


 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)

7th Monthly Progress Report for Contaminated Mud Pits at Sha Chau – January 2010

Revision 0

12 February 2010

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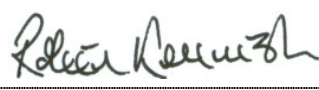



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Environmental Monitoring and Audit for Contaminated Mud Pit at Sha Chau (2009-2013) – Investigation

7th Monthly Progress Report for Contaminated Mud Pits at Sha Chau – January 2010

Revision 0

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Client: Civil Engineering and Development Department (CEDD)		Proposal No: 0103262			
Summary: This document presents progress of monitoring works on contaminated mud pits at Sha Chau in January 2010 under Agreement No. CE 4/2009 (EP).		Date: 12 February 2010			
		Approved by:  <i>Dr Robin Kennish</i> Director			
0	7 th Monthly Progress Report for CMP – Revision 0	FW	EW/JT	RK	12/02/10
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

7th MONTHLY PROGRESS REPORT FOR CONTAMINATED MUD PITS
AT SHA CHAU - January 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 January 2010.

1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES

Field sampling activities conducted in this monthly period for CMP IVc are listed below:

- *Demersal Trawling* was conducted on 14 and 15 January 2010; and,
- *Water Column Profiling* was conducted on 18 January 2010.

For CMP V, sampling for *Water Column Profiling* and *Impact Monitoring during Dredging Operations* were conducted on 19 and 20 January 2010, respectively. 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 IV		
Water Sampling and Chemical Analysis	a) Water Column Profiling	December's sampling: 21 January 2010 January's sampling: 27 January 2010
CMP V		
Water Sampling and Chemical Analysis	a) Water Column Profiling	January's sampling: 28 January 2010
	b) Impact Monitoring during Dredging Operations	January's sampling: 29 January 2010

1.4 *DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS*

No outstanding sampling remained from January 2010. Data for *Tissue/Whole Body Contaminant Testing* remained outstanding from the Contractor.

1.5 *BRIEF DISCUSSION OF THE MONITORING RESULTS*

Results of *Water Column Profiling* for December 2009 and January 2010 are presented for CMP IV. Monitoring results presented for CMP V include *Water Column Profiling* and *Impact Monitoring during Dredging Operations* for January 2010. Detailed results will be discussed in the relevant *Quarterly Reports*.

1.5.1 *CMP IV*

Water Column Profiling for CMP IV in December 2009

Results of *Water Column Profiling* for December 2009 show that levels of salinity, pH and dissolved oxygen (DO) complied with the water quality objectives (WQOs) at both Upstream and Downstream stations (*Figures 2 to 4 of Annex B*). Levels of total suspended solids (TSS) exceeded the WQO at the Upstream station and was within compliance limits for the Downstream station (*Figure 1 of Annex B*).

Water Column Profiling for CMP IV in January 2010

Results of *Water Column Profiling* for January 2010 show that levels of salinity, pH and DO complied with the WQOs at both Upstream and Downstream stations (*Figures 6 to 8 of Annex B*). Levels of TSS complied with the WQO at both Upstream and Downstream stations (*Figure 5 of Annex B*).

1.5.2 **CMP V**

Water Column Profiling for CMP V during January 2010

Results of *Water Column Profiling* for January 2010 show that levels of salinity, pH and DO complied with the WQOs at both Upstream and Downstream stations (*Figures 10 to 12 of Annex B*). Levels of TSS complied with the WQO at both Upstream and Downstream stations (*Figure 9 of Annex B*).

Impact Monitoring during Dredging Operations of CMP V – January 2010

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

Monitoring results are presented in *Figures 13 to 16 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 February 2010:

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

The sampling schedule is presented in *Annex A*.

1.7 **STUDY PROGRAMME**

A summary of 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

			2009					2010		
Pit Specific Sediment Chemistry	Code	Frequency	J	A	S	O	N	D	J	F
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	*					*		

			J	A	S	O	N	D	J	F
Cumulative Impact Sediment Chemistry										
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	*					*		

			J	A	S	O	N	D	J	F
Sediment Toxicity Tests										
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		

			J	A	S	O	N	D	J	F
Tissue/Whole Body Sampling										
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	*							*

			J	A	S	O	N	D	J	F
Demersal Trawling										
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

			J	A	S	O	N	D	J	F
Capping										
<i>Ebb Tide</i>										
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
	IFC1	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
<i>Flood Tide</i>										
Impact Station Downcurrent	INF1	4 times per year	3	3				3		3
	IFC2	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

			J	A	S	O	N	D	J	F
Routine Water Quality Monitoring										
<i>Ebb Tide</i>										
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	*							*
<i>Flood Tide</i>										
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	*							*



			J	A	S	O	N	D	J	F
Water Column Profiling										
Plume Stations	WCP1	6 times per year	2	2				2	2	2
	WCP2	6 times per year	2	2				2	2	2

			J	A	S	O	N	D	J	F
Benthic Recolonisation Studies										
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		

n = 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 - February 2010)

			2009						2010	
Baseline Water Quality Monitoring			J	A	S	O	N	D	J	F
Near Field	ESC-WNAA	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-WNAB		*	*						
	ESC-WNAC		*	*						
	ESC-WNAD		*	*						
	ESC-WNBA		*	*						
	ESC-WNBB		*	*						
	ESC-WNBC		*	*						
Mid Field	ESC-WMB	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		*	*						
Far Field	ESC-WFA	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-WFB		*	*						
	MW1		*	*						
Reference Stations	NM1	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	*	*						
	NM2		*	*						
	NM3		*	*						
	NM5		*	*						
	NM6		*	*						
Water Column Profiling			J	A	S	O	N	D	J	F
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
Downcurrent Impact Stations	1				*	*	*	*	*	*
	2				*	*	*	*	*	*
	3				*	*	*	*	*	*
	4				*	*	*	*	*	*
	5				*	*	*	*	*	*
Upcurrent Stations	1				*	*	*	*	*	*
	2				*	*	*	*	*	*
	MW1				*	*	*	*	*	*

 Sampling completed
 Sampling to be completed

Annex B

Monitoring Results

Water Quality Profiling for CMP IV - December 2009 Sampling

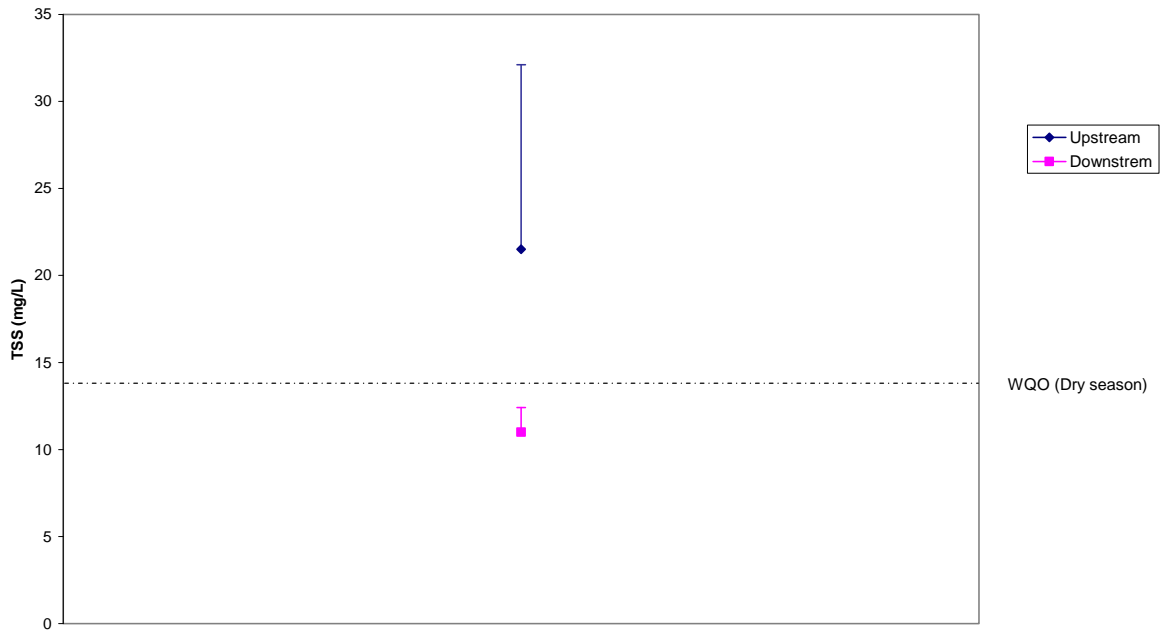


Figure 1: Total Suspended Solids (mean + SD) during Water Column Profiling for CMP IV in December 2009.

Water Column Profiling for CMP IV - Dec 2009 Sampling

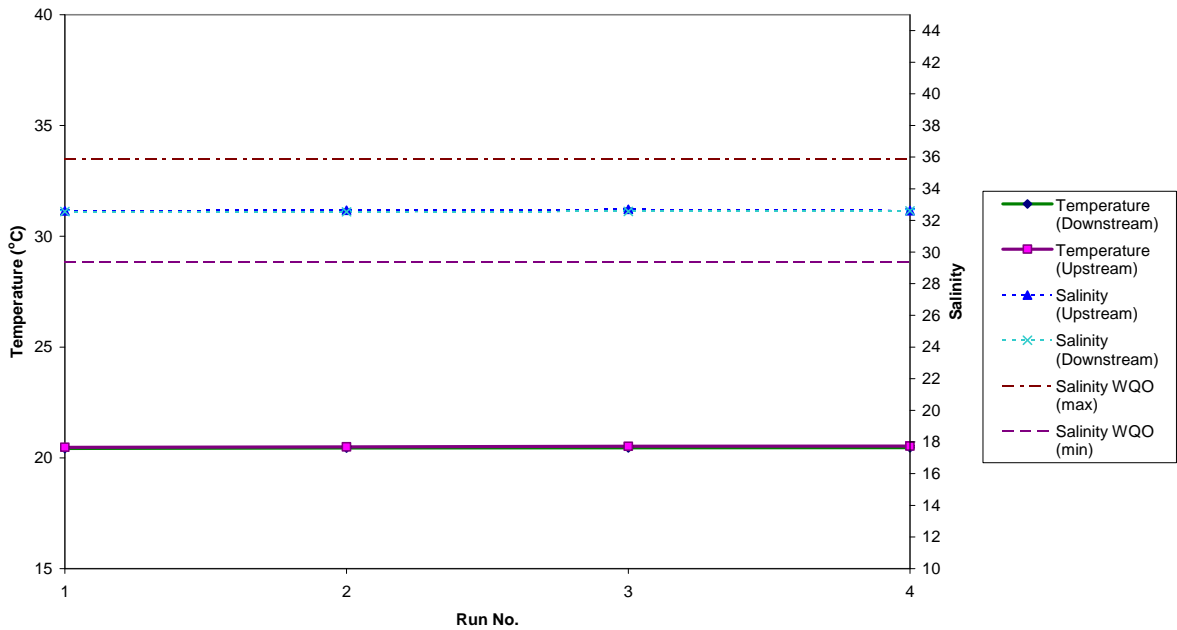


Figure 2: Salinity and Temperature (mean + SD) during Water Column Profiling for CMP IV in December 2009

Source: H:\Team\EM\GMS Projects\0103262 CEDD EM&A for CMP at Sha Chau (2009 - 2013)\06 Contract Submission (LAM)\06.9 Water Column Profiling CMP IV\Dec 2009

Date: 03/02/2010

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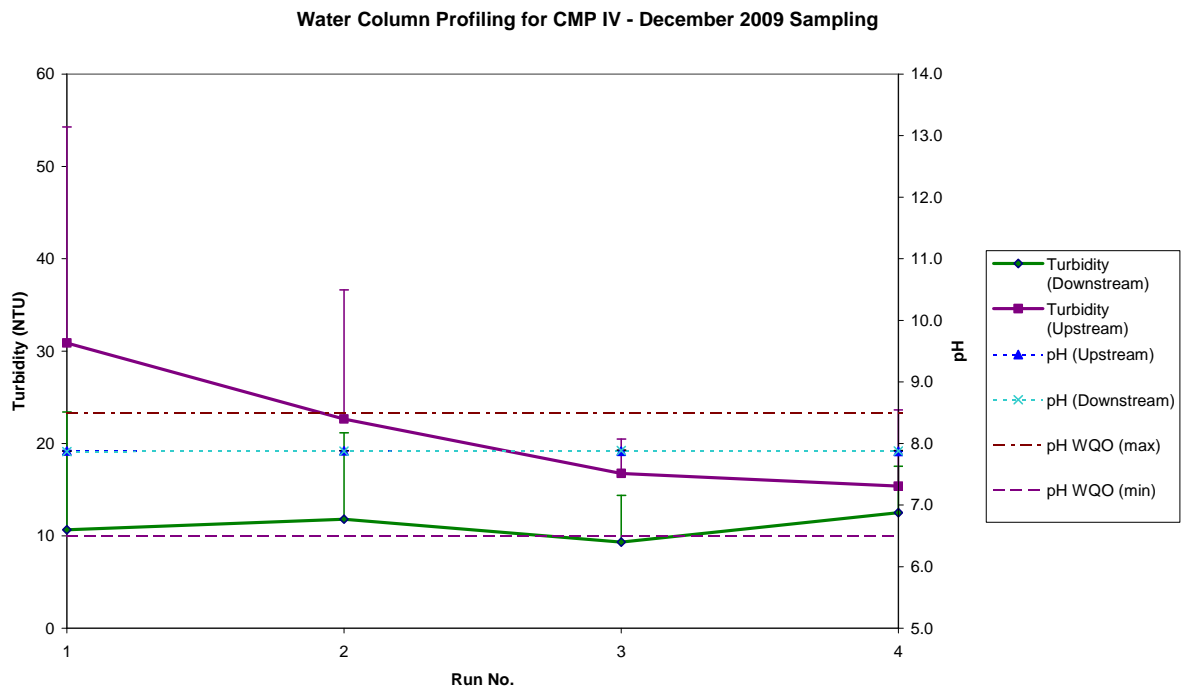


Figure 3: Turbidity and pH (mean + SD) during Water Column Profiling for CMP IV in December 2009.

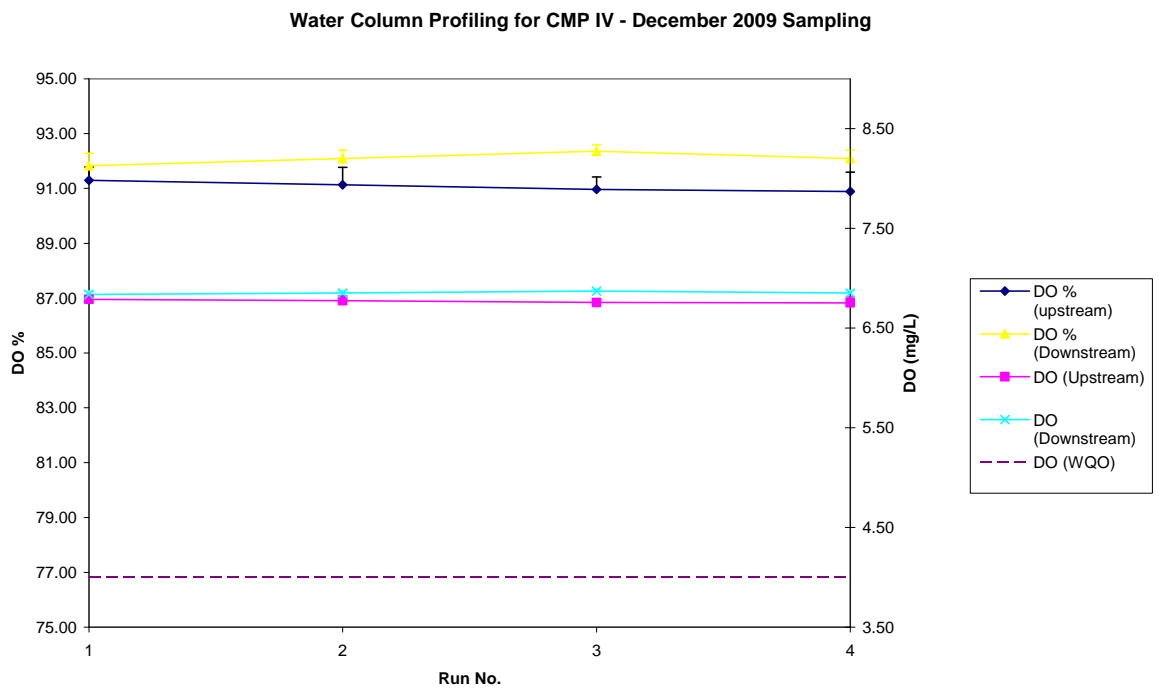


Figure 4: Dissolved Oxygen (mean + SD) during Water Column Profiling for CMP IV in December 2009.

Source: H:\Team\EM\GMS Projects\0103262 CEDD EM&A for CMP at Sha Chau (2009 - 2013)\06 Contract Submission (LAM)\06.9 Water Column Profiling CMP IV\Dec 2009
 Date: 03/02/2010

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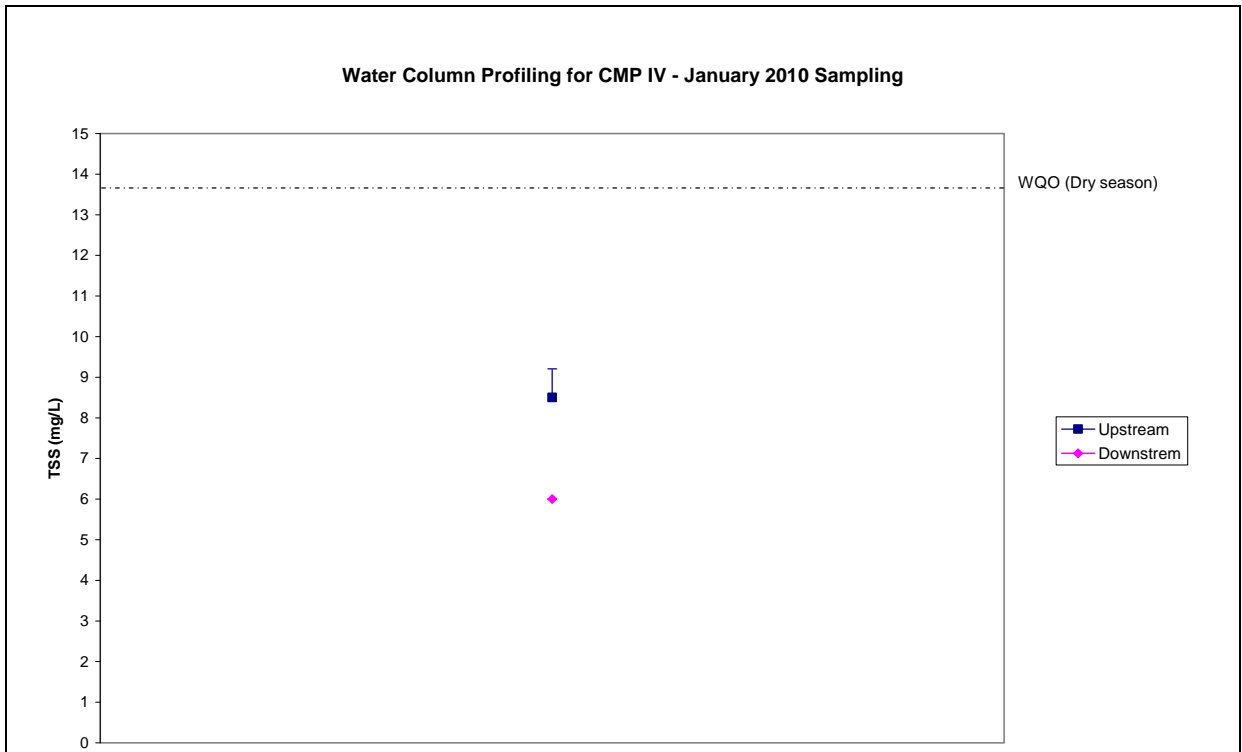


Figure 5: Total Suspended Solids (mean + SD) during Water Column Profiling for CMP IV in January 2010.

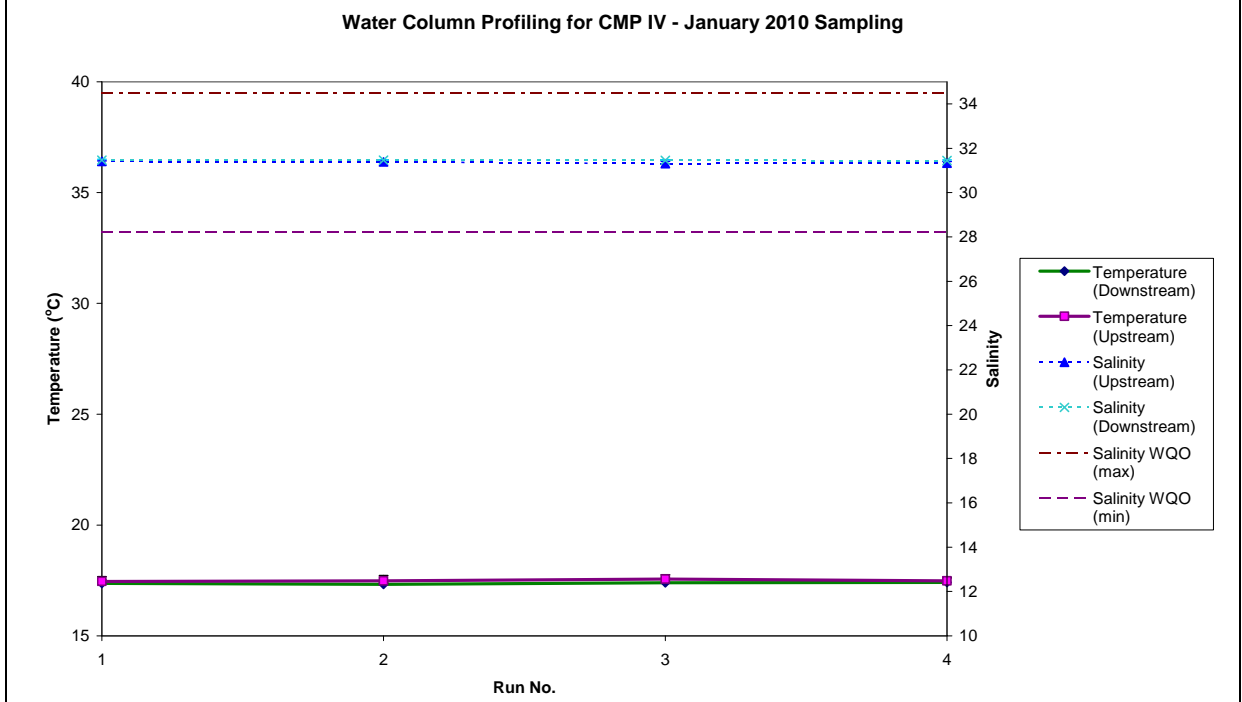


Figure 6: Salinity and Temperature (mean + SD) during Water Column Profiling for CMP IV in January 2010.

Source: H:\Team\EM\GMS Projects\0103262 CEDD EM&A for CMP at Sha Chau (2009 - 2013)\06 Contract Submission (LAM)\06.9 Water Column Profiling CMP IV\Jan 2010
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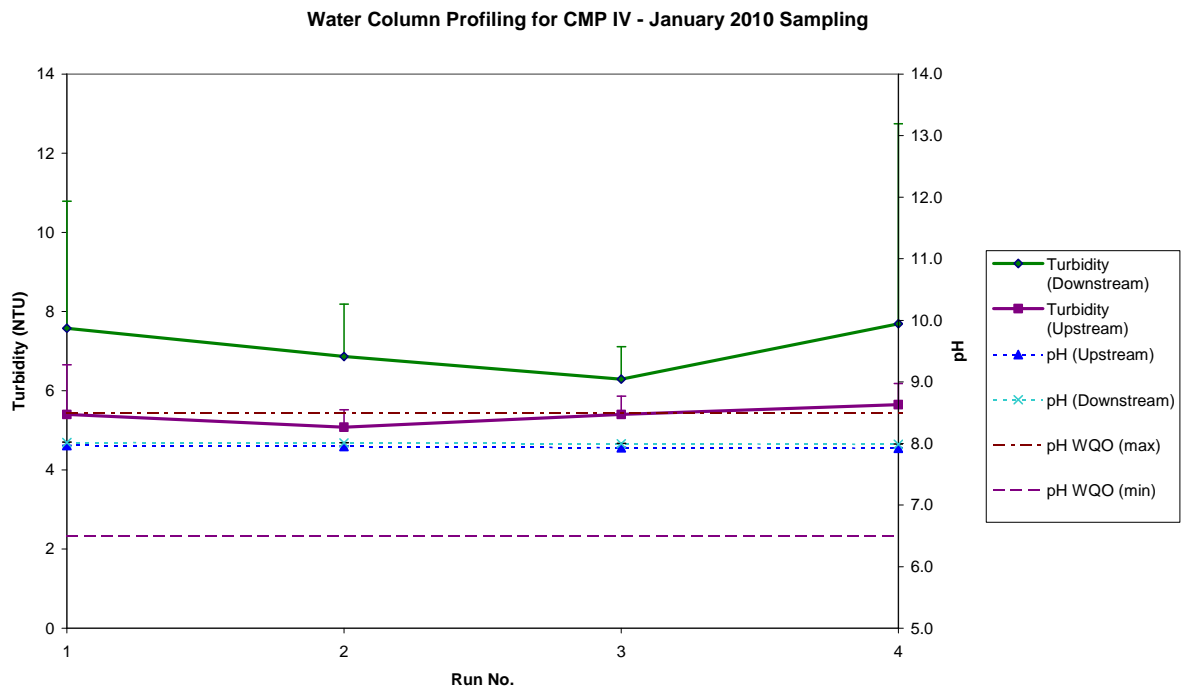


Figure 7: Turbidity and pH (mean + SD) during Water Column Profiling for CMP IV in January 2010.

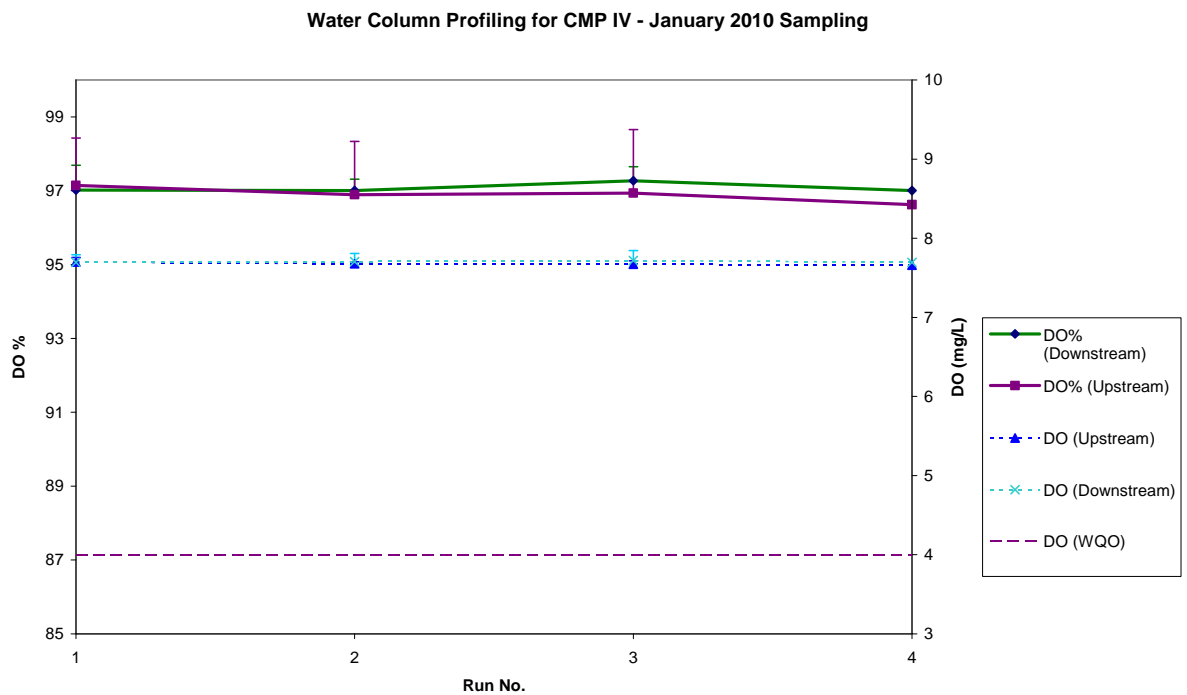


Figure 8: Dissolved Oxygen (mean + SD) during Water Column Profiling for CMP IV in January 2010.

Source: H:\Team\EM\GMS Projects\0103262 CEDD EM&A for CMP at Sha Chau (2009 - 2013)\06 Contract Submission (LAM)\06.9 Water Column Profiling CMP IV\Jan 2010
 Date: 03/02/2010

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Water Quality Sampling for CMP V - January 2010 Sampling

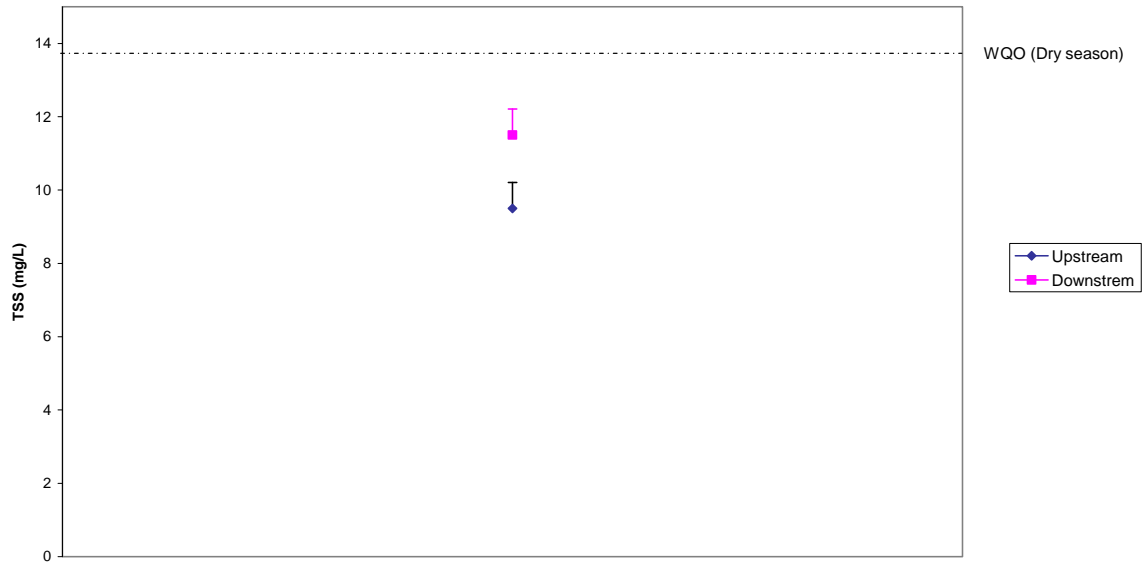


Figure 9: Total Suspended Solids (mean + SD) during Water Column Profiling for CMP V in January 2010.

Water Column Profiling for CMP V - January 2010 Sampling

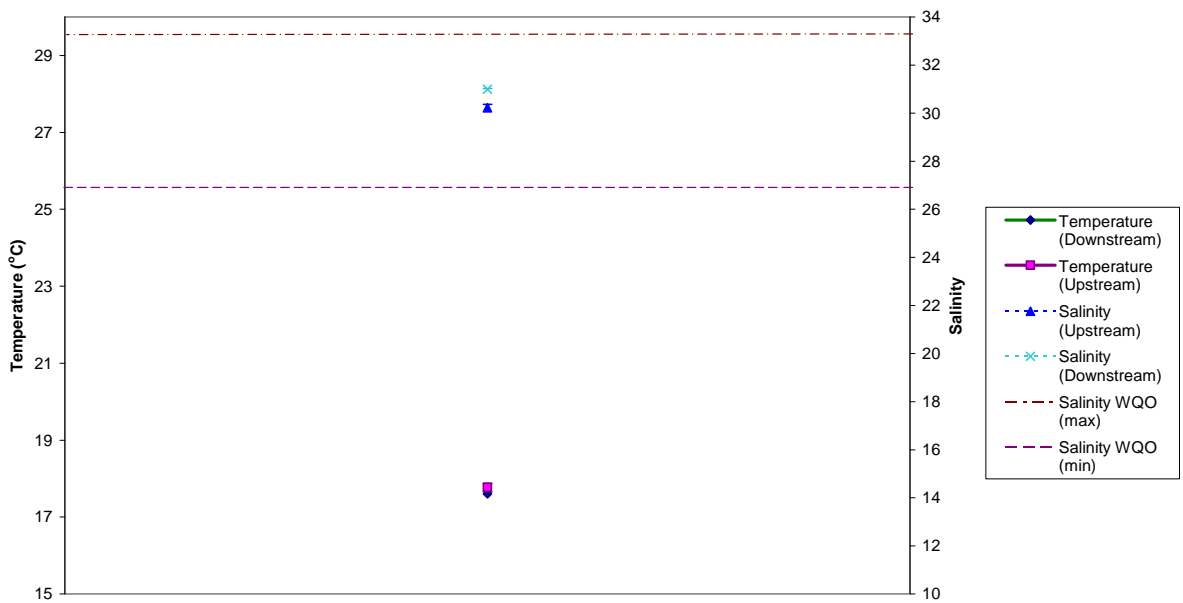


Figure 10: Salinity and Temperature (mean + SD) during Water Column Profiling for CMP V in January 2010.

Source: H:\Team\EM\GMS Projects\0103262 CEDD EM&A for CMP at Sha Chau (2009 - 2013)\06 Contract Submission (LAM)\06. 12 Water Column Profiling CMP V\Jan 2010
 Date: 03/02/2010

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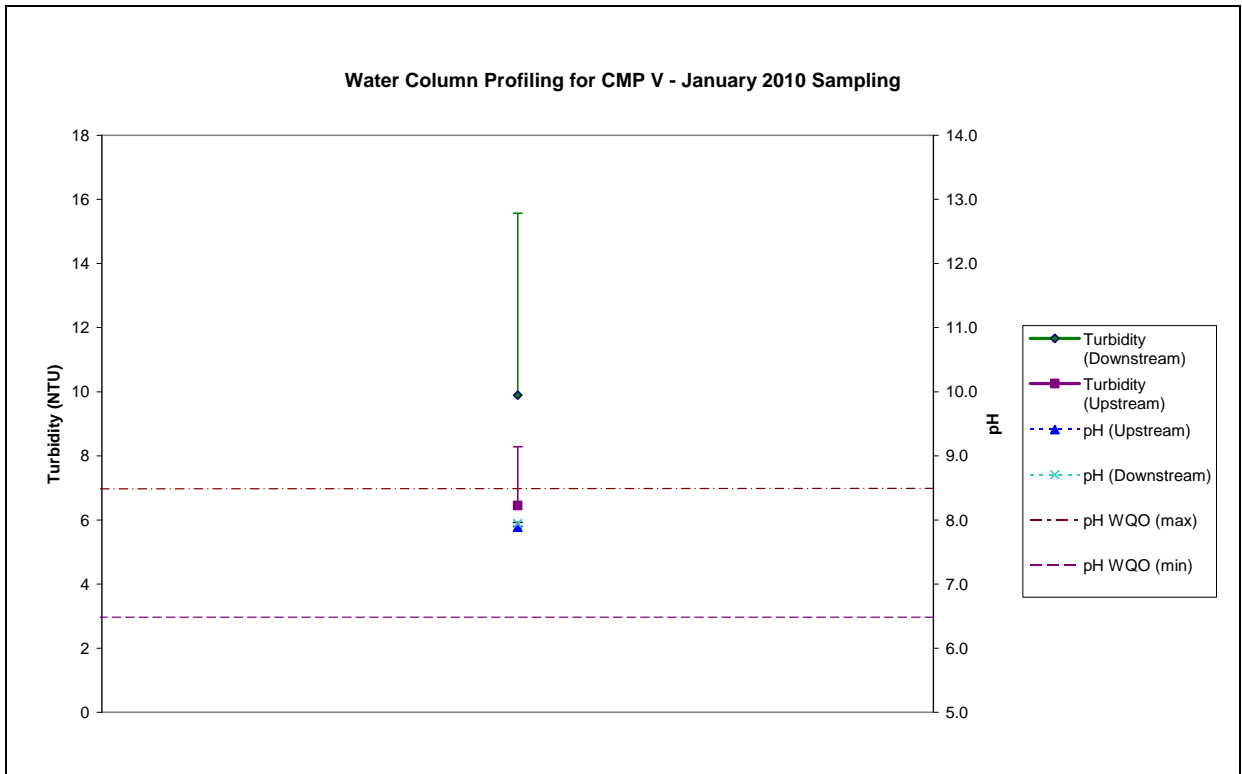


Figure 11: Turbidity and pH (mean + SD) during Water Column Profiling for CMP V in January 2010.

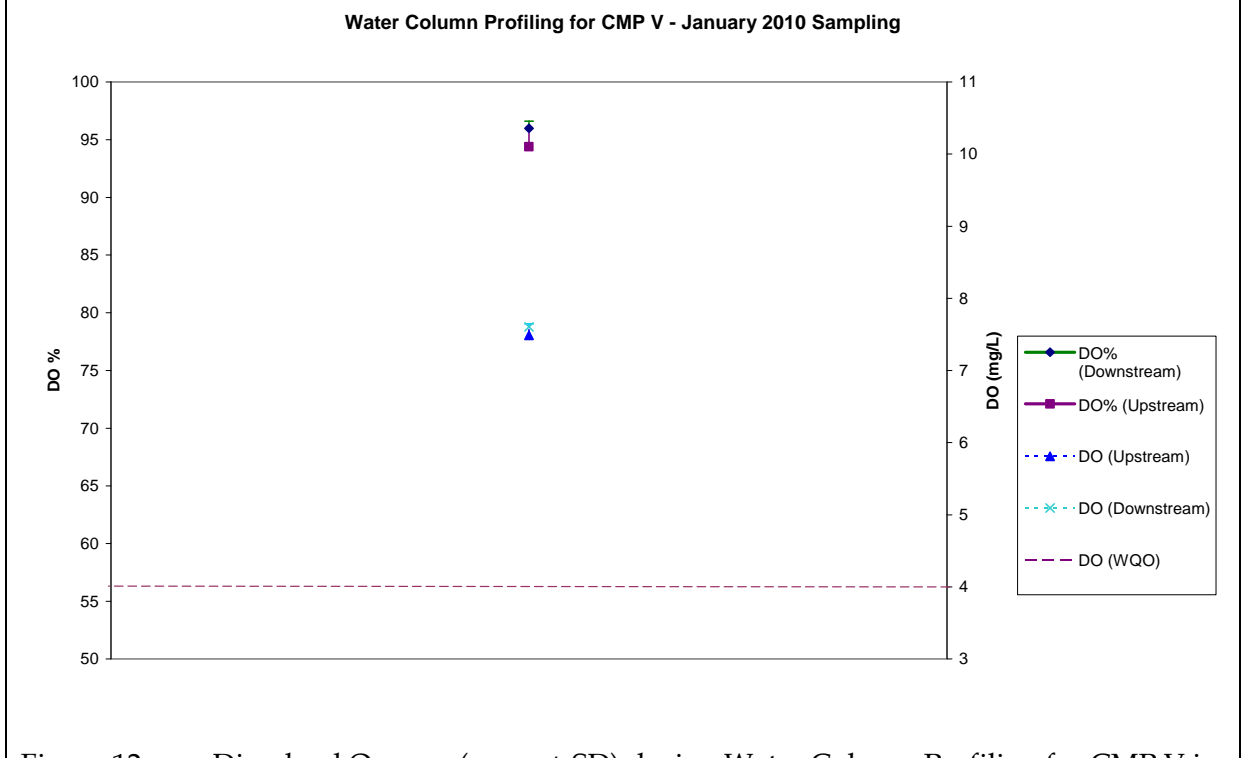


Figure 12: Dissolved Oxygen (mean + SD) during Water Column Profiling for CMP V in January 2010.

Source: H:\Team\EM\GMS Projects\0103262 CEDD EM&A for CMP at Sha Chau (2009 - 2013)\06 Contract Submission (LAM)\06. 12 Water Column Profiling CMP V\Jan 2010
 Date: 03/02/2010

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Impact Monitoring during Dredging for CMP V – 20 January 2010

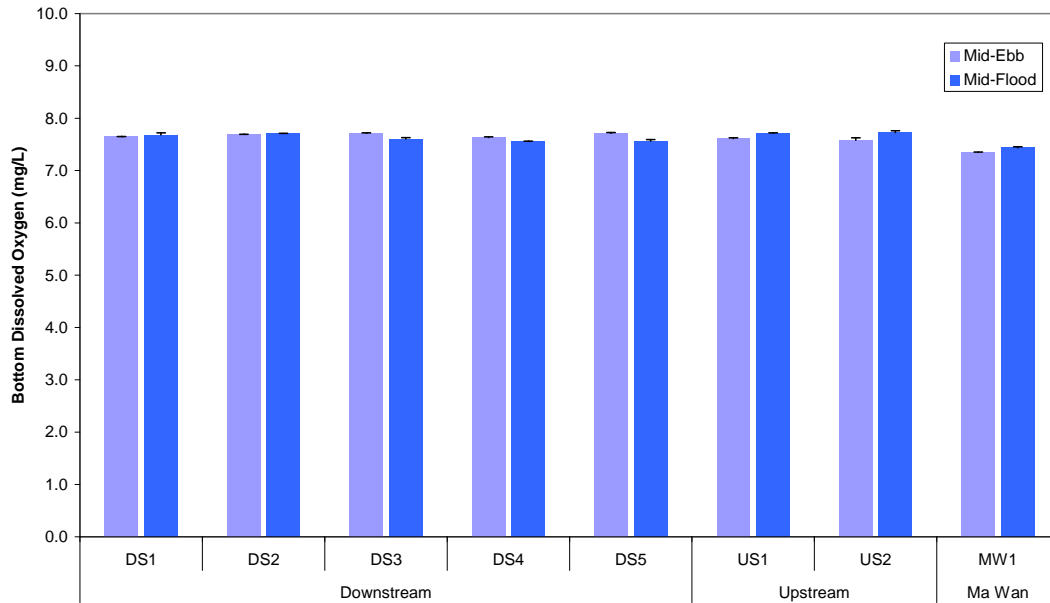


Figure 13: Bottom DO level (mean + SD) at Downstream (DS1, DS2, DS3, DS4 and DS5 stations), Upstream (US1 and US2 stations) and Ma Wan (MW1 station) during Impact Monitoring for Dredging on 20 January 2010.

Impact Monitoring during Dredging for CMP V – 20 January 2010

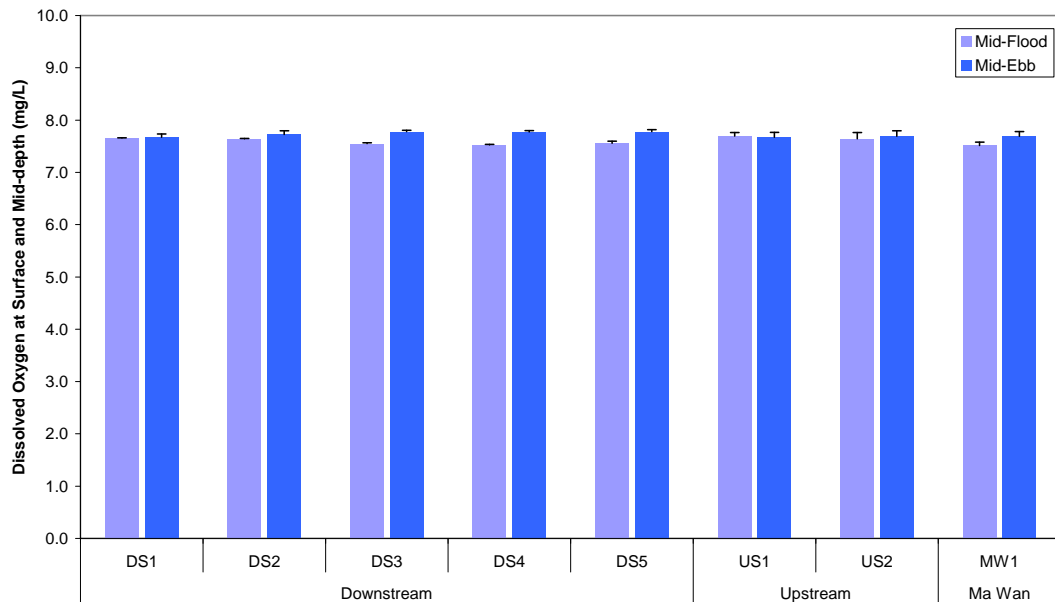


Figure 14: DO Level at Surface and Mid-depth (mean + SD) at Downstream (DS1, DS2, DS3, DS4 and DS5 stations), Upstream (US1 and US2 stations) and Ma Wan (MW1 station) during Impact Monitoring for Dredging on 20 January 2010.

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

Date: 03/02/2010

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Impact Monitoring during Dredging for CMP V – 20 January 2010

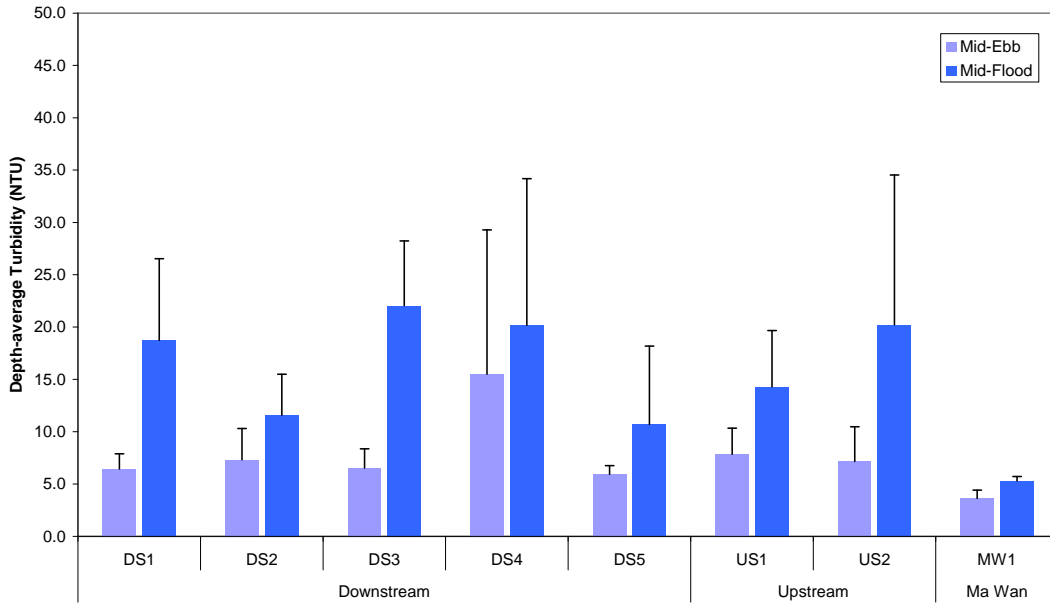


Figure 15: Depth-average Turbidity (mean + SD) at Downstream (DS1, DS2, DS3, DS4 and DS5 stations), Upstream (US1 and US2 stations) and Ma Wan (MW1 station) during Impact Monitoring for Dredging on 20 January 2010.

Impact Monitoring during Dredging for CMP V – 20 January 2010

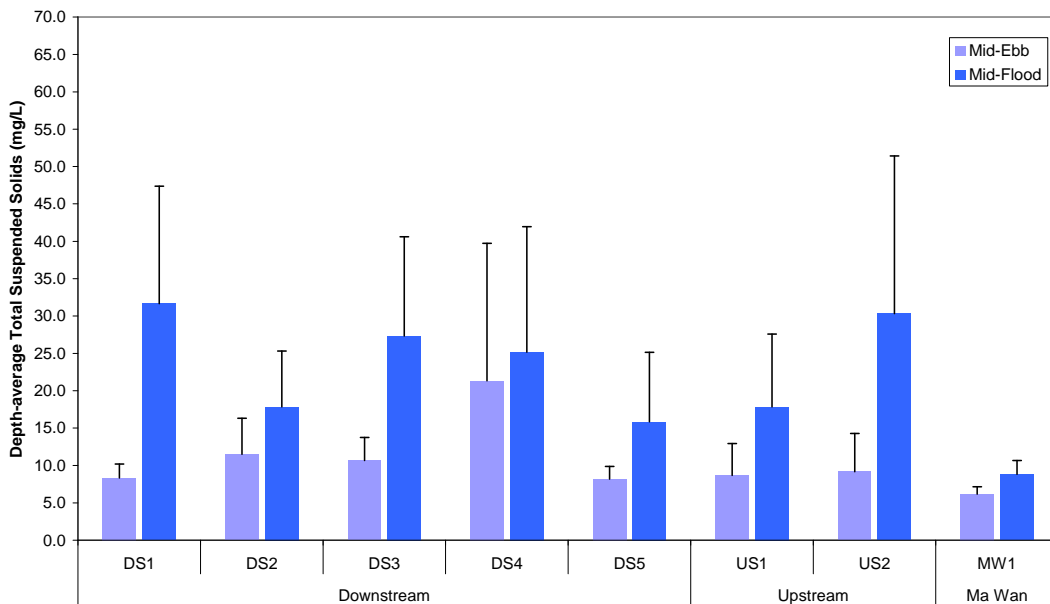


Figure 16: Depth-average Total Suspended Solids (mean + SD) at Downstream (DS1, DS2, DS3, DS4 and DS5), Upstream (US1 and US2) and Ma Wan (MW1) stations during Impact Monitoring for Dredging on 20 January 2010.

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

Station	Downstream (Impact)		
Time (hh:mm)	14:45-15:23		
Monitoring Depth (m)	Depth Average	Surface and Middle	Bottom
D.O. (mg/L)	N/A	7.75	7.68
Turbidity (NTU)	8.34	N/A	N/A
SS (mg/L)	12.00	N/A	N/A
Remarks	Dredging works were observed.		

Station	Upstream (Reference)		
Time (hh:mm)	14:25-14:59		
Monitoring Depth (m)	Depth Average	Surface and Middle	Bottom
D.O. (mg/L)	N/A	7.68	7.6
Turbidity (NTU)	7.49	N/A	N/A
SS (mg/L)	8.92	N/A	N/A
Remarks	Dredging works were observed.		

Station	Ma Wan		
Time (hh:mm)	16:09-16:13		
Monitoring Depth (m)	Depth Average	Surface and Middle	Bottom
D.O. (mg/L)	N/A	7.43	7.35
Turbidity (NTU)	3.63	N/A	N/A
SS (mg/L)	6.17	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
	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)	7.68	7.60	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)	7.75	7.68	Y	Y
Turbidity (Depth-averaged)	> 28.14	I ≥ 1.2 R (8.99)	> 38.32	I ≥ 1.3 R (9.74)	8.34	7.49	Y	Y
SS (Depth-averaged)	> 37.88	I ≥ 1.2 R (10.70)	> 61.92	I ≥ 1.3 R (11.59)	12.00	8.92	Y	Y

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

Station	Downstream (Impact)		
Time (hh:mm)	10:19 - 10:58		
Monitoring Depth (m)	Depth Average	Surface and Middle	Bottom
D.O. (mg/L)	N/A	7.59	7.62
Turbidity (NTU)	16.64	N/A	N/A
SS (mg/L)	23.57	N/A	N/A
Remarks	Dredging works were observed.		

Station	Upstream (Reference)		
Time (hh:mm)	09:56 - 10:13		
Monitoring Depth (m)	Depth Average	Surface and Middle	Bottom
D.O. (mg/L)	N/A	7.67	7.7
Turbidity (NTU)	17.25	N/A	N/A
SS (mg/L)	24.08	N/A	N/A
Remarks	Dredging works were observed.		

Station	Ma Wan		
Time (hh:mm)	08:37 - 09:33		
Monitoring Depth (m)	Depth Average	Surface and Middle	Bottom
D.O. (mg/L)	N/A	7.52	7.44
Turbidity (NTU)	5.29	N/A	N/A
SS (mg/L)	8.83	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)	7.62	7.7	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)	7.59	7.67	Y	Y
Turbidity (Depth-averaged)	> 28.14	I ≥ 1.2 R (20.70)	> 38.32	I ≥ 1.3 R (22.43)	16.64	17.25	Y	Y
SS (Depth-averaged)	> 37.88	I ≥ 1.2 R (28.90)	> 61.92	I ≥ 1.3 R (31.31)	23.57	24.08	Y	Y

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

Annex C

Study Programme

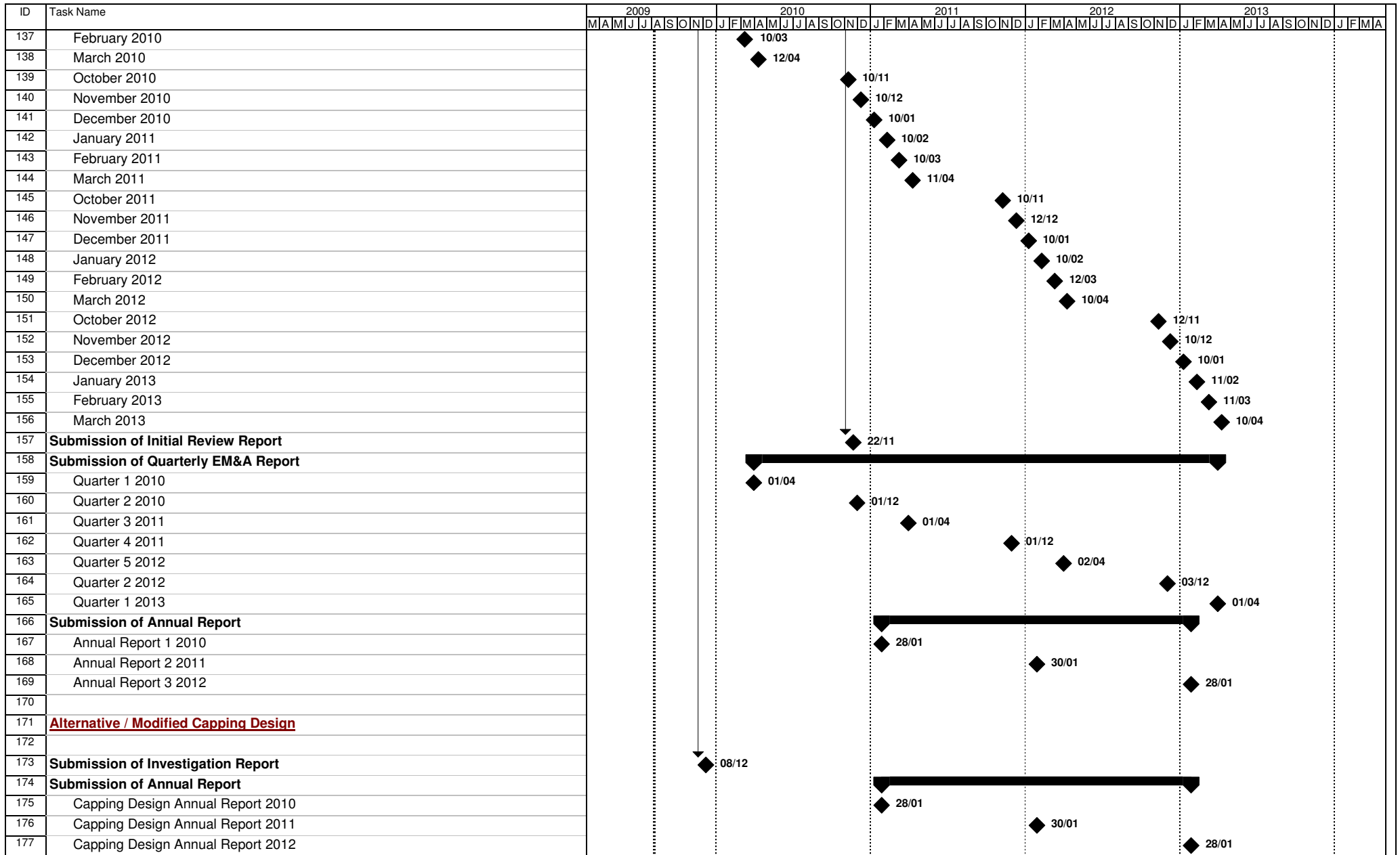


Figure 4.1 - Study Programme

