

 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)

11th Monthly Progress Report for Contaminated Mud Pits at Sha Chau – May 10

Revision 0

24 June 2010

Environmental Resources Management
21/F Lincoln House
Taikoo Place, 979 King's Road
Island East, Hong Kong
Telephone 2271 3000
Facsimile 2723 5660

www.erm.com





**Environmental Resources
Management**





21/F Lincoln House
979 King's Road
Taikoo Place
Island East
Hong Kong
Telephone: (852) 2271 3000
Facsimile: (852) 2723 5660
E-mail: post.hk@erm.com
http://www.erm.com

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

11th Monthly Progress Report for Contaminated Mud Pits at Sha Chau – May 2010

Revision 0

Document Code: 0103262 May 10 Monthly Report_v 0.doc

Client: Civil Engineering and Development Department (CEDD)		Project No: 0103262			
Summary: This document presents progress of monitoring works on contaminated mud pits at Sha Chau in May 2010 under Agreement No. CE 4/2009 (EP).		Date: 24 June 2010			
		Approved by:  <i>Dr Robin Kennish</i> Director			
0	11 th Monthly Progress Report for CMP – Revision 0	SL	CAR	RK	24/06/10
Revision	Description	By	Checked	Approved	Date
<p>This report has been prepared by Environmental Resources Management the trading name of 'ERM Hong-Kong, Limited', with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.</p> <p>We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.</p> <p>This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.</p>		<p>Distribution</p> <p><input checked="" type="checkbox"/> Internal</p> <p><input checked="" type="checkbox"/> Public</p> <p><input type="checkbox"/> Confidential</p>			
		  			



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

11th MONTHLY PROGRESS REPORT FOR CONTAMINATED MUD PITS
AT SHA CHAU - May 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 May 2010.

1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES

No sampling activity was conducted for CMP IVc during the reporting period. For CMP V, sampling for *Impact Water Quality Monitoring during Dredging Operations* was conducted on 24 May 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 in *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	May's sampling: 24 May 2010

1.4 *DETAILS OF OUTSTANDING SAMPLING AND / OR ANALYSIS*

No outstanding sampling and laboratory analysis remained from May 2010.

1.5 *BRIEF DISCUSSION OF THE MONITORING RESULTS*

Results of *Pit Specific Sediment Chemistry* for April 2010 are presented for CMP IV. Results of *Impact Water Quality Monitoring during Dredging Operations* for May 2010 are presented for CMP V. Detailed results will be discussed in the relevant *Quarterly Reports*.

1.5.1 *CMP IV*

Pit Specific Sediment Chemistry for CMP IV during April 2010

Concentrations of metals at all stations were below the *Lower Chemical Exceedance Level (LCEL)*, with the exception of Arsenic (*Figures 1 and 2 of Annex B*). Concentrations of Arsenic slightly exceeded the LCEL at all Near Pit and Pit Edge stations. No metal concentrations exceeded the *UCEL* (*Figures 1 and 2 of Annex B*).

Concentrations of Total DDT and 4,4' DDE were higher than the detection limits at the Pit-Edge station CPA (*Figure 3 of Annex B*). Total Organic Carbon (TOC) concentration in the sediment was the highest at the Pit-Edge station CPB when compared to other stations (*Figure 4*). Sediments were mainly composed of silt and clay (65.0 – 95.5 %) materials with the exception of Pit-Edge station CPA, in which sediments were mainly composed of sand (63 %; *Figure 5*).

Concentrations of Low Molecular Weight (LMW) Polycyclic Aromatic Hydrocarbons (PAHs), High Molecular Weight (HMW) PAHs, Total PAHs, Polychlorinated Biphenyls (PCBs) and TBT were below detection limits in sediment samples collected from all stations.

1.5.2 *CMP V*

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

Impact Water Quality Monitoring during Dredging Operations of CMP V was conducted on 24 May 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 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 *Figures 6 to 9 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*

The following monitoring activities will be conducted in the next monthly period of June 2010:

- *Water Column Profiling* for CMP IV;
- *Water Quality Monitoring during Capping* for CMP IV; and,
- *Impact Water Quality Monitoring during Dredging Operations* for CMP V.

The sampling schedule is presented in *Annex A*.

1.7 *STUDY PROGRAMME*

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

(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.

Annex A

Sampling Schedule

Pit Specific Sediment Chemistry	Code	Frequency	2009					2010						
			J	A	S	O	N	D	J	F	M	A	M	J
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	2009					2010						
			J	A	S	O	N	D	J	F	M	A	M	J
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	2009					2010						
			J	A	S	O	N	D	J	F	M	A	M	J
Near-Field Stations	TCA	2 times per year						3						
	TCB	2 times per year						3						
Reference Stations	TRA	2 times per year						3						
	TRB	2 times per year						3						

Tissue/ Whole Body Sampling	Code	Frequency	2009					2010						
			J	A	S	O	N	D	J	F	M	A	M	J
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	2009					2010						
			J	A	S	O	N	D	J	F	M	A	M	J
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					

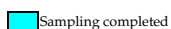
Capping	Code	Frequency	2009					2010						
			J	A	S	O	N	D	J	F	M	A	M	J
Ebb Tide														
Impact Station Downcurrent	IPE1	4 times per year	3	3				3	3					3
	IPE2	4 times per year	3	3				3	3					3
	IPE3	4 times per year	3	3				3	3					3
	IPE4	4 times per year	3	3				3	3					3
	PFC1	4 times per year	3	3				3	3					3
Intermediate Station Downcurrent	INE1	4 times per year	3	3				3	3					3
	INE2	4 times per year	3	3				3	3					3
	INE3	4 times per year	3	3				3	3					3
	INE4	4 times per year	3	3				3	3					3
	INE5	4 times per year	3	3				3	3					3
Reference Station Upcurrent	RFE1	4 times per year	3	3				3	3					3
	RFE2	4 times per year	3	3				3	3					3
	RFE3	4 times per year	3	3				3	3					3
	RFE4	4 times per year	3	3				3	3					3
	RFE5	4 times per year	3	3				3	3					3
Flood Tide														
Impact Station Downcurrent	INF1	4 times per year	3	3				3	3					3
	PFC2	4 times per year	3	3				3	3					3
	INF3	4 times per year	3	3				3	3					3
Intermediate Station Downcurrent	IPF1	4 times per year	3	3				3	3					3
	IPF2	4 times per year	3	3				3	3					3
	IPF3	4 times per year	3	3				3	3					3
Reference Station Upcurrent	RFF1	4 times per year	3	3				3	3					3
	RFF2	4 times per year	3	3				3	3					3
	RFF3	4 times per year	3	3				3	3					3

Routine Water Quality Monitoring	Code	Frequency	2009					2010						
			J	A	S	O	N	D	J	F	M	A	M	J
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	2009					2010						
			J	A	S	O	N	D	J	F	M	A	M	J
Plume Stations	WCP1	6 times per year	2	2				2	2	2				2
	WCP2	6 times per year	2	2				2	2	2				2



Benthic Recolonisation Studies	Code	Frequency	2009					2010						
			J	A	S	O	N	D	J	F	M	A	M	J
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



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	J
Near Field	ESC-WNAA	*	*										
	ESC-WNAB	*	*										
	ESC-WNAC	*	*										
	ESC-WNAD	*	*										
	ESC-WNBA	*	*										
	ESC-WNBB	*	*										
	ESC-WNBC	*	*										
	ESC-WNBD	*	*										
Mid Field	ESC-WMB	*	*										
	ESC-WMA	*	*										
Far Field	ESC-WFA	*	*										
	ESC-WFB	*	*										
	MW1	*	*										
Reference Stations	NM1	*	*										
	NM2	*	*										
	NM3	*	*										
	NM5	*	*										
	NM6	*	*										
Water Column Profiling		J	A	S	O	N	D	J	F	M	A	M	J
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
Downcurrent Impact Stations	1			*	*	*	*	*	*	*	*	*	*
	2			*	*	*	*	*	*	*	*	*	*
	3			*	*	*	*	*	*	*	*	*	*
	4			*	*	*	*	*	*	*	*	*	*
	5			*	*	*	*	*	*	*	*	*	*
Upcurrent Stations	1			*	*	*	*	*	*	*	*	*	*
	2			*	*	*	*	*	*	*	*	*	*
	MW1			*	*	*	*	*	*	*	*	*	*

 Sampling completed
 Sampling to be completed

Annex B

Monitoring Results

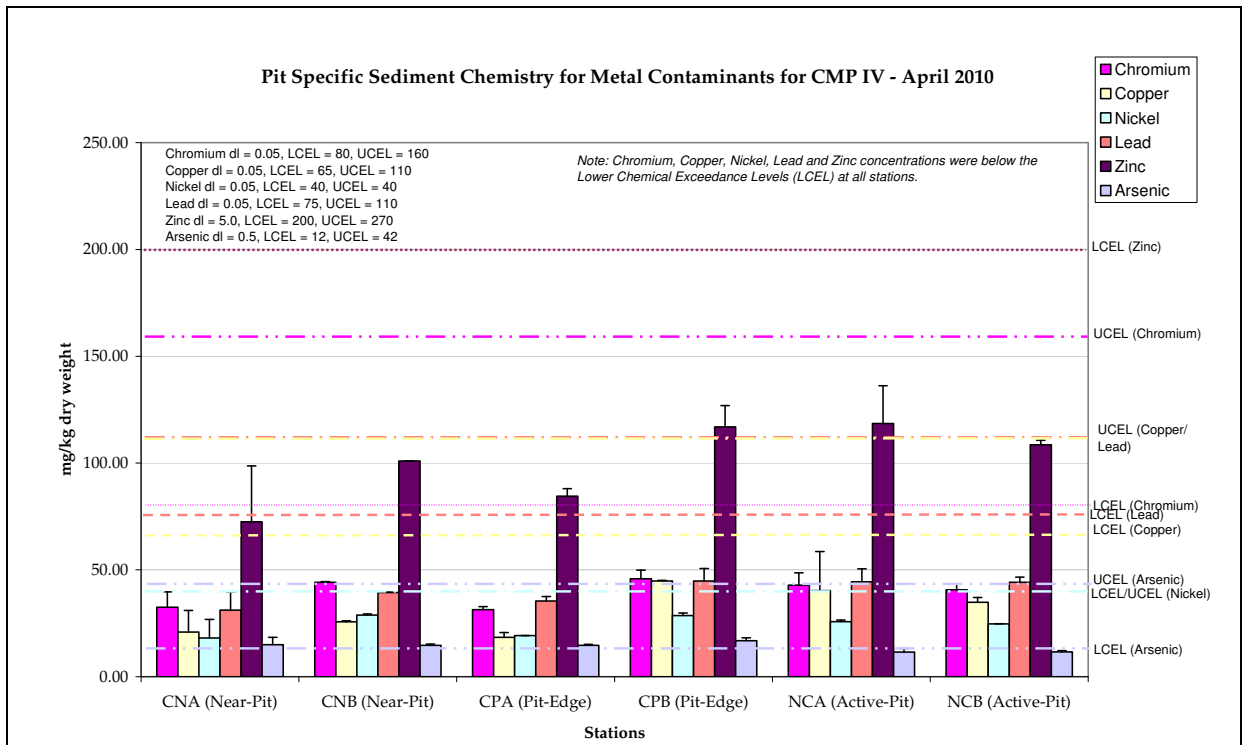


Figure 1: Concentrations of Metals (Cr, Cu, Ni, Pb, Zn and As) in sediment samples for Pit Specific Sediment Chemistry for CMP IV during April 2010.

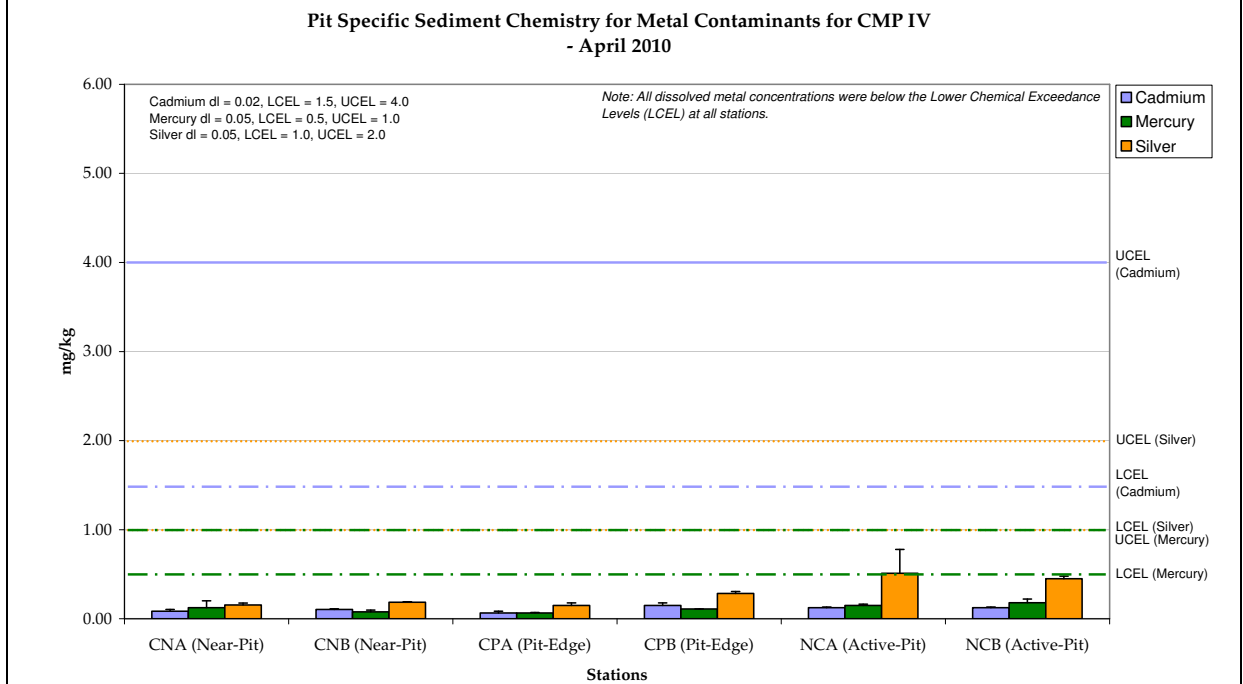


Figure 2: Concentrations of Metals (Cd, Hg and Ag) in sediment samples for Pit Specific Sediment Chemistry for CMP IV during April 2010.

Source: H:\Team\EM\GMS Projects\0103262 CEDD EM&A for CMP at Sha Chau (2009 - 2013)\06 Contractor Submission (LAM)\06.3 Pit Specific Sediment Chemistry\April 2010

Date: 07/06/2010

Environmental Resources Management



**Pit Specific Sediment Chemistry for Organic Contaminants (DDT & DDE) for CMP IV
- April 2010**

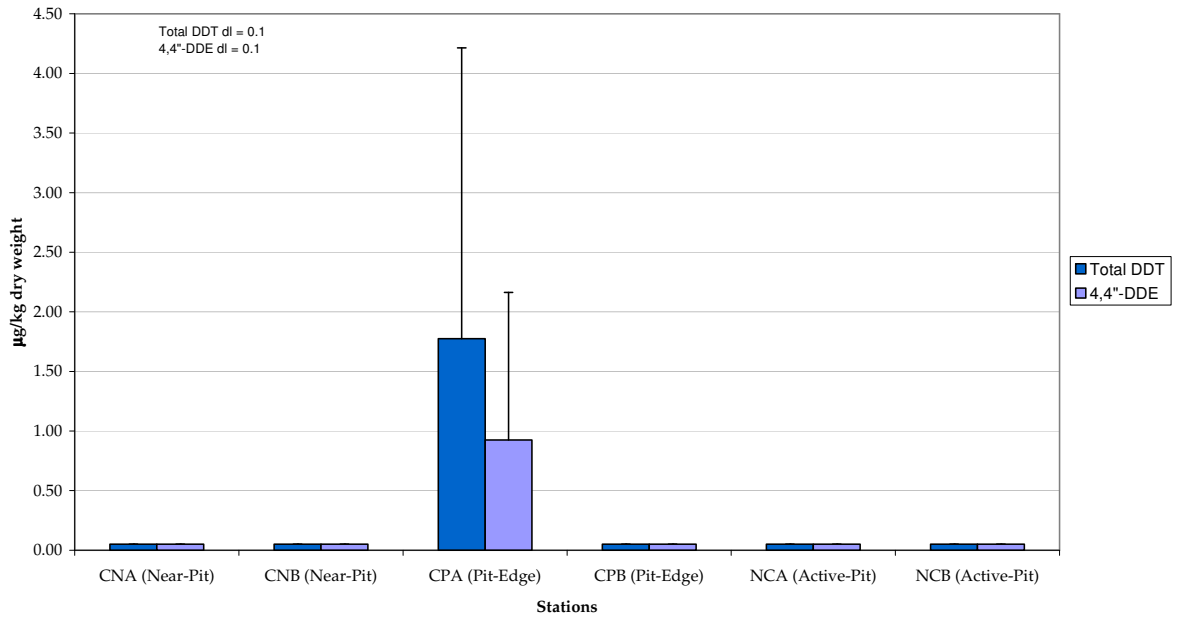


Figure 3: Concentrations of DDT and DDE in sediment samples for Pit Specific Sediment Chemistry for CMP IV during April 2010.

**Pit Specific Sediment Chemistry for Total Organic Carbon (TOC) for CMP IV
- April 2010**

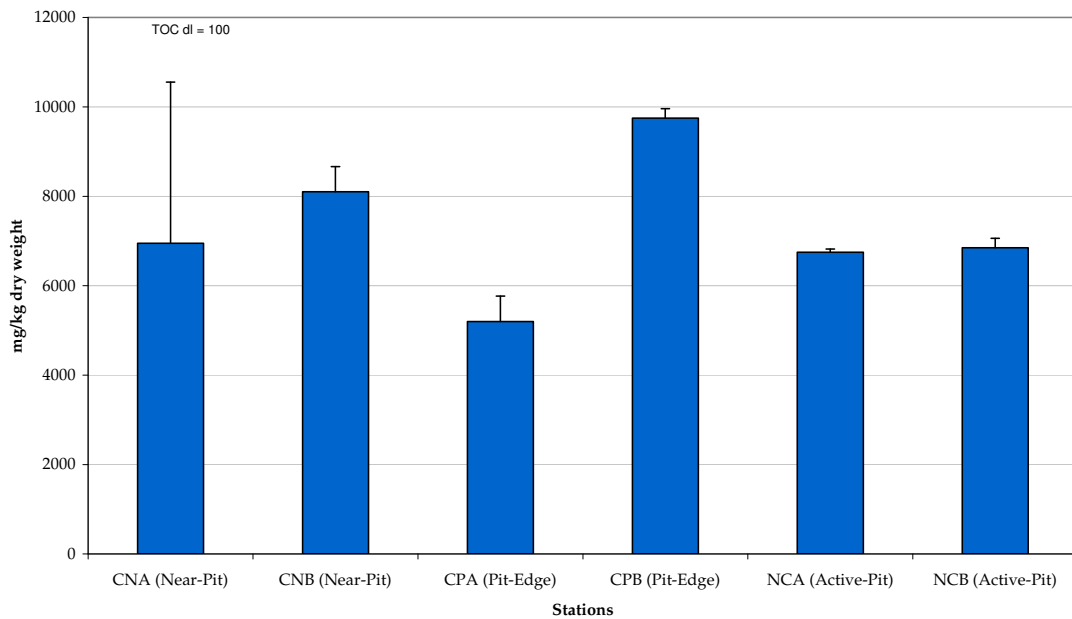


Figure 4: Concentrations of Total Organic Carbon (TOC) in sediment samples for Pit Specific Sediment Chemistry for CMP IV during April 2010.

Source: H:\Team\EM\GMS Projects\0103262 CEDD EM&A for CMP at Sha Chau (2009 - 2013)\06 Contractor Submission (LAM)\06.3 Pit Specific Sediment Chemistry\April 2010
Date: 07/06/2010

**Environmental
Resources
Management**



**Pit Specific Sediment Chemistry for Particle Size Distribution for CMP IV
- April 2010**

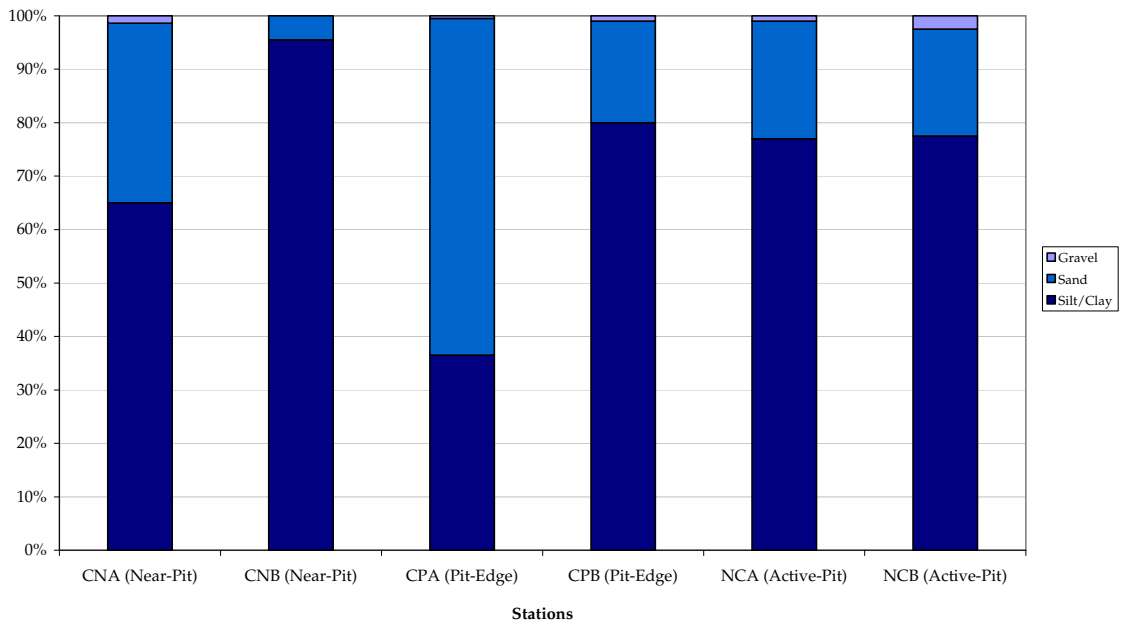


Figure 5: Particle Size Distribution in sediment samples for Pit Specific Sediment Chemistry for CMP IV during April 2010.

Source: H:\Team\EM\GMS Projects\0103262 CEDD EM&A for CMP at Sha Chau (2009 - 2013)\06 Contractor Submission (LAM)\06.3 Pit Specific Sediment Chemistry\April 2010
Date: 07/06/2010

**Environmental
Resources
Management**



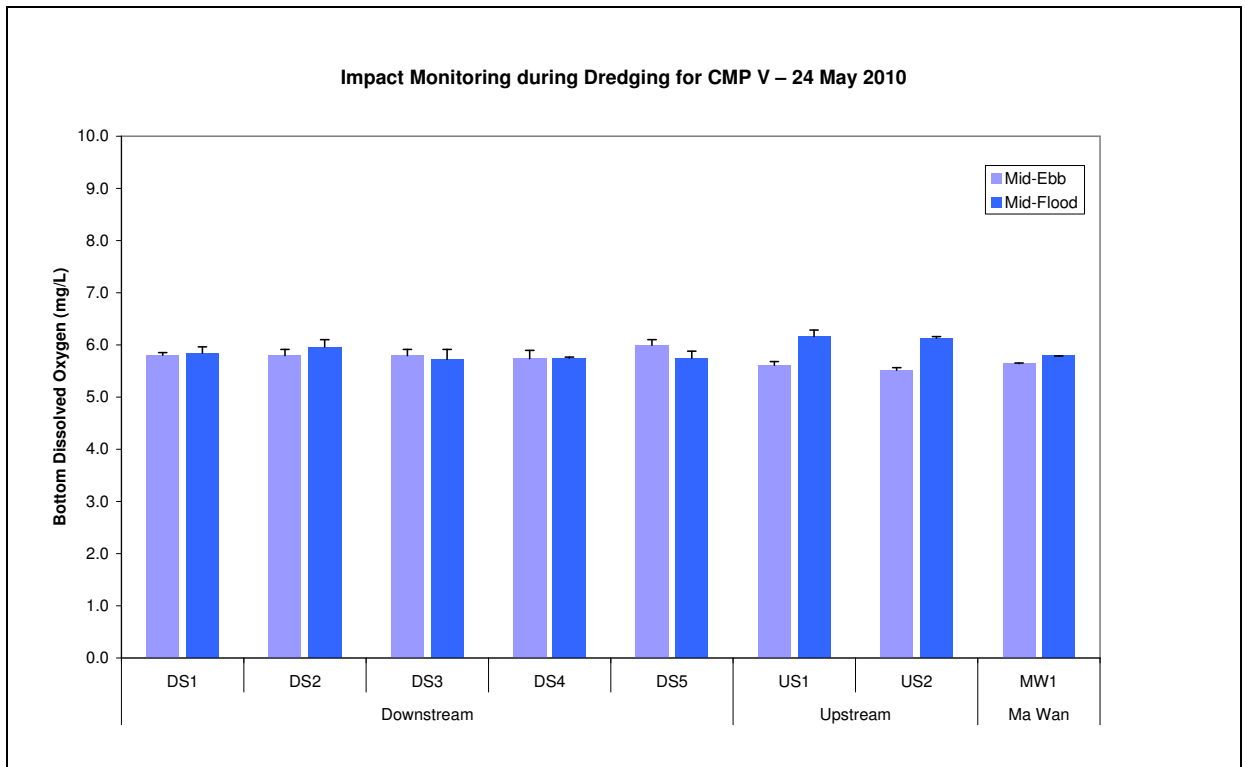


Figure 6: Bottom DO level (mean + SD) at Downstream (DS1, DS2, DS3, DS4 and DS5), Upstream (US1 and US2) and Ma Wan (MW1) stations during Impact Monitoring for Dredging at CMP V on 24 May 2010.

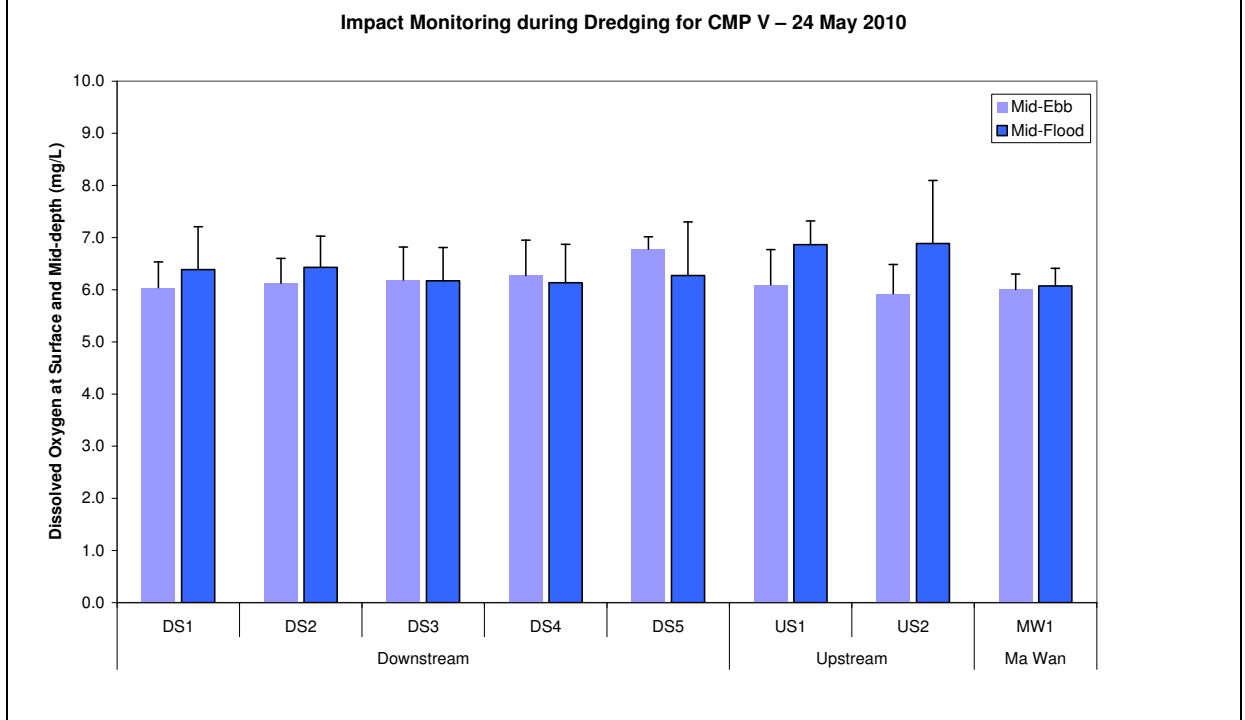


Figure 7: DO level at Surface and Mid-depth (mean + SD) at Downstream (DS1, DS2, DS3, DS4 and DS5), Upstream (US1 and US2) and Ma Wan (MW1) stations during Impact Monitoring for Dredging at CMP V on 24 May 2010.

Impact Monitoring during Dredging for CMP V – 24 May 2010

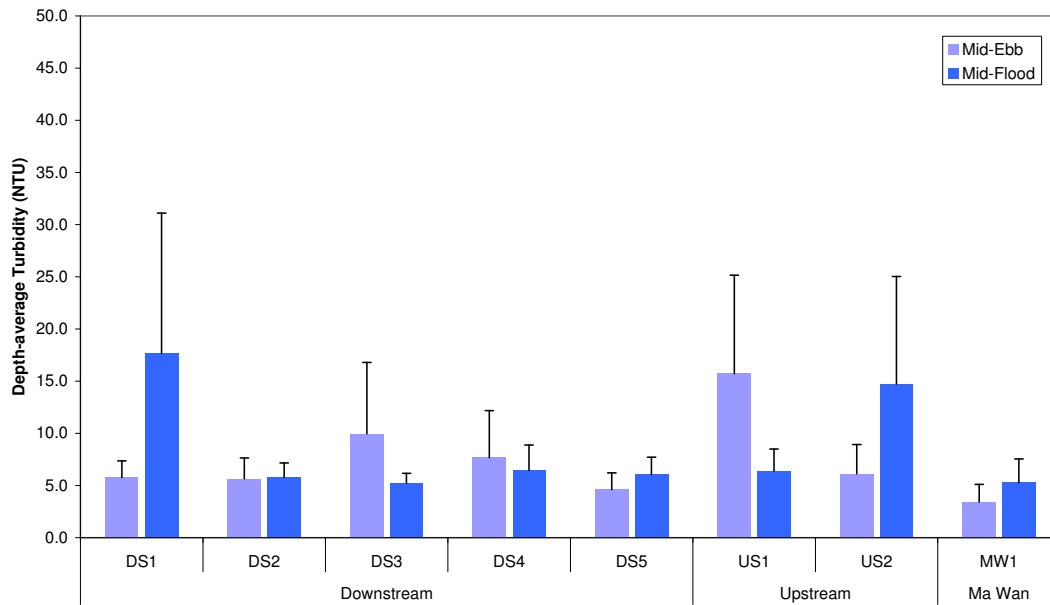


Figure 8: Depth-average Turbidity (mean + SD) at Downstream (DS1, DS2, DS3, DS4 and DS5), Upstream (US1 and US2) and Ma Wan (MW1) stations during Impact Monitoring for Dredging at CMP V on 24 May 2010.

Impact Monitoring during Dredging for CMP V – 24 May 2010

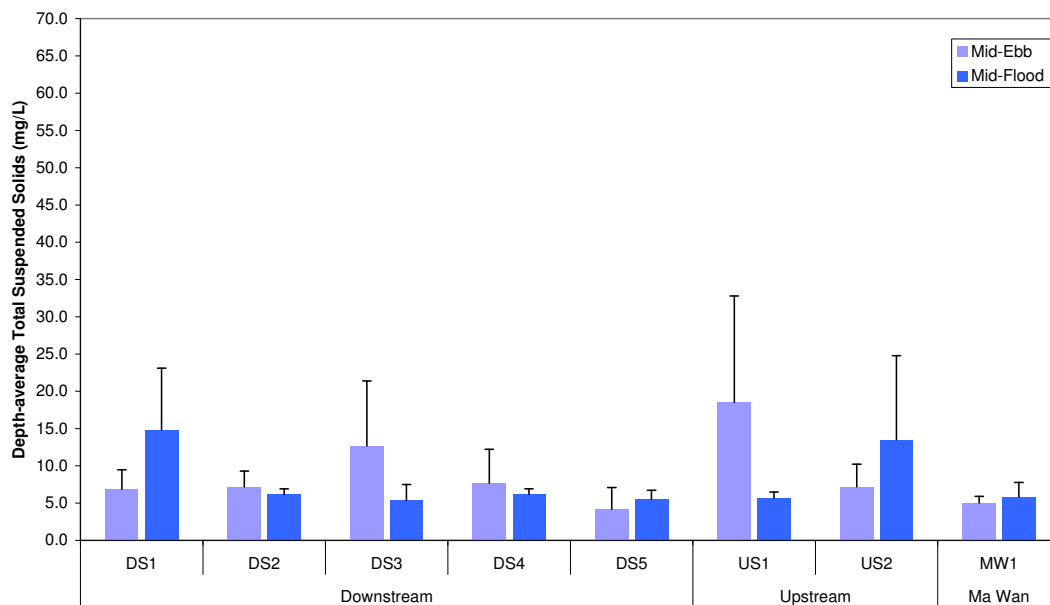


Figure 9: Depth-average TSS (mean + SD) at Downstream (DS1, DS2, DS3, DS4 and DS5), Upstream (US1 and US2) and Ma Wan (MW1) stations during Impact Monitoring for Dredging at CMP V on 24 May 2010.

Source: H:\Team\EM\GMS Projects\0103262 CEDD EM&A for CMP at Sha Chau (2009 - 2013)\06 Contractor Submission (LAM)\06.2 Impact Monitoring during Dredging\May 2010

Date: 07/06/2010

**Environmental
Resources
Management**



Annex C

Study Programme

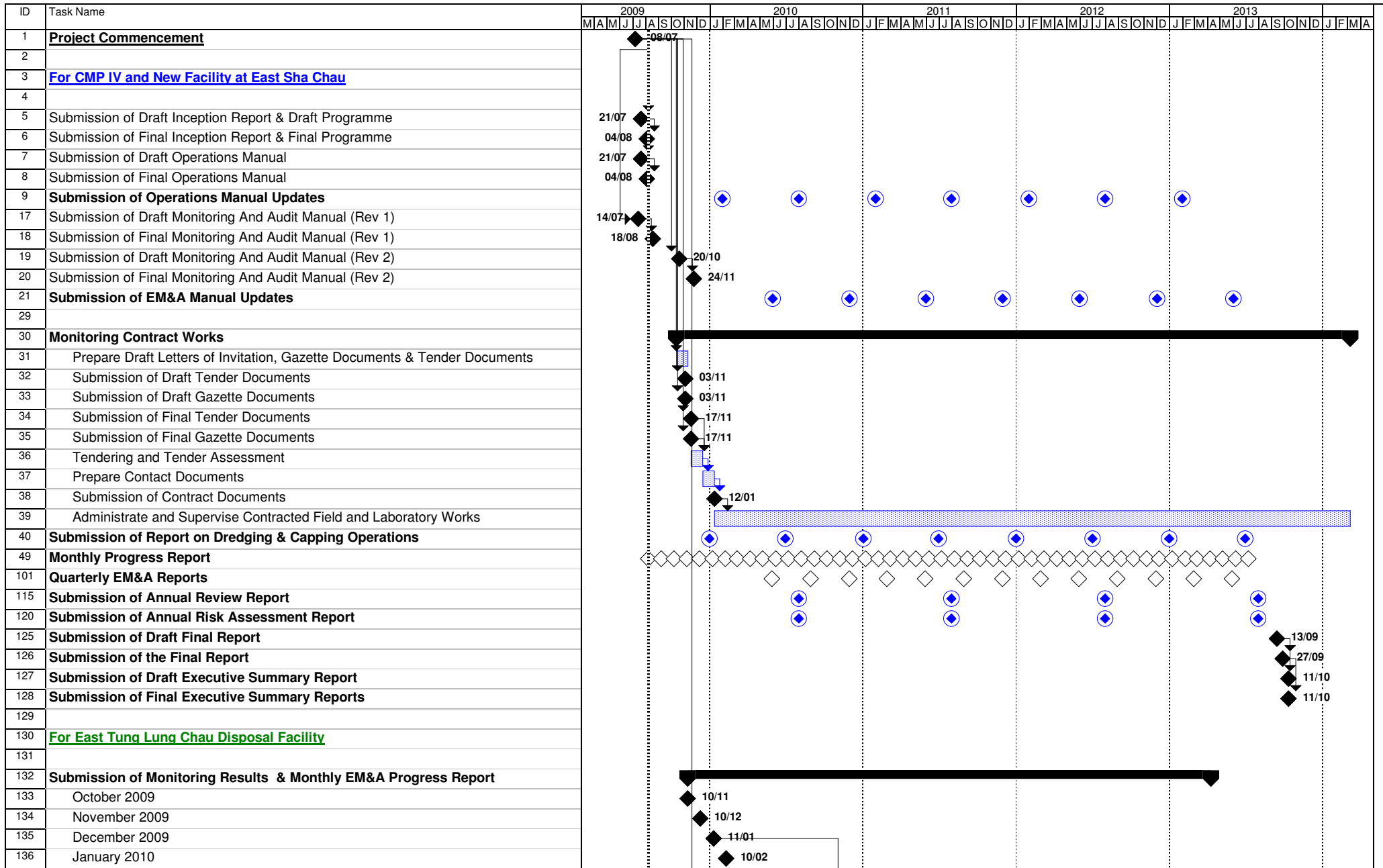


Figure 4.1 - Study Programme



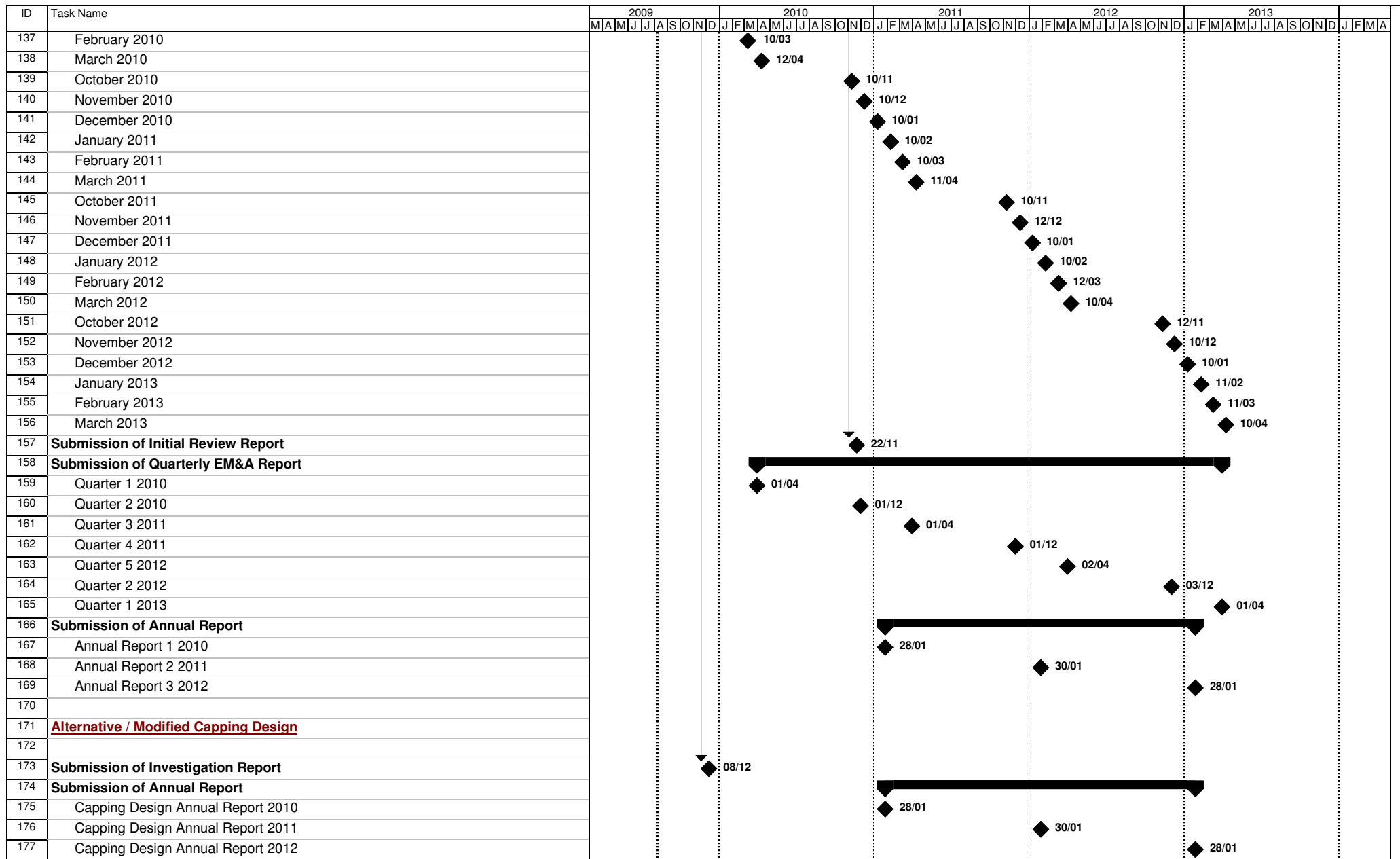


Figure 4.1 - Study Programme

