香港電燈有限公司
The Hongkong Electric Co., Ltd.

Improvement Dredging for Lamma Power Station Navigation Channel Quarterly Environmental Monitoring & Audit Report

May – July 2020

香港電燈有限公司
The Hongkong Electric Co., Ltd.

港燈
HK Electric

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) ORDINANCE, CAP. 499

ENVIRONMENTAL PERMIT NO. EP-535/2017

IMPROVEMENT DREDGING FOR LAMMA POWER STATION NAVIGATION CHANNEL

Report Title	Quarterly EM&A Report (May to July 2020)
Date	3 September 2020
Certified by	(Mr. Kenneth Fung, Environmental Team Leader)
Verified by	Mr. Y T Tang (AECOM Asia Company Limited, Independent Environmental Checker)

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The actual dredging work for the "Improvement Dredging for Lamma Power Station Navigation Channel" (the Project) commenced on 18 February 2020. This is the 2nd quarterly Environmental Monitoring and Audit (EM&A) Summary report for the Project prepared by the Environmental Team (ET). This report presents the results of impact monitoring for the said project in the period from May to July 2020.

Marine water quality monitoring was performed. The results were checked against the established Alert, Action and Limit levels. The implementation status of the environmental mitigation measures, Alert/Event and Action Plans and environmental complaint handling procedures were also checked.

Construction Activities Undertaken

The major construction activities during the reporting period were dredging and dumping of dredged mud. Dredging work was suspended from 1 May to 10 July 2020 in the reporting period. The maximum hourly and daily dredging rates actually achieved by the contractors were within the limits specified in the latest dredging schedule.

Environmental Monitoring Works

All monitoring work at designated stations was performed as scheduled in the reporting period.

Water Quality

The water quality monitoring results for Suspended Solid (SS) and Turbidity obtained during the reporting period were within their corresponding Action Levels, Limit Levels and Alert Levels. For Dissolved Oxygen (DO) there were nine (9) Action Level exceedances and seventeen (17) Limit Level exceedances recorded in the reporting period. All cases were investigated and the investigations concluded that all the cases were not related to the Project.

Site Environmental Audit

Site audits were carried out by ET on a weekly basis to monitor environmental issues at the construction sites to ensure that all mitigation measures were implemented timely and properly. Four site audits were performed in the reporting period. As per no dredging work was carried out from 1 May 2020 to 10 July 2020, no site audit was arranged during this period.

Independent Environmental Checker (IEC) conducted a site inspection on 29 May 2020, 29 June 2020 and 27 July 2020 to audit the water quality monitoring works/ site works. The site conditions were generally satisfactory. The site audit findings for the reporting period are summarized in Annex E.

Environmental Licensing and Permitting

Description	Permit No.	Valid Period		Issued To	Date of Issuance
		From	To		
Environmental Permit	EP-535/2017	10/10/2017	-	HK Electric	10/10/2017
Construction Noise Permit	GW-RS0080-20	12/02/2020	06/08/2020	Contractor	07/02/2020

Description	Permit No.	Valid Period		Issued To	Date of Issuance
		From	To		
Marine Dumping Permit	EP/MD/20-076	17/02/2020	16/08/2020	Contractor	17/02/2020
Marine Dumping Permit	EP/MD/21-004	09/06/2020	08/12/2020	Contractor	09/06/2020
Marine Dumping Permit	EP/MD/21-005	09/06/2020	30/09/2020	Contractor	09/06/2020

Implementation Status of Environmental Mitigation Measures

Environmental mitigation measures for the construction activities as recommended in the EM&A manual were implemented in the reporting period.

Environmental Complaints

No complaint against the Project was received in the reporting period.

Environmental Summon and Successful Prosecution

No notifications of summon or successful prosecution was received in the reporting period.

Concluding Remarks

The environmental performance of the project during the reporting period was generally satisfactory.

1. INTRODUCTION

1.1 Background

The Environmental Team (hereinafter called the "ET") was formed within the Hongkong Electric Co. Ltd (HK Electric) to undertake Environmental Monitoring and Audit for "Improvement Dredging for Lamma Power Station Navigation Channel" (hereinafter called the "Project"). Under the requirements of Section 3 of Environmental Permit EP-535/2017, an EM&A programme for impact environmental monitoring is required to be implemented. In accordance with the EM&A Manual, environmental monitoring of water quality and regular environmental audits are required for the Project.

The Project involves re-profiling the Lamma Power Station Navigation Channel (the "Channel") to a target depth of -16.5 mPD with an estimated sediment quantity up to approx. 3.2 million m^3, subject to fine-tuning against the actual existing seabed profile. The Project Area is shown in Figure 1.1.

The majority of dredging work is to be carried out by Trailer Suction Hopper Dredger (TSHD) whereas the minority of dredging work for remedial trimming and near the existing jetty structure is to be carried out by grab dredger. The construction works of the Project was commenced in February 2020.

This report summarizes the environmental monitoring and audit work for the Project for the period from May to July 2020.

1.2 Project Organisation

The management structure to oversee the Project includes the following:

- Project Proponent (HK Electric);
- Environmental Protection Department (EPD);
- Engineer or Engineer's Representative (ER);
- Independent Environmental Checker (IEC);
- Environmental Team (ET); and
- Contractor.

The project organisation chart and environmental team organisation chart for the construction EM&A programme are shown in Annex A.

1.3 Construction Works undertaken during the Reporting Period

Construction activities undertaken during the reporting report for this Project were dredging and dumping of dredged mud. One grab dredger was deployed and operated within the Project Area. The total volume of dredged materials from 1 May to 31 July 2020 was 43,200 m^3. Dredging work was suspended from 1 May to 10 July 2020 in the reporting period. Uncontaminated materials were dumped at the designated location within the East Ninepin Open Sea Sediment Disposal Area and East of Sha Chau Contaminated Mud Pit and the total dumped volume in reporting period was 43,200 m^3. The location of dumping site is shown in Figure 1.2, Figure 1.3 and Figure 1.4.

Daily records of dredged / dumped volume are presented in Annex B. The maximum hourly and daily dredging rates achieved by the contractors were within the limits specified in the latest dredging schedule.

The main construction activities carried out during the reporting period and the corresponding environmental mitigation measures are summarized in Table 1.1. The implementation of major mitigation measures in the period is provided in Annex F.

Table 1.1 Construction Activities and Their Corresponding Environmental Mitigation Measures

Construction Activities	**Environmental Mitigation Measures**
Dredging	**Water Quality** – There was no concurrent or mixed use of grab dredger and TSHD operation. – Closed grab capacity was not less than $8m^3$ (except for dredging works near submarine pipeline). – Cage-type silt curtain (at least 10m depth) was used for grab dredger operation. – No operation of more than 5 grab dredgers concurrently at any time was allowed. – Both maximum total hourly and daily dredging rates as specified in the latest dredging schedule were strictly followed. – Vessel speeds within the Project Area were reduced to maximum speed limit. – Neither overflow nor using of lean mixture overboard (LMOB) system was occurred. – All barges for transportation of dredged materials were fitted with tight bottom seals to prevent leakage. **Marine Ecology** – No dredging on Zone 4 of the navigation channel during the calving season for the Finless Porpoise. – All construction related vessels travelled to and from the Project Area followed the designated route to avoid the Finless Porpoise habitat area. – The dumping of chemicals, rubbish, oils etc. into the water was strictly prohibited. **Hazard to Life** – Marine vessels should avoid traveling during berthing and unberthing of coal vessel. – As far as practicable, marine vessels should avoid traveling after sunset or under low visibility when the works area is near submarine pipeline. – Working vessel not to stay right above the submarine pipeline unless it is necessary.

Construction Activities	Environmental Mitigation Measures
	Noise – General noise mitigation measures were employed at work site throughout the construction phase. – The number and type of plants and operation conditions as specified in the CNP were strictly followed. **Waste Management** – All barges for transportation of dredged materials were fitted with tight bottom seals to prevent leakage. – All vessels were filled to a level such that dredged materials would not spill over during loading and transportation. – Dredged wastes were disposed of at Licensed dumping site – South Cheung Chau. – Records of the quantities of waste generated and disposed of off-site were taken.

1.4 Summary of EM&A Requirements

The EM&A program requires environmental monitoring of water quality. The detailed EM&A monitoring work for water quality is described in Sections 2 of this report.

The following environmental audits are summarized in Section 3 of the report:

- Environmental monitoring results;
- Waste Management Records;
- Weekly site audit results;
- The status of environmental licensing and permits for the Project;
- The implementation status of environmental protection and pollution control/ mitigation measures.

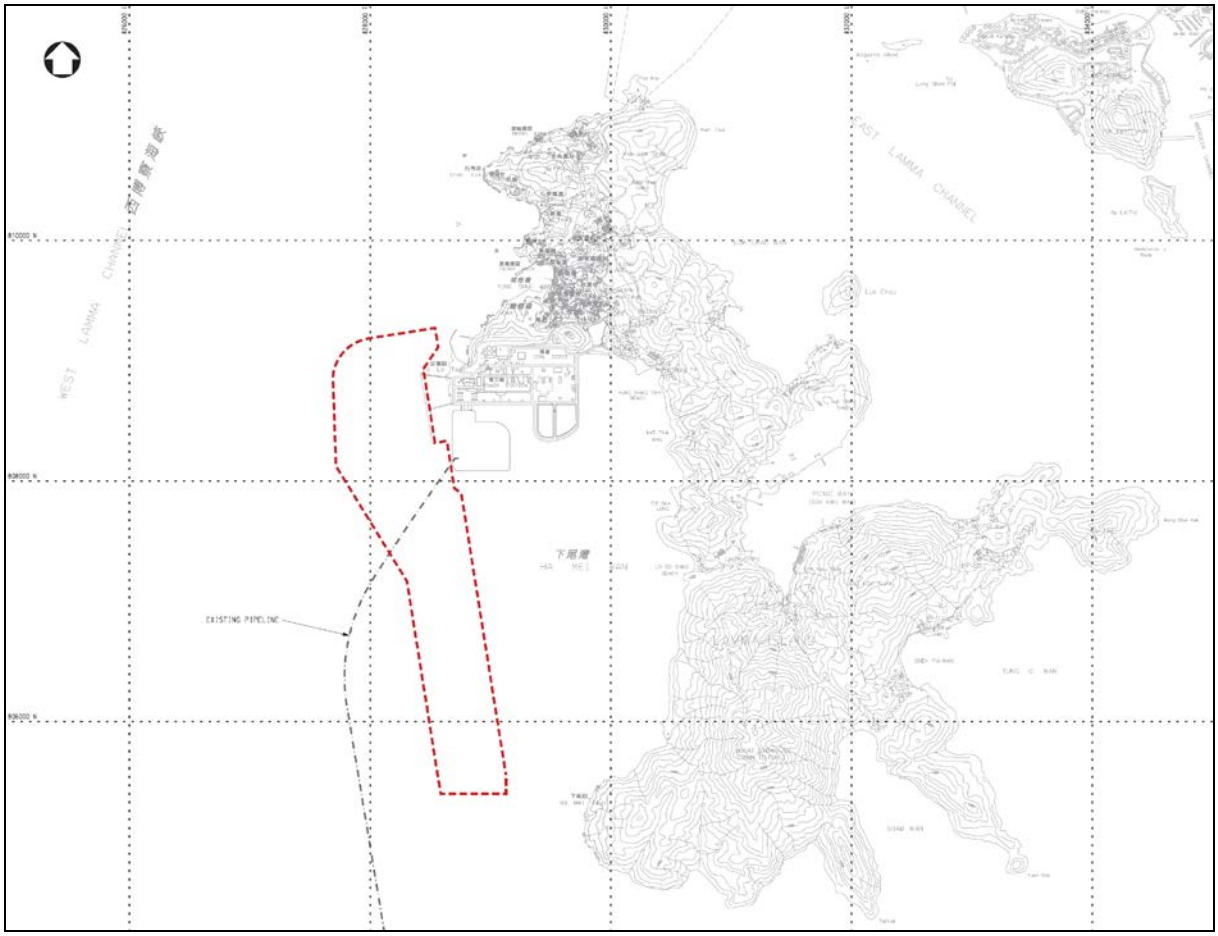


Figure 1.1 Project Area

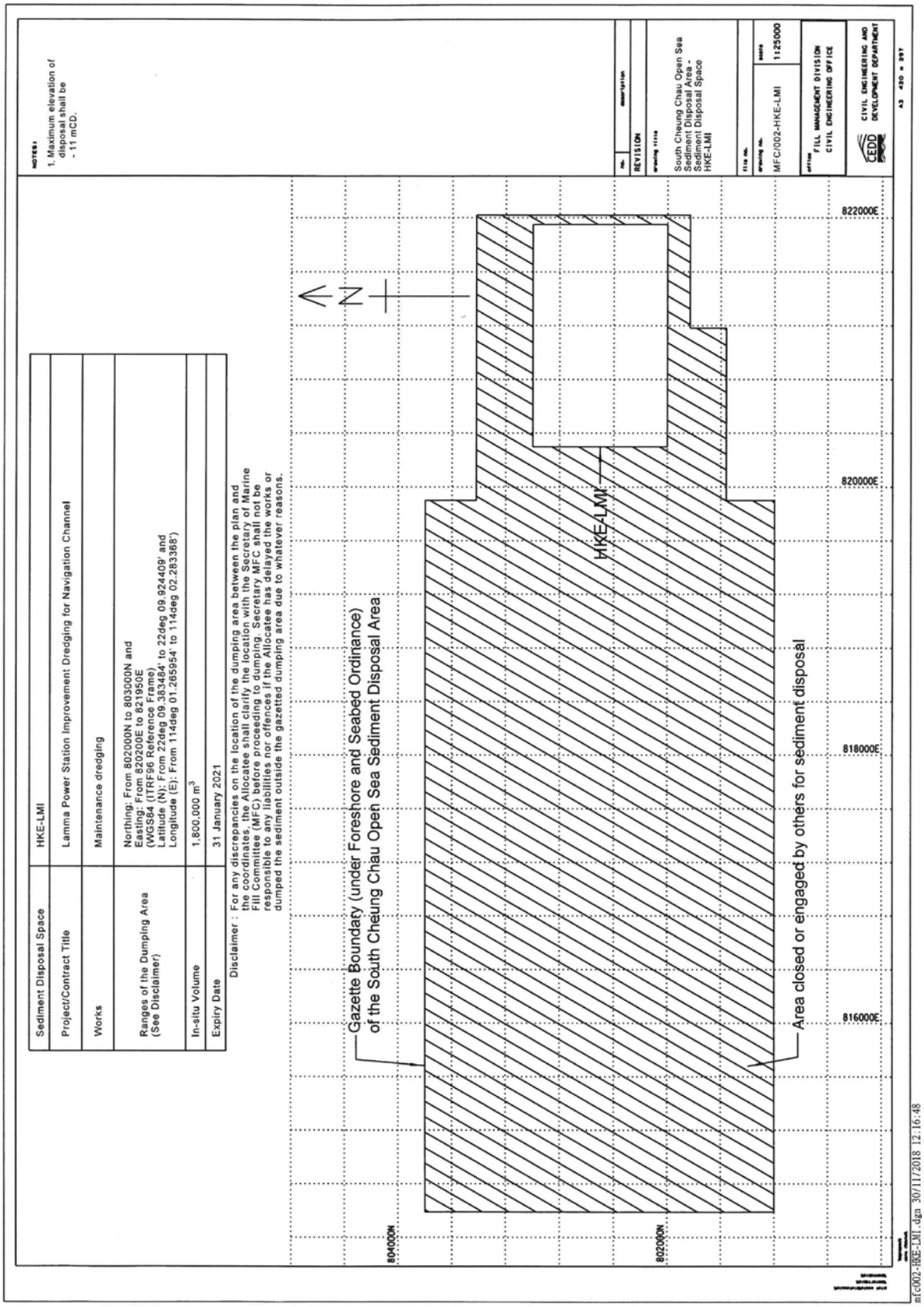


Figure 1.2 Location of Dumping Site (South Cheung Chau Open Sea Sediment Disposal Area)

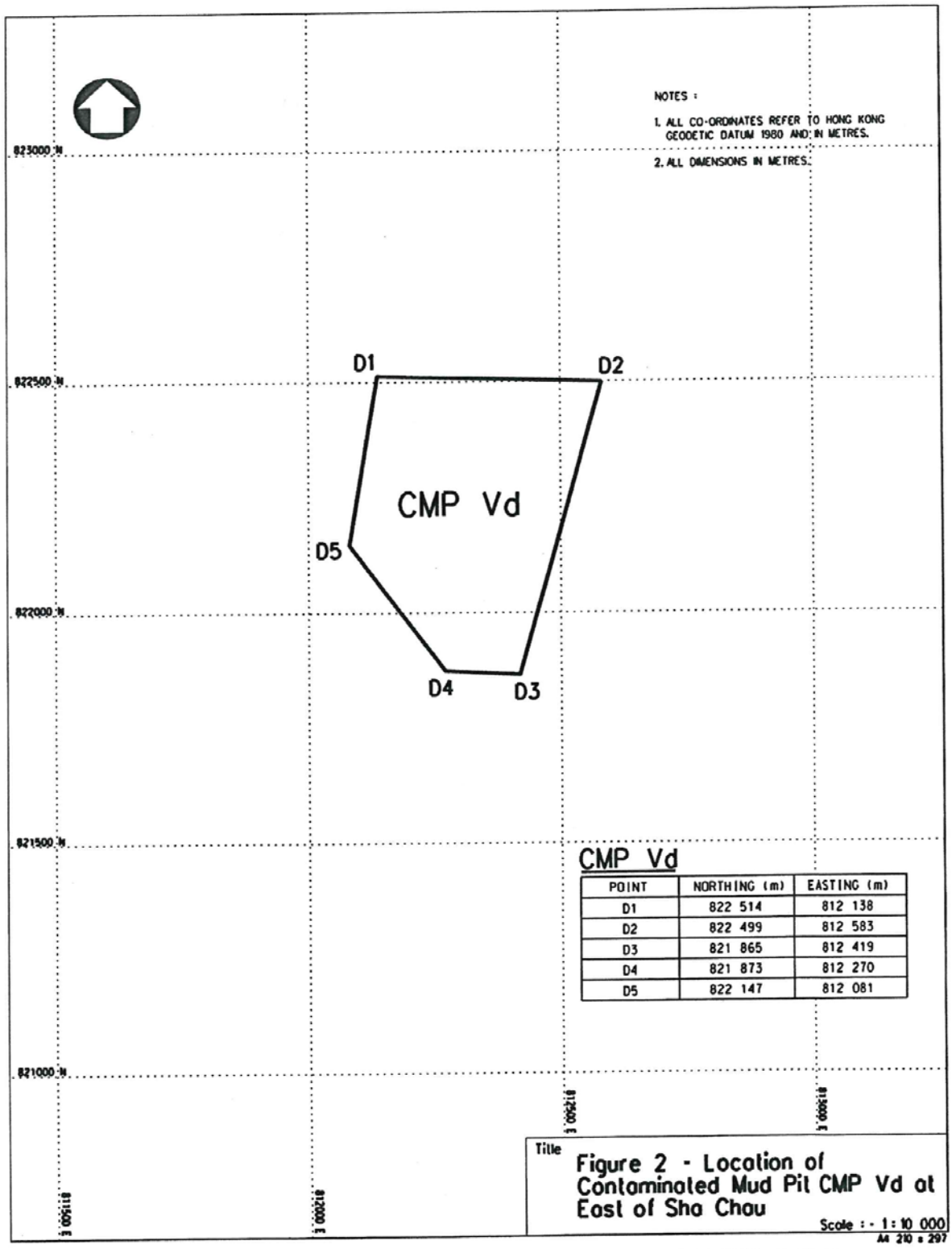


Figure 1.3 Location of Dumping Site (East of Sha Chau Contaminated Mud Pit)

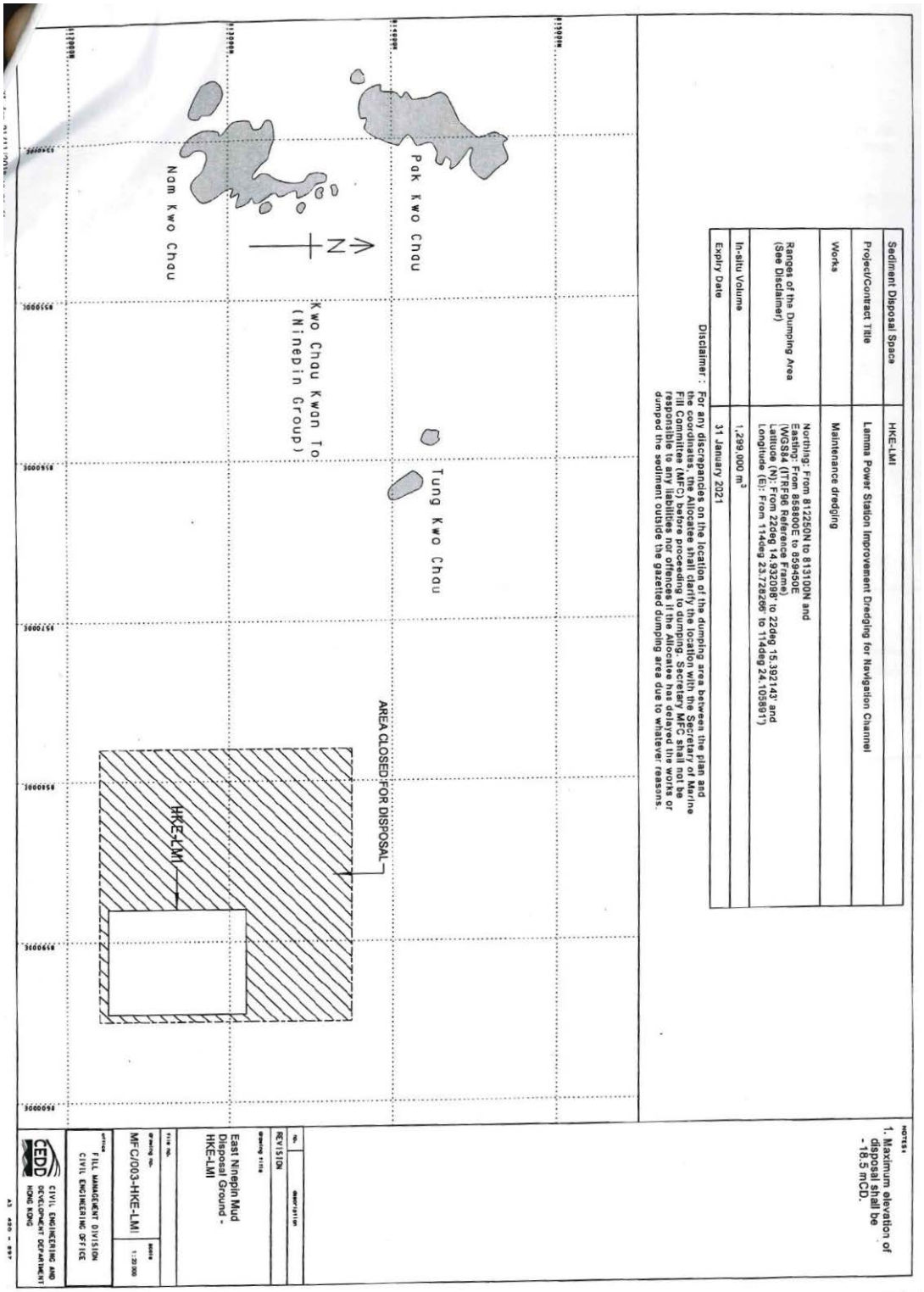


Figure 1.4 Location of Dumping Site (East Ninepin Open Sea Sediment Disposal Area)

2. WATER QUALITY MONITORING

Marine water quality monitoring was carried out during the marine works to detect and check for any deterioration in water quality and ensure that timely action is taken to rectify deteriorations that are due to the Project.

HK Electric commissioned Mott MacDonald Hong Kong Limited to carry out water quality monitoring works of the Project. Details of the water quality monitoring results and the associated alert/event and action plans presented in the Quarterly Water Quality Monitoring Report are shown in Annex C.

3. ENVIRONMENTAL AUDIT

3.1 Review of Environmental Monitoring Procedures

The environmental monitoring procedures were regularly reviewed by the Environmental Team. No modification to the existing monitoring procedures was recommended.

3.2 Assessment of Environmental Monitoring Results

Monitoring results for Water Quality

Table 3.1 Summary of Alert, Action and Limit Level Exceedances on Monitoring Parameters

Item	Parameter Monitored	Monitoring Period	No. of Exceedances			Alert/Event and Action Plans Implementation Status and Results
			Alert Level	Action Level	Limit Level	
Water						
1	DO (Surface & Middle)	01/05/2020 31/07/2020	0	0	14	Investigation concluded that the exceedance was not related to the Project. Please refer to Section 2 and Annex C of the report for details.
2	DO (Bottom)	01/05/2020 31/07/2020	0	9	3	
3	Turbidity	01/05/2020 31/07/2020	0	0	0	
4	SS	01/05/2020 31/07/2020	N.A.	0	0	

There were nine (9) Action Level and seventeen (17) Limit Level exceedances of Dissolved Oxygen (DO) recorded in the reporting period. These exceedances were investigated and found that the affected SR stations were either upstream of the Project during the corresponding tide or the exceedances appeared to be due to local factors not related to the Project. No further action was required. Nevertheless IEC, Engineer and the construction contractor had been informed of the exceedances accordingly as per requirements of the EM&A Manual. For details, please refer to Section 2 and Annex C of the report.

Waste Management

The estimated amounts of waste generated in reporting period are shown in Table 3.2.

Table 3.2 Estimated Amounts of Waste Generated

Period	Waste Type	Estimated Amount (m^3)
May 2020	Dredged Materials – Marine Mud	0
June 2020	Dredged Materials – Marine Mud	0
July 2020	Dredged Materials – Marine Mud	43,200

The total bulk volume of dredged material was 1,510,557 m^3.

3.3 Site Environmental Audit

Site audits were carried out by ET on a weekly basis to monitor environmental issues at the construction sites to ensure that all mitigation measures were implemented timely and properly. Four site audits were performed in the reporting period. As no dredging work was carried out from 1 May 2020 to 10 July 2020, no site audit was arranged during this period.

Independent Environmental Checker (IEC) conducted a site inspection on 29 May 2020, 29 May 2020 and 27 July 2020 to audit the water quality monitoring and/or site works. The site conditions were generally satisfactory. The site audit findings for the reporting period are summarized in Annex E.

3.4 Status of Environmental Licensing and Permitting

All permits/licenses obtained for the project are summarised in Table 3.3.

Table 3.3 Summary of Environmental Licensing and Permit Status

Description	**Permit No.**	**Valid Period**		**Highlights**	**Status**
		From	**To**		
Environmental Permit	EP-535/2017	10/10/2017	-	The whole construction work site	Valid
Construction Noise Permit	GW-RS0080-20	12/02/2020	06/08/2020	Operation of PME during the restricted hours (00:00-24:00 hours on general holidays, and 00:00-07:00 and 19:00-2400 hours on any day not being a general holiday)	Valid

Description	Permit No.	Valid Period		Highlights	Status
		From	To		
Marine Dumping Permit	EP/MD/20-076	17/02/2020	16/08/2020	Dumping at South Cheung Chau Open Sea Sediment Disposal Area	Valid
Marine Dumping Permit	EP/MD/21-004	09/06/2020	08/12/2020	Dumping at East of Sha Chau Contaminated Mud Pit	Valid
Marine Dumping Permit	EP/MD/21-005	09/06/2020	30/09/2020	Dumping at East Ninepin Open Sea Sediment Disposal Area	Valid

3.5 Implementation Status of Environmental Mitigation Measures

Mitigation measures detailed in the permits and the EM&A Manual are required to be implemented. An updated summary of the Environmental Mitigation Implementation Schedule (EMIS) is presented in Annex F.

3.6 Implementation Status of Alert/Event and Action Plans

According to the findings presented in water quality monitoring results obtained during the reporting period, some of the testing results triggered the relevant Action and Limit Levels, and investigations were conducted accordingly. The investigations concluded that all cases were not related to the Project; hence, the Project did not induce adverse impact to all water quality sensitive receivers. All required actions under the Event and Action Plan were followed.

The Alert/Event and Action Plans for water quality extracted from the EM&A Manual are presented in Annex D.

3.7 Implementation Status of Environmental Complaint Handling Procedures

During the reporting period, there was no environmental complaint against the Project was received.

Table 3.4 Environmental Complaints Received

Case Reference / Date, Time Received / Date, Time Concerned	Descriptions / Actions Taken	Conclusion / Status
Nil	N/A	N/A

Table 3.5 Outstanding Environmental Complaints Carried Over

Case Reference / Date, Time Received / Date, Time Concerned	Descriptions / Actions Taken	Conclusion / Status
Nil	N/A	N/A

3.8 Environmental Summon and Successful Prosecution

No notifications of summon or successful prosecution was received in the reporting period.

4. CONCLUSION

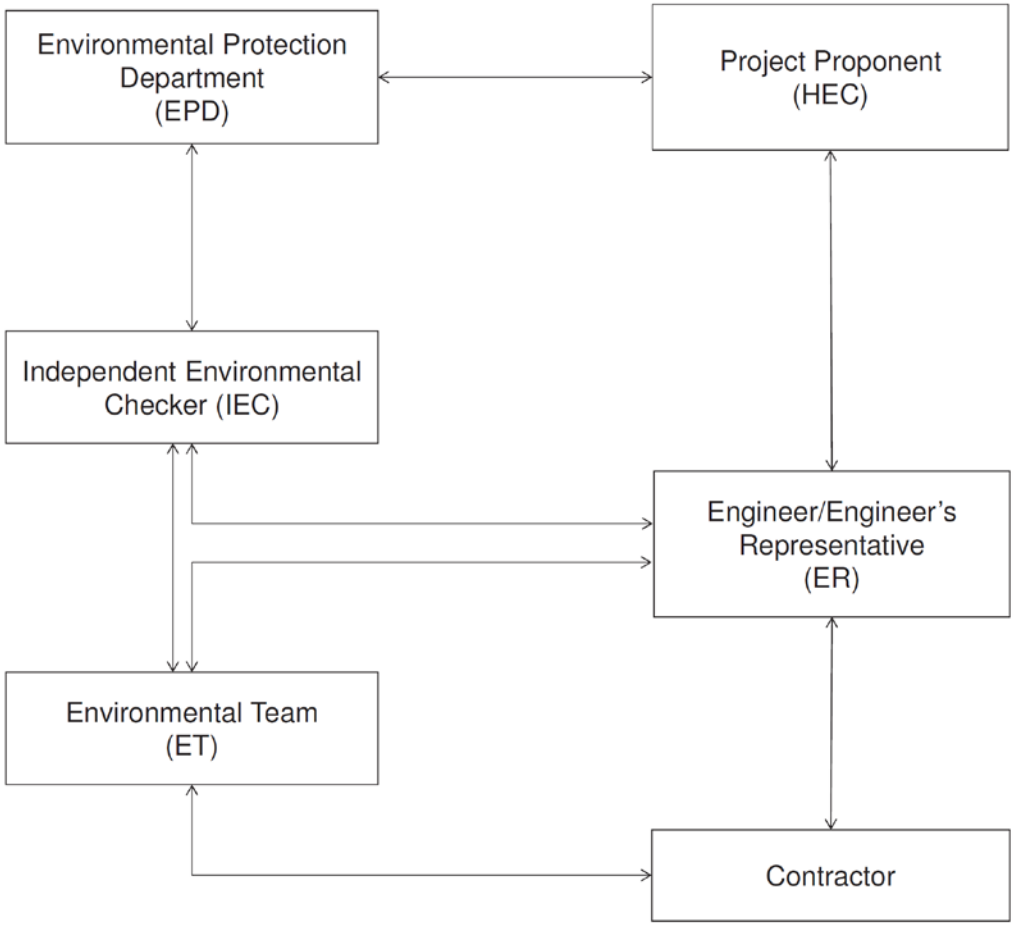
Environmental monitoring was performed as required in the reporting period. All monitoring results were checked and reviewed. The water quality monitoring results for all parameters, except DO, obtained during the reporting period were within the corresponding Action, Limit or Alert Levels stipulated in the EM&A programme. For DO, some of the testing results triggered the relevant Action and Limit Levels, and investigations were conducted accordingly. The investigations concluded that the cases were not related to the Project.

Environmental mitigation measures recommended in the EM&A manual for the Project were implemented in the reporting period. No compliant against the Project was received. No prosecution and summons was received for this Project in the reporting period.

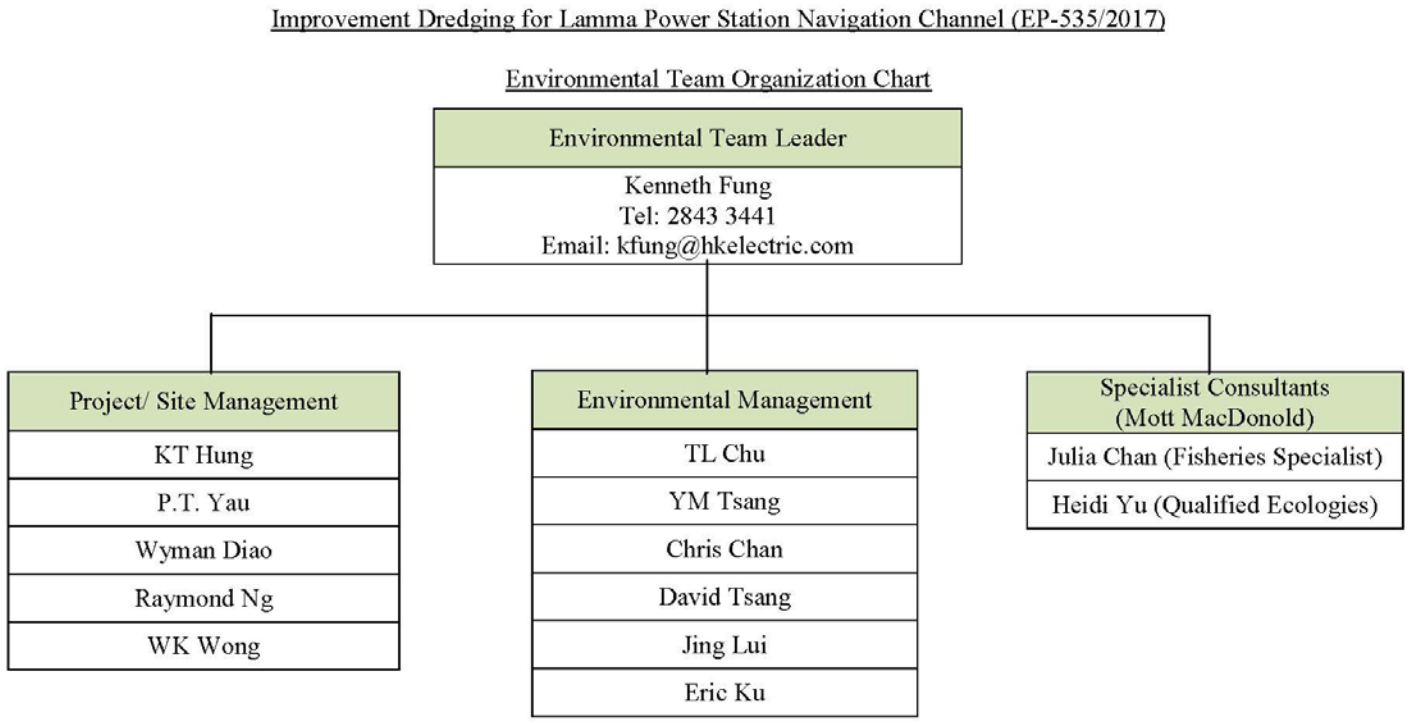
The environmental performance of the Project was generally satisfactory.

Annex A Organization Chart

A1: Project Organisation Chart



A2: Environmental Team Organisation Chart



Annex B Amount of Dredged and Dumped Marine Sediment

Date	Dredging Time	Dredged Marine Mud (bulk volume m^3)	Dumping Time	Dumped Marine Mud (bulk volume m^3)
01/05/2020	-	-	-	-
02/05/2020	-	-	-	-
03/05/2020	-	-	-	-
04/05/2020	-	-	-	-
05/05/2020	-	-	-	-
06/05/2020	-	-	-	-
07/05/2020	-	-	-	-
08/05/2020	-	-	-	-
09/05/2020	-	-	-	-
10/05/2020	-	-	-	-
11/05/2020	-	-	-	-
12/05/2020	-	-	-	-
13/05/2020	-	-	-	-
14/05/2020	-	-	-	-
15/05/2020	-	-	-	-
16/05/2020	-	-	-	-
17/05/2020	-	-	-	-
18/05/2020	-	-	-	-
19/05/2020	-	-	-	-
20/05/2020	-	-	-	-
21/05/2020	-	-	-	-
22/05/2020	-	-	-	-
23/05/2020	-	-	-	-
24/05/2020	-	-	-	-
25/05/2020	-	-	-	-
26/05/2020	-	-	-	-
27/05/2020	-	-	-	-
28/05/2020	-	-	-	-
29/05/2020	-	-	-	-
30/05/2020	-	-	-	-
31/05/2020	-	-	-	-
Total in the Month		0		0
Accumulated Total		1,467,357		1,467,357

Date	Dredging Time	Dredged Marine Mud (bulk volume m^3)	Dumping Time	Dumped Marine Mud (bulk volume m^3)
01/06/2020	-	-	-	-
02/06/2020	-	-	-	-
03/06/2020	-	-	-	-
04/06/2020	-	-	-	-
05/06/2020	-	-	-	-
06/06/2020	-	-	-	-
07/06/2020	-	-	-	-
08/06/2020	-	-	-	-
09/06/2020	-	-	-	-
10/06/2020	-	-	-	-
11/06/2020	-	-	-	-
12/06/2020	-	-	-	-
13/06/2020	-	-	-	-
14/06/2020	-	-	-	-
15/06/2020	-	-	-	-
16/06/2020	-	-	-	-
17/06/2020	-	-	-	-
18/06/2020	-	-	-	-
19/06/2020	-	-	-	-
20/06/2020	-	-	-	-
21/06/2020	-	-	-	-
22/06/2020	-	-	-	-
23/06/2020	-	-	-	-
24/06/2020	-	-	-	-
25/06/2020	-	-	-	-
26/06/2020	-	-	-	-
27/06/2020	-	-	-	-
28/06/2020	-	-	-	-
29/06/2020	-	-	-	-
30/06/2020	-	-	-	-
Total in the Month		0		0
Accumulated Total		1,467,357		1,467,357

Date	Dredging Time	Dredged Marine Mud (bulk volume m^3)	Dumping Time	Dumped Marine Mud (bulk volume m^3)
01/07/2020	-	-	-	-
02/07/2020	-	-	-	-
03/07/2020	-	-	-	-
04/07/2020	-	-	-	-
05/07/2020	-	-	-	-
06/07/2020	-	-	-	-
07/07/2020	-	-	-	-
08/07/2020	-	-	-	-
09/07/2020	-	-	-	-
10/07/2020	-	-	-	-
11/07/2020	08:35 – 16:05	600	20:35 – 21:05	600
12/07/2020	-	-	-	-
13/07/2020	00:00 – 18:55	1,800	12:58 – 23:59	1,800
14/07/2020	00:00 – 21:41	1,800	14:11 – 23:59	1,800
15/07/2020	00:00 – 20:42	2,400	14:05 – 23:59	2,400
16/07/2020	00:00 – 21:15	2,400	15:36 – 23:59	2,400
17/07/2020	00:00 – 20:29	2,400	14:43 – 23:59	2,400
18/07/2020	00:00 – 19:58	3,000	14:12 – 23:36	3,000
19/07/2020	00:00 – 21:02	3,000	12:25 – 23:59	3,000
20/07/2020	00:00 – 18:56	3,000	12:19 – 23:00	3,000
21/07/2020	00:00 – 17:54	1,800	15:23 – 22:10	1,800
22/07/2020	00:00 – 22:15	2,400	15:15 – 23:59	2,400
23/07/2020	00:00 – 19:38	2,400	13:48 – 21:40	2,400
24/07/2020	00:00 – 15:16	1,200	00:47 – 21:23	1,200
25/07/2020	00:00 – 19:38	2,400	11:55 – 23:59	2,400
26/07/2020	00:00 – 20:01	3,600	07:07 – 23:59	3,600
27/07/2020	00:00 – 23:28	1,800	01:21 – 18:19	1,800
28/07/2020	00:00 – 21:47	2,400	04:49 – 23:59	2,400
29/07/2020	00:00 – 19:05	1,200	03:18 – 20:08	1,200
30/07/2020	00:00 – 18:19	2,400	01:35 – 22:50	2,400
31/07/2020	00:00 – 09:10	1,200	00:30 – 16:01	1,200
Total in the Month		43,200		43,200
Accumulated Total		1,510,557		1,510,557

Note:-
As the bulking factor (i.e. bulking factor of 4 for TSHD & 1.3 for Hopper Barge in accordance with assumptions in the approved dumping permit by EPD) of dredged marine mud is found varying considerably at different locations in the navigation channel depending on the depth of high spots to be removed, the final in-situ as-dredged volume will be determined by swath surveys of the navigation channel before and after the dredging work.

Following the interim survey carried out from 13 to 16 March 2020, the bulking factor for TSHD has been adjusted from 4 to 2.8 as directed by EPD. Subsequent planning and control of dredging rates for coming works would be based on the adjusted bulking factor.

Annex C

Water Quality Monitoring Results

MOTT MACDONALD

Improvement Dredging for Lamma Power Station Navigation Channel

Construction Phase Quarterly Water Quality Monitoring Report No. 2 (May–July 2020)

August 2020

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Improvement Dredging for Lamma Power Station Navigation Channel

Construction Phase Quarterly Water Quality Monitoring Report No. 2 (May–July 2020)

August 2020

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Executive summary

The Project “Improvement Dredging for Lamma Power Station Navigation Channel” commenced on 18 February 2020. This is the second quarterly Water Quality Monitoring report for the Project. This report presents the results of impact monitoring on marine water quality for the Project from May to July 2020.

During this reporting period, a total of 40 days of marine water quality monitoring was carried out. The water quality monitoring results for all parameters, except dissolved oxygen (DO), obtained during the reporting period were within the corresponding Action and Limit Levels for sensitive receiver stations and within the Alert Levels for near stations as stipulated in the EM&A programme. Some of the DO (surface, middle and bottom layers) triggered the relevant Action or Limit Levels, and the corresponding investigations concluded that the cases were not related to the Project. To conclude, the dredging activities in the reporting period did not cause adverse impact to all water quality sensitive receivers.

1 Introduction

On 10 October 2017, the Environment Impact Assessment (EIA) Report (Register No.: AEIAR-212/2017) for the "Improvement Dredging for Lamma Power Station Navigation Channel" (the Project) was approved and an Environmental Permit (EP) (No. EP-535/2017) was issued for the construction and operation of the Project. Mott MacDonald Hong Kong Limited was commissioned by The Hongkong Electric Company, Limited to carry out the water quality monitoring works of the Project during the construction phase.

The purpose of the Project is to provide and maintain safe clearance for ocean-going marine vessels delivering coal to Lamma Power Station (LPS) via the Lamma Power Station Navigation Channel (the "Channel"), through the dredging of naturally accumulating sediment from the seabed. In order to meet the requirements for continued safe passage, the construction phase of the Project involves improvement dredging of the Channel to a target dredge depth[1] of -16.5 mPD.

The construction phase of the Project commenced on 18 February 2020. This Water Quality Monitoring Report summarizes the water quality monitoring as part of the EM&A programme for the Project for the months of May, June and July 2020.

[1] While the Project aims to dredge to a target depth of -16.5 mPD, some overdredge may occur due to the limited precision control of dredging depths in practice.

2 Monitoring Methodology

2.1 Monitoring Frequency and Locations

The water quality monitoring was conducted three days per week during the reporting period at mid-flood and mid-ebb tides. The monitoring was conducted at a total of 18 water quality monitoring stations, comprising ten SR stations, five near stations and three control stations. Details of the monitoring locations are shown in **Figure 2.1** and **Table 2.2**. It should be noted that the location of SR8 provided in **Table 2.2** is approximate due to changing location of fish rafts under different tidal and wind condition. Water quality monitoring at SR8 was conducted at the nearest safely accessible location to the Fish Culture Zone.

Table 2.1: Locations of Water Quality Monitoring Stations

ID	Station	Easting	Northing	Remarks
SR1	HK Electric Power Station Intake	829194	808600	Monitored for SS only
SR2	Hung Shing Yeh Beach	830200	808700	Monitored during bathing season only (March to October inclusive)
SR3	Lo So Shing Beach	830450	807300	Monitored during bathing season only (March to October inclusive)
SR4	Marine Ecological Habitat at Pak Kok	829600	811630	
SR5	Marine Ecological Habitat at Shek Kok Tsui	828560	811100	
SR6	Marine Ecological Habitat at Ha Mei Wan	829760	805520	
SR7	Marine Ecological Habitat at Southwest of Lamma	829590	804520	
SR8	Fish Culture Zone at Lo Tik Wan	831265	809115	
SR9	Fish Culture Zone at Sok Kwu Wan	831600	807765	
SR10	Fish Culture Zone at Cheung Sha Wan	819160	810780	
A1	Near station for Zone 1	828543	809573	For monitoring potential impacts to SR5 and SR4 during flood tide
A2	Near station for Zone 2	829053	807945	For monitoring potential impacts to SR1 and SR2 during flood tide
A3	Near station for Zone 3	829187	807100	For monitoring potential impacts to SR3 during both flood and ebb tide
A4	Near station for Zone 4 (east)	829427	805520	For monitoring potential impacts to SR6 during ebb tide
A5	Near station for Zone 4 (south)	829267	805134	For monitoring potential impacts to SR7 during ebb tide
C1	Control Station 1	828000	813500	
C2	Control Station 2	825000	808000	
C3	Control Station 3	829000	802000	

2.2 Monitoring Parameters

For the 10 SR stations (SR1 to SR10) and three control stations (C1 to C3), monitoring of DO, DO%, pH, temperature, turbidity, salinity, water depth and SS were undertaken. For monitoring of the five near stations (A1 to A5), only the in-situ parameters (DO, DO%, pH, temperature, turbidity, salinity and water depth) were recorded. Other relevant data were also recorded, including monitoring location, time, tidal stage, weather condition and sea condition.

3 Water Quality Performance Limits

3.1 Action and Limit Levels

The Action and Limit levels are summarized in **Table 3.1**.

Table 3.1: Calculated Action and Limit Levels

Parameters	Action Level		Limit Level	
SR1				
SS in mg/L	90		100	
SR2 to SR7				
DO in mg/L	Wet	Dry	Wet	Dry
Surface & Middle	3.1	5.6	2.6	4
Bottom	2.4	5.8	1.9	2
SS in mg/L	9.5 *OR* 120% of upstream control station(s) at the same tide of the same day, whichever is higher		12.3 *OR* 130% of upstream control station(s) at the same tide of the same day, whichever is higher	
Turbidity in NTU	9.7 *OR* 120% of upstream control station(s) at the same tide of the same day, whichever is higher		11.8 *OR* 130% of upstream control station(s) at the same tide of the same day, whichever is higher	
SR8 to SR10				
DO in mg/L	Wet	Dry	Wet	Dry
Surface & Middle	5	5.6	5	5
Bottom	2.4	5.8	2	2
SS in mg/L	9.5 *OR* 120% of upstream control station(s) at the same tide of the same day, whichever is higher		12.3 *OR* 130% of upstream control station(s) at the same tide of the same day, whichever is higher	
Turbidity in NTU	9.7 *OR* 120% of upstream control station(s) at the same tide of the same day, whichever is higher		11.8 *OR* 130% of upstream control station(s) at the same tide of the same day, whichever is higher	

Notes:

1. Wet season: April to September; Dry season: October to March.
2. For DO measurement, non-compliance occurs when the monitoring result is lower than the limits.
3. For parameters other than DO, non-compliance of water quality occurs when the monitoring result is higher than the limits.
4. Depth-averaged results are used unless specified otherwise.
5. SR1 is monitored for SS only.
6. All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered as necessary.

3.2 Alert Levels

The Initial Alert levels for water quality at near stations are presented in **Table 4.1**.

Table 3.2: Calculated Initial Alert Levels

Alert Level	A1	A2	A3	A4	A5
Turbidity (NTU)	30.1	18.4	38.8	32.0	24.3
DO (mg/L) – Depth-average, Dry Season	4	4	4	4	4
	OR 0.1 mg/L less than the same day control, whichever is lower				
DO (mg/L) – Bottom, Dry Season	2	2	2	2	2
	OR 0.1 mg/L less than the same day control, whichever is lower				
DO (mg/L) – Depth-average, Wet Season	3	3	3	3	3
	OR 0.1 mg/L less than the same day control, whichever is lower				
DO (mg/L) – Bottom, Wet Season	0.9	0.9	0.9	0.9	0.9
	OR 0.1 mg/L less than the same day control, whichever is lower				

Note: Wet season: April to September; Dry season: October to March.

4 Monitoring Results

Marine water quality monitoring was conducted as scheduled during the reporting period. Graphical presentations of the monitoring results are provided in **Appendix A**.

The water quality monitoring results for turbidity and SS obtained during the reporting period were within their corresponding Action Levels, Limit Levels and Alert Levels.

For DO, some of the testing results at SR stations triggered the corresponding Action or Limit Levels. The IEC, Engineer and the construction contractor were informed of the exceedances and the Event and Action Plan of the Updated EM&A Manual was initiated. **Table 5.1** presents the summary of the DO exceedances at SR stations during mid-ebb and mid-flood tide for the reporting period.

Table 4.1: Summary of DO Exceedances

Date	Parameter(s)	Affected Station(s)	Tide	Exceedance Type
22 May	DO (Surface & Middle)	SR9, SR10	Flood tide	Limit Level
25 May	DO (Surface & Middle)	SR10	Ebb tide	Limit Level
		SR10	Flood tide	Limit Level
27 May	DO (Surface & Middle)	SR8, SR9	Flood tide	Limit Level
8 June	DO (Surface & Middle)	SR10	Ebb tide	Limit Level
		SR8, SR9, SR10	Flood tide	Limit Level
10 June	DO (Surface & Middle)	SR10	Ebb tide	Limit Level
		SR8, SR9	Flood tide	Limit Level
12 June	DO (Surface & Middle)	SR8	Flood tide	Limit Level
15 June	DO (Bottom)	SR6, SR7	Flood tide	Action Level
19 June	DO (Bottom)	SR2, SR4, SR5	Flood tide	Action Level
29 June	DO (Bottom)	SR10	Ebb tide	Action Level
		SR5, SR6	Ebb tide	Limit Level
		SR5	Flood tide	Action Level
		SR10	Flood tide	Limit Level
13 July	DO (Bottom)	SR2, SR10	Ebb tide	Action Level

The investigation findings are summarised below:

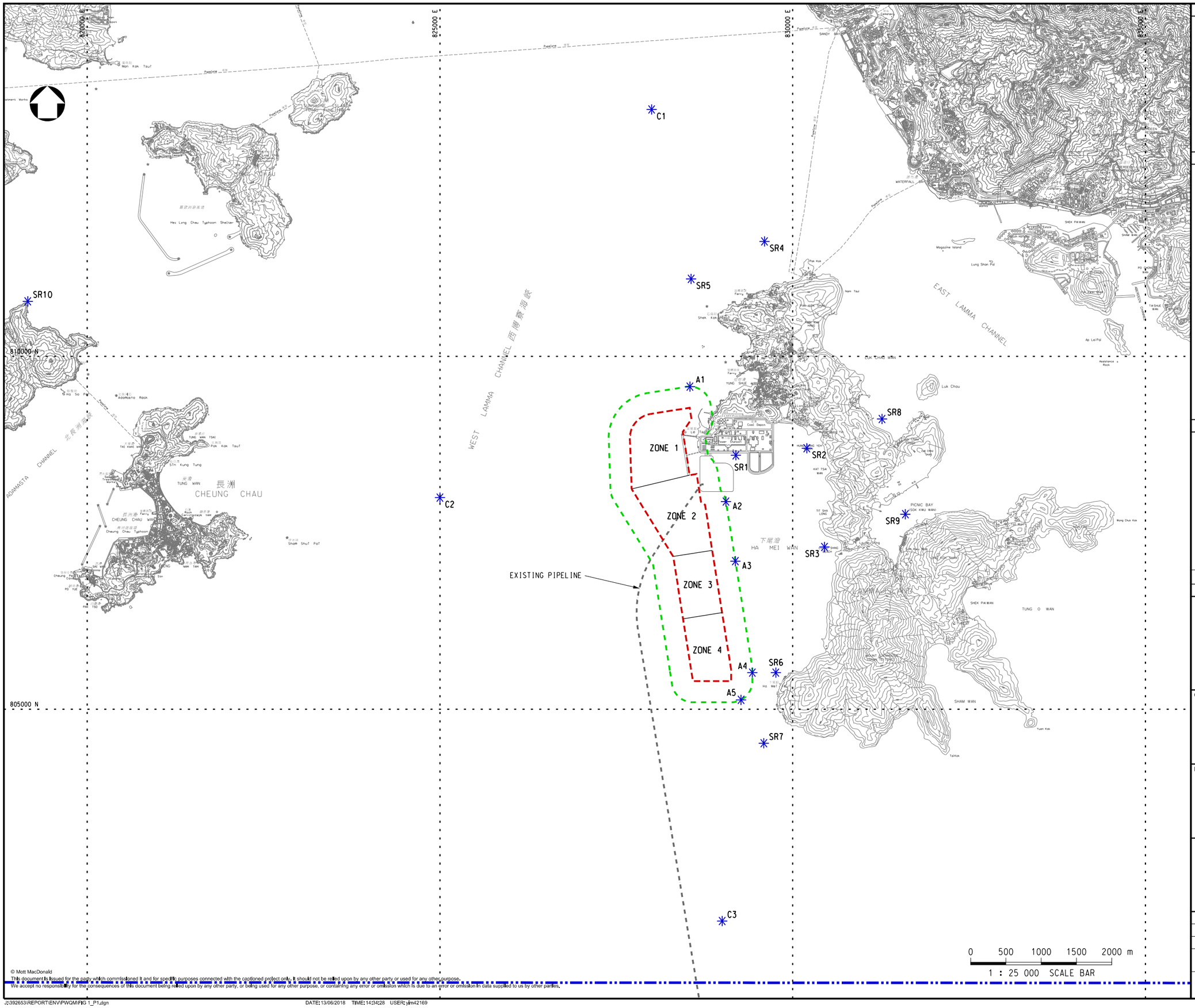
- 22, 25 and 27 May and 8, 10, 12, 15, 19 and 29 June 2020 – dredging work was suspended during this period hence the causes are not related to the Project.
- 13 July 2020 – the contractor confirmed that no abnormal operation and spillage occurred and all required mitigation measures were implemented. The investigations found that the exceedance appeared to be due to local factors not related to the Project.

As all investigations concluded that the cases were not related to the Project, no further action was required.

5 Conclusion

Monitoring work for water quality was conducted during the reporting period in accordance with the updated EM&A Manual.

The water quality monitoring results for all parameters, except DO, obtained during the reporting period were within the corresponding Action, Limit or Alert Levels stipulated in the EM&A programme. For DO (surface, middle and bottom layers), some of the results triggered the relevant Action and Limit Levels, and investigations were conducted accordingly. The investigations concluded that the cases were not related to the Project. To conclude, the construction activities in the reporting period did not cause adverse impact to all water quality sensitive receivers.



Notes

Key to symbols

- HKSAR BOUNDARY
- PROJECT BOUNDARY
- 300m BUFFER
- WATER QUALITY MONITORING LOCATION

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	JUN 18	MING	FIRST ISSUE	DC	EC

MOTT MACDONALD

20/F AIA Kowloon Tower
Landmark East
100 How Ming Street
Kwun Tong, Kowloon
Hong Kong
T +852 2828 5757
F +852 2827 1823
W mottmac.com

Client

HK Electric 港燈

Project

IMPROVEMENT DREDGING FOR LAMMA POWER STATION NAVIGATION CHANNEL

Title

WATER QUALITY MONITORING LOCATIONS

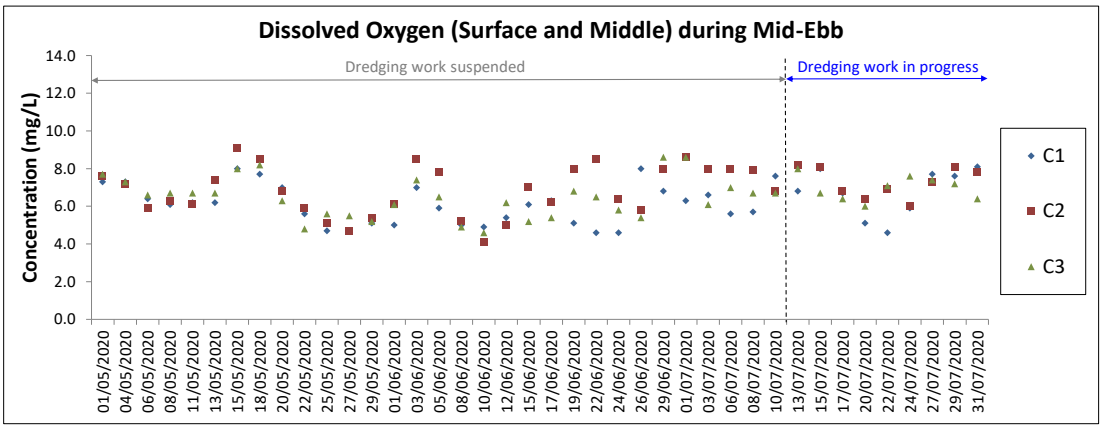
Designed	DC		Eng check	DC	
Drawn	MING		Coordination	DC	
Dwg check	DC		Approved	EC	
Scale at A1	1:25000	Status	PRE	Rev	P1

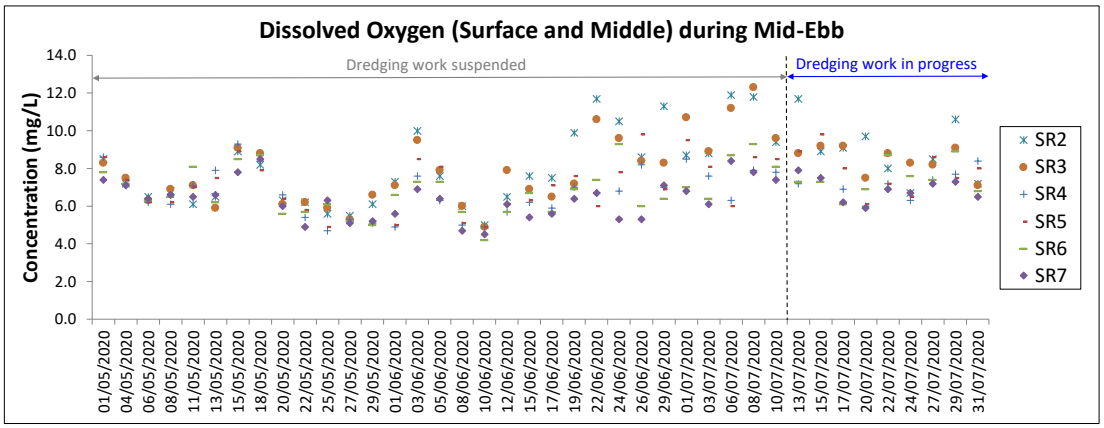
Drawing Number

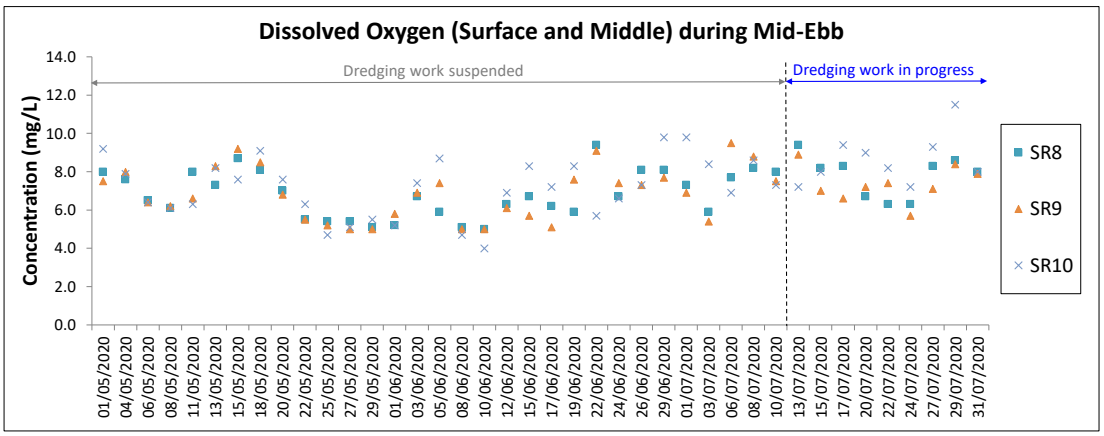
FIGURE 2.1

Appendix

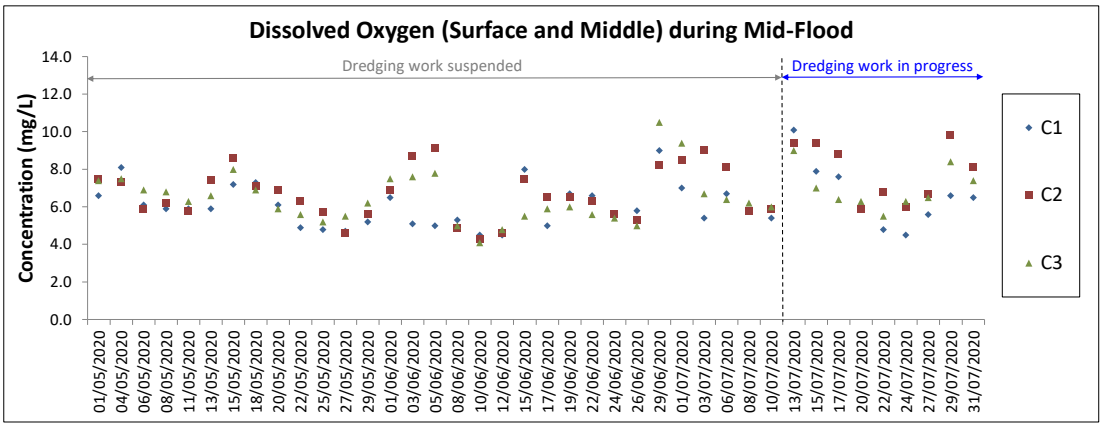
A. Graphical Presentations of Water Quality Monitoring Results

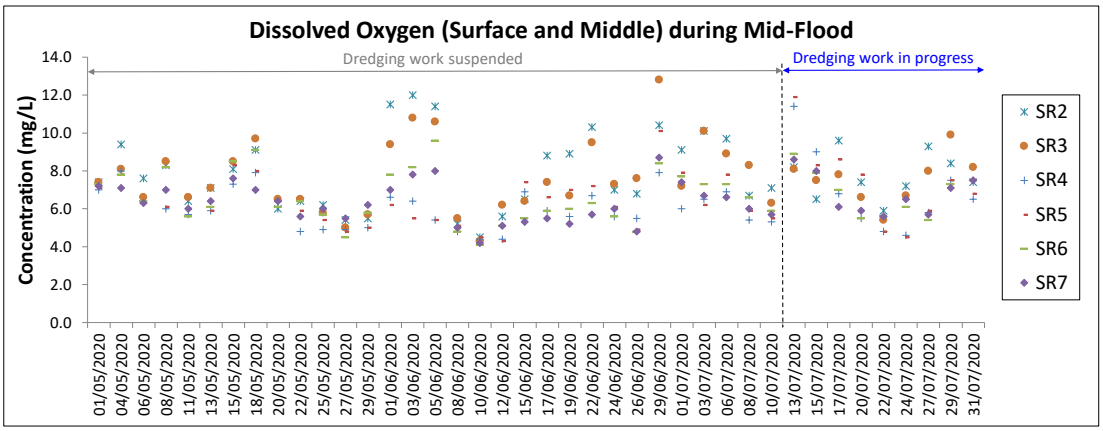


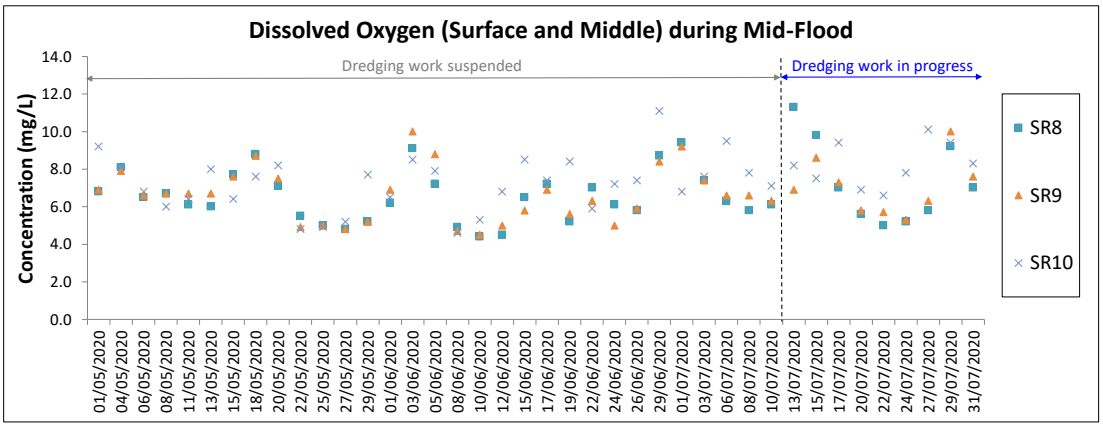




Note:
General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions can be referred to the corresponding Monthly Water Quality Monitoring Reports.







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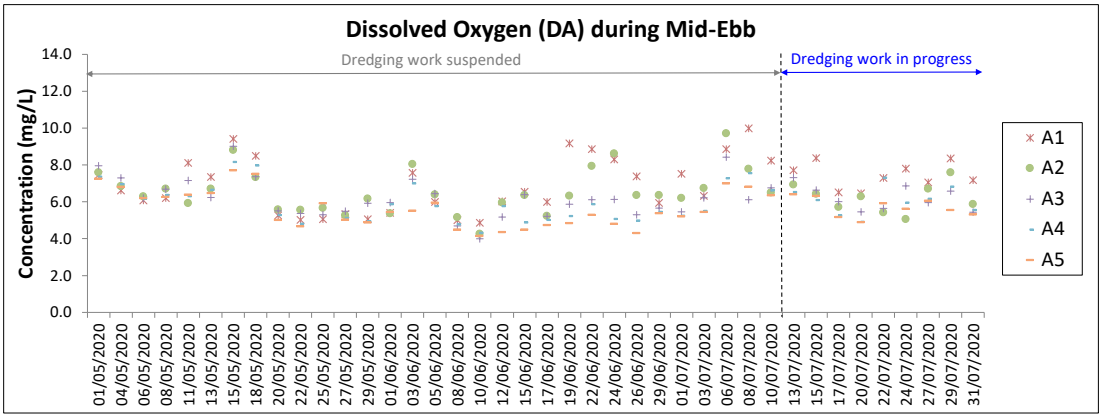

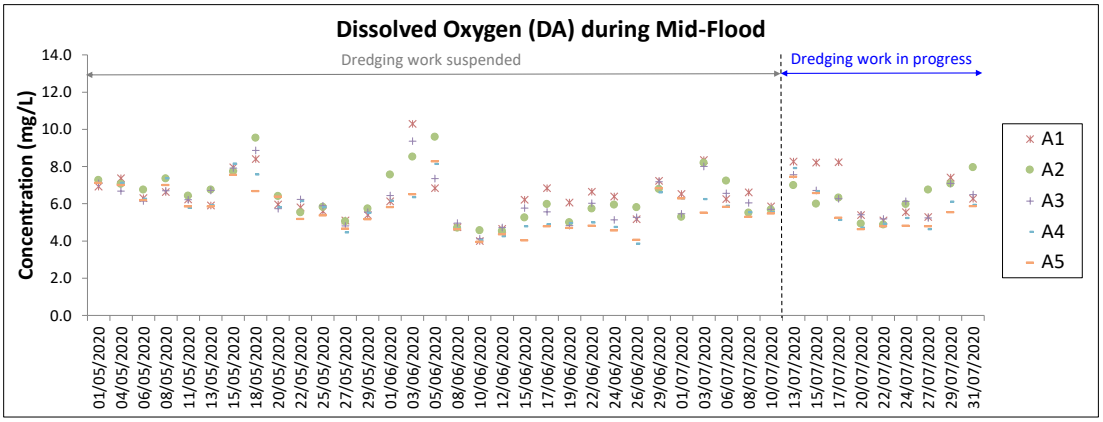

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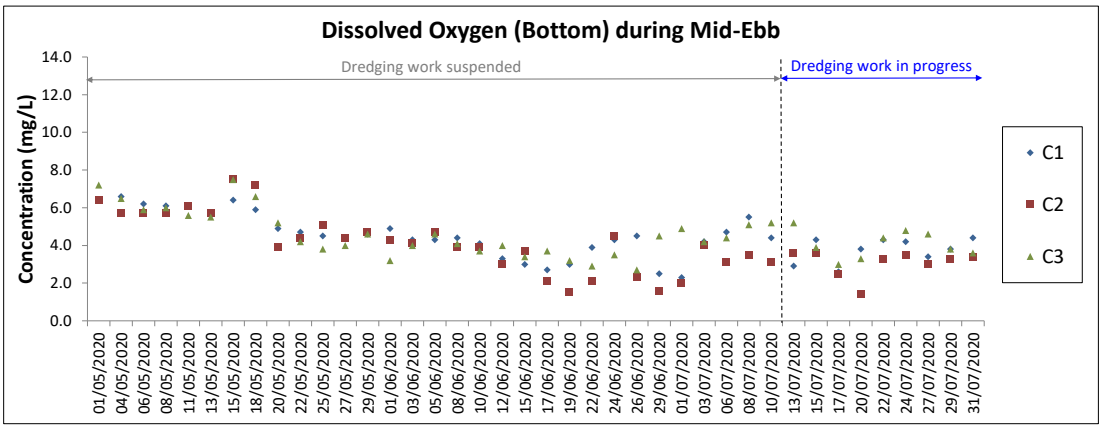

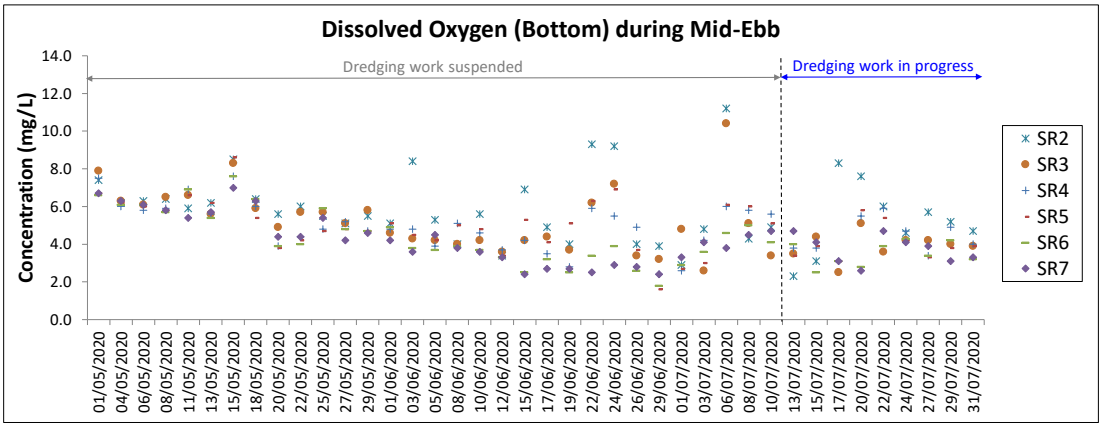

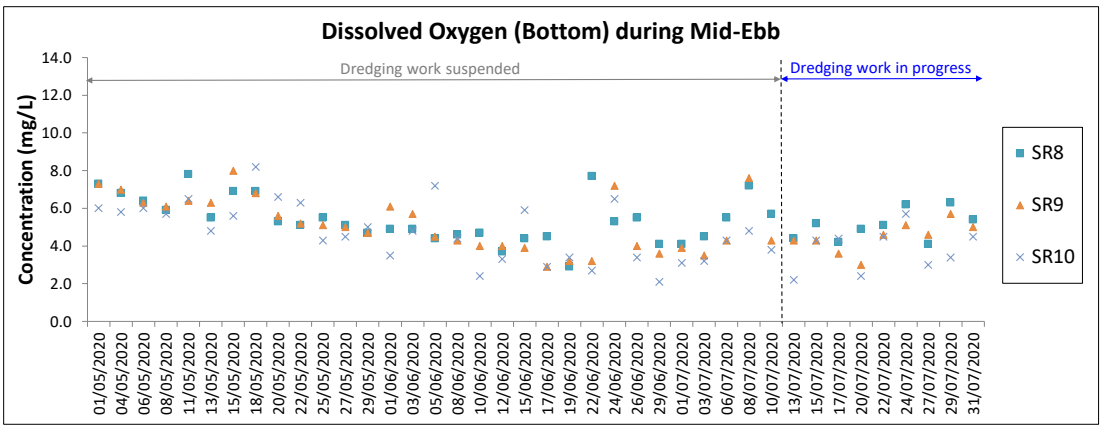

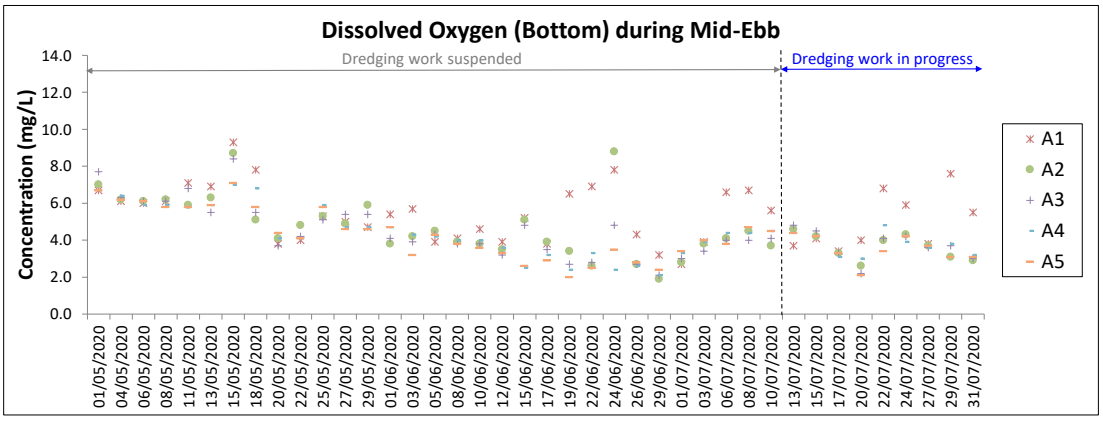

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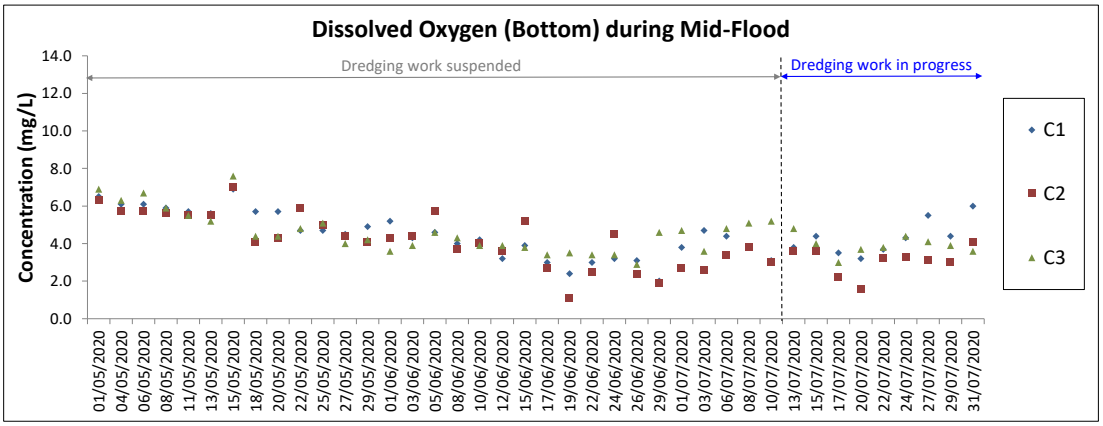
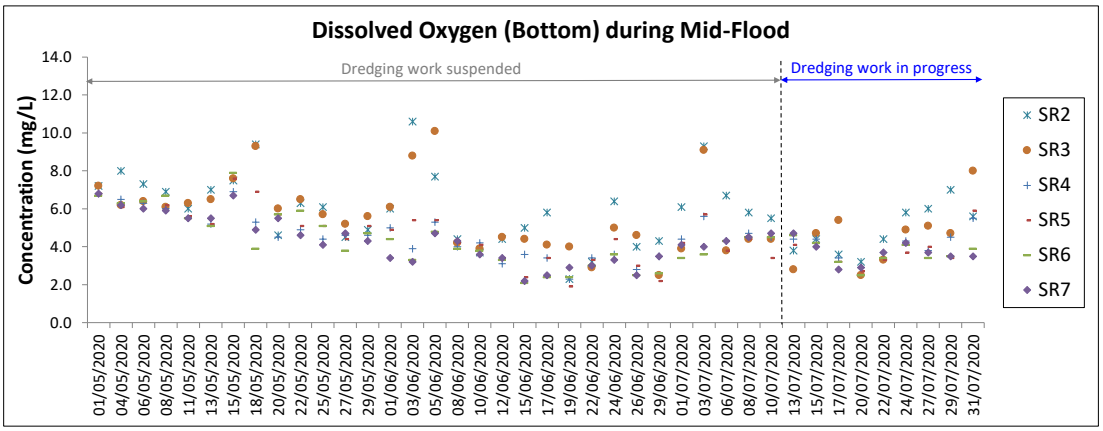
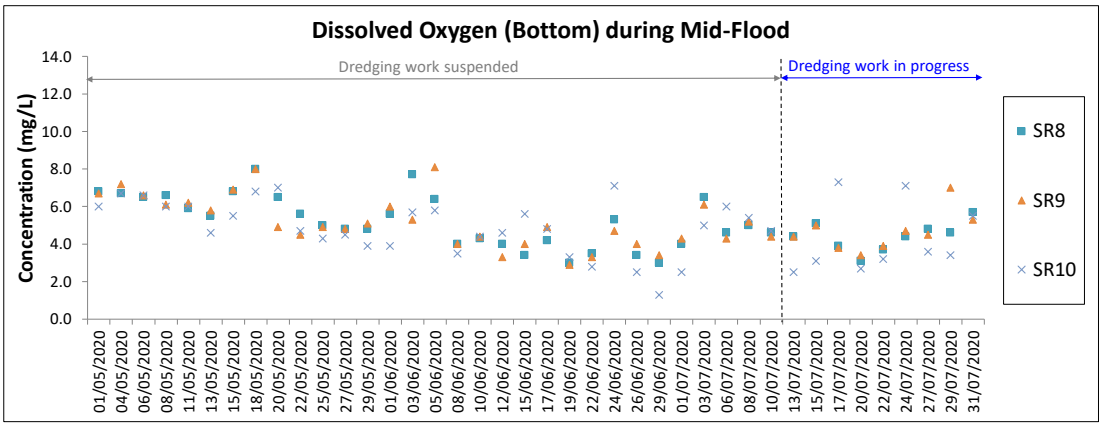
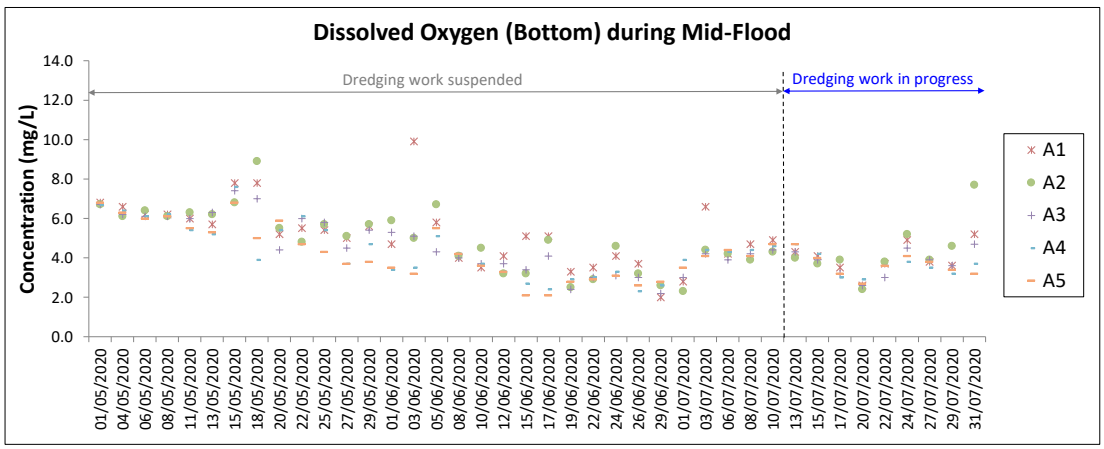
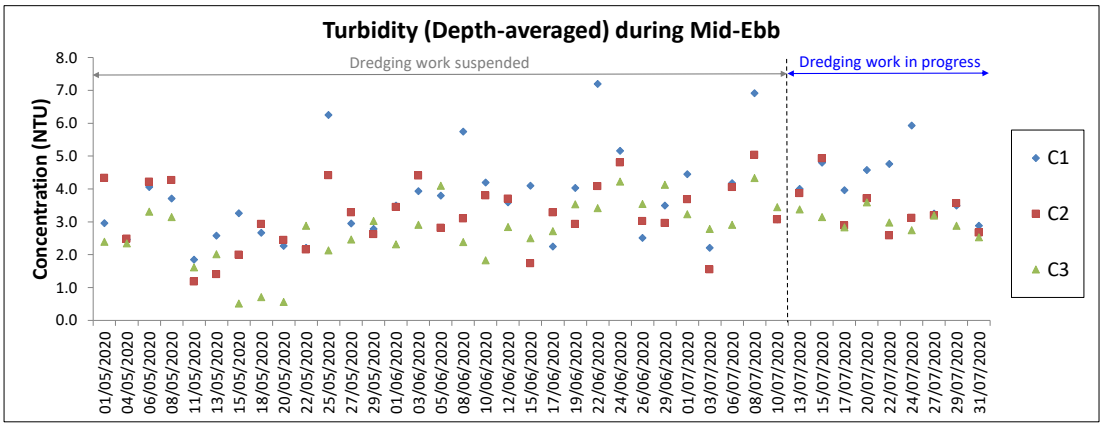


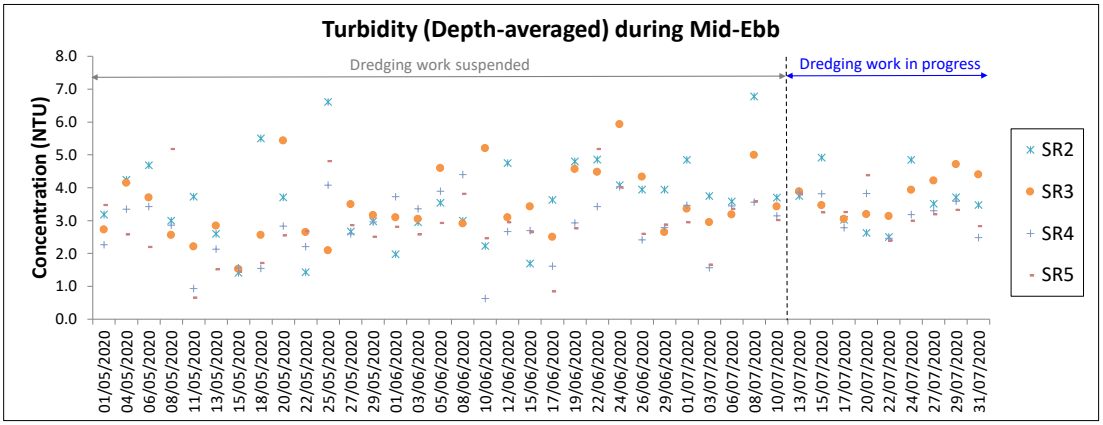


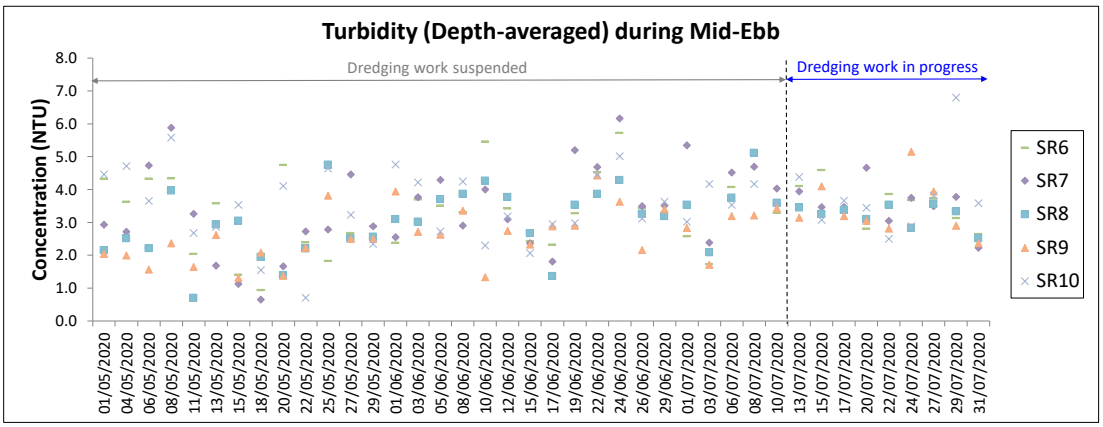


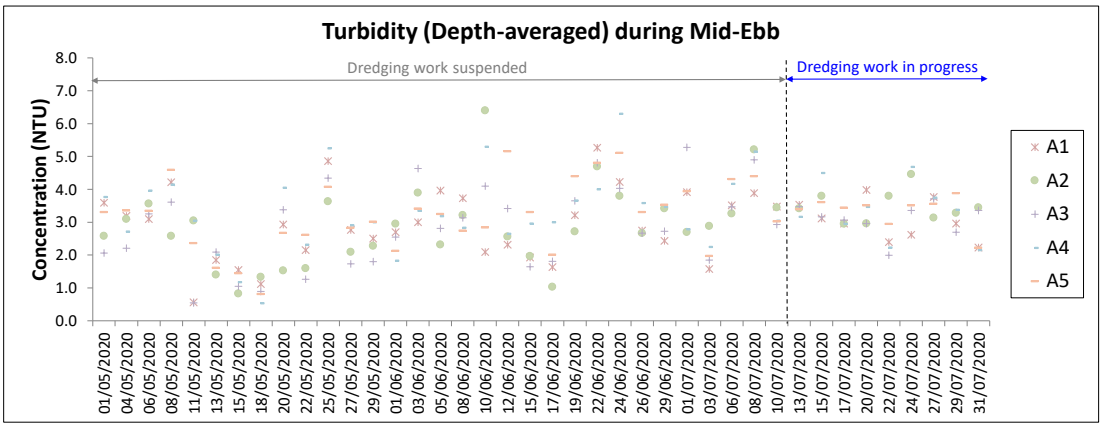


Note:
General weather condition during monitoring ranged from sunny to rainy, with sea condition ranged from calm to rough. Detailed meteorological conditions can be referred to the corresponding Monthly Water Quality Monitoring Reports.









Note:
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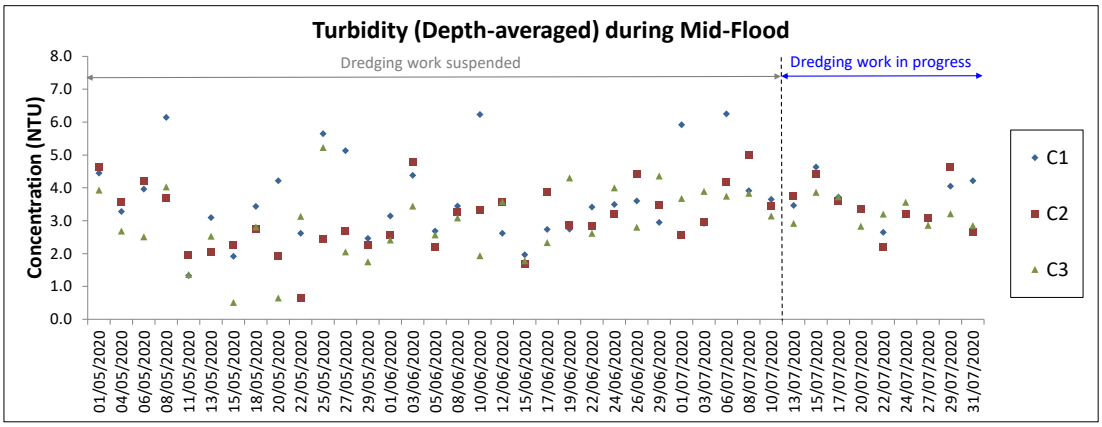

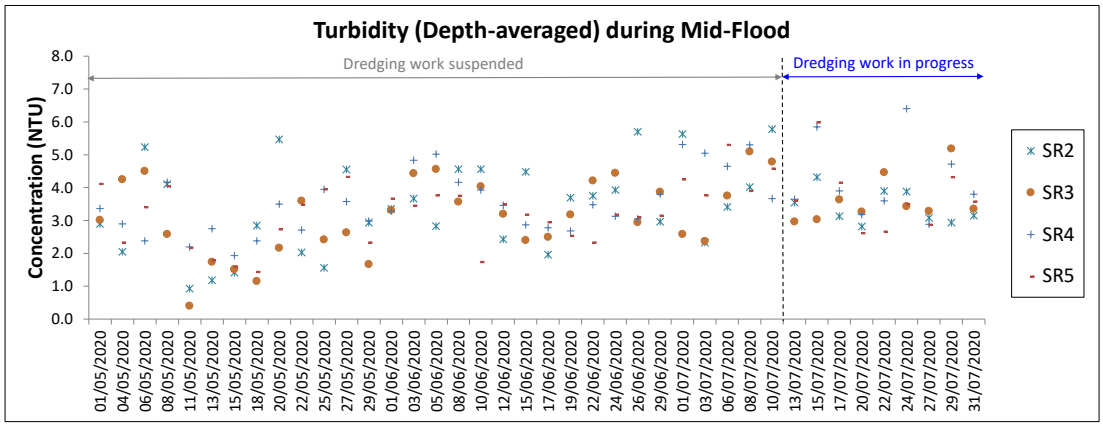

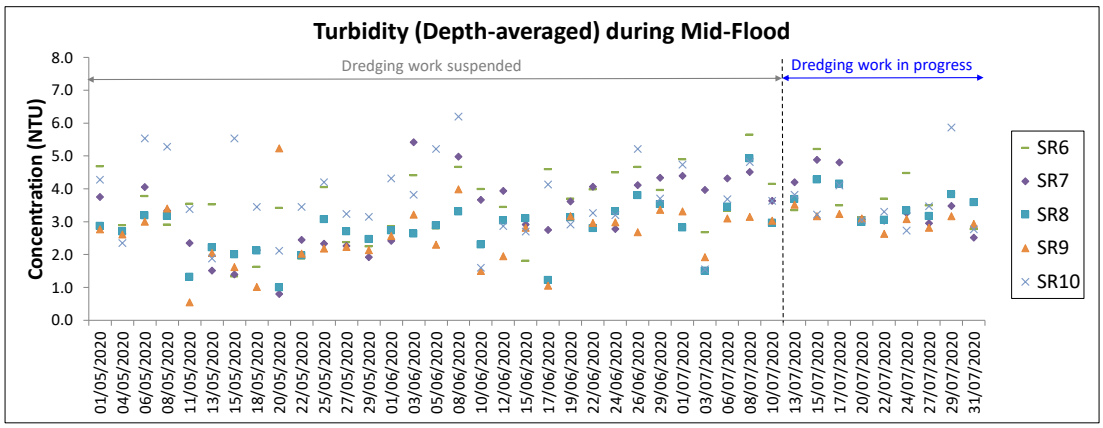

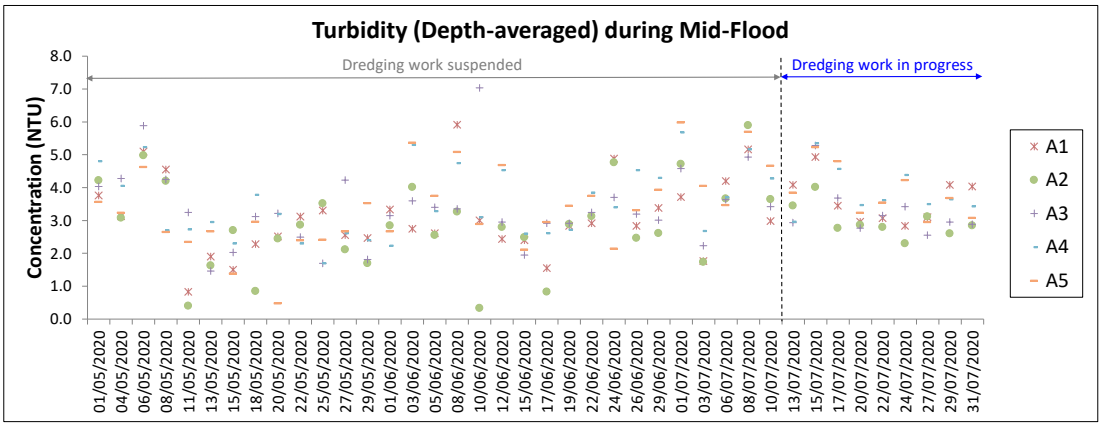

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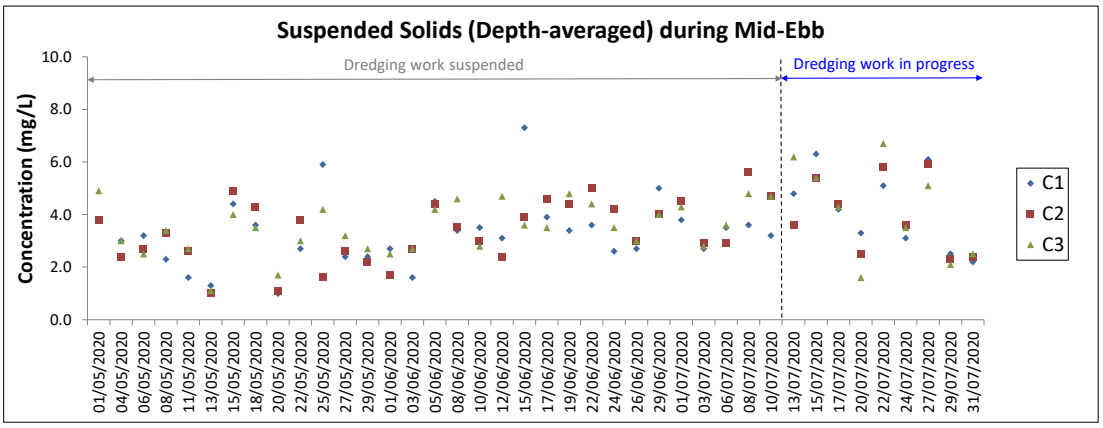

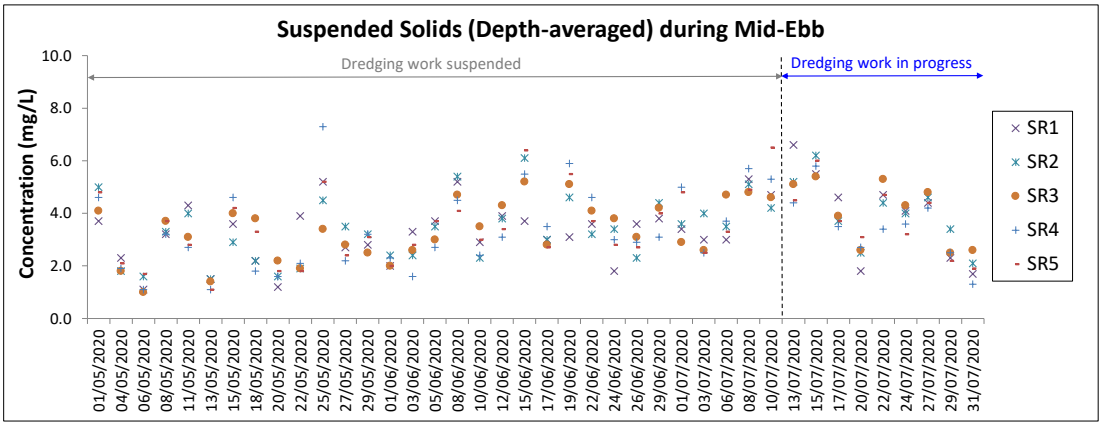

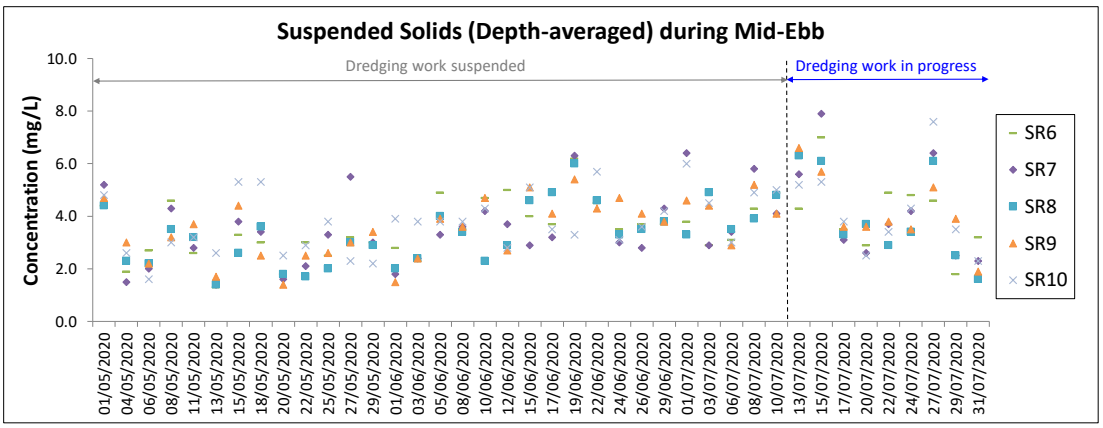

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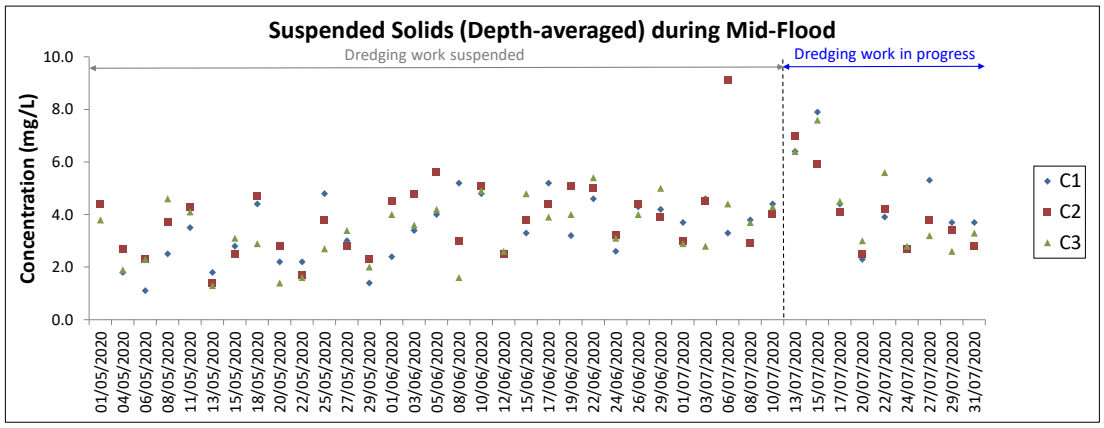

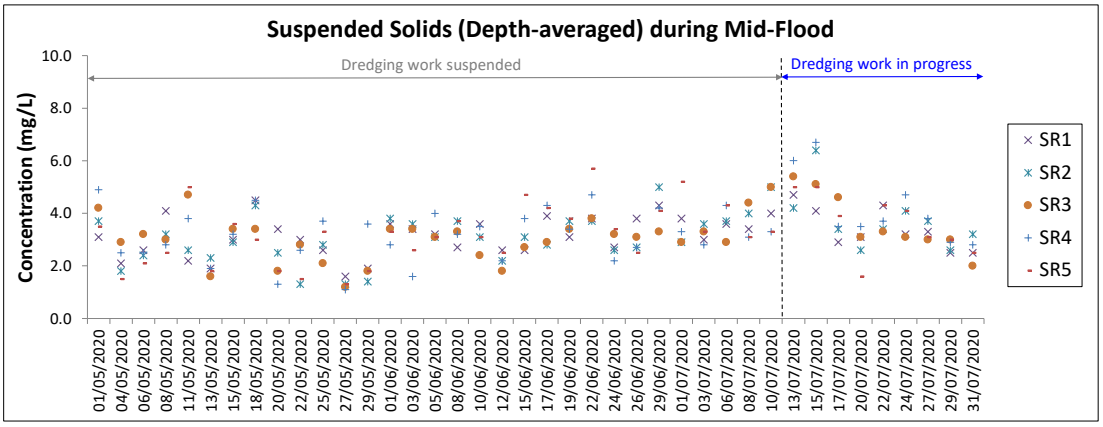

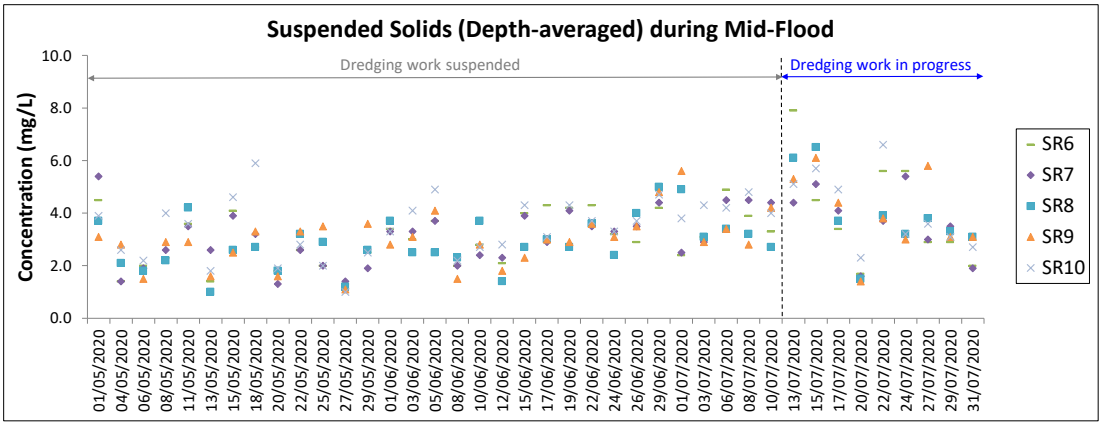

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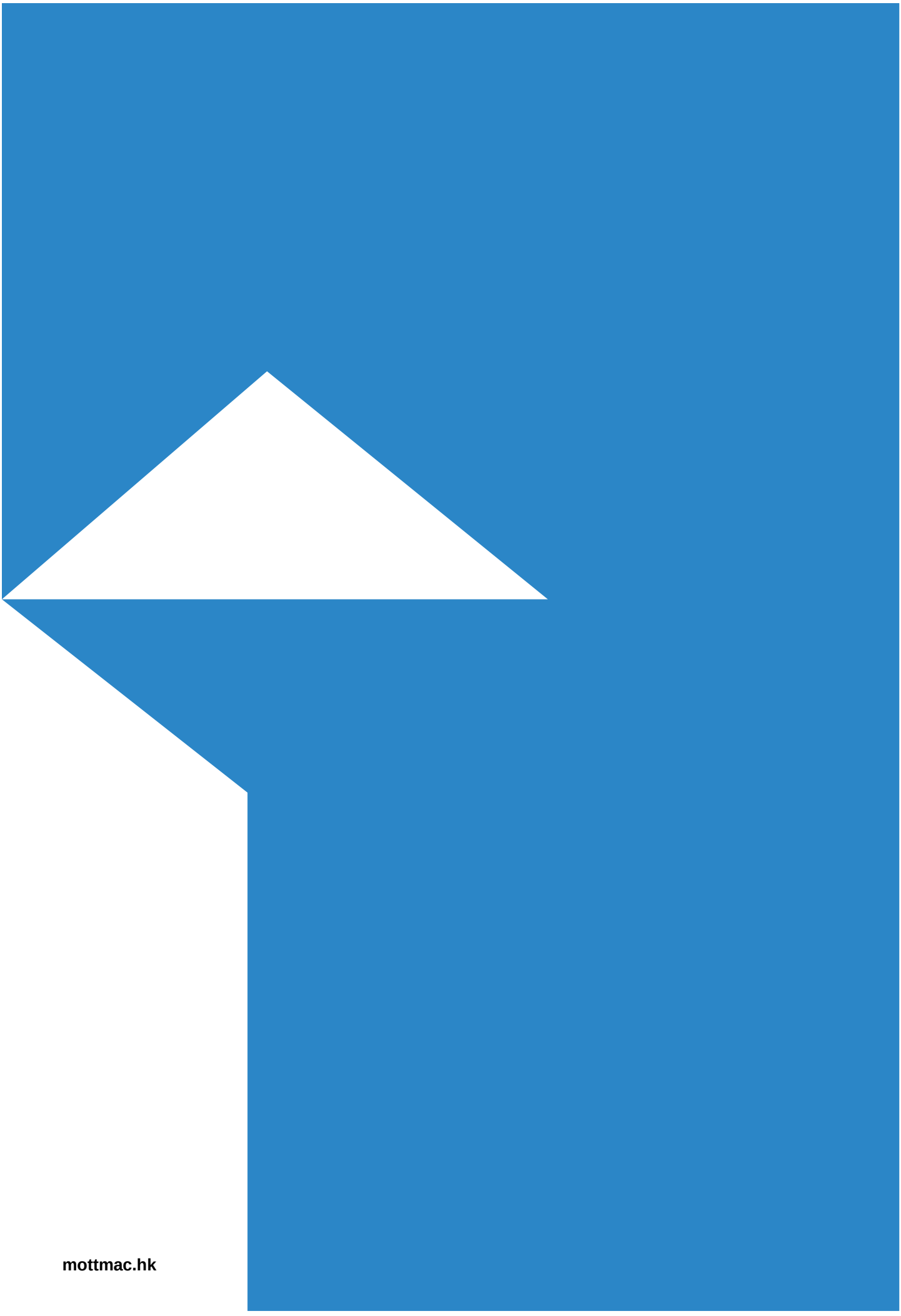

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Annex D Alert/Event and Action Plans

D1: Event and Action Plan for Water Quality at SR Stations

	Action			
Event	**ET Leader**	**IEC**	**Engineer**	**Contractor**
Action level being exceeded by one sampling day	• Repeat in-situ measurements to confirm findings; • Inform IEC, Contractor and Engineer; • Check monitoring data, all plant, equipment and Contractor's working methods; • Discuss mitigation measures with IEC, Engineer and Contractor; • Repeat in-situ measurement on next day of exceedance.	• Discuss with ET, Engineer and Contractor on the mitigation measures; • Review proposals on mitigation measures submitted by Contractor and advise Engineer accordingly; • Verify the effectiveness of the implemented mitigation measures.	• Discuss with IEC, ET and Contractor on the mitigation measures; • Make agreement on the mitigation measures to be implemented; • Supervise the implemented of agreed mitigation measures.	• Identify source(s) of impact; • Inform the Engineer and confirm notification of the non-compliance in writing; • Rectify unacceptable practice; • Check all plant and equipment; • Consider changes of working methods; • Discuss with ET, IEC and Engineer and propose mitigation measures; • Implement the agreed mitigation measures
Action Level being exceeded on more than one consecutive sampling day	• Repeat in-situ measurement to confirm findings; • Inform IEC, Contractor and Engineer; • Check monitoring data, all plant, equipment and Contractor's working methods; • Discuss mitigation measures with IEC, Engineer and Contractor; • Ensure mitigation measures are implemented; • Prepare to increase the monitoring • frequency to daily; • Confirm the need for reducing dredging rates as per G2.	• Discuss with ET, Engineer and Contractor on the mitigation measures; • Review proposals on mitigation measures submitted by Contractor and advise Engineer accordingly; • Verify the effectiveness of the implemented mitigation measures; • Verify the need for reducing dredging rates as per G2.	• Discuss with IEC, ET and Contractor on the proposed mitigation measures; • Make agreement on the mitigation measures to be implemented; • Discuss with ET, IEC and Contractor on the effectiveness of the implemented mitigation measures; • Instruct the Contractor to reduce dredging rates as per G2 if confirmed by ET and verified by IEC.	• Identify the source(s) of impact; • Inform the Engineer and confirm notification • of the non-compliance in writing; • Rectify unacceptable practice; • Check all plant and equipment; • Consider changes of working methods; • Discuss with ET, IEC and Engineer and propose mitigation measures to Engineer and IEC within 3 working days of notification; • Implement the agreed mitigation measures; • As directed by the Engineer, reduce dredging rates as per G2.

	Action			
Event	**ET Leader**	**IEC**	**Engineer**	**Contractor**
Limit Level being exceeded by one sampling day	• Repeat in-situ measurement to confirm findings; • Inform IEC, Contractor and Engineer; • Check monitoring data, all plant, equipment and Contractor's working methods; • Discuss mitigation measures with IEC, Engineer and Contractor; • Ensure mitigation measures are implemented; • Increase the monitoring frequency to daily until no exceedance of limit level.	• Discuss with ET, Engineer and Contractor on the mitigation measures; • Review proposals on mitigation measures submitted by Contractor and advise Engineer accordingly; • Verify the effectiveness of the implemented mitigation measures.	• Discuss with IEC, ET and Contractor on the proposed mitigation measures; • Request Contractor to critically review the working methods; • Make agreement on the mitigation measures to be implemented; • Discuss with ET, IEC and Contractor on the effectiveness of the implemented mitigation measures.	• Identify the source(s) of impact; • Inform the Engineer and confirm notification of the non-compliance in writing; • Rectify unacceptable practice; • Check all plant and equipment; • Consider changes of working methods; • Discuss with ET, IEC and Engineer and propose mitigation measures to Engineer and IEC within 3 working days of notification; • Implement the agreed mitigation measures.
Limit Level being exceeded by more than one consecutive sampling days	• Inform IEC, Contractor and Engineer; • Check monitoring data, all plant, equipment and Contractor's working methods; • Discuss mitigation measures with IEC, Engineer and Contractor; • Ensure mitigation measures are implemented; • Confirm the need for reducing dredging rates as per D2; • Increase the monitoring frequency to daily until no exceedance of limit level for two consecutive days.	• Discuss with ET, Engineer and Contractor on the mitigation measures; • Review proposals on mitigation measures submitted by Contractor and advise Engineer accordingly; • Verify the effectiveness of the implemented mitigation measures; • Verify the need for reducing dredging rates as per D2.	• Discuss with IEC, ET and Contractor on the proposed mitigation measures; • Request Contractor to critically review the working methods; • Make agreement on the mitigation measures to be implemented; • Discuss with ET, IEC and Contractor on the effectiveness of the implemented mitigation measures; • Instruct the Contractor to reduce dredging rates as per D2 if confirmed by ET and verified by IEC.	• Identify the source(s) of impact; • Inform the Engineer and confirm notification of the non-compliance in writing; • Rectify unacceptable practice; • Check all plant and equipment; • Consider changes of working methods; • Discuss with ET, IEC and Engineer and propose mitigation • measures to Engineer • and IEC within 3 working days of notification; • Implement the agreed mitigation measures; • As directed by the Engineer, reduce dredging rates as per D2.

D2. Reduction of Maximum Allowable Hourly Dredging Rates due to Exceedances

Frequency of Exceedance	No. of Consecutive Sampling Days					
	Two	**Three**	**Four**	**Five**	**Six**	**More than Six**
Action Level	5%	10%	15%	20%	30%	40%
Limit Level	10%	20%	30%	40%	50%	Stop all dredging works for one week. Contractor to propose changes in dredging methods, dredging rates and mitigation measures for agreement with ET and IEC before re-initiating dredging works.

Note: Where action level followed by limit level is exceeded consecutively, the larger percentage reduction shall apply (e.g. if action level is exceeded for four consecutive days, followed immediately by two consecutive days of limit level exceedance, the percentage reduction to be applied between Day 2 and Day 6 shall be 5%, 10%, 15%, 20% and 30% respectively). Similarly, where limit level followed by action level is exceeded consecutively, the larger percentage reduction also applies as action level is inherently exceeded whenever limit level is exceeded.

D3. Alert Action Plan

The Alert Action Plan applies to exceedances of Alert levels at the near stations (A1 to A5) only. Upon identification of an exceedance of Alert level, the actions as in Alert Action Plan shall be implemented. Where applicable, the alert related actions shall proceed in parallel with the Event and Action Plan.

Action	Action By	Outcome	Follow Up Action	Follow Up Action By
1. Repeat in-situ measurement to confirm findings	ET	No exceedance in repeat measurement	No further action required	
		Exceedance identified in repeat measurement	**Proceed to Action 2**	
2. Check relevant SR station results	ET	No exceedance of Action or Limit Level	Notify IEC, Engineer and Contractor	ET
			Obtain and record Contractor's working methods and the status of existing mitigation measures implemented	ET
			Identify any unacceptable practice	ET, IEC, Engineer
			Rectify any unacceptable practice	Contractor
			Proceed to Action 3	
		Exceedance of Action or Limit Level	Initiate Event and Action Plan in Action or Limit Level	ET, IEC, Engineer, Contractor
			Proceed to Action 3	
3. Check for repeated cases of Outcome 2a or 2b	ET	No consecutive repeats of Outcome 2a or 2b	No further action required	
		Consecutive repeats of Outcome 2a	Review Contractor's working methods / mitigation measures and discuss with IEC, Engineer and Contractor	ET
			Identify and agree on improvements such as changes in working methods and/or additional mitigation measures	ET, IEC, Engineer, Contractor
			Implement the recommended improvements	Contractor
		Consecutive repeats of Outcome 2b	Review Alert levels and propose revised Alert levels where necessary to prevent exceedances at SR stations (due to project activities)	ET
			Verify the revised Alert levels	IEC
			Notify and agree with EPD on revised Alert levels	ET, Project Proponent

Annex E Site Audit Summary

There was no dredging work performed in the reporting month. Therefore, no weekly site audit was carried out. Independent Environmental Checker (IEC) conducted a site inspection on 29 May 2020 to audit the water quality monitoring works. The monitoring works were generally satisfactory.

Dates of Inspection: N.A.

Summary of Findings

General

- N.A.

Water Quality & Marine Ecology

- N.A.

Hazard to Life

- N.A.

Waste Management

- N.A

Noise

- N.A.

Period: June 2020

There was no dredging work performed in the reporting month. Therefore, no weekly site audit was carried out. Independent Environmental Checker (IEC) conducted a site inspection on 29 June 2020 to audit the water quality monitoring works. The monitoring works were generally satisfactory.

Dates of Inspection: N.A. (There was no dredging work performed in the month.)

Summary of Findings

General

- N.A.

Water Quality & Marine Ecology

- N.A.

Hazard to Life

- N.A.

Waste Management

- N.A

Noise

- N.A.

Period: July 2020

Dates of Inspection: 11/7/2020, 15/7/2020, 24/7/2020 and 27/7/2020

Summary of Findings

General

- No environmental deficiency identified.

Water Quality & Marine Ecology

- Silt plume was observed when silt curtain was damaged due to strong current on 27/7/2020. Dredging operation was put on hold until repair work was completed.

Hazard to Life

- No environmental deficiency identified.

Waste Management

- No environmental deficiency identified.

Noise

- No environmental deficiency identified.

Annex F Summary of EMIS

EM&A Log Ref.	Mitigation Measures	Implementation Status
EM&A: 2.10	Dredging shall be conducted by either closed grab dredgers and/or TSHDs. The grab dredgers shall not be operating at the same time as the TSHDs.	C
EM&A: 2.10	The dredging rates for the Project shall not exceed the maximum allowable dredging rates for each respective working zone and for the respective dredging method.	C
EM&A: 2.10	Adequate clearance to the seabed shall be provided to vessel at all states of tide.	C
EM&A: 2.10	No overflow is permitted and use of lean mixture overboard (LMOB) system is prohibited.	C
EM&A: 2.10	Closed grab capacity of grab dredger should not be less than $8m^3$ (except near the submarine pipeline where smaller grabs may be used).	C
EM&A: 2.10	Cage-type silt curtains (at least 10m depth) shall be deployed for grab dredgers in accordance with the Silt Curtain Deployment Plan	C
EM&A: 3.2	No dredging shall be carried out at Zone 4 of the navigation channel during the calving season for the Finless Porpoise from February to April.	C
EM&A: 3.2	As far as practicable, vessel movements to disposal grounds bypass the Finless Porpoise habitat area in southwest and east Lamma.	C
EM&A: 3.2	Implement a maximum speed limit of 10 knots in south and east Lamma waters.	C
EM&A: 3.2	All vessel operators working on the Project should be thoroughly briefed on the possible occurrence of Finless Porpoise within and in the vicinity of the Project Area and along routes to the Project Area, as well as rules for safe vessel operation around cetaceans.	C
EM&A: 5.2 & 5.3	Marine vessels should avoid traveling during berthing and unberthing of coal vessel.	C
EM&A: 5.2 & 5.3	As far as practicable, marine vessels should avoid traveling after sunset or under low visibility when the works area is near submarine pipeline.	C
EM&A: 5.2 & 5.3	Working vessel not to stay right above the submarine pipeline unless it is necessary.	C
EM&A: 5.2 & 5.3	TSHD should not lower suction pipes in close proximity of the submarine pipeline.	N/A
EM&A: 5.2 & 5.3	TSHD should not stay near the submarine pipeline unless approval is granted.	N/A
EM&A: 6.1	The number of dredgers and operation conditions specified in the applicable CNPs should be strictly followed.	C
EM&A: 7.2 & 7.3	Monitoring of the barge loading should be conducted to ensure that loss of material does not take place during transportation.	C
EM&A: 7.2 & 7.3	All barges and hoppers shall be fitted with tight fitting seals to their bottom openings to prevent leakage of material.	C

EM&A Log Ref.	Mitigation Measures	Implementation Status
EM&A: 7.2 & 7.3	The Real Time Tracking and Monitoring of Vessel (RTTMV) system should be installed in hoppers/ TSHD for monitoring the mud dumping activities.	C

Remarks:

C - Compliance with mitigation measure
NC - Non-compliance with mitigation measure
N/A - Not Applicable