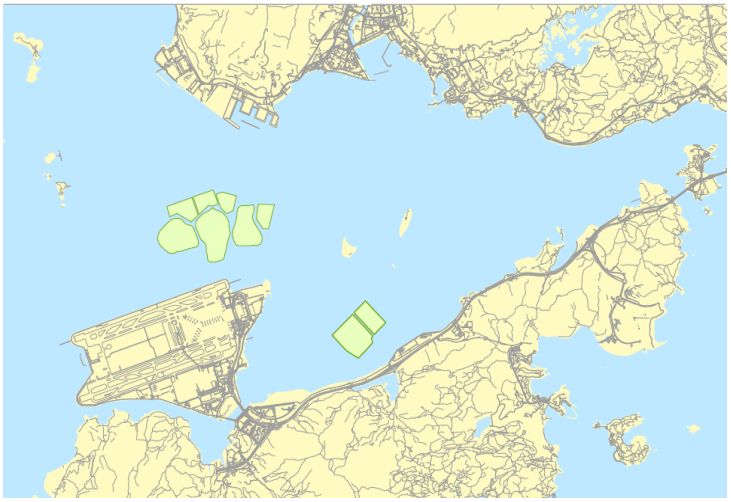

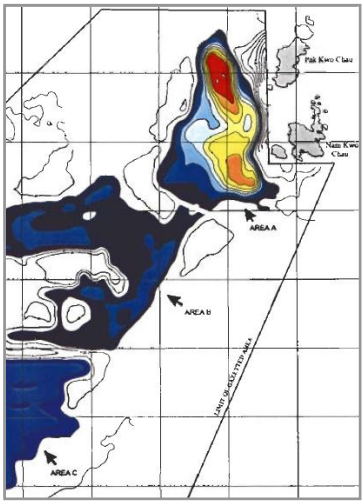

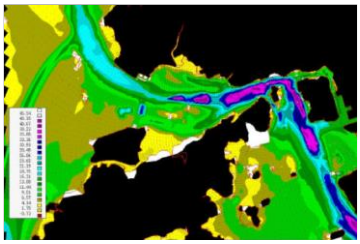

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Civil Engineering and Development Department

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)

35th Monthly Progress Report for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau – July 2015

Revision 0

14 August 2015

Environmental Resources Management
16/F Berkshire House
25 Westlands Road
Quarry Bay, Hong Kong
Telephone (852) 2271 3000
Facsimile (852) 2723 5660
www.erm.com

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

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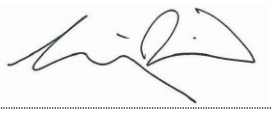
Environmental Resources Management

16/F
Berkshire House
25 Westlands Road
Quarry Bay
Hong Kong
Telephone: (852) 2271 3000
Facsimile: (852) 2723 5660
E-mail: post.hk@erm.com
http://www.erm.com

Client:	Project No:
Civil Engineering and Development Department (CEDD)	0175086
Summary: This document presents the 35th monthly progress report for Contaminated Mud Pits at the South of The Brothers and at East Sha Chau.	Date: 14 August 2015 Approved by:  Craig A. Reid *Partner*

Revision	Description	By	Checked	Approved	Date
v0	35th Monthly Progress Report for ESC CMPs and SB CMPs	CY	JT	CAR	14/8/15

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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:	35th Monthly Progress Report for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau – July 2015
Date of Report:	14 August 2015
Date prepared by ET:	14 August 2015
Date received by IA:	14 August 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.

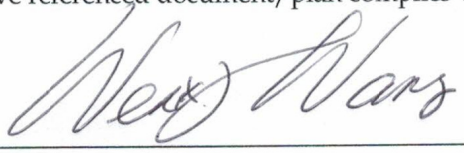
ET Certification

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: 14/8/2015

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: 14/8/2015

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

35TH MONTHLY PROGRESS REPORT FOR JULY 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))

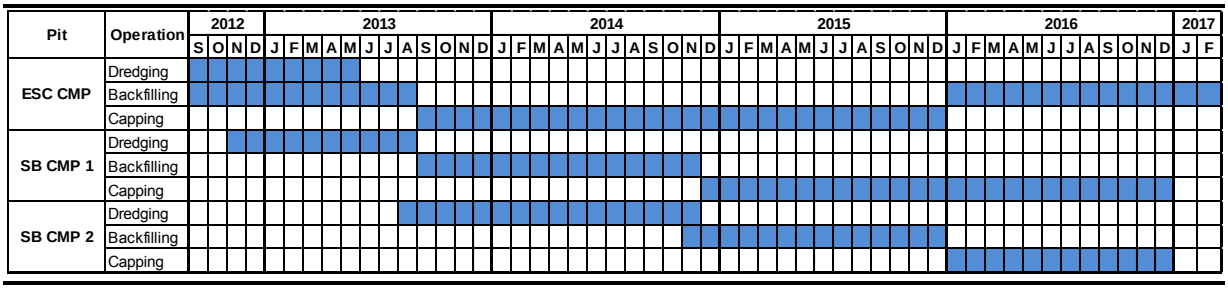
(4) Under the CEDD study *Contaminated Sediment Disposal Facility to the South of The Brothers (Agreement No. FM 2/2009)*

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 July 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 *35th Monthly Progress Report* covers the EM&A activities for the reporting month of July 2015.

1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES

1.3.1 No monitoring activity has been undertaken for ESC CMPs in July 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 July 2015:

- *Routine Water Quality Monitoring* of CMP 2 was undertaken on 6 July 2015;
- *Water Column Profiling* of CMP 2 was undertaken on 7 July 2015*;*
- *Pit Specific Sediment Chemistry* of CMP 2 was undertaken on 8 July 2015*;* and
- *Demersal Trawling* was undertaken on 27 and 28 July 2015.

1.4 DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS

1.4.1 No outstanding sampling remained for July 2015.

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

1.5 BRIEF DISCUSSION OF THE MONITORING RESULTS FOR SB CMPS

1.5.1 Brief discussion of the monitoring results of the following activities for SB CMPs is presented in this *35th Monthly Progress Report*:

- *Pit Specific Sediment Chemistry* of CMP 2 in June and July 2015;
- *Cumulative Specific Sediment Chemistry* of CMP 2 in June 2015;
- *Routine Water Quality Monitoring* of CMP 2 in July 2015;
- *Water Column Profiling* of CMP 2 in July 2015; and
- *Sediment Chemistry after a Major Storm* of CMP 2 in 15 July 2015.

1.5.2 ***Pit Specific Sediment Chemistry of CMP 2 – June and July 2015***

1.5.3 Monitoring locations for *Pit Specific Sediment Chemistry for CMP 2* are shown in *Figure 1.2*. A total of six (6) monitoring stations were sampled in June and July 2015.

1.5.4 Copper exceeded the Lower Chemical Exceedance Level (LCEL) at Active Pit station SB-NPBB in June 2015 and the Upper Chemical Exceedance Level (UCEL) at Active Pit station SB-NPBA in June and July 2015. In addition, Silver exceeded the LCEL at Active Pit stations SB-NPBA and SB-NPBB in June 2015 and the UCEL at Active Pit station SB-NPBA in July 2015. Exceedances of LCEL were also recorded for Mercury at Active Pit station SB-NPBB and Zinc at Active Pit station SB-NPBA. The concentrations of other inorganic contaminants (Cadmium, Chromium, Lead, Nickel and Arsenic in June and July 2015 & Mercury and Zinc in June 2015) were lower than the LCEL at all stations. As higher Copper, Silver, Mercury and Zinc concentrations were recorded within the Active Pit stations only which were receiving contaminated mud during the reporting month, there is no evidence indicating any dispersal of contaminants from the active pit.

1.5.5 For organic contaminants, the concentrations of Total Organic Carbon (TOC) were similar at all stations in June and July 2015. Tributyltin (TBT) concentrations were observed to be higher at Active Pit station SB-NPBA in June and July 2015 (*Figure 4* and *9* of *Annex B*). Low and High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs), Total Polychlorinated Biphenyls (PCBs), 4,4'-dichlorodiphenyldichloroethylene (DDE) and Total dichlorodiphenyltrichloroethane (DDT) concentrations were below the limit of reporting at most stations in June and July 2015 (except High MW PAHs at Active Pit station SB-NPBA in June 2015 and at Active Pit stations SB-NPBA and SB-NPBB in July 2015) (*Figure 5* and *10* 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 2 in June and July 2015. Statistical analysis will be undertaken and presented in the quarterly report to investigate whether there are any unacceptable impacts in the area caused by the contaminated mud disposal.

1.5.7 ***Cumulative Impact Sediment Chemistry of SB CMPs – June 2015***

1.5.8 Monitoring locations for *Cumulative Impact Sediment Chemistry for SB CMPs* are shown in *Figure 1.3*. A total of eleven (11) monitoring stations were sampled in June 2015.

1.5.9 Analyses of results for the *Cumulative Impact Sediment Chemistry Monitoring* indicated that the concentrations of all inorganic contaminants were below the Lower Chemical Exceedance Level (LCEL) in June 2015 (*Figures 11* and *12* of *Annex B*).

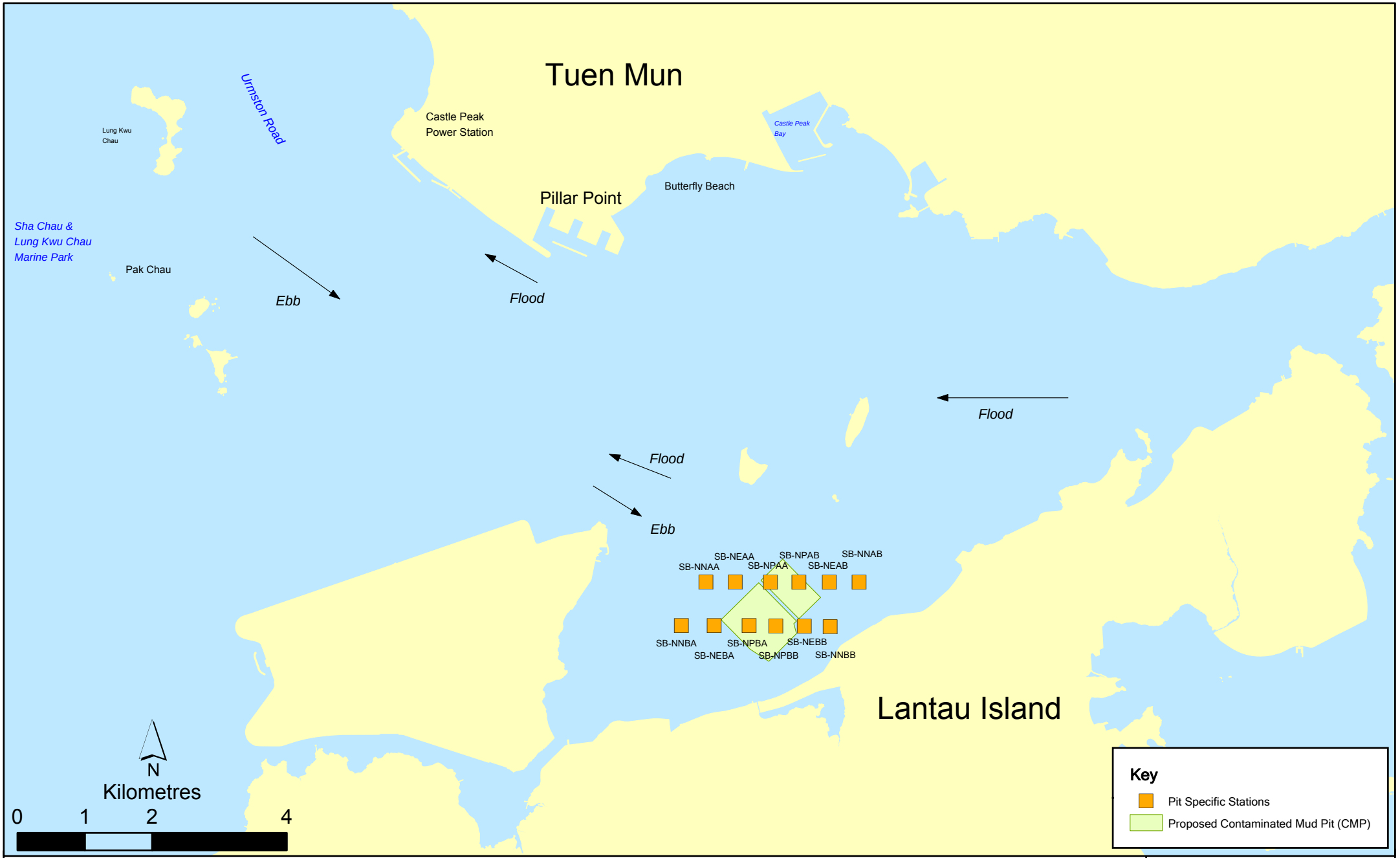


Figure 1.2

Pit Specific Sediment Quality Monitoring Stations for South Brothers Facility

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Date: 12/12/2012

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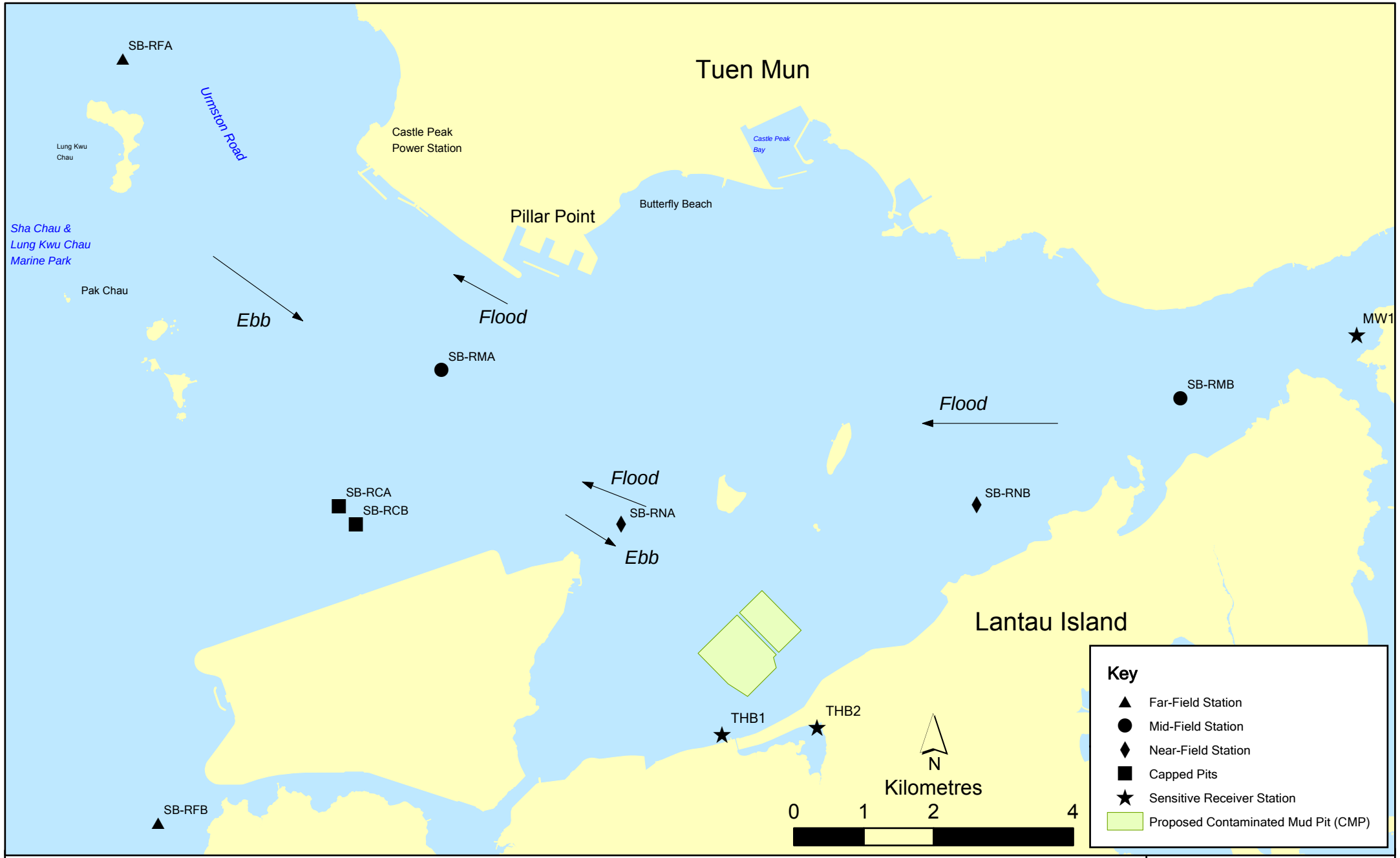

Figure 1.3

Cumulative Impacts Sediment Quality Monitoring Stations for South Brothers Facility

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Date: 11/12/2012

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1.5.10 For organic contaminants, concentration of TOC at Tai Ho Bay Station 2 (THB2) was recorded to be higher than other stations (*Figure 13* of *Annex B*). Concentrations of TBTs were recorded to be higher at Near-field station SB-RNB, Mid-field SB-RMB and Ma Wan station (*Figure 14* of *Annex B*). Total DDT, 4,4'-DDE, Total PCBs as well as Low and High Molecular Weight PAHs were recorded below the limit of reporting at most stations, except High Molecular Weight PAHs at Capped Pit station SB-RCA and Tai Ho Bay Station 1 (THB1) (*Figure 15* of *Annex B*).

1.5.11 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 June 2015. Statistical analysis will be undertaken and presented in the quarterly report to investigate whether there are any unacceptable impacts in the area caused by the contaminated mud disposal.

1.5.12 ***Routine Water Quality Monitoring of SB CMP 2 – July 2015***

1.5.13 The monitoring results for the Routine Water Quality Monitoring conducted in July 2015 in the wet season have been assessed for compliance with the Water Quality Objectives (WQOs) set by EPD. This consists of a review of the EPD routine water quality monitoring data for the wet season period (April to October) of 2004 - 2013 from stations in the Northwestern Water Control Zone, where the CMPs are located [1]. For Salinity, the averaged value obtained from the Reference stations was used for the basis as the WQO. Levels of Dissolved Oxygen (DO) and Turbidity 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 16-26* of *Annex B* and Tables C2 and C3 of Annex C. A total of twenty (20) monitoring stations were sampled in July 2015 as shown in *Figure 1.4*.

In-situ Measurements

[1] http://epic.epd.gov.hk/EPICRIVER/marine/?lang=en

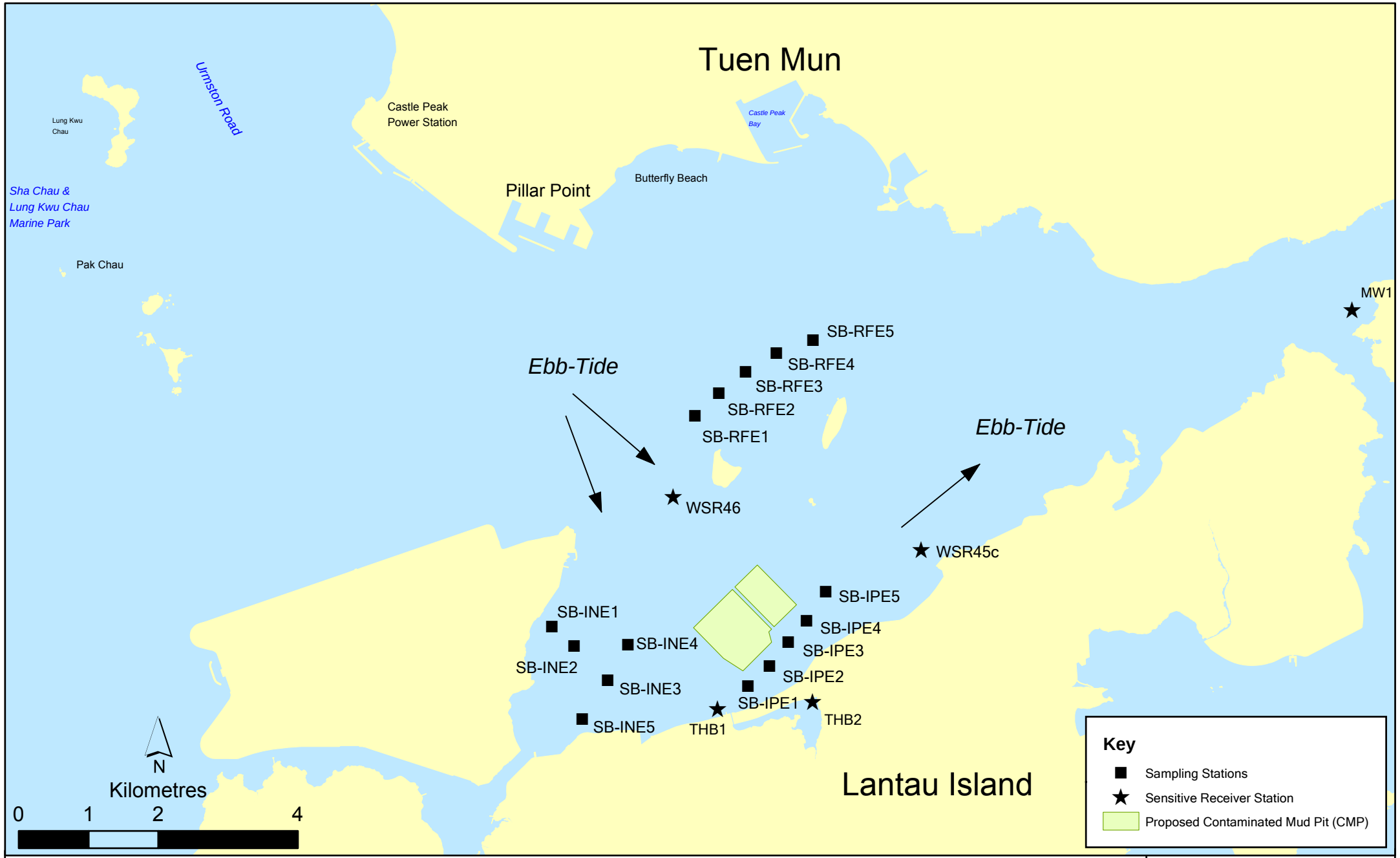

Figure 1.4

Routine Water Quality Sampling Stations (Ebb-Tide) for South Brothers Facility

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Date: 11/12/2012

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1.5.14 Graphical presentation of the monitoring results (Temperature, DO, pH, Salinity and Turbidity) is shown in *Figures 16-21* of *Annex B.* Analyses of results for July 2015 indicated that the levels of pH complied with the WQOs at all stations (Impact, Intermediate, Reference and Water Sensitive Receiver stations) in July 2015 (*Figure 16 of Annex B*). Levels of DO complied with the WQO at most stations except at Reference and Tai Mo To stations (*Figures 17* and *18 of Annex B)*. As Tai Mo To station is located further from the CMP 2 and a low DO level was also recorded at Reference station, it is considered that the WQO exceedance of DO at these stations were possibly caused by the natural background variation in water quality of the area, instead of the disposal operation at CMP 2.

1.5.15 The levels of Salinity at Impact, Intermediate and Water Sensitive Receiver stations exceeded the WQO in July 2015 (*Figure 20* of *Annex B*). The lower Salinities recorded at these stations, which lead to exceedance of the WQO, is likely to be caused by the freshwater discharged from the Pearl River Delta during the summer months which tend to form a surface layer of low salinity water at these stations with shallower depth when compared with the Reference stations.

1.5.16 The levels of DO and Turbidity complied with the Action and Limit Levels at all stations (*Figures 18* and *21* of *Annex B*; *Table C1* of *Annex C*).

1.5.17 Overall, *in-situ* measurement results of the *Routine Water Quality Monitoring* indicated that the disposal operation at CMP 2 did not appear to cause any unacceptable impacts in water quality in July 2015.

Laboratory Measurements

1.5.18 Laboratory analysis of July 2015 results indicated that concentrations of Cadmium, Chromium and Silver were below their limit of reporting at all stations. Arsenic, Copper, Lead, Mercury, Nickel and Zinc were detected in July 2015 samples and the concentrations were similar amongst stations (*Figures 22-23* of *Annex B*). Results of laboratory analysis were shown in *Table C3* of *Annex C*.

1.5.19 For nutrients, concentrations of Total Inorganic Nitrogen (TIN) at all stations in July 2015 exceeded the WQO (0.5mg/L) (*Figures 24 of Annex B*). It is important to note that due to the effect of the Pearl River discharges, the North Western WCZ has historically experienced higher levels of TIN (1) . Therefore, the exceedances of TIN WQO at all stations in July 2015 were unlikely to be caused by the disposal operation at CMP 2. Ammonia Nitrogen (NH3-N) concentration was relatively similar amongst all stations (*Figures 24 of Annex B*). Levels of 5-day Biochemical Oxygen Demand (BOD_5) appear to be higher at Tai Ho Bay 1 station in July 2015 (*Figures 25 of Annex B*).

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

1.5.20 Concentrations of SS exceeded the WQO (11.6 mg/L for wet season) at Impact, Intermediate and Reference stations in July 2015. Since exceedance and higher level of SS was also recorded at Reference station, exceedances at Impact and Intermediate stations were considered to be due to natural background fluctuation in this area of Hong Kong. Concentrations of SS complied with the Action and Limit Levels at all stations in July 2015 (*Figure 26* of *Annex B*; *Table C3* of *Annex C*).

1.5.21 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 July 2015. Detailed statistical analysis will be presented in the Quarterly Report to investigate any spatial and temporal trends of potential concern.

1.5.22 ***Water Column Profiling of CMP 2 – July 2015***

1.5.23 *Water Column Profiling* was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 7 July 2015. The water quality monitoring results have been assessed for compliance with the WQOs as discussed in *Section 1.5.13*. The monitoring results were also compared with the Action and Limit Levels set in *Baseline Monitoring Report* (see *Table C2* of *Annex C* for details).

In-situ Measurements

1.5.24 Analyses of results for July 2015 indicated that levels of pH complied with the WQOs at both Downstream and Upstream stations (*Table C4* of *Annex C*). Salinity and DO at Downstream station did not comply with the WQO. The non-compliance of Salinity was possibly caused by the stratification of seawater during summer when the freshwater discharged from the Pearl River tended to form a surface layer of lower salinity water, which is probably responsible for the lower salinity recorded at the shallower Upstream station compared to the higher salinity recorded at the deeper Downstream station. DO and Turbidity at all stations complied with the Action and Limit Levels and the exceedance of DO WQO at the Downstream station thus did not appear to indicate any unacceptable water quality impact from the mud disposal operation (*Tables C1* and *C4* of *Annex C*).

Laboratory Measurements for SS

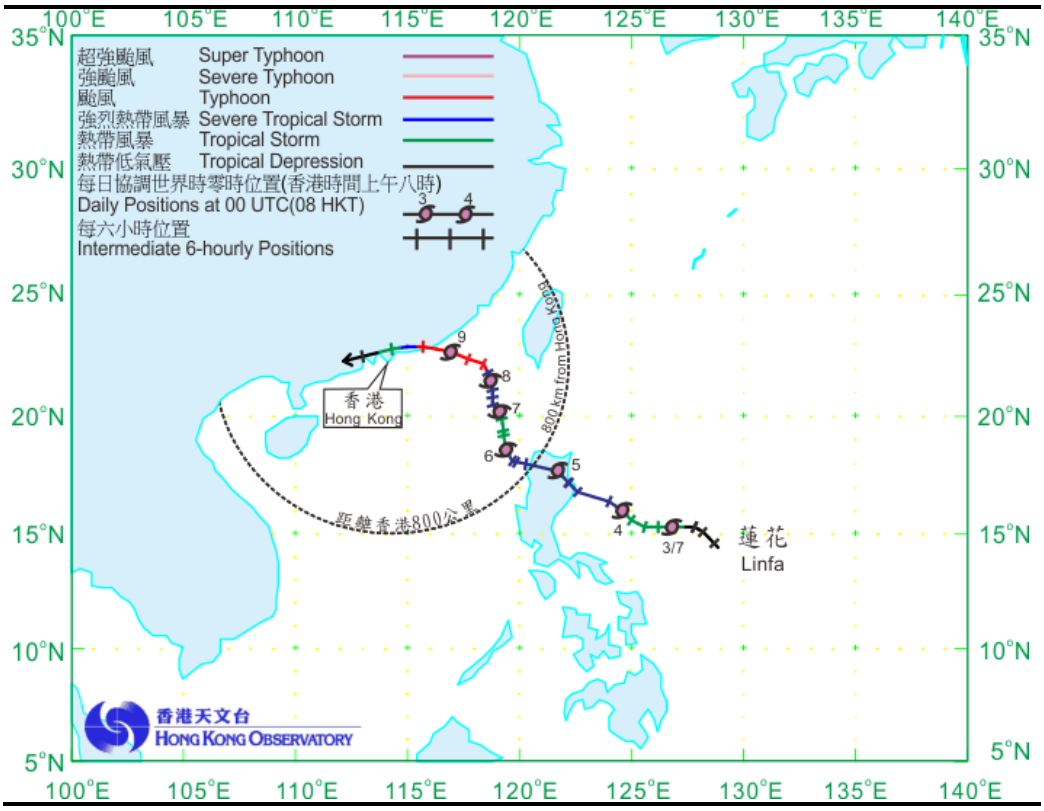
1.5.25 Analyses of results for June 2015 indicated that the SS levels at both Upstream and Downstream stations complied with the WQO. Both Upstream and Downstream stations also complied with the Action and Limit Levels (*Tables C2 and C3* of *Annex C*).

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.

1.5.26 ***Sediment Chemistry after a Major Storm of CMP 2 – July 2015***

1.5.27 Sampling for Sediment Chemistry after a Major Storm Event was conducted at eleven (11) monitoring stations (*Figure 1.2*) on 15 July 2015 after the visit of Typhoon Linfa, which led to the issue of Gale or Storm Wind Signal No.8 on 9 July 2015. The track of Linfa is shown in *Figure 1.5*.

Figure 1.5 ***Track of Typhoon Linfa from 2 to 10 July 2015*** ***(Source: Hong Kong Observatory)***



1.5.28 Analyses of results for the *Sediment Chemistry after a Major Storm* indicated that the concentrations of most inorganic contaminants, except Mercury, were below the LCEL (*Figures 27* and *28* of *Annex B*). Concentration of Mercury exceeded the LCEL at Capped Pit station SB-RCB, Near Field stations SB-RNA and RNB and Mid field station SB-RMA. As lower Mercury concentrations were recorded at the Capped Pit stations, it is considered that the exceedances of Mercury LCEL at these stations were unlikely to be caused by the failure of the cap in retaining contaminated sediment within the mud pit.

1.5.29 Overall, there appeared to be no evidence showing the failure of CMPs in retaining disposed mud or causing contamination of sediments after the major storm event in July 2015.

1.5.30 ***Activities Scheduled for the Next Month***

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

- *Pit Specific Sediment Chemistry of CMP 2;*
- *Cumulative Impact Sediment Chemistry of CMP 2;*
- *Water Quality Monitoring During Capping of CMP 1;*
- *Water Column Profiling of CMP 2;*
- *Routine Water Quality Monitoring of CMP 2;* and
- *Demersal Trawling for SB CMPs.*

1.5.32 The following monitoring activities will be conducted in the next monthly period of August 2015 for ESC CMPs:

- *Water Quality Monitoring During Capping of ESC CMPs;* and
- *Benthic Recolonisation Studies of ESC CMPs.*

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

1.6 STUDY PROGRAMME

1.6.1 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**
Near-Field Stations																																																				
ESC-TDA						*						*																														*										*	
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)

		2012				2013												2014												2015												2016												2017	
Routine Water Quality Monitoring		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 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)

Cumulative Impact Sediment Chemistry			2012						2013												2014												2015												2016												2017	
			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															
	SB-RNB	4 times per year														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															
	SB-RMB	4 times per year														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															
	SB-RFB	4 times per year														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															
	SB-RCB	4 times per year														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															
	THB1	4 times per year														12				12		12				12					12		12				12		12				12															
	THB2	4 times per year														12				12		12				12					12		12				12		12				12															

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																				

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																				*						*						*						*															

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			
	SB-IPE2	4 times per year																													3		3				3		3				3		3				3		3			
	SB-IPE3	4 times per year																													3		3				3		3				3		3				3		3			
	SB-IPE4	4 times per year																													3		3				3		3				3		3				3		3			
	SB-IPE5	4 times per year																													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			
	SB-INE2	4 times per year																													3		3				3		3				3		3				3		3			
	SB-INE3	4 times per year																													3		3				3		3				3		3				3		3			
	SB-INE4	4 times per year																													3		3				3		3				3		3				3		3			
	SB-INE5	4 times per year																													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			
	SB-RFE2	4 times per year																													3		3				3		3				3		3				3		3			
	SB-RFE3	4 times per year																													3		3				3		3				3		3				3		3			
	SB-RFE4	4 times per year																													3		3				3		3				3		3				3		3			
	SB-RFE5	4 times per year																													3		3				3		3				3		3				3		3			
Sensitive Receiver Stations																																																					
	MW1	4 times per year																													3		3				3		3				3		3				3		3			
	THB1	4 times per year																													3		3				3		3				3		3				3		3			
	THB2	4 times per year																													3		3				3		3				3		3				3		3			
	WSR45C	4 times per year																													3		3				3		3				3		3				3		3			
	WSR46	4 times per year																													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			
	SB-IPF2	4 times per year																													3		3				3		3				3		3				3		3			
	SB-IPF3	4 times per year																													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			
	SB-INF2	4 times per year																													3		3				3		3				3		3				3		3			
	SB-INF3	4 times per year																													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			
	SB-RFF2	4 times per year																													3		3				3		3				3		3				3		3			
	SB-RFF3	4 times per year																													3		3				3		3				3		3				3		3			
Sensitive Receiver Stations																																																					
	MW1	4 times per year																													3		3				3		3				3		3				3		3			
	THB1	4 times per year																													3		3				3		3				3		3				3		3			
	THB2	4 times per year																													3		3				3		3				3		3				3		3			
	WSR45C	4 times per year																													3		3				3		3				3		3				3		3			
	WSR46	4 times per year																													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																															12												12												12		
	SB-CPB	2 times per year																															12												12												12		
																																	12												12												12		
Reference Stations																																																									
	RBA	2 times per year																															12												12												12		
	RBB	2 times per year																															12												12												12		
	RBC	2 times per year																															12												12												12		

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

Annex B

Graphical Presentations

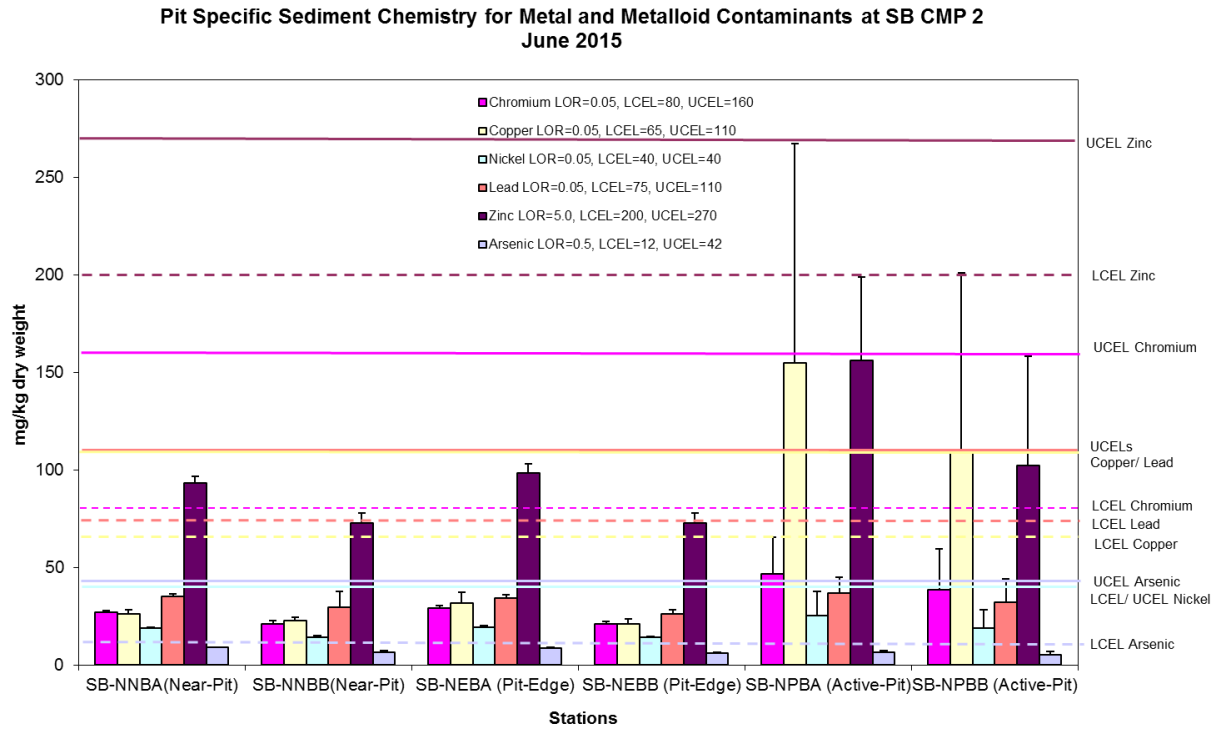


Figure 1: Concentration of Metals (Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in June 2015.

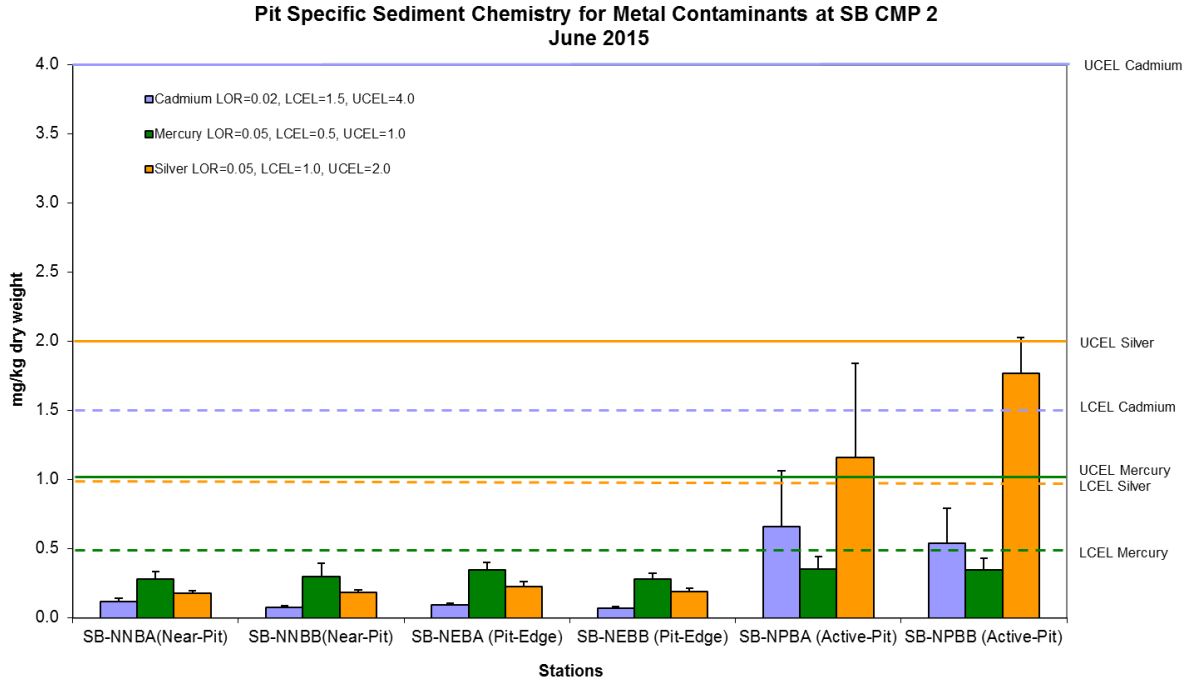


Figure 2: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in June 2015.

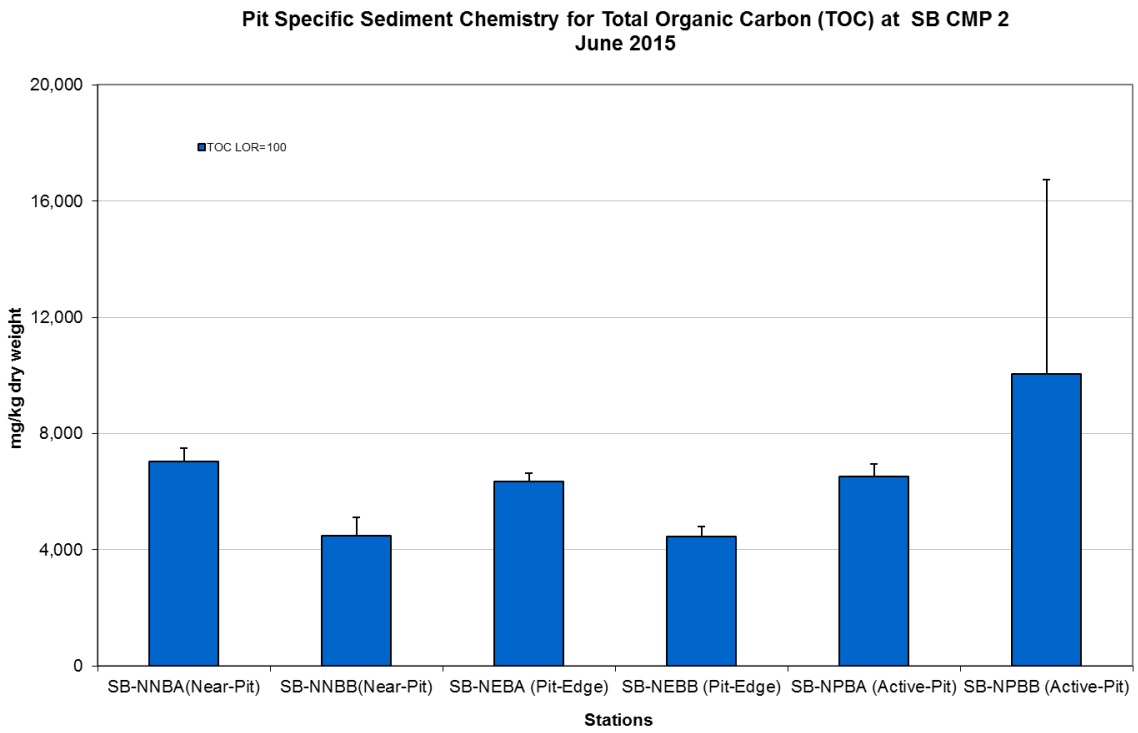


Figure 3: Concentration of Total Organic Carbon (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in June 2015.

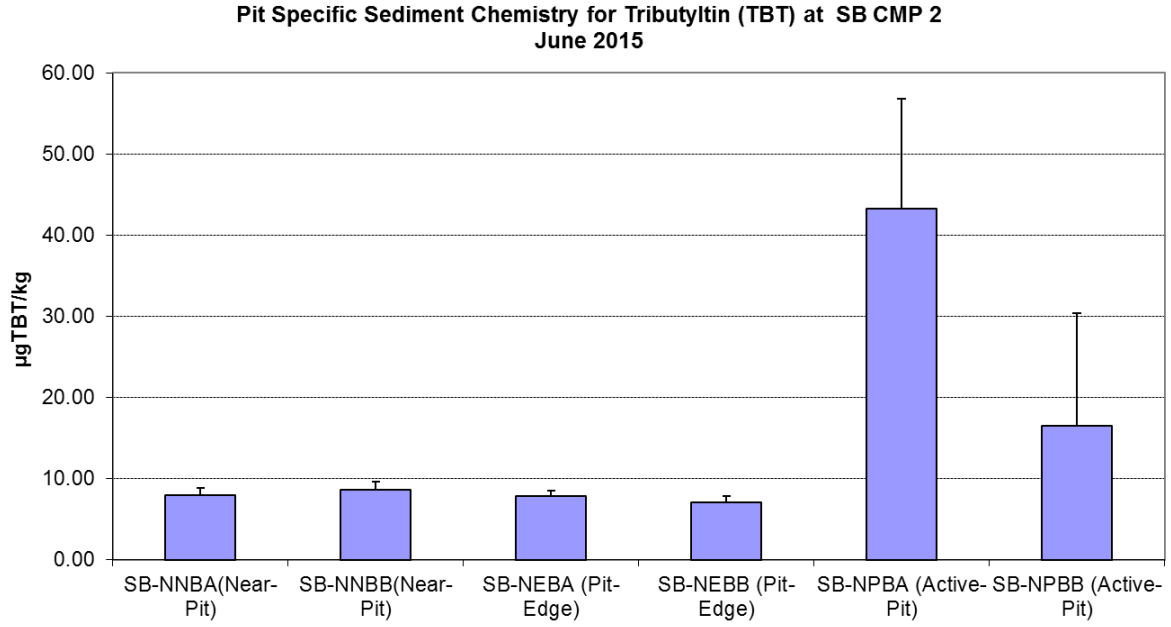


Figure 4: Concentration of Tributyltin (µg TBT/kg; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in June 2015.

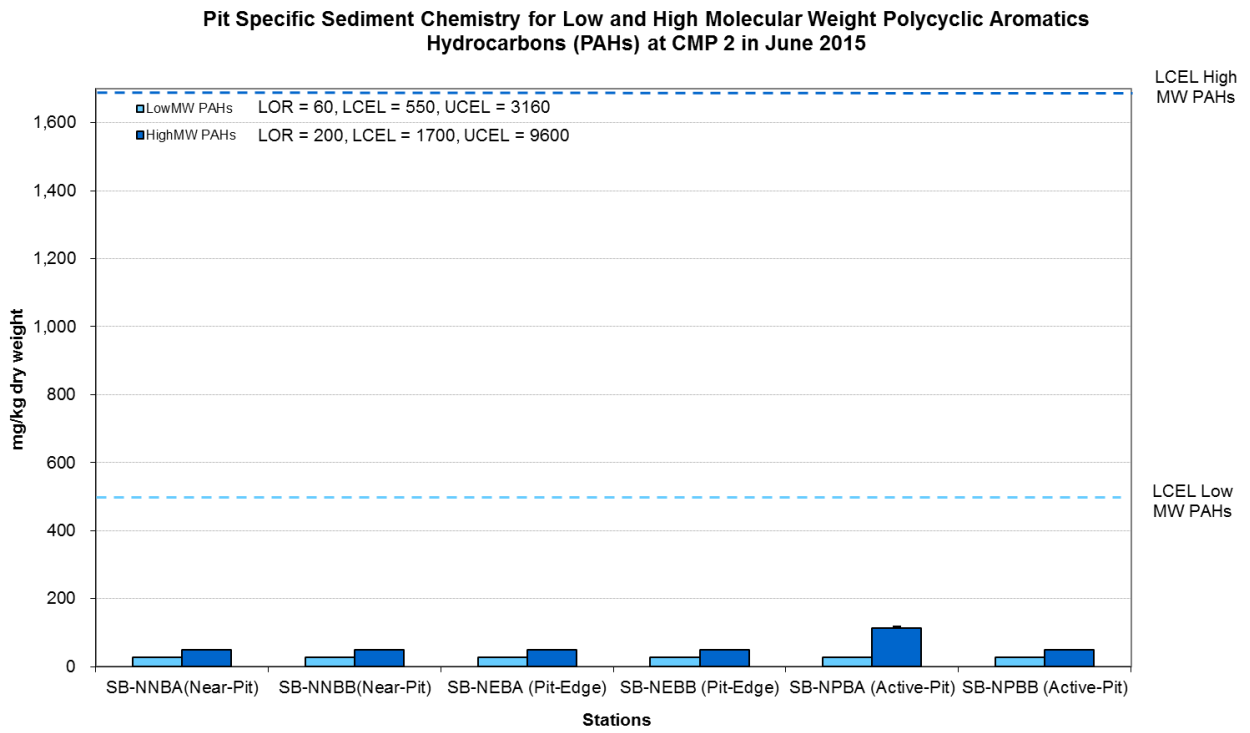


Figure 5: Concentration of Low and High Molecular Weight Polycyclic Aromatics Hydrocarbons (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in June 2015.

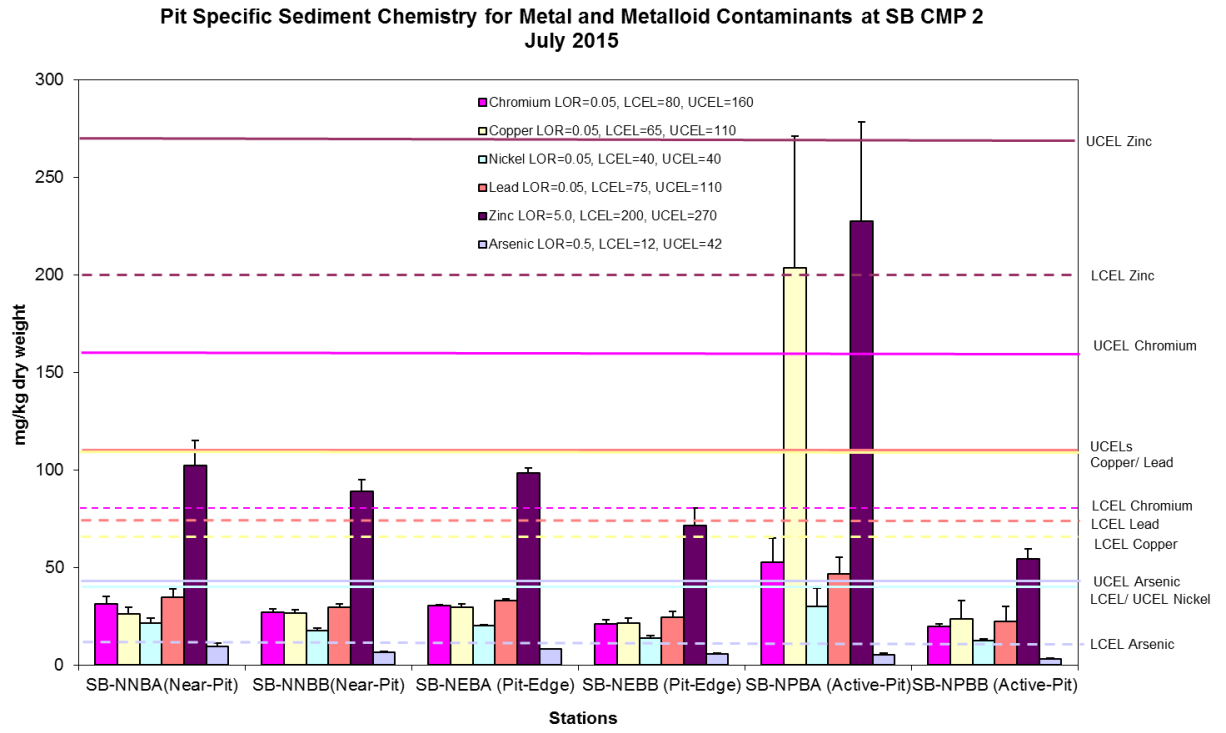


Figure 6: Concentration of Metals (Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in July 2015.

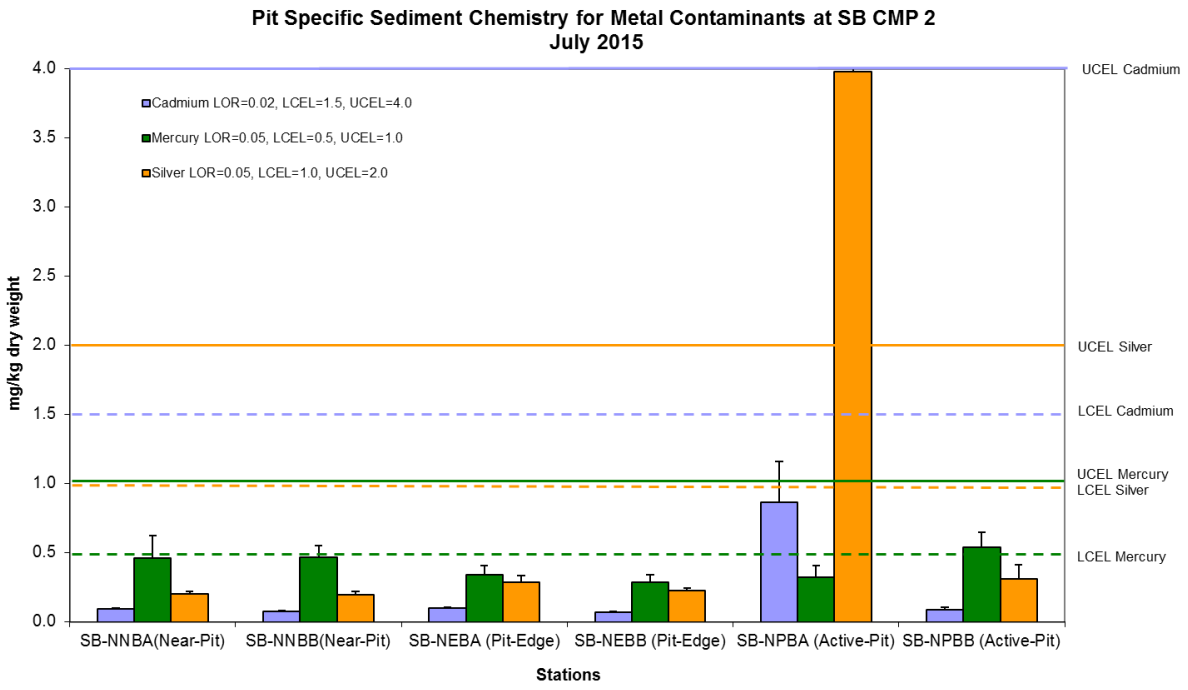


Figure 7: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in May 2015.

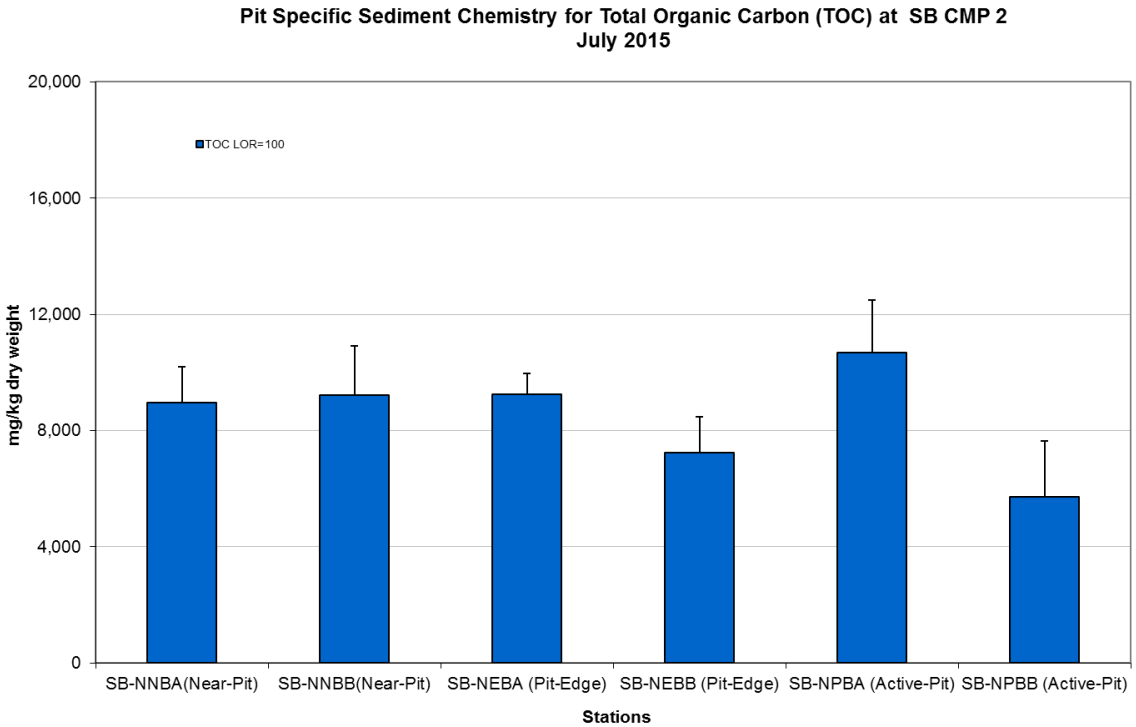


Figure 8: Concentration of Total Organic Carbon (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in July 2015.

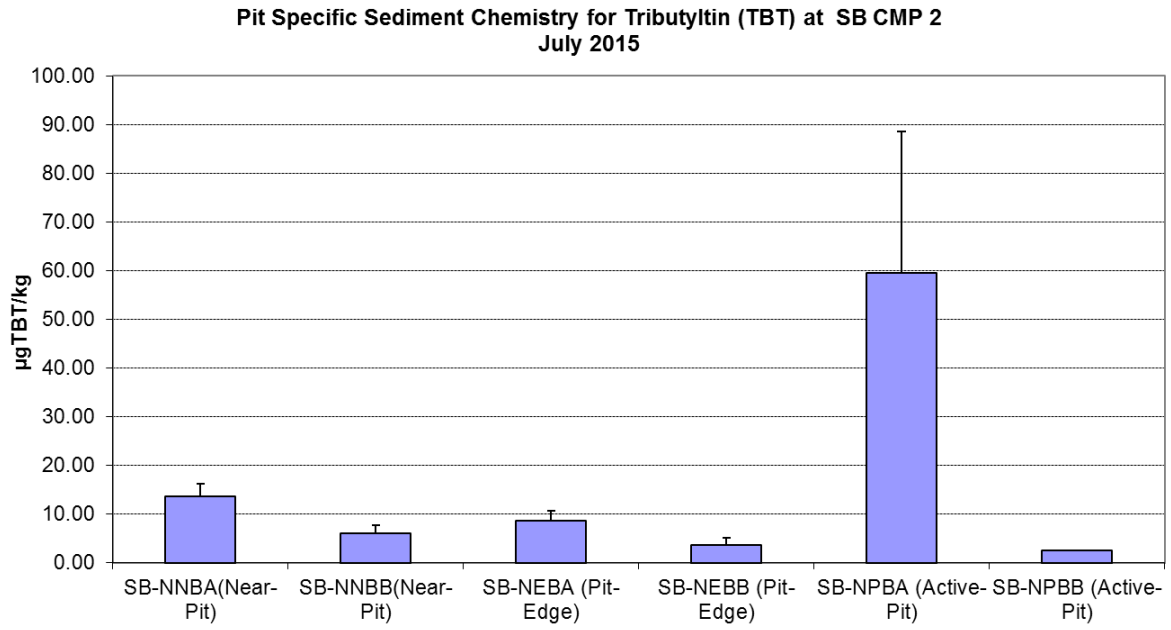


Figure 9: Concentration of Tributyltin (µg TBT/kg; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in July 2015.

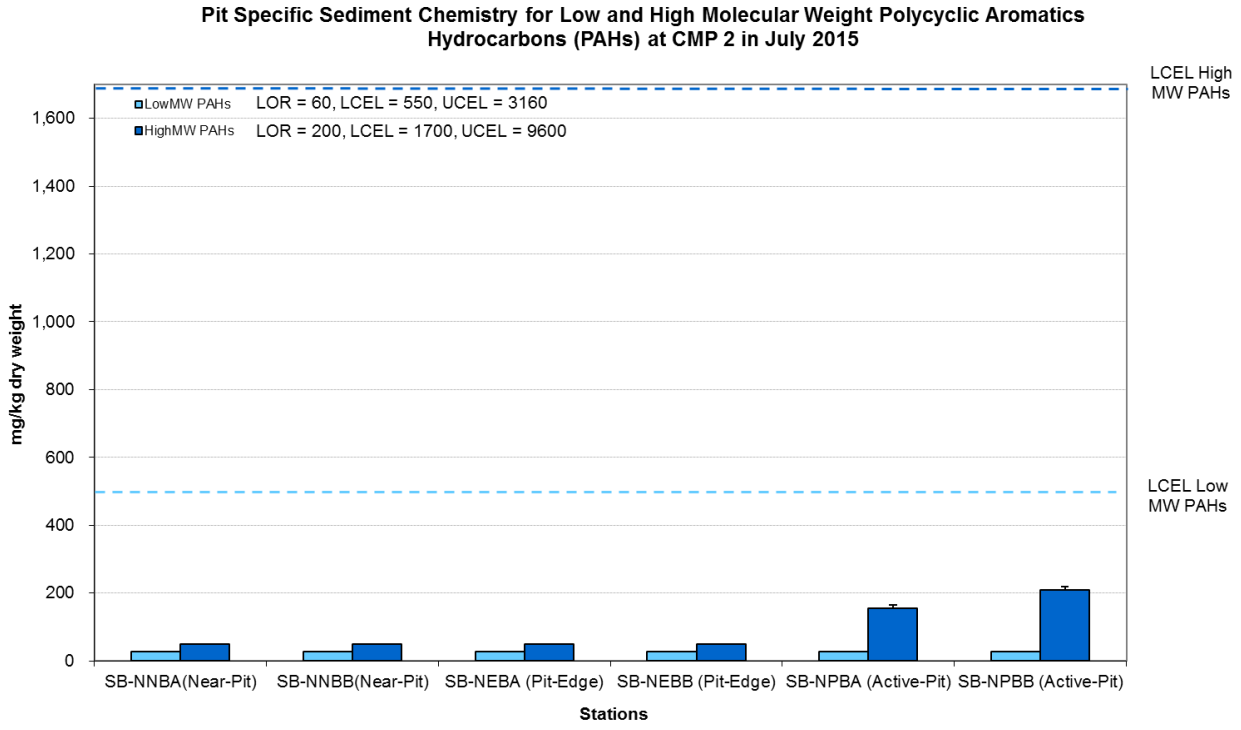


Figure 10: Concentration of Low and High Molecular Weight Polycyclic Aromatics Hydrocarbons (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for CMP 2 in July 2015.

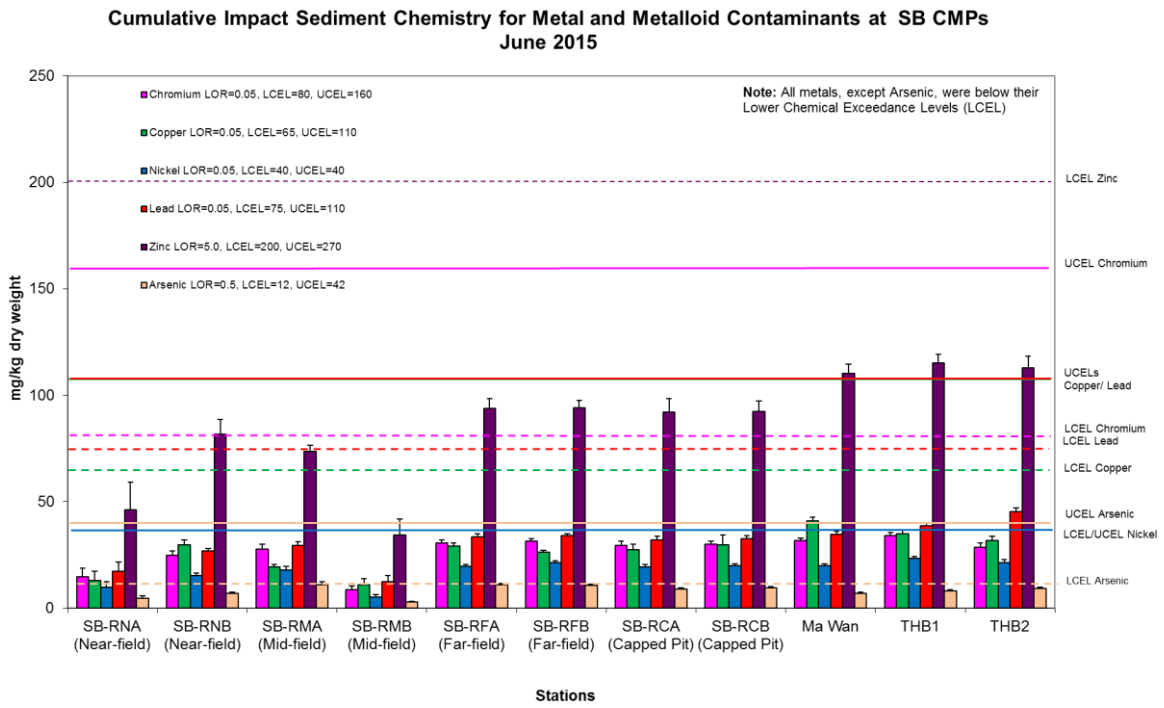


Figure 11: Concentration of Metals and Metalloid (Cr, Cu, Ni, Pb, Zn, As; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for SB CMPs in June 2015.

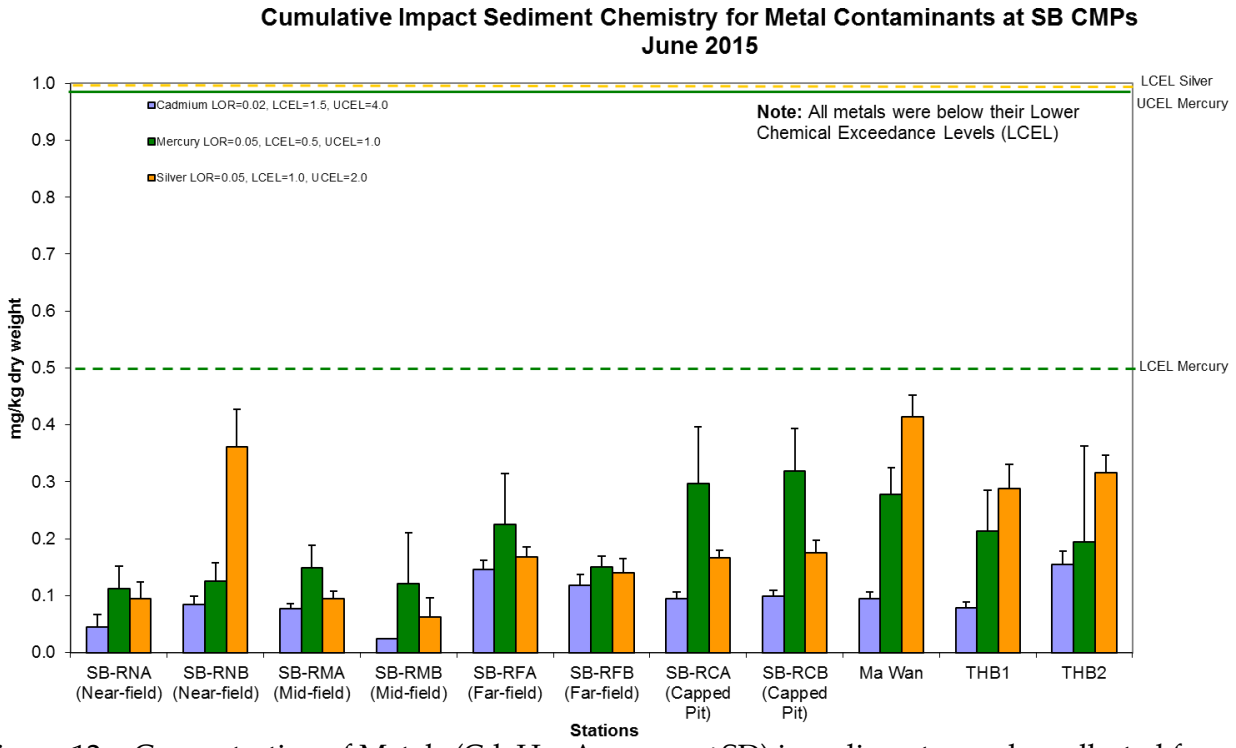


Figure 12: Concentration of Metals (Cd, Hg, Ag; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for SB CMPs in June 2015.

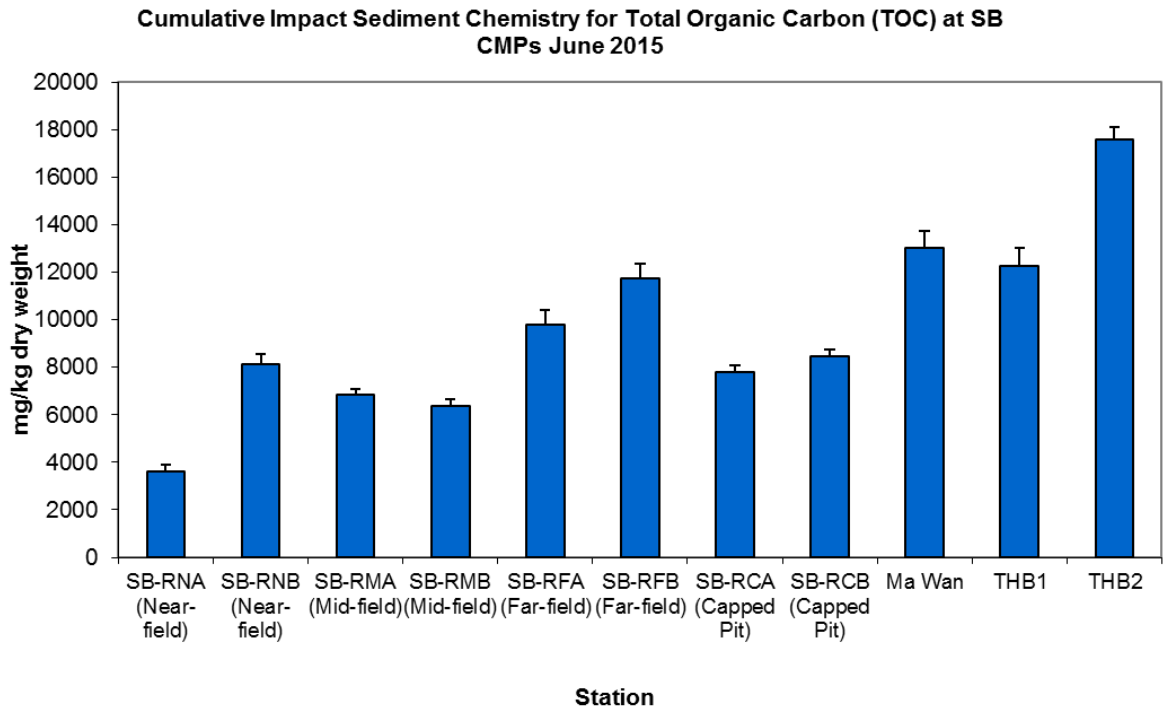


Figure 13: Concentration of Total Organic Carbon (mg/kg dry weight; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for SB CMPs in June 2015.

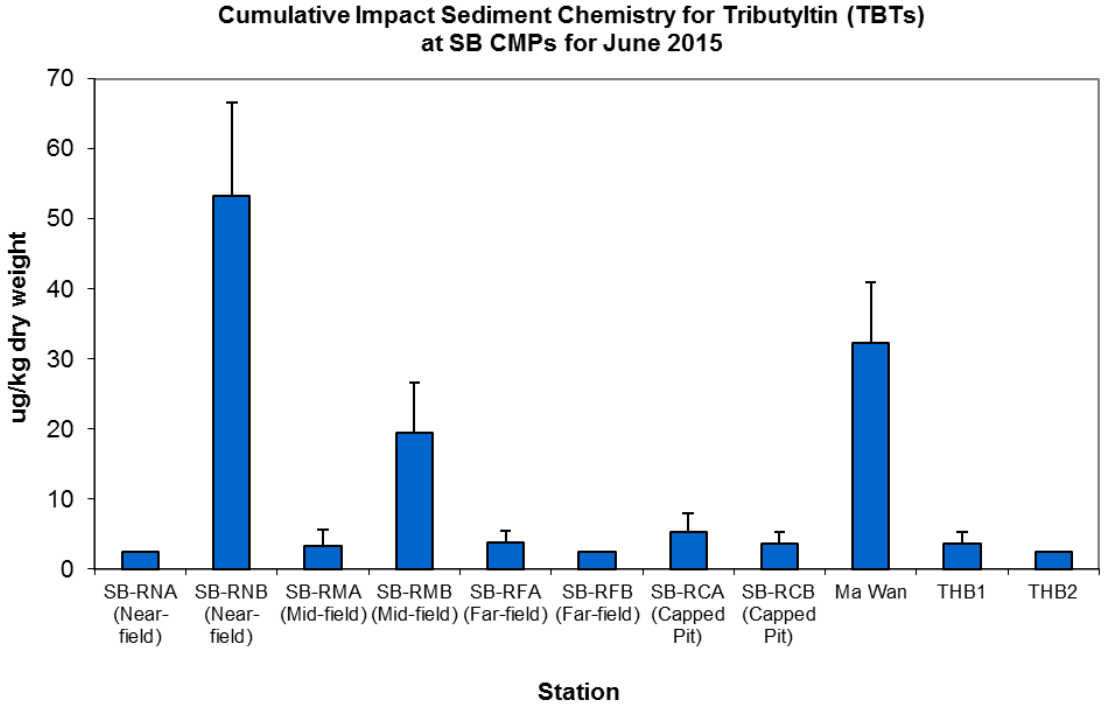


Figure 14: Concentration of Tributyltin (µg TBT/kg; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for SB CMPs in June 2015.

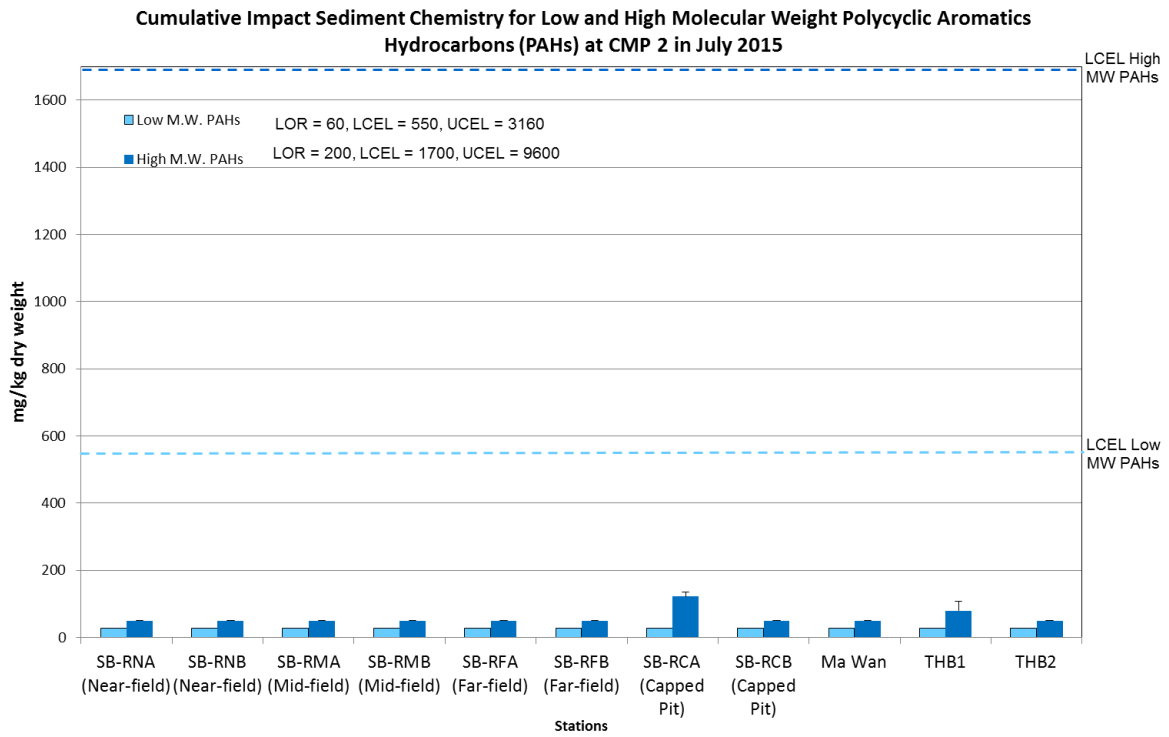


Figure 15: Concentration of Low and High Molecular Weight Polycyclic Aromatics Hydrocarbons (mg/kg dry weight; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for SB CMPs in July 2015.

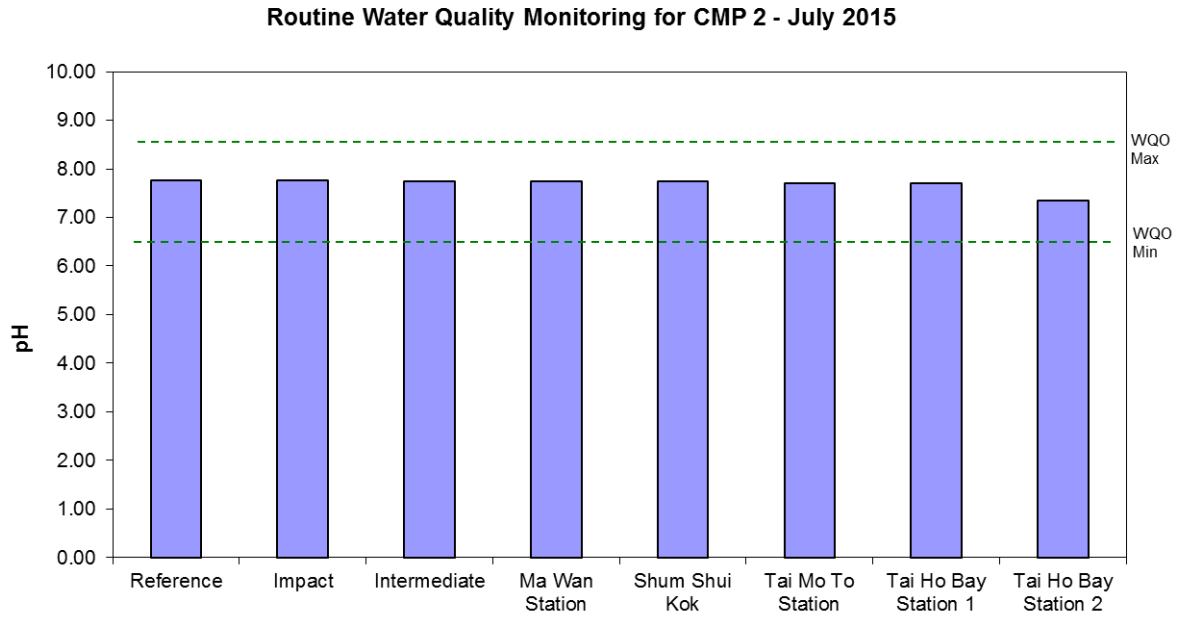


Figure 16: Level of pH recorded during Routine Water Quality Monitoring for disposal operations at CMP 2 in July 2015.

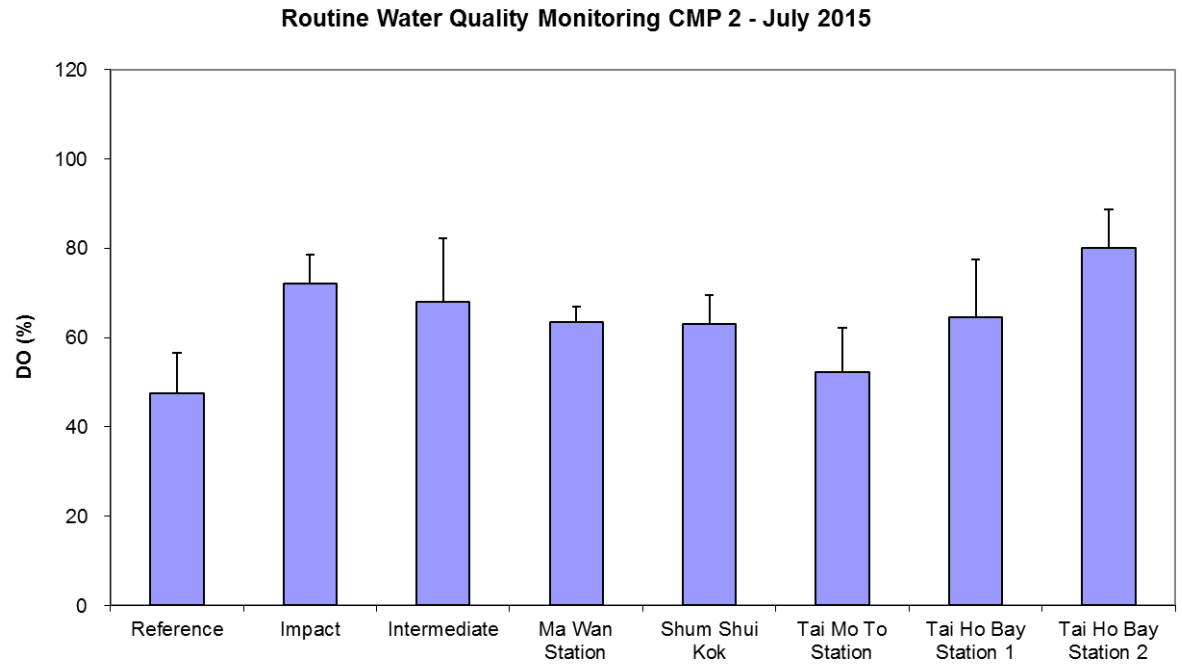


Figure 17: Level of Dissolved Oxygen (% saturation; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP 2 in July 2015.

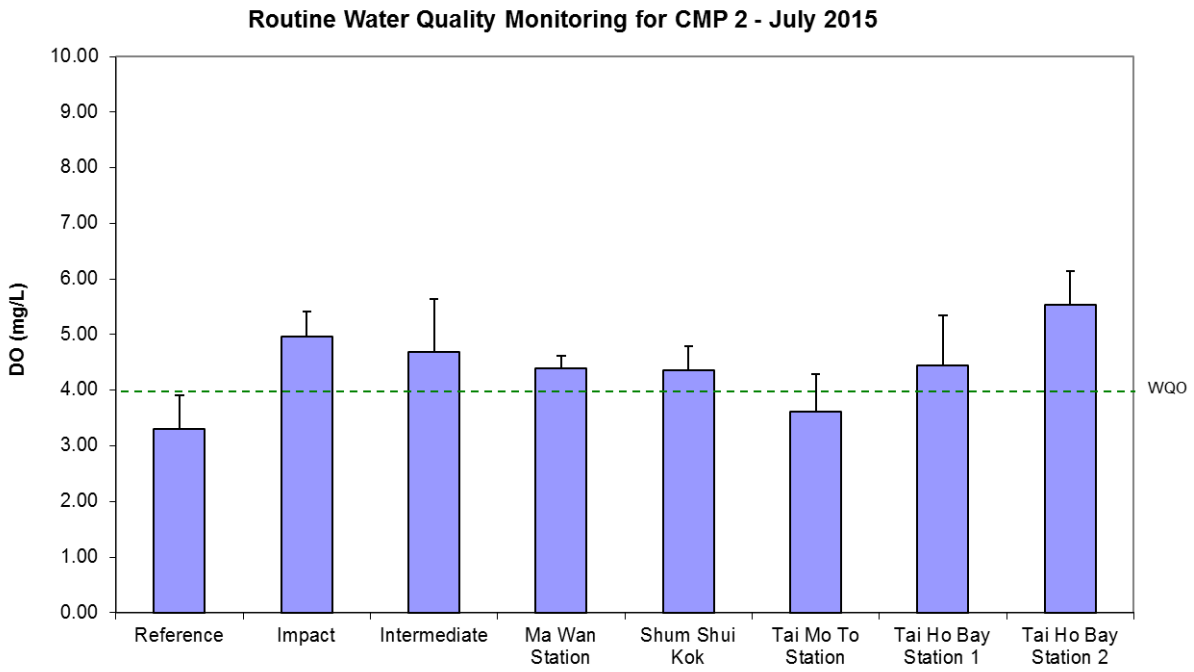


Figure 18: Concentration of Dissolved Oxygen (mg/L; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP 2 in July 2015.

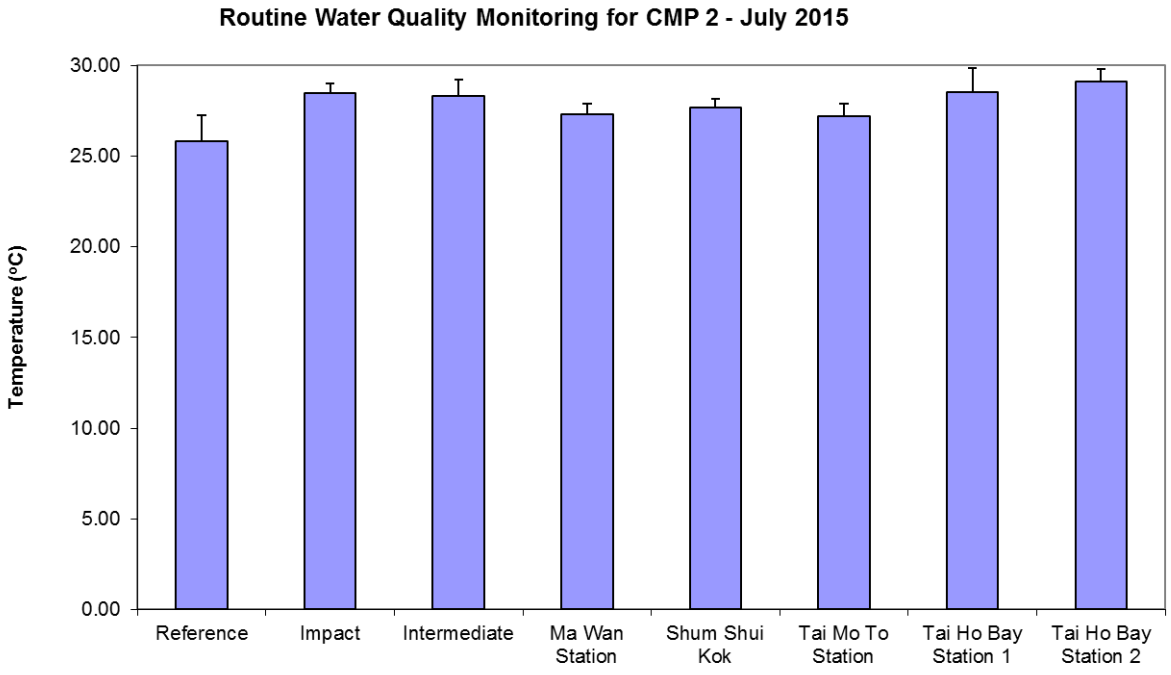


Figure 19: Level of Temperature (˚C; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP 2 in July 2015.

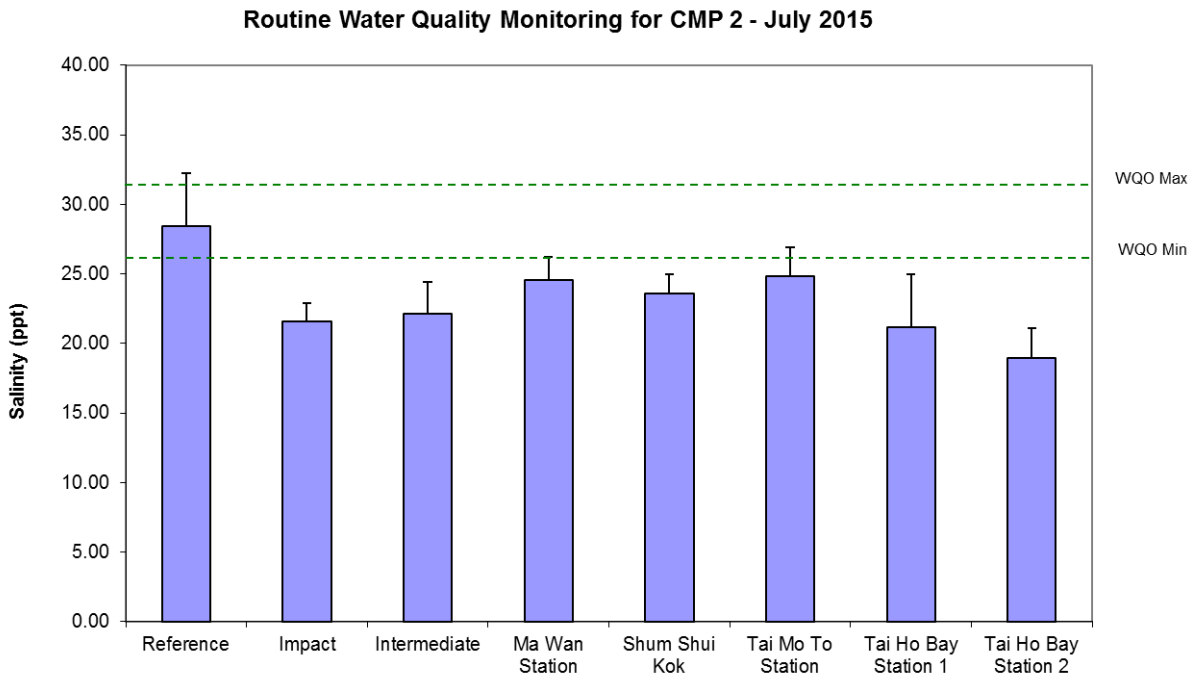


Figure 20: Level of Salinity (ppt; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP 2 in July 2015.

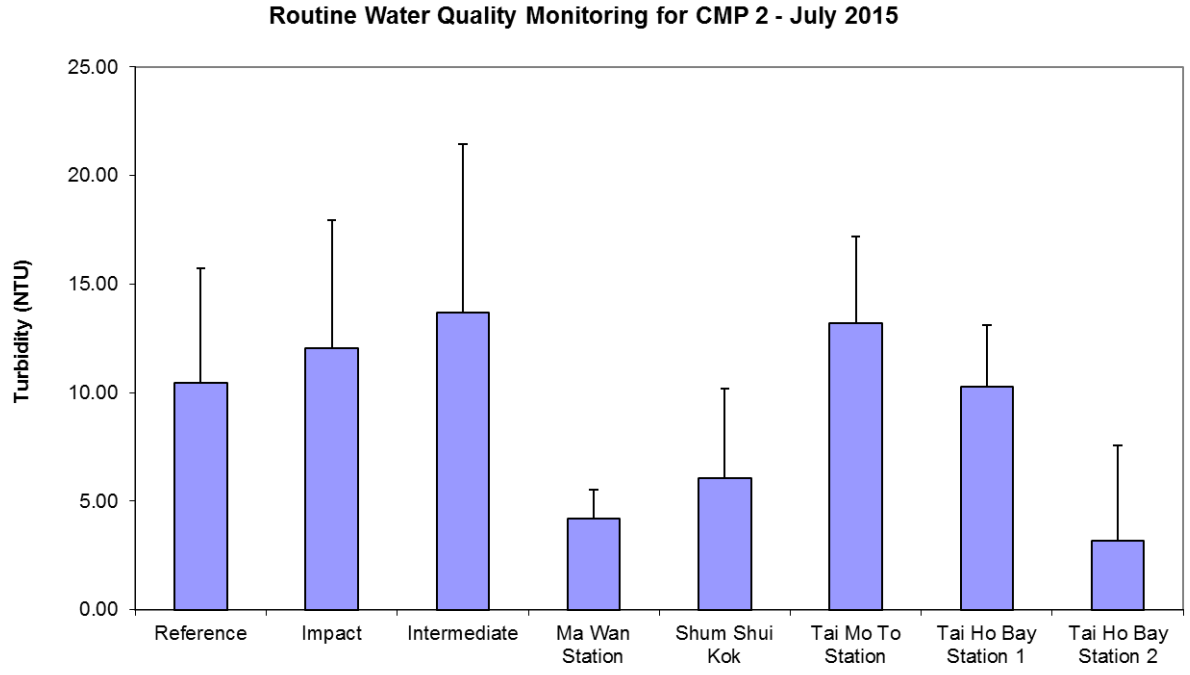


Figure 21: Levels of Turbidity (NTU; ,mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at CMP 2 in July 2015.

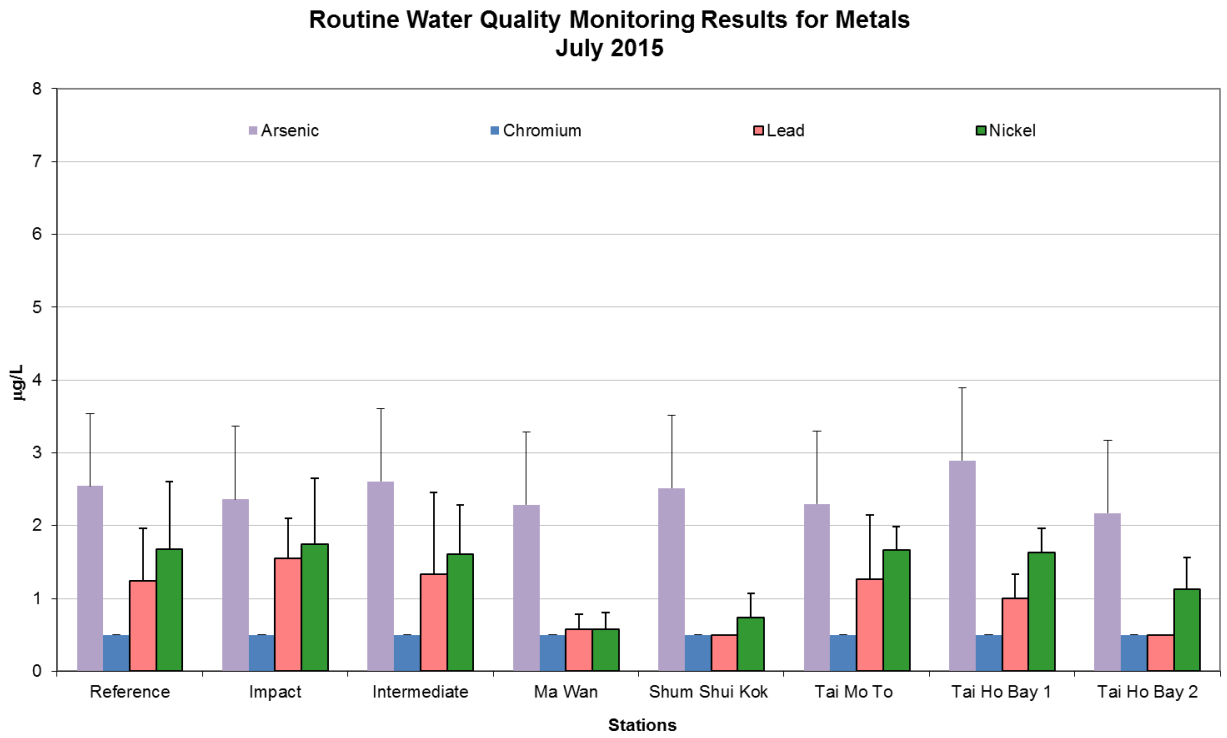


Figure 22: Concentration of Arsenic, Chromium, Lead, Nickel (µg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in July 2015.

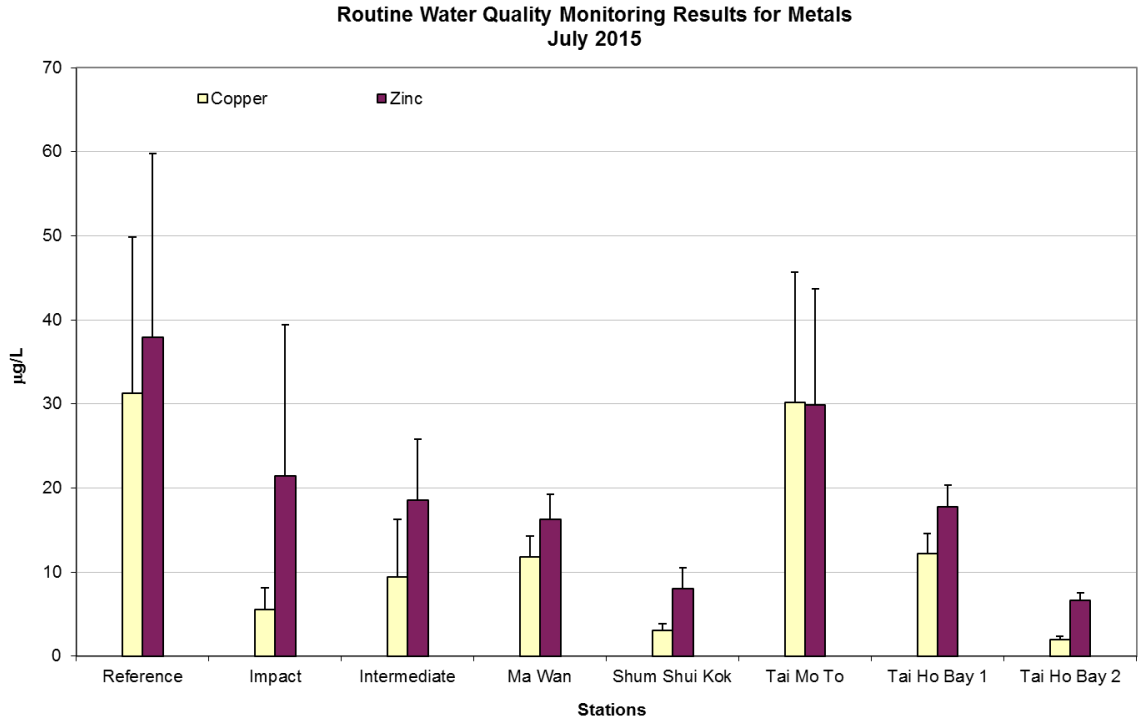


Figure 23: Concentration of Copper and Zinc (µg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in July 2015.

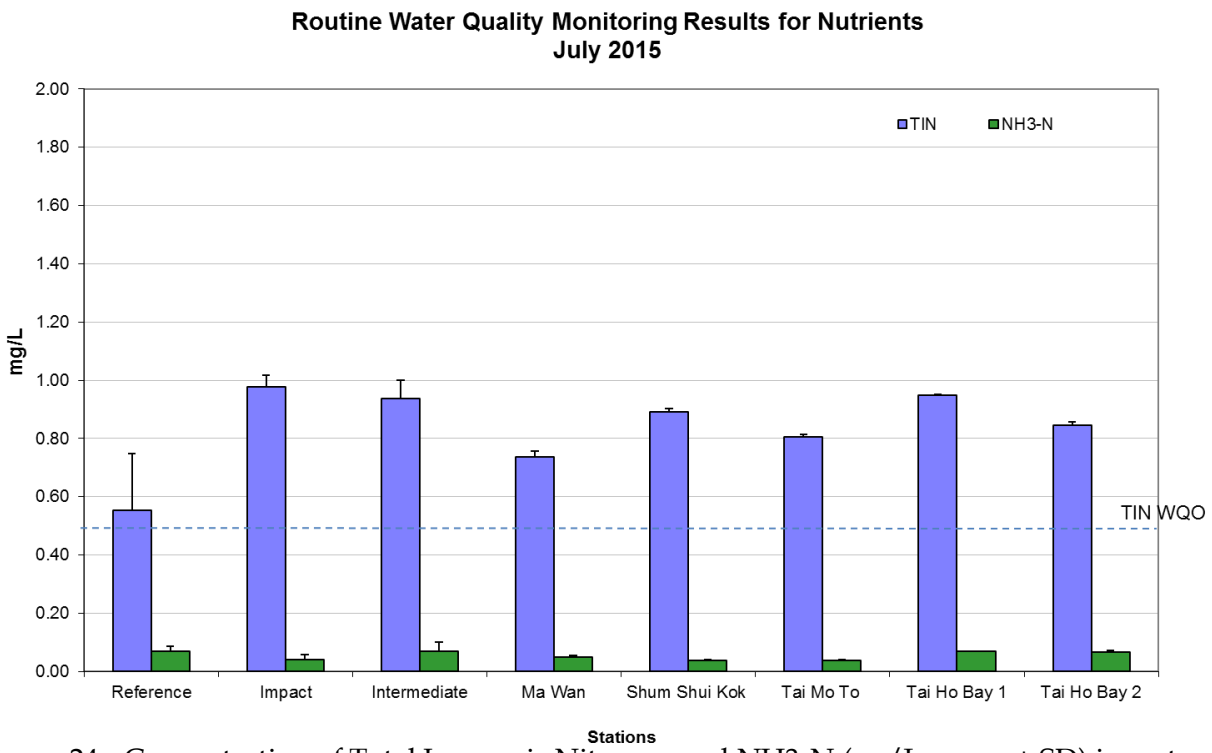


Figure 24: Concentration of Total Inorganic Nitrogen and NH3-N (µg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in July 2015.

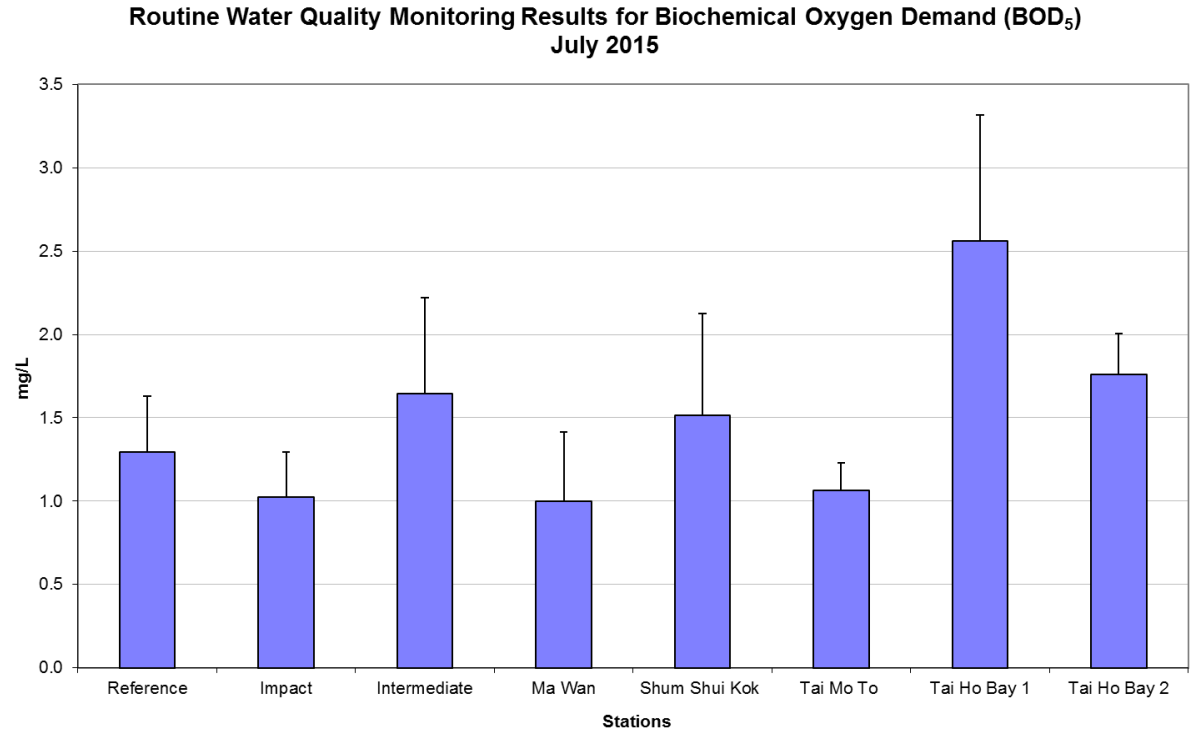


Figure 25: Level of Biochemical Oxygen Demand (BOD5) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in July 2015.

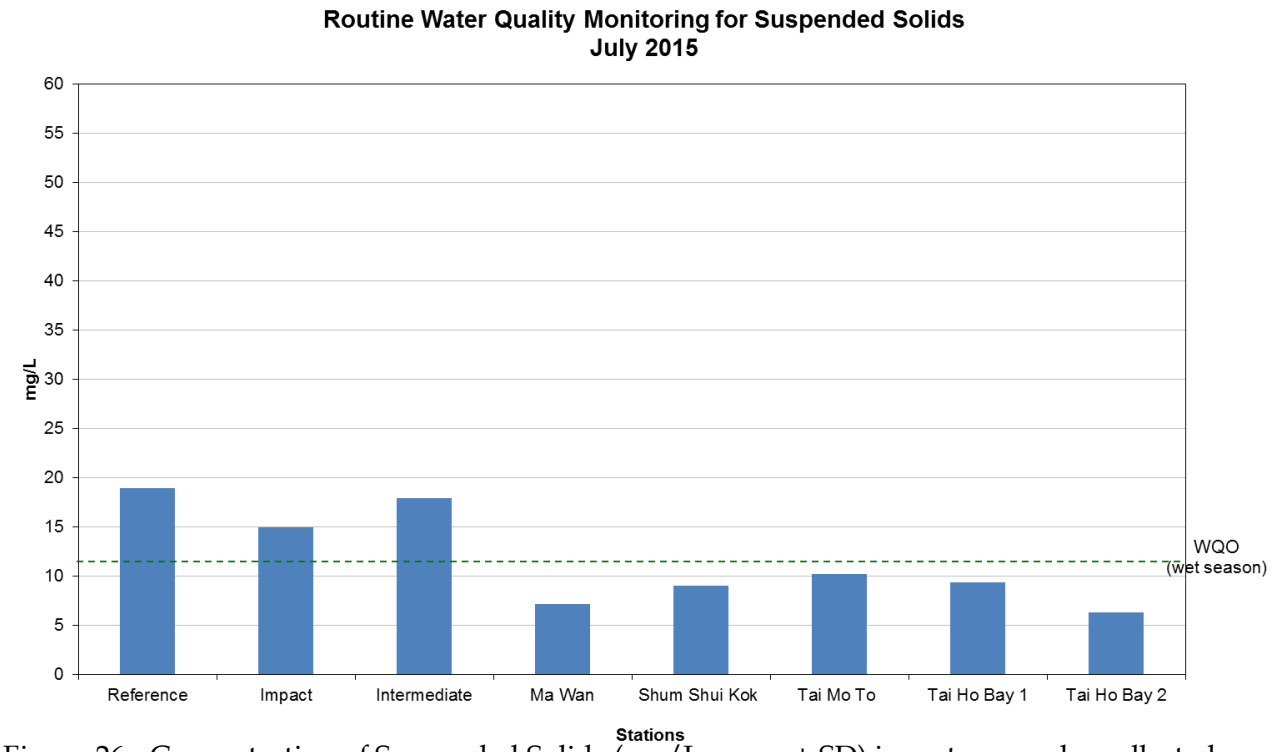


Figure 26: Concentration of Suspended Solids (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at CMP 2 in July 2015.

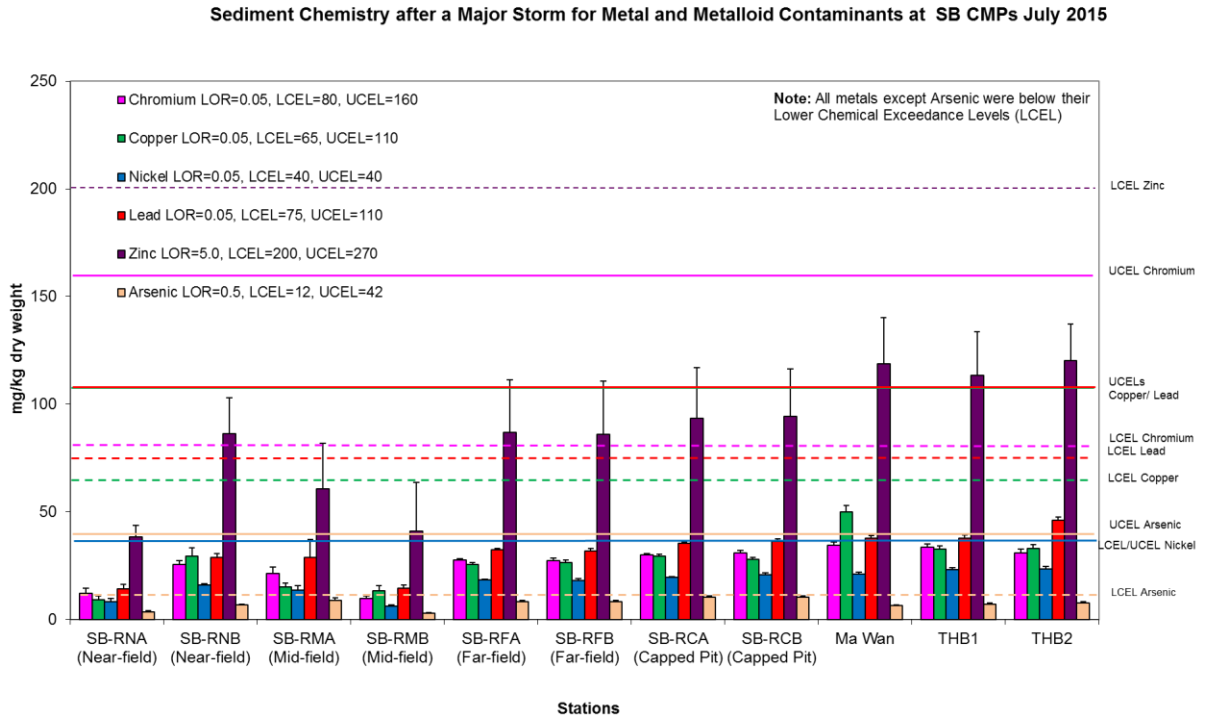


Figure 27: Concentration of Metals (Cr, Cu, Ni, Pb, Zn, As; mean +SD) in sediment samples collected from *Sediment Chemistry after a Major Storm* for SB CMPs in July 2015.

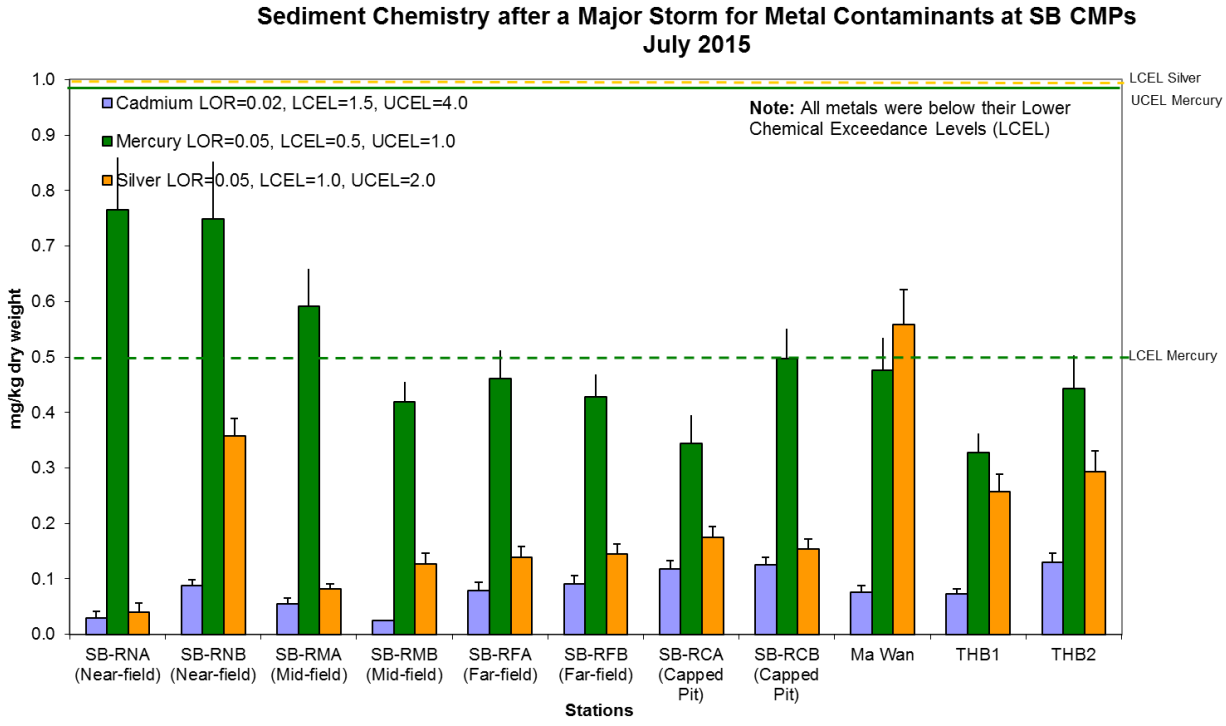


Figure 28: Concentration of Metals (Cd, Hg, Ag; mean +SD) in sediment samples collected from *Sediment Chemistry after a Major Storm* for SB CMPs in July 2015.

Annex C

Water Quality Monitoring Results

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

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 on 6 July 2015***

Sampling Period	Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%)	Dissolved Oxygen (mg L^{-1})	pH (mg L^{-1})
July 2015	RFF (Reference)	25.82	28.46	10.44	47.58	3.30	7.76
	IPF (Impact)	28.48	21.55	12.03	72.08	4.96	7.77
	INF (Intermediate)	28.33	22.15	13.71	68.06	4.68	7.75
	Ma Wan	27.32	24.58	4.19	63.57	4.39	7.74
	Shum Shui Kok	27.67	23.60	6.04	63.12	4.36	7.75
	Tai Mo To	27.22	24.85	13.21	52.34	3.62	7.70
	Tai Ho Bay 1	28.51	21.15	10.25	64.60	4.45	7.71
	Tai Ho Bay 2	29.09	18.98	3.18	80.17	5.54	7.34
	WQO	N/A	25.61 – 31.30#	N/A	N/A	>4	6.5-8.5

Notes:
Not exceeding 2°C of change of the results from the Reference Station.
#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.
Cell shaded grey indicate value exceeding the WQO.

Table C3 ***Laboratory Results for Routine Water Quality Monitoring of CMP 2 in July 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)
July 2015	RFF	2.54	<LOR	<LOR	31.29	1.24	0.89	1.68	<LOR	37.89	0.07	0.55	1.30	18.97
	IPF	2.36	<LOR	<LOR	5.56	1.54	1.02	1.75	<LOR	21.38	0.04	0.98	1.02	14.92
	INF	2.61	<LOR	<LOR	9.41	1.34	0.80	1.61	<LOR	18.58	0.07	0.94	1.65	17.92
	Ma Wan	2.28	<LOR	<LOR	11.77	0.57	0.71	0.58	<LOR	16.28	0.05	0.74	1.00	7.13
	Shum Shui Kok	2.52	<LOR	<LOR	3.08	<LOR	0.74	0.73	<LOR	8.04	0.04	0.89	1.51	9.05
	Tai Mo To	2.30	<LOR	<LOR	30.18	1.27	0.61	1.67	<LOR	29.88	0.04	0.81	1.06	10.18
	Tai Ho Bay 1	2.89	<LOR	<LOR	12.14	1.00	0.48	1.63	<LOR	17.75	0.07	0.95	2.56	9.35
	Tai Ho Bay 2	2.17	<LOR	<LOR	1.93	<LOR	0.73	1.13	<LOR	6.61	0.07	0.85	1.76	6.29

WQO of TIN: 0.5 mg/L
Wet Season WQO of SS : 11.6 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 SB CMP 2 on 7 July 2015***

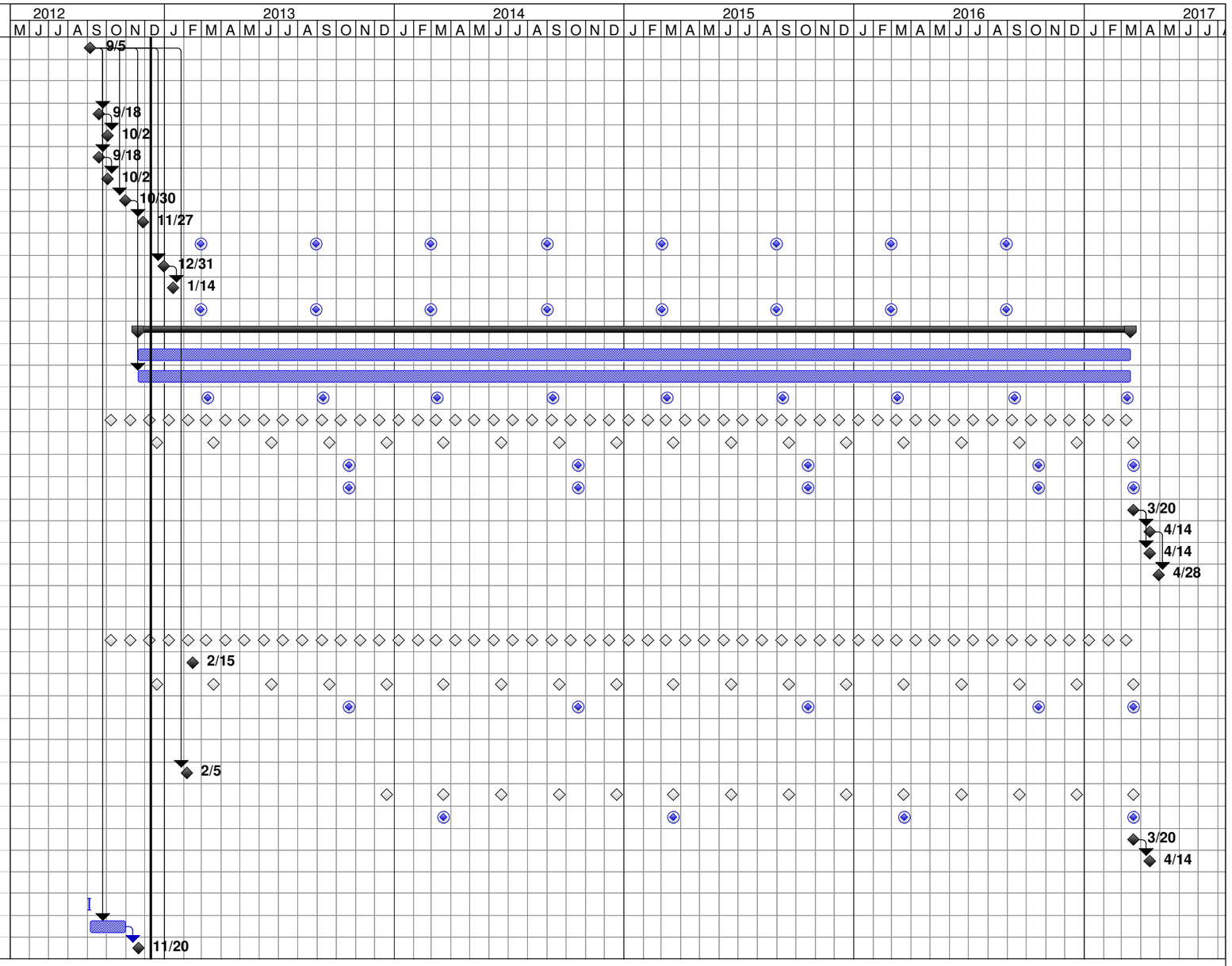
Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%)	Dissolved Oxygen (mg L^{-1})	pH (mg L^{-1})	Suspended Solids (mg L^{-1})
WCP 1 (Downstream)	26.41	26.45	6.73	52.14	3.62	7.81	8.58
WCP 2 (Upstream)	27.58	23.45	12.55	66.76	4.62	7.81	9.95
WQO (wet season)	N/A	22.45-25.79#	N/A	N/A	>4	6.5-8.5	11.6

Note: # Not exceeding 2°C of change of the results from the Reference Station.
#Not exceeding 10% of natural ambient level which is the result obtained from the Reference Station.
Cell shaded grey indicate value exceeding the WQO.

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