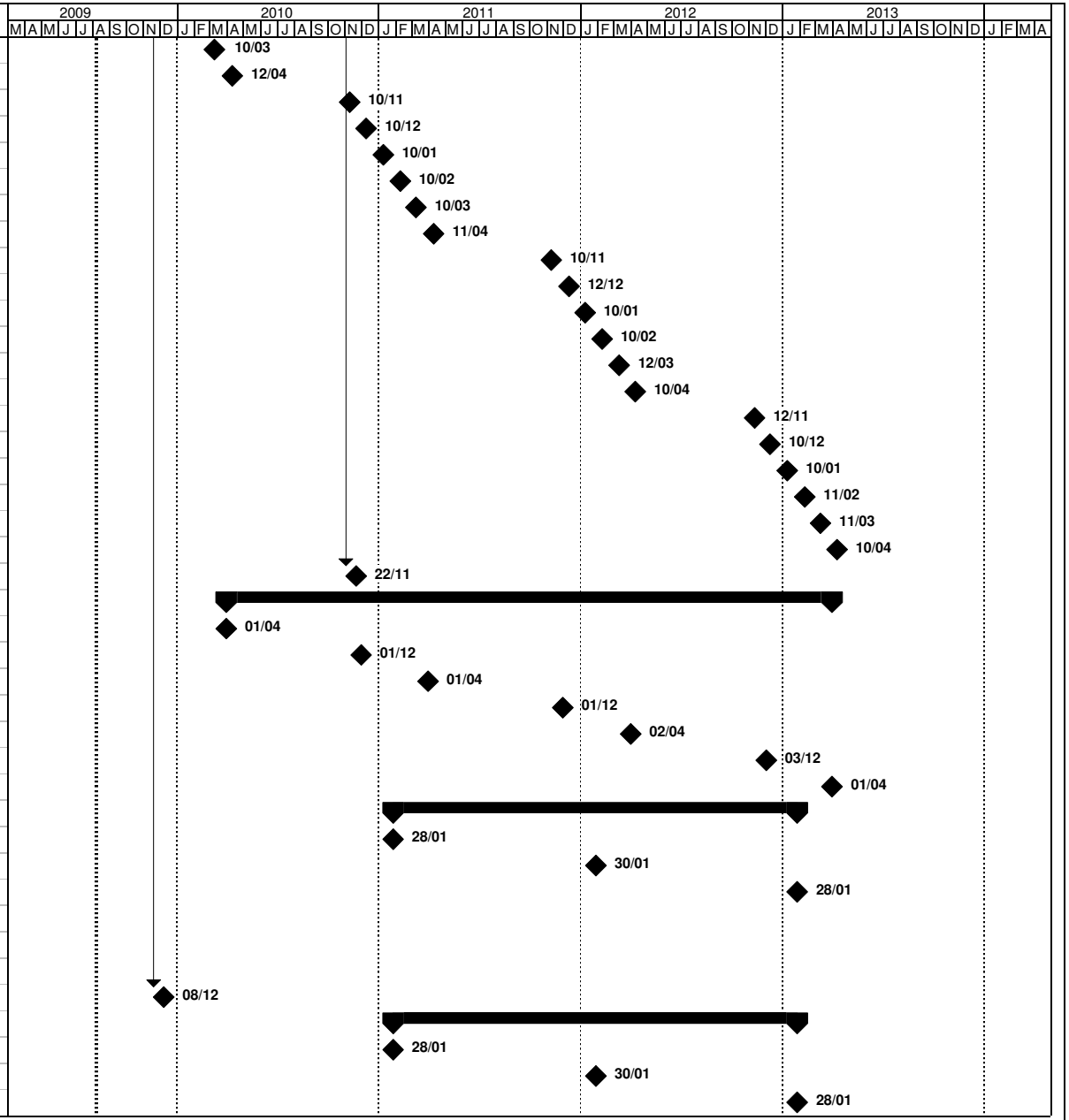

Figure 4.1 - Study Programme

Task | Milestone | Rolled Up Task
Progress | Summary | Rolled Up Milestone

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