

## 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 – October 2024

November 2024

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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 – October 2024
Date of Report:	12 November 2024
Date prepared by ET:	12 November 2024
Date received by IA:	12 November 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): /

them Cler

Date: 12 November 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):

Nerg Marg

Date: 12 November 2024

## **Issue and Revision Record**

Date	Originator	Checker	Approver	Description
Nov 2024	Various	Liz Lo	Thomas Chan	Revision A of Submission
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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.<sup>1,2</sup> 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 October 2024, the following works were undertaken:

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

<sup>&</sup>lt;sup>1</sup> 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.

<sup>&</sup>lt;sup>2</sup> 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* – September 2024 covers the EM&A activities for the reporting period of October 2024 (from 1 to 31 October 2024).

#### 1.3 Details of Sampling and Laboratory Testing Activities

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

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

#### 1.4 Details of Outstanding Sampling or Analysis

Laboratory analysis data of Mercury for Routine Water Quality Monitoring of ESC CMPs in October 2024 are still under consolidation, which will be presented in the Monthly EM&A Report of the next reporting period.

## 2 Brief Discussion of Monitoring Results for ESC CMP V

#### 2.1 Introduction

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

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

#### 2.2 Water Column Profiling of ESC CMP Vb – in October 2024

Water Column Profiling was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 9 October 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.<sup>3</sup> 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 October 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 October 2024 indicated that the SS level at both Upstream and Downstream stations complied with the WQO and the Action and Limit Levels (**Tables B1 and B2** of **Appendix B**).

Overall, the monitoring results indicated that the mud disposal operation at ESC CMP Vb did not appear to cause any deterioration in water quality during this reporting period.

#### 2.3 Routine Water Quality Monitoring of ESC CMPs – in October 2024

Routine Water Quality Monitoring of ESC CMPs was undertaken on 8 October 2024. The monitoring results have been assessed for compliance with the WQOs (see Section 2.2 above for details). The monitoring results are shown in Tables B3, B4 and B5 of Appendix B and Figures 1 to 11 of Appendix C. A total of ten (10) monitoring stations were sampled in October 2024 as shown in Figure 2.1.

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

#### 2.3.1 In-situ Measurements

Graphical presentation of the monitoring results (Temperature, DO, pH, Salinity and Turbidity) is shown in **Figures 1 to 6** of **Appendix C**. Analyses of results indicated that the levels of pH, and DO complied with the WQOs at all stations in October 2024.

The levels of DO and Turbidity complied with the Action and Limit Levels at all stations (**Table B3** of **Appendix B**; **Figures 3 and 6** of **Appendix C**).

Overall, *in-situ* measurement results of the Routine Water Quality Monitoring indicated that the disposal and capping operation at ESC CMPs did not appear to cause any unacceptable impacts in water quality in October 2024.

#### 2.3.2 Laboratory Measurements

Refer to **Section 1.4**, laboratory analysis data of Mercury in October 2024 are still under consolidation, which will be presented in the Monthly EM&A Report of the next reporting period.

Laboratory analysis of samples obtained during the reporting period indicated that the concentrations of Arsenic, Cadmium, Chromium, Copper, Lead, Nickel and Zinc were detected in the samples at some/ all stations and their concentrations were generally similar across stations; except the concentrations of Silver 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 lower than the WQO (0.5 mg/L) at all stations. (**Table B5** of **Appendix B**; **Figure 9** of **Appendix C**). The concentrations of Ammonia Nitrogen (NH<sub>3</sub>-N) were lower at Intermediate (INF) station and the concentrations of Biochemical Oxygen Demand (BOD5) were lower at Reference (RFF) and Ma Wan stations. (**Table B5** of **Appendix B**; **Figure 9 and10** of **Appendix C**)

Analyses of results for the reporting period indicated that the SS levels complied with the Action and Limit Levels at all stations, except SS levels were slightly higher than wet season WQO (11.9 mg/L) at Reference (RFF) and Impact (IPF) stations. (**Tables B1 and B5** of **Appendix B**; **Figure 11** of **Appendix C**).

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

#### 2.4 Pit Specific Sediment Chemistry of ESC CMP Vb – in October 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 7 October 2024.

The concentrations of all inorganic contaminants were lower than the Lower Chemical Exceedance Levels (LCELs) at all stations. (**Figures 12 and 13** of **Appendix C**).

For organic contaminants, the concentrations of Total Organic Carbon (TOC) were higher at Active-Pit stations ESC-NPCA and ESC-NPCB. (**Figure 14** of **Appendix C**). The concentrations of Low Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) were higher than LCEL at Pit-Edge station ESC-NECA. (**Figures 15** of **Appendix C**).

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

The concentrations of Tributyltin (TBT), Total Polychlorinated Biphenyls (PCBs), Total dichlorodiphenyl-trichloroethane (DDT) and 4,4'-dichlorodiphenyldichloroethylene (DDE) were below the limit of reporting at all stations during the reporting period.

It is observed that the elevated level concentrations of Low Molecular Weight and High Molecular Weight PAHs (i.e. higher than LCELs) only occurred within Pit-Edge station NECA, but the concentrations of other organic and all inorganic contaminants were lower than the LCELs at the Pit-Edge station.

The slightly elevated level of Low Molecular Weight 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.

## 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 November 2024 for ESC CMP V (see **Appendix A** for the sampling schedule):

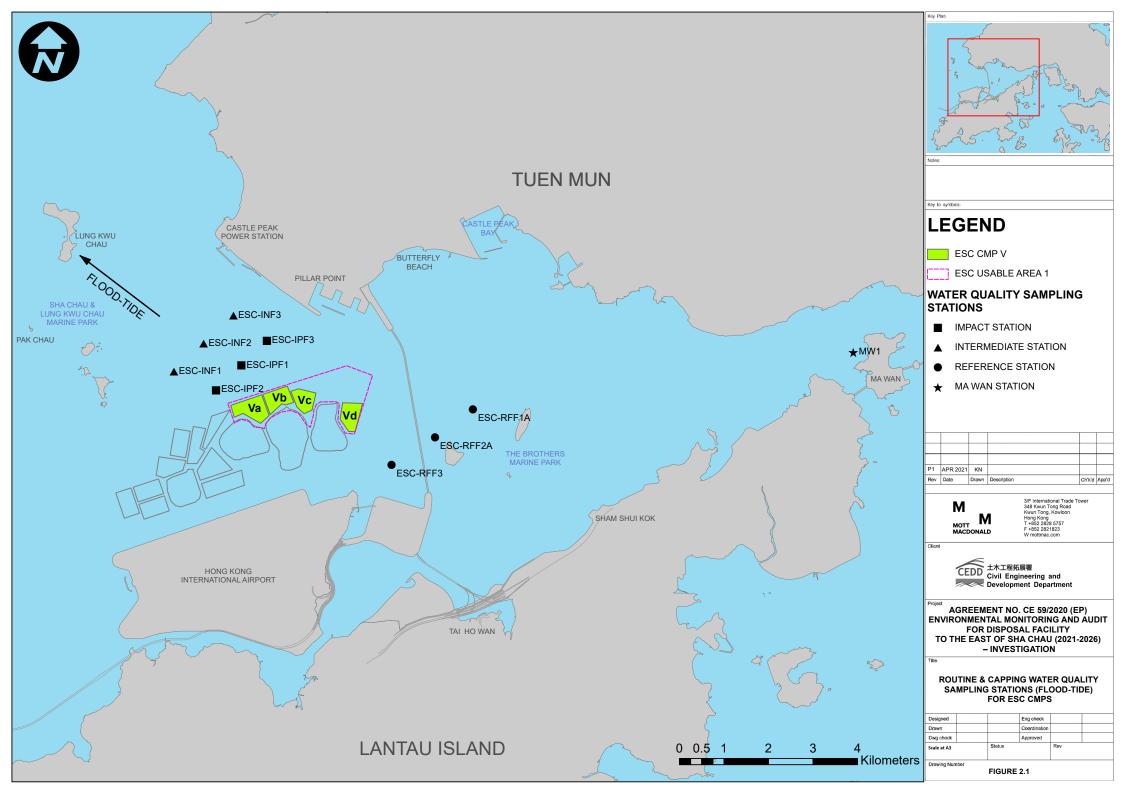
- Water Column Profiling of ESC CMP Vb;
- Routine Water Quality Monitoring of ESC CMPs; and
- Pit Specific Sediment Chemistry of ESC CMP Vb;

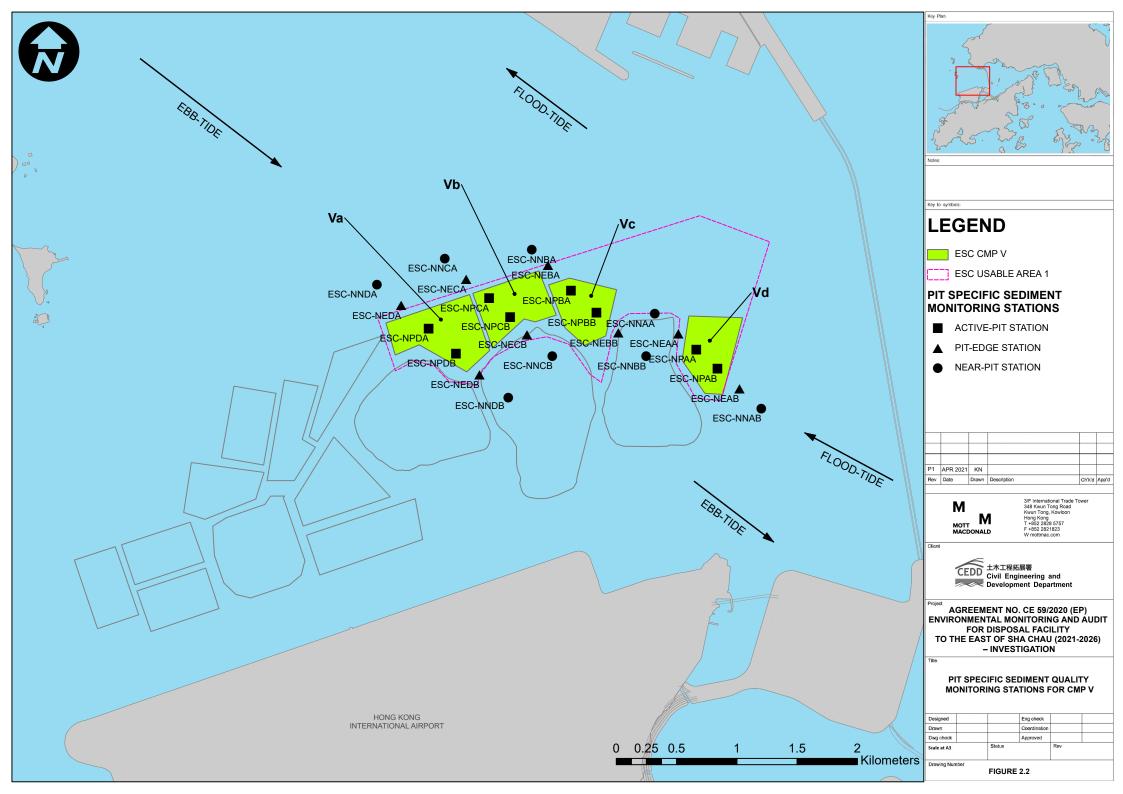
#### 3.2 Study Programme

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

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## Appendices

- Appendix A Sampling Schedule
- Appendix B Water Quality Monitoring Results
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## **Appendix A. Sampling Schedule**

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

Parameter / Station Type Pit Specific Sediment Ch Active-Pit	e Station ID nemistry *	Frequency					
Pit-Edge	ESC-NPAA ESC-NPAB	Monthly Monthly	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 2 2 2 2 2 2 2 2 2
Near-Pit	ESC-NEAB	Monthly	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 2 2 2 2 2 2 2 2 2
Cumulative Impact Sedir	ESC-NNAB	Monthly	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 2 2 2 2 2 2 2 2 2 2 2 2 2 2
Near-field Stations	ESC-RNA	4 times per year	6 6 6			2 2 2 2	
Mid-field Stations	ESC-RMA ESC-RMB	4 times per year 4 times per year	6 6 6		2         2	2         2         2         2         2           2         2         2         2         2         2	2         2
Capped Pit Stations	ESC-RCA1 ESC-RCB1	4 times per year 4 times per year			2         2         2         2         2           2         2         2         2         2         2	2         2         2         2           2         2         2         2         2	2         2         2         2         2         2           2         2         2         2         2         2         2
Far-field Stations	ESC-RFA ESC-RFB	4 times per year 4 times per year			2         2         2         2         2           2         2         2         2         2         2	2         2         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 Sediment Toxicity Tests	MW1	4 times per year					
Near-pit Stations	Subar Series Ser		5 5 5				
Reference Stations	ESC-TRA	2 times per year	5 5	5 5	5 5	5 5	5 5 5
Ma Wan Station							
Tissue / Whole Body Sar Near-pit Stations		2 times per vear	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov D	c Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec J	n Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec J	an 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
Reference North	ESC-INB	2 times per year					
Reference South	TNB	2 times per year 2 times per year					
Demersal Trawling	TSB	2 times per year	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Da	ic Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec J	in Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec J	an 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 Reference North							
Reference North		4 times per year 4 times per year					
Capping * Ebb Tide Impact Station Downcur			Jan   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Do	ic Jan   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec   J	ın Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec J	an 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-IPE2A ESC-IPE3	4 times per year * 4 times per year *					
Intermediate Station Dov	ESC-IPE5	4 times per year *					
	ESC-INE2A ESC-INE3A	4 times per year * 4 times per year *					
Reference Station Upcur	ESC-INE5A	4 times per year *					
	ESC-RFE2 ESC-RFE3	4 times per year * 4 times per year *					
Ma Wan Station	ESC-RFE5	4 times per year *					
Flood Tide Impact Station Downcur		4 10000 0000000					
Intermediate Station Dov	ESC-IPF2 ESC-IPF3	4 times per year *					
Internetiate Station Dov	ESC-INF1 ESC-INF2	4 times per year *					
Reference Station Upcur	ESC-RFF1A	4 times per year *					
Ma Wan Station							
Routine Water Quality M Ebb Tide Impact Station Downcur			Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov D	ic   Jan   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec   J	ın   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec   J	ın   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-IPE1A 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
Intermediate Station Dov	ESC-IPE5 wncurrent	Monthly*		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
	ESC-INE2A ESC-INE3A	Monthly* Monthly*	4     4     4     4     4       4     4     4     4     4	4         4         4         4         2         2           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
Reference Station Upcur	ESC-INE5A	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
	ESC-RFE2 ESC-RFE3 ESC-RFE4	Monthly* Monthly* Monthly*	4     4     4     4     4       4     4     4     4     4	4     4     4     2     2       4     4     4     4     2     2       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
Ma Wan Station						2 2 2 2 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 Downcur		Monthle*					
Intermediate Station Dov	ESC-IPF2 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	1       1
State State De	ESC-INF1 ESC-INF2	Monthly*	4 4 4 4 4 4	4 4 2 2 2 2	2 2 2 2 2 2		
Reference Station Upcur	ESC-RFF1A ESC-RFF2A	Monthly* Monthly*		4         4         2	2         2	2     2     2     2     2     2     2       2     2     2     2     2     2     2	2       2
Ma Wan Station	ESC-RFF3 MW1	Monthly* Monthly*		4     4     2     2     2     2       4     4     2     2     2     2		2 2 2 2 2 2 2	2       2
Water Column Profiling ' Plume Stations	WOR	Morikke					Jan   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec   Jan   Feb   Mar
Benthic Recoloinisation	WCP1 WCP2	Monthly* 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 2	2       2
Capped Stations at CMP	ESCV-CPA	2 times per year 2 times per year					
Reference Stations	ESCV-CPC ESCV-CPD	2 times per year 2 times per year 2 times per year					
	RBA RBB RBC1	2 times per year 2 times per year 2 times per year					

RBB	2 times per year			
RBC1	2 times per year			

Impact Monitoring for Dredging		Ja	Feb I	Mar A	pr N	lay Jι	ın Ju	I Au	g Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Ma	ıy J	un .	Jul	Aug	Se	p Oc	t N	ov I	Dec	Jan I	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jar	n Fet	o Ma	ir Aj	pr N	lay	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Ju	n Ju	ΙΑ	ug	Sep	Oct	Nov	De	/ <mark>C J</mark> a	n Fe	/ Mr
Upstream Stations																																																																			
US1	3 times per week	(												2	2	2	2		2																																																
US2	3 times per week	(												2	2	2	2		2																																														T	T	
Downstream Stations																																																																	T		
DS1	3 times per week	(												2	2	2	2		2																																															T	
DS2	3 times per week	(												2	2	2	2		2																																														T	T	
DS3	3 times per week	( [ [	$\square$											2	2	2	2		2																							Т																							T	T	
DS4	3 times per week													2	2	2	2		2																																														T	T	
DS5	3 times per week													2	2	2	2		2																																																
Ma Wan Station			_																																																														T		
MW1	3 times per week	(						T						2	2	2	2		2	T					T																T	T		T	T	T																		T	T	T	

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. 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 moniths monitoring data at mid-ebb, and 6 moniths monitoring data at mid-flood.

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

(3) Impact Monitoring for Dredging will be scheduled when dredging operations commence.
 (4) Benthic Recolonisation Studies for CMP V will be scheduled when dredging operations commence.
 (4) Benthic Recolonisation Studies for CMP V will be scheduled when dredging operations for CMP V is completed.
 \* 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 as 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. Vater Quality Monitoring third graphing perplication of sample replication of water quality and sediment 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 devreey affecting the supply of international species adopted in testing programme of Sediment Toxicity Tests, as such, Sediment Toxicity Tests, as such sediment 2022.
 \* To enable the required Research Fishing Permit could be granted by the time undertaking the Demensal Traving, trawing originally scheduled in July and August 2022 was postponed to August and September 2022.

# Appendix B. Water Quality Monitoring Results



Parameters	Action	Limit
Dissolved Oxygen (DO)	Surface and Middle Depth <sup>(2)</sup>	Surface and Middle Depth <sup>(2)</sup>
in mg L <sup>-1</sup> (Surface, Middle & Bottom) <sup>(1)</sup>	5%-ile of baseline data for surface and middle layer = <b>3.76</b>	1%-ile of baseline data for surface and middle layer = <b>3.11</b> <sup>(3)</sup>
	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 = <b>2.96</b>	The average of the impact station readings are < <b>2</b>
	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 <sup>-1</sup>	95%-ile of baseline data for depth- averaged = <b>37.88</b>	99%-ile of baseline data for depth- averaged = <b>61.92</b>
(depth-averaged) <sup>(5)</sup>	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	95%-ile of baseline data = 28.14	99%-ile of baseline data = <b>38.32</b>
in NTU	and	and
(depth-averaged) <sup>(4)(5)</sup>	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

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

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.

 Given the Action Level for DO for Surface and Middle layers has already been lower than 4 mg L<sup>-1</sup>, it is proposed to set the Limit Level at 3.11 mg L<sup>-1</sup> 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 October 2024

Station	Temp.	Salinity	Turbidity	Dissolve	d Oxygen	рН	Suspended Solids
	(°C)	(ppt)	(NTU)	(%)	(mg L <sup>-1</sup> )		(mg L <sup>-1</sup> )
WCP 1 (Downstream)	28.35	30.03	8.52	86.39	5.69	8.00	8.5
WCP 2 (Upstream)	28.40	30.11	10.95	84.30	5.54	7.96	6.5
WQO (Wet Season)	N/A	27.10-33.12#	N/A	N/A	>4	6.5-8.5	11.9

Notes:

1. <sup>#</sup> 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 October 2024

Station	Temp.	Salinity	Turbidity	Dissolve	d Oxygen	рН
	(°C)	(ppt)	(NTU)	(%)	(mg L <sup>-1</sup> )	
RFF (Reference)	28.50	29.70	9.96	87.43	5.75	8.06
IPF (Impact)	28.58	30.02	10.67	85.91	5.64	8.01
INF (Intermediate)	28.58	29.74	7.46	87.52	5.75	8.01
Ma Wan	28.54	30.70	6.07	82.83	5.42	8.04
WQO (Wet Season)	N/A	26.73-32.67#	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 October 2024

Station	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn
	(µg/L)								
RFF	2.09	0.05	0.10	0.43	0.01	*	0.57	ND	3.63
IPF	2.45	0.12	0.10	0.50	0.02	*	0.52	ND	1.35
INF	2.39	0.04	0.12	0.48	0.01	*	0.56	0.01	0.51
Ma Wan	2.18	0.04	0.07	0.46	0.01	*	0.53	ND	4.86

Note:

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

2. \* Laboratory analysis data of Mercury are still under consolidation, which will be presented in the Monthly EM&A Report of the next reporting period.

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

Station	NH <sub>3</sub>	TIN	<b>BOD</b> ₅	SS
	(mg/L)	(mg/L)	(mg/L)	(mg/L)
RFF	0.05	0.30	<lor< td=""><td>12.6</td></lor<>	12.6
IPF	0.05	0.32	0.63	14.3
INF	0.03	0.34	0.45	9.5
Ma Wan	0.06	0.25	<lor< td=""><td>5.5</td></lor<>	5.5
				WQO of TIN: 0.5 mg/L

Wet Season WQO of SS: 11.9 mg/L

Notes:

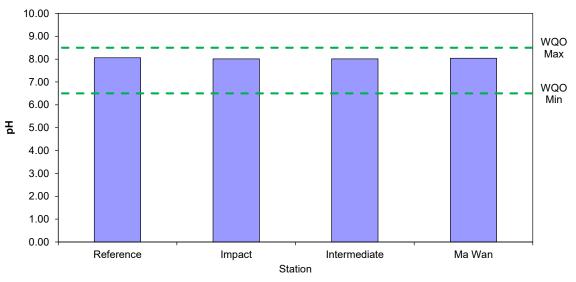
1. "<LOR" indicates the concentrations of contaminants are below the limit of reporting.

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

3. Cell shaded grey indicates value exceeding the WQO.

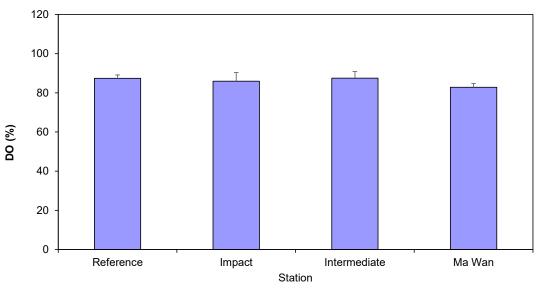
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## **Appendix C. Graphical Presentations**

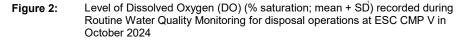


Routine Water Quality Monitoring for ESC CMP V - October 2024

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

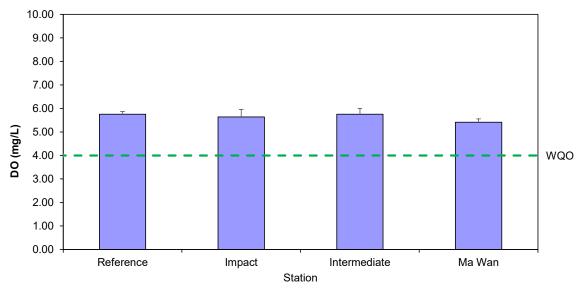


Routine Water Quality Monitoring for ESC CMP V - October 2024

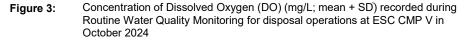


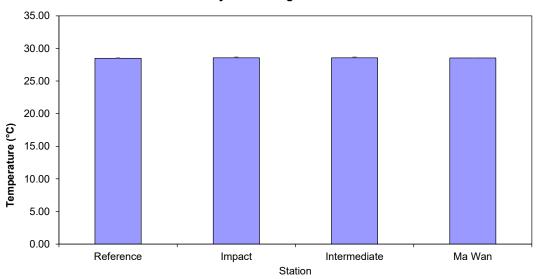
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The mean and standard deviation (SD) for in-situ data are the mean and SD for water columns within the area.



Routine Water Quality Monitoring for ESC CMP V - October 2024



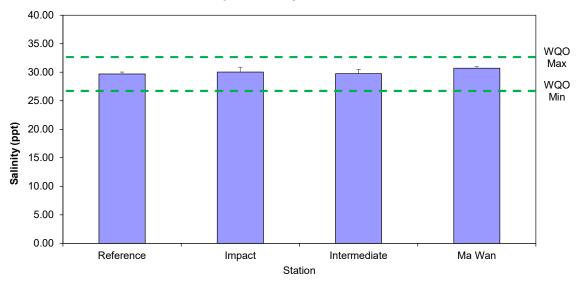


Routine Water Quality Monitoring for ESC CMP V - October 2024

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

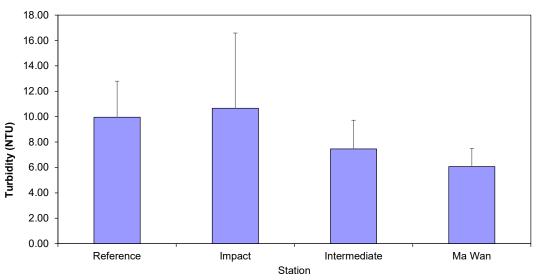
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<sup>&</sup>lt;sup>1</sup> The mean and standard deviation (SD) for in-situ data are the mean and SD for water columns within the area.



#### Routine Water Quality Monitoring for ESC CMP V - October 2024

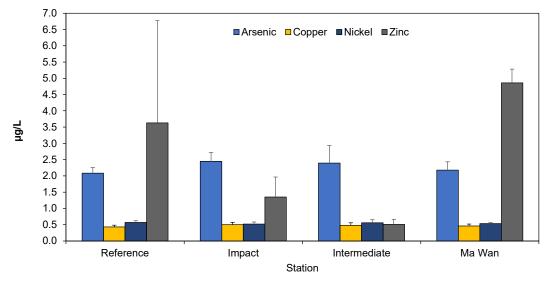
Figure 5: Level of Salinity (ppt; mean + SD) recorded during Routine Water Quality Monitoring for disposal operations at ESC CMP V in October 2024



Routine Water Quality Monitoring for ESC CMP V - October 2024

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

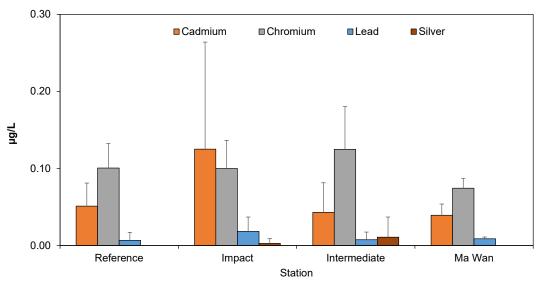
<sup>&</sup>lt;sup>1</sup> The mean and standard deviation (SD) for in-situ data are the mean and SD for water columns within the area.



#### Routine Water Quality Monitoring for ESC CMP V October 2024

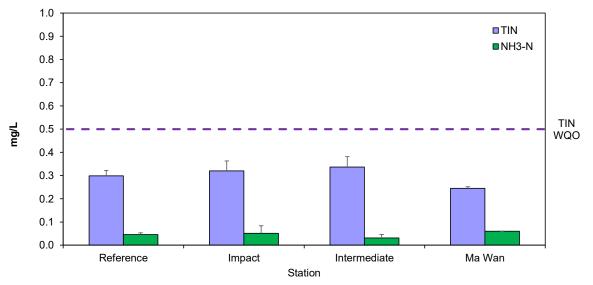
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Figure 7: Concentration of Arsenic, Copper, Nickel, and Zinc ( $\mu$ g/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in October 2024



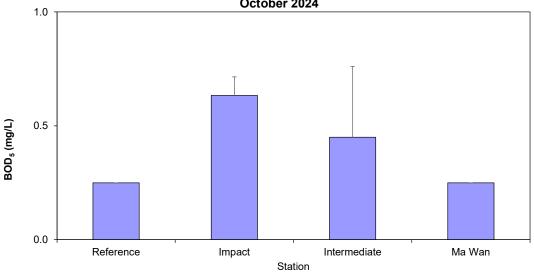
#### Routine Water Quality Monitoring for ESC CMP V October 2024

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



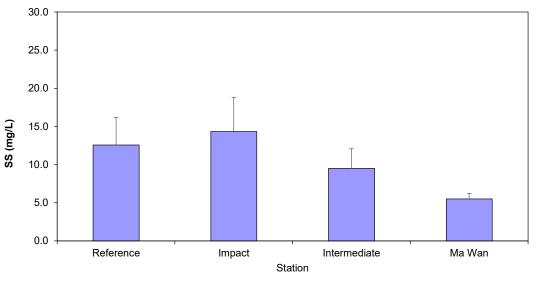
#### Routine Water Quality Monitoring for Nutrients - October 2024

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 October 2024

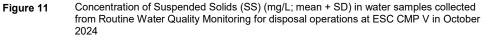


Routine Water Quality Monitoring for Biochemical Oxygen Demand (BOD5) -October 2024

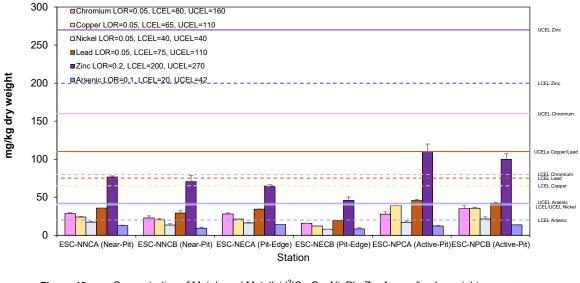
Figure 10: Level of Biochemical Oxygen Demand (BOD5) (mg/L; mean + SD) in water samples collected from Routine Water Quality Monitoring for disposal operations at ESC CMP V in October 2024

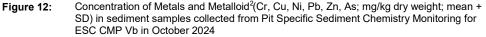


Routine Water Quality Monitoring for Suspended Solids - October 2024



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





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

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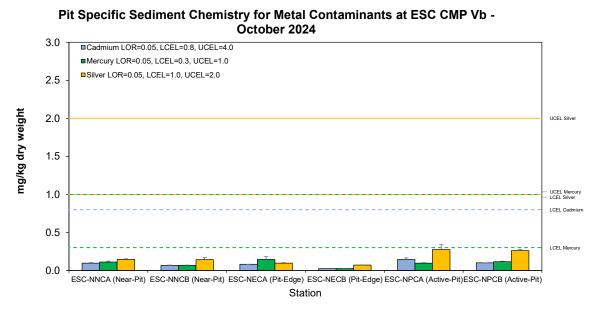
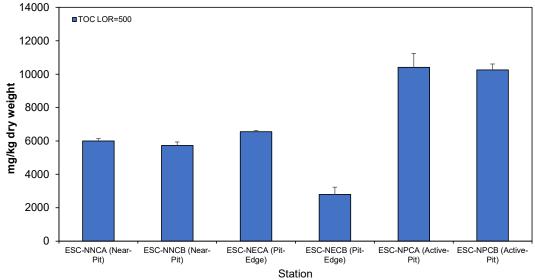
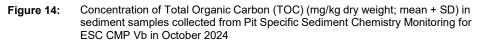


Figure 13: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean + SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vb in October 2024

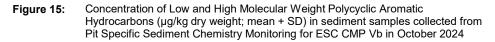


Pit Specific Sediment Chemistry for Total Organic Carbon (TOC) at ESC CMP Vb - October 2024



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Pit Specific Sediment Chemistry for Low and High Molecular Weight Polycyclic Aromatics Hydrocarbons (PAHs) at ESC CMP Vb - October 2024 12000 Low MW PAHs LOR=55, LCEL=550, UCEL=3160 High MW PAHs LOR=100, LCEL=1700, UCEL=9600 10000 EL High MW PAHs 8000 µg/kg dry weight 6000 4000 CEL Low MW PAH: 2000 CEL High MW PAH CEL Low MW PAH: 0 ESC-NNCA (Near-ESC-NECA (Pit-ESC-NECB (Pit-ESC-NPCA (Active-ESC-NPCB (Active-ESC-NNCB (Near-Pit) Pit) Edge) Edge) Pit) Pit) Station



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## **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

		to the E	ast of Sha Cr	1au (2021-202	26) - Investiga	ation								
D	Task Name		Start	Finish		2022 4 Q1 Q2 Q3 NDJFMAMJJAS	2023 Q4 Q1	02 03	202 Q4 Q1		2025 Q4 Q1	02 03 0	2026 24 Q1	02 03
1	COMMENCEMENT OF AGREEMENT NO	). CE 59/2020 (EP)	01/04/21		•				SIGINIDIJIE					
2	EAST OF SHA CHAU CONTAMINATED N	NUD 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 I	Manual (for ESC CMPs) - annual basis assumed	20/05/22	20/05/25		\$		\$		$\diamond$		\$		
15	Regular Site Inspections of CMP Contractors		01/04/21	31/03/26										I
16	Monthly EM&A Report		14/05/21	14/04/26	<b>\$\$\$\$</b>	\$\$\$\$\$\$\$\$\$\$	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	>>>>>	>>>>>>	\$\$\$\$\$\$\$	><>	0000000	\$\$\$\$\$	\$
77	Quarterly EM&A Report		30/07/21	30/04/26	♦ <	$\diamond$ $\diamond$ $\diamond$	◊ ◊	◊ ◊	♦ ♦	$\diamond \diamond$	\$	$\diamond$ $\diamond$	>	\$
98	Annual EM&A Report		30/01/22	30/01/26		$\diamond$	\$		\$		\$		\$	
104	Annual Risk Assessment Report		31/05/22	31/05/26		\$		\$		$\diamond$		\$		\$
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) DISI SEPTEMBER 2021 & MARCH-APRIL 202	POSAL FACILITY (MONITORING PERIOD: 2)	23/11/21	31/08/22										
115	Monthly EM&A Report		23/11/21	06/06/22		$\diamond$ $\diamond$ $\diamond$								
119	Quarterly EM&A Report		15/07/22	15/07/22		$\diamond$								
121	Annual EM&A Report		31/08/22	31/08/22		\$								
	amme Revision: C 11/05/22	Start/End of ET Services Location Repeating Task	Start of Agreen Submission Multiple-Occas	nent sion Submission	<ul> <li>◆</li> <li>◆</li> <li>◇</li> </ul>									