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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

Monthly EM&A Report for
Contaminated Mud Pits to the East of Sha Chau
– August 2022

September 2022

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Mott MacDonald Hong Kong Limited
registered in Hong Kong no. 236497

土木工程拓展署
Civil Engineering and Development Department

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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 – August 2022
Date of Report:	14 September 2022
Date prepared by ET:	14 September 2022
Date received by IA:	14 September 2022

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: 14 September 2022

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: 14 September 2022

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	Sep 2022	Various	Thomas Chan	Eric Ching	Revision A of Submission
B	Sep 2022	Various	Thomas Chan	Eric Ching	Revision B for Record [Finalised]

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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**.

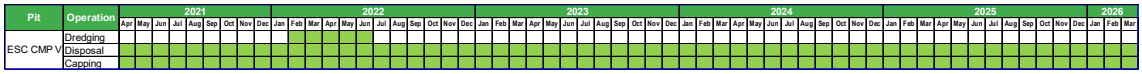
The present EM&A programme under Agreement No. CE 59/2020 (EP) covers the dredging, disposal and capping operations of the ESC CMP V (see **Appendix A** for the EM&A programme.) Detailed works schedule for ESC CMP V is shown in **Table 1.1**. In August 2022, the following works were undertaken:

- 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



1.2 Reporting Period

This *Monthly EM&A Report for Contaminated Mud Pits to the East of Sha Chau – August 2022* covers the EM&A activities for the reporting period of August 2022 (from 1 to 31 August 2022).

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;
- Cumulative Impact Sediment Chemistry of ESC CMPs;
- Sediment Chemistry after a Major Storm of ESC CMP V; and.
- Sediment Toxicity Tests of ESC CMPs.
- Demersal Trawling for ESC CMPs.

1.4 Details of Outstanding Sampling or Analysis

Laboratory analysis data of metals and metalloid for Routine Water Quality Monitoring of ESC CMPs in August 2022 are still under consolidation, which will be presented in the Monthly EM&A Report of the next reporting period.

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

- Species identification of the biota samples collection from Demersal Trawling for ESC CMPs in August 20212; and
- Sediment Toxicity Tests of ESC CMPs in August 2022.

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;
- Cumulative Impact Sediment Chemistry of ESC CMPs; and
- Sediment Chemistry after a Major Storm of ESC CMP V.

2.2 Water Column Profiling of ESC CMP Vb – in August 2022

Water Column Profiling was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 17 August 2022. 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 2011 – 2020 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 August 2022 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 August 2022 indicated that the SS level at both Downstream and Upstream 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 July 2022

Further to Section 2.3.2 of the *Monthly EM&A Report for Contaminated Mud Pits to the East of Sha Chau – July 2022*, laboratory analysis data of dissolved metals and metalloid in Routine Water Quality Monitoring of ESC CMPs conducted in July 2022 is presented in **Tables B4** of **Appendix B** and **Figures 1** of **Appendix C**. The laboratory analysis of samples indicated that the concentrations of Arsenic, Zinc, Cadmium, Chromium, Copper, Mercury and Nickel were detected in the samples at all stations and their concentrations of most metals and metalloids were

[3] http://epic.epd.gov.hk/EPICRIVER/marine/?lang=en

generally similar across stations, except the concentration of Zinc which was lower at Intermediate (INF) stations.

Laboratory analysis data of Nutrients and Suspended Solid in Routine Water Quality Monitoring of ESC CMPs in July 2022 is presented again in **Table B5** of **Appendix B** for easy reference.

Overall, 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 in July 2022. Detailed statistical analysis will be presented in the Quarterly EM&A Report to investigate any spatial and temporal trends of potential concern.

2.4 Routine Water Quality Monitoring of ESC CMPs – in August 2022

Routine Water Quality Monitoring of ESC CMPs was undertaken on 22 August 2022. 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 B6 and B7** of **Appendix B** and **Figures 2 to 10** of **Appendix C**. A total of sixteen (16) monitoring stations were sampled in August 2022 as shown in **Figure 2.1**.

2.4.1 In-situ Measurements

Graphical presentation of the monitoring results (Temperature, DO, pH, Salinity and Turbidity) is shown in **Figures 2 to 7** of **Appendix C**. Analyses of results indicated that the levels of pH, DO and Salinities complied with the WQOs at all stations in August 2022.

The levels of DO and Turbidity complied with the Action and Limit Levels at all stations (**Table B3** of **Appendix B**; **Figures 4 and 7** 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 August 2022.

2.4.2 Laboratory Measurements

Refer to **Section 1.4**, laboratory analysis data of metals and metalloid in August 2022 are still under consolidation, which will be presented in the Monthly EM&A Report of the next reporting period.

For nutrients, concentrations of Total Inorganic Nitrogen (TIN) were higher than the WQO (0.5 mg/L) at Reference (RFE), Impact (IPE) and Intermediate (INE) stations (**Table B7** of **Appendix B**; **Figure 8** 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 concentration of Ammonia Nitrogen (NH_3-N) was slightly higher at Impact (IPE) station (**Table B7** of **Appendix B**; **Figure 8** of **Appendix C**). The concentrations of Biochemical Oxygen Demand (BOD_5) were higher at Reference (RFE) and Intermediate (INE) station (**Table B7** of **Appendix B**; **Figure 9** of **Appendix C**).

Analyses of results for the reporting period indicated that the SS levels at all stations complied with the wet season WQO (12.0 mg/L) and the Action and Limit Levels (**Tables B1 and B7** 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

[4] http://www.epd.gov.hk/epd/misc/marine_quality/1986-2005/textonly/eng/index.htm

presented in the Quarterly EM&A Report to investigate any spatial and temporal trends of potential concern.

2.5 Pit Specific Sediment Chemistry of ESC CMP Vb – in August 2022

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 19 August 2022.

The concentrations of most inorganic contaminants were lower than the Lower Chemical Exceedance Levels (LCELs) at most stations, except for Arsenic. The concentrations of Arsenic were higher than the LCEL at Pit-Edge station ESC-NECA and Active-Pit stations ESC-NPCA, ESC-NPCB (**Figures 11 and 12** of **Appendix C**).

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.[5] It is presumed that the natural concentrations of Arsenic are similar in onshore and offshore sediments,[6] and relatively high Arsenic levels may thus occur throughout Hong Kong. Therefore, the LCEL exceedances of Arsenic are unlikely to be caused by the disposal operations at ESC CMP Vb but rather as a result of naturally occurring deposits.

For organic contaminants, the concentration of Total Organic Carbon (TOC) was higher at Active-Pit station ESC-NPCB (**Figure 13** of **Appendix C**). The concentrations of Low Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) were similar across all stations, while concentrations of High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) was higher at Active Pit station ESC-NPCB (**Figure 14** of **Appendix C**). The concentrations of Tributyltin (TBT) were similar across all stations (**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.

Overall, there is no evidence indicating any unacceptable environmental impacts to sediment quality outside the pit area as a result of the contaminated mud disposal operations at ESC CMP Vb 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.

2.6 Cumulative Impact Sediment Chemistry of ESC CMPs – in August 2022

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 18 August 2022.

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 during the reporting period, except concentrations of Arsenic were higher than the LCEL at Near-field station ESC-RNB1, Mid-field stations ESC-RMA, ESC-RMB, Far-field station ESC-RFB and Capped Pits station ESC-RCA1, as well as concentrations of Silver were higher than the LCEL at Ma Wan station MW1 (**Figures 16** and **17** of **Appendix C**). As discussed in **Section 2.4**, the LCEL 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. While Ma Wan Station is comparatively apart from the Near-field, Mid-field, Far-field and Capped pits stations with no exceedance of LCEL in

[5] Sewell RJ (1999) Geochemical Atlas of Hong Kong. Geotechnical Engineering Office, Government of the Hong Kong Special Administrative Region

[6] 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

silver concentration, therefore, there is no evidence indicating the exceedances of Silver to be caused by the disposal operations at ESC CMP Vb.

For organic contaminants, the concentration of TOC was higher at Far-field station ESC-RFB and Ma Wan station MW1 (**Figure 18** of **Appendix C**). The concentrations of High Molecular Weight PAHs were higher at Near-field station ESC-RNA and Mid-field station ESC-RMA (**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 and Low Molecular Weight PAHs 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.

2.7 Sediment Chemistry after a Major Storm of ESC CMP V – in August 2022

Sampling for Sediment Chemistry after a Major Storm Event was conducted at nine (9) monitoring stations (see **Figure 2.4** for the locations of the monitoring stations) on 29 August 2022 after the visit of tropical cyclones Chaba, which led to the issue of No. 8 Gale or Storm Signal on 1 August 2022. The tracks of Ma-on are shown in **Figure 2.5**.

Figure 2.5: Track of Tropical Cyclone Ma-on (Source: Hong Kong Observatory)

Analyses of results for the Sediment Chemistry after a Major Storm indicated that the concentrations of all inorganic contaminants were below the LCEL in August 2022, except for Arsenic and Silver. The concentrations of Arsenic were higher than the LCEL at Near-field station ESC-RNB1, Mid-field station ESC-RMA, Far-field stations ESC-RFB and Capped Pit stations ESC-RCB1. The concentrations of Silver were higher than the LCEL at Ma Wan station MW1 **(Figures 21** and **22** of **Appendix C**).

As discussed in **Section 2.5**, the LCEL 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. Also, refer to **Section 2.6**, there is no evidence indicating the exceedances of Silver to be caused by the disposal operations at ESC CMP Vb.

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 2022.

3 Future Key Issues

3.1 Activities Scheduled for the Next Reporting Period

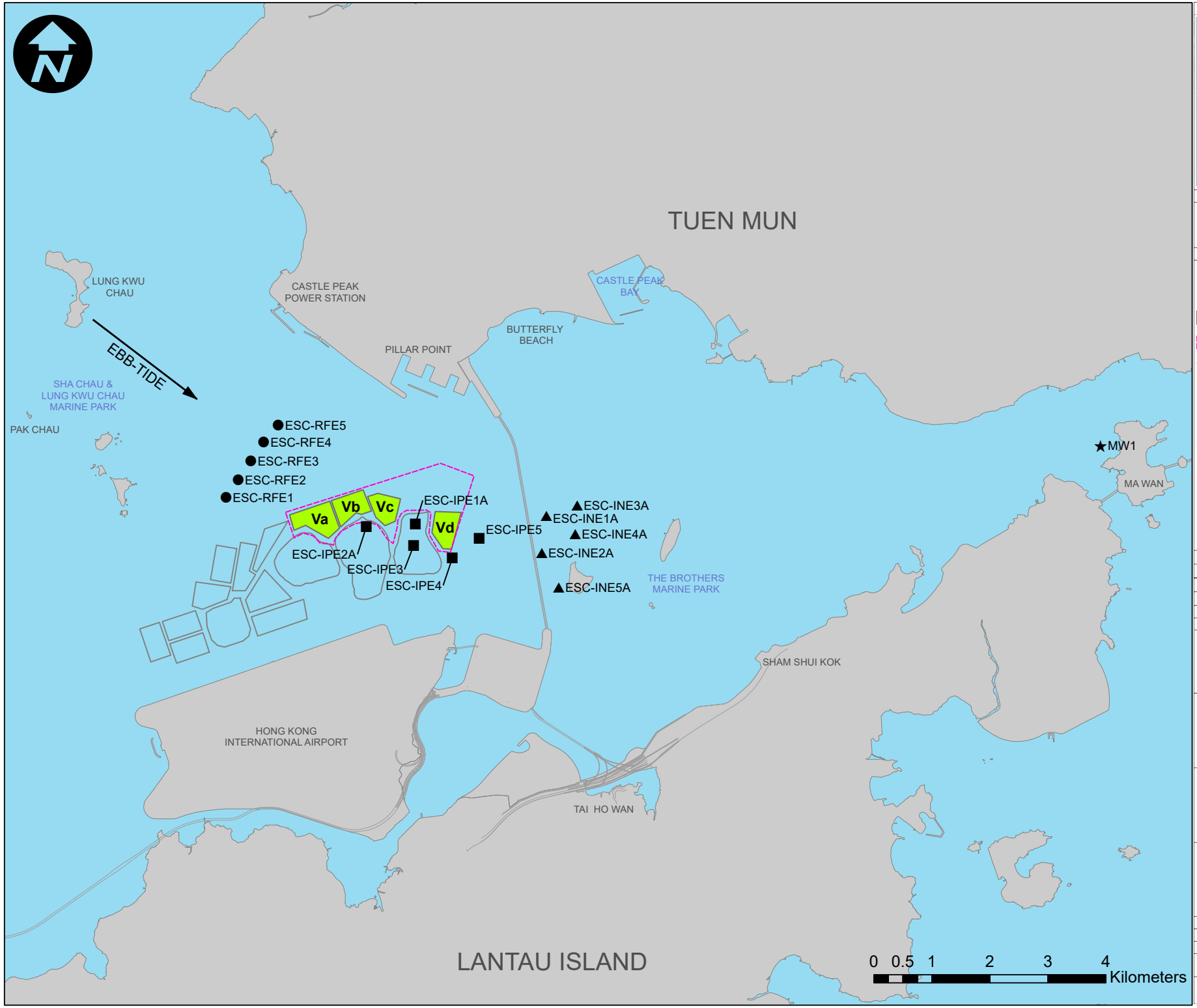
The following monitoring activities will be conducted in the next reporting period of September 2022 for ESC CMP V (see **Appendix A** for the sampling schedule):

- 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



Key Plan:

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'k'd	App'd
P1	APR 2021	KN			

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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

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

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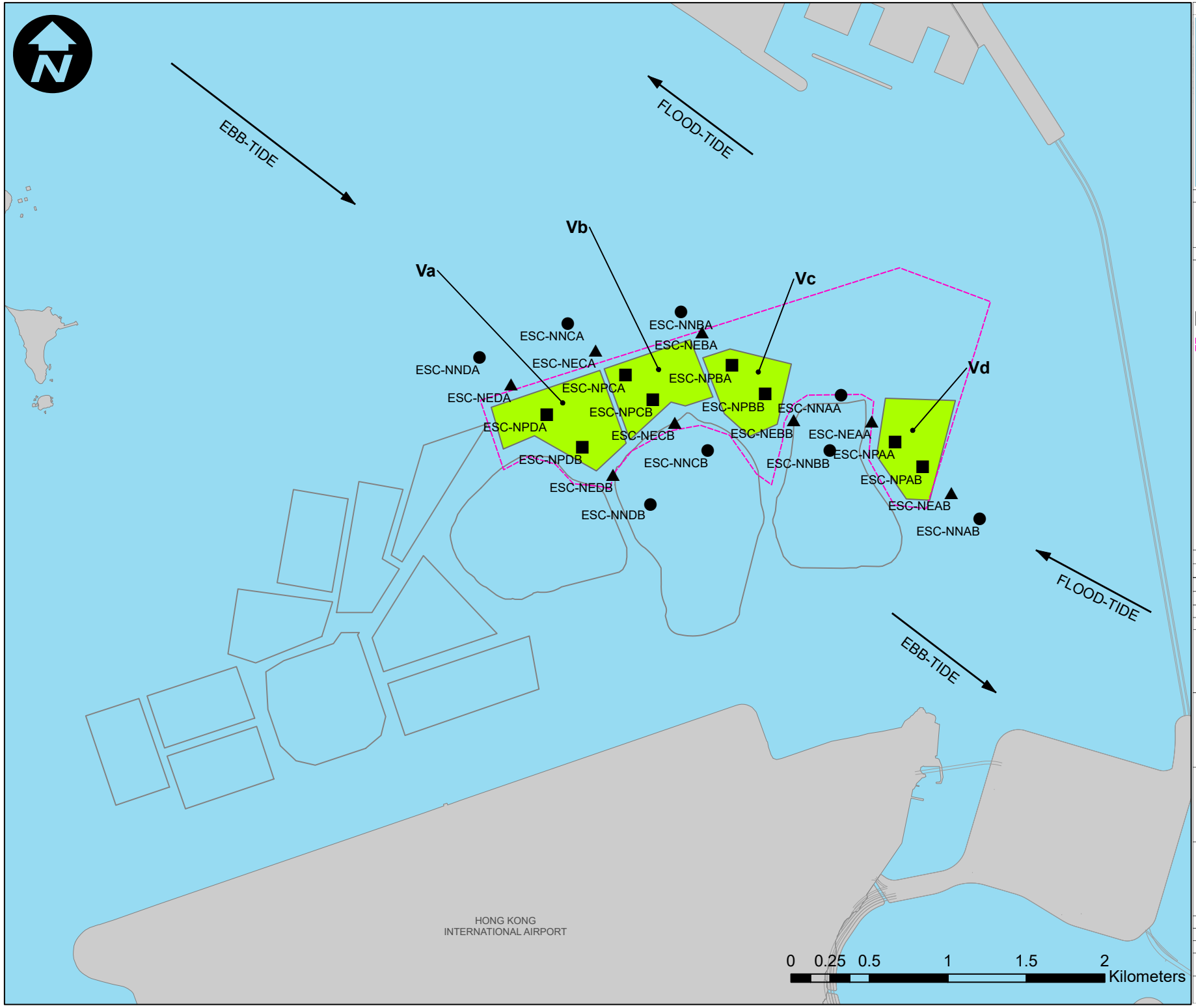
Dwg check			Approved		
Scale at A3		Status		Rev	

Drawing Number

FIGURE 2.1



Key Plan:

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

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P1	APR 2021	KN			

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Title

PIT SPECIFIC SEDIMENT QUALITY MONITORING STATIONS FOR CMP V

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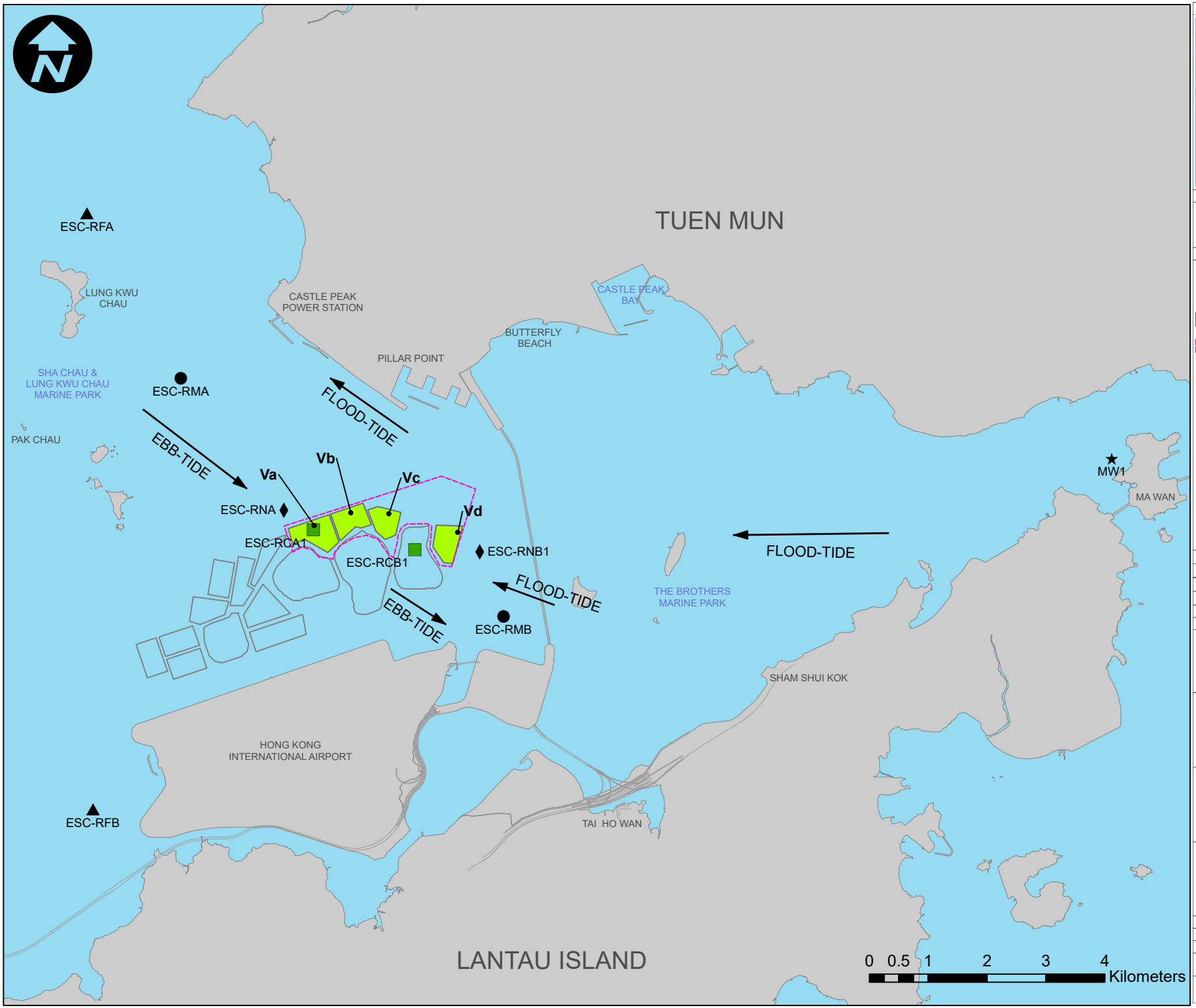
Dwg check			Approved		
Scale at A3		Status		Rev	

Drawing Number

FIGURE 2.2



Key Plan:

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

Rev	Date	Drawn	Description	Ch'k'd	App'd
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Title

CUMULATIVE IMPACTS SEDIMENT QUALITY MONITORING STATIONS FOR ESC CMPS

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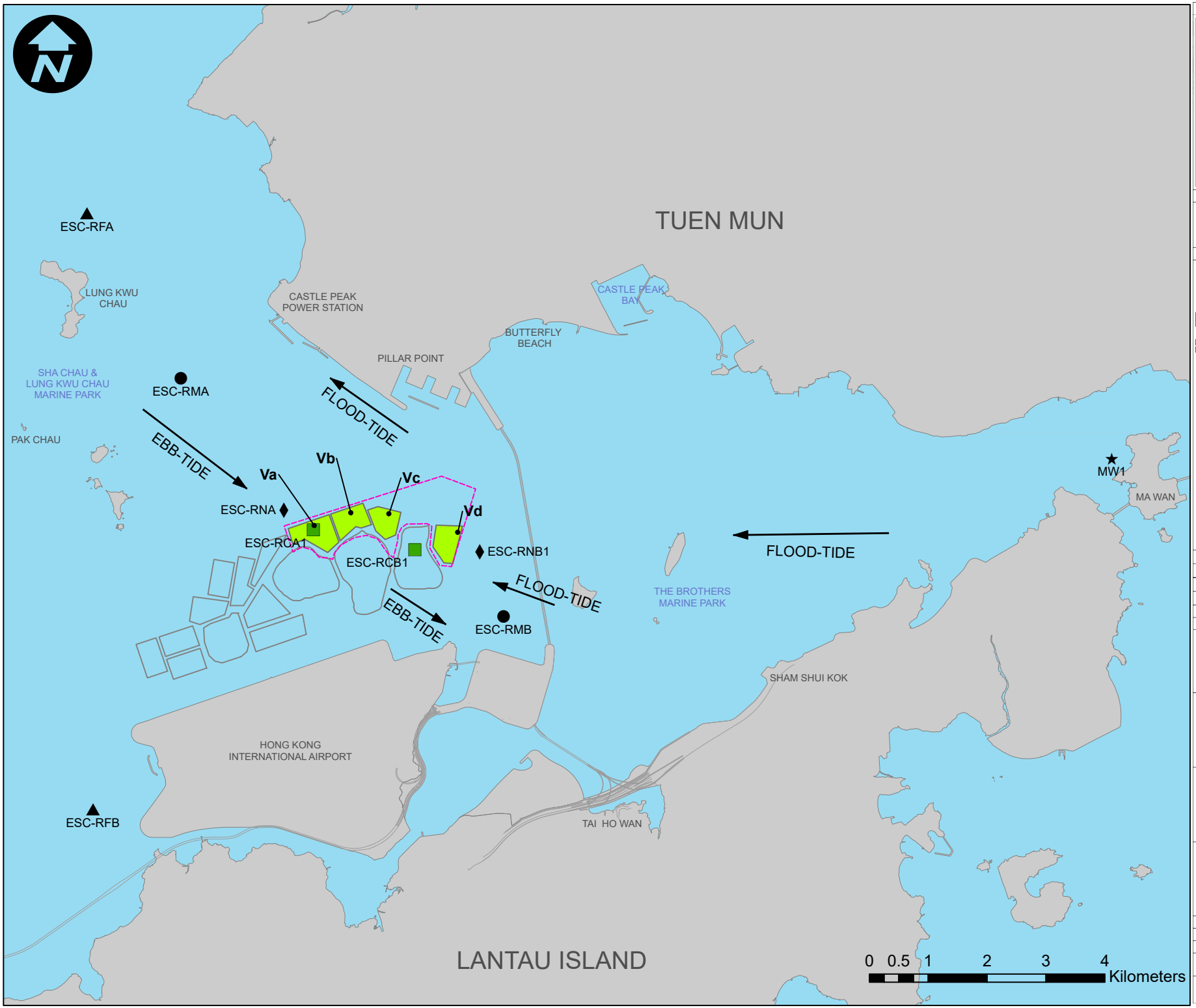
Scale at A3		Status		Rev	

Drawing Number

FIGURE 2.3



Key Plan:

Notes:

Key to symbols:

LEGEND

- ESC CMP V
- ESC USABLE AREA 1

MONITORING STATIONS

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

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

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ENVIRONMENTAL MONITORING AND AUDIT FOR DISPOSAL FACILITY TO THE EAST OF SHA CHAU (2021-2026) – INVESTIGATION

Title

SEDIMENT CHEMISTRY AFTER A MAJOR STORM MONITORING STATIONS FOR ESC CMPS

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

Drawing Number

FIGURE 2.4

Appendices

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	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
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	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	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	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	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	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	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	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	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	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	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	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	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	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
Near-field Stations																																																																		
	ESC-RNA	4 times per year		6				6		6				6		6				6		2				2		2				2		2				2		2				2		2				2		2				2		2				2		2	
	ESC-RNB1	4 times per year		6				6		6				6		6				6		2				2		2				2		2				2		2				2		2				2		2				2		2				2		2	
Mid-field Stations																																																																		
	ESC-RMA	4 times per year		6				6		6				6		6				6		2				2		2				2		2				2		2				2		2				2		2				2		2				2		2	
	ESC-RMB	4 times per year		6				6		6				6		6				6		2				2		2				2		2				2		2				2		2				2		2				2		2				2		2	
Capped Pit Stations																																																																		
	ESC-RCA1	4 times per year		6				6		6				6		6				6		2				2		2				2		2				2		2				2		2				2		2				2		2				2		2	
	ESC-RCB1	4 times per year		6				6		6				6		6				6		2				2		2				2		2				2		2				2		2				2		2				2		2				2		2	
Far-field Stations																																																																		
	ESC-RFA	4 times per year		6				6		6				6		6				6		2				2		2				2		2				2		2				2		2				2		2				2		2				2		2	
	ESC-RFB	4 times per year		6				6		6				6		6				6		2				2		2				2		2				2		2				2		2				2		2				2		2				2		2	
Ma Wan Station																																																																		
	MW1	4 times per year		6				6		6				6		6				6		2				2		2				2		2				2		2				2		2				2		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	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
Near-pit Stations																																																																		
	ESC-TDA	2 times per year		5						5							5#					5						5						5						5						5						5						5						5	
	ESC-TDB1	2 times per year		5						5							5#					5						5						5						5						5						5						5						5	
Reference Stations																																																																		
	ESC-TRA	2 times per year		5						5							5#					5						5						5						5						5						5						5						5	
	ESC-TRB	2 times per year		5						5							5#					5						5						5						5						5						5						5						5	
Ma Wan Station																																																																		
	MW1	2 times per year		5						5							5#					5						5						5						5						5						5						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	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
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	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
Near-pit Stations																																																																		
	ESC-INA	4 times per year	5	5					5	5					5	5						5^	5^				5	5					5	5					5	5					5	5					5	5					5	5					5	5	
	ESC-INB	4 times per year	5	5					5	5					5	5						5^	5^				5	5					5	5					5	5					5	5					5	5					5	5					5	5	
Reference North																																																																		
	TNA	4 times per year	5	5					5	5					5	5						5^	5^				5	5					5	5					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					5	5					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					5	5					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					5	5					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	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
Ebb Tide																																																																		
Impact Station Downcurrent																																																																		
	ESC-IPE1A	4 times per year *																																																																	
	ESC-IPE2A	4 times per year *																																																																	
	ESC-IPE3	4 times per year *																																																																	
	ESC-IPE4	4 times per year *																																																																	
	ESC-IPE5	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	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
Ebb Tide																																																																		
Impact Station Downcurrent																																																																		
	ESC-IPE1A	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-IPE2A	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-IPE3	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-IPE4	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-IPE5	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	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	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-INE2A	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-INE3A	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-INE4A	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-INE5A	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Reference Station Upcurrent																																																																		
	ESC-RFE1	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-RFE2	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-RFE3	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-RFE4	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-RFE5	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Ma Wan Station																																																																		
	MW1	Monthly*				4	4	4		4		4	4			4		4	4	4		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flood Tide																																																																		
Impact Station Downcurrent																																																																		
	ESC-IPF1	Monthly*	4	4	4				4		4			4	4		4				2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-IPF2	Monthly*	4	4	4				4		4			4	4		4				2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-IPF3	Monthly*	4	4	4				4		4			4	4		4				2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Intermediate Station Downcurrent																																																																		
	ESC-INF1	Monthly*	4	4	4				4		4			4	4		4				2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-INF2	Monthly*	4	4	4				4		4			4	4		4				2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-INF3	Monthly*	4	4	4				4		4			4	4		4				2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Reference Station Upcurrent																																																																		
	ESC-RFF1A	Monthly*	4	4	4				4		4			4	4		4				2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-RFF2A	Monthly*	4	4	4				4		4			4	4		4				2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ESC-RFF3	Monthly*	4	4	4				4		4			4	4		4				2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Ma Wan Station																																																																		
	MW1	Monthly*	4	4	4				4		4			4	4		4				2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Water Column Profiling *			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	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
Plume Stations																																																																		
	WCP1	Monthly*	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	WCP2	Monthly*	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Benthic Recoloinisation Studies			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	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
Capped Stations at CMP V																																																																		
	ESCV-CPA	2 times per year																																																																
	ESCV-CPB	2 times per year																																																																
	ESCV-CPC	2 times per year																																																																
	ESCV-CPD	2 times per year																																																																
Reference Stations																																																																		
	RBA	2 times per year																																																															
	RBB	2 times per year																																																															
	RBC1	2 times per year																																																															
Impact Monitoring for Dredging			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	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
Upstream Stations																																																																		
	US1	3 times per week														2	2	2	2	2																																													
	US2	3 times per week														2	2	2	2	2																																													
Downstream Stations																																																																		
	DS1	3 times per week														2	2	2	2	2																																													
	DS2	3 times per week														2	2	2	2	2																																													
	DS3	3 times per week														2	2	2	2	2																																													
	DS4	3 times per week														2	2	2	2	2																																													
	DS5	3 times per week														2	2	2	2	2																																													
Ma Wan Station																																																																		
	MW1	3 times per week														2	2	2	2	2																																													

Notes:

(1) The number shown in each cell represents the numbers of replicates per monitoring station. The number shown in **green bolded text** represented monitoring works have been conducted before/ during the reporting period of this Monthly EM&A Report, while the number shown in black represent planned monitoring works after the reporting period of this Monthly EM&A Report.

(2) For the planned Routine Water Quality Monitoring (i.e. the numbers of replicates per monitoring station shown in black), the monitoring will be conducted at mid-ebb OR mid-flood tide. The yearly tidal selection of this monitoring will be based on a principle to obtain 6 months monitoring data at mid-ebb, and 6 months monitoring data at mid-flood.

(3) Impact Monitoring for Dredging will be scheduled when dredging operations commence.

(4) Benthic Recolonisation Studies for CMP V will be scheduled when capping operation for CMP V is completed.

Remarks:

***** A proposal on the change of number of sample replication of water quality & sediment monitoring and combination of routine water quality monitoring and water quality monitoring during capping operation was submitted to EPD and agreed by EPD on 3 December 2020. The proposed changes have been implemented for the EM&A activities since December 2020. Water Quality Monitoring during Capping Operation and Routine Water Quality Monitoring are combined such that Routine Water Quality Monitoring have been conducted monthly starting in December 2020. 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 was provided to EPD in April 2022. Phase 2 optimization of sample replication has been effective for the EM&A activities since July 2022.

Due to the logistic problem induced by the pandemic which adversely affecting the supply of international species adopted in testing programme of Sediment Toxicity Tests, as such, Sediment Toxicity Tests of ESC CMPs originally scheduled in February 2022 were postponed to March 2022.

^ To enable the required Research Fishing Permit could be granted by the time undertaking the Demersal Trawling, trawling originally scheduled in July and August 2022 will be tentatively postponed to August and September 2022.

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)**	**Surface and Middle Depth(2)**
	5%-ile of baseline data for surface and middle layer = **3.76**	1%-ile of baseline data for surface and middle layer = **3.11** (3)
	and	and
	Significantly less than the reference station's mean DO (at the same tide of the same day)	Significantly less than the reference station's mean DO (at the same tide of the same day)
	Bottom	**Bottom**
	5%-ile of baseline data for surface and middle layer = **2.96**	The average of the impact station readings are **< 2**
	and	and
	Significantly less than the reference station's mean DO (at the same tide of the same day)	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**	99%-ile of baseline data for depth-averaged = **61.92**
	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
Turbidity in NTU (depth-averaged)(4)(5)	95%-ile of baseline data = **28.14**	99%-ile of baseline data = **38.32**
	and	and
	120% of control station's Turbidity at the same tide of the same day	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 August 2022

Station	Temp. (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%)	Dissolved Oxygen (mg L^{-1})	pH	Suspended Solids (mg L^{-1})
WCP 1 (Downstream)	28.89	23.73	1.62	88.97	6.01	8.03	3.0
WCP 2 (Upstream)	29.04	23.27	2.00	90.38	6.11	7.98	6.5
WQO (Wet Season)	N/A	20.94-25.60#	N/A	N/A	>4	6.5-8.5	12.0

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 August 2022

Station	Temp. (°C)	Salinity (ppt)	Turbidity (NTU)	Dissolved Oxygen (%)	Dissolved Oxygen (mg L^{-1})	pH
RFF (Reference)	29.00	21.42	1.95	117.34	8.06	8.37
IPF (Impact)	29.14	21.20	2.78	114.64	7.86	8.32
INF (Intermediate)	29.02	22.13	3.13	113.46	7.75	8.29
Ma Wan	28.97	23.48	1.18	123.47	8.35	8.34
WQO (Wet Season)	N/A	19.28-23.56	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 July 2022

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	2.08	0.04	0.12	0.50	ND	0.001	0.56	ND	0.72
IPF	1.95	0.04	0.11	0.56	ND	0.001	0.60	ND	0.23
INF	2.04	0.04	0.14	0.61	ND	0.001	0.66	ND	0.11
Ma Wan	1.86	0.06	0.14	0.56	ND	0.001	0.48	ND	1.24

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 July 2022

Station	NH_3 (mg/L)	TIN (mg/L)	BOD_5 (mg/L)	SS (mg/L)
RFF	<LOR	0.68	1.25	7.0
IPF	<LOR	0.79	1.40	4.7
INF	<LOR	0.84	1.45	2.5
Ma Wan	<LOR	0.56	1.50	3.5

WQO of TIN: 0.5 mg/L
Wet Season WQO of SS: 12.0 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.

Table B6: Laboratory Results for Dissolved Metals and Metalloid in Routine Water Quality Monitoring of ESC CMPs in August 2022

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	*	*	*	*	*	*	*	*	*
IPE	*	*	*	*	*	*	*	*	*
INE	*	*	*	*	*	*	*	*	*
Ma Wan	*	*	*	*	*	*	*	*	*

Note:
1. "* Laboratory analysis data of metals and metalloid are still under consolidation, which will be presented in the Monthly EM&A Report of the next reporting period.

Table B7: Laboratory Results for Nutrients and Suspended Solid in Routine Water Quality Monitoring of ESC CMPs in August 2022

Station	NH_3 (mg/L)	TIN (mg/L)	BOD_5 (mg/L)	SS (mg/L)
RFE	0.03	0.55	2.12	6.6
IPE	0.07	0.52	1.48	5.9
INE	0.05	0.56	2.12	6.7
Ma Wan	0.03	0.40	1.40	4.0

WQO of TIN: 0.5 mg/L
Wet Season WQO of SS: 12.0 mg/L

Notes:
4. "<LOR" indicates the concentrations of contaminants are below the limit of reporting.
5. Cell shaded yellow / red indicates value exceeding the Action/Limit levels.
6. Cell shaded grey indicates value exceeding the WQO.

Appendix C. Graphical Presentations

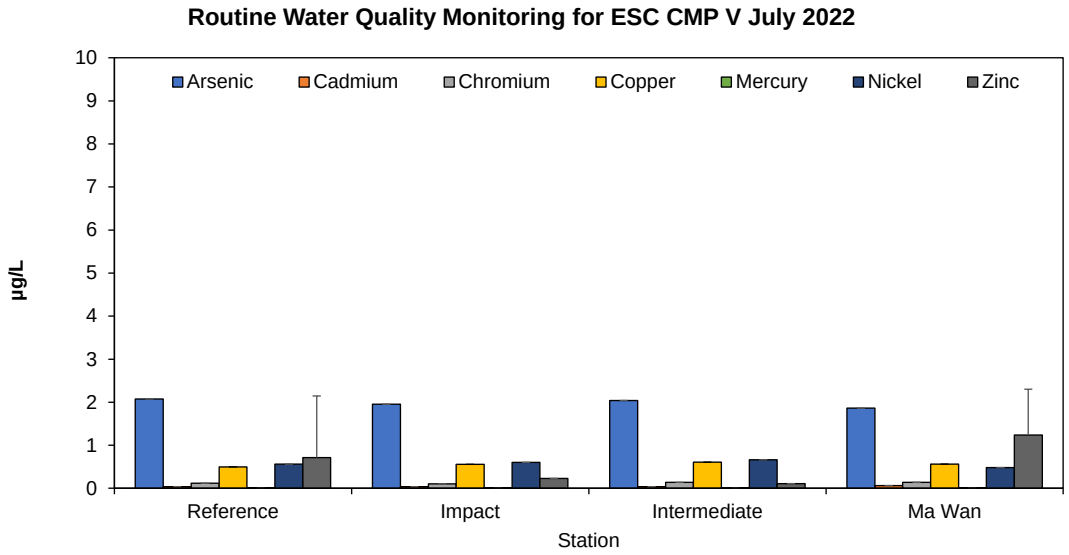


Figure 1: Concentration of Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Silver, and Zinc (µg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in July 2022

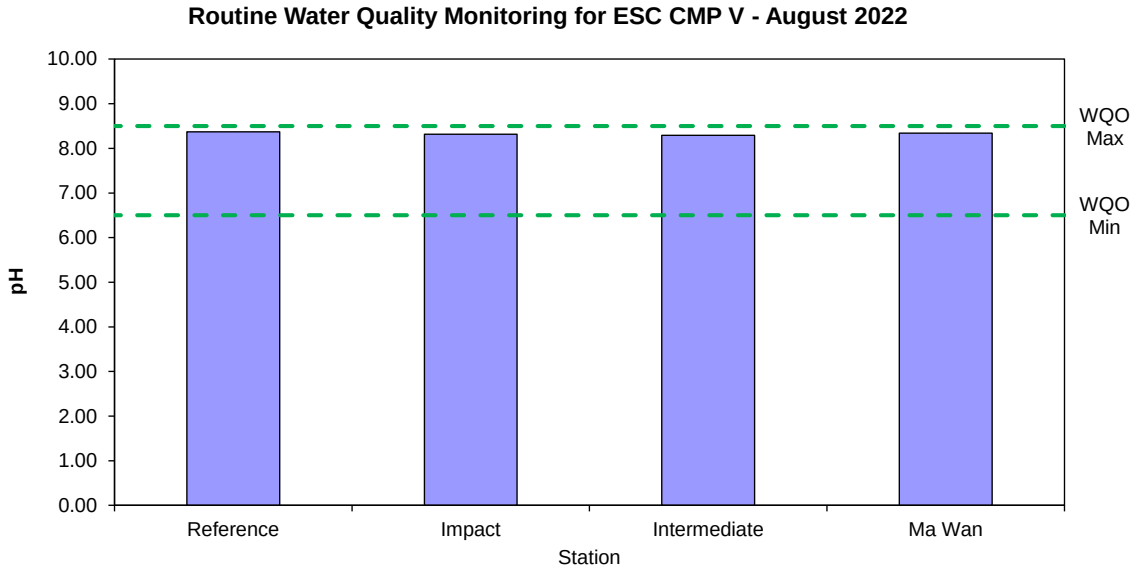


Figure 2: Level of pH recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2022

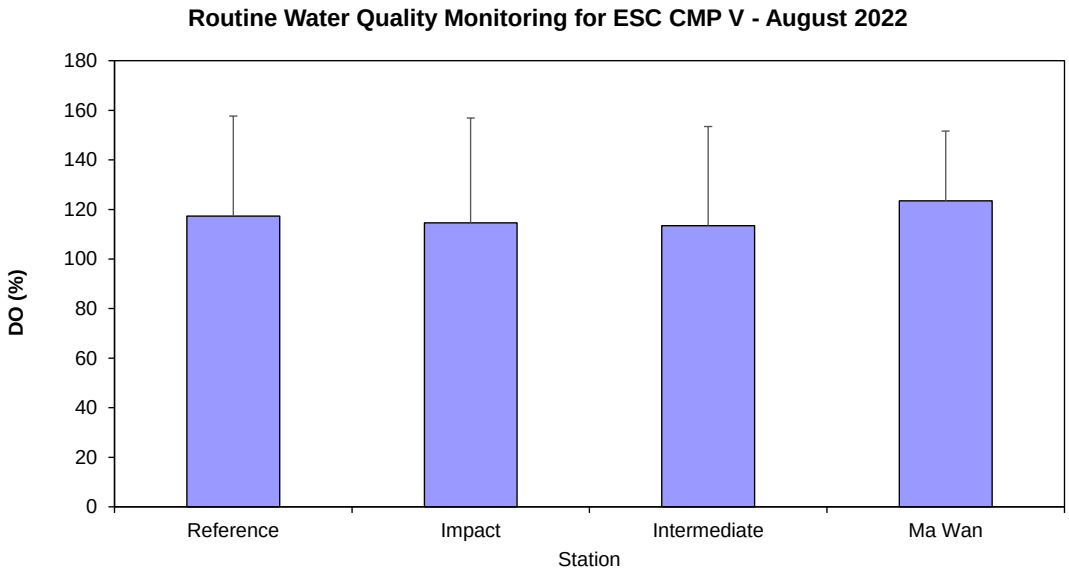


Figure 3: Level of Dissolved Oxygen (DO) (% saturation; mean + SD[1]) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2022

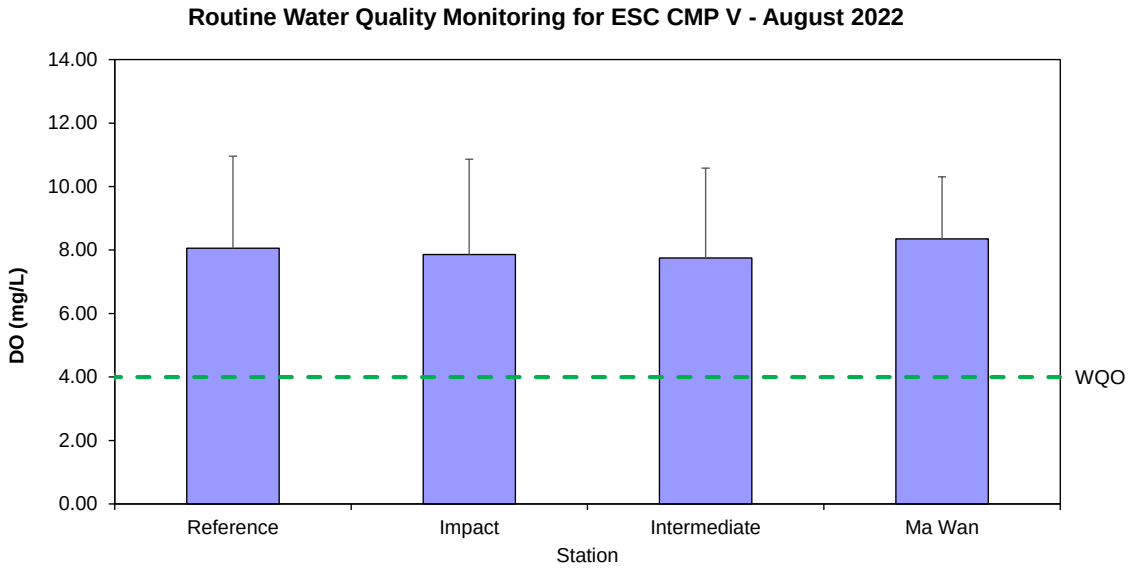


Figure 4: Concentration of Dissolved Oxygen (DO) (mg/L; mean + SD[1]) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2022

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

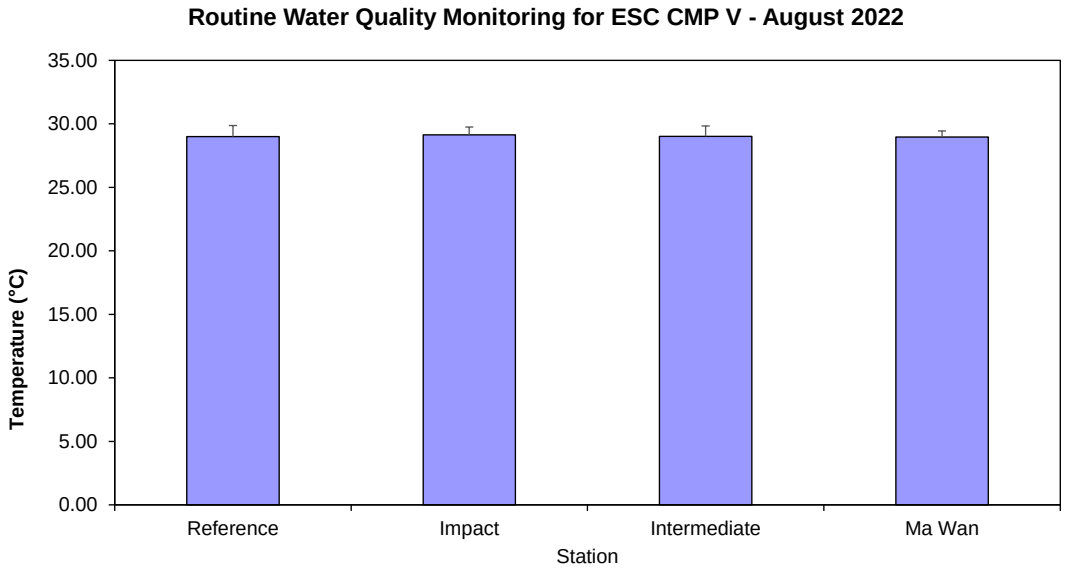


Figure 5: Level of Temperature (°C; mean + SD[1]) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2022

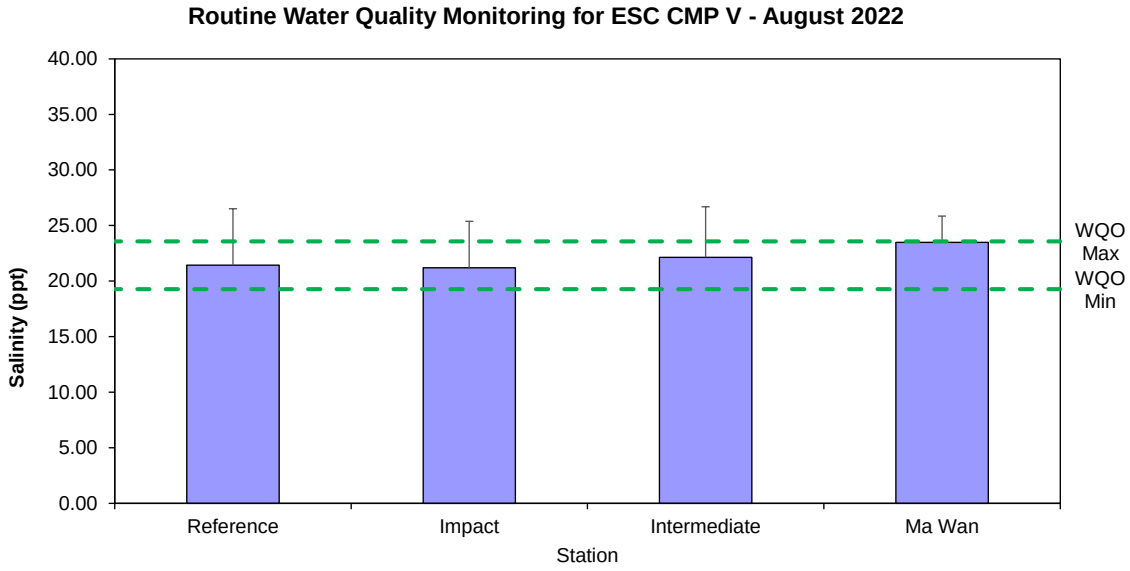


Figure 6: Level of Salinity (ppt; mean + SD[1]) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2022

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

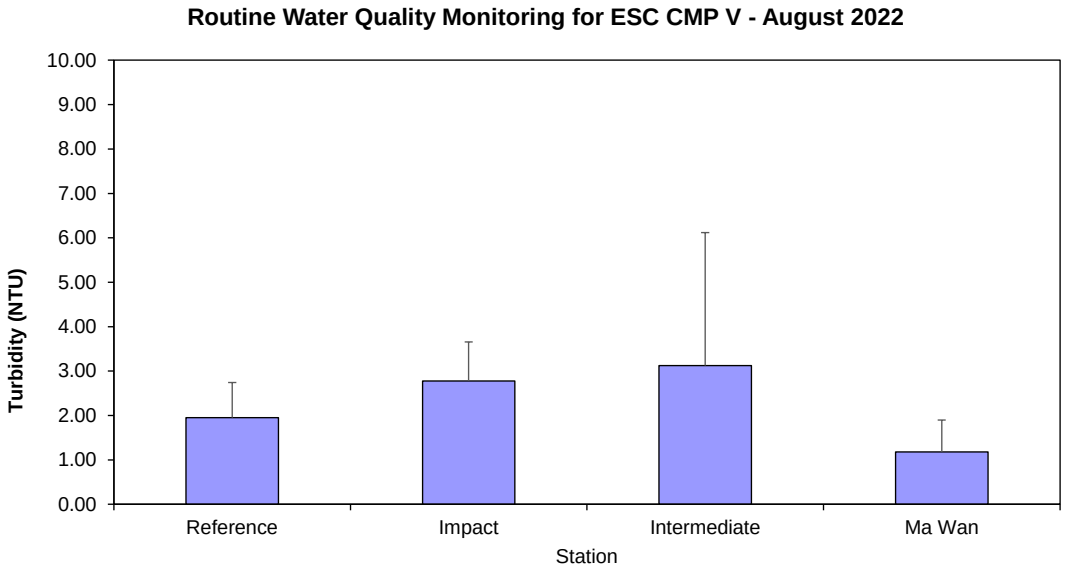


Figure 7: Level of Turbidity (NTU; mean + SD[1]) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2022

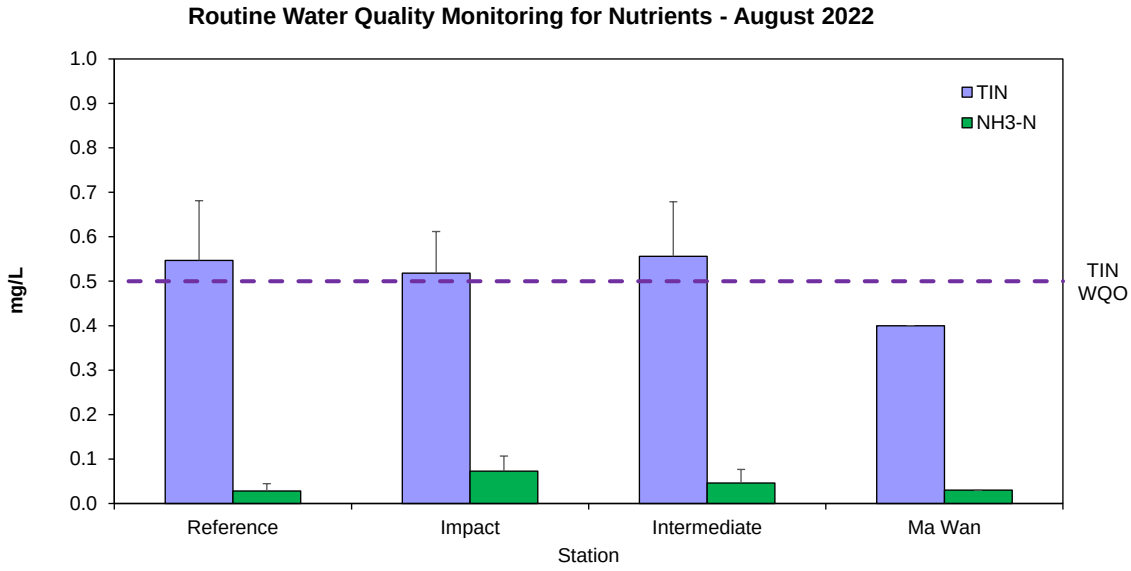


Figure 8: Concentration of Total Inorganic Nitrogen (TIN) and Ammonia Nitrogen (NH3-N) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2022

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

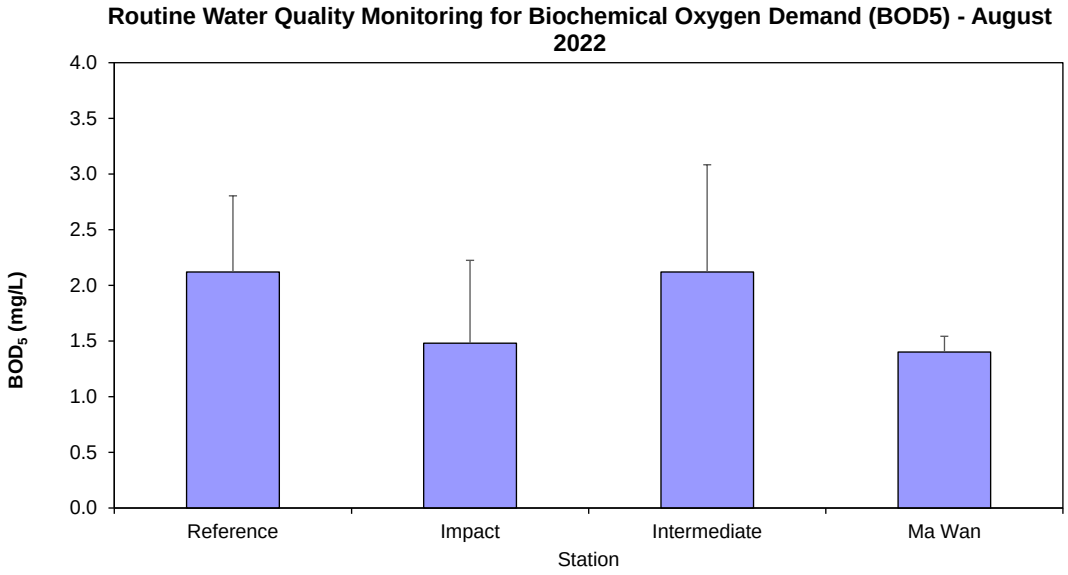


Figure 9: Level of Biochemical Oxygen Demand (BOD5) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2022

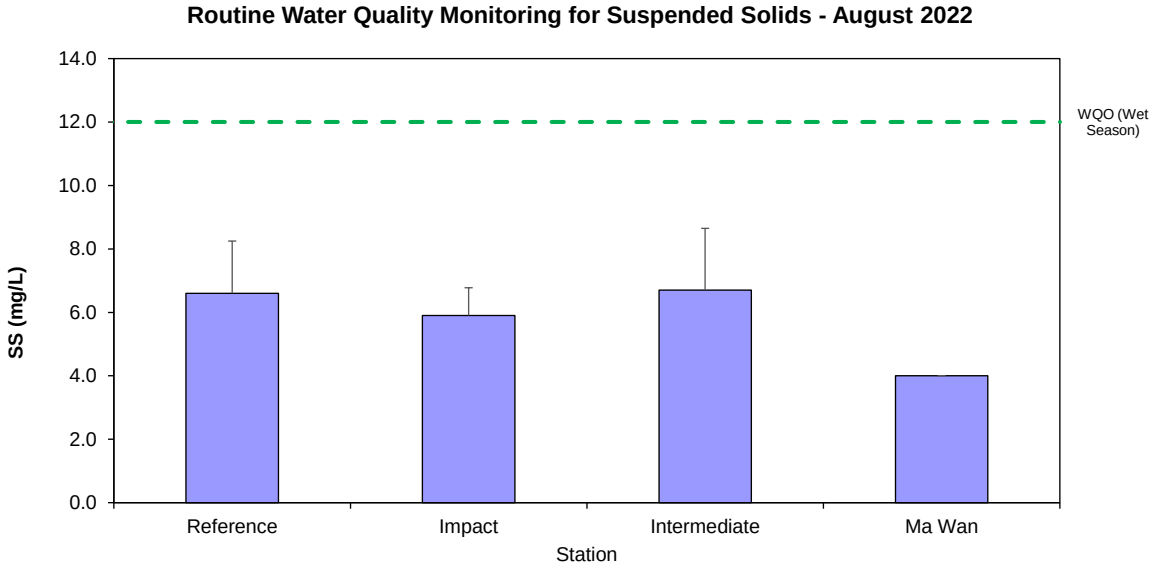


Figure 10: Concentration of Suspended Solids (SS) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in August 2022

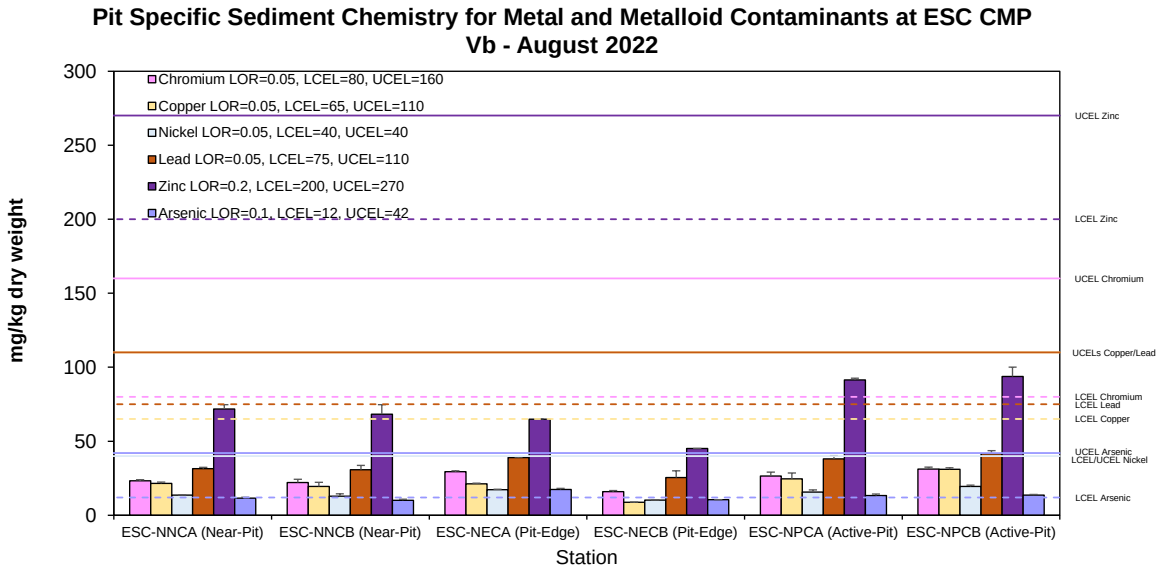


Figure 11: Concentration of Metals and Metalloid (Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in August 2022

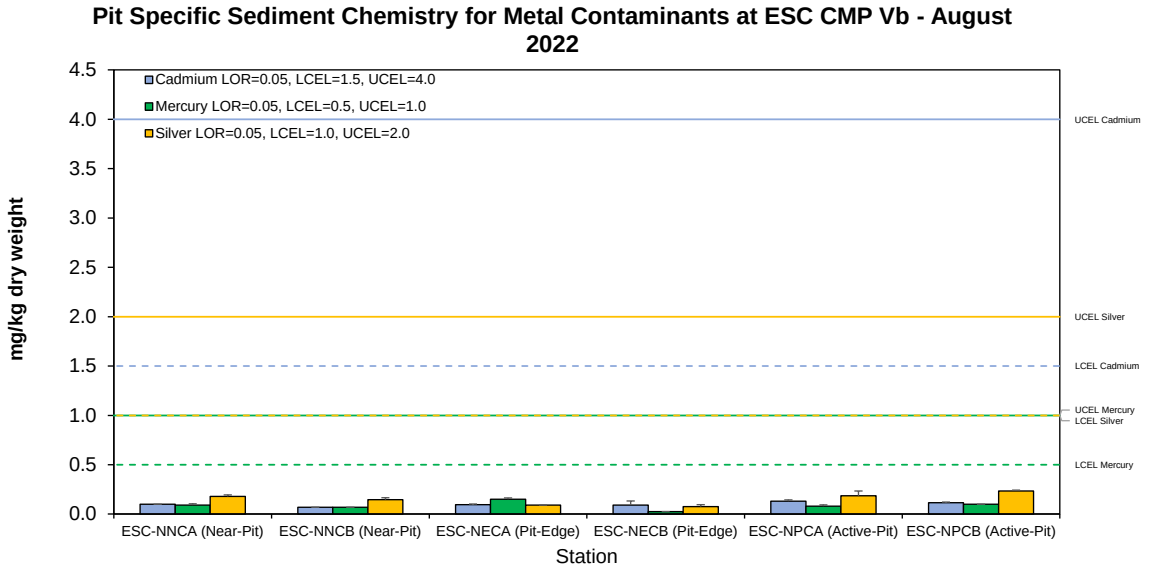


Figure 12: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in August 2022

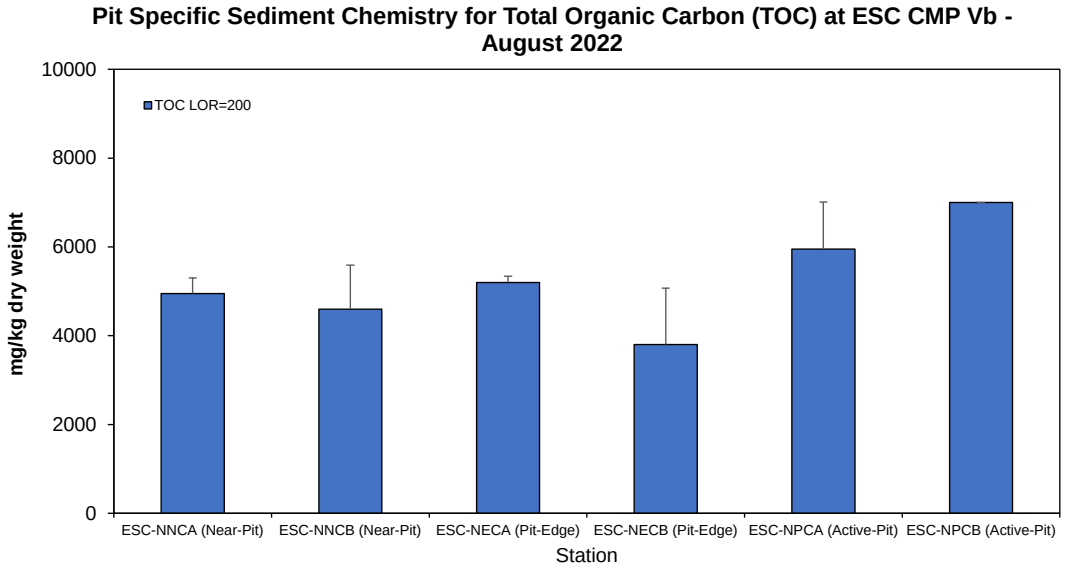


Figure 13: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in August 2022

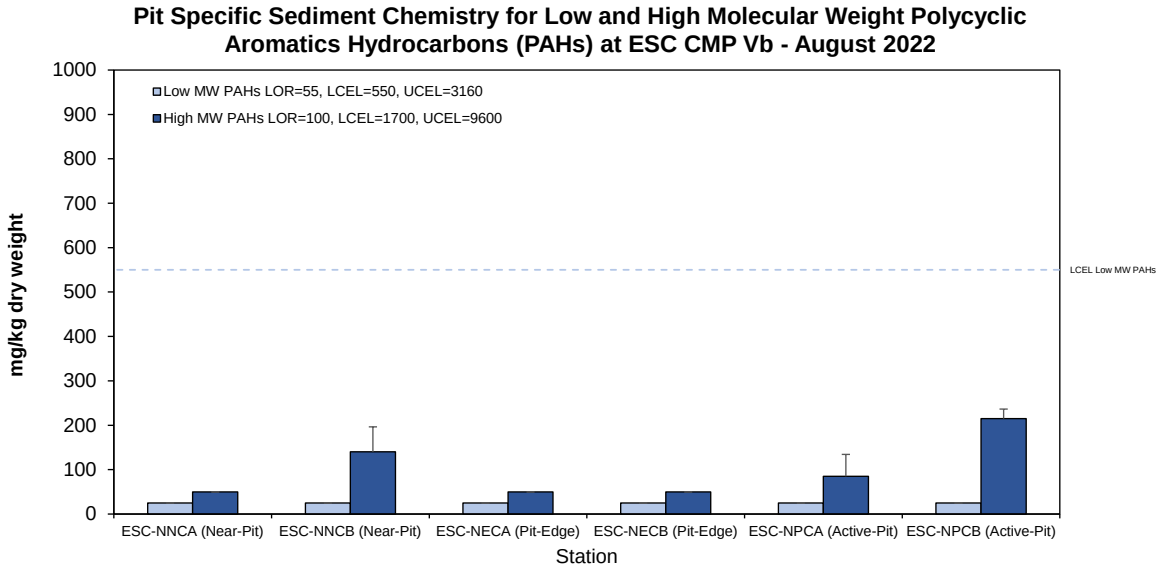


Figure 14: Concentration of Low and High Molecular Weight Polycyclic Aromatic Hydrocarbons (mg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in August 2022

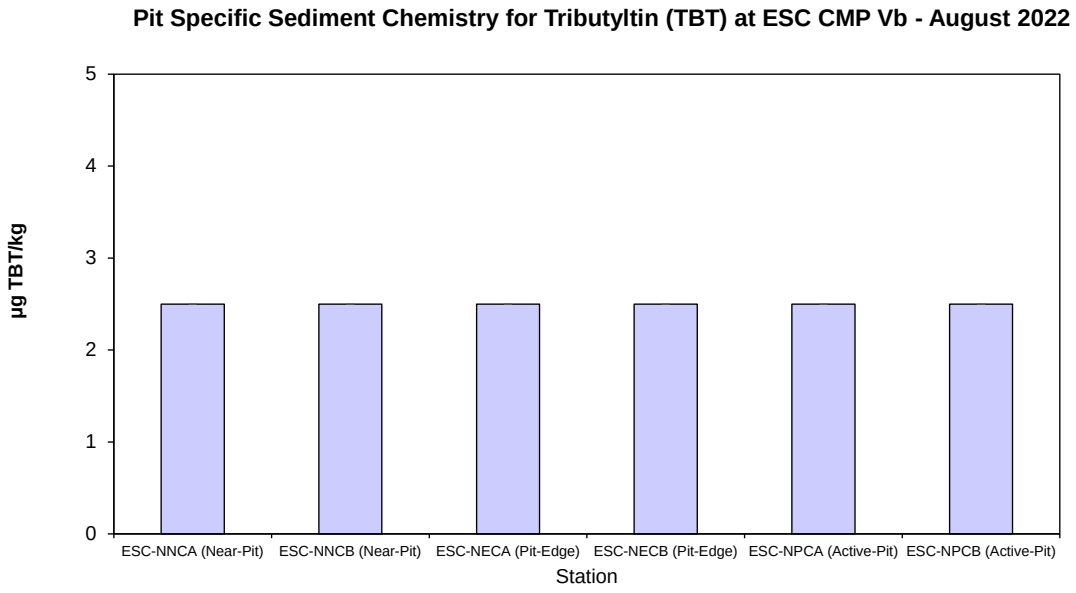


Figure 15: Concentration of Tributyltin (TBT) (µg TBT/kg; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in August 2022

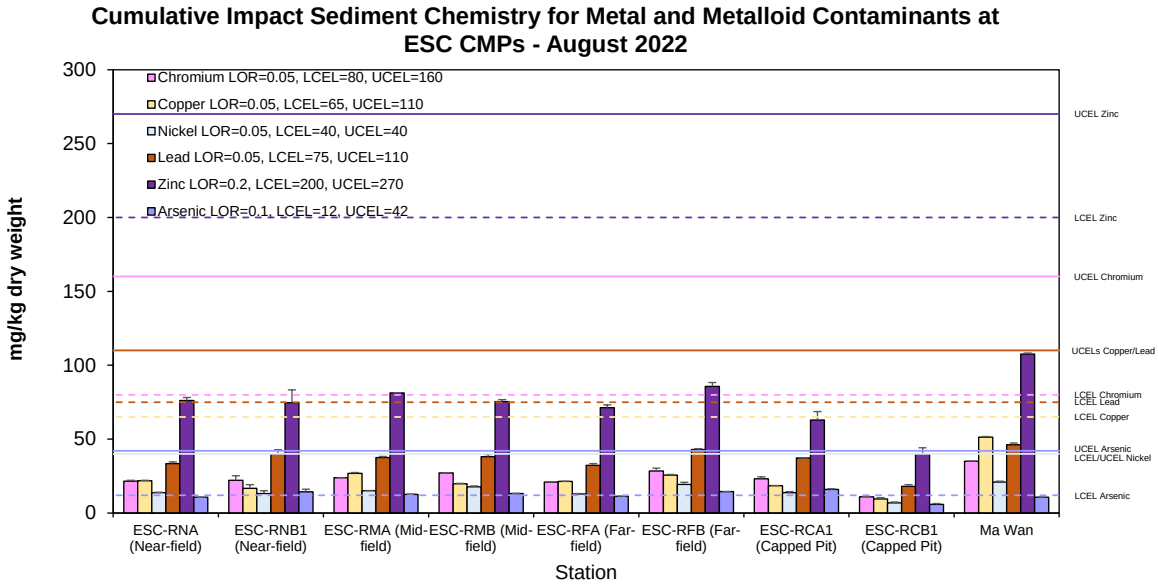


Figure 16: Concentration of Metals and Metalloid (Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean + SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in August 2022

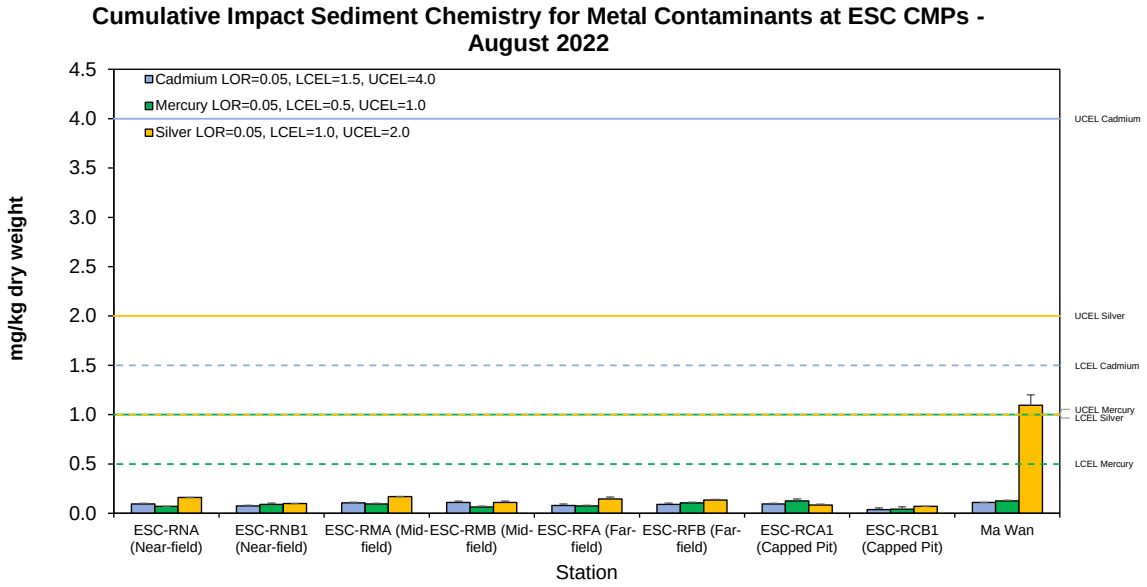


Figure 17: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean + SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in August 2022

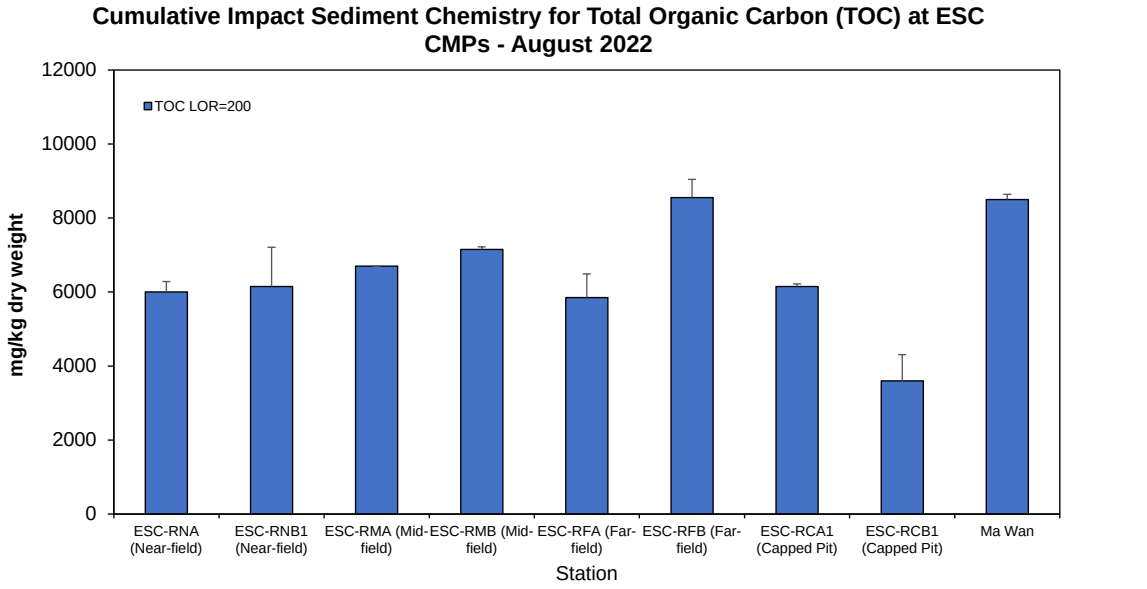


Figure 18: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean + SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in August 2022

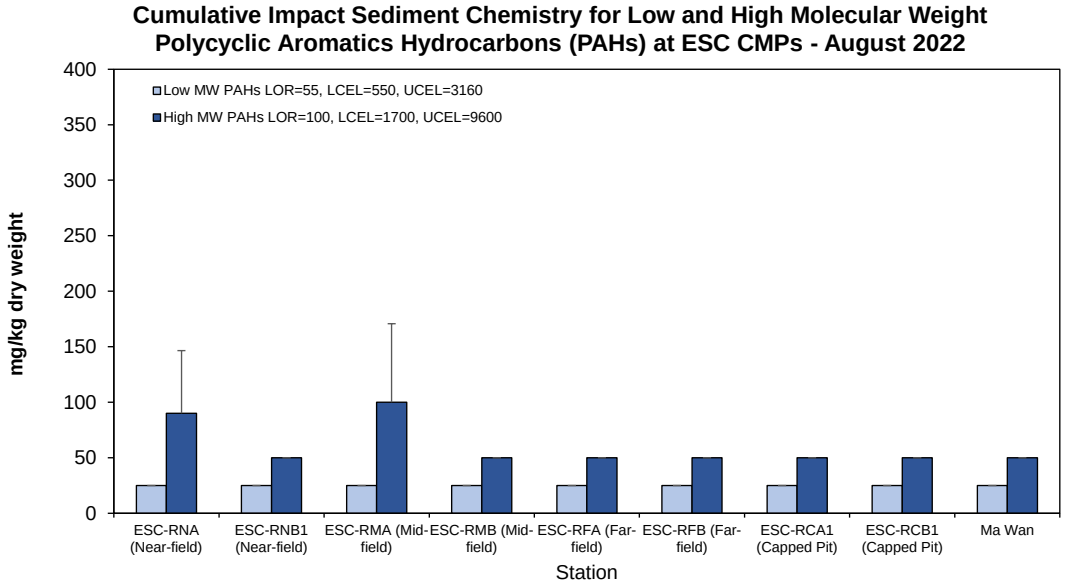


Figure 19: Concentration of Low and High Molecular Weight Polycyclic Aromatics (mg/kg dry weight; mean + SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in August 2022

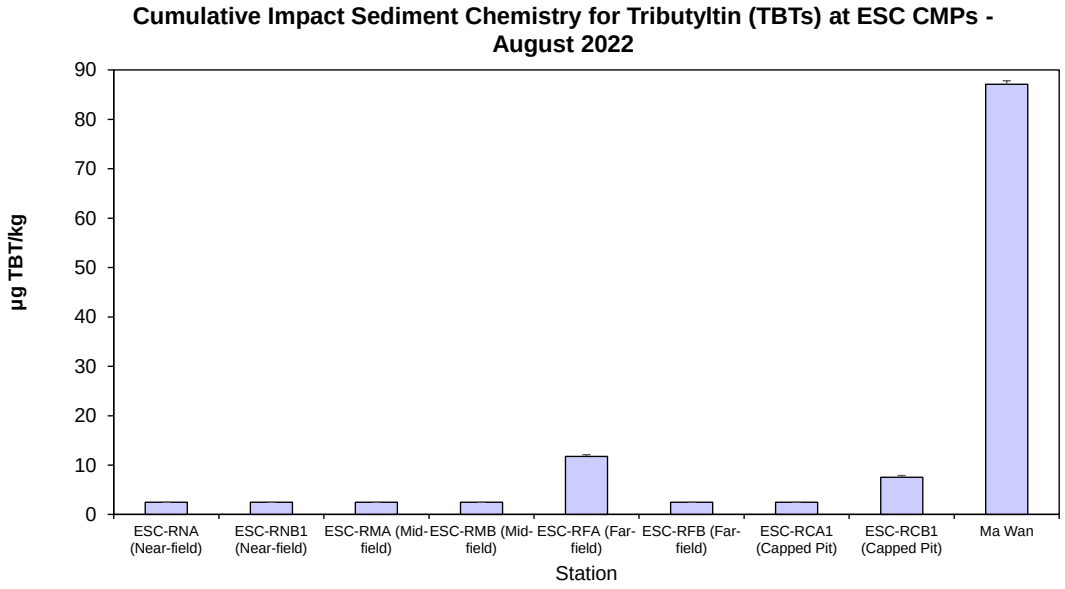


Figure 20: Concentration of Tributyltin (TBT) (µg/kg dry weight; mean + SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in August 2022

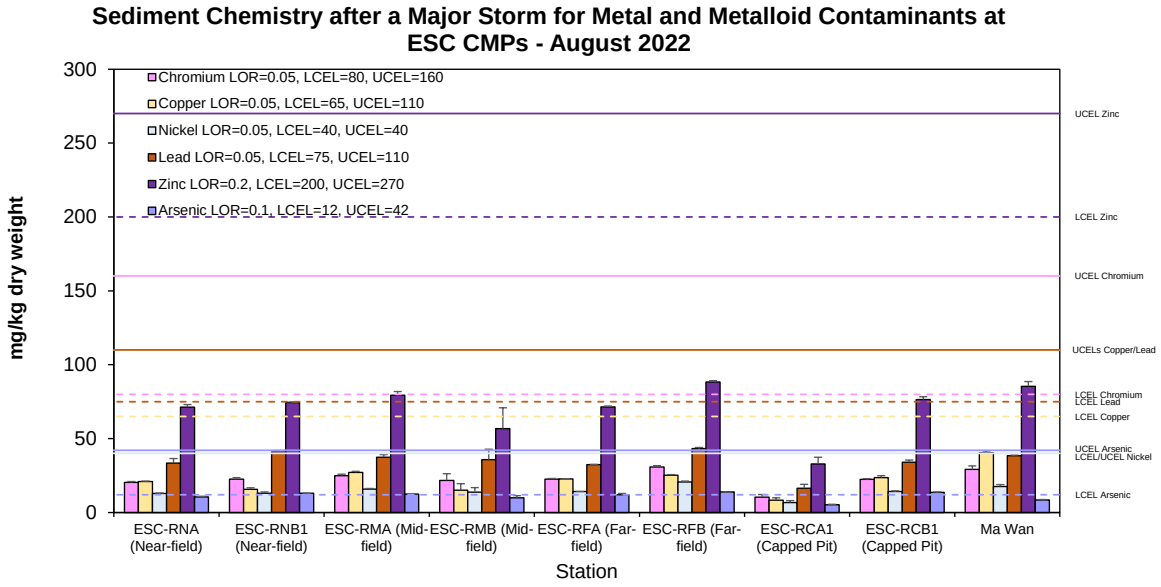


Figure 21 Concentration of Metals (Cr, Cu, Ni, Pb, Zn, As; mean + SD) in sediment samples collected from Sediment Chemistry after a Major Storm for ESC CMPs in August 2022

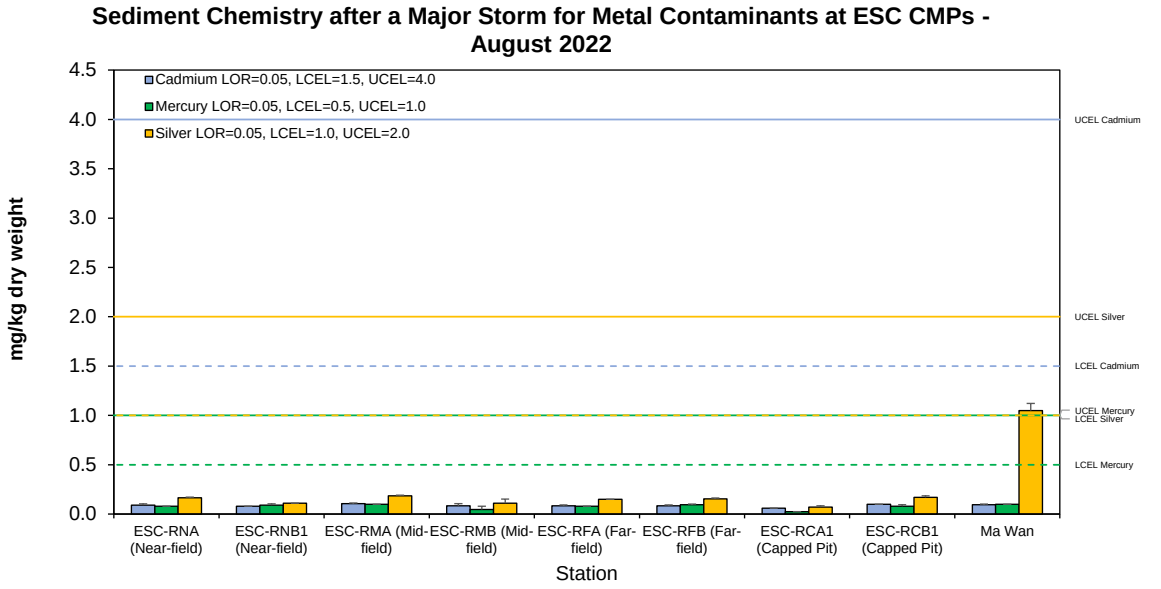


Figure 22: Concentration of Metals (Cd, Hg, Ag; mean + SD) in sediment samples collected from Sediment Chemistry after a Major Storm for ESC CMPs in August 2022

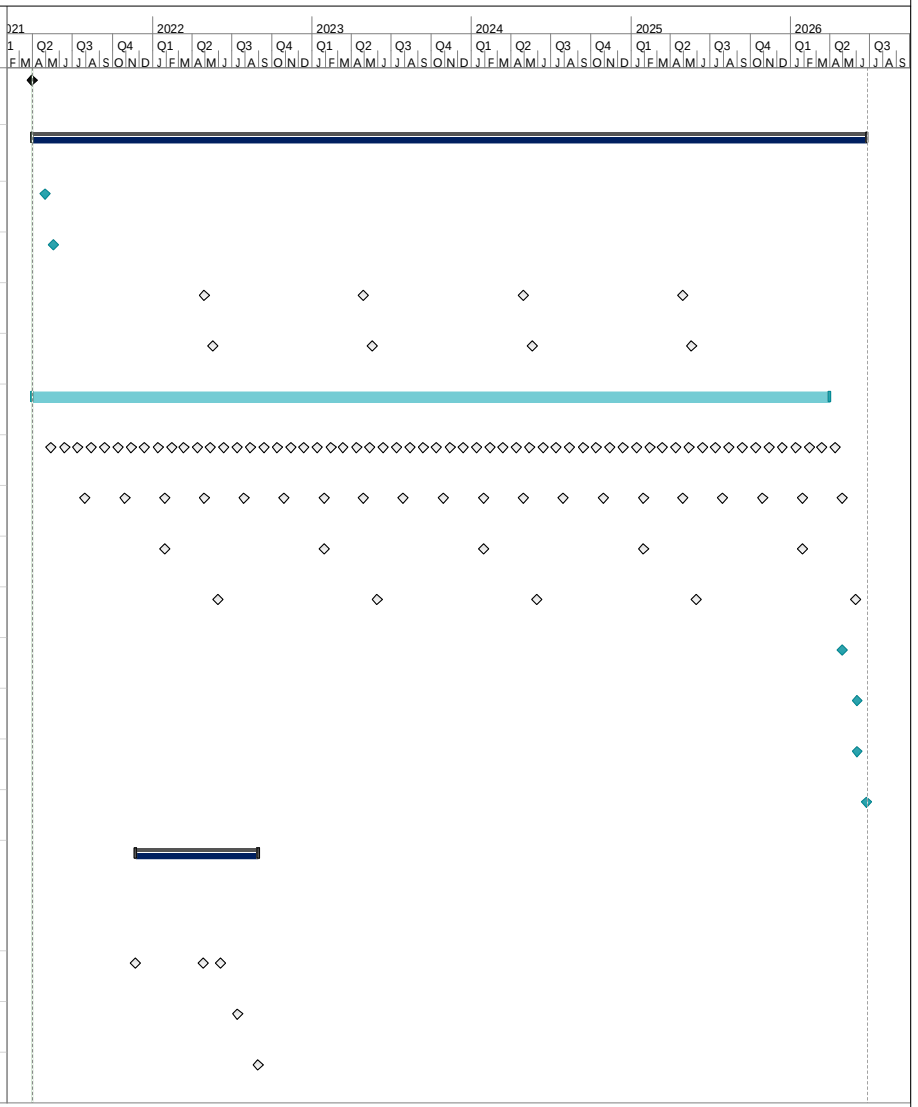
Appendix D. Study Programme

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
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