



**Agreement No. CE 63/2016 (EP)  
Environmental Monitoring and Audit  
for Disposal Facility to the East of  
Sha Chau (2017-2020) – Investigation**

**Monthly EM&A Report for Contaminated  
Mud Pits to the East of Sha Chau and the  
South of The Brothers – January 2018**

Revision 0

February 2018

**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](http://www.erm.com)

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Telephone: (852) 2271 3000  
Facsimile: (852) 2723 5660  
E-mail: post.hk@erm.com  
http://www.erm.com

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Client:  Civil Engineering and Development Department (CEDD)		Project No:  0400720			
Summary:  This document presents the Monthly EM&A Report for <i>Environmental Monitoring and Audit for Disposal Facility to the East of Sha Chau and the South of The Brothers.</i>		Date: 14 February 2018			
		Approved by: 			
		Craig A. Reid Partner			
v0	Monthly EM&A Report for ESC CMPs and SB CMPs	CY	JT	CAR	14/2/18
Revision	Description	By	Checked	Approved	Date
<p>This report has been prepared by Environmental Resources Management the trading name of 'ERM Hong-Kong, Limited', with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.</p> <p>We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.</p> <p>This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.</p>		<p>Distribution</p> <p><input type="checkbox"/> Internal</p> <p><input checked="" type="checkbox"/> Public</p> <p><input type="checkbox"/> Confidential</p>			
		 			

## Dredging, Management and Capping of Contaminated Sediment Disposal Facility at Sha Chau and to the South of The Brothers

### Environmental Certification Sheet EP-312/2008/A & EP-427/2011/A

#### Reference Document/Plan

Document/Plan-to be-Certified/ Verified:	Monthly EM&A Report for Contaminated Mud Pits to the East of Sha Chau and the South of The Brothers – January 2018
Date of Report:	14 February 2018
Date prepared by ET:	14 February 2018
Date received by IA:	14 February 2018

#### Reference EP Condition

##### Environmental Permit Condition:

Condition 3.4 of EP-312/2008/A and Condition 4.4 of EP-427/2011/A:  
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-312/2008/A and EP-427/2011/A

Jovy Tam,  
Environmental Team Leader:



Date: 14/2/2018

#### IA Verification

I hereby verify that the above referenced document/~~plan~~ complies with the above referenced condition of EP-312/2008/A and EP-427/2011/A

Dr Wang Wen Xiong,  
Independent Auditor:



Date: 14/2/2018

## **CONTENTS**

<b>1.1</b>	<b>BACKGROUND</b>	<b>1</b>
<b>1.2</b>	<b>REPORTING PERIOD</b>	<b>2</b>
<b>1.3</b>	<b>DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES</b>	<b>2</b>
<b>1.4</b>	<b>DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS</b>	<b>2</b>
<b>1.5</b>	<b>BRIEF DISCUSSION OF THE MONITORING RESULTS FOR ESC CMP V</b>	<b>2</b>
<b>1.6</b>	<b>ACTIVITIES SCHEDULED FOR THE NEXT MONTH</b>	<b>5</b>
<b>1.7</b>	<b>STUDY PROGRAMME</b>	<b>5</b>

## **ANNEXES**

<b>ANNEX A</b>	<b>SAMPLING SCHEDULE</b>
<b>ANNEX B</b>	<b>WATER QUALITY MONITORING RESULTS</b>
<b>ANNEX C</b>	<b>GRAPHICAL PRESENTATIONS</b>
<b>ANNEX D</b>	<b>STUDY PROGRAMME</b>

**Agreement No. CE 63/2016 (EP)**  
**Environmental Monitoring and Audit**  
**for Disposal Facility to the East of Sha Chau (2017-2020) - Investigation**

**MONTHLY EM&A REPORT FOR JANUARY 2018**

**1.1 BACKGROUND**

1.1.1 The Civil Engineering and Development Department (CEDD) is managing a number of marine disposal facilities in Hong Kong waters, including the Contaminated Mud Pits (CMPs) to the South of The Brothers (SB) and to the East of Sha Chau (ESC) for the disposal of contaminated sediment, and open-sea disposal grounds located to the South of Cheung Chau (SCC), East of Tung Lung Chau (ETLC) and East of Ninepins (ENP) for the disposal of uncontaminated sediment. Two Environmental Permits (EPs), EP-312/2008/A and EP-427/2011/A, were issued by the Environmental Protection Department (EPD) to the CEDD, the Permit Holder, on 28 November 2008 and 23 December 2011 for the Dredging, Management and Capping of Contaminated Sediment Disposal Facilities at ESC CMP V and SB CMPs, respectively.

1.1.2 Under the requirements of the two EPs for ESC CMP V and SB CMPs, EM&A programmes which encompass water and sediment chemistry, fisheries assessment, tissue and whole body analysis, sediment toxicity and benthic recolonisation studies as set out in the EM&A Manuals are required to be implemented. EM&A programmes have been continuously carried out during the operation of the CMPs at ESC and SB. A review of the collection and analysis of such environmental data from the monitoring programme demonstrated that there had not been any adverse environmental impacts resulting from disposal activities <sup>(1)</sup> <sup>(2)</sup>. The current programme will assess the impacts resulting from dredging, disposal and capping operations of CMP V as well as capping operations of SB CMPs.

1.1.3 The present EM&A programme under *Agreement No. CE 63/2016 (EP)* covers the dredging, disposal and capping operations of the ESC CMP V as well as the capping operations of the SB CMPs (see *Annex A* for the EM&A programme). Detailed works schedule for ESC CMP V and SB CMPs is shown in *Figure 1.1*. In January 2018, the following work was being undertaken:

- Disposal of contaminated mud at ESC CMP Vd.

(1) ERM (2013) Final Report. Submitted under Agreement No. CE 4/2009 (EP) Environmental Monitoring and Audit for Contaminated Mud Pit at East Sha Chau. For CEDD.

(2) ERM (2017) Final Report. Submitted under 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). For CEDD.



1.5.2 ***Water Column Profiling of ESC CMP Vd - January 2018***

1.5.3 *Water Column Profiling* was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 5 January 2018. The monitoring results have been assessed for compliance with the Water Quality Objectives (WQOs) set by Environmental Protection Department (EPD). This consists of a review of the EPD routine water quality monitoring data for the dry season period (November to March) of 2007 - 2016 from stations in the Northwestern Water Control Zone (WCZ), where the ESC CMPs are located <sup>(1)</sup>. For Salinity, the averaged value obtained from the Reference (Upstream) station 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 B1 of Annex B* for details).

*In-situ Measurements*

1.5.4 Analyses of results for January 2018 indicated that levels of DO, Salinity and pH complied with the WQOs at both Downstream and Upstream stations (*Table B2 of Annex B*). In addition, levels of DO and Turbidity at all stations complied with the Action and Limit Levels (*Tables B1 and B2 of Annex B*).

*Laboratory Measurements for Suspended Solids (SS)*

1.5.5 Analyses of results for January 2018 indicated that the SS levels at Upstream and Downstream stations complied with the WQOs as well as the Action and Limit Levels (*Tables B1 and B2 of Annex B*).

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

1.5.7 ***Routine Water Quality Monitoring of ESC CMP V - January 2018***

1.5.8 *Routine Water Quality Monitoring of ESC CMP V* was undertaken on 3 January 2018. The monitoring results have been assessed for compliance with the WQOs (see *Section 1.5.3* for details). The monitoring results are shown in *Tables B3 and B4 of Annex B* and *Figures 1 - 10 of Annex C*. A total of sixteen (16) monitoring stations were sampled in January 2018 as shown in *Figure 1.2*.

*In-situ Measurements*

1.5.9 Graphical presentation of the monitoring results (Temperature, DO, pH, Salinity and Turbidity) is shown in *Figures 1 - 6 of Annex C*. Analyses of results for January 2018 indicated that the levels of pH, Salinity and DO complied with the WQOs at all stations (Impact, Intermediate, Reference and Ma Wan stations) in January 2018 (*Table B3 of Annex B; Figures 1, 3 and 5 of Annex C*).

<sup>(1)</sup> <http://epic.epd.gov.hk/EPICRIVER/marine/?lang=en>

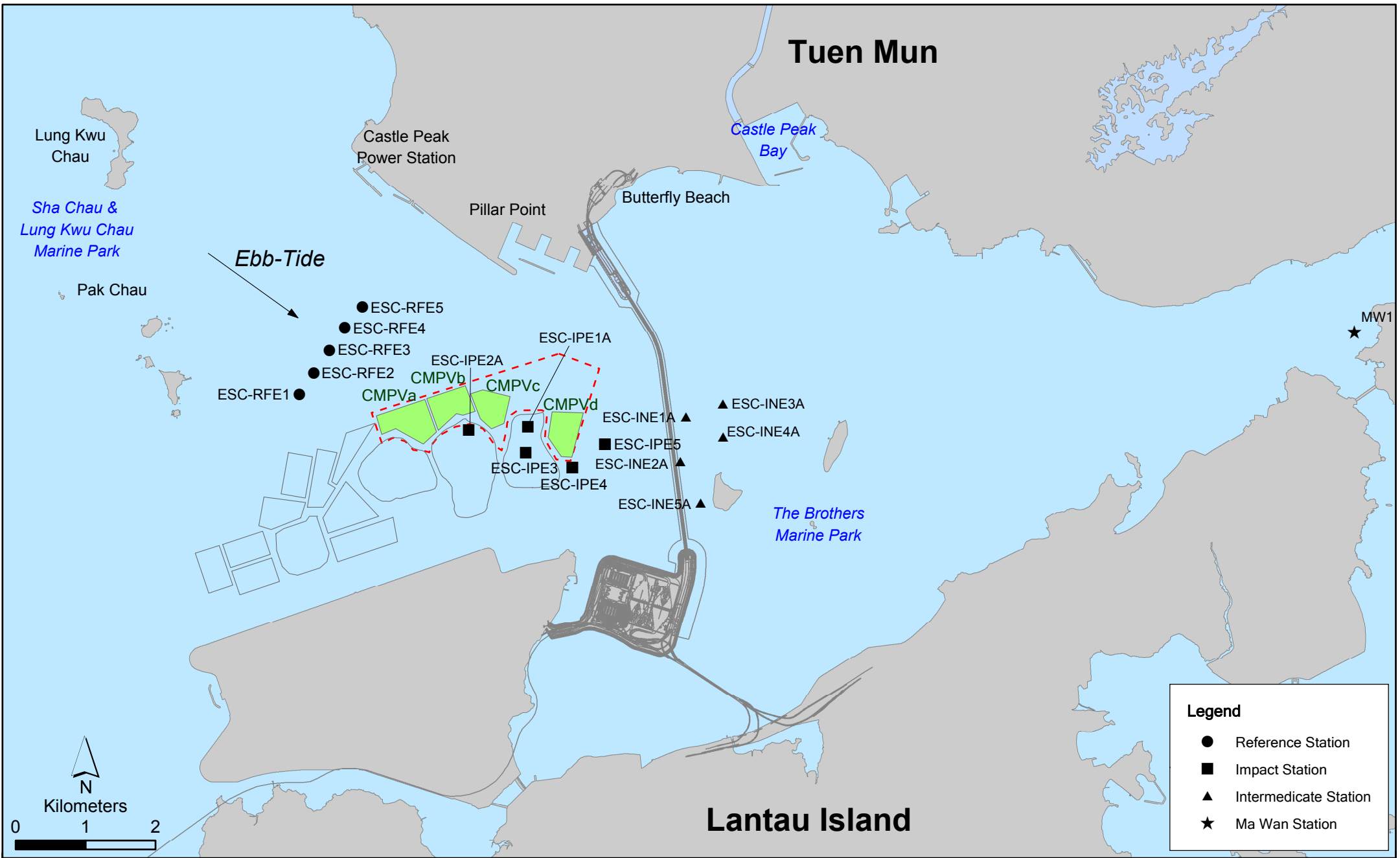


Figure 1.2

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



- 1.5.10 The levels of DO and Turbidity complied with the Action and Limit Levels at all stations (*Table B3 of Annex B; Figures 3 and 6 of Annex C*).
- 1.5.11 Overall, *in-situ* measurement results of the *Routine Water Quality Monitoring* indicated that the disposal operation at ESC CMP Vd did not appear to cause any unacceptable impacts in water quality in January 2018.
- Laboratory Measurements*
- 1.5.12 Laboratory analysis of January 2018 results indicated that concentrations of Cadmium, Silver and Mercury were below their limit of reporting at all stations. Arsenic, Chromium, Nickel, Lead, Copper and Zinc were detected in January 2018 samples and the concentrations of these metals and metalloids were similar amongst stations (*Table B4 of Annex B; Figure 7 of Annex C*).
- 1.5.13 For nutrients, concentrations of Total Inorganic Nitrogen (TIN) at all stations in January 2018 were higher than the WQO (0.5 mg/L) (*Table B4 of Annex B; Figure 8 of Annex C*). It should be noted that due to the effect of the Pearl River, the North Western WCZ has historically experienced higher levels of TIN <sup>(1)</sup>. Therefore, the exceedances of TIN WQO at these stations are unlikely to be caused by the disposal operation at ESC CMP Vd. Concentrations of Ammonia Nitrogen (NH<sub>3</sub>-N) and 5-day Biochemical Oxygen Demand (BOD<sub>5</sub>) were similar amongst all stations in January 2018 (*Table B4 of Annex B; Figure 8 and 9 of Annex C*).
- 1.5.14 Analyses of results for January 2018 indicated that the SS levels at all stations were lower than the WQO (12.8 mg/L for dry season) and SS levels compiled with the Action and Limit Levels at all stations (*Tables B1 and B4 of Annex B; Figure 10 of Annex C*).
- 1.5.15 Overall, results of the *Routine Water Quality Monitoring* indicated that the disposal operation at ESC CMP Vd did not appear to cause any unacceptable deterioration in water quality in January 2018. Detailed statistical analysis will be presented in the Quarterly Report to investigate any spatial and temporal trends of potential concern.
- 1.5.16 ***Pit Specific Sediment Chemistry of ESC CMP Vd – January 2018***
- 1.5.17 Monitoring locations for *Pit Specific Sediment Chemistry for ESC CMP Vd* are shown in *Figure 1.3*. A total of six (6) monitoring stations were sampled in January 2018.
- 1.5.18 The concentrations of all inorganic contaminants were lower than the Lower Chemical Exceedance Level (LCEL) at all stations in January 2018 (*Figures 11 and 12 of Annex C*).

<sup>(1)</sup> [http://www.epd.gov.hk/epd/misc/marine\\_quality/1986-2005/textonly/eng/index.htm](http://www.epd.gov.hk/epd/misc/marine_quality/1986-2005/textonly/eng/index.htm)

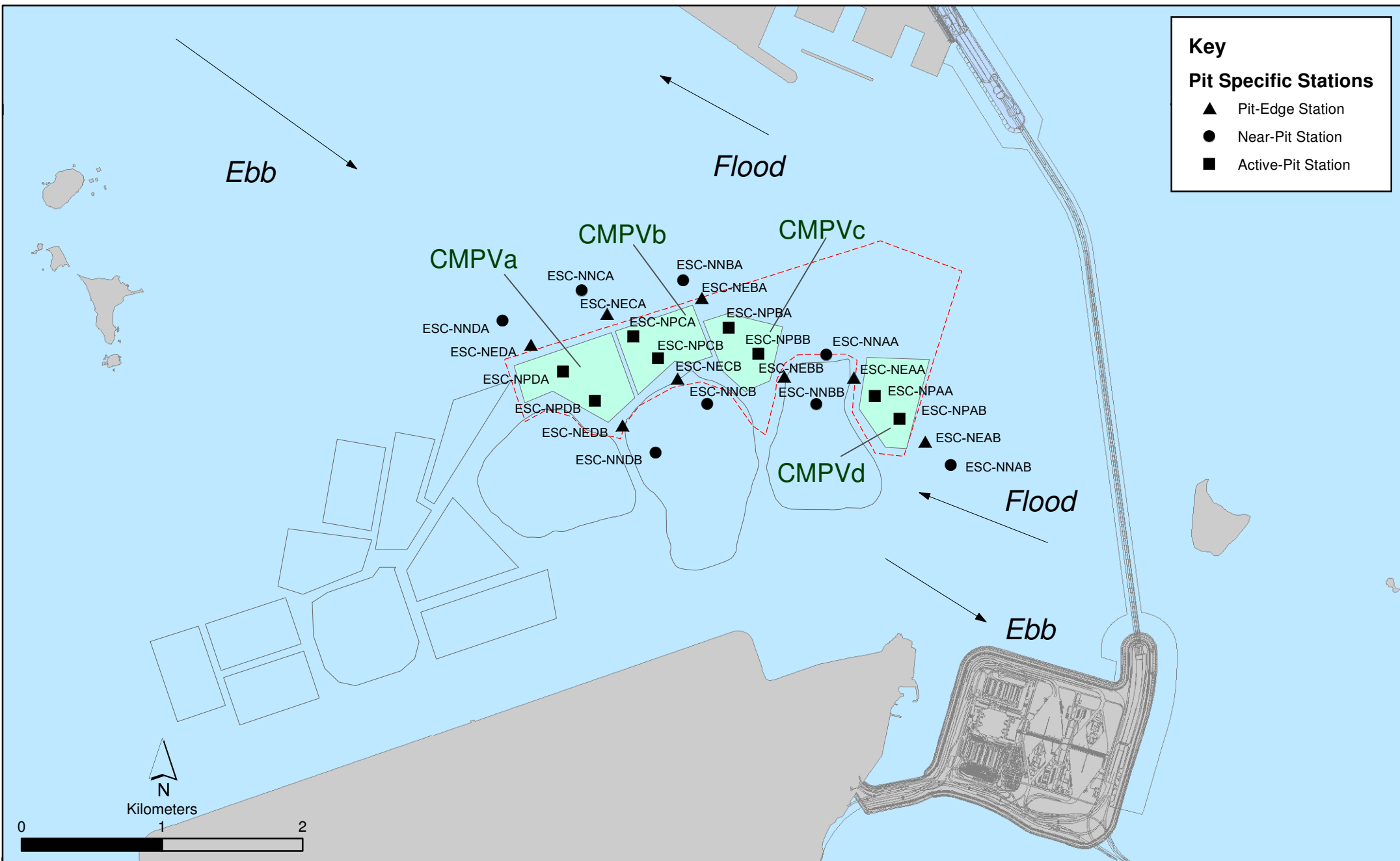


Figure 1.3

Pit Specific Sediment Quality Monitoring Stations for CMPV

1.5.19 For organic contaminants, the concentrations of Total Organic Carbon (TOC) were generally similar in January 2018 (*Figure 13 of Annex C*). The concentration of Tributyltin (TBT) was generally higher at Active-Pit station ESC-NPAB in January 2018 (*Figure 14 of Annex C*). Low and High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs), Total Polychlorinated Biphenyls (PCBs), Total dichloro-diphenyl-trichloroethane (DDT) and 4,4'-dichlorodiphenyldichloroethylene (DDE) concentrations were below the limit of reporting at most stations in January 2018, except for High Molecular Weight PAHs, DDT and DDE being detected at Active-Pit station ESC-NPAB and Near-Pit station ESC-NNAA (*Figures 15 and 16 of Annex C*).

1.5.20 Overall, there is no evidence indicating any unacceptable environmental impacts to sediment quality as a result of the contaminated mud disposal operations at ESC CMP Vd in January 2018. Statistical analysis will be undertaken and presented in the corresponding quarterly report to investigate whether there are any unacceptable impacts in the area caused by the contaminated mud disposal.

## 1.6 *ACTIVITIES SCHEDULED FOR THE NEXT MONTH*

1.6.1 The following monitoring activities will be conducted in the next monthly period of February 2018 for ESC CMP V (see *Annex A* for the sampling schedule):

- *Water Column Profiling of ESC CMP Vd;*
- *Routine Water Quality Monitoring of ESC CMP V;*
- *Pit Specific Sediment Chemistry of ESC CMP Vd;*
- *Cumulative Impact Sediment Chemistry of ESC CMPs;*
- *Sediment Toxicity Tests of ESC CMPs; and*
- *Demersal Trawling for ESC CMP V.*

1.6.2 No monitoring activities are scheduled to be undertaken for SB CMPs in February 2018.

## 1.7 *STUDY PROGRAMME*

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

Annex A

## Sampling Schedule

			2017				2018				2019				2020				2021																																															
Pit Specific Sediment Chemistry	Code	Frequency	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	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J
Active-Pit	ESC-NPAA	Monthly	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																					
	ESC-NPAB	Monthly	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																					
Pit-Edge	ESC-NEAA	Monthly	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																					
	ESC-NEAB	Monthly	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																					
Near-Pit	ESC-NNAA	Monthly	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																					
	ESC-NNAB	Monthly	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12																					
<b>Cumulative Impact Sediment Chemistry</b>			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	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J
Near-field Stations	ESC-RNA	4 times per year																																																																
	ESC-RNB1	4 times per year																																																																
Mid-field Stations	ESC-RMA	4 times per year																																																																
	ESC-RMB	4 times per year																																																																
Capped Pit Stations	ESC-RCA1	4 times per year																																																																
	ESC-RCB1	4 times per year																																																																
Far-Field Stations	ESC-RFA	4 times per year																																																																
	ESC-RFB	4 times per year																																																																
Ma Wan Station																																																																		
	MW1	4 times per year																																																																
<b>Sediment Toxicity Tests</b>			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	M	A	M	J	J												
Near-Pit Stations	ESC-TDA	2 times per year																																																																
	ESC-TDB1	2 times per year																																																																
Reference Stations	ESC-TRA	2 times per year																																																																
	ESC-TRB	2 times per year																																																																
Ma Wan Station																																																																		
	MW1	2 times per year																																																																
<b>Tissue/Whole Body Sampling</b>			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	M	A	M	J	J												
Near-Pit Stations	ESC-INA	2 times per year																																																																
	ESC-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																																																																
<b>Demersal Trawling</b>			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	M	A	M	J	J												
Near Pit Stations	ESC-INA	4 times per year																																																																
	ESC-INB	4 times per year																																																																
Reference North	TNA	4 times per year																																																																
	TNB	4 times per year																																																																
Reference South	TSA	4 times per year																																																																
	TSB	4 times per year																																																																
<b>Capping</b>			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	M	A	M	J	J												
Ebb Tide	Impact Station Downcurrent																																																																	
	ESC-IP1A	4 times per year																																																																
Intermediate Station Downcurrent	ESC-INE1A	4 times per year																																																																
	ESC-INE2A	4 times per year																																																																
Reference Station Upcurrent	ESC-RFE1	4 times per year																																																																
	ESC-RFE2	4 times per year																																																																
Ma Wan Station																																																																		
	MW1	4 times per year																																																																
Flood Tide	Impact Station Downcurrent																																																																	
	ESC-IPF1	4 times per year																																																																
Intermediate Station Downcurrent	ESC-INF1	4 times per year																																																																

Annex A2 - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (April 2017 - December 2018)

			2017												2018											
			A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D			
<b>Capping Water Quality Monitoring</b>																										
<i>Ebb Tide</i>																										
Impact Stations Downcurrent	SB-IPE1	4 times per year		3	3		3	3																		
	SB-IPE2	4 times per year		3	3		3	3																		
	SB-IPE3	4 times per year		3	3		3	3																		
	SB-IPE4	4 times per year		3	3		3	3																		
	SB-IPE5	4 times per year		3	3		3	3																		
Intermediate Stations Downcurrent	SB-INE1	4 times per year		3	3		3	3																		
	SB-INE2	4 times per year		3	3		3	3																		
	SB-INE3	4 times per year		3	3		3	3																		
	SB-INE4	4 times per year		3	3		3	3																		
	SB-INE5	4 times per year		3	3		3	3																		
Reference Stations Upcurrent	SB-RFE1	4 times per year		3	3		3	3																		
	SB-RFE2	4 times per year		3	3		3	3																		
	SB-RFE3	4 times per year		3	3		3	3																		
	SB-RFE4	4 times per year		3	3		3	3																		
	SB-RFE5	4 times per year		3	3		3	3																		
Sensitive Receiver Stations	MW1	4 times per year		3	3		3	3																		
	THB1	4 times per year		3	3		3	3																		
	THB2	4 times per year		3	3		3	3																		
	WSR45C	4 times per year		3	3		3	3																		
	WSR46	4 times per year		3	3		3	3																		
<i>Flood Tide</i>																										
Impact Stations Downcurrent	SB-IPF1	4 times per year		3	3		3	3																		
	SB-IPF2	4 times per year		3	3		3	3																		
	SB-IPF3	4 times per year		3	3		3	3																		
Intermediate Stations Downcurrent	SB-INF1	4 times per year		3	3		3	3																		
	SB-INF2	4 times per year		3	3		3	3																		
	SB-INF3	4 times per year		3	3		3	3																		
Reference Stations Upcurrent	SB-RFF1	4 times per year		3	3		3	3																		
	SB-RFF2	4 times per year		3	3		3	3																		
	SB-RFF3	4 times per year		3	3		3	3																		
Sensitive Receiver Stations	MW1	4 times per year		3	3		3	3																		
	THB1	4 times per year		3	3		3	3																		
	THB2	4 times per year		3	3		3	3																		
	WSR45C	4 times per year		3	3		3	3																		
	WSR46	4 times per year		3	3		3	3																		
<b>Benthic Recolonisation Studies</b>																										
Capped Contaminated Mud Pits	SB-CPA	2 times per year					12				12								12				12			
	SB-CPB	2 times per year					12				12								12				12			
Reference Stations	RBA	2 times per year					12				12								12				12			
	RBB	2 times per year					12				12								12				12			
	RBC	2 times per year					12				12								12				12			

Notes:

The number shown in each cell represents the numbers of replicates per monitoring station  
Capping works are planned to be conducted between May and December 2017.

Annex B

## Water Quality Monitoring Results

**Table B1** *Action and Limit Levels of Water Quality for Dredging, Disposal and Capping Activities at ESC CMP V*

<b>Parameter</b>	<b>Action Level</b>	<b>Limit Level</b>
Dissolved Oxygen (DO) <sup>(1)</sup>	<u>Surface and Mid-depth</u> <sup>(2)</sup> 5%-ile of baseline data for surface and middle layer = <b>3.76 mg L<sup>-1</sup></b>	<u>Surface and Mid-depth</u> <sup>(2)</sup> 1%-ile of baseline data for surface and middle layer = <b>3.11 mg L<sup>-1</sup></b> <sup>(3)</sup>
	and	and
	Significantly less than the reference stations mean DO (at the same tide of the same day)	Significantly less than the reference stations mean DO (at the same tide of the same day)
	<u>Bottom</u> 5%-ile of baseline data for bottom layers = <b>2.96 mg L<sup>-1</sup></b>	<u>Bottom</u> The average of the impact station readings are <b>&lt;2 mg/L<sup>-1</sup></b>
	and	and
	Significantly less than the reference stations mean DO (at the same tide of the same day)	Significantly less than the reference stations mean DO (at the same tide of the same day)
Depth-averaged Suspended Solids (SS) <sup>(4)(5)</sup>	95%-ile of baseline data for depth average = <b>37.88 mg L<sup>-1</sup></b>	99%-ile of baseline data for depth average = <b>61.92 mg L<sup>-1</sup></b>
	and	and
	120% of control station's SS at the same tide of the same day	130% of control station's SS at the same tide of the same day
Depth-averaged Turbidity (Tby) <sup>(4)(5)</sup>	95%-ile of baseline data = <b>28.14 NTU</b>	99%-ile of baseline data = <b>38.32 NTU</b>
	and	and
	120% of control station's Tby at the same tide of the same day	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) Given the Action Level for DO for Surface & Middle layers has already been lower than 4 mg L<sup>-1</sup>, it is proposed to set the Limit Level at 3.11 mg L<sup>-1</sup> which is the first percentile of the baseline data.
- (4) "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
- (5) For turbidity and SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.



**Table B2** *Water Column Profiling Results for ESC CMP Vd in January 2018*

Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%) (mg L <sup>-1</sup> )		pH	Suspended Solids (mg L <sup>-1</sup> )
WCP 1 (Downstream)	18.82	29.37	12.73	94.05	7.35	7.99	8.80
WCP 2 (Upstream)	18.81	29.02	2.86	96.13	7.53	7.97	5.20
WQO (Dry season)	N/A	26.12 – 31.92 <sup>#</sup>	N/A	N/A	>4	6.5-8.5	12.8

**Note:**

<sup>#</sup>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 B3** *In-situ Monitoring Results for Routine Water Quality Monitoring of ESC CMPs in January 2018*

Sampling Period	Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%) (mg L <sup>-1</sup> )		pH (mg L <sup>-1</sup> )
November 2017	RFE (Reference)	18.69	29.13	5.69	97.29	7.64	8.10
	IPE (Impact)	18.73	30.08	3.58	97.31	7.59	8.05
	INE (Intermediate)	18.65	30.03	5.02	97.17	7.59	8.02
	Ma Wan	18.62	30.37	2.35	93.27	7.28	8.00
	WQO	N/A	26.22 – 32.04 <sup>#</sup>	N/A	N/A	>4	6.5-8.5

**Notes:**

<sup>#</sup>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 B4** *Laboratory Results for Routine Water Quality Monitoring of ESC CMPs in January 2018*

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 <sub>3</sub> (mg/L)	TIN (mg/L)	BOD <sub>5</sub> (mg/L)	SS (mg/L)
November 2017	RFE	2.18	<0.5	0.91	7.56	0.95	<0.5	2.29	<1	34.54	0.20	0.67	0.64	9.23
	IPE	2.55	<0.5	0.71	1.09	0.61	<0.5	1.08	<1	34.16	0.25	0.75	0.26	6.69
	INE	2.33	<0.5	0.80	2.69	0.59	<0.5	1.48	<1	31.58	0.21	0.63	0.87	8.60
	Ma Wan	2.05	<0.5	0.79	10.36	0.63	<0.5	1.17	<1	34.06	0.22	0.56	0.31	6.40

WQO of TIN: 0.5 mg/L

Dry Season WQO of SS : 12.8 mg/L

**Notes:**

Cell shaded yellow / red indicate value exceeding the Action/Limit levels.

Cell shaded grey indicate value exceeding the WQO.

Annex C

## Graphical Presentations

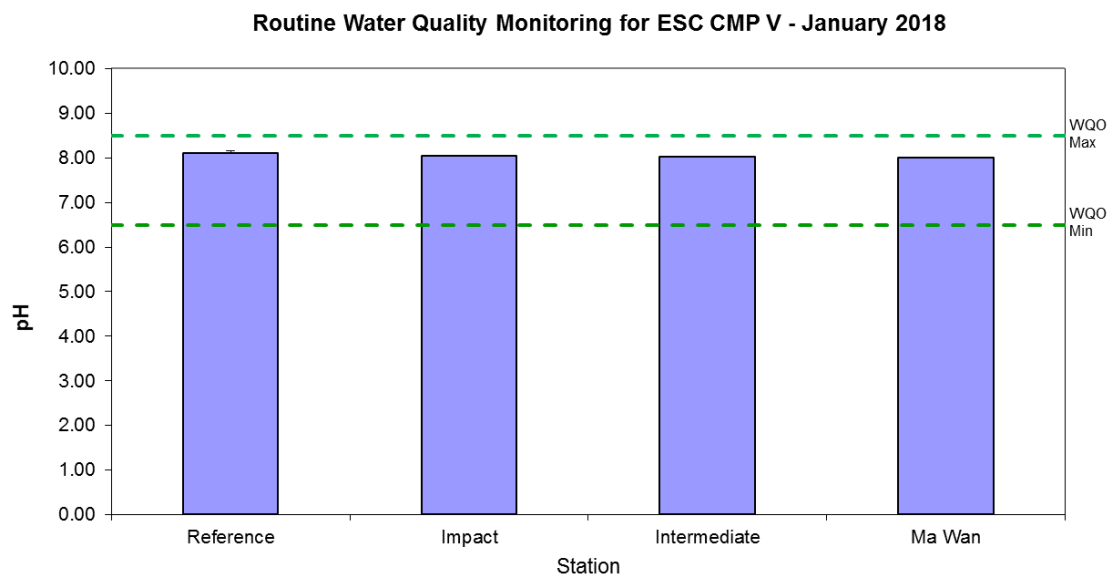


Figure 1: Level of pH recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in January 2018.

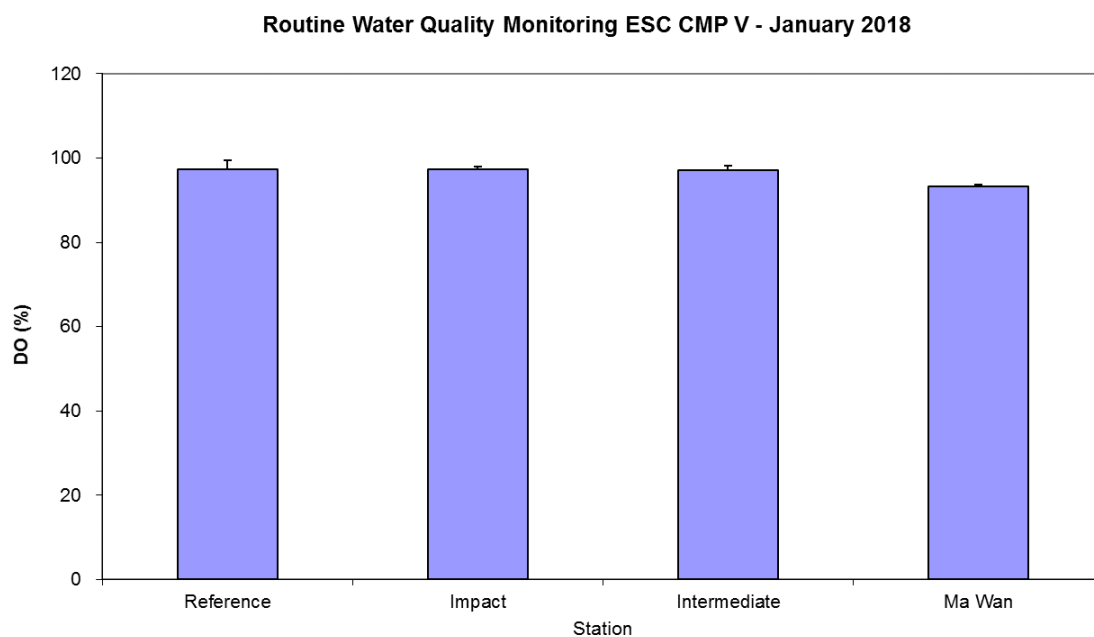


Figure 2: Level of Dissolved Oxygen (DO) (% saturation; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in January 2018.

Source: H:\Team\EM\GMS Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\January 2018)

Date: February 2018

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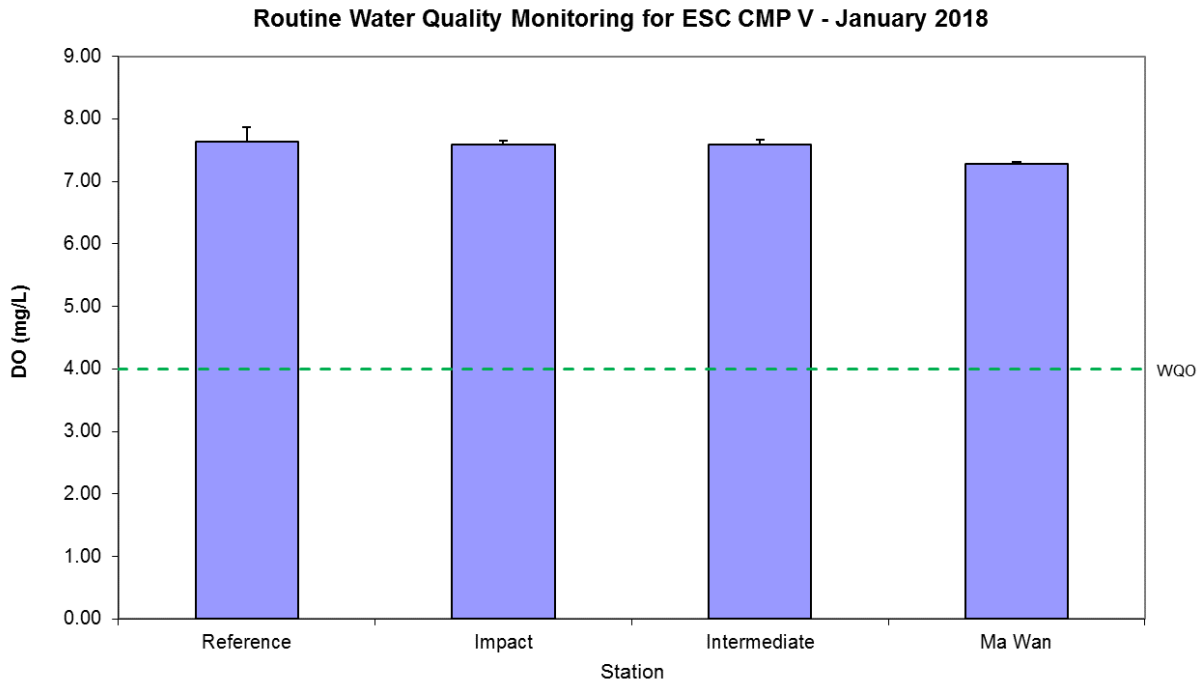


Figure 3: Concentration of Dissolved Oxygen (DO) (mg/L; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in January 2018.

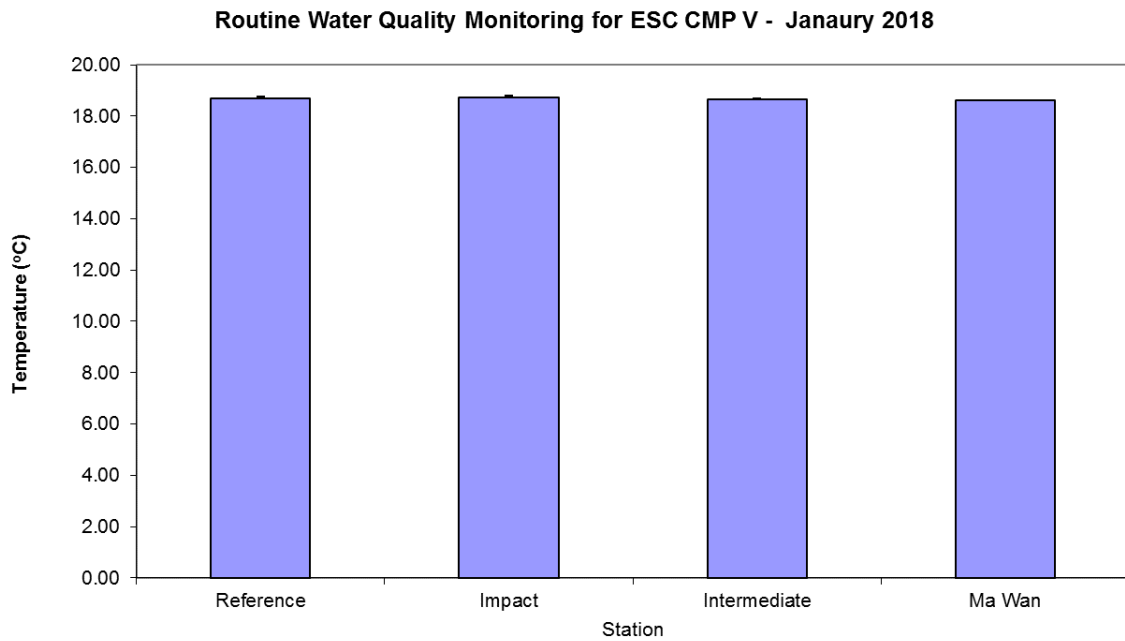


Figure 4: Level of Temperature (°C; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in January 2018.

Source: H:\Team\EM\GMS Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\January 2018)

Date: February 2018

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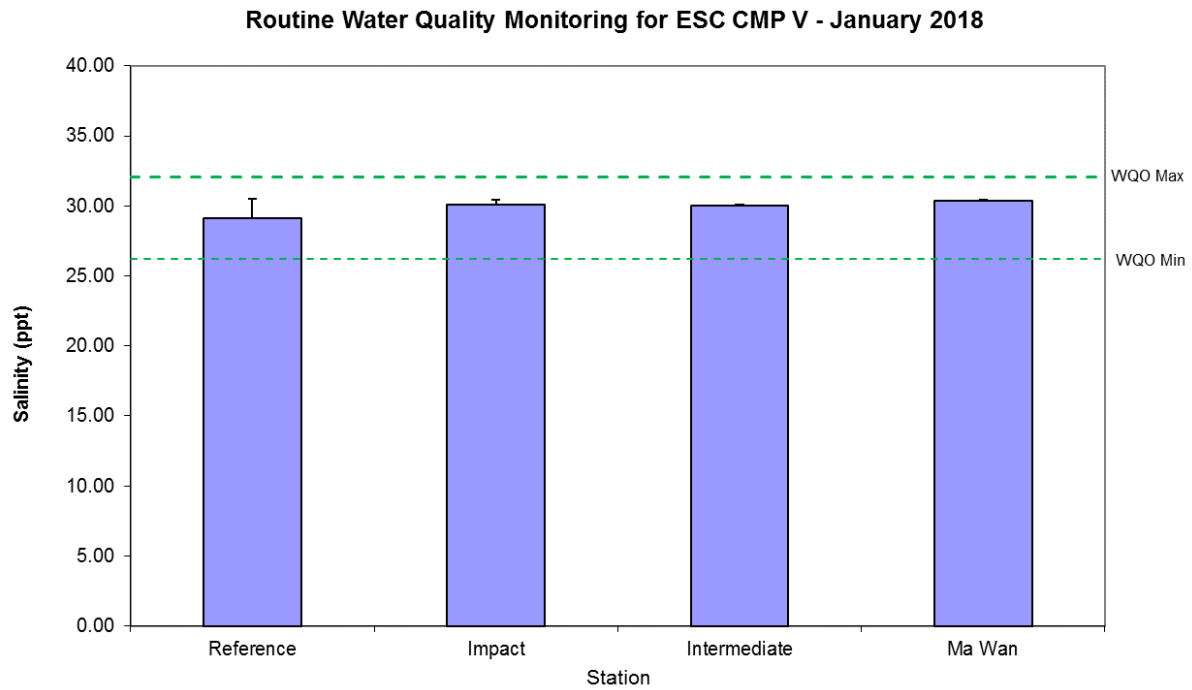


Figure 5: Level of Salinity (ppt; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in January 2018.

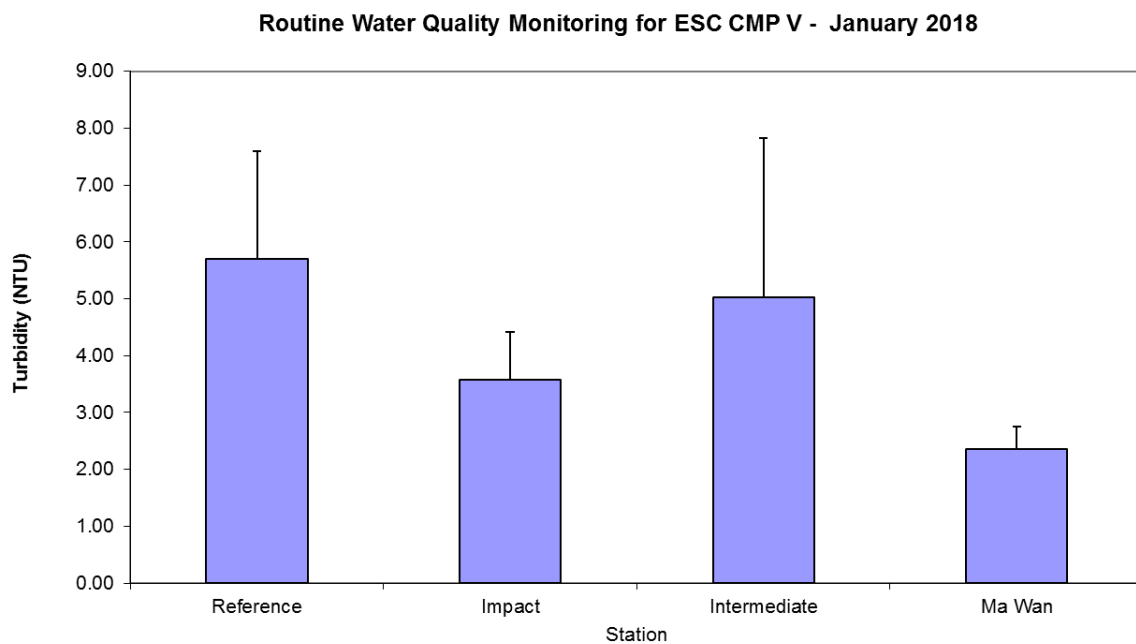


Figure 6: Levels of Turbidity (NTU; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in January 2018.

Source: H:\Team\EM\GMS Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\January 2018)

Date: February 2018

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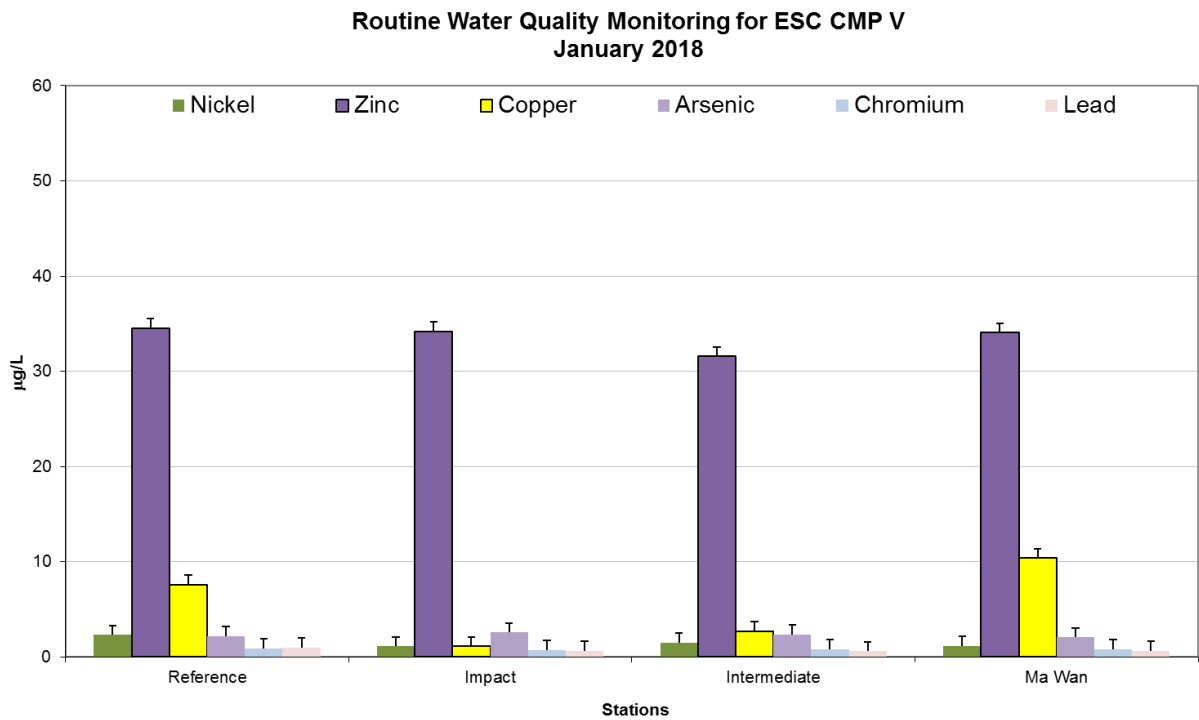


Figure 7: Concentration of Arsenic, Chromium, Nickel, Lead, Copper and Zinc ( $\mu\text{g/L}$ ; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in January 2018.

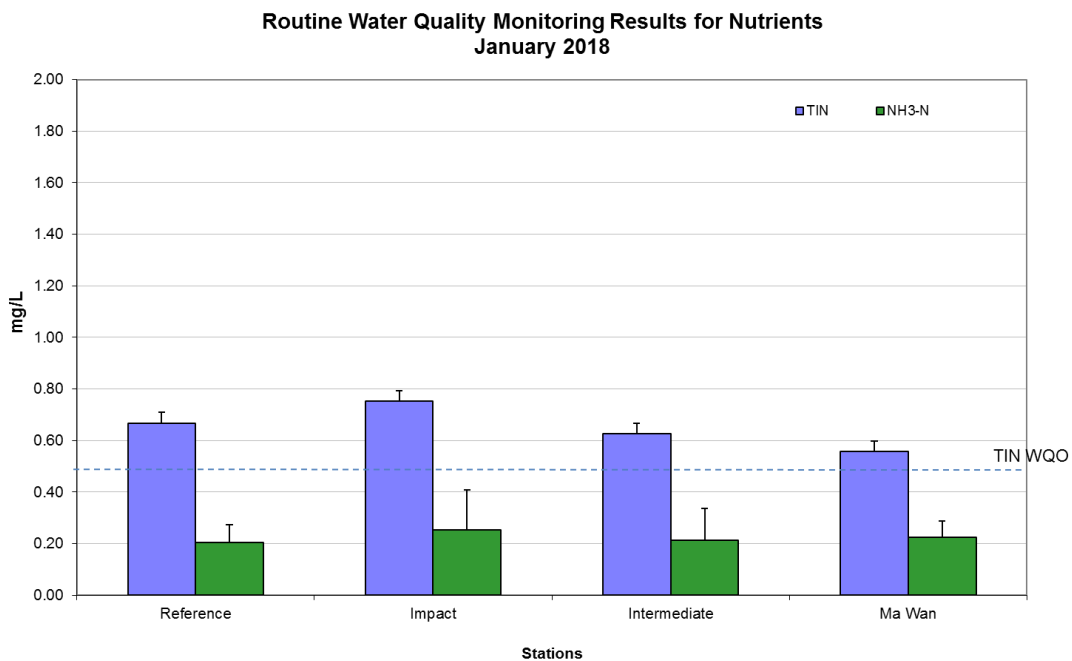


Figure 8: Concentration of Total Inorganic Nitrogen (TIN) and Ammonia Nitrogen ( $\text{NH}_3\text{-N}$ ) ( $\mu\text{g/L}$ ; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in January 2018.

Source: H:\Team\EM\GMS Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\January 2018)

Date: February 2018

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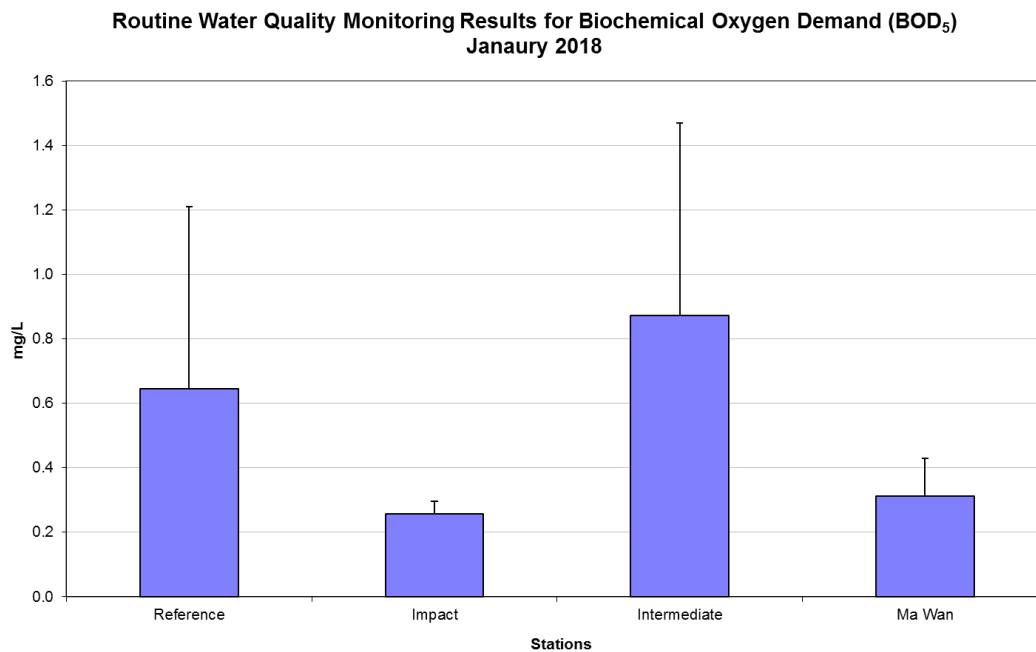


Figure 9: Level of Biochemical Oxygen Demand (BOD<sub>5</sub>) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in January 2018.

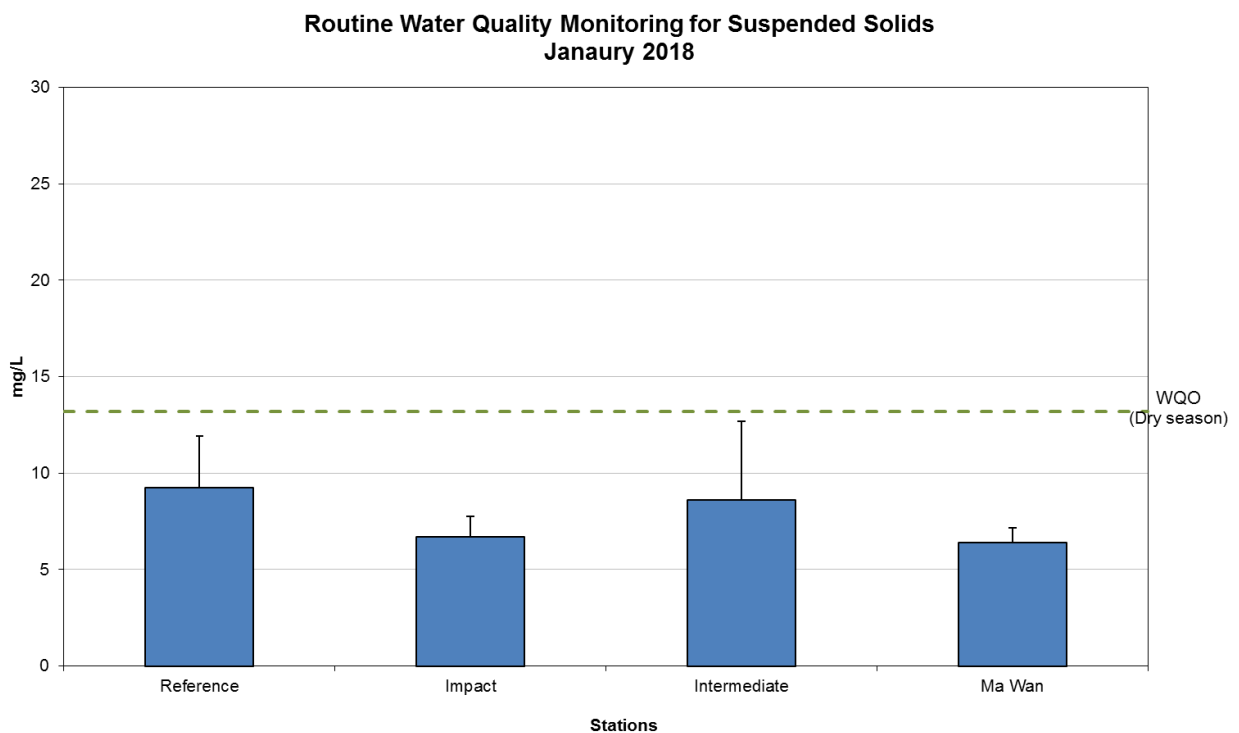


Figure 10: Concentration of Suspended Solids (SS) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in January 2018.

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Date: February 2018

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**Pit Specific Sediment Chemistry for Metal and Metalloid Contaminants at ESC CMP Vd  
January 2018**

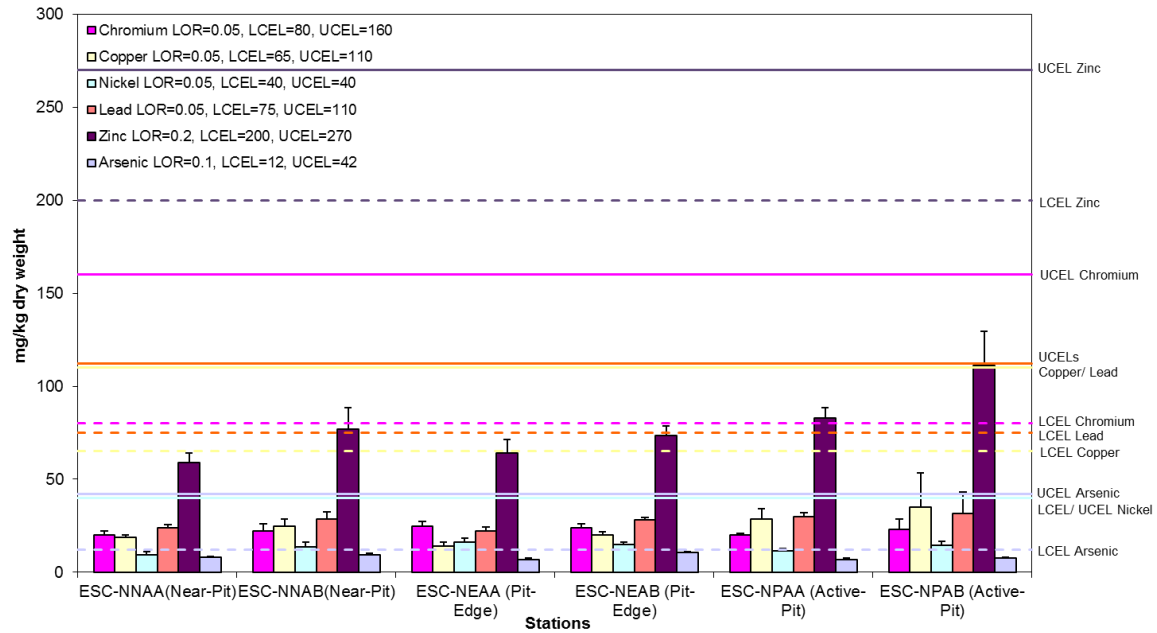


Figure 11: Concentration of Metals and Metalloid (Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in January 2018.

**Pit Specific Sediment Chemistry for Metal Contaminants at ESC CMP Vd  
January 2018**

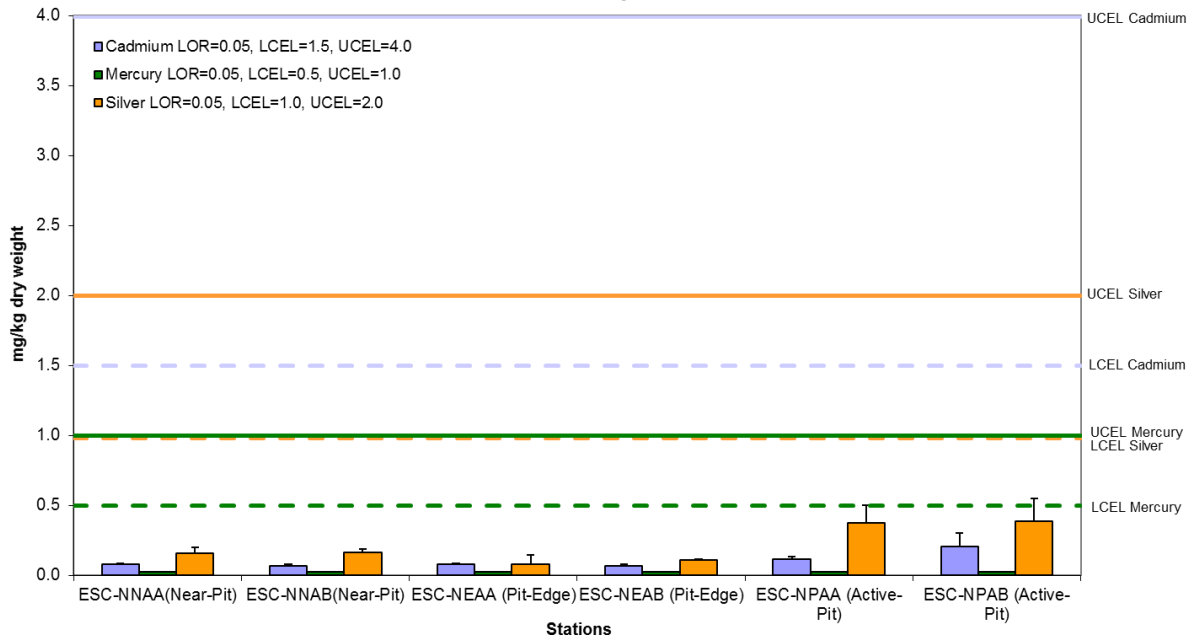


Figure 12: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in January 2018.

Source: H:\Team\EM\GMS Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\January 2018)

Date: February 2018

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**Pit Specific Sediment Chemistry for Total Organic Carbon (TOC) at ESC CMP Vd  
January 2018**

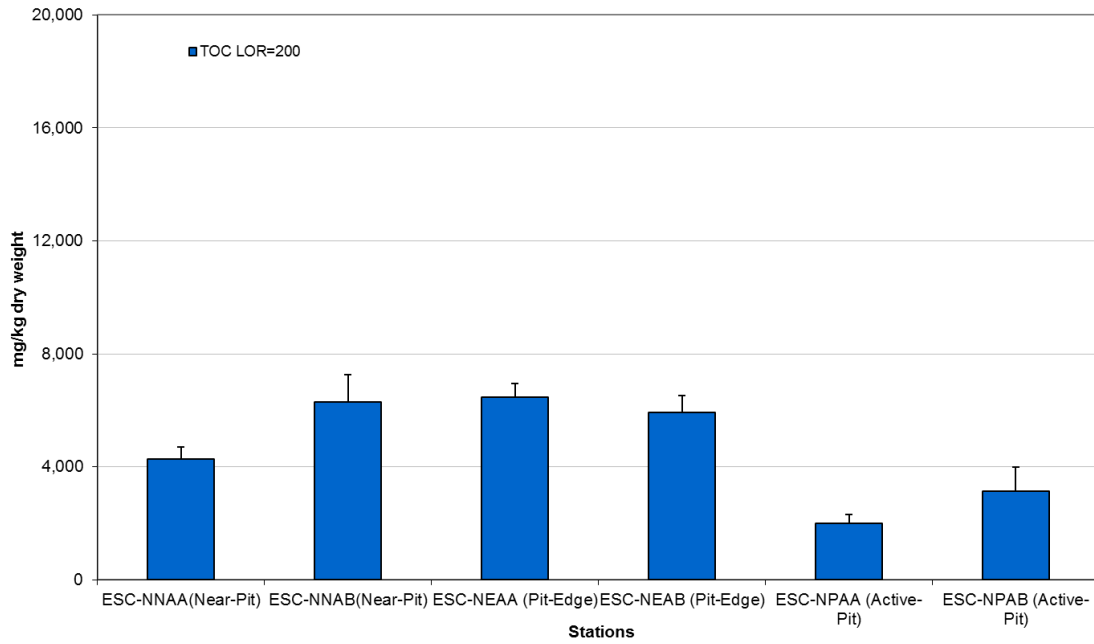


Figure 13: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in January 2018.

**Pit Specific Sediment Chemistry for Tributyltin (TBT) at ESC CMP Vd  
January 2018**

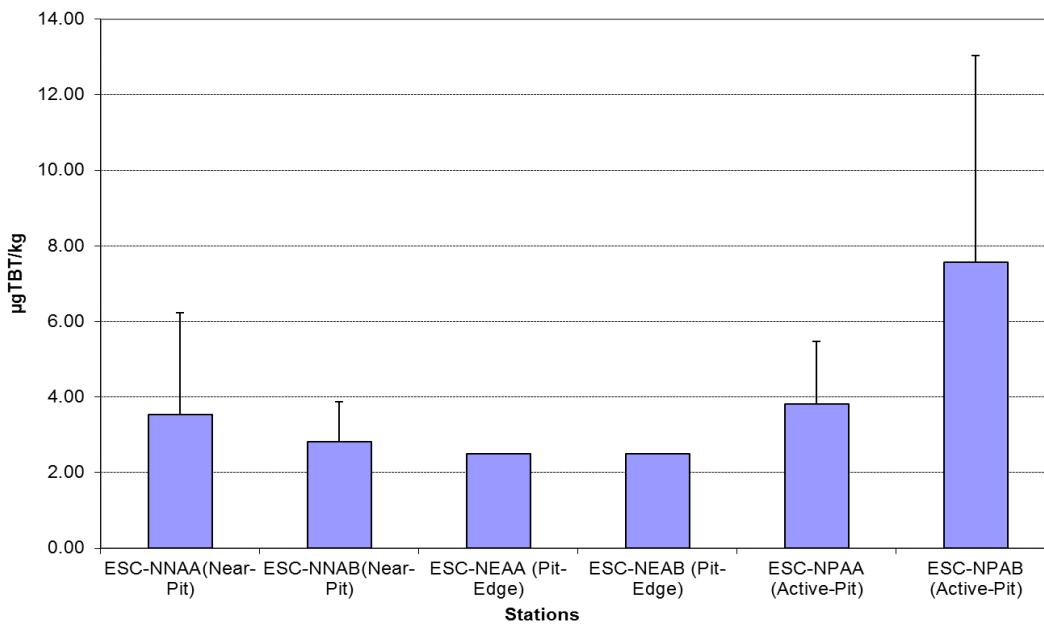


Figure 14: Concentration of Tributyltin (TBT) (µg TBT/kg; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in January 2018.

Source: H:\Team\EM\GMS Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\January 2018)

Date: February 2018

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**Pit Specific Sediment Chemistry for Organic Contaminants (DDT & DDE) at CMP 2  
January 2018**

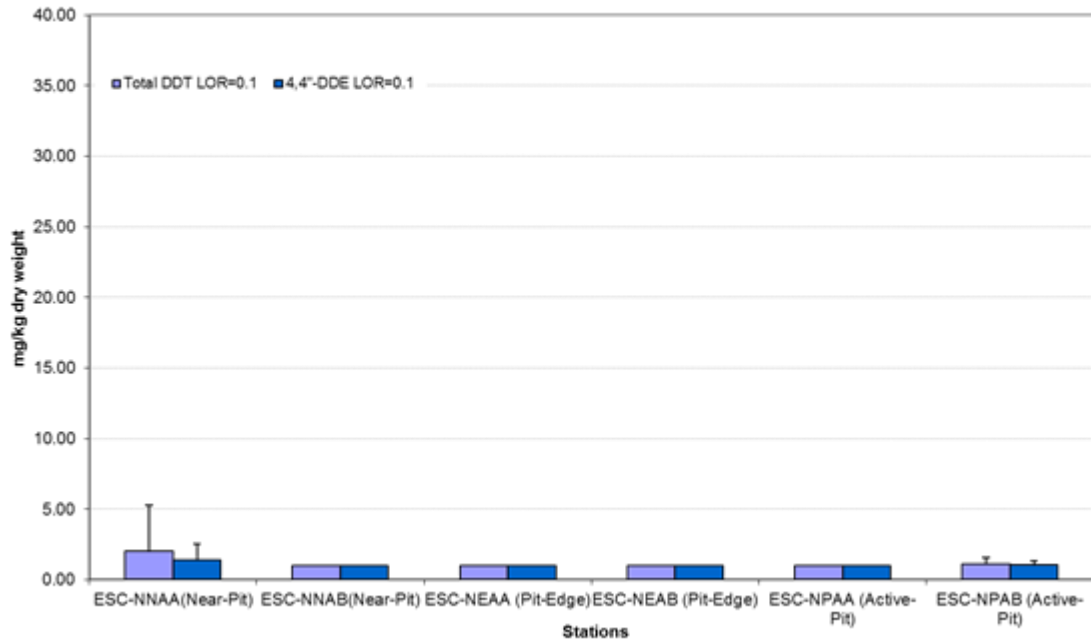


Figure 15: Concentration of total DDT and 4,4' -DDE (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in January 2018.

**Pit Specific Sediment Chemistry for Low and High Molecular Weight Polycyclic Aromatics Hydrocarbons (PAHs) at ESC CMP Vd in January 2018**

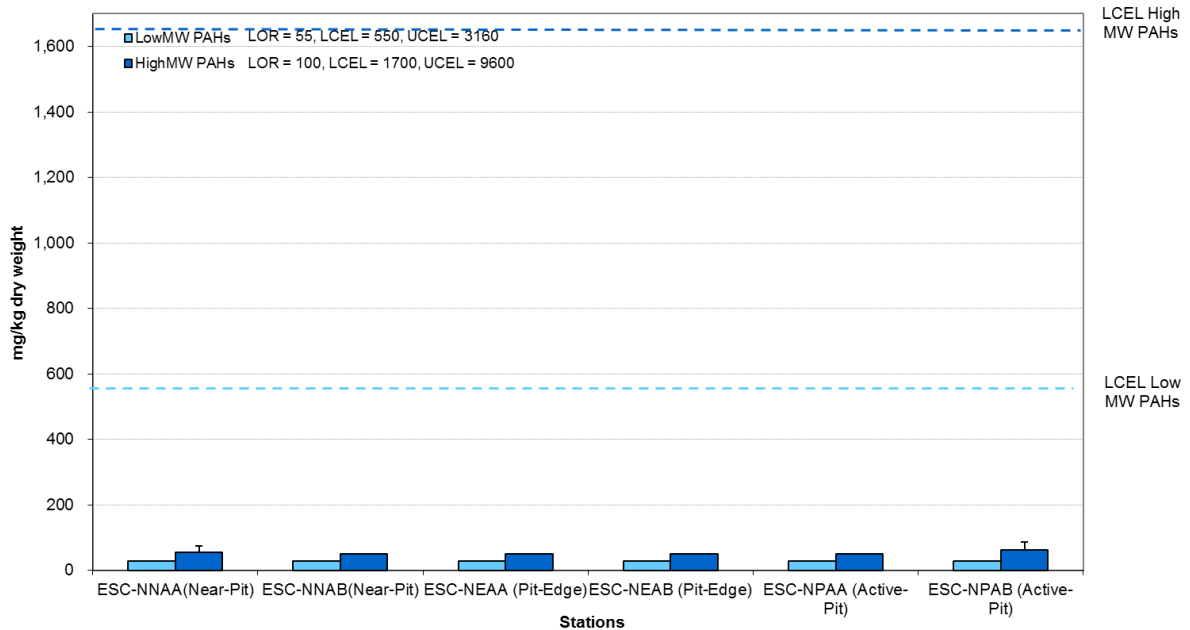


Figure 16: Concentration of Low and High Molecular Weight Polycyclic Aromatics (mg/kg dry weight; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in January 2018..

Source: H:\Team\EM\GMS Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\January 2018)

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Annex D

## Study Programme

