Asia Pacific Gateway (APG) – Tseung Kwan O

Fourth Weekly Impact Water Quality Monitoring Report

15 June 2016

Submitted by
Environmental Resources Management
16/F Berkshire House
25 Westlands Road
Quarry Bay, Hong Kong
Telephone 2271 3000
Facsimile 2723 5660
www.erm.com

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Asia Pacific Gateway (APG) – Tseung Kwan O
Environmental Certification Sheet
EP-485/2014

Reference Document/Plan

Document/~~Plan~~ to be ~~Certified~~/ Verified:	Fourth Weekly Impact Water Quality Monitoring Report
Date of Report:	15 June 2016
Date prepared by ET:	15 June 2016
Date received by IEC:	15 June 2016

Reference EM&A Manual

EM&A Manual: Section 2

Content: *Reporting on Impact Water Quality Monitoring*

2.5 "An Impact Monitoring Report will be provided weekly within three days after the relevant monitoring data are collected or become available during Project marine installation work.... "

"A Weekly Impact Monitoring shall include, but not limited to, the following details: Basic Project Information – Project marine installation works programme with fine tuning of activities showing the inter-relationship with environmental protection/mitigation measures for the week and works undertaken during the week; Operating practices of any Project marine installation works machinery (e.g. cable burial machine) during sampling (including: position, speed, cable burial depth) and an interpretation of monitoring results; and The monitoring data should be provided graphically to show the relationship between the Control and the Impact monitoring stations and compliance or non-compliance with respect to the Action/Limit Levels. "

EP Condition: Condition 2

Content: *Impact Monitoring Report on Water Quality*

2.5 "(ii)(b): To monitor the environmental impacts and timely implementation of the recommended mitigation measures, the Permit Holder shall submit to the director four hard copies and one electronic copy of weekly impact monitoring and site audit report within three days after the relevant monitoring data are collected or become available, as defined in the approved EM&A Manual."

"All environmental monitoring and audit results submitted under this Permit shall be true, valid and correct. Before submission to the Director, the reports as required in Condition 2.4 and 2.5 (ii) shall be certified by the independent checker that all mitigation measures recommended in the Project Profile (Register No.:PP-496/2013) have been fully implemented."

ET Certification

I hereby certify that the above referenced document/~~plan~~ complies with the above referenced condition of EP-485/2014.

Terence Fong, Environmental Team Leader: Date: 15 June 2016

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IEC Verification

I hereby verify that the above referenced document/~~plan~~ complies with the above referenced condition of EP-485/2014.

Vincent Lai, Independent Environmental Checker:

Date: 15 June 2016

Asia Pacific Gateway (APG) – Tseung Kwan O

Fourth Weekly Impact Water Quality Monitoring Report

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Environmental Resources Management

16/F Berkshire House
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3000
Facsimile: (852) 2723 5660
E-mail: post.hk@erm.com
http://www.erm.com

Client:	Project No:
China Mobile International Limited (CMI Ltd)	0324228
Summary: This document presents the monitoring requirements, methodologies and results of the impact marine water quality measurements at the monitoring locations near the proposed submarine cable installation works in the monitoring period from 6 to 12 June 2016.	Date: 15 June 2016 Approved by: *Terence Fong* *Partner*

v0	Fourth Weekly Impact Water Quality Monitoring Report_v0	YL	ME	TF	15/6/16
Revision	Description	By	Checked	Approved	Date

Distribution

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EXECUTIVE SUMMARY

This is the *Fourth Weekly Impact Water Quality Monitoring Report* presenting the impact and repeated (*ad hoc*) water quality monitoring conducted for the monitoring reporting week from 6 to 12 June 2016 in accordance with the *Environmental Monitoring and Audit Manual (EM&A Manual)*.

Summary of Construction Works undertaken during the Reporting Week

The Post Lay Inspection & Burial (PLIB) works were completed on 5 June 2016 (as notified by the contractor on 6 June 2016). Further confirmation of the completion of all marine works on 5 June 2016 was received from the contractor on 8 June 2016. Water quality monitoring related to the impact monitoring requirements of the *EM&A Manual* were only required on 6 to 7 June 2016, no other water quality monitoring was required from 8 to 12 June 2016 of this reporting period.

Water Quality

Two (2) rounds of repeated water quality measurements were obtained in Zone B on 6 June 2016 and in Zone C on 7 June 2016, according to *the Event Action Plan for Water Quality* in the *EM&A Manual* following Notifications of Exceedances (NOEs) issued for 4 June 2016 (Zone B), and 5 June 2016 (Zone C).

The repeated monitoring results of water quality (e.g. DO, turbidity and SS) in Zones B and C were generally similar among the stations in the impact monitoring reporting period from 6 to 12 June 2016. Water quality in Zones B and C was also similar throughout the monitoring reporting period. Neither a sudden drop in dissolved oxygen concentrations nor a sharp increase in turbidity levels and suspended solids levels were observed on each monitoring day.

Results of the repeated monitoring data were compared against the results of the *Baseline Environmental Monitoring* for Zones B and C respectively and exceedances of Action and Limit Levels in all zones were observed. Generally, it is considered that these exceedances reflected the natural background fluctuation of marine water quality since no Project works were conducted during the reporting week.

The observation of a number of exceedances of Action and Limit Levels on 6 and 7 June 2016 strengthens the conclusion that the baseline data show very good water quality for Hong Kong waters such that natural water quality fluctuation is more likely to cause exceedances of Action and Limit Levels, as well as the NOEs issued for 4 to 5 June 2016 being due to natural water quality fluctuation.

Environmental Non-conformance

Exceedances of DO (all depths), depth-averaged turbidity and SS in Action Level, and DO (all depths) in Limit Level were recorded during the monitoring period from 6 to 12 June 2016 (i.e. 6 and 7 June 2016); however the exceedances were considered to reflect the natural background fluctuation.

No non-compliance event was recorded during the reporting week.

No complaint and summons/prosecution was received during the reporting week.

Future Key Issues

It is confirmed that all Project marine works were completed on 5 June 2016 and thereby no further impact monitoring is required. Post project monitoring will be commenced in the following week from 13 to 19 June 2016.

1 INTRODUCTION

ERM-Hong Kong, Limited (ERM) has been appointed by China Mobile International Limited (CMI Ltd) as the Environmental Team (ET) to implement the Environmental Monitoring and Audit (EM&A) programme for the 'Asia Pacific Gateway (APG) – Tseung Kwan O' (hereafter referred to as the 'Project').

1.1 PURPOSE OF THE REPORT

This is the *Fourth Weekly Impact Water Quality Monitoring Report*, which summarises the results of impact water quality monitoring as part of the Environmental Monitoring & Audit (EM&A) programme during the reporting week from 6 to 12 June 2016.

1.2 STRUCTURE OF THE REPORT

The structure of the report is as follows:

Section 1 : ***Introduction***
Details the background, purpose and structure of the report.

Section 2 : ***Project Information***
Summarises background and scope of the Project, 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.

2 PROJECT INFORMATION

2.1 BACKGROUND

In order to help meet the tremendous telecommunication services requirements for intra-Asia connectivity between South East Asia and North Asia, the APG Consortium has decided to build a submarine telecommunication cable system, which will be approximately 10,400 km in length, connecting the major business hubs across the region – the Asia Pacific Gateway (APG). The cable will link up with several countries, including Malaysia, Singapore, Vietnam, Taiwan, Mainland China, Japan, Korea and the Hong Kong Special Administrative Region (HKSAR). Since the cable that branches to HKSAR will ultimately connect to land at Tseung Kwan O (TKO), the HKSAR section of the submarine cable will be referred to at the APG-TKO cable.

As one of the members of the APG Consortium, China Mobile International Limited (CMI) proposes to install the APG–TKO section of the cable. The proposed cable will land via an existing Beach Manhole (BMH) within the TKO Industrial Estate on the reclaimed land and ultimately connect with a Cable Landing Station in the TKO Industrial Estate. It should be noted that Tseung Kwan O is currently the landing site for a number of submarine cables. The proposed submarine cable will travel west and southward from TKO as it approaches the Tathong Channel. After crossing the Tathong Channel and near to Cape Collinson, the cable then runs approximately parallel to the Tathong Channel until north of Sung Kong Island where it then turns eastward to the boundary of HKSAR waters where it enters the South China Sea. At the southeast offshore waters, it will be necessary to install a grout mattress to protect the cable where it crosses Hong Kong Electric Co., Ltd's (HKE) gas pipeline. A map of the proposed cable route is presented in *Figure 2.1*.

The Project Profile (PP-496/2013) (which includes an assessment of the potential environmental impacts associated with the installation of the submarine telecommunications cable system within HKSAR, including the connection to land at TKO), 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)*. EPD subsequently issued an approval letter on *Application for Permission to Apply Directly for Environmental Permit* on 15th November 2013 (DIR-233/2013) and issued an EP on 18 February 2014 (EP-485/2014).

Although no unacceptable environmental impacts have been identified, it is recommended that during APG-TKO installation works an Environmental Monitoring and Audit (EM&A) programme shall be conducted. The key aspects of the EM&A programme include Water Quality Monitoring and Coral Monitoring as well as the implementation a Marine Mammal (mainly

WLCP	Easting	Northing	WLCP	Easting	Northing	WLCP	Easting	Northing	WLCP	Easting	Northing
1	845588.70	815897.93	17	844646.40	813703.38	33	845447.61	809899.21	49	849680.77	807095.91
2	845556.09	815866.54	18	844669.62	813648.58	34	845604.56	809780.81	50	850966.87	807010.88
3	845305.98	815905.89	19	844685.62	813611.68	35	846278.13	808981.74	51	857127.50	807037.45
4	845181.61	815925.38	20	844750.18	813348.72	36	846541.71	808745.68	52	857294.09	807122.57
5	845110.68	815898.08	21	844747.87	813179.67	37	846587.45	808705.84	53	858187.64	807575.78
6	844850.18	815797.85	22	844735.29	812289.73	38	846688.11	808502.90	54	859209.68	808734.05
7	844836.11	815782.70	23	844720.57	812188.95	39	847135.01	807602.02	55	859922.46	809541.99
8	844683.67	815618.73	24	844708.59	812107.37	40	847200.72	807516.98	56	860046.48	809682.63
9	844534.05	815321.70	25	844641.15	811648.90	41	847336.27	807341.75	57	860205.34	809737.32
10	844305.49	814867.76	26	844649.37	811049.83	42	847375.49	807290.84	58	861589.52	810214.74
11	844264.01	814687.79	27	844919.25	810509.60	43	847399.22	807260.22	59	866499.41	810855.95
12	844225.62	814520.38	28	845018.29	810386.56	44	847457.54	807184.60	60	866961.11	810673.40
13	844232.34	814484.58	29	845037.20	810363.13	45	847766.64	807050.09	61	867438.99	810476.69
14	844260.07	814335.84	30	845222.90	810132.35	46	847855.31	807058.83	62	869831.85	810619.15
15	844378.68	814186.41	31	845243.02	810107.27	47	848656.46	807137.33			
16	844469.78	814081.26	32	845352.72	809970.94	48	849142.30	807131.45			

KOWLOON CITY DISTRICT
九龍城區

KWUN TONG DISTRICT
觀塘區

WAN CHAI DISTRICT
灣仔區

EASTERN DISTRICT
東區

SOUTHERN DISTRICT
南區

ISLANDS DISTRICT
離島區

SAI KUNG DISTRICT
西貢區

Hong Kong SAR Boundary
香港特別行政區界線

N
北

Kilometers 公里
0 2.5 5

Legend 圖例

- Work Limit Control Point (WLCP) 座標點
- Proposed APG Submarine Cable System 擬建之APG海底光纖系統
- District Boundary 分區邊界

Figure 2.1
圖 2.1

Proposed APG Submarine Cable System
擬建之APG海底光纖系統

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Finless Porpoise) Exclusion Zone, conducted according to the location of works.

EP-485/2014 *Special Condition 2.5* states that an EM&A programme should be implemented in accordance with the procedures and requirements set out in the *EM&A Manual*. In accordance with the *EM&A Manual*, water quality monitoring is required for the Project, including baseline monitoring, impact monitoring and site audit and post Project monitoring.

Baseline water quality Monitoring was conducted in in Zones A, B and C between 27 April 2016 and 5 May 2016 and the results were presented in the *Baseline Water Quality Monitoring Report*.

According to *EM&A Manual*, impact water quality monitoring will commence in Zone A when the cable installation barge works are within Zone A. The sampling works will cease once the cable barge is outside Zone A or no cable laying works are being undertaken. Similarly, impact Monitoring will commence in Zone B when cable installation barge works move to within Zone B. The monitoring works will start in Zone C when the vessel goes into Zone C. The water quality sampling works will cease once the cable laying works are outside Zones A, B and C or when no cable laying works are being undertaken.

Impact Monitoring started on 17 May 2016. The impact water quality monitoring is used to reflect the water quality conditions and to identify potential water quality impacts during the cable installation works. With reference to the *EM&A Manual*, an Impact Monitoring Report will be provided weekly within three days after the relevant monitoring data are collected or become available during Project marine installation work. Repeated (*ad hoc*) monitoring will be carried out accordingly if exceedance of Action and Limit Level are observed. All Project marine works were completed on 5 June 2016, with all impact-related monitoring (including repeated monitoring) requirements completed on 7 June 2016. Thereby no further impact monitoring is required.

This report, therefore, presents the impact monitoring results from monitoring stations within Zones B and C (on 6 and 7 June 2016, respectively) during the monitoring week from 6 to 12 June 2016.

2.2 *MARINE CONSTRUCTION WORKS UNDERTAKEN DURING REPORTING WEEK*

The Post Lay Inspection & Burial (PLIB) works were completed on 5 June 2016 (as notified by the contractor on 6 June 2016). Further confirmation of the completion of all marine works on 5 June 2016 was received from the contractor on 8 June 2016. No Project marine works were carried out during this reporting period.

2.3 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 2.1*.

Table 2.1 Summary of Environmental Licensing, Notification, Permit and Reporting Status

Permit / Licence / Notification / Report	Reference	Validity Period	Remarks
Project Profile	PP-496/2013	Throughout the construction and operation stages	Submitted on 9 October 2013
EM&A Manual	-	Throughout the construction and operation stages	Approved by EPD on 17 January 2014
Environmental Permit	EP-485/2014	Throughout the construction and operation stages	Granted by EPD on 18 February 2014
Baseline Water Quality Monitoring Report	-	Throughout the construction period for Zones A to C	Submitted on 9 May 2016
First Weekly Impact Water Quality Monitoring Report	-	Throughout the construction period for Zones A to C	Submitted on 26 May 2016
Second Weekly Impact Water Quality Monitoring Report	-	Throughout the construction period for Zones A to C	Submitted on 3 June 2016
Site Inspection Report	-	Throughout the construction period for land-based works.	Submitted on 6 June 2016
Third Weekly Impact Water Quality Monitoring Report		Throughout the construction period for Zones B and C	Submitted on 13 June 2016

3 WATER QUALITY MONITORING REQUIREMENTS

3.1 MONITORING LOCATIONS

In accordance with the *EM&A Manual*, impact water quality monitoring were carried out at twenty-six (26) stations the same stations as in baseline water quality monitoring following commencement of Project route clearance works. These stations are situated around the cable laying works in Junk Bay and near to Tung Lung Chau and Tai Long Pai and listed below. The locations are also shown in *Figure 3.1*.

- B1 is an Impact Station to monitor the impacts of cable installation works on the Big Wave Bay Beach;
- B2 is an Impact Station to monitor the impacts of cable installation works on the Rocky Bay Beach;
- B3 is an Impact Station to monitor the impacts of cable installation works on the Shek O Beach;
- E1 is an Impact Station to monitor impacts of cable installation works on Cape d'Aguilar Marine Reserve;
- E2 is an Impact Station to monitor the impacts of cable installation works on the coral communities at Tung Lung Chau;

  (There is no Impact Station E3 as E3 represents coral communities along the coast of Ninepins, over 5 km from the cable installation works, and will not be affected by the Project due to the distance)
- E4 is the Impact Station to monitor the impacts of cable installation works on the coral communities at the coast of Sung Kong;
- E5 is the Impact Station to monitor the impacts of cable installation works on the coral communities at the coast of Waglan Island;
- E6 is an Impact Station to monitor the impacts of cable installation works on the coral communities at Tai Long Pai (the Gradient Station is not set due to the insufficient distance between this Impact Station and the nearby proposed cable works which may affect the cable laying works);
- E7 is an Impact Station to monitor the impacts of cable installation works on the coral communities along Junk Bay – South West;
- E8 is an Impact Station to monitor the impacts of cable installation works on the coral communities at Cape Collinson (the Gradient Station is not set due to the insufficient distance between this Impact Station to nearby proposed cable works which may affect the cable laying works);
- E9 is an Impact Station to monitor the impacts of cable installation works on the coral communities at Fat Tong Chau (the Gradient Station is not set due to the insufficient distance between this Impact Station to nearby proposed cable works which may affect the cable laying works);

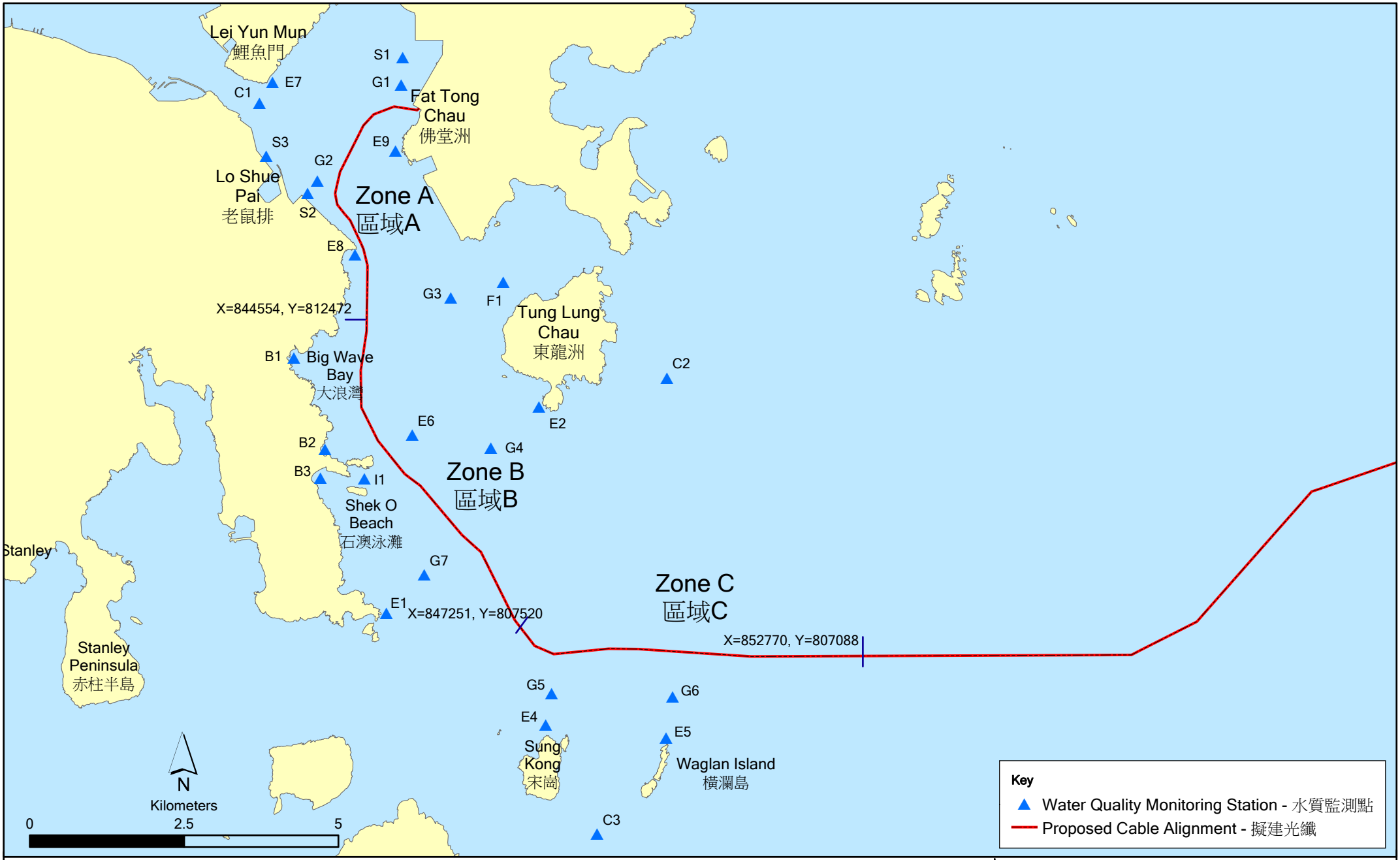

Figure 3.1
圖 3.1

Water Quality Monitoring Station
水 質 監 測 點

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- F1 is an Impact Station to monitor the impacts of cable installation works on the Tung Lung Chau Fish Culture Zone;
- I1 is an Impact Station to monitor the impacts of cable installation works on the Shek O Headland SSSI;
- S1 is an Impact Station situated at the WSD Seawater Intake Point in Junk Bay. It is located within 500 m north of the cable alignment at Junk Bay and set up to monitor the effect of cable laying works in the area;
- S2 is an Impact Station to monitor the impacts of cable installation works on the WSD Seawater Intake at Siu Sai Wan;
- S3 is an Impact Station to monitor the impacts of cable installation works on the Pamela Youde Nethersole Eastern Hospital Cooling Water Intake at Heng Fa Chuen;
- G1 is a Gradient Station between S1 and the cable alignment;
- G2 is a Gradient Station between S2 and the cable alignment;
- G3 is a Gradient Station between F1 and the cable alignment;
- G4 is a Gradient Station between E2 and the cable alignment;
- G5 is the Gradient Station between E4 and the alignment;
- G6 is the Gradient Station between E5 and the alignment;
- G7 is a Gradient Station between E1 and the cable alignment;
- C1 is a Control Station (approximately 3 km from the proposed cable alignment) for Zone A. It is not supposed to be influenced by the cable laying works due to its remoteness to the construction works;
- C2 is a Control Station (approximately 4 km from the proposed cable alignment) for Zone B. It is not supposed to be influenced by the cable laying works due to its remoteness to the construction works; and
- C3 is a Control Station (approximately 3 km from the proposed cable alignment) for Zone C. It is not supposed to be influenced by the cable laying works due to its remoteness to the construction works.

Stations of C1, E7, E8, E9, F1, G1, G2, G3, S1, S2, and S3 (i.e. elven (11) stations) are located in Zone A (*Figure 3.2*). Thirteen (13) stations (i.e. B1, B2, B3, C2, E1, E2, E6, E8, F1, G3, G4, G7 and I1) are located in Zone B (*Figure 3.3*) and five (5) stations (i.e. C3, E4, E5, G5 and G6) are located in Zone C (*Figure 3.4*). The above monitoring stations shall be sampled as well during Post Project Monitoring.

The co-ordinates of these monitoring stations are listed in *Table 3.1*.

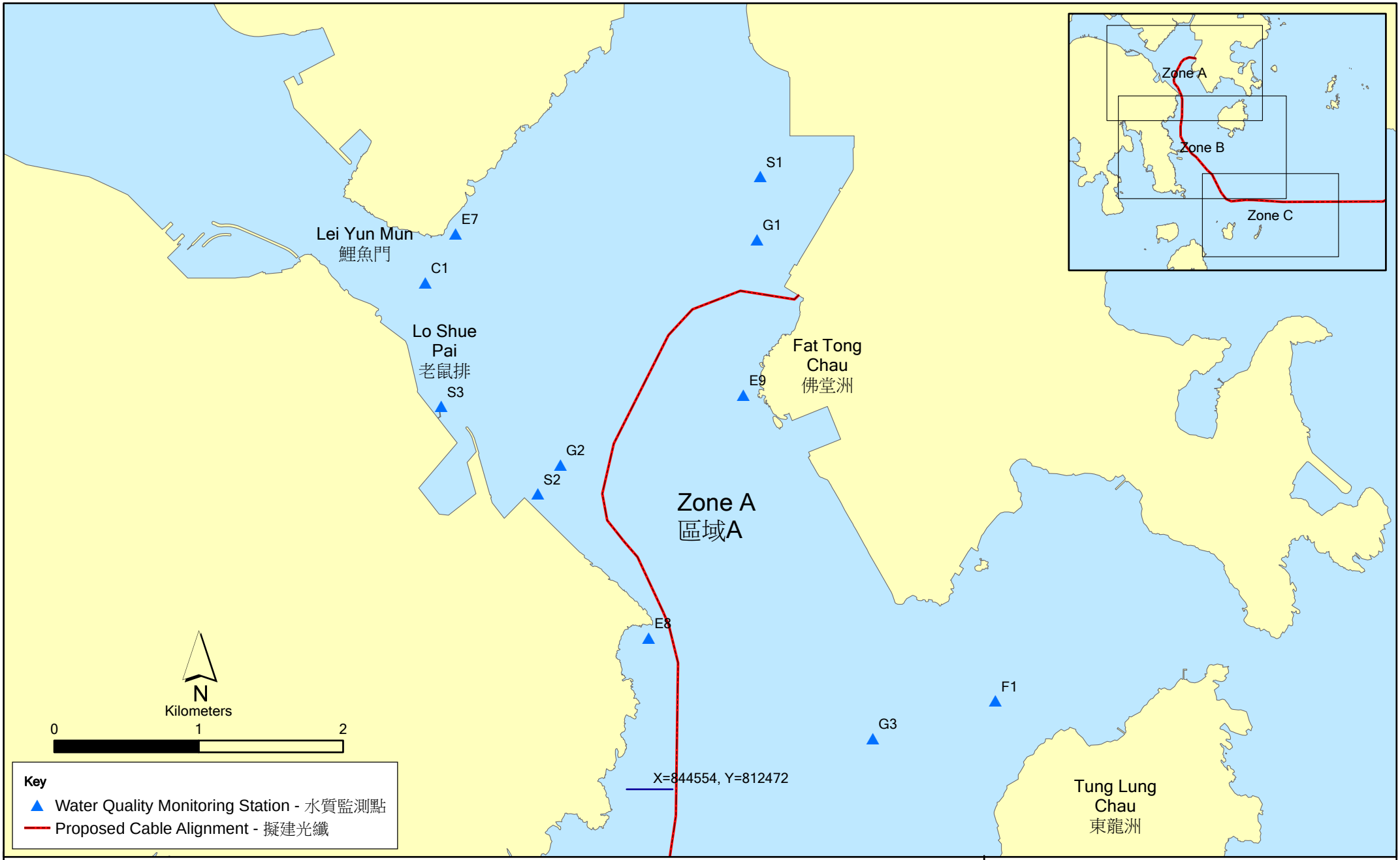

Figure 3.2
圖 3.2

Water Quality Monitoring Station (Zone A)
區域A內的水質監測點

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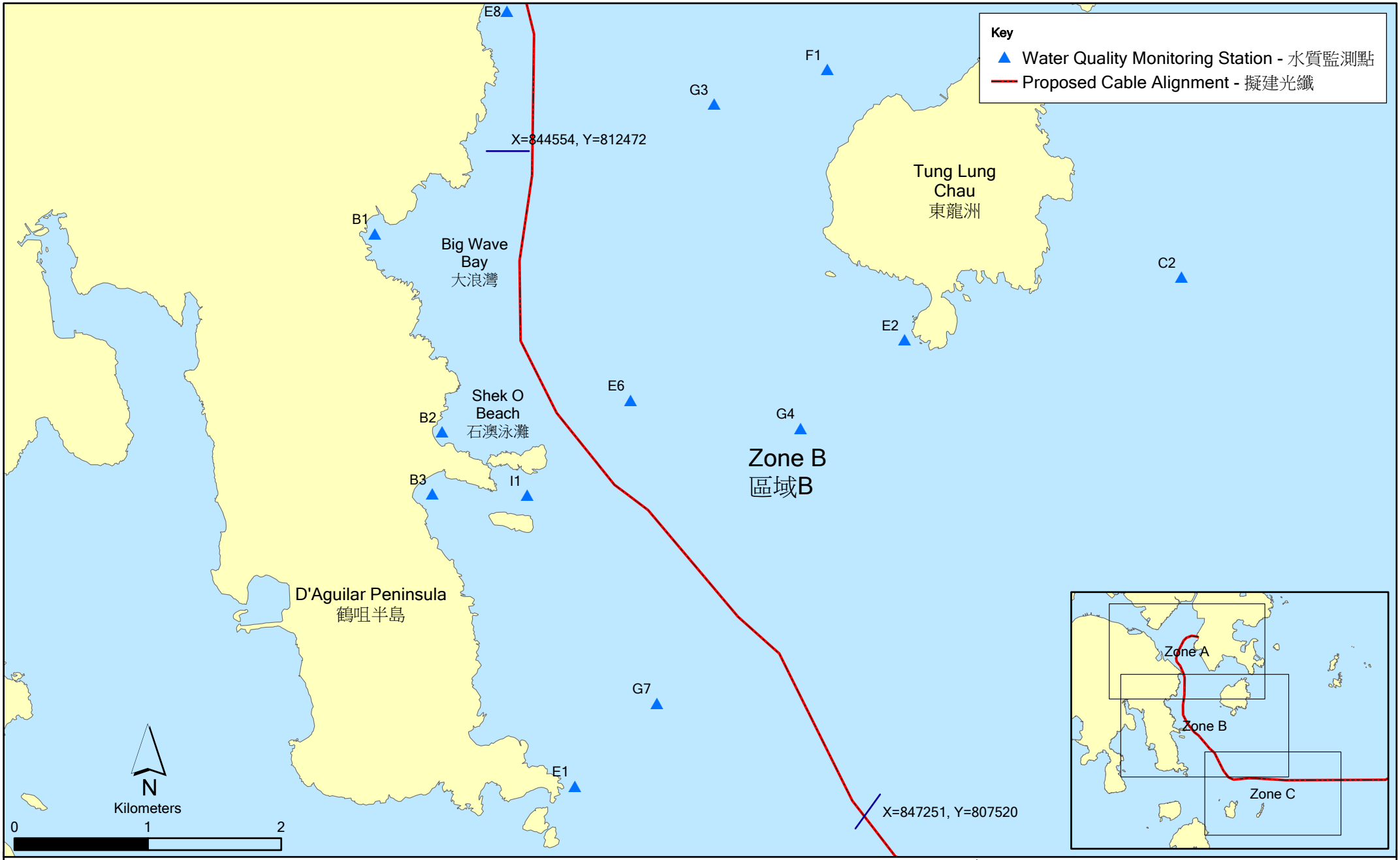

Figure 3.3
圖 3.3

Water Quality Monitoring Station (Zone B)
區域B內的水質監測點

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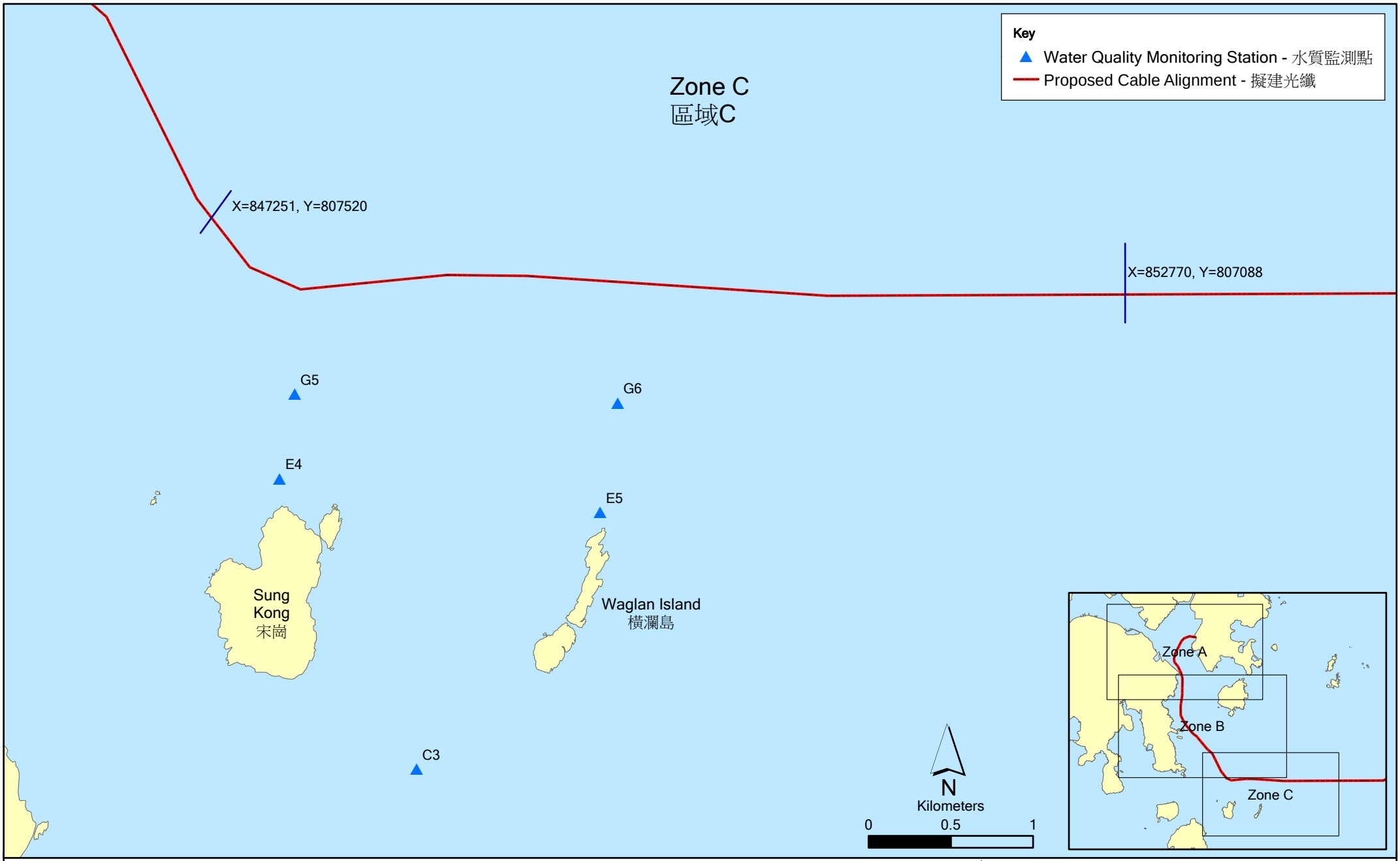

Figure 3.4
圖 3.4

Water Quality Monitoring Station (Zone C)
區域C內的水質監測點

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Table 3.1 Co-ordinates of Sampling Stations (HK Grid)

Station	Nature	Easting	Northing
B1	Impact Station (Beach)	843556.84	811853.46
B2	Impact Station (Beach)	844062.02	810369.19
B3	Impact Station (Beach)	843988.33	809902.13
E1	Impact Station (Marine Reserve)	842021.64	816547.02
E2	Impact Station (Coral Communities)	847527.33	811059.83
E4	Impact Station (Coral Communities)	848471.60	804135.73
E5	Impact Station (Coral Communities)	845056.10	807712.89
E6	Impact Station (Coral Communities)	848503.03	811247.01
E7	Impact Station (Coral Communities)	849586.94	805696.09
E8	Impact Station (Coral Communities)	844547.04	813522.78
E9	Impact Station (Coral Communities)	845202.76	815205.38
F1	Impact Station (Fish Culture Zone)	846948.57	813085.03
I1	Impact Station (Site of Special Scientific Interest)	844698.75	809894.80
S1	Impact Station (Seawater Intakes)	845297.24	816281.54
S2	Impact Station (Seawater Intakes)	844070.53	814783.54
S3	Impact Station (Seawater Intakes)	846099.31	812825.53
G1	Gradient Station	847365.06	810245.78
G2	Gradient Station	843936.91	814720.04
G3	Gradient Station	849692.91	806360.59
G4	Gradient Station	846748.01	810394.92
G5	Gradient Station	845320.83	816717.97
G6	Gradient Station	843779.38	814520.41
G7	Gradient Station	843110.53	815125.70
C1	Control Station	842999.91	815984.25
C2	Control Station	845297.24	816281.54
C3	Control Station	844070.53	814783.54

3.2 MONITORING PARAMETERS

The parameters measured *in situ* were:

- Dissolved Oxygen (DO) (% saturation and mg/L)
- Water temperature (°C)
- Turbidity (Nephelometric Turbidity Units [NTU])
- Salinity (parts per thousand [ppt])

The only parameter to be measured in the laboratory was:

- Suspended solids (SS) (mg/L)

In addition to the water quality parameters, other relevant data were also measured and recorded in field logs, including the location of the sampling stations, water depth, sampling depth, current velocity and direction, time, weather conditions, sea conditions (where appropriate), tidal state (where appropriate), special phenomena and work activities undertaken around the monitoring and works area that may influence the monitoring results.

These parameters were monitored at all designated marine water quality monitoring stations during the whole impact monitoring phase.

3.3 MONITORING EQUIPMENT AND METHODOLOGY

3.3.1 Monitoring 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 10
Water Depth Gauge	Speedtech Instruments SM-5
Water Sampling Equipment	Wildlife Supply Co Kemmerer 1520
Salinity, DO, Temperature Measuring Meter	DO and Salinity Meter (Pro 2030)
Current Velocity and Direction	Global Water FP111
Turbidity Meter	HACH 2100Q

3.3.2 Monitoring Frequency and Timing

Impact Monitoring at C1, E7, E8, E9, F1, G1, G2, G3, S1, S2, and S3 (i.e. eleven (11) stations) will commence when the cable installation barge works are within Zone A. The sampling works will cease once the cable barge is outside Zone A or no cable laying works are being undertaken.

Similarly, Impact Monitoring at B1, B2, B3, C2, E1, E2, E6, E8, F1, G3, G4, G7, and I1 (i.e. thirteen (13) stations) will commence when cable installation barge works move to within Zone B.

The monitoring works will start at E4, E5, G5, G6 and C3 (i.e. five (5) stations) when the vessel goes into Zone C.

The water quality sampling works will cease once the cable laying works are outside Zones A, B and C or when no cable laying works are being undertaken for the Project.

In-situ data and SS data will be collected at monitoring stations (actual time interval subject to the sampling vessel travelling time among stations) during the cable installation works for each zone.

In-situ data and SS data of each station will be collected at least 4 times (estimated 4-hour sampling intervals to be required for each zone, actual time interval subject to the sampling vessel travelling time among stations) during the cable installation works for each zone within a day. Impact monitoring will be conducted as soon as marine works commence and will be undertaken throughout the Project works, including for route clearance and cable laying operations.

Impact water quality monitoring was conducted between 6 and 12 June 2016, following the schedule presented in *Annex A*.

3.3.3 Sampling/Testing Protocol

All *in situ* monitoring instruments were checked, calibrated and certified by a laboratory accredited under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) or any other international accreditation scheme before use (see calibration reports in *Annex B*), and subsequently will 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* was observed. Sufficient stocks of spare parts were maintained for replacements when necessary. Backup monitoring equipment was made available.

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 each measurement/ sampling depth, two (2) consecutive *in-situ* measurements (DO concentration and saturation, temperature, turbidity, and salinity) and two water samples for SS were taken for lab analysis.

3.3.4 Laboratory Analysis

All laboratory work was carried out in a HOKLAS accredited laboratory. Water samples of about 1,000 mL were collected at the monitoring and control stations for carrying out the laboratory determinations. The determination work started within the next working day after collection of the water samples. The SS laboratory measurements were provided within two (2) days of the sampling event (48 hours). 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 QA/QC details were in accordance with requirements of HOKLAS or another internationally accredited scheme (*Annex C*)

3.3.5 Sampling Depths & Replication

Each station was sampled and measurements/ water samples were taken at three depths, namely, 1 m below water surface, mid-depth and 1 m above sea bed, except where the water depth was less than 6 m, in which case the mid-depth station was omitted. For stations where the water is less than 3 m deep, only the mid-depth sample was taken.

For *in situ* measurements, duplicate readings were made at each water depth at each station. Duplicate water samples were collected at each water depth at each station.

3.4 ACTION AND LIMIT LEVELS

The Action and Limit levels which were established based on the results of baseline water quality monitoring are presented in *Table 3.3 to Table 3.5*.

Table 3.3 Action and Limit Levels for Water Quality in Zone A

Parameter	Action Level	Limit Level
SS in mg/L (Depth-averaged) [a] [c]	95%-ile of baseline data (3.37 mg/L), or	99%-ile of baseline data (3.49 mg/L), and
	120% of the corresponding data from respective control station at the same tide of the same day	130% of the corresponding data from respective control station at the same tide of the same day
DO in mg/L [b]	Surface and Middle 5%-ile of baseline data for surface and middle layer (7.00 mg/L)	Surface and Middle 5 mg/L [d] [e] or 1%-ile of baseline for surface and middle layer (6.71 mg/L)
	Bottom 5%-ile of baseline data for bottom layers (6.99 mg/L)	Bottom 2 mg/L [d] [e] or 1%-ile of baseline data for bottom layer (6.91 mg/L)
Turbidity in NTU (Depth-averaged) [c]	95%-ile of baseline data (2.86 NTU), or	99%-ile of baseline data (3.06 NTU), and
	120% of the corresponding data from respective control station at the same tide of the same day	130% of the corresponding data from respective control station at the same tide of the same day

Notes:

a. "Depth-averaged" is calculated by taking the arithmetic means of reading of all sampled depths.
b. For DO, non-compliance of the water quality limits occurs when the monitoring result is lower than the limits. These levels are for both FCZ and non-FCZ.
c. For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
d. Set Limit Level for DO was derived from the Water Quality Objectives (WQO) for Junk Bay, Eastern Buffer, and Mirs Bay Water Control Zones under the Water Pollution Control Ordinance (WPCO) Chapters 358L, 358Y, and 358I respectively.
e. Higher value is selected in assessing the exceedances of Limit Levels.

Table 3.4 Action and Limit Levels for Water Quality in Zone B

Parameter	Action Level	Limit Level
SS in mg/L (Depth-averaged) [a] [c]	95%-ile of baseline data (3.33 mg/L), or	99%-ile of baseline data (3.39 mg/L), and
	120% of the corresponding data from respective control station at the same tide of the same day	130% of the corresponding data from respective control station at the same tide of the same day
DO in mg/L [b]	Surface and Middle 5%-ile of baseline data for surface and middle layer (7.49 mg/L)	Surface and Middle 5 mg/L [d] [e] or 1%-ile of baseline for surface and middle layer (7.41 mg/L)
	Bottom 5%-ile of baseline data for bottom layers (7.26 mg/L)	Bottom 2 mg/L [d] [e] or 1%-ile of baseline data for bottom layer (7.01 mg/L)
Turbidity in NTU (Depth-averaged) [c]	95%-ile of baseline data (2.67 NTU), or	99%-ile of baseline data (2.79 NTU), and
	120% of the corresponding data from respective control station at the same tide of the same day	130% of the corresponding data from respective control station at the same tide of the same day

Notes:

a. "Depth-averaged" is calculated by taking the arithmetic means of reading of all sampled depths.
b. For DO, non-compliance of the water quality limits occurs when the monitoring result is lower than the limits. These levels are for both FCZ and non-FCZ.
c. For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
d. Set Limit Level for DO was derived from the *Water Quality Objectives* (WQO) *for Junk Bay, Eastern Buffer, and Mirs Bay Water Control Zones* under the *Water Pollution Control Ordinance* (WPCO) Chapters 358L, 358Y, and 358I respectively.
e. Higher value is selected in assessing the exceedances of Limit Levels.

Table 3.5 Action and Limit Levels for Water Quality in Zone C

Parameter	Action Level	Limit Level
SS in mg/L (Depth-averaged) [a] [c]	95%-ile of baseline data (3.37 mg/L), or	99%-ile of baseline data (3.87 mg/L), and
	120% of the corresponding data from respective control station at the same tide of the same day	130% of the corresponding data from respective control station at the same tide of the same day
DO in mg/L [b]	Surface and Middle 5%-ile of baseline data for surface and middle layer (8.33 mg/L)	Surface and Middle 5 mg/L [d] [e] or 1%-ile of baseline for surface and middle layer (8.22 mg/L)
	Bottom 5%-ile of baseline data for bottom layers (8.23 mg/L)	Bottom 2 mg/L [d] [e] or 1%-ile of baseline data for bottom layer (8.15 mg/L)
Turbidity in NTU (Depth-averaged) [c]	95%-ile of baseline data (2.75 NTU), or	99%-ile of baseline data (3.20 NTU), and
	120% of the corresponding data from respective control station at the same tide of the same day	130% of the corresponding data from respective control station at the same tide of the same day

Notes:

a. "Depth-averaged" is calculated by taking the arithmetic means of reading of all sampled depths.
b. For DO, non-compliance of the water quality limits occurs when the monitoring result is lower than the limits. These levels are for both FCZ and non-FCZ.
c. For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
d. Set Limit Level for DO was derived from the *Water Quality Objectives* (WQO) *for Junk Bay, Eastern Buffer, and Mirs Bay Water Control Zones* under the *Water Pollution Control Ordinance* (WPCO) Chapters 358L, 358Y, and 358I respectively.
e. Higher value is selected in assessing the exceedances of Limit Levels.

3.5 EVENT AND ACTION PLAN

The Event and Action Plan for water quality monitoring which was stipulated in the *EM&A Manual* is presented in *Table 3.6*.

Table 3.6 Event Action Plan for Water Quality

Event	Contractor
Action Level Exceedance	**Step 1** - repeat sampling event. **Step 2** - Inform EPD and AFCD and confirm notification of the noncompliance in writing; **Step 3** - discuss with cable installation contractor the most appropriate method of reducing suspended solids during cable installation (e.g. reduce cable laying speed/volume of water used during installation. **Step 4** - repeat measurements after implementation of mitigation for confirmation of compliance. **Step 5** - if non-compliance continues, increase measures in Step 3 and repeat measurements in Step 3. If non-compliance occurs a third time, suspend cable laying operations.
Limit Level Exceedance	Undertake **Steps 1-4** immediately, if further non-compliance continues at the Limit Level, suspend cable laying operations until an effective solution is identified.

Water Quality Monitoring Arrangement

Two (2) rounds of repeated (*ad hoc*) water quality measurements were obtained in Zone B on 6 June 2016 and in Zone C on 7 June 2016, according to *the Event Action Plan for Water Quality* in the *EM&A Manual* following Notifications of Exceedances (NOEs) issued for 4 June 2016 (Zone B), and 5 June 2016 (Zone C).

Water Quality Monitoring Results

The results from the monitoring for water quality impacts between the reporting period 6 and 12 June 2016, and their graphical presentations are included in *Annex D*. As shown by *Figure D4* to *D9* of *Annex D*, the impact monitoring results of water quality (e.g. DO, turbidity and SS) in Zones B and C were generally similar among the stations in the monitoring reporting week from 6 to 12 June 2016. Water quality in Zones B and C was also recorded similar throughout the monitoring events in this week. Neither a sudden drop in dissolved oxygen concentrations nor a sharp increase in turbidity levels and SS levels were observed on each monitoring day (i.e. 6 and 7 June 2016). Despite the stable water quality in Zones B and C during the *ad hoc* monitoring periods from 6 to 7 June 2016, exceedances of the Action and Limit Levels were recorded on each monitoring day. It is important to note that although exceedances were recorded on 6 and 7 June 2016, no Project works were undertaken in the water quality monitoring zones on these days.

Records of Exceedances

Exceedances were recorded for each monitoring day (i.e. 6 and 7 June 2016) in this reporting week. A summary of stations where exceedances were recorded is presented in *Table 4.1*. Details for the exceedances, e.g. location and parameters with exceedances, are presented in *Annex E*.

Table 4.1 Summary of Exceedances during the Reporting Week from 6 to 12 June 2016

Date	Surface DO		Middle DO		Bottom DO		Depth-averaged Turbidity		Depth-averaged SS	
	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level
6 June 2016	**Zone B** B3, E1, E2, and F1	**Zone B** B3, E6, and I1	**Zone B** B3, E2 and F1	**Zone B** B3, E1, E6, and I1	**Zone B** B3, E1, E6, and I1		**Zone B** B1, B2, B3, E1, E6, E8, F1 and I1		**Zone B** E6	
7 June 2016		**Zone C** E4 and E5	**Zone C** E5	**Zone C** E4 and E5	**Zone C** E5	**Zone C** E4 and E5				

The relationship between the issued NOEs and corresponding *ad hoc* monitoring are summarized in *Table 4.2*.

Table 4.2 Relationship between NOEs and Repeated (Ad hoc) Monitoring

Date with NOEs	*Zones with NOEs*	*Repeated (Ad hoc) monitoring following NOEs*	*Remark*
4 June 2016	Zone B	6 June 2016-	*Ad hoc* monitoring was conducted on 6 June 2016 related to the NOE of 4 June 2016. No Project works were carried on the same day.
5 June 2016	Zone C	7 June 2016	*Ad hoc* monitoring was conducted on 7 June 2016 related to the NOE of 5 June 2016. No Project works were carried on the same day.

In summary, the exceedances of Action and Limit Levels are considered a reflection of natural background fluctuation since no Project works were conducted. The detailed reasoning for such conclusion is also provided in *Annex E* for monitoring days (i.e. 6 and 7 June 2016) with exceedances.

5 ENVIRONMENTAL NON-CONFORMANCES

5.1 SUMMARY OF ENVIRONMENTAL EXCEEDANCE

Exceedances of DO (all depths), depth-averaged turbidity and SS in Action Level, and DO (all depths) in Limit Level were recorded during the monitoring reporting period from 6 to 12 June 2016 (i.e. 6 and 7 June 2016); however the exceedances were considered a reflection of the natural background fluctuation since no Project works were conducted during this week.

5.2 SUMMARY OF ENVIRONMENTAL NON-COMPLIANCE

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

5.3 SUMMARY OF ENVIRONMENTAL COMPLAINT

No 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 week.

It is confirmed that all Project marine works were completed on 5 June 2016 and thereby no further impact monitoring is required. Post project monitoring will be commenced in the following week from 13 to 19 June 2016.

7 CONCLUSIONS

This *Fourth Weekly Impact Water Quality Monitoring Report* presents the results and findings of water quality impact monitoring undertaken during the week from 6 to 12 June 2016 in accordance with the *EM&A Manual* and the requirements under Environmental Permit (*EP - 485/2014*) for the Project.

The repeated (*ad hoc*) monitoring results for water quality (e.g. DO, turbidity and SS) in Zones B and C were similar among the stations in the monitoring reporting week from 6 to 12 June 2016. Water quality in Zones B and C was also similar throughout the monitoring events in this week. Neither a sudden drop in dissolved oxygen concentrations nor a sharp increase in turbidity levels and suspended solids levels were observed on each monitoring day. In general, the overall water quality at the impact stations was found to be similar to that at the control stations.

Exceedances of DO (all depth), depth-averaged turbidity and SS in Action Level, and DO (all depths) in Limit Level were recorded during the monitoring reporting period from 6 to 12 June 2016; however these exceedances were considered a reflection of the natural background fluctuation since no Project works were conducted during this week.

The observation of a number of exceedances of Action and Limit Levels on 6 and 7 June 2016 strengthens the conclusion that the baseline data show very good water quality for Hong Kong waters such that natural water quality fluctuation is more likely to cause exceedances of Action and Limit Levels, as well as the NOEs issued for 4 to 5 June 2016 being due to natural water quality fluctuation.

Annex A

Impact Water Quality Monitoring Schedule

Asia Pacific Gateway (APG) - Tseung Kwan O
Impact Marine Water Quality Monitoring (WQM) Schedule

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
15-May	16-May	17-May	18-May	19-May	20-May	21-May
		Impact WQM 11:00 to 15:00 (A) 15:00 to 19:00 (A) 19:00 to 23:00 (A)	**Impact WQM** 07:00 to 11:00 (A) 11:00 to 15:00 (A) 15:00 to 19:00 (A) 19:00 to 23:00 (B)	**Impact WQM** 07:00 to 11:00 (B) 11:00 to 15:00 (B) 15:00 to 19:00 (B) 19:00 to 23:00 (B)	**Impact WQM** 07:00 to 11:00 (B) 11:00 to 15:00 (C)	***Ad Hoc* WQM** 07:00 to 11:00 (A) 11:00 to 15:00 (B) 15:00 to 19:00 (A) 19:00 to 23:00 (B)
22-May	23-May	24-May	25-May	26-May	27-May	28-May
		***Ad Hoc* WQM** 11:00 to 15:00 (C) 15:00 to 19:00 (C)		**Impact WQM** 07:00 to 11:00 (A) 11:00 to 15:00 (A) 15:00 to 19:00 (A) 19:00 to 23:00 (A)	**Impact WQM** 15:00 to 19:00 (A) 19:00 to 23:00 (A)	**Impact WQM** 07:00 to 11:00 (A,B) 11:00 to 15:00 (A,B) 15:00 to 19:00 (A,B) 19:00 to 23:00 (A,B)
29-May	30-May	31-May	1-Jun	2-Jun	3-Jun	4-Jun
***Ad Hoc* WQM** 11:00 to 15:00 (A) 15:00 to 19:00 (A)	**Impact WQM** 07:00 to 11:00 (B,C) 11:00 to 15:00 (B,C) 15:00 to 19:00 (B,C) 19:00 to 23:00 (B,C)	***Ad Hoc* WQM** 11:00 to 15:00 (B) 19:00 to 23:00 (B)	***Ad Hoc* WQM** 07:00 to 11:00 (C) 11:00 to 15:00 (C)	**Impact WQM** 07:00 to 11:00 (B) 11:00 to 15:00 (B) 15:00 to 19:00 (B)	**Impact WQM** 07:00 to 11:00 (B) 11:00 to 15:00 (B) 15:00 to 19:00 (B) 19:00 to 23:00 (B)	**Impact WQM** 07:00 to 11:00 (B) 11:00 to 15:00 (B) 15:00 to 19:00 (B) 19:00 to 23:00 (B)
5-Jun	6-Jun	7-Jun	8-Jun	9-Jun	10-Jun	11-Jun
Impact WQM 07:00 to 11:00 (C) 11:00 to 15:00 (C) 15:00 to 19:00 (C) 19:00 to 23:00 (C)	***Ad Hoc* WQM** 07:00 to 11:00 (B) 11:00 to 15:00 (B)	***Ad Hoc* WQM** 07:00 to 11:00 (C) 11:00 to 15:00 (C)				

Note:
1. A represents moitoring in Zone A;
2. B represents moitoring in Zone B;
3. C represents moitoring in Zone C;
4. Grey cells indicates monitoring is not conducted yet.

Annex B

Calibration Reports of Multi-parameter Sensor

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ETS-TESTCONSULT LIMITED

Performance Check of Turbidity Meter

Equipment Ref. No. : ET/0505/014 Manufacturer : HACH

Model No. : 2100Q Serial No. : 13110C029448

Date of Calibration : 26/05/2016 Due Date : 25/06/2016

Theoretical Value of Turbidity Standard (NTU)	Measured Value (NTU)	Difference % *
20	20.2	1.00
100	97.6	-2.40
800	778	-2.75

(*) Difference = (Measured Value – Theoretical Value) / Theoretical Value x 100

Acceptance Criteria

Difference : -5 % to 5 %

The turbidity meter complies * / ~~does not comply~~ * with the specified requirements and is deemed acceptable * / ~~unacceptable~~ * for use. Measurements are traceable to national standards.

Prepared by : _____ Checked by : _____

東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED

Internal Calibration Report of Dissolved Oxygen Meter

Equipment Ref. No.	:	ET/EW/008/004	Manufacturer	:	YSI
Model No.	:	Pro 2030	Serial No.	:	10F 101978
Date of Calibration	:	26/05/2016	Calibration Due Date	:	25/06/2016

Temperature Verification

Ref. No. of Reference Thermometer : ET/0521/017

Ref. No. of Water Bath : ---

	Temperature (°C)			
Reference Thermometer reading	Measured	19.9	Corrected	19.8
DO Meter reading	Measured	20.0	Difference	-0.2

Standardization of sodium thiosulphate ($Na_2S_2O_3$) solution

Reagent No. of $Na_2S_2O_3$ titrant	CPE/012/4.5/001/13	Reagent No. of 0.025N $K_2Cr_2O_7$	CPE/012/4.4/002/10

	Trial 1	Trial 2
Initial Vol. of $Na_2S_2O_3$ (ml)	0.00	10.20
Final Vol. of $Na_2S_2O_3$ (ml)	10.20	20.50
Vol. of $Na_2S_2O_3$ used (ml)	10.20	10.30
Normality of $Na_2S_2O_3$ solution (N)	0.02451	0.02427
Average Normality (N) of $Na_2S_2O_3$ solution (N)	0.02439	
Acceptance criteria, Deviation	Less than ± 0.001N	

Calculation: Normality of $Na_2S_2O_3$, N = 0.25 / ml $Na_2S_2O_3$ used

Lineality Checking

Determination of dissolved oxygen content by Winkler Titration *

Purging Time (min)	2		5		10	
Trial	1	2	1	2	1	2
Initial Vol. of $Na_2S_2O_3$ (ml)	0.00	10.90	21.90	0.00	6.80	10.50
Final Vol. of $Na_2S_2O_3$ (ml)	10.90	21.90	28.50	6.80	10.50	14.10
Vol. (V) of $Na_2S_2O_3$ used (ml)	10.90	11.00	6.60	6.80	3.70	3.60
Dissolved Oxygen (**DO**), mg/L	7.14	7.20	4.32	4.45	2.42	2.36
Acceptance criteria, Deviation	Less than + 0.3mg/L		Less than + 0.3mg/L		Less than + 0.3mg/L	

Calculation: DO (mg/L) = V x N x 8000/298

Purging time, min	DO meter reading, mg/L			Winkler Titration result *, mg/L			Difference (%) of DO Content
	1	2	Average	1	2	Average	
2	7.42	7.34	7.38	7.14	7.20	7.17	2.89
5	4.56	4.59	4.58	4.32	4.45	4.39	4.24
10	2.35	2.22	2.29	2.42	2.36	2.39	4.27
Linear regression coefficient				0.9987			

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Internal Calibration Report of Dissolved Oxygen Meter

Zero Point Checking

DO meter reading, mg/L	0.00

Salinity Checking

Reagent No. of NaCl (10ppt)	CPE/012/4.7/003/23	Reagent No. of NaCl (30ppt)	CPE/012/4.8/003/23

Determination of dissolved oxygen content by Winkler Titration **

Salinity (ppt)	10		30	
Trial	1	2	1	2
Initial Vol. of $Na_2S_2O_3$ (ml)	0.00	11.40	22.90	32.40
Final Vol. of $Na_2S_2O_3$ (ml)	11.40	22.90	32.40	42.00
Vol. (**V**) of $Na_2S_2O_3$ used (ml)	11.40	11.50	9.50	9.60
Dissolved Oxygen (**DO**), mg/L	7.46	7.53	6.22	6.29
Acceptance criteria, Deviation	Less than + 0.3mg/L		Less than + 0.3mg/L	

Calculation: DO (mg/L) = **V** x **N** x 8000/298

Salinity (ppt)	DO meter reading, mg/L			Winkler Titration result**, mg/L			Difference (%) of DO Content
	1	2	Average	1	2	Average	
10	7.31	7.25	7.28	7.46	7.53	7.50	2.98
30	6.45	6.46	6.46	6.22	6.29	6.26	3.14

Acceptance Criteria

(1) Differenc between temperature readings from temperature sensor of DO probe and reference thermometer : < 0.5 °C
(2) Linear regression coefficient : >0.99
(3) Zero checking: 0.0mg/L
(4) Difference (%) of DO content from the meter reading and by winkler titration : within ± 5%

The equipment complies # / ~~does not comply~~ # with the specified requirements and is deemed acceptable # / ~~unacceptable~~ # for use.

Delete as appropriate

Calibrated by : _____ Approved by : _____

東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED

Performance Check of Salinity Meter

Equipment Ref. No. :	ET/EW/008/004	Manufacturer :	YSI
Model No. :	Pro 2030	Serial No. :	10F 101978
Date of Calibration :	26/05/2016	Due Date :	25/06/2016

Ref. No. of Salinity Standard used (30ppt)	S/001/5

Salinity Standard (ppt)	Measured Salinity (ppt)	Difference * (%)
30.0	30.3	1.00

(*) Difference (%) = (Measured Salinity – Salinity Standard value) / Salinity Standard value x 100

Acceptance Criteria

Difference : -10 % to 10 %

The salinity meter complies * / ~~does not comply~~ * with the specified requirements and is deemed acceptable * / ~~unacceptable~~ * for use. Measurements are traceable to national standards.

Checked by : _____ Approved by : _____

Annex C

QA/QC Results for Suspended Solids Testing

QA/QC Results of Laboratory Analysis of Total Suspended Solids

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
6/6/2016 (Zone B)	93.6	B1 S1(0700)	2.99	C2 S2 (0700)	106.4
	104.1	C2 M1(0700)	0.00	E6 M2 (0700)	107.4
	99.9	E6 B1(0700)	2.60	G3 B2 (0700)	95.1
	98.9	G4 S1(0700)	6.45	I1 B2 (0700)	99.0
	106.3	B1 S1(1100)	7.14	C2 S2 (1100)	107.8
	102.2	C2 M1(1100)	3.17	E6 M2 (1100)	106.8
	106.3	E6 B1(1100)	0.00	G3 B2 (1100)	92.5
	103.1	G4 S1(1100)	3.64	I1 B2 (1100)	104.0

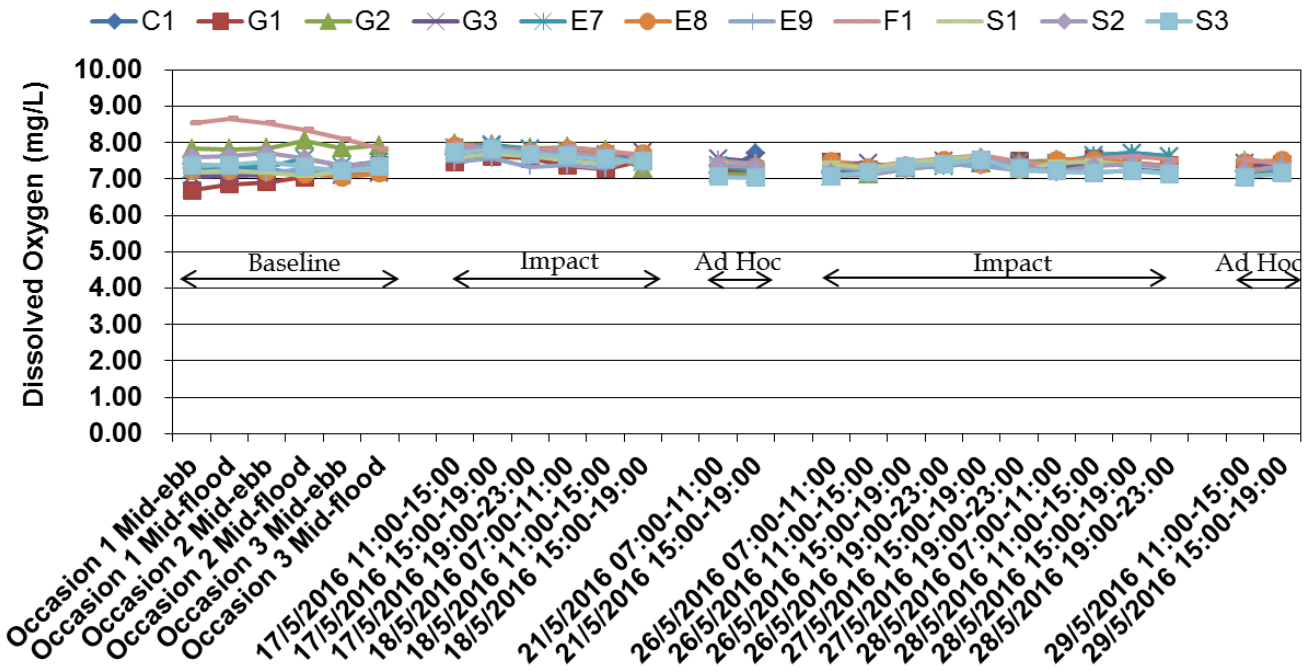
Note:
(*) % Recovery of QC sample should be between 80% to 120%.
(#) % Error of Sample Duplicate should be between 0% to 10%.
(@) % Recovery of Sample Spike should be between 80% to 120%.
(**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
7/6/2016 (Zone C)	104.2	G5-S1(0700)	6.67	E5-S2	98.0
	102.3	E5-M1(0700)	0.00	G6-B2	99.7
	92.3	G5-S1(1100)	3.28	E5-S2	106.5
	101.8	E5-M1(1100)	6.06	G6-B2	100.5

Note:
(*) % Recovery of QC sample should be between 80% to 120%.
(#) % Error of Sample Duplicate should be between 0% to 10%.
(@) % Recovery of Sample Spike should be between 80% to 120%.
(**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Annex D

Water Quality Monitoring Results



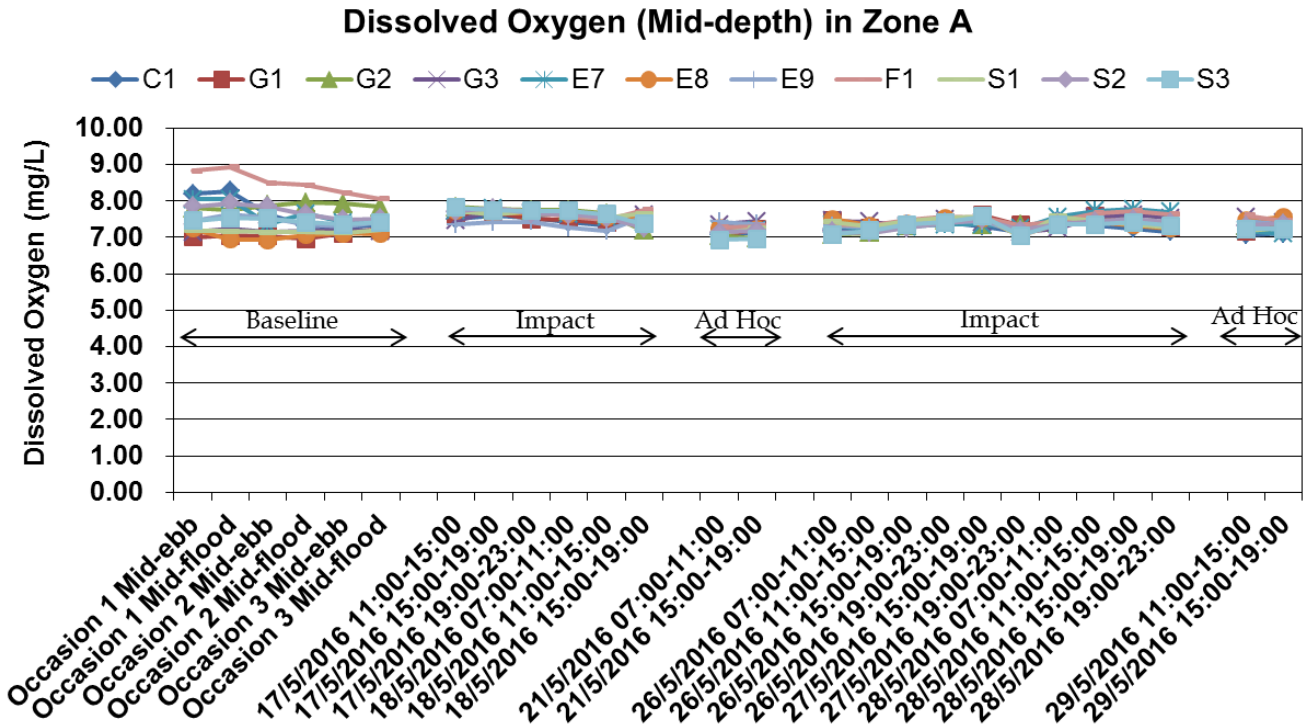
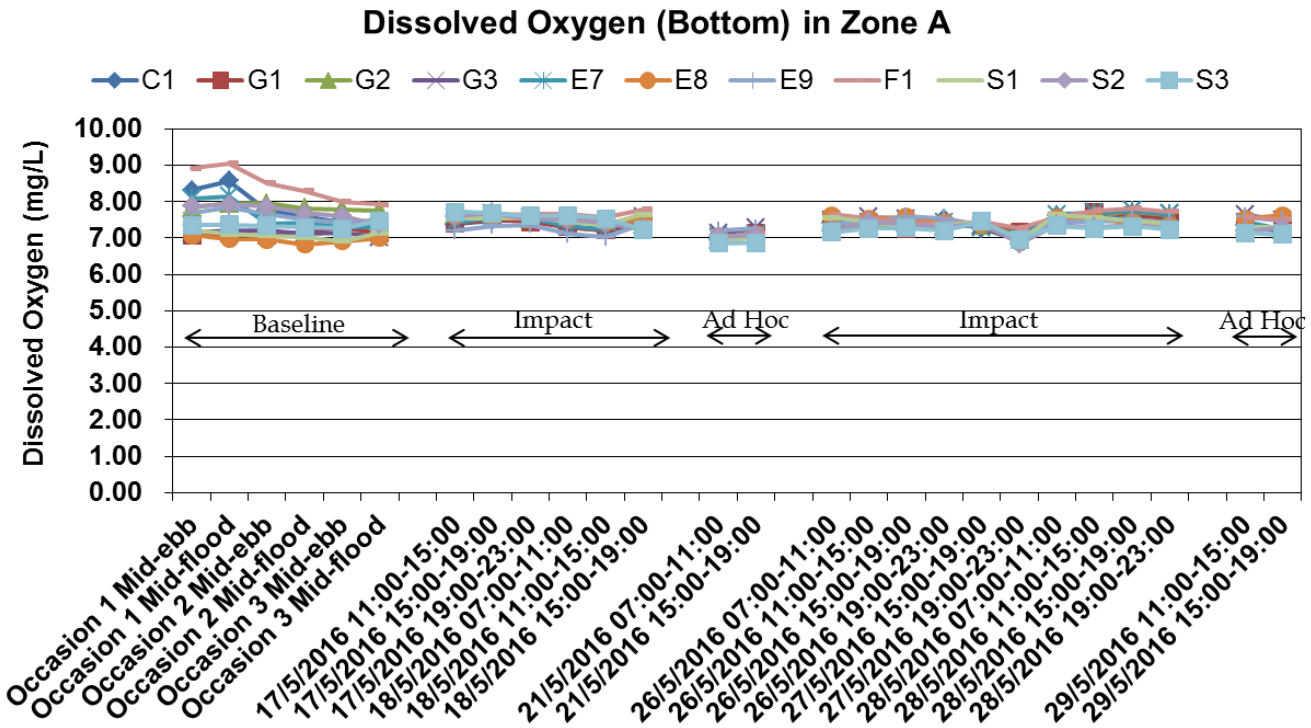


Figure D1 Dissolved oxygen (mg/L) at surface and mid-depth of water column measured during the baseline monitoring and the impact monitoring period from 16 May to 12 June 2016 (Zone A)
(Baseline monitoring in Zone A was conducted on 28 April, 3 May and 5 May 2016 respectively)

ERM



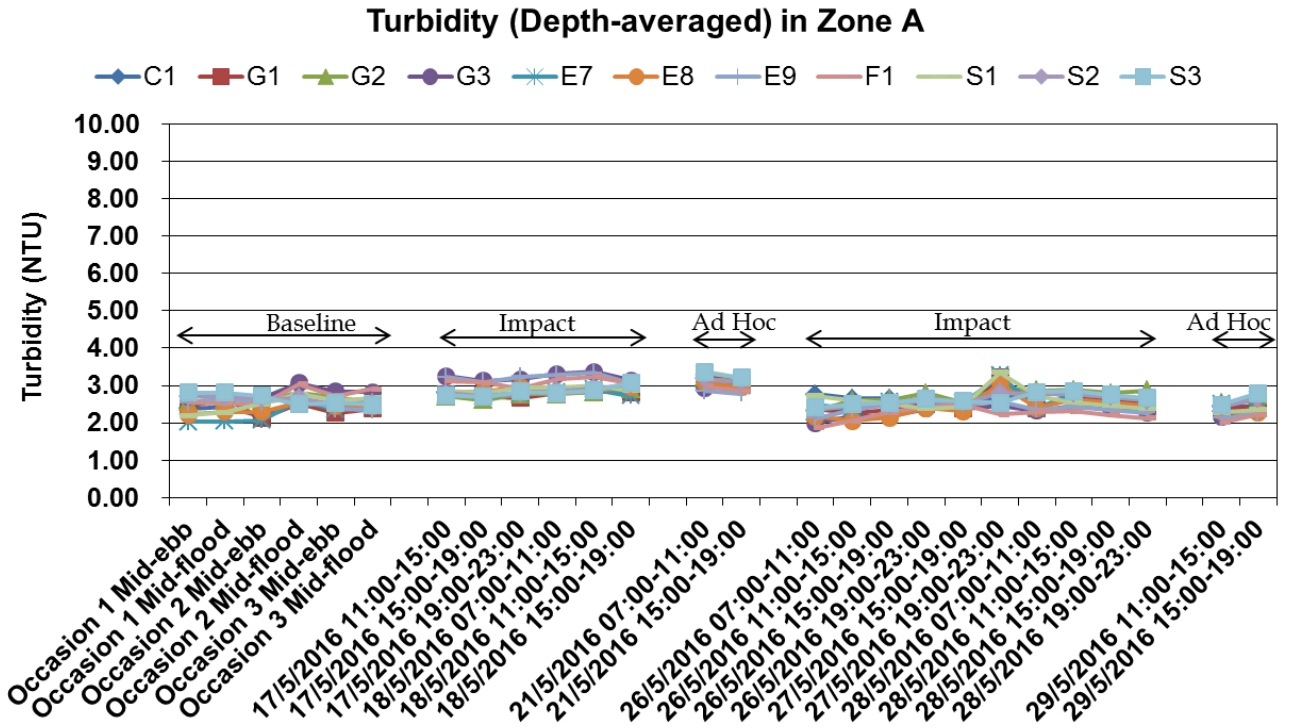


Figure D2 Dissolved oxygen (mg/L) at bottom and depth-averaged turbidity (NTU) of water column measured during the baseline monitoring and the impact monitoring period from 16 May to 12 June 2016 (Zone A)
(Baseline monitoring in Zone A was conducted on 28 April, 3 May and 5 May 2016 respectively)

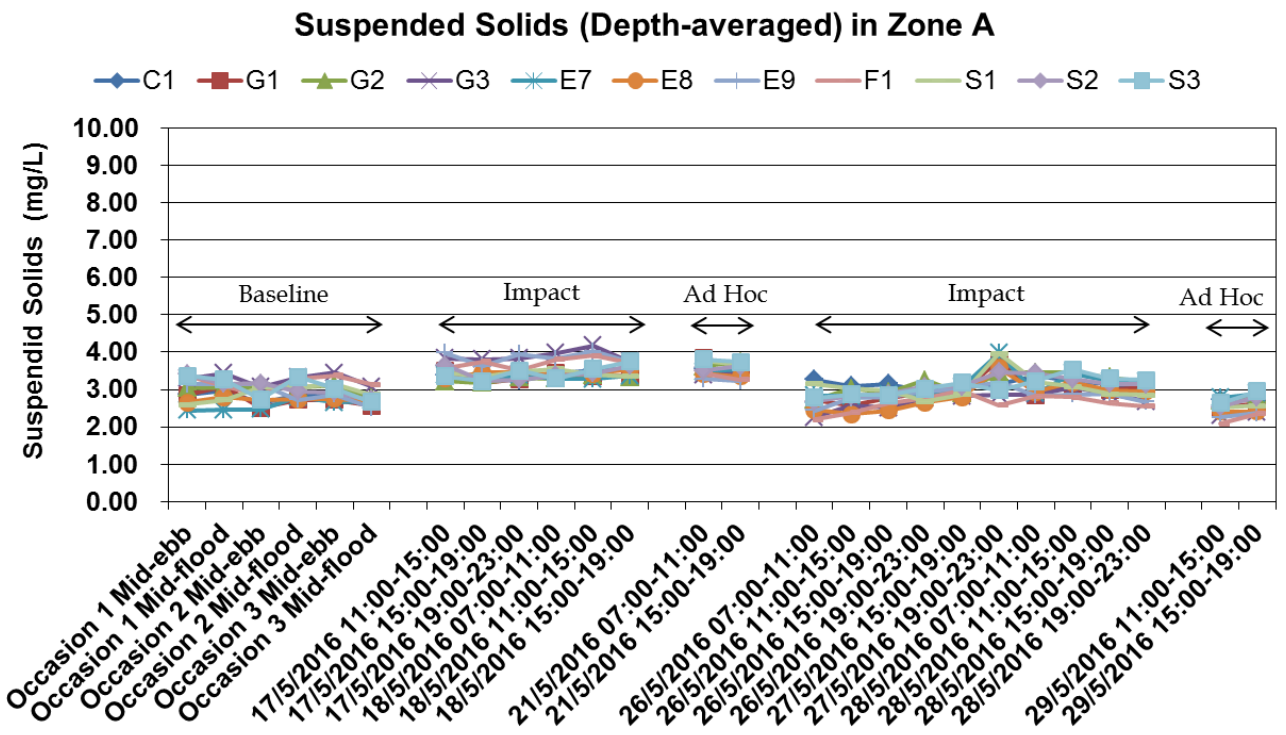
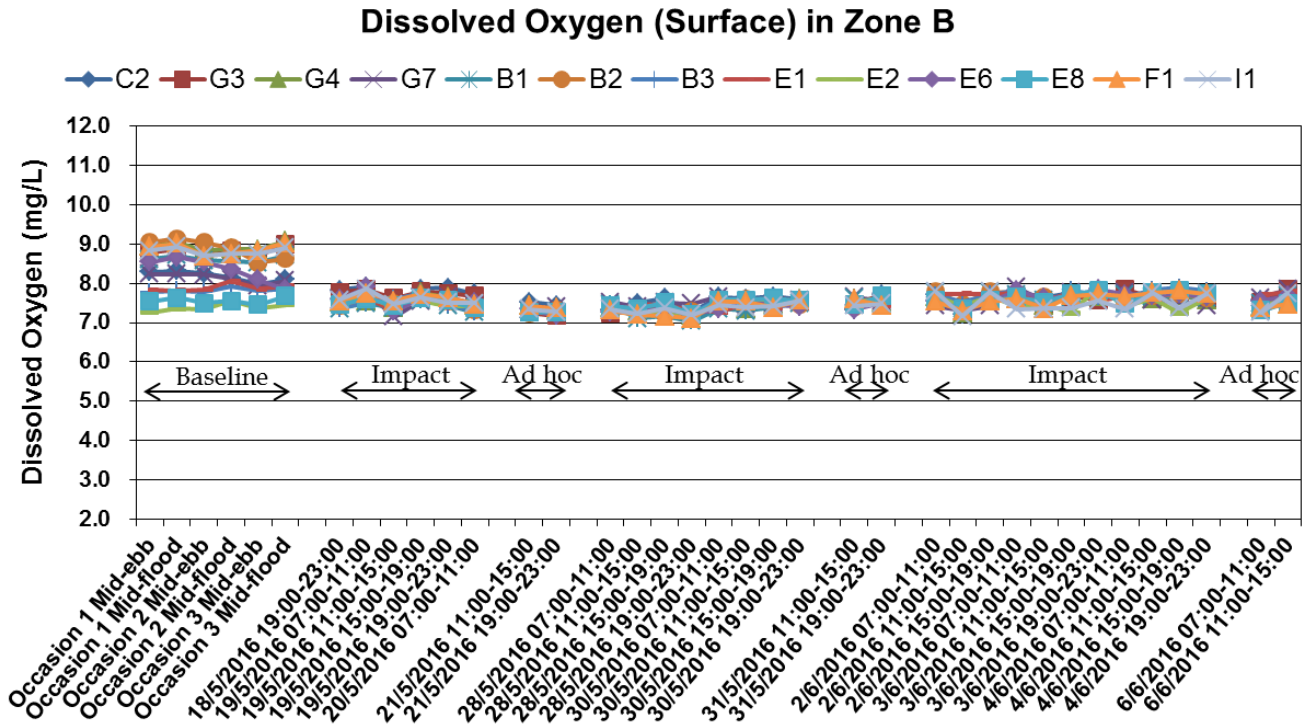


Figure D3 Depth-averaged suspended solids (mg/L) of water column measured during the baseline monitoring and the impact monitoring period from 16 May to 12 June 2016 (Zone A)
(Baseline monitoring in Zone A was conducted on 28 April, 3 May and 5 May 2016 respectively)



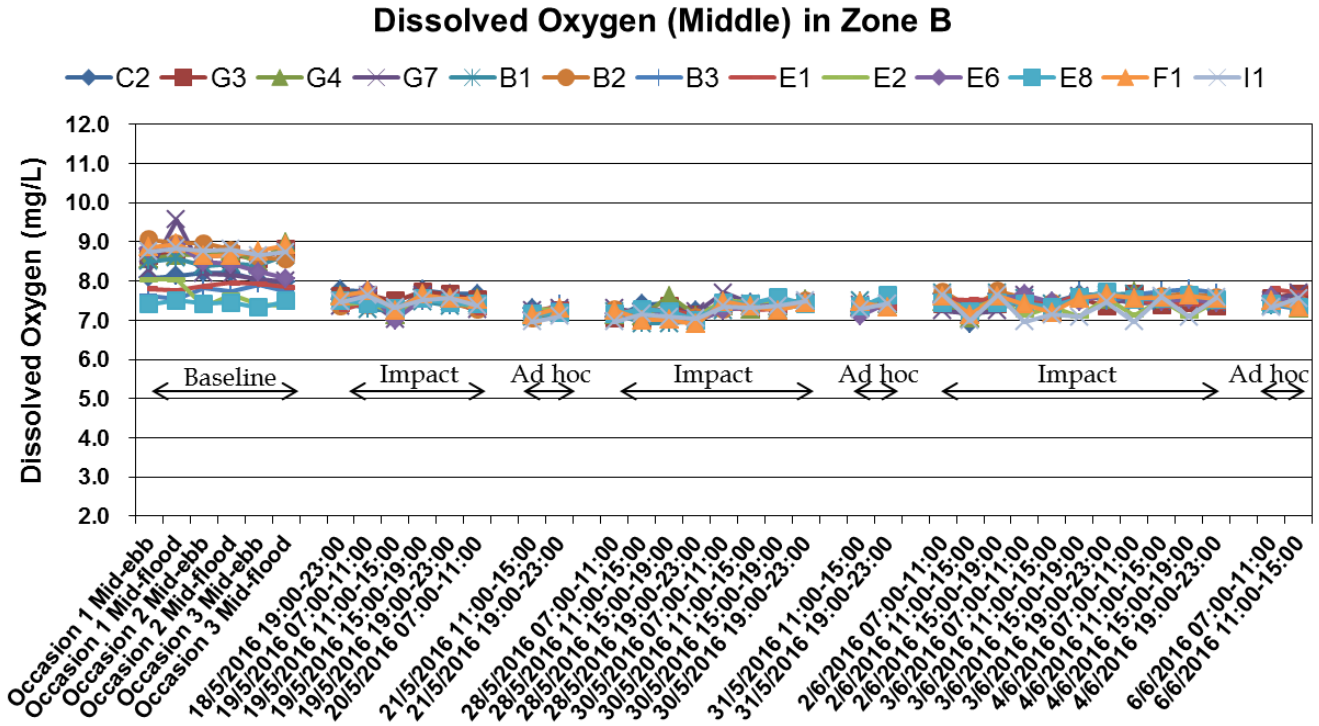


Figure D4 Dissolved oxygen (mg/L) at surface and mid-depth of water column measured during the baseline monitoring and the impact monitoring period from 16 May to 12 June 2016 (Zone B)
(In Zone B, baseline monitoring was conducted at stations B2, B3, E1, G4, G7 and I1 conducted on 27 April, 29 April and 4 May 2016 respectively, and at stations B1, C2, E2, E6, E8, F1 and G3 on 28 April, 3 May and 5 May 2016 respectively)

ERM

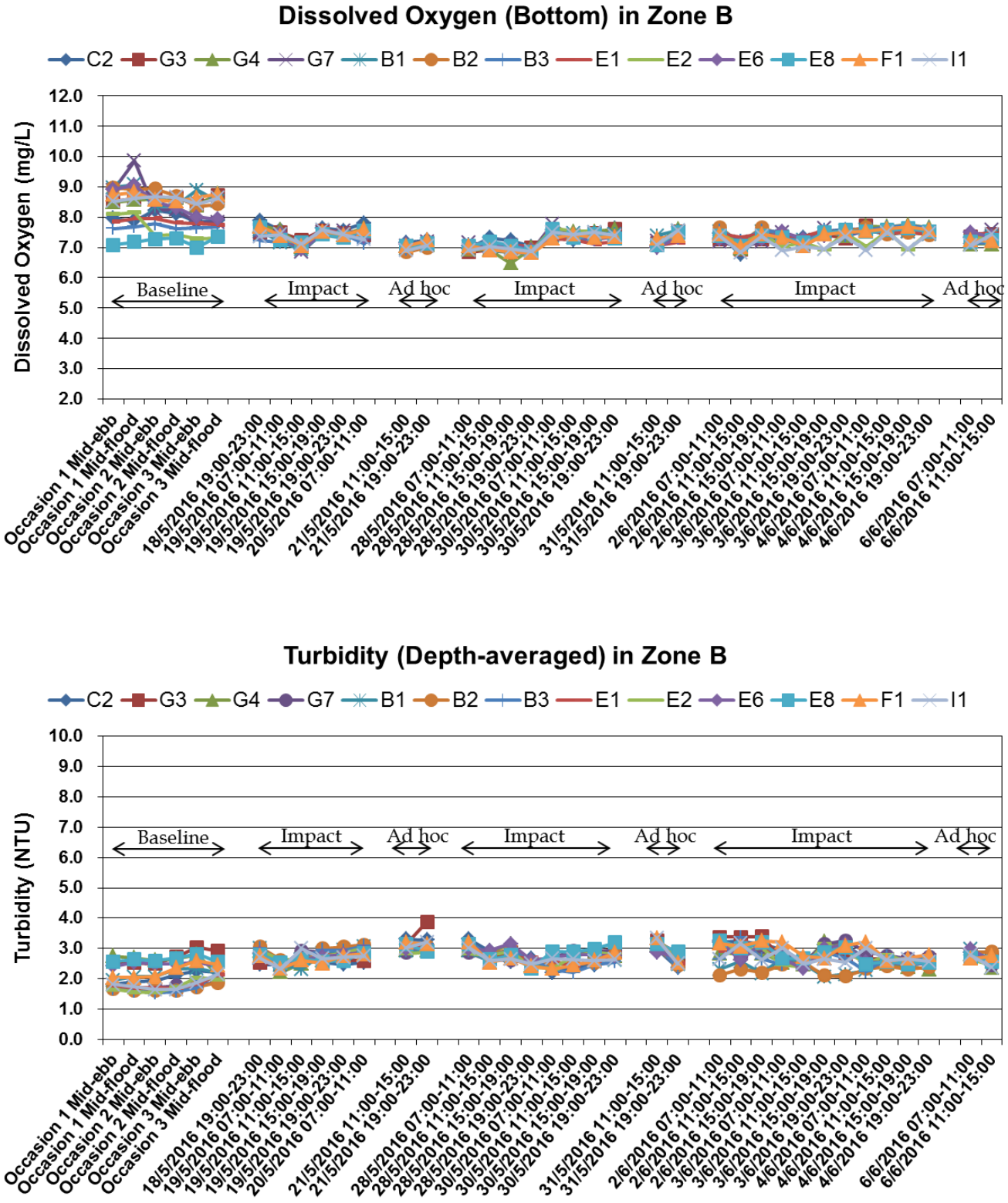


Figure D5 Dissolved oxygen (mg/L) at bottom and depth-averaged turbidity (NTU) of water column measured during the baseline monitoring and the impact monitoring period from 16 May to 12 June 2016 (Zone B)
(In Zone B, baseline monitoring was conducted at stations B2, B3, E1, G4, G7 and I1 conducted on 27 April, 29 April and 4 May 2016 respectively, and at stations B1, C2, E2, E6, E8, F1 and G3 on 28 April, 3 May and 5 May 2016 respectively)

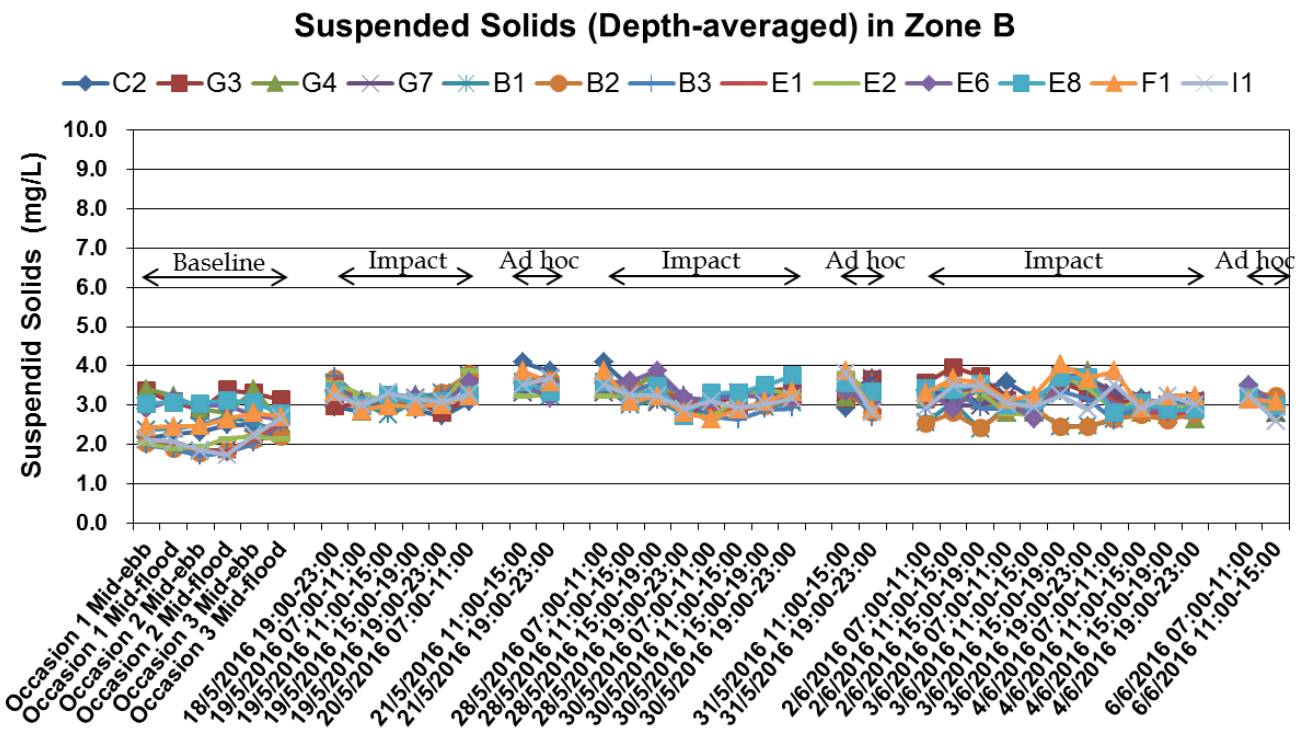
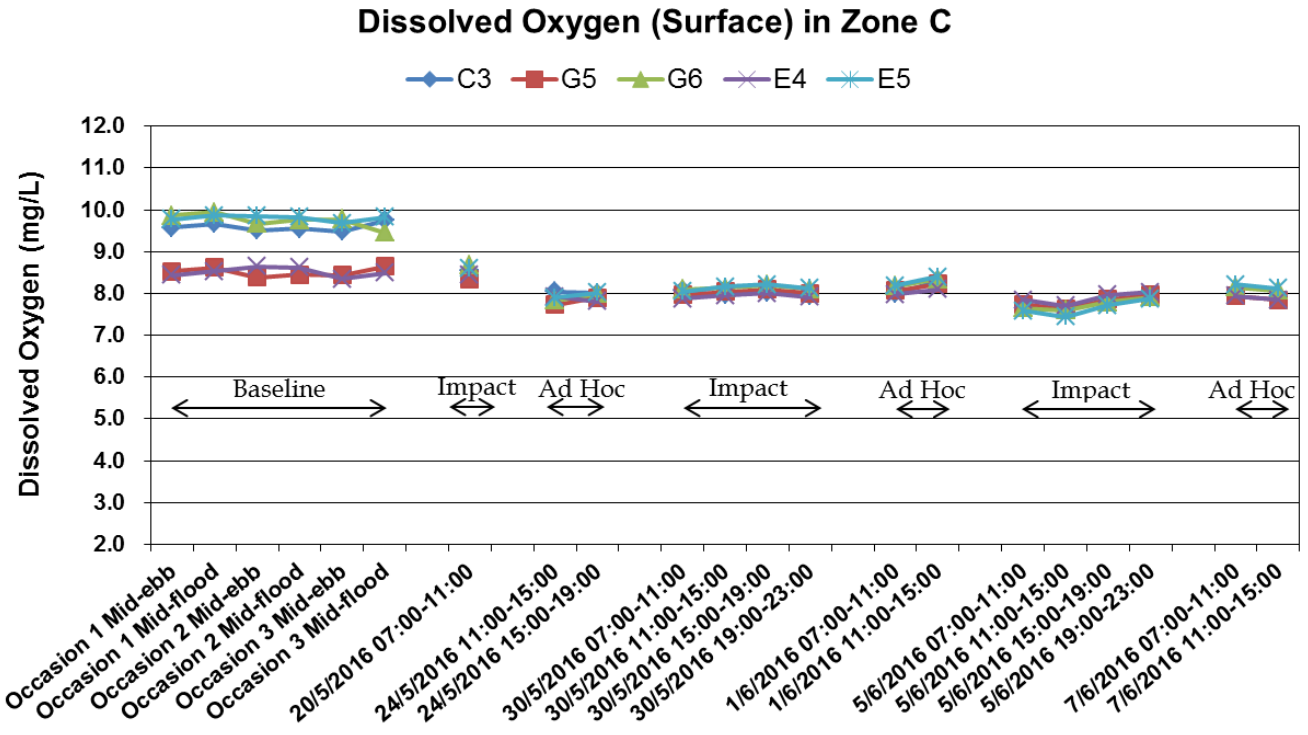


Figure D6 Depth-averaged suspended solids (mg/L) of water column measured during the baseline monitoring and the impact monitoring period from 16 May to 12 June 2016 (Zone B)
(In Zone B, baseline monitoring was conducted at stations B2, B3, E1, G4, G7 and I1 conducted on 27 April, 29 April and 4 May 2016 respectively, and at stations B1, C2, E2, E6, E8, F1 and G3 on 28 April, 3 May and 5 May 2016 respectively)



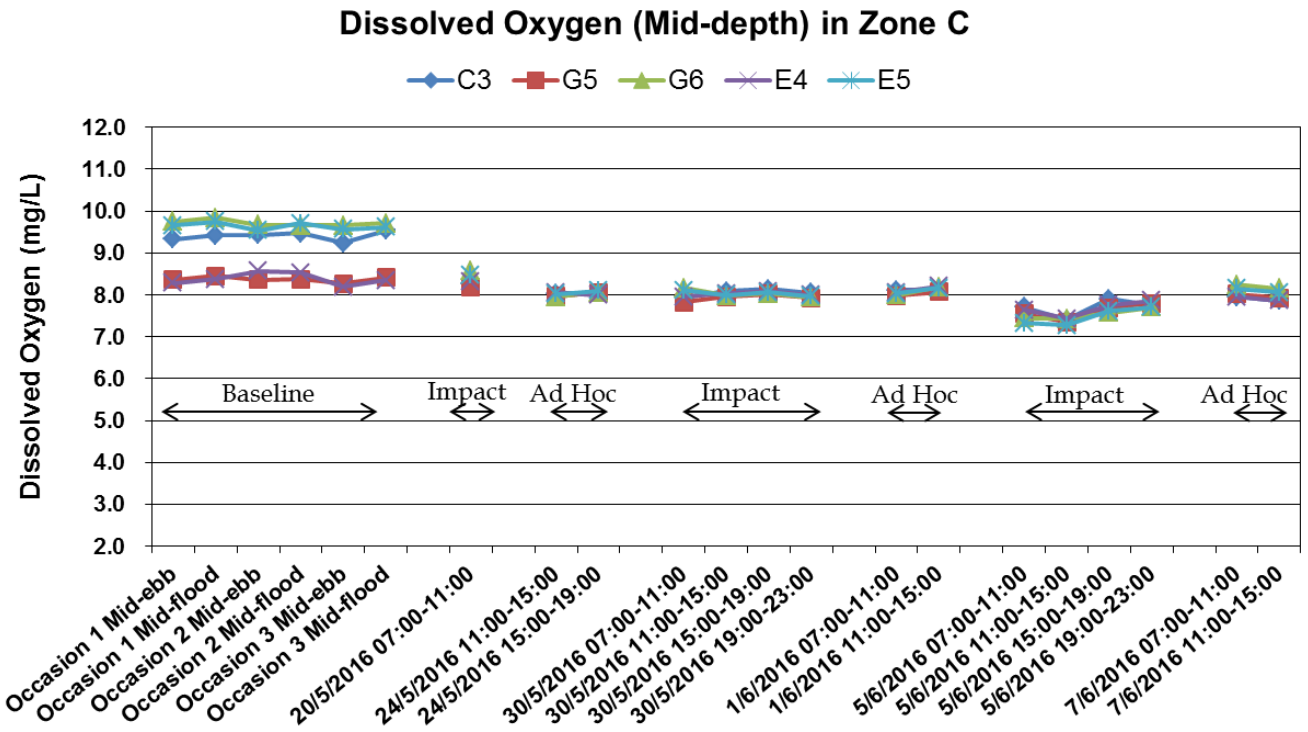
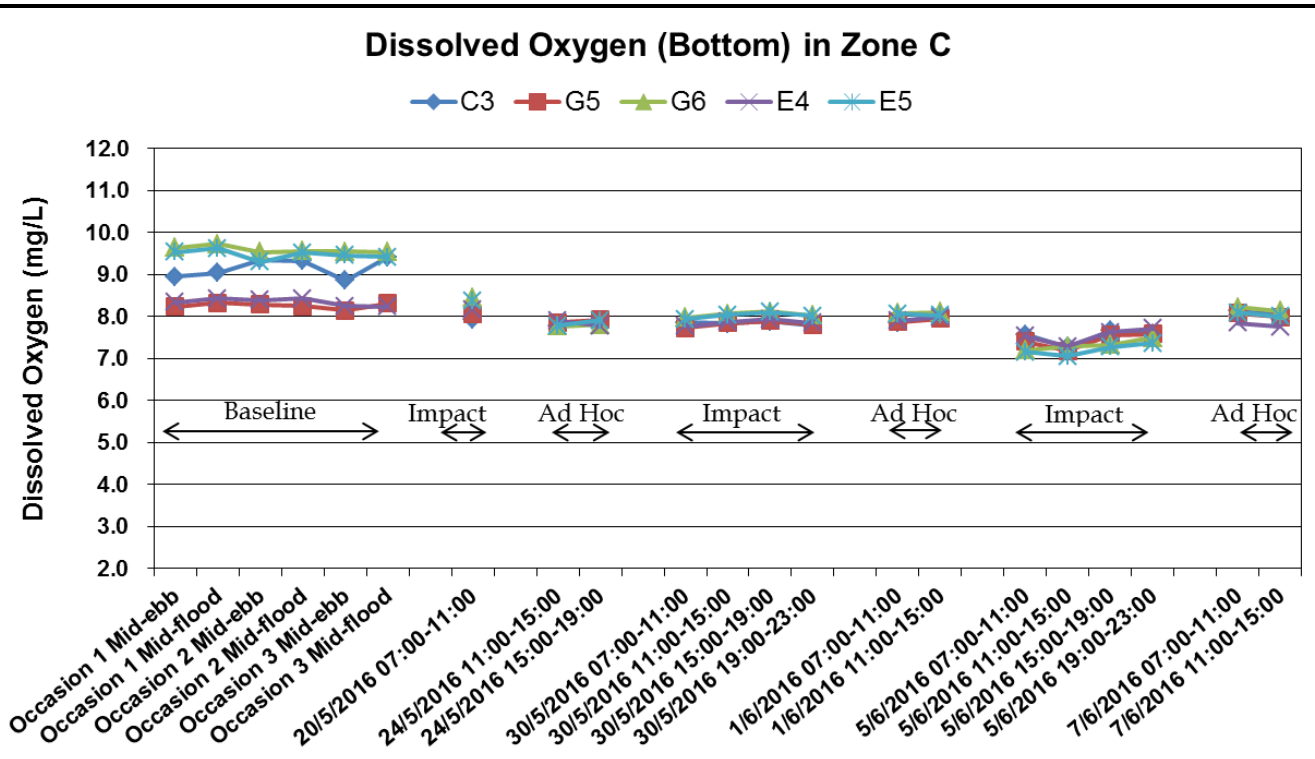


Figure D7 Dissolved oxygen (mg/L) at surface and mid-depth of water column measured during the baseline monitoring and the impact monitoring period from 16 May to 12 June 2016 (Zone C)
(Baseline monitoring in Zone C was conducted on 27 April, 29 April and 4 May 2016 respectively)



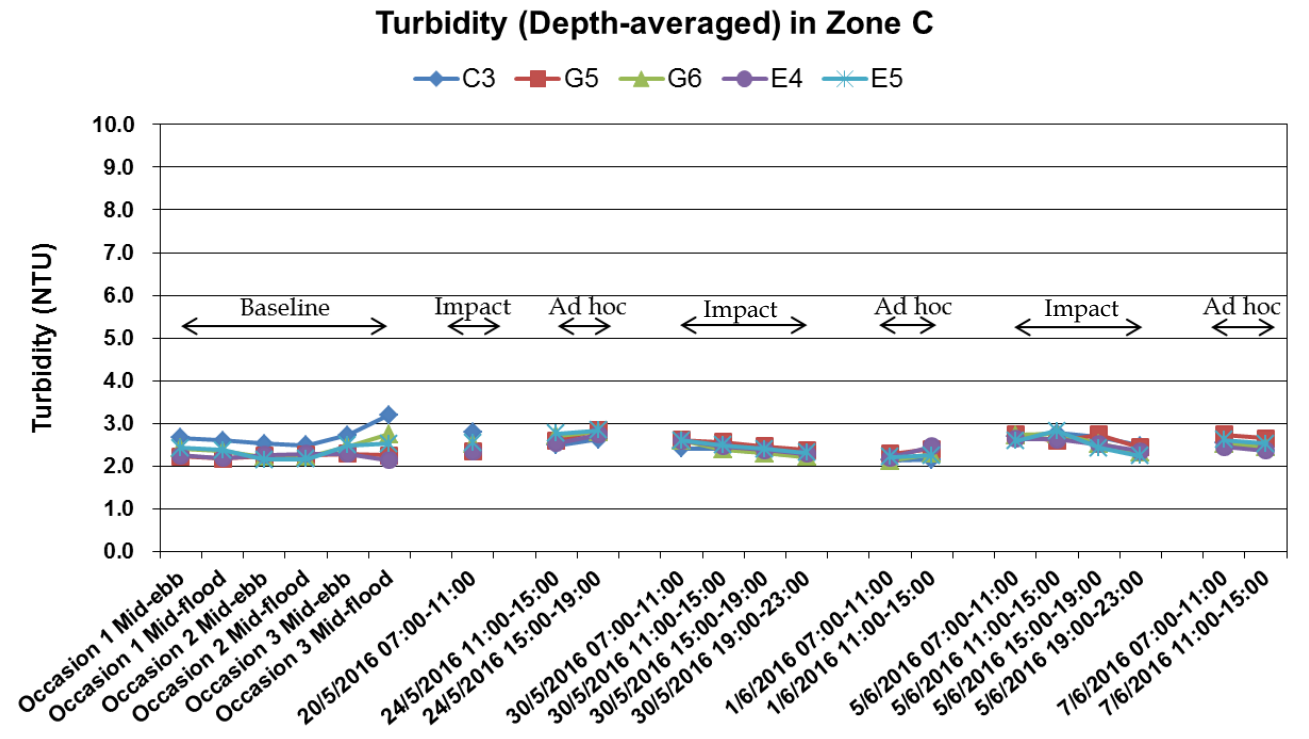


Figure D8 Dissolved oxygen (mg/L) at bottom and depth-averaged turbidity (NTU) of water column measured during the baseline monitoring and the impact monitoring period from 16 May to 12 June 2016 (Zone C)
(Baseline monitoring in Zone C was conducted on 27 April, 29 April and 4 May 2016 respectively)

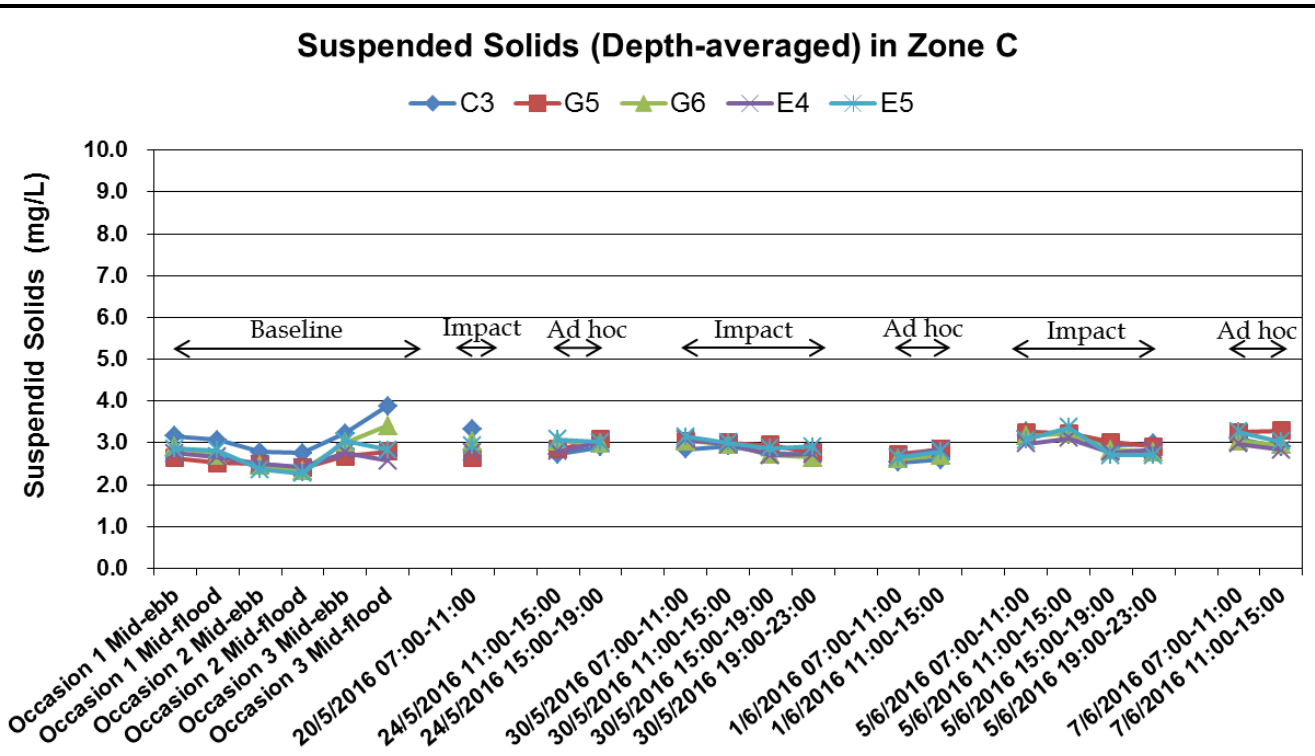


Figure D9 Depth-averaged suspended solids (mg/L) of water column measured during the baseline monitoring and the impact monitoring period from 16 May to 12 June 2016 (Zone C)
(Baseline monitoring in Zone C was conducted on 27 April, 29 April and 4 May 2016 respectively)

Sampling Date : 6-Jun-16
Sampling Time : 07:00 - 11:00 (1st Round)
Sampling Location : Zone B

Location	Nature	Sampling Time	Water Depth (m)	Current direction	Current speed (ms^{-1})	Monitoring Depth	Temp (°C)		Salinity (ppt)		DO (mg/L)		DO Saturation (%)		Turbidity (NTU)		Suspended Solids (mg/L)		DO	Turbidity (Depth-average)		SS (Depth-average)	
							1	2	1	2	1	2	1	2	1	2	1	2	Average (mg/L)	Average (NTU)	Impact Stations Exceed Control Station C2 (%)	Average (mg/L)	Impact Stations Exceed Control Station C2 (%)
C2	Control Station	0807-0820	31.6	W	0.6	*Surface*	26.8	26.9	25.8	25.9	7.65	7.61	110.7	110.1	2.89	2.82	3.5	3.4	7.63	2.85	N.A.	3.50	N.A.
						Middle	26.7	26.7	26.0	26.1	7.49	7.50	108.5	109.1	2.69	2.73	3.5	3.3	7.50				
						Bottom	26.6	26.5	26.6	26.7	7.29	7.32	105.7	106.1	2.98	3.00	3.3	4.0	7.31				
G3	Gradient Station	0746-0800	17.0	W	0.5	*Surface*	26.8	26.8	25.7	25.8	7.53	7.57	109.0	109.6	2.85	2.77	3.4	3.4	7.55	2.68	N.A.	3.15	N.A.
						Middle	26.7	26.6	26.1	26.2	7.63	7.60	110.5	110.1	2.53	2.49	3.1	2.8	7.62				
						Bottom	26.6	26.6	26.4	26.4	7.50	7.48	108.8	108.5	2.67	2.74	2.9	3.3	7.49				
G4	Gradient Station	0842-0855	20.4	W	0.5	*Surface*	26.8	26.7	25.9	25.9	7.33	7.30	106.1	105.7	2.76	2.83	3.0	3.4	7.32	2.82	N.A.	3.22	N.A.
						Middle	26.8	26.9	26.1	26.2	7.41	7.44	107.4	107.8	2.60	2.53	2.9	2.8	7.43				
						Bottom	26.6	26.5	26.4	26.4	7.21	7.17	104.5	103.9	3.14	3.08	3.5	3.7	7.19				
G7	Gradient Station	0920-0935	17.2	W	0.5	*Surface*	26.8	26.9	25.7	25.7	7.35	7.39	106.4	107.0	2.96	2.85	3.3	3.1	7.37	2.86	N.A.	3.15	N.A.
						Middle	26.6	26.7	26.0	26.0	7.47	7.50	108.2	108.6	2.73	2.69	3.0	3.0	7.49				
						Bottom	26.5	26.5	26.3	26.3	7.26	7.23	105.2	104.8	2.94	2.99	3.2	3.3	7.25				
B1	Impact Station	1050-1100	9.0	E	0.3	*Surface*	26.7	26.7	25.6	25.7	7.59	7.55	109.9	109.3	2.98	3.03	3.3	3.3	7.57	2.97	4.0%	3.32	-5.2%
						Middle	26.7	26.7	25.8	25.8	7.50	7.47	108.7	108.2	2.79	2.83	3.1	3.1	7.49				
						Bottom	26.6	26.6	25.9	25.9	7.33	7.30	106.2	105.8	3.06	3.11	3.4	3.7	7.32				
B2	Impact Station	1034-1046	11.6	E	0.3	*Surface*	26.7	26.8	25.8	25.7	7.53	7.48	109.0	108.3	2.87	2.95	3.4	3.3	7.51	2.89	1.2%	3.32	-5.2%
						Middle	26.7	26.7	25.8	25.8	7.54	7.57	109.2	109.7	2.73	2.77	3.3	3.3	7.56				
						Bottom	26.7	26.6	25.9	26.0	7.36	7.32	106.7	106.1	2.95	3.04	3.3	3.3	7.34				
B3	Impact Station	1000-1013	12.1	W	0.3	*Surface*	26.8	26.8	25.8	25.8	7.38	7.41	106.9	107.3	2.98	2.87	3.6	3.2	7.40	2.89	1.2%	3.30	-5.7%
						Middle	26.7	26.7	25.8	25.9	7.46	7.48	108.0	108.3	2.68	2.73	3.0	3.0	7.47				
						Bottom	26.6	26.7	25.9	26.0	7.13	7.09	103.3	102.8	3.08	2.98	3.4	3.6	7.11				
E1	Impact Station	0940-0954	12.7	W	0.4	*Surface*	26.7	26.8	25.7	25.7	7.50	7.46	108.6	108.1	2.84	2.77	3.1	3.1	7.48	2.77	-2.9%	3.10	-11.4%
						Middle	26.7	26.8	25.8	25.9	7.38	7.34	106.9	106.3	2.56	2.62	2.8	2.9	7.36				
						Bottom	26.7	26.6	26.1	26.2	7.16	7.19	103.8	104.3	2.96	2.87	3.5	3.2	7.18				
E2	Impact Station	0825-0838	9.3	W	0.4	*Surface*	26.8	26.9	26.0	25.8	7.43	7.40	107.5	107.1	2.60	2.68	2.9	2.9	7.42	2.62	-8.1%	3.08	-11.9%
						Middle	26.8	26.8	26.0	26.1	7.47	7.50	108.2	108.6	2.45	2.38	2.9	2.9	7.49				
						Bottom	26.6	26.6	26.2	26.3	7.36	7.33	106.7	106.2	2.77	2.85	3.4	3.5	7.35				
E6	Impact Station	0900-0915	21.4	W	0.5	*Surface*	26.8	26.8	25.8	25.8	7.27	7.31	105.2	105.8	2.88	2.80	3.2	3.4	7.29	2.99	4.7%	3.48	-0.5%
						Middle	26.6	26.7	26.2	26.3	7.38	7.40	106.9	107.2	2.94	2.89	3.2	3.5	7.39				
						Bottom	26.4	26.4	26.5	26.6	7.14	7.11	103.5	103.0	3.24	3.16	3.8	3.8	7.13				
E8	Impact Station	0725-0740	19.6	W	0.4	*Surface*	26.8	26.9	25.8	25.8	7.69	7.72	113.5	111.7	2.67	2.74	3.2	3.3	7.71	2.70	-5.4%	3.20	-8.6%
						Middle	26.7	26.8	26.2	26.3	7.78	7.81	112.7	113.1	2.33	2.45	2.8	2.9	7.80				
						Bottom	26.6	26.6	26.5	26.4	7.43	7.46	107.7	108.1	2.96	3.04	3.6	3.4	7.45				
F1	Impact Station	0804-0820	15.2	W	0.5	*Surface*	26.8	26.9	25.8	25.7	7.46	7.42	108.0	107.4	2.73	2.80	3.3	3.1	7.44	2.67	-6.5%	3.15	-10.0%
						Middle	26.8	26.7	26.1	26.1	7.51	7.53	108.8	109.1	2.64	2.57	3.2	3.0	7.52				
						Bottom	26.6	26.6	26.3	26.4	7.33	7.31	106.2	105.9	2.60	2.66	3.1	3.2	7.32				
I1	Impact Station	1017-1030	11.4	E	0.3	*Surface*	26.8	26.7	25.7	25.8	7.23	7.28	104.7	105.4	2.85	2.76	3.4	3.3	7.26	2.77	-2.9%	3.23	-7.6%
						Middle	26.7	26.7	25.8	25.8	7.33	7.30	106.2	105.7	2.62	2.55	3.1	2.8	7.32				
						Bottom	26.6	26.7	25.9	25.9	7.04	7.07	102.1	102.5	2.89	2.95	3.5	3.3	7.06				

Note:
: Raw Data
: Indicates Exceedance of Action Level at Impact Stations
: Indicates Exceedance of Limit Level at Impact Stations
: Calculated Data

Sampling Date : 6-Jun-16
Sampling Time : 11:00 - 15:00 (2nd Round)
Sampling Location : Zone B

Location	Nature	Sampling Time	Water Depth (m)	Current direction	Current speed (ms^{-1})	Monitoring Depth	Temp (°C)		Salinity (ppt)		DO (mg/L)		DO Saturation (%)		Turbidity (NTU)		Suspended Solids (mg/L)		DO	Turbidity (Depth-average)		SS (Depth-average)	
							1	2	1	2	1	2	1	2	1	2	1	2	Average (mg/L)	Average (NTU)	Impact Stations Exceed Control Station C2 (%)	Average (mg/L)	Impact Stations Exceed Control Station C2 (%)
C2	Control Station	1200-1215	31.3	W	0.3	*Surface*	26.9	26.9	25.7	25.8	7.84	7.86	113.4	113.7	2.35	2.37	2.8	3.1	7.85	2.45	N.A.	3.02	N.A.
						Middle	26.8	26.7	26.0	26.1	7.69	7.71	111.3	111.5	2.44	2.46	3.1	3.2	7.70				
						Bottom	26.6	26.5	26.3	26.4	7.55	7.57	109.5	109.8	2.54	2.56	3.1	2.8	7.56				
G3	Gradient Station	1120-1135	17.2	W	0.3	*Surface*	27.1	27.0	25.7	25.8	7.66	7.68	110.8	111.0	2.54	2.56	2.8	3.0	7.67	2.66	N.A.	3.03	N.A.
						Middle	26.9	26.8	25.9	26.0	7.43	7.45	107.5	107.6	2.68	2.70	3.2	2.9	7.44				
						Bottom	26.7	26.8	26.1	26.2	7.33	7.35	106.3	106.5	2.74	2.76	3.3	3.0	7.34				
G4	Gradient Station	1240-1255	20.6	W	0.3	*Surface*	27.0	26.9	25.6	25.5	7.49	7.51	108.3	108.6	2.25	2.27	2.7	2.7	7.50	2.36	N.A.	2.80	N.A.
						Middle	26.8	26.8	25.8	25.9	7.34	7.32	106.3	106.1	2.39	2.36	2.9	2.8	7.33				
						Bottom	26.6	26.7	26.1	26.2	7.22	7.24	104.7	104.9	2.44	2.46	2.7	3.0	7.23				
G7	Gradient Station	1320-1335	17.5	W	0.4	*Surface*	27.1	27.0	25.7	25.8	7.46	7.48	107.9	108.1	2.30	2.32	2.5	2.8	7.47	2.44	N.A.	2.78	N.A.
						Middle	26.8	26.7	26.0	26.1	7.33	7.31	106.1	105.8	2.40	2.48	2.7	2.7	7.32				
						Bottom	26.6	26.5	26.2	26.3	7.19	7.21	104.3	104.5	2.57	2.59	3.1	2.9	7.20				
B1	Impact Station	1442-1500	9.3	E	0.4	*Surface*	26.8	26.7	25.8	25.9	7.71	7.69	111.5	111.3	2.49	2.51	2.7	2.8	7.70	2.64	7.6%	3.03	0.6%
						Middle	26.6	26.5	26.0	26.1	7.50	7.52	108.6	108.9	2.66	2.68	2.9	3.2	7.51				
						Bottom	26.3	26.4	26.3	26.2	7.38	7.40	107.0	107.3	2.74	2.76	3.3	3.3	7.39				
B2	Impact Station	1426-1439	11.8	W	0.3	*Surface*	26.7	26.6	25.7	25.8	7.85	7.83	113.5	113.2	2.60	2.62	2.9	2.9	7.84	2.88	17.4%	3.23	7.2%
						Middle	26.5	26.4	25.9	26.0	7.66	7.68	110.9	110.6	2.88	2.90	3.2	3.5	7.67				
						Bottom	26.3	26.3	26.1	26.2	7.44	7.42	107.9	107.7	3.13	3.15	3.4	3.5	7.43				
B3	Impact Station	1400-1412	12.3	W	0.3	*Surface*	26.9	26.8	25.9	26.0	7.43	7.46	107.5	107.7	2.46	2.47	2.7	3.0	7.45	2.56	4.4%	2.90	-3.9%
						Middle	26.7	26.6	26.1	26.2	7.29	7.31	105.5	105.7	2.56	2.58	3.1	2.8	7.30				
						Bottom	26.5	26.4	26.3	26.4	7.11	7.09	103.2	103.0	2.64	2.66	2.9	2.9	7.10				
E1	Impact Station	1340-1355	12.9	W	0.3	*Surface*	26.8	26.7	25.8	25.9	7.66	7.68	110.8	111.1	2.34	2.36	2.6	2.8	7.67	2.50	2.0%	2.97	-1.7%
						Middle	26.6	26.5	26.0	26.1	7.53	7.51	109.0	108.8	2.50	2.52	3.0	3.0	7.52				
						Bottom	26.4	26.4	26.2	26.2	7.35	7.37	106.6	106.8	2.64	2.66	3.2	3.2	7.36				
E2	Impact Station	1220-1235	9.6	W	0.4	*Surface*	26.9	26.8	25.7	25.8	7.65	7.67	110.6	110.9	2.38	2.40	2.7	2.8	7.66	2.45	-0.1%	2.85	-5.5%
						Middle	26.7	26.6	26.0	26.1	7.43	7.41	107.5	107.3	2.44	2.46	2.9	2.7	7.42				
						Bottom	26.5	26.4	26.3	26.3	7.35	7.33	106.6	106.4	2.50	2.52	3.0	3.0	7.34				
E6	Impact Station	1300-1315	21.7	W	0.3	*Surface*	26.9	26.8	25.7	25.8	7.57	7.55	109.5	109.2	2.40	2.42	2.9	2.9	7.56	2.58	5.2%	3.03	0.6%
						Middle	26.7	26.7	25.9	26.0	7.29	7.31	105.5	105.7	2.58	2.60	2.8	3.1	7.30				
						Bottom	26.6	26.5	26.1	26.2	7.14	7.16	103.6	103.9	2.73	2.75	3.2	3.3	7.15				
E8	Impact Station	1100-1115	19.9	W	0.3	*Surface*	27.0	26.9	25.8	25.9	7.78	7.80	112.5	112.8	2.43	2.45	3.0	2.9	7.79	2.55	3.9%	2.98	-1.1%
						Middle	26.8	26.7	26.0	26.1	7.69	7.71	111.4	111.6	2.56	2.58	2.8	2.9	7.70				
						Bottom	26.6	26.6	26.2	26.3	7.43	7.45	107.8	108.1	2.63	2.65	3.1	3.2	7.44				
F1	Impact Station	1140-1155	15.4	W	0.3	*Surface*	27.1	27.1	25.8	25.9	7.58	7.60	109.6	109.8	2.66	2.68	3.2	2.9	7.59	2.74	11.8%	3.08	2.2%
						Middle	27.0	26.9	26.0	26.1	7.46	7.48	108.0	108.3	2.70	2.74	3.2	3.3	7.47				
						Bottom	26.8	26.7	26.3	26.4	7.27	7.29	108.3	105.6	2.83	2.85	3.0	2.9	7.28				
I1	Impact Station	1414-1424	11.6	W	0.4	*Surface*	26.7	26.6	25.6	25.7	7.73	7.75	111.8	111.9	2.26	2.28	2.5	2.5	7.74	2.36	-3.7%	2.60	-13.8%
						Middle	26.5	26.5	25.9	26.0	7.58	7.56	109.7	109.5	2.33	2.35	2.6	2.6	7.57				
						Bottom	26.4	26.3	26.1	26.2	7.42	7.44	107.6	107.8	2.47	2.49	2.7	2.7	7.43				

Note:
: Raw Data
: Indicates Exceedance of Action Level at Impact Stations
: Indicates Exceedance of Limit Level at Impact Stations
: Calculated Data

Sampling Date : 7-Jun-16

Sampling Time : 07:00 - 11:00 (1st Round)

Sampling Location : Zone C

Location	Nature	Sampling Time	Water Depth (m)	Current direction	Current speed (ms^{-1})	Monitoring Depth	Temp (°C)		Salinity (ppt)		DO (mg/L)		DO Saturation (%)		Turbidity (NTU)		Suspended Solids (mg/L)		DO	Turbidity (Depth-average)		SS (Depth-average)	
							1	2	1	2	1	2	1	2	1	2	1	2	Average (mg/L)	Average (NTU)	Impact Stations Exceed Control Station C3 (%)	Average (mg/L)	Impact Stations Exceed Control Station C3 (%)
C3	Control Station	0930-0950	28.6	E	0.7	*Surface*	26.8	26.9	29.0	29.1	8.02	7.98	117.90	117.40	2.41	2.46	2.7	3.0	8.00	2.54	N.A.	3.12	N.A.
						Middle	26.5	26.4	29.3	29.4	7.97	7.94	116.80	116.40	2.52	2.59	3.3	3.1	7.96				
						Bottom	26.5	26.5	29.4	29.4	8.11	8.14	119.00	119.40	2.59	2.66	3.4	3.2	8.13				
G5	Gradient Station	0830-0850	22.0	E	0.7	*Surface*	26.8	26.9	29.0	29.1	7.92	7.96	116.40	116.90	2.60	2.67	2.9	2.9	7.94	2.74	N.A.	3.25	N.A.
						Middle	26.6	26.5	29.2	29.3	7.98	7.94	117.10	116.60	2.88	2.80	3.7	3.4	7.96				
						Bottom	26.4	26.4	29.3	29.4	7.86	7.83	115.00	114.50	2.71	2.75	3.0	3.6	7.85				
G6	Gradient Station	1030-1050	24.6	E	0.6	*Surface*	26.8	26.8	29.1	29.2	8.24	8.20	121.30	120.80	2.14	2.21	2.8	2.9	8.22	2.53	N.A.	3.05	N.A.
						Middle	26.7	26.7	29.3	29.4	8.17	8.14	120.10	119.70	2.66	2.59	3.2	3.1	8.16				
						Bottom	26.6	26.6	29.4	29.4	8.11	8.08	119.20	118.80	2.81	2.77	3.3	3.0	8.10				
E4	Impact Station	0900-0920	24.8	E	0.5	*Surface*	26.8	26.7	29.1	29.1	7.95	7.93	117.00	116.70	2.34	2.38	2.8	2.6	7.94	2.45	-3.5%	2.98	-4.3%
						Middle	26.7	26.7	29.2	29.2	8.04	8.01	118.20	117.80	2.29	2.35	3.0	3.1	8.03				
						Bottom	26.6	26.5	29.3	29.3	8.09	8.07	118.80	118.50	2.64	2.69	3.4	3.0	8.08				
E5	Impact Station	1000-1020	19.4	E	0.7	*Surface*	26.9	26.8	29.1	29.1	8.17	8.14	120.50	120.10	2.52	2.60	2.8	3.4	8.16	2.61	3.0%	3.27	4.8%
						Middle	26.8	26.7	29.3	29.3	8.26	8.22	121.80	121.30	2.75	2.70	3.2	3.6	8.24				
						Bottom	26.6	26.5	29.3	29.4	8.20	8.24	120.40	120.90	2.59	2.52	3.4	3.2	8.22				

Note: (1) : Raw Data

: Indicates Exceedance of Action Level at Impact Stations

: Indicates Exceedance of Limit Level at Impact Stations

: Calculated Data

Sampling Date : 7-Jun-16

Sampling Time : 11:00 - 15:00 (2nd Round)

Sampling Location : Zone C

Location	Nature	Sampling Time	Water Depth (m)	Current direction	Current speed (ms^{-1})	Monitoring Depth	Temp (^oC)		Salinity (ppt)		DO (mg/L)		DO Saturation (%)		Turbidity (NTU)		Suspended Solids (mg/L)		DO	Turbidity (Depth-average)		SS (Depth-average)	
							1	2	1	2	1	2	1	2	1	2	1	2	Average (mg/L)	Average (NTU)	Impact Stations Exceed Control Station C3 (%)	Average (mg/L)	Impact Stations Exceed Control Station C3 (%)
C3	Control Station	1203-1223	28.4	W	0.5	*Surface*	26.9	27.0	29.4	29.5	7.93	7.89	116.70	116.10	2.32	2.37	2.50	2.60	7.91	2.45	N.A.	2.90	N.A.
						Middle	26.6	26.5	29.5	29.4	7.88	7.85	115.50	115.20	2.43	2.50	3.20	3.00	7.87				
						Bottom	26.4	26.3	29.5	29.6	8.02	8.05	117.70	118.20	2.49	2.57	3.00	3.10	8.04				
G5	Gradient Station	1110-1130	21.8	W	0.6	*Surface*	27.0	26.9	29.1	29.2	7.83	7.87	115.20	115.70	2.51	2.58	3.00	3.30	7.85	2.65	N.A.	3.30	N.A.
						Middle	26.6	26.7	29.4	29.3	7.89	7.85	115.80	115.40	2.79	2.71	3.30	3.30	7.87				
						Bottom	26.5	26.4	29.4	29.5	7.77	7.74	113.80	113.20	2.62	2.66	3.40	3.50	7.76				
G6	Gradient Station	1256-1316	24.2	W	0.7	*Surface*	26.9	26.8	29.2	29.3	8.15	8.11	120.00	119.50	2.05	2.12	2.40	2.40	8.13	2.44	N.A.	2.95	N.A.
						Middle	26.7	26.8	29.4	29.3	8.08	8.05	118.90	118.50	2.57	2.50	3.30	3.00	8.07				
						Bottom	26.6	26.5	29.5	29.6	8.02	7.99	118.00	117.50	2.72	2.68	3.00	3.60	8.01				
E4	Impact Station	1135-1155	24.6	W	0.6	*Surface*	26.9	26.8	29.2	29.1	7.86	7.84	115.80	115.50	2.25	2.29	2.70	3.00	7.85	2.36	-3.6%	2.83	-2.3%
						Middle	26.8	26.7	29.3	29.4	7.95	7.92	116.90	116.60	2.20	2.26	2.60	2.50	7.94				
						Bottom	26.6	26.7	29.4	29.3	8.00	7.98	117.50	117.20	2.55	2.60	3.10	3.10	7.99				
E5	Impact Station	1231-1251	19.0	W	0.6	*Surface*	27.0	27.0	29.2	29.3	8.08	8.05	119.30	118.80	2.43	2.51	2.90	3.00	8.07	2.52	3.1%	3.03	4.6%
						Middle	26.9	26.8	29.4	29.3	8.17	8.13	120.60	120.10	2.66	2.61	3.20	3.10	8.15				
						Bottom	26.6	26.7	29.4	29.5	8.11	8.15	119.10	119.60	2.50	2.43	3.00	3.00	8.13				

Note: (1) : Raw Data

: Indicates Exceedance of Action Level at Impact Stations

: Indicates Exceedance of Limit Level at Impact Stations

: Calculated Data

Annex E

Details of Exceedances Occurred during the Reporting Week

Table E.1 Exceedances of Action and Limit Levels on 6 June 2016

Exceedance Log No.	**0324228_06 June 2016_Depth-averaged Turbidity_B1_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Depth-averaged Turbidity_B2_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Depth-averaged Turbidity_B3_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Depth-averaged Turbidity_E1_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Depth-averaged Turbidity_E6_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Depth-averaged Turbidity_E8_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Depth-averaged Turbidity_I1_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Depth-averaged SS_E6_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Surface DO_B3_07:00-11:00_Zone B_Limit Level** **0324228_06 June 2016_Middle DO_B3_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Bottom DO_B3_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Surface DO_E1_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Middle DO_E1_07:00-11:00_Zone B_Limit Level** **0324228_06 June 2016_Bottom DO_E1_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Surface DO_E2_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Surface DO_E6_07:00-11:00_Zone B_Limit Level** **0324228_06 June 2016_Middle DO_E6_07:00-11:00_Zone B_Limit Level** **0324228_06 June 2016_Bottom DO_E6_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Surface DO_F1_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Surface DO_I1_07:00-11:00_Zone B_Limit Level** **0324228_06 June 2016_Middle DO_I1_07:00-11:00_Zone B_Limit Level** **0324228_06 June 2016_Bottom DO_I1_07:00-11:00_Zone B_Action Level** **0324228_06 June 2016_Depth-averaged Turbidity_B2_11:00-15:00_Zone B_Action Level** **0324228_06 June 2016_Depth-averaged Turbidity_F1_11:00-15:00_Zone B_Action Level** **0324228_06 June 2016_Surface DO_B3_11:00-15:00_Zone B_Action Level** **0324228_06 June 2016_Middle DO_B3_11:00-15:00_Zone B_Limit Level** **0324228_06 June 2016_Bottom DO_B3_11:00-15:00_Zone B_Action Level** **0324228_06 June 2016_Middle DO_E2_11:00-15:00_Zone B_Action Level** **0324228_06 June 2016_Middle DO_E6_11:00-15:00_Zone B_Limit Level** **0324228_06 June 2016_Bottom DO_E6_11:00-15:00_Zone B_Action Level** **0324228_06 June 2016_Middle DO_F1_11:00-15:00_Zone B_Action Level** **[Total No. of Exceedance = 31]**
Monitoring Station(s) with Exceedance(s)	**Zone B:** B1, B2, B3, E1, E2, E6, E8, F1 and I1
Parameter(s) with Exceedance(s)	**Zone B**: Action Levels for Dissolved Oxygen (DO) at all depths, Depth-averaged Turbidity and Depth-averaged Suspended Solid (SS) Limit Levels for DO at surface and middle depths
Action Levels	Refer to *Table 3.4*
Limit Levels	Refer to *Table 3.4*
Measured Levels	Please refer to *Annex D*.
Exceedances	Refer to Exceedance Log No. for stations, water quality monitoring zone, exceedance of Action or Limit Levels.
Possible Reason for Action or Limit Level Non-compliance	Two (2) rounds of *ad hoc* monitoring were conducted in Zone B (07:00-11:00 and 11:00-15:00), on 6 June 2016. Monitoring results of DO at all depths in Zone B during baseline monitoring, all impact monitoring and *ad hoc* monitoring (to date) are presented in *Figures 1 to 5*. Although there are depth-averaged Turbidity results and a depth-averaged SS result higher than 99%-ile of baseline monitoring results (i.e. value of Limit Levels, 2.79 NTU for Turbidity and 3.39 mg/L for SS), these results are within 130% of the corresponding data from respective control station at the same tide of the same day. Thus these results

	are not regarded as Limit Level exceedances. No Project works, including Post Lay Inspection & Burial (PLIB), were conducted within water quality monitoring zone (Zone B) on 6 June 2016 – the most recent Project works conducted in Zone B were PLIB works on 4 June 2016. DO, Turbidity and SS levels at control and gradient stations were also similar to impact monitoring stations. Therefore, these exceedances of Action and Limit Levels are considered to be caused by natural background fluctuations. The observation of a number of exceedances of Action and Limit Levels on 6 June 2016 strengthens the conclusion that the baseline data show very good water quality for Hong Kong waters such that natural water quality fluctuation is more likely to cause exceedances of Action and Limit Levels, as well as the NOEs issued for 4 June 2016 being due to natural water quality fluctuation.

Table E.2 Exceedances of Action and Limit Levels on 7 June 2016

Exceedance Log No.	**0324228_07 June 2016_Surface DO_E4_07:00-11:00_Zone C_Limit Level** **0324228_07 June 2016_Middle DO_E4_07:00-11:00_Zone C_Limit Level** **0324228_07 June 2016_Bottom DO_E4_07:00-11:00_Zone C_Limit Level** **0324228_07 June 2016_Surface DO_E5_07:00-11:00_Zone C_Limit Level** **0324228_07 June 2016_Middle DO_E5_07:00-11:00_Zone C_Action Level** **0324228_07 June 2016_Bottom DO_E5_07:00-11:00_Zone C_Action Level** **0324228_07 June 2016_Surface DO_E4_11:00-15:00_Zone C_Limit Level** **0324228_07 June 2016_Middle DO_E4_11:00-15:00_Zone C_Limit Level** **0324228_07 June 2016_Bottom DO_E4_11:00-15:00_Zone C_Limit Level** **0324228_07 June 2016_Surface DO_E5_11:00-15:00_Zone C_Limit Level** **0324228_07 June 2016_Middle DO_E5_11:00-15:00_Zone C_Limit Level** **0324228_07 June 2016_Bottom DO_E5_11:00-15:00_Zone C_Limit Level** **[Total No. of Exceedance = 12]**
Monitoring Station(s) with Exceedance(s)	**Zone C:** E4 and E5
Parameter(s) with Exceedance(s)	**Zone C**: Action Levels for Dissolved Oxygen (DO) at middle and bottom depths Limit Levels for DO at all depths
Action Levels	Refer to *Table 3.5*
Limit Levels	Refer to *Table 3.5*
Measured Levels	Please refer to *Annex D*.
Exceedances	Refer to Exceedance Log No. for stations, water quality monitoring zone, exceedance of Action or Limit Levels.
Possible Reason for Action or Limit Level Non-compliance	Two (2) rounds of *ad hoc* monitoring were conducted in Zone C (07:00-11:00 and 11:00-15:00), on 7 June 2016. Monitoring results of DO at all depths in Zone C during baseline monitoring, all impact monitoring and *ad hoc* monitoring (to date) are presented in *Figures 1 to 3*. No Project works, including Post Lay Inspection & Burial (PLIB), were conducted within water quality monitoring zone (Zone C) on 7 June 2016 – the most recent Project works conducted in Zone C were PLIB works on 5 June 2016. DO, Turbidity and SS levels at control and gradient stations were also similar to impact monitoring stations. Therefore, these exceedances of Action and Limit Levels are considered to be caused by natural background fluctuations. The observation of a number of exceedances of Action and Limit Levels on 7 June 2016 strengthens the conclusion that the baseline data show very good water quality for Hong Kong waters such that natural water quality fluctuation is more likely to cause exceedances of Action and Limit Levels, as well as the NOE issued for 5 June 2016 being due to natural water quality fluctuation.

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Environmental Resources Management

16/F Berkshire House
25 Westlands Road
Quarry Bay, Hong Kong

T: 2271 3000
F: 2723 5660

www.erm.com