

**Agreement No. CE 59/2020 (EP)
Environmental Monitoring and
Audit for Disposal Facility to the
East of Sha Chau (2021-2026)
– Investigation**

Monthly EM&A Report for
Contaminated Mud Pits to the East of Sha Chau
– March 2024

April 2024

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Contaminated Mud Pits to the East of Sha Chau
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Dredging, Management and Capping of Contaminated Sediment Disposal

Facility at Sha Chau

Environmental Certification Sheet

Environmental Permit No. 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 – March 2024
Date of Report:	8 April 2024
Date prepared by ET:	8 April 2024
Date received by IA:	8 April 2024

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 10 working days 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 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.

Ir Thomas Chan,
Environmental Team Leader (ETL): 

Date: 8 April 2024

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 (IA): 

Date: 8 April 2024

Issue and Revision Record

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- Appendix C Graphical Presentations
- Appendix D Study Programme

1 Introduction

1.1 Background

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 East of Sha Chau (ESC) for the disposal of contaminated sediment, and various 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.

Environmental Permits (EPs) (Ref. No. EP-312/2008/A) was issued by the Environmental Protection Department (EPD) to the CEDD, the Permit Holder, on 28 November 2008 for the Project - Disposal of Contaminated Sediment – Dredging, Management and Capping of Sediment Disposal Facility at Sha Chau.

Under the requirements of the EP, 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. 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.

A proposal on the change of number of sample replication of water quality and sediment monitoring as well as 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. In early 2022, after implementing the Phase 1 optimisation for at least one year, a further data review was conducted. The monitoring data has been reviewed and demonstrated that the data robustness and representativeness are maintained. Therefore, a technical note presenting the data review results served as a supplementary information was submitted to EPD and presented that Phase 2 optimization of sample replication of water quality and sediment monitoring for the Project will be implemented in 2022. EPD expressed no comment on the review and note the implementation of Phase 2 optimization of sample replication on 18 May 2022, and thus this optimization has been effective for the EM&A activities since July 2022.

The latest sampling schedule is provided in **Appendix A**.

The present EM&A programme under Agreement No. CE 59/2020 (EP) covers the dredging, disposal and capping operations of the ESC CMP V (see **Appendix A** for the EM&A programme.) Detailed works schedule for ESC CMP V is shown in **Table 1.1**. In March 2024, 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.

Table 1.1: Works Schedule for ESC CMP V

Pit	Operation	2021					2022					2023					2024					2025					2026										
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
ESC CMP V	Dredging																																				
	Disposal																																				
	Capping																																				

1.2 Reporting Period

This *Monthly EM&A Report for Contaminated Mud Pits to the East of Sha Chau – March 2024* covers the EM&A activities for the reporting period of March 2024 (from 1 to 31 March 2024).

1.3 Details of Sampling and Laboratory Testing Activities

The following monitoring activities were undertaken for ESC CMP V during the reporting period:

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

1.4 Details of Outstanding Sampling or Analysis

No outstanding sampling remained for the reporting month (March 2024).

2 Brief Discussion of Monitoring Results for ESC CMP V

2.1 Introduction

This section presents a brief discussion of the results obtained from the following monitoring activities for ESC CMP V during the reporting period:

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

2.2 Water Column Profiling of ESC CMP Vb – in March 2024

Water Column Profiling was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 5 March 2024. 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 2013 – 2022 from stations in the North Western Water Control Zone (WCZ), where the ESC CMPs are located.³ 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 **Appendix B** for details).

2.2.1 In-situ Measurements

Analyses of results for March 2024 indicated that levels of Salinity, pH and DO complied with the WQOs at both Downstream and Upstream stations (**Table B2** of **Appendix B**). Levels of DO and Turbidity at all stations complied with the Action and Limit Levels (**Tables B1 and B2** of **Appendix B**).

2.2.2 Laboratory Measurements for Suspended Solids (SS)

Analyses of results for March 2024 indicated that the SS level at both Upstream and Downstream stations complied with the WQO and the Action and Limit Levels (**Tables B1 and B2** of **Appendix B**).

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.

2.3 Routine Water Quality Monitoring of ESC CMPs – in March 2024

Routine Water Quality Monitoring of ESC CMPs was undertaken on 8 March 2024. The monitoring results have been assessed for compliance with the WQOs (see **Section 2.2** above for details). The monitoring results are shown in **Tables B3, B4 and B5** of **Appendix B** and **Figures 1 to 11** of **Appendix C**. A total of sixteen (16) monitoring stations were sampled in March 2024 as shown in **Figure 2.1**.

³ <http://epic.epd.gov.hk/EPICRIVER/marine/?lang=en>

2.3.1 In-situ Measurements

Graphical presentation of the monitoring results (Temperature, DO, pH, Salinity and Turbidity) is shown in **Figures 1 to 6 of Appendix C**. Analyses of results indicated that the levels of pH, Salinities and DO complied with the WQOs at all stations in March 2024. The levels of DO and Turbidity complied with the Action and Limit Levels at all stations (**Table B3 of Appendix B; Figures 3 and 6 of Appendix C**).

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 March 2024.

2.3.2 Laboratory Measurements

Laboratory analysis of samples obtained during the reporting period indicated that the concentrations of Arsenic, Cadmium, Chromium, Mercury, Copper, Nickel and Zinc were detected in the samples at some/ all stations and their concentrations were generally similar across stations; except the concentrations of Lead were only detected at Ma Wan station. (**Table B4 of Appendix B; Figure 7 and 8 of Appendix C**).

For nutrients, concentrations of Total Inorganic Nitrogen (TIN) were lower than the WQO (0.5 mg/L) at all stations (**Table B5 of Appendix B; Figure 9 of Appendix C**). The concentration of Ammonia Nitrogen (NH₃-N) and Biochemical Oxygen Demand (BOD₅) were generally similar across all stations; except the concentrations of Ammonia Nitrogen were higher at Ma Wan station while the concentrations of BOD₅ were slightly elevated at Impact and Intermediate stations. (**Table B5 of Appendix B; Figure 10 of Appendix C**).

Analyses of results for the reporting period indicated that the SS levels complied with the dry season WQO (13.2 mg/L) and Action and Limit Levels at all stations. (**Tables B1 and B5 of Appendix B; Figure 11 of Appendix C**).

Based on the available results of the Routine Water Quality Monitoring which indicated that the disposal and capping operation at ESC CMPs did not appear to cause any unacceptable deterioration in water quality during the reporting period. Detailed statistical analysis will be presented in the Quarterly EM&A Report to investigate any spatial and temporal trends of potential concern.

2.4 Pit Specific Sediment Chemistry of ESC CMP Vb – in March 2024

Monitoring locations for Pit Specific Sediment Chemistry for ESC CMP Vb are shown in **Figure 2.2**. A total of six (6) monitoring stations were sampled on 4 March 2024.

The concentrations of most inorganic contaminants were lower than the Lower Chemical Exceedance Levels (LCELs) and Upper Chemical Exceedance Levels (UCELs) at all stations, except for Silver and Copper at Active-Pit stations. (**Figures 12 and 13 of Appendix C**). The concentrations of Silver were higher than the LCEL at Active-Pit station ESC-NPCB. The concentrations of Copper were higher than the LCEL at Active-Pit stations ESC-NPCB and higher than UCEL at Active-Pit station ESC-NPCA. (**Figures 12 and 13 of Appendix C**).

Considering that the higher levels of Silver and Copper occurred within Active-Pit stations only but not at the Pit-Edge and Near-Pit stations, there is no evidence indicating any unacceptable environment impacts to sediment quality as a result of the contaminated mud disposal operation at ESC CMP Vb in March 2024.

For organic contaminants, the concentrations of Total Organic Carbon (TOC) were higher at Active-Pit stations ESC-NPCA and ESC-NPCB. (**Figure 14 of Appendix C**). The concentrations of Low Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) were higher than LCEL at

Pit-Edge station ESC-NECA, and were higher than UCEL at Active-Pit station ESC-NPCB. **(Figures 15a and Figures 15b of Appendix C).**

For High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs), the concentrations were higher than LCEL at Pit-Edge station ESC-NECA, and were higher than UCEL at Active-Pit station ESC-NPCB. **(Figures 15a and 15b of Appendix C).**

The concentrations of Tributyltin (TBT) were higher at Active-Pit stations ESC-NPCA and ESC-NPCB. **(Figure 16 of Appendix 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 during the reporting period.

Noting that higher levels (i.e. concentrations higher than UCEL) of Low Molecular Weight and High Molecular Weight PAHs are only occurred within Active-Pit station ESC-NPCB. While only concentrations of Low Molecular Weight PAH and High Molecular Weight PAH at Pit-Edge station ESC-NECA were higher than LCELs but the concentrations of most inorganic contaminants were lower than the LCELs at Pit-Edge station.

The slightly elevated levels of Low Molecular Weight PAH and High Molecular Weight PAH at Pit-Edge station ESC-NECA are possible induced by external factors rather than disposal operations. Therefore, 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 during the reporting period.

Statistical analysis will be undertaken and presented in the corresponding Quarterly EM&A Report to investigate whether there are any unacceptable impacts in the area caused by the contaminated mud disposal.

3 Future Key Issues

3.1 Activities Scheduled for the Next Reporting Period

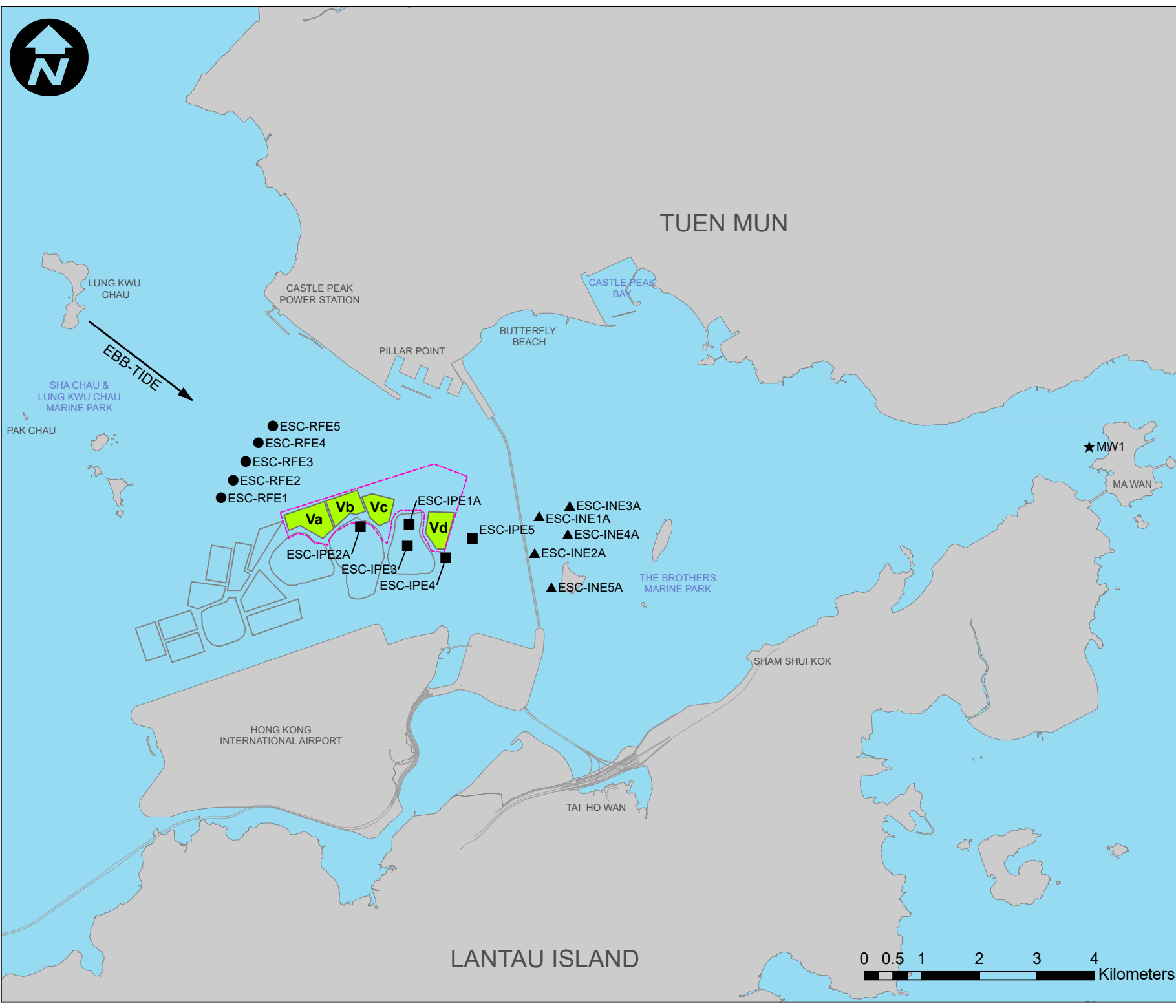
The following monitoring activities will be conducted in the next reporting period of April 2024 for ESC CMP V (see **Appendix A** for the sampling schedule):

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

3.2 Study Programme

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

Figures



Notes:

Key to symbols:

LEGEND

ESC CMP V

ESC USABLE AREA 1

WATER QUALITY SAMPLING STATIONS

IMPACT STATION

INTERMEDIATE STATION

REFERENCE STATION

MA WAN STATION

P1	APR 2021	KN			
Rev	Date	Drawn	Description	Ch'k'd	App'd

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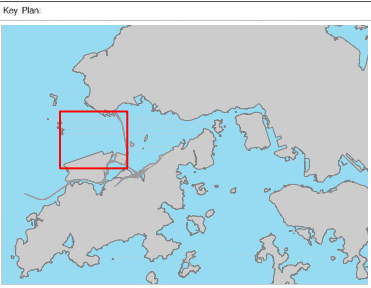
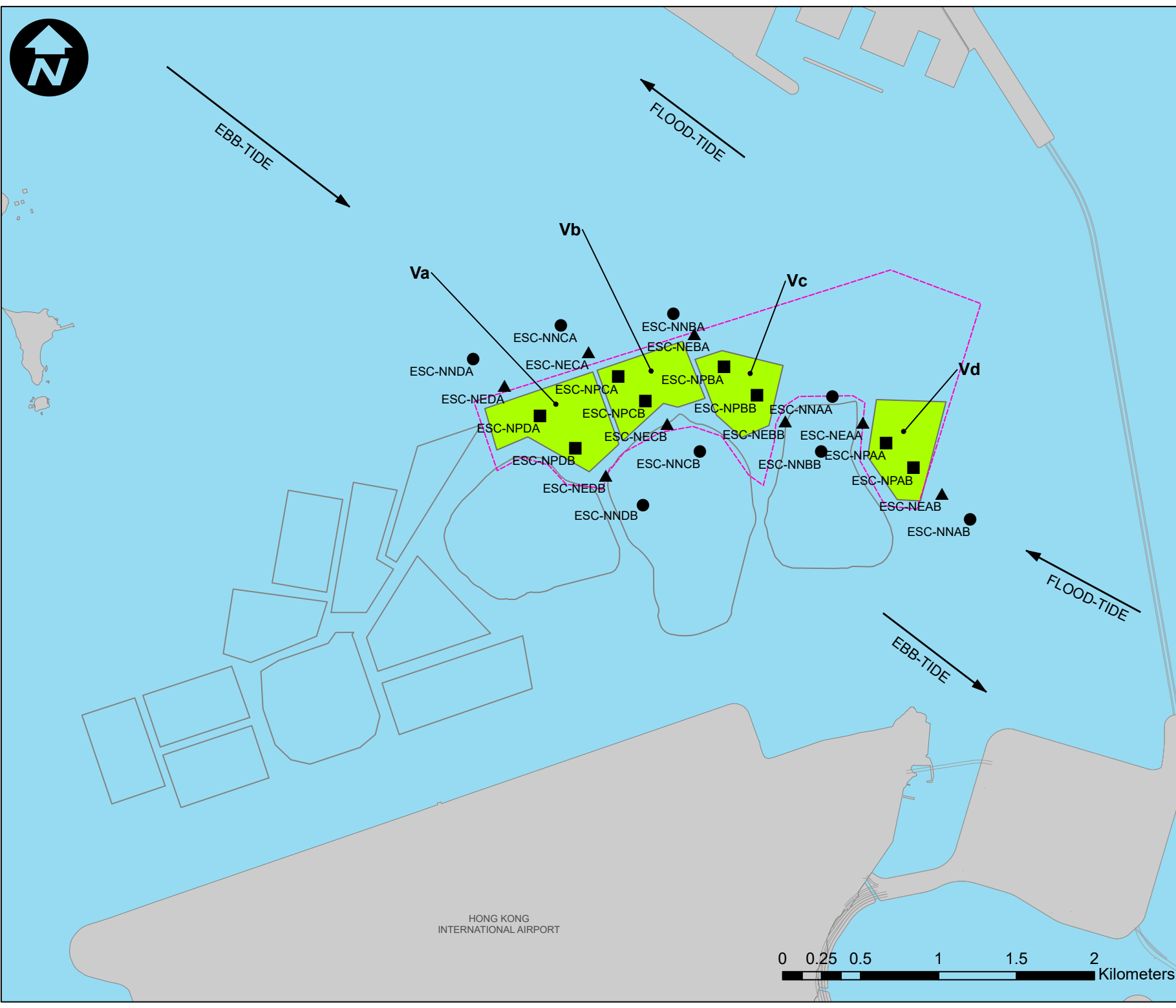
CEDD 土木工程拓展署
Civil Engineering and Development Department

Project **AGREEMENT NO. CE 59/2020 (EP)
ENVIRONMENTAL MONITORING AND AUDIT
FOR DISPOSAL FACILITY
TO THE EAST OF SHA CHAU (2021-2026)
– INVESTIGATION**

Title **ROUTINE & CAPPING WATER QUALITY
SAMPLING STATIONS (EBB-TIDE)
FOR ESC CMPS**

Designed		Eng check	
Drawn		Coordination	
Dwg check		Approved	
Scale at A3	Status	Rev	

Drawing Number **FIGURE 2.1**



Notes:

Key to symbols:

LEGEND

- ESC CMP V
- ESC USABLE AREA 1

PIT SPECIFIC SEDIMENT MONITORING STATIONS

- ACTIVE-PIT STATION
- PIT-EDGE STATION
- NEAR-PIT STATION

P1	APR 2021	KN			
Rev	Date	Drawn	Description	Ch'k'd	App'd

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**AGREEMENT NO. CE 59/2020 (EP)
ENVIRONMENTAL MONITORING AND AUDIT
FOR DISPOSAL FACILITY
TO THE EAST OF SHA CHAU (2021-2026)
- INVESTIGATION**

Title

**PIT SPECIFIC SEDIMENT QUALITY
MONITORING STATIONS FOR CMP V**

Designed		Eng check	
Drawn		Coordination	
Dwg check		Approved	
Scale at A3	Status	Rev	

Appendices

Appendix A	Sampling Schedule
Appendix B	Water Quality Monitoring Results
Appendix C	Graphical Presentations
Appendix D	Study Programme

Appendix A. Sampling Schedule

East of Sha Chau CMPs
Environmental Monitoring and Audit Sampling Schedule
(January 2021 - March 2026)

Parameter / Station Type	Station ID	Frequency	2021	2022	2023	2024	2025	2026																						
Pit Specific Sediment Chemistry *			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Active-Pit	ESC-NPAA	Monthly	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	2	2	2	2	2	2	2	2	2	2
	ESC-NPAB	Monthly	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	2	2	2	2	2	2	2	2	2	2
Pit-Edge	ESC-NEAA	Monthly	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	2	2	2	2	2	2	2	2	2	2
	ESC-NEAB	Monthly	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	2	2	2	2	2	2	2	2	2	2
Near-Pit	ESC-NNAA	Monthly	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	2	2	2	2	2	2	2	2	2	2
	ESC-NNAB	Monthly	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	2	2	2	2	2	2	2	2	2	2
Cumulative Impact Sediment Chemistry *			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Near-field Stations	ESC-RNA	4 times per year		6			6	6				6		6		6			6	2				2		2		2		2
	ESC-RNB1	4 times per year		6			6	6				6		6		6			6	2				2		2		2		2
Mid-field Stations	ESC-RMA	4 times per year		6			6	6				6		6		6			6	2				2		2		2		2
	ESC-RMB	4 times per year		6			6	6				6		6		6			6	2				2		2		2		2
Capped Pit Stations	ESC-RCA1	4 times per year		6			6	6				6		6		6			6	2				2		2		2		2
	ESC-RCB1	4 times per year		6			6	6				6		6		6			6	2				2		2		2		2
Far-field Stations	ESC-RFA	4 times per year		6			6	6				6		6		6			6	2				2		2		2		2
	ESC-RFB	4 times per year		6			6	6				6		6		6			6	2				2		2		2		2
Ma Wan Station	MW1	4 times per year		6			6	6				6		6		6			6	2				2		2		2		2
Sediment Toxicity Tests			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Near-pit Stations	ESC-TDA	2 times per year		5					5							5 ^a				5							5			
	ESC-TDB1	2 times per year		5					5							5 ^a				5							5			
Reference Stations	ESC-TRA	2 times per year		5					5							5 ^a				5							5			
	ESC-TRB	2 times per year		5					5							5 ^a				5							5			
Ma Wan Station	MW1	2 times per year		5					5							5 ^a				5							5			
Tissue / Whole Body Sampling			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Near-pit Stations	ESC-INA	2 times per year		+					+							+				+							+			
	ESC-INB	2 times per year		+					+							+				+							+			
Reference North	TNA	2 times per year		+					+							+				+							+			
	TNB	2 times per year		+					+							+				+							+			
Reference South	TSA	2 times per year		+					+							+				+							+			
	TSB	2 times per year		+					+							+				+							+			
Demersal Trawling			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Near-pit Stations	ESC-INA	4 times per year		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		
Reference North	TNA	4 times per year		5	5			5	5							5	5			5	5						5	5		
	TNB	4 times per year		5	5			5	5							5	5			5	5						5	5		
Reference South	TSA	4 times per year		5	5			5	5							5	5			5	5						5	5		
	TSB	4 times per year		5	5			5	5							5	5			5	5						5	5		
Capping *			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Ebb Tide																														
Impact Station Downcurrent	ESC-IP1A	4 times per year *																												
	ESC-IP2A	4 times per year *																												
	ESC-IP3	4 times per year *																												
	ESC-IP4	4 times per year *																												
	ESC-IP5	4 times per year *																												
Intermediate Station Downcurrent	ESC-INE1A	4 times per year *																												
	ESC-INE2A	4 times per year *																												
	ESC-INE3A	4 times per year *																												
	ESC-INE4A	4 times per year *																												
	ESC-INE5A	4 times per year *																												
Reference Station Upcurrent	ESC-RFE1	4 times per year *																												
	ESC-RFE2	4 times per year *																												
	ESC-RFE3	4 times per year *																												
	ESC-RFE4	4 times per year *																												
	ESC-RFE5	4 times per year *																												
Ma Wan Station	MW1	4 times per year *																												
Flood Tide																														
Impact Station Downcurrent	ESC-IPF1	4 times per year *																												
	ESC-IPF2	4 times per year *																												
	ESC-IPF3	4 times per year *																												
Intermediate Station Downcurrent	ESC-INF1	4 times per year *																												
	ESC-INF2	4 times per year *																												
	ESC-INF3	4 times per year *																												
Reference Station Upcurrent	ESC-RFF1A	4 times per year *																												
	ESC-RFF2A	4 times per year *																												
	ESC-RFF3	4 times per year *																												
Ma Wan Station	MW1	4 times per year *																												
Routine Water Quality Monitoring *			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Ebb Tide																														
Impact Station Downcurrent	ESC-IP1A	Monthly*			4	4	4		4		4	4				4	4	4	4	2	2			2	2		2	2	2	2
	ESC-IP2A	Monthly*			4	4	4		4	4	4	4				4	4	4	4	2	2			2	2		2	2	2	
	ESC-IP3	Monthly*			4	4	4		4	4	4	4				4	4	4	4	2	2			2	2		2	2	2	
	ESC-IP4	Monthly*			4	4	4		4	4	4	4				4	4	4	4	2	2			2	2		2	2	2	
	ESC-IP5	Monthly*			4	4	4		4	4	4	4				4	4	4	4	2	2			2	2		2	2	2	
Intermediate Station Downcurrent	ESC-INE1A	Monthly*			4	4	4		4		4	4				4	4	4	4	2	2			2	2		2	2	2	
	ESC-INE2A	Monthly*			4	4	4		4	4	4	4				4	4	4	4	2	2			2	2		2	2	2	
	ESC-INE3A	Monthly*			4	4	4		4	4	4	4				4	4	4	4	2	2			2	2		2	2	2	
	ESC-INE4A	Monthly*			4	4	4		4	4	4	4				4	4	4	4	2	2			2	2		2	2	2	
	ESC-INE5A	Monthly*			4	4	4		4	4	4	4				4	4	4	4	2	2			2	2		2	2	2	
Reference Station Upcurrent																														

Appendix B. Water Quality Monitoring Results

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

Parameters	Action	Limit
Dissolved Oxygen (DO) in mg L ⁻¹ (Surface, Middle & Bottom) ⁽¹⁾	Surface and Middle Depth⁽²⁾ 5%-ile of baseline data for surface and middle layer = 3.76 and Significantly less than the reference station's mean DO (at the same tide of the same day)	Surface and Middle Depth⁽²⁾ 1%-ile of baseline data for surface and middle layer = 3.11 ⁽³⁾ and Significantly less than the reference station's mean DO (at the same tide of the same day)
	Bottom 5%-ile of baseline data for surface and middle layer = 2.96 and Significantly less than the reference station's mean DO (at the same tide of the same day)	Bottom The average of the impact station readings are < 2 and Significantly less than the reference station's mean DO (at the same tide of the same day)
Suspended Solids (SS) in mg L ⁻¹ (depth-averaged) ⁽⁵⁾	95%-ile of baseline data for depth-averaged = 37.88 and 120% of control station's SS at the same tide of the same day	99%-ile of baseline data for depth-averaged = 61.92 and 130% of control station's SS at the same tide of the same day
Turbidity in NTU (depth-averaged) ⁽⁴⁾⁽⁵⁾	95%-ile of baseline data = 28.14 and 120% of control station's Turbidity at the same tide of the same day	99%-ile of baseline data = 38.32 and 130% of control station's Turbidity 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. Action and Limit Levels for DO for Surface and 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 and 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 March 2024

Station	Temp. (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%)	(mg L ⁻¹)	pH	Suspended Solids (mg L ⁻¹)
WCP 1 (Downstream)	19.22	32.35	1.51	98.36	7.50	8.19	2.5
WCP 2 (Upstream)	19.46	32.64	1.45	98.98	7.50	8.16	1.0
WQO (Dry Season)	N/A	29.37-35.90 [#]	N/A	N/A	>4	6.5-8.5	13.2

Notes:

1. [#] Not exceeding 10% of natural ambient level which is the result obtained from the Reference Station.
2. Cell shaded yellow / red indicates value exceeding the Action/Limit levels.
3. Cell shaded grey indicates value exceeding the WQO.

Table B3: In-situ Monitoring Results for Routine Water Quality Monitoring of ESC CMPs in March 2024

Station	Temp. (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%)	(mg L ⁻¹)	pH
RFE (Reference)	19.81	32.25	2.11	96.14	7.25	8.19
IPE (Impact)	19.89	32.26	1.85	96.25	7.25	8.18
INE (Intermediate)	20.00	32.66	1.40	94.52	7.09	8.14
Ma Wan	20.13	33.42	0.94	92.06	6.86	8.10
WQO (Dry Season)	N/A	29.02-35.47 [#]	N/A	N/A	>4	6.5-8.5

Notes:

1. [#] Not exceeding 10% of natural ambient level which is the result obtained from the Reference Station.
2. Cell shaded yellow / red indicates value exceeding the Action/Limit levels.
3. Cell shaded grey indicates value exceeding the WQO.

Table B4: Laboratory Results for Dissolved Metals and Metalloid in Routine Water Quality Monitoring of ESC CMPs in March 2024

Station	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)
RFE	1.66	0.02	0.14	0.62	ND	0.001	0.61	ND	0.50
IPE	1.51	0.03	0.15	0.41	ND	0.001	0.58	ND	0.53
INE	1.51	0.02	0.15	0.38	ND	0.001	0.55	ND	0.54
Ma Wan	1.53	0.01	0.13	0.91	0.03	0.001	0.39	ND	0.96

Note:

1. "ND" indicates the concentrations of metals and metalloids are not detected.

Table B5: Laboratory Results for Nutrients and Suspended Solid in Routine Water Quality Monitoring of ESC CMPs in March 2024

Station	NH ₃ (mg/L)	TIN (mg/L)	BOD ₅ (mg/L)	SS (mg/L)
RFE	0.08	0.32	0.45	3.1
IPE	0.08	0.32	0.65	2.8
INE	0.10	0.31	0.63	2.2
Ma Wan	0.15	0.29	<LOR	3.0

WQO of TIN: 0.5 mg/L

Dry Season WQO of SS: 13.2 mg/L

Notes:

1. "<LOR" indicates the concentrations of contaminants are below the limit of reporting.
2. Cell shaded yellow / red indicates value exceeding the Action/Limit levels.
3. Cell shaded grey indicates value exceeding the WQO.

Appendix C. Graphical Presentations

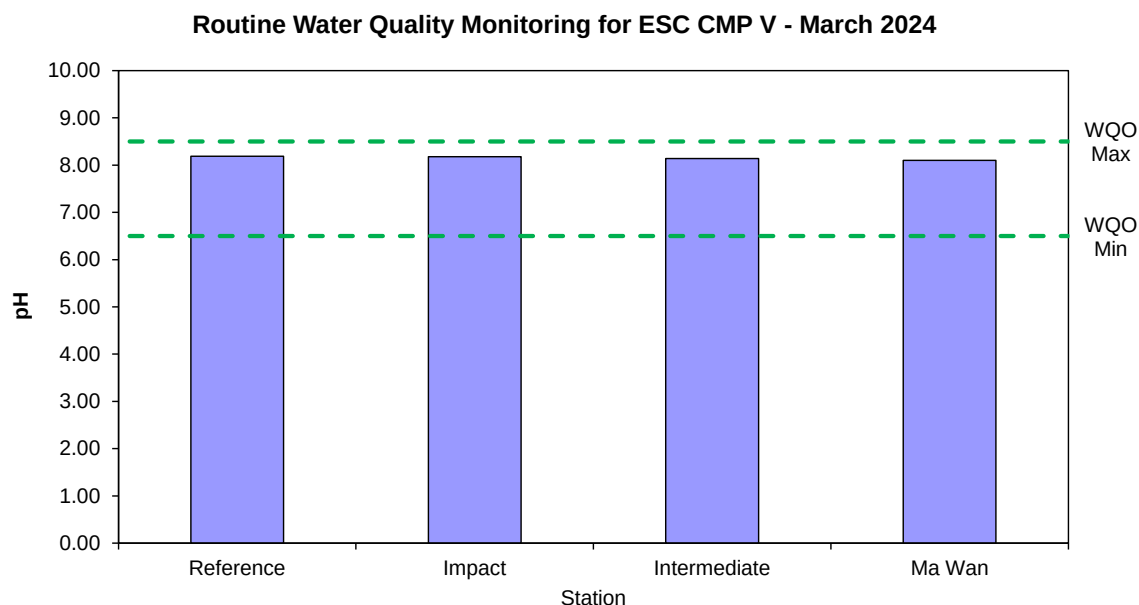


Figure 1: Level of pH recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in March 2024

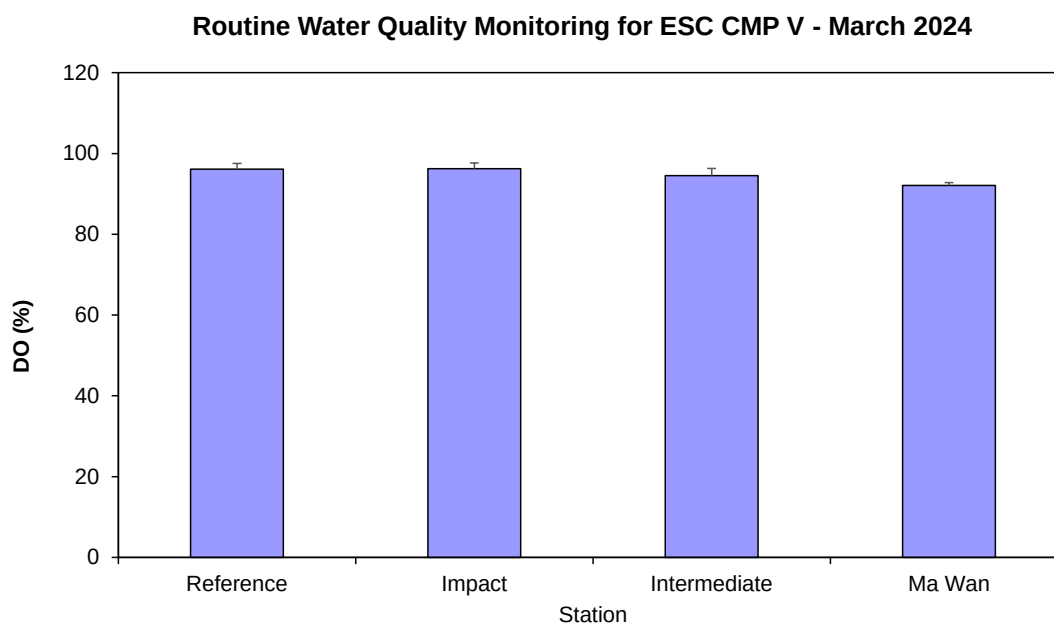


Figure 2: Level of Dissolved Oxygen (DO) (% saturation; mean + SD¹) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in March 2024

¹ The mean and standard deviation (SD) for in-situ data are the mean and SD for water columns within the area.

Routine Water Quality Monitoring for ESC CMP V - March 2024

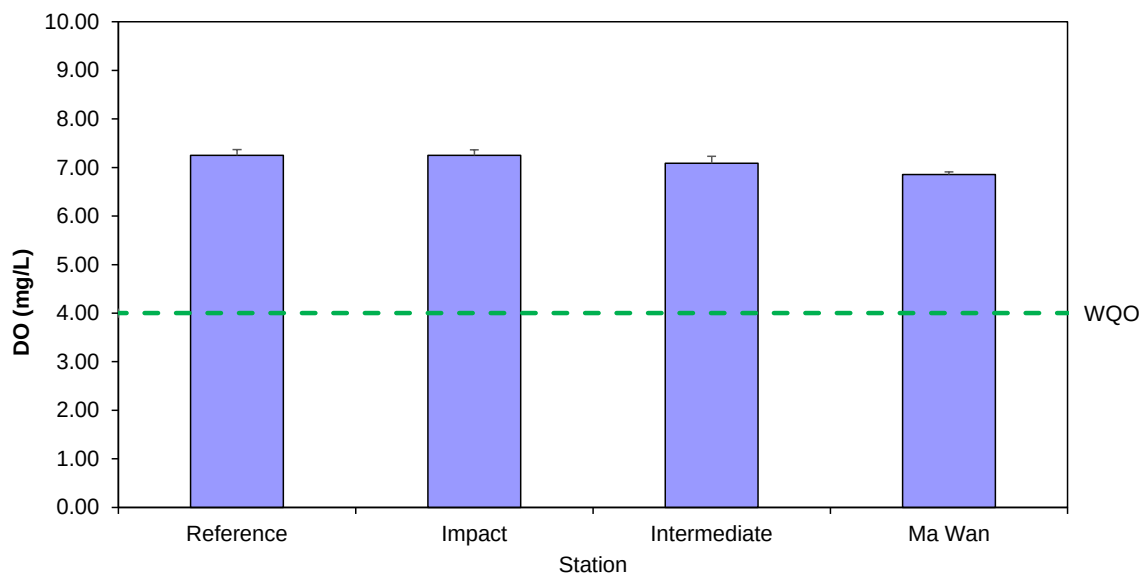


Figure 3: Concentration of Dissolved Oxygen (DO) (mg/L; mean + SD¹) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in March 2024

Routine Water Quality Monitoring for ESC CMP V - March 2024

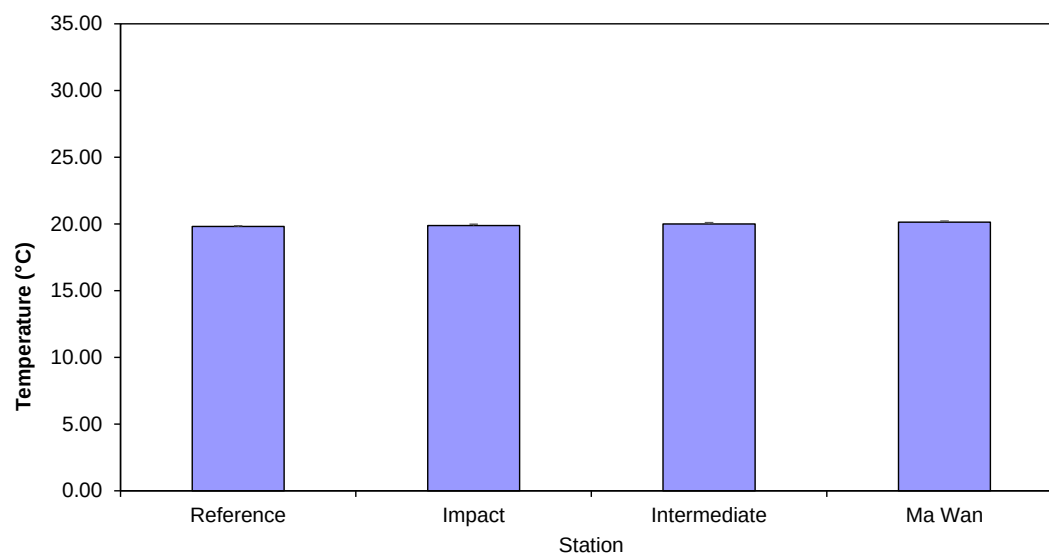


Figure 4: Level of Temperature (°C; mean + SD¹) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in March 2024

¹ The mean and standard deviation (SD) for in-situ data are the mean and SD for water columns within the area.

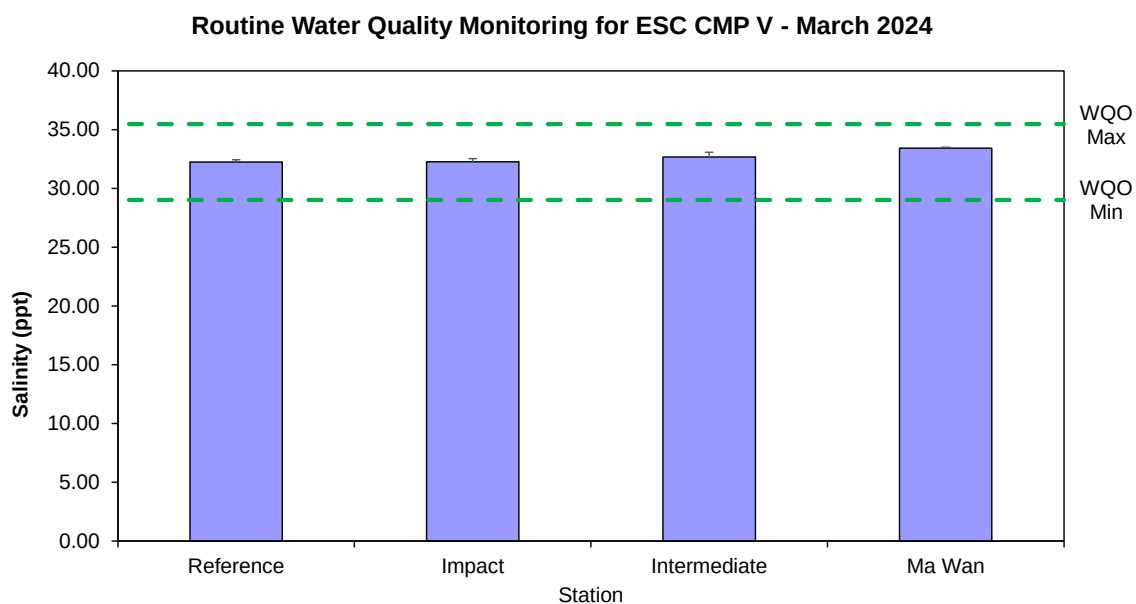


Figure 5: Level of Salinity (ppt; mean + SD)¹ recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in March 2024

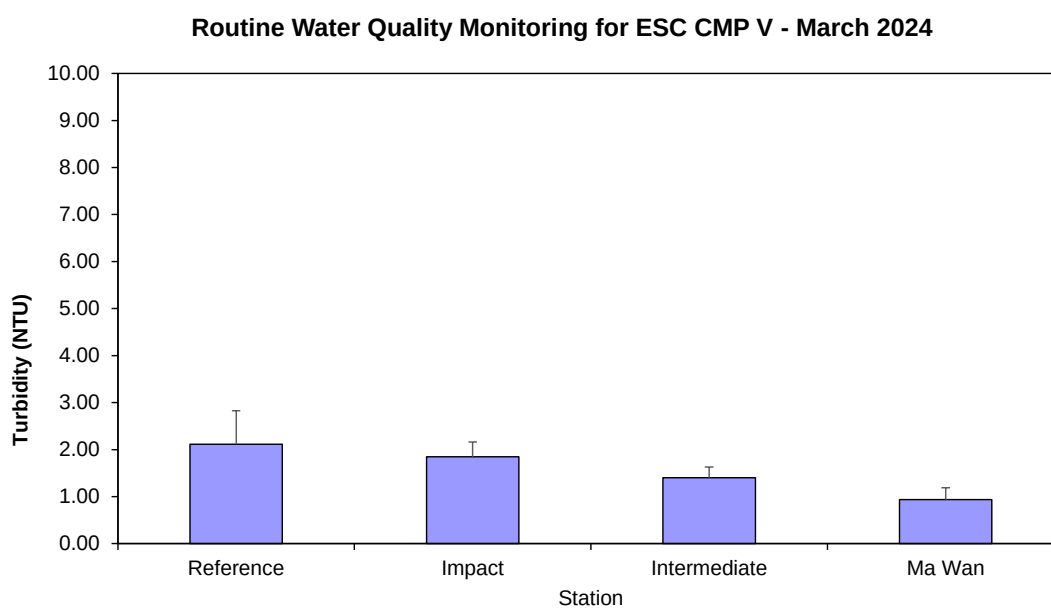


Figure 6: Level of Turbidity (NTU; mean + SD)¹ recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in March 2024

¹ The mean and standard deviation (SD) for in-situ data are the mean and SD for water columns within the area.

Routine Water Quality Monitoring for ESC CMP V March 2024

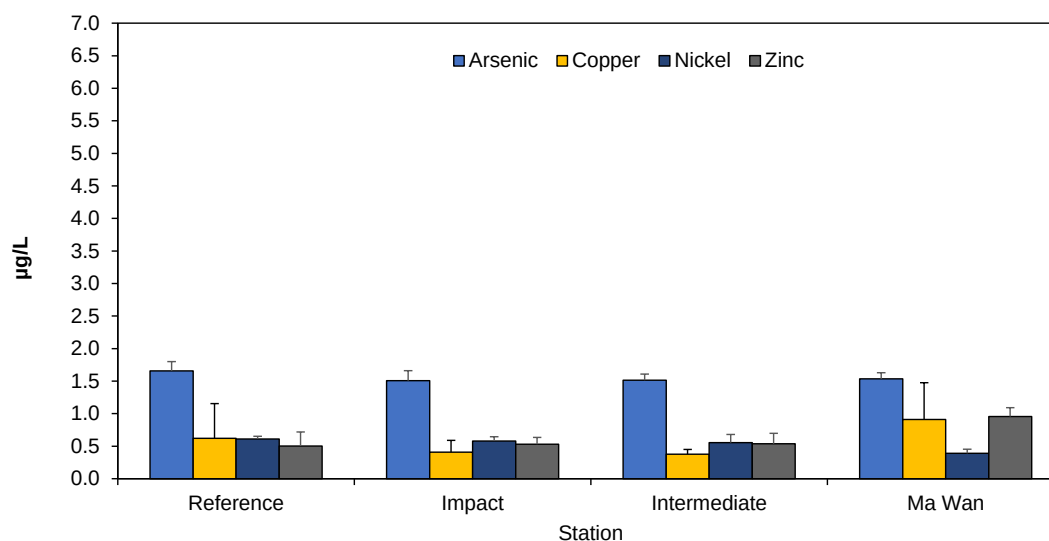


Figure 7: Concentration of Arsenic, Copper, Nickel, and Zinc (µg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in March 2024

Routine Water Quality Monitoring for ESC CMP V March 2024

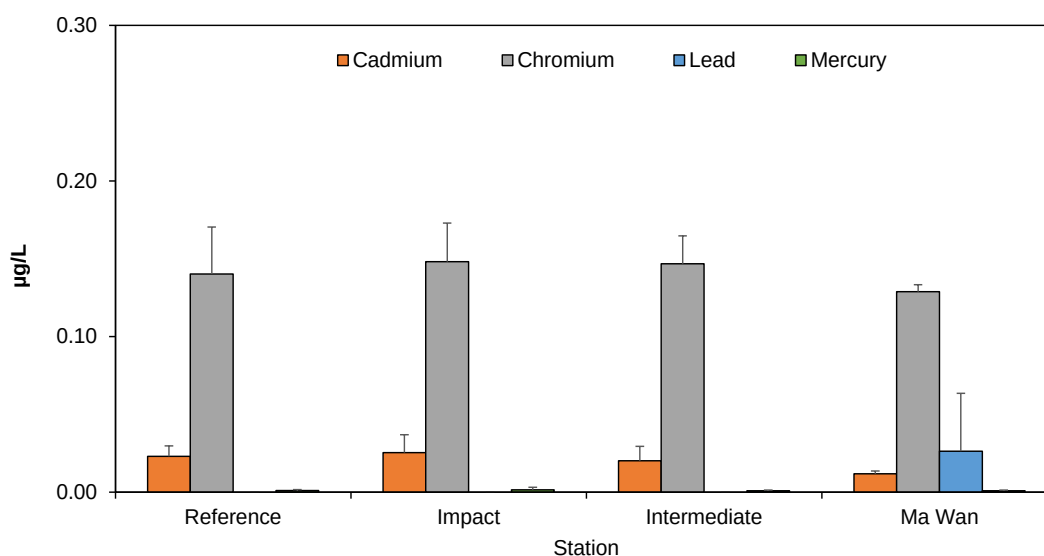


Figure 8: Concentration of Cadmium, Chromium, Lead and Mercury, (µg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in March 2024

Routine Water Quality Monitoring for Nutrients - March 2024

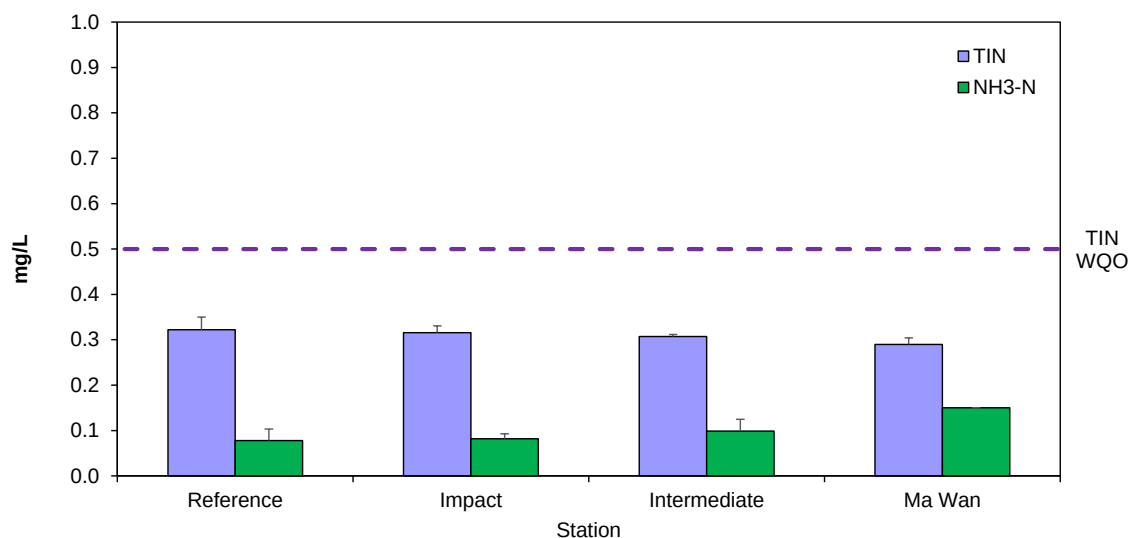


Figure 9: Concentration of Total Inorganic Nitrogen (TIN) and Ammonia Nitrogen (NH3-N) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in March 2024

Routine Water Quality Monitoring for Biochemical Oxygen Demand (BOD5) - March 2024

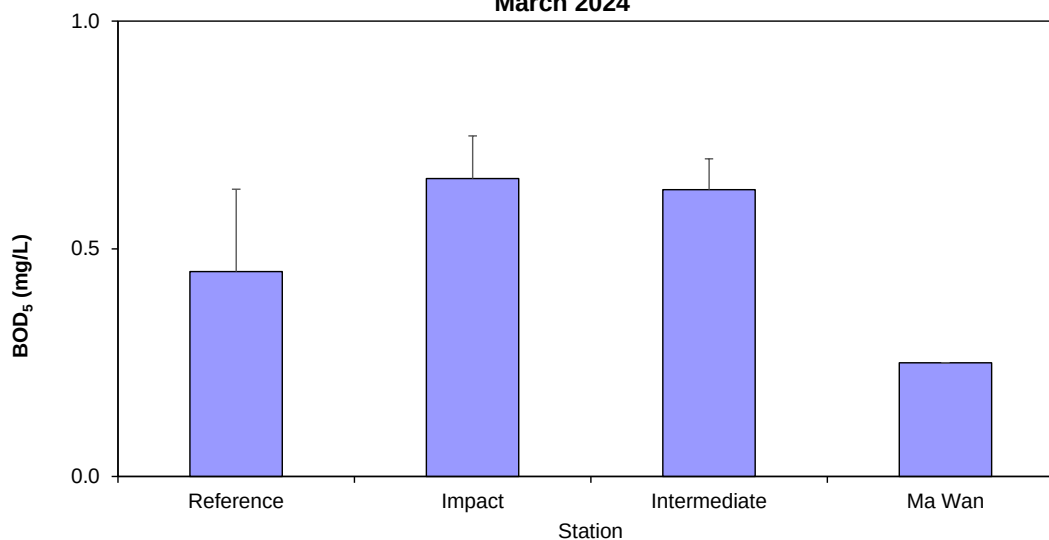


Figure 10: Level of Biochemical Oxygen Demand (BOD5) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in March 2024

Routine Water Quality Monitoring for Suspended Solids - March 2024

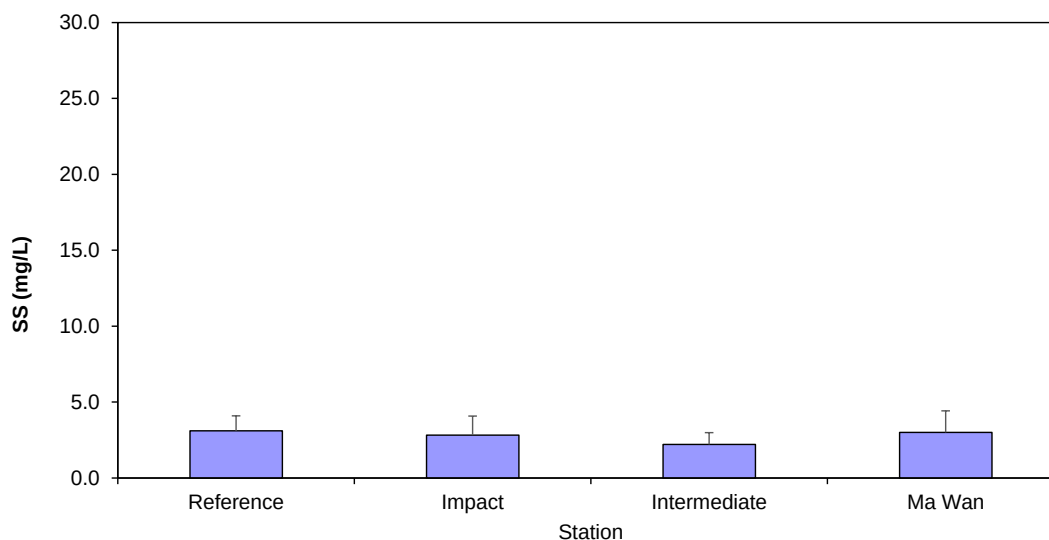


Figure 11 Concentration of Suspended Solids (SS) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in March 2024

Pit Specific Sediment Chemistry for Metal and Metalloid Contaminants at ESC CMP Vb - March 2024

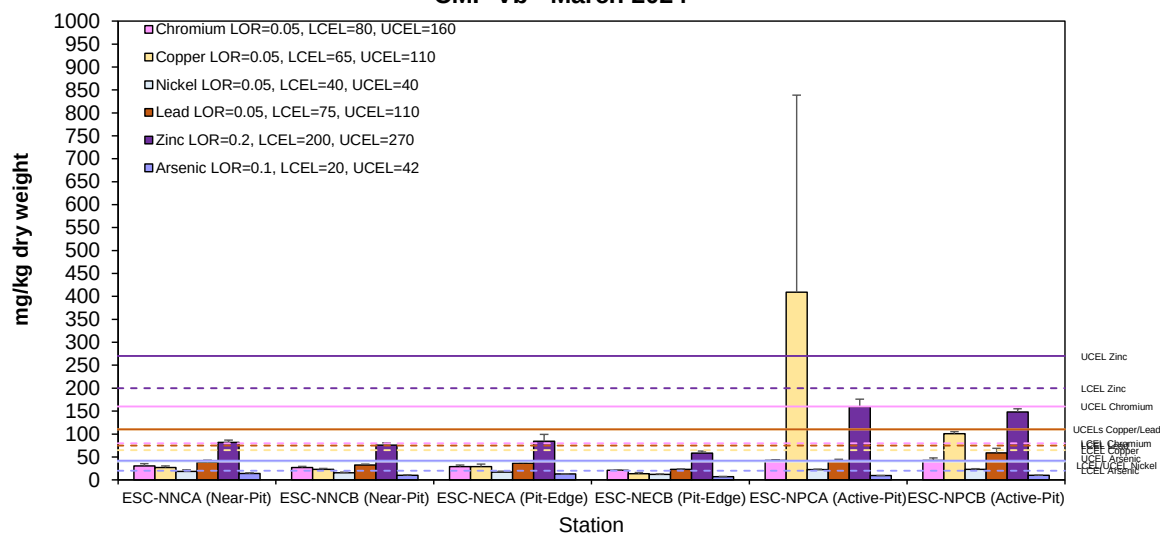


Figure 12: Concentration of Metals and Metalloid²(Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in March 2024

² The LCEL and UCEL of Cadmium, Mercury and Arsenic have been updated according to the standard promulgated starting from 19 January 2024. https://www.cedd.gov.hk/filemanager/eng/content_80/PAH 2022 Chapter 4 Rev 06_240321_Clean.pdf

Pit Specific Sediment Chemistry for Metal Contaminants at ESC CMP Vb - March 2024

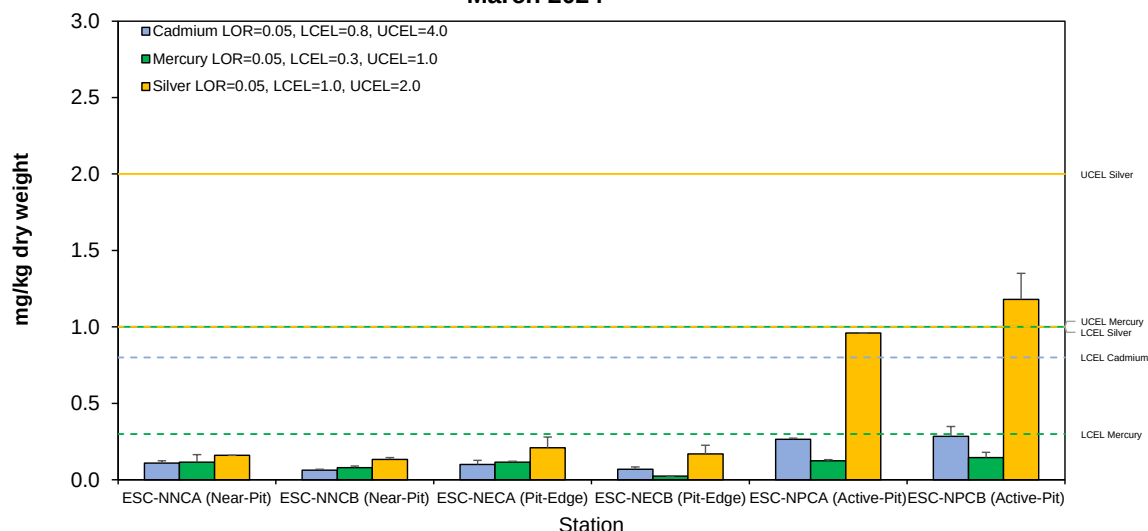


Figure 13: Concentration of Metals²(Cd, Hg, Ag; mg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in March 2024

Pit Specific Sediment Chemistry for Total Organic Carbon (TOC) at ESC CMP Vb - March 2024

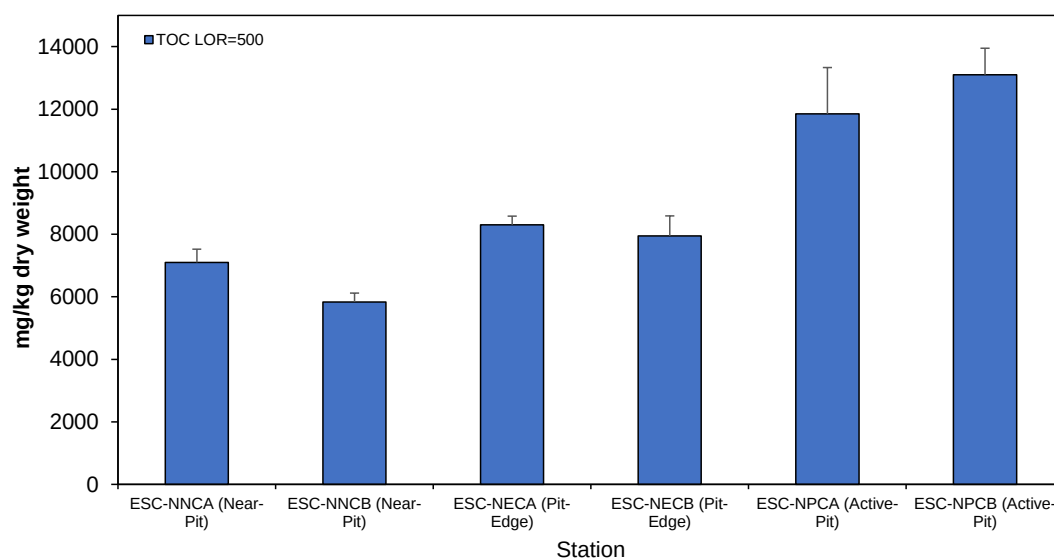


Figure 14: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in March 2024

² The LCEL and UCEL of Cadmium, Mercury and Arsenic have been updated according to the standard promulgated starting from 19 January 2024. https://www.cedd.gov.hk/filemanager/eng/content_80/PAH 2022 Chapter 4 Rev 06_240321_Clean.pdf

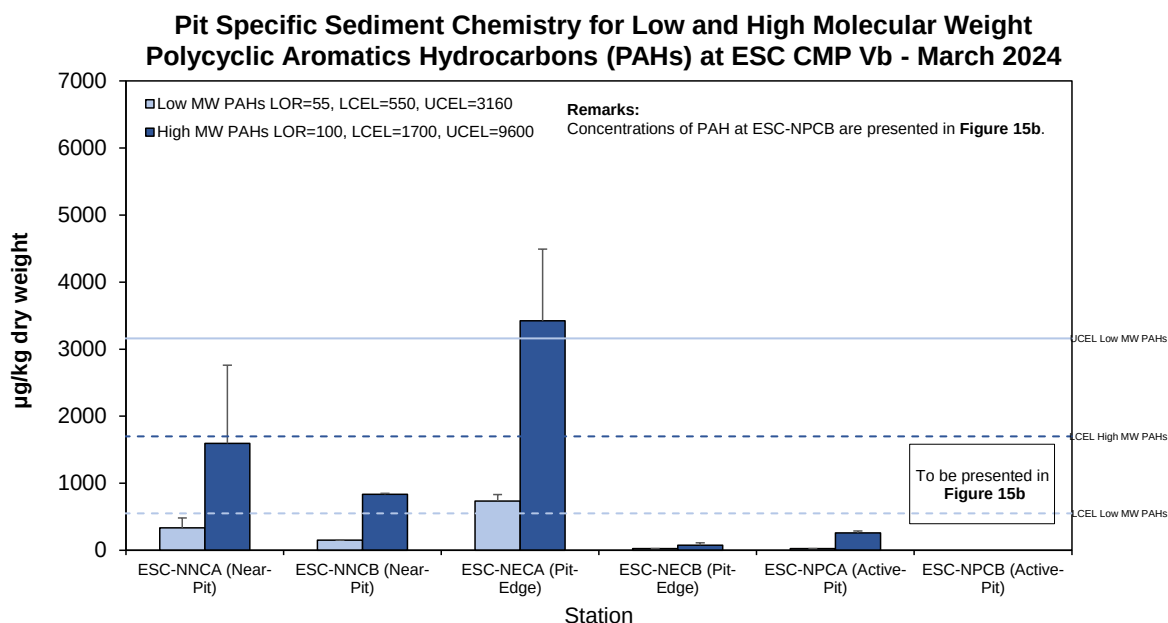


Figure 15a Concentration of Low and High Molecular Weight Polycyclic Aromatic Hydrocarbons (µg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in March 2024

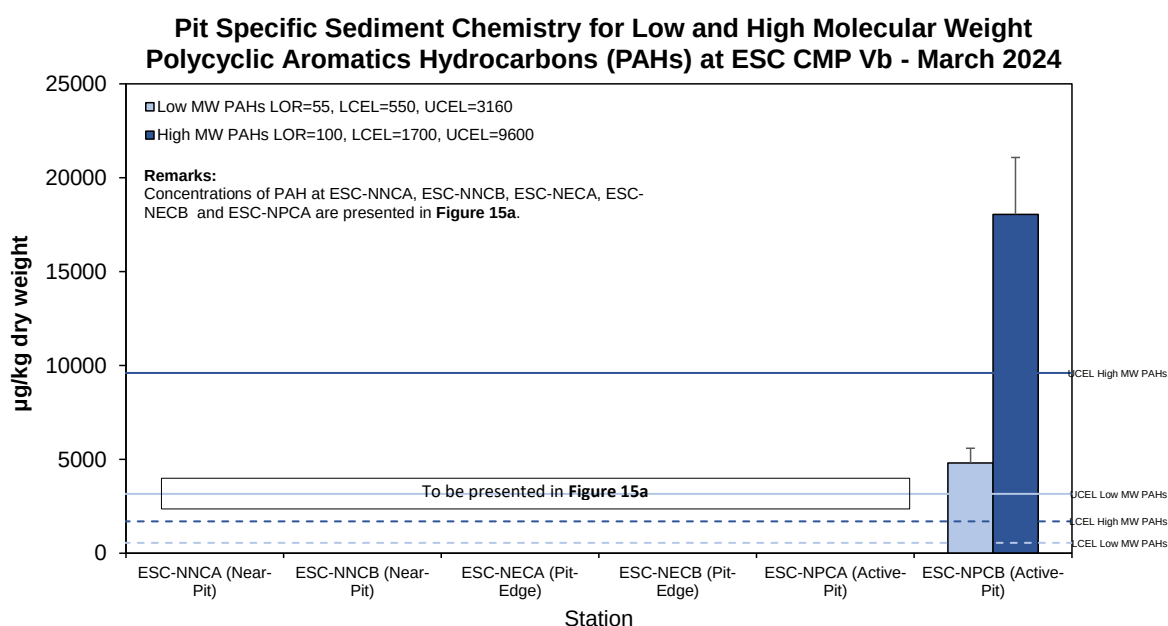


Figure 15b Concentration of Low and High Molecular Weight Polycyclic Aromatic Hydrocarbons (µg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in March 2024

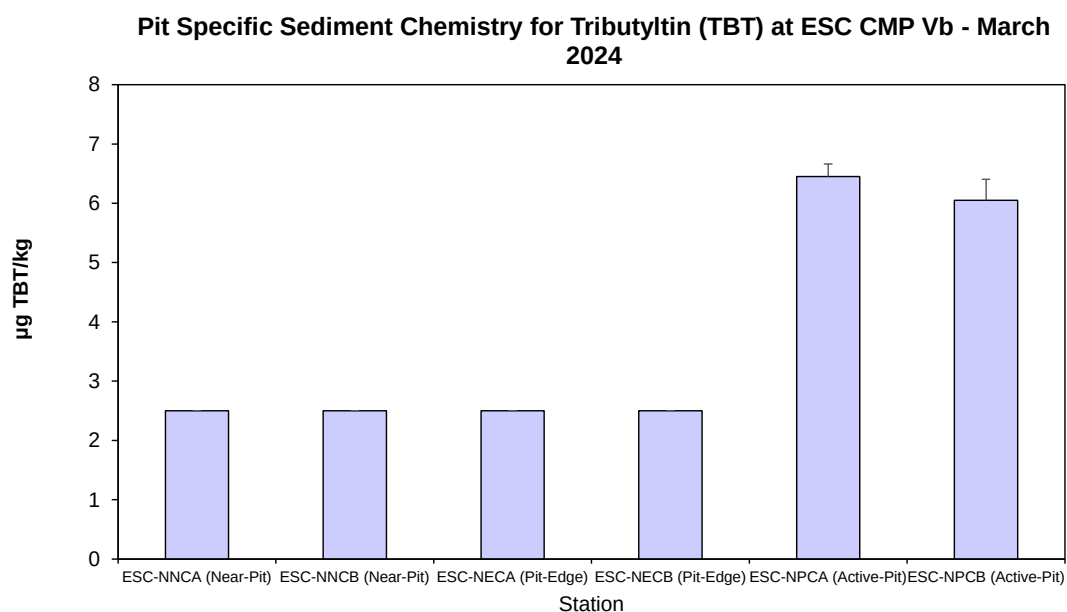


Figure 16: Concentration of Tributyltin (TBT) (µg TBT/kg; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in March 2024

Appendix D. Study Programme

Study Programme

Agreement No. CE 59/2020 (EP) Environmental Monitoring and Audit for Disposal Facility to the East of Sha Chau (2021-2026) - Investigation

Mott MacDonald Hong Kong Limited

ID	Task Name	Start	Finish	202120222023202420252026																																															
				1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3																									
1	COMMENCEMENT OF AGREEMENT NO. CE 59/2020 (EP)	01/04/21		◆																																															
2	EAST OF SHA CHAU CONTAMINATED MUD PITS (ESC CMPs) BETWEEN 2021 & 2026	01/04/21	25/06/26	◆																																															
3	Draft Report of First Review of EM&A Manual (for ESC CMPs)		30/04/21	◆																																															
4	Final Report of First Review of EM&A Manual (for ESC CMPs)		20/05/21	◆																																															
5	Draft Report of Subsequent Review of EM&A Manual (for ESC CMPs) - annual basis assumed	30/04/22	30/04/25	◆																																															
10	Final Report of Subsequent Review of EM&A Manual (for ESC CMPs) - annual basis assumed	20/05/22	20/05/25	◆																																															
15	Regular Site Inspections of CMP Contractors	01/04/21	31/03/26	◆																																															
16	Monthly EM&A Report	14/05/21	14/04/26	◆																																															
77	Quarterly EM&A Report	30/07/21	30/04/26	◆																																															
98	Annual EM&A Report	30/01/22	30/01/26	◆																																															
104	Annual Risk Assessment Report	31/05/22	31/05/26	◆																																															
110	Draft Final Report		30/04/26	◆																																															
111	Final Report		04/06/26	◆																																															
112	Draft Executive Summary		04/06/26	◆																																															
113	Final Executive Summary		25/06/26	◆																																															
114	EAST OF TUNG LUNG CHAU (ETLC) DISPOSAL FACILITY (MONITORING PERIOD: SEPTEMBER 2021 & MARCH-APRIL 2022)	23/11/21	31/08/22	◆																																															
115	Monthly EM&A Report	23/11/21	06/06/22	◆																																															
119	Quarterly EM&A Report	15/07/22	15/07/22	◆																																															
121	Annual EM&A Report	31/08/22	31/08/22	◆																																															

Programme Revision: C
Date: 11/05/22

Start/End of ET Services

Location

Repeating Task

Start of Agreement

Submission

Multiple-Occasion Submission

