
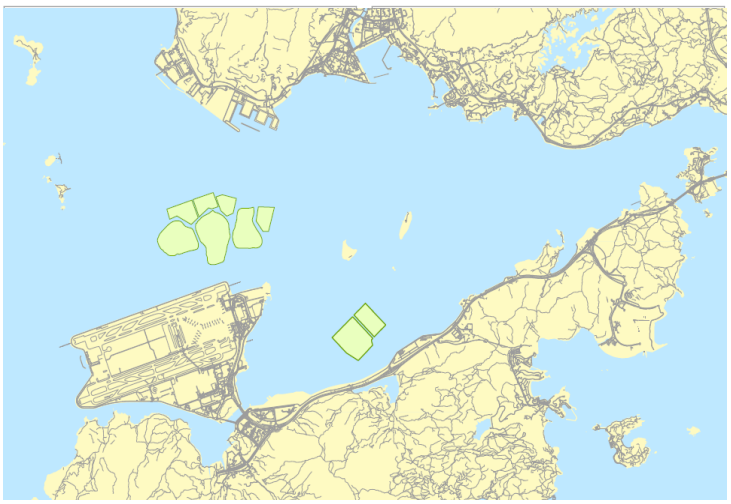




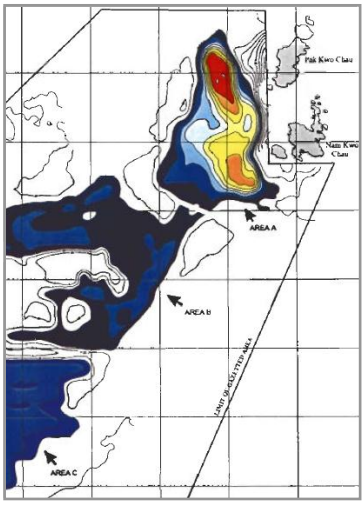





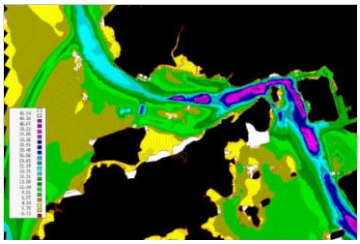

CEDD 土木工程拓展署
Civil Engineering and Development Department

Environmental Monitoring and Audit for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau (2012-2017) – Investigation

Agreement No. CE 23/2012(EP)

30th Monthly Progress Report for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau – February 2015

Final (Revision 2)

6 May 2015

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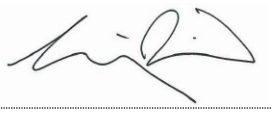
Client:	Project No:
Civil Engineering and Development Department (CEDD)	0175086
Summary: This document presents the 30th monthly progress report for Contaminated Mud Pits at the South of The Brothers and at East Sha Chau.	Date: 6 May 2015 Approved by:  Craig A. Reid *Partner*

Revision	Description	By	Checked	Approved	Date
v2	30th Monthly Progress Report for ESC CMPs and SB CMPs	EL	JT	CAR	6/5/15
v1	30th Monthly Progress Report for ESC CMPs and SB CMPs	EL	JT	CAR	17/4/15
v0	30th Monthly Progress Report for ESC CMPs and SB CMPs	CY	JT	CAR	13/3/15

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Dredging, Management and Capping of Contaminated Sediment Disposal Facility to the South of The Brothers

Environmental Certification Sheet
EP-427/2011/A

Reference Document/Plan

Document/~~Plan~~ to be ~~Certified~~/ Verified:	30th Monthly Progress Report for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau – February 2015
Date of Report:	13 March 2015
Date prepared by ET:	13 March 2015
Date received by IA:	13 March 2015

Reference EP Condition

Environmental Permit Condition: Condition No.: 4.4

4 hard copies and 1 electronic copy of monthly EM&A Report shall be submitted to the Director within 2 weeks after the end of the reporting month. The EM&A Reports shall include a summary of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit Levels). The submissions shall be certified by the ET Leader and verified by the Independent Auditor. Additional copies of the submission shall be provided to the Director upon request by the Director.

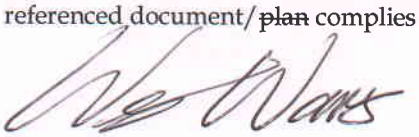
ET Certification

I hereby certify that the above referenced document/ ~~plan~~ complies with the above referenced condition of EP-427/2011/A

Craig A. Reid,
Environmental Team Leader:  Date: 13/3/2015

IA Verification

I hereby verify that the above referenced document/ ~~plan~~ complies with the above referenced condition of EP-427/2011/A

Dr Wang Wen Xiong,
Independent Auditor:  Date: 13/3/2015

CONTENTS

ANNEXES

Agreement No. CE 23/2012 (EP)
Environmental Monitoring and Audit
for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau (2012-2017) - Investigation

30TH MONTHLY PROGRESS REPORT FOR FEBRUARY 2015

1.1 BACKGROUND

1.1.1 Since early 1990s, contaminated sediment (1) arising from various construction works (e.g. dredging and reclamation projects) in Hong Kong has been disposed of at a series of seabed pits at East of Sha Chau (ESC). In late 2008, a review indicated that the existing and planned facilities at ESC would not be able to meet the disposal demand after 2012. In order to meet this demand, the Hong Kong Special Administrative Region Government (HKSARG) decided to implement a new contained aquatic disposal (CAD) (2) facility at the South of The Brothers (SB CMPs) which had been under consideration for a number of years.

1.1.2 The environmental acceptability of the construction and operation of the Project had been confirmed by findings of the associated Environmental Impact Assessment (EIA) study completed in 2005 under *Agreement No. CE 12/2002(EP)* (3). The Director of Environmental Protection (DEP) approved this EIA report under the *Environmental Impact Assessment Ordinance* (*Cap. 499*) (*EIAO*) in September 2005 (*EIA Register No.: AEIAR-089/2005*).

1.1.3 In accordance with the EIA recommendation, prior to commencement of construction works for the SB CMPs, the Civil Engineering and Development Department (CEDD) undertook a detailed review and update of the EIA findings for the SB site (4). Findings of the EIA review undertaken in 2009/ 2010 confirmed that the construction and operation of the SB site had been predicted to be environmentally acceptable.

(1) According to the Management Framework of Dredged/ Excavated Sediment of ETWB TC(W) No. 34/2002, contaminated sediment in general shall mean those sediment requiring Type 2 – Confined Marine Disposal as determined according to this TC(W).

(2) CAD options may involve use of excavated borrow pits, or may involve purpose-built excavated pits. CAD sites are those which involve filling a seabed pit with contaminated mud and capping it with uncontaminated material such that the original seabed level is restored and the contaminated material is isolated from the surrounding marine environment.7

(3) Detailed Site Selection Study for a Proposed Contaminated Mud Disposal Facility within the Airport East/ East of Sha Chau Area (Agreement No. CE 12/2002(EP))

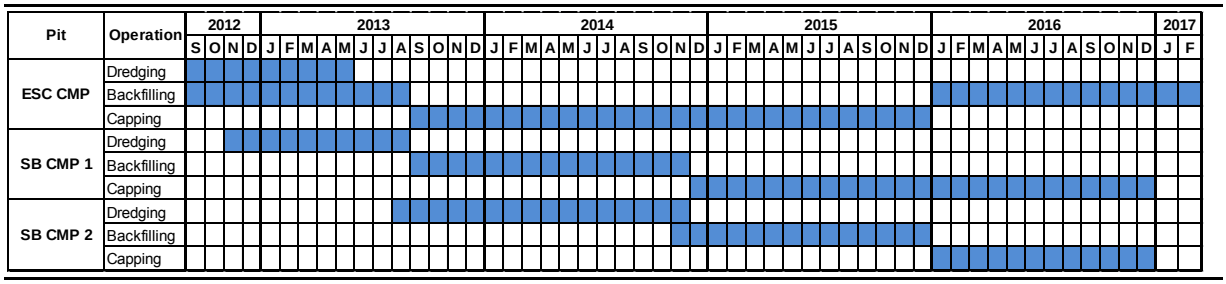
(4) Under the CEDD study *Contaminated Sediment Disposal Facility to the South of The Brothers (Agreement No. FM 2/2009)*

1.1.4 *Environmental Permits (EPs)* (*EP-312/2008/A* and *EP-427/2011A*) were issued by the Environmental Protection Department (EPD) to the CEDD, the Permit Holder, on 28 November 2008 for ESC CMP V and on 23 December 2011 for SB CMPs, respectively. Under the requirements of the *EPs*, an Environmental Monitoring and Audit (EM&A) programme as set out in the EM&A Manuals (1) (2) is required to be implemented for the CMPs.

1.1.5 The present EM&A programme under *Agreement No. CE 23/2012 (EP)* covers the dredging, disposal and capping operations of the SB CMPs as well as ESC CMPs. Detailed works schedule for both CMPs is shown in *Figure 1.1*. In February 2015, the following works were being undertaken at the CMPs:

- Capping operations at ESC CMPs;
- Capping operations at SB CMP 1; and
- Disposal of contaminated mud at SB CMP 2.

Figure 1.1 Works Schedule for ESC CMPs and SB CMPs



1.2 REPORTING PERIOD

1.2.1 This *30th Monthly Progress Report* covers the EM&A activities for the reporting month of February 2015.

1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES

1.3.1 The following monitoring activities have been undertaken for ESC CMPs in February 2015:

- *Water Quality Monitoring during Capping* was undertaken for ESC CMPs on 5 February 2015.

(1) ERM (2012) Environmental Monitoring and Audit (EM&A) Manual. Final First Review. Environmental Monitoring and Audit for Contaminated Mud Pits to the South of the Brothers and at East Sha Chau (2012-2017) – Investigation. Agreement No. CE 23/2012(EP). Submitted to EPD in November 2012.

(2) ERM (2010) Environmental Monitoring and Audit (EM&A) Manual. Final Second Review. Environmental Monitoring and Audit for Contaminated Mud Pit at Sha Chau (2009-2013) – Investigation. Agreement No. CE 4/2009(EP). Submitted to EPD in November 2010.

1.3.2 The following monitoring activities have been undertaken for SB CMPs in February 2015:

- *Water Column Profiling* for CMP 2 was undertaken on 2 February 2015;
- *Pit Specific Sediment Chemistry* for CMP 2 was undertaken on 3 February 2015;
- *Water Quality Monitoring during Capping* was undertaken for CMP 1 on 5 February 2015;
- *Cumulative Impact Sediment Chemistry* for CMP 2 was undertaken from 9 to 11 February 2015;
- *Sediment Toxicity Tests* for CMP 2 was undertaken from 9 to 11 February 2015;
- *Routine Water Quality Monitoring* for CMP 2 was undertaken on 12 February 2015; and
- *Demersal Trawling* for CMP 2 was undertaken on 25 and 26 February 2015.

1.4 DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS

1.4.1 No outstanding sampling remained for February 2015. The following laboratory analyses were still in progress during the preparation of this monthly report and hence are not presented in this monthly report:

- Laboratory analyses of sediment samples collected for *Cumulative Impact Sediment Chemistry of CMP 2* in February 2015;
- Laboratory analyses of sediment samples collected for *Sediment Toxicity Tests of CMP 2* in February 2015; and
- Identification of Catch from *Demersal Trawling* of CMP 2 and subsequent chemical analysis for the biota samples in January and February 2015.

1.4.2 A summary of field activities conducted are presented in *Annex A*.

1.5 BRIEF DISCUSSION OF THE MONITORING RESULTS FOR ESC CMPS

1.5.1 Brief discussion of the monitoring results of the *Water Quality Monitoring during Capping of ESC CMPs* conducted on 5 February 2015 is presented below.

1.5.2 Water Quality Monitoring during Capping – February 2015

1.5.3 The monitoring results obtained during February 2015 sampling in the dry season have been assessed for compliance with the Water Quality Objectives (WQOs) through a review of the Environmental Protection Department (EPD) routine water quality monitoring data for the dry season period (November to March) of 2004 – 2013 from stations in the North Western Water Control Zone (WCZ), where ESC CMPs are located. For Salinity, the average value obtained from the Reference stations was used for the basis as the WQO. A total of sixteen (16) monitoring stations were sampled in February 2015 as shown in *Figure 1.2*. Graphical presentation of the monitoring results is provided in *Annex B*.

In-situ Measurements

1.5.4 Graphical presentation of the monitoring results is shown in *Figures 1-6* of *Annex B*. Levels of Dissolved Oxygen (DO), pH and Salinity at all stations in February 2015 complied with the WQO.

Laboratory Measurements for Suspended Solids (SS)

1.5.5 Concentrations of SS complied with the WQO at all stations in February 2015 (*Figure 7 of Annex B*). Further statistical analysis will be undertaken in the quarterly report to investigate whether the capping operations at ESC CMPs is causing any unacceptable deterioration in water quality of the area.

1.6 BRIEF DISCUSSION OF THE MONITORING RESULTS FOR SB CMPS

1.6.1 Brief discussion of the monitoring results of the following activities for SB CMPs is presented in this *30th Monthly Progress Report*:

- *Pit Specific Sediment Chemistry of CMP 2* conducted in January and February 2015;
- *Routine Water Quality Monitoring of CMP 2* conducted in January (laboratory measurements) and February 2015;
- *Water Column Profiling of CMP 2* conducted on 2 February 2015; and
- *Water Quality Monitoring during Capping* for CMP 1 conducted on 5 February 2015.

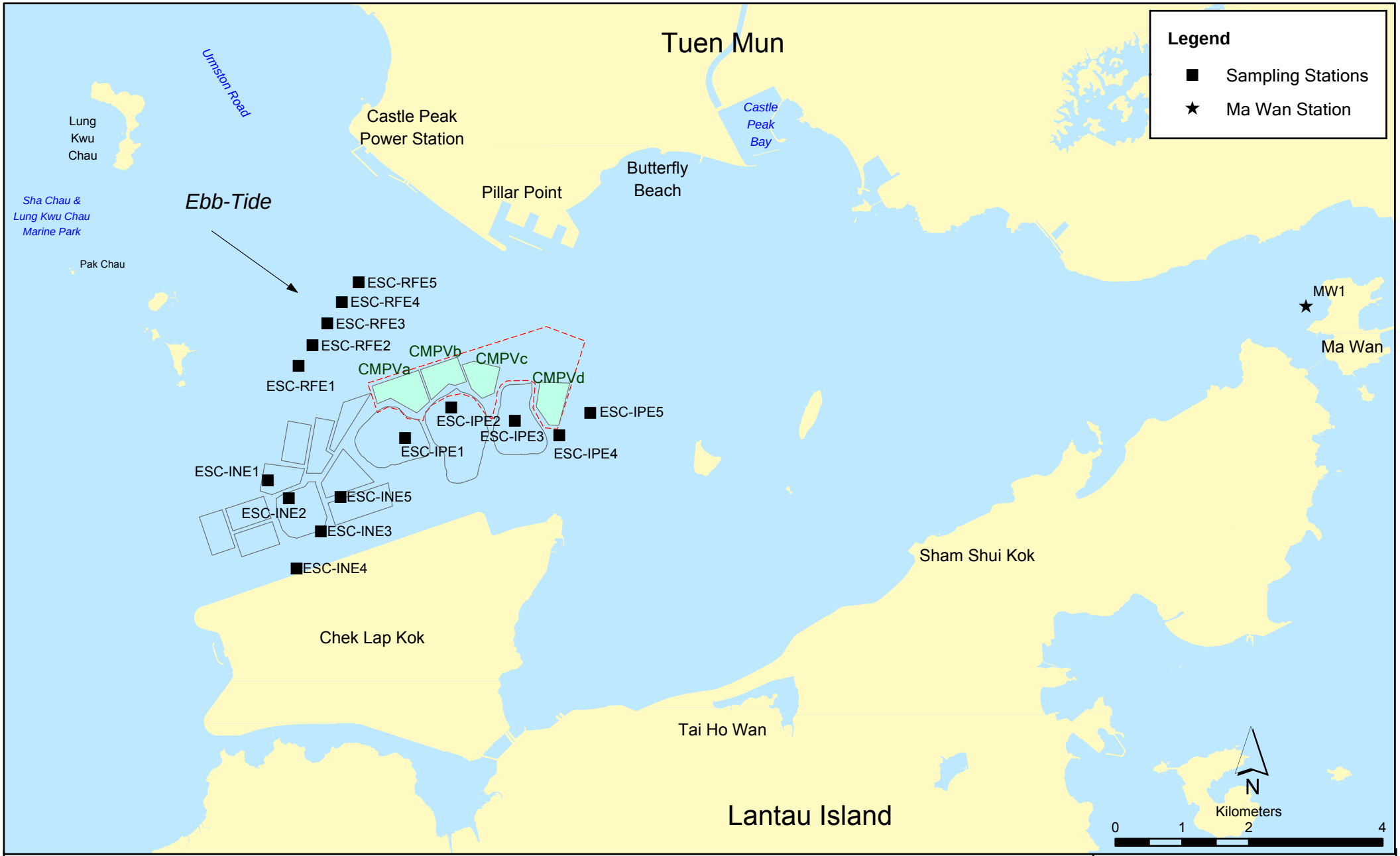


Figure 1.2

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

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Date: 3/12/2012

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1.6.2 Pit Specific Sediment Chemistry of CMP 2 – January and February 2015

1.6.3 Monitoring locations for *Pit Specific Sediment Chemistry for CMP 2* are shown in *Figure 1.3*. A total of six (6) monitoring stations were sampled in January and February 2015.

1.6.4 The concentrations of most inorganic contaminants were lower than the Lower Chemical Exceedance Level (LCEL) except for Copper and Silver concentrations at Active Pit station SB-NPBB in January and February 2015 (*Figures 8-9* and *13-14* of *Annex B*). Copper and Silver concentrations at Active Pit station SB-NPBB exceeded the LCEL and Upper Chemical Exceedance Level (UCEL) in both January and February 2015. As higher Copper and Silver concentrations were recorded within the Active Pit station only which were receiving contaminated mud during the reporting month, there is no evidence indicating any dispersal of contaminants from the active pit.

1.6.5 For organic contaminants, the concentrations of Total Organic Carbon (TOC) were similar amongst stations in January 2015, while concentrations at Active Pit Station SB-NPBB were observed to be higher in February 2015 (*Figure 10* and *15* of *Annex B*). Tributyltin (TBTs) concentrations were observed to be higher at Active Pit station SB-NPBB in both January and February 2015 (*Figures 11* and *16* of *Annex B*). Low Molecular Weight Polycyclic Aromatic Hydrocarbons (Low MW PAHs) and High MW PAHs were generally below the limit of reporting at most stations except for Active Pit Station SB-NPBB in January 2015, Near Pit Station SB-NNBA and Pit Edge Station SB-NEBB in February 2015. Low MW PAHs and High MW PAHs were all below the LCEL at all stations in both months. Total Dichloro-Diphenyl-Trichloroethane (DDT), 4,4'-Dichloro-Diphenyl-Dichloroethylene (4,4'-DDE) and Total Polychlorinated Biphenyls (PCBs) were recorded below the limit of reporting at all stations in both January 2015 and February 2015.

1.6.6 As higher TOC and TBTs concentrations were recorded within the Active Pit station only which was receiving contaminated mud during the reporting month, there is no evidence indicating any dispersal of contaminants from the active pit.

1.6.7 Overall, there is no evidence indicating any unacceptable environmental impacts to sediment quality as a result of the contaminated mud disposal operations at CMP 2 in January and February 2015. Statistical analysis will be undertaken in the quarterly report to investigate whether there are any unacceptable impacts in the area caused by the contaminated mud disposal.

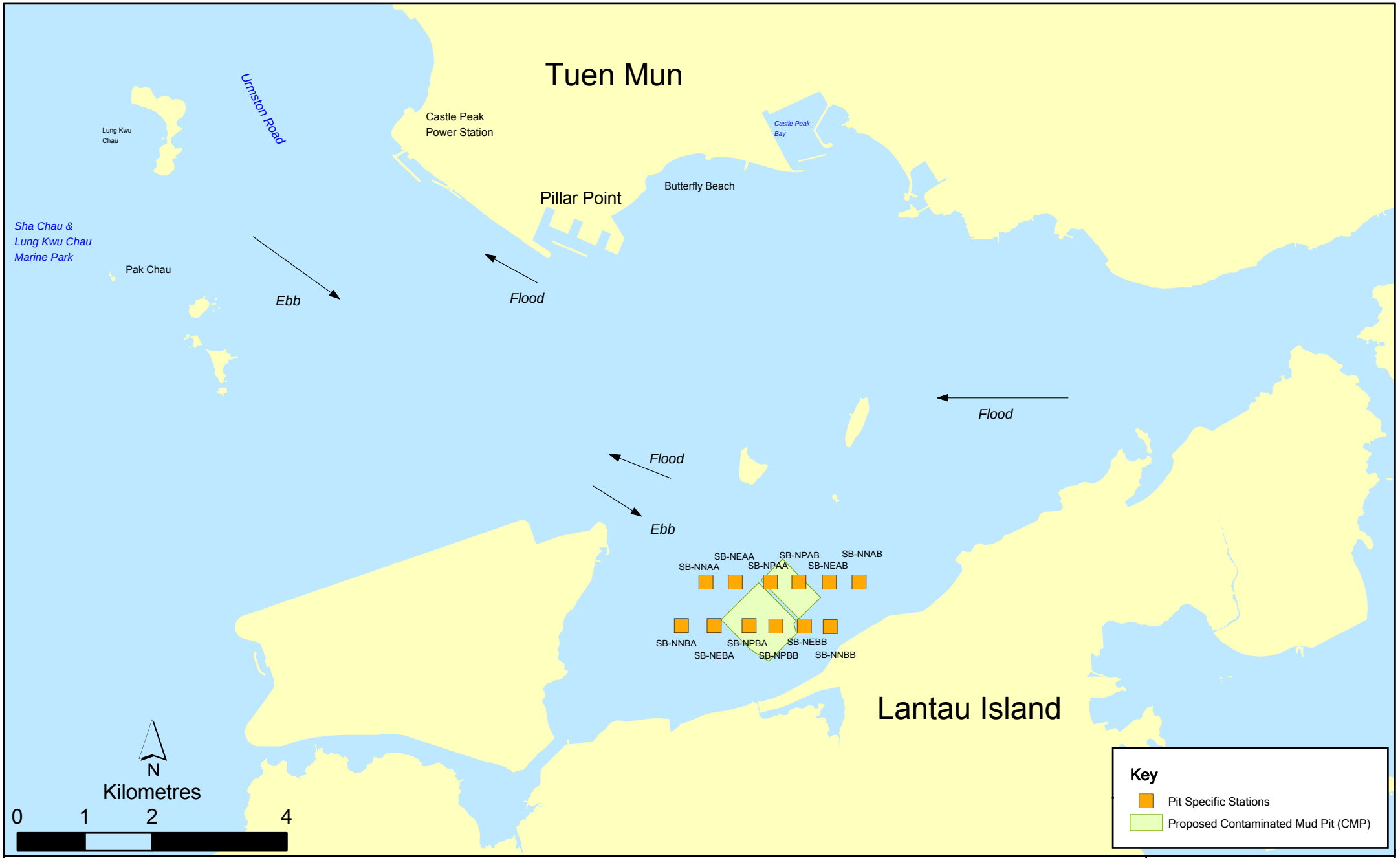

Figure 1.3

Pit Specific Sediment Quality Monitoring Stations for South Brothers Facility

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Date: 12/12/2012

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1.6.8 Routine Water Quality Monitoring of SB CMP 2 – January and February 2015

1.6.9 The monitoring results for the *Routine Water Quality Monitoring* conducted in January and February 2015 in the dry season have been assessed for compliance with the Water Quality Objectives (WQOs) set by EPD as discussed in *Section 1.5.3*. Levels of DO, Turbidity and SS were also assessed for compliance with the Action and Limit Levels (see *Table C1* of *Annex C* for details). The monitoring results are shown in *Figures 6-10* of *Annex B* and *Table C2* of *Annex C*. A total of fourteen (14) monitoring stations were sampled in January and February 2015 as shown in *Figure 1.4*.

In-situ Measurements

1.6.10 Analyses of *in-situ* measurements for January 2015 were presented in the 29th Monthly Progress Report.

1.6.11 Analyses of results for February 2015 indicated that the levels of pH, DO and Salinity complied with the WQOs at all stations (Impact, Intermediate, Reference and Water Sensitive Receiver stations) in February 2015 (*Figure 23-26 of Annex B*).

1.6.12 The levels of DO and Turbidity complied with the Action and Limit Levels at all stations (*Figures 24* and 27 of *Annex B*; *Table C1* and *C2* of *Annex C*).

Laboratory Measurements

1.6.13 Laboratory analysis of January and February 2015 results indicated that concentrations of Cadmium, Mercury and Silver were below their limit of reporting at all stations. The concentrations of Chromium and Lead in half of the samples were below their limit for reporting in both months. Arsenic, Copper, Nickel and Zinc were detected in samples from most stations in January and February 2015 (*Figures 18-19* and *28-29* of *Annex B*). Results of laboratory analysis were shown in *Table C3* of *Annex C*. Detailed statistical analysis will be presented in the Quarterly Report to observe any spatial and temporal trends.

Figure 1.4

Routine & Capping Water Quality Sampling Stations (Flood-Tide) for South Brothers Facility

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Date: 11/12/2012

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1.6.14 For nutrients, concentrations of Total Inorganic Nitrogen (TIN) at Tai Ho Bay 2 in January 2015 and most stations (except Intermediate and Ma Wan Stations) in February 2015 exceeded the WQO (0.5mg/L) (*Figure 20* and *30 of Annex B*). It is important to note that due to the effect of the Pearl River, the North Western WCZ has historically experienced higher levels of TIN (1). Therefore, the exceedances of TIN WQO at all stations are unlikely to be caused by the disposal operation at CMP 2. Ammonia Nitrogen (NH3-N) concentration was relatively similar amongst all stations (*Figure 20* and *30 of Annex B*). Level of 5-day Biochemical Oxygen Demand (BOD_5) appear to be higher at Tai Ho Bay station 1 in January 2015 and at Shum Shui Kok and Tai Mo To stations in February 2015 (*Figure 21* and *31 of Annex B*).

1.6.15 Concentrations of SS exceeded the WQO (13.7 mg/L for dry season) at Tai Ho Bay station 1 in January 2015 while complied with the WQO at all stations in February 2015. SS at all stations complied with the Action and Limit Levels in January and February 2015 (*Figure 2*2 and *32* of *Annex B*; *Table C2* of *Annex C*).

1.6.16 Overall, results of the *Routine Water Quality Monitoring* indicated that the disposal operation at CMP 2 did not appear to cause any unacceptable deterioration in water quality in January and February 2015.

1.6.17 Water Column Profiling of CMP 2 – February 2015

1.6.18 *Water Column Profiling* was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 2 February 2015. The water quality monitoring results have been assessed for compliance with the WQOs as discussed in *Section 1.5.3*. The monitoring results were also compared with the Action and Limit Levels set in *Baseline Monitoring Report* (see *Table C1* of *Annex C* for details).

In-situ Measurements

1.6.19 Analyses of results for February 2015 indicated that levels of Salinity, DO and pH complied with the WQOs at both Downstream and Upstream stations (*Table C4* of *Annex C*). DO and Turbidity at all stations complied with the Action and Limit Levels (*Table C1* and *C4* of *Annex C*).

Laboratory Measurements for SS

1.6.20 Analyses of results for February 2015 indicated that the SS levels at both Upstream and Downstream stations complied with the WQO. SS levels at all stations also complied with the Action and Limit Levels (*Tables C1 and C3* of *Annex C*).

1.6.21 Overall, the monitoring results indicated that the mud disposal operation at CMP 2 did not appear to cause any deterioration in water quality during this reporting period.

(1) http://www.epd.gov.hk/epd/misc/marine_quality/1986-2005/textonly/eng/index.htm

1.6.22 Water Quality Monitoring during Capping Operations of CMP 1– February 2015

1.6.23 The monitoring results obtained during February 2015 sampling in the dry season have been assessed for compliance with the WQOs (see *Section 1.5.3* for details). A total of fourteen (14) monitoring stations were sampled in February 2015 as shown in *Figure 1.4.* Graphical presentation of the monitoring results is provided in *Annex B.*

In-situ Measurements

1.6.24 Graphical presentation of the monitoring results is shown in *Figures 33-38* of *Annex B*. Levels of DO, pH and Salinity at all stations in February 2015 complied with the WQO.

Laboratory Measurements

1.6.25 Concentrations of SS complied with the WQO at all stations in February 2015 (*Figure 39* of *Annex B*).

1.6.26 For nutrients, concentrations of Ammonia (NH_3) were similar amongst all stations (*Figures 40* of *Annex B*). Concentrations of Biochemical Oxygen Demand (BOD_5) were similar at Impact, Intermediate and Reference stations, but slightly higher than other stations in February 2015. Total Inorganic Nitrogen (TIN) at all stations exceeded the WQO of 0.5 mg/L in February 2015 (*Figure 42* of *Annex B*). As discussed in *Section 1.6.14*, the North Western WCZ has historically experienced higher levels of TIN and the exceedances of TIN WQO at all stations are unlikely to be caused by the capping operation at CMP 1.

1.6.27 Since higher BOD_5 was recorded for both Impact and Reference stations, the higher concentration is likely due to the natural fluctuation of BOD_5 in the environment. Therefore, there is no evidence indicating any degradation for water quality due to the capping activities at CMP 1.

1.6.28 Statistical analysis will be undertaken in the quarterly report to investigate whether the capping operations at CMP 1 is causing any unacceptable impacts in water quality of the area.

1.7 ACTIVITIES SCHEDULED FOR THE NEXT MONTH

1.7.1 The following monitoring activities will be conducted in the next monthly period of March 2015 for SB CMPs:

- *Pit Specific Sediment Chemistry of CMP 2; and*
- *Water Column Profiling of CMP 2.*

1.7.2 No monitoring activities will be conducted in the next monthly period of March 2015 for ESC CMPs.

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

1.8 STUDY PROGRAMME

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

Annex A

Sampling Schedule

Annex A1 - Environmental Monitoring and Audit Sampling Schedule for East of Sha Chau (September 2012 - February 2017)

		2012				2013											2014												2015												2016												2017	
Pit Specific Sediment Chemistry	**Code**	**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**
Active-Pit																																																				
	ESC-NPDA	*	*	*	*	*	*	*	*	*	*	*	*																													*	*	*	*	*	*	*	*	*	*	*	*	*	*
	ESC-NPDB	*	*	*	*	*	*	*	*	*	*	*	*																													*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pit-Edge																																																				
	ESC-NEDA	*	*	*	*	*	*	*	*	*	*	*	*																													*	*	*	*	*	*	*	*	*	*	*	*	*	*
	ESC-NEDB	*	*	*	*	*	*	*	*	*	*	*	*																													*	*	*	*	*	*	*	*	*	*	*	*	*	*
Near-Pit																																																				
	ESC-NNDA	*	*	*	*	*	*	*	*	*	*	*	*																													*	*	*	*	*	*	*	*	*	*	*	*	*	*
	ESC-NNDB	*	*	*	*	*	*	*	*	*	*	*	*																													*	*	*	*	*	*	*	*	*	*	*	*	*	*

Cumulative Impact Sediment Chemistry	**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**
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	**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**
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ESC-TDB						*						*																														*					*							*
Reference Stations																																																					
ESC-TRA						*						*																														*					*							*
ESC-TRB						*						*																														*					*							*
Ma Wan Station																																																					
MW1						*						*																														*					*							*

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

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

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

Annex A1 - Environmental Monitoring and Audit Sampling Schedule for East of Sha Chau (September 2012 - February 2017)

	2012				2013												2014												2015												2016												2017	
Benthic Recolonisation Studies	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
Capped Contaminated Mud Pits IVa-c																																																		
ESC-CPA				*								*				*								*				*								*				*								*				*		
ESC-CPB				*								*				*								*				*								*				*								*				*		
ESC-CPC				*								*				*								*				*								*				*								*				*		
Reference Stations																																																								
ESC-RBA				*								*				*								*				*								*				*								*				*		
ESC-RBB				*								*				*								*				*								*				*								*				*		
ESC-RBC				*								*				*								*				*								*				*								*				*		

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

Capping	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
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																*		*				*		*				*		*				*		*				*														

Annex A1 - Environmental Monitoring and Audit Sampling Schedule for East of Sha Chau (September 2012 - February 2017)

Routine Water Quality Monitoring		2012 S	2012 O	2012 N	2012 D	2013 J	2013 F	2013 M	2013 A	2013 M	2013 J	2013 J	2013 A	2013 S	2013 O	2013 N	2013 D	2014 J	2014 F	2014 M	2014 A	2014 M	2014 J	2014 J	2014 A	2014 S	2014 O	2014 N	2014 D	2015 J	2015 F	2015 M	2015 A	2015 M	2015 J	2015 J	2015 A	2015 S	2015 O	2015 N	2015 D	2016 J	2016 F	2016 M	2016 A	2016 M	2016 J	2016 J	2016 A	2016 S	2016 O	2016 N	2016 D	2017 J	2017 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		*	*		*	*		*	*		*	*																													*	*		*	*		*	*		*	*		*	*

Annex A2 - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (July 2012 - February 2017)

			2012						2013												2014												2015												2016												2017	
Baseline Monitoring Prior to Dredging	**Code**	**Frequency**	**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**
Far Field Stations																																																							
	SB-WFA	3 days per week for 4 weeks	*	*																																																		
	SB-WFB	3 days per week for 4 weeks	*	*																																																	
Mid Field Stations																																																						
	SB-WMA	3 days per week for 4 weeks	*	*																																																	
	SB-WMB	3 days per week for 4 weeks	*	*																																																	
Near Field Stations																																																						
	SB-WNAA	3 days per week for 4 weeks	*	*																																																	
	SB-WNAB	3 days per week for 4 weeks	*	*																																																	
	SB-WNBA	3 days per week for 4 weeks	*	*																																																	
	SB-WNBB	3 days per week for 4 weeks	*	*																																																	
Reference Stations																																																						
	NM1	3 days per week for 4 weeks	*	*																																																	
	NM2	3 days per week for 4 weeks	*	*																																																	
	NM3	3 days per week for 4 weeks	*	*																																																	
	NM5	3 days per week for 4 weeks	*	*																																																	
	NM6	3 days per week for 4 weeks	*	*																																																	
Sensitive Receiver Stations																																																						
	MW1	3 days per week for 4 weeks	*	*																																																	
	THB1	3 days per week for 4 weeks	*	*																																																	
	THB2	3 days per week for 4 weeks	*	*																																																	
	WSR45C	3 days per week for 4 weeks	*	*																																																	
	WSR46	3 days per week for 4 weeks	*	*																																																	

Impact Monitoring for Dredging			**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**
Upstream Stations																																																								
	US1	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																									
	US2	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																									
Downstream Stations																																																							
	DS1	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																									
	DS2	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																									
	DS3	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																									
	DS4	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																									
	DS5	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																									
Sensitive Receiver Stations																																																							
	MW1	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																									
	THB1	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																									
	THB2	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																									
	WSR45C	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																									
	WSR46	3 days per week					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*																									

Pit Specific Sediment Chemistry			**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**
SB CMP 1 Active																																																						
Near-Pit																																																						
	SB-NNAA	Monthly														12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																									
	SB-NNAB	Monthly														12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																									
Pit-Edge																																																						
	SB-NEAA	Monthly														12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																									
	SB-NEAB	Monthly														12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																									
Active-Pit																																																					
	SB-NPAA	Monthly														12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																									
	SB-NPAB	Monthly														12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																									
SB CMP 2 Active																																																						
Near-Pit																																																						
	SB-NNBA	Monthly																														12	12	12	12	12	12	12	12	12	12	12	12													
	SB-NNBB	Monthly																														12	12	12	12	12	12	12	12	12	12	12	12													
Pit-Edge																																																						
	SB-NEBA	Monthly																														12	12	12	12	12	12	12	12	12	12	12	12													
	SB-NEBB	Monthly																														12	12	12	12	12	12	12	12	12	12	12	12													
Active-Pit																																																						
	SB-NPBA	Monthly																														12	12	12	12	12	12	12	12	12	12	12	12													
	SB-NPBB	Monthly																														12	12	12	12	12	12	12	12	12	12	12	12													

Annex A2 - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (July 2012 - February 2017)

			2012						2013												2014												2015												2016												2017	
Cumulative Impact Sediment Chemistry			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
Near-field Stations																																																							
	SB-RNA	4 times per year														12				12		12				12		12				12		12				12		12				12													
	SB-RNB	4 times per year														12				12		12				12		12				12		12				12		12				12													
Mid-field Stations																																																							
	SB-RMA	4 times per year														12				12		12				12		12				12		12				12		12				12													
	SB-RMB	4 times per year														12				12		12				12		12				12		12				12		12				12													
Far-Field Stations																																																						
	SB-RFA	4 times per year														12				12		12				12		12				12		12				12		12				12													
	SB-RFB	4 times per year														12				12		12				12		12				12		12				12		12				12													
Capped Pit Stations																																																						
	SB-RCA	4 times per year														12				12		12				12		12				12		12				12		12				12													
	SB-RCB	4 times per year														12				12		12				12		12				12		12				12		12				12													
Sensitive Receiver Stations																																																						
	MW1	4 times per year														12				12		12				12		12				12		12				12		12				12													
	THB1	4 times per year														12				12		12				12		12				12		12				12		12				12													
	THB2	4 times per year														12				12		12				12		12				12		12				12		12				12													

			2012						2013												2014												2015												2016												2017	
Sediment Toxicity Tests			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
SB CMP 1 Active																																																					
Reference																																																							
	SB-TRA	2 times per year														5						5				5																														
	SB-TRB	2 times per year														5						5				5																														
Near-Field																																																						
	SB-TAA	2 times per year														5						5				5																														
	SB-TAB	2 times per year														5						5				5																														
Sensitive Receiver Stations																																																						
	MW1	2 times per year														5						5				5																														
	THB1	2 times per year														5						5				5																														
	THB2	2 times per year														5						5				5																														
SB CMP 2 Active																																																						
Reference																																																							
	SB-TRA	2 times per year																																5						5																
	SB-TRB	2 times per year																																5						5																
Near-Field																																																						
	SB-TBA	2 times per year																																5						5																
	SB-TBB	2 times per year																																5						5																
Sensitive Receiver Stations																																																					
	MW1	2 times per year																																5						5																
	THB1	2 times per year																																5						5																
	THB2	2 times per year																																5						5																

			2012						2013												2014												2015												2016												2017	
Tissue/ Whole Body Sampling			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
Near-Pit Stations																																																						
	SB-INA	2 times per year																				*						*						*						*																
	SB-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																				*						*						*						*																

			2012						2013												2014												2015												2016												2017	
Demersal Trawling			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
Impact																																																						
	SB-INA 1-5	4 times per year														5					5	5				5	5					5	5				5	5																
	SB-INB 1-5	4 times per year														5					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	5																
	TNB 1-5	4 times per year														5					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	5																
	TSB 1-5	4 times per year														5					5	5				5	5					5	5				5	5																

Annex A2 - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (July 2012 - February 2017)

			2012						2013												2014												2015												2016												2017	
Routine Water Quality Monitoring			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
Ebb Tide																																																										
Impact Stations Downcurrent																																																										
	SB-IPE1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-IPE2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-IPE3	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-IPE4	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-IPE5	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Intermediate Stations Downcurrent																																																										
	SB-INE1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-INE2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-INE3	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-INE4	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-INE5	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Reference Stations Upcurrent																																																										
	SB-RFE1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-RFE2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-RFE3	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-RFE4	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-RFE5	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Sensitive Receiver Stations																																																										
	MW1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	THB1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	THB2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	WSR45C	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	WSR46	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Flood Tide																																																										
Impact Stations Downcurrent																																																										
	SB-IPF1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-IPF2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-IPF3	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Intermediate Stations Downcurrent																																																										
	SB-INF1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-INF2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-INF3	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Reference Stations Upcurrent																																																										
	SB-RFF1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-RFF2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	SB-RFF3	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
Sensitive Receiver Stations																																																										
	MW1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	THB1	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	THB2	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	WSR45C	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															
	WSR46	8 times per year														8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8		8	8															

Water Column Profiling			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
Plume Stations	WCP1	Monthly														4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4														
	WCP2	Monthly														4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4														

Annex A2 - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (July 2012 - February 2017)

			2012						2013												2014												2015												2016												2017	
Capping Water Quality Monitoring			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
Ebb Tide																																																					
Impact Stations Downcurrent																																																						
	SB-IPE1	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-IPE2	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-IPE3	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-IPE4	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-IPE5	4 times per year																													3		3				3		3				3		3				3		3				3			
Intermediate Stations Downcurrent																																																					
	SB-INE1	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-INE2	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-INE3	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-INE4	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-INE5	4 times per year																													3		3				3		3				3		3				3		3				3			
Reference Stations Upcurrent																																																					
	SB-RFE1	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-RFE2	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-RFE3	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-RFE4	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-RFE5	4 times per year																													3		3				3		3				3		3				3		3				3			
Sensitive Receiver Stations																																																					
	MW1	4 times per year																													3		3				3		3				3		3				3		3				3			
	THB1	4 times per year																													3		3				3		3				3		3				3		3				3			
	THB2	4 times per year																													3		3				3		3				3		3				3		3				3			
	WSR45C	4 times per year																													3		3				3		3				3		3				3		3				3			
	WSR46	4 times per year																													3		3				3		3				3		3				3		3				3			
Flood Tide																																																					
Impact Stations Downcurrent																																																					
	SB-IPF1	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-IPF2	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-IPF3	4 times per year																													3		3				3		3				3		3				3		3				3			
Intermediate Stations Downcurrent																																																					
	SB-INF1	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-INF2	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-INF3	4 times per year																													3		3				3		3				3		3				3		3				3			
Reference Stations Upcurrent																																																					
	SB-RFF1	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-RFF2	4 times per year																													3		3				3		3				3		3				3		3				3			
	SB-RFF3	4 times per year																													3		3				3		3				3		3				3		3				3			
Sensitive Receiver Stations																																																					
	MW1	4 times per year																													3		3				3		3				3		3				3		3				3			
	THB1	4 times per year																													3		3				3		3				3		3				3		3				3			
	THB2	4 times per year																													3		3				3		3				3		3				3		3				3			
	WSR45C	4 times per year																													3		3				3		3				3		3				3		3				3			
	WSR46	4 times per year																													3		3				3		3				3		3				3		3				3			

Benthic Recolonisation Studies			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
Capped Contaminated Mud Pits																																																							
	SB-CPA	2 times per year																																																							
	SB-CPB	2 times per year																																																						
Reference Stations																																																							
	RBA	2 times per year																																																						
	RBB	2 times per year																																																						
	RBC	2 times per year																																																						

Notes:
"*" = Number of replicates depends on parameters
Naming of stations are tentative only and will be subjected to changes

Annex B

Graphical Presentations

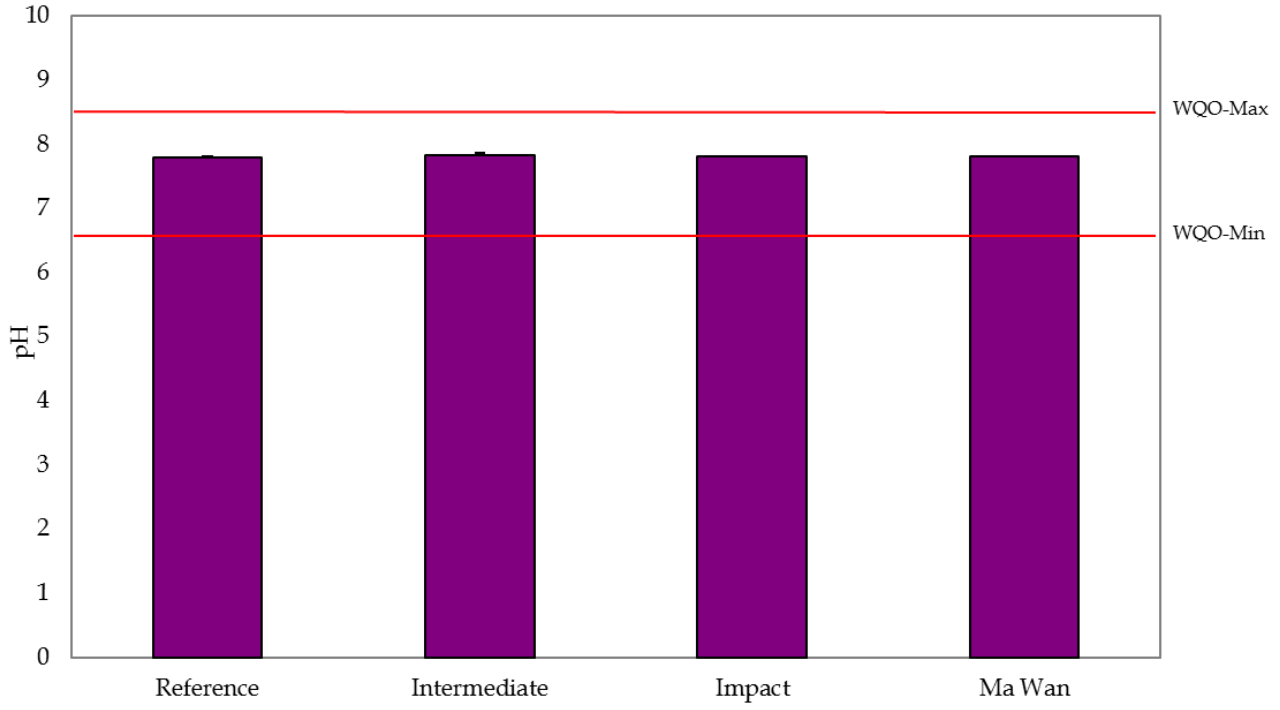


Figure 1: Levels of pH (mean + SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in February 2015.

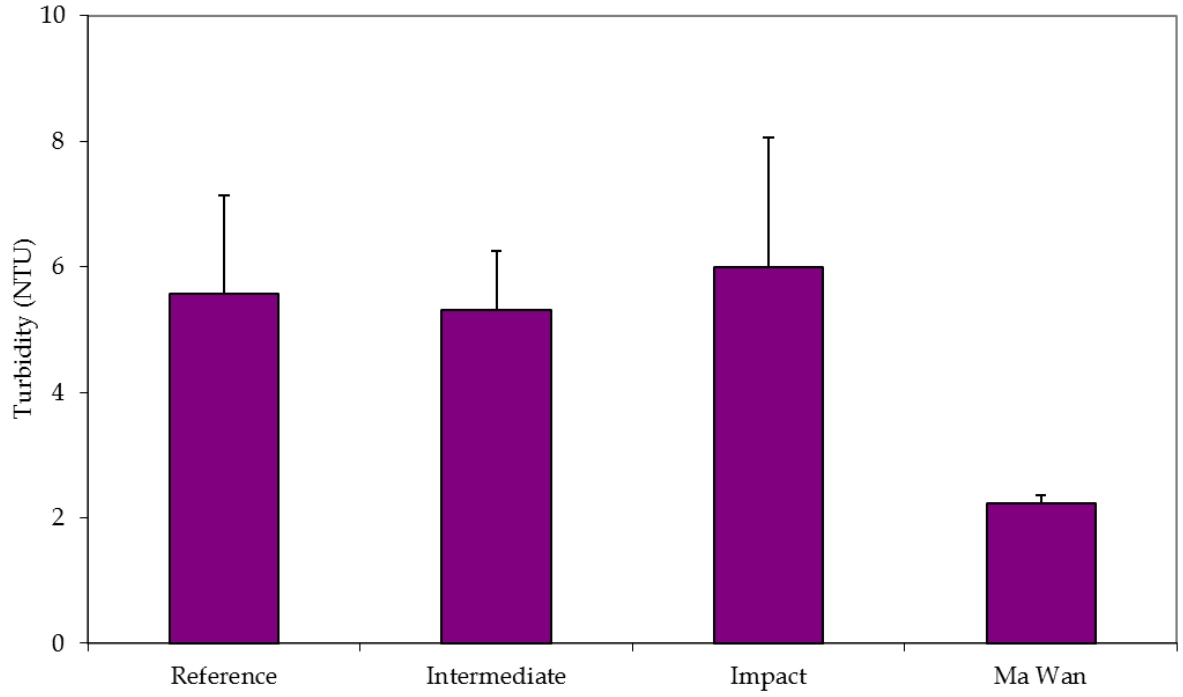


Figure 2: Levels of Turbidity (NTU; mean + SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in February 2015.

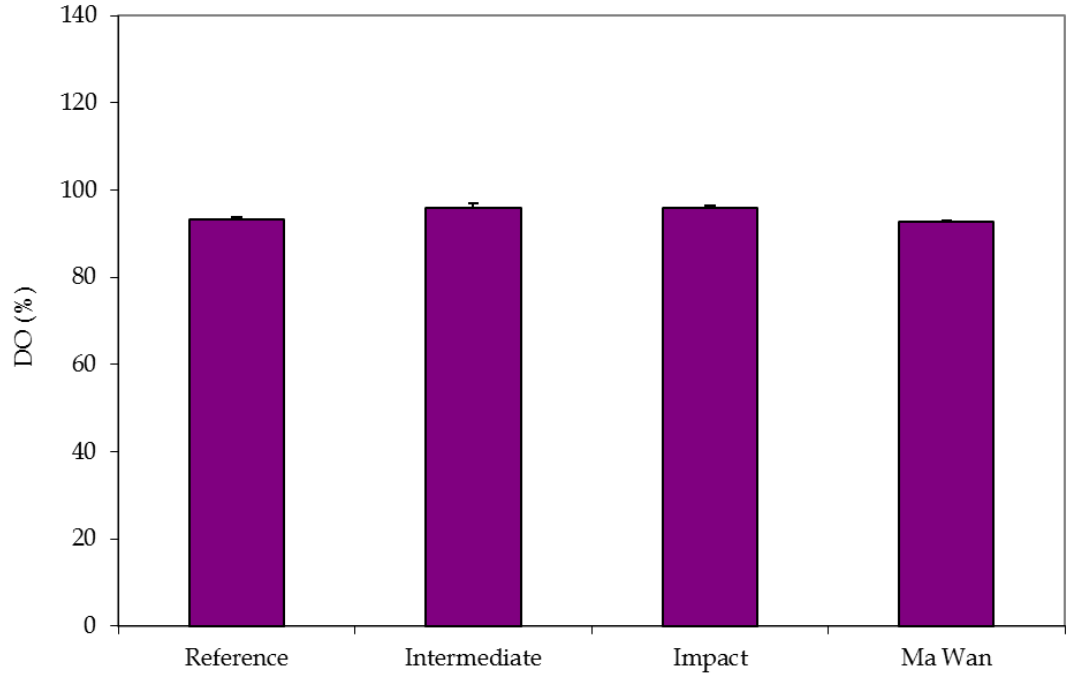


Figure 3: Level of Dissolved Oxygen (% saturation; mean + SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in February 2015.

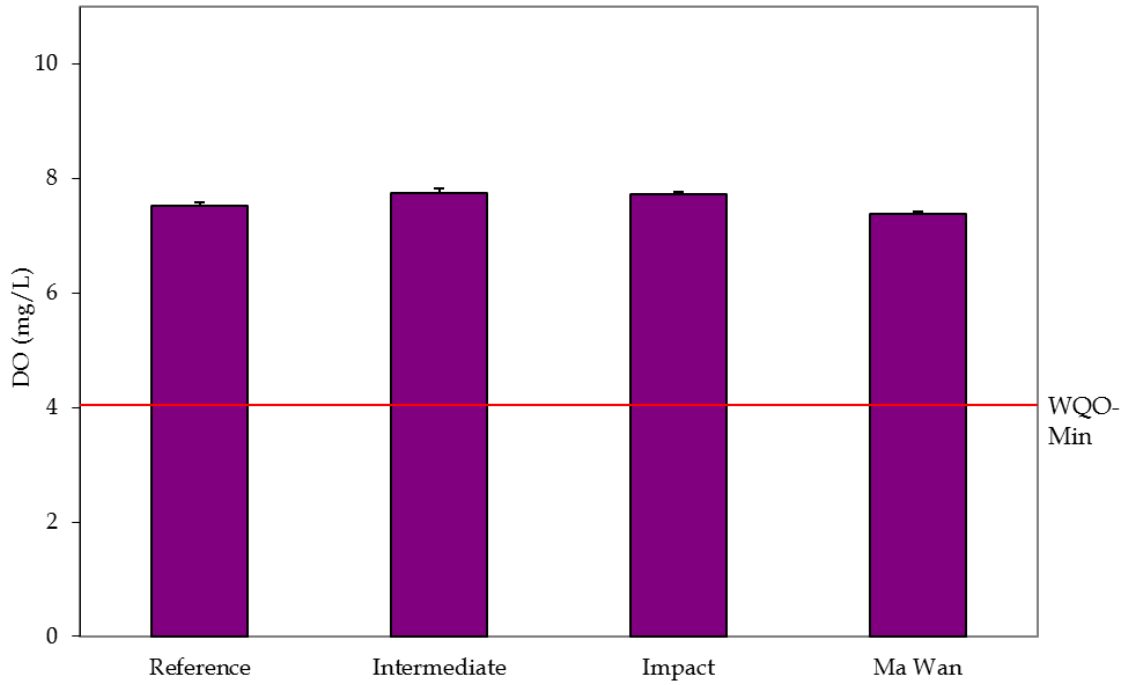


Figure 4: Concentration of Dissolved Oxygen (mg/L; mean + SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in February 2015.

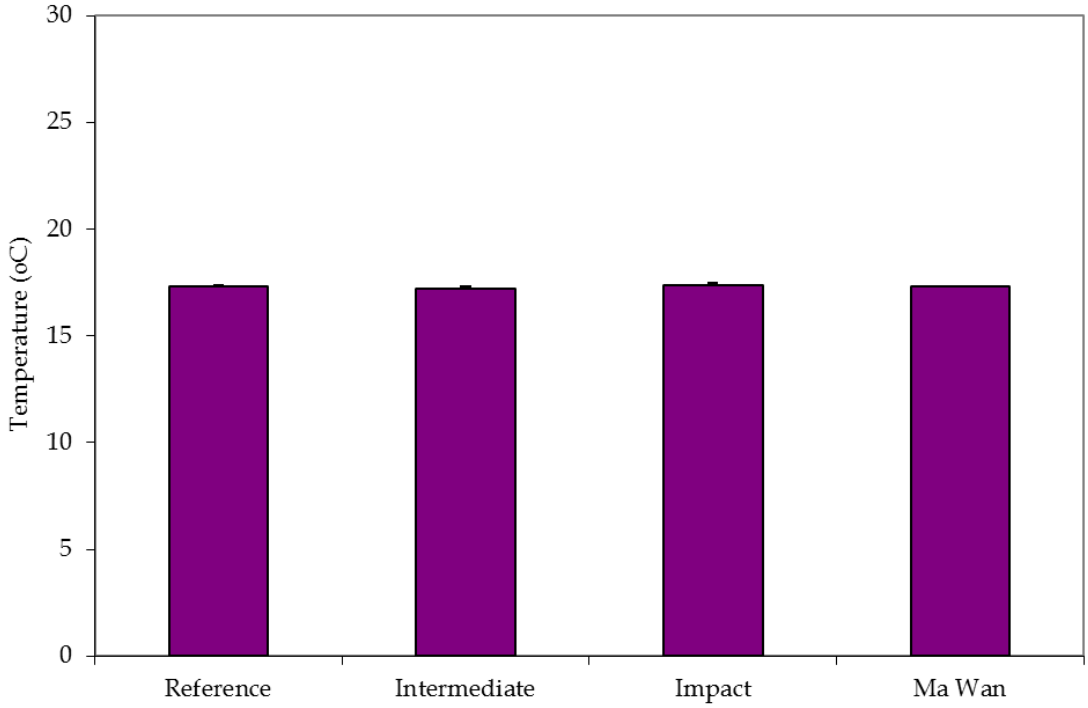


Figure 5: Levels of Temperature (°C; mean + SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in February 2015.

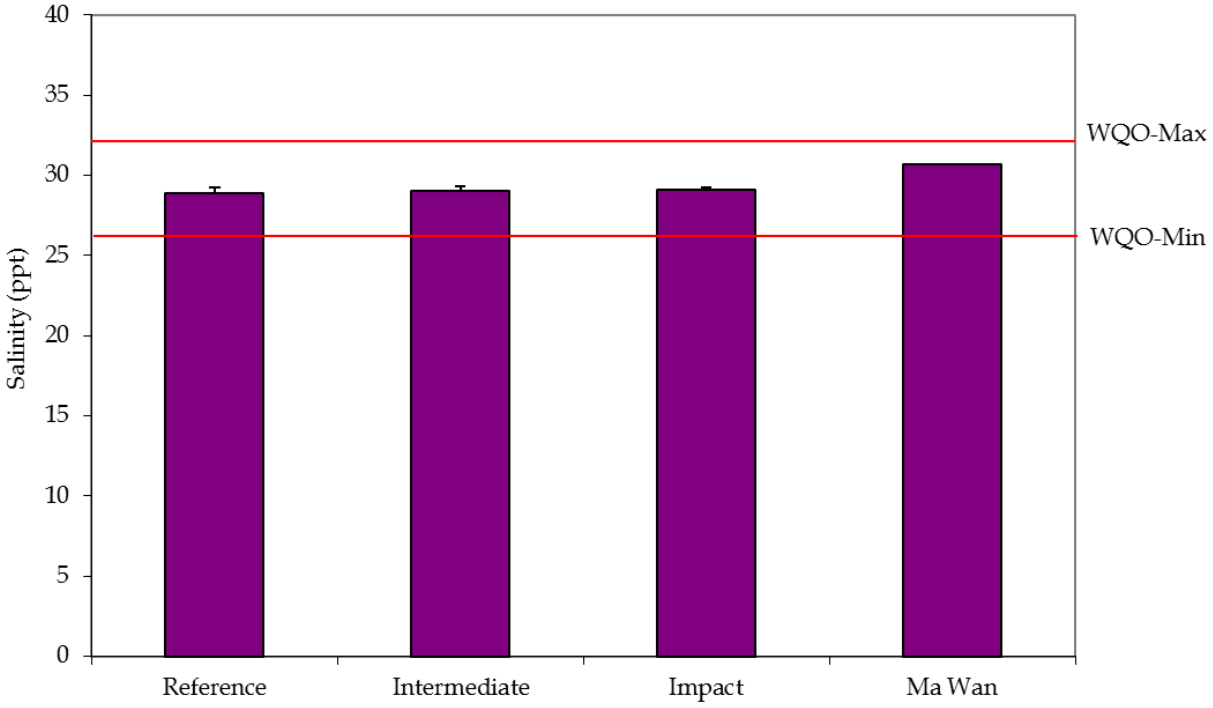


Figure 6: Levels of Salinity (ppt; mean + SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in February 2015.

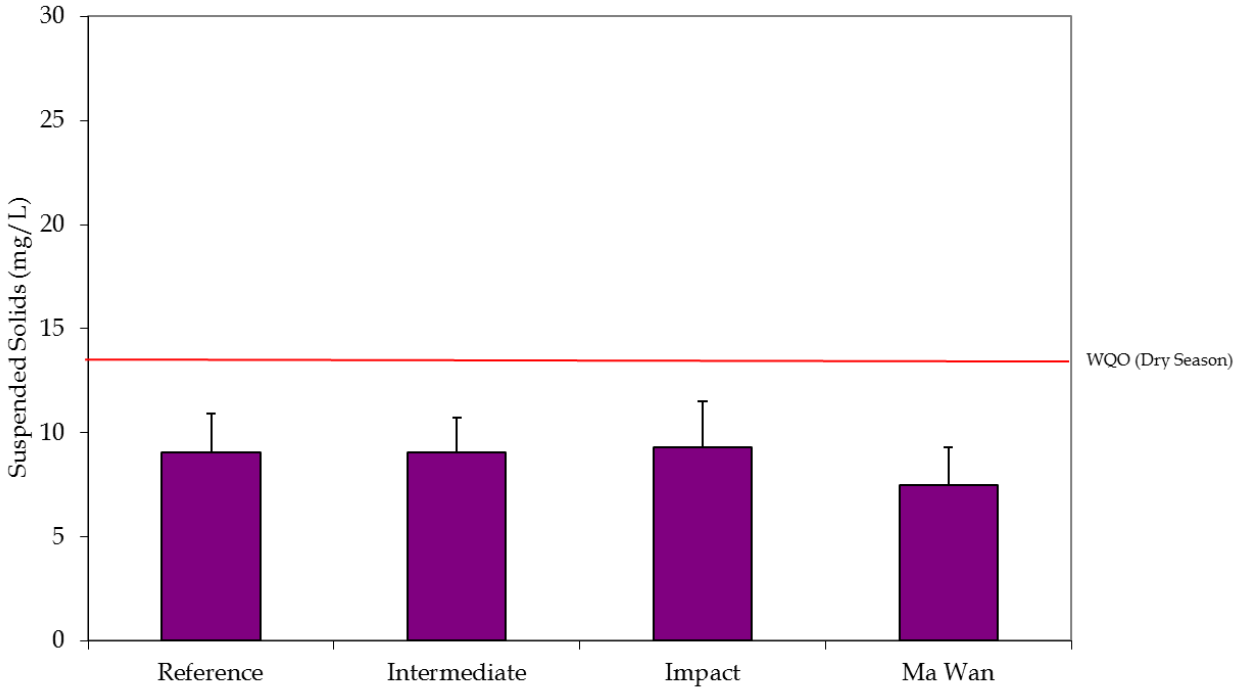


Figure 7: Concentrations of Suspended Solids (mg/L; mean + SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in February 2015.

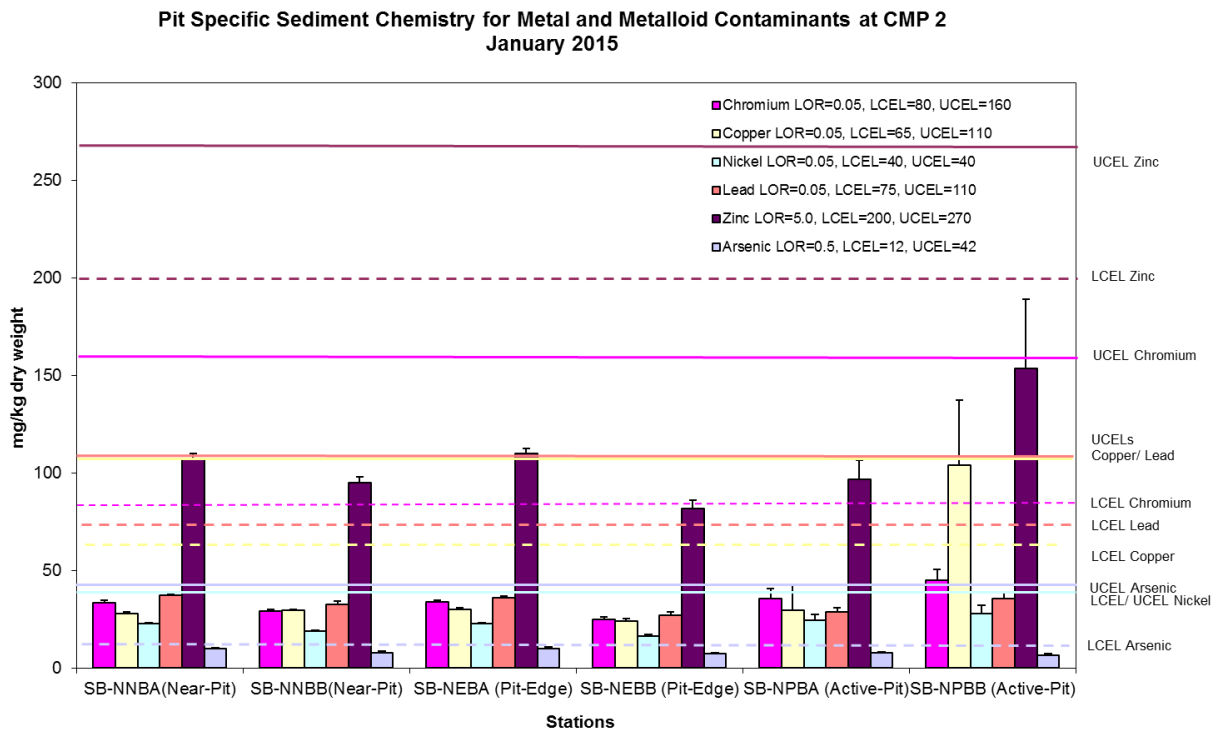


Figure 8: Concentration of Metals (Cr, Cu, Ni, Pb, Zn, As; mean +SD) in sediment samples collected from *Pit Specific Sediment Chemistry Monitoring* for CMP 2 in January 2015.

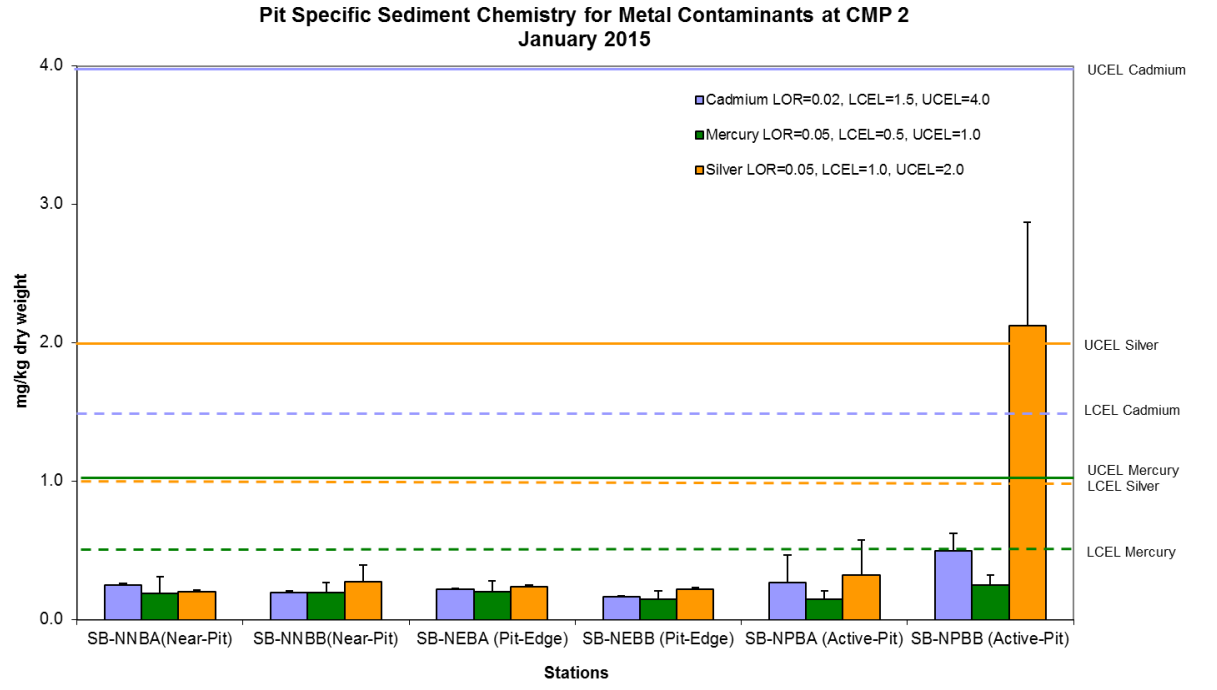


Figure 9: Concentration of Metals (Cd, Hg, Ag; mean +SD) in sediment samples collected from *Pit Specific Sediment Chemistry Monitoring* for CMP 2 in January 2015.

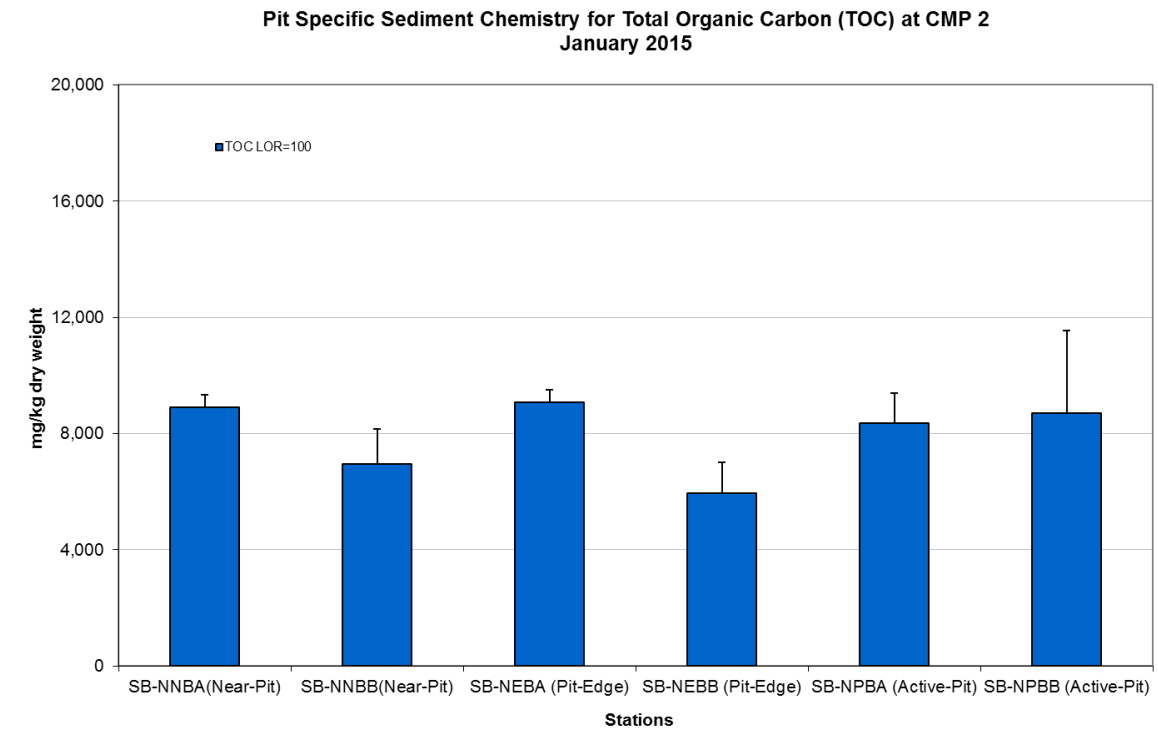


Figure 10: Concentration of Total Organic Carbon (mg/kg dry weight; mean +SD) in sediment samples collected from *Pit Specific Sediment Chemistry Monitoring* for CMP 2 in January 2015.

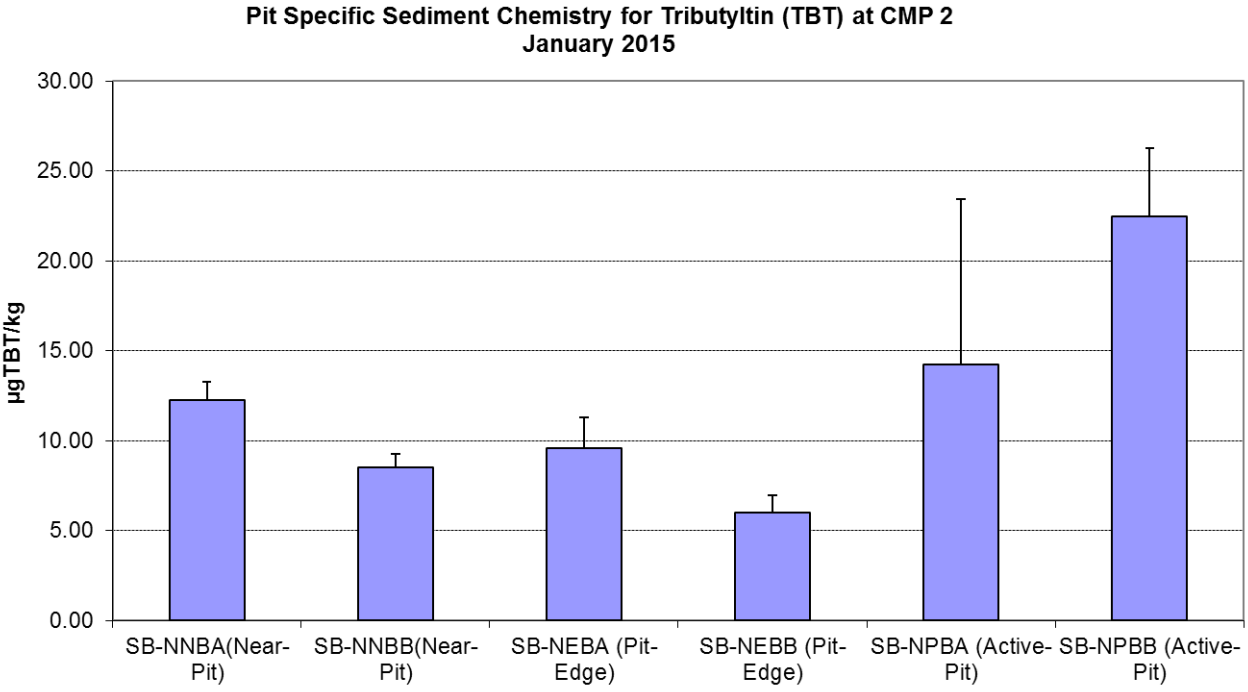


Figure 11: Concentration of Tributyltin (µg TBT/kg; mean +SD) in sediment samples collected from *Pit Specific Sediment Chemistry Monitoring* of CMP 2 in January 2015.

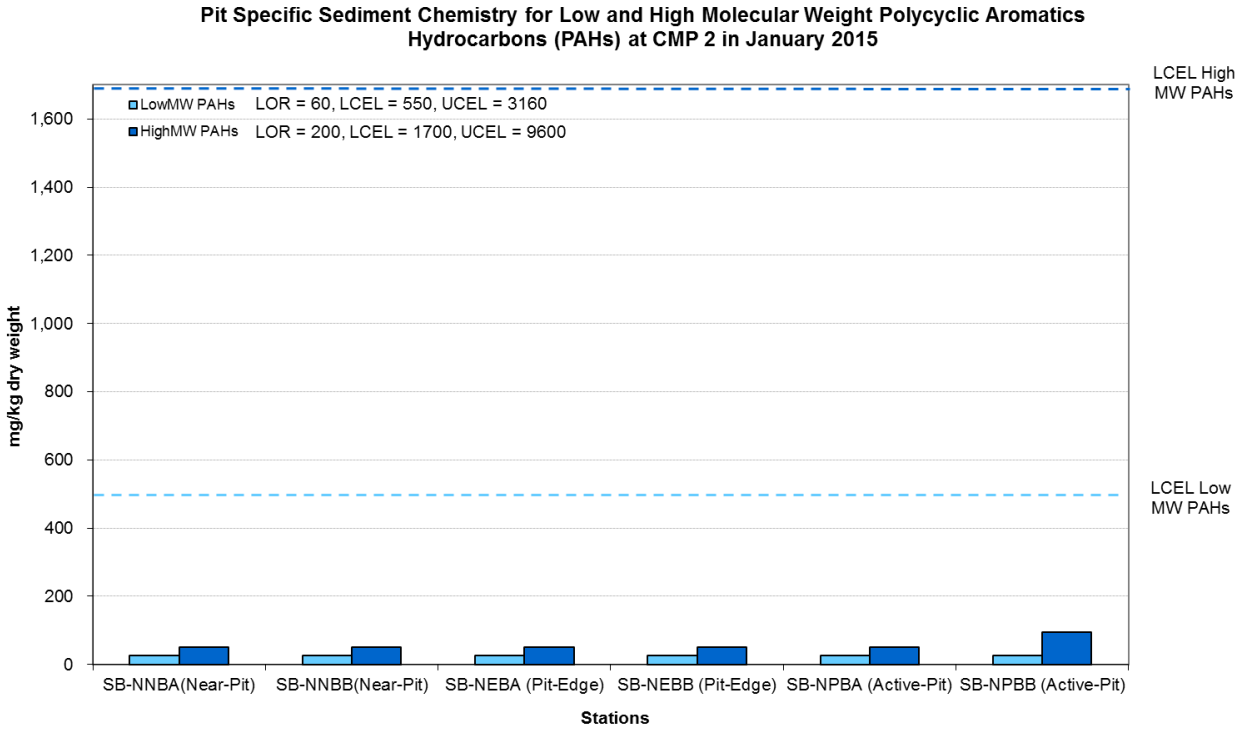


Figure 12: Concentration of Low and High Molecular Weight Polycyclic Aromatics Hydrocarbons (mg/kg dry weight; mean +SD) in sediment samples collected from *Pit Specific Sediment Chemistry Monitoring* for CMP 2 in January 2015.

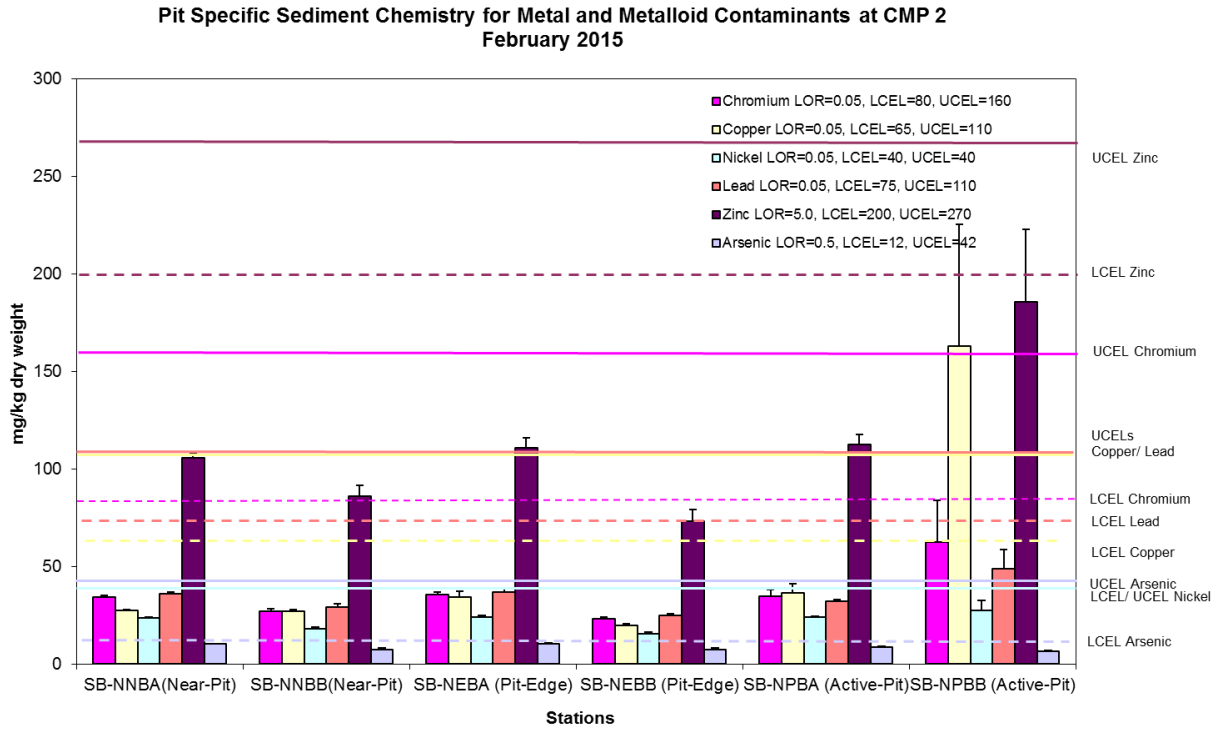


Figure 13: Concentration of Metals (Cr, Cu, Ni, Pb, Zn, As; mean +SD) in sediment samples collected from *Pit Specific Sediment Chemistry Monitoring* for CMP 2 in February 2015.

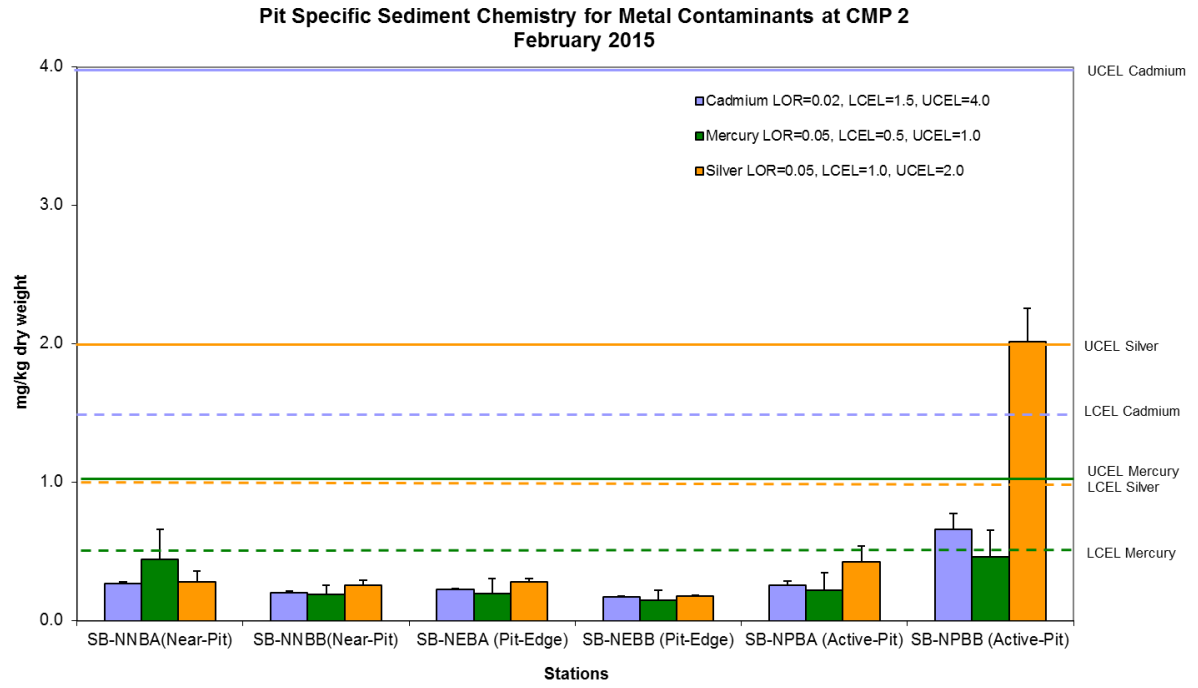


Figure 14: Concentration of Metals (Cd, Hg, Ag; mean +SD) in sediment samples collected from *Pit Specific Sediment Chemistry Monitoring* for CMP 2 in February 2015.

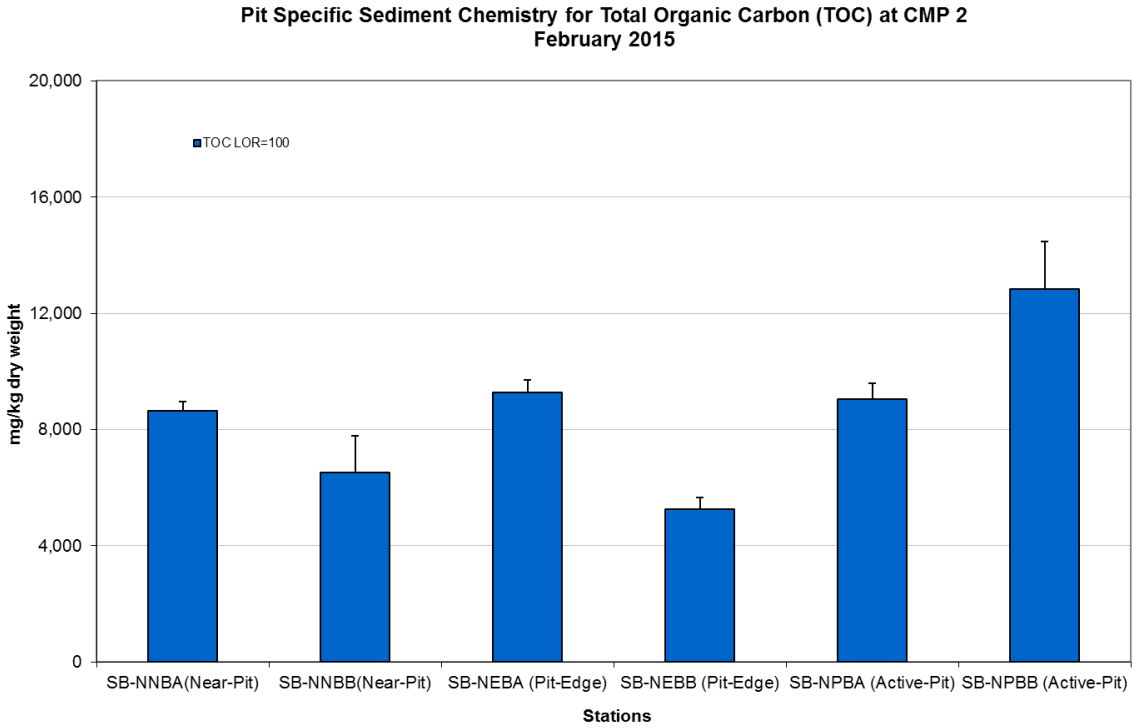


Figure 15: Concentration of Total Organic Carbon (mg/kg dry weight; mean +SD) in sediment samples collected from *Pit Specific Sediment Chemistry Monitoring* for CMP 2 in February 2015.

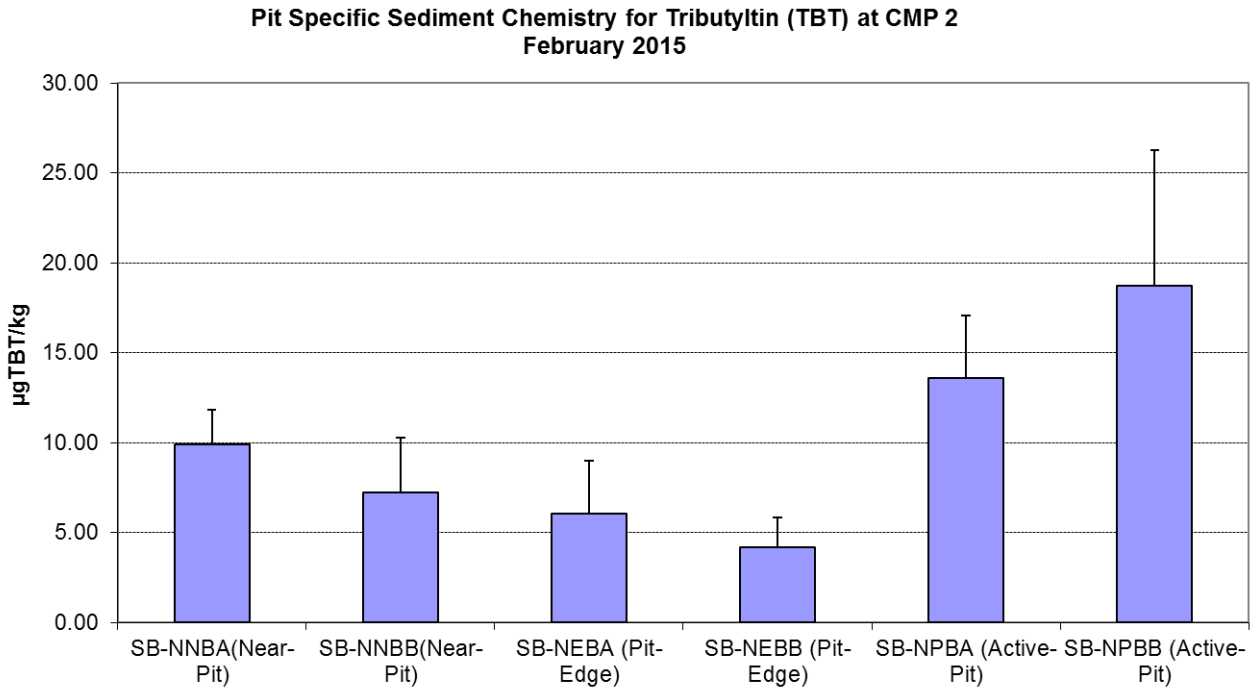


Figure 16: Concentration of Tributyltin (µg TBT/kg; mean +SD) in sediment samples collected from *Pit Specific Sediment Chemistry Monitoring* of CMP 2 in February 2015.

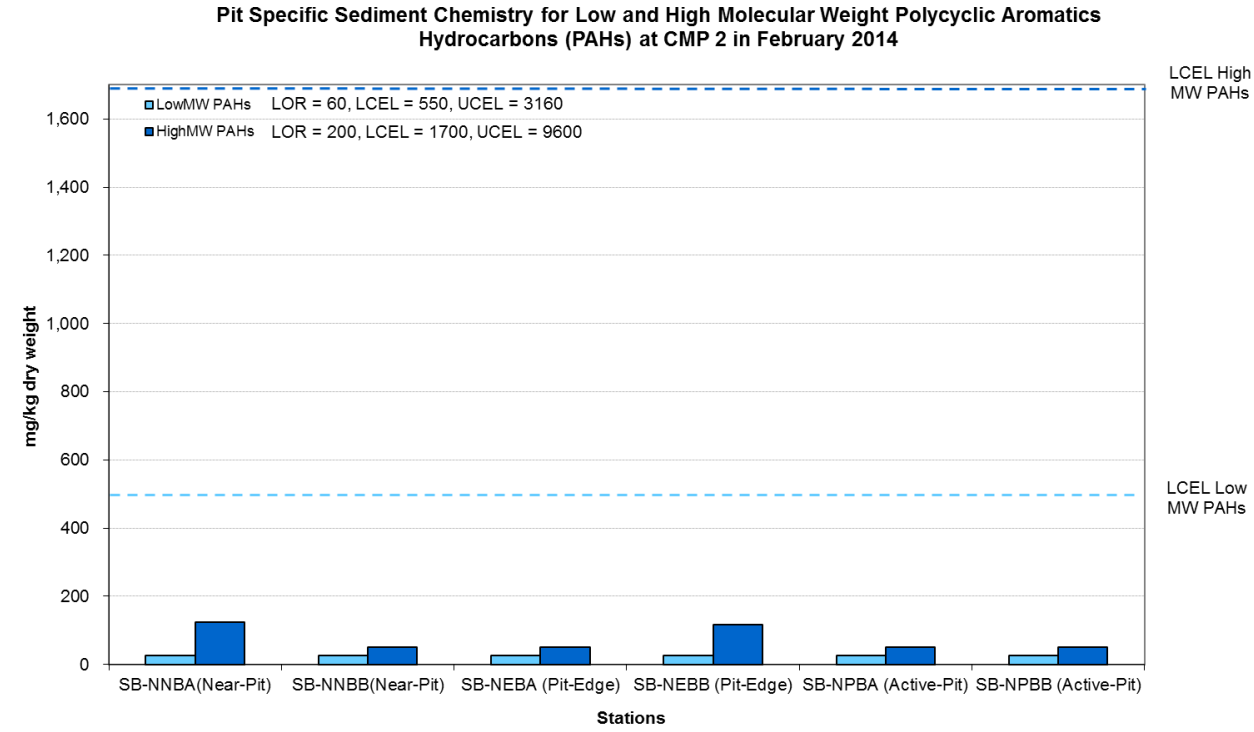


Figure 17: Concentration of Low and High Molecular Weight Polycyclic Aromatics Hydrocarbons (mg/kg dry weight; mean +SD) in sediment samples collected from *Pit Specific Sediment Chemistry Monitoring* for CMP 2 in February 2015.

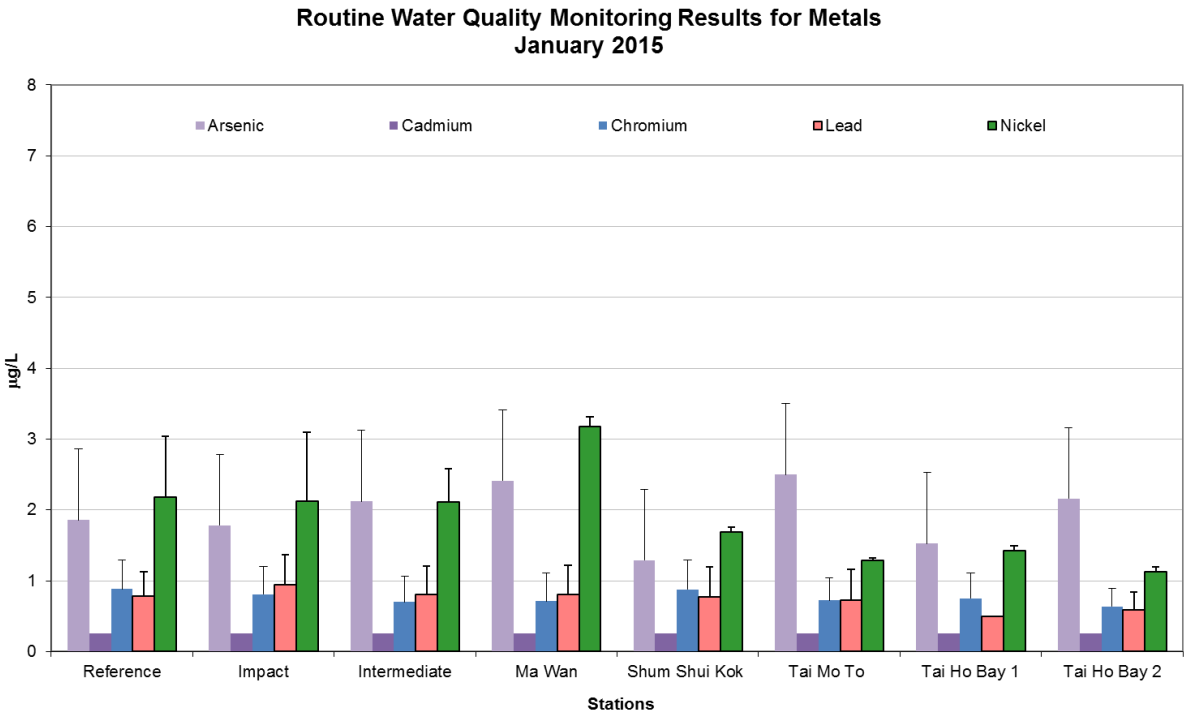


Figure 18: Concentration of Arsenic, Chromium, Lead, Nickel (mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in January 2015.

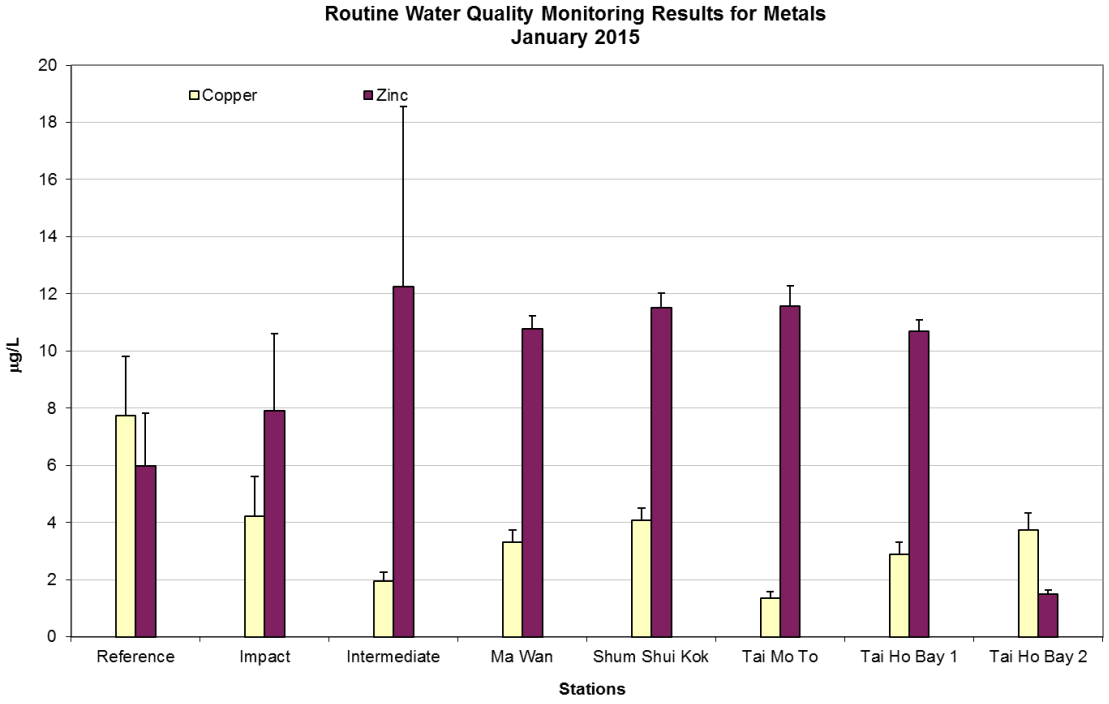


Figure 19: Concentration of Copper and Zinc (mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in January 2015.

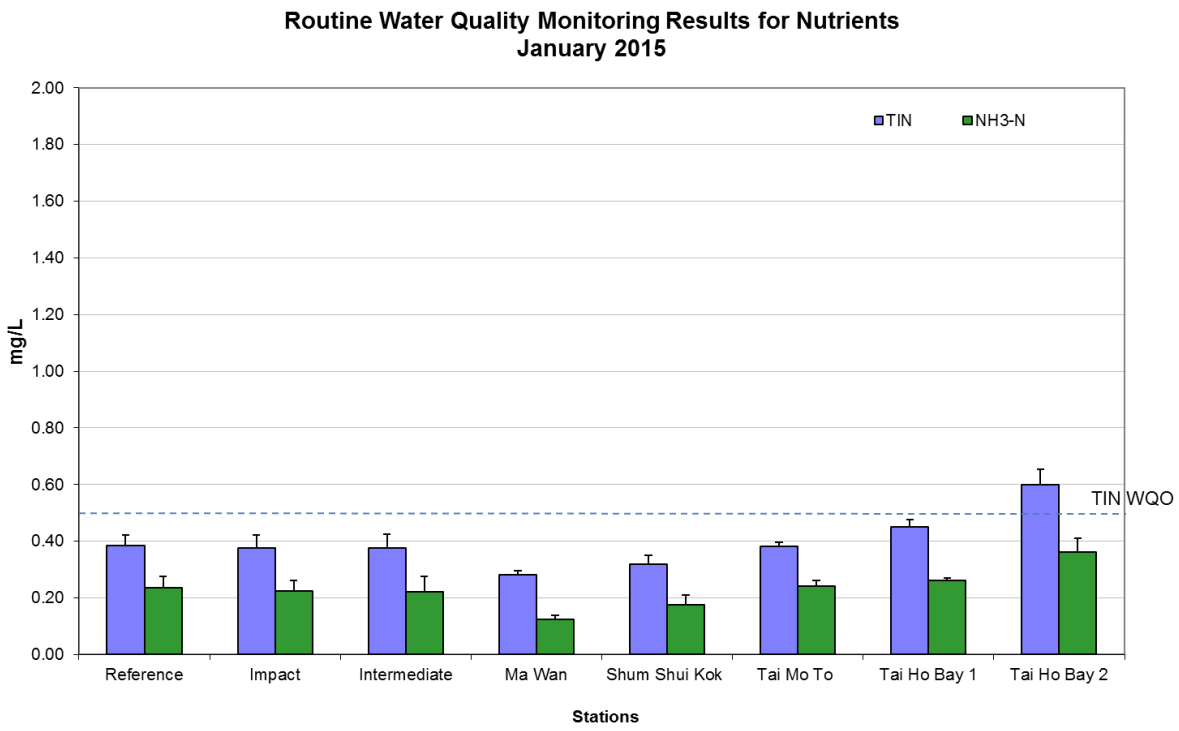


Figure 20: Concentration of Total Inorganic Nitrogen and NH_3-N (mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in January 2015.

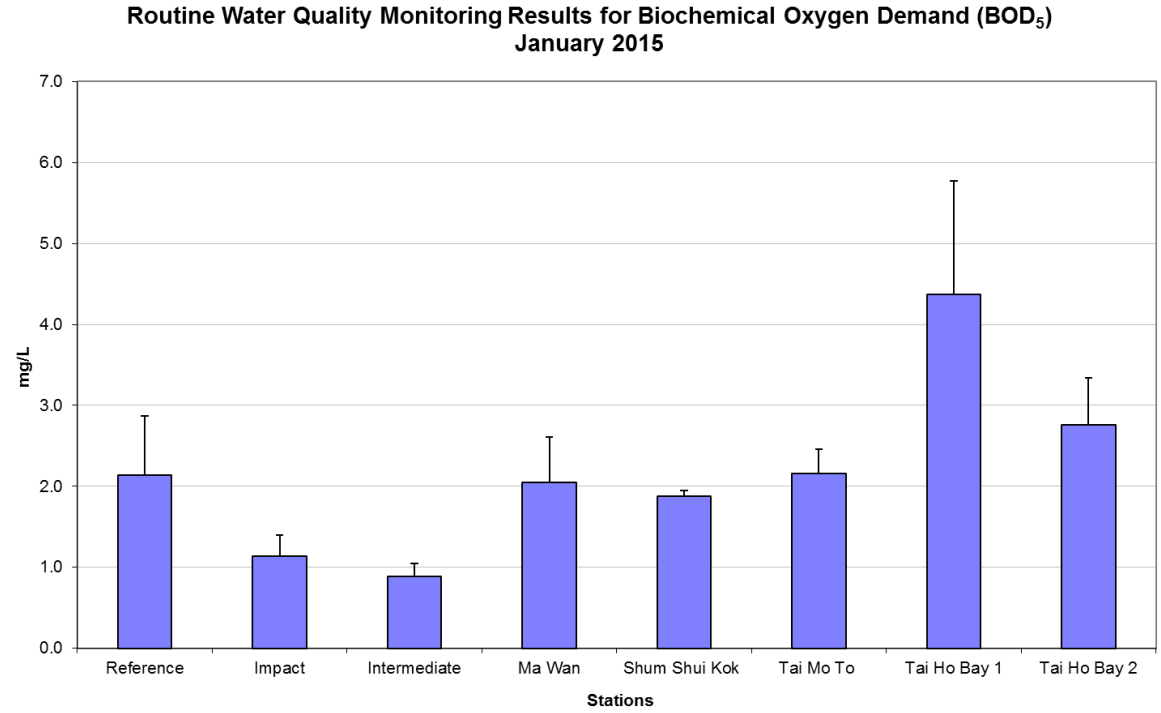


Figure 21: Level of Biochemical Oxygen Demand (BOD_5; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in January 2015.

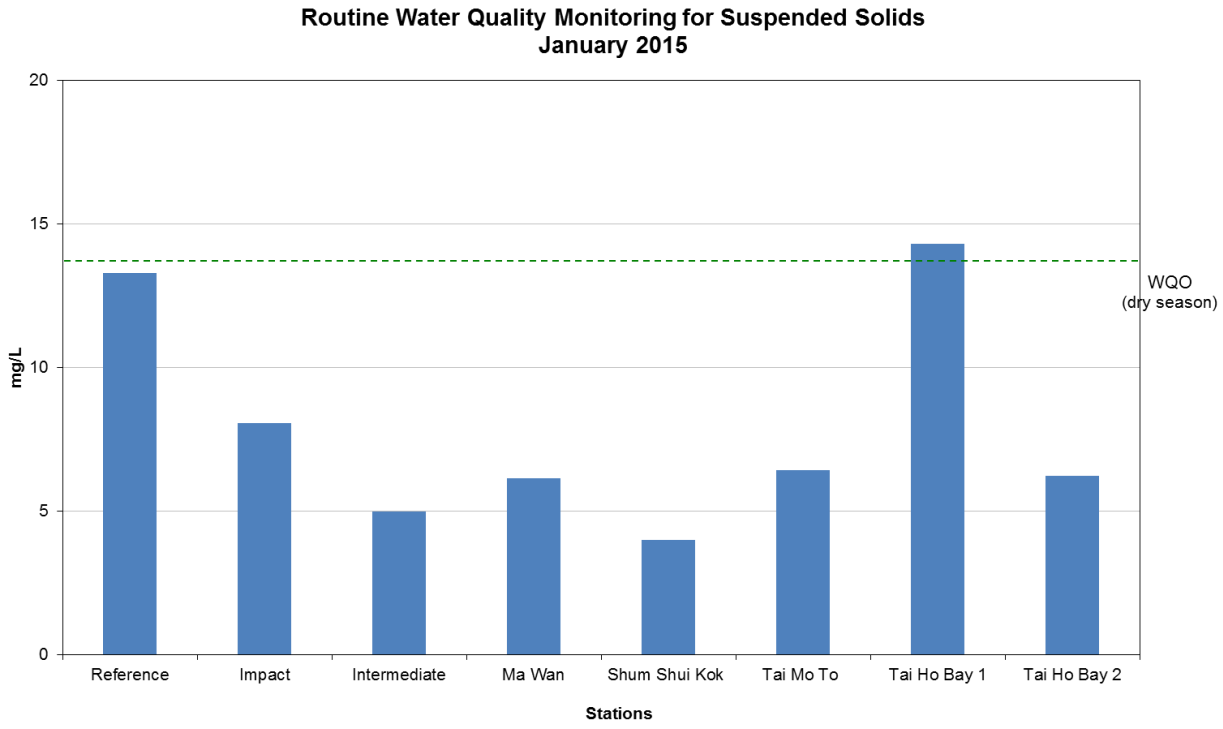


Figure 22: Concentration of Suspended Solids (mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in January 2015.

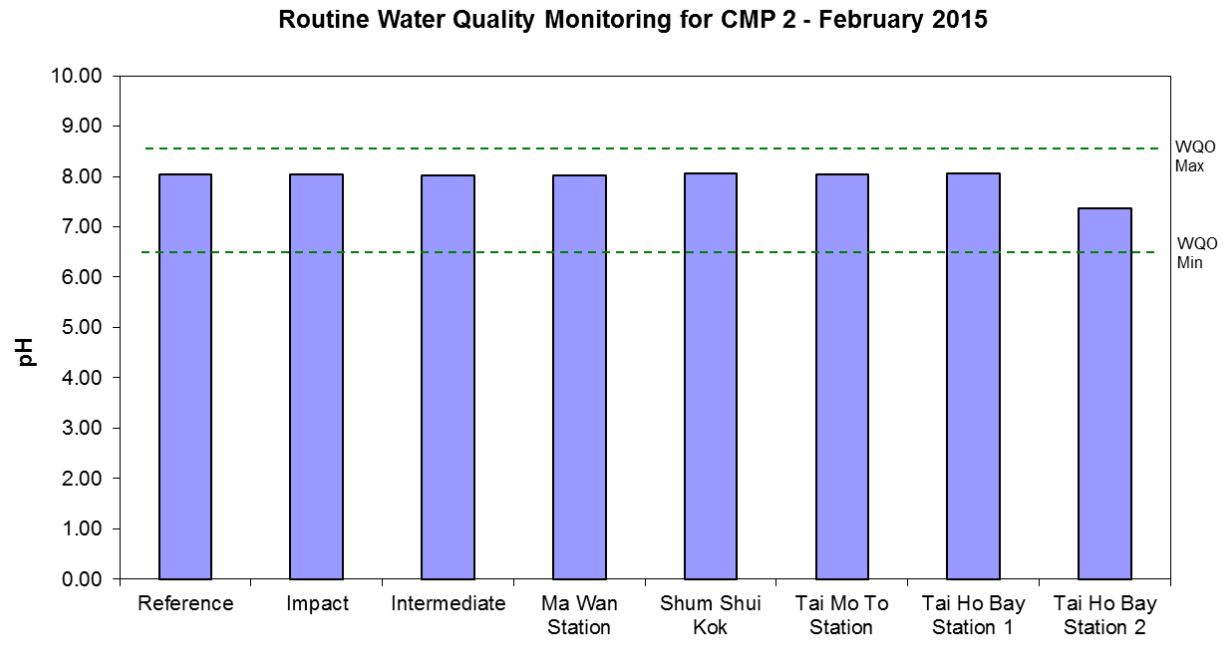


Figure 23: Level of pH recorded during Routine Water Quality Monitoring for disposal operations at CMP 2 in February 2015.

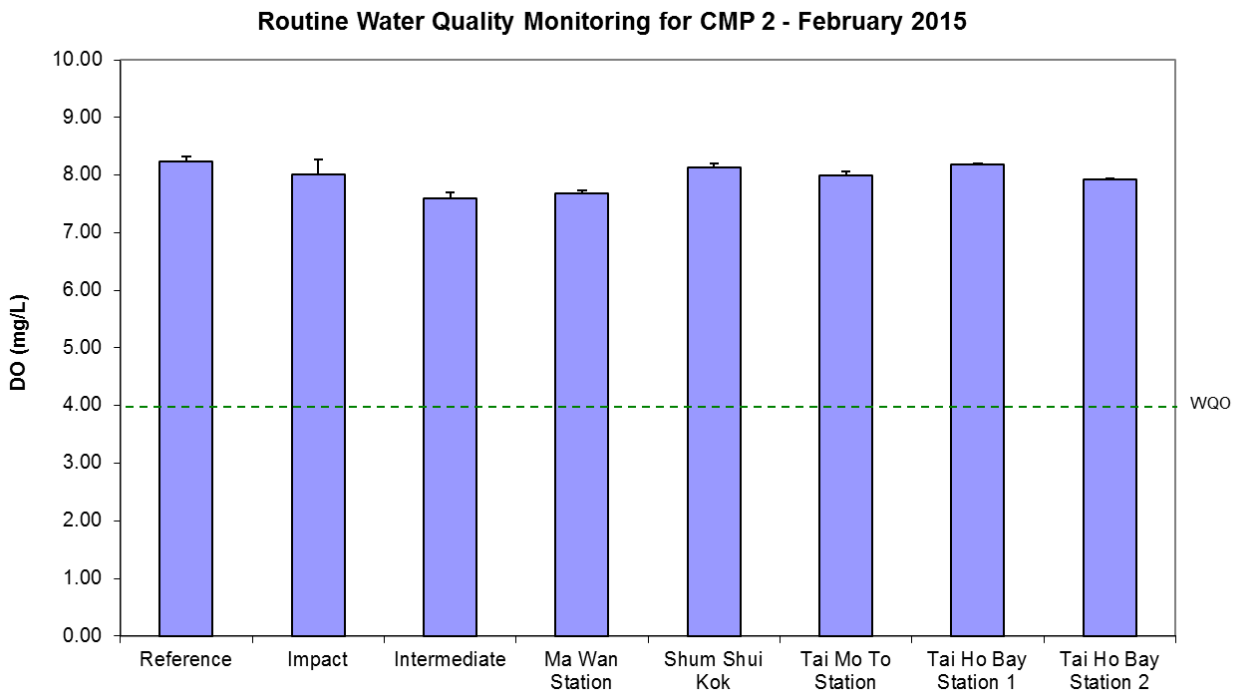


Figure 24: Concentration of Dissolved Oxygen (mg/L; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP 2 in February 2015.

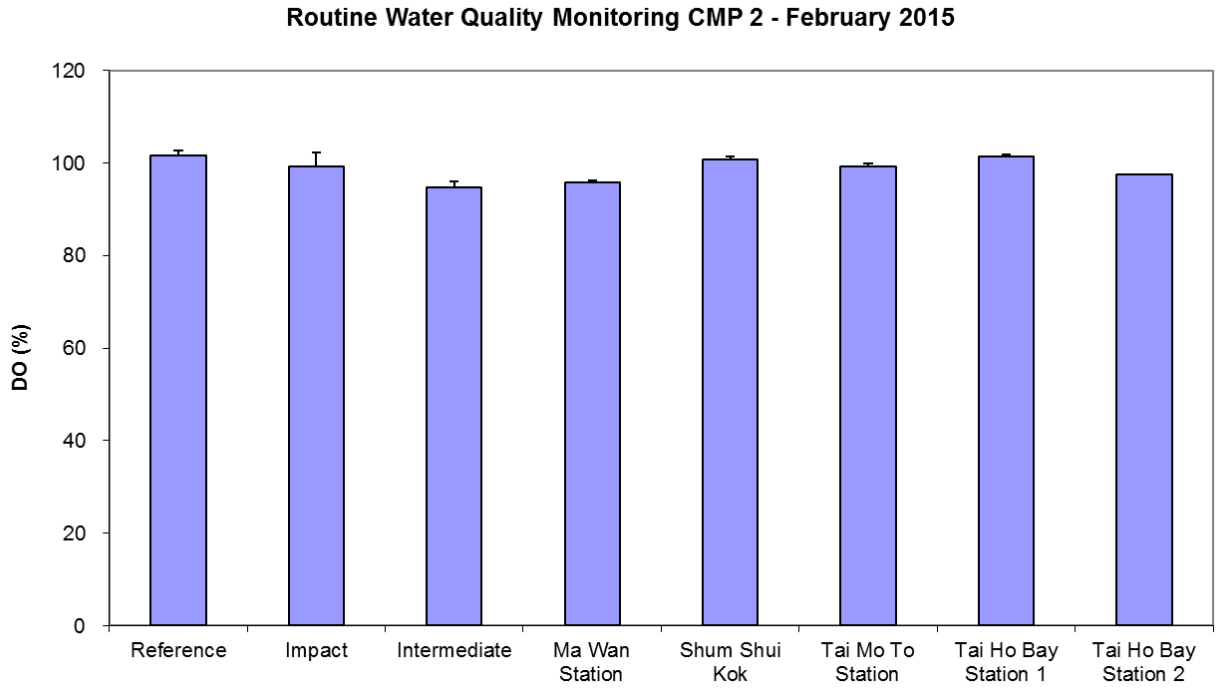


Figure 25: Level of Dissolved Oxygen (% saturation; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP 2 in February 2015.

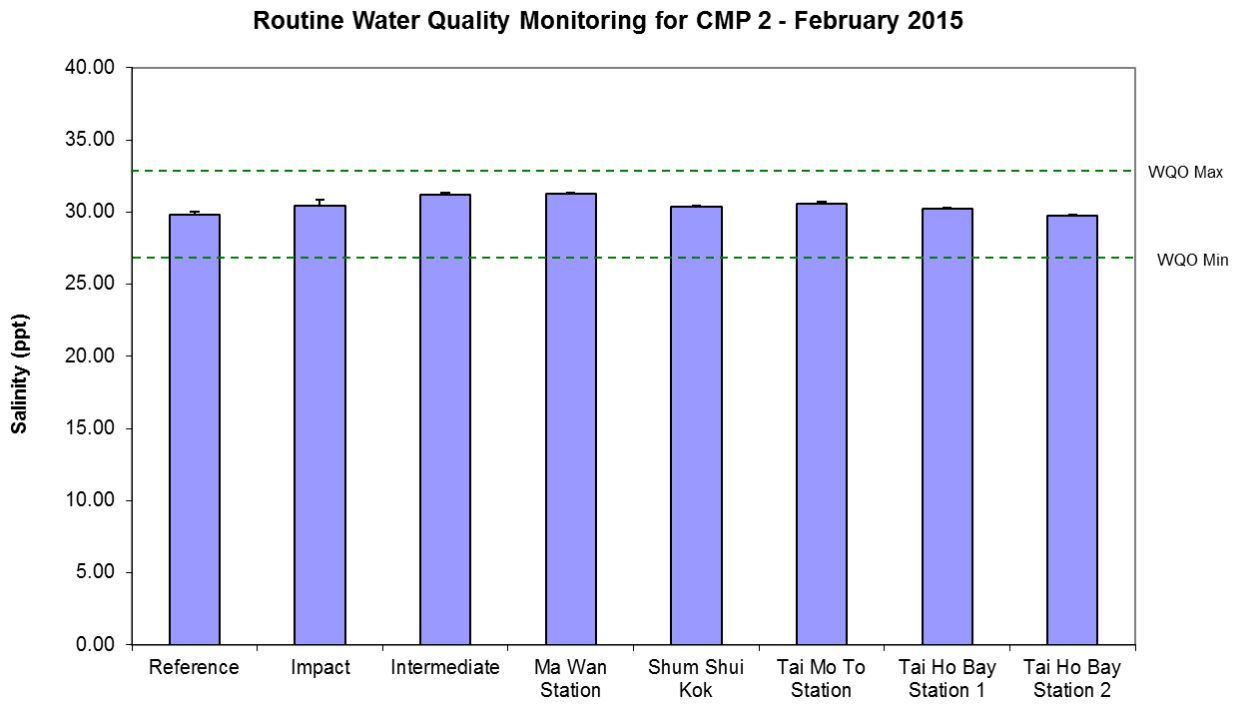


Figure 26: Level of Salinity (ppt; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP 2 in February 2015.

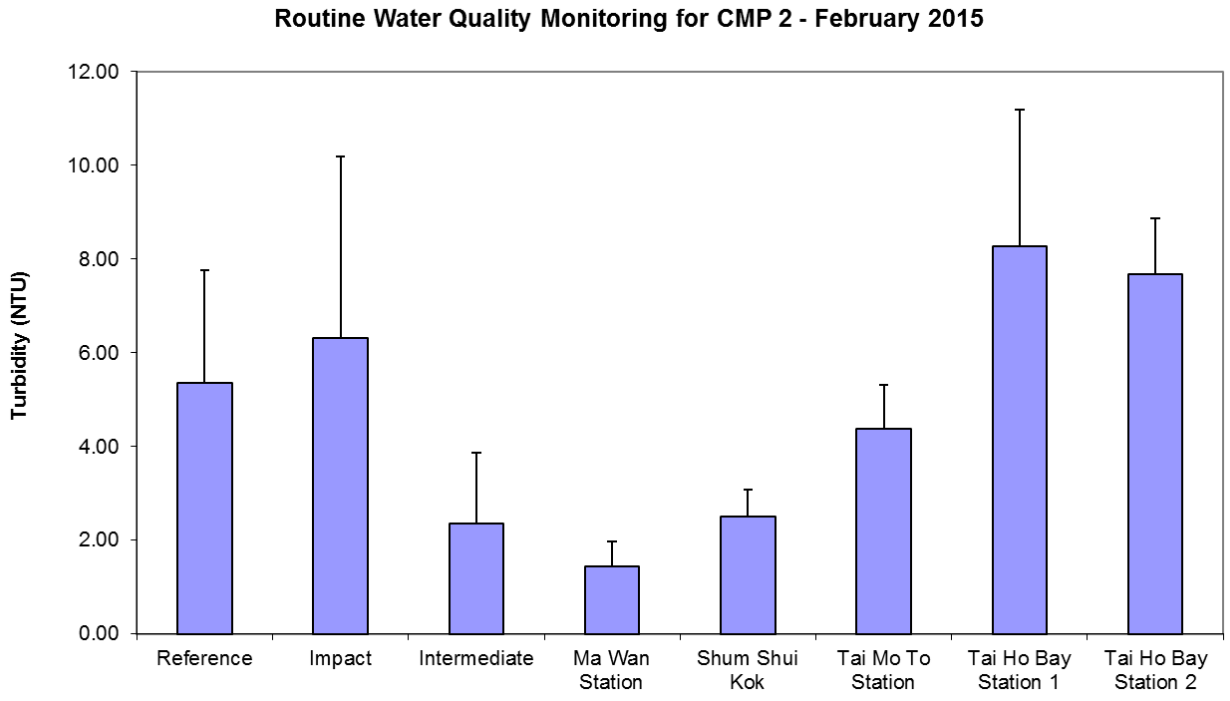


Figure 27: Level of Turbidity (NTU; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP 2 in February 2015.

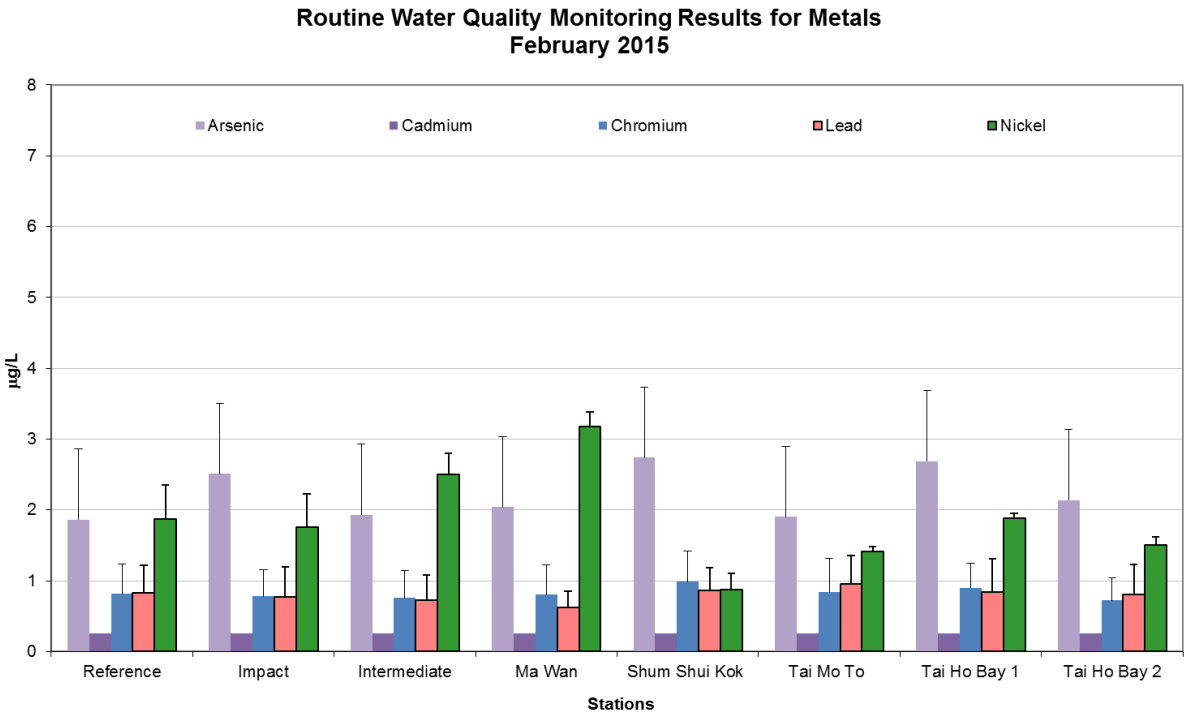


Figure 28: Concentration of Arsenic, Chromium, Lead, Nickel (mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in February 2015.

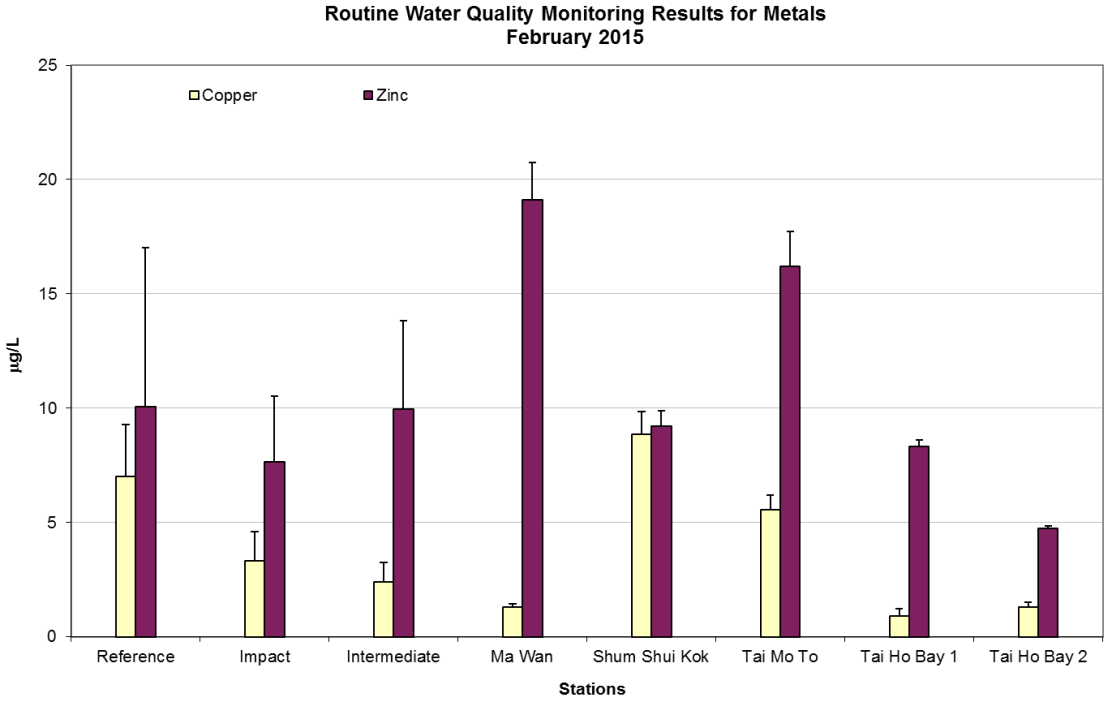


Figure 29: Concentration of Copper and Zinc (mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in February 2015.

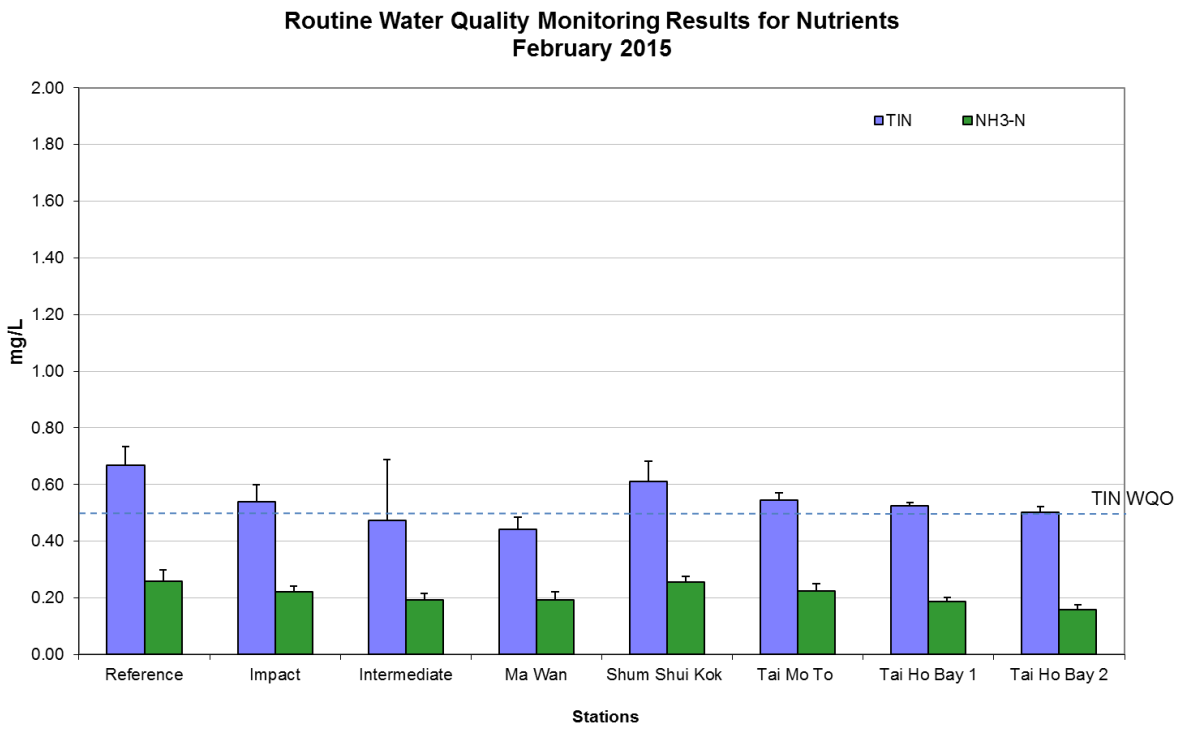


Figure 30: Concentration of Total Inorganic Nitrogen and NH_3-N (mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in February 2015.

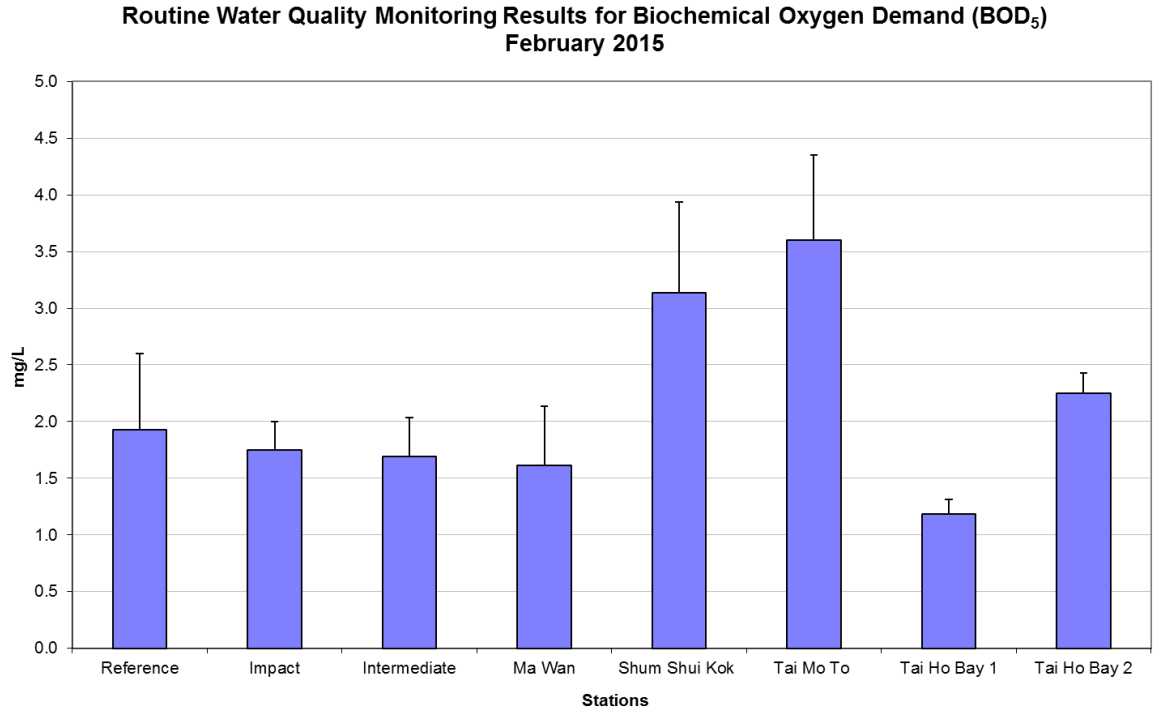


Figure 31: Level of Biochemical Oxygen Demand (BOD_5; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in February 2015.

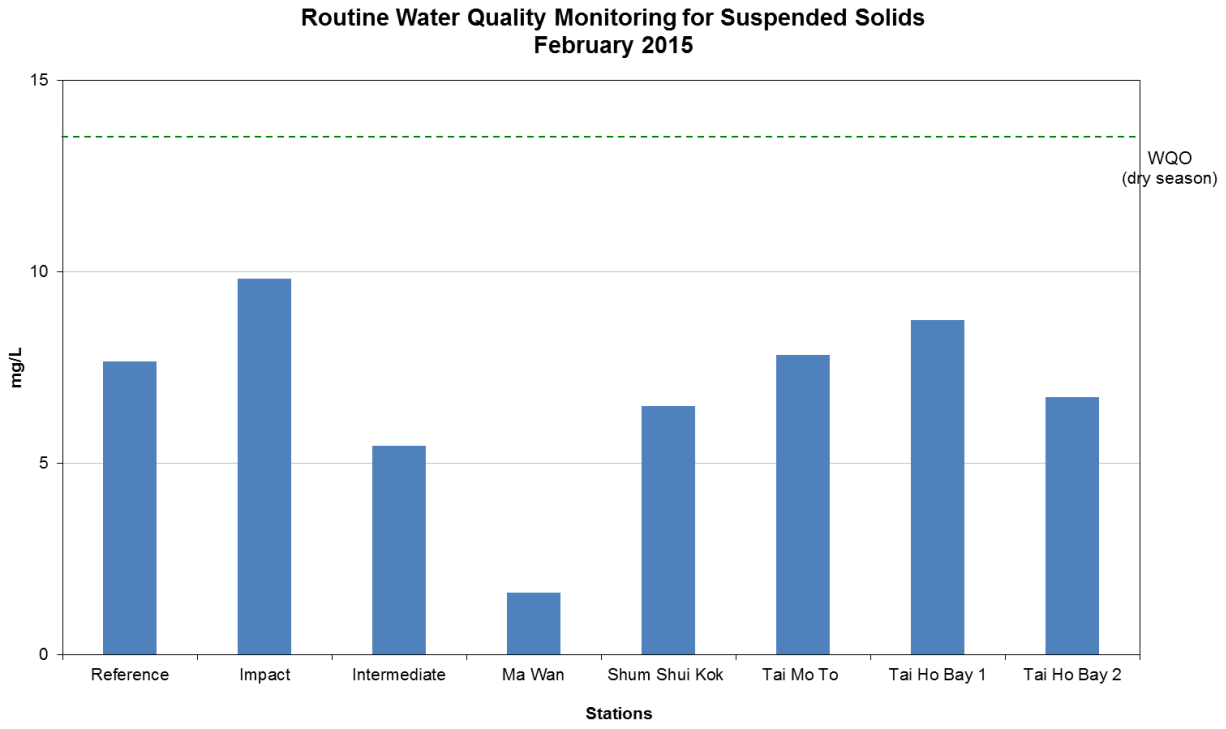


Figure 32: Concentration of Suspended Solids (mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in February 2015.

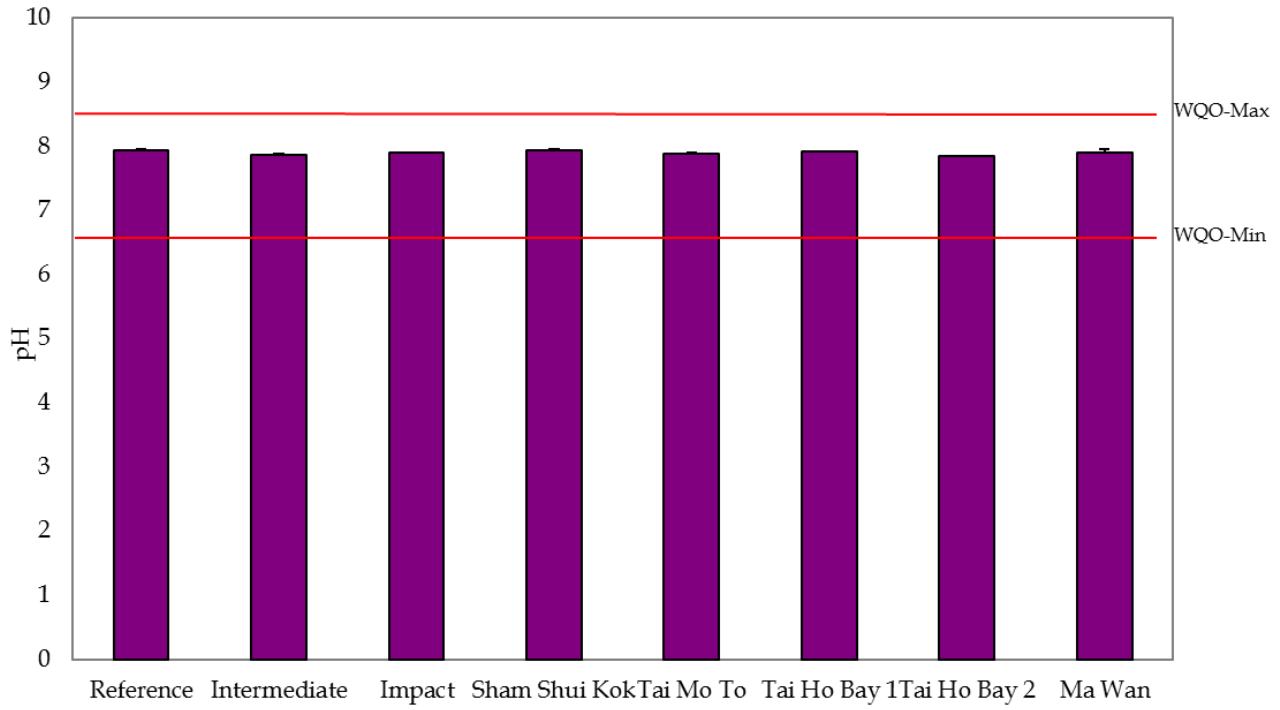


Figure 33: Levels of pH (mean + SD) recorded from Water Quality Monitoring during Capping of SB CMP 1 in February 2015.

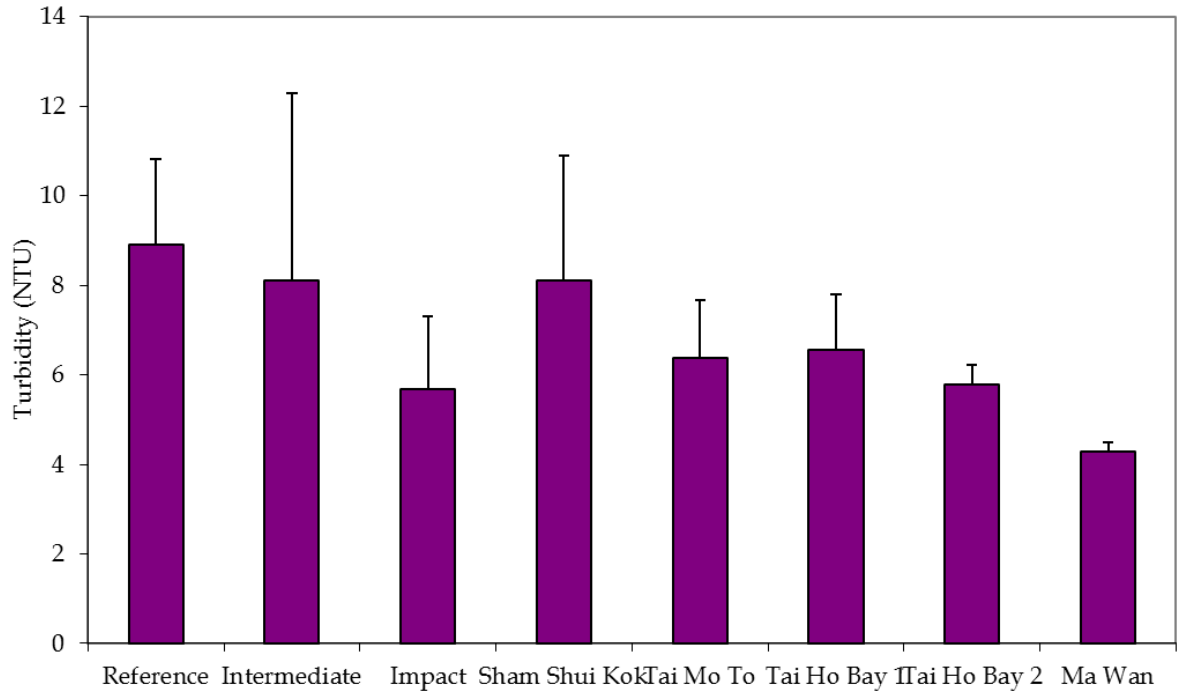


Figure 34: Levels of Turbidity (NTU; mean + SD) recorded from Water Quality Monitoring during Capping of SB CMP 1 in February 2015.

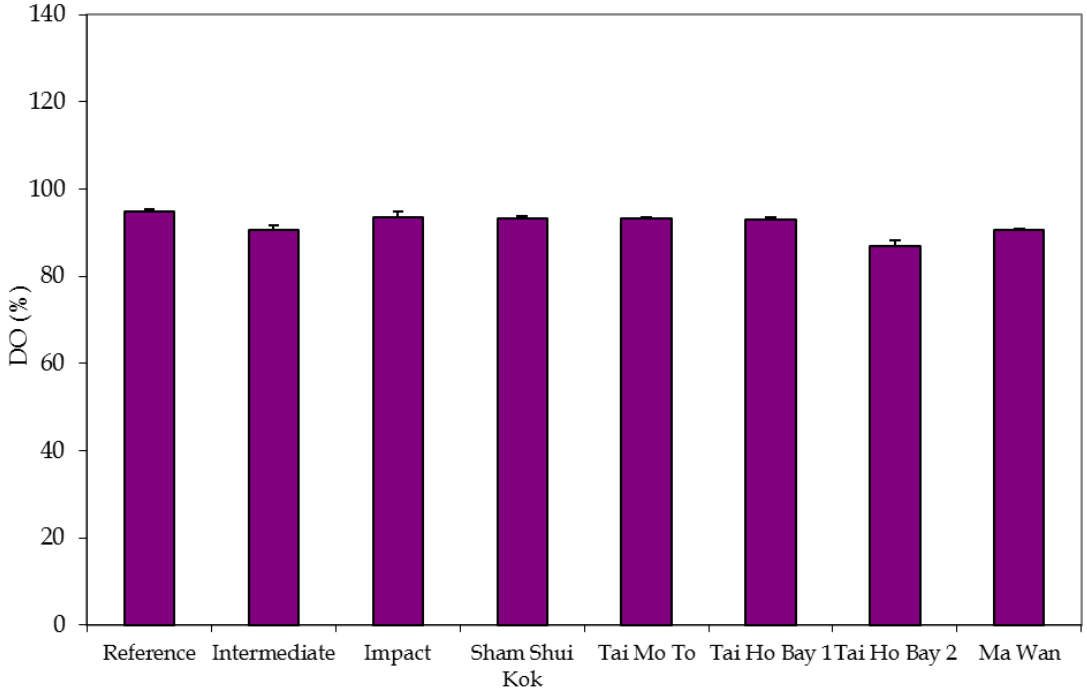


Figure 35: Level of Dissolved Oxygen (% saturation; mean + SD) recorded from Water Quality Monitoring during Capping of SB CMP 1 in February 2015.

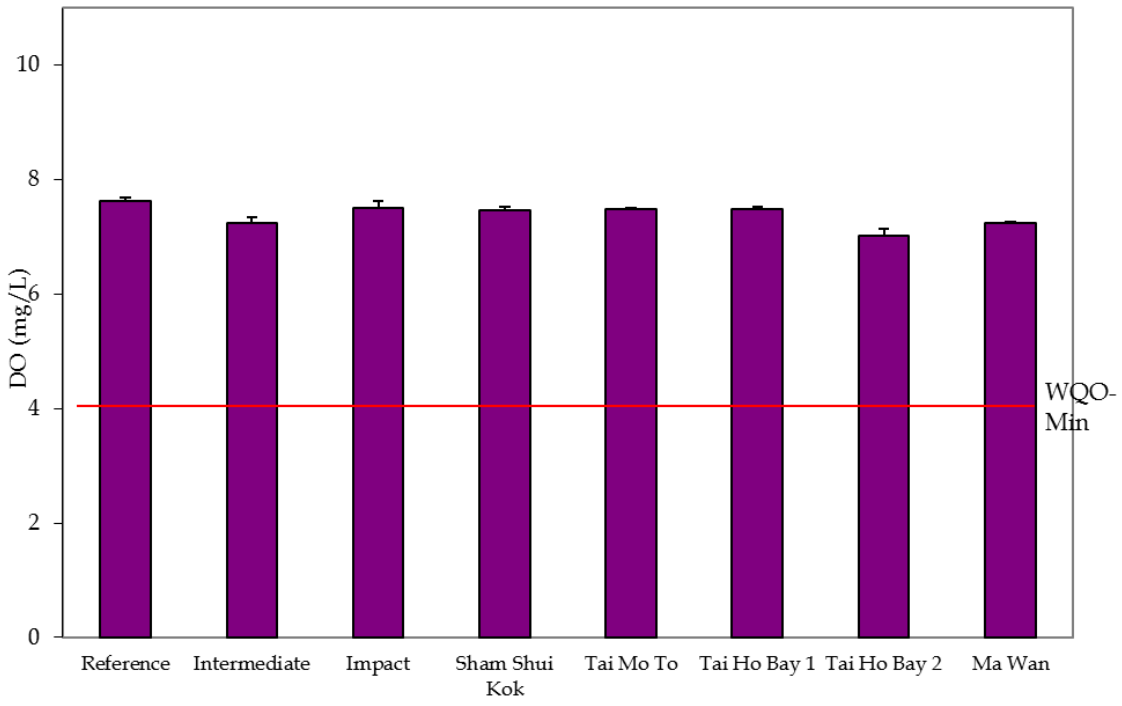


Figure 36: Concentration of Dissolved Oxygen (mg/L; mean + SD) recorded from Water Quality Monitoring during Capping of SB CMP 1 in February 2015.

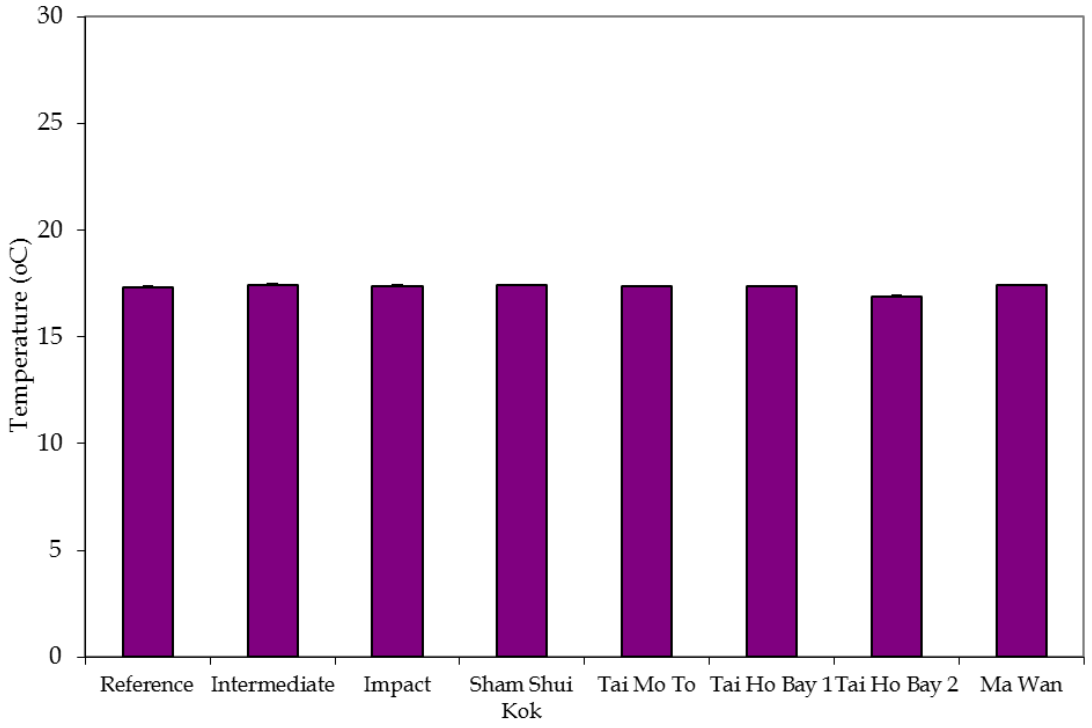


Figure 37: Levels of Temperature (°C ; mean + SD) recorded from Water Quality Monitoring during Capping of SB CMP 1 in February 2015.

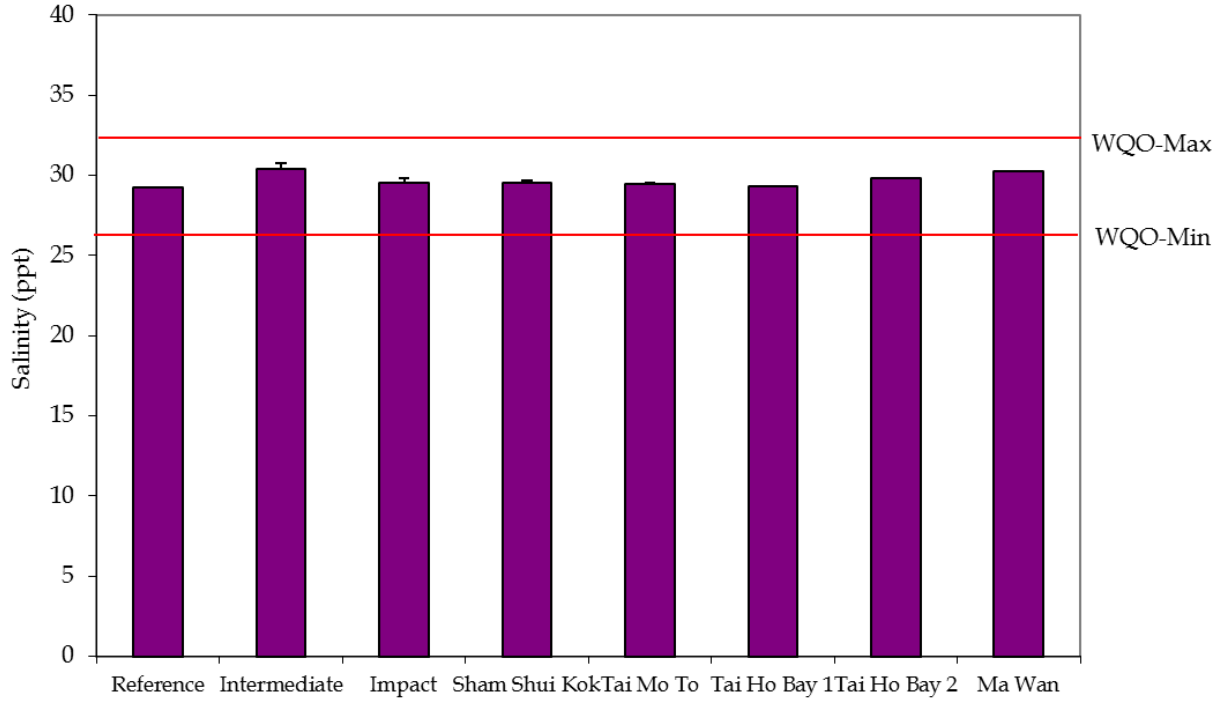


Figure 38: Levels of Salinity (ppt; mean + SD) recorded from Water Quality Monitoring during Capping of SB CMP 1 in February 2015.

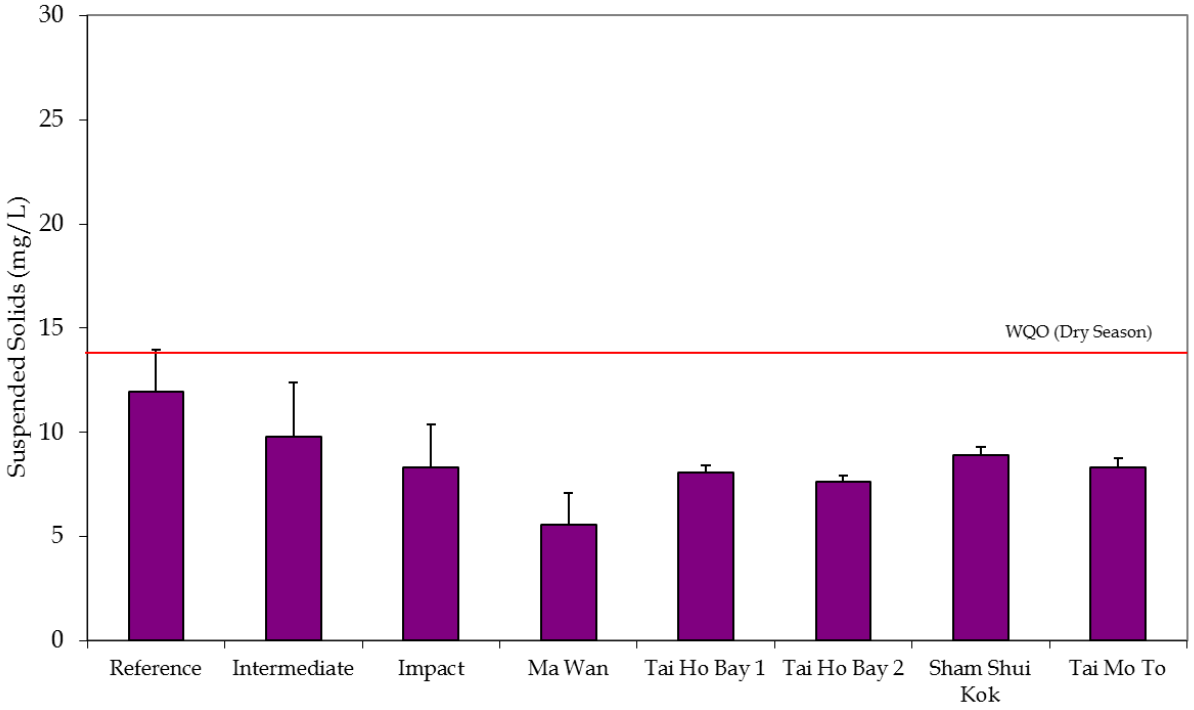


Figure 39: Level of Suspended Solids (mg/L; mean + SD) recorded from Water Quality Monitoring during Capping of SB CMP 1 in February 2015.

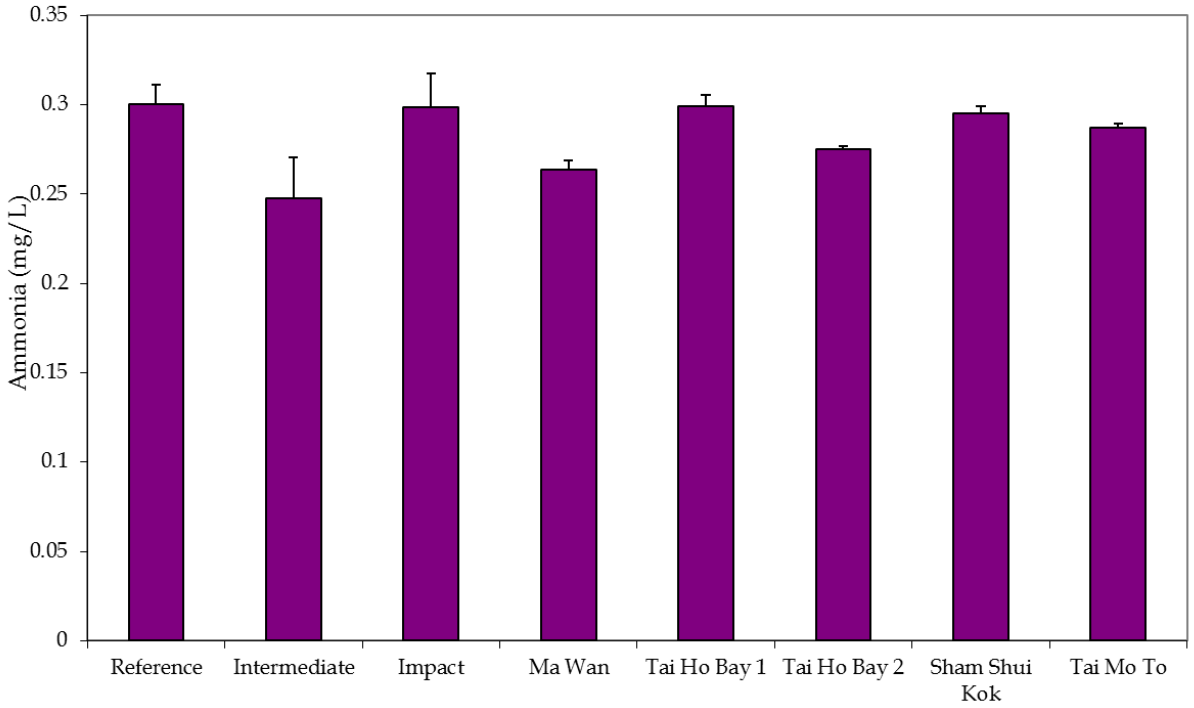


Figure 40: Concentration of Ammonia (mg/L; mean + SD) recorded from Water Quality Monitoring during Capping of SB CMP 1 in February 2015.

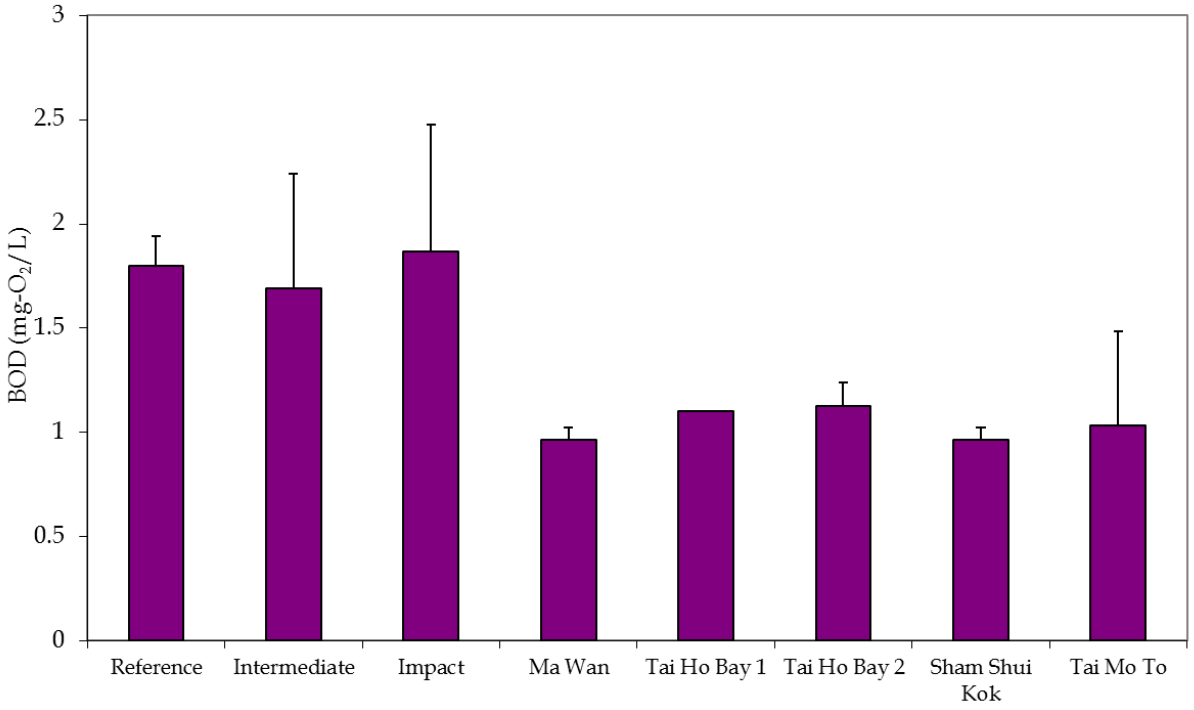


Figure 41: Level of BOD_5 (mg-O_2/L; mean + SD) recorded from Water Quality Monitoring during Capping of SB CMP 1 in February 2015.

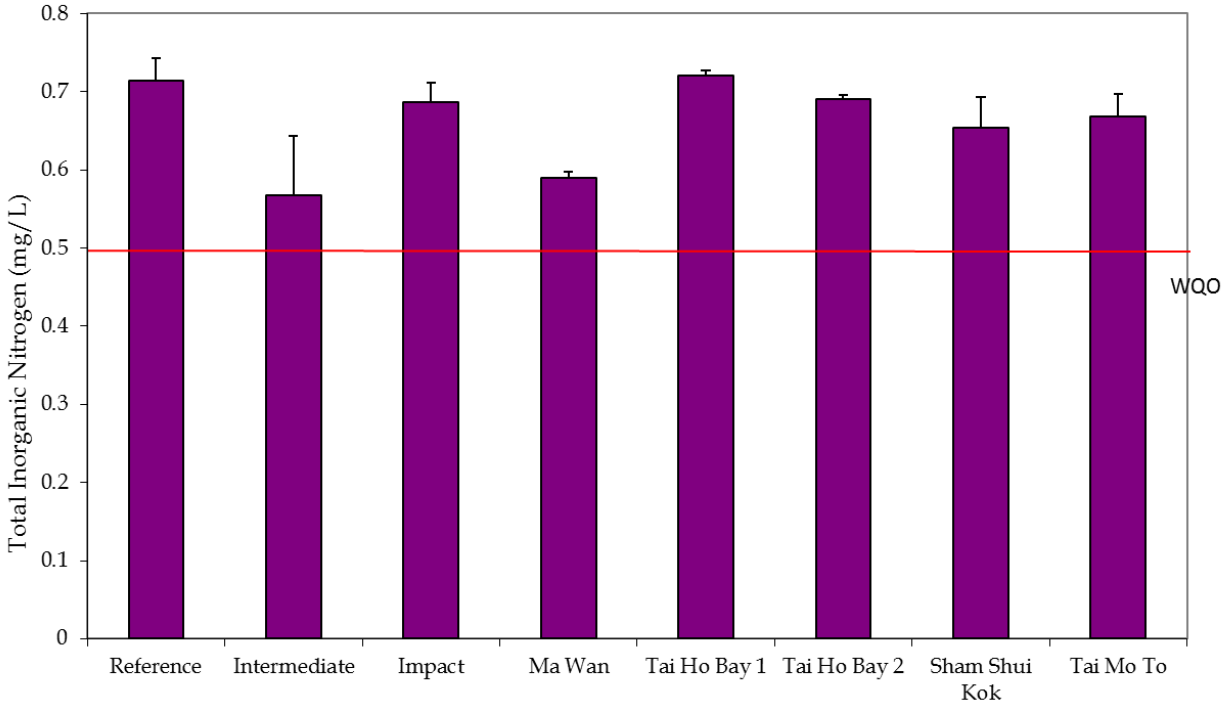


Figure 42: Level of TIN (mg/L; mean + SD) recorded from Water Quality Monitoring during Capping of Capping of SB CMP 1 in February 2015.

Annex C

Water Quality Monitoring Results

Table C1 Action and Limit Levels of Water Quality for Dredging, Backfilling and Capping Activities

Parameter	Action Level	Limit Level
Dissolved Oxygen (DO) (1)	Surface and Mid-depth (2) The average of the impact, WSR 45C and WSR 46 station readings are < 5%-ile of baseline data for surface and middle layer = **4.32 mg L^{-1}** and Significantly less than the reference stations mean DO (at the same tide of the same day)	Surface and Mid-depth (2) The average of the impact, WSR 45C and WSR 46 station readings are **< 4 mg L^{-1}** and Significantly less than the reference stations mean DO (at the same tide of the same day)
	Bottom The average of the impact, WSR 45C and WSR 46 station readings are < 5%-ile of baseline data for bottom layers = **3.12 mg L^{-1}** and Significantly less than the reference stations mean DO (at the same tide of the same day)	Bottom The average of the impact station, WSR 45C and WSR 46 readings are **< 2 mg L^{-1}** and Significantly less than the reference stations mean DO (at the same tide of the same day)
Depth-averaged Suspended Solids (SS) (3) (4)	The average of the impact, WSR 45C and WSR 46 station readings are > 95%-ile of baseline data for depth average = **21.60 mg L^{-1}** and 120% of control station's SS at the same tide of the same day	The average of the impact, WSR 45C and WSR 46 station readings are > 99%-ile of baseline data for depth average = **40.10 mg L^{-1}** and 130% of control station's SS at the same tide of the same day
Depth-averaged Turbidity (Tby) (3) (4)	The average of the impact, WSR 45C and WSR 46 station readings are > 95%-ile of baseline data = **25.04 NTU** and 120% of control station's Tby at the same tide of the same day	The average of the impact, WSR 45C and WSR 46 station readings are > 99%-ile of baseline data = **32.68 NTU** and 130% of control station's Tby at the same tide of the same day

Notes:

(1) For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.

(2) The Action and Limit Levels for DO for Surface & Middle layers were calculated from the combined pool of baseline surface layer data and baseline middle layer data.

(3) "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.

(4) For turbidity and SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

Table C2 In-situ Monitoring Results for Routine Water Quality Monitoring of CMP 2 in February 2015

Sampling Period	Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%)	Dissolved Oxygen (mg L^{-1})	pH (mg L^{-1})
February 2015	RFF (Reference)	16.83	29.79	5.35	101.61	8.23	8.04
	IPF (Impact)	16.85	30.47	6.32	99.34	8.01	8.04
	INF (Intermediate)	16.91	31.22	2.35	94.81	7.60	8.03
	Ma Wan	16.86	31.23	1.43	95.71	7.68	8.02
	Shum Shui Kok	16.82	30.34	2.51	100.70	8.13	8.06
	Tai Mo To	16.88	30.56	4.38	99.27	8.00	8.04
	Tai Ho Bay 1	16.87	30.24	8.28	101.38	8.18	8.06
	Tai Ho Bay 2	16.62	29.75	7.67	97.42	7.93	7.37
	WQO	N/A	26.81-32.76#	N/A	N/A	>4	6.5-8.5

Notes:
#Not exceeding 10% of natural ambient level which is the result obtained from the Reference Station.
Cell shaded yellow / red indicate value exceeding the Action/Limit levels.

Table C3 Laboratory Results for Routine Water Quality Monitoring of CMP 2 in January and February 2015

Sampling Period	Stations	As (µg/L)	Cd (µg/L)	Cr (µg/L)	Cu (µg/L)	Pb (µg/L)	Hg (µg/L)	Ni (µg/L)	Ag (µg/L)	Zn (µg/L)	NH_3 (mg/L)	TIN (mg/L)	BOD_5 (mg/L)	SS (mg/L)
January 2015	RFF	1.86	<LOR	0.88	7.74	0.79	<LOR	2.18	<LOR	5.99	0.24	0.38	2.14	13.29
	IPF	1.78	<LOR	0.81	4.21	0.94	<LOR	2.13	<LOR	7.90	0.22	0.38	1.14	8.08
	INF	2.12	<LOR	0.70	1.96	0.80	<LOR	2.11	<LOR	12.26	0.22	0.38	0.89	4.99
	Ma Wan	2.41	<LOR	0.71	3.31	0.80	<LOR	3.18	<LOR	10.76	0.13	0.28	2.05	6.14
	Shum Shui Kok	1.29	<LOR	0.88	4.08	0.78	<LOR	1.69	<LOR	11.50	0.18	0.32	1.88	4.00
	Tai Mo To	2.50	<LOR	0.73	1.36	0.73	<LOR	1.29	<LOR	11.58	0.24	0.38	2.16	6.43
	Tai Ho Bay 1	1.53	<LOR	0.75	2.88	0.50	<LOR	1.43	<LOR	10.70	0.26	0.45	4.38	14.31
	Tai Ho Bay 2	2.16	<LOR	0.64	3.73	0.59	<LOR	1.13	<LOR	1.50	0.36	0.60	2.76	6.24
February 2015	RFF	1.86	<LOR	0.81	7.02	0.83	<LOR	1.87	<LOR	10.08	0.26	0.67	1.93	7.65
	IPF	2.51	<LOR	0.78	3.34	0.77	<LOR	1.76	<LOR	7.65	0.22	0.54	1.75	98.2
	INF	1.93	<LOR	0.76	2.39	0.73	<LOR	2.50	<LOR	9.94	0.19	0.47	1.69	5.45
	Ma Wan	2.04	<LOR	0.80	1.31	0.63	<LOR	3.18	<LOR	19.13	0.19	0.44	1.61	1.61
	Shum Shui Kok	2.74	<LOR	0.99	8.86	0.86	<LOR	0.88	<LOR	9.23	0.26	0.61	3.14	6.50
	Tai Mo To	1.90	<LOR	0.84	5.56	0.95	<LOR	1.41	<LOR	16.21	0.23	0.55	3.60	7.84
	Tai Ho Bay 1	2.69	<LOR	0.90	0.90	0.84	<LOR	1.89	<LOR	8.31	0.19	0.53	1.19	8.75
	Tai Ho Bay 2	2.14	<LOR	0.73	1.30	0.80	<LOR	1.50	<LOR	4.74	0.16	0.50	2.25	6.74
												WQO of TIN: 0.5 mg/L		
												Dry Season WQO of SS : 13.7 mg/L		

Note: Cell shaded yellow / red indicate value exceeding the Action/Limit levels.
Cell shaded grey indicate value exceeding the WQO.

Table C4 Water Column Profiling Results for CMP 2 on 2 February 2015

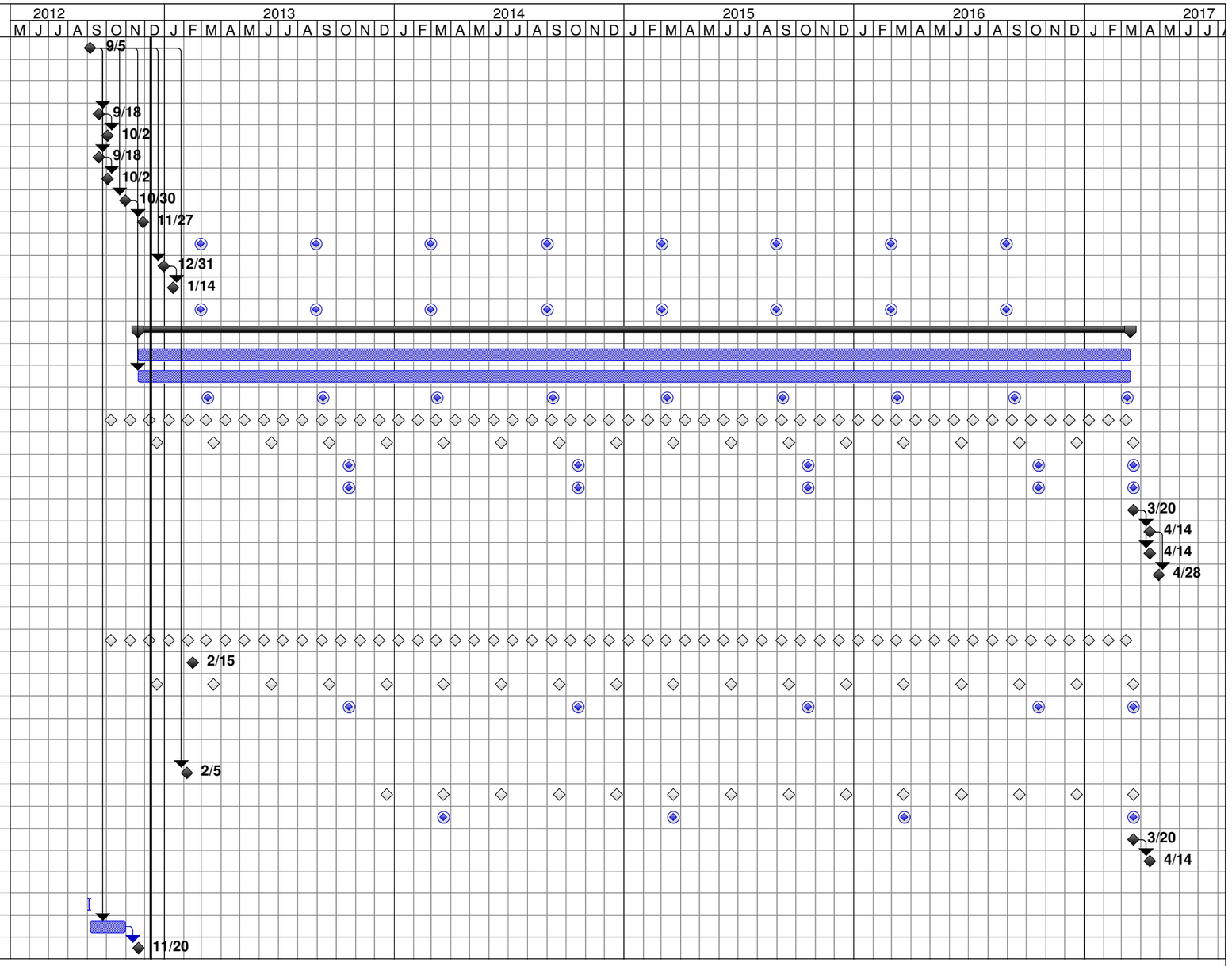
Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%)	Dissolved Oxygen (mg L^{-1})	pH (mg L^{-1})	Suspended Solids (mg L^{-1})
WCP 1 (Downstream)	17.36	30.58	7.18	94.01	7.50	8.11	7.45
WCP 2 (Upstream)	17.42	30.54	5.03	95.64	7.62	8.09	6.48
WQO (dry season)	N/A	28.13-34.73#	N/A	N/A	>4	6.5-8.5	13.7

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

Annex D

Study Programme

Task Name
Project Commencement
For South Brothers CMPs and East of Sha Chau CMPs
Submission of Draft Inception Report & Draft Programme
Submission of Final Inception Report & Final Programme
Submission of Draft EM&A Manual (First Review)
Submission of Final EM&A Manual (First Review)
Submission of Draft EM&A Manual (Second Review)
Submission of Final EM&A Manual (Second Review)
Submission of Subsequent EM&A Manual Updates
Submission of Draft Operations Manual
Submission of Final Operations Manual
Submission of Operations Manual Updates
Monitoring Contracts
Regular Site Inspections of CMP Contractors
Participate in Liaison Group Meetings/ Consultations as required by CEDD
Submission of Report on Dredging & Capping Operations
Submission of Monthly Progress Report
Submission of Quarterly EM&A Report
Submission of Annual Review Report
Submission of Annual Risk Assessment Report
Submission of Draft Final Report
Submission of the Final Report
Submission of Draft Executive Summary Report
Submission of Final Executive Summary Report
For East Tung Lung Chau Disposal Facility
Submission of Monitoring Results & Monthly EM&A Progress Report
Submission of Initial Review Report (assume disposal commences in November 2012)
Submission of Quarterly EM&A Report
Submission of Annual Report
Alternative / Modified Capping Design
Submission of Investigation Report
Submission of Quarterly Report
Submission of Annual Report
Submission of Draft Final Report
Submission of the Final Report
Baseline Pelagic and Demersal Fisheries Survey
Baseline Shrimp Trawl & Hang Trawl Surveys, twice before SB CMPs dredging
Submission of Baseline Pelagic and Demersal Fisheries Survey Report



Study Programme	Task	Milestone	Summary	Rolled Up Task	Rolled Up Milestone

Agreement No. CE 23/2012 (EP) Environmental Monitoring and Audit for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau (2012-2017) - Investigation