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Environmental Monitoring and Audit for Contaminated Mud Pit at Sha Chau (2009-2013) – Investigation *Agreement No. CE 4/2009(EP)*
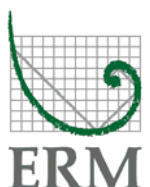
18th Monthly Progress Report for Contaminated Mud Pits at Sha Chau – December 2010

Revision 0

31 January 2011

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

18th Monthly Progress Report for Contaminated Mud Pits at Sha Chau – December 2010

Revision 0

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Client:	Project No:
Civil Engineering and Development Department (CEDD)	0103262

Summary:	Date: 31 January 2011
	Approved by:
This document presents progress of monitoring works on contaminated mud pits at Sha Chau in December 2010 under Agreement No. CE 4/2009 (EP).	*Dr Robin Kennish* *Director*

Revision	Description	By	Checked	Approved	Date
0	18th Monthly Progress Report for CMP – Revision 0	JT	CAR	RK	31/01/11

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

18th MONTHLY PROGRESS REPORT FOR CONTAMINATED MUD PITS
AT SHA CHAU - December 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 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 December 2010.

1.3   *DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES*

The following monitoring activities have been undertaken for CMP IV in December 2010:

- *Benthic Macro In-fauna Monitoring* and *Pit Specific Sediment Chemistry Monitoring* were conducted on 7 December;

- *Cumulative Impact Sediment Chemistry Monitoring* was conducted on 9 December;

- *Demersal Trawling* was conducted on 9-10 December;

- *Sediment Toxicity Monitoring* was conducted on 11 December; and

- *Water Column Profiling* and *Water Quality Monitoring during Capping* were conducted on 16 December.

For CMP V, sampling for *Impact Water Quality Monitoring during Dredging Operations* was conducted 13 December.   A summary of field activities are presented in *Annex A*.

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1.4 DETAILS OF OUTSTANDING SAMPLING AND / OR ANALYSIS

No outstanding sampling and laboratory analysis remained from December 2010.

1.5 BRIEF DISCUSSION OF THE MONITORING RESULTS

Results of *Impact Water Quality Monitoring during Dredging Operations* for December 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 – December 2010

Impact Water Quality Monitoring during Dredging Operations of CMP V was conducted on 13 December 2010.   On the 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*.   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].   Therefore, 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

Water Column Profiling and *Demersal Trawling* will be undertaken for CMP IV while *Impact Water Quality Monitoring during Dredging* will be undertaken for CMP V in the next monitoring month.

The sampling schedule is presented in *Annex A*.

1.7 STUDY PROGRAMME

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

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(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.

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Annex A

Sampling Schedule

Year columns: **2009** = J(ul) A S O N D; **2010** = J F M A M J J A S O N D; **2011** = J F M A

Pit Specific Sediment Chemistry

	Code	Frequency	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
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

	Code	Frequency	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
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

	Code	Frequency	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
Near-Field Stations																								
	TCA	2 times per year		3				3								3				3				
	TCB	2 times per year		3				3								3				3				
Reference Stations																								
	TRA	2 times per year		3				3								3				3				
	TRB	2 times per year		3				3								3				3				

Tissue/ Whole Body Sampling

	Code	Frequency	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
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

	Code	Frequency	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
Near Pit Stations																								
	INA 1-5	4 times per year	5	5					5	5					5	5					5	5		
	INB 1-5	4 times per year	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		
	TNB 1-5	4 times per year	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		
	TSB 1-5	4 times per year	5	5					5	5					5	5					5	5		

Capping

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

Routine Water Quality Monitoring

	Code	Frequency	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
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

	Code	Frequency	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
Plume Stations																								
	WCP1	6 times per year	2	2				2	2	2				2	2	2				2	2	2		
	WCP2	6 times per year	2	2				2	2	2				2	2	2				2	2	2		

Benthic Recolonisation Studies

	Code	Frequency	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
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				

'*' = Number of replicates depends on field catch or parameters   ▇ Sampling completed

Baseline Water Quality Monitoring			2009						2010												
			J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	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	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	J	J	A	S	O	N	D
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	J	J	A	S	O	N	D
Downcurrent Impact Stations	1			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	3			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	4			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	5			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Upcurrent Stations	1			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	MW1			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Sampling completed
Sampling to be completed

Annex B

Monitoring Results

Table B1   *Summary Table of DO, Turbidity and TSS Levels recorded in December 2010*

Sampling Date	Tidal Period	Station	Average DO Levels (mg/L)		Average Turbidity Level (NTU)	Average TSS Level (mg/L)
			Bottom	Surface and Mid Depth		
2010/12/13	ME	DS1	6.98	7.06	5.97	6.67
		DS2	6.96	7.02	5.12	5.00
		DS3	6.75	6.95	4.88	6.50
		DS4	6.92	7.01	4.28	5.33
		DS5	6.88	7.00	4.47	5.33
		MW1	6.49	6.51	2.57	4.00
		US1	7.03	7.06	3.57	5.17
		US2	7.01	7.07	3.95	4.17
	MF	DS1	6.90	6.87	8.10	9.50
		DS2	6.91	6.89	6.77	8.33
		DS3	6.89	6.88	6.27	7.33
		DS4	6.85	6.84	6.68	8.50
		DS5	6.79	6.78	5.37	7.67
		MW1	6.53	6.52	3.80	6.17
		US1	6.83	6.82	8.12	9.83
		US2	6.79	6.78	9.00	12.00

Annex C
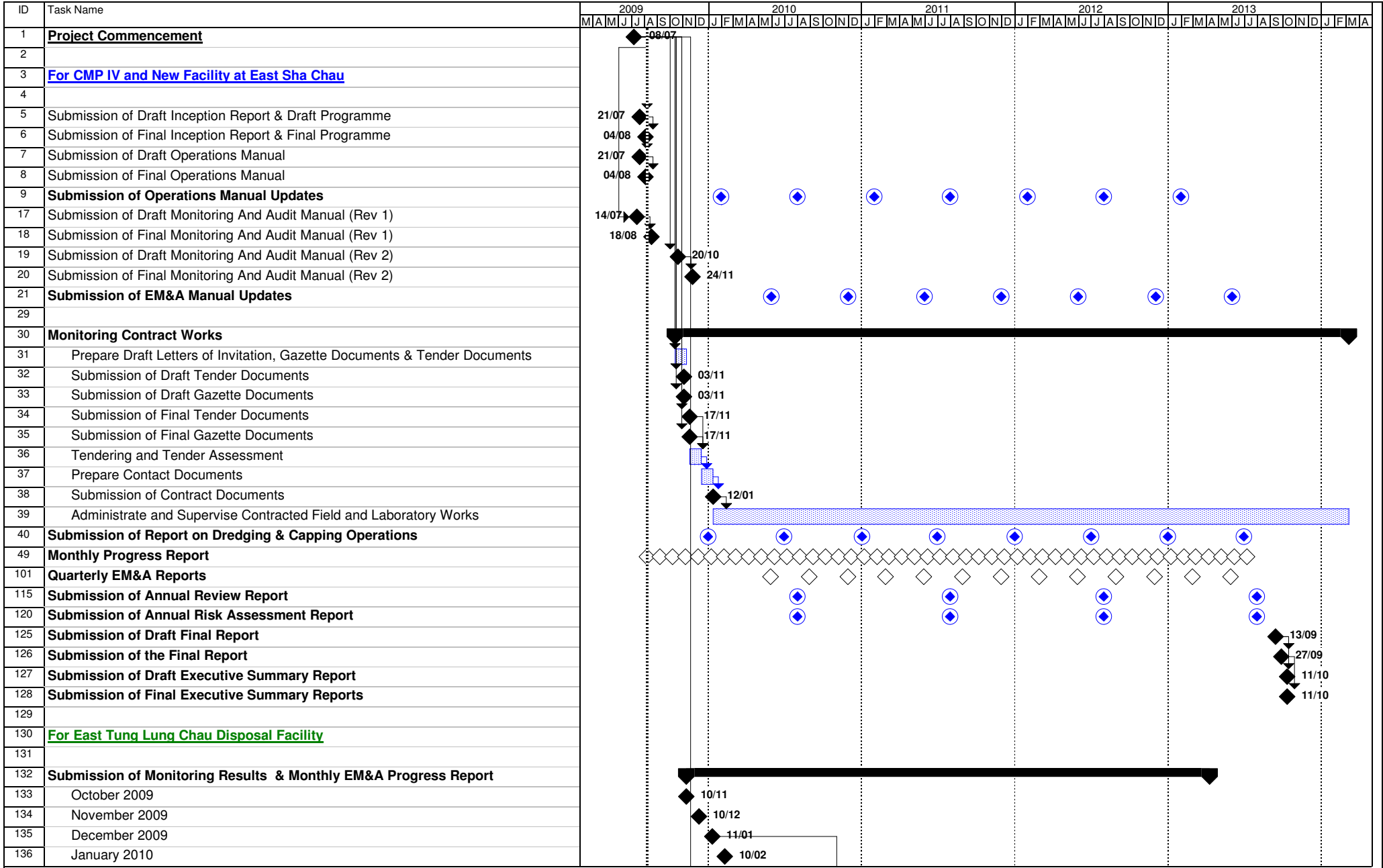
Study Programme

Figure 4.1 - Study Programme

ID	Task Name	Date/Milestone
1	**Project Commencement**	08/07
2		
3	**For CMP IV and New Facility at East Sha Chau**	
4		
5	Submission of Draft Inception Report & Draft Programme	21/07
6	Submission of Final Inception Report & Final Programme	04/08
7	Submission of Draft Operations Manual	21/07
8	Submission of Final Operations Manual	04/08
9	**Submission of Operations Manual Updates**	
17	Submission of Draft Monitoring And Audit Manual (Rev 1)	14/07
18	Submission of Final Monitoring And Audit Manual (Rev 1)	18/08
19	Submission of Draft Monitoring And Audit Manual (Rev 2)	20/10
20	Submission of Final Monitoring And Audit Manual (Rev 2)	24/11
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	03/11
33	Submission of Draft Gazette Documents	03/11
34	Submission of Final Tender Documents	17/11
35	Submission of Final Gazette Documents	17/11
36	Tendering and Tender Assessment	
37	Prepare Contact Documents	
38	Submission of Contract Documents	12/01
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**	13/09
126	**Submission of the Final Report**	27/09
127	**Submission of Draft Executive Summary Report**	11/10
128	**Submission of Final Executive Summary Reports**	11/10
129		
130	**For East Tung Lung Chau Disposal Facility**	
131		
132	**Submission of Monitoring Results & Monthly EM&A Progress Report**	
133	October 2009	10/11
134	November 2009	10/12
135	December 2009	11/01
136	January 2010	10/02

Legend:
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

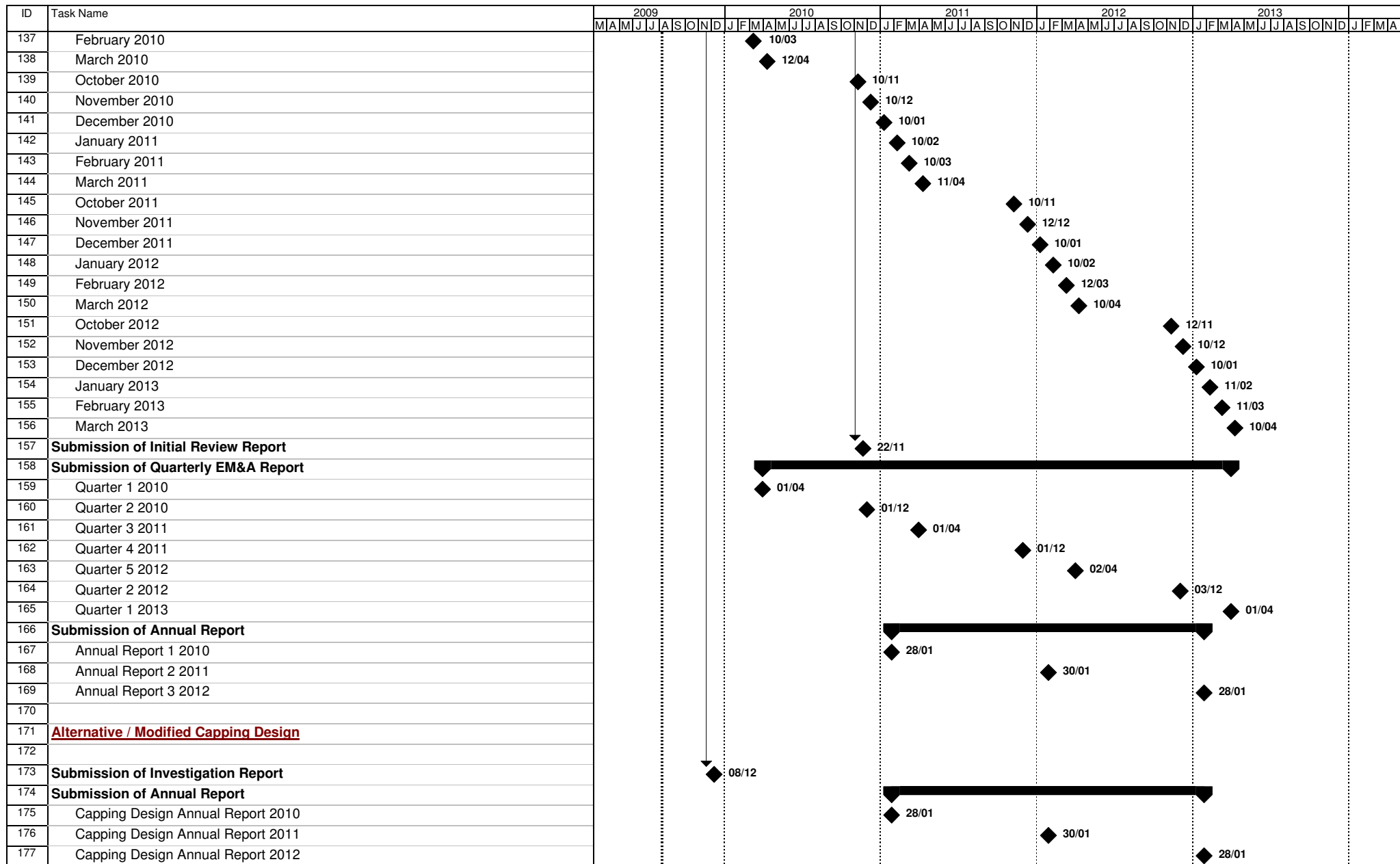| ID	Task Name	2009	2010	2011	2012	2013
		M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D J F M A
137	February 2010		◆ 10/03			
138	March 2010		◆ 12/04			
139	October 2010		◆ 10/11			
140	November 2010		◆ 10/12			
141	December 2010		◆ 10/01			
142	January 2011		◆ 10/02			
143	February 2011		◆ 10/03			
144	March 2011		◆ 11/04			
145	October 2011			◆ 10/11		
146	November 2011			◆ 12/12		
147	December 2011			◆ 10/01		
148	January 2012			◆ 10/02		
149	February 2012			◆ 12/03		
150	March 2012			◆ 10/04		
151	October 2012				◆ 12/11	
152	November 2012				◆ 10/12	
153	December 2012				◆ 10/01	
154	January 2013				◆ 11/02	
155	February 2013				◆ 11/03	
156	March 2013					◆ 10/04
157	**Submission of Initial Review Report**		◆ 22/11			
158	**Submission of Quarterly EM&A Report**		�			
159	Quarter 1 2010		◆ 01/04			
160	Quarter 2 2010		◆ 01/12			
161	Quarter 3 2011		◆ 01/04			
162	Quarter 4 2011			◆ 01/12		
163	Quarter 5 2012			◆ 02/04		
164	Quarter 2 2012				◆ 03/12	
165	Quarter 1 2013				◆ 01/04	
166	**Submission of Annual Report**			▬▬▬▬▬▬▬▬▬▬▬▬▬▬		
167	Annual Report 1 2010		◆ 28/01			
168	Annual Report 2 2011			◆ 30/01		
169	Annual Report 3 2012				◆ 28/01	
170						
171	**Alternative / Modified Capping Design**					
172						
173	**Submission of Investigation Report**	◆ 08/12				
174	**Submission of Annual Report**			▬▬▬▬▬▬▬▬▬▬▬▬▬▬		
175	Capping Design Annual Report 2010		◆ 28/01			
176	Capping Design Annual Report 2011			◆ 30/01		
177	Capping Design Annual Report 2012				◆ 28/01	

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