



**Monthly EM&A Report for Contaminated**  
**Mud Pits to the East of Sha Chau –**  
**February 2021**

Revision 0

March 2021

**Environmental Resources Management**  
2509, 25/F, One Harbourfront  
18 Tak Fung Street  
Hung Hom, Kowloon  
Hong Kong  
Telephone (852) 2271 3000  
Facsimile (852) 2723 5660

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

**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 – February 2021**

**Revision 0**

**Environmental Resources  
Management**

2509, 25/F, One Harbourfront  
18 Tak Fung Street  
Hung Hom, Kowloon  
Hong Kong  
Telephone: (852) 2271 3000  
Facsimile: (852) 2723 5660  
E-mail: post.hk@erm.com  
http://www.erm.com

*Document Code: 0400720\_Monthly February 2021\_v0.doc*

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</i> .		Date: 11 March 2021			
		Approved by:  			
		Craig A. Reid <i>Partner</i>			
v0	Monthly EM&A Report for ESC CMPs	GS	RC	CAR	11/03/21
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

### Environmental Certification Sheet EP-312/2008/A

#### Reference Document/Plan

Document/ <del>Plan to be Certified</del> / Verified:	Monthly EM&A Report for Contaminated Mud Pits to the East of Sha Chau - February 2021
Date of Report:	11 March 2021
Date prepared by ET:	11 March 2021
Date received by IA:	11 March 2021

#### Reference EP Condition

Environmental Permit Condition:

Condition 3.4 of EP-312/2008/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

Craig Reid,  
Environmental Team Leader:



Date: 11/03/2021

#### IA Verification

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

Dr Wang Wen Xiong,  
Independent Auditor:



Date: 11/03/2021

## **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>3</b>
<b>1.6</b>	<b>ACTIVITIES SCHEDULED FOR THE NEXT MONTH</b>	<b>7</b>
<b>1.7</b>	<b>STUDY PROGRAMME</b>	<b>7</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 FEBRUARY 2021**

**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 A proposal on the change of number of sample replication of water quality & sediment monitoring and combination of routine water quality monitoring and water quality monitoring during capping operation was submitted to EPD and agreed by EPD on 3 December 2020. The proposed changes have been effective for the EM&A activities since December 2020. The latest sampling schedule is provided in *Annex A*.

(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.

1.1.4 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). The scheduled EM&A programme for SB CMPs was completed in December 2018. Detailed works schedule for ESC CMP V is shown in *Figure 1.1*. In February 2021, the following works were undertaken:

- Disposal of contaminated mud at ESC CMP Vb; and
- Capping operations at ESC CMP Vd.

**Figure 1.1 Works Schedule for ESC CMP V**

Pit	Operation	2017					2018					2019					2020					2021													
		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
ESC CMP V	Dredging																																		
	Disposal																																		
	Capping																																		

**1.2 REPORTING PERIOD**

1.2.1 This *Monthly EM&A Report for February 2021* covers the EM&A activities for the reporting month of February 2021.

**1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES**

1.3.1 The following monitoring activities were undertaken for ESC CMP V in February 2021:

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

**1.4 DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS**

1.4.1 No outstanding sampling remained for February 2021.

1.4.2 The following analyses are in progress and will be presented in the corresponding quarterly report:

- *Species identification of the biota samples collected from Demersal Trawling for ESC CMPs in February 2021; and*

- *Sediment Toxicity Tests of ESC CMPs in February 2021.*

## **1.5** *BRIEF DISCUSSION OF THE MONITORING RESULTS FOR ESC CMP V*

1.5.1 Brief discussion of the monitoring results of the following activities for ESC CMP V is presented in this *Monthly EM&A Report for February 2021*:

- *Water Column Profiling of ESC CMP Vb;*
- *Routine Water Quality Monitoring of ESC CMPs;*
- *Pit Specific Sediment Chemistry of ESC CMP Vb; and*
- *Cumulative Impact Sediment Chemistry of ESC CMPs.*

1.5.2 ***Water Column Profiling of ESC CMP Vb - February 2021***

1.5.3 *Water Column Profiling* was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 11 February 2021. 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 2010 - 2019 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 February 2021 indicated that levels of Salinity, pH and DO complied with the WQOs at both Downstream and Upstream stations (*Table B2 of Annex B*). 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 February 2021 indicated that the SS levels at both Downstream and Upstream stations complied with the WQO and 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 Vb did not appear to cause any deterioration in water quality during this reporting period.

1.5.7 ***Routine Water Quality Monitoring of ESC CMPs - February 2021***

1.5.8 *Routine Water Quality Monitoring of ESC CMPs* was undertaken on 4 February 2021. 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 ten (10) monitoring stations were sampled in February 2021 as shown in *Figure 1.2*.

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



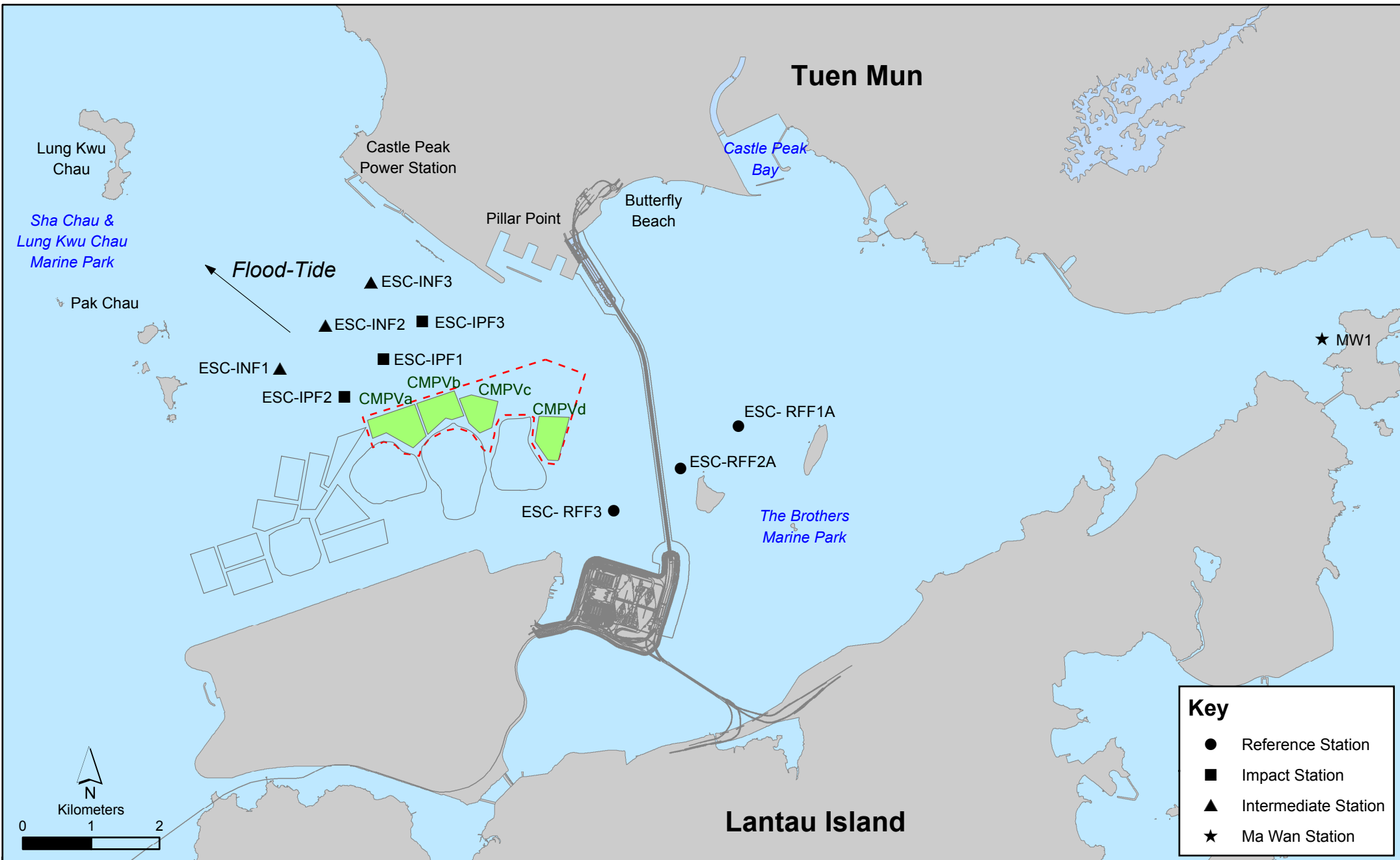


Figure 1.2

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

File: T:\GIS\CONTRACT\0175086\Wxd\updated\_20170419\0175086\_R\_C\_WQMS\_flood.mxd  
Date: 25/4/2017

Key	
●	Reference Station
■	Impact Station
▲	Intermediate Station
★	Ma Wan Station

### *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 indicated that the levels of pH, Salinity and DO complied with the WQOs at all stations in February 2021.
- 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 and capping operation at ESC CMPs did not appear to cause any unacceptable impacts in water quality in February 2021.

### *Laboratory Measurements*

- 1.5.12 Laboratory analysis of February 2021 results indicated that concentrations of Arsenic, Chromium, Copper, Lead, Nickel and Zinc were detected in February 2021 samples at all stations and their concentrations were generally similar across stations (*Table B4 of Annex B; Figure 7 of Annex C*).
- 1.5.13 For nutrients, concentrations of Total Inorganic Nitrogen (TIN) at Ma Wan station complied with the WQO (0.5 mg/L) while those recorded at Reference, Intermediate and Impact stations were higher than the WQO (*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 CMPs. The concentrations of Ammonia Nitrogen (NH<sub>3</sub>-N) were generally similar across stations in February 2021 (*Table B4 of Annex B; Figure 8 of Annex C*). The concentrations of Biochemical Oxygen Demand (BOD<sub>5</sub>) were generally similar across stations (*Table B4 of Annex B; Figure 9 of Annex C*).
- 1.5.14 Analyses of results for February 2021 indicated that the SS levels at all stations complied with the WQO (12.8 mg/L) and the Action and Limit Levels (*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 and capping operation at ESC CMPs did not appear to cause any unacceptable deterioration in water quality in February 2021. 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 Vb - February 2021***
- 1.5.17 Monitoring locations for *Pit Specific Sediment Chemistry for ESC CMP Vb* are shown in *Figure 1.3*. A total of six (6) monitoring stations were sampled on 8 February 2021.

(1) [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)

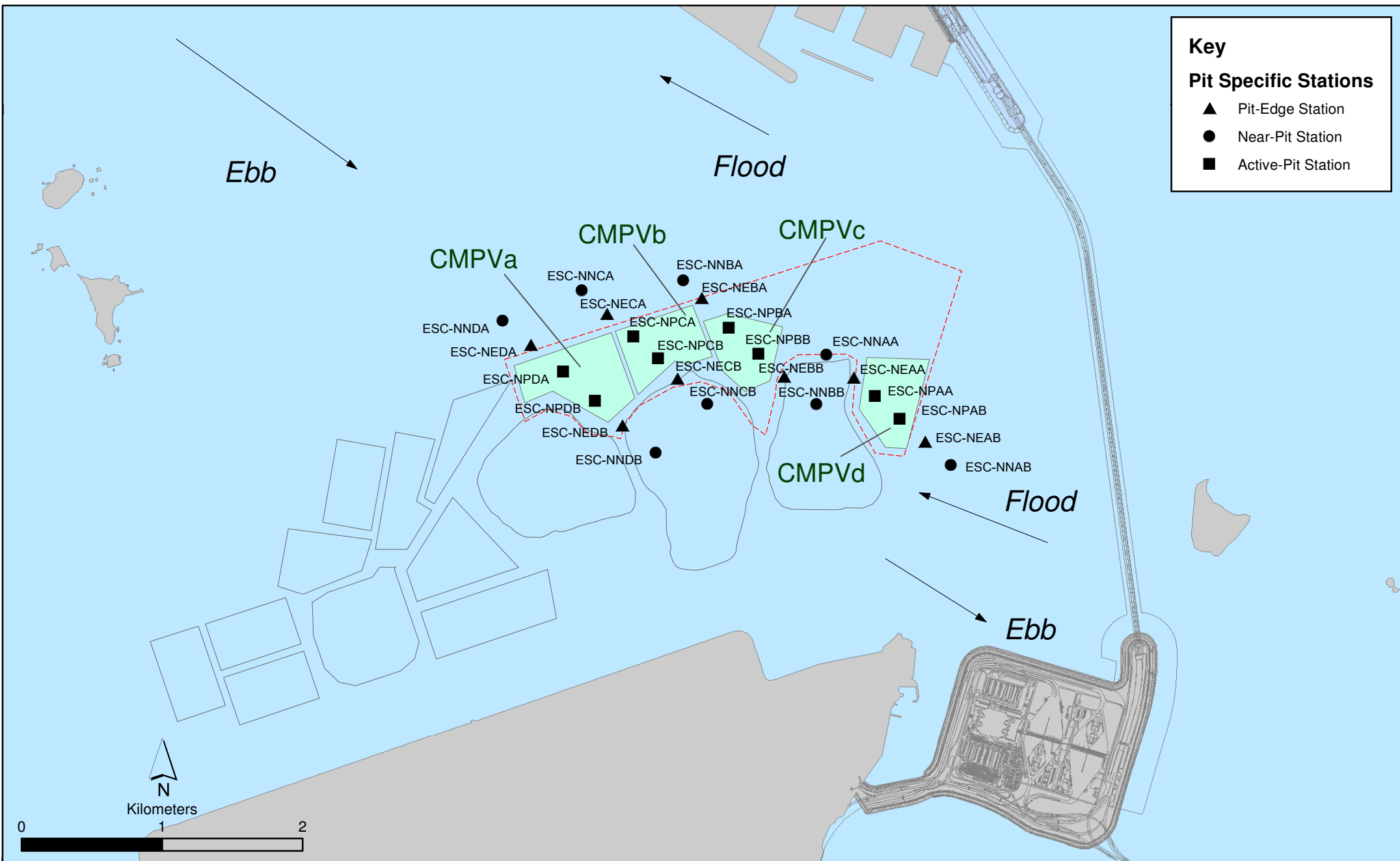


Figure 1.3

Pit Specific Sediment Quality Monitoring Stations for CMPV

- 1.5.18 The concentrations of most inorganic contaminants were lower than the Lower Chemical Exceedance Levels (LCELs) at most stations, except for Arsenic and Copper (*Figures 11 and 12 of Annex C*). The concentrations of Arsenic were higher than the LCEL at Near-Pit station ESC-NNCA, Pit-Edge stations ESC-NECA and ESC-NECB; the concentrations of Copper was higher than LECL at Active-Pit station ESC-NPCB.
- 1.5.19 Whilst the average concentration of Arsenic in the Earth's crust is generally ~2mg/kg, significantly higher Arsenic concentrations (median = 14 mg/kg) have been recorded in Hong Kong's onshore sediments <sup>(1)</sup>. It is presumed that the natural concentrations of Arsenic are similar in onshore and offshore sediments <sup>(2)</sup>, and relatively high Arsenic levels may thus occur throughout Hong Kong. Therefore, the LECL exceedances of Arsenic are unlikely to be caused by the disposal operations at ESC CMP Vb but rather as a result of naturally occurring deposits.
- 1.5.20 Considering that the higher levels of Copper occurred within Active-Pit station only but not at the Pit-Edge and Near-Pit stations, there is no evidence indicating any unacceptable environmental impacts to sediment quality as a result of the contaminated mud disposal operations at ESC CMP Vb in February 2021.
- 1.5.21 For organic contaminants, the concentrations of Total Organic Carbon (TOC) were higher at Pit-Edge station ESC-NPCB in February 2021 (*Figure 13 of Annex C*). The concentrations of Low Molecular Weight and High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) were lower than the LECLs at all stations (*Figure 14 of Annex C*). The concentrations of Tributyltin (TBT) were higher at Near-Pit station ESC-NNCA and Active-Pit station ESC-NPCA (*Figure 15 of Annex C*). The concentrations of Total Polychlorinated Biphenyls (PCBs), Total dichloro-diphenyl-trichloroethane (DDT) and 4,4'-dichlorodiphenyldichloroethylene (DDE) were below the limit of reporting at all stations in February 2021.
- 1.5.22 Overall, there is no evidence indicating any unacceptable environmental impacts to sediment quality outside the pit area as a result of the contaminated mud disposal operations at ESC CMP Vb in February 2021.
- 1.5.23 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) Sewell RJ (1999) Geochemical Atlas of Hong Kong. Geotechnical Engineering Office, Government of the Hong Kong Special Administrative Region

(2) Whiteside PGD (2000) Natural geochemistry and contamination of marine sediments in Hong Kong. In: The Urban Geology of Hong Kong (ed Page A & Reels SJ). Geological Society of Hong Kong Bulletin No. 6, p109-121

- 1.5.24 ***Cumulative Impact Sediment Chemistry of ESC CMPs – February 2021***
- 1.5.25 Monitoring locations for Cumulative Impact Sediment Chemistry for ESC CMPs are shown in *Figure 1.4*. A total of nine (9) monitoring stations were sampled on 9 and 10 February 2021.
- 1.5.26 Analyses of results for the *Cumulative Impact Sediment Chemistry Monitoring* indicated that the concentrations of most inorganic contaminants were below the LCEL at most stations in February 2021, except concentrations of Arsenic were higher than the LCEL at Mid-field stations ESC-RMA, ESC-RMB, Near-field station ESC-RNB1, Capped Pit stations ESC-RCA1 and ESC-RCB1 (*Figures 16 and 17 of Annex C*). As discussed in *Section 1.5.19*, the LECL exceedances of Arsenic are unlikely to be caused by the disposal operations at ESC CMP Vb but rather as a result of naturally occurring deposits.
- 1.5.27 For organic contaminants, the concentrations of TOC were higher at Far-field station ESC-RFA (*Figure 18 of Annex C*). The concentrations of TBT were higher at Ma Wan station (*Figure 19 of Annex C*). The concentrations of High Molecular Weight PAHs were below LECL (*Figure 20 of Annex C*). The concentrations of Total PCBs, Total DDT, 4,4'-DDE and Low Molecular Weight PAHs were below the limit of reporting at all stations in February 2021.
- 1.5.28 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 Vb in February 2021. 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 March 2021 for ESC CMP V (see *Annex A* for the sampling schedule):
- *Water Column Profiling of ESC CMP Vb;*
  - *Routine Water Quality Monitoring of ESC CMPs; and*
  - *Pit Specific Sediment Chemistry of ESC CMP Vb.*

## **1.7 *STUDY PROGRAMME***

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

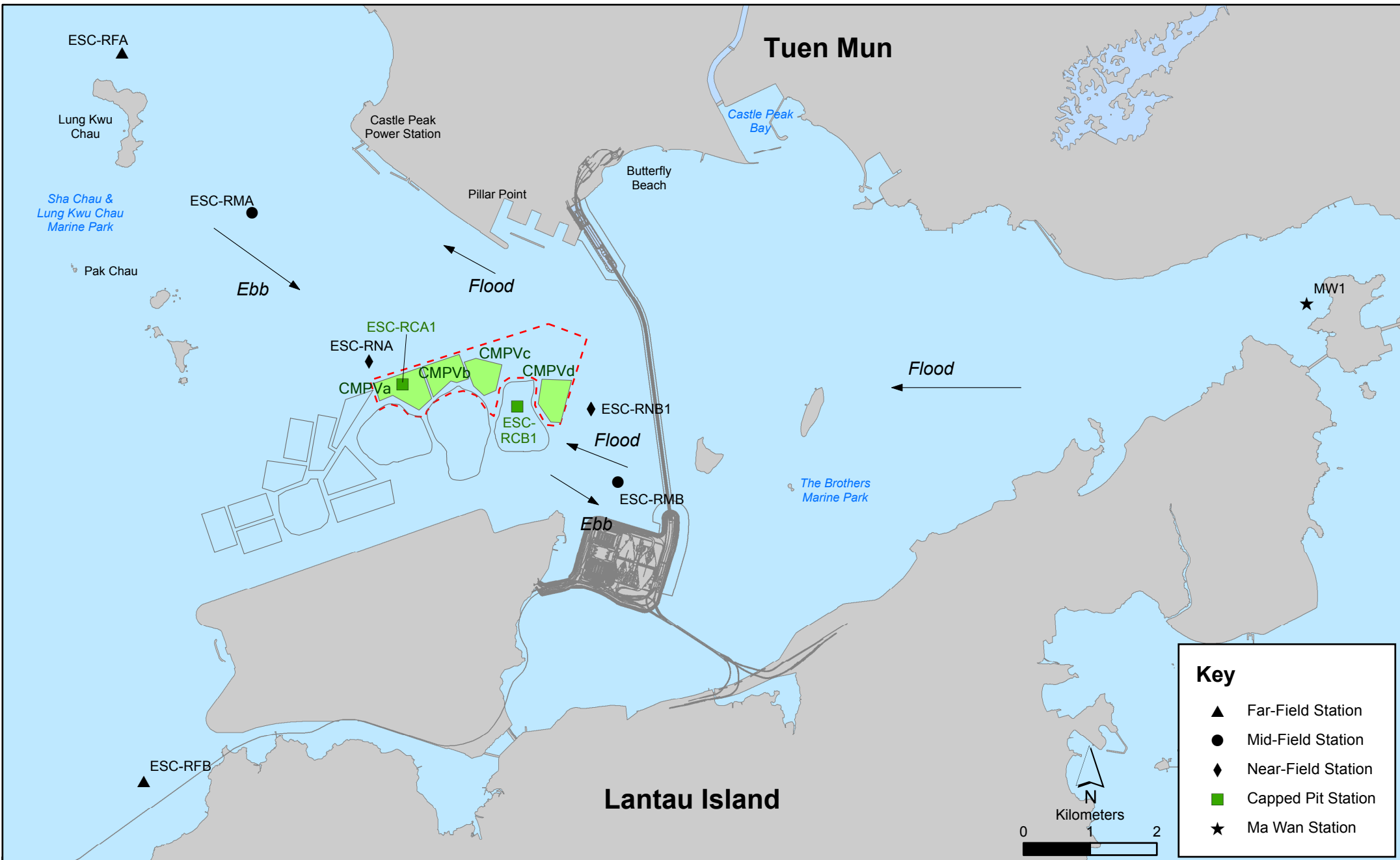


Figure 1.4

Cumulative Impacts Sediment Quality Monitoring Stations for ESC CMPs

**Key**

- ▲ Far-Field Station
- Mid-Field Station
- ◆ Near-Field Station
- Capped Pit Station
- ★ Ma Wan Station

Annex A

## Sampling Schedule





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 Vb in February 2021*

Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen		pH	Suspended Solids (mg L <sup>-1</sup> )
				(%)	(mg L <sup>-1</sup> )		
WCP 1 (Downstream)	18.81	28.85	1.12	105.82	8.30	8.34	6.0
WCP 2 (Upstream)	18.75	29.18	1.46	104.51	8.19	8.31	4.3
WQO (Dry Season)	N/A	26.26-32.09#	N/A	N/A	>4	6.5-8.5	12.8

**Note:**

#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 February 2021*

Sampling Period	Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen		pH (mg L <sup>-1</sup> )
					(%)	(mg L <sup>-1</sup> )	
February 2021	RFF (Reference)	18.58	28.92	1.33	108.06	8.51	8.31
	IPF (Impact)	18.72	28.81	2.18	110.85	8.71	8.29
	INF (Intermediate)	18.75	28.70	2.39	111.65	8.77	8.30
	Ma Wan	18.40	29.43	0.59	106.23	8.37	8.25
	WQO	N/A	26.03- 31.81#	N/A	N/A	>4	6.5-8.5

**Notes:**

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

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

Cell shaded grey indicate value higher than the WQO.

**Table B4** *Laboratory Results for Routine Water Quality Monitoring of ESC CMPs in February 2021*

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)
February 2021	RFF	1.57	<LOR	0.89	8.50	1.10	<LOR	1.20	<LOR	46.14	0.28	0.58	1.67	4.41
	IPF	1.69	<LOR	1.31	6.36	0.93	<LOR	1.39	<LOR	62.03	0.29	0.58	1.56	6.61
	INF	1.63	<LOR	0.91	7.82	0.58	<LOR	1.30	<LOR	41.78	0.30	0.56	1.33	6.72
	Ma Wan	1.50	<LOR	0.90	6.83	1.28	<LOR	1.28	<LOR	48.08	0.22	0.46	1.33	3.73

WQO of TIN: 0.5 mg/L

Dry Season WQO of SS : 12.8 mg/L

**Notes:**

<LOR indicates the concentrations of metals and metalloids are below the limit of reporting

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

Cell shaded grey indicate value higher than the WQO.

Annex C

## Graphical Presentations

**Routine Water Quality Monitoring for ESC CMP V - February 2021**

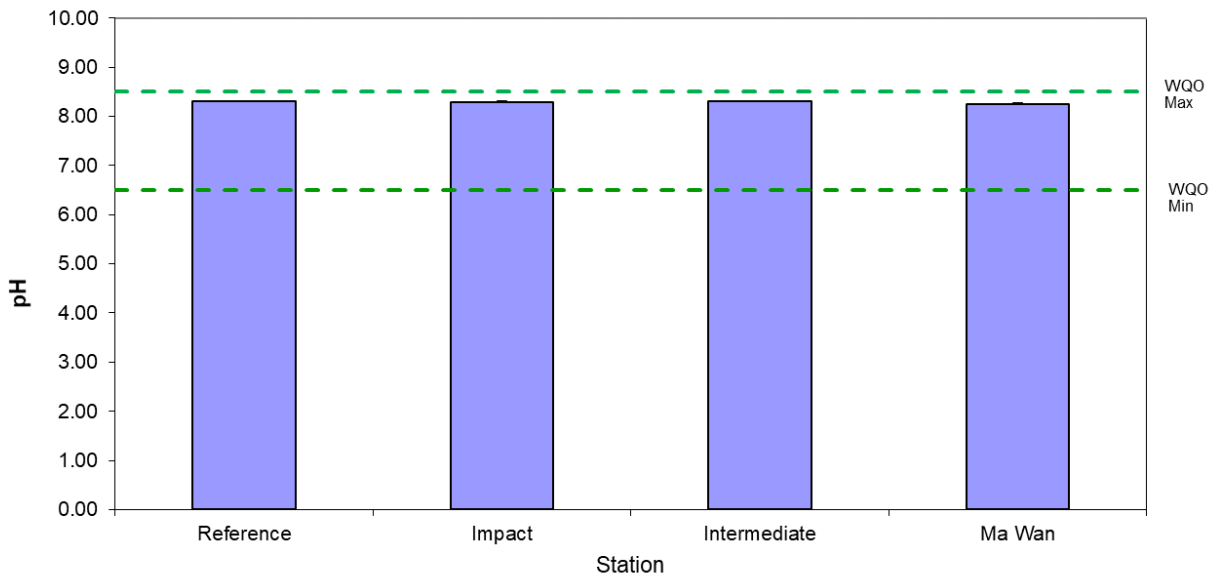


Figure 1: Level of pH recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in February 2021.

**Routine Water Quality Monitoring ESC CMP V - February 2021**

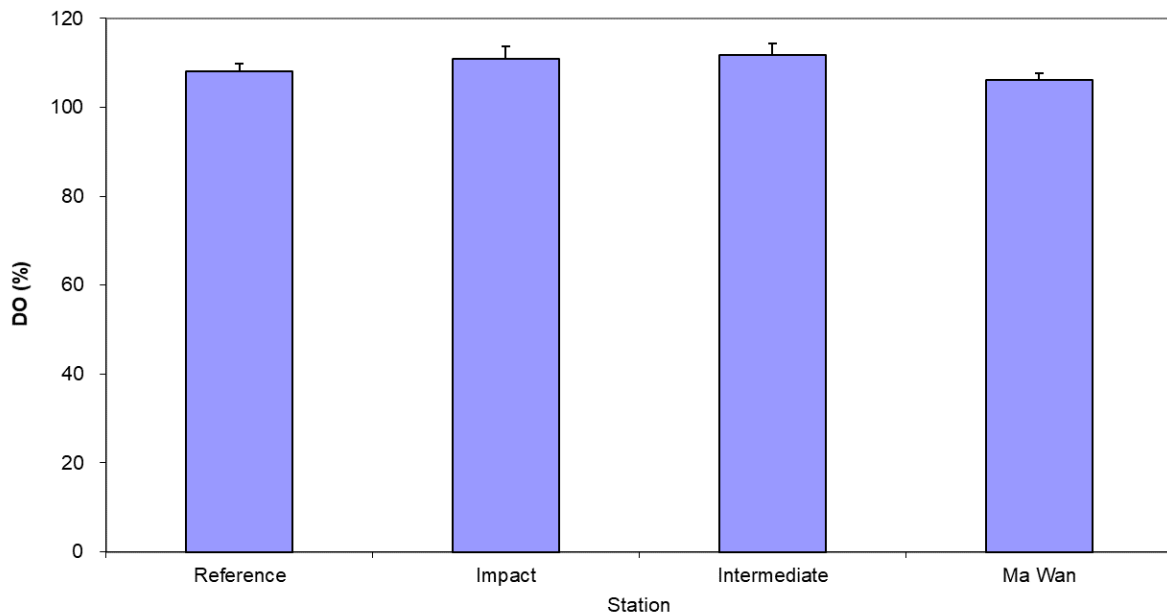


Figure 2: Level of Dissolved Oxygen (DO) (% saturation; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in February 2021.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\47 Monthly February 2021

Date: March 2021

**Environmental  
Resources  
Management**



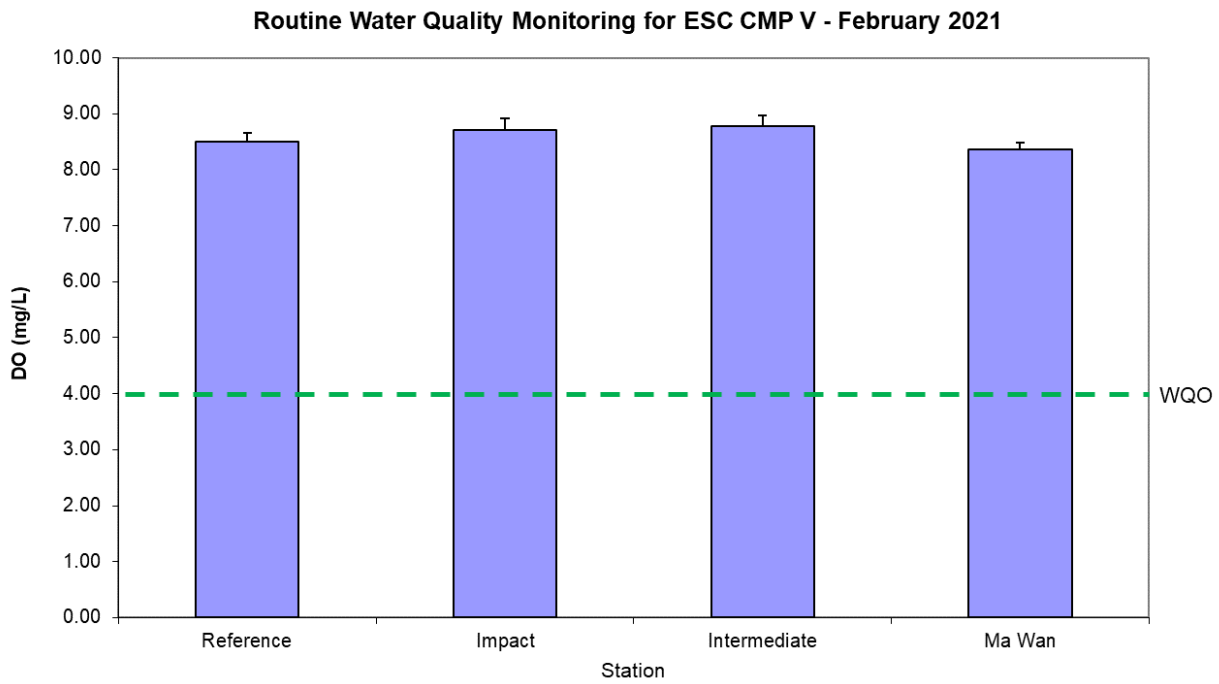


Figure 3: Concentration of Dissolved Oxygen (DO) (mg/L; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in February 2021.

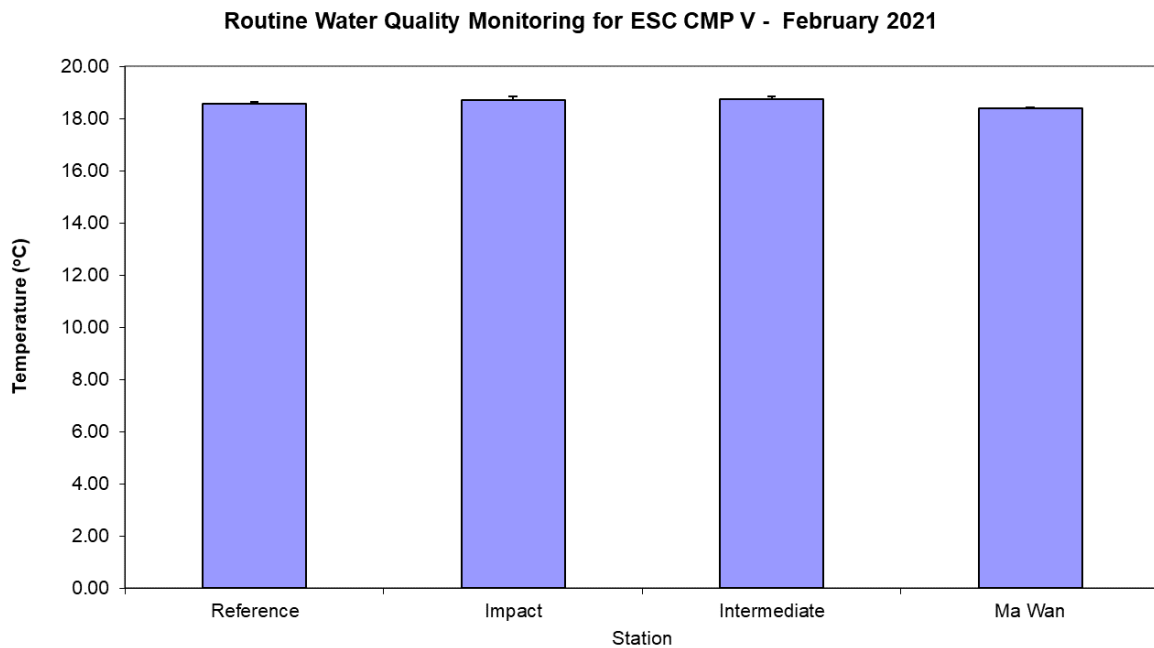


Figure 4: Level of Temperature (°C; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in February 2021.

**Routine Water Quality Monitoring for ESC CMP V - February 2021**

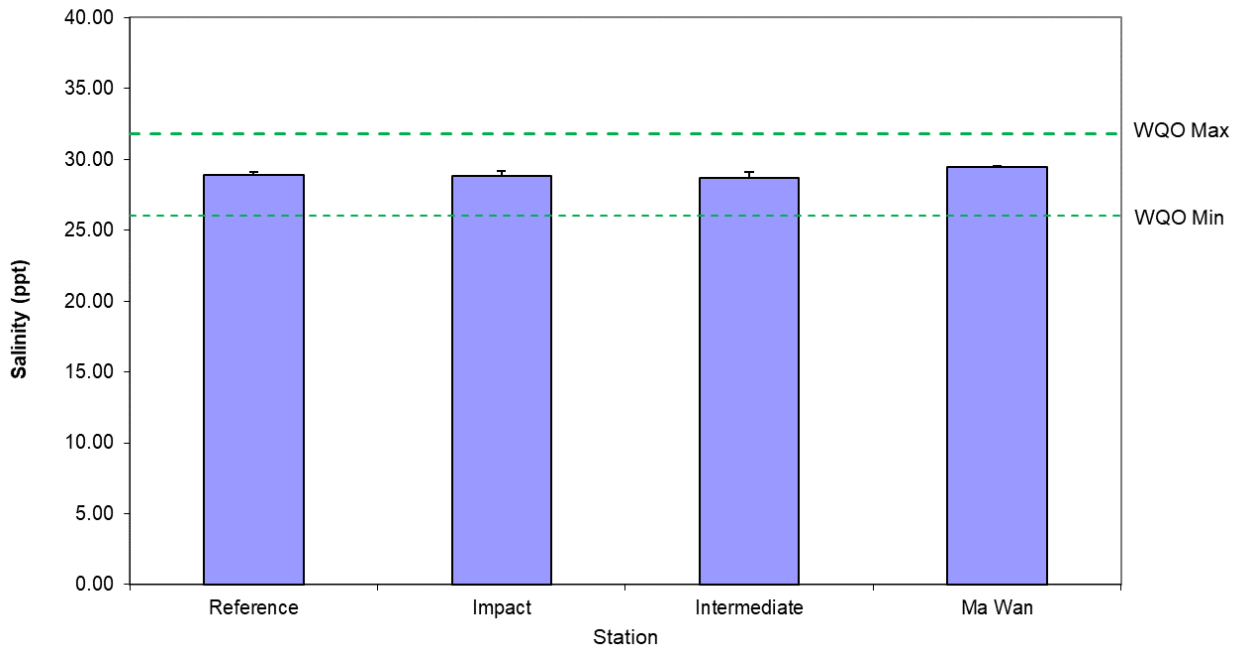


Figure 5: Level of Salinity (ppt; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in February 2021.

**Routine Water Quality Monitoring for ESC CMP V - February 2021**

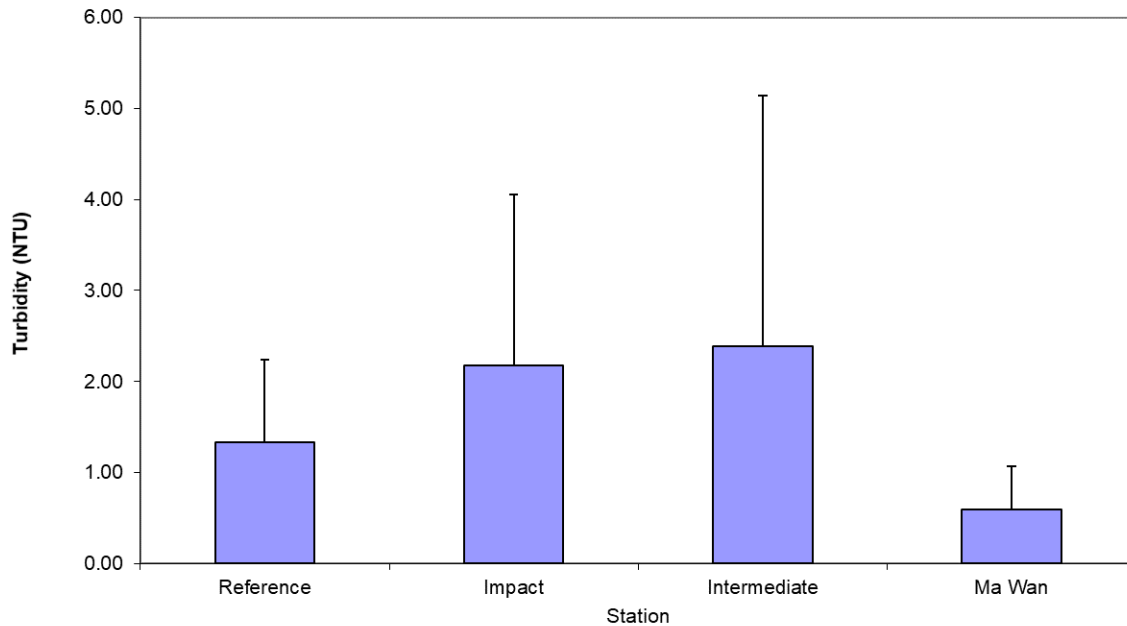


Figure 6: Levels of Turbidity (NTU; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in February 2021.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\47 Monthly February 2021

Date: March 2021

**Environmental  
Resources  
Management**



**Routine Water Quality Monitoring for ESC CMP V  
February 2021**

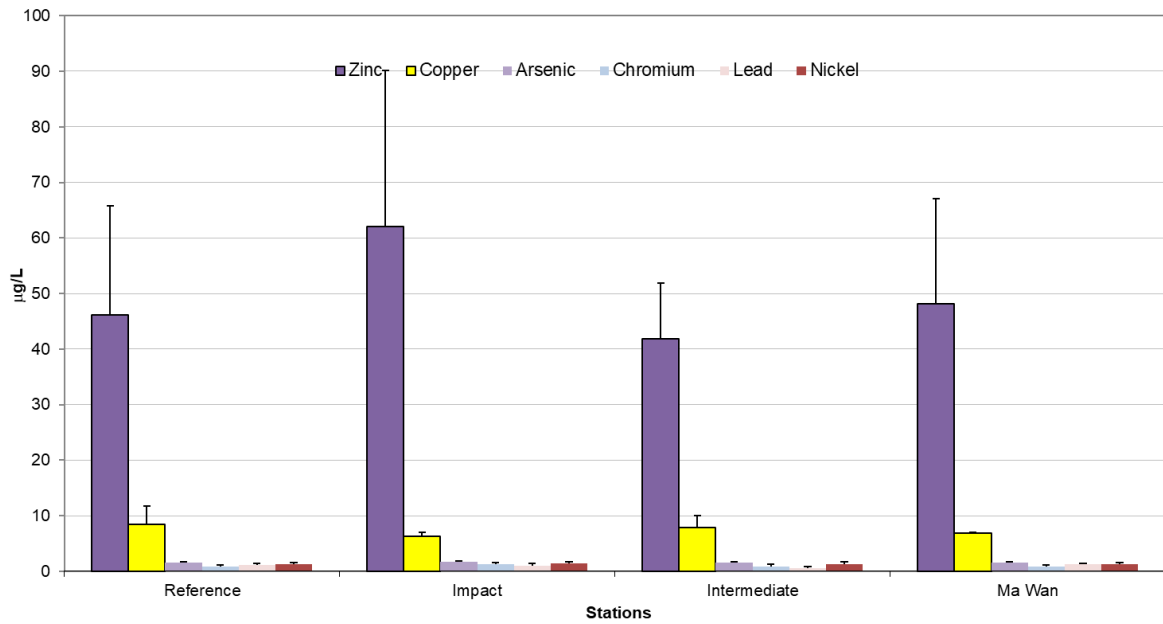


Figure 7: Concentration of Arsenic, Chromium, Copper, Lead, Nickel and Zinc ( $\mu\text{g/L}$ ; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in February 2021.

**Routine Water Quality Monitoring Results for Nutrients  
February 2021**

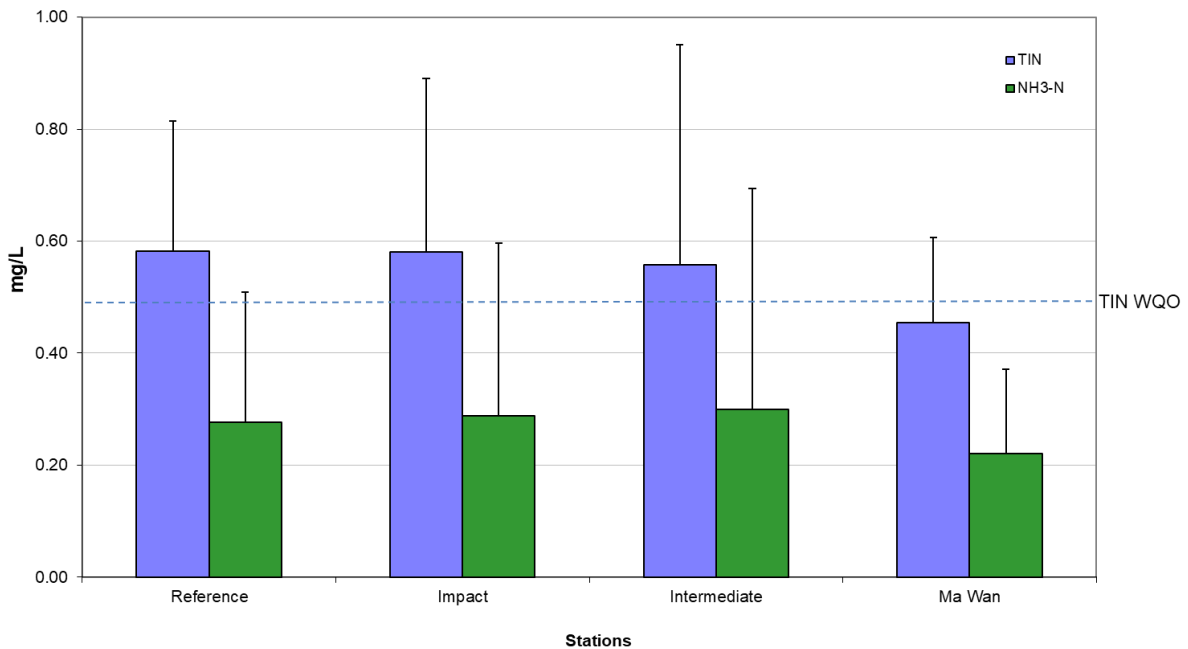


Figure 8: Concentration of Total Inorganic Nitrogen (TIN) and Ammonia Nitrogen ( $\text{NH}_3\text{-N}$ ) ( $\text{mg/L}$ ; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in February 2021.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\47 Monthly February 2021

Date: March 2021

**Environmental  
Resources  
Management**





**Routine Water Quality Monitoring Results for Biochemical Oxygen Demand (BOD<sub>5</sub>)  
February 2021**

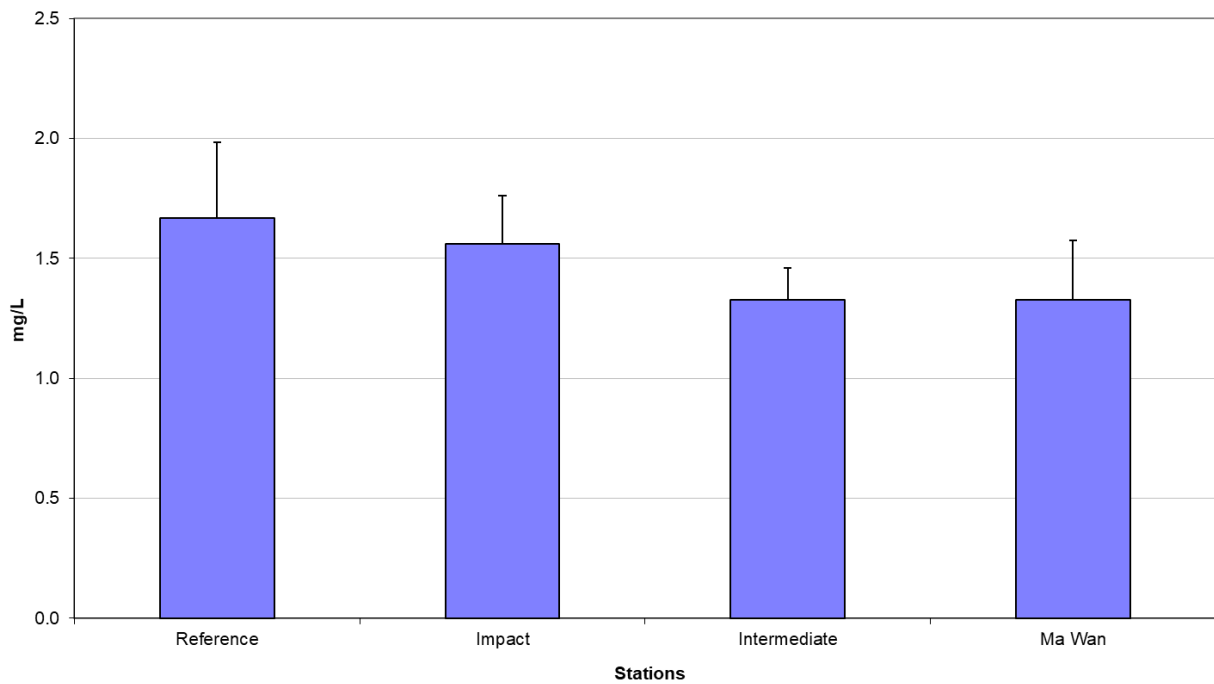


Figure 9: Level of Biochemical Oxygen Demand (BOD<sub>5</sub>) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in February 2021.

**Routine Water Quality Monitoring for Suspended Solids  
February 2021**

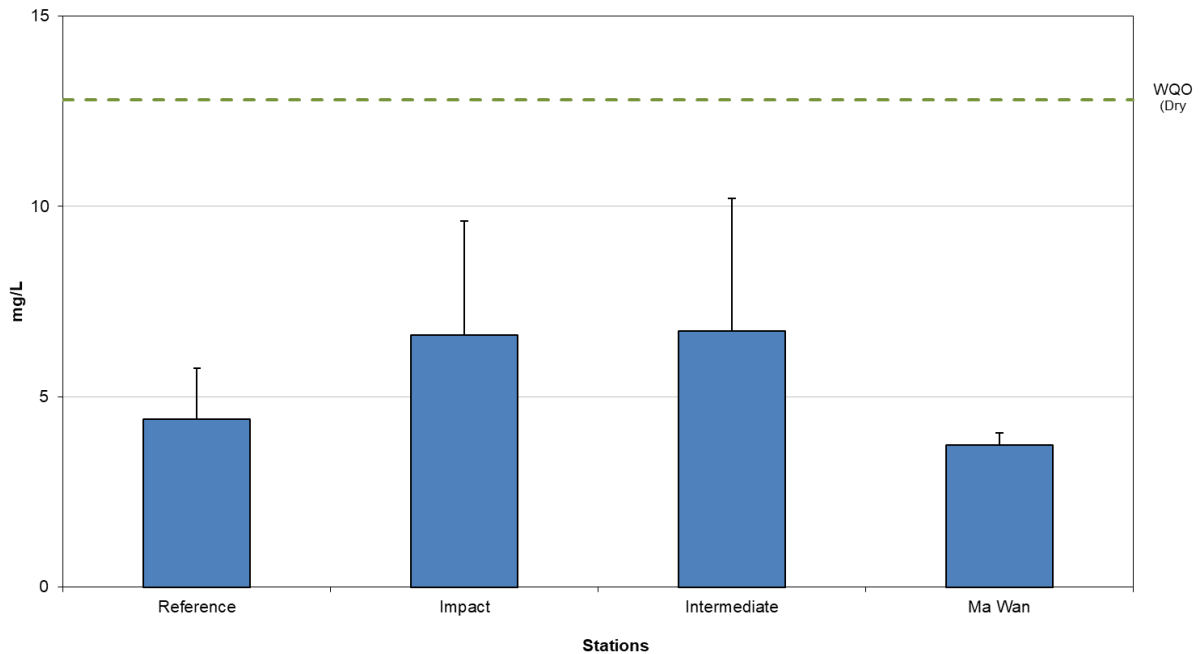


Figure 10: Concentration of Suspended Solids (SS) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in February 2021.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\47 Monthly February 2021

Date: March 2021

**Environmental  
Resources  
Management**



**Pit Specific Sediment Chemistry for Metal and Metalloid Contaminants at ESC CMP Vb  
February 2021**

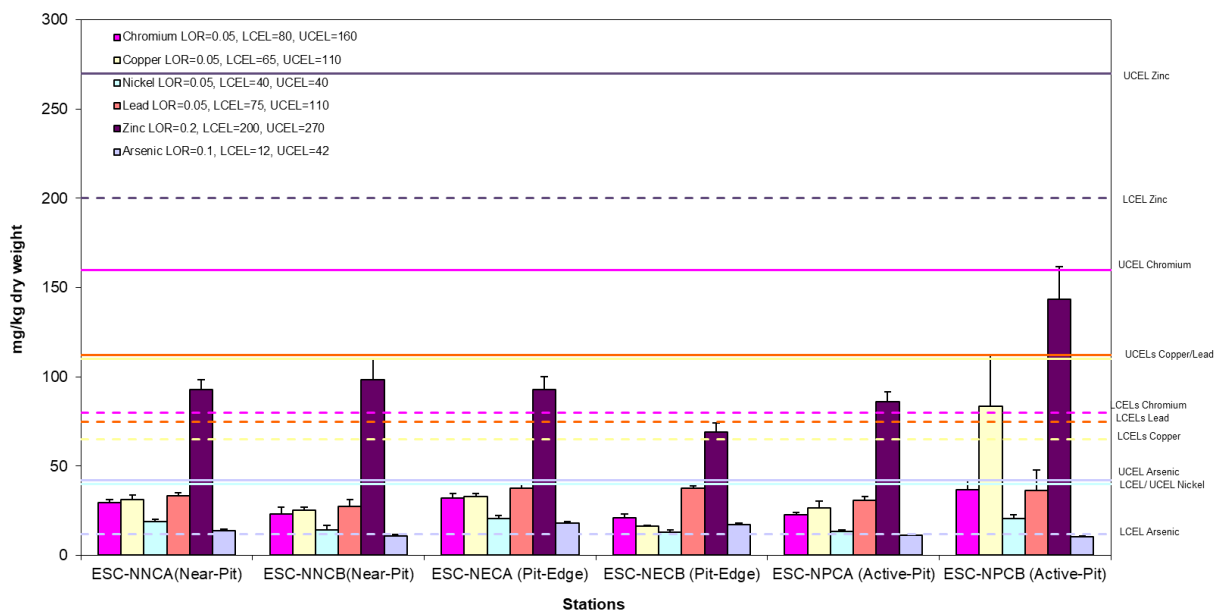


Figure 11: Concentration of Metals and Metalloid (Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in February 2021.

**Pit Specific Sediment Chemistry for Metal Contaminants at ESC CMP Vb  
February 2021**

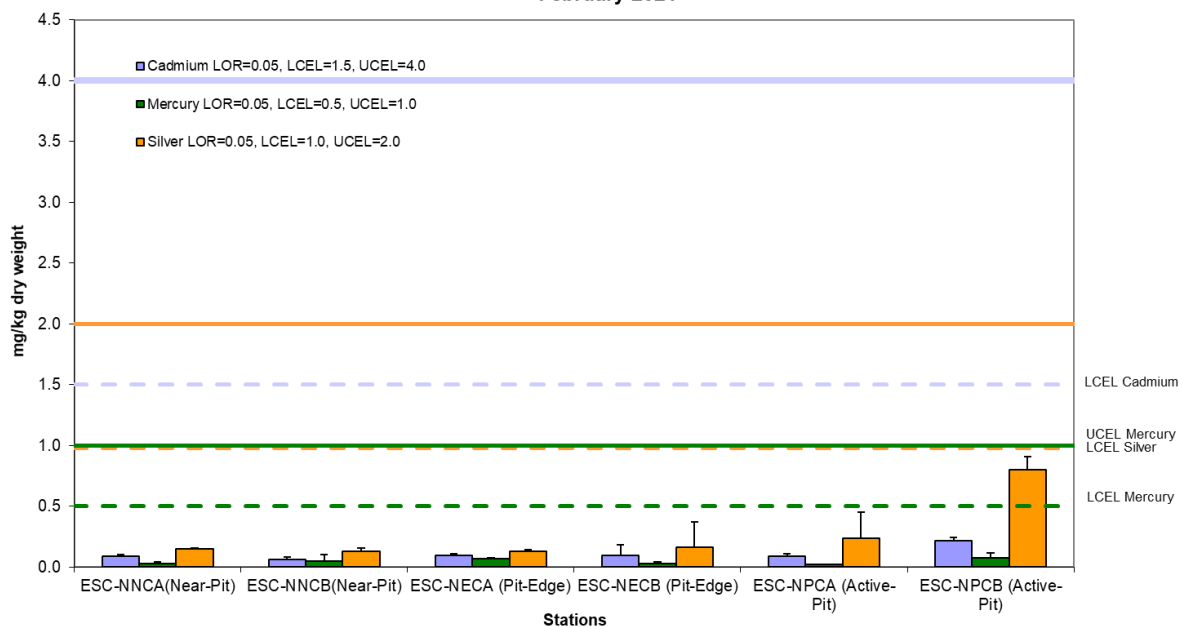


Figure 12: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in February 2021.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\47 Monthly February 2021

Date: March 2021

**Environmental  
Resources  
Management**



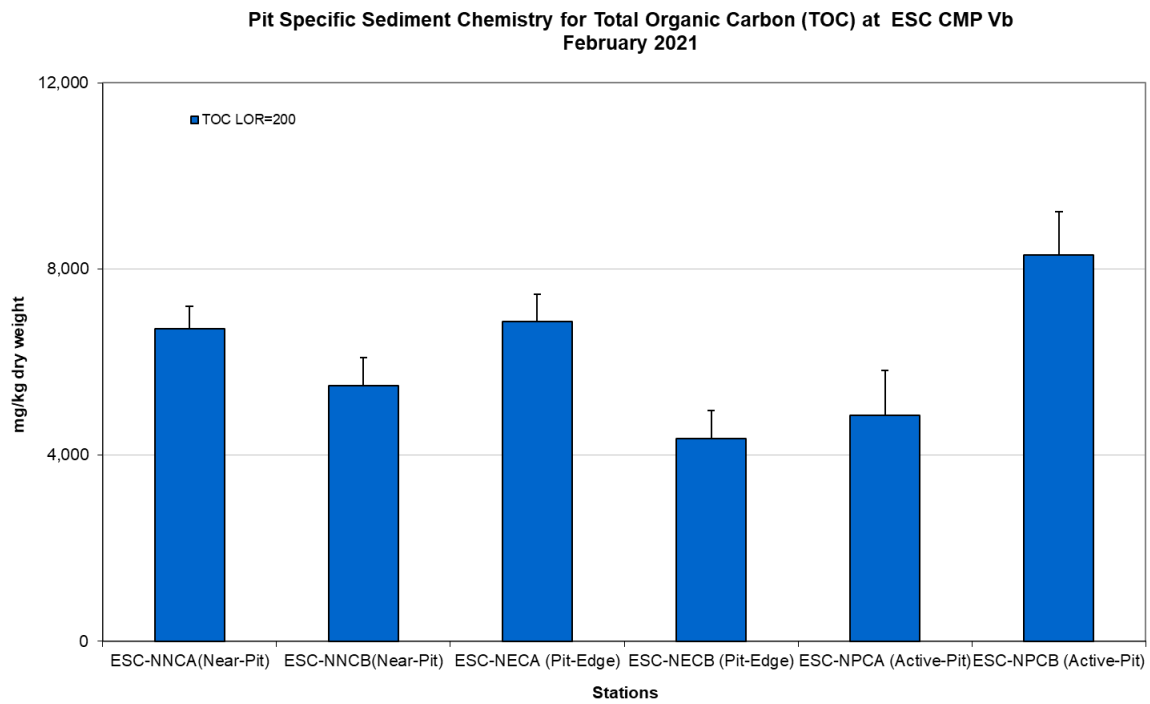


Figure 13: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in February 2021.

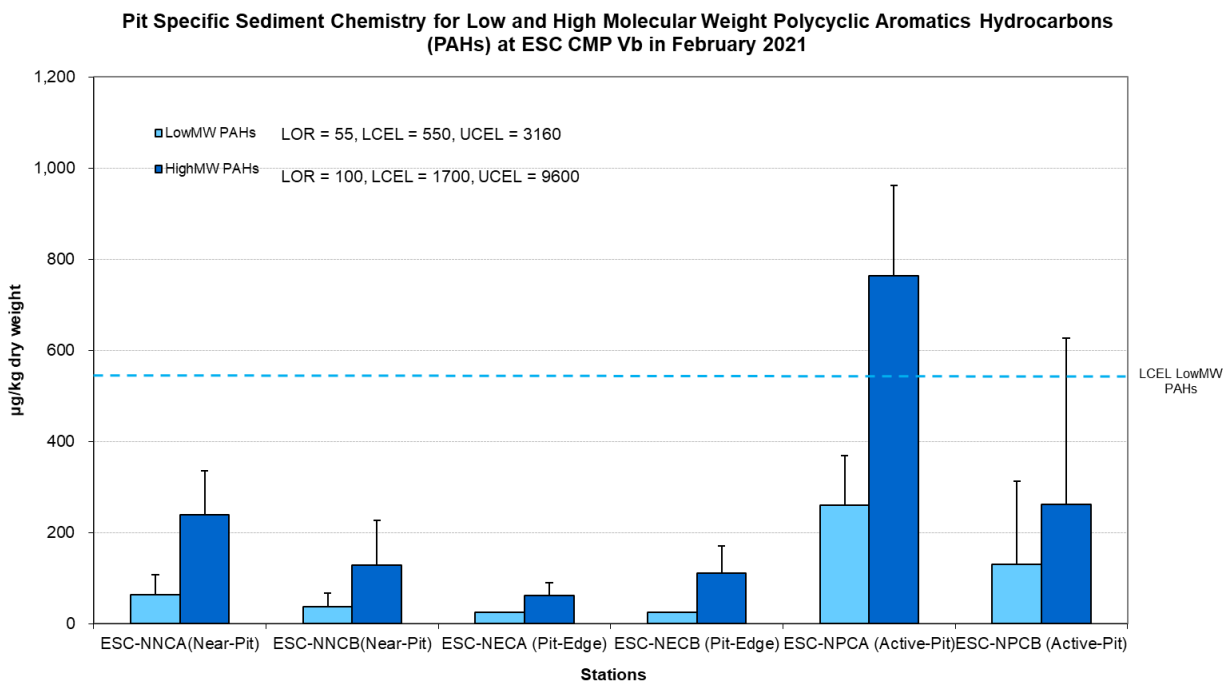


Figure 14: Concentration of Low and High Molecular Weight Polycyclic Aromatic Hydrocarbons (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in February 2021.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\47 Monthly February 2021

Date: March 2021

**Environmental  
Resources  
Management**



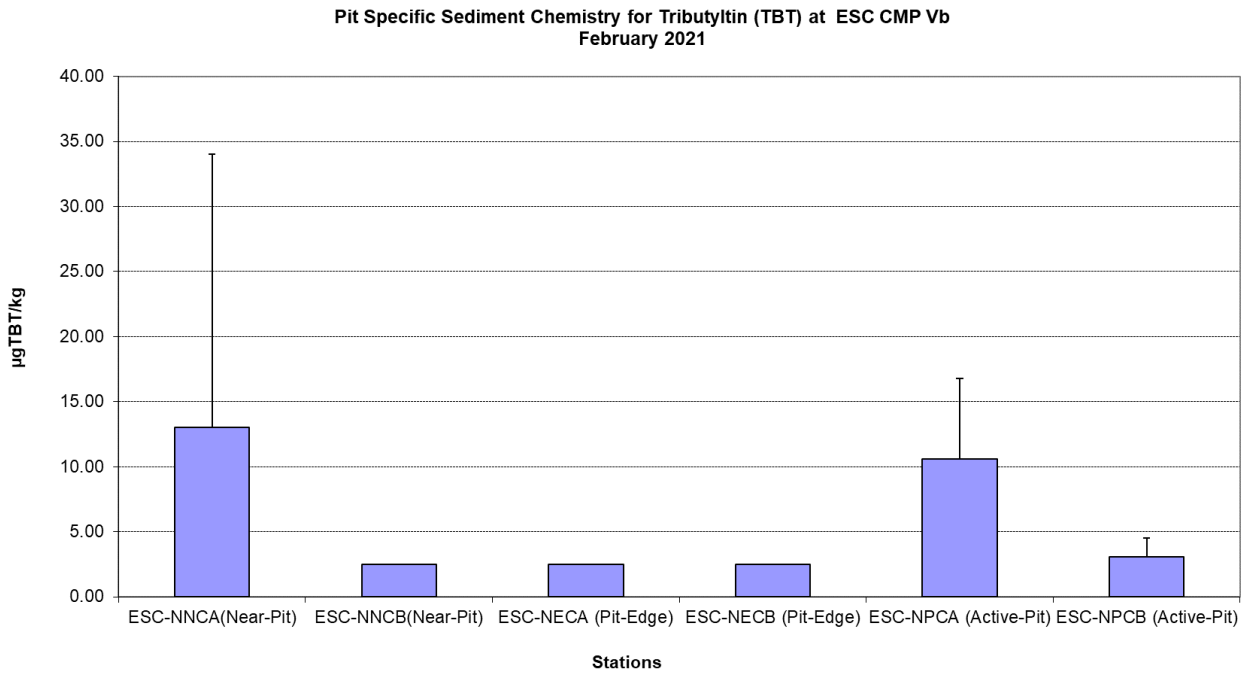


Figure 15: Concentration of Tributyltin (TBT) ( $\mu\text{g TBT/kg}$ ; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in February 2021.

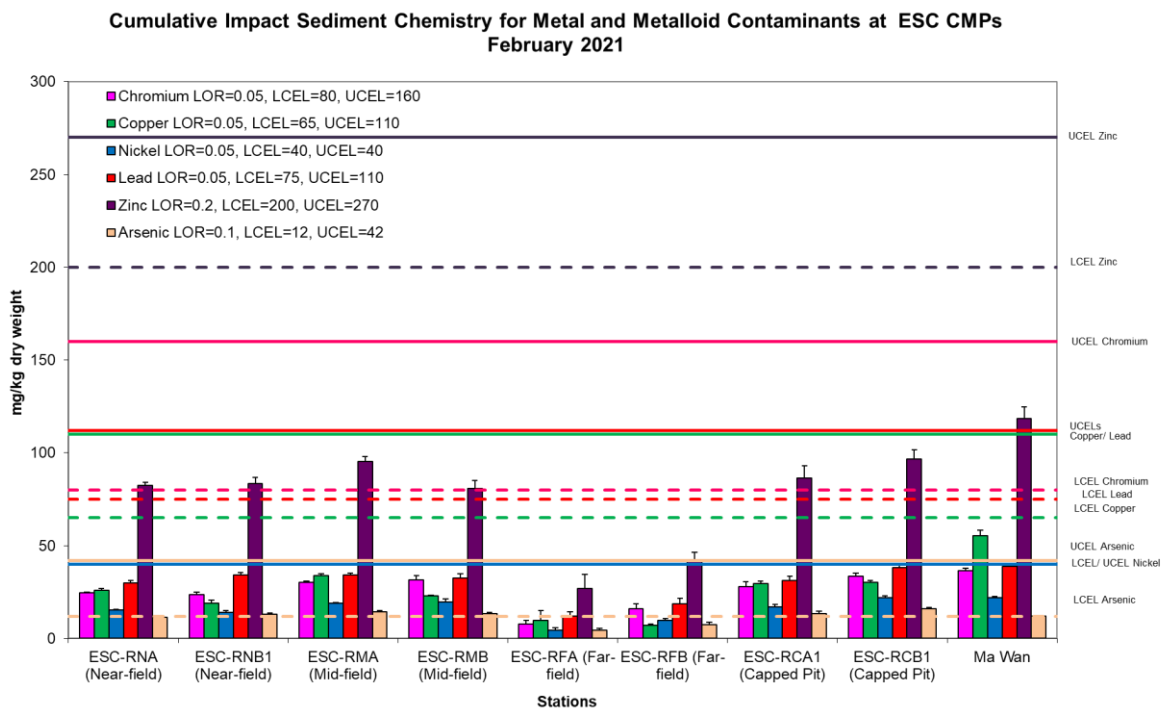


Figure 16: Concentration of Metals and Metalloid (Cr, Cu, Ni, Pb, Zn, As; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in February 2021.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\47 Monthly February 2021

Date: March 2021

**Environmental  
Resources  
Management**



**Cumulative Impact Sediment Chemistry for Metal Contaminants at ESC CMPs  
February 2021**

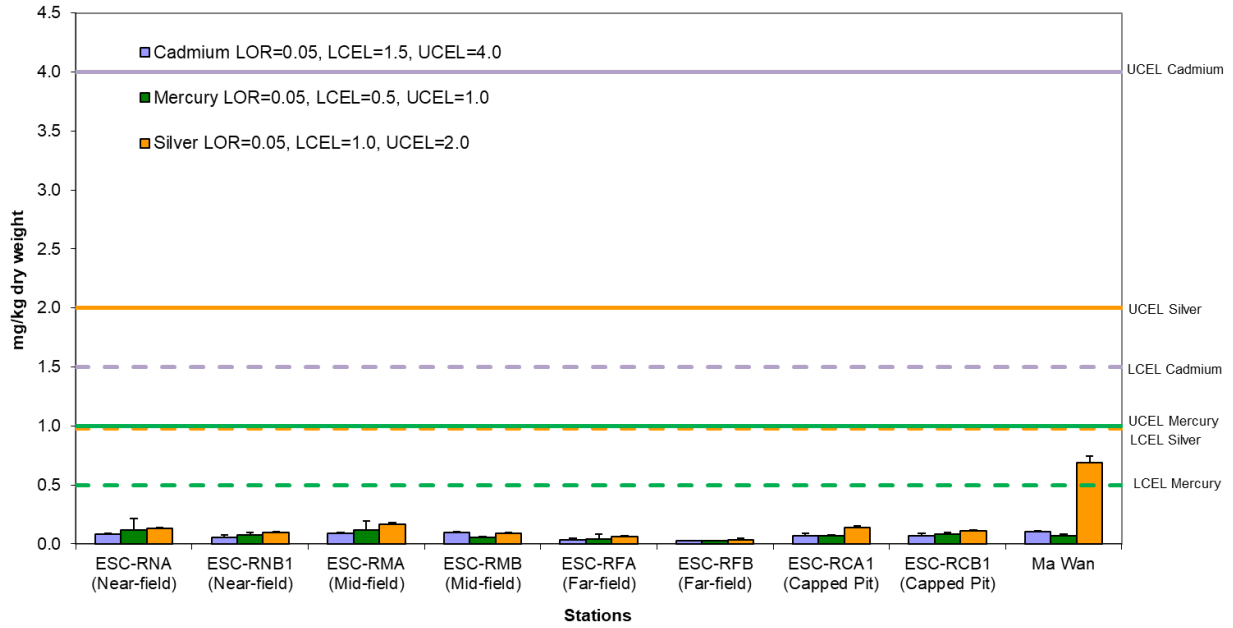


Figure 17: Concentration of Metals (Cd, Hg, Ag; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in February 2021.

**Cumulative Impact Sediment Chemistry for Total Organic Carbon (TOC) at ESC  
CMPs for February 2021**

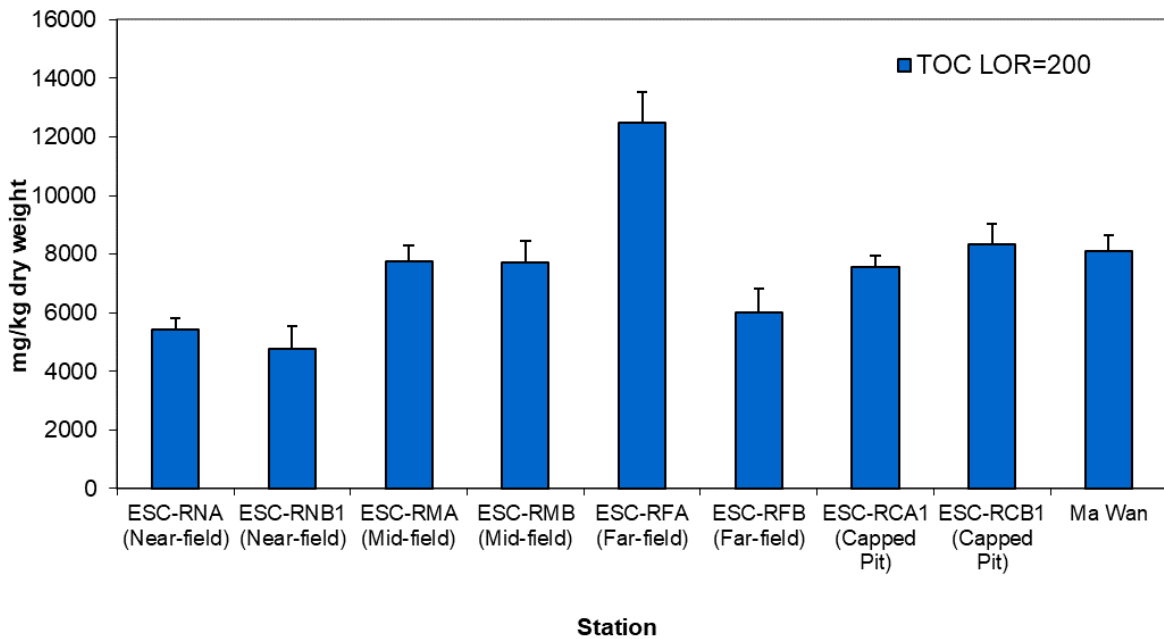


Figure 18: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in February 2021.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\47 Monthly February 2021

Date: March 2021

**Environmental  
Resources  
Management**



**Cumulative Impact Sediment Chemistry for Tributyltin (TBTs)  
at ESC CMPs for February 2021**

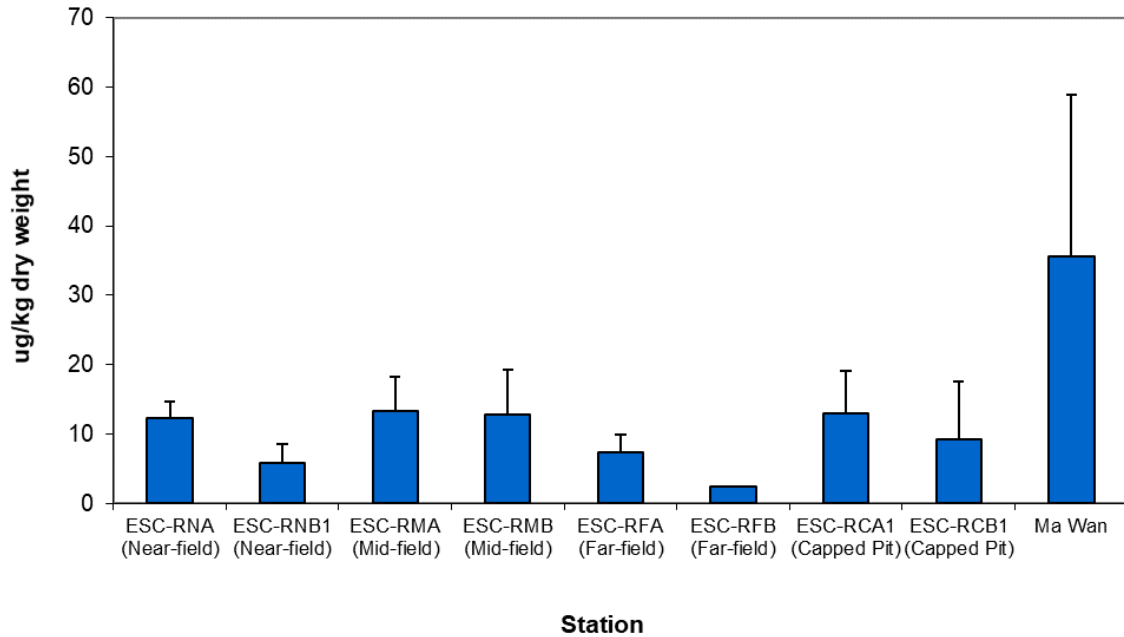


Figure 19: Concentration of Tributyltin (TBT) ( $\mu\text{g}/\text{kg}$  dry weight; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in February 2021.

**Cumulative Impact Sediment Chemistry for Low and High Molecular Weight Polycyclic Aromatics  
Hydrocarbons (PAHs) at ESC CMPs for February 2021**

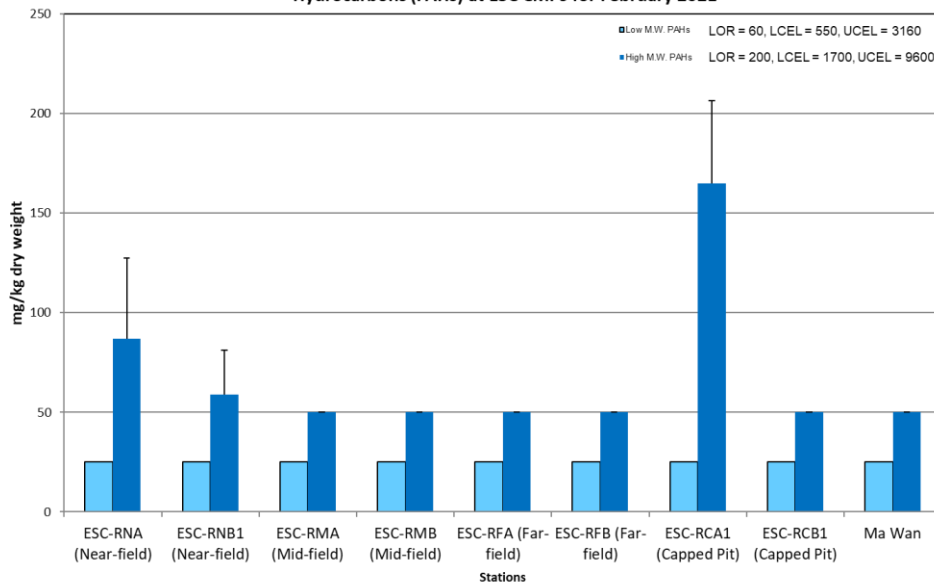


Figure 20: Concentration of Low and High Molecular Weight Polycyclic Aromatics ( $\text{mg}/\text{kg}$  dry weight; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in February 2021.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\47 Monthly February 2021

Date: March 2021

**Environmental  
Resources  
Management**



Annex D

## Study Programme

