

**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
– June 2024

July 2024

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Monthly EM&A Report for
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– June 2024

July 2024

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 – June 2024
Date of Report:	10 July 2024
Date prepared by ET:	10 July 2024
Date received by IA:	10 July 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: 10 July 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: 10 July 2024

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	Jul 2024	Various	Liz Lo	Thomas Chan	Revision A of Submission

Document reference: 423134 | 06/05/39 | A

Information class: Standard

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Appendices

- Appendix A Sampling Schedule
- Appendix B Water Quality Monitoring Results
- Appendix C Graphical Presentations
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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 June 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 – June 2024* covers the EM&A activities for the reporting period of June 2024 (from 1 to 30 June 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;
- Pit Specific Sediment Chemistry of ESC CMP Vb; and
- Cumulative Impact Sediment Chemistry of ESC CMPs.

1.4 Details of Outstanding Sampling or Analysis

No outstanding sampling remained for the reporting month (June 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;
- Pit Specific Sediment Chemistry of ESC CMP Vb; and
- Cumulative Impact Sediment Chemistry of ESC CMPs.

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

Water Column Profiling was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 7 June 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 wet season period (April to October) 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 June 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 June 2024 indicated that the SS level at Downstream station was higher than the WQO while the SS level at Upstream station complied with the WQO. Both SS levels at Upstream and Downstream stations complied with the Action and Limit Levels (**Tables B1 and B2** of **Appendix B**). No mud disposal operation at ESC CMP Vb was record on the sampling day (i.e. 7 June 2024).

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 June 2024

Routine Water Quality Monitoring of ESC CMPs was undertaken on 13 June 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 10**

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

of **Appendix C**. A total of ten (10) monitoring stations were sampled in June 2024 as shown in **Figure 2.1**.

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, and DO complied with the WQOs at all stations in June 2024, except for higher levels of Salinity were recorded at Impact (IPF), Intermediate (INF) and Ma Wan stations. The higher levels of Salinity were likely to be caused by the larger separation distance to Pearl River Delta mouth, which releases a large amount of freshwater runoff in the area during wet season, when compared to the Reference station.

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 June 2024.

2.3.2 Laboratory Measurements

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

For nutrients, concentrations of Total Inorganic Nitrogen (TIN) were higher than the WQO (0.5 mg/L) at Reference (RFF), Impact (IPF) and Intermediate (INF) stations (**Table B5 of Appendix B; Figure 9 of Appendix 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.⁴ 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 generally similar across all stations (**Table B5 of Appendix B; Figure 9 of Appendix C**). The concentrations of Biochemical Oxygen Demand (BOD₅) were below limit of reporting at all stations. (**Table B5 of Appendix B**)

Analyses of results for the reporting period indicated that the SS levels complied with the wet season WQO (11.9 mg/L) and Action and Limit Levels at all stations. (**Tables B1 and B5 of Appendix B; Figure 10 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 June 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 11 June 2024.

⁴ https://www.epd.gov.hk/epd/misc/marine_quality/1986-2005/eng/08_western_content.htm

The concentrations of most inorganic contaminants were lower than the Lower Chemical Exceedance Levels (LCELs) at all stations. (**Figures 11 and 12 of Appendix C**).

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 June 2024.

For organic contaminants, the concentrations of Total Organic Carbon (TOC) were higher at Active-Pit stations ESC-NPCA and ESC-NPCB. (**Figure 13 of Appendix C**). The concentrations of Low Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) were higher than LCEL at Pit-Edge station ESC-NECA and Active-Pit stations ESC-NPCA and ESC-NPCB. (**Figures 14 of Appendix C**).

For High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs), the concentrations were higher than LCEL at Pit-Edge station ESC-NECA and Active-Pit stations ESC-NPCA and ESC-NPCB. (**Figures 14 of Appendix C**).

The concentrations of Tributyltin (TBT) were higher at Active-Pit station ESC-NPCB. (**Figure 15 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.

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

The slightly elevated level of Low Molecular Weight PAH and High Molecular Weight PAH at Pit-Edge station 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.

2.5 Cumulative Impact Sediment Chemistry of ESC CMPs – in June 2024

Monitoring locations for Cumulative Impact Sediment Chemistry for ESC CMPs are shown in **Figure 2.3**. A total of nine (9) monitoring stations were sampled on 12 June 2024.

Analyses of results for the Cumulative Impact Sediment Chemistry Monitoring indicated that the concentrations of all inorganic contaminants were below the LCEL at all stations during the reporting period. (**Figures 16 and 17 of Appendix C**).

For organic contaminants, the concentration of TOC was higher at Far Field station ESC-RFB and Ma Wan station. (**Figure 18 of Appendix C**). The concentrations of Low Molecular Weight PAH were generally similar across all stations. The concentration of High Molecular Weight PAHs were higher at Near-field station ESC-RNA, Far-field station ESC-RFA and Capped Pit station ESC-RCB1. (**Figure 19 of Appendix C**)

The concentrations of TBT were higher at Ma Wan station MW1. (**Figure 20 of Appendix C**). The concentrations of Total PCBs, Total DDT, 4,4'-DDE, 2,4'-DDT, 4,4'-DDT were below the limit of reporting at all stations during the reporting period.

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 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

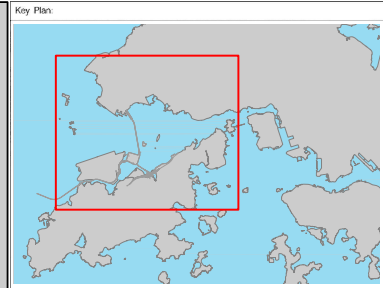
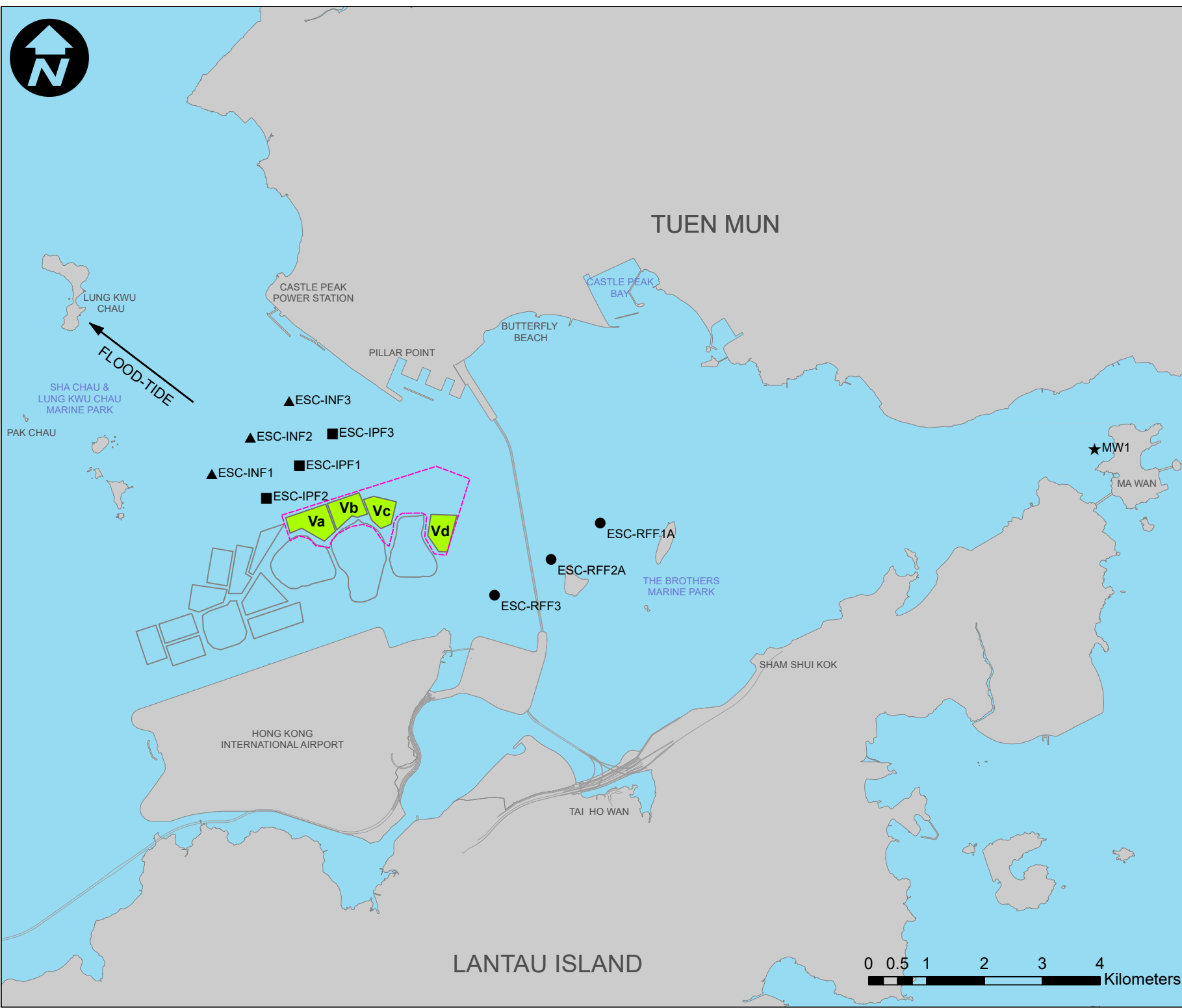
The following monitoring activities will be conducted in the next reporting period of July 2024 for ESC CMP V (see **Appendix A** for the sampling schedule):

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

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

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

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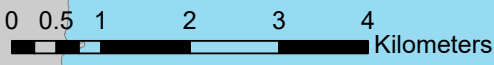
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TO THE EAST OF SHA CHAU (2021-2026)
- INVESTIGATION**

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

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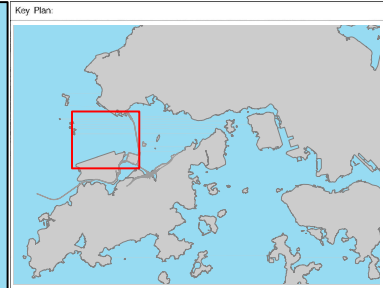
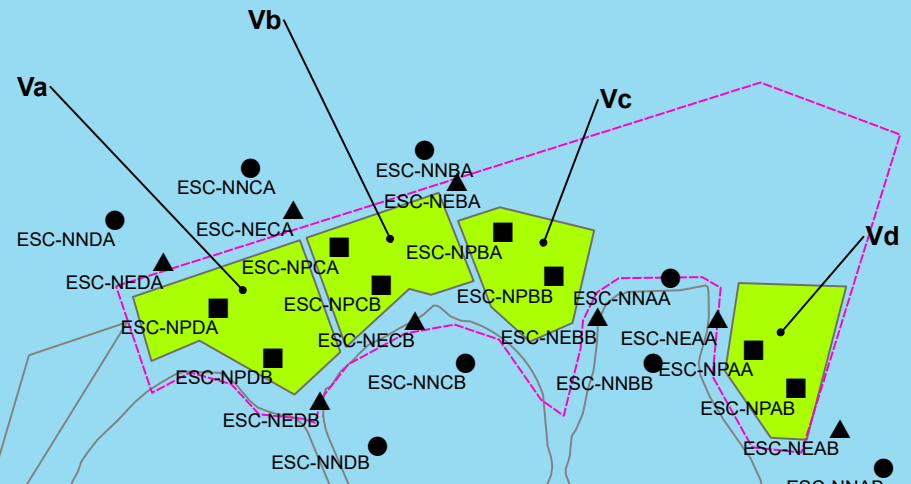
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EBB-TIDE

FLOOD-TIDE



Notes:

Key to symbols:

LEGEND

- ESC CMP V
- ESC USABLE AREA 1
- ACTIVE-PIT STATION
- PIT-EDGE STATION
- NEAR-PIT STATION

PIT SPECIFIC SEDIMENT MONITORING STATIONS

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

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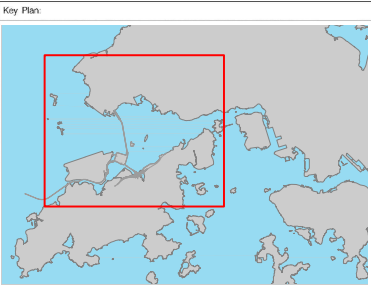
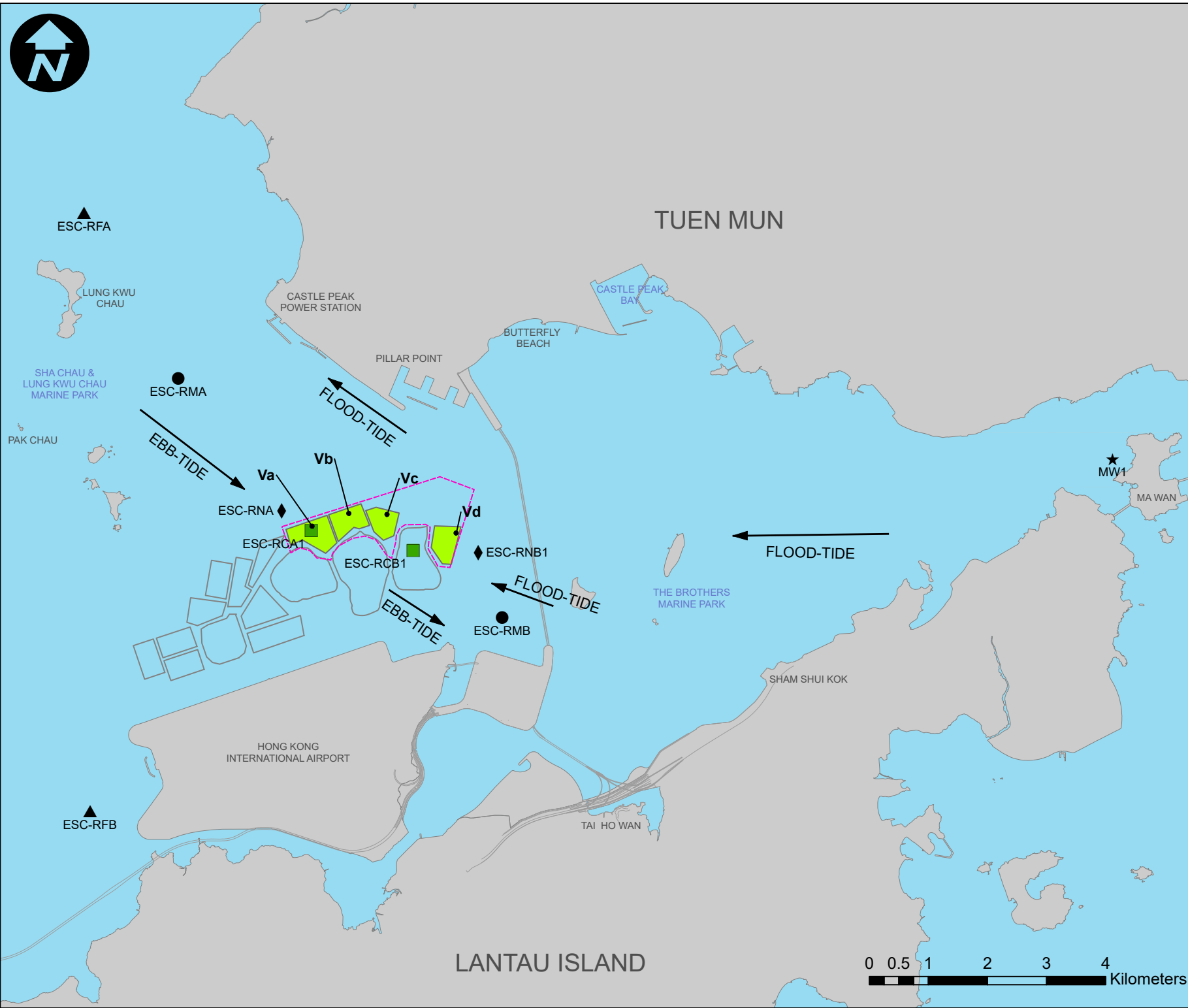
PIT SPECIFIC SEDIMENT QUALITY MONITORING STATIONS FOR CMP V

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Notes:

Key to symbols:

LEGEND

- ESC CMP V
- ESC USABLE AREA 1

CUMULATIVE IMPACT SEDIMENT MONITORING STATIONS

- CAPPED PIT STATION
- NEAR-FIELD STATION
- MID-FIELD STATION
- FAR-FIELD STATION
- MA WAN STATION

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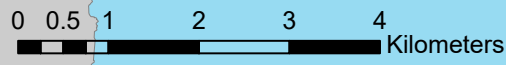
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Project **AGREEMENT NO. CE 59/2020 (EP)
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FOR DISPOSAL FACILITY
TO THE EAST OF SHA CHAU (2021-2026)
- INVESTIGATION**

Title **CUMULATIVE IMPACTS SEDIMENT
QUALITY MONITORING STATIONS
FOR ESC CMPS**

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LANTAU ISLAND

Appendices

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

Appendix A. Sampling Schedule

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 June 2024

Station	Temp. (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%)	Dissolved Oxygen (mg L ⁻¹)	pH	Suspended Solids (mg L ⁻¹)
WCP 1 (Downstream)	26.49	21.88	18.78	80.45	5.72	8.05	18.0
WCP 2 (Upstream)	26.61	20.33	13.83	80.06	5.73	8.00	9.5
WQO (Wet Season)	N/A	18.30-22.36 [#]	N/A	N/A	>4	6.5-8.5	11.9

Notes:

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

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

Station	Temp. (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%)	Dissolved Oxygen (mg L ⁻¹)	pH
RFF (Reference)	27.29	19.36	3.67	82.72	5.89	7.91
IPF (Impact)	27.09	21.52	3.57	82.70	5.84	7.96
INF (Intermediate)	27.05	22.23	3.41	81.70	5.75	7.96
Ma Wan	26.87	25.56	3.15	86.44	5.99	7.99
WQO (Wet Season)	N/A	17.42-21.29 [#]	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 indicates value exceeding the Action/Limit levels.
- 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 June 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)
RFF	2.06	0.06	0.04	0.89	0.01	ND	0.48	0.01	0.39
IPF	2.08	0.04	0.09	0.69	0.02	ND	0.65	0.01	0.69
INF	1.75	0.04	0.22	0.72	0.01	0.001	0.64	0.04	0.83
Ma Wan	1.20	ND	0.18	0.64	0.02	ND	0.35	ND	0.64

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 June 2024

Station	NH ₃ (mg/L)	TIN (mg/L)	BOD ₅ (mg/L)	SS (mg/L)
RFF	0.02	0.84	<LOR	3.9
IPF	0.02	0.77	<LOR	5.0
INF	0.02	0.78	<LOR	3.8
Ma Wan	0.04	0.47	<LOR	4.0

WQO of TIN: 0.5 mg/L

Wet Season WQO of SS: 11.9 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

Routine Water Quality Monitoring for ESC CMP V - June 2024

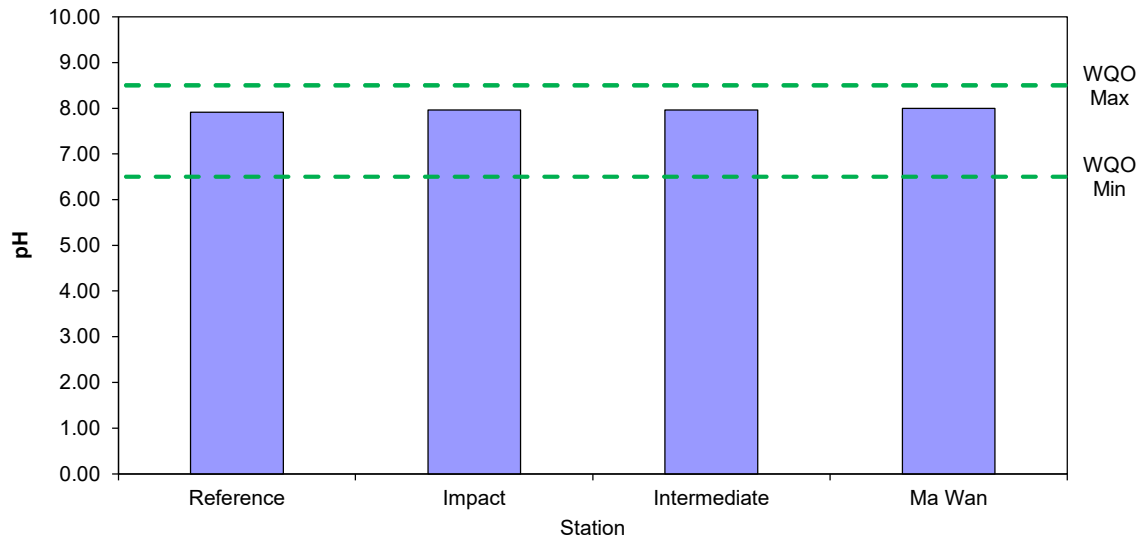


Figure 1: Level of pH recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in June 2024

Routine Water Quality Monitoring for ESC CMP V - June 2024

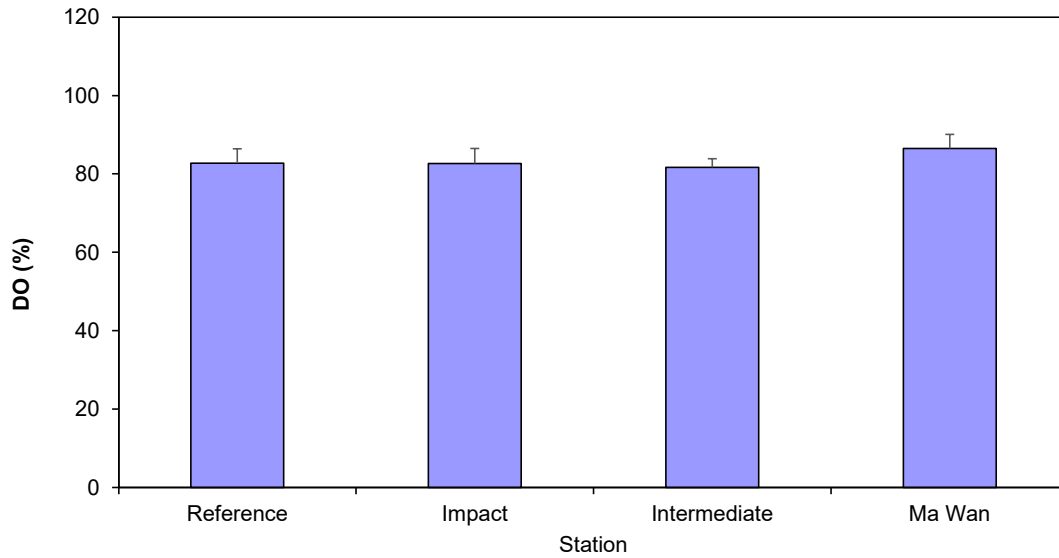


Figure 2: Level of Dissolved Oxygen (DO) (% saturation; mean + SD¹) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in June 2024

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 - June 2024

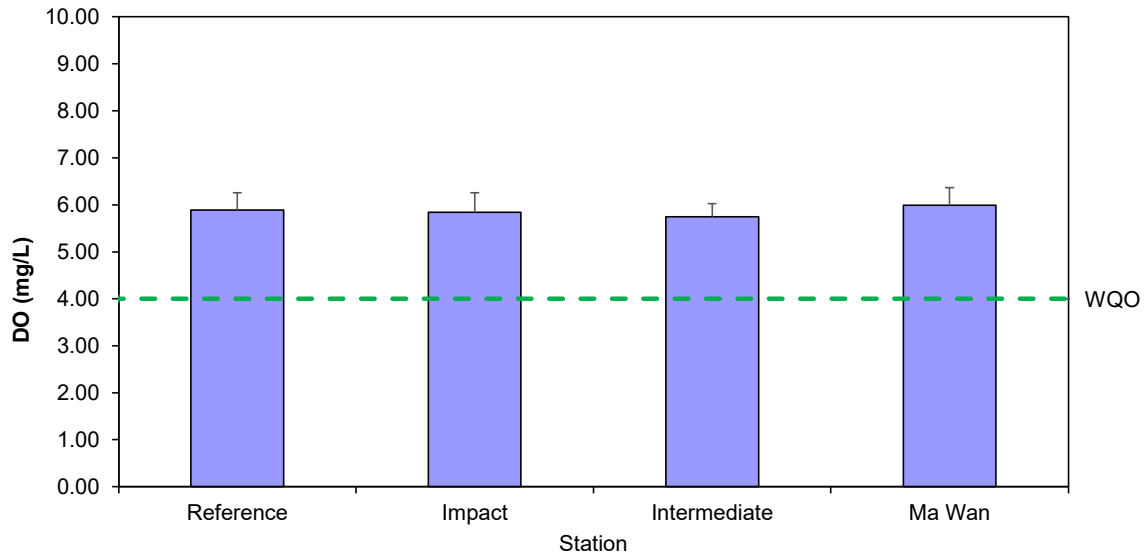


Figure 3: Concentration of Dissolved Oxygen (DO) (mg/L; mean + SD¹) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in June 2024

Routine Water Quality Monitoring for ESC CMP V - June 2024

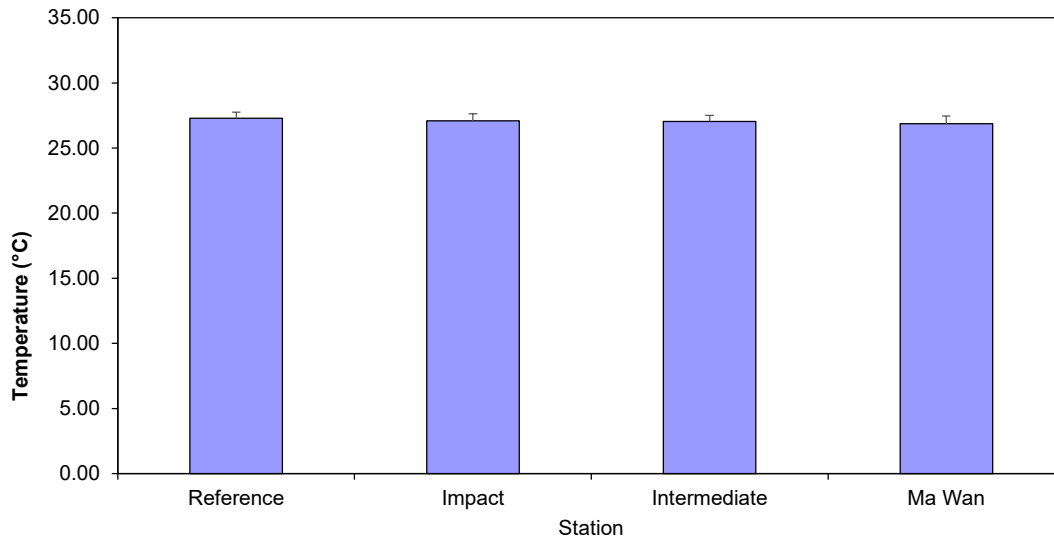


Figure 4: Level of Temperature (°C; mean + SD¹) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in June 2024

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 - June 2024

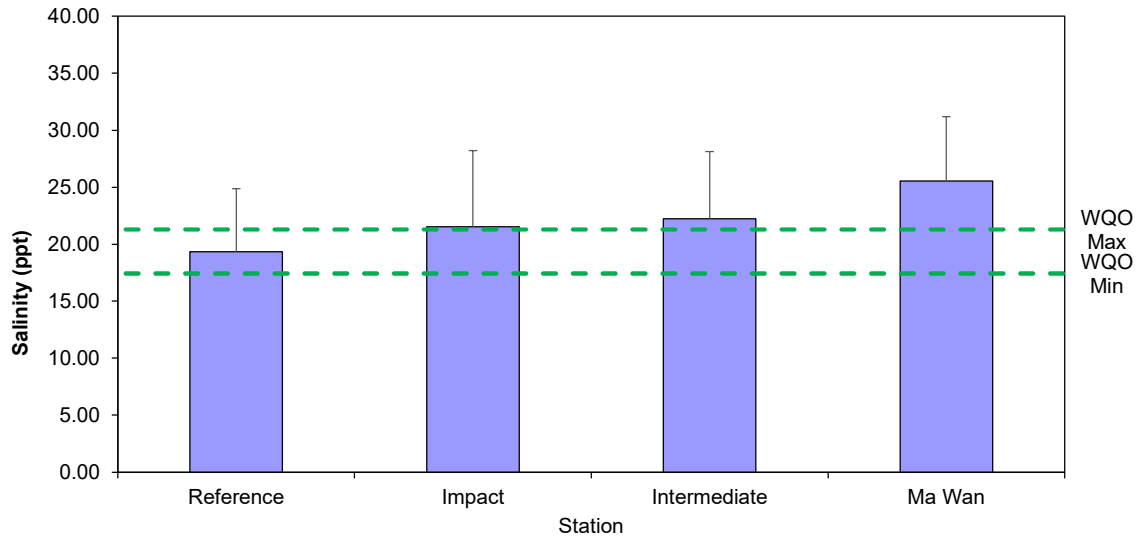


Figure 5: Level of Salinity (ppt; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in June 2024

Routine Water Quality Monitoring for ESC CMP V - June 2024

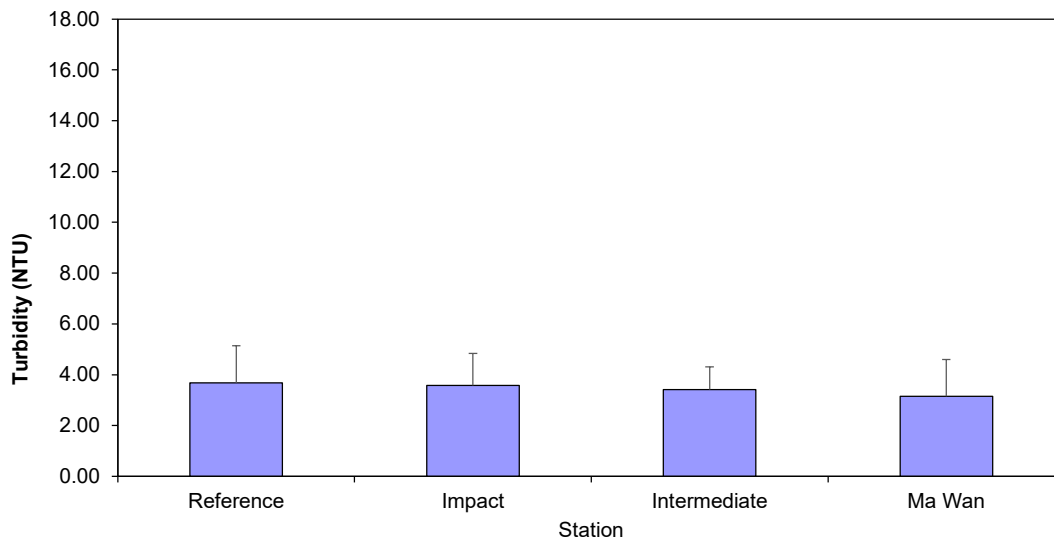


Figure 6: Level of Turbidity (NTU; mean + SD)¹ recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in June 2024

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 June 2024

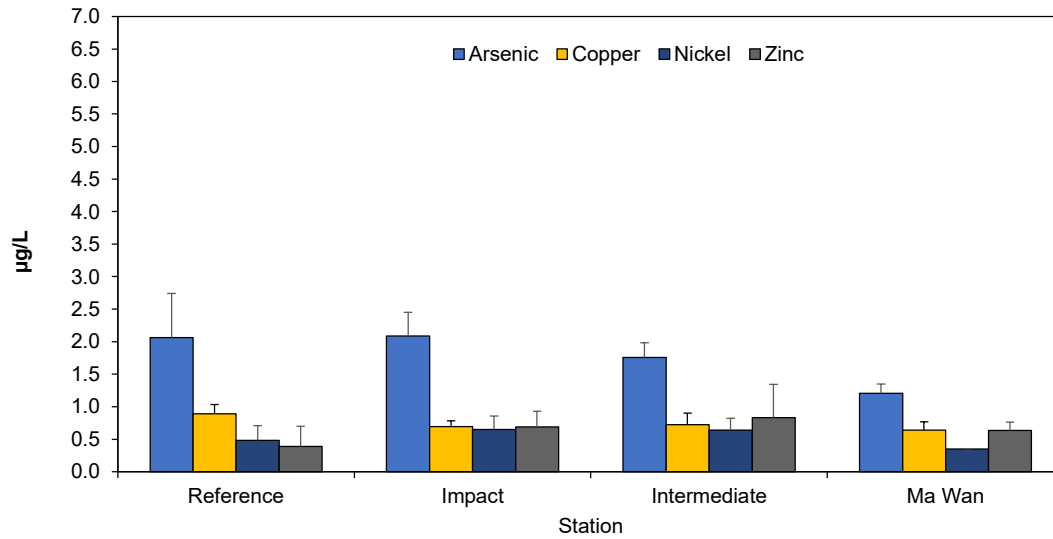


Figure 7: Concentration of Arsenic, Copper, Nickel, and Zinc (µg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in June 2024

Routine Water Quality Monitoring for ESC CMP V June 2024

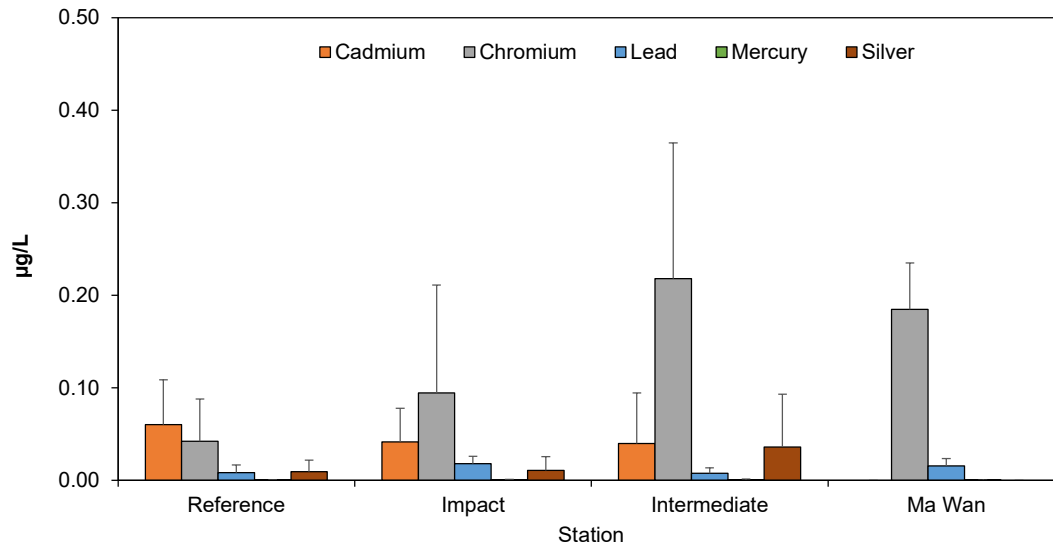


Figure 8: Concentration of Cadmium, Chromium, Lead, Mercury and Silver, (µg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in June 2024

Routine Water Quality Monitoring for Nutrients - June 2024

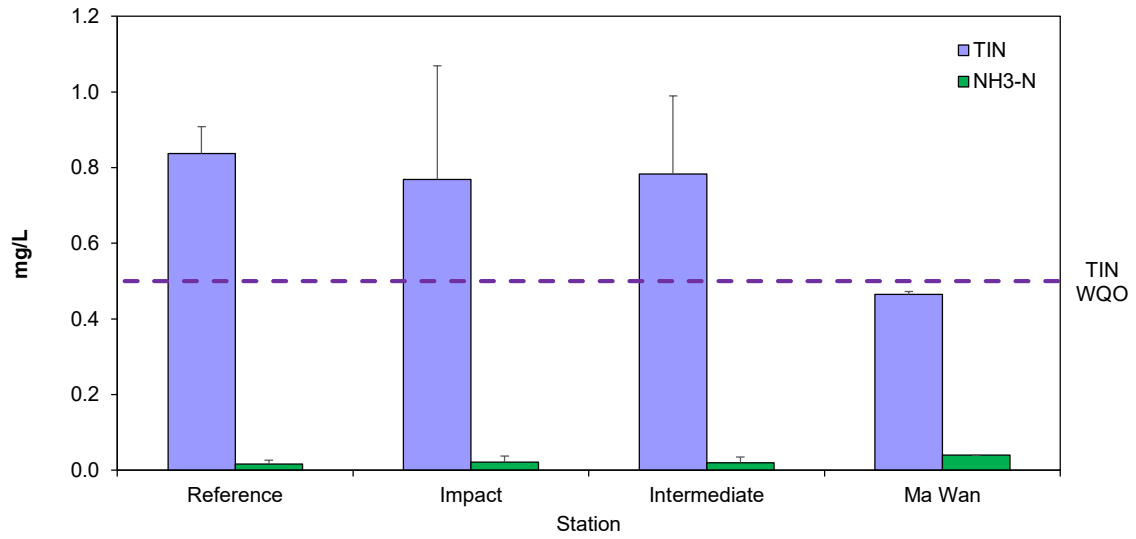


Figure 9: Concentration of Total Inorganic Nitrogen (TIN) and Ammonia Nitrogen (NH3-N) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in June 2024

Routine Water Quality Monitoring for Suspended Solids - June 2024

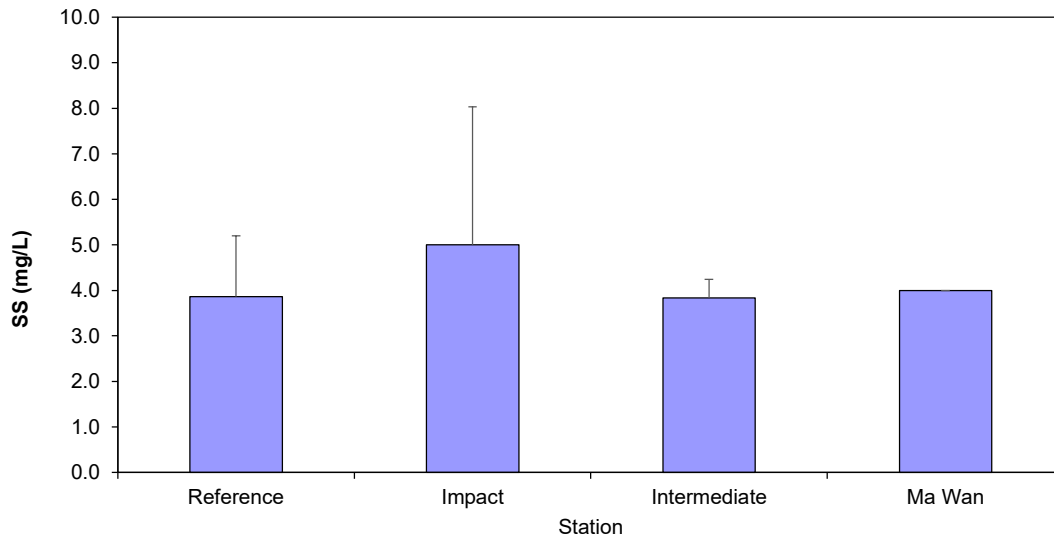


Figure 10 Concentration of Suspended Solids (SS) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in June 2024

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

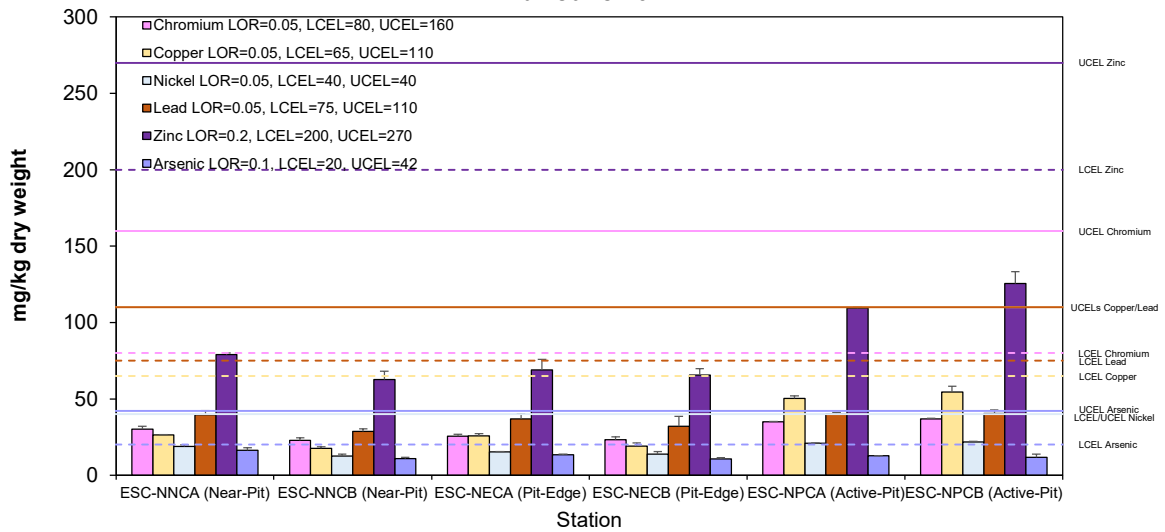


Figure 11: Concentration of Metals and Metalloid²(Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in June 2024

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

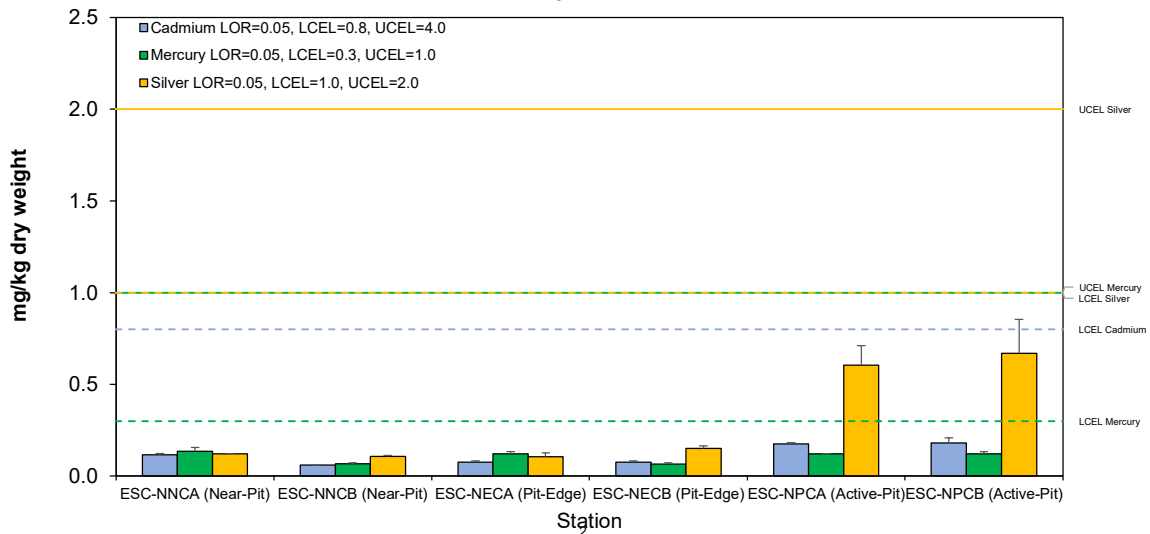


Figure 12: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in June 2024

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 Total Organic Carbon (TOC) at ESC CMP Vb - June 2024

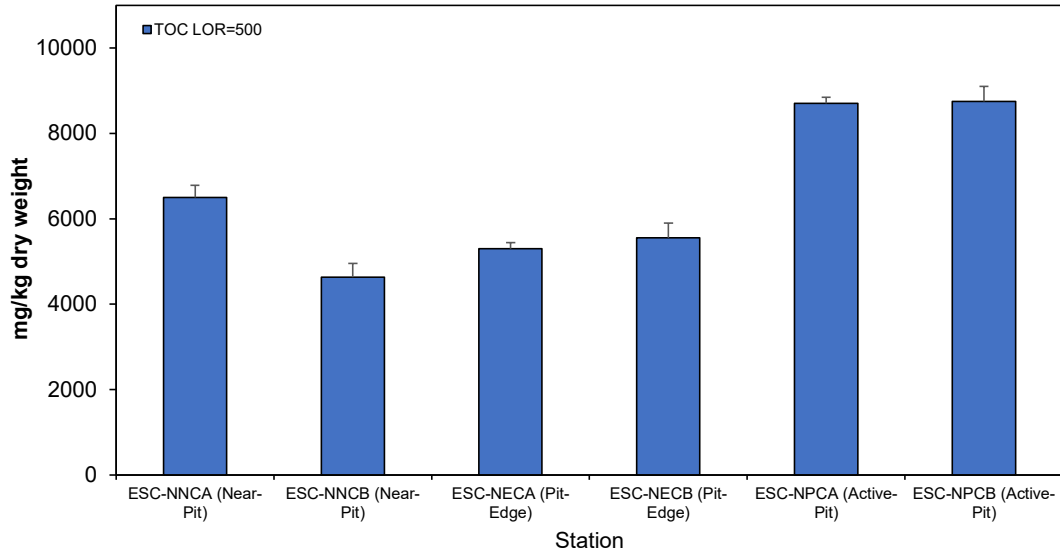


Figure 13: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in June 2024

Pit Specific Sediment Chemistry for Low and High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) at ESC CMP Vb - June 2024

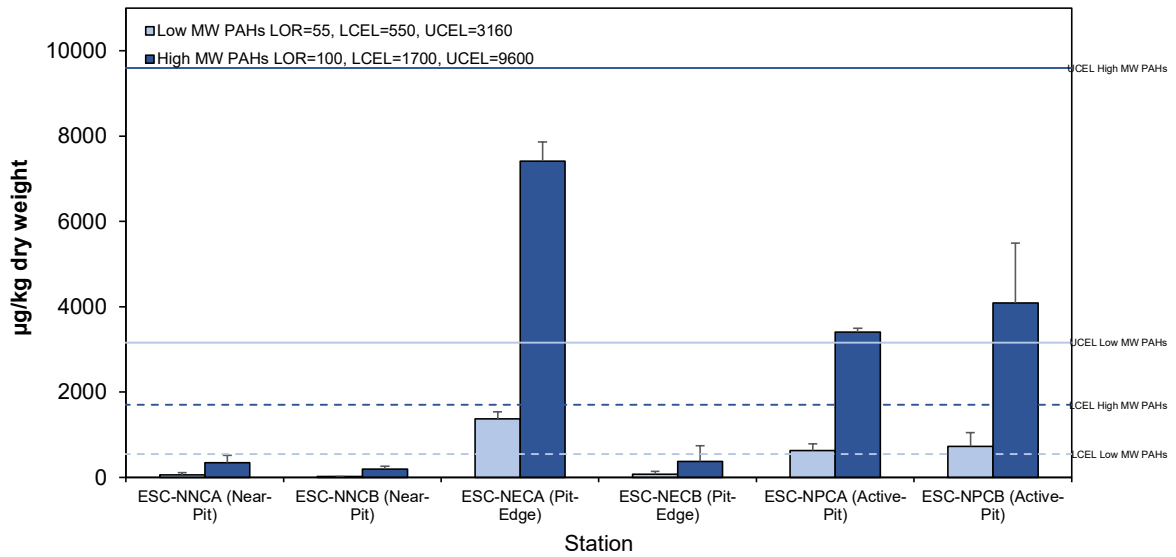


Figure 14: Concentration of Low and High Molecular Weight Polycyclic Aromatic Hydrocarbons (µg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in June 2024

Pit Specific Sediment Chemistry for Tributyltin (TBT) at ESC CMP Vb - June 2024

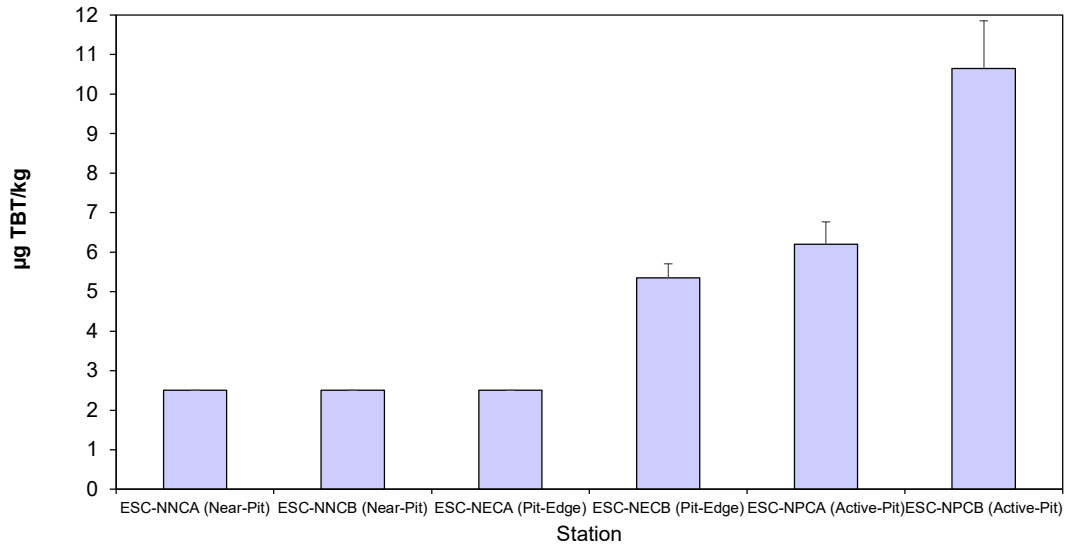


Figure 15: Concentration of Tributyltin (TBT) (µg TBT/kg; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in June 2024

Cumulative Impact Sediment Chemistry for Metal and Metalloid Contaminants at ESC CMPs - June 2024

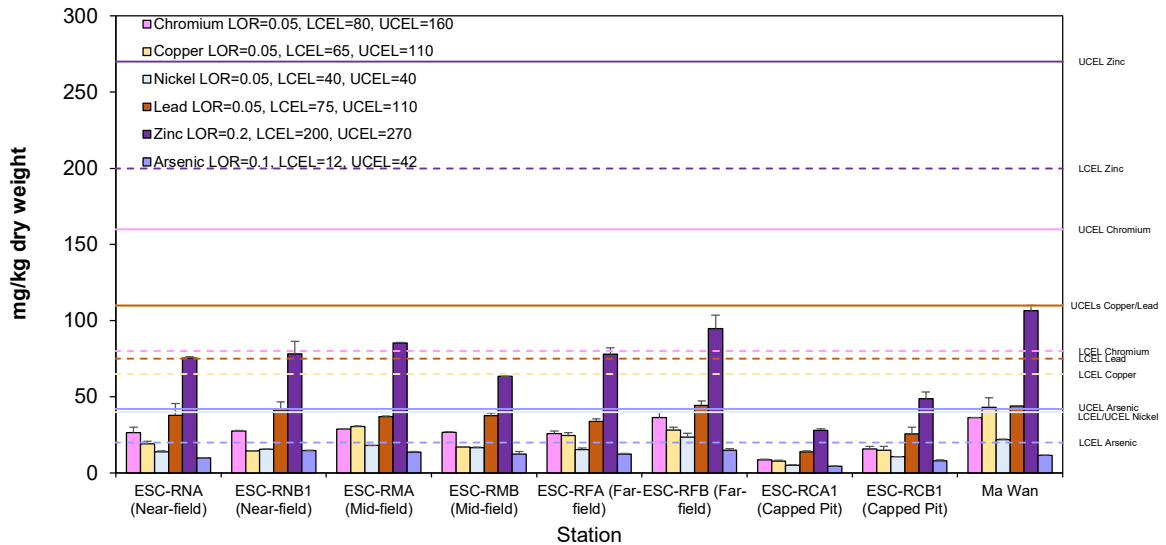


Figure 16: Concentration of Metals and Metalloid (Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean + SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in June 2024

Cumulative Impact Sediment Chemistry for Metal Contaminants at ESC CMPs - June 2024

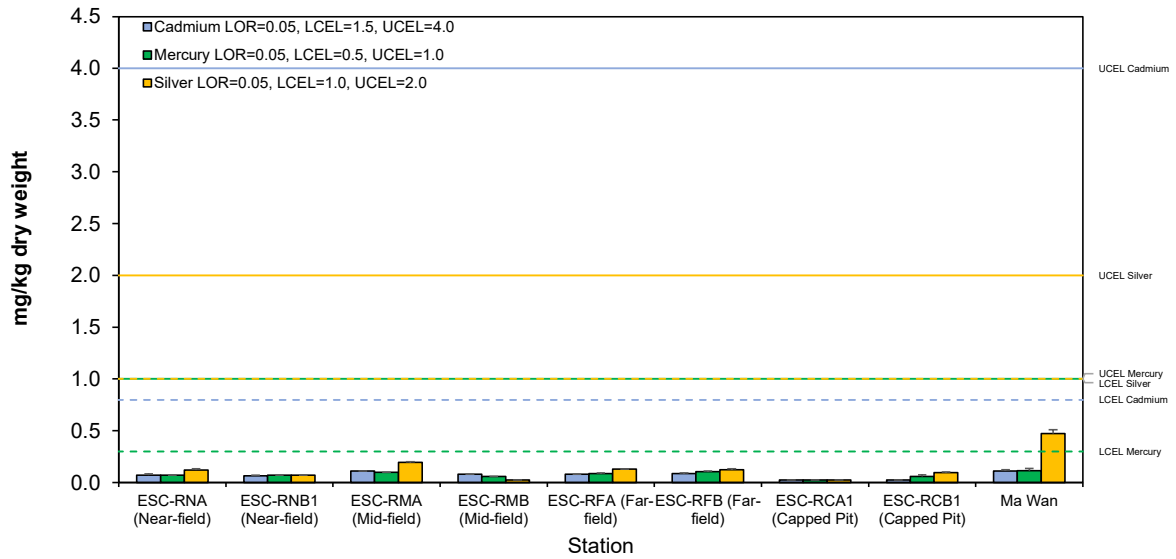


Figure 17: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean + SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in June 2024

Cumulative Impact Sediment Chemistry for Total Organic Carbon (TOC) at ESC CMPs - June 2024

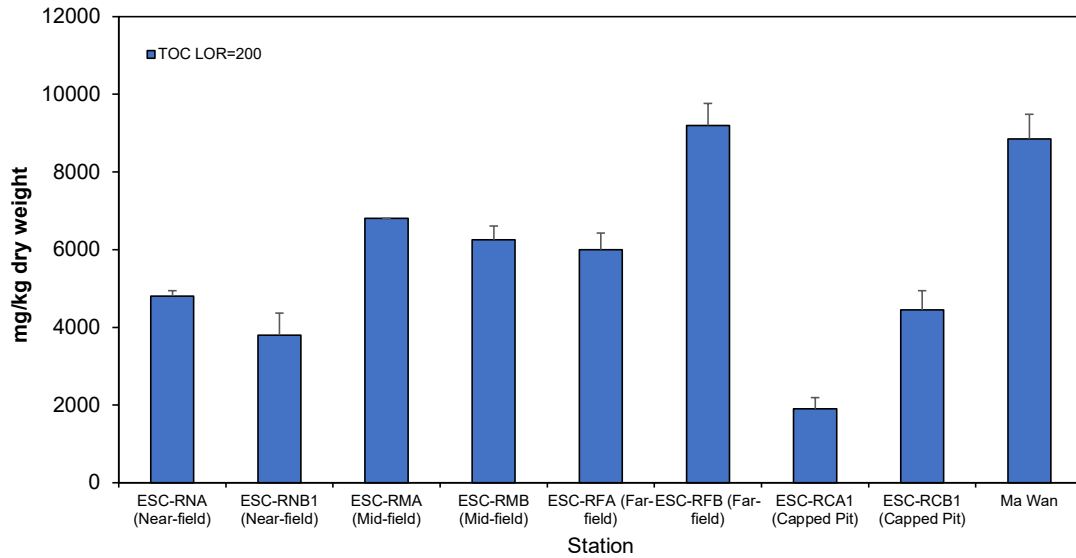


Figure 18: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean + SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in June 2024

Cumulative Impact Sediment Chemistry for Low and High Molecular Weight Polycyclic Aromatics Hydrocarbons (PAHs) at ESC CMPs - June 2024

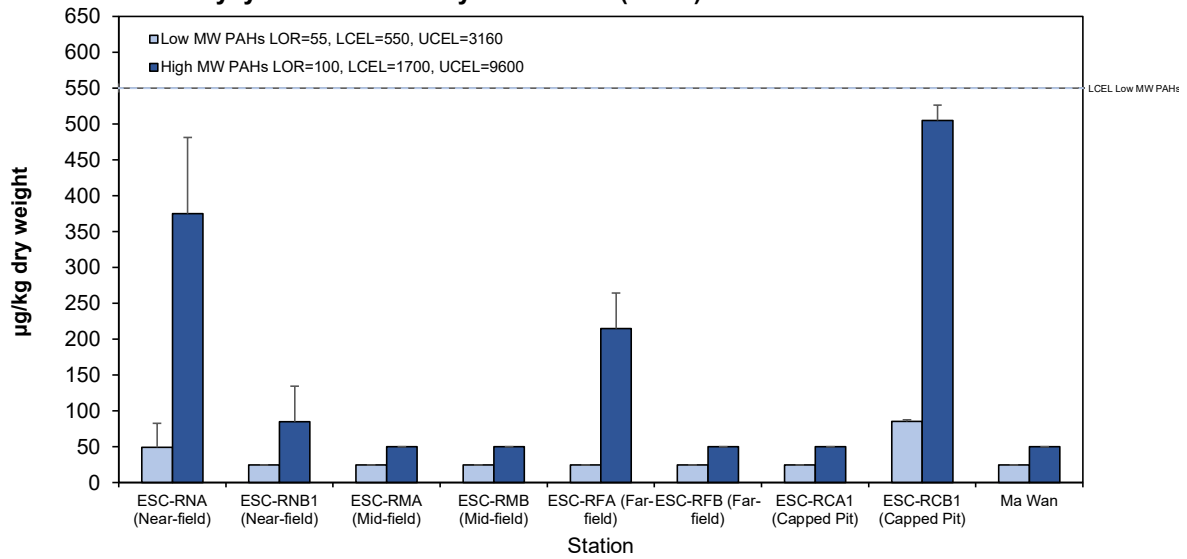


Figure 19: Concentration of Low and High Molecular Weight Polycyclic Aromatics (mg/kg dry weight; mean + SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in June 2024

Cumulative Impact Sediment Chemistry for Tributyltin (TBTs) at ESC CMPs - June 2024

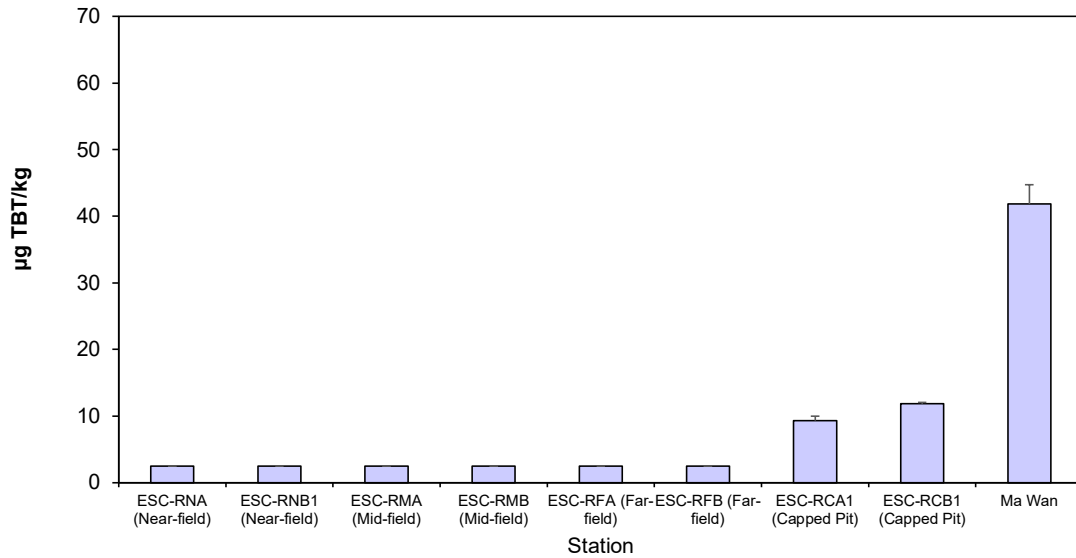


Figure 20: Concentration of Tributyltin (TBT) (µg/kg dry weight; mean + SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in June 2024

Appendix D. Study Programme

