

HKA Submarine Cable – Chung Hom Kok

1st Weekly Impact Water Quality
Monitoring Report (Zone A)

21 May 2021

Project No.: 0585919

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21 May 2021

HKA Submarine Cable – Chung Hom Kok

1st Weekly Impact Water Quality Monitoring Report (Zone A)



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Environmental Permit No. EP- 567/2019
HKA Submarine Cable – Chung Hom Kok

Environmental Team Leader Certification & Independent Environmental Checker
Verification


Reference Document/Plan

Document/Plan:	1 st Weekly Water Quality Monitoring Report
Date of Report:	21 May 2021
Certified by ET:	ERM-Hong Kong Ltd
Verified by IEC:	Ecosystems Ltd.

Reference EP Requirement

EP Condition:	Conditions No. 3.2 – 3.3
Content:	<i>Water Quality Monitoring</i>
<p>3.2 Samples, measurements and necessary remedial actions shall be taken in accordance with the EM&A requirements described in the Project Profile (Register No.: PP-573/2018) by:</p> <ul style="list-style-type: none"> (a) conducting baseline environmental monitoring; (b) conducting impact monitoring; (c) conducting post project monitoring; and (d) carrying out remedial actions in accordance to the EM&A requirements as described in the Project Profile (Register No.: PP-573/2018), or as agreed by the Director, in case where specified criteria in the EM&A requirements are exceeded. <p>3.3 Submit to the Director three hard copies and one electronic copy of the following, as defined in the EM&A requirements described in the Project Profile (Register No.: PP-573/2018):</p> <ul style="list-style-type: none"> (a) Baseline Monitoring Report on water quality no later than 2 week before the commencement of cable installation/ repair operation works; (b) Weekly EM&A Report no later than 5 days after the relevant monitoring data are collected or become available during the cable installation/ repair operation works; and (c) Post Project Monitoring Report within one month after completion of the marine works. 	

ETL Certification

<p>I hereby certify that the above referenced document/plan complies with the above referenced condition of EP-567/2019.</p>	
	
Mandy To, Environmental Team Leader	Date: 21 May 2021



IEC Verification

I hereby verify that the above referenced document/plan complies with the above referenced condition of EP-567/2019.

A handwritten signature in black ink, appearing to be 'Lai', written over a light blue grid background.

Dr Vincent Lai, Independent
Environmental Checker

Date: 24 May 2021

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EXECUTIVE SUMMARY

The cable installation works for the **HKA Submarine Cable – Chung Hom Kok** (the ‘Project’) have been scheduled to be carried out one (1) continuous phase, as follows:

- **Land & Shore-End Cable Installation and Submarine Cable Installation up to Zone A** – tentatively scheduled for end of May 2021; and
- **Marine Installation of Submarine Cable** – From 10 to 31 May 2021, and to return and complete marine installation works in September 2021, if required, according to *Condition 2.5(a)* of the Environmental Permit (EP-567/2019), stating, “*no marine works shall be carried out within the area of Stanley Bay from 1 June to 31 August inclusive*”.

The Project commenced nearshore marine diver jetting works on 10 May 2021, and offshore marine diver jetting works on 13 May 2021. Offshore marine installation works were completed at the time of report writing. The land works at Sha Shek Tan (SST), Chung Hom Kok (CHK) are tentatively scheduled for the end of May 2021 (note: no jetting work and no water quality [WQ] impact monitoring requirements).

This is the *1st Weekly Impact Water Quality Monitoring Report*, presenting the water quality impact monitoring conducted during the period between 10 and 11 May 2021 in Zone A, in accordance with the EM&A Manual.

Summary of Construction Works undertaken during the Reporting Period

During the reporting week, preparation for transition to CHK and diver hand jetting operations (i.e. simultaneous jetting and burial of cable) were carried out between 10 and 11 May 2021 inclusive. Marine installation works were conducted within Zone A on 10 May 2021 during the reporting period.

Water Quality

Monitoring events were conducted for the installation period between 10 and 11 May 2021 in Zone A. Monitoring was carried out for a maximum of three (3) days per week where required, at mid-flood and mid-ebb tides, at three (3) depths (surface, middle and bottom). The intervals between two (2) sets of monitoring were not less than 36 hours. For this relatively short work period in Zone A, two (2) monitoring events at the four (4) designated monitoring stations in Zone A (including two [2] Sensitive Receiver Station, one [1] Gradient Station and one [1] Control Station) were performed on schedule, i.e. on 10 May 2021.

Environmental Non-conformance

No non-conformance was recorded during the reporting period of 10 and 11 May 2021 in Zone A.

The Contractors have been requested by the Environmental Team (ET) to be aware in case of any exceedances, and take care to ensure all necessary procedures are followed to avoid the Project impacting the water environment.

Future Key Issues

There are no key issues identified.

Over the next monitoring period (i.e. on 14 to 20 May 2021), diver hand jetting works offshore in Zone B were ongoing for *Marine Installation of Submarine Cable*, as well as the quality impact monitoring work during all installation work-days, accordingly. Diver jetting works offshore were completed on Wednesday 19 May 2021, no further impact monitoring works are required for Zone B.

Land & Shore-End Cable Installation and Submarine Cable Installation up to Zone A and some marine installation works in Zone A are due to occur in end of May 2021, and in September 2021, if required, according to Condition 2.5(a) of the EP, stating, “no marine works shall be carried out within the area of Stanley Bay from 1 June to 31 August inclusive”.

1. INTRODUCTION

1.1 Background

The proposed submarine cable is a section of the 'Hong Kong-America (HKA)' submarine cable network (hereafter known as 'HKA' and / or the Project), which will span more than 13,000 kilometers in total. The system will further boost the external telecommunications capacity of Hong Kong, reinforcing Hong Kong as a key communication hub in the Asia-Pacific region.

The cable will connect to Chung Hom Kok (CHK) within the HKSAR. **China Telecom Global Limited (CTG)** is providing the cable landing point and the associated cable landing services in Hong Kong.

The route of the proposed HKA submarine cable system within Hong Kong SAR is depicted in **Figure 1.1**. The proposed cable would land at an existing Beach Manhole (BMH) location at Sha Shek Tan (SST), CHK, and connect to an existing Cable Landing Station (CLS).

It should be noted that CHK is currently the landing site for a number of submarine cables (i.e. New T&T domestic cable route, C2C Cable network; and SJC). The existing BMH is connected to the CLS on the hill above the landing beach and existing conduits connect the BMH and CLS.

The cable will travel from SST of CHK southward, exiting Stanley Bay, turning east near the Stanley Peninsular and past Cape d'Aguilar, continuing eastward, north of Beaufort and Sung Kong Islands, to the eastern boundary of HKSAR waters, where it will enter the South China Sea.

The Project Profile (PP- 573/2018) which includes an assessment of the potential environmental impacts associated with the installation of the submarine telecommunications cable system within HKSAR (including connection to land at CHK) was prepared and submitted to the Environmental Protection Department (EPD) under section 5(1)(b) and 5(11) of the *Environmental Impact Assessment Ordinance* (EIAO) for the application for Permission to apply directly for Environmental Permit (EP). On 2 January 2019, EPD issued a letter to CTG permitting direct application for an environmental permit and following an application, EPD subsequently issued an Environmental Permit (EP-567/2019) on 20 February 2019.

Pursuant to *Condition 3.1* of the EP, an Environmental Monitoring and Audit (EM&A) programme, as set out in the Project Profile (PP) is required for this Project, with baseline water quality monitoring data collected prior to the start of cable installation works, and Action and Limit Levels derived from these data.

The HKA cable installation is scheduled to be carried out in one (1) continuous phase. The specific Zones for cable installation works for Zone A and Zone B are shown in **Figure 1.2** to **Figure 1.4**, and the current schedule and works carried out to date for each Phase is as follows:

- 1) **Land & Shore-End Cable Installation and Submarine Cable Installation up to Zone A:** Land trenching and nearshore marine diver jetting works up to Zone A (i.e. HK Grid coordinate 839544.426E 806852.911N, at 2.088 km from the landing point in SST, CHK) – tentatively scheduled week commencing ; and
- 2) **Marine Installation of Submarine Cable:** Installation of the HKA submarine cable from Zone A to HKSAR marine eastern boundary, using injector burial tools/ sledge tools for simultaneous lay and burial operations, and potential diver jetting in specific areas (e.g. HK Electric Pipeline crossing).
 - a. Baseline data for Zone A and Zone B was collected prior to the start of marine installation works (i.e. between 12 March and 6 April 2021) and Action and Limit Levels derived from these data, as presented in the final *Baseline Water Quality Monitoring Report*.
 - b. Nearshore marine diver jetting works in Zone A commenced on 10 May 2021, and was partially completed on the same day.

- c. Remaining marine installation works from end of Zone A to the HKSAR marine eastern boundary using jetting technique commenced on 13 May 2021, and was completed on 19 May 2021.
- d. Land trenching and some marine works in Zone A tentatively scheduled to start in end of May 2021. Following issue of Marine Department Notice on 29 January 2021. If required, works will re-commence in September 2021, according to *Condition 2.5(a)* of the EP, stating, “no marine works shall be carried out within the area of Stanley Bay from 1 June to 31 August inclusive”.

This report covers the data collected from monitoring stations as shown in **Figure 1.3**, and refers to the *Baseline Water Quality Monitoring Report* for Action and Limit Levels.

1.2 Purpose of this Report

This is the 1st Weekly Water Quality Impact Monitoring Report for monitoring works in Zone A, summarising the water quality impact monitoring results during the reporting period from 10 to 11 May 2021.

Under the requirement of *Condition 3.3(b)* of the EP, weekly impact monitoring reports on water quality shall be prepared and submitted to the EPD no later than five (5) days after the relevant monitoring data are collected or become available during the cable installation works.

1.3 Structure of this Report

The remainder of the report is structured as follows:

Section 1: Introduction

Provide details of the background, purpose and structure of the report, and scope of the Project.

Section 2: Project Information

Summarises the construction works undertaken and the status of Environmental Permits/Licenses during the reporting period.

Section 3: Water Quality Monitoring Requirements

Summarises the monitoring parameters, monitoring programmes, monitoring methodologies, monitoring frequency, monitoring locations, Action and Limit Levels, and Event / Action Plans.

Section 4: Monitoring Results

Summarises the monitoring results obtained in the reporting period.

Section 5: Environmental Non-conformance

Summarises any monitoring exceedance, environmental complaints and environmental summons within the reporting period.

Section 6: Future Key Issues

Summarises the monitoring schedule for the next week.

Section 7: Conclusions

Presents the key findings of the impact monitoring results.

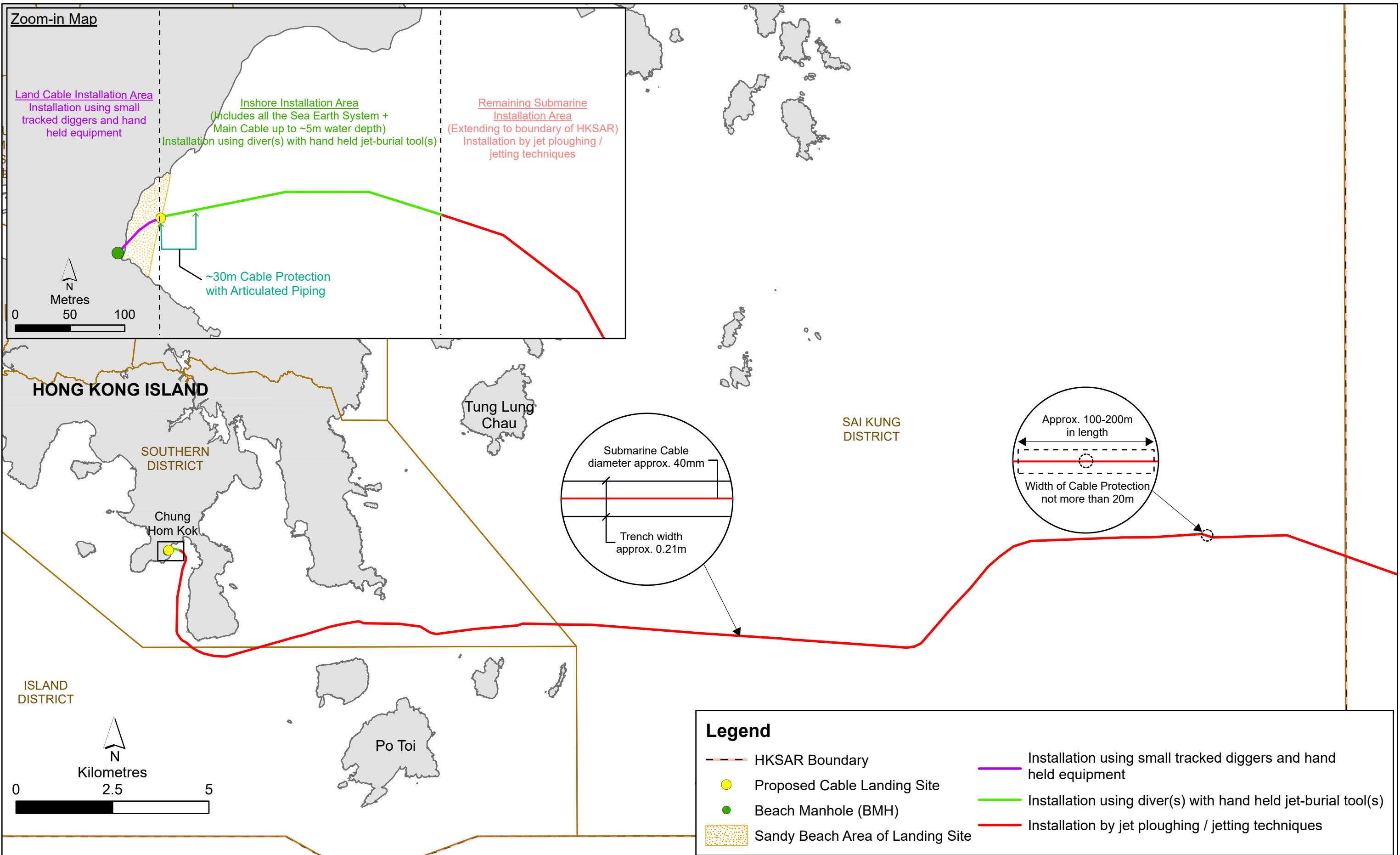


Figure 1.1

Proposed HKA Cable System

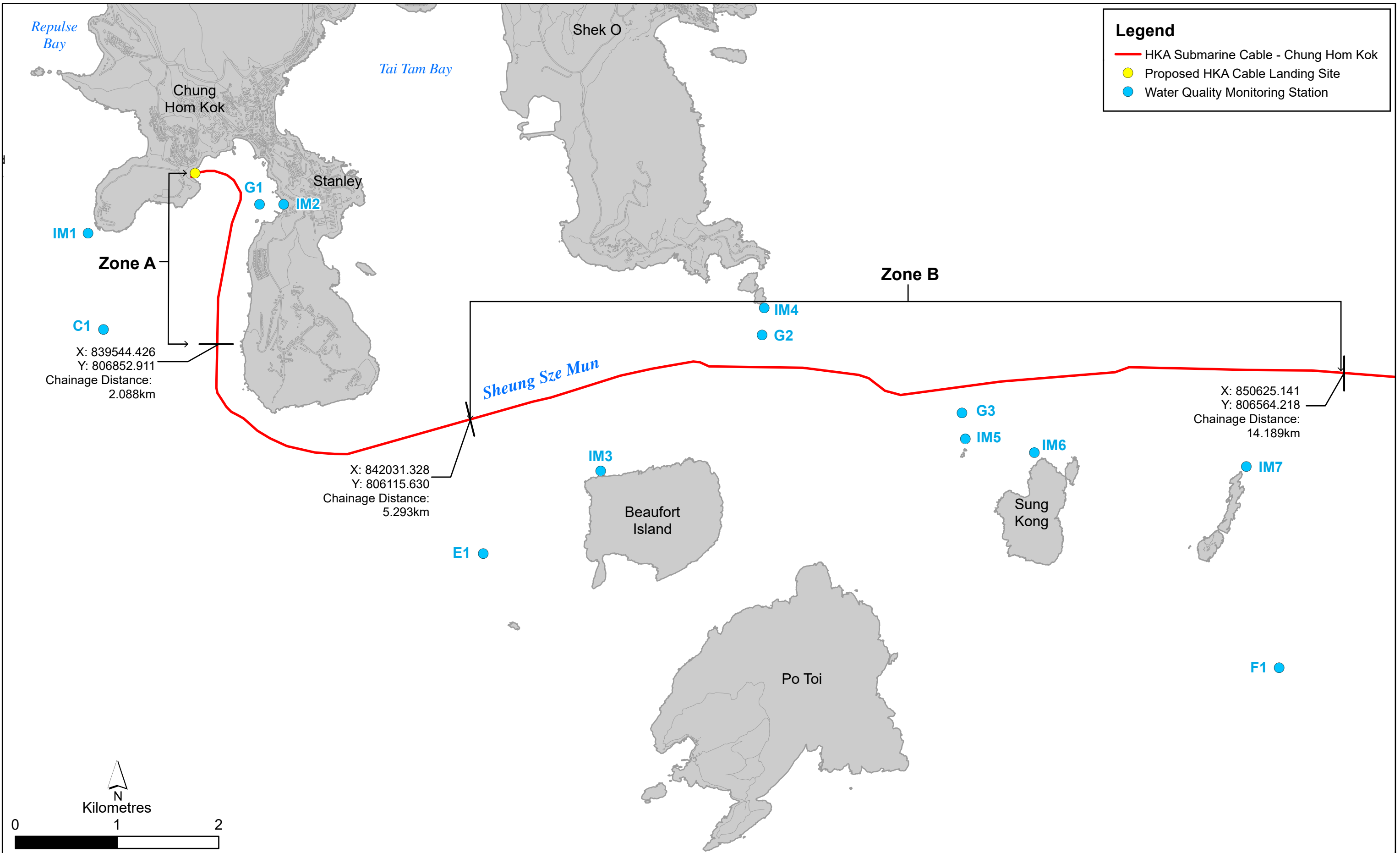
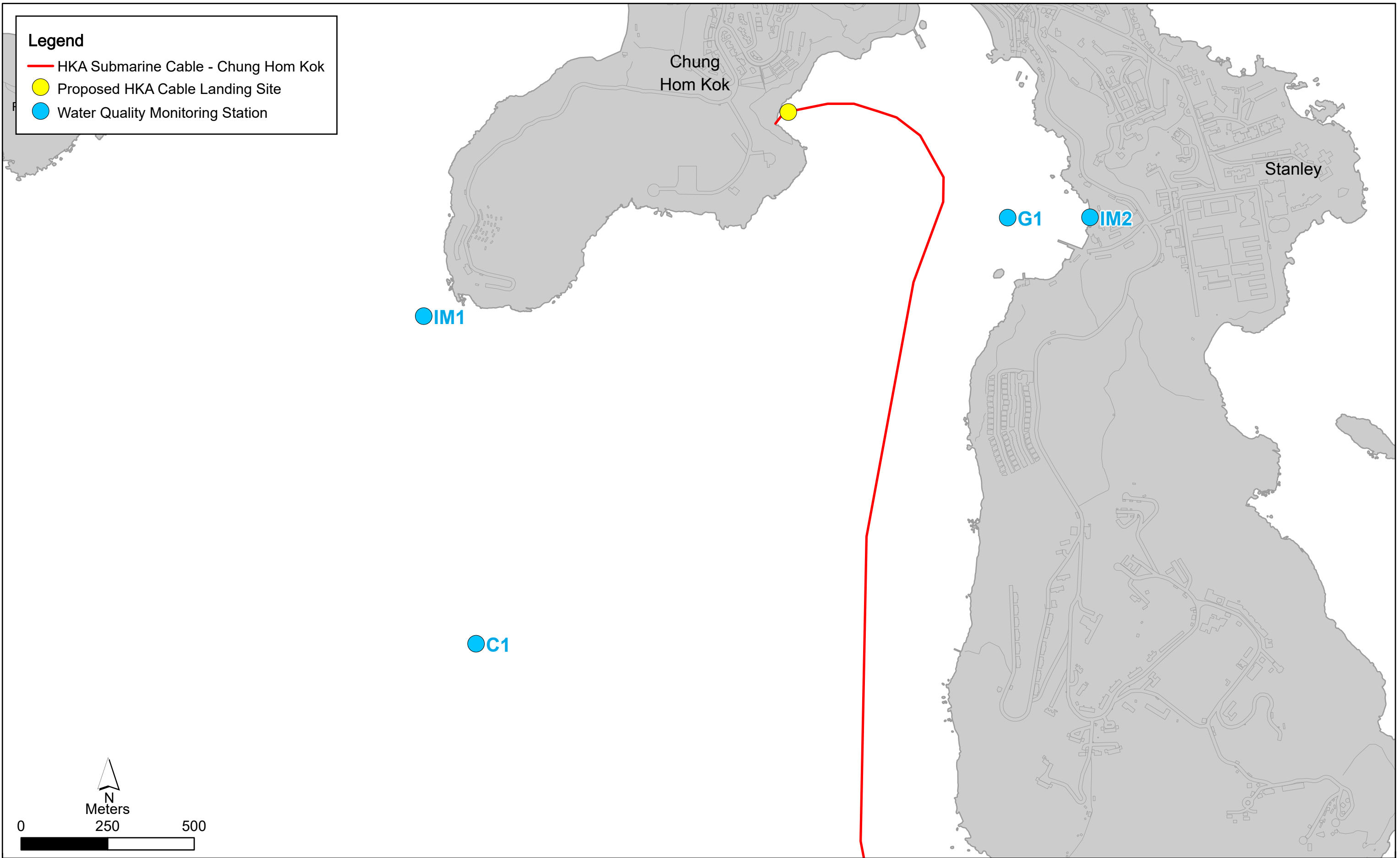


Figure 1.2

Water Quality Monitoring Stations



Legend

- HKA Submarine Cable - Chung Hom Kok
- Water Quality Monitoring Station

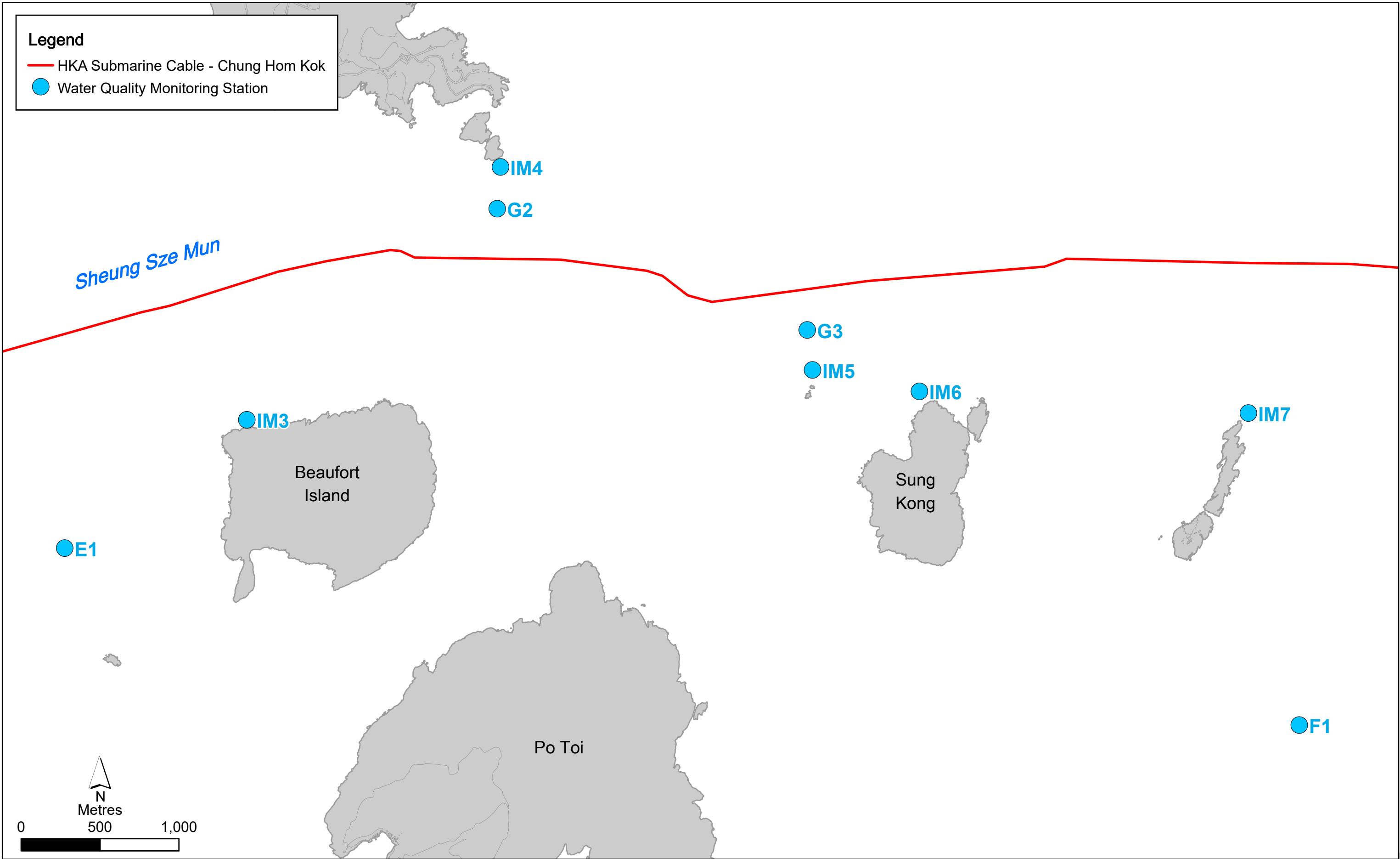


Figure 1.4

Water Quality Monitoring Stations - Zone B

File: T:\GIS\CONTRACT\0585919\mxd\0585919_WQMS_ZoneB(EP_Alignment).mxd
Date: 8/4/2021

**Environmental
Resources
Management**



2. PROJECT INFORMATION

2.1 Marine Construction Works Undertaken during Reporting Week

A summary of the key works undertaken during the reporting week is shown in **Table 2.1**:

Table 2.1 Summary of Marine Works Undertaken During the Reporting Week

Date	Works Area	Activity
Mon 10 May 2021	Zone A	Diver hand jetting and burial of cable simultaneously.
Tue 11 May 2021	Between Zone A and Zone B	Diver hand jetting and burial of cable simultaneously.

2.2 Status of Environmental Approval Documents

A summary of the relevant permits, licences, notifications and/or reports on environmental protection for this Project is presented in **Table 2.2**:

Table 2.2 Summary of Environmental Licensing, Notification, Permit and Reporting Status

Permit / Licence / Notification / Report	Reference	Validity Period	Remarks
Environmental Permit	(EP-567/2019) Available at https://www.epd.gov.hk/eia/register/permit/latest/ep5672019.htm	Throughout construction & operation period	Granted on 20 February 2019
EM&A Manual	(PP-573/2018) As part of the Project Profile; available at: https://www.epd.gov.hk/eia/register/profile/latest/dir265/dir265.pdf	Throughout construction & operation period	Approved by EPD on 2 January 2019
Marine Department Notice	(No. 28/2021) Available at: https://www.mardep.gov.hk/en/notices/pdf/mdn21028.pdf	Throughout construction & operation period	Issued by the Marine Department on 29 January 2021
<i>Baseline Water Quality Monitoring Report</i>	Currently unavailable online, at the time of this report	Throughout construction period & operation period	Approval by EPD still ongoing at the time of report writing

3. WATER QUALITY MONITORING

3.1 Monitoring Location

In accordance with the *Appendix F* of approved PP, during the installation of the HKA Project in Zone A, water quality sampling was undertaken at stations situated around the cable laying works at CHK. The locations of the sampling stations are listed in **Table 3.1** and shown in **Figure 1.2** and **Figure 1.3**.

Table 3.1 Water Quality Monitoring Stations

Stations	Nature	Approx. Geodesic Distance ⁽¹⁾ to Proposed Cable Alignment (m)	Easting	Northing
Zone A: The waters near Stanley Bay Covers the cable alignment between Chainage 0 and 2.088 km.				
IM1	Coral sites along the coast of Chung Hom Kok	1320	838275	807941
IM2	Saint Stephen's Beach	430	840199	808226
G1	Gradient Stations (Between Saint Stephen's Beach and cable alignment)	190	839961	808225
C1 ⁽²⁾	Control Station for Zone A	1120	838426	806996

Note:

- (1) Geodesic distance refers to the shortest straight line distance between two locations, without regard on the physical obstacles in between.
(2) These stations are also considered to fall within the spawning grounds of commercial fisheries resources.

3.2 Sampling and Testing Methodology

The impact water quality monitoring was conducted in accordance with the requirements stated in the *Appendix F* of approved PP. These are presented below.

3.2.1 Parameters Measured

The parameters measured *in situ* were:

- dissolved oxygen (DO) (% saturation and mgL⁻¹)
- temperature (°C)
- turbidity (NTU)
- salinity (‰ or ppt)

The only parameter to be measured in the laboratory was:

- suspended solids (SS) (mgL⁻¹)

In addition to the water quality parameters, other relevant data had also been measured and recorded in field logs, including the location of the sampling stations and cable vessel/ burial machine at the time of sampling, water depth, time, weather conditions, sea conditions, tidal state, current direction and speed, special phenomena and work activities undertaken around the monitoring and works area that may influence the monitoring results.

3.2.2 Equipment

Table 3.2 summaries the equipment used for the impact water quality monitoring.

Table 3.2 Equipment used during Impact Water Quality Monitoring

Equipment	Model
Global Positioning Device	Garmin etrex 20x
Water Depth Gauge	Sontek Riversurveyor
Water Sampling Equipment	Aquatic Research Instruments horizontal / vertical types 2.2L
Salinity, DO, Temperature Measuring Meter	YSI ProDSS (Multi-Parameter)
Current Velocity and Direction	Sontek Riversurveyor
Turbidity Meter	YSI ProDSS (Multi-Parameter)

3.2.3 Monitoring Frequency and Timing

Impact Monitoring at all monitoring stations within Zone A (i.e. IM1, IM2, G1, and C1) took place when the cable installation works were undertaken within Zone A only, as shown in **Figure 1.3**. The sampling works ceased when no cable installation works were conducted inside each particular Zone.

All construction works were undertaken during the designated working hours (i.e. 00:00 - 24:00; including Sundays and public holidays). A total of two (2) monitoring rounds were conducted during the 24-hour work period on each work-day from 00:00 - 24:00. The interval between two (2) sets of impact monitoring (i.e. including the collection of *In-situ* and SS data) during the cable installation works was no less than 36 hours and samples were taken twice during a 4 hour window of 2 hours before and 2 hours after a mid-flood and mid-ebb tidal state on each sampling occasion.

Reference was made to the predicted tides at Waglan Island, which is the tidal station nearest to the Project Site, published on the website of the Hong Kong Observatory ⁽¹⁾. Based on the predicted tidal levels at Waglan Island, the impact water quality monitoring was, and will be conducted between 10 May and 31 May 2021, following the schedule presented in **Appendix A**.

3.2.4 Sampling / Testing Protocols

All *in situ* monitoring instruments were checked, calibrated and certified by a laboratory accredited under HOKLAS (Quality Pro Test-Consult Limited) before use (see calibration reports in **Appendix B**), and will subsequently be re-calibrated at monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes were checked with certified standard solutions before each use.

For the on-site calibration of field equipment, the *BS 1427: 1993, Guide to Field and On-Site Test Methods for the Analysis of Waters* were observed. Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment were made available so that monitoring could proceed uninterrupted even when equipment is under maintenance, calibration etc.

Water samples for SS measurements were collected in high density polythene bottles, packed in ice (cooled to 4°C without being frozen), and delivered to a HOKLAS laboratory as soon as possible after collection.

At least two (2) replicate samples were collected from each of the monitoring events for *in situ* measurement and lab analysis.

3.2.5 Laboratory Analysis

All laboratory work was carried out in a HOKLAS accredited laboratory (ALS Technichem (HK) Pty Ltd). Water samples of about 1,000 mL were collected at the monitoring, gradient and control stations for carrying out the laboratory determinations. The determination work shall start within the next

⁽¹⁾ Hong Kong Observatory (2021) <http://www.hko.gov.hk/tide/predtide.htm?s=WAG> [Accessed in April 2021]

working day after collection of the water samples. The SS laboratory measurements were provided within five (5) days of the sampling event. The analyses followed the standard methods as described in *APHA Standard Methods for the Examination of Water and Wastewater, 19th Edition*, unless otherwise specified (APHA 2540D for SS).

The submitted information included pre-treatment procedures, instrument use, Quality Assurance/Quality Control (QA/QC) details (such as blank, spike recovery, number of duplicate samples per-batch etc.), detection limits and accuracy. The QA/QC details were in accordance with requirements of HOKLAS or another internationally accredited scheme (**Appendix C**).

3.2.6 Sampling Depths

At each station, measurements and water samples were taken at three (3) depths, namely 1 m below water surface, mid-depth and 1 m above seabed. For stations that are less than 3 m in depth, only the mid-depth sample was taken. For stations that are less than 6 m in depth, only the surface and seabed sample was taken.

3.2.7 Action and Limit Levels

The Action and Limit levels, which were established based on the results of *Baseline Water Quality Monitoring Report*, are presented in **Table 3.3**.

Table 3.3 Action and Limit Level for Water Quality

Parameter	Action Level	Limit Level
SS in mgL ⁻¹ (Depth-averaged)	95%-ile of baseline data (3.9 mg L ⁻¹), or 20% exceedance of value at any impact station compared with corresponding data from control station, whichever monitoring result is higher	99%-ile of baseline data (4.6 mg L ⁻¹), or 30% exceedance of value at any impact station compared with corresponding data from control station, whichever monitoring result is higher
DO in mgL ⁻¹	<u>Surface and Middle</u> 5%-ile of baseline data for surface or middle layer (6.84 mg L ⁻¹) <u>Bottom</u> 5%-ile of baseline data for bottom layers (6.69 mg L ⁻¹)	<u>Surface and Middle</u> 4mg/L or 1%-ile of baseline for surface and middle layer, whichever is lower (4 mg L ⁻¹) <u>Bottom</u> 2mg/L or 1%-ile of baseline data for bottom layer whichever is lower (2 mg L ⁻¹)
Turbidity in NTU (Depth-averaged)	95%-ile of baseline data (2.7 NTU), or 20% exceedance of value at any impact station compared with corresponding data from control station, whichever monitoring result is higher	99%-ile of baseline data (3.7 NTU), or 30% exceedance of value at any impact station compared with corresponding data from control station, whichever monitoring result is higher

Notes:

- For DO, non-compliance of the water quality limits occurs when the monitoring result is lower than the limits.
- "Depth-averaged" is calculated by taking the arithmetic means of reading of all sampled depths.
- For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- Limit level for DO was derived from the Water Quality Objectives (WQO) for Southern, Eastern Buffer, and Mirs Bay Water Control Zones under the Water Pollution Control Ordinance (WPCO) Chapters 358L, 358Y, and 358I respectively.

4. IMPACT MONITORING RESULTS

A total of two (2) monitoring events were carried out between 10 and 11 May 2021 at Zone A in the period of the 1st week of impact monitoring reporting. All monitoring events at all designated monitoring stations within Zone A were performed on schedule, i.e. on 10 May 2021.

No major Project activities that influenced the water quality within Zone A were identified between 10 and 11 May 2021.

4.1 Data Collected

The impact monitoring data taken for this 1st weekly impact monitoring report within Zone A are presented in **Appendix D**. In general, the water quality parameters were stable throughout each sampling day (i.e. on 10 May 2021).

No non-conformance was recorded during the reporting period.

5. ENVIRONMENTAL NON-CONFORMANCES

5.1 Summary of Environmental Exceedance

No exceedances were recorded during the monitoring period (i.e. between 10 and 11 May 2021).

The Contractors have been requested by the ET to be aware in case of any exceedances, and take care to ensure all necessary procedures are followed to avoid the Project impacting the water environment.

5.2 Summary of Environmental Non-compliance

No non-compliance events were recorded during the reporting period due to the Project.

5.3 Summary of Environmental Complaint

No environmental complaints were received during the reporting period.

5.4 Summary of Environmental Summons and Prosecution

No summons or prosecution on environmental matters were received during the reporting period.

6. FUTURE KEY ISSUES

6.1 Key Issues for the Coming Week

There is no key issue identified.

Over the next monitoring period (i.e. on 14 to 20 May 2021), diver hand jetting works offshore in Zone B were ongoing for *Marine Installation of Submarine Cable*, as well as the quality impact monitoring work during all installation work-days, accordingly. Water quality monitoring was not conducted on 12 and 13 May 2021 as the cable installation was conducted outside of Zone A and Zone B.

Diver jetting works offshore were completed on Wednesday 19 May 2021, no further impact monitoring works are required for Zone B.

6.2 Monitoring Schedule for the Coming Weeks

Land & Shore-End Cable Installation and Submarine Cable Installation up to Zone A and some marine installation works in Zone A are due to re-commence in end of May 2021, and in September 2021, if required, according to *Condition 2.5(a)* of the EP, stating, “no marine works shall be carried out within the area of Stanley Bay from 1 June to 31 August inclusive”.

7. CONCLUSION

This 1st Weekly Impact Monitoring Report presents the EM&A work undertaken during the period from 10 to 11 May 2021 in accordance with the *Appendix F* of the approved Project Profile (PP) and the requirements under EP-567/2019.

No non-compliance events were recorded during the reporting week due to the Project.

The Contractors have been requested by the Environmental Team (ET) to be aware in case of any exceedances, take care to ensure all necessary procedures are followed to avoid the Project impacting the water environment.

The ET will keep track of the EM&A programme to verify compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

**APPENDIX A IMPACT WATER QUALITY MONITORING SCHEDULE
(ZONE A & B)**

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
ebb tide 9:46 - 13:46 flood tide 15:59 - 19:59 Zone A impact 10-May	11-May	12-May	13-May	ebb tide 11:43 - 15:43 flood tide 18:38 - 22:38 Zone B impact 14-May	15-May	16-May
ebb tide 13:04 - 17:04 flood tide 5:08 - 9:08 Zone B impact 17-May	18-May	19-May	20-May	21-May	22-May	23-May
24-May	25-May	ebb tide 9:59 - 13:59 flood tide 16:50 - 20:50 Zone A impact 26-May	27-May	ebb tide 11:35 - 15:35 flood tide 4:38 - 8:38 Zone A impact 28-May	29-May	30-May
ebb tide 14:18 - 18:18 flood tide 6:34 - 10:34 Zone A impact 31-May	01-Jun	02-Jun	03-Jun	04-Jun	05-Jun	06-Jun
					Appendix A	
					HKA Impact Monitoring Schedule (Zone A & Zone B)	

**APPENDIX B CERTIFICATES OF CALIBRATION FOR *IN SITU*
MONITORING INSTRUMENTS**



專業化驗有限公司
QUALITY PRO TEST-CONSULT LIMITED

Unit 10, 14/F, Wah Wai Centre, 38-40 Au Pui Wan St., Fotan, Hong Kong
Email: info@qualityprotest.com; Website: www.qualityprotest.com
Tel: (852) 3956 8717; Fax: (852) 3956 3928

REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

Report No. : BA040092
Date of Issue : 22 April 2021
Page No. : 1 of 2

PART A – CUSTOMER INFORMATION

Enovative Environmental Service Ltd.
Flat 2207, Yu Fun House,
Yu Chui Court, Shatin
New Territories, Hong Kong
Attn: Mr. Thomas WONG

PART B – DESCRIPTION

Name of Equipment : YSI ProDSS (Multi-Parameters)
Manufacturer : YSI (a xylem brand)
Serial Number : 16H104234
Date of Received : Apr 22, 2021
Date of Calibration : Apr 22, 2021
Date of Next Calibration^(a) : Jul 21, 2021

PART C – REFERENCE METHODS/ DOCUMENTS FOR THE CALIBRATION

Parameter	Reference Method
pH at 25°C	APHA 21e 4500-H ⁺ B
Dissolved Oxygen	APHA 21e 4500-O G
Conductivity at 25°C	APHA 21e 2510 B
Salinity	APHA 21e 2520 B
Turbidity	APHA 21e 2130 B
Temperature	Section 6 of international Accreditation New Zealand Technical Guide no. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

PART D – CALIBRATION RESULTS^(b,c)

(1) pH at 25°C

Target (pH unit)	Displayed Reading ^(d) (pH Unit)	Tolerance ^(e) (pH Unit)	Results
4.00	3.98	-0.02	Satisfactory
7.42	7.40	-0.02	Satisfactory
10.01	9.92	-0.09	Satisfactory

Tolerance of pH should be less than ± 0.20 (pH unit)

(2) Temperature


Reading of Ref. thermometer (°C)	Displayed Reading (°C)	Tolerance (°C)	Results
10	10.02	0.02	Satisfactory
25	24.00	-1.00	Satisfactory
40	40.00	0.00	Satisfactory

Tolerance limit of temperature should be less than ± 2.0 (°C)

~ CONTINUED ON NEXT PAGE ~

Remark(s): -

- ^(a) The "Date of Next Calibration" is recommended according to best practice principals as practiced by QPT or quoted from relevant international standards.
^(b) The results relate only to the calibrated equipment as received
^(c) The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.
^(d) "Displayed Reading" denotes the figure shown on item under calibration/ checking regardless of equipment precision or significant figures.
^(e) The "Tolerance Limit" mentioned is the acceptance criteria applicable for similar equipment used by Quality Pro Test-Consult Ltd. or quoted from relevant international standards..


LEE Chun-ning, Desmond
Senior Chemist



REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

Report No. : BA040092
Date of Issue : 22 April 2021
Page No. : 2 of 2

PART D – CALIBRATION RESULTS (Cont'd)

(3) Dissolved Oxygen

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)	Results
0.15	0.27	0.12	Satisfactory
1.88	1.92	0.04	Satisfactory
5.79	5.79	0.00	Satisfactory
8.49	8.42	-0.07	Satisfactory

Tolerance limit of dissolved oxygen should be less than ± 0.50 (mg/L)

(4) Conductivity at 25°C

Conc. of KCl (M)	Expected Reading ($\mu\text{S}/\text{cm}$)	Displayed Reading ($\mu\text{S}/\text{cm}$)	Tolerance (%)	Results
0.001	146.9	145.3	-1.09	Satisfactory
0.01	1412	1331	-5.74	Satisfactory
0.1	12890	12364	-4.08	Satisfactory
0.5	58670	56724	-3.32	Satisfactory
1.0	111900	109210	-2.40	Satisfactory

Tolerance limit of conductivity should be less than ± 10.0 (%)

(5) Salinity

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)	Results
10	10.18	1.80	Satisfactory
20	20.25	1.25	Satisfactory
30	30.04	0.13	Satisfactory

Tolerance limit of salinity should be less than ± 10.0 (%)

(6) Turbidity

Expected Reading (NTU)	Displayed Reading ^(b) (NTU)	Tolerance ^(a) (%)	Results
0	0.00	--	Satisfactory
10	10.10	1.0	Satisfactory
20	20.14	0.7	Satisfactory
100	107.6	7.6	Satisfactory
800	790	-1.3	Satisfactory

Tolerance limit of turbidity should be less than ± 10.0 (%)

~ END OF REPORT ~

Remark(s): -

^(a) "Displayed Reading" presents the figures shown on item under calibration/ checking regardless of equipment precision or significant figures.^(b) The "Tolerance Limit" mentioned is the acceptance criteria applicable for similar equipment used by Quality Pro Test-Consult Ltd. or quoted from relevant international standards.

APPENDIX C QA/ QC RESULTS FOR SUSPENDED SOLIDS TESTING

QA/QC Results of Laboratory Analysis of Total Suspended Solids				
Sampling Date	Sample Duplicate		Method Blank * (mg/L)	Laboratory Control Spike % Recovery **
	Sample ID	% Error		
10-May-21	C1-ME-S-1	14.3	<0.5	101.0
	IM1-ME-B-1	16.7		
	G1-ME-B-2	16.7	<0.5	99.5
	IM1-MF-M-1	5.9		
	G1-MF-M-1	21.4	<0.5	102.0

Note: (*) Reporting limit of SS is 0.5 mg/L.

(**) % Recovery of laboratory control spike should be between 85% to 115%.



CERTIFICATE OF ANALYSIS

<i>Client</i>	: ENOVATIVE ENVIRONMENTAL SERVICE LTD	<i>Laboratory</i>	: ALS Technichem (HK) Pty Ltd	<i>Page</i>	: 1 of 5
<i>Contact</i>	: MR THOMAS WONG	<i>Contact</i>	: Richard Fung	<i>Work Order</i>	: HK2118793
<i>Address</i>	: FLAT 2207, YU FUN HSE, YU CHUI COURT, SHATIN, N.T. HONG KONG	<i>Address</i>	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
<i>E-mail</i>	: thomas.wong@eno.com.hk	<i>E-mail</i>	: richard.fung@alsglobal.com		
<i>Telephone</i>	: ----	<i>Telephone</i>	: +852 2610 1044	<i>Date received</i>	: 10-May-2021
<i>Facsimile</i>	: ----	<i>Facsimile</i>	: +852 2610 2021	<i>Date of issue</i>	: 13-May-2021
<i>Project</i>	: HKA SUBMARINE CABLE – CHUNG HOM KOK			<i>No. of samples</i>	- Received : 44
<i>Order number</i>	: —	<i>Quote number</i>	: HKE/1236/2021		- Analysed : 44
<i>C-O-C number</i>	: —				
<i>Site</i>	: —				

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This document has been signed by those names that appear on this report and are the authorised signatories.

<i>Signatory</i>	<i>Position</i>	<i>Authorised results for:</i>
 Fung Lim Chee, Richard	Managing Director	Inorganics



General Comments

This report supersedes any previous report(s) with this reference. All pages of this report have been checked and approved for release. When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes. Testing period is from 10-May-2021 to 13-May-2021.

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific Comments for Work Order HK2118793 :

Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in chilled condition. The result(s) related only to the item(s) tested.

Sample information (Project name, Sample ID, Sampling date/time, etc.) is provided by client.



Analytical Results

Sub-Matrix: MARINE WATER			Compound	EA025: Suspended Solids (SS)	---	---	---	---
			LOR Unit	0.5 mg/L	---	---	---	---
Sample ID	Sampling date / time	Laboratory sample ID	EA/ED: Physical and Aggregate Properties	---	---	---	---	---
C1-ME-S-1	10-May-2021	HK2118793-001	1.4	---	---	---	---	---
C1-ME-S-2	10-May-2021	HK2118793-002	1.2	---	---	---	---	---
C1-ME-M-1	10-May-2021	HK2118793-003	1.8	---	---	---	---	---
C1-ME-M-2	10-May-2021	HK2118793-004	1.0	---	---	---	---	---
C1-ME-B-1	10-May-2021	HK2118793-005	1.8	---	---	---	---	---
C1-ME-B-2	10-May-2021	HK2118793-006	1.6	---	---	---	---	---
IM1-ME-S-1	10-May-2021	HK2118793-007	1.9	---	---	---	---	---
IM1-ME-S-2	10-May-2021	HK2118793-008	1.2	---	---	---	---	---
IM1-ME-M-1	10-May-2021	HK2118793-009	1.9	---	---	---	---	---
IM1-ME-M-2	10-May-2021	HK2118793-010	1.2	---	---	---	---	---
IM1-ME-B-1	10-May-2021	HK2118793-011	1.8	---	---	---	---	---
IM1-ME-B-2	10-May-2021	HK2118793-012	1.7	---	---	---	---	---
IM2-ME-S-1	10-May-2021	HK2118793-013	1.0	---	---	---	---	---
IM2-ME-S-2	10-May-2021	HK2118793-014	1.5	---	---	---	---	---
IM2-ME-B-1	10-May-2021	HK2118793-017	1.5	---	---	---	---	---
IM2-ME-B-2	10-May-2021	HK2118793-018	1.3	---	---	---	---	---
G1-ME-S-1	10-May-2021	HK2118793-019	0.6	---	---	---	---	---
G1-ME-S-2	10-May-2021	HK2118793-020	0.7	---	---	---	---	---
G1-ME-M-1	10-May-2021	HK2118793-021	1.5	---	---	---	---	---
G1-ME-M-2	10-May-2021	HK2118793-022	1.0	---	---	---	---	---
G1-ME-B-1	10-May-2021	HK2118793-023	1.3	---	---	---	---	---
G1-ME-B-2	10-May-2021	HK2118793-024	1.8	---	---	---	---	---
C1-MF-S-1	10-May-2021	HK2118793-025	1.6	---	---	---	---	---
C1-MF-S-2	10-May-2021	HK2118793-026	2.2	---	---	---	---	---
C1-MF-M-1	10-May-2021	HK2118793-027	1.7	---	---	---	---	---
C1-MF-M-2	10-May-2021	HK2118793-028	1.9	---	---	---	---	---
C1-MF-B-1	10-May-2021	HK2118793-029	1.7	---	---	---	---	---
C1-MF-B-2	10-May-2021	HK2118793-030	1.0	---	---	---	---	---
IM1-MF-S-1	10-May-2021	HK2118793-031	2.1	---	---	---	---	---
IM1-MF-S-2	10-May-2021	HK2118793-032	2.0	---	---	---	---	---
IM1-MF-M-1	10-May-2021	HK2118793-033	1.7	---	---	---	---	---



Sub-Matrix: MARINE WATER

			<i>Compound</i>	EA025: Suspended Solids (SS)	----	----	----	----
			<i>LOR Unit</i>	0.5 mg/L	----	----	----	----
<i>Sample ID</i>	<i>Sampling date / time</i>	<i>Laboratory sample ID</i>	EA/ED: Physical and Aggregate Properties	----	----	----	----	----
IM1-MF-M-2	10-May-2021	HK2118793-034	2.0	----	----	----	----	----
IM1-MF-B-1	10-May-2021	HK2118793-035	1.4	----	----	----	----	----
IM1-MF-B-2	10-May-2021	HK2118793-036	1.6	----	----	----	----	----
IM2-MF-S-1	10-May-2021	HK2118793-037	2.0	----	----	----	----	----
IM2-MF-S-2	10-May-2021	HK2118793-038	3.0	----	----	----	----	----
IM2-MF-B-1	10-May-2021	HK2118793-041	2.2	----	----	----	----	----
IM2-MF-B-2	10-May-2021	HK2118793-042	1.6	----	----	----	----	----
G1-MF-S-1	10-May-2021	HK2118793-043	1.9	----	----	----	----	----
G1-MF-S-2	10-May-2021	HK2118793-044	1.4	----	----	----	----	----
G1-MF-M-1	10-May-2021	HK2118793-045	1.4	----	----	----	----	----
G1-MF-M-2	10-May-2021	HK2118793-046	1.5	----	----	----	----	----
G1-MF-B-1	10-May-2021	HK2118793-047	2.0	----	----	----	----	----
G1-MF-B-2	10-May-2021	HK2118793-048	2.2	----	----	----	----	----



Laboratory Duplicate (DUP) Report

Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 3673181)								
HK2118793-001	C1-ME-S-1	EA025: Suspended Solids (SS)	----	0.5	mg/L	1.4	1.6	8.3
HK2118793-011	IM1-ME-B-1	EA025: Suspended Solids (SS)	----	0.5	mg/L	1.8	1.5	17.1
EA/ED: Physical and Aggregate Properties (QC Lot: 3673182)								
HK2118793-024	G1-ME-B-2	EA025: Suspended Solids (SS)	----	0.5	mg/L	1.8	1.5	18.2
HK2118793-033	IM1-MF-M-1	EA025: Suspended Solids (SS)	----	0.5	mg/L	1.7	1.6	0.0
EA/ED: Physical and Aggregate Properties (QC Lot: 3673183)								
HK2118793-045	G1-MF-M-1	EA025: Suspended Solids (SS)	----	0.5	mg/L	1.4	1.7	20.8

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
						LCS	DCS	Low	High	Value	Control Limit
EA/ED: Physical and Aggregate Properties (QCLot: 3673181)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	101	----	85.9	117	----	----
EA/ED: Physical and Aggregate Properties (QCLot: 3673182)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	99.5	----	85.9	117	----	----
EA/ED: Physical and Aggregate Properties (QCLot: 3673183)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	102	----	85.9	117	----	----

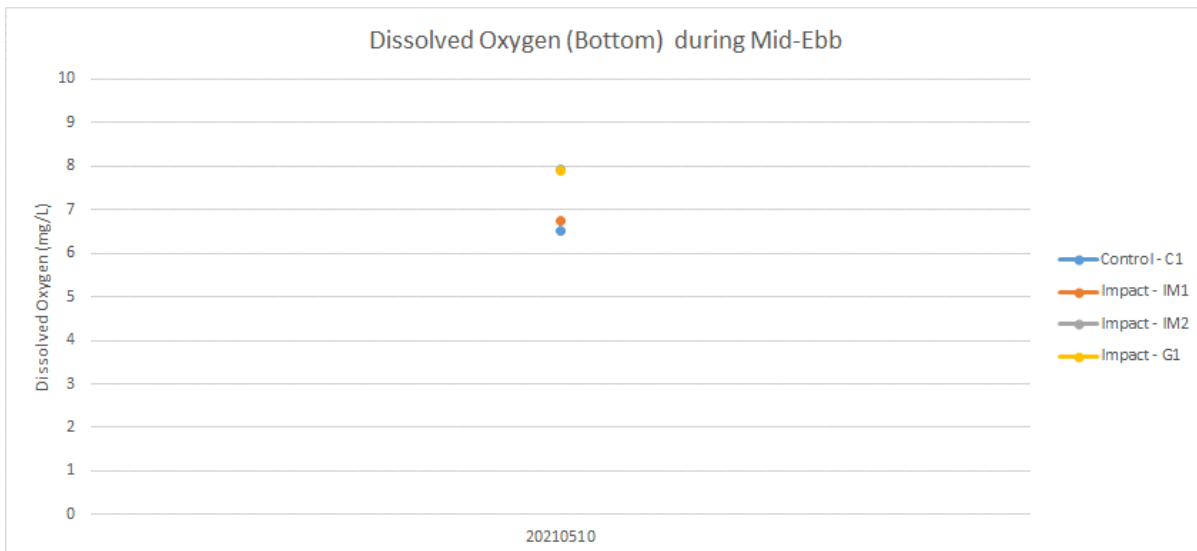
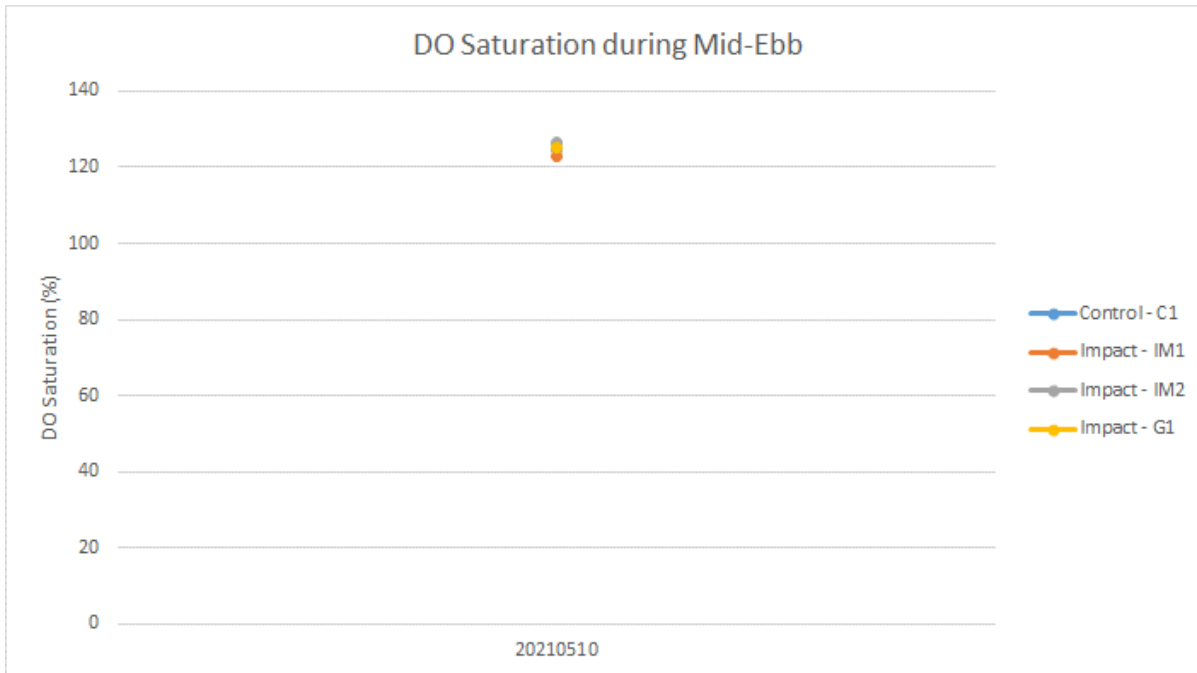
Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

- No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.

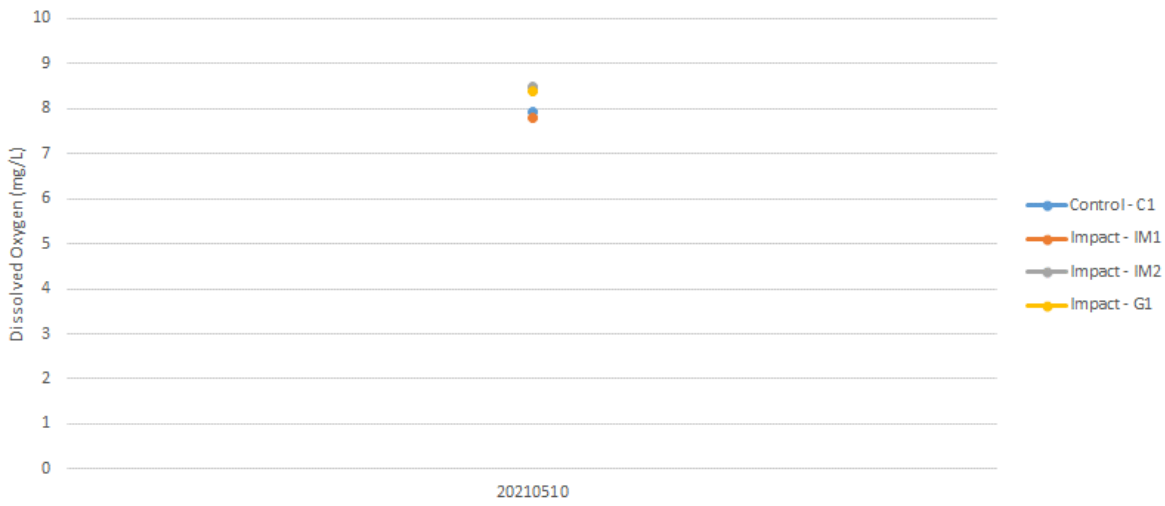
APPENDIX D IMPACT WATER QUALITY MONITORING RESULTS (ZONE A)

Graphical presentation of the Impact monitoring result for
Zone A (10May2021))

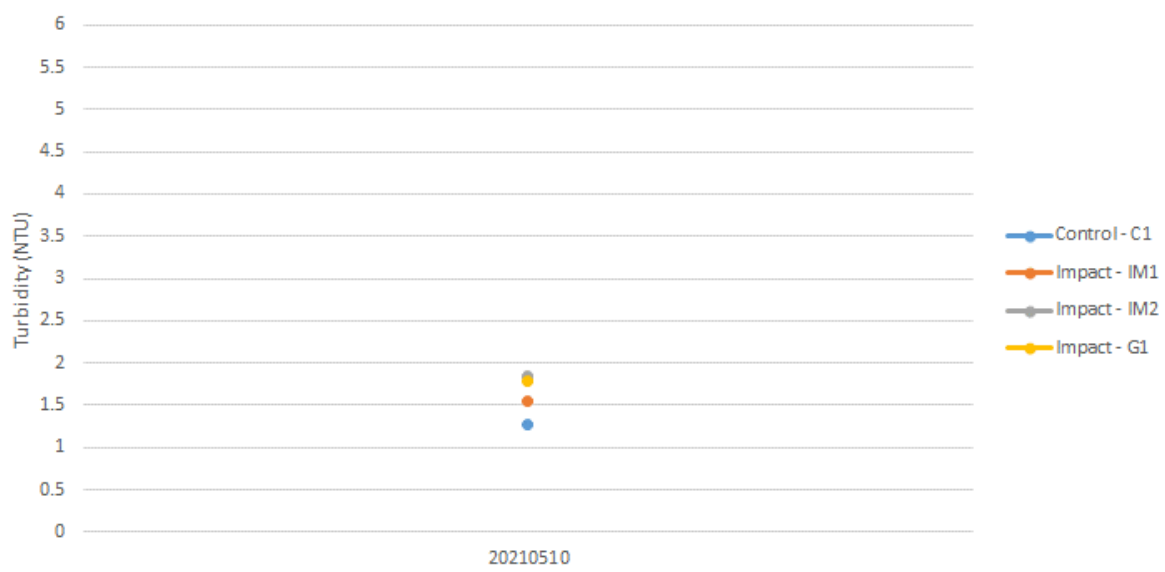
During Mid-Ebb



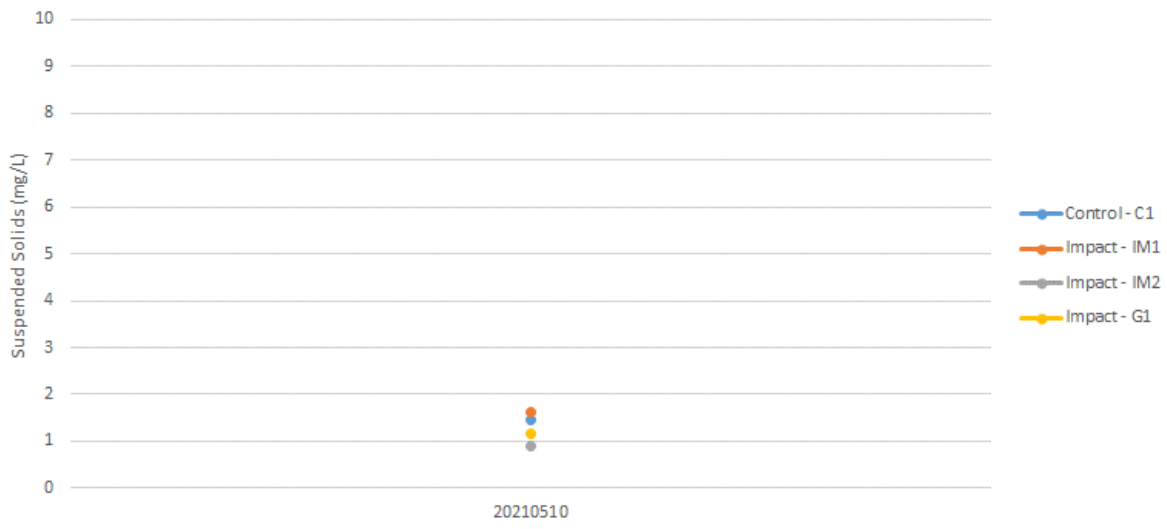
Dissolved Oxygen (Surface and Middle) during Mid-Ebb



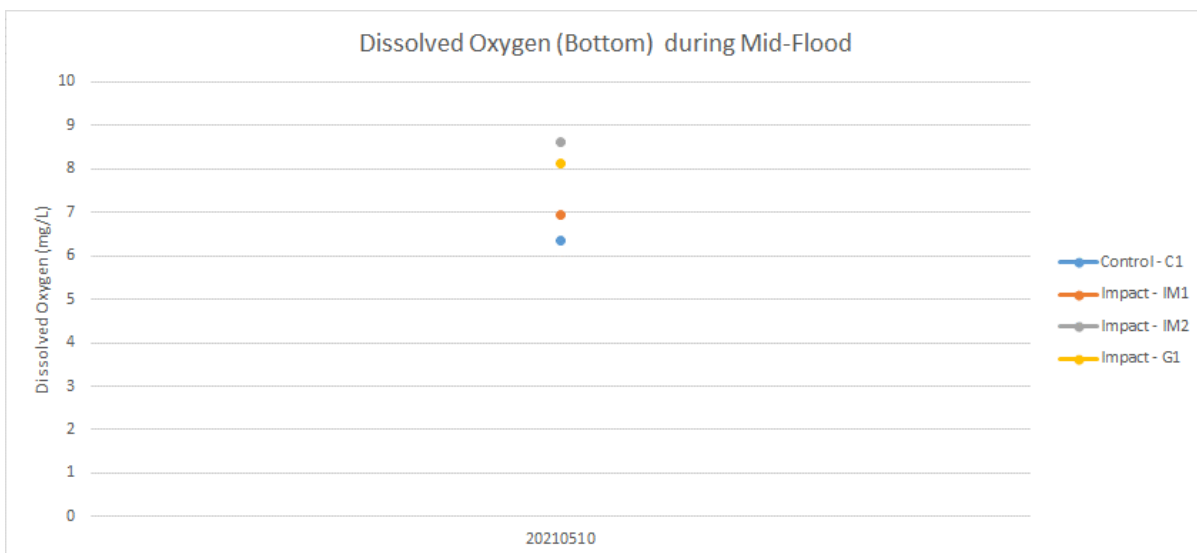
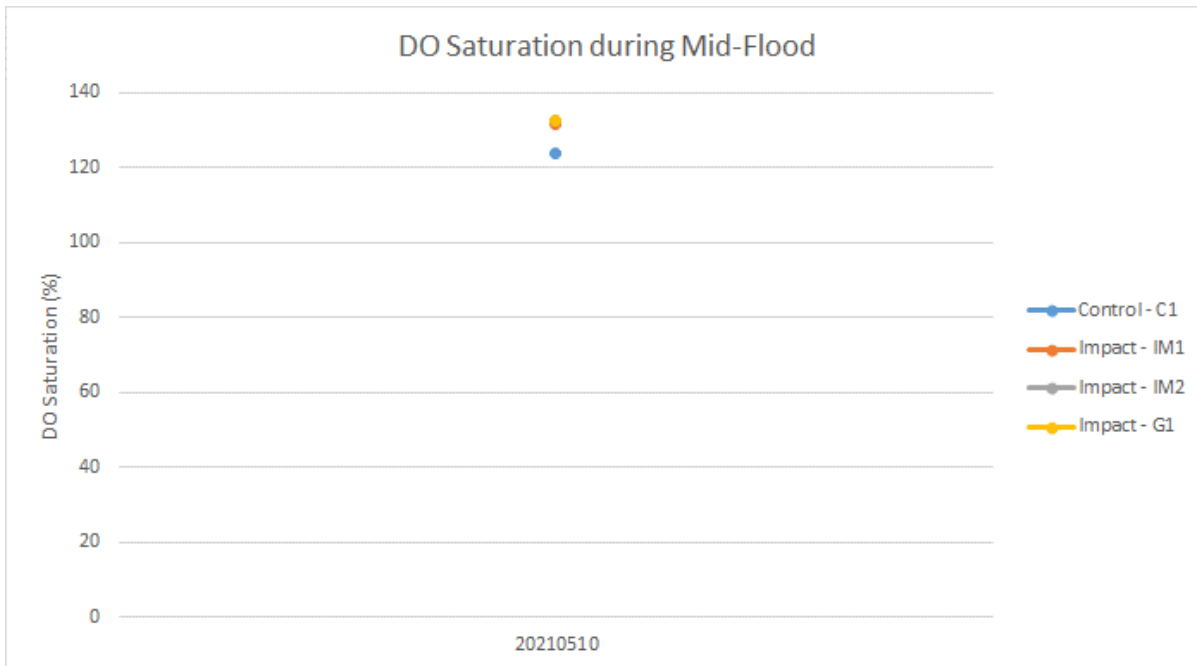
Turbidity (Depth-averaged) during Mid-Ebb



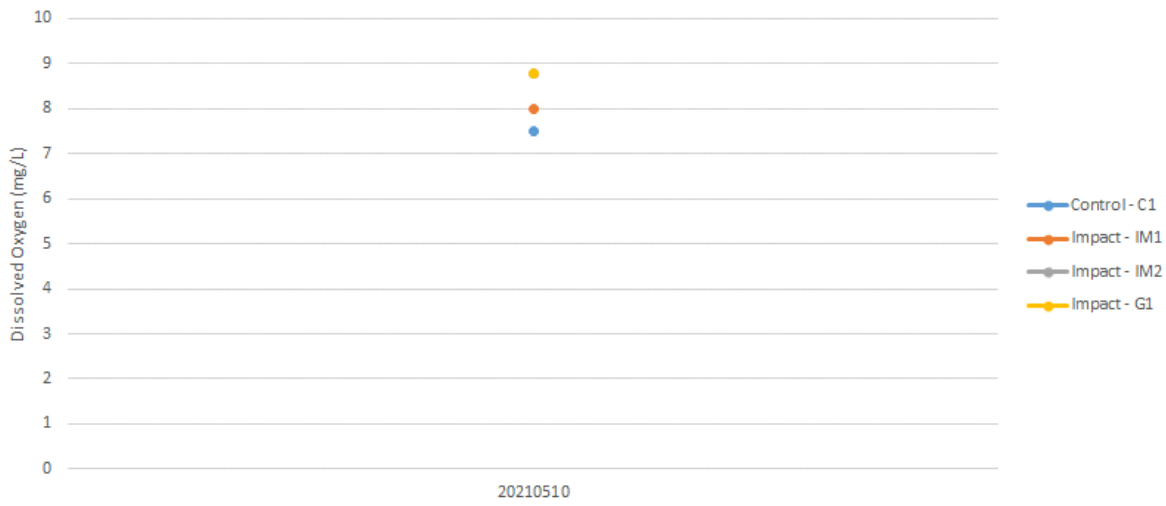
Suspended Solids (Depth-averaged) during Mid-Ebb



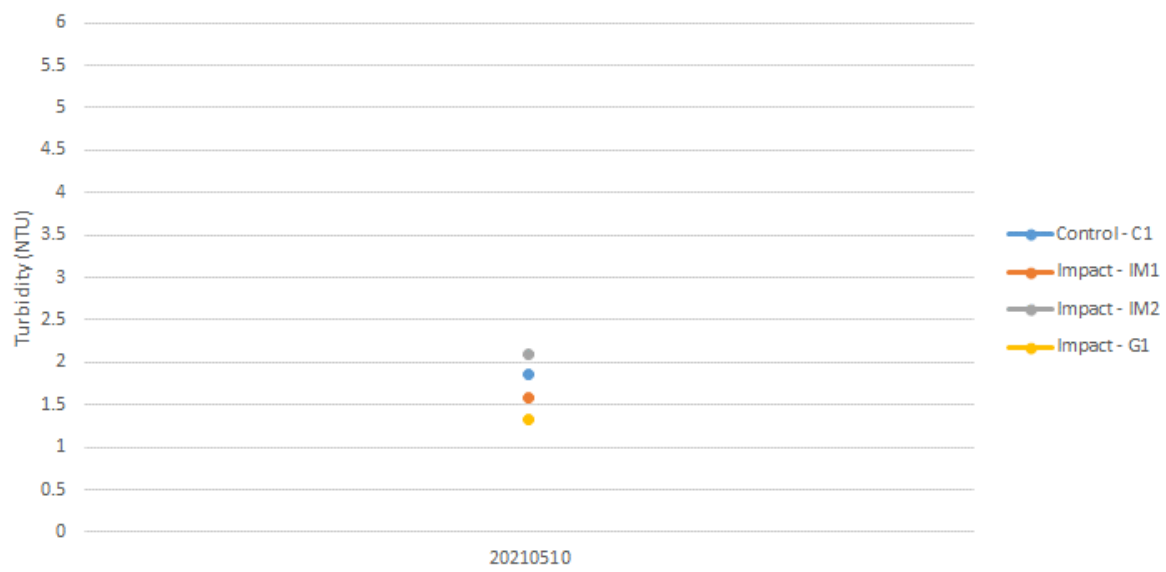
During Mid-Flood



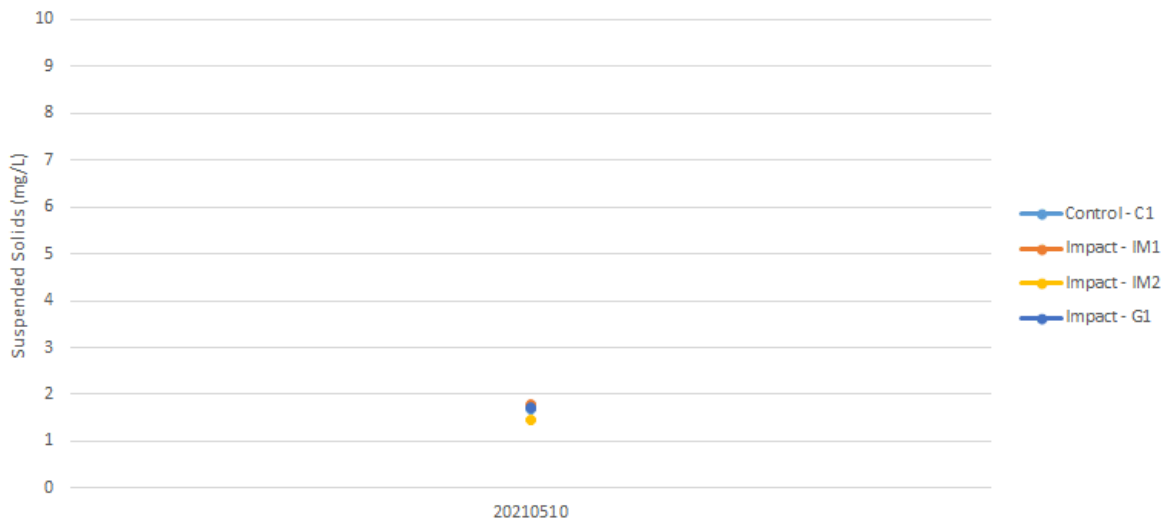
Dissolved Oxygen (Surface and Middle) during Mid-Flood



Turbidity (Depth-averaged) during Mid-Flood



Suspended Solids (Depth-averaged) during Mid-Flood



Water Quality Monitoring Data Log Sheet

10-May-2021

Tide: Mid-Ebb

Monitoring Station	Weather Condition	Sea Condition**	Sampling Time	Water Depth (m)	Depth Level ***	Current Velocity (m/s)	Current Direction	Temperature (°C)		Salinity (ppt)		pH		DO Saturation (%)		Dissolved Oxygen (mg/L)			Turbidity(NTU)			Suspended Solids (mg/L)						
								Value	Average	Value	Average	Value	Average	Value	Average	Value	Average	DA*	Value	Average	DA*	Value	Average	DA*				
C1	Fine	Moderate	12:45	21.8	S	2.48	160	26.4	26.4	32.49	32.49	8.32	8.32	124.6	124.6	8.36	8.36	7.92	0.97	0.97	1.27	1.4	1.3	1.5				
						2.51	160	26.4		32.48		8.31		124.6		8.36			0.97			1.2						
					M	2.22	156	25.5	25.5	34.00	34.02	8.26	8.26	110.7	110.7	7.48	7.48		0.96			0.96			0.96	0.96	1.8	1.4
						2.35	159	25.4		34.03		8.25		110.6		7.48			0.95						1.0			
					B	1.81	164	24.9	25.0	34.73	34.72	8.23	8.23	95.7	95.7	6.49	6.50		1.96			1.89			1.8	1.7		
						1.86	167	25.0		34.71		8.23		95.7		6.50			1.82						1.6			
IM1	Fine	Moderate	12:55	20.1	S	1.88	156	26.5	26.5	32.36	32.39	8.30	8.30	123.0	122.9	8.25	8.25	7.80	1.08	1.09	1.55	1.9	1.6	1.6				
						2.00	161	26.4		32.41		8.30		122.8		8.24			1.10			1.2						
					M	1.43	155	25.5	25.5	34.12	34.14	8.26	8.26	109.1	108.9	7.37	7.36		1.17			1.24			1.9	1.6		
						1.56	168	25.4		34.16		8.26		108.7		7.35			1.31						1.2			
					B	1.62	151	25.0	25.0	34.75	34.75	8.26	8.26	99.4	99.6	6.74	6.75		2.30			2.31			1.8	1.8		
						1.67	151	25.0		34.74		8.26		99.7		6.76			2.31						1.7			
IM2	Fine	Moderate	13:15	5.4	S	0.34	114	26.5	26.5	32.74	32.84	8.36	8.36	126.5	126.5	8.47	8.47	8.47	1.36	1.45	1.84	1.0	1.3	0.9				
						0.37	122	26.4		32.93		8.36		126.5		8.47			1.54			1.5						
					M	0.00	0		-		-		-		-		-					-			0.0	0.0		
						0.00	0												0.0									
					B	0.39	88	26.0	26.0	33.72	33.73	8.36	8.36	118.4	118.1	7.94	7.93		2.19			2.23			1.5	1.4		
						0.42	91	26.0		33.73		8.36		117.8		7.91			2.26						1.3			
G1	Fine	Moderate	13:11	6.5	S	1.39	44	27.3	27.3	32.23	32.24	8.37	8.37	125.1	125.1	8.28	8.28	8.37	1.05	1.06	1.79	0.6	0.7	1.2				
						1.42	46	27.3		32.24		8.37		125.0		8.27			1.06			0.7						
					M	1.59	47	26.3	26.3	32.76	32.87	8.40	8.40	126.3	126.2	8.47	8.47		1.34			1.46			1.5	1.3		
						1.66	47	26.2		32.97		8.40		126.1		8.46			1.58						1.0			
					B	2.23	56	25.8	25.8	34.08	34.02	8.42	8.42	117.7	117.6	7.91	7.90		2.97			2.85			1.3	1.6		
						2.34	58	25.8		33.96		8.42		117.4		7.89			2.73						1.8			

Remark: * DA: Depth-Averaged

*** S: 1 m below the sea surface; M: mid-depth; S: 1 m above the seabed

Water Quality Monitoring Data Log Sheet

10-May-2021

Tide: Mid-Flood

Monitoring Station	Weather Condition	Sea Condition**	Sampling Time	Water Depth (m)	Depth Level ***	Current Velocity (m/s)	Current Direction	Temperature (°C)		Salinity (ppt)		pH		DO Saturation (%)		Dissolved Oxygen (mg/L)			Turbidity(NTU)			Suspended Solids (mg/L)		
								Value	Average	Value	Average	Value	Average	Value	Average	Value	Average	DA*	Value	Average	DA*	Value	Average	DA*
C1	Fine	Moderate	16:22	21.4	S	1.26	124	26.3	26.2	32.90	32.99	8.28	8.28	123.8	123.6	8.31	8.31	7.50	0.97	0.98	1.86	1.6	1.9	1.7
						1.32	127	26.1		33.08		8.27		123.4		8.30			0.98			2.2		
					M	1.38	129	25.0	25.0	34.71	34.73	8.23	8.23	98.9	98.8	6.70	6.70		1.18	1.24		1.7	1.8	
						1.42	136	25.0		34.74		8.22		98.6		6.69			1.30			1.9		
					B	1.17	121	24.9	24.9	34.92	34.92	8.23	8.23	93.3	93.4	6.34	6.34		3.38	3.36		1.7	1.4	
						1.27	131	24.9		34.92		8.23		93.4		6.34			3.33			1.0		
IM1	Fine	Moderate	16:14	19.4	S	2.28	43	27.1	27.1	32.48	32.47	8.33	8.33	131.7	131.7	8.74	8.74	7.99	0.99	0.98	1.59	2.1	2.1	1.8
						2.38	46	27.1		32.46		8.33		131.6		8.73			0.97			2.0		
					M	2.39	46	25.2	25.2	34.63	34.64	8.26	8.26	107.4	107.0	7.27	7.25		1.16	1.19		1.7	1.9	
						2.45	47	25.2		34.64		8.26		106.6		7.22			1.21			2.0		
					B	2.78	46	25.0	25.0	34.83	34.83	8.27	8.28	101.9	102.2	6.90	6.92		2.58	2.60		1.4	1.5	
						2.84	49	25.0		34.83		8.28		102.4		6.94			2.61			1.6		
IM2	Fine	Moderate	15:59	4.9	S	0.03	60	27.2	27.2	32.29	32.31	8.43	8.43	132.4	132.3	8.77	8.77	1.43	1.50	2.10	2.0	2.5	1.5	
						0.03	61	27.2		32.32		8.43		132.2		8.77		1.57			3.0			
					M	0.00	0		-		-		-		-			-			-	0.0		0.0
						0.00	0												0.0					
					B	0.01	6	26.9	26.9	32.56	32.57	8.46	8.46	129.8	129.6	8.63		8.62	2.66		2.71	2.2		1.9
						0.01	6	26.9		32.58		8.46		129.3		8.60			2.75			1.6		
G1	Fine	Moderate	16:05	6.8	S	0.19	183	27.5	27.5	32.27	32.27	8.35	8.35	132.5	132.5	8.73	8.76	1.11	1.12	1.32	1.9	1.7	1.7	
						0.20	198	27.5		32.27		8.35		132.5		8.73		1.13			1.4			
					M	0.15	210	26.2	26.2	33.26	33.22	8.37	8.37	131.1	131.1	8.79		8.79	0.95		0.96	1.4		1.5
						0.16	229	26.2		33.17		8.37		131.0		8.78			0.96			1.5		
					B	0.15	179	25.8	25.8	33.88	33.87	8.37	8.37	120.9	120.7	8.13		8.11	2.05		1.89	2.0		2.1
						0.16	184	25.8		33.86		8.37		120.4		8.09			1.72			2.2		

Remark: * DA: Depth-Averaged

*** S: 1 m below the sea surface; M: mid-depth; S: 1 m above the seabed

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