








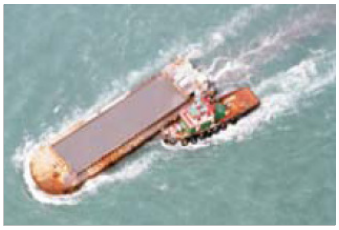
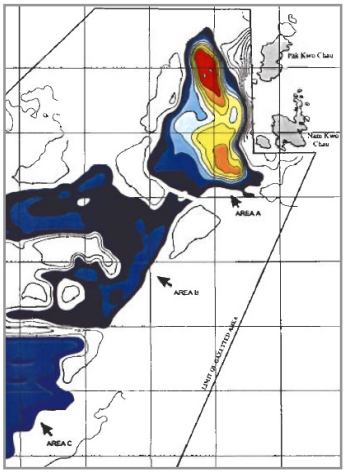

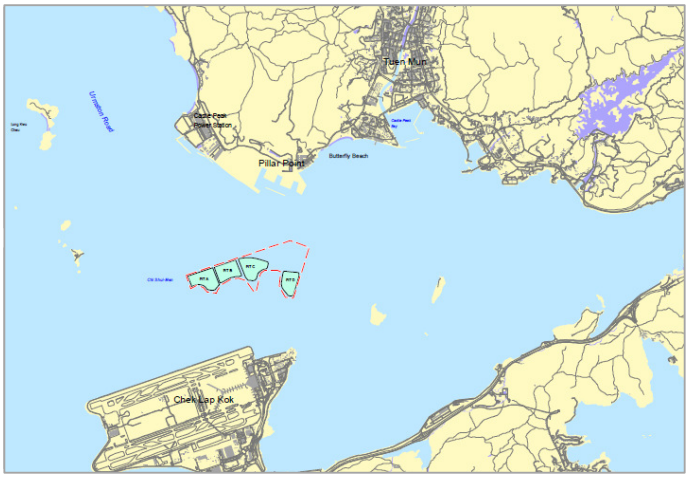

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Civil Engineering and Development Department

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

Agreement No. CE 4/2009(EP)

35th Monthly Progress Report for Contaminated Mud Pits at Sha Chau – May 2012

Revision 0

4 October 2012

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

35th Monthly Progress Report for Contaminated Mud Pits at Sha Chau – May 2012

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 May 2012 under Agreement No. CE 4/2009 (EP).	Date: 4 October 2012 Approved by:  *Dr Robin Kennish* *Director*

Revision	Description	By	Checked	Approved	Date
0	35th Monthly Progress Report for CMP	CL	JT	RK	04/10/12

Distribution

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CONTENTS

ANNEXES

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

35th MONTHLY PROGRESS REPORT FOR CONTAMINATED MUD PITS AT SHA CHAU May 2012

1.1 BACKGROUND

1.1.1 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. In May 2012, the following works were being undertaken at the CMPs:

- Capping was being undertaken at CMP IVc;
- Disposal of contaminated mud was taking place at CMP Va; and
- The dredging of CMP Vc was in progress.

The Environmental Monitoring and Audit (EM&A) programme for the CMPs at the East of Sha Chau area (ESC) presently covers the above operations.

1.2 REPORTING PERIOD

1.2.1 This *Monthly Progress Report* covers the reporting month of May 2012.

1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES

1.3.1 The following monitoring activities have been undertaken for CMP V in May 2012:

- *Pit Specific Sediment Chemistry Monitoring* was conducted for CMP Va on 15 May 2012;
- *Routine Water Quality Monitoring* was conducted for CMP Va on 16 May 2012;
- *Impact Water Quality Monitoring during Dredging Operations* was conducted for CMP Vc on 17 May 2012; and
- *Water Column Profiling* was conducted for CMP Va on 18 May 2012.

1.3.2 A summary of field activities is presented in *Annex A*.

1.4 DETAILS OF OUTSTANDING SAMPLING AND / OR ANALYSIS

1.4.1 No outstanding sampling and laboratory analysis remained from May 2012.

1.5 BRIEF DISCUSSION OF THE MONITORING RESULTS FOR CMP V

1.5.1 *Table 1.1* summarises the monitoring results that are presented in the current monthly report. All monitoring data collected in May 2012 will be presented in this monthly report.

Table 1.1 Monitoring results presented in the May 2012 Monthly Report

Date of Monitoring	Monitoring Component
15 May 2012	Pit Specific Sediment Chemistry Monitoring for CMP Va
16 May 2012	Routine Water Quality Monitoring for CMP Va
17 May 2012	Impact Water Quality Monitoring during Dredging Operations for CMP Vc
18 May 2012	Water Column Profiling for CMP Va

1.5.2 Brief discussion of the monitoring results is presented in this section. Detailed discussion will be presented in the corresponding *Quarterly Report*.

1.5.3 Pit Specific Sediment Chemistry Monitoring of CMP Va – May 2012

1.5.4 Monitoring locations for Pit Specific Sediment Chemistry for CMP Va are shown in *Figure 1.1*. Concentrations of metals were generally below the Lower Chemistry Exceedance Level (LCEL) (*Figures 1* and *2* of *Annex B*) and no exceedance of Upper Chemistry Exceedance Level (UCEL) was recorded in May 2012. Concentrations of Copper, Lead and Zinc exceeded the LCEL at Active Pit station NPDA. Concentrations of Silver exceeded the LCEL at Active Pit stations NPDA and NPDB. Concentrations of Arsenic exceeded the LCEL at all stations, except Active Pit station NPDB and Near-Pit station NNDB stations, in May 2012. It is important to note that relatively high natural levels of Arsenic are present in Hong Kong's marine sediments. Therefore, the slight exceedances of the LCEL for Arsenic are unlikely to be caused by the disposal operations at CMP Va but rather as a result of naturally occurring deposits. In addition, the Action Pit stations are located within CMP Va which was receiving contaminated mud during the reporting month. Therefore, the exceedances of LCEL recorded at the Action Pit stations alone (for Copper, Lead, Silver and Zinc) are not considered as indicating any dispersal of contaminated mud from CMP Va and thus not indicating any unacceptable environmental impacts from the mud disposal operations.

1.5.5 For organic contaminants, PCBs were all below the limit of reporting at all stations in May 2012. Levels of Low and High Molecular Weight Polycyclic Aromatics Hydrocarbons (Low and High M.W. PAHs) were higher than the limit of reporting in only a few samples collected in May 2012. TOC and TBTs concentrations were the highest at Active Pit stations (NPDA) in May 2012 when compared to other stations (*Figures 3* and *4* of *Annex B*).

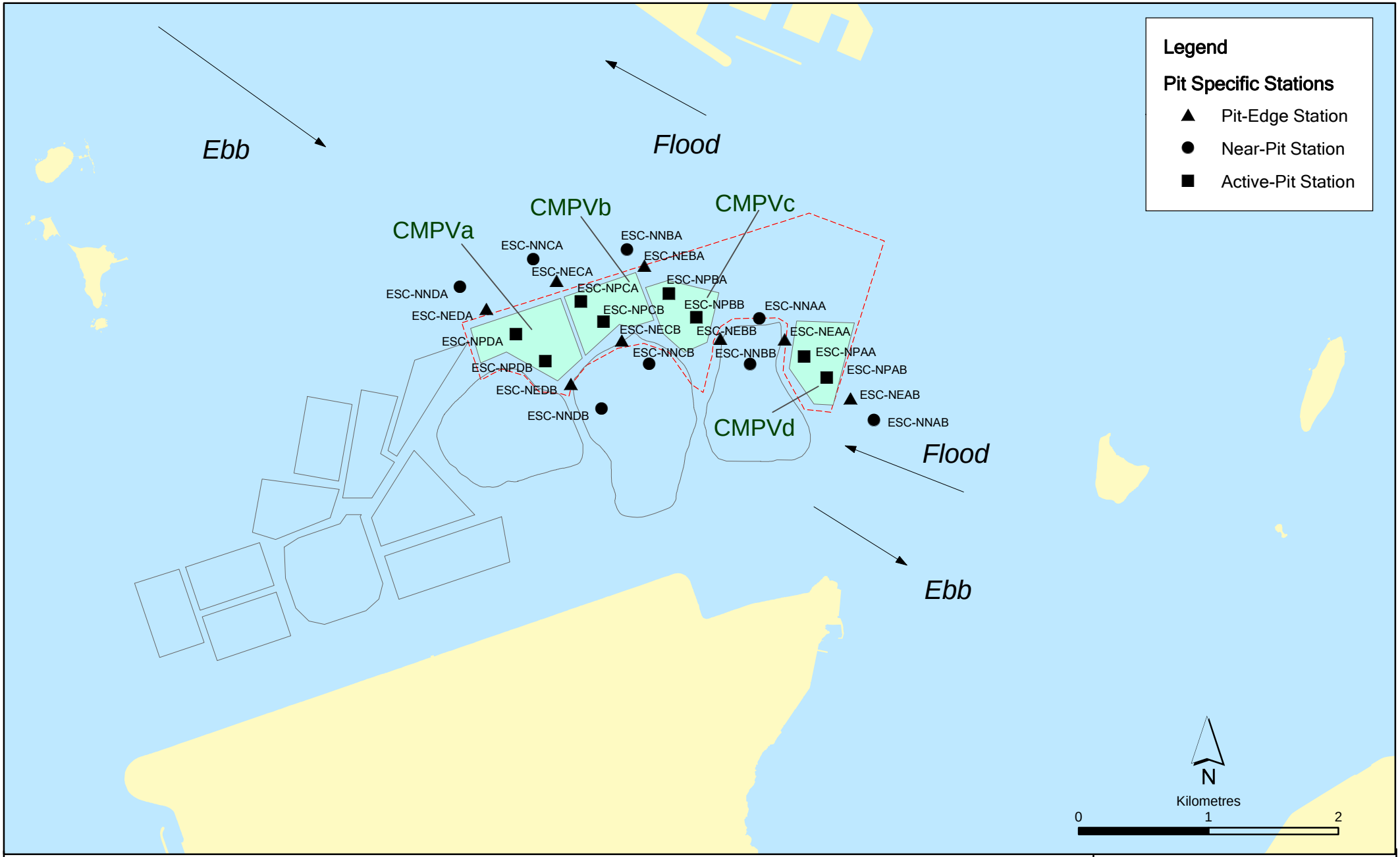

Figure 1.1

Pit Specific Sediment Quality Monitoring Stations for CMPV

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Date: 29/10/2009

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Concentrations of 4,4″-DDE were higher than the limit of reporting at Active Pit stations (NPDA and NPDB) for May 2012, whereas concentrations of DDT were all lower than the limit of reporting at all stations (*Figure 5* of *Annex B*).

1.5.6 Overall, there is no evidence indicating any unacceptable environmental impacts to sediment quality as a result of the contaminated mud disposal operations at CMP Va during this monthly period.

1.5.7 Routine Water Quality Monitoring of CMP Va – May 2012

1.5.8 The results for the Routine Water Monitoring conducted during May 2012 in the wet season have been assessed for compliance with the Water Quality Objectives (WQOs) (please see *Figure 1.2* for the monitoring locations). This consists of a review of the Environmental Protection Department (EPD) routine water quality monitoring data for the wet season period (April to October) of 1999-2010 from stations in the Northwestern Water Control Zone, where CMPs are located. For Salinity, the average value obtained from the upstream station was used for the basis as the WQO. *In-situ* monitoring and laboratory results are shown in *Table 1.2* and *1.3* respectively, with graphical presentation provided in *Annex B.*

In-situ Measurements

1.5.9 Analyses of results for May 2012 indicated that for all stations (Impact, Intermediate and Reference), levels of pH, Salinity and DO generally complied with the WQOs (*Figures 8, 9* and *11* of *Annex B*). Levels of DO and Turbidity within the reporting month also complied with the Action and Limit Levels set in the EM&A Manual (1). All *in-situ* water quality measurements showed relatively minor variations between Impact, Intermediate and Reference stations (*Figures 6 to 11* of *Annex B*).

Laboratory Measurements

1.5.10 Analyses of May 2012 results indicate that Arsenic, Cadmium, Mercury and Silver concentrations were below their limit of reporting at all stations. Concentrations of Copper, Lead, Nickel and Chromium appeared to be similar among all stations. Concentrations of Zinc appeared to be higher at Reference stations.

1.5.11 For parameters other than metals, levels of 5-day Biochemical Oxygen Demand (BOD_5), Total Inorganic Nitrogen (TIN) and NH_3-N were similar among all stations (*Figures 14* and *15* of *Annex B*). Concentrations of TSS did not exceed WQO and complied with the Action and Limit Levels at all stations within the reporting month (*Figure 16* of *Annex B*).

(1) ERM (2009). Draft Second Review of the EM&A Manual. Prepared for CEDD for EM&A for Contaminated Mud Pit at Sha Chau (2009-2013) – Investigation Agreement No. CE 4/2009 (EP).

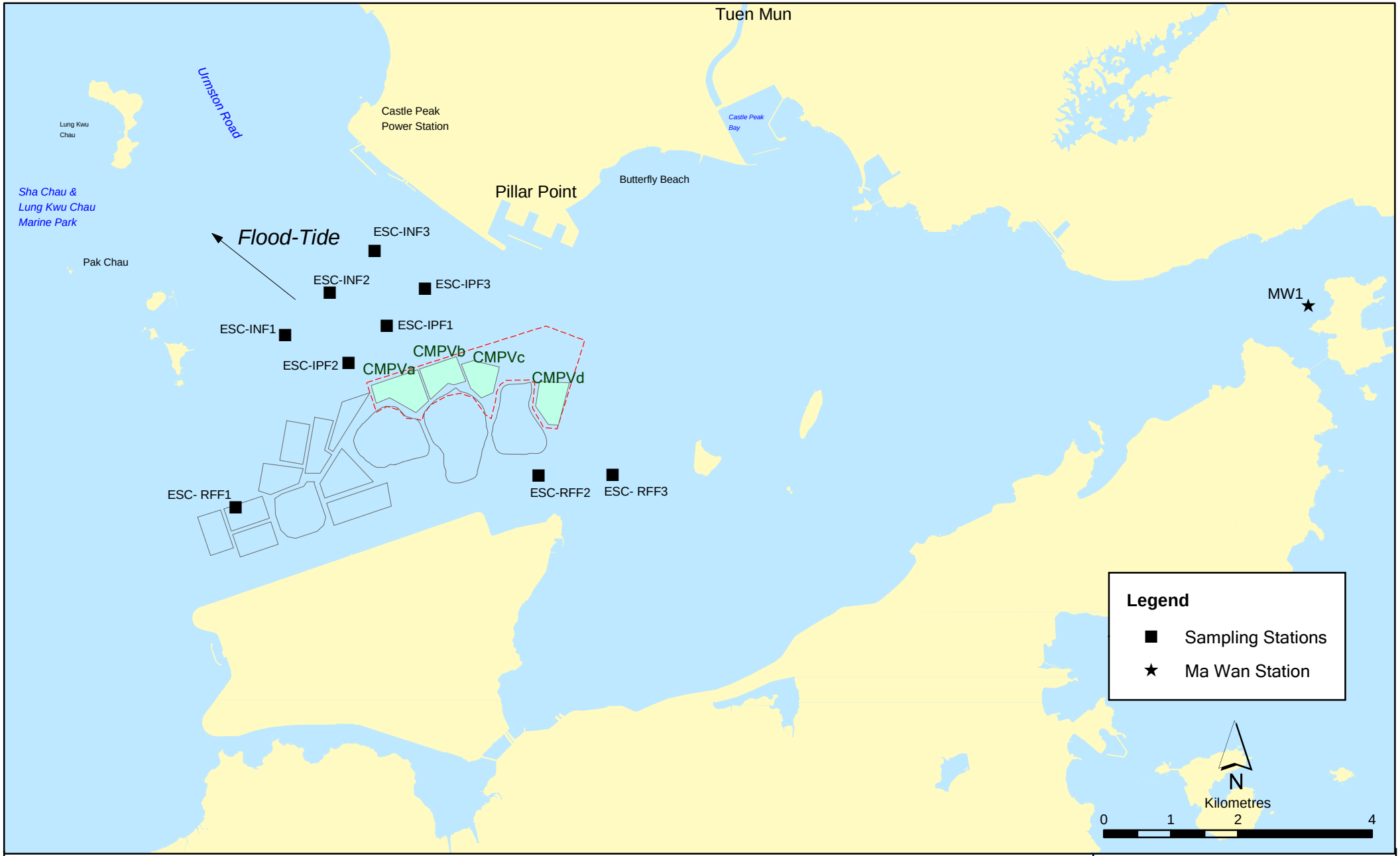

Figure 1.2

Routine & Capping Water Quality Sampling Stations (Flood-Tide) for CMPV

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Date: 29/10/2009

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1.5.12 Overall, the results indicated that the disposal operation at CMP Va did not appear to cause any deterioration in water quality during this reporting period.

Table 1.2 ***In-situ Monitoring Results for Routine Water Quality Monitoring during May 2012***

Stations	Temp (°C)	Salinity	Turbidity (NTU)	pH	Dissolved Oxygen (%)	Dissolved Oxygen (mg L^{-1})
RFE (Reference)	26.29	24.15	3.12	7.83	73.53	5.18
IPE (Impact)	26.65	22.64	4.21	7.92	81.08	5.73
INE (Intermediate)	26.28	24.60	4.15	7.93	80.63	5.67
Ma Wan Station	27.32	20.27	0.85	8.16	111.59	7.90
WQO	*N/A*	21.73-26.56#	*N/A*	*6.5-8.5*	*N/A*	>4

Note: # Not exceeding 10% of natural ambient level which is the result obtained from the Reference Station.

Table 1.3 ***Laboratory Results for Routine Water Quality Monitoring during May 2012***

Stations	As	Ag	Cd	Cr	Cu	Hg	Pb	Ni	Zn	NH_3-N	TIN	BOD_5	TSS
RFF	<LOR	<LOR	<LOR	1.05	11.40	<LOR	1.5	3.70	21.50	0.08	0.85	1.77	3.95
IPF	<LOR	<LOR	<LOR	<LOR	5.68	<LOR	<LOR	2.88	7.20	0.07	1.02	1.77	4.73
INF	<LOR	<LOR	<LOR	<LOR	3.70	<LOR	<LOR	2.68	8.15	0.06	0.97	1.94	4.55
Ma Wan Station	<LOR	<LOR	<LOR	<LOR	12.00	<LOR	1.00	3.38	9.13	0.07	1.17	1.66	<LOR
											WQO of TSS		13.00

1.5.13 ***Water Column Profiling for CMP Va – May 2012***

In-situ Measurements

1.5.14 The water quality monitoring results for May 2012 have been assessed for compliance with the WQOs set by EPD (please refer to *Section 1.5.8* for details of setting the WQOs). Graphical presentation of the monitoring results is provided in *Annex B*.

1.5.15 Analyses of results for May 2012 indicated that levels of Salinity, pH and Dissolved Oxygen (DO) all complied with the WQOs at both Upstream and Downstream stations (*Figures 17, 18* and *19* in *Annex B*). DO and Turbidity complied with the Action and Limit Levels set in the EM&A Manual (1).

Laboratory Measurements for Total Suspended Solids (TSS)

1.5.16 Analyses of data obtained in May 2012 indicated that the TSS levels at both Upstream and Downstream stations complied with the WQO (*Figure 20* in *Annex B*). TSS levels measured in May 2012 complied with the Action and Limit Levels set in the EM&A Manual.

(1) ERM (2009). Draft Second Review of the EM&A Manual. Prepared for CEDD for EM&A for Contaminated Mud Pit at Sha Chau (2009-2013) – Investigation Agreement No. CE 4/2009 (EP).

1.5.17 Overall, the results indicated that the mud disposal operation at CMP Va did not appear to cause any deterioration in water quality during this reporting period.

1.5.18 Impact Water Quality Monitoring during Dredging Operations of CMP Vc – May 2012

1.5.19 *Impact Water Quality Monitoring during Dredging Operations of CMP V* was conducted on 17 May 2012 for CMP Vc. 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 Vc (*Figure 1.3*). 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).

1.5.20 Monitoring results are presented in *Table C1* of *Annex C*. Levels of DO, Turbidity and TSS complied with the Action and Limit Levels set in the *Baseline Monitoring Report* (1).

1.5.21 Overall, the results indicated that the dredging operations at CMP Vc did not appear to cause any unacceptable deterioration in water quality during this reporting period. Therefore, no further mitigation measures, except for those recommended in the Environmental Permit (*EP-312/2008*), are considered required for the dredging operations of CMP Vc.

1.6 ACTIVITIES SCHEDULED FOR THE NEXT MONTH

1.6.1 The following monitoring programmes will be conducted in the next monthly period of June 2012:

CMP IV

- *Water Quality Monitoring during Capping* for CMP IVc;

CMP V

- *Pit Specific Sediment Chemistry* for CMP Va;
- *Cumulative Impact Sediment Chemistry* for CMP Va;
- *Water Column Profiling* for CMP Va; and
- *Impact Water Quality Monitoring during Dredging Operations* for CMP Vc**.**

(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.

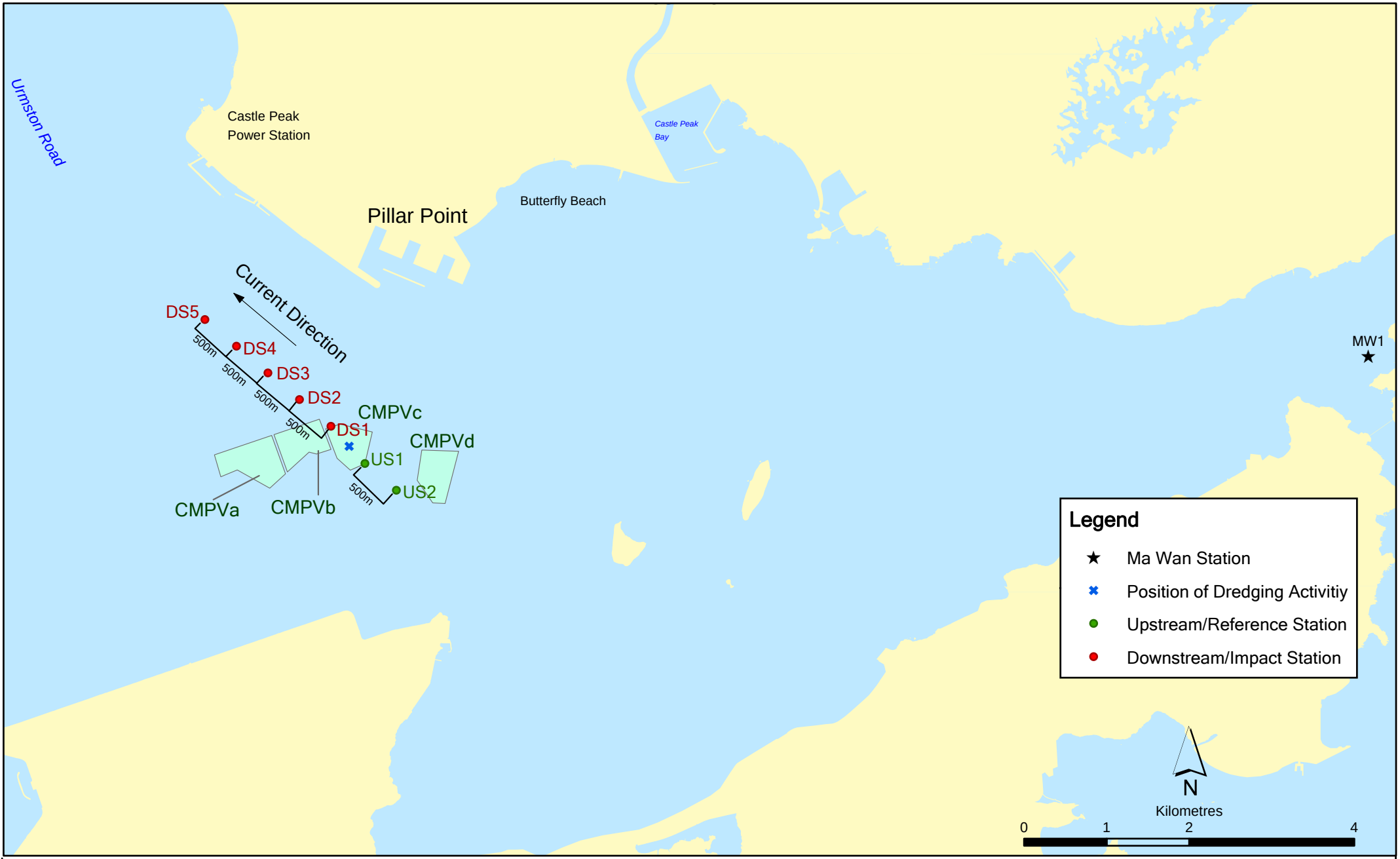

Figure 1.3

Indicative Dredging Impact Sampling Stations for CMPVc

Note: The locations of sampling stations will be determined on site based on current direction and position of dredging activities.

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Date: 27/03/2012

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1.6.2 The sampling schedule is presented in *Annex A*.

1.7 STUDY PROGRAMME

1.7.1 A summary of the Study Programme is presented in *Annex D*.

Annex A

Sampling Schedule

Annex A1 - East of Sha Chau Environmental Monitoring and Audit Sampling Schedule for CMP IV (January - December 2012)

		2012											
Tissue/ Whole Body Sampling		**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Near-Pit Stations													
	INA		*										
	INB		*										
Reference North													
	TNA		*										
	TNB		*										
Reference South													
	TSA		*										
	TSB		*										
Demersal Trawling		**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Near Pit Stations													
	INA 1-5	*	*										
	INB 1-5	*	*										
Reference North													
	TNA 1-5	*	*										
	TNB 1-5	*	*										
Reference South													
	TSA 1-5	*	*										
	TSB 1-5	*	*										
Capping		**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Ebb Tide													
Impact Station Downcurrent													
	IPE1		*				*		*				*
	IPE2		*				*		*				*
	IPE3		*				*		*				*
	IPE4		*				*		*				*
	PFC1		*				*		*				*
Intermediate Station Downcurrent													
	INE1		*				*		*				*
	INE2		*				*		*				*
	INE3		*				*		*				*
	INE4		*				*		*				*
	INE5		*				*		*				*
Reference Station Upcurrent													
	RFE1		*				*		*				*
	RFE2		*				*		*				*
	RFE3		*				*		*				*
	RFE4		*				*		*				*
	RFE5		*				*		*				*
Flood Tide													
Impact Station Downcurrent													
	INF1		*				*		*				*
	PFC2		*				*		*				*
	INF3		*				*		*				*
Intermediate Station Downcurrent													
	IPF1		*				*		*				*
	IPF2		*				*		*				*
	IPF3		*				*		*				*
Reference Station Upcurrent													
	RFF1		*				*		*				*
	RFF2		*				*		*				*
	RFF3		*				*		*				*
Water Column Profiling		**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Plume Stations	WCP1	*											
	WCP2	*											

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

Sampling completed

Sampling to be completed

Annex A2 - East of Sha Chau Environmental Monitoring and Audit Sampling Schedule for CMP V (January 2012 - February 2014)

		2012												2013												2014	
Pit Specific Sediment Chemistry	**Code**	**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**
Active-Pit																											
	ESC-NPDA		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	ESC-NPDB		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pit-Edge																											
	ESC-NEDA		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	ESC-NEDB		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Near-Pit																											
	ESC-NNDA		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	ESC-NNDB		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Cumulative Impact Sediment Chemistry	**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**
Near-field Stations																										
ESC-RNA		*				*		*				*		*				*		*				*		*
ESC-RNB		*				*		*				*		*				*		*				*		*
Mid-field Stations																										
ESC-RMA		*				*		*				*		*				*		*				*		*
ESC-RMB		*				*		*				*		*				*		*				*		*
Capped Pit Stations																										
ESC-RCA		*				*		*				*		*				*		*				*		*
ESC-RCB		*				*		*				*		*				*		*				*		*
Far-Field Stations																										
ESC-RFA		*				*		*				*		*				*		*				*		*
ESC-RFB		*				*		*				*		*				*		*				*		*
Ma Wan Station																										
MW1		*				*		*				*		*				*		*				*		*

Sediment Toxicity Tests	**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**
Near-Field Stations																										
ESC-TDA		*						*						*						*						*
ESC-TDB		*						*						*						*						*
Reference Stations																										
ESC-TRA		*						*						*						*						*
ESC-TRB		*						*						*						*						*
Ma Wan Station																										
MW1		*						*						*						*						*

Tissue/ Whole Body Sampling	**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**
Impact Stations																										
ESC-INA								*						*						*						*
ESC-INB								*						*						*						*
Reference																										
ESC-TNA								*						*						*						*
ESC-TNB								*						*						*						*
ESC-TSA								*						*						*						*
ESC-TSB								*						*						*						*

Demersal Trawling	**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**
Impact Stations																										
ESC-INA							*	*					*	*					*	*					*	*
ESC-INB							*	*					*	*					*	*					*	*
Reference Stations																										
ESC-TNA							*	*					*	*					*	*					*	*
ESC-TNB							*	*					*	*					*	*					*	*
ESC-TSA							*	*					*	*					*	*					*	*
ESC-TSB							*	*					*	*					*	*					*	*

Capping	**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**
Ebb Tide																										
Impact Station																										
ESC-IPE1														*				*		*				*		*
ESC-IPE2														*				*		*				*		*
ESC-IPE3														*				*		*				*		*
ESC-IPE4														*				*		*				*		*
ESC-IPE5														*				*		*				*		*
Intermediate Station																										
ESC-INE1														*				*		*				*		*
ESC-INE2														*				*		*				*		*
ESC-INE3														*				*		*				*		*
ESC-INE4														*				*		*				*		*
ESC-INE5														*				*		*				*		*
Reference Station																										
ESC-RFE1														*				*		*				*		*
ESC-RFE2														*				*		*				*		*
ESC-RFE3														*				*		*				*		*
ESC-RFE4														*				*		*				*		*
ESC-RFE5														*				*		*				*		*
Ma Wan Station																										
MW1														*				*		*				*		*
Flood Tide																										
Impact Station																										
ESC-IPF1														*				*		*				*		*
ESC-IPF2														*				*		*				*		*
ESC-IPF3														*				*		*				*		*
Intermediate Station																										
ESC-INF1														*				*		*				*		*
ESC-INF2														*				*		*				*		*
ESC-INF3														*				*		*				*		*
Reference Station																										
ESC-RFF1														*				*		*				*		*
ESC-RFF2														*				*		*				*		*
ESC-RFF3														*				*		*				*		*
Ma Wan Station																										
MW1														*				*		*				*		*

Routine Water Quality Monitoring	**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**
Ebb Tide																										
Impact Station																										
ESC-IPE1		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-IPE2		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-IPE3		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-IPE4		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-IPE5		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
Intermediate Station																										
ESC-INE1		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-INE2		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-INE3		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-INE4		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-INE5		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
Reference Station																										
ESC-RFE1		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-RFE2		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-RFE3		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-RFE4		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-RFE5		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
Ma Wan Station																										
MW1		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
Flood Tide																										
Impact Station																										
ESC-IPF1		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-IPF2		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-IPF3		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
Intermediate Station																										
ESC-INF1		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-INF2		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-INF3		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
Reference Station																										
ESC-RFF1		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-RFF2		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
ESC-RFF3		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*
Ma Wan Station																										
MW1		*		*	*		*	*		*	*		*	*		*	*		*	*		*	*		*	*

Water Column Profiling		**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**
Plume Stations	WCP1		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	WCP2		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Benthic Recolonisation Studies	**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**
Capped Contaminated Mud Pits IVa-c																										
ESC-CPA								*				*								*				*		
ESC-CPB								*				*								*				*		
ESC-CPC								*				*								*				*		
Reference Stations																										
ESC-RBA								*				*								*				*		
ESC-RBB								*				*								*				*		
ESC-RBC								*				*								*				*		

Impact Monitoring for Dredging	**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**
Upstream/Reference Stations																										
US1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*										
US2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*										
Downstream/Impact Stations																										
DS1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*										
DS2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*										
DS3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*										
DS4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*										
DS5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*										
Ma Wan Station																										
MW1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*										

Sampling completed

Sampling to be completed

Annex B

Monitoring Results

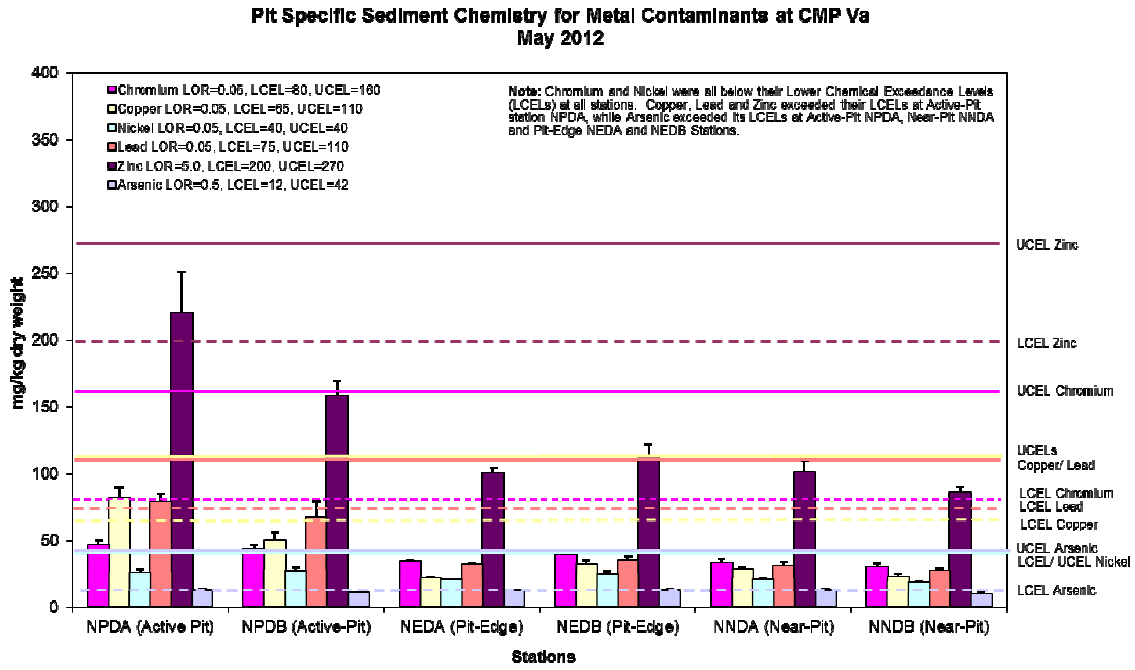

Figure 1: Concentration of Metals (Cr, Cu, Ni, Pb, Zn, As; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP Va in May 2012.

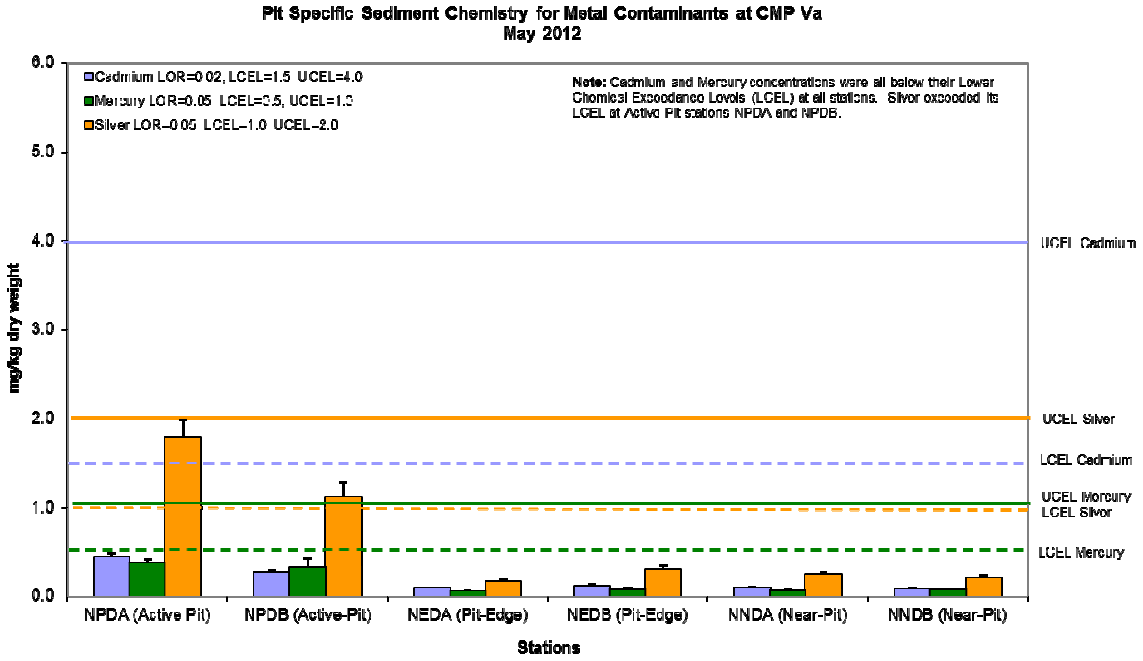

Figure 2: Concentration of Metals (Cd, Hg, Ag; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP Va in May 2012.

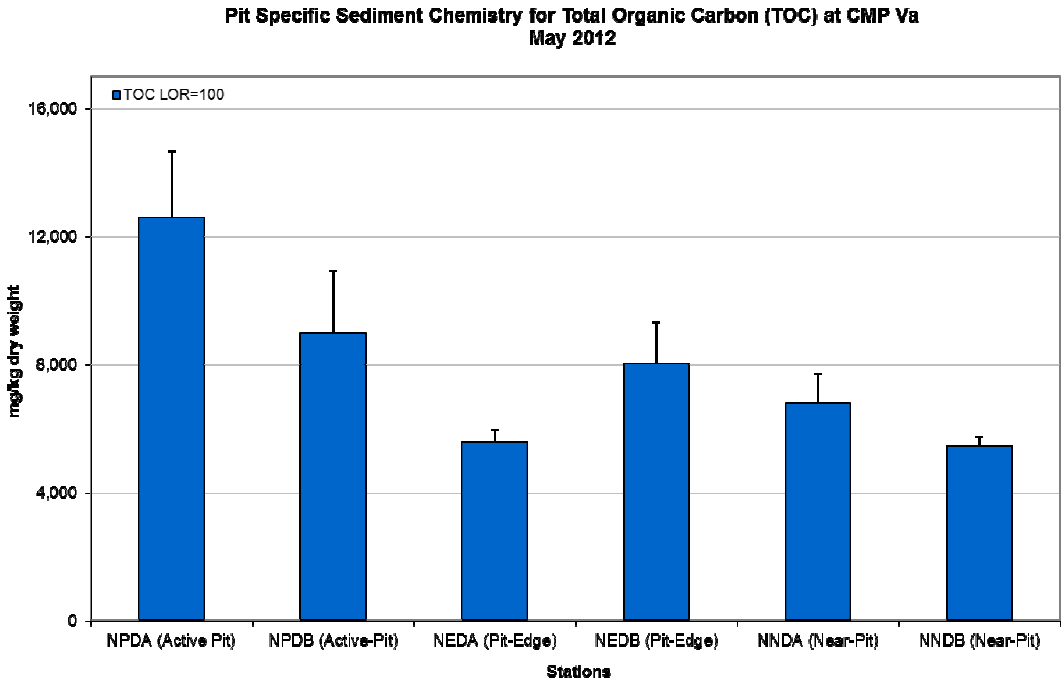

Figure 3: Concentration of Total Organic Carbon (TOC; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP Va in May 2012.

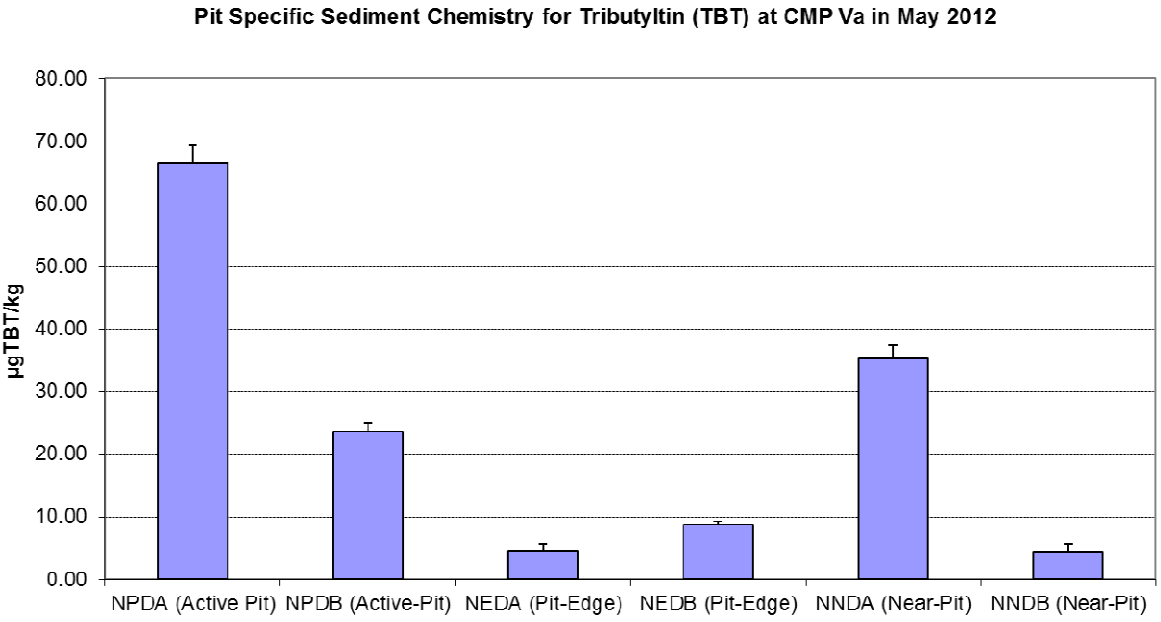

Figure 4: Concentration of Tributyltin (TBT; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP Va in May 2012.

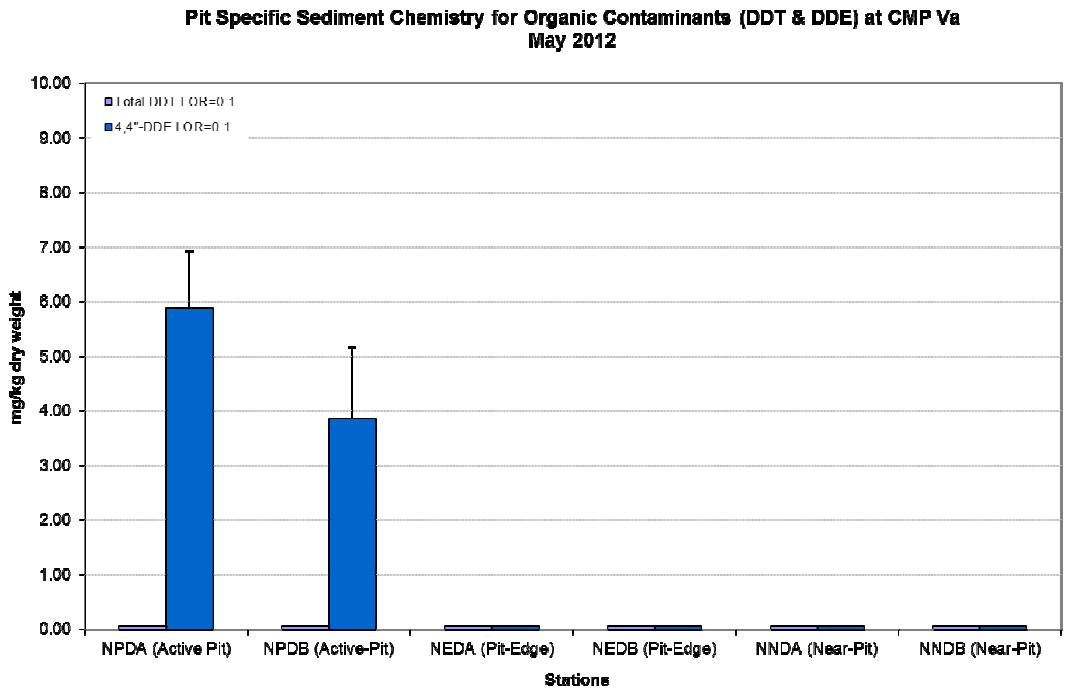

Figure 5: Concentration of Total DDT and 4,4″-DDE (mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP Va in May 2012.

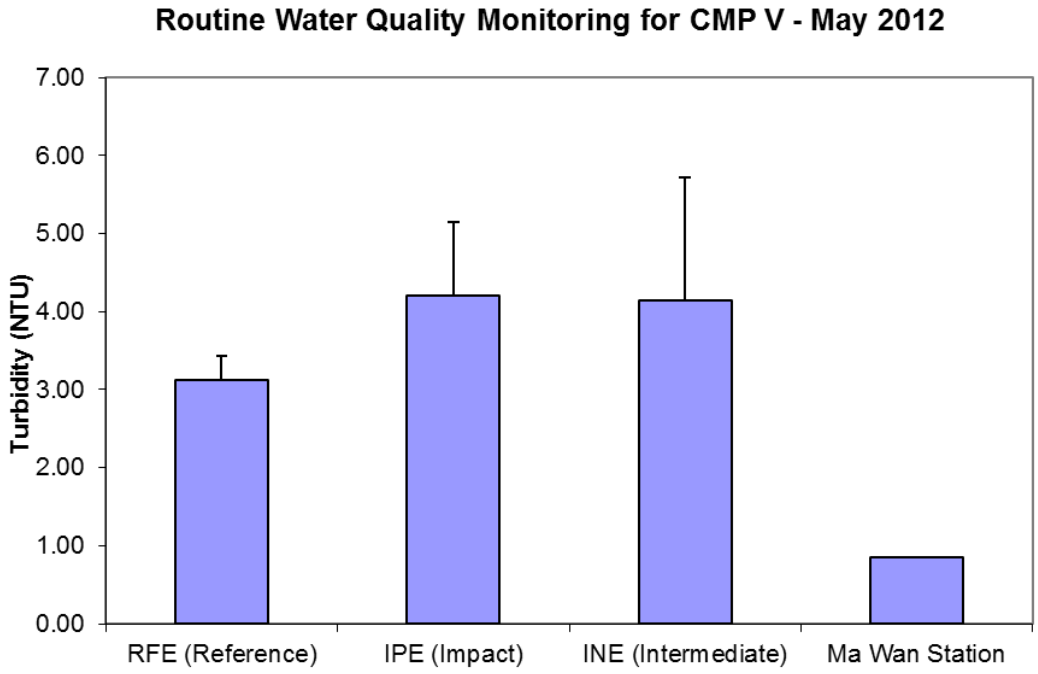

Figure 6: Level of Turbidity (mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP Va in May 2012.

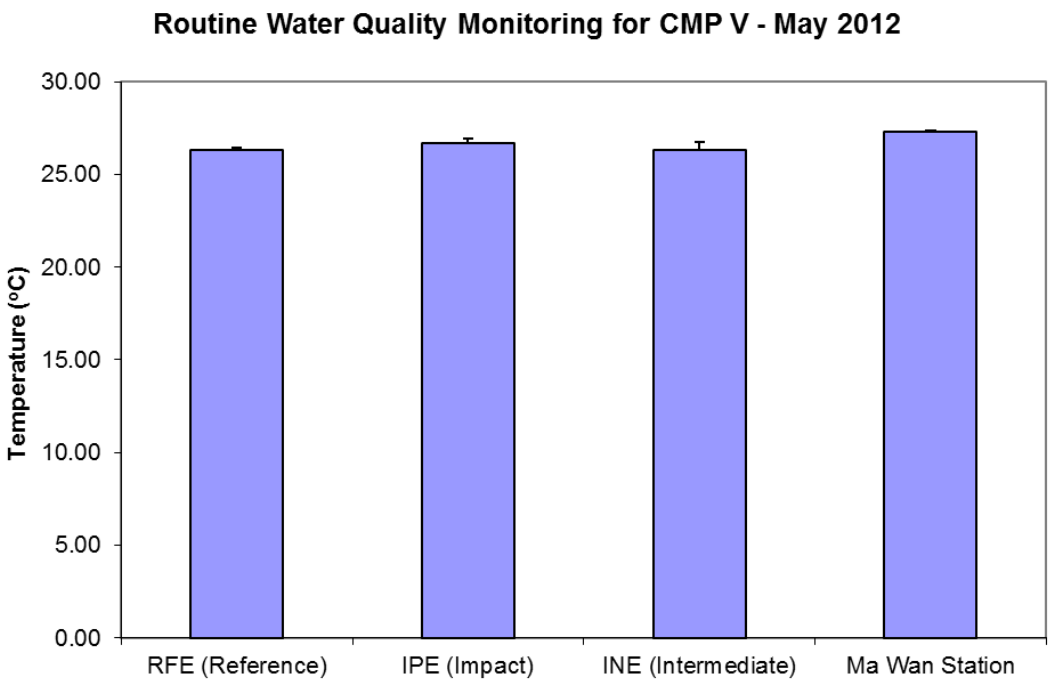

Figure 7: Temperature (mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP Va in May 2012.

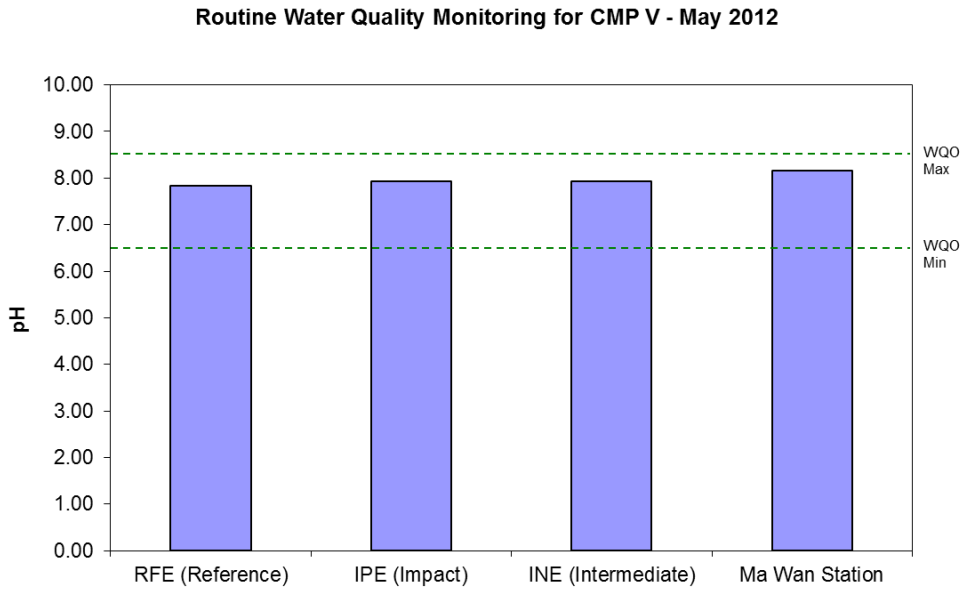

Figure 8: Level of pH (mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP Va in May 2012.

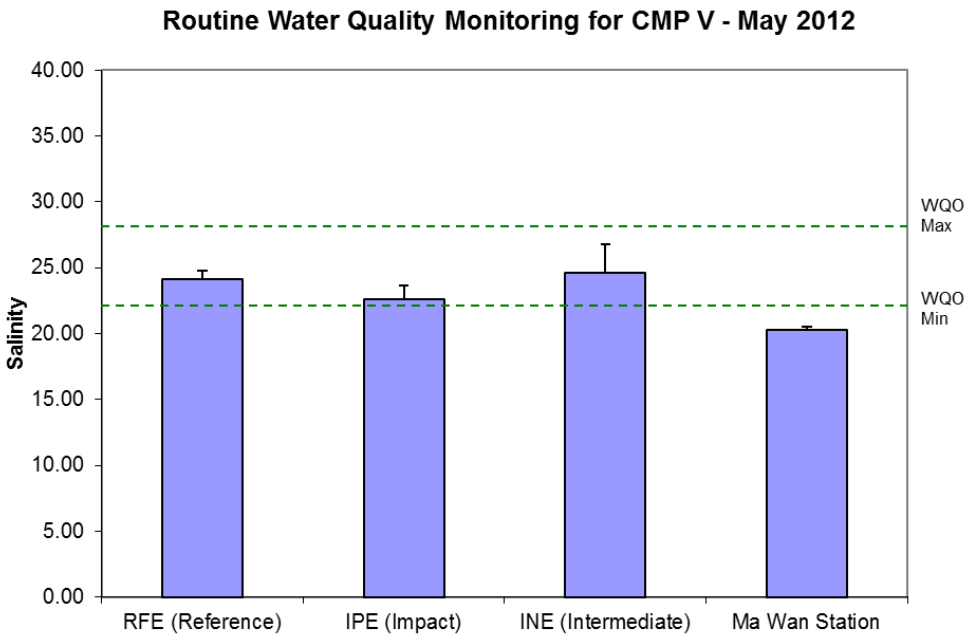

Figure 9: Level of Salinity (mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP Va in May 2012.

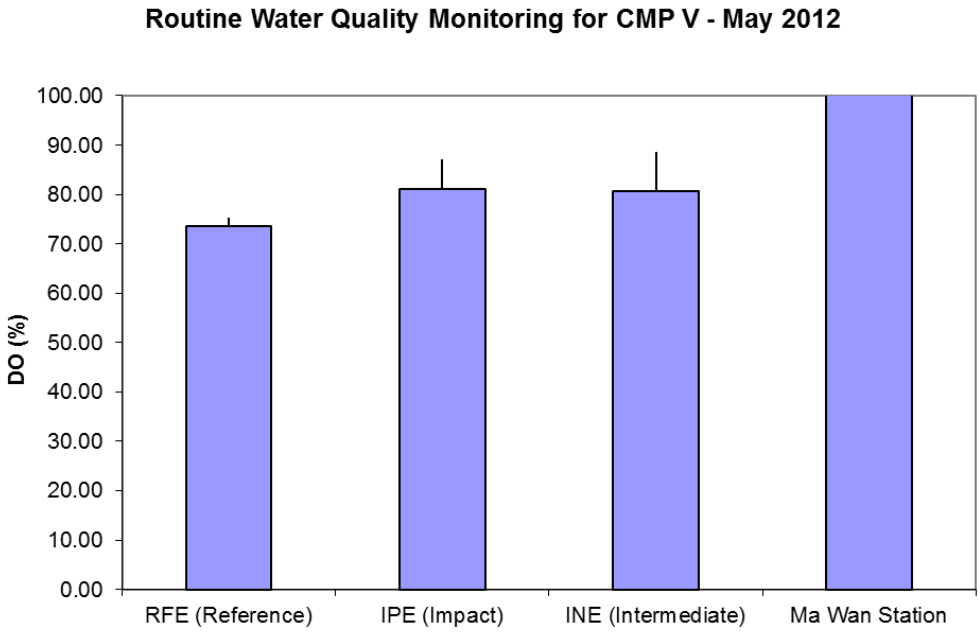

Figure 10: Level of Dissolved Oxygen (mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP Va in May 2012.

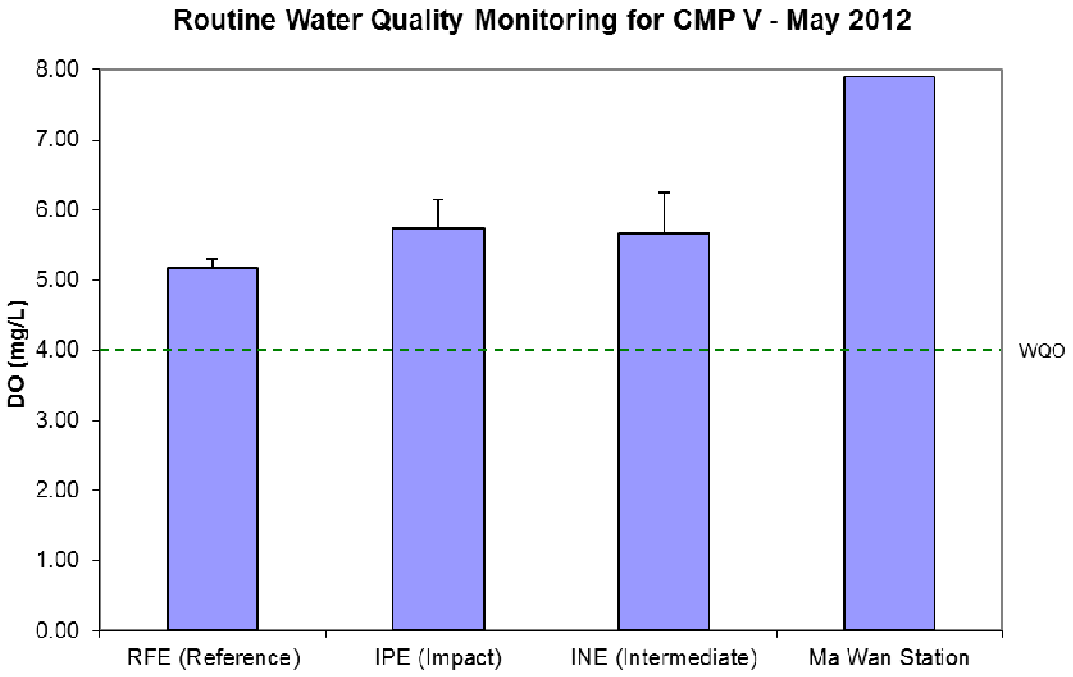

Figure 11: Concentration of Dissolved Oxygen (mg/L; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP Va in May 2012.

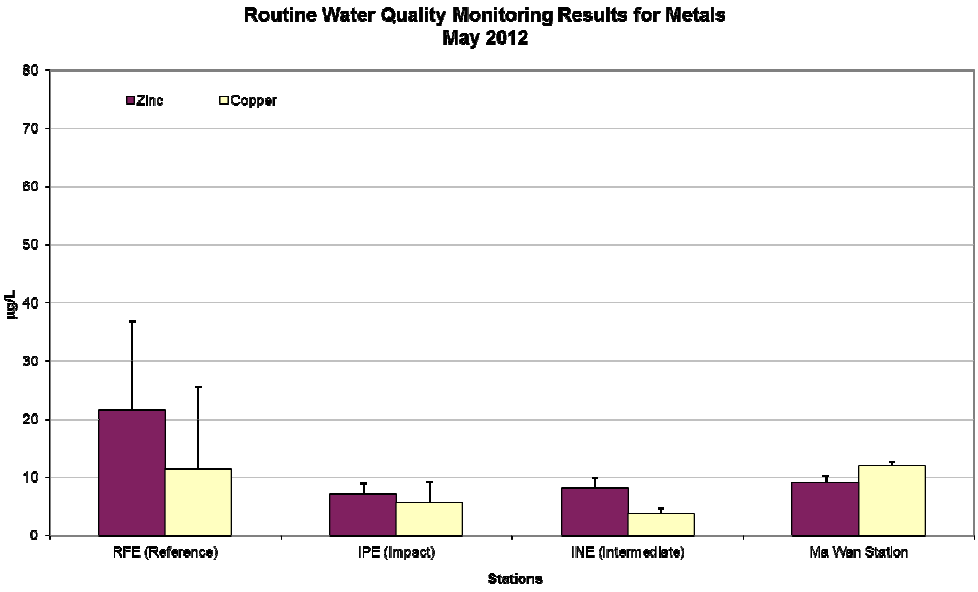

Figure 12: Concentration of Zinc and Copper (mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP Va in May 2012.

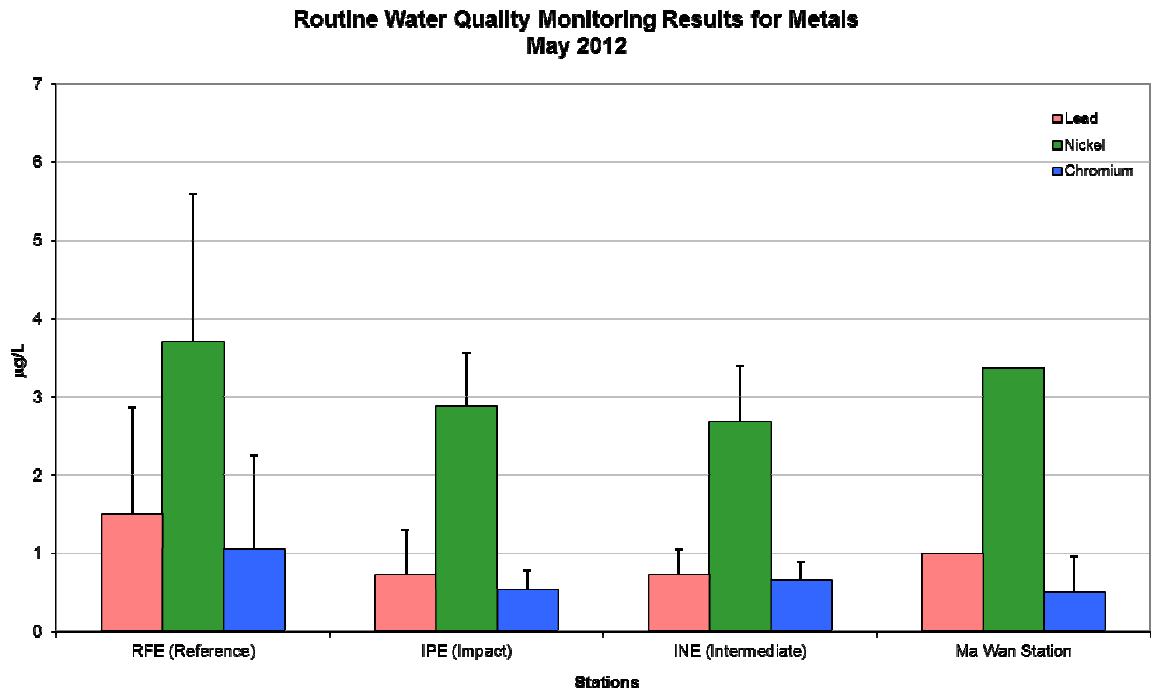

Figure 13: Concentration of Lead, Nickel and Chromium (mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP Va in May 2012.

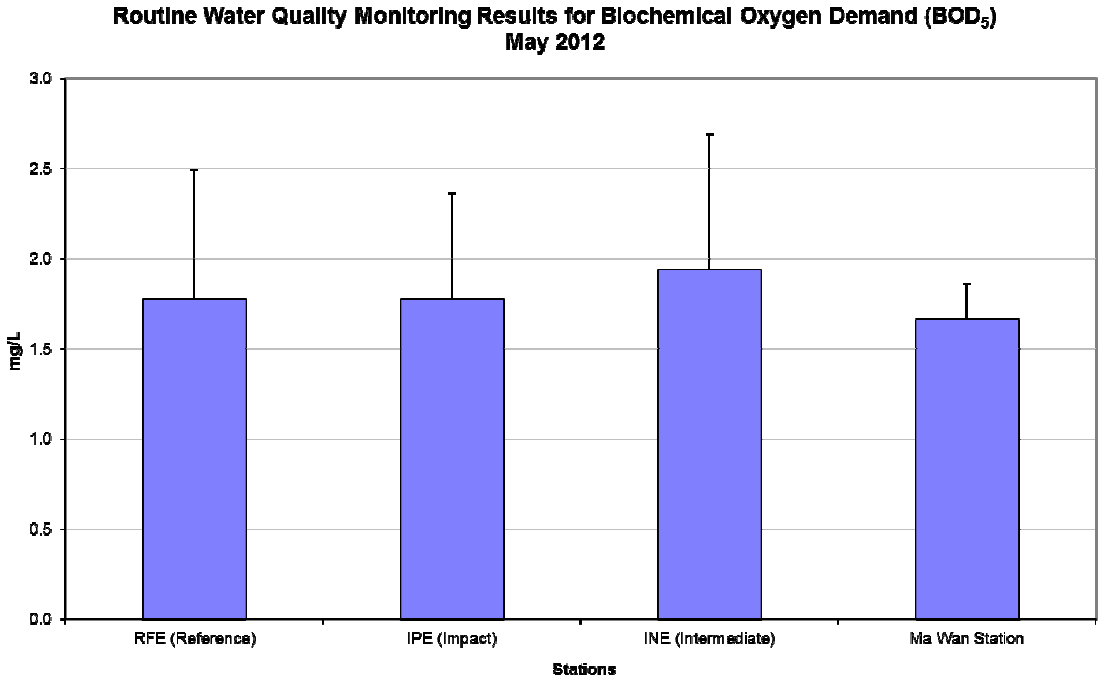

Figure 14: Level of Biological Oxygen Demand (BOD_5, mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP Va in May 2012.

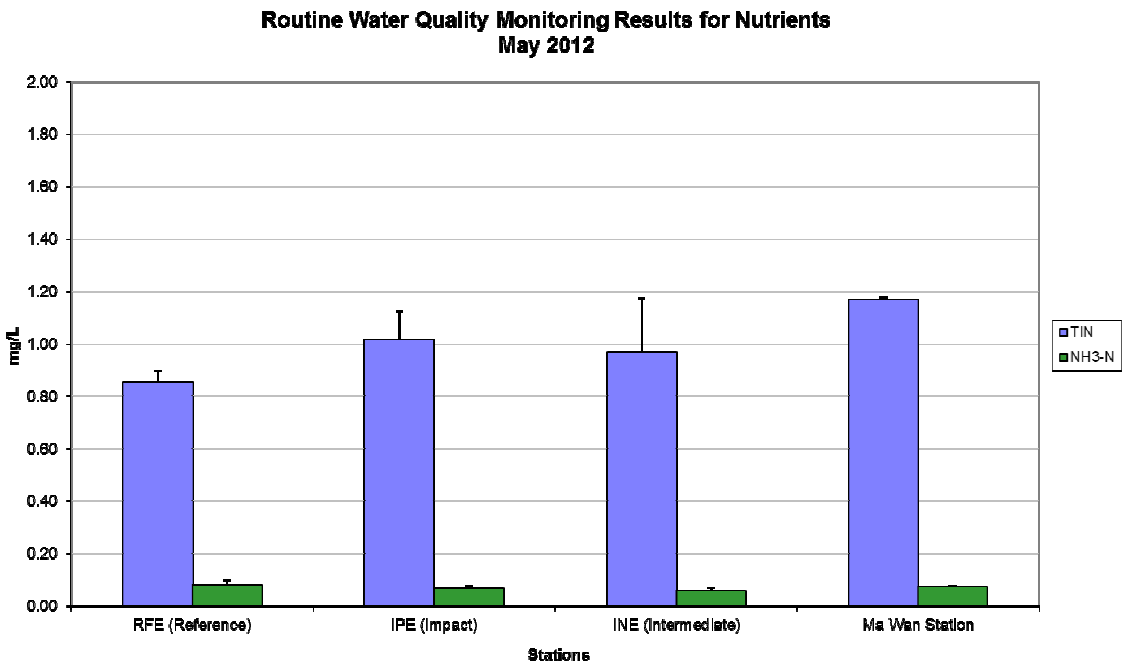

Figure 15: Concentration of Total Inorganic Nitrogen and NH_3-N (mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP Va in May 2012.

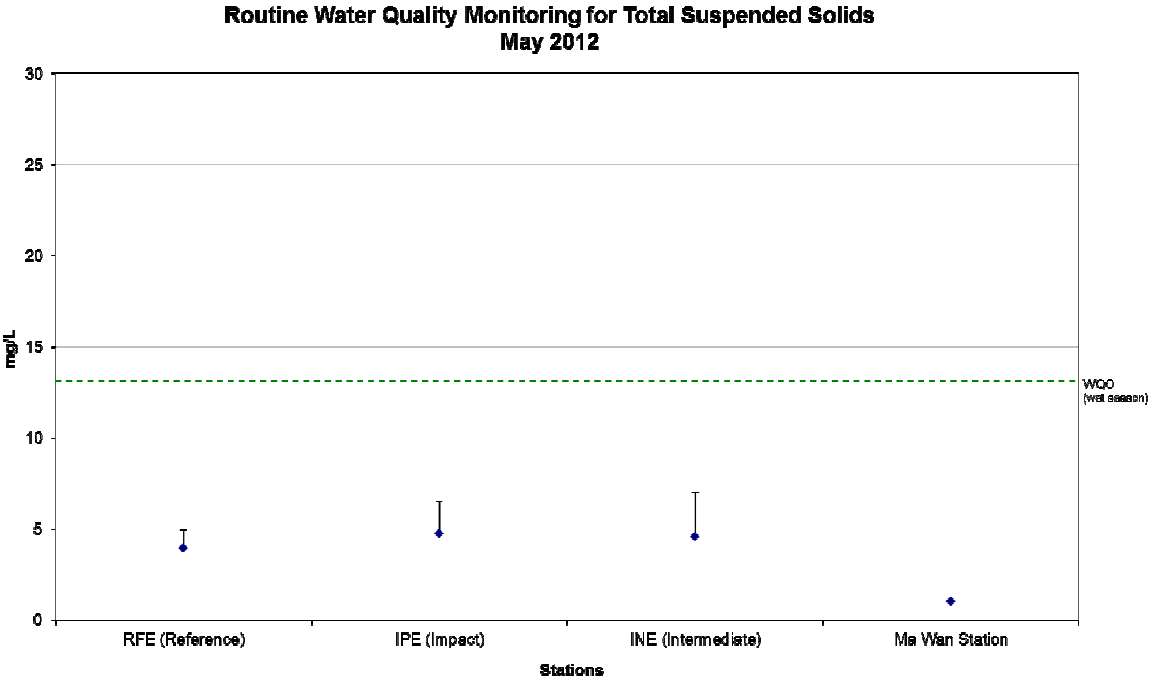

Figure 16: Concentration of Total Suspended Solids (mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP Va in May 2012.

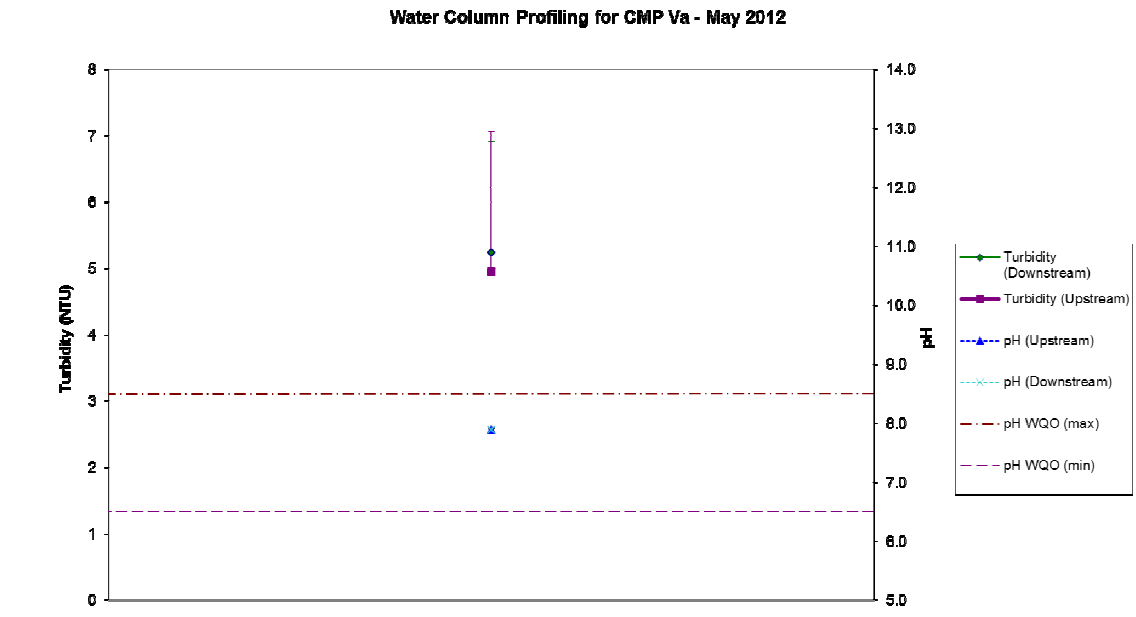

Figure 17: Turbidity and pH (mean + SD) recorded during Water Column Profiling for disposal operations at CMP Va in May 2012.

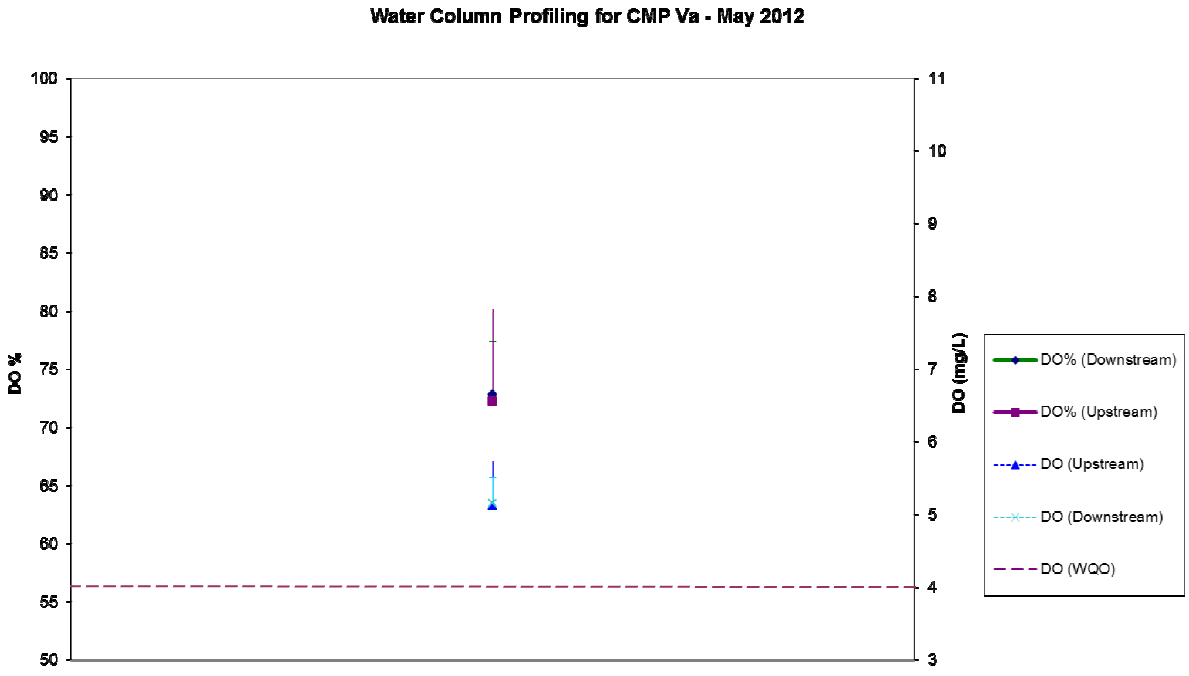

Figure 18: Dissolved Oxygen (mean + SD) recorded during Water Column Profiling for disposal operations at CMP Va in May 2012.

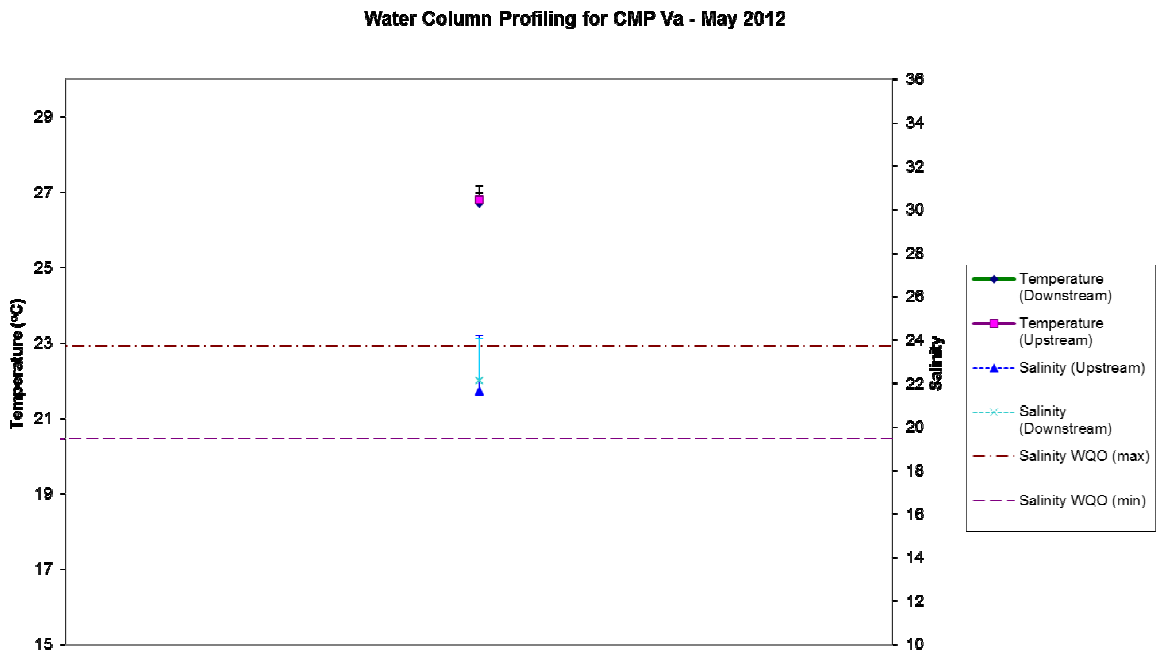

Figure 19: Salinity and Temperature (mean + SD) recorded during Water Column Profiling for disposal operations at CMP Va in May 2012.

.

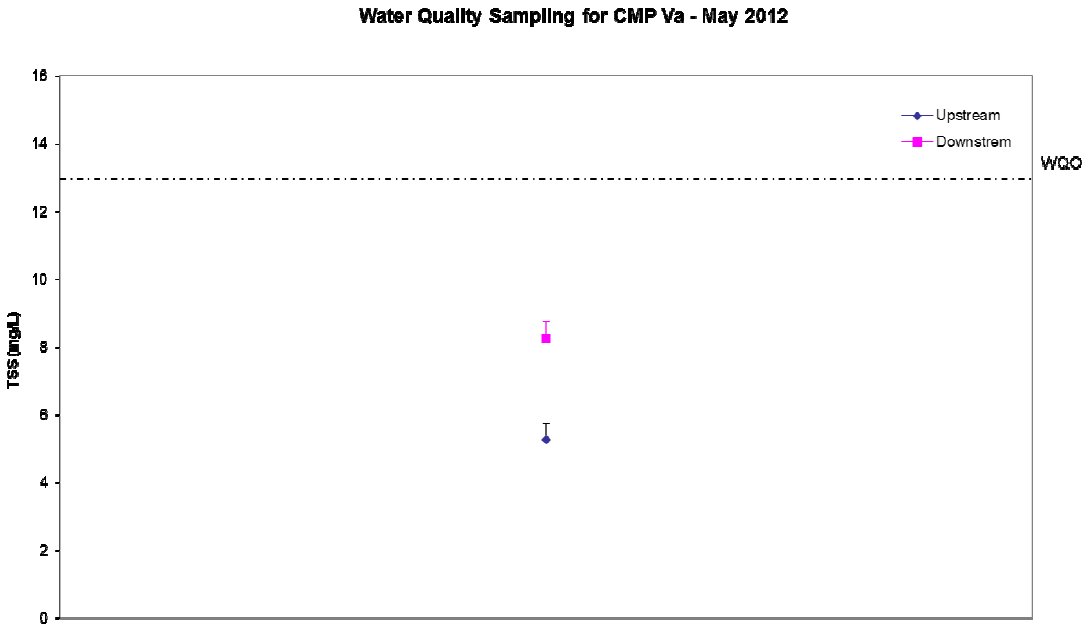

Figure 20: Total Suspended Solid Levels (mean + SD) in water samples collected from Water Column Profiling for disposal operations at CMP Va in May 2012.

Annex C

Results of Impact Monitoring during CMP V Dredging Operations for May 2012

Table C1 Summary Table of DO, Turbidity and TSS Levels Recorded in May 2012

Sampling Date	Tidal Period	Station	Average DO Levels (mg/L)		Average Turbidity Level (NTU)	Average TSS Level (mg/L)
			Bottom	Surface and Mid Depth		
2012/05/17	ME	DS1	5.12	5.72	3.90	5.80
		DS2	4.95	6.27	5.00	8.00
		DS3	5.26	6.26	4.00	5.30
		DS4	5.37	6.91	3.70	5.50
		DS5	5.33	6.62	4.20	4.00
		MW1	5.29	5.82	1.60	3.30
		US1	5.07	6.19	5.00	8.50
		US2	4.99	7.16	3.70	5.70
	MF	DS1	4.65	5.83	5.20	6.70
		DS2	5.11	6.01	3.10	3.20
		DS3	5.07	5.82	3.50	3.80
		DS4	5.16	6.12	3.60	3.70
		DS5	5.44	5.57	3.10	3.00
		MW1	5.21	5.57	3.40	5.50
		US1	5.22	5.87	4.10	5.20
		US2	4.87	5.86	6.20	8.33

Notes:

1. Cell shaded yellow indicated value exceeding the Action Level criteria.
2. Cell shaded red indicated value exceeding the Limit Level criteria.
3. DO for Surface and Mid-depth: less than 3.76 mg L^{-1} (Action Level); less than 3.11 mg L^{-1} (Limit Level)
   DO for Bottom: less than 2.96 mg L^{-1} (Action Level); less than 2 mg L^{-1} (Limit Level)
   Depth-average Turbidity: greater than 28.14 NTU(Action Level); greater than 38.32 NTU(Limit Level)
   Depth-average SS: greater than 37.88 mg L^{-1} (Action Level); greater than 61.92 mg L^{-1} (Limit Level)

Annex D

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

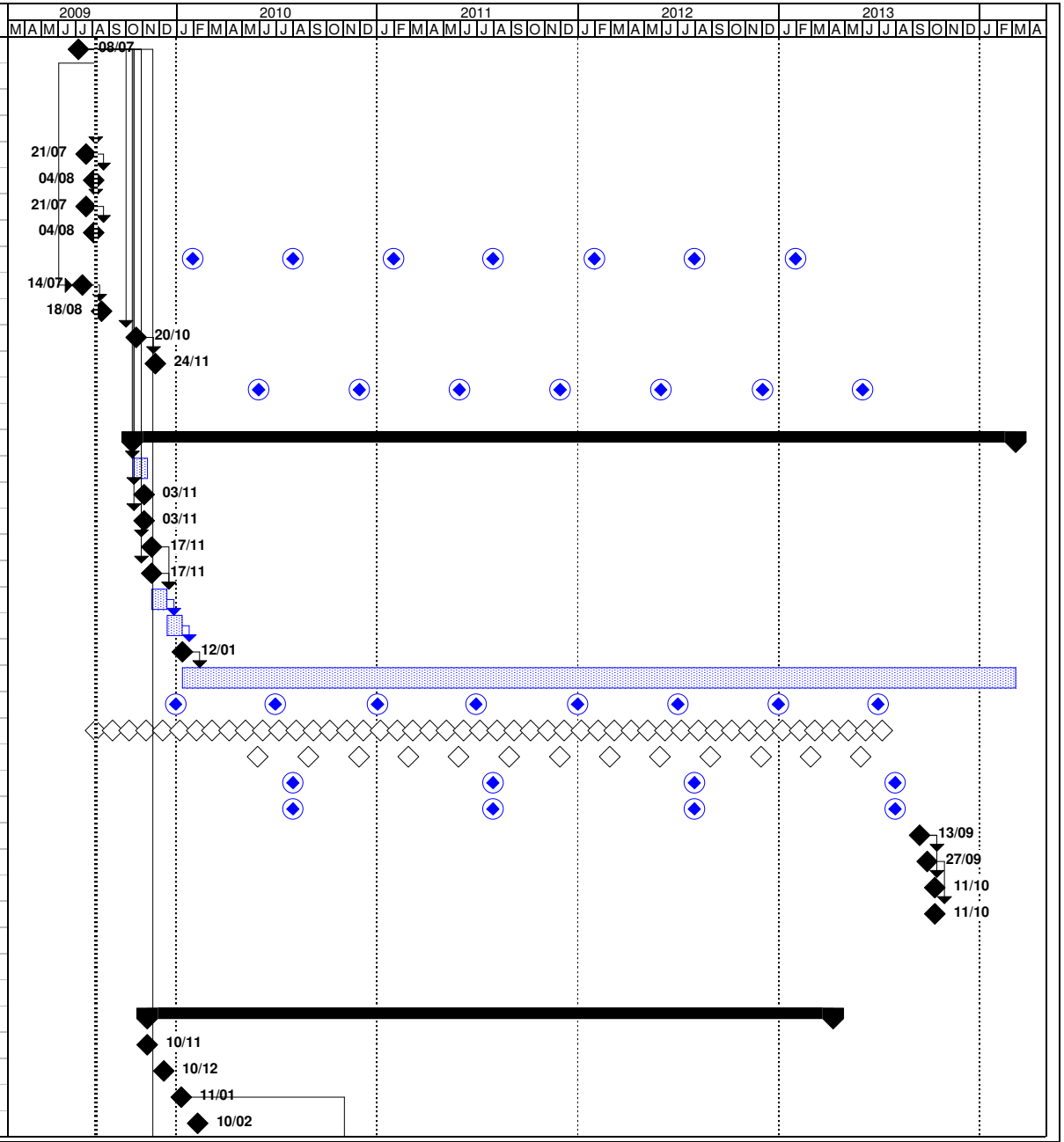

Figure 4.1 - Study Programme

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

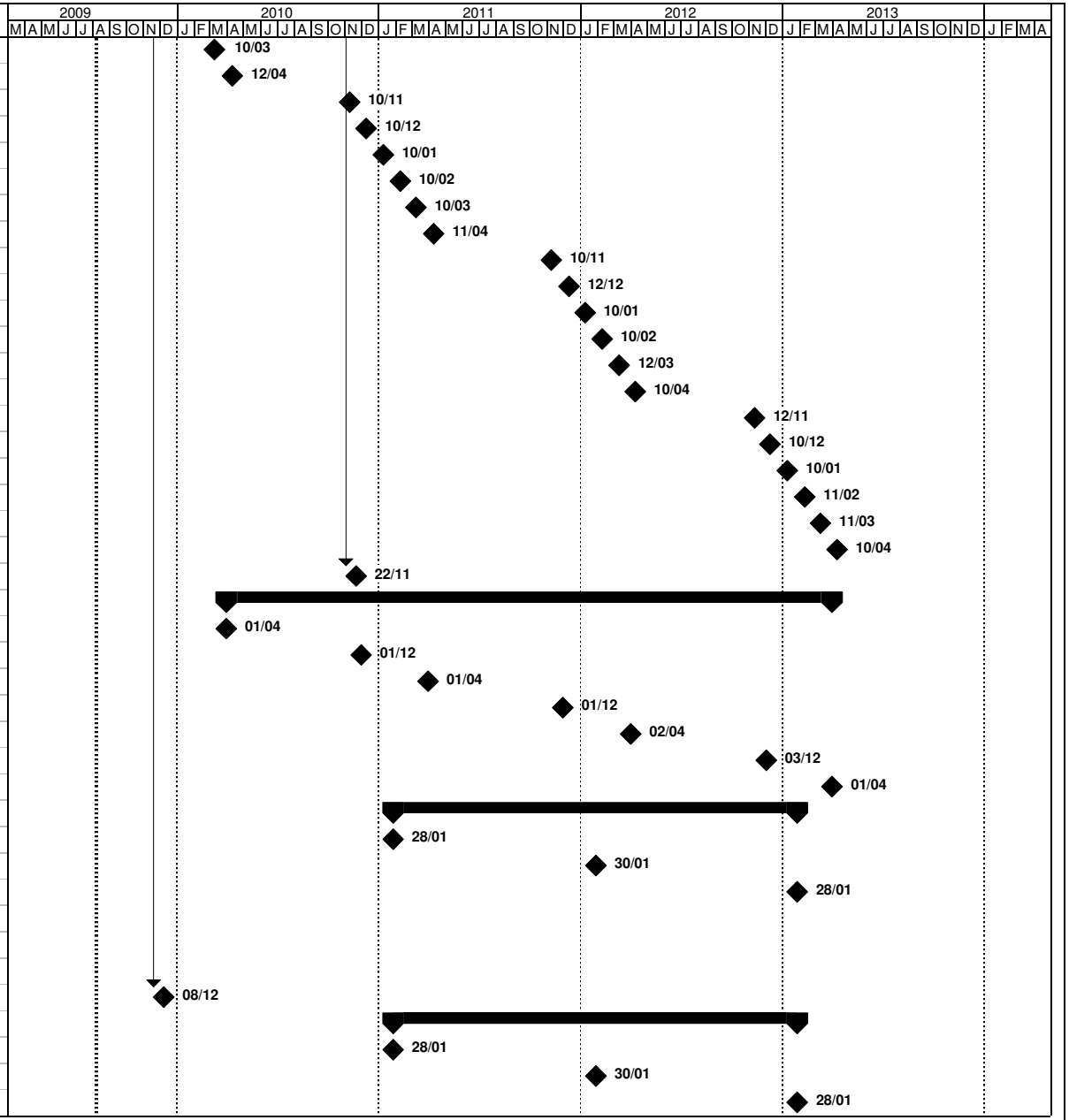

Figure 4.1 - Study Programme

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