



**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 – October
2019**

Revision 0

November 2019

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Document Code: 0400720_Monthly October 2019_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: 13 November 2019			
		Approved by:  Craig A. Reid Partner			
v0	Monthly EM&A Report for ESC CMPs	GS	RC	CAR	13/11/19
Revision	Description	By	Checked	Approved	Date
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Dredging, Management and Capping of Contaminated Sediment Disposal Facility at Sha Chau

Environmental Certification Sheet EP-312/2008/A


Reference Document/Plan

Document/Plan to be Certified/ Verified:	Monthly EM&A Report for Contaminated Mud Pits to the East of Sha Chau - October 2019
Date of Report:	13 November 2019
Date prepared by ET:	13 November 2019
Date received by IA:	13 November 2019

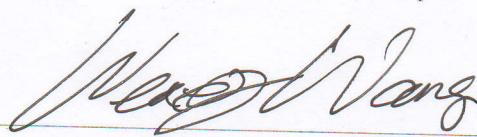
Reference EP Condition

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: 13/11/2019

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: 13/11/2019

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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 OCTOBER 2019

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 ⁽¹⁾ ⁽²⁾. 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). 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 October 2019, disposal of contaminated mud at ESC CMP Vd was undertaken.

(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.

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	F
ESC CMP V	Dredging																																			
	Disposal																																			
	Capping																																			

1.2 REPORTING PERIOD

1.2.1 This *Monthly EM&A Report for October 2019* covers the EM&A activities for the reporting month of October 2019.

1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES

1.3.1 The following monitoring activities were undertaken for ESC CMP V in October 2019:

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

1.4 DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS

1.4.1 No outstanding sampling remained for October 2019.

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 October 2019*:

- *Water Column Profiling of ESC CMP Vd in October 2019;*
- *Routine Water Quality Monitoring of ESC CMPs in October 2019; and*
- *Pit Specific Sediment Chemistry of ESC CMP Vd in October 2019.*

1.5.2 ***Water Column Profiling of ESC CMP Vd – October 2019***

1.5.3 *Water Column Profiling* was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 10 October 2019. 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 wet season period (April to October) of 2008 - 2017 from stations in the Northwestern Water Control Zone (WCZ), where the ESC CMPs are located ⁽¹⁾. 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 October 2019 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 October 2019 indicated that the SS levels at both Downstream and Upstream stations were 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 Vd did not appear to cause any deterioration in water quality during this reporting period.

1.5.7 ***Routine Water Quality Monitoring of ESC CMPs – October 2019***

1.5.8 *Routine Water Quality Monitoring of ESC CMP V* was undertaken on 9 October 2019. 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 October 2019 as shown in *Figure 1.2*.

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

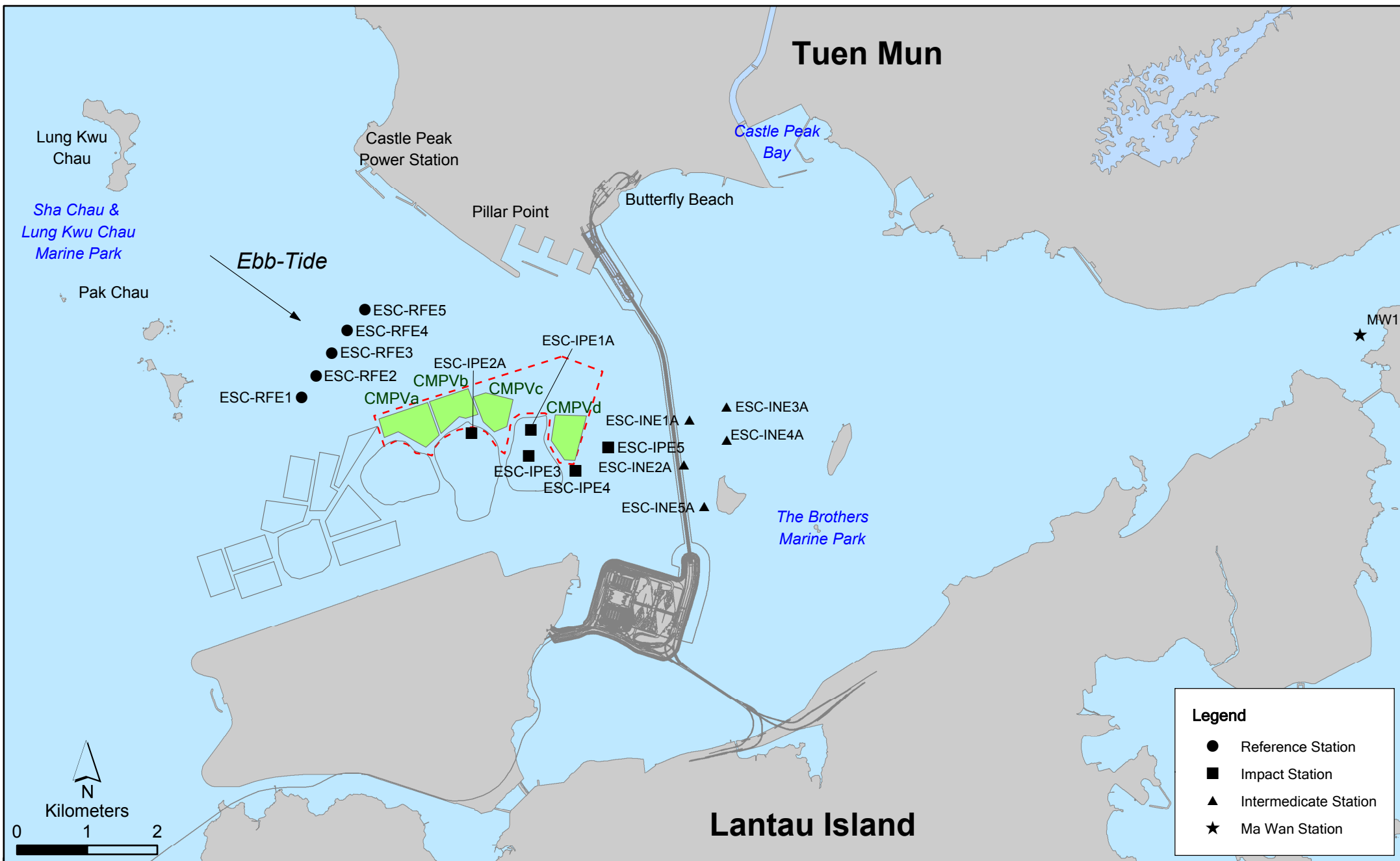


Figure 1.2

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

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 October 2019 indicated that the levels of pH, Salinity and DO complied with the WQOs at all stations in October 2019.
- 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 October 2019.

Laboratory Measurements

- 1.5.12 Laboratory analysis of October 2019 results indicated that concentrations of Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Silver and Zinc were detected in October 2019 samples at most stations and the concentrations of these metals and metalloids were similar amongst the stations, except the concentration of Zinc was higher at reference station (*Table B4 of Annex B; Figure 7 of Annex C*).
- 1.5.13 For nutrients, concentrations of Total Inorganic Nitrogen (TIN) at impact stations in October 2019 was 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 ⁽¹⁾. Therefore, the exceedances of TIN WQO at impact station is unlikely to be caused by the disposal operation at ESC CMP Vd. Concentrations of Ammonia Nitrogen (NH₃-N) and 5-day Biochemical Oxygen Demand (BOD₅) were generally similar amongst the stations in October 2019 (*Table B4 of Annex B; Figure 8 and 9 of Annex C*).
- 1.5.14 Analyses of results for October 2019 indicated that the SS levels at all stations were lower than the WQO (10.8 mg/L for wet season) and complied with 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 operation at ESC CMP Vd did not appear to cause any unacceptable deterioration in water quality in October 2019. 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 - October 2019***
- 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 on 8 October 2019.

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

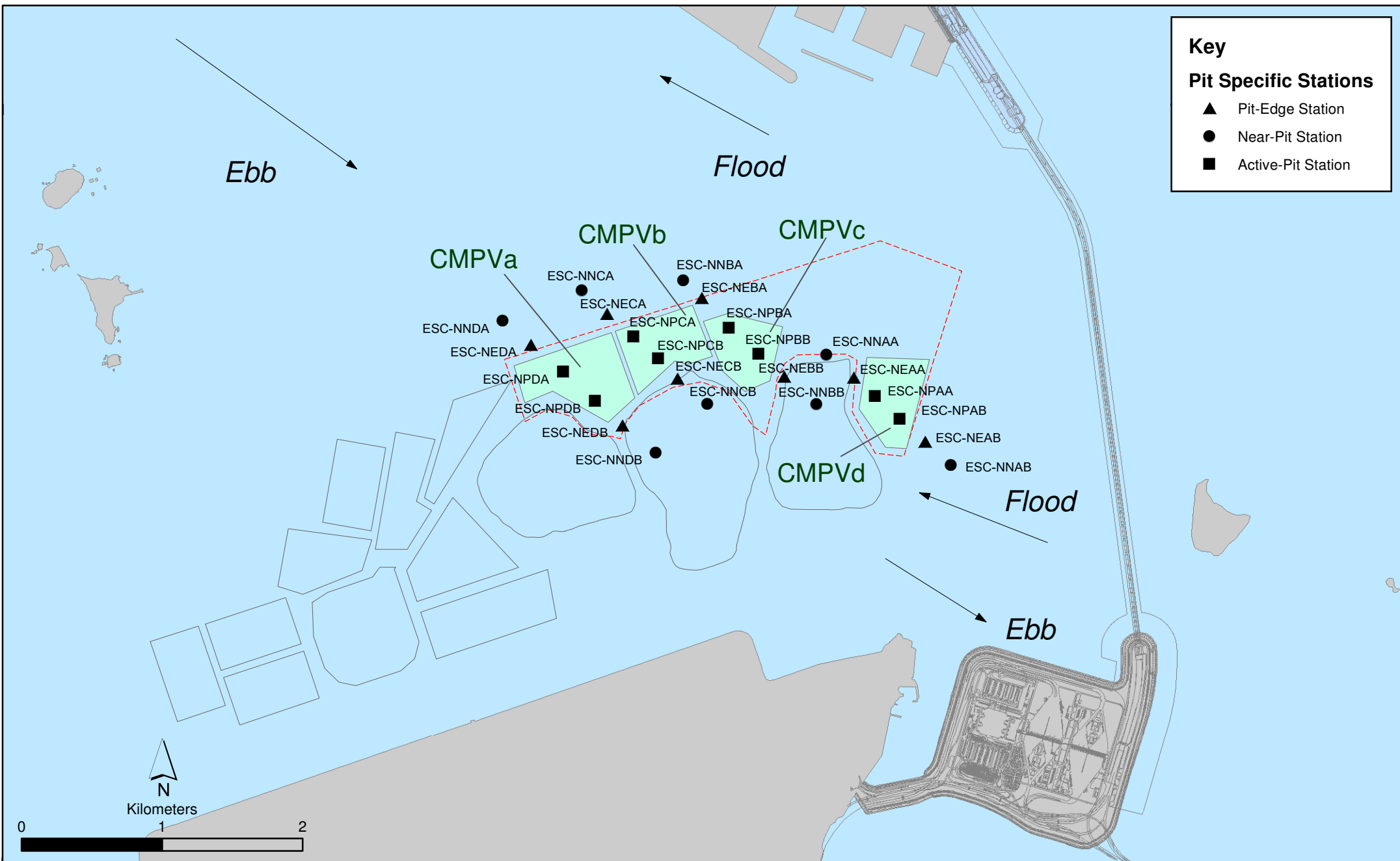


Figure 1.3

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, Copper and Silver at Active-Pit stations (*Figures 11 and 12 of Annex C*). The concentrations of Arsenic were higher than the LCEL at Active-Pit station ESC-NPAA. The concentrations of Copper were higher than the Upper Chemical Exceedance Level (UCEL) at Active-Pit station ESC-NPAB. The concentrations of Silver were higher than the LCEL at Active-Pit station ESC-NPAB.
- 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 ⁽¹⁾. It is presumed that the natural concentrations of Arsenic are similar in onshore and offshore sediments ⁽²⁾, and relatively high Arsenic levels may thus occur throughout Hong Kong. Therefore, the LCEL exceedances of Arsenic are unlikely to be caused by the disposal operations at ESC CMP Vd but rather as a result of naturally occurring deposits.
- 1.5.20 Considering that the higher levels of Copper and Silver occurred within Active-Pit stations 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 Vd in October 2019.
- 1.5.21 For organic contaminants, the concentrations of Total Organic Carbon (TOC) varied between stations in October 2019 and were higher at Active-Pit stations ESC-NPAA and ESC-NPAB (*Figure 13 of Annex C*). The concentrations of Tributyltin (TBT) were also higher at Active-Pit stations ESC-NPAA and ESC-NPAB in October 2019 (*Figure 14 of Annex C*). Total Polychlorinated Biphenyls (PCBs), Total dichloro-diphenyl-trichloroethane (DDT) and 4,4'-dichlorodiphenyldichloroethylene (DDE) concentrations were below the limit of reporting at all stations. The concentrations of Low Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) and High Molecular Weight PAHs were lower than LCEL at most of the stations, except they exceeded UCEL at Active-Pit station ESC-NPAB (*Figure 15 of Annex C*).

(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

1.5.22 Considering that the higher levels of PAHs occurred within one 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 Vd in October 2019. 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 November 2019 for ESC CMP V (see *Annex A* for the sampling schedule ⁽¹⁾):

- *Water Column Profiling of ESC CMP Vd;*
- *Routine Water Quality Monitoring of ESC CMPs; and*
- *Pit Specific Sediment Chemistry of ESC CMP V.*

1.7 *STUDY PROGRAMME*

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

(1) The scheduled EM&A Programme for SB CMPs was completed in December 2018.

Annex A

Sampling Schedule

Annex A1 - East of Sha Chau Environmental Monitoring and Audit Sampling Schedule for CMP (April 2017 - March 2021)

Activity/Station	Code	Frequency	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	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
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	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	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12		
Near-field Stations	ESC-RNA	4 times per year		12						12				12							12				12									12				12									12															
	ESC-RNB1	4 times per year		12						12				12							12				12									12				12									12															
Near-Pit Stations	ESC-TDA	2 times per year				5						5				5							5				5									5				5							5															
	ESC-TDB1	2 times per year				5						5				5								5				5									5				5							5														
Near Pit Stations	ESC-INA	4 times per year		5	5					5	5			5	5						5	5			5	5								5	5			5	5								5	5														
	ESC-INB	4 times per year		5	5					5	5			5	5						5	5			5	5								5	5			5	5								5	5														
Impact Station Downcurrent	ESC-IP1A	4 times per year																																																												
	ESC-IP2A	4 times per year																																																												
Impact Station Downcurrent	ESC-IP1A	8 times per year	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8												
	ESC-IP2A	8 times per year	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8												

Notes:
The number shown in each cell represents the numbers of replicates per monitoring station.
Impact Monitoring for Dredging will be scheduled when dredging operations commence.
Benthic Recolonisation Studies for CMP V will be scheduled when capping operation for CMP V is completed.

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*

Parameter	Action Level	Limit Level
Dissolved Oxygen (DO) ⁽¹⁾	<u>Surface and Mid-depth</u> ⁽²⁾ 5%-ile of baseline data for surface and middle layer = 3.76 mg L⁻¹	<u>Surface and Mid-depth</u> ⁽²⁾ 1%-ile of baseline data for surface and middle layer = 3.11 mg L⁻¹ ⁽³⁾
	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 = 2.96 mg L⁻¹	<u>Bottom</u> The average of the impact station readings are <2 mg/L⁻¹
	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) ^{(4) (5)}	95%-ile of baseline data for depth average = 37.88 mg L⁻¹	99%-ile of baseline data for depth average = 61.92 mg L⁻¹
	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) ^{(4) (5)}	95%-ile of baseline data = 28.14 NTU	99%-ile of baseline data = 38.32 NTU
	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⁻¹, it is proposed to set the Limit Level at 3.11 mg L⁻¹ 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 October 2019

Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen		pH	Suspended Solids (mg L ⁻¹)
				(%)	(mg L ⁻¹)		
WCP 1 (Downstream)	29.17	28.27	8.10	89.08	5.84	7.89	7.8
WCP 2 (Upstream)	29.13	28.29	8.88	87.14	5.72	7.86	8.5
WQO (Wet Season)	N/A	25.45-31.11 [#]	N/A	N/A	>4	6.5-8.5	10.8

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 October 2019

Sampling Period	Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen		pH (mg L ⁻¹)
					(%)	(mg L ⁻¹)	
October 2019	RFE (Reference)	28.84	28.34	4.46	85.93	5.67	7.88
	IPE (Impact)	28.86	28.53	6.28	85.97	5.66	7.86
	INE (Intermediate)	28.99	28.92	8.09	83.31	5.46	7.83
	Ma Wan	28.91	30.26	4.68	78.61	5.12	7.83
	WQO	N/A	25.51-31.17 [#]	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 exceeding the WQO.

Table B4 Laboratory Results for Routine Water Quality Monitoring of ESC CMPs in October 2019

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)
October 2019	RFE	2.20	<0.5	1.62	11.13	1.85	<0.5	2.84	<1	26.80	0.09	0.49	1.59	5.60
	IPE	2.23	<0.5	<1	13.64	<1	<0.5	1.44	<1	16.00	0.09	0.64	1.90	7.57
	INE	2.16	<0.5	<1	9.44	<1	<0.5	1.38	<1	11.69	0.09	0.48	1.89	9.81
	Ma Wan	2.05	<0.5	<1	7.55	<1	<0.5	<1	<1	11.49	0.12	0.34	1.33	7.36

WQO of TIN: 0.5 mg/L

Wet Season WQO of SS : 10.8 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

Routine Water Quality Monitoring for ESC CMP V - October 2019

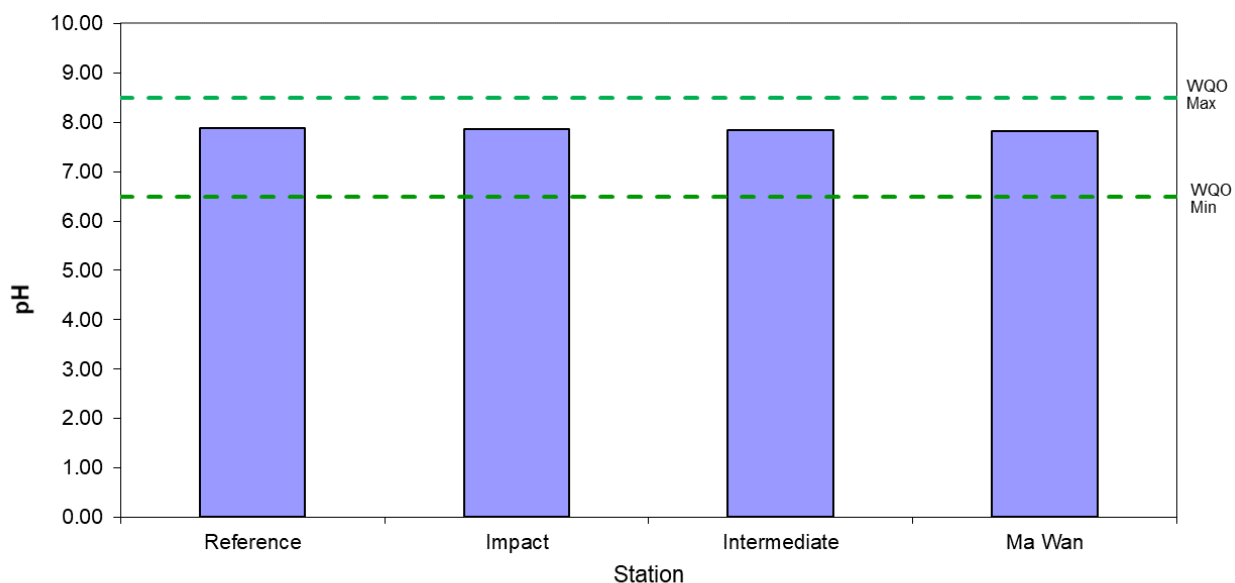


Figure 1: Level of pH recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in October 2019.

Routine Water Quality Monitoring ESC CMP V - October 2019

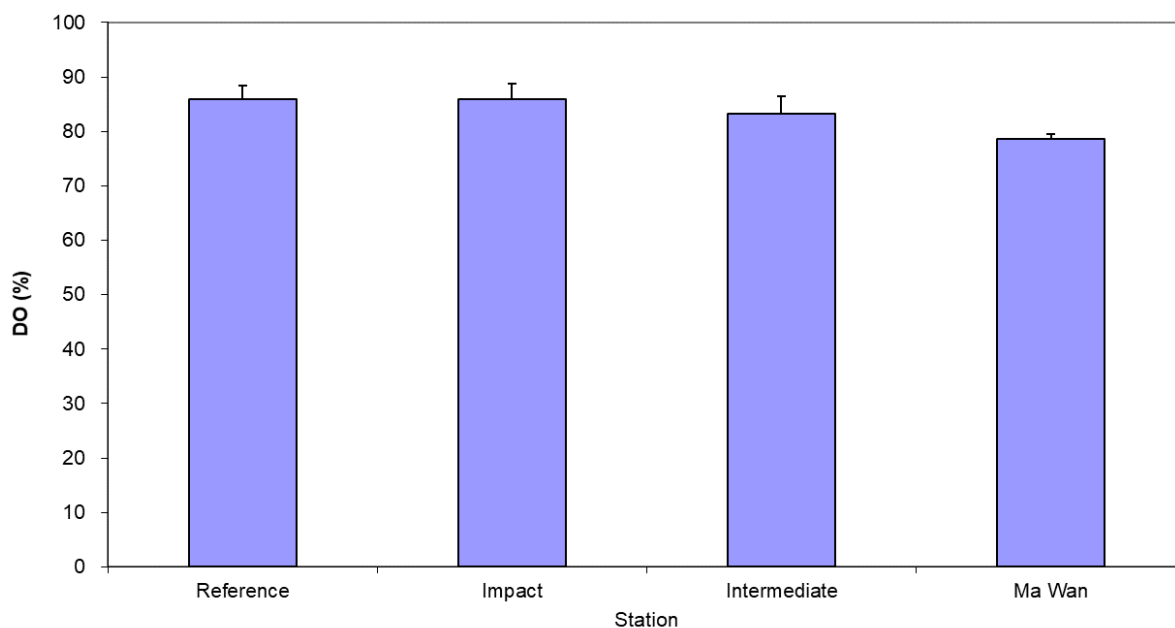


Figure 2: Level of Dissolved Oxygen (DO) (% saturation; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in October 2019.

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Date: November 2019

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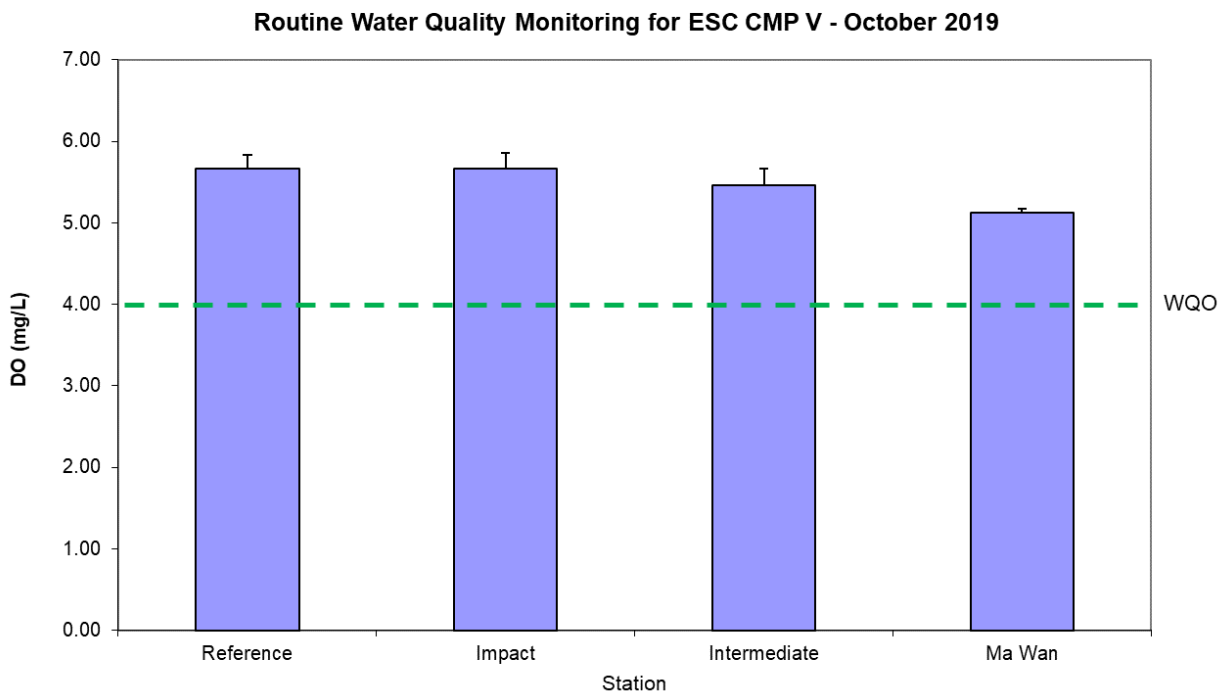


Figure 3: Concentration of Dissolved Oxygen (DO) (mg/L; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in October 2019.

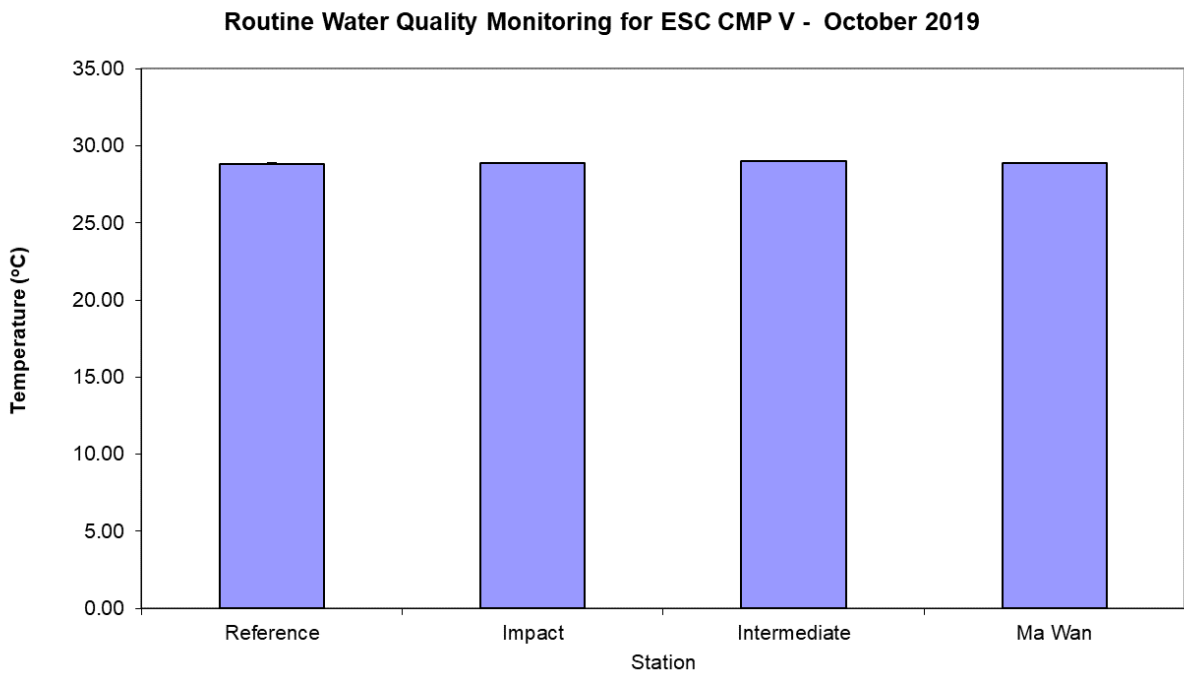


Figure 4: Level of Temperature (°C; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in October 2019.

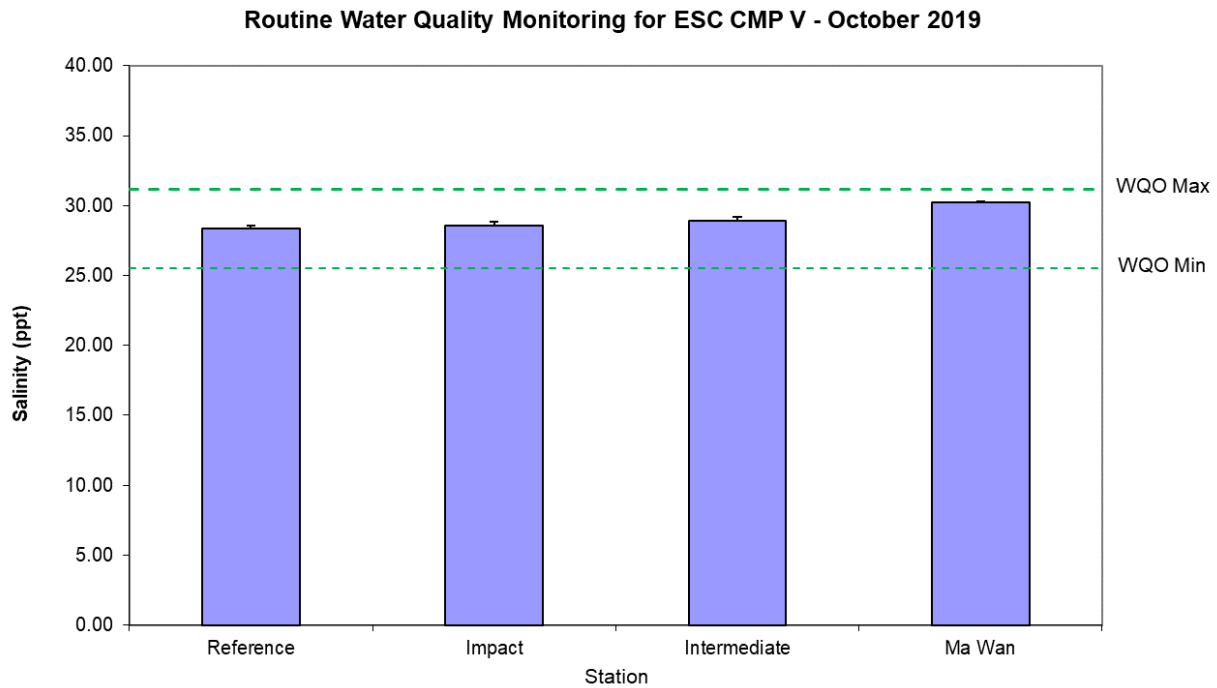


Figure 5: Level of Salinity (ppt; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in October 2019.

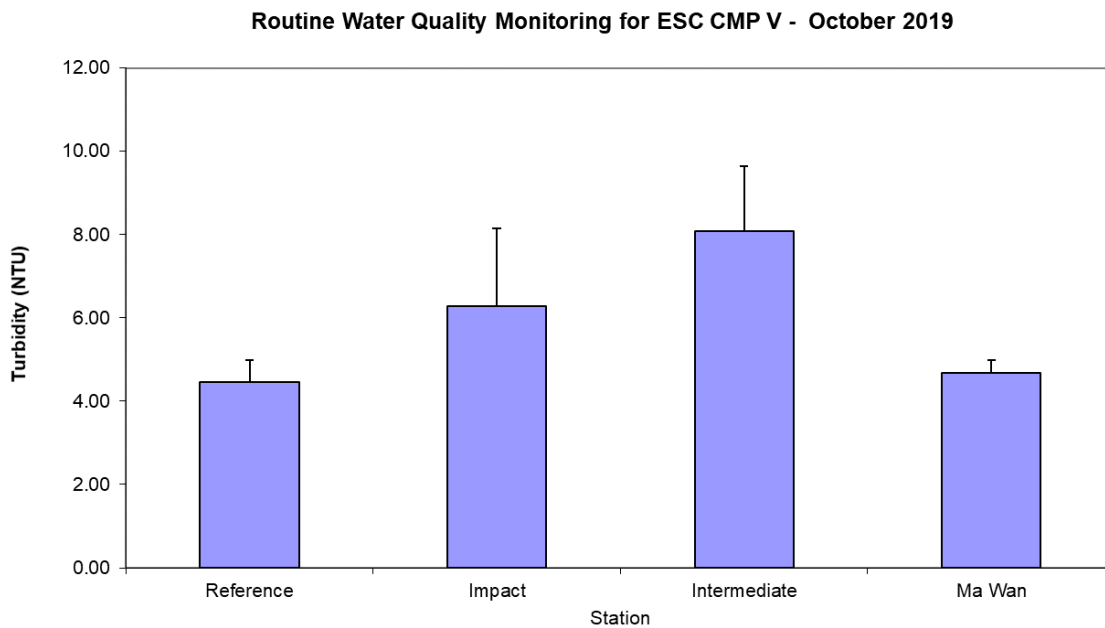


Figure 6: Levels of Turbidity (NTU; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in October 2019.

**Routine Water Quality Monitoring for ESC CMP V
October 2019**

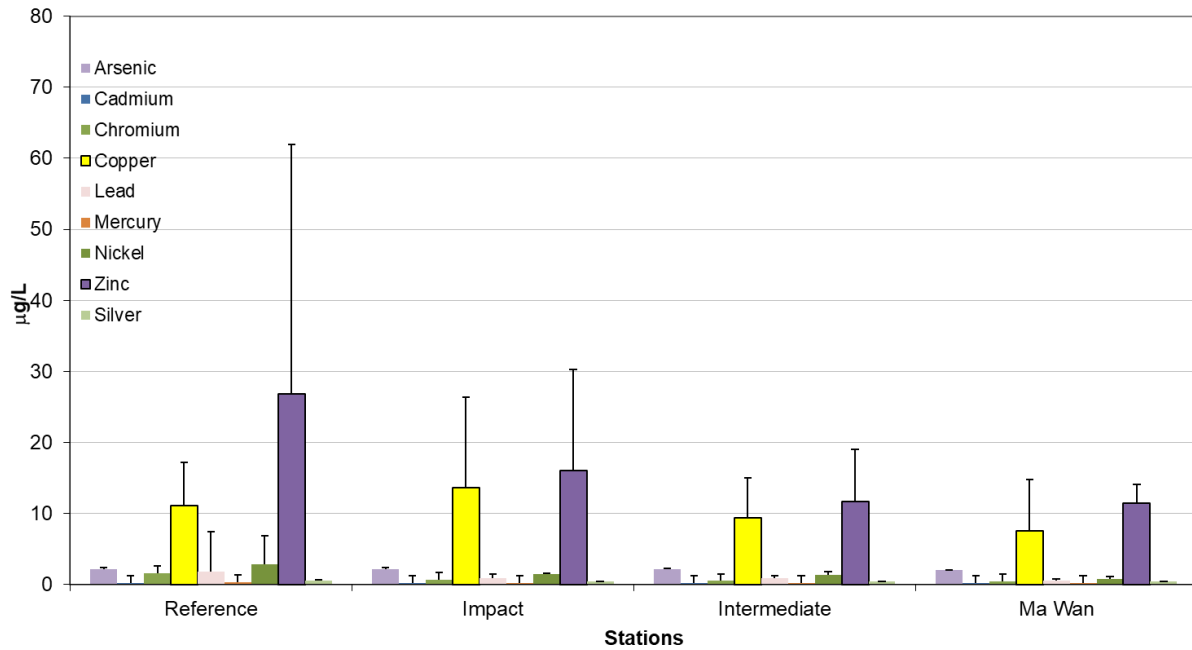


Figure 7: Concentration of Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc and Silver ($\mu\text{g/L}$; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in October 2019.

**Routine Water Quality Monitoring Results for Nutrients
October 2019**

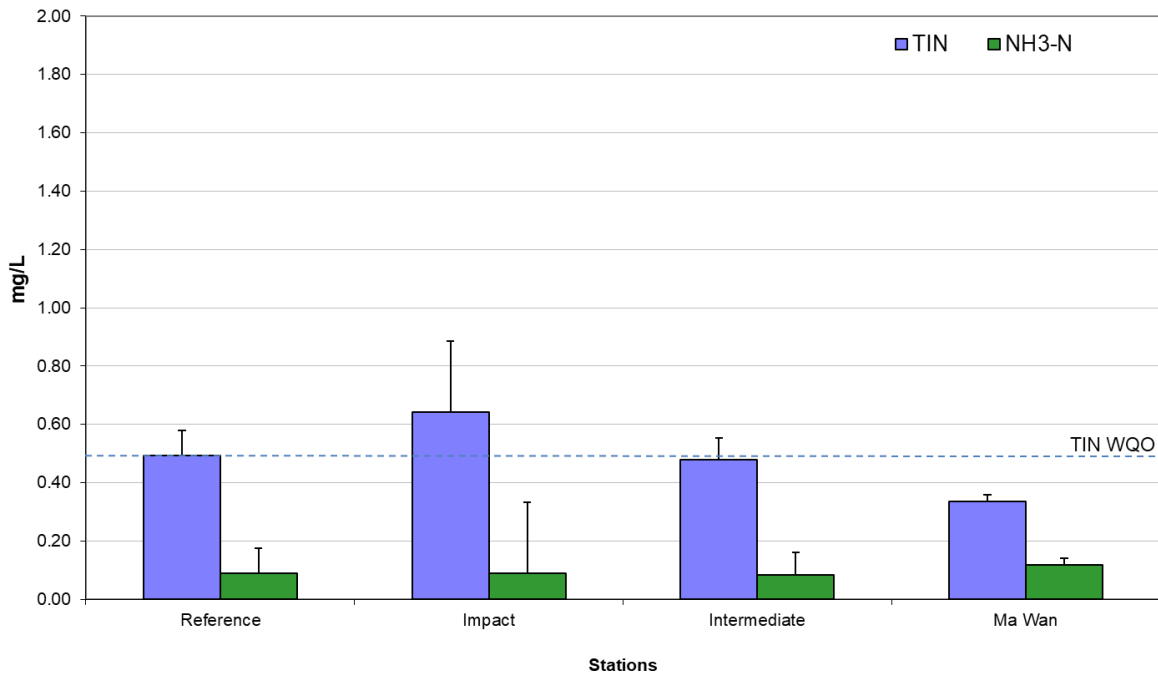


Figure 8: Concentration of Total Inorganic Nitrogen (TIN) and Ammonia Nitrogen ($\text{NH}_3\text{-N}$) ($\mu\text{g/L}$; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in October 2019.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\31 Monthly October 2019

Date: November 2019

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**Routine Water Quality Monitoring Results for Biochemical Oxygen Demand (BOD₅)
October 2019**

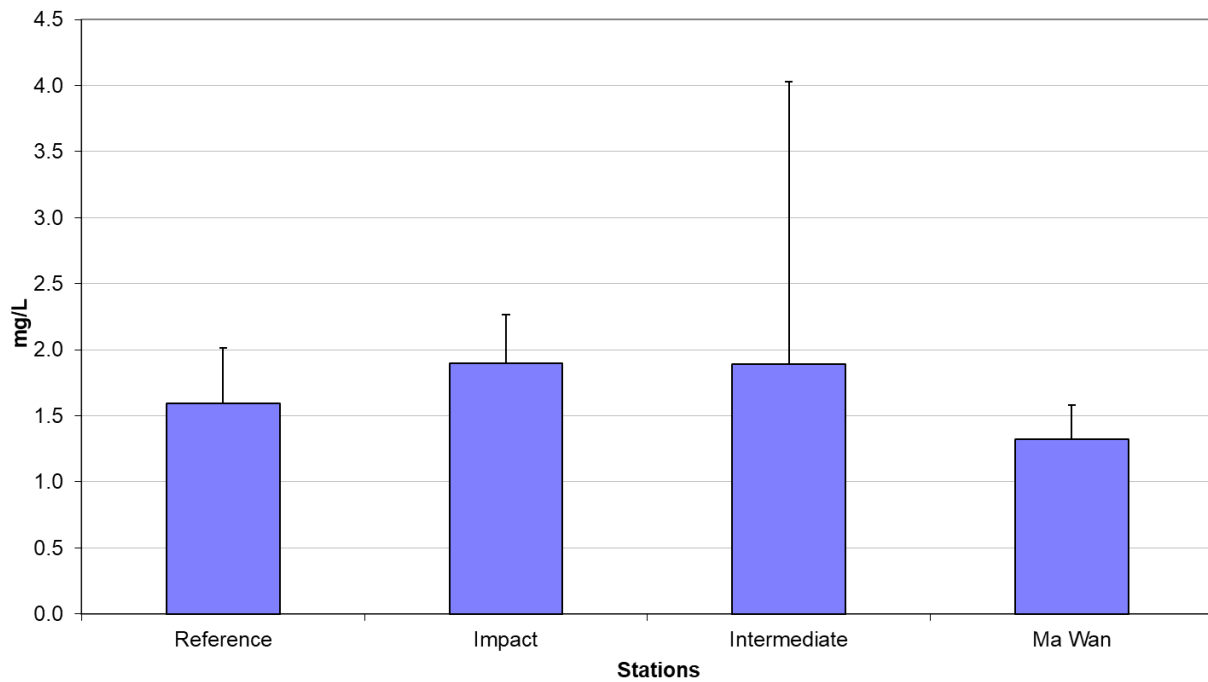


Figure 9: Level of Biochemical Oxygen Demand (BOD₅) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in October 2019.

**Routine Water Quality Monitoring for Suspended Solids
October 2019**

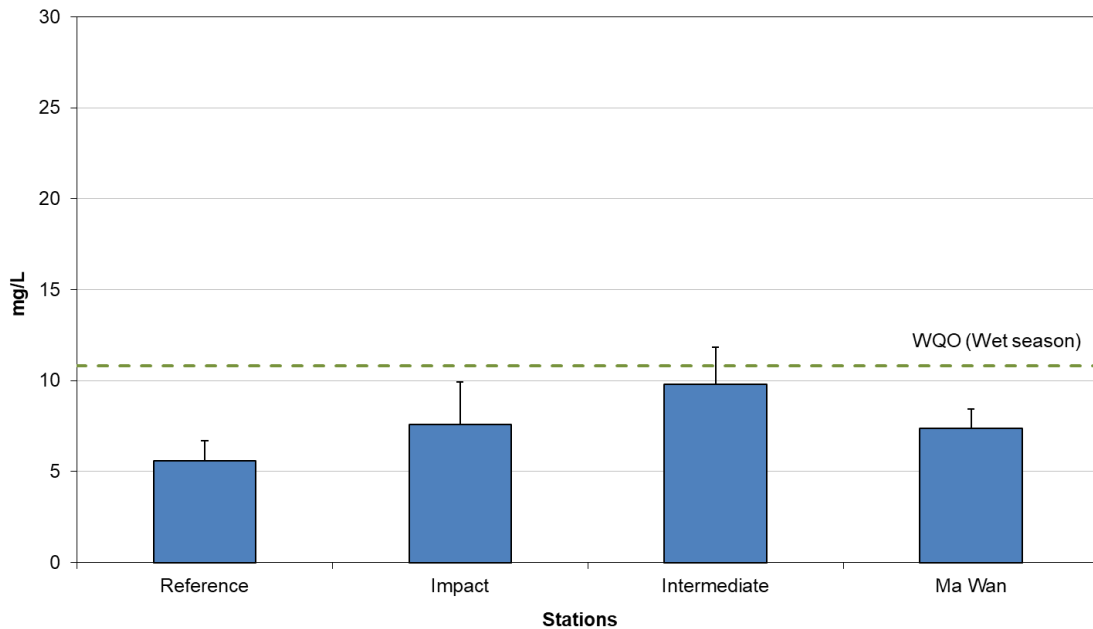


Figure 10: Concentration of Suspended Solids (SS) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in October 2019.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\31 Monthly October 2019

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**Pit Specific Sediment Chemistry for Metal and Metalloid Contaminants at ESC CMP Vd
October 2019**

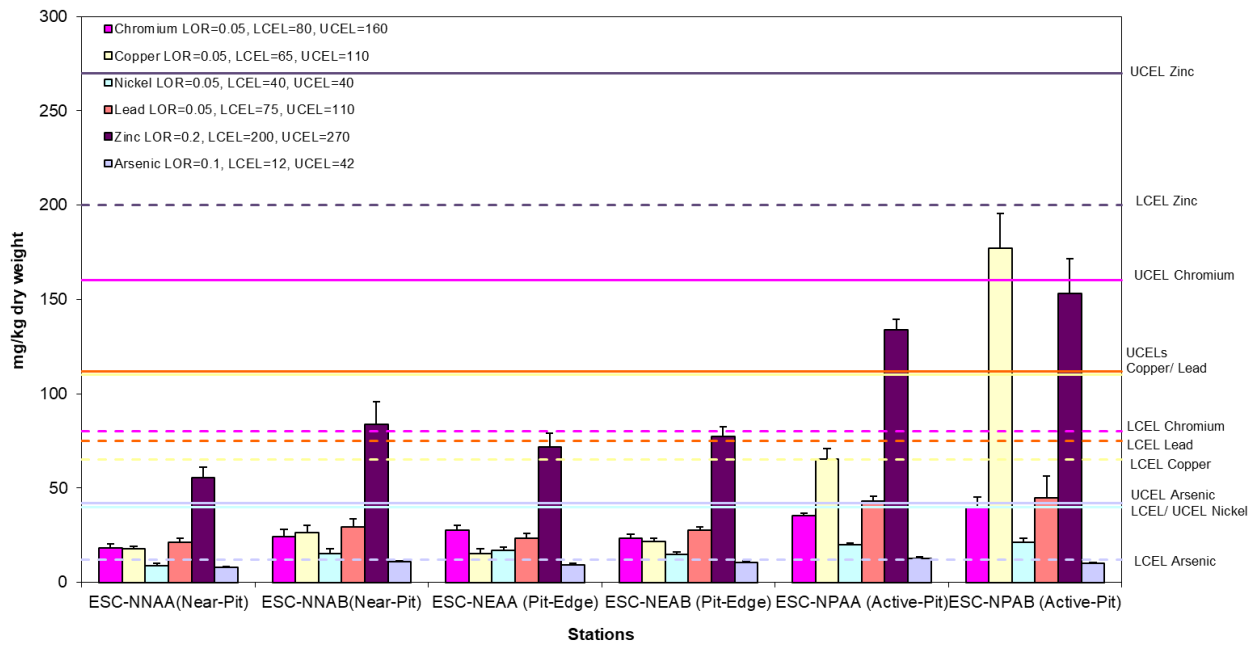


Figure 11: Concentration of Metals and Metalloid (Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in October 2019.

**Pit Specific Sediment Chemistry for Metal Contaminants at ESC CMP Vd
October 2019**

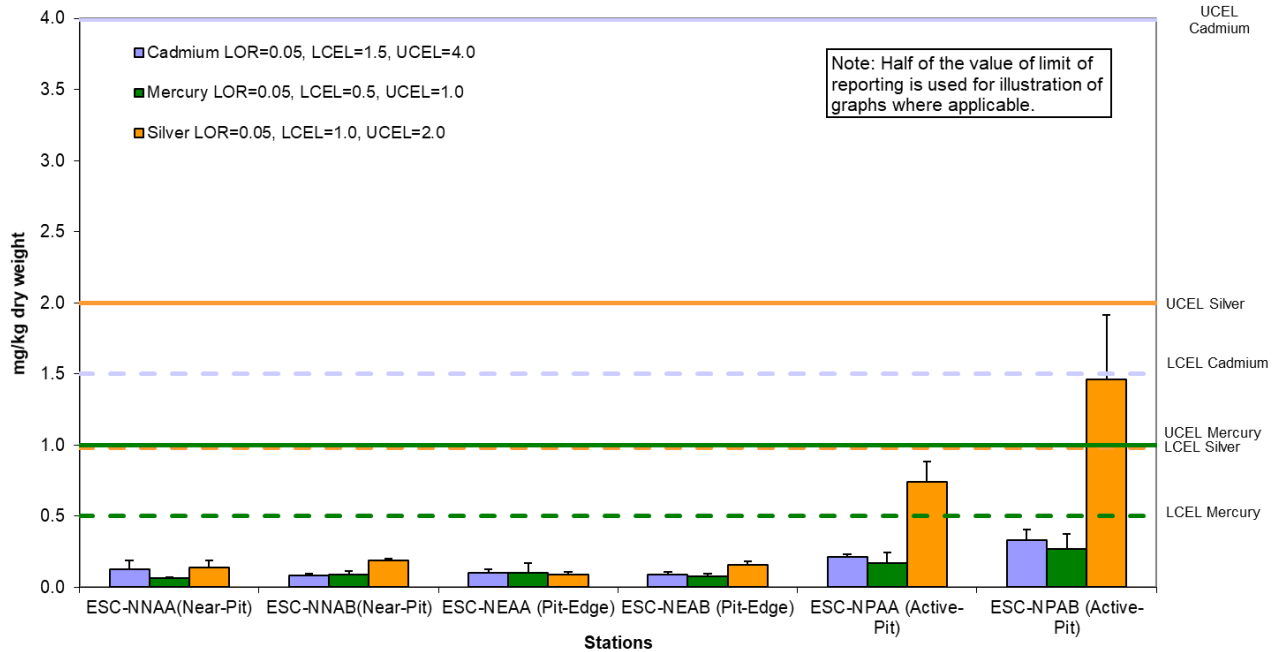


Figure 12: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in October 2019.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\31 Monthly October 2019

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Pit Specific Sediment Chemistry for Total Organic Carbon (TOC) at ESC CMP Vd
October 2019

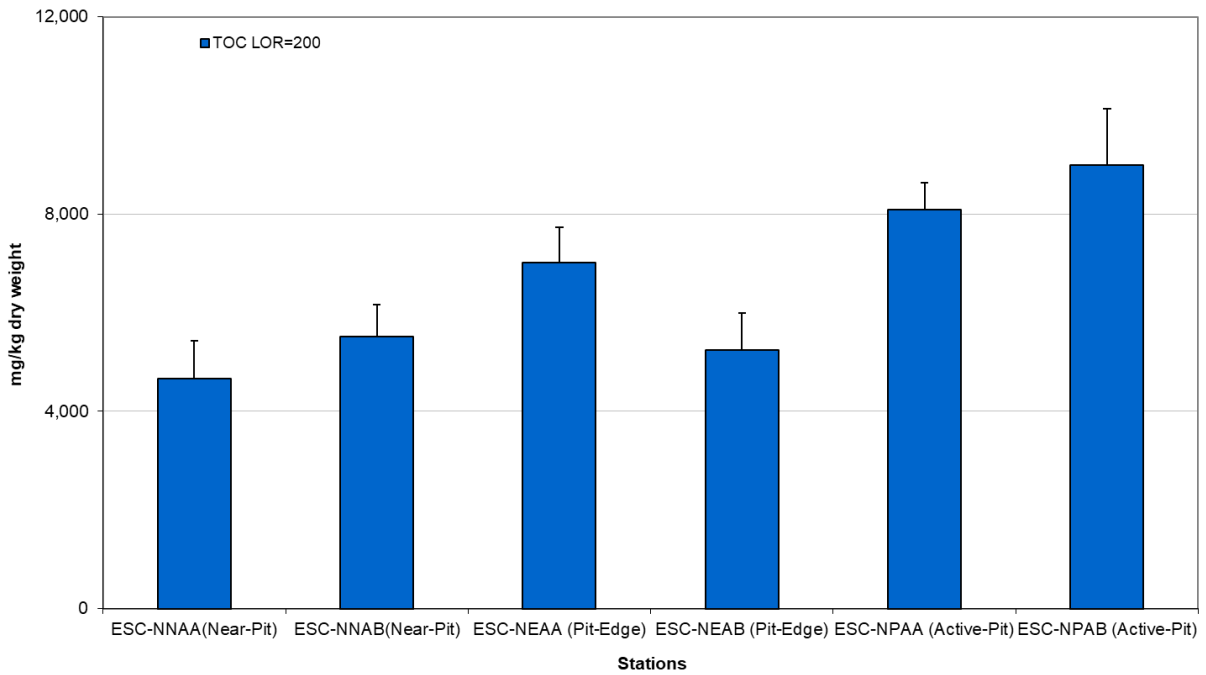


Figure 13: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in October 2019.

Pit Specific Sediment Chemistry for Tributyltin (TBT) at ESC CMP Vd
October 2019

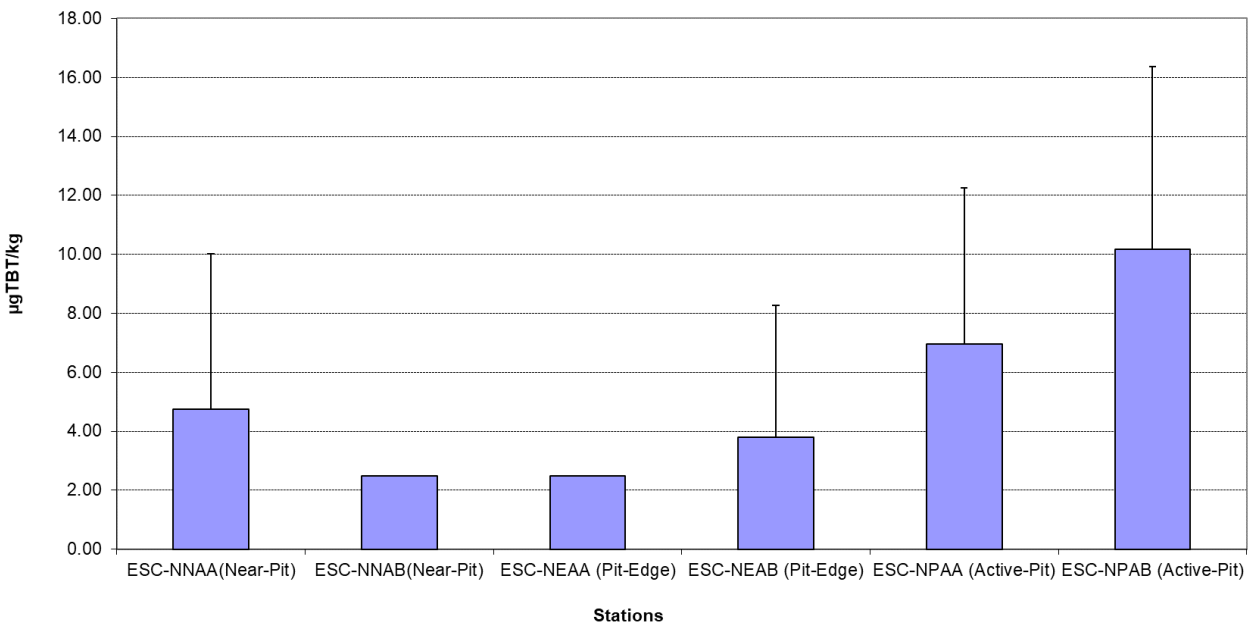


Figure 14: Concentration of Tributyltin (TBT) (µg TBT/kg; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in October 2019.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\31 Monthly October 2019

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Pit Specific Sediment Chemistry for Low and High Molecular Weight Polycyclic Aromatics Hydrocarbons (PAHs) at ESC CMP Vd in October 2019

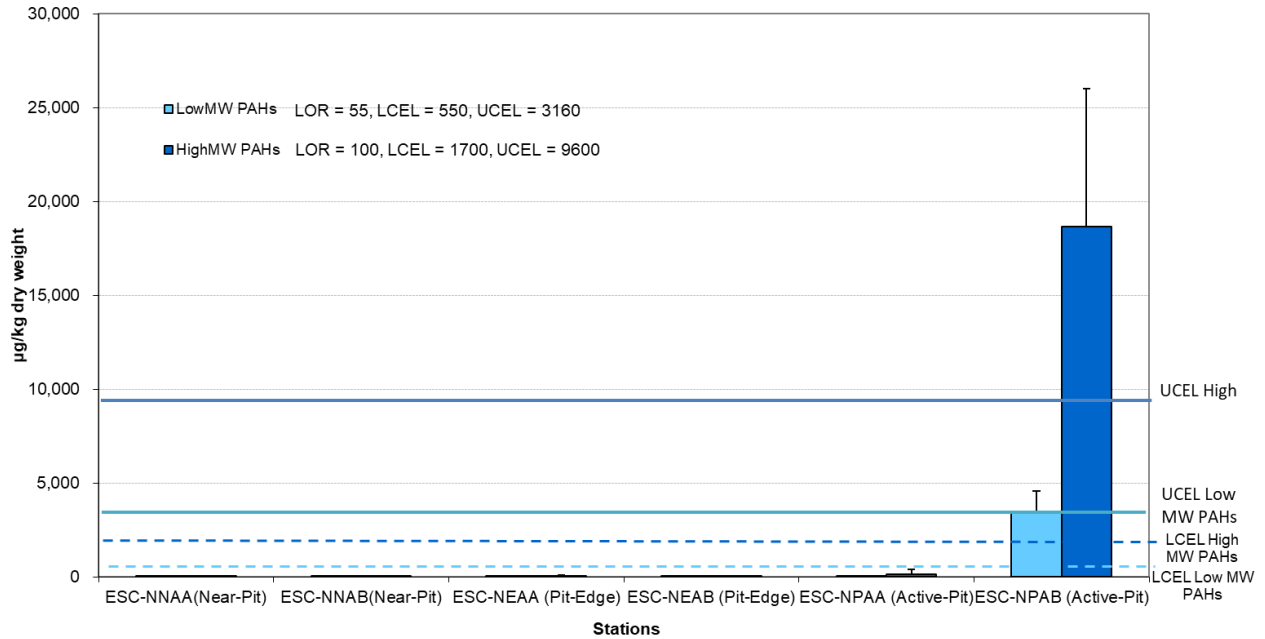


Figure 15: Concentration of Total Organic Carbon (TOC) ($\mu\text{g}/\text{kg}$ dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in October 2019.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\31 Monthly October 2019

Date: November 2019

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Annex D

Study Programme

Task Name	Start	Finish	2017				2018				2019				2020				2021																											
			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						
<u>Commencement of Agreement No. CE 63/2016 (EP)</u>	Sat 1/4/17	Sat 1/4/17	◆																																											
<u>Project Management and General Deliverables</u>	Mon 3/4/17	Mon 5/4/21	▬																																											
<u>For the disposal facilities to the East of Sha Chau (ESC) (between 2017 and 2021) and the South of The Brothers (SB) (between 2017 and 2018)</u>	Sat 1/4/17	Fri 1/10/21	▬																																											
Draft Report on Review of EM&A Manual	Tue 2/5/17	Tue 2/5/17	◆																																											
Final Report on Review of EM&A Manual	Tue 23/5/17	Tue 23/5/17	◆																																											
Regular Review of EM&A Manual	Wed 2/5/18	Sat 2/5/20								◇																																				
Regular Site Inspections of CMP Contractors	Sat 1/4/17	Wed 31/3/21	▬																																											
Participate in Liaison Group Meetings/ Consultations as required by CEDD	Sat 1/4/17	Wed 31/3/21	▬																																											
Submission of Monthly EM&A Report	Sun 14/5/17	Sun 14/3/21	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇				
Submission of Quarterly EM&A Report	Fri 14/7/17	Wed 14/4/21				◇									◇													◇																		
Submission of Annual EM&A Report	Sun 14/1/18	Thu 14/1/21								◇					◇													◇																		
Submission of Annual Risk Assessment Report	Thu 14/6/18	Mon 14/6/21																																												
Submission of Draft Final Report (including database of all data collected)	Fri 23/7/21	Fri 23/7/21																																								◆				
Submission of Final Report (including database of all data collected)	Fri 27/8/21	Fri 27/8/21																																									◆			
Submission of Draft Executive Summary	Fri 27/8/21	Fri 27/8/21																																									◆			
Submission of Final Executive Summary	Fri 1/10/21	Fri 1/10/21																																										◆		
<u>For East Tung Lung Chau Disposal Facility (subject to the actual disposal programme to be confirmed by CEDD)</u>	Sun 14/10/18	Fri 14/12/18	▬																																											
Submission of Monthly EM&A Report	Sun 14/10/18	Fri 14/12/18																																												
Submission of Quarterly EM&A Report	Fri 14/12/18	Fri 14/12/18																																												
Submission of Annual EM&A Report	Fri 14/12/18	Fri 14/12/18																																												

Study Programme
Tue 13/6/17

Task Milestone ◆ Summary Rolled Up Milestone ◇