

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 – April 2021

May 2021

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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 - April 2021
Date of Report:	13 May 2021
Date prepared by ET:	13 May 2021
Date received by IA:	13 May 2021

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.

Mon Chim.

Ir Thomas Chan,
Environmental Team Leader(ETL)

Date: 13 May 2021

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, Date: 13/May 2021	
Independent Auditor (IA):	

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	May 2021	Various	Thomas Chan	Eric Ching	Revision A of Submission

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Contents

1	Intro	duction	1
	1.1	Background	1
	1.2	Reporting Period	2
	1.3	Details of Sampling and Laboratory Testing Activities	2
2	Brief	Discussion of Monitoring Results for ESC CMP V	3
	2.1	Introduction	3
	2.2	Water Column Profiling of ESC CMP Vb – in April 2021	3
		2.2.1 In-situ Measurements	3
		2.2.2 Laboratory Measurements for Suspended Solids (SS)	3
	2.3	Routine Water Quality Monitoring of ESC CMPs – in April 2021	3
		2.3.1 In-situ Measurements	4
		2.3.2 Laboratory Measurements	4
	2.4	Pit Specific Sediment Chemistry of ESC CMP Vb - in April 2021	4
3	Futu	re Key Issues	6
	3.1	Activities Scheduled for the Next Reporting Period	6
	3.2	Study Programme	6

Figures

Figure 2.1	Routine & Capping Water Quality Sampling Stations (Flood-Tide) for ESC CMPs
Figure 2.2	Pit Specific Sediment Quality Monitoring Stations for CMP V

Appendices

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

1 Introduction

1.1 Background

The Civil Engineering and Development Department (CEDD) is managing a number of marine disposal facilities in Hong Kong waters, including the Contaminated Mud Pits (CMPs) to the South of The Brothers (SB) and to the East of Sha Chau (ESC) for the disposal of contaminated sediment, and open-sea disposal grounds located to the South of Cheung Chau (SCC), East of Tung Lung Chau (ETLC) and East of Ninepins (ENP) for the disposal of uncontaminated sediment. Two Environmental Permits (EPs), EP-312/2008/A and EP-427/2011/A, were issued by the Environmental Protection Department (EPD) to the CEDD, the Permit Holder, on 28 November 2008 and 23 December 2011 for the Dredging, Management and Capping of Contaminated Sediment Disposal Facilities at ESC CMP V and SB CMPs, respectively.

Under the requirements of the two EPs for ESC CMP V and SB CMPs, EM&A programmes which encompass water and sediment chemistry, fisheries assessment, tissue and whole body analysis, sediment toxicity and benthic recolonisation studies as set out in the EM&A Manuals are required to be implemented. EM&A programmes have been continuously carried out during the operation of the CMPs at ESC and SB. A review of the collection and analysis of such environmental data from the monitoring programme demonstrated that there had not been any adverse environmental impacts resulting from disposal activities.^{1,2} The current programme will assess the impacts resulting from dredging, disposal and capping operations of CMP V as well as capping operations of SB CMPs.

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 effective for the EM&A activities since December 2020. 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 April 2021, the following works were undertaken:

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

Table 1.1: Works Schedule for ESC CMP V

Pit	Operation				20	17									20)18											20	19											202	20							202 [,]	1	П.
FIL	Operation	May	Jun	Jul	Aug	Sep	o Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	o Oct	t Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul /	Aug	Sep (Oct N	lov I	Dec Ja	n Fe	eb M	ar A	pr
	Dredging																																																
ESC CMP \	/Disposal																																																
	Capping																																																

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.

1.2 Reporting Period

This Monthly EM&A Report for Contaminated Mud Pits to the East of Sha Chau – April 2021 covers the EM&A activities for the reporting period of April 2021 (from 1 to 30 April 2021).

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.

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 April 2021

Water Column Profiling was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 13 April 2021. 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 2010 - 2019 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 April 2021 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 April 2021 indicated that the SS levels at both Downstream and Upstream stations complied with the WQO and the Action and Limit Levels (**Tables B1 and B2** of **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 April 2021

Routine Water Quality Monitoring of ESC CMPs was undertaken on 8 April 2021. 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 and B4** of **Appendix B** and **Figures 1 to 10** of **Appendix C**. A total of sixteen (16) monitoring stations were sampled in April 2021 as shown in **Figure 2.1**.

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

2.3.1 In-situ Measurements

Graphical presentation of the monitoring results (Temperature, DO, pH, Salinity and Turbidity) is shown in **Figures 1 to 6** of **Appendix C**. Analyses of results indicated that the levels of pH, Salinity and DO complied with the WQOs at most stations during the reporting period, except for higher levels of Salinity were recorded at Ma Wan station. The higher Salinities recorded at Ma Wan station are likely to be caused by the larger separation distance to Pearl River Delta mouth, which releases a large amount of freshwater runoff in the area during wet season, when compared to the Reference stations.

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 April 2021.

2.3.2 Laboratory Measurements

Laboratory analysis of samples obtained during the reporting period indicated that the concentrations of Arsenic, Chromium, Copper, Lead, Nickel and Zinc were detected in the samples at all stations and their concentrations were generally similar across stations, except the concentrations of Zinc were higher at Intermediate Station (**Table B4** of **Appendix B**; **Figure 7** of **Appendix C**).

For nutrients, concentrations of Total Inorganic Nitrogen (TIN) at all stations complied with the WQO (0.5 mg/L) (Table B4 of Appendix B; Figure 8 of Appendix C). The concentrations of Ammonia Nitrogen (NH₃-N) were higher at Ma Wan station that the other stations in the reporting month (Table B4 of Appendix B; Figure 8 of Appendix C). The concentrations of Biochemical Oxygen Demand (BOD5) were generally similar across stations (Table B4 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 (11.8 mg/L) and the Action and Limit Levels (**Tables B1 and B4** of **Appendix B**; **Figure 10** of **Appendix C**).

Overall, results of the Routine Water Quality Monitoring 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 Report to investigate any spatial and temporal trends of potential concern.

2.4 Pit Specific Sediment Chemistry of ESC CMP Vb – in April 2021

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 12 April 2021.

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

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.⁴ It is presumed that the natural concentrations of Arsenic are similar in onshore and

⁴ Sewell RJ (1999) Geochemical Atlas of Hong Kong. Geotechnical Engineering Office, Government of the Hong Kong Special Administrative Region

offshore sediments,⁵ and relatively high Arsenic levels may thus occur throughout Hong Kong. Therefore, the LECL exceedances of Arsenic are unlikely to be caused by the disposal operations at ESC CMP Vb but rather as a result of naturally occurring deposits.

For organic contaminants, the concentrations of Total Organic Carbon (TOC) were higher at Active-Pit stations ESC-NPCA and ESC-NPCB during the reporting period (**Figure 13** of **Appendix C**). The concentrations of Low Molecular Weight and High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) were lower than the LECLs at all stations (**Figure 14** of **Appendix C**). The concentrations of Tributyltin (TBT) were higher at Active-Pit station ESC-NPCB (**Figure 15** of **Appendix C**). The concentrations of Total Polychlorinated Biphenyls (PCBs), Total dichloro-diphenyl-trichloroethane (DDT) and 4,4'-dichlorodiphenyldichloroethylene (DDE) were below the limit of reporting at all stations during the reporting period.

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 report to investigate whether there are any unacceptable impacts in the area caused by the contaminated mud disposal.

⁵ 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

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 May 2021 for ESC CMP V (see **Appendix A** for the sampling schedule):

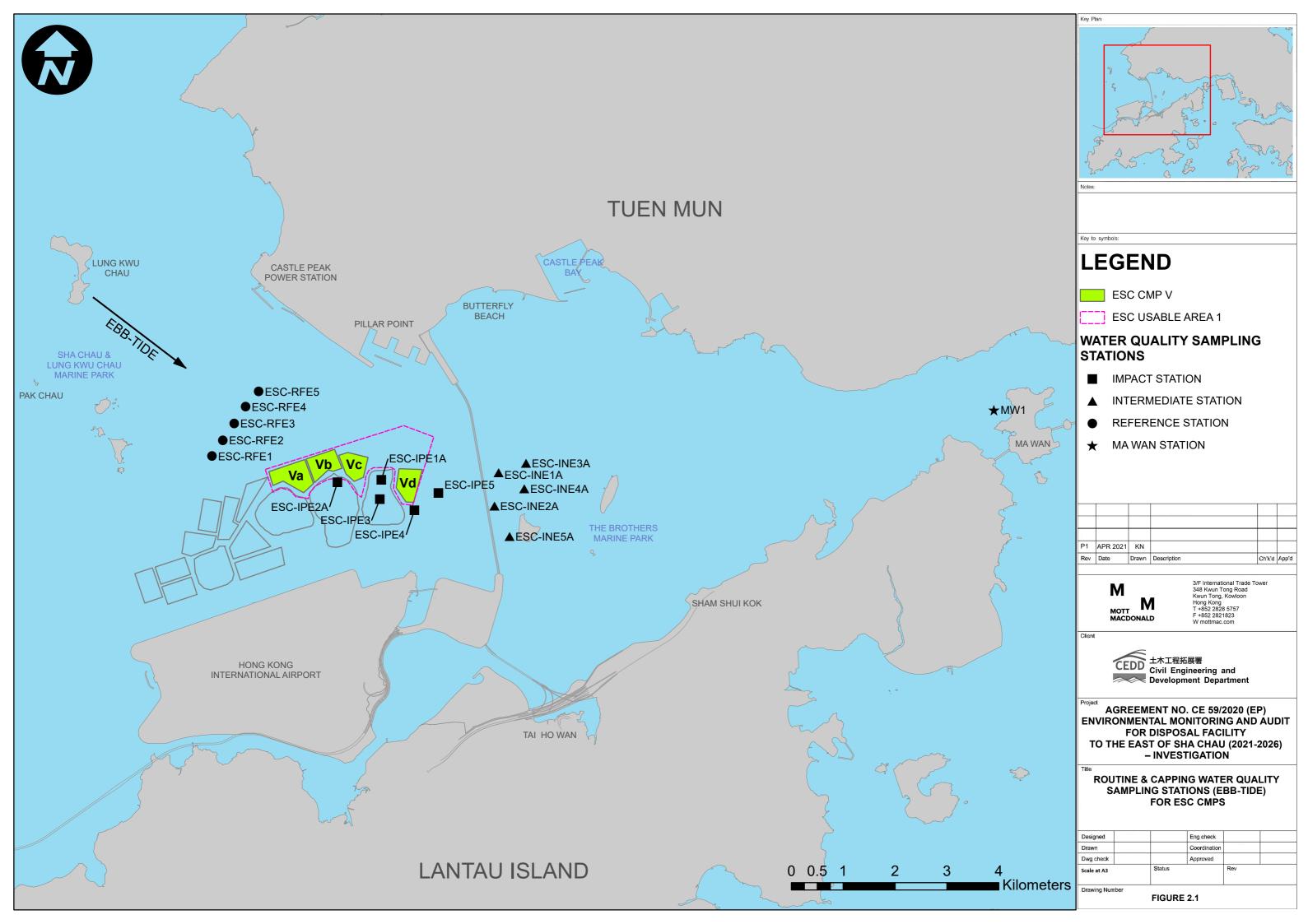
- Water Column Profiling of ESC CMP Vb;
- Routine Water Quality Monitoring of ESC CMPs; and
- Pit Specific Sediment Chemistry of ESC CMP Vb.

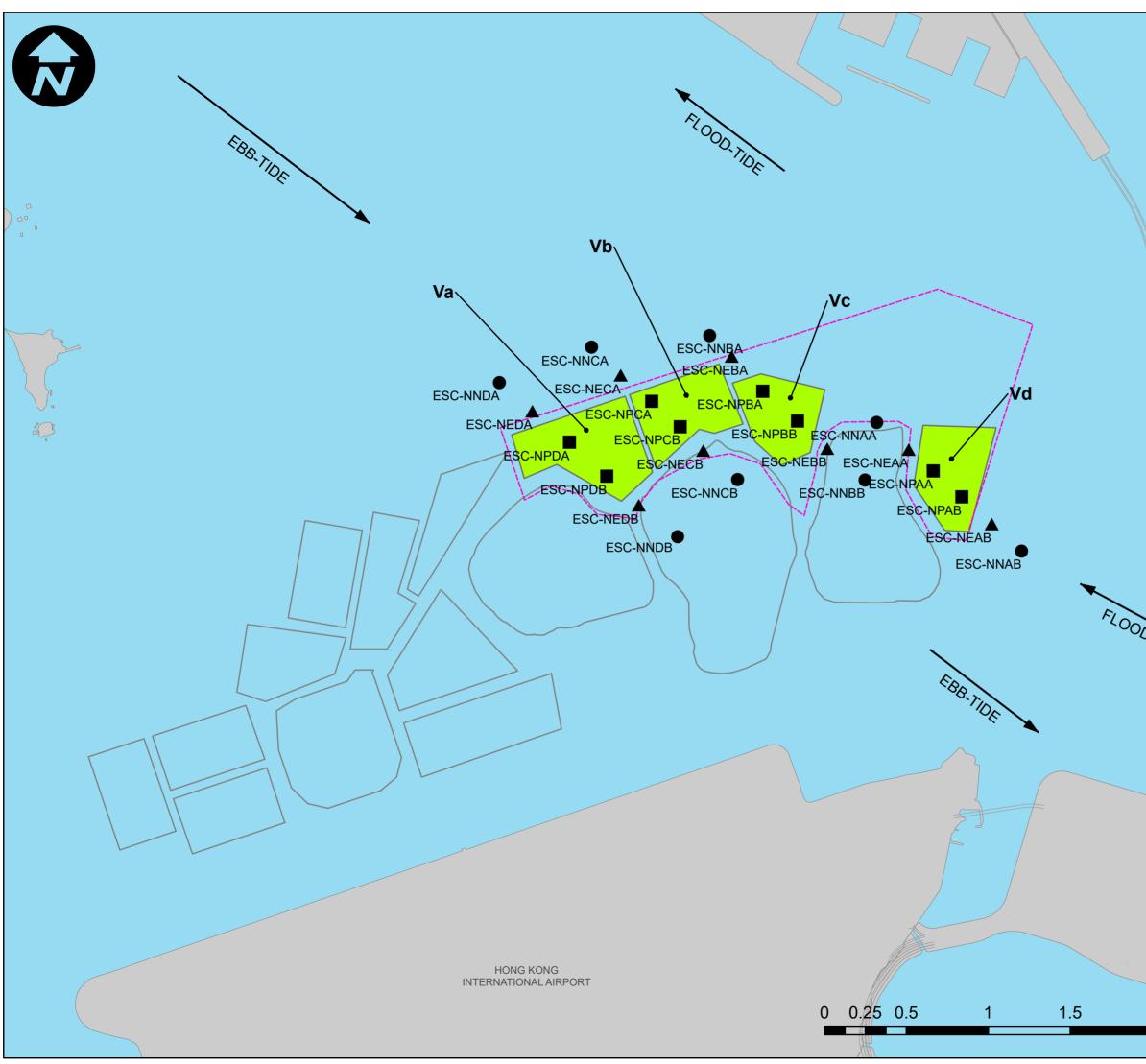
3.2 Study Programme

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

Mott MacDonald | Agreement No. CE59/2020(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 – April 2021







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Appendices

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A. Sampling Schedule

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

Parameter / Station Type Pit Specific Sediment Che	Station ID	Frequency	2021 Jan Feb	Mar Apr	May Ju	in Jul Av	a Sep C	Oct Nov D	2022 Dec Jan	Feb Mar	Apr May	Jun J	ul Aug Sep	Oct Nov	2023 Dec Jan Feb I	Mar Apr N	av Jun Ju	I Aug Sep	Oct Nov D	2024 ec Jan F	eb Mar A	or May Ju	n Jul Aug	Sep Oct N	ov Dec Ja	025 an Feb Ma	r Apr May	Jun Jul	Aug Sep 0	t Nov Dec	2026 Jan Feb Mar
Active-Pit	ESC-NPAA ESC-NPAB	Monthly Monthly	6 6	66	6 6	6 6 6	6 6	6 6	6 6	6 6	66	6 6	6 6 6	6 6	6 6 6 6 6 6	66	666	6 6	6 6	6 6	6 6 6	66	6 6	6 6 1	6 6 0	6 6 6	6 6	6 6	6 6 0	66	6 6 6
Pit-Edge	ESC-NEAA ESC-NEAB	Monthly Monthly	6 6	6 6	6 6	6 6	6 6	6 6	6 6	6 6	6 6	6 6	6 6 6	6 6	6 6 6 6 6 6	6 6	6 6 6	6 6	6 6 0	6 6	6 6 6	6 6	6 6	6 6 1	6 6 1	6 6 6	6 6	6 6	6 6 0	66	6 6 6
Near-Pit	ESC-NNAA ESC-NNAB	Monthly Monthly			6 6	6 6	6 6	6 6	6 6	6 6	6 6	6 6	6 6 6	6 6	6 6 6 6 6 6	6 6	6 6 6	6 6	6 6 0	6 6	6 6 6	6 6	6 6	6 6 0	6 6 1	6 6 6	6 6	6 6	6 6 0	66	6 6 6
Cumulative Impact Sedim Near-field Stations	ent Chemistry	*	Jan Feb	Mar Apr	May Ju	in Jul Au	ig Sep C	Oct Nov C	Dec Jan	Feb Mar	Apr May	<mark>/ Jun J</mark>	ul Aug Sep	Oct Nov I	Dec Jan Feb	Mar Apr M	ay Jun Ju	I Aug Sep	Oct Nov D	ec Jan F	eb Mar A	pr May Ju	n Jul Aug	Sep Oct N	ov Dec J	an Feb Ma	r Apr May	Jun Jul	Aug Sep O	ct Nov Dec	Jan Feb Mar
Mid-field Stations	ESC-RNA ESC-RNB1	4 times per year 4 times per year	6		6	6 6 6 6	5		6	6 6		6 6	6 6		6 6 6 6		6 6	6 6		6	6	6	6		6	6 6		6 6	6 6	6	6 6
Capped Pit Stations	ESC-RMA ESC-RMB	4 times per year 4 times per year	6		6				6 6	6 6		6 6	6 6		6 6 6 6		6 6	6 6		-	6	6			6	6 6			6 6	6 6	6 6
Far-field Stations	ESC-RCA1 ESC-RCA2	4 times per year 4 times per year	6		6				6	6 6		6 6	6 6		6 6 6 6		6 6	6 6	1	6	6	6	6		6	6 6			6	6	6 6
Ma Wan Station	ESC-RFA ESC-RFB	4 times per year 4 times per year	6		6				6 6	6 6		6 6	6 6		6 6 6 6		6 6	6 6			6	6			6 6	6 6			6	6 6	6 6
	MW1	4 times per year	6		6	6			6	6		6	6		6 6		6	6		6	6	6	6		6	6		6	6	6	
Sediment Toxicity Tests Near-pit Stations	ESC-TDA	2 times per year	Jan Feb	Mar Apr	May Jur	un Jul Aug		Oct Nov E	Dec Jan	5	Apr May	/ Jun J	ul Aug Sep	Oct Nov	Dec Jan Feb 5	Mar Apr M	ay Jun Ju	5	Oct Nov D	ec Jan H	eb Mar Aj 5	pr May Ju	n Jul Aug	Sep Oct N	ov Dec Ja	an Feb Ma	r Apr May	(Jun Jul .	Aug Sep O	ct Nov Dec	Jan Feb Mar 5
Reference Stations	ESC-TDB1 ESC-TRA	2 times per year 2 times per year	5			5	;			5			5		5			5			5		5			5			5		5
Ma Wan Station	ESC-TRB	2 times per year 2 times per year	5			5	· · · ·			5			5		5			5			5		5			5			5		5
Tissue / Whole Body Sam Near-pit Stations	pling		Jan Feb	Mar Apr	May Ju	in Jul Au	ig Sep C	Oct Nov C	Dec Jan	Feb Mar	Apr May	<mark>Jun J</mark>	ul Aug Sep	Oct Nov I	Dec Jan Feb I	Mar Apr M	ay <mark>Jun Ju</mark>	I Aug Sep	Oct Nov D	ec Jan F	eb Mar A	pr May Ju	n Jul Aug	Sep Oct N	ov Dec Ja	an <mark>Feb Ma</mark>	r Apr May	<mark>, Jun Jul</mark>	Aug Sep O	ct Nov Dec	Jan Feb Mar
Reference North	ESC-INA ESC-INB	2 times per year 2 times per year	*		Ħ	*				*			*	H	*			*			*		*			*			*		*
Reference South	TNA TNB	2 times per year 2 times per year	*		Ħ	*				*		F	*		*			*		\square	*		*			*			*		*
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Demersal Trawling Near-pit Stations	ESC-INA	4 times per year	Jan Feb	Mar Apr	May Jur	un Jul Au		Oct Nov C	Dec Jan		Apr May		ul Aug Sep	Oct Nov I	Dec Jan Feb 5	Mar Apr N		I Aug Sep	Oct Nov D	ec Jan F		pr May Ju	n Jul Aug	Sep Oct N		an Feb Ma	r Apr May	Jun Jul			Jan Feb Mar
Reference North	ESC-INB	4 times per year 4 times per year	5 5			5 5	5		5	5		1	5 5 5		5 5		5	5		5	5		5 5			5 5 5		5	5		5 5 5
Reference South	TNB	4 times per year 4 times per year	5 5		Ħ	5 5	i		5	5			5 5		5 5			5		5	5		5 5			5 5 5		5	5		5 5
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Impact Station Downcurr	ESC-IPF1 ESC-IPF2	4 times per year * 4 times per year *	E		Ħ	\mp	\square																								
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	ESC-RFE1 ESC-RFE2 ESC-RFE3	Monthly* Monthly* Monthly*		4	4 4 4 4	1 4 4 1 4 4	4	4 4 4 4	4 4 4 4	4 4 4 4	4 4 4 4	4 4	4 4 4 4 4 4	4 4 4 4	4 4 4 4 4 4 4 4 4	4 4 4 4	4 4 4 4 4 4	4 4 4 4	4 4 4	4 4 4 4	4 4 4 4 4 4	1 4 4 1 4 4	4 4	4 4 4	4 4 4	4 4 4 4 4 4	4 4 4 4	4 4 4 4	4 4 4	4 4	4 4 4 4 4 4
Ma Wan Station	ESC-RFE4 ESC-RFE5	Monthly* Monthly*		4	4 4 4 4	4 4 4 4 4 4	4	4 4 4	4 4 4	4 4 4 4	4 4 4 4	4 4	4 4 4 4 4 4	4 4 4 4	4 4 4 4 4 4	4 4 4	4 4 4 4 4 4	4 4 4 4	4 4 4	4 4 4	4 4 4	1 4 4 1 4 4	4 4 4 4	4 4 4	4 4 4	4 4 4 4 4 4	4 4 4 4	4 4 4 4	4 4 4	4 4 4	4 4 4 4 4 4
Flood Tide	MW1	Monthly*		4	4 4	4 4	4	4 4	4 4	4 4	4 4	4 4	4 4 4	4 4	4 4 4	4 4	4 4 4	4 4	4 4 4	4 4	4 4 4	4 4	4 4	4 4 4	4 4 4	4 4 4	4 4	4 4	4 4 4	4 4	4 4 4
Impact Station Downcurr	ESC-IPF1 ESC-IPF2	Monthly* Monthly*	4 4 4 4	4	4 4	4 4 4	4 4	4 4	4 4	4 4	4 4	4 4	4 4 4	4 4	4 4 4 4 4 4	4 4	4 4 4	4 4	4 4 4	4 4	4 4 4	4 4 4	4 4	4 4 4	4 4 4	4 4 4	4 4	4 4	4 4 4	4 4	4 4 4
Intermediate Station Dow	ESC-INF1	Monthly* Monthly*	4 4 4 4	4	4 4	4 4 4 4 4 4	4	4 4	4 4	4 4	4 4	4 4	4 4 4	4 4	4 4 4	4 4	4 4 4 4 4 4	4 4	4 4 4	4 4	4 4 4	1 4 4 1 4 4	4 4	4 4 4	4 4 4	4 4 4 4 4 4	4 4	4 4	4 4 4	4 4	4 4 4
Reference Station Upcurr		Monthly* Monthly*		4	4 4 4	4 4 4 4 4 4	4	4 4 4	4 4 4	4 4 4 4	4 4 4 4	4 4	4 4 4 4 4 4	4 4 4 4	4 4 4 4 4 4	4 4 4	4 4 4 4 4 4	4 4 4 4	4 4 4	4 4 4	4 4 4	1 4 4 1 4 4	4 4	4 4 4	4 4 4	4 4 4 4 4 4	4 4 4 4	4 4 4 4	4 4 4	4 4	4 4 4 4 4 4
	ESC-RFF1A ESC-RFF2A ESC-RFF3		4 4 4 4 4 4	4	4 4	4 4 4	4 4	4 4	4 4	4 4	4 4	4 4	4 4 4	4 4	4 4 4 4 4 4 4 4 4	4 4	4 4 4	4 4	4 4	4 4	4 4 4	4 4	4 4	4 4	4 4 4	4 4 4	4 4	4 4	4 4 4	4 4	4 4 4
Ma Wan Station	MW1	Monthly*	4 4												4 4 4																
Water Column Profiling * Plume Stations	WCP1	Monthly*			1 21										Dec Jan Feb			1 01 1													
Benthic Possie in testing	WCP2	Monthly*	2 2	2 2	2 2	2 2 2	2 2 3	2 2	2 2	2 2	2 2	2 2	2 2 2	2 2	2 2 2	2 2	2 2 2	2 2	2 2 2	2 2	2 2 2	2 2 2	2 2	2 2 3	2 2 3	2 2 2	2 2	2 2	2 2 3	2 2	2 2 2
Benthic Recoloinisation S Capped Stations at CMP	v	2 times per year	Jan Feb	mat Apr	Imay Jur		ig joep C		Jan	Nar Mar	рарг (Мау	l norl	ur Aug Sep		Dec Jan Feb		ay Jun Ju	- Aug Sep		ecijanji	eu Mar Aj	µr In∿lay Ju		sep UCT N	ov Dec J	an reb Ma	- Apr May	L'INC LUNCH	may sep 0	TT INOV DEC	Jan (reb Mâr

Capped Stations at Smith															
ESCV-CP	PA 2 times per year														
ESCV-CP	PA 2 times per year PB 2 times per year														
ESCV-CP	PC 2 times per year PD 2 times per year														
ESCV-CP	D 2 times per year														
Reference Stations															
RBA	2 times per year														
RBB	2 times per year														
RBC1	2 times per year														

mpact Monitoring for Dredging		Jan Feb	Mar Apr May Jun	Jul A	ug Sep C	Ict Nov Dec	Jan Fe	b Mar	Apr May	Jun Ju	I Aug S	Sep Oct	Nov D	ec Jan Fel	b Mar A	Apr May	Jun .	Jul Aug Sep Oct Nov	Dec .	lan Feb	Mar Apr May Jur	Jul	Aug Sep	Oct No	v Dec Jan	Feb M	ar Apr	May Ju	n Jul	Aug Se	Oct N	ov Dec	Jan Feb Ma
Jpstream Stations																										_		_	_				
US1	3 times per week																																
US2	3 times per week																																
Downstream Stations																																	
DS1	3 times per week																												1				
DS2	3 times per week																																
DS3	3 times per week																																
DS4	3 times per week																																
DS5	3 times per week																																
Ma Wan Station																																	
MW1	3 times per week							TT					T		T					1 1			1			ГГ		T	1	1	1		

Notes: (1) The numbers 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 numbers shown in black represent planned monitoring station shown in black, the 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.

*A proposal on the change of number of sample replication of water quality 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 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 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 have be conducted monthly starting in December 2020. The number of sampling replicates can be further reduced according to Sections 3 and 4, subject to the findings of the further data review.

Mott MacDonald | Agreement No. CE59/2020(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 – April 2021

B. Water Quality Monitoring Results

Parameters	Action	Limit
Dissolved Oxygen (DO)	Surface and Middle Depth ⁽²⁾	Surface and Middle Depth ⁽²⁾
in mg L ⁻¹ (Surface, Middle & Bottom) ⁽¹⁾	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	95%-ile of baseline data for depth- averaged = 37.88	99%-ile of baseline data for depth- averaged = 61.92
(depth-averaged) ⁽⁴⁾⁽⁵⁾	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 = 38.32
in NTU	and	and
(depth-averaged) ⁽⁴⁾⁽⁵⁾	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:

For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits. 1.

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 L¹, it is proposed to 3. set the Limit Level at 3.11 mg L⁻¹ which is the first percentile of the baseline data. "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.

4.

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 April 2021

Station	Temp.	Salinity	Turbidity	Dissolve	d Oxygen	рН	Suspended Solids		
	(°C)	(ppt)	(NTU)	(%)	(mg L ⁻¹)		(mg L ⁻¹)		
WCP 1 (Downstream)	24.74	29.69	7.16	100.43	7.04	8.13	7.7		
WCP 2 (Upstream)	25.02	29.19	21.41	105.25	7.37	8.09	10.6		
WQO (Wet Season)	N/A	26.27 – 32.1#	N/A	N/A	>4	6.5 – 8.5	11.8		

Notes:

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

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

3. Cell shaded grey indicates value exceeding the WQO.

Table B3: In-situ Monitoring Results for Routine Water Quality Monitoring of ESC CMPs in April 2021

Station	Temp.	Salinity	Turbidity	Dissolve	рН	
	(°C)	(ppt)	(NTU)	(%)	(mg L ⁻¹)	
RFF (Reference)	24.73	28.95	5.02	95.52	6.73	7.99
IPF (Impact)	24.59	29.30	3.08	94.10	6.63	8.01
INF (Intermediate)	24.27	30.96	1.75	89.58	6.29	8.03
Ma Wan	23.92	32.20	0.92	87.70	6.15	8.09
WQO (Wet Season)	N/A	26.05 - 31.84#	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 Routine Water Quality Monitoring of ESC CMPs in April 2021

Station	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn	NH ₃	TIN	BODs	SS				
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)				
RFF	1.93	<lor< td=""><td>1.66</td><td>1.52</td><td>0.53</td><td><lor< td=""><td>0.81</td><td><lor< td=""><td>20.06</td><td>0.14</td><td>0.49</td><td>0.81</td><td>6.0</td></lor<></td></lor<></td></lor<>	1.66	1.52	0.53	<lor< td=""><td>0.81</td><td><lor< td=""><td>20.06</td><td>0.14</td><td>0.49</td><td>0.81</td><td>6.0</td></lor<></td></lor<>	0.81	<lor< td=""><td>20.06</td><td>0.14</td><td>0.49</td><td>0.81</td><td>6.0</td></lor<>	20.06	0.14	0.49	0.81	6.0				
IPF	1.93	<lor< td=""><td>1.62</td><td>1.22</td><td>0.54</td><td><lor< td=""><td>0.81</td><td><lor< td=""><td>20.07</td><td>0.13</td><td>0.45</td><td>0.79</td><td>6.1</td></lor<></td></lor<></td></lor<>	1.62	1.22	0.54	<lor< td=""><td>0.81</td><td><lor< td=""><td>20.07</td><td>0.13</td><td>0.45</td><td>0.79</td><td>6.1</td></lor<></td></lor<>	0.81	<lor< td=""><td>20.07</td><td>0.13</td><td>0.45</td><td>0.79</td><td>6.1</td></lor<>	20.07	0.13	0.45	0.79	6.1				
INF	1.87	<lor< td=""><td>1.53</td><td>1.08</td><td><lor< td=""><td><lor< td=""><td><lor< td=""><td><lor< td=""><td>26.58</td><td>0.14</td><td>0.34</td><td>0.77</td><td>6.2</td></lor<></td></lor<></td></lor<></td></lor<></td></lor<>	1.53	1.08	<lor< td=""><td><lor< td=""><td><lor< td=""><td><lor< td=""><td>26.58</td><td>0.14</td><td>0.34</td><td>0.77</td><td>6.2</td></lor<></td></lor<></td></lor<></td></lor<>	<lor< td=""><td><lor< td=""><td><lor< td=""><td>26.58</td><td>0.14</td><td>0.34</td><td>0.77</td><td>6.2</td></lor<></td></lor<></td></lor<>	<lor< td=""><td><lor< td=""><td>26.58</td><td>0.14</td><td>0.34</td><td>0.77</td><td>6.2</td></lor<></td></lor<>	<lor< td=""><td>26.58</td><td>0.14</td><td>0.34</td><td>0.77</td><td>6.2</td></lor<>	26.58	0.14	0.34	0.77	6.2				
Ma Wan	1.85	<lor< td=""><td>1.65</td><td>0.98</td><td><lor< td=""><td><lor< td=""><td><lor< td=""><td><lor< td=""><td>16.63</td><td>0.25</td><td>0.41</td><td>0.64</td><td>11.7</td></lor<></td></lor<></td></lor<></td></lor<></td></lor<>	1.65	0.98	<lor< td=""><td><lor< td=""><td><lor< td=""><td><lor< td=""><td>16.63</td><td>0.25</td><td>0.41</td><td>0.64</td><td>11.7</td></lor<></td></lor<></td></lor<></td></lor<>	<lor< td=""><td><lor< td=""><td><lor< td=""><td>16.63</td><td>0.25</td><td>0.41</td><td>0.64</td><td>11.7</td></lor<></td></lor<></td></lor<>	<lor< td=""><td><lor< td=""><td>16.63</td><td>0.25</td><td>0.41</td><td>0.64</td><td>11.7</td></lor<></td></lor<>	<lor< td=""><td>16.63</td><td>0.25</td><td>0.41</td><td>0.64</td><td>11.7</td></lor<>	16.63	0.25	0.41	0.64	11.7				
											WQO of TIN: 0.5 mg/L						

Wet Season WQO of SS: 11.8 mg/L

Notes:

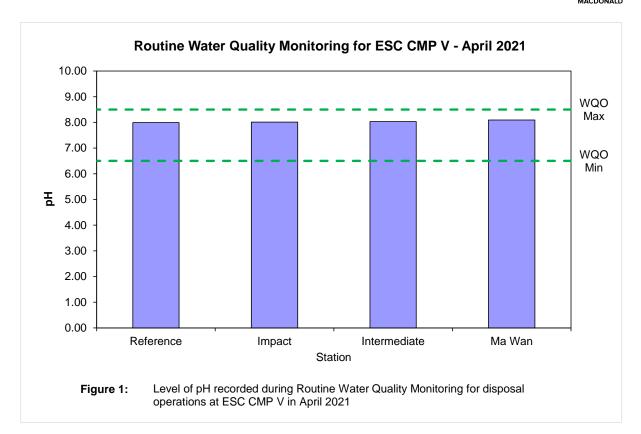
1. "<LOR" indicates the concentrations of metals and metalloids are below the limit of reporting.

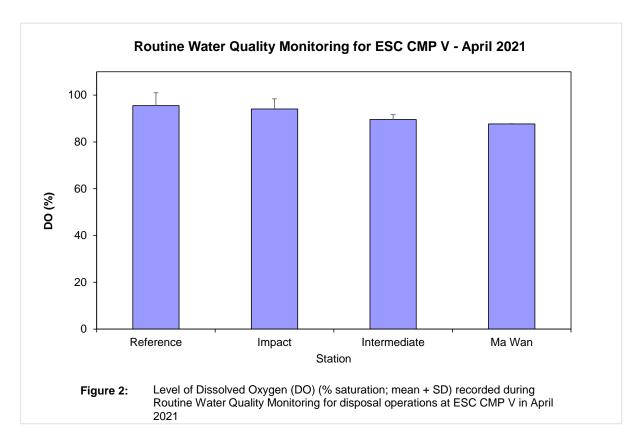
2. Cell shaded yellow / red indicates value exceeding the Action/Limit levels.

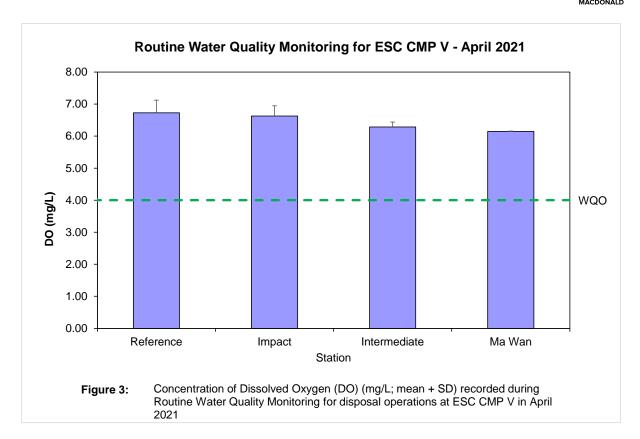
3. Cell shaded grey indicates value exceeding the WQO.

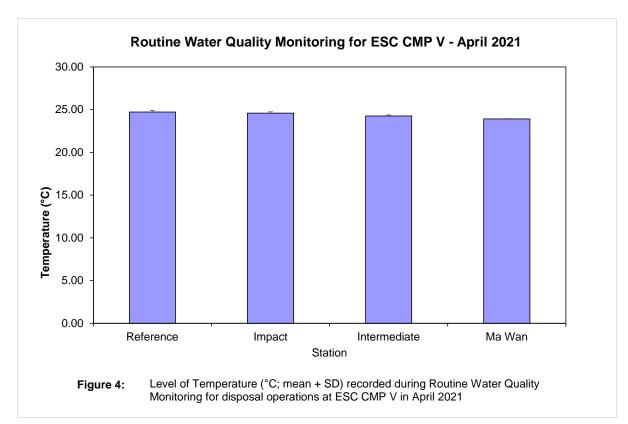
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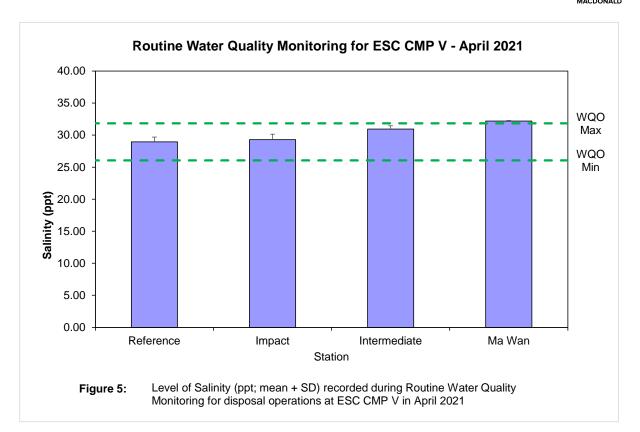
C. Graphical Presentations

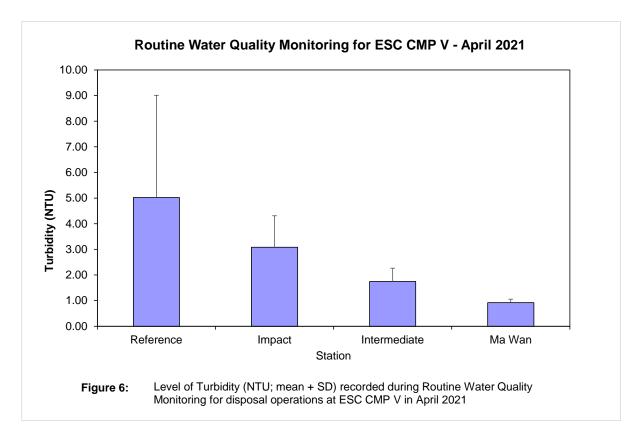


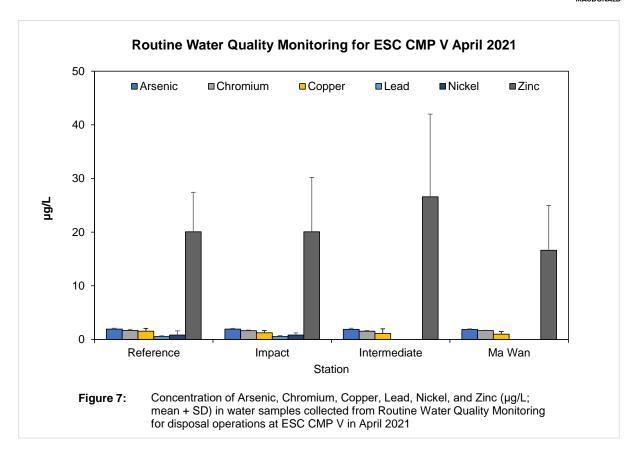


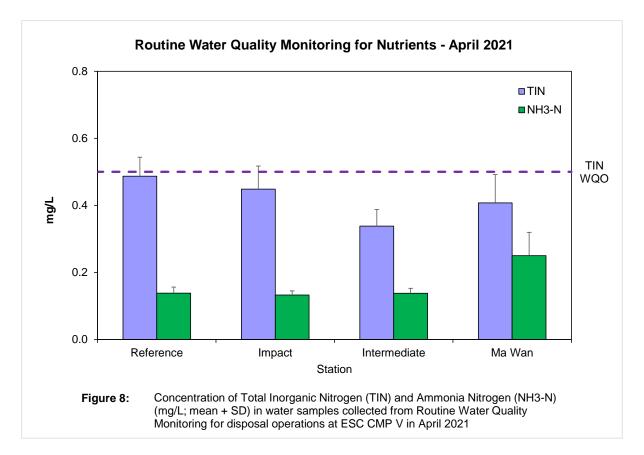


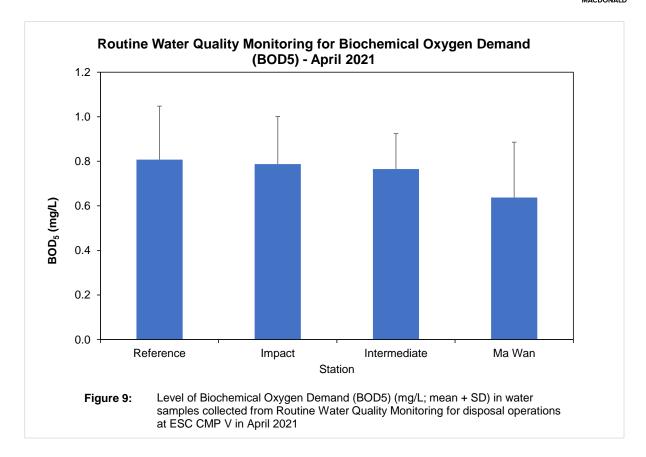


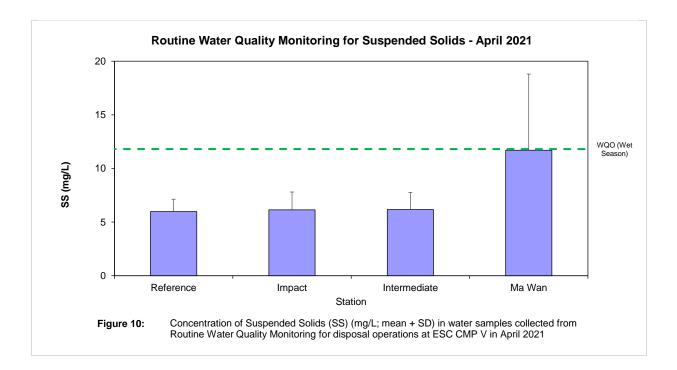


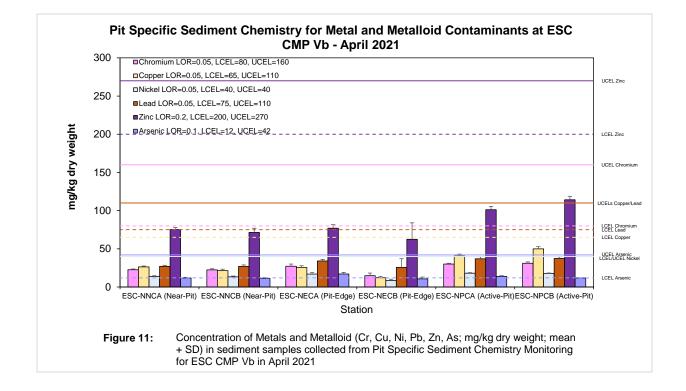


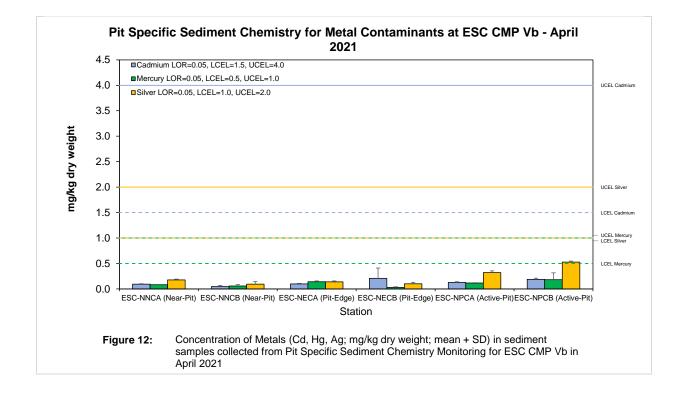


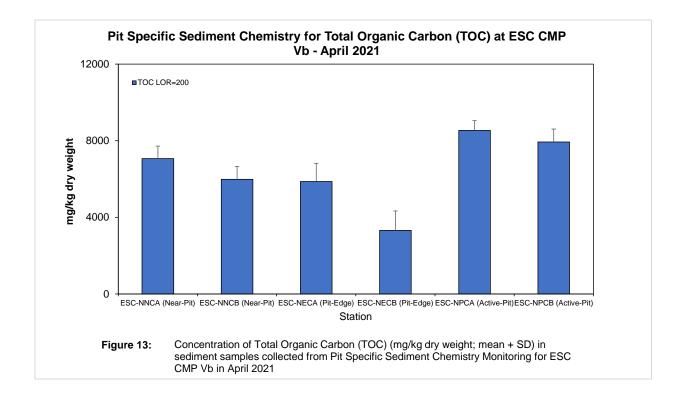


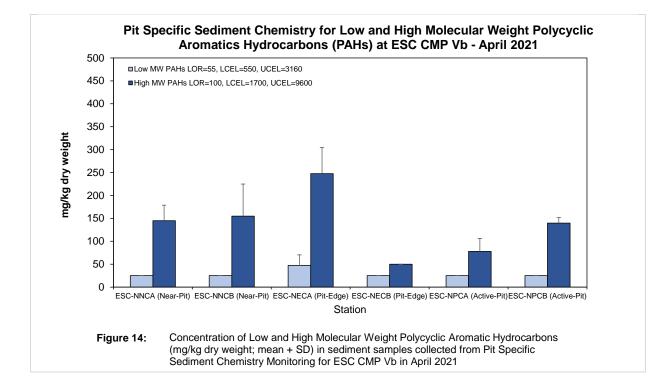




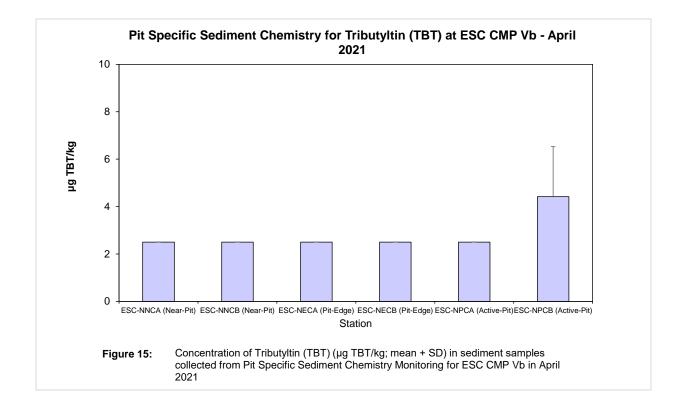








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Mott MacDonald | Agreement No. CE59/2020(EP) Environmental Monitoring and Audit for Disposal Facility to the East of Sha Chau (2021-2026) – Investigation Monthly EM&A Report for Contaminated Mud Pits to the East of Sha Chau – April 2021

D. Study Programme

Appendix D Study Programme	Enviro	Agreeme nmental Monit	ent No. CE 59. Foring and Au			V	Mott	MacDor	ald Ho	ng Ko	ong Li	mite
		he East of Sha				5						
ask Name		Start	Finish		2022 Q4 Q1 Q2 Q O N D J F M A M J J	2023 3 Q4 Q1 Q A S Q N D L E M A	02 03 04	2024 Q1 Q2 Q3	2025 Q4 Q1	Q2 Q3	Q4 Q1	Q2 0
COMMENCEMENT OF AGREEMENT NO. CE 59/2020 (E	P)	Thu 01/04/21		•						MINI J J MIS		1171113
EAST OF SHA CHAU CONTAMINATED MUD PITS (ESC 0 2026	CMPs) BETWEEN 2021 &	Thu 01/04/21	Thu 25/06/26									
Draft Report of First Review of EM&A Manual (for ESC CMPs)			Fri 30/04/21	•								
Final Report of First Review of EM&A Manual (for ESC CMPs)			Thu 20/05/21	•								
Draft Report of Subsequent Review of EM&A Manual (for ESC CM	1Ps) - annual basis assumed	Sat 30/04/22	Wed 30/04/25		\$	•	\$	\diamond		\diamond		
Final Report of Subsequent Review of EM&A Manual (for ESC CMPs) - annual basis assumed		Fri 20/05/22	Tue 20/05/25		\diamond		\diamond	\diamond		\diamond		
Regular Site Inspections of CMP Contractors		Thu 01/04/21	Tue 31/03/26	_								-
Monthly EM&A Report		Fri 14/05/21	Tue 14/04/26	\$\$\$\$	~~~~~~~~~	ooooooooo		\$\$\$\$\$\$\$\$	****	00000	>>>>>	>>
Quarterly EM&A Report	Fri 30/07/21	Thu 30/04/26	\$		\rightarrow \diamond \diamond		$\diamond \diamond \diamond$	◊ ◊	◊ ◊	◊ ◊	\$	
Annual EM&A Report		Thu 30/12/21	Tue 30/12/25	_	\$	\$		\$	\diamond		\diamond	
Annual Risk Assessment Report		Tue 31/05/22	Sun 31/05/26		\diamond		\diamond	\diamond		\diamond		\$
Draft Final Report			Thu 30/04/26									٠
Final Report			Thu 04/06/26									٠
Draft Executive Summary			Thu 04/06/26									٠
Final Executive Summary			Thu 25/06/26									٠
EAST TUNG LUNG CHAU DISPOSAL FACILITY (OCTOBEI (subject to actual disposal programme to be confirme		Mon 14/11/22	Tue 14/10/25								-	
Monthly EM&A Report (if any new disposals during reporting per	Mon 14/11/22	Tue 14/01/25	_		$\diamond \diamond \diamond$			$\diamond \diamond \diamond$				
Quarterly EM&A Report (if any new disposals during reporting pe	Sat 14/01/23	Tue 14/01/25	_		\$			\diamond				
Annual EM&A Report (if any new disposals during reporting period)		Sat 14/10/23	Tue 14/10/25	_			\diamond				\$	
Revision: A Location Date: Sun 09/05/21 Regular T	8	Start of Agr Submission		•	Multiple-C	Occasion Submis	sion	\$				<u> i </u>