



**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 –
August 2020**

Revision 0

September 2020

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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</i> .		Date: 11 September 2020			
		Approved by:  Craig A. Reid Partner			
v0	Monthly EM&A Report for ESC CMPs	GS	RC	CAR	11/09/20
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 - August 2020
Date of Report:	11 September 2020
Date prepared by ET:	11 September 2020
Date received by IA:	11 September 2020

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:

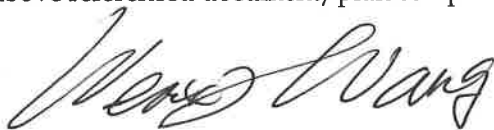


Date: 11/09/2020

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: 11/09/2020

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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 AUGUST 2020

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 August 2020, the following works were undertaken:

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

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 August 2020* covers the EM&A activities for the reporting month of August 2020.

1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES

1.3.1 The following monitoring activities were undertaken for ESC CMP V in August 2020:

- *Water Column Profiling of ESC CMP Vb;*
- *Routine Water Quality Monitoring of ESC CMPs;*
- *Water Quality Monitoring During Capping of ESC CMPs;*
- *Pit Specific Sediment Chemistry of ESC CMP Vb;*
- *Cumulative Impact Sediment Chemistry of ESC CMPs;*
- *Sediment Chemistry after a Major Storm of ESC CMP V;*
- *Sediment Toxicity Tests of ESC CMP V; and*
- *Demersal Trawling for ESC CMPs.*

1.4 DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS

1.4.1 No outstanding sampling remained for August 2020.

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 August 2020; and*
- *Sediment Toxicity Tests of ESC CMPs in August 2020.*

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 August 2020*:

- *Water Column Profiling of ESC CMP Vb;*
- *Routine Water Quality Monitoring of ESC CMPs;*
- *Water Quality Monitoring During Capping of ESC CMPs;*
- *Pit Specific Sediment Chemistry of ESC CMP Vb;*
- *Cumulative Impact Sediment Chemistry of ESC CMPs; and*
- *Sediment Chemistry after a Major Storm of ESC CMP V.*

1.5.2 ***Water Column Profiling of ESC CMP Vb – September 2020***

1.5.3 *Water Column Profiling* was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 11 August 2020. 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 2009 - 2018 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 August 2020 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 August 2020 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 – August 2020***

1.5.8 *Routine Water Quality Monitoring of ESC CMPs* was undertaken on 4 August 2020. 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 August 2020 as shown in *Figure 1.2*.

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

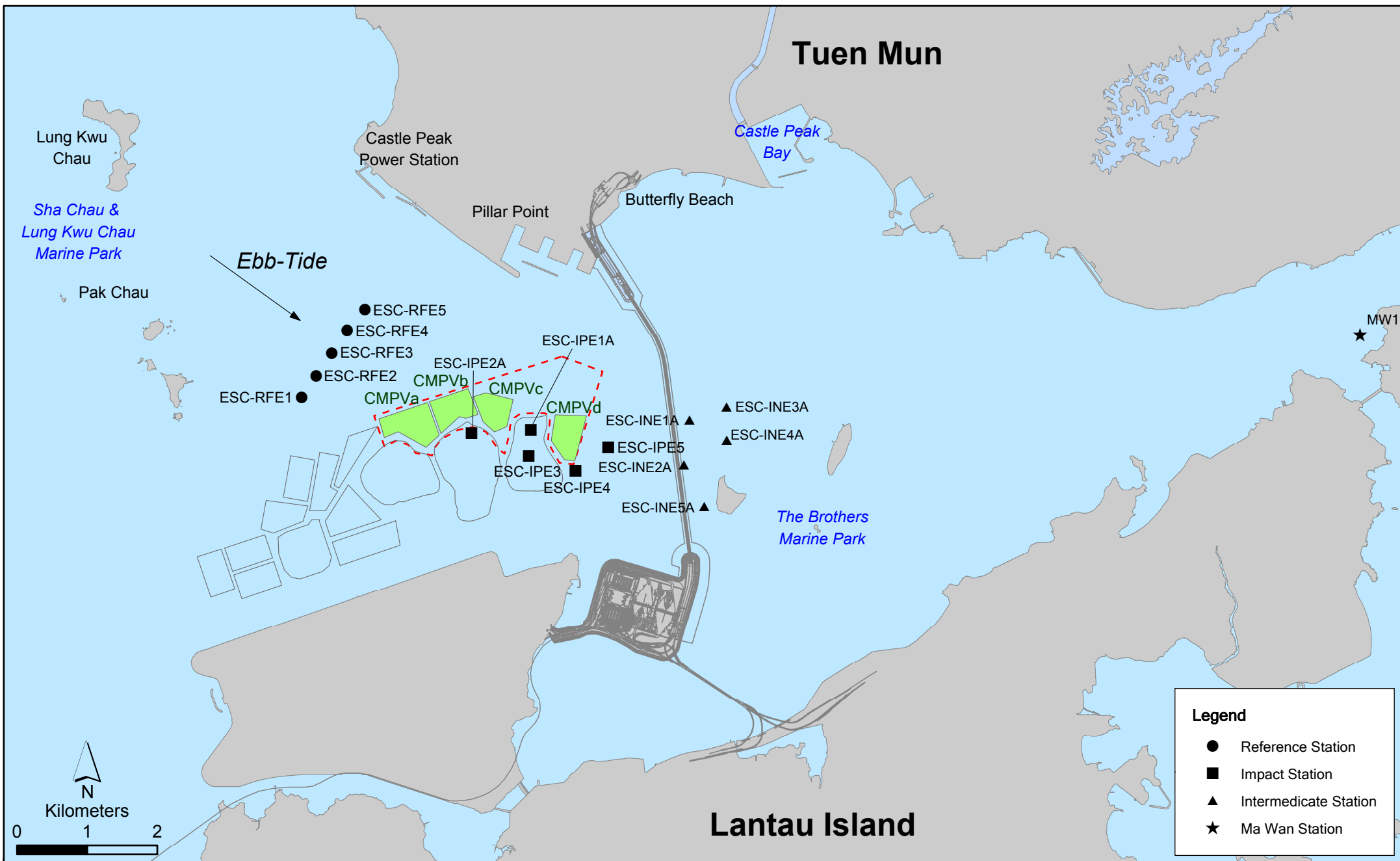


Figure 1.2

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 August 2020 indicated that the levels of pH, Salinity and DO complied with the WQOs at all stations in August 2020.
- 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 Vb did not appear to cause any unacceptable impacts in water quality in August 2020.

Laboratory Measurements

- 1.5.12 Laboratory analysis of August 2020 results indicated that concentrations of Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc were detected in August 2020 samples at all stations and the concentrations of most metals and metalloids were similar amongst the stations, except the concentrations of Nickel and Lead were higher at Intermediate stations, the concentrations of Chromium and Mercury were higher at Impact stations when compared to other stations (*Table B4 of Annex B; Figure 7 of Annex C*). Some of the values for Copper and Zinc were found to be outliers and thus excluded from analysis.
- 1.5.13 For nutrients, concentrations of Total Inorganic Nitrogen (TIN) at all stations 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 ⁽¹⁾. 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 (NH₃-N) were higher at Ma Wan station in August 2020 (*Table B4 of Annex B; Figure 8 of Annex C*). The concentrations of Biochemical Oxygen Demand (BOD₅) were lower at Ma Wan station (*Table B4 of Annex B; Figure 9 of Annex C*).
- 1.5.14 Analyses of results for August 2020 indicated that the SS levels at Intermediate and Impact stations were higher than the WQO, and the SS levels at all stations 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 CMPs did not appear to cause any unacceptable deterioration in water quality in August 2020. Detailed statistical analysis will be presented in the Quarterly Report to investigate any spatial and temporal trends of potential concern.

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

1.5.16 ***Water Quality Monitoring during Capping of ESC CMPs – August 2020***

1.5.17 The monitoring results obtained during August 2020 sampling in the wet season have been assessed for compliance with the WQOs (see *Section 1.5.3* for details). A total of ten (10) monitoring stations were sampled on 10 August 2020 as shown in *Figure 1.3*.

In-situ Measurements

1.5.18 Graphical presentation of the monitoring results (Temperature, DO, pH, Salinity and Turbidity) is shown in *Figures 11-16* of *Annex C*. Levels of pH and DO at all stations in August 2020 complied with the WQO, while the Levels of Salinity were higher than WQO at Ma Wan Station (*Table B5* of *Annex B*). Levels of DO and Turbidity complied with the Action and Limit levels at all stations (*Tables B1* and *B5* of *Annex B*). The higher Salinities recorded at Ma Wan station are likely to be caused by the larger separation distance to Pearl River mouth, which release a large amount of freshwater runoff in the area during wet season, when compared to the Reference stations.

Laboratory Measurements for Suspended Solids (SS)

1.5.19 Concentrations of SS complied with the WQO and the Action and Limit Levels at all stations in August 2020 (*Table B5* of *Annex B*; *Figure 17* of *Annex C*).

1.5.20 Overall, results of the Water Quality Monitoring during Capping of ESC CMPs indicated that the capping operation at ESC CMP Vd did not appear to cause any unacceptable deterioration in water quality in August 2020. Further statistical analysis will be undertaken in the quarterly report to investigate whether the capping operations at ESC CMP Vd is causing any unacceptable deterioration in water quality of the area.

1.5.21 ***Pit Specific Sediment Chemistry of ESC CMP Vb – August 2020***

1.5.22 Monitoring locations for *Pit Specific Sediment Chemistry* for ESC CMP Vb are shown in *Figure 1.4*. A total of six (6) monitoring stations were sampled on 12 August 2020.

1.5.23 The concentrations of most inorganic contaminants were lower than the Lower Chemical Exceedance Levels (LCELs) at most stations, except for Arsenic (*Figures 18* and *19* of *Annex C*). The concentrations of Arsenic were higher than the LCEL at Pit-Edge station ESC-NECA and Active-Pit station ESC-NPCB.

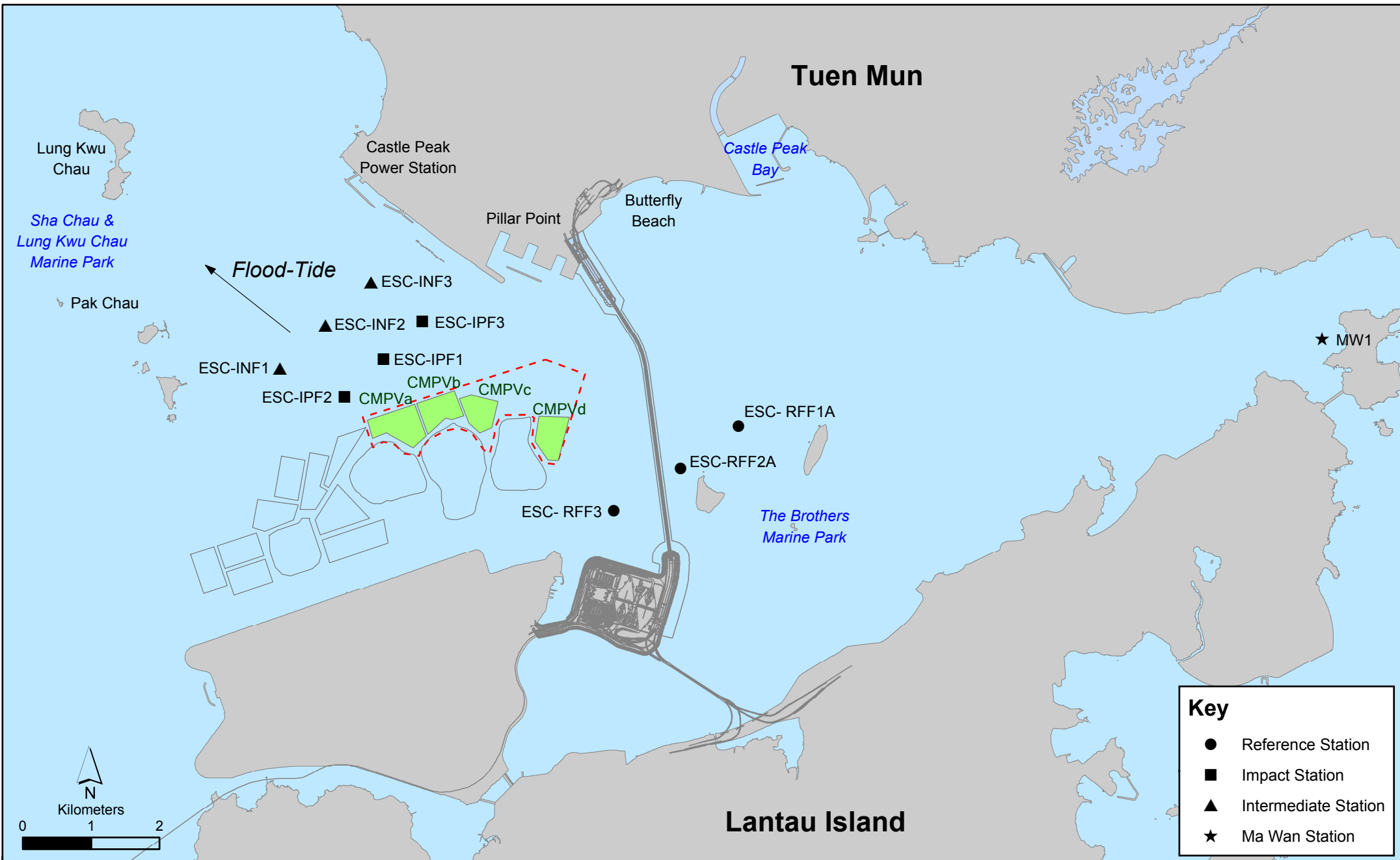


Figure 1.3

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

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Date: 25/4/2017

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

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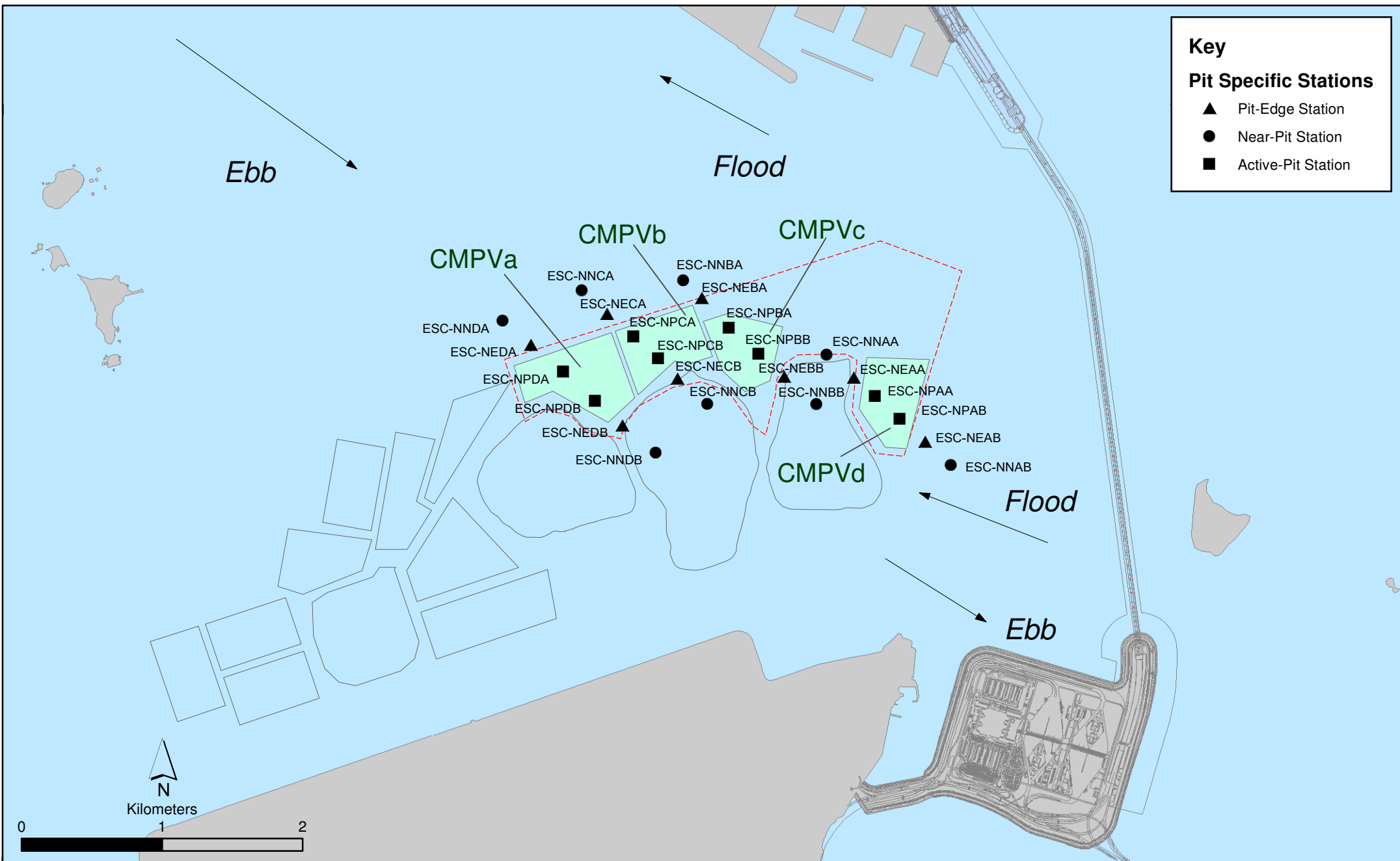


Figure 1.4

Pit Specific Sediment Quality Monitoring Stations for CMPV

- 1.5.24 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 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.
- 1.5.25 For organic contaminants, the concentrations of Total Organic Carbon (TOC) were higher at Active-Pit stations ESC-NPCA and ESC-NPCB in August 2020 (*Figure 20 of Annex C*). The concentrations of Low Molecular Weight and High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) were lower than the LCEs at all stations (*Figure 21 of Annex C*). The concentrations of Tributyltin (TBT) were higher at Active-Pit stations ESC-NPCA and ESC-NPCB (*Figure 22 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 August 2020.
- 1.5.26 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 August 2020. 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.
- 1.5.27 ***Cumulative Impact Sediment Chemistry of ESC CMPs – August 2020***
- 1.5.28 Monitoring locations for Cumulative Impact Sediment Chemistry for ESC CMPs are shown in *Figure 1.5*. A total of nine (9) monitoring stations were sampled on 5 and 6 August 2020.
- 1.5.29 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 August 2020, except concentrations of Arsenic were higher than the LCEL at Mid-field stations ESC-RMA, ESC-RMB and Capped Pit station ESC-RCB1 (*Figures 23 and 24 of Annex C*). As discussed in *Section 1.5.24*, 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) 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

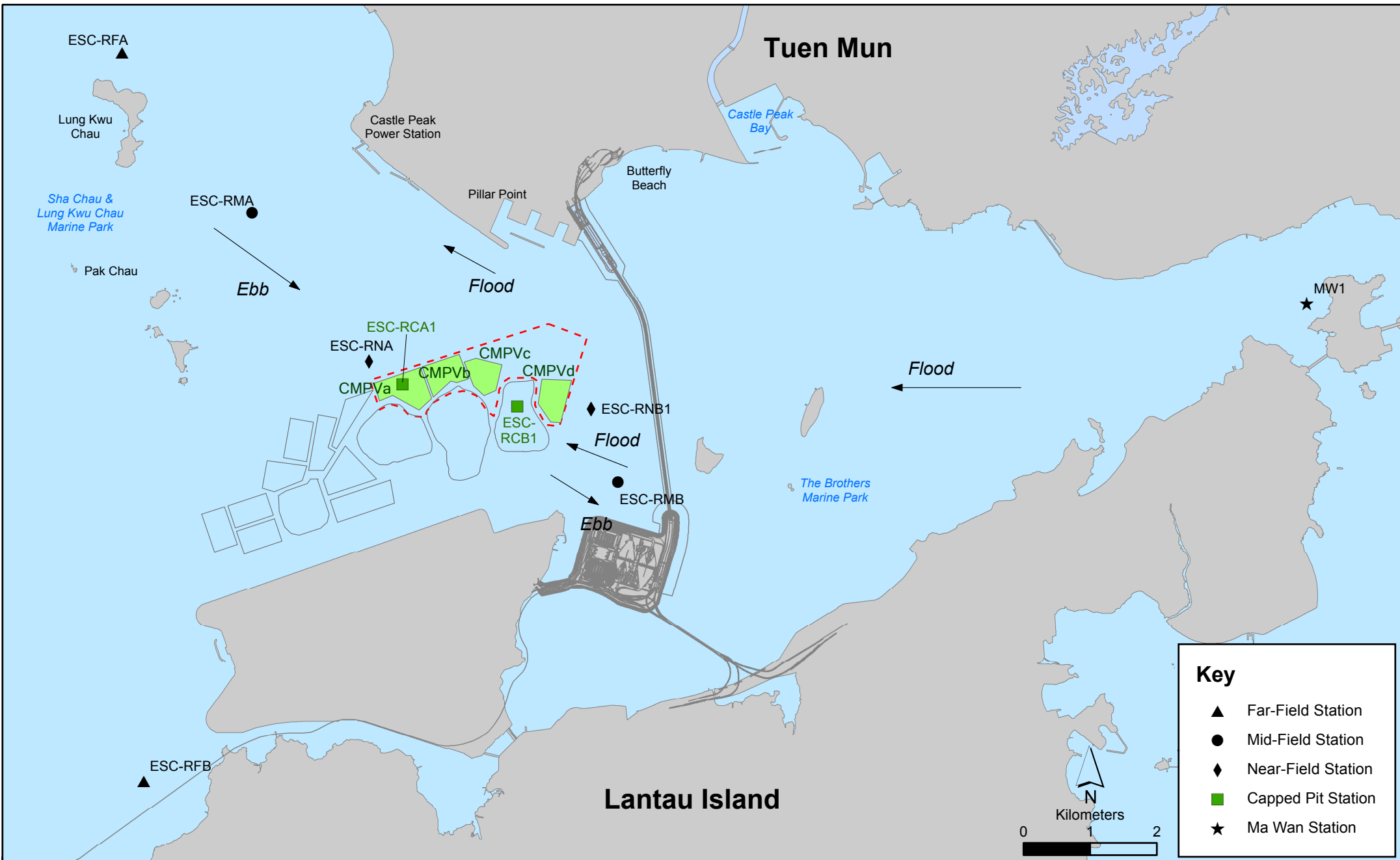


Figure 1.5

Cumulative Impacts Sediment Quality Monitoring Stations for ESC CMPs

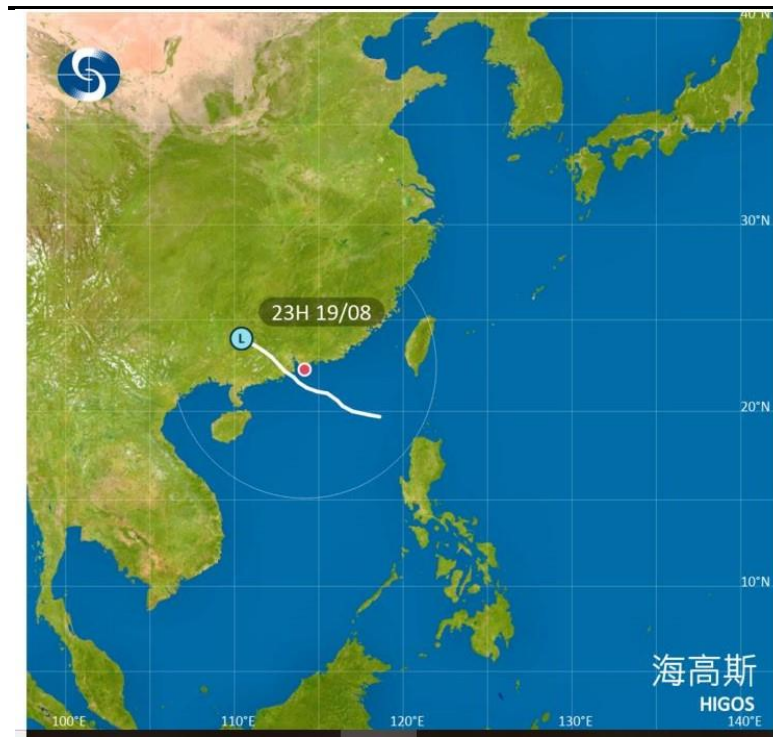
1.5.30 For organic contaminants, the concentrations of TOC and TBT varied between stations in August 2020, with the generally higher concentrations of TOC and TBT recorded at Ma Wan station (*Figure 25 and 26 of Annex C*). The concentrations of Total PCBs, Total DDT, 4,4'- DDE, Low Molecular Weight and High Molecular Weight PAHs were below the limit of reporting at all stations in August 2020.

1.5.31 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 August 2020. 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.

1.5.32 ***Sediment Chemistry after a Major Storm of ESC CMP V – August 2020***

Sampling for Sediment Chemistry after a Major Storm Event was conducted at nine (9) monitoring stations (see *Figure 1.4* for the locations of the monitoring stations) on 21 August 2020 after the visit of tropical cyclone Higos, which led to the issue of No. 9 Gale or Storm Signal on 19 August 2020. The track of higos are shown in *Figure 1.6*.

Figure 1.6 *Track of Tropical Cyclone Higos (Source: Hong Kong Observatory)*



1.5.33 Analyses of results for the *Sediment Chemistry after a Major Storm* indicated that the concentrations of most inorganic contaminants were below the LCEL, except Arsenic at Near-field station ESC-RNB1, Mid-field stations ESC-RMA and ESC-RMB, Far-field stations ESC-RFA and ESC-RFB and Ma Wan Station in August 2020 (*Figures 27 and 28 of Annex C*).

1.5.34 As discussed in *Section 1.5.24*, 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.

Overall, there appeared to be no evidence showing the failure of ESC CMP V in retaining disposed mud or causing contamination of sediments after the major storm event in August 2020.

1.6 *ACTIVITIES SCHEDULED FOR THE NEXT MONTH*

1.6.1 The following monitoring activities will be conducted in the next monthly period of September 2020 for ESC CMP V (see *Annex A* for the sampling schedule ⁽¹⁾):

- *Water Column Profiling of ESC CMP Vb; 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*.

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

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*

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 Vb in August 2020

Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen		pH	Suspended Solids (mg L ⁻¹)
				(%)	(mg L ⁻¹)		
WCP 1 (Downstream)	29.44	20.40	4.28	121.43	8.31	8.13	7.68
WCP 2 (Upstream)	29.46	21.16	3.28	128.08	8.70	8.17	8.90
WQO (Wet Season)	N/A	19.04-23.27#	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 August 2020

Sampling Period	Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen		pH (mg L ⁻¹)
					(%)	(mg L ⁻¹)	
August 2020	RFE (Reference)	27.46	25.56	4.06	84.32	5.78	7.92
	IPE (Impact)	27.55	25.24	5.10	86.36	5.92	7.94
	INE (Intermediate)	27.35	25.63	7.04	83.69	5.74	7.92
	Ma Wan	26.83	27.01	3.42	76.29	5.24	7.88
	WQO	N/A	23.00- 28.11#	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 August 2020

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)
August 2020	RFE	3.65	0.31	1.36	18.23	1.56	0.82	1.38	<LOR	32.46	0.15	0.59	1.29	7.75
	IPE	3.22	0.27	2.61	17.33	3.29	1.69	1.53	<LOR	24.44	0.13	0.58	1.10	11.30
	INE	3.56	0.25	1.71	20.99	3.63	0.87	1.97	<LOR	33.40	0.15	0.62	1.07	13.93
	Ma Wan	3.74	0.25	1.54	14.06	0.86	0.49	0.75	<LOR	39.14	0.24	0.55	0.76	7.83

WQO of TIN: 0.5 mg/L

Wet Season WQO of SS : 10.8 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.

Table B5 *Monitoring Results for Water Quality Monitoring during Capping of ESC on 10 August 2020*

Sampling Period	Stations	Temp (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%)	(mg L ⁻¹)	pH (mg L ⁻¹)	SS (mg L ⁻¹)
August 2020	RFF (Reference)	29.18	22.17	2.00	103.89	7.05	8.07	5.4
	IPF (Impact)	28.90	23.02	3.60	94.28	5.67	7.99	6.2
	INF (Intermediate)	28.95	22.74	2.57	95.40	6.48	7.99	5.0
	Ma Wan	28.24	26.05	0.80	87.66	5.92	7.89	3.2
	WQO	N/A	19.95-24.39*	N/A	N/A	>4	6.5-8.5	10.8

Notes:

Not exceeding 2°C of change of the results from the Reference Station.

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

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

Cell shaded grey indicate value exceeding the WQO.

Annex C

Graphical Presentations

Routine Water Quality Monitoring for ESC CMP V - August 2020

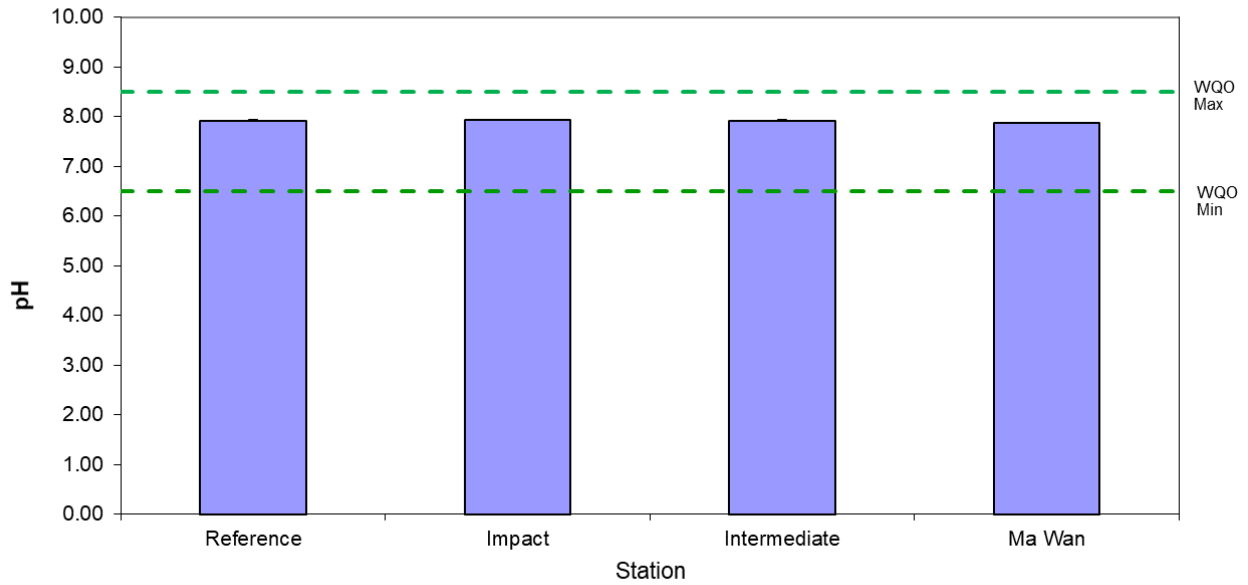


Figure 1: Level of pH recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2020.

Routine Water Quality Monitoring ESC CMP V - August 2020

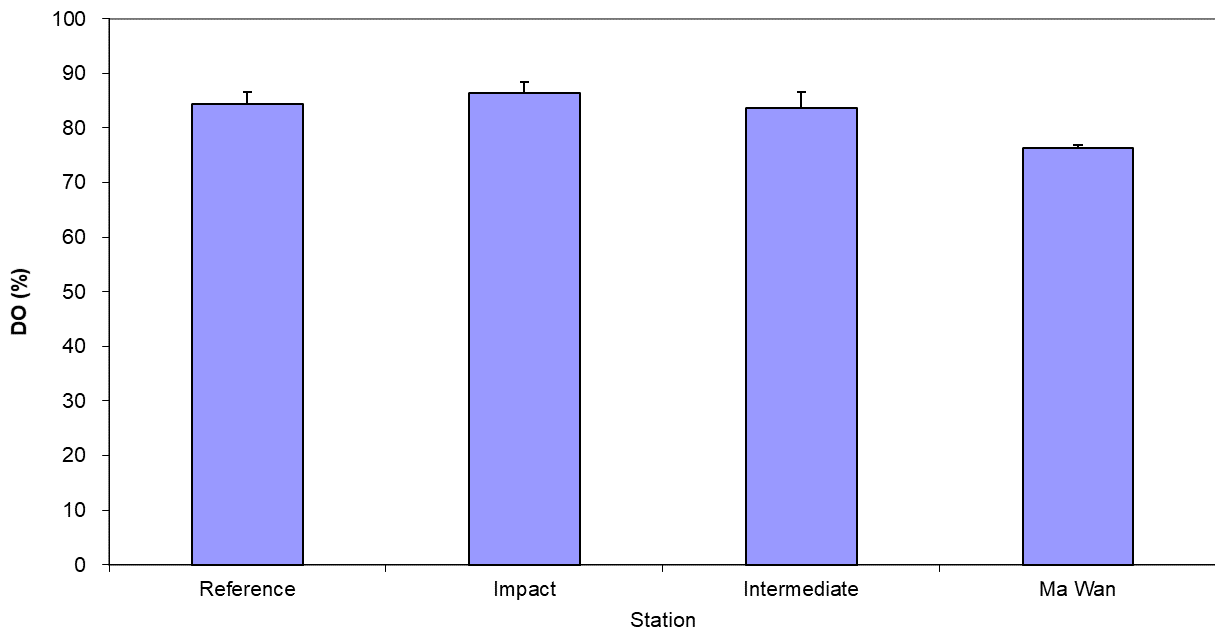


Figure 2: Level of Dissolved Oxygen (DO) (% saturation; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2020.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\41 Monthly August 2020

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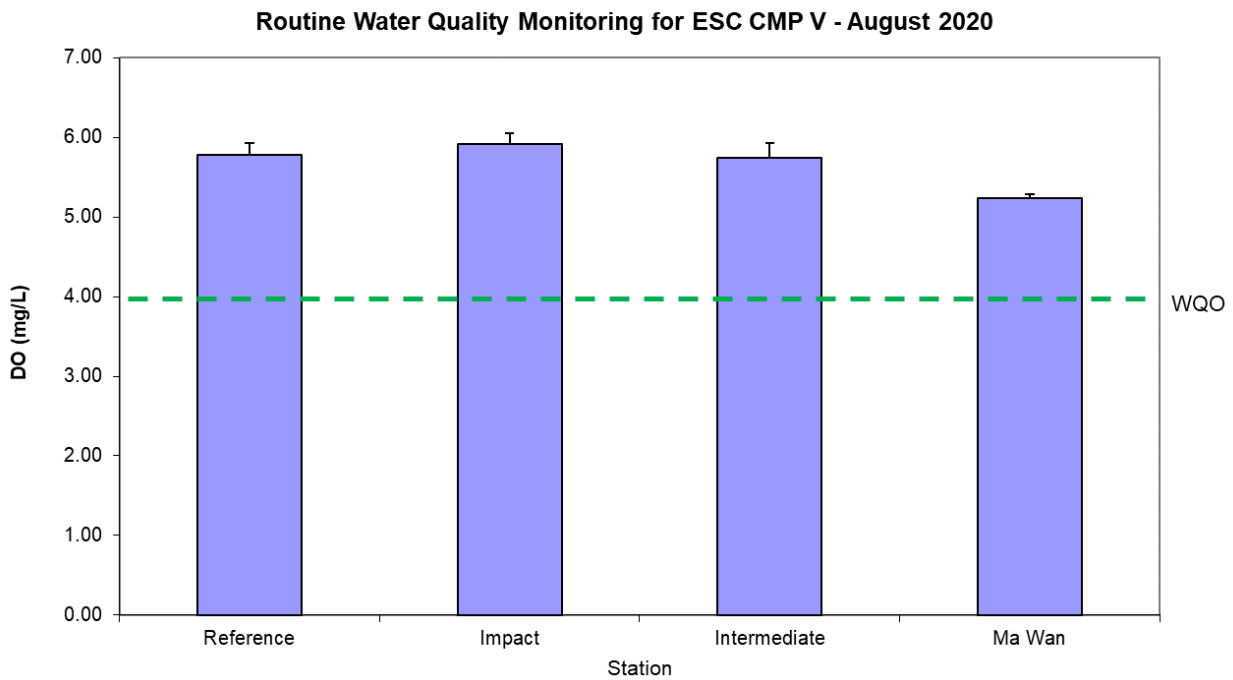


Figure 3: Concentration of Dissolved Oxygen (DO) (mg/L; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2020.

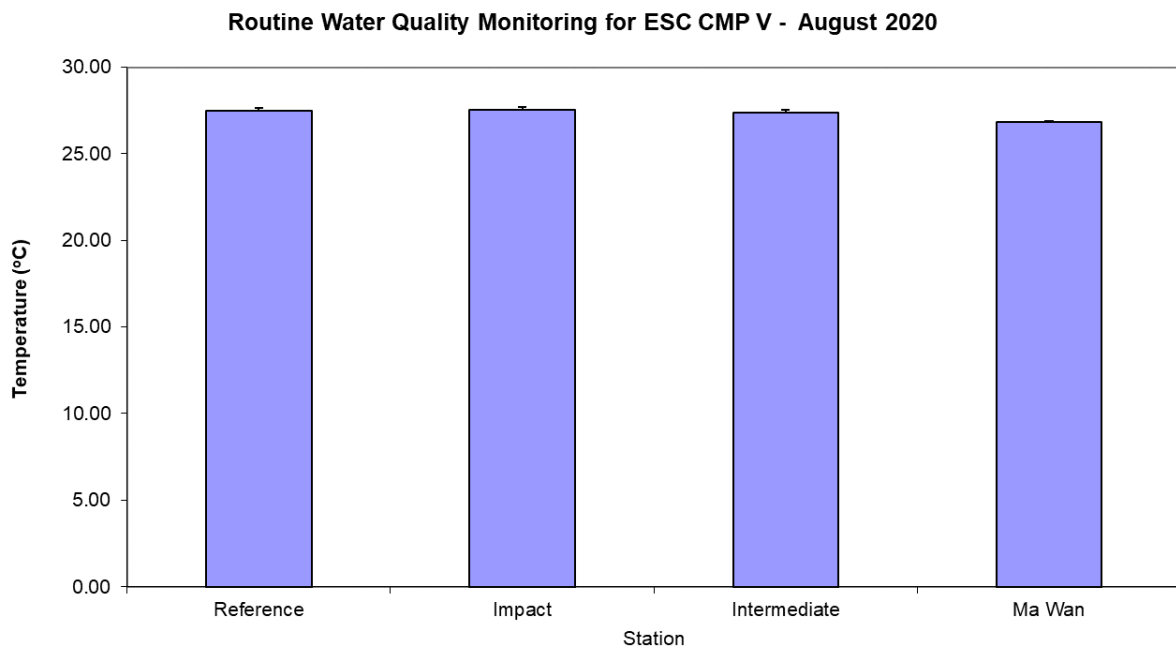


Figure 4: Level of Temperature (°C; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2020.

Routine Water Quality Monitoring for ESC CMP V - August 2020

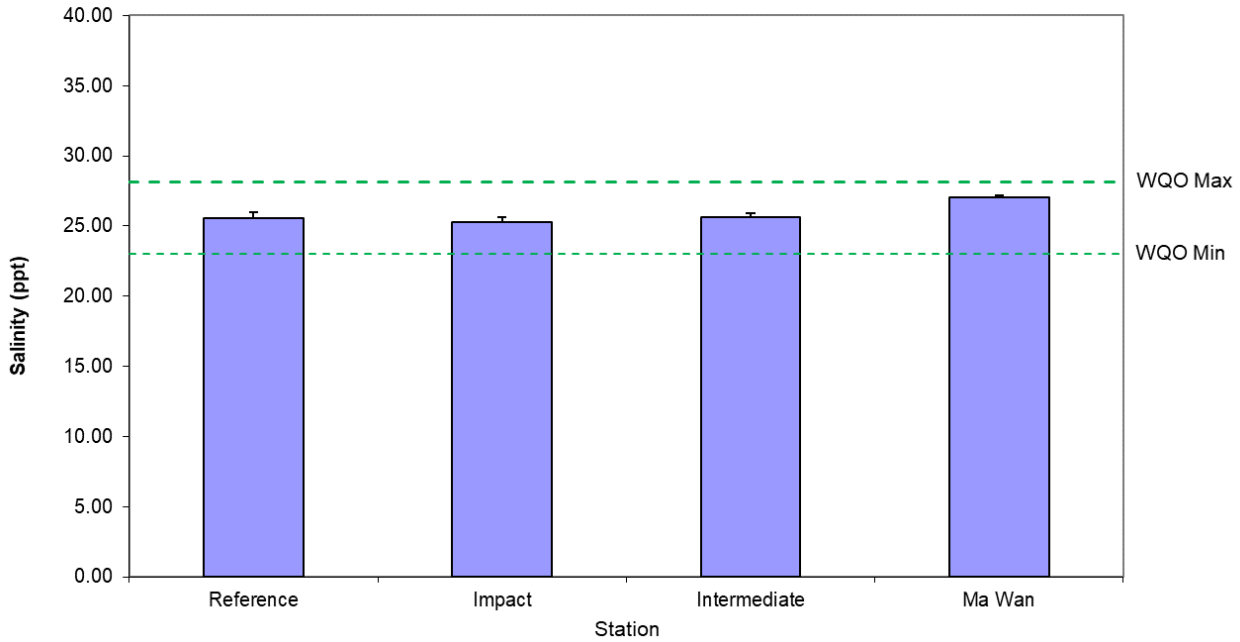


Figure 5: Level of Salinity (ppt; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2020.

Routine Water Quality Monitoring for ESC CMP V - August 2020

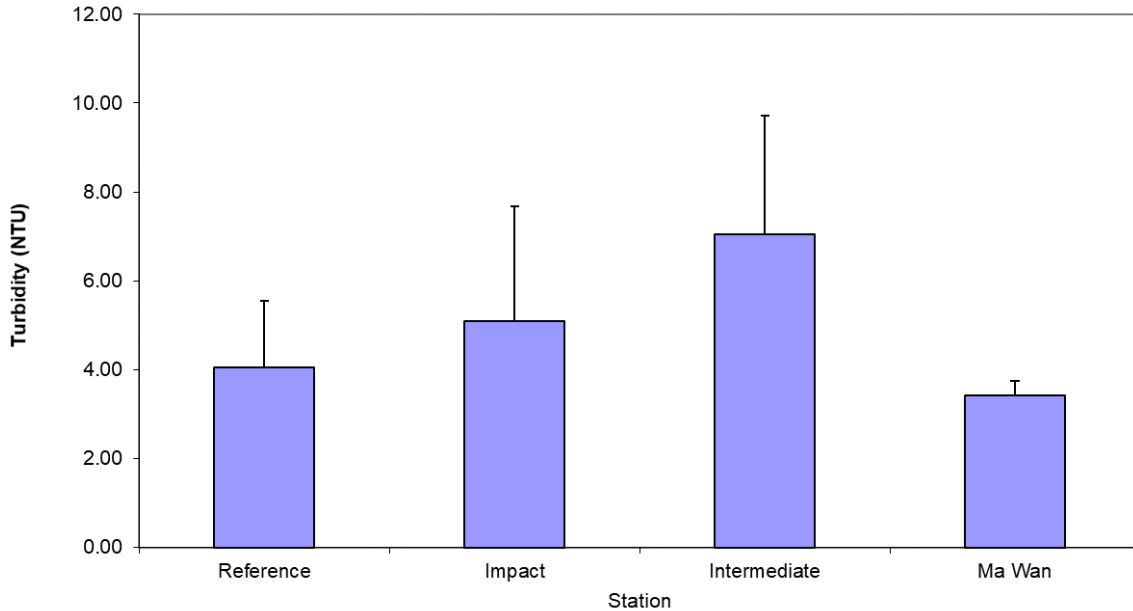


Figure 6: Levels of Turbidity (NTU; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2020.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\41 Monthly August 2020

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**Routine Water Quality Monitoring for ESC CMP V
August 2020**

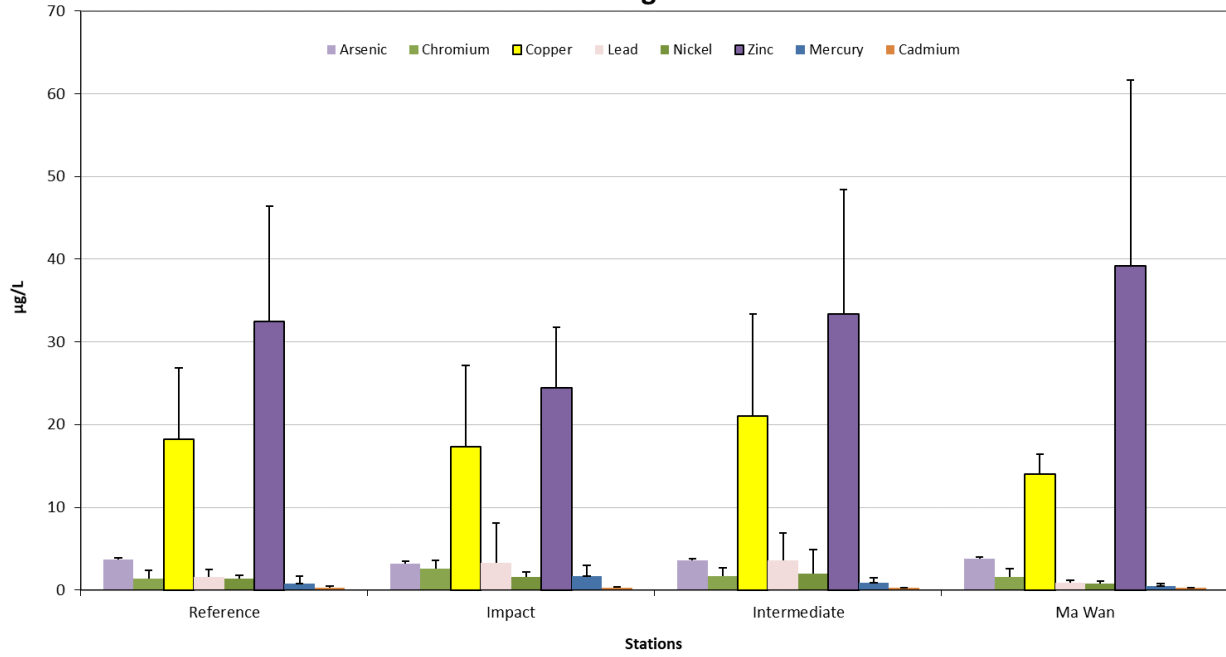


Figure 7: Concentration of Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc (µg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2020.

**Routine Water Quality Monitoring Results for Nutrients
August 2020**

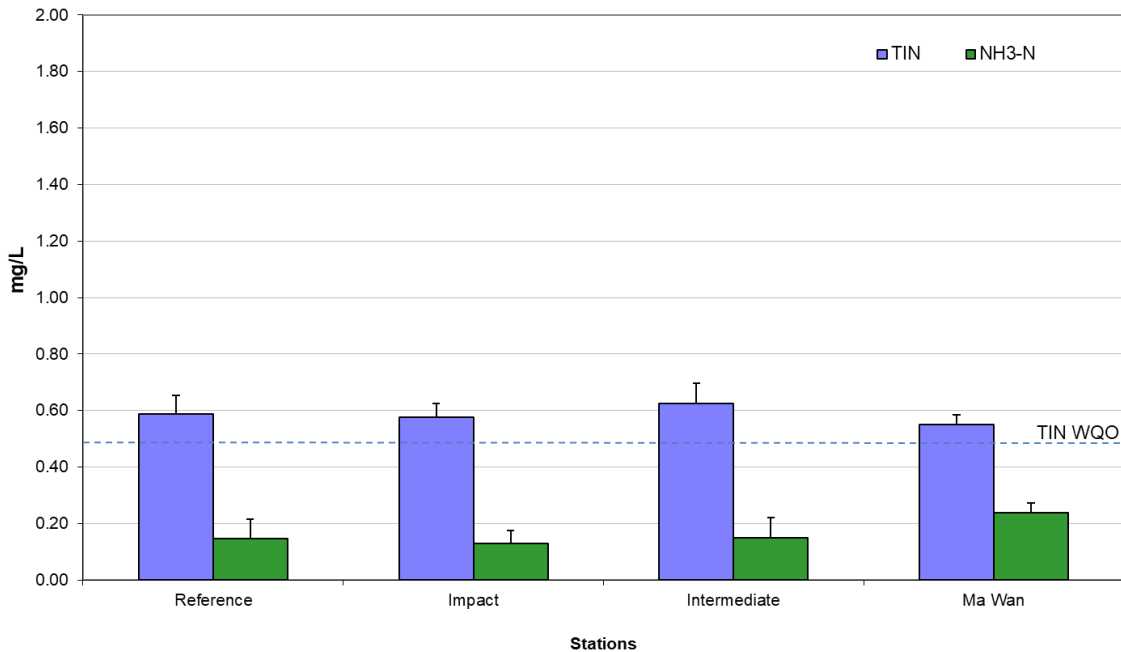


Figure 8: Concentration of Total Inorganic Nitrogen (TIN) and Ammonia Nitrogen (NH3-N) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2020.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\41 Monthly August 2020

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**Routine Water Quality Monitoring Results for Biochemical Oxygen Demand (BOD₅)
August 2020**

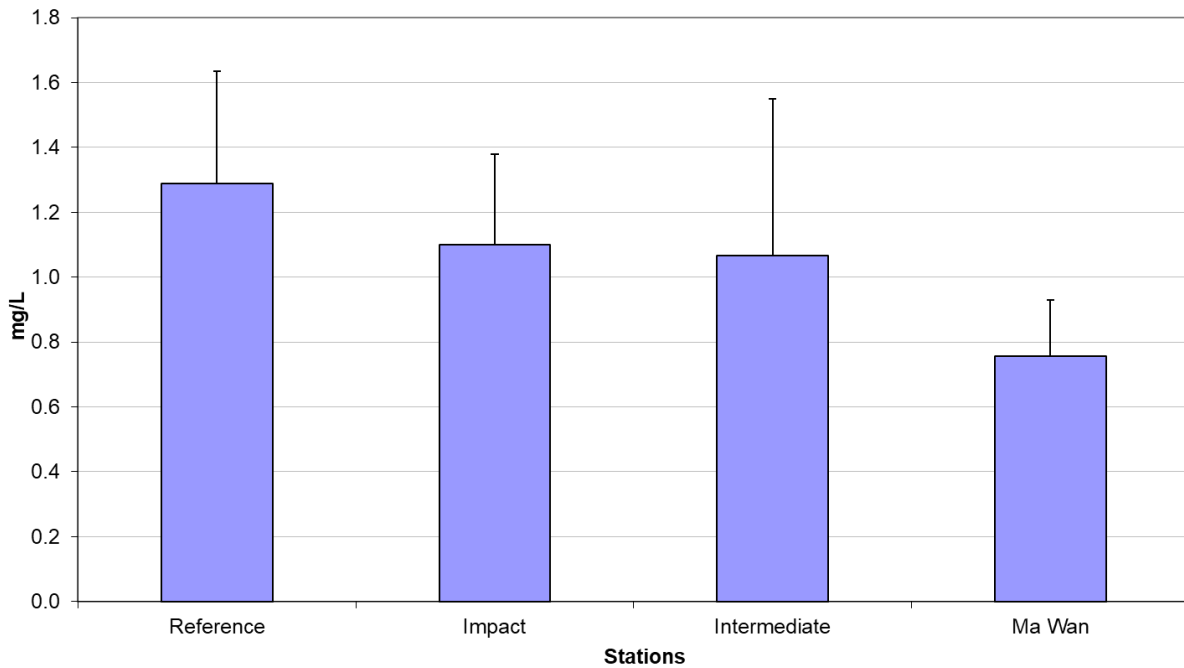


Figure 9: Level of Biochemical Oxygen Demand (BOD₅) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2020.

**Routine Water Quality Monitoring for Suspended Solids
August 2020**

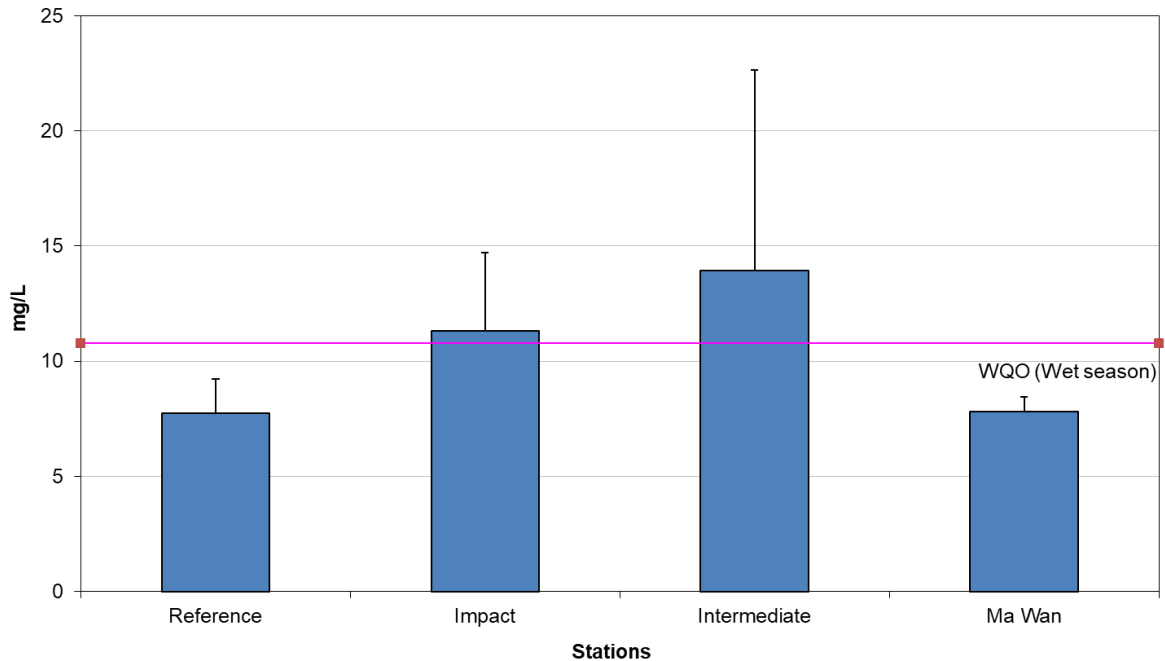


Figure 10: Concentration of Suspended Solids (SS) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2020.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\41 Monthly August 2020

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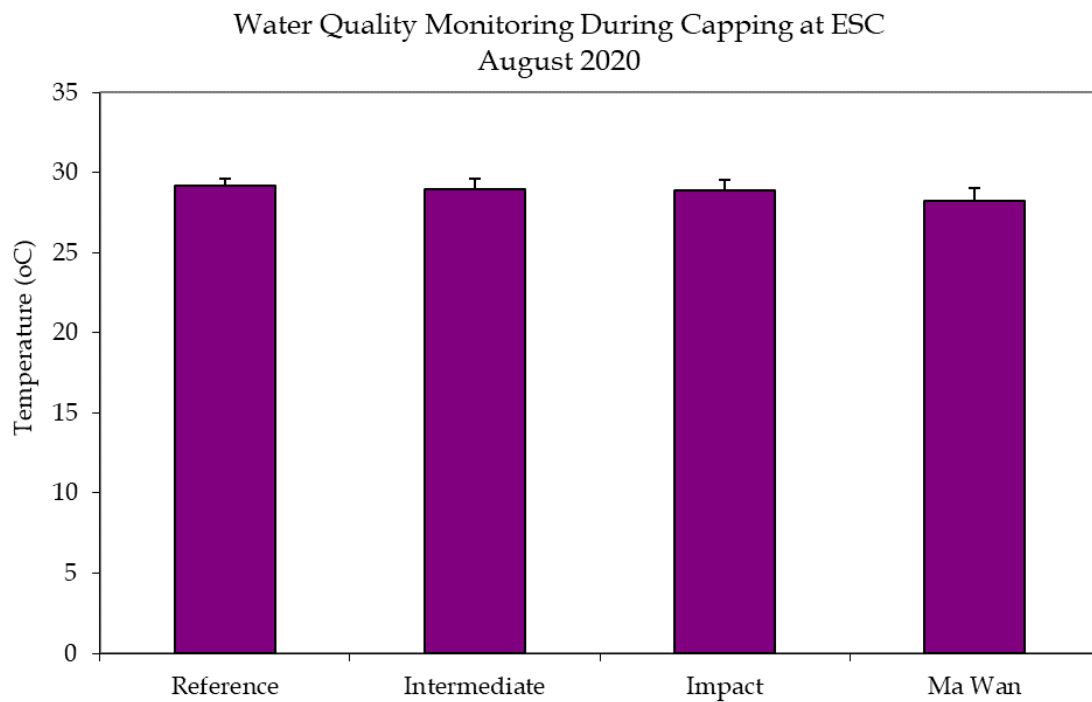


Figure 11: Levels of Temperature (°C; mean +SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in August 2020.

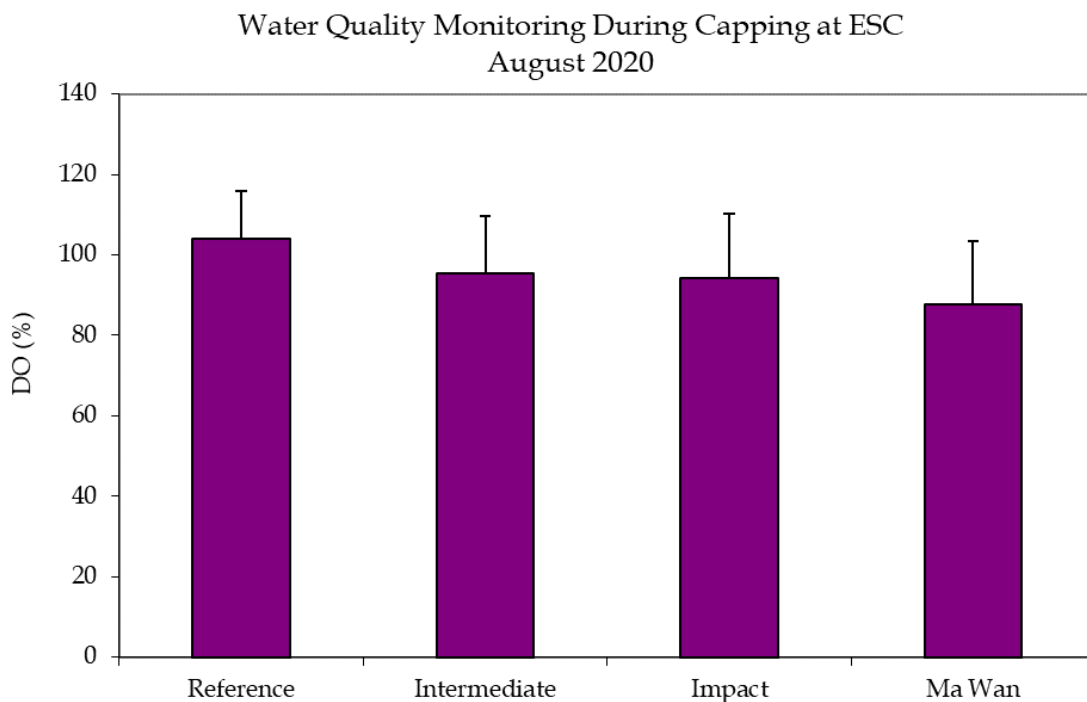


Figure 12: Levels of Dissolved Oxygen (% saturation; mean +SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in August 2020

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\41 Monthly August 2020

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Water Quality Monitoring During Capping at ESC
August 2020

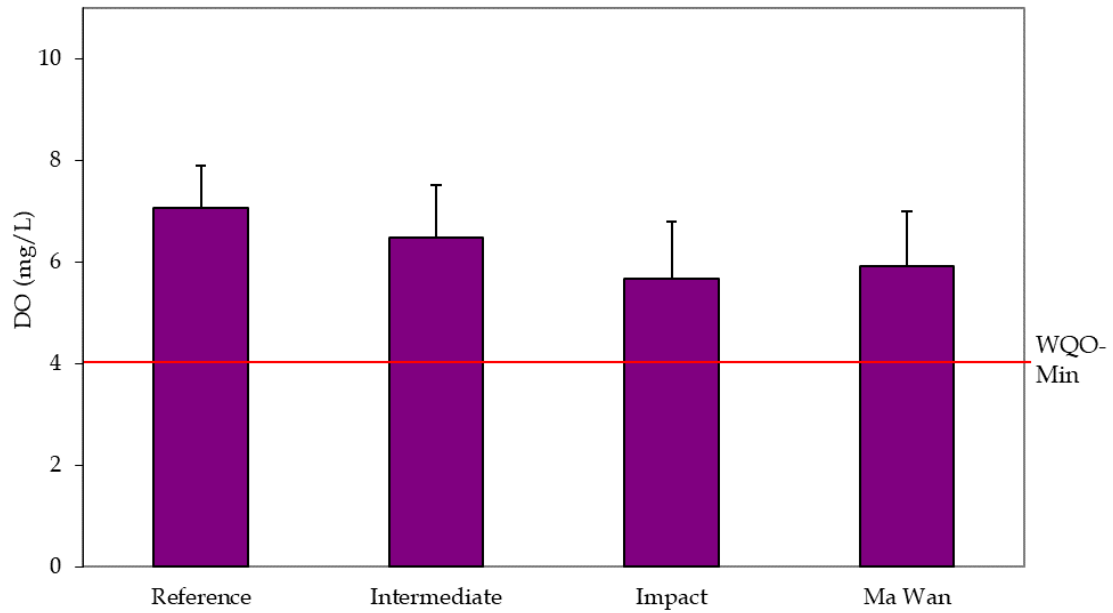


Figure 13: Levels of Dissolved Oxygen (% saturation; mean +SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in August 2020

Water Quality Monitoring During Capping at ESC
August 2020

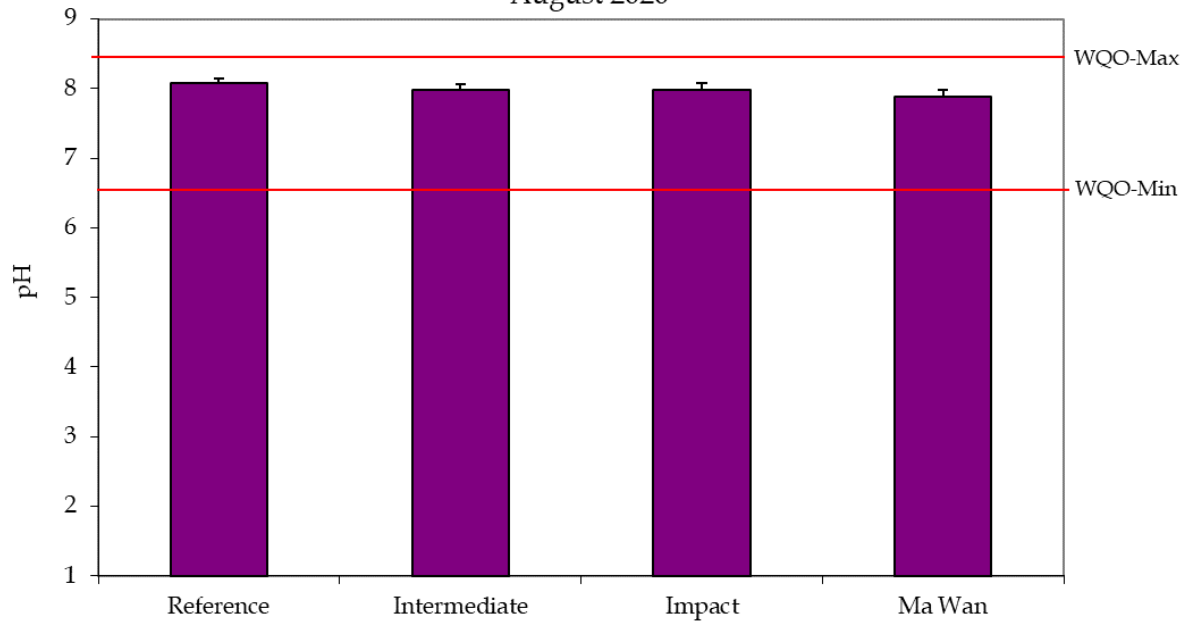


Figure 14: Levels of pH (mean +SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in August 2020.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\41 Monthly August 2020

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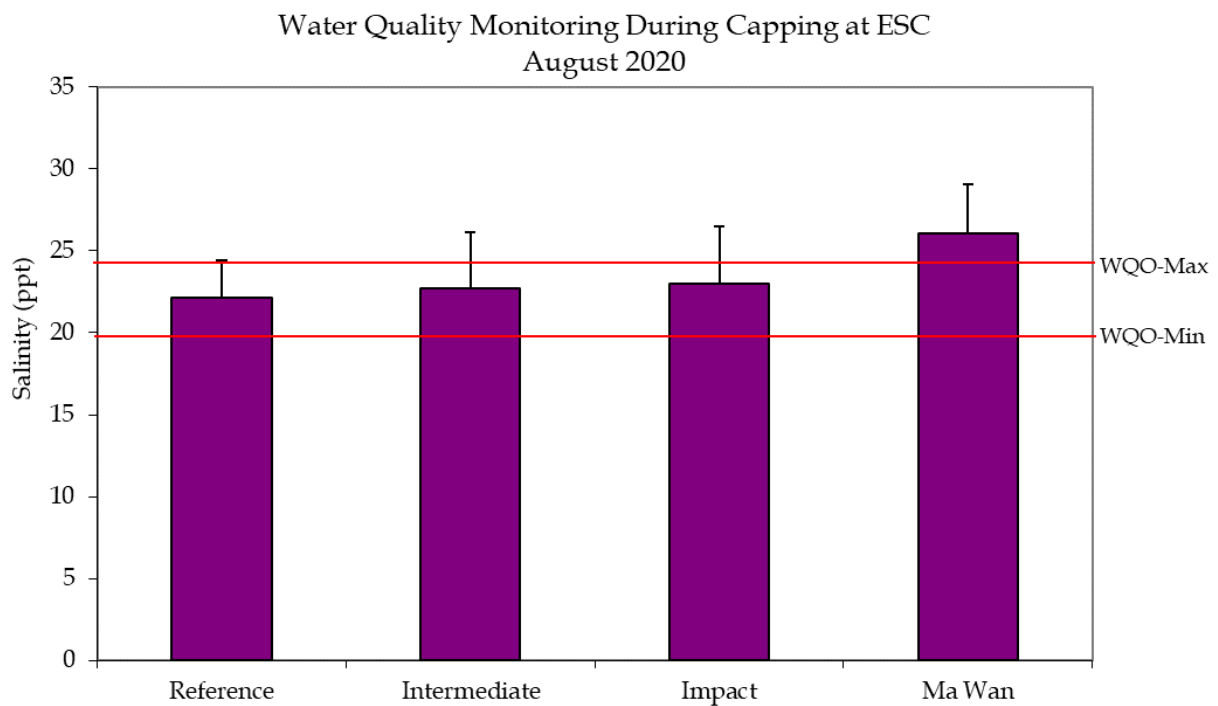


Figure 15: Levels of Salinity (ppt; mean +SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in August 2020.

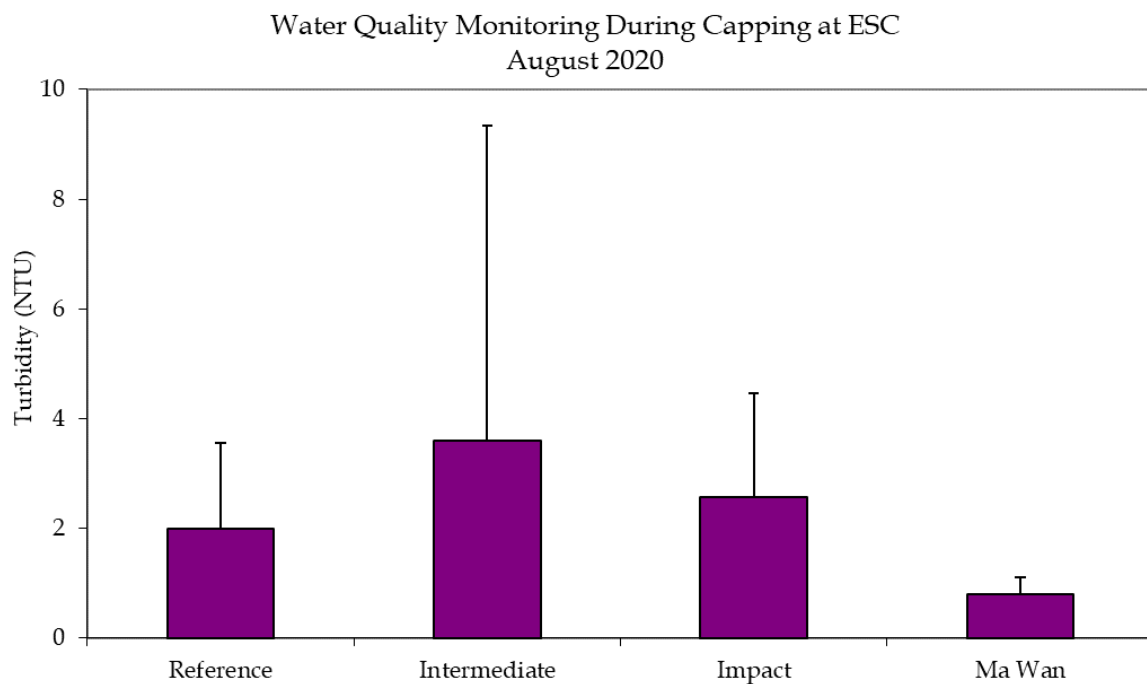


Figure 16: Levels of Turbidity (NTU; mean +SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in August 2020.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\41 Monthly August 2020

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Water Quality Monitoring During Capping at ESC
August 2020

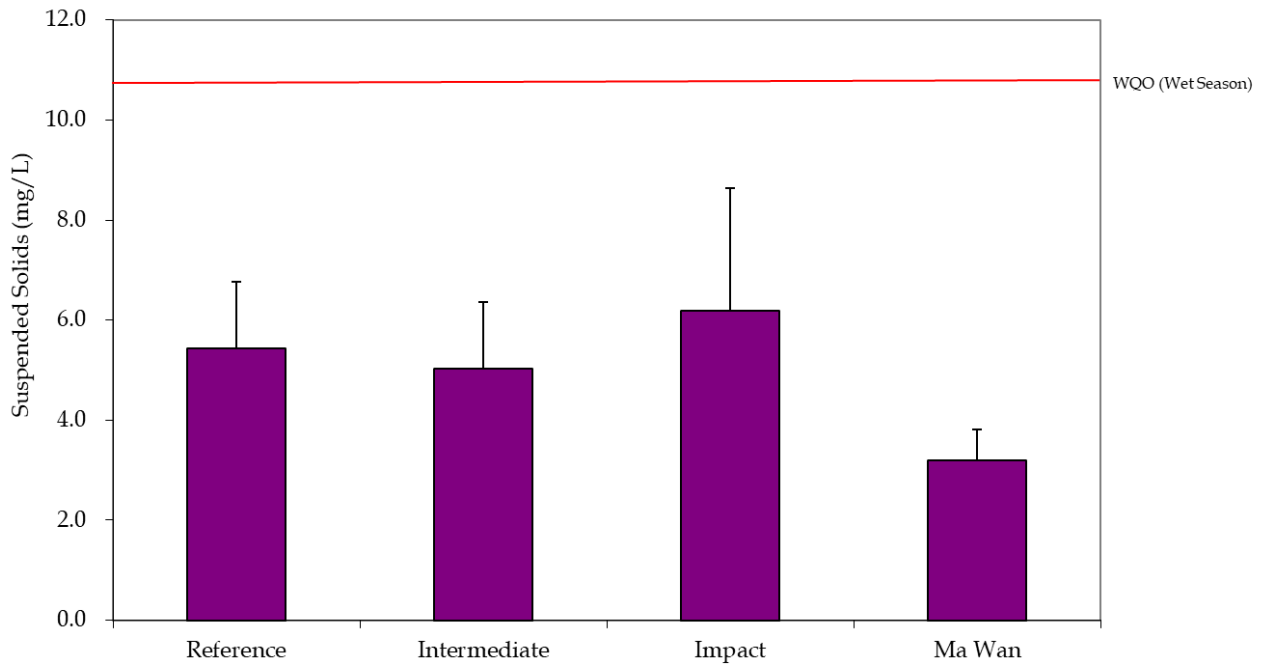


Figure 17: Levels of Suspended Solids (mg/L; mean +SD) recorded from Water Quality Monitoring during Capping of ESC CMPs in August 2020.

Pit Specific Sediment Chemistry for Metal and Metalloid Contaminants at ESC CMP Vb
August 2020

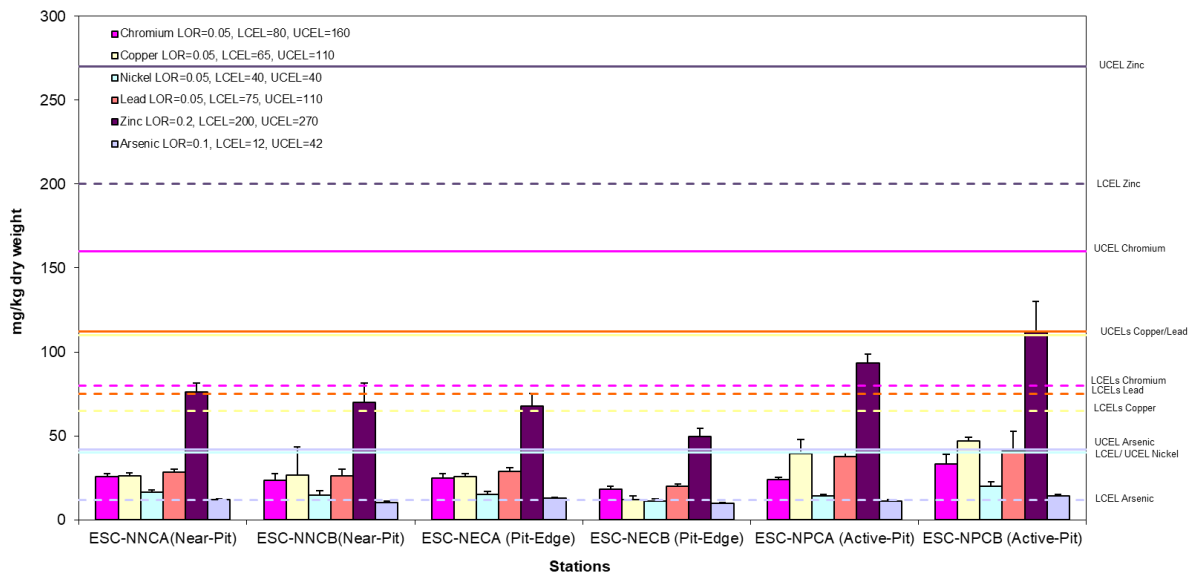


Figure 18: Concentration of Metals and Metalloid (Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in August 2020.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\41 Monthly August 2020

Date: September 2020

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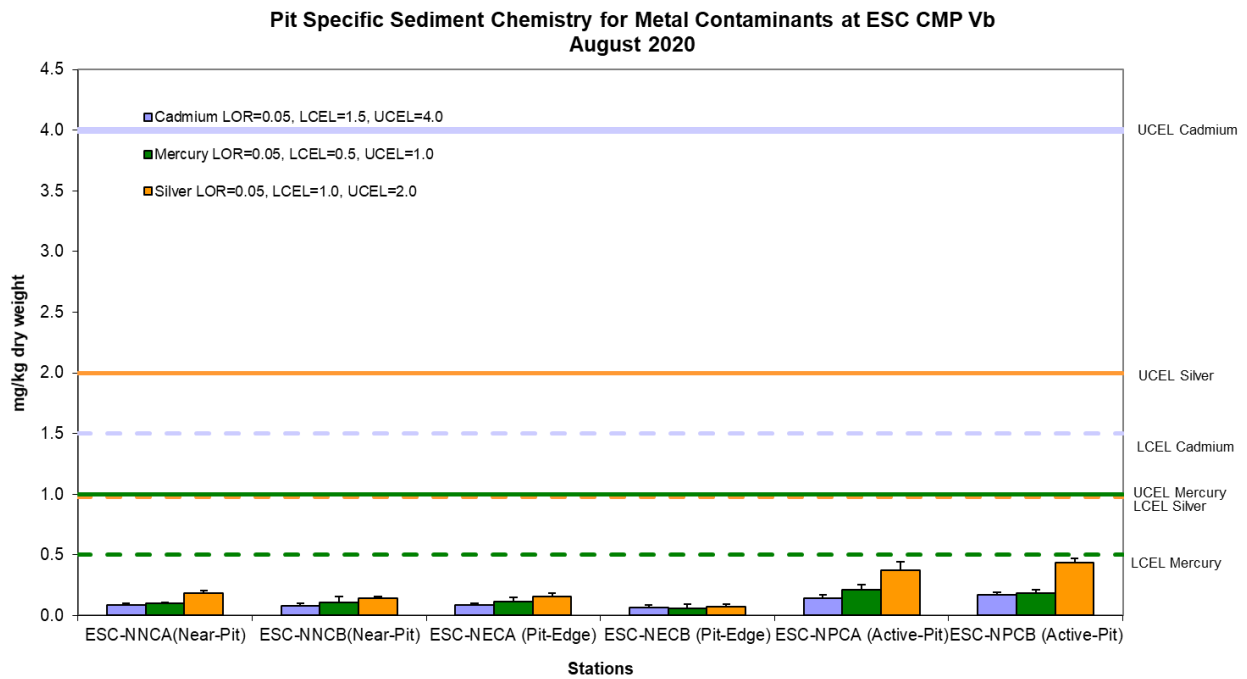


Figure 19: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in August 2020.

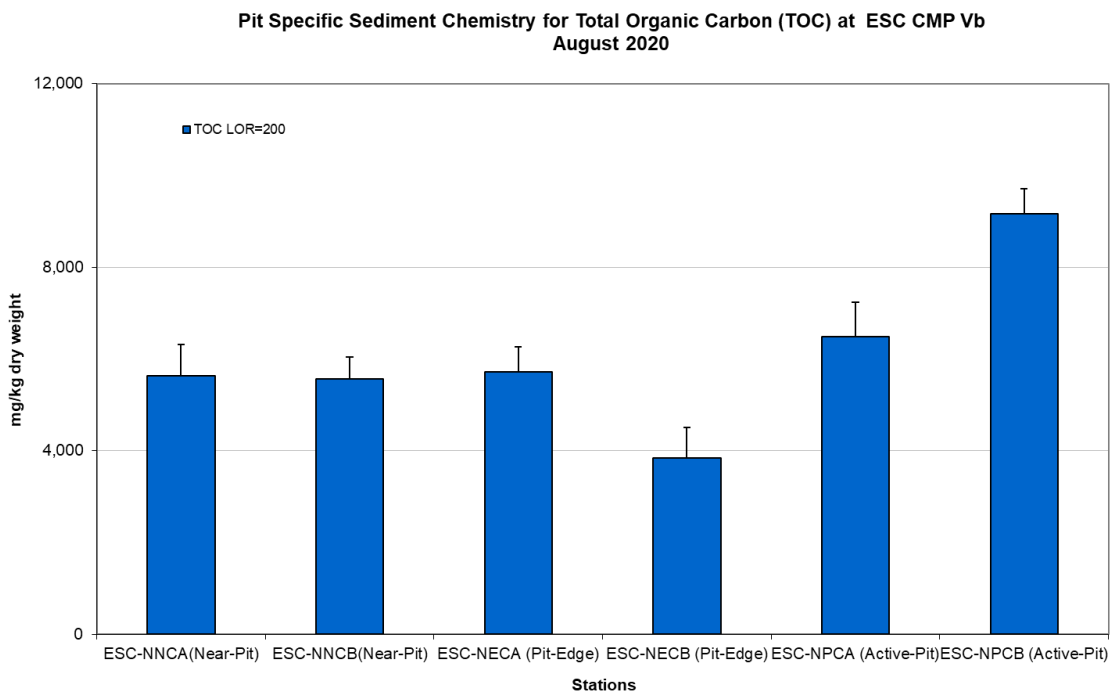


Figure 20: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in August 2020.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\41 Monthly August 2020

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Pit Specific Sediment Chemistry for Low and High Molecular Weight Polycyclic Aromatics Hydrocarbons (PAHs) at ESC CMP Vb in August 2020

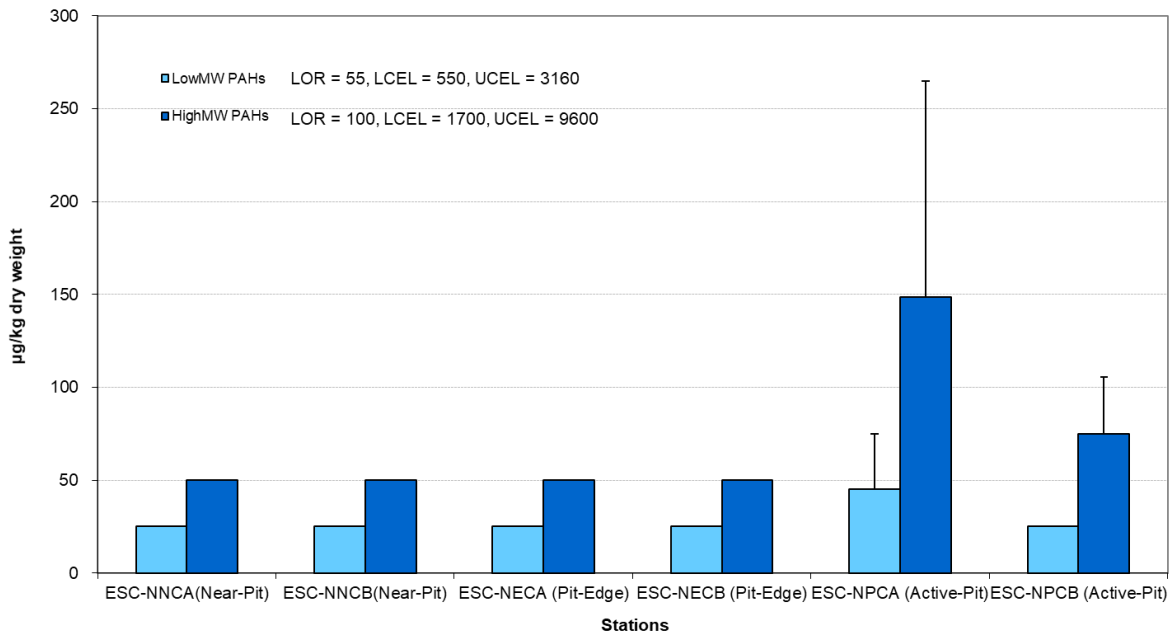


Figure 21: Concentration of Low and High Molecular Weight Polycyclic Aromatics (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in August 2020.

Pit Specific Sediment Chemistry for Tributyltin (TBT) at ESC CMP Vb August 2020

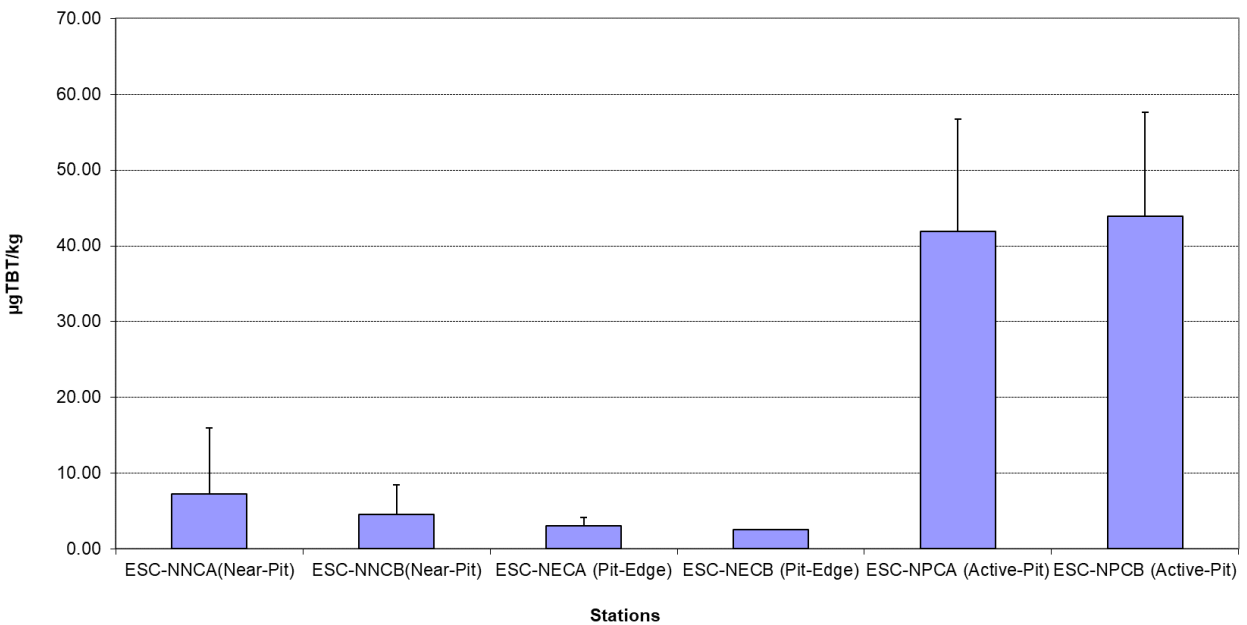


Figure 22: Concentration of Tributyltin (TBT) (µg/kg dry weight; mean +SD) in sediment samples collected Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in August 2020.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\41 Monthly August 2020

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**Cumulative Impact Sediment Chemistry for Metal and Metalloid Contaminants at ESC CMPs
August 2020**

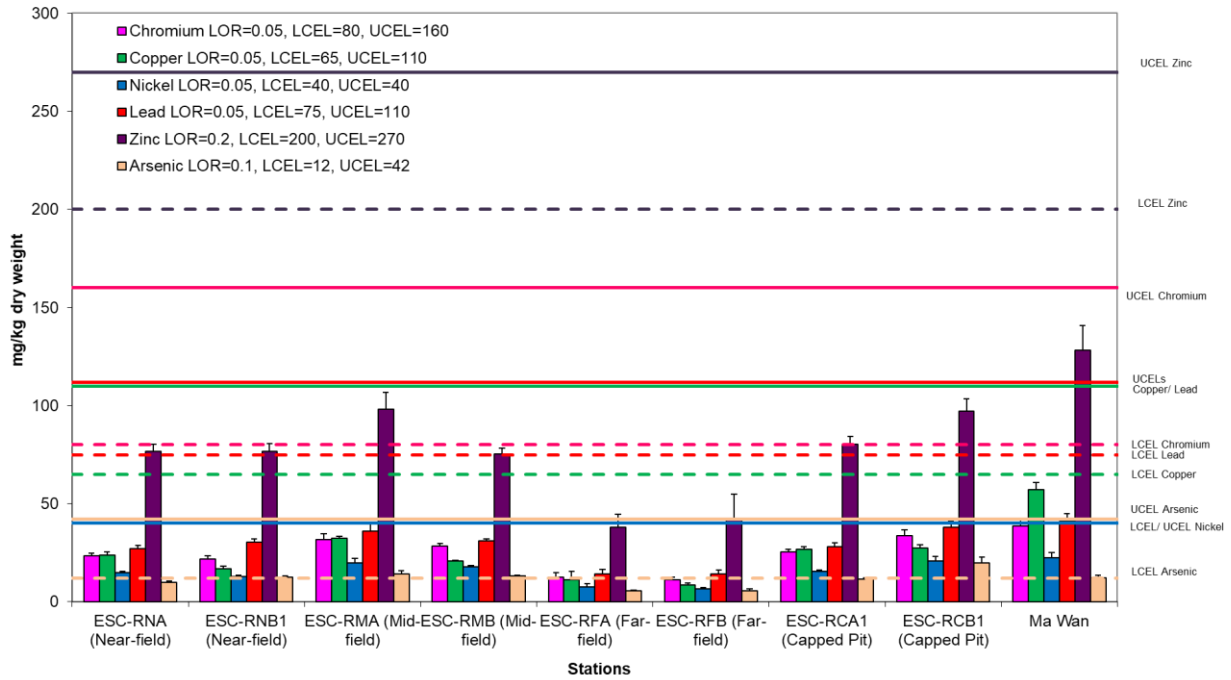


Figure 23: Concentration of Metals and Metalloid (Cr, Cu, Ni, Pb, Zn, As; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in August 2020.

**Cumulative Impact Sediment Chemistry for Metal Contaminants at ESC CMPs
August 2020**

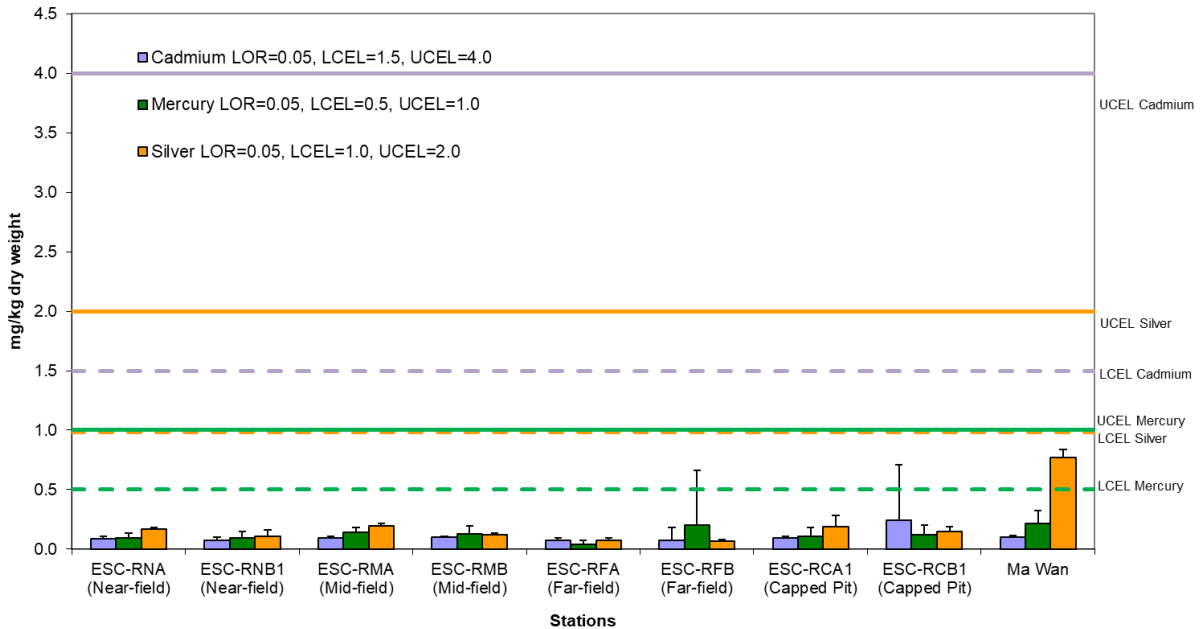


Figure 24: Concentration of Metals (Cd, Hg, Ag; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in August 2020.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\41 Monthly August 2020

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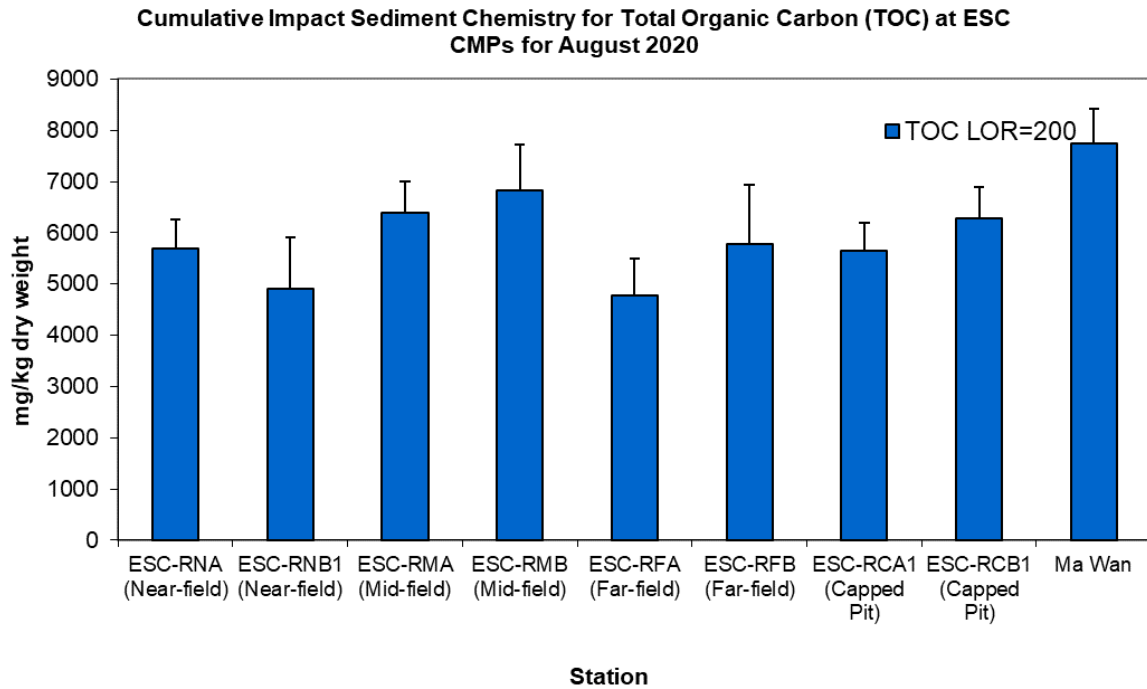


Figure 25: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in August 2020.

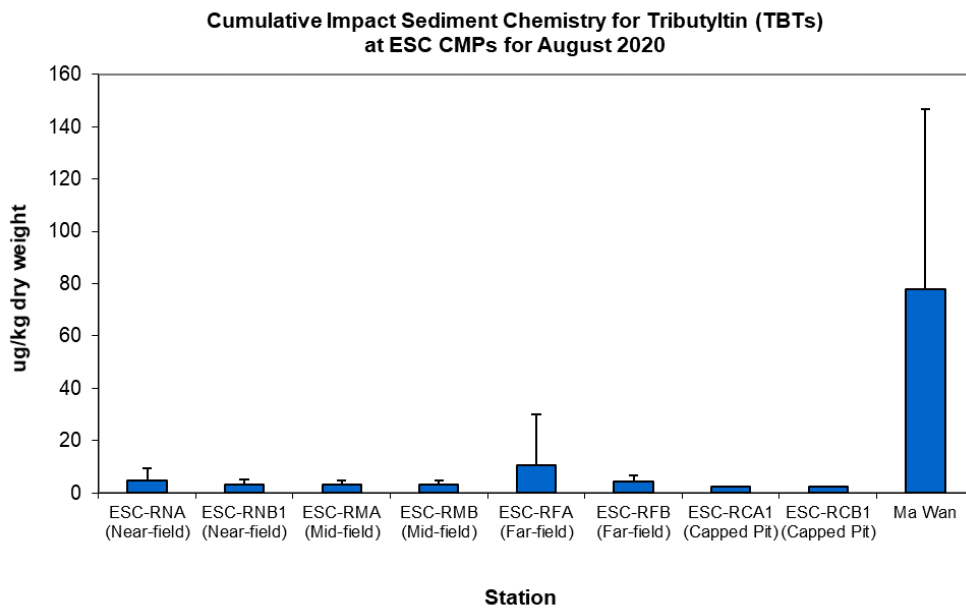


Figure 26: Concentration of Tributyltin (TBT) ($\mu\text{g}/\text{kg}$ dry weight; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in August 2020.

Source: P:\Projects\0400720 CEDD CMP EM&A 2017-2020\02 Deliverable\05 CMP Monthly Report\41 Monthly August 2020

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**Sediment Chemistry after a Major Storm for Metal and Metalloid Contaminants at ESC CMPs
August 2020**

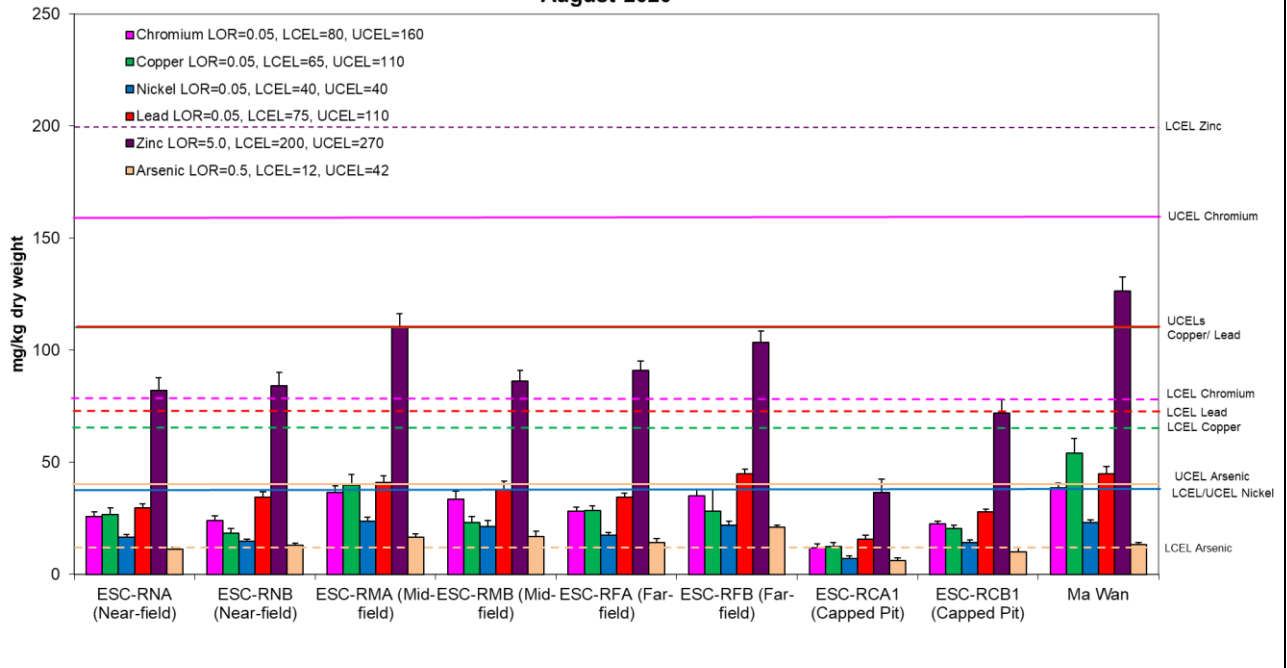


Figure 27: Concentration of Metals (Cr, Cu, Ni, Pb, Zn, As; mean +SD) in sediment samples collected from Sediment Chemistry after a Major Storm for ESC CMPs in August 2020.

**Sediment Chemistry after a Major Storm for Metal Contaminants at ESC CMPs
August 2020**

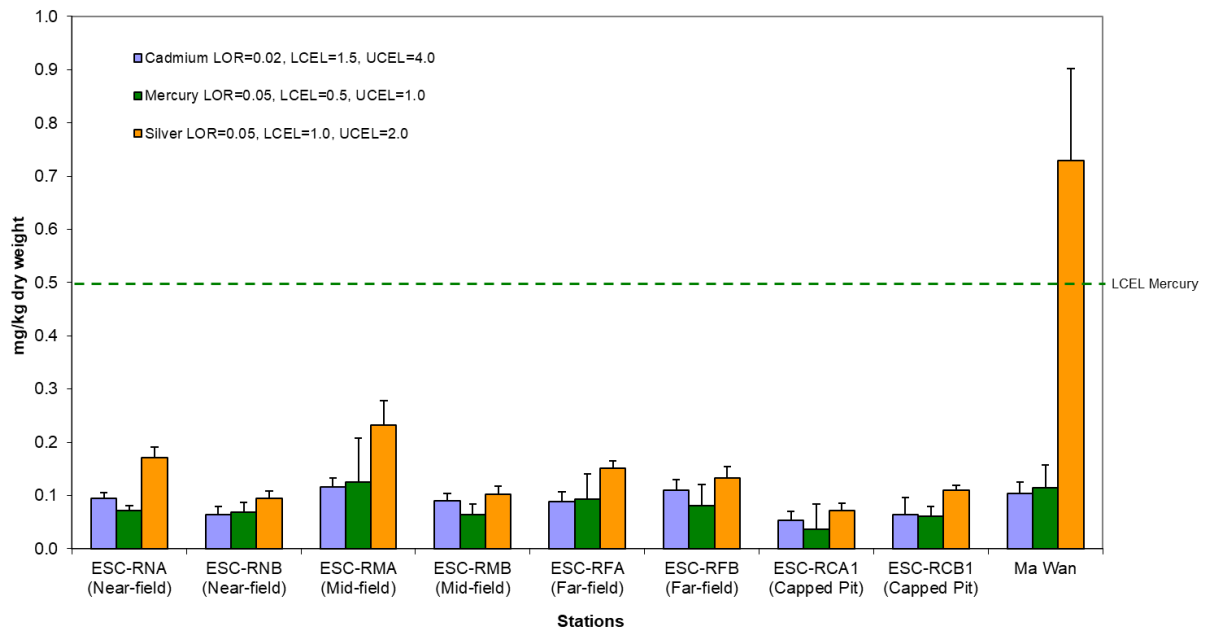


Figure 28: Concentration of Metals (Cd, Hg, Ag; mean +SD) in sediment samples collected from Sediment Chemistry after a Major Storm for ESC CMPs in August 2020.

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
Commencement of Agreement No. CE 63/2016 (EP)	Sat 1/4/17	Sat 1/4/17	◆	1/4																															
Project Management and General Deliverables	Mon 3/4/17	Mon 5/4/21																																	
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)	Sat 1/4/17	Fri 1/10/21																																	
Draft Report on Review of EM&A Manual	Tue 2/5/17	Tue 2/5/17	◆	2/5																															
Final Report on Review of EM&A Manual	Tue 23/5/17	Tue 23/5/17	◆	23/5																															
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																														◆	23/7		
Submission of Final Report (including database of all data collected)	Fri 27/8/21	Fri 27/8/21																															◆	27/8	
Submission of Draft Executive Summary	Fri 27/8/21	Fri 27/8/21																															◆	27/8	
Submission of Final Executive Summary	Fri 1/10/21	Fri 1/10/21																															◆	1/10	
For East Tung Lung Chau Disposal Facility (subject to the actual disposal programme to be confirmed by CEDD)	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																																◆	14/12
Submission of Annual EM&A Report	Fri 14/12/18	Fri 14/12/18																																◆	14/12

Study Programme
Tue 13/6/17

Task Milestone Summary Rolled Up Milestone