



中國建築工程(香港)有限公司
CHINA STATE CONSTRUCTION ENGINEERING (HONG KONG) LTD.

Contract No. HY/2013/04
Hong Kong-Zhuhai-Macao Bridge
Hong Kong Boundary Crossing Facilities –
Infrastructure Works Stage II (Southern Portion)

CONTRACTOR SUBMISSION FORM (CSF)

To	Engineer's Representative	Attn.	Mr. Peter Lee
Ref. No.	CDG/CSF/MA02.05/2019/8814	CSF No.	CSF/02999a
Subject	Monthly EM&A Report for December 2019		

Item	Description
1	Pursuant to G.S. Clause 25.01A and Condition 5.4 of the Environmental Permit No. EP-353/2009/K, we would like to submit herewith a copy of EM&A Report certified by our ETL, Messrs. Mott MacDonald for your onward submission to Environmental Protection Department.

Remarks :

Purpose of Submission :

For Approval

For Information

For Record Purposes

Expected Reply Date :

From : Contractor's Representative

Name : Jason Chung

Date : 22 January 2019

Signature :

Prepared by : WHW

Ramboll Hong Kong Limited
21st Floor, BEA Harbour View Centre
56 Gloucester Road
Wan Chai, Hong Kong

Attn:
Mr. Ray Yan - Independent Environmental Checker

**Contract No. HY/2013/04 Hong Kong-Zhuhai-Macao Bridge (HZMB)
Hong Kong Boundary Crossing Facilities – Infrastructure Works Stage II
(Southern Portion)**

Our Reference
TC/GC/bw/T355861/02/
02/L113

Monthly EM&A Report for December 2018

3/F Mapletree Bay Point
348 Kwun Tong Road
Kowloon
Hong Kong

17 January 2019

By Email

T +852 2828 5757
F +852 2827 1823
mottmac.hk

Dear Sir,

In accordance with Condition 5.4 of the Environmental Permit (EP-353/2009/K) covering the captioned contract, we are pleased to submit the certified Monthly EM&A Report for December 2018 for your verification.

Yours faithfully
For MOTT MACDONALD HONG KONG LIMITED



Gary Chow
Environmental Team Leader

Encl.

cc.
AECOM – Mr. Peter Lee (By Email)
China State Construction Engineering (Hong Kong) Ltd. – Mr. Xavier Lam / Mr. Ng
Ka Po (By Email)

17 January 2019

By Fax (3468 2076) and By Post

AECOM Asia Co. Ltd.
The PRE's Office
550 Cheung Tung Road, Lantau, Hong Kong

Attention: Mr. Peter Lee

Dear Sir,

**Re: Agreement No. CE 48/2011 (EP)
Environmental Project Office for the
HZMB Hong Kong Link Road, HZMB Hong Kong Boundary Crossing Facilities,
and Tuen Mun-Chek Lap Kok Link – Investigation**

**Contract No. HY/2013/04 – HZMB HKBCF – Infrastructure Works Stage II
(Southern Portion)
Monthly Environmental Monitoring & Audit Report for December 2018**

Reference is made to the Environmental Team's submission of the Monthly Environmental Monitoring & Audit Report for December 2018 certified by the ET Leader (ET's ref.: "TC/GC/bw/T355861/02/02/L113") and provided to us via e-mail.

We are pleased to inform you that we have no adverse comments on the captioned submission. We write to verify the captioned submission in accordance with Condition 5.4 of the Environmental Permit No. EP-353/2009/K.

Please be reminded to keep close attention on the proper implementation of site environmental mitigation measures as per Conditions 1.2 and 1.7 the EP through your close supervision and ET's surveillance, in particular on the consistency of Contractor's effort on haul road dust suppression; and wheel-washing facility implementation and maintenance.

Thank you very much for your attention and please feel free to contact the undersigned should you require further information.

Yours faithfully,
For and on behalf of
Ramboll Hong Kong Limited





Ray Yan
Independent Environmental Checker

c.c.	HyD	Mr. Tony Pang	(By Fax: 3188 6614)
	HyD	Mr. Harry Louie	(By Fax: 3188 6614)
	MMHK	Mr. Gary Chow	(By Fax: 2827 1823)
	CSCE	Mr. Jason Chung	(By Fax: 2459 4336)

Internal: DY, YH, DF, HW, ENPO Site

Q:\Projects\HYDHZMBEEM00\02_Proj_Mgt\02_Corr\HYDHZMBEEM00_0_7117L.19.doc



Contract No. HY/2013/04 HZMB HKBCF –
Infrastructure Works Stage II (Southern Portion)

Monthly EM&A Report for December 2018

January 2019

Contents

Executive summary	1
1 Introduction	4
1.1 Background	4
1.2 Project Description	4
1.3 Project Organisation	4
1.4 Construction Programme	5
1.5 Construction Works undertaken during the Reporting Period	5
2 Air Quality Monitoring	6
2.1 Introduction	6
2.2 Monitoring Locations	6
2.3 Monitoring Action and Limit Levels	7
2.4 Monitoring Station AMS6	7
2.5 Monitoring Schedule for the Reporting Period	7
2.6 Monitoring Equipment	7
2.7 Monitoring Methodology	8
2.8 Monitoring Results	10
3 Noise Monitoring	11
3.1 Introduction	11
3.2 Monitoring Locations	11
3.3 Monitoring Parameters, Frequency and Duration	11
3.4 Action and Limit Levels	11
3.5 Monitoring Schedule for the Reporting Period	12
3.6 Monitoring Equipment	12
3.7 Monitoring Methodology	12
3.8 Monitoring Results	13
4 Water Quality Monitoring	14
4.1 Introduction	14
4.2 Monitoring Locations	14
4.3 Monitoring Parameters, Frequency and Duration	15
4.4 Monitoring Action and Limit Levels	15
4.5 Monitoring Schedule for the Reporting Period	16
4.6 Monitoring Equipment	16
4.7 Monitoring Methodology	16

4.7.1	Instrumentation	16
4.7.2	Operating/Analytical Procedures	16
4.7.3	Maintenance and Calibration	17
4.8	Monitoring Results and Exceedance Investigations	17
5	Dolphin Monitoring	19
5.1	Introduction	19
5.2	Monitoring Locations	19
5.2.1	Vessel-based Line-transect Survey	19
5.2.2	Photo-identification Work	21
5.3	Action and Limit Levels for Dolphin Monitoring	22
5.4	Monitoring Schedule for the Reporting Period	22
5.5	Monitoring Results	22
5.5.1	Vessel-based Line-transect Survey	22
5.5.2	Photo-identification Work	23
6	Environmental Site and Audit	25
6.1	Site Inspection	25
6.2	Advice on the Solid and Liquid Waste Management Status	26
6.2.1	Disposal of Marine Sediment Extracted from Bored Piling Works	26
6.3	Environmental Licenses and Permits	27
6.4	Implementation Status of Environmental Mitigation Measures	28
6.5	Summary of Exceedance of the Environmental Quality Performance Limit	28
6.6	Summary of Complaints, Notification of Summons and Successful Prosecution	29
7	Future Key Issues	30
7.1	Construction Programme for the Coming Months	30
7.2	Environmental Site Inspection and Monitoring Schedule for the Coming Month	30
8	Conclusions	31
8.1	Conclusions	31

Figures

- Figure 2.1: Location of Air Quality Monitoring Stations
- Figure 3.1: Location of Noise Monitoring Stations
- Figure 4.1: Location of Water Quality Monitoring Stations
- Figure 5.1: Impact Dolphins Monitoring Line Transect Layout Map

Appendices

- Appendix A. Location of Works Areas
- Appendix B. Project Organization for Environmental Works
- Appendix C. Construction Programme

Appendix D. Event and Action Plan	
Appendix E. Waste Flow Table	
Appendix F. Environmental Licences and Permits	
Appendix G. Implementation Schedule for Environmental Mitigation Measures (EMIS)	
Appendix H. Statistics on Environmental Complaints, Notification of Summons and Successful Prosecutions	
Appendix I. Environmental Site Inspection and Monitoring Schedule	
Appendix J. Calibration Certificates	
Appendix K. Monitoring Data and Graphical Plots (Air Quality, Noise and Water Quality)	
Appendix L. Dolphin Monitoring Results	
Appendix M. Wind Data	
Appendix N. Investigation Report	

Tables

Table 1.1: Contact Information of Key Personnel	5
Table 2.1: Construction Dust Monitoring Locations	6
Table 2.2: Action and Limit Levels for 1-hour TSP	7
Table 2.3: Action and Limit Levels for 24-hour TSP	7
Table 2.4: Air Quality Monitoring Equipment	7
Table 2.5: Summary of 1-hour TSP Monitoring Results During the Reporting Period	10
Table 2.6: Summary of 24-hour TSP Monitoring Results During the Reporting Period	10
Table 3.1: Construction Noise Monitoring Locations	11
Table 3.2: Noise Monitoring Parameters, Frequency and Duration	11
Table 3.3: Action and Limit Level for Construction Noise	12
Table 3.4: Noise Monitoring Equipment	12
Table 3.5: Summary of Construction Noise Monitoring Results During the Reporting Period	13
Table 4.1: Impact Water Quality Monitoring Stations	14
Table 4.2: Impact Water Quality Monitoring Parameters and Frequency	15
Table 4.3: Action and Limit Levels for Water Quality	15
Table 4.4: Water Quality Monitoring Equipment	16
Table 4.5: Laboratory Analysis for Suspended Solids	17
Table 4.6: Action and Limit Level Exceedance for Water Quality	18
Table 5.1: Impact Dolphin Monitoring Line Transect Co-ordinates (Provided by AFCD)	19
Table 5.2: Action and Limit Levels for Chinese White Dolphin Monitoring - Approach to Define Action Level (AL) and Limit Level (LL)	22
Table 5.3: Derived Value of Action Level (AL) and Limit Level (LL) for Chinese White Dolphin Monitoring	22
Table 5.4: Dolphin encounter rates deduced from the two sets of HKBCF surveys (two surveys in each set) during the reporting period in Northeast (NEL) and Northwest Lantau (NWL)	23
Table 5.5: Overall dolphin encounter rates (sightings per 100 km of survey effort) from all four HKBCF surveys conducted during the reporting period on primary lines only as well as both primary lines and secondary lines in NEL and NWL	23

Table 6.1: Summary of Marine Sediment disposed to Dumping Site via Contract No. HY/2013/03	27
Table 7.1: Construction Activities for January 2019	30

Executive summary

This Monthly Environmental Monitoring and Audit (EM&A) Report is prepared for Contract No. HY/2013/04 “Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Infrastructure Works Stage II (Southern Portion)” (hereafter referred to as “the Contract”) for the Highways Department of Hong Kong Special Administrative Region (HKSAR). The Contract was awarded to China State Construction Engineering (Hong Kong) Limited (hereafter referred to as “the Contractor”) and Mott MacDonald Hong Kong Limited (MMHK) was appointed as the Environmental Team (ET) by the Contractor.

The Contract is part of the “Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities” (HZMB HKBCF) Project which is a “Designated Project” under Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance (Cap. 499) and for which an EIA Report (Register No. AEIAR-145/2009) was prepared and approved. The current Environmental Permit (EP) for HKBCF, namely No. EP-353/2009/K, was issued on 11 April 2016. These documents are available through the EIA Ordinance Register. Commencement of the Contract took place on 13 March 2015 and the construction works commenced on 13 July 2015.

Mott MacDonald Hong Kong Limited has been appointed by the Contractor to implement the Environmental Monitoring & Audit (EM&A) programme for the Contract in accordance with the Updated EM&A Manual for HKBCF (Version 1.0) and will be providing environmental team services for the Contract.

This is the 42nd Monthly EM&A Report for the Contract which summaries findings of the EM&A works during the reporting period from 1 to 31 December 2018 (the “reporting period”).

Environmental Monitoring and Audit Progress

The monthly EM&A programme was undertaken in accordance with the Updated EM&A Manual for HKBCF (Version 1.0).

The remaining air quality, noise, water quality and dolphin monitoring works under Contract No. HY/2013/01 “HZMB HKBCF – Passenger Clearance Building” were temporarily suspended from 1 October 2018. The ET of Contract No. HY/2013/04 is required and continues the full implementation of environmental monitoring commencing on 1 October 2018.

Air quality monitoring stations AMS2, AMS3C and AMS7B are covered by this Contract. It should be noted that the air quality monitoring station AMS6 is covered by Contract No. HY/2011/03 “Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road (HZMB HKLR) – Section between Scenic Hill and HKBCF”. If the impact air quality monitoring at AMS6 is no longer covered under Contract No. HY/2011/03, it is required to continue such monitoring at AMS6 as part of EM&A programme. However, this is subject to ENPO’s final decision on which ET should carry out the monitoring work at these stations.

Noise monitoring stations NMS2 and NMS3C, water quality monitoring works and dolphin monitoring works under HZMB HKBCF are covered by this Contract.

A summary of the monitoring activities during the reporting period are listed below:

- 1-hour TSP Monitoring: 5, 6, 11, 12, 17, 18, 22, 24 and 28 December 2018

- 24-hour TSP Monitoring: 5, 11, 17, 21, 22, 27 and 28 December 2018
- Noise Monitoring: 5, 11, 17 and 28 December 2018
- Water Quality Monitoring: 3[^], 5, 7, 10, 12 and 14[^] December 2018
- Chinese White Dolphin Monitoring: 3, 5, 10 and 12 December 2018
- Environmental Site Inspection: 5, 13, 17 and 27 December 2018

Remarks:

[^] The water quality monitoring programme was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.

Breaches of Action and Limit Levels

A summary of environmental exceedances for the reporting period as recorded by the Environmental Team of this Contract are listed below:

Environmental Monitoring	Parameters	Action Level	Limit Level
Air Quality	1-hour TSP	-	-
	24-hour TSP	-	-
Noise	Leq (30 min)	-	-
Water Quality	Suspended Solids (SS)	5	1
	Turbidity	-	-
	Dissolved Oxygen (DO)	-	-

Complaint Log

There were no complaints received in relation to the environmental impact during the reporting period.

Notifications of Summons and Successful Prosecutions

There were no notifications of summons or prosecutions received during this reporting period.

Reporting Changes

The water quality monitoring programme was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.

Future Key Issues

The future key issues to be undertaken in the upcoming month are:

- Erection of sign gantries (land-based)
- Construction of parapets for bridge structures (land-based)
- Construction of Retaining Wall RW16N and RW16S (land-based)
- Construction of Bridge Deck D16 in-situ deck (land-based)
- Construction of utilities cross-over frame under Bridge D9c (land-based)
- Backfilling of retaining walls and formation of fill slopes and road embankment (land-based)
- Drainage works and watermain laying (land-based)
- Roadworks and road furniture (land-based)

- Maintenance of temporary traffic arrangements (TTA) associated with the commissioning of HKBCF and Tuen Mun – Chek Lap Kok Link Southern Connection (TM-CLKL-SC) (land-based)
- Removal of silt curtain (marine-based) (expected to be carried out in January 2019)

1 Introduction

1.1 Background

On 13 March 2015, Mott MacDonald Hong Kong Limited (MMHK) was commissioned by China State Construction Engineering (Hong Kong) Limited (also referred to as “the Contractor”) to undertake the Environmental Team (ET) services (including environmental monitoring and audit (EM&A)) for Contract No. HY/2013/04 “Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Infrastructure Works Stage II (Southern Portion)” (“the Contract”) for the Highways Department of Hong Kong Special Administrative Region (HKSAR).

The Contract is part of the “Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities” (HZMB HKBCF) Project which is a “Designated Project” under Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance (Cap. 499) and for which an EIA Report (Register No. AEIAR-145/2009) was prepared and approved. The current Environmental Permit (EP) for HKBCF, namely No. EP-353/2009/K, was issued on 11 April 2016. These documents are available through the EIA Ordinance Register. Commencement of the Contract took place on 13 March 2015 and the construction works commenced on 13 July 2015. The works areas of the contract are shown in **Appendix A**.

This is the 42nd Monthly EM&A Report summarising the findings of EM&A activities conducted under the Contract from 1 to 31 December 2018 (the “reporting period”) and is submitted to fulfil Condition 5.4 of the EP.

1.2 Project Description

The Proposed works under this Contract comprise the following:

- Construction of vehicular bridge and at-grade roads at the southern portion of Hong Kong Boundary Crossing Facilities;
- Construction of associated street lighting, street furniture, road marking, road signage, box culverts and outfalls, drainage, sewerage, fresh water and flushing water supply, irrigation, landscape, electrical and mechanical (E&M), utilities and services works;
- Provisioning of civil engineering works and power supply for Traffic Control and Surveillance System (TCSS); and
- Other works in accordance with the Contract.

1.3 Project Organisation

The organisation chart and lines of communication with respect to the on-site environmental management structure together with the contact information of the key personnel are shown in **Appendix B**. The key personnel contact names and numbers are summarized in **Table 1.1**.

Table 1.1: Contact Information of Key Personnel

Party	Position	Name	Telephone	Fax
Engineer or Engineer's Representative (AECOM Asia Co. Ltd.)	Senior Resident Engineer	Peter Lee	3958 7465	3748 8900
Environmental Project Office / Independent Environmental Checker (Ramboll Hong Kong Limited)	Environmental Project Office Leader	Y H Hui	3465 2888	3465 2899
	Independent Environmental Checker (until 31 Dec 2018)	Raymond Dai	3465 2888	3465 2899
	Independent Environmental Checker (from 1 Jan 2019)	Ray Yan	3465 2836 / 5181 8401	3465 2899
	Environmental Site Supervisor (until 31 Dec 2018)	Ray Yan	5181 8165	3465 2899
	Environmental Site Supervisor (from 1 Jan 2019)	Harris Wong	3465 2805 / 5181 8709	3465 2899
Contractor (China State Construction Engineering (Hong Kong) Limited)	Site Agent	Jason Chung	9127 8369	2459 4336
	Environmental Officer	Xavier Lam	9493 2944	2459 4336
		K P Ng	9626 9961	2459 4336
Environmental Team (Mott MacDonald Hong Kong Limited)	Environmental Team Leader	Gary Chow	2828 5874	2827 1823
24-hour Complaint Hotline	-	-	5236 7111	-

1.4 Construction Programme

The Construction Works Programme of the Project is provided in **Appendix C**.

1.5 Construction Works undertaken during the Reporting Period

A summary of the construction activities undertaken during this reporting period is shown below:

- Erection of sign gantries
- Construction of parapets for bridge structures
- Construction of Retaining Wall RW16N and RW16S
- Construction of Bridge Deck D16 in-situ deck
- Construction of utilities cross-over frame under Bridge D9c
- Backfilling of retaining walls and formation of fill slopes and road embankment
- Drainage works and watermains laying
- Roadworks and road furniture
- Maintenance of temporary traffic arrangements (TTA) associated with the commissioning of HKBCF and TM-CLKL-SC
- No marine-based segment delivery (all segments stored at segment storage yard on HKBCF island site)
- No generation of excavated marine sediment

During this reporting period, temporary soft landscaping works were conducted and marine-based outfall works had not commenced, and no marine-based removal of silt curtain was conducted.

2 Air Quality Monitoring

2.1 Introduction

In accordance with the Contract Specific EM&A Manual, baseline 1-hour and 24-hour Total Suspended Particulates (TSP) levels at air quality monitoring stations AMS6 and AMS7 were established. Also, baseline 1-hour and 24-hour Total Suspended Particulates (TSP) levels at air quality monitoring stations AMS2 and AMS3 were established under other HKBCF contracts. Impact 1-hour TSP monitoring was conducted for at least three times every 6 days, while impact 24-hour TSP monitoring was carried out for at least once every 6 days.

2.2 Monitoring Locations

Monitoring locations AMS2, AMS3, AMS6 and AMS7 were set up at the proposed locations in accordance with the relevant Contract Specific EM&A Manual. For monitoring location AMS3 (Ho Yu College), as proposed in the Contract Specific EM&A Manual, approval for carrying out impact monitoring could not be obtained from the principal of the school. Permission on setting up and carrying out impact monitoring works at nearby sensitive receivers, like Caribbean Coast and Coastal Skyline, was also sought. However, approvals for carrying out impact monitoring works within their premises were not obtained. Impact air quality monitoring was conducted at site boundary of the site office area in Works Area WA2 (AMS3B) before being relocated to Ying Tung Estate Market Rooftop (AMS3C) on 20 August 2018 under this Contract. The same baseline and Action Level for air quality, as derived from the baseline monitoring data recorded at Ho Yu College, was adopted for this alternative air quality location.

It should be noted that the air quality monitoring works for the Contract at AMS6 (Dragonair/CNAC (Group) Building) are covered by Contract No. HY/2011/03 “Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road (HZMB HKLR) – Section between Scenic Hill and HKBCF”.

The ET of the Contract or another ET of the HZMB project is required to conduct impact air quality monitoring at AMS6 as part of EM&A programme if this air quality monitoring station is no longer covered under Contract No. HY/2011/03.

Table 2.1 describes the details of the monitoring stations and **Figure 2.1** shows the locations of air monitoring stations.

Table 2.1: Construction Dust Monitoring Locations

Identification No.	Location Description
AMS2	Tung Chung Development Pier
AMS3C	Ying Tung Estate Market Rooftop
AMS6 ⁽¹⁾	Dragonair/CNAC (Group) Building
AMS7B	3RS Site Offices

Remarks: (1) The ET of this Contract should conduct impact air quality monitoring at station AMS6 listed in the table as part of EM&A programme according to latest notification from ENPO when the monitoring station(s) is/are no longer covered by another ET of the HZMB project.

2.3 Monitoring Action and Limit Levels

The Action and Limit Levels for 1-hr TSP and 24-hr TSP are provided in **Table 2.2** and **Table 2.3** respectively. The same baseline and Action/Limit Levels for air quality, as derived from the baseline monitoring data recorded at and AMS3 and AMS7, apply with the abovementioned relocations to AMS3C and AMS7B respectively.

Table 2.2: Action and Limit Levels for 1-hour TSP

Monitoring Station	Action Level, $\mu\text{g}/\text{m}^3$	Limit Level, $\mu\text{g}/\text{m}^3$
AMS2 – Tung Chung Development Pier	374	500
AMS3C – Ying Tung Estate Market Rooftop	368	500
AMS6 – Dragonair / CNAC (Group) Building (HKIA)	360	500
AMS7B – 3RS Site Offices	370	500

Table 2.3: Action and Limit Levels for 24-hour TSP

Monitoring Station	Action Level, $\mu\text{g}/\text{m}^3$	Limit Level, $\mu\text{g}/\text{m}^3$
AMS2 – Tung Chung Development Pier	176	260
AMS3C – Ying Tung Estate Market Rooftop	167	260
AMS6 – Dragonair / CNAC (Group) Building (HKIA)	173	260
AMS7B – 3RS Site Offices	183	260

The event and action plan is provided in **Appendix D**.

If exceedance(s) at these stations is/are recorded by the ET of the Contract or referred by the other ET under the HZMB project to the Contract, the ET of the Contract will carry out an investigation and findings will be reported in the monthly EM&A Report.

2.4 Monitoring Station AMS6

The monitoring requirements, monitoring equipment, monitoring parameters, frequency and duration, monitoring methodology and monitoring schedule for air quality monitoring station AMS6 are detailed in the monthly EM&A Reports prepared for Contract No. HY/2011/03.

2.5 Monitoring Schedule for the Reporting Period

The schedule for air quality monitoring at AMS2, AMS3C and AMS7B in the reporting period is presented in **Appendix I**.

2.6 Monitoring Equipment

24-hour TSP air quality monitoring was performed using High Volume Sampler (HVS) located at each designated monitoring station. The HVS meets all the requirements of the Contract Specific EM&A Manual. Portable direct reading dust meters were used to carry out the 1-hour TSP monitoring. Brand and model of the equipment used for air quality monitoring stations AMS2, AMS3C and AMS7B under this Contract is given in **Table 2.4**.

Table 2.4: Air Quality Monitoring Equipment

Equipment	Brand	Model No.
Portable direct reading dust meter (1-hour TSP)	Sibata Digital Dust Monitor	LD-3B, LD-5R
High Volume Sampler (24-hour TSP)	Tisch Environmental Mass Flow Controlled Total Suspended Particulate (TSP) High Volume Sampler	TE-5170

2.7 Monitoring Methodology

24-hour TSP Monitoring

- a. The HVS was installed in the vicinity of the air sensitive receivers. The following criteria were considered in the installation of the HVS.
 - i. A horizontal platform with appropriate support to secure the sampler against gusty wind was provided.
 - ii. The distance between the HVS and any obstacles, such as buildings, was at least twice the height that the obstacle protrudes above the HVS.
 - iii. A minimum of 2 meters separation from walls, parapets and penthouse for rooftop sampler was provided.
 - iv. No furnace or incinerator flues are nearby.
 - v. Airflow around the sampler was unrestricted.
 - vi. Permission was obtained to set up the samplers and access to the monitoring stations.
 - vii. A secured supply of electricity was obtained to operate the samplers.
 - viii. The sampler was located more than 20 meters from any dripline.
 - ix. Any wire fence and gate, required to protect the sampler, did not obstruct the monitoring process.
 - x. Flow control accuracy was kept within $\pm 2.5\%$ deviation over 24-hour sampling period.
- b. Preparation of Filter Papers
 - i. Glass fibre filters, G810 were labelled and sufficient filters that were clean and without pinholes were selected.
 - ii. All filters were equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature was around 25 °C and not variable by more than ± 3 °C; the relative humidity (RH) was < 50% and not variable by more than $\pm 5\%$. A convenient working RH was 40%.
 - iii. All filter papers were prepared and analysed by ALS Technichem (HK) Pty Ltd., which is a HOKLAS accredited laboratory and has comprehensive quality assurance and quality control programmes.
- c. Field Monitoring
 - i. The power supply was checked to ensure the HVS works properly.
 - ii. The filter holder and the area surrounding the filter were cleaned.
 - iii. The filter holder was removed by loosening the four bolts and a new filter, with stamped number upward, on a supporting screen was aligned carefully.
 - iv. The filter was properly aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter.
 - v. The swing bolts were fastened to hold the filter holder down to the frame. The pressure applied was sufficient to avoid air leakage at the edges.
 - vi. Then the shelter lid was closed and was secured with the aluminium strip.
 - vii. The HVS was warmed-up for about 5 minutes to establish run-temperature conditions.
 - viii. A new flow rate record sheet was set into the flow recorder.
 - ix. On site temperature and atmospheric pressure readings were taken and the flow rate of the HVS was checked and adjusted at around 1.1 m³/min, and complied with

the range specified in the Updated EM&A Manual for HKBCF (Version 1.0) (i.e. 0.6-1.7 m³/min).

- x. The programmable digital timer was set for a sampling period of 24 hours, and the starting time, weather condition and the filter number were recorded.
 - xi. The initial elapsed time was recorded.
 - xii. At the end of sampling, on site temperature and atmospheric pressure readings were taken and the final flow rate of the HVS was checked and recorded.
 - xiii. The final elapsed time was recorded.
 - xiv. The sampled filter was removed carefully and folded in half length so that only surfaces with collected particulate matter were in contact.
 - xv. It was then placed in a clean plastic envelope and sealed.
 - xvi. All monitoring information was recorded on a standard data sheet.
 - xvii. Filters were then sent to ALS Technichem (HK) Pty Ltd. for analysis.
- d. Maintenance and Calibration
- i. The HVS and its accessories were maintained in good working condition, such as replacing motor brushes routinely and checking electrical wiring to ensure a continuous power supply.
 - ii. 5-point calibration of the HVS was conducted using TE-5025A Calibration Kit prior to the commencement of baseline monitoring. Bi-monthly 5-point calibration of the HVS will be carried out during impact monitoring.
 - iii. Calibration certificate of the HVSs are provided in **Appendix J**.

1-hour TSP Monitoring

a. Measuring Procedures

The measuring procedures of the 1-hour dust meter were in accordance with the Manufacturer's Instruction Manual as follows:

- i. Turn the power on.
 - ii. Close the air collecting opening cover.
 - iii. Push the "TIME SETTING" switch to [BG].
 - iv. Push "START/STOP" switch to perform background measurement for 6 seconds.
 - v. Turn the knob at SENSI ADJ position to insert the light scattering plate.
 - vi. Leave the equipment for 1 minute upon "SPAN CHECK" is indicated in the display.
 - vii. Push "START/STOP" switch to perform automatic sensitivity adjustment. This measurement takes 1 minute.
 - viii. Pull out the knob and return it to MEASURE position.
 - ix. Push the "TIME SETTING" switch the time set in the display to 3 hours.
 - x. Lower down the air collection opening cover.
 - xi. Push "START/STOP" switch to start measurement.
- b. Maintenance and Calibration
- i. The 1-hour TSP meter was calibrated at 1-year intervals against a Tisch Environmental Mass Flow Controlled Total Suspended Particulate (TSP) High Volume Air Sampler. Calibration certificates of the Laser Dust Monitors are provided in **Appendix J**.

2.8 Monitoring Results

The monitoring results for 1-hour and 24-hour TSP at AMS2, AMS3C and AMS7B are summarized in **Table 2.5** and **Table 2.6** respectively. Detailed impact air quality monitoring results are presented in **Appendix K**.

Table 2.5: Summary of 1-hour TSP Monitoring Results During the Reporting Period

Monitoring Station	Average, $\mu\text{g}/\text{m}^3$	Range, $\mu\text{g}/\text{m}^3$	Action Level, $\mu\text{g}/\text{m}^3$	Limit Level, $\mu\text{g}/\text{m}^3$
AMS2	50	36 – 66	374	500
AMS3C	40	20 – 58	368	500
AMS7B	43	22 – 65	370	500

Table 2.6: Summary of 24-hour TSP Monitoring Results During the Reporting Period

Monitoring Station	Average, $\mu\text{g}/\text{m}^3$	Range, $\mu\text{g}/\text{m}^3$	Action Level, $\mu\text{g}/\text{m}^3$	Limit Level, $\mu\text{g}/\text{m}^3$
AMS2	74	55 – 84	176	260
AMS3C	70	49 – 96	167	260
AMS7B	111	54 – 165	183	260

There was no Action and Limit Level exceedance of 1-hr TSP level and 24-hr TSP level recorded at station AMS2, AMS3C and AMS7B by the Environmental Team of this Contract during the reporting period.

The monitoring results for AMS6 are reported in the monthly EM&A Reports prepared for Contract No. HY/2011/03 respectively.

Summary of Action and Limit Level exceedance of 1-hr TSP level and 24-hr TSP level at AMS6 shall be referred to the monthly EM&A report prepared by Contract No. HY/2011/03.

The wind data obtained from the on-site wind station (as shown in **Figure 2.1**) during the reporting period is provided in **Appendix M**.

3 Noise Monitoring

3.1 Introduction

In accordance with the Contract Specific EM&A Manual, impact noise monitoring was conducted at least once per week for each noise monitoring location during the construction phase of the Contract.

3.2 Monitoring Locations

Approval for carrying out impact monitoring at NMS3 (Ho Yu College), as proposed in the Contract Specific EM&A Manual, could not be obtained from the principal of school. Permission on setting up and carry out impact monitoring works at nearby sensitive receivers, like Caribbean Coast and Coastal Skyline, was also sought. However, approvals for carrying out impact monitoring works within their premises were not obtained. Impact noise monitoring was conducted at site boundary of the site office area in Works Area WA2 (NMS3B) before being relocated to Ying Tung Estate Market Rooftop (NMS3C) on 20 August 2018 under this Contract. The same baseline noise level (as derived from the baseline monitoring data recorded at Ho Yu College) and Limit Level were adopted for this alternative noise monitoring location.

Table 3.1 describes the details of the monitoring stations and **Figure 3.1** shows the locations of noise monitoring stations.

Table 3.1: Construction Noise Monitoring Locations

Identification No.	Location Description
NMS2	Seaview Crescent
NMS3C ⁽¹⁾	Ying Tung Estate Refuse Collection Point

Remarks: (1) The Action and Limit Levels for schools will be applied for this alternative monitoring location.

3.3 Monitoring Parameters, Frequency and Duration

Table 3.2 summarises the monitoring parameters, frequency and duration of impact TSP monitoring.

Table 3.2: Noise Monitoring Parameters, Frequency and Duration

Parameter	Frequency and Duration
30-minutes measurement at each monitoring station between 0700 and 1900 on normal weekdays (Monday to Saturday). L _{eq} , L ₁₀ and L ₉₀ would be recorded.	At least once per week

3.4 Action and Limit Levels

The Action and Limit Levels for construction noise are defined in **Table 3.3**.

Table 3.3: Action and Limit Level for Construction Noise

Monitoring Station	Time Period	Action Level	Limit Level
NMS2	07:00 – 19:00 hours on normal weekdays	When one documented complaint is received	70 dB(A)
NMS3C			70/65 dB(A)*

Remark: Limit Level for schools will be applied for NMS3C. Day time noise Limit Level of 70 dB(A) applies to education institutions, while 65 dB(A) applies during the school examination period.

The event and action plan is provided in **Appendix D**.

If exceedance(s) at these stations is/are recorded by the ET of the Contract or referred by the other ET under the HZMB project to the Contract, the ET of the Contract will carry out an investigation and findings will be reported in the monthly EM&A Report.

3.5 Monitoring Schedule for the Reporting Period

The schedule for noise monitoring in the reporting period is presented in **Appendix I**.

3.6 Monitoring Equipment

Noise monitoring was performed using sound level meters at each designed monitoring station. The sound level meters deployed comply with the International Electrotechnical Commission Publications (IEC) 651:1979 (Type 1) and 804:1985 (Type 1) specifications. Acoustic calibrator was deployed to check the sound level meters at a known sound pressure level. Brand and model of the equipment used for noise monitoring under this Contract is given in **Table 3.4**.

Table 3.4: Noise Monitoring Equipment

Equipment	Brand	Model No.
Integrated Sound Level Meter	Rion	NL-52
Acoustic Calibrator	Larson Davis	CAL200

3.7 Monitoring Methodology

1. Monitoring Procedure

- a. The measurement at NMS3C was free-field measurement and NMS2 was façade measurement. A correction of +3dB(A) shall be made to the free-field measurement.
- b. The battery condition was checked to ensure the correct functioning of the meter.
- c. Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:
 - i. frequency weighting: A
 - ii. time weighting: Fast
 - iii. time measurement: L_{eq} (30-minutes) during non-restricted hours i.e. 0700-1900 on normal workdays.
- d. Prior to and after each noise measurement, the meter was calibrated using the acoustic calibrator for 94dB(A) at 1000 Hz. If the difference in the calibration level before and after measurement was more than 1 dB(A), the measurement would be considered invalid and repeat of noise measurement would be required after re-calibration or repair of the equipment.
- e. During the monitoring period, the L_{eq} , L_{10} and L_{90} were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.

- f. Noise measurement was paused during periods of high intrusive noise (e.g. dog barking, helicopter noise) if possible. Observations were recorded when intrusive noise was unavoidable.
 - g. Noise monitoring was cancelled in the presence of fog, rain, wind with a steady speed exceeding 5m/s, or wind with gusts exceeding 10m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.
2. Maintenance and Calibration
- a. The microphone head of the sound level meter was cleaned with soft cloth at regular intervals.
 - b. The meter and calibrator were sent to the supplier or HOKLAS laboratory to check and calibrate at yearly intervals.
 - c. Calibration certificates of the sound level meters and acoustic calibrators are provided in **Appendix J**.

3.8 Monitoring Results

The monitoring results for construction noise are summarized in **Table 3.5**. Detailed impact noise monitoring results and relevant graphical plots are presented in **Appendix K**.

Table 3.5: Summary of Construction Noise Monitoring Results During the Reporting Period

Monitoring Station	Average, dB(A)	Range, dB(A)	Limit Level, dB(A)
	L_{eq} (30 mins)	L_{eq} (30 mins)	L_{eq} (30 mins)
NMS2	66	65 – 66	75
NMS3C	67	66 – 67	70/65*

Remark: (*) The Limit Level for schools will be applied for NMS3C. Daytime noise Limit Level of 70 dB(A) applies to education institutions, while 65 dB(A) applies during the school examination period.

The school calendar of Ho Yu College was checked and there was no school examination period at Ho Yu College during the reporting period.

No noise exceedances were recorded at stations NMS2 and NMS3C by the ET of this Contract during the reporting period.

4 Water Quality Monitoring

4.1 Introduction

Impact water quality monitoring was carried out to ensure that any deterioration of water quality was detected, and that timely action was taken to rectify the situation. For impact water quality monitoring, measurement were taken in accordance with the Contract Specific EM&A Manual.

4.2 Monitoring Locations

During the reporting period, the water quality monitoring works are covered by this Contract. A total of twenty-one stations (nine Impact Stations, seven Sensitive Receiver Stations and five Control/Far Field Stations) are covered by the current EM&A programme.

The nine Impact Stations (IS) were chosen on the basis of their proximity to the reclamation and thus the greatest potential for water quality impacts, the seven Sensitive Receiver Stations (SR) were chosen as they are close to the key sensitive receives and the five Control/ Far Field Stations (CS) were chosen to facilitate comparison of the water quality of the IS stations with less influence by the Project/ ambient water quality conditions.

The water quality monitoring stations at CS(Mf)3 (Coordinate: 809989E, 821117N), IS10 (Coordinate: 812577E, 820670N) and SR5 (811489E, 820455N) have been occupied by the marine work of a designated project – “Expansion of Hong Kong International Airport into a Three-Runway System” (3RS Project). The alternative water quality monitoring station at CS(Mf)3(N) (Coordinate: 808814E, 822355N), IS10(N) (Coordinate: 812942E, 820881N) and SR5(N) (812569E, 8201475N) were justified and verified by the ET Leader of Contract No. HY/2010/02 and the IEC respectively on 24 March 2017 and it was approved by EPD on 12 May 2017.

The water quality monitoring stations at SR3, SR10A and SR10B(N) were not available for water sampling due to safety reason, thus, monitoring stations were changed to SR3(N) (Coordinate: 810689E, 816591N); SR10A(N) (Coordinate: 823644E, 823484N) and SR10B(N2) (Coordinate: 823689E, 823159N) were justified by the ET Leader of Contract No. HY/2013/01 on 8 November 2017 and the IEC verified on 13 November 2017; and submitted to EPD on 29 November 2017 and it was approved by EPD on 22 December 2017.

Table 4.1 and **Figure 4.1** shows the locations of water quality monitoring stations.

Table 4.1: Impact Water Quality Monitoring Stations

Station	Description	East	North
IS5	Impact Station (Close to HKBCF construction site)	811579	817106
IS(Mf)6	Impact Station (Close to HKBCF construction site)	812101	817873
IS7	Impact Station (Close to HKBCF construction site)	812244	818777
IS8	Impact Station (Close to HKBCF construction site)	814251	818412
IS(Mf)9	Impact Station (Close to HKBCF construction site)	813273	818850
IS10(N)	Impact Station (Close to HKBCF construction site)	812942	820881
IS(Mf)11	Impact Station (Close to HKBCF construction site)	813562	820716
IS(Mf)16	Impact Station (Close to HKBCF construction site)	814328	819497

Station	Description	East	North
IS17	Impact Station (Close to HKBCF construction site)	814539	820391
SR3(N)	Sensitive receivers (San Tau SSSI)	810689	816591
SR4(N)	Sensitive receivers (Tai Ho)	814705	817859
SR5(N)	Sensitive receivers (Artificial Reef in NE Airport)	812569	821475
SR6	Sensitive receivers (Sha Chau and Lung Kwu Chau Marine Park)	805837	821818
SR7	Sensitive receivers (Tai Mo Do)	814293	821431
SR10A(N)	Sensitive receivers (Ma Wan FCZ) 1	823644	823484
SR10B(N2)	Sensitive receivers (Ma Wan FCZ) 2	823689	823159
CS(Mf)3(N)	Control Station	808814	822355
CS(Mf)5	Control Station	817990	821129
CS4	Control Station	810025	824004
CS6	Control Station	817028	823992
CSA	Control Station	818103	823064

If exceedance(s) at these stations is/are recorded by the ET of the Contract or referred by the other ET under the HZMB project to the Contract, the ET of the Contract will carry out an investigation and findings will be reported in the monthly EM&A Report.

4.3 Monitoring Parameters, Frequency and Duration

Table 4.2 summarizes the monitoring parameters, frequency and monitoring depths of impact water quality monitoring in the Contract Specific EM&A Manual.

Table 4.2: Impact Water Quality Monitoring Parameters and Frequency

Monitoring Stations	Parameter, Unit	Frequency	No. of Depths Measured
Impact Stations: IS5, IS(Mf)6, IS7, IS8, IS(Mf)9, IS10(N), IS(Mf)11, IS(Mf)16, IS17	<ul style="list-style-type: none"> Depth, m Temperature, °C Salinity, ppt Dissolved Oxygen (DO), mg/L 	Three times per week during mid-ebb and mid-flood tides (within ±1.75 hour of the predicted time)	3 (1m below water surface, mid-depth and 1m above sea bed, except where the water depth is less than 6m, in which case the mid-depth station may be omitted. Should the water depth be less than 3m, only the mid-depth station will be monitored.)
Control/Far Field Stations: CS(Mf)3(N), CS(Mf)5, CS4, CS6, CSA	<ul style="list-style-type: none"> DO Saturation, % Turbidity, NTU 		
Sensitive Receiver Stations: SR3(N), SR4(N), SR5(N), SR6, SR7, SR10A(N) & SR10B(N2)	<ul style="list-style-type: none"> pH Suspended Solids (SS), mg/L 		

4.4 Monitoring Action and Limit Levels

The Action and Limit Levels for water quality are provided in **Table 4.3**.

Table 4.3: Action and Limit Levels for Water Quality

Parameters	Action	Limit
DO in mg L ⁻¹ (Surface, Middle & Bottom)	Surface and Middle 5.0 Bottom 4.7	Surface and Middle 4.2 (except 5 mg/L for FCZ) Bottom 3.6
SS in mg L ⁻¹ (depth-averaged) at all monitoring stations and control stations	23.5 and 120% of upstream control station's SS at the same tide of the same day*	34.4 and 130% of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes*

Parameters	Action	Limit
Turbidity in NTU (depth-averaged)	27.5 and 120% of upstream control station's turbidity at the same tide of the same day*	47.0 and 130% of upstream control station's

Remarks:

* Reference is made to EPD approval of adjustment of water quality assessment criteria issued and became effective on 18 February 2013.

Notes:

1. "depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
2. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
3. For turbidity, SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
4. All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered as necessary.
5. The 1%-ile of baseline data for dissolved oxygen (surface and middle) and dissolved oxygen (bottom) are 4.2 mg/L and 3.6 mg/L respectively.

The event and action plan is provided in **Appendix D**.

4.5 Monitoring Schedule for the Reporting Period

The water quality monitoring programme was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.

The schedule for water quality monitoring in the reporting period is presented in **Appendix I**.

4.6 Monitoring Equipment

Table 4.4 summaries the equipment used in the impact water quality monitoring programme.

Table 4.4: Water Quality Monitoring Equipment

Equipment	Brand and Model	Serial Number
DO and Temperature Meter, Salinity Meter, Turbidity Meter & pH Meter	YSI ProDSS	16H104234 / 17H105557 / 16H104233 / 17E100747

4.7 Monitoring Methodology

4.7.1 Instrumentation

- a. The in-situ water quality parameters, viz. dissolved oxygen, temperature, salinity, turbidity and pH, were measured by multi-parameter meters and pH meter.

4.7.2 Operating/Analytical Procedures

- a. Digital Differential Global Positioning Systems (DGPS) were used to ensure that the correct location was selected prior to sample collection.
- b. Portable, battery-operated echo sounders were used for the determination of water depth at each designated monitoring station.
- c. All in-situ measurements were taken at 3 water depths, 1m below water surface, mid-depth and 1m above sea bed, except where the water depth was less than 6m, in which case the mid-depth station was omitted. Should the water depth be less than 3m, only the mid-depth station was monitored.
- d. At each measurement/sampling depth, two consecutive in-situ monitoring (DO concentration and saturation, temperature, turbidity, pH, salinity) and water sample for

SS. The probes were retrieved out of the water after the first measurement and then re-deployed for the second measurement. Where the difference in the value between the first and second readings of DO or turbidity parameters was more than 25% of the value of the first reading, the reading was discarded and further readings were taken.

- e. Duplicate samples from each independent sampling event were collected for SS measurement. Water samples were collected using the water samplers and the samples were stored in high density polythene bottles. Water samples collected were well-mixed in the water sampler prior to pre-rinsing and transferring to sample bottles. Sample bottles were pre-rinsed with the same water samples. The sample bottles were then be packed in cool-boxes (cooled at 4°C without being frozen), and delivered to ALS Technichem (HK) Pty Ltd. for the analysis of suspended solids concentrations. The laboratory determination work would be started within 24 hours after collection of the water samples. ALS Technichem (HK) Pty Ltd. is a HOKLAS accredited laboratory and has comprehensive quality assurance and quality control programmes. For QA/QC procedures, one duplicate samples of every batch of 20 samples was analyzed.
- f. The analysis method and reporting and detection limit for SS is shown in **Table 4.5**.

Table 4.5: Laboratory Analysis for Suspended Solids

Parameters	Instrumentation	Analytical Method	Reporting Limit	Detection Limit
Suspended Solids (SS)	Weighting	APHA 2540-D	0.5 mg/L	0.5 mg/L

- g. Other relevant data were recorded, including monitoring location / position, time, water depth, tidal stages, weather conditions and any special phenomena or work underway at the construction site in the field log sheet for information.

4.7.3 Maintenance and Calibration

- a. All in situ monitoring instruments would be calibrated and calibrated by ALS Technichem (HK) Pty Ltd. before use and at 3-monthly intervals throughout all stages of the water quality monitoring programme. Calibration details are provided in **Appendix J**.
- b. The dissolved oxygen probe of YSI 6820 was calibrated by wet bulb method. Before the calibration routine, the sensor for dissolved oxygen was thermally equilibrated in water-saturated air. Calibration cup is served as a calibration chamber and it was loosened from airtight condition before it is used for the calibration. Calibration at ALS Technichem (HK) Pty Ltd. was carried out once every three months in a water sample with a known concentration of dissolved oxygen. The sensor was immersed in the water and after thermal equilibration, the known mg/L value was keyed in and the calibration was carried out automatically.
- c. The turbidity probe of YSI 6820 is calibrated two times a month. A zero check in distilled water was performed with the turbidity probe of YSI 6820 once per monitoring day. The probe will be calibrated with a solution of known NTU at ALS Technichem (HK) Pty Ltd. once every three months.

4.8 Monitoring Results and Exceedance Investigations

Impact water quality monitoring results and graphical plots are presented in **Appendix K**.

Water quality exceedances recorded during the reporting period are summarised in **Table 4.6**.

Table 4.6: Action and Limit Level Exceedance for Water Quality

Date	Parameter	Station	Depth	Exceedance Recorded during Mid-ebb Tide	Exceedance Recorded during Mid-flood Tide
7 Dec 2018	SS	SR6	Depth Average	-	Action Level
10 Dec 2018	SS	SR6	Depth Average	Action Level	-
12 Dec 2018	SS	IS8	Depth Average	-	Limit Level
12 Dec 2018	SS	SR4(N)	Depth Average	-	Action Level
12 Dec 2018	SS	IS(Mf)9	Depth Average	-	Action Level
12 Dec 2018	SS	IS7	Depth Average	-	Action Level

Six exceedances of water quality (consisting of five Action Level exceedances and one Limit Level exceedance of suspended solids) were recorded by the Environmental Team of this Contract during the reporting period. Following investigations, it was concluded that the exceedances were not related to the HZMB HKBCF project. The detailed investigation results of these exceedances recorded is shown in **Appendix N**.

5 Dolphin Monitoring

5.1 Introduction

Vessel based surveys for the Chinese White Dolphin (CWD), *Sousa chinensis*, are to be conducted by a dedicated team comprising a qualified marine mammal ecologist and experienced marine mammal observers (MMOs). The purpose of the surveys is to evaluate the impact of the HKCBF reclamation and, if deemed detrimental, to take appropriate action as per the EM&A Manual.

5.2 Monitoring Locations

5.2.1 Vessel-based Line-transect Survey

According to the requirement of the updated EM&A Manual, the dolphin monitoring programme should adopt line-transect vessel survey method. The survey follows pre-set and fixed transect lines in the two areas defined by AFCD as: Northeast Lantau (NEL) survey area; and Northwest Lantau (NWL) survey area.

Table 5.1 shows the co-ordinates for the transect lines and layout map. The layout map showing the transect lines have been provided by AFCD and are shown in **Figure 5.1**.

Table 5.1: Impact Dolphin Monitoring Line Transect Co-ordinates (Provided by AFCD)

Transect	HK Grid System		Long Lat in WGS84	
	X	Y	Long	Lat
1 [#]	804671	815456	113.870287	22.277678
	804671	831404	113.869975	22.421696
2 ^{#^}	805476	820800	113.877995	22.325951
	805476	826654	113.877882	22.378815
3 [^]	806464	821150	114.030267	22.196697
	806464	822911	114.047344	22.196712
4 [^]	807518	821500	114.033651	22.206219
	807518	829230	114.108618	22.206267
5 [^]	808504	821850	114.037037	22.215126
	808504	828602	114.102523	22.215169
6 [^]	809490	822150	114.039938	22.224033
	809490	825352	114.070995	22.224056
7 ^{#^}	810499	822000	114.038474	22.233143
	810499	824613	114.063820	22.233163
8 [#]	811508	821123	113.936539	22.328966
	811508	824254	113.936486	22.357241
9 [#]	812516	821303	113.946320	22.330606
	812516	824254	113.946279	22.357255
10 [*]	813525	820827	113.956112	22.326321
	813525	824657	113.956066	22.360908
11 [#]	814556	818853	113.966155	22.304858

Transect	HK Grid System		Long Lat in WGS84	
	814556	820992	113.966125	22.327820
12	815542	818807	113.975726	22.308109
	815542	824882	113.975647	22.362962
13	816506	819480	113.985072	22.314192
	816506	824859	113.985005	22.362771
14	817537	820220	113.995070	22.320883
	817537	824613	113.995018	22.360556
15	818568	820735	114.005071	22.325550
	818568	824433	114.005030	22.358947
16	819532	821420	114.014420	22.331747
	819532	824209	114.014390	22.356933
17	820451	822125	114.023333	22.338117
	820451	823671	114.023317	22.352084
18	821504	822371	114.033556	22.340353
	821504	823761	114.033544	22.352903
19	822513	823268	114.043340	22.348458
	822513	824321	114.043331	22.357971
20	823477	823402	114.052695	22.349680
	823477	824613	114.052686	22.360610
21	805476	827081	113.877878	22.382668
	805476	830562	113.877811	22.414103
22	806464	824033	113.887520	22.355164
	806464	829598	113.887416	22.405423
23	814559	821739	113.966142	22.334574
	814559	824768	113.966101	22.361920
24^	805476	815900	113.979368	22.187721
	805476	819100	114.010398	22.187756

Remarks:

- (a) * Due to the presence of deployed silt curtain systems at the site boundaries of the Contract, some of the transect lines shown in Figure 5.1 could not be fully surveyed during the regular survey. Transect 10 is reduced from 6.4km to approximately 3.6km in length due to the HKBCF construction site. Therefore the total transect length for both NEL and NWL combined is reduced to approximately 108km.
- (b) # Coordinates for transect lines 1, 2, 7, 8, 9 and 11 have been updated in respect to the Proposal for Alteration of Transect Line for Dolphin Monitoring approved by EPD on 19 August 2015.
- (c) ^ Due to marine works of the Expansion of Hong Kong International Airport into a Three-Runway System (3RS Project), the change of transect lines 2, 3, 4, 5, 6 and 7 and new transect line 24 were justified and verified by the ET Leader for Contract No. HY/2010/02 and the IEC respectively on 24 March 2017 and it was approved by EPD on 12 May 2017.

The survey team used standard line-transect methods (Buckland *et al.*, 2001) to conduct the systematic vessel surveys, and followed the same technique of data collection that has been adopted over the last 20 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung, 2017). For each monitoring vessel survey, a 15-m inboard vessel with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area.

Two experienced observers (a data recorder and a primary observer) made up the on-effort survey team, and the survey vessel transited different transect lines at a constant speed of 13-15 km per hour. The data recorder searched with unaided eyes and filled out the datasheets,

while the primary observer searched for dolphins and porpoises continuously through 7 x 50 Fuion marine binoculars.

Both observers searched the sea ahead of the vessel, between 270° and 90° (in relation to the bow, which is defined as 0°). One to two additional experienced observers were available on the boat to work in shift (i.e. rotate every 30 minutes) in order to minimize fatigue of the survey team members. All observers were experienced in small cetacean survey techniques and identifying local cetacean species.

During on-effort survey periods, the survey team recorded effort data including time, position (latitude and longitude), weather conditions (Beaufort sea state and visibility), and distance travelled in each series (a continuous period of search effort) with the assistance of a handheld GPS (Garmin eTrex Legend).

Data including time, position and vessel speed were also automatically and continuously logged by handheld GPS throughout the entire survey for subsequent review.

When dolphins were sighted, the survey team would end the survey effort, and immediately record the initial sighting distance and angle of the dolphin group from the survey vessel, as well as the sighting time and position. Then the research vessel was diverted from its course to approach the animals for species identification, group size estimation, assessment of group composition, and behavioural observations. The perpendicular distance (PSD) of the dolphin group to the transect line was later calculated from the initial sighting distance and angle.

Survey effort being conducted along the parallel transect lines that were perpendicular to the coastlines was labelled as “primary” survey effort, while the survey effort conducted along the connecting lines between parallel lines was labelled as “secondary” survey effort. According to HKCRP long-term dolphin monitoring data, encounter rates of Chinese white dolphins deduced from effort and sighting data collected along primary and secondary lines were similar in NEL and NWL survey areas. Therefore, both primary and secondary survey effort were presented as on-effort survey effort in this report.

Encounter rates of Chinese white dolphins (number of on-effort sightings per 100 km of survey effort and number of dolphins from all on-effort sightings per 100 km of survey effort) were calculated in NEL and NWL survey areas in relation to the amount of survey effort conducted during each month of monitoring survey. Only data collected under Beaufort 3 or below condition would be used for encounter rate analysis. Dolphin encounter rates were calculated using primary survey effort alone, as well as the combined survey effort from both primary and secondary lines.

5.2.2 Photo-identification Work

When a group of Chinese White Dolphins were sighted during the line-transect survey, the survey team would end effort and approach the group slowly from the side and behind to take photographs of them. Every attempt was made to photograph every dolphin in the group, and even photograph both sides of the dolphins, since the colouration and markings on both sides may not be symmetrical.

A professional digital camera (Canon EOS 7D or 60D model), equipped with long telephoto lenses (100-400 mm zoom), were available on board for researchers to take sharp, close-up photographs of dolphins as they surfaced. The images were shot at the highest available resolution and stored on Compact Flash memory cards for downloading onto a computer.

All digital images taken in the field were first examined, and those containing potentially identifiable individuals were sorted out. These photographs would then be examined in greater

detail, and were carefully compared to the existing Chinese White Dolphin photo-identification catalogue maintained by HKCRP since 1995.

Chinese White Dolphins can be identified by their natural markings, such as nicks, cuts, scars and deformities on their dorsal fin and body, and their unique spotting patterns were also used as secondary identifying features (Jefferson, 2000).

All photographs of each individual were then compiled and arranged in chronological order, with data including the date and location first identified (initial sighting), re-sightings, associated dolphins, distinctive features, and age classes entered into a computer database.

5.3 Action and Limit Levels for Dolphin Monitoring

The Action and Limit Levels for Chinese White Dolphin Monitoring are provided in **Table 5.2** and **Table 5.3**, respectively.

Table 5.2: Action and Limit Levels for Chinese White Dolphin Monitoring - Approach to Define Action Level (AL) and Limit Level (LL)

	North Lantau Social Cluster	
	NEL	NWL
Action Level	(STG < 70% of baseline) & (ANI < 70% of baseline)	(STG < 70% of baseline) & (ANI < 70% of baseline)
Limit Level	[(STG < 40% of baseline) & (ANI < 40% of baseline)] AND [(STG < 40% of baseline) & (ANI < 40% of baseline)]	

Table 5.3: Derived Value of Action Level (AL) and Limit Level (LL) for Chinese White Dolphin Monitoring

	North Lantau Social Cluster	
	NEL	NWL
Action Level	(STG < 4.2) & (ANI < 15.5)	(STG < 6.9) & (ANI < 31.3)
Limit Level	[(STG < 2.4) & (ANI < 8.9)] AND [(STG < 3.9) & (ANI < 17.9)]	

The event and action plan is provided in **Appendix D**.

If exceedance(s) at these survey transect(s) is/are recorded by the ET of the Contract or referred by the other ET under the HZMB project to the Contract, the ET of the Contract will carry out an investigation and findings will be reported in the monthly EM&A Report.

5.4 Monitoring Schedule for the Reporting Period

The schedule for dolphin monitoring for the reporting period is provided in **Appendix I**.

5.5 Monitoring Results

5.5.1 Vessel-based Line-transect Survey

Two sets of systematic line-transect vessel surveys were conducted under the HKBCF dolphin monitoring programme on 3, 5, 10 and 12 December 2018, to cover all transect lines in NWL and NEL survey areas twice. The survey routes of each survey day are presented in **Figures 2 to 5 of Appendix L**.

A total of 261.96 km of survey effort was collected, with 90.3% of the total survey effort being conducted under favourable weather conditions (i.e. Beaufort Sea State 3 or below with good visibility) during the reporting period's surveys (**Annex I of Appendix L**).

Among the two areas, 97.00 km and 164.96 km of survey effort were collected from NEL and NWL survey areas respectively. The total survey effort conducted on primary and secondary lines were 193.46 km and 68.50 km respectively (**Annex I of Appendix L**).

During the two sets of monitoring surveys in the reporting period, only two groups of six Chinese White Dolphins were sighted (**Annex II of Appendix L**). Both dolphin groups were sighted in NWL, while no dolphin was sighted at all in NEL. Notably, the two dolphin sightings were both made on primary lines during on-effort search (**Appendix II of Appendix L**).

Distribution of the dolphin sightings made in the reporting period is shown in **Figure 6 of Appendix L**. The two dolphin groups were sighted to the west of Lung Kwu Chau and near Lung Kwu Tan respectively (**Figure 6 of Appendix L**). Notably, these sightings were made very far away from the HKBCF reclamation site, as well as the HZMB HKLR HY/2011/03 (HKLR03) reclamation site and HZMB TM-CLKL/HKLR HY/2011/09 (HKLR09) alignments. (**Figure 6 of Appendix L**).

During the reporting period's surveys, the encounter rates of Chinese White Dolphins deduced from the survey effort and on-effort sighting data made under favourable conditions (Beaufort 3 or below) are shown in **Table 5.4** and **Table 5.5**.

Table 5.4: Dolphin encounter rates deduced from the two sets of HKBCF surveys (two surveys in each set) during the reporting period in Northeast (NEL) and Northwest Lantau (NWL)

		Encounter rate (STG)	Encounter rate (ANI)
		(no. of on-effort dolphin sightings per 100 km of survey effort)	(no. of dolphins from all on-effort sightings per 100 km of survey effort)
		Primary Lines Only	Primary Lines Only
NEL	Set 1: December 3 rd / 5 th	0.0	0.0
	Set 2: December 10 th / 12 th	0.0	0.0
NWL	Set 1: December 3 rd / 5 th	4.0	11.9
	Set 2: December 10 th / 12 th	0.0	0.0

Table 5.5: Overall dolphin encounter rates (sightings per 100 km of survey effort) from all four HKBCF surveys conducted during the reporting period on primary lines only as well as both primary lines and secondary lines in NEL and NWL

	Encounter rate (STG)		Encounter rate (ANI)	
	(no. of on-effort dolphin sightings per 100 km of survey effort)		(no. of dolphins from all on-effort sightings per 100 km of survey effort)	
	Primary Lines Only	Both Primary and Secondary Lines	Primary Lines Only	Both Primary and Secondary Lines
NEL	0.0	0.0	0.0	0.0
NWL	1.9	1.4	5.7	4.3

The average dolphin group size recorded during the reporting period's surveys was just 3.0 individuals per group, as there were only two small groups of one and five dolphins being sighted respectively (**Annex II of Appendix L**).

5.5.2 Photo-identification Work

Three known individual dolphins were sighted three times in total during the reporting period's surveys (**Annex III and IV of Appendix L**). All three known individuals were re-sighted only once.

None of these identified individuals was sighted with any young calf during their re-sightings in this reporting period (**Annex III of Appendix L**).

6 Environmental Site and Audit

6.1 Site Inspection

Site Inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control mitigation measures for the project. During the reporting period, site inspections were carried out on 5, 13, 17 and 27 December 2018.

When permanent soft landscaping works within the site boundaries of the Contract are commenced, construction phase landscape and visual mitigation measures would be implemented in accordance with the EP, EIA and EM&A Manual. Monitoring and audit of landscape and visual mitigation measures would be conducted bi-weekly in accordance with Section 14.2 of the Updated EM&A Manual for HKBCF (Version 1.0). Permanent soft landscaping works within the Contract site had not commenced during the reporting period.

Particular observations during the site inspections and corrective actions undertaken by the Contractor are described below.

28 November 2018

- a. A chemical container without drip tray was observed on Bridge D15. Subsequently, the chemical container was removed. The observation was closed on 5 December 2018.

5 December 2018

- a. Loose general refuse was observed near P1501 area. Subsequently, the general refuse near P1501 area was cleared. The observation was closed on 13 December 2018.

13 December 2018

- a. Loose general refuse was observed on Bridge D15. Subsequently, the general refuse was cleared. The observation was closed on 17 December 2018.

17 December 2018

- a. Fugitive dust was observed when vehicle passing by the haul road between Bridge D9 and Bridge D12. Subsequently, water spraying was provided on the haul road. The observation was closed on 27 December 2018.
- b. Excavator without provision of valid NRMM label was observed. Subsequently, valid NRMM label was provided. The observation was closed on 27 December 2018.
- c. Accumulation of general refuse was observed in the vicinity of wheel-washing facilities. Subsequently, the general refuse was cleared. The observation was closed on 27 December 2018.

27 December 2018

- a. Accumulation of stagnant water was observed on site. The Contractor was reminded to clear the stagnant water as soon as possible. Follow-up action for the outstanding observation will be inspected during the upcoming site inspections and reported in the coming reporting period.

6.2 Advice on the Solid and Liquid Waste Management Status

The Contractor registered as a chemical waste producer for the Contract. Sufficient numbers of receptacles were available for general refuse collection and sorting. As a practical means, the disposal operation is managed by a single HKBCF contractor who is also responsible for applying dumping permit and its subsequent extension applications from EPD. Contract No. HY/2013/03 has been assigned to coordinate and arrange for disposal of extracted marine sediment from this Contract.

There was no generation of excavated sediment for treatment during this reporting period. Any treatment of excavated marine sediment will be conducted using cement solidification/stabilization (Cement S/S) techniques and the treated sediment will be reused onsite for either backfilling or landscaping (e.g. berm material).

The monthly summary of waste flow table is detailed in **Appendix E**.

The Contractor was reminded that chemical waste containers should be properly treated and stored temporarily in designated chemical waste storage area on site in accordance with the Code of Practice on the Packing, Labelling and Storage of Chemical Waste.

6.2.1 Disposal of Marine Sediment Extracted from Bored Piling Works

6.2.1.1 Background

After the acceptance of the review of the approved Sediment Quality Report (SQR) for this Project under EPD letter dated 19 August 2015, an approval to dispose the marine sediment extracted from bored piling for this Project was then approved under memo from Secretary, Marine Fill Committee of CEDD dated 20 August 2015 for the disposal of marine sediment extracted from bored piling works. The disposal sites allocated to this Project are the Mud Pit CMP2 of the Confined Marine Sediment Disposal Facility to the South of The Brothers (or at the East of Sha Chau). As advised by CEDD in the memo dated 19 February 2016, from 00:00 on 22 March 2016 onward, the disposal space at CMP2 of the South of The Brothers is closed and all disposal of contaminated sediment is to be carried out at CMP Vd to the East of Sha Chau (ESC).

As Contract No. HY/2013/01 has commenced treatment of the extracted marine sediment, treatment will continue and the treated marine sediment will be re-used within the HKBCF Island. On the other hand, Contract Nos. HY/2013/02, HY/2013/03 and HY/2013/04 have not commenced the treatment of extracted marine sediment. Therefore, the marine sediment extracted from these three Contracts will be disposed to the allocated disposal sites directly without treatment. As a practical means, the disposal operation is managed by one contractor who is also responsible for applying dumping permit and its subsequent extension applications from EPD. Contract No. HY/2013/03 has been assigned to coordinate and arrange for disposal of extracted marine sediment from all three Contracts.

The SQR was further reviewed in mid-2016. EPD has no comment to extend the validity of the SQR to August 2017 under letter dated 18 August 2016.

Based on the actual piling operation, the estimated quantity of marine sediment to be extracted has been revised from 85,000 m³ to 126,000 m³ (bulk volume). EPD has no comments on the request as in the letter dated 20 October 2016. The Secretary of Marine Fill Committee, CEDD approved the increasing quantity in the memo dated 10 November 2016.

During the course of reviewing the SQR, it was noted that the contamination level of the marine sediment extracted from the inner part of the HKBCF Island was not identified during the

previous sampling and testing. As requested by EPD, sampling and testing are required. The Sediment Sampling and Testing Proposal (SSTP) for the inner area of the HKBCF Island was approved by EPD on 2 June 2016.

As in the agreed SSTP for the inner area of the HKBCF Island, samples were taken from the seventeen batches of stockpiled marine sediments and from five boreholes each in one of the five sampling grids. After conducting chemical tests on samples, six batches of stockpiled samples under Contract No. HY/2013/03 and all eight batches of stockpiled samples under Contract No. HY/20013/04 are classified as Category L sediment. The Secretary of Marine Fill Committee of CEDD allocated disposal sites under memo dated 24 October 2016 and dated 22 November 2016 for disposal of a total of 9,500 m³ in-situ volume of Category L sediment (using a bulk factor of 1.3). The Category L sediment was disposed in December 2016.

One sample from the batch of stockpiled marine sediment under Contract No. HY/2013/03 and samples from all five sampling grids had contamination levels exceeding the Lower Chemical Exceedance Levels (LCEL) and biological screenings were carried out. All samples passed the biological screenings and are classified as Category Mp sediment and to be disposed off site using Type II confined marine disposal method the same method used for marine sediment extracted from other part of the HKBCF Island.

6.2.1.2 Dumping Arrangements

The barge for disposal of marine sediment will morn at the temporary loading and unloading at the east shore of the HKBCF Island, which has been being used by reclamation contractor (Contract No. HY/2010/02) for reclamation activities. In terms of safety consideration, each dumping date will be allocated to one Contract. The quantity of marine sediment disposed on the date is from one Contract.

During dumping, each Contractor is responsible for transporting the marine sediment from his site area to the barge. The estimated quantity of marine sediment in each truck is confirmed by Resident Site Staff of each Contract. The trip tickets for transportation and disposal of marine sediment are collected and checked. Contract No. HY/2013/03 as the dumping permit holder is responsible for reporting to EPD the quantity disposed of as the condition stipulated in the dumping permit.

6.2.1.3 Reporting

AECOM has confirmed that the disposal of excavated marine sediments to allocated dumping site via Contract No. HY/2013/03 has been completed with the last batch disposal on 30 August 2017. The total quantities disposed are presented in the following table (**Table 6.1**):

Table 6.1: Summary of Marine Sediment disposed to Dumping Site via Contract No. HY/2013/03

	Type of Sediment and Quantity Disposed (m ³)	
	Cat. L (in Type I)	Type II
Total	3,570	39,814

Note: For monthly breakdown of these quantities, please refer to the waste flow table in **Appendix E**.

6.3 Environmental Licenses and Permits

The valid environmental licenses and permits during the reporting period are summarized in **Appendix F**.

6.4 Implementation Status of Environmental Mitigation Measures

In response to the site audit findings, the Contractor carried out corrective actions.

A summary of the Implementation Schedule of Environmental Mitigation Measures (EMIS) is presented in **Appendix G**. Most of the necessary mitigation measures were implemented properly.

Implementation status of the Regular Marine Travel Route Plan (RMTRP) was checked by ET. Training of marine travel route for marine vessel operator was given to relevant staff and relevant records were kept properly.

According to the Contractor of HY/2013/04, all marine-based segment deliveries were completed in January 2018 and no marine-based works were conducted under the contract during the reporting period.

The localised silt curtains under this Contract were deployed on 15 July 2017. No dolphins were observed by the trained MMOs during the reporting period. Regarding the implementation of dolphin monitoring and protection measures (i.e. implementation of Dolphin Watching Plan, Dolphin Exclusion Zone and Silt Curtain Integrity Check), regular checking was conducted by the experienced MMOs within the works area to ensure no dolphin was trapped by the enclosed silt curtain systems. Any dolphin spotted within the enclosed silt curtain systems was reported and recorded. Relevant procedures were followed and measures were well implemented. Silt curtain systems were also inspected timely in accordance to the submitted plan. All inspection records were kept properly.

6.5 Summary of Exceedance of the Environmental Quality Performance Limit

Air Quality

No Action and Limit Level exceedances of 1-hour and 24-hour TSP level were recorded at AMS2, AMS3C and AMS7B during the reporting period.

Summary of Action and Limit Level exceedance of 1-hour TSP level and 24-hour TSP level at AMS6 shall be referred to the monthly EM&A report prepared by Contract No. HY/2011/03.

Noise

No Action and Limit Level exceedances were recorded at NMS2 and NMS3C during the reporting period.

Water Quality

The water quality monitoring programme was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.

Six exceedances of water quality (consisting of five Action Level exceedances and one Limit Level exceedance of suspended solids) were recorded by the Environmental Team of this Contract during the reporting period. Following investigations, it was concluded that the exceedances were not related to the HZMB HKBCF project.

Chinese White Dolphin

For dolphin monitoring, dolphin surveys were conducted on 3, 5, 10 and 12 December 2018. A total of 261.96 km of survey effort was collected, with 90.3% of the total survey effort being conducted under favourable weather conditions. Only two groups of six Chinese White Dolphins

were sighted. Both dolphin groups were sighted in NWL, while no dolphin was sighted at all in NEL.

6.6 Summary of Complaints, Notification of Summons and Successful Prosecution

Complaints

There were no complaints received in relation to the environmental impact during the reporting period.

Notification of Summons and Successful Prosecution

No notification of summons or prosecutions was received during the reporting period.

Statistics on notifications of summons and successful prosecutions are summarized in **Appendix H**.

7 Future Key Issues

7.1 Construction Programme for the Coming Months

As informed by the Contractor, the major construction activities for January 2019 are summarized in **Table 7.1**.

Table 7.1: Construction Activities for January 2019

Site Area	Description of Activities
HKBCF	<ul style="list-style-type: none"> ● Erection of sign gantries (land-based) ● Construction of parapets for bridge structures (land-based) ● Construction of Retaining Wall RW16N and RW16S (land-based) ● Construction of Bridge Deck D16 in-situ deck (land-based) ● Construction of utilities cross-over frame under Bridge D9c (land-based) ● Backfilling of retaining walls and formation of fill slopes and road embankment (land-based) ● Drainage works and watermains laying (land-based) ● Roadworks and road furniture (land-based) ● Maintenance of temporary traffic arrangements (TTA) associated with the commissioning of HKBCF and Tuen Mun – Chek Lap Kok Link Southern Connection (TM-CLKL-SC) (land-based) ● Removal of silt curtain (marine-based) (expected to be carried out in January 2019)

7.2 Environmental Site Inspection and Monitoring Schedule for the Coming Month

The tentative schedule for weekly site inspection and monitoring for air quality, noise, water quality and Chinese White Dolphin for January 2019 is provided in **Appendix I**.

8 Conclusions

8.1 Conclusions

General

Commencement of the Contract took place on 13 March 2015 and the construction works of the Contract commenced on 13 July 2015.

The air quality, noise, water quality and dolphin monitoring works under Contract No. HY/2013/01 were suspended on 1 October 2018. From 1 October 2018 onwards, the ET of Contract No. HY/2013/04 has continued the same implementation of air quality, noise and water quality environmental monitoring (including air quality and noise monitoring already under its implementation) while the ET of Contract No. HY/2011/03 has continued the same implementation of dolphin monitoring, with the reporting of all environmental monitoring continued by the ET of Contract No. HY/2013/04.

The water quality monitoring programme was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.

Breaches of Action and Limit Levels

Air Quality

No Action and Limit Level exceedances of 1-hour and 24-hour TSP level were recorded at AMS2, AMS3C and AMS7B during the reporting period.

Summary of Action and Limit Level exceedance of 1-hour TSP level and 24-hour TSP level at AMS6 shall be referred to the monthly EM&A report prepared by Contract No. HY/2011/03.

Noise

No Action and Limit Level exceedances were recorded at the NMS2 and NMS3C during the reporting period.

Water Quality

Six exceedances of water quality (consisting of five Action Level exceedances and one Limit Level exceedance of suspended solids) were recorded by the Environmental Team of this Contract during the reporting period. Following investigations, it was concluded that the exceedances were not related to the HZMB HKBCF project.

Chinese White Dolphin

For dolphin monitoring, dolphin surveys were conducted on 3, 5, 10 and 12 December 2018. A total of 261.96 km of survey effort was collected, with 90.3% of the total survey effort being conducted under favourable weather conditions. Only two groups of six Chinese White Dolphins were sighted. Both dolphin groups were sighted in NWL, while no dolphin was sighted at all in NEL.

Environmental Site Inspections

Environmental site inspections were carried out on 5, 13, 17 and 27 December 2018. Recommendations on remedial actions were given to the Contractor for the deficiencies identified during the site inspections.

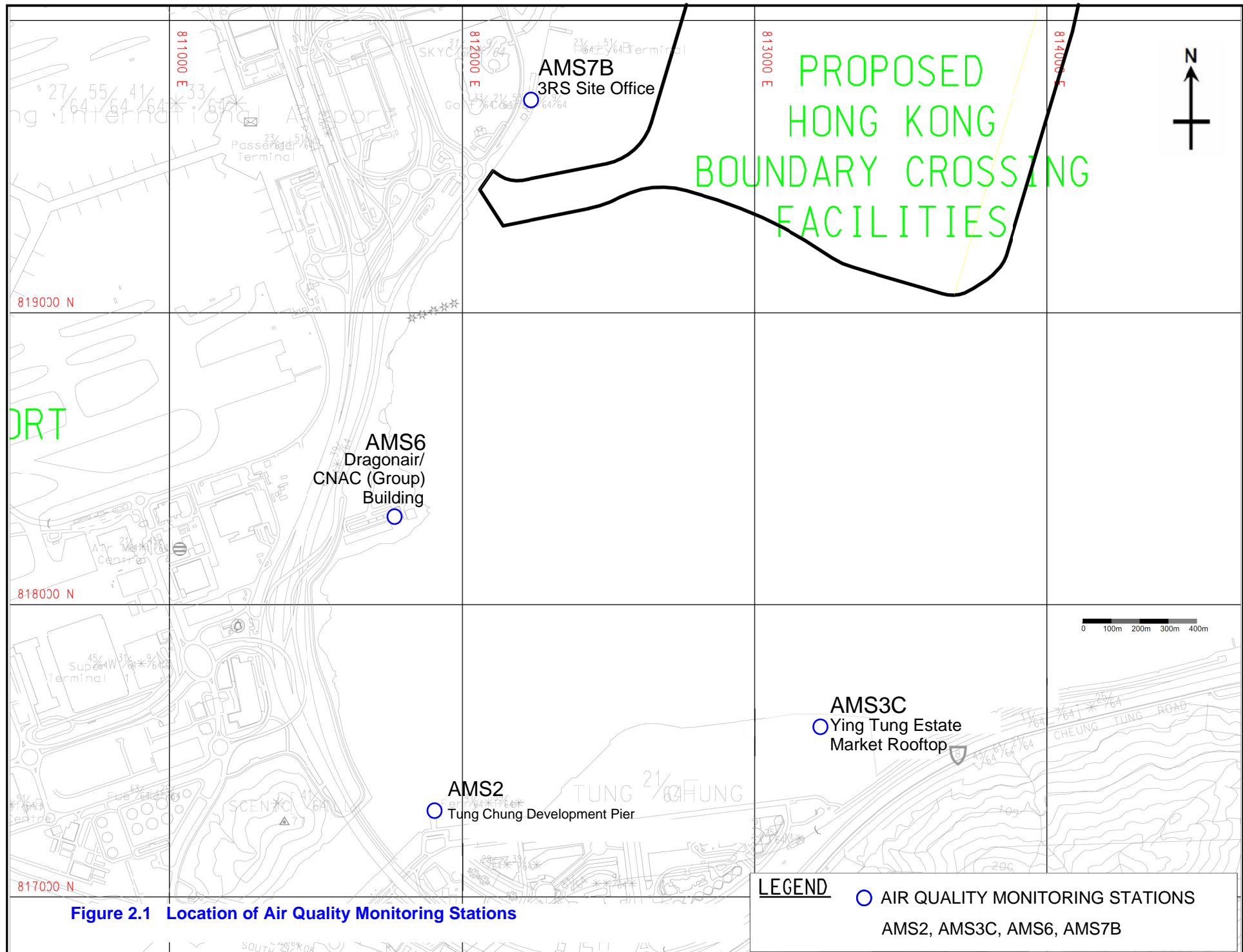
Complaints

There were no complaints received in relation to the environmental impact during the reporting period.

Notifications of Summons and Successful Prosecutions

There were no notifications of summons or prosecutions received during the reporting period.

Figures



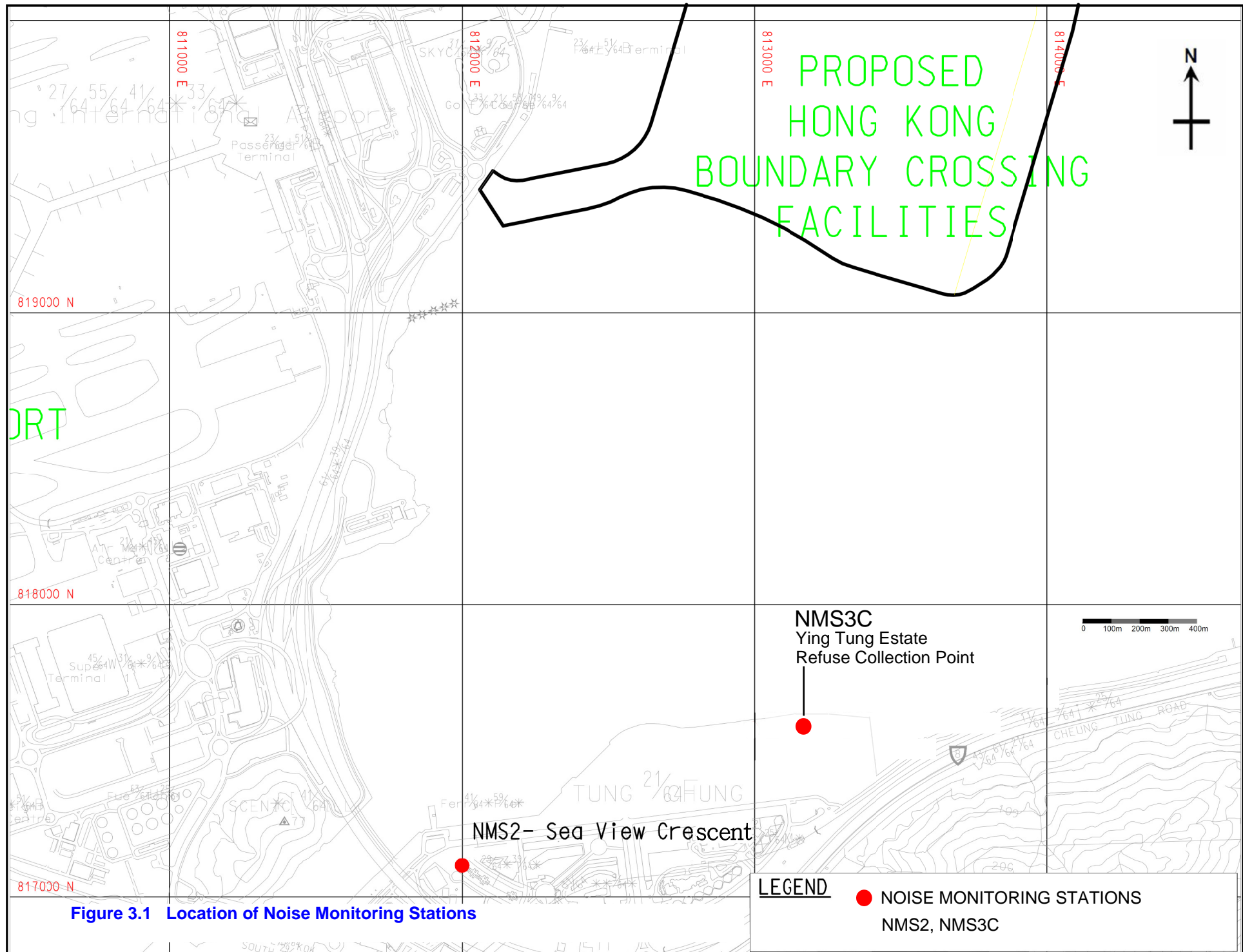


Figure 3.1 Location of Noise Monitoring Stations



Station	East	North
IS5	811579	817106
IS(Mf)6	812101	817873
IS7	812244	818777
IS8	814251	818412
IS(Mf)9	813273	818850
IS10(N)	812942	820881
IS(Mf)11	813562	820716
IS(Mf)16	814328	819497
IS17	814539	820391
SR3(N)	810689	816591
SR4(N)	814705	817859
SR5(N)	812569	821475
SR6	805837	821818
SR7	814293	821431
SR10A(N)	823644	823484
SR10B(N2)	823689	823159
CS(Mf)3(N)	808814	822355
CS(Mf)5	817990	821129
CS4	810025	824004
CS6	817028	823992
CSA	818103	823064

FIGURE 4.1— LOCATION OF WATER QUALITY MONITORING STATIONS

LEGEND




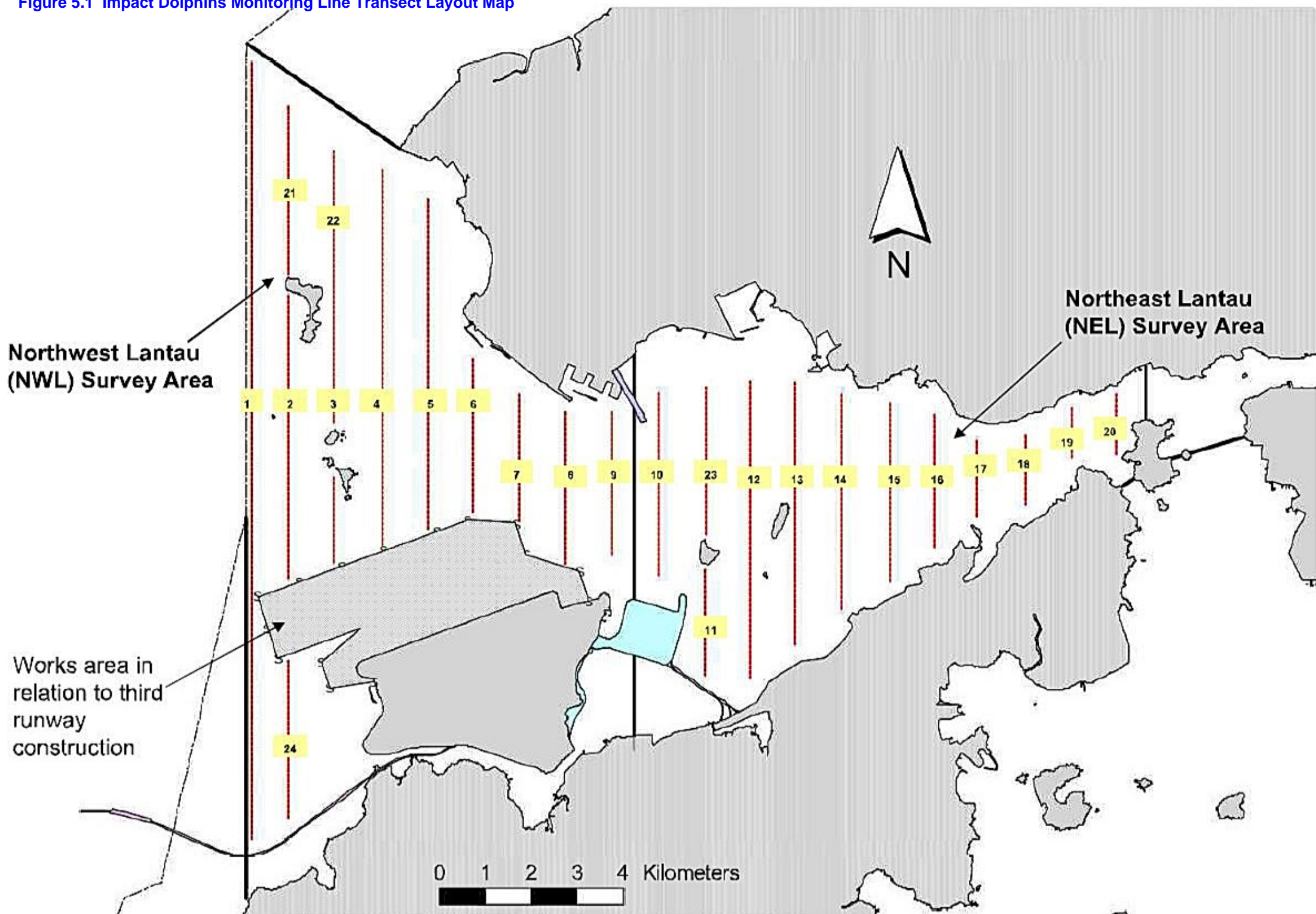
-  IS IMPACT STATIONS
-  CS CONTROL / FAR FIELD STATIONS
-  SR SENSITIVE RECEIVERS STATIONS

Figure 5.1 Impact Dolphins Monitoring Line Transect Layout Map



Appendix A. Location of Works Areas



- NOTES:**
- COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
 - DIMENSIONS ARE IN MILLIMETER AND CHAINAGE ARE IN METRES UNLESS OTHERWISE SHOWN.

- LEGEND:**
- SITE BOUNDARY
 - ▨ WORKS AREA

ROAD
 825000 N
 820000 N
 815000 N
 810000 E
 815000 E
 820000 E
 825000 E
 P.S. [1] By : 22/12/24 W4K/CSY
 P:\PROJECTS\SYSTEMS\DRAWING\GEN\FACTORY\000000-000000-000000

REV.	DESCRIPTION	DATE
1	TENDER DRAWING	FEB.14

路政處
 HIGHWAYS DEPARTMENT
 港珠澳大橋香港工程管理局
 Hong Kong-Zhuhai-Macao Bridge Hong Kong Project Management Office

HONG KONG-ZHUHAI-MACAO BRIDGE
 HONG KONG BOUNDARY CROSSING FACILITIES
 - INFRASTRUCTURE WORKS STAGE 1 (SOUTHERN PORTION)

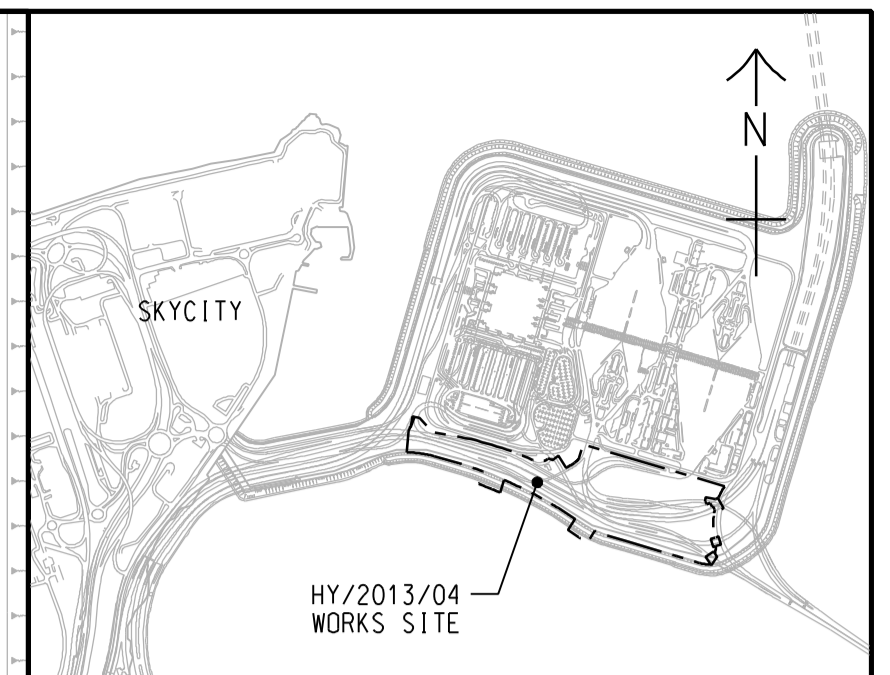
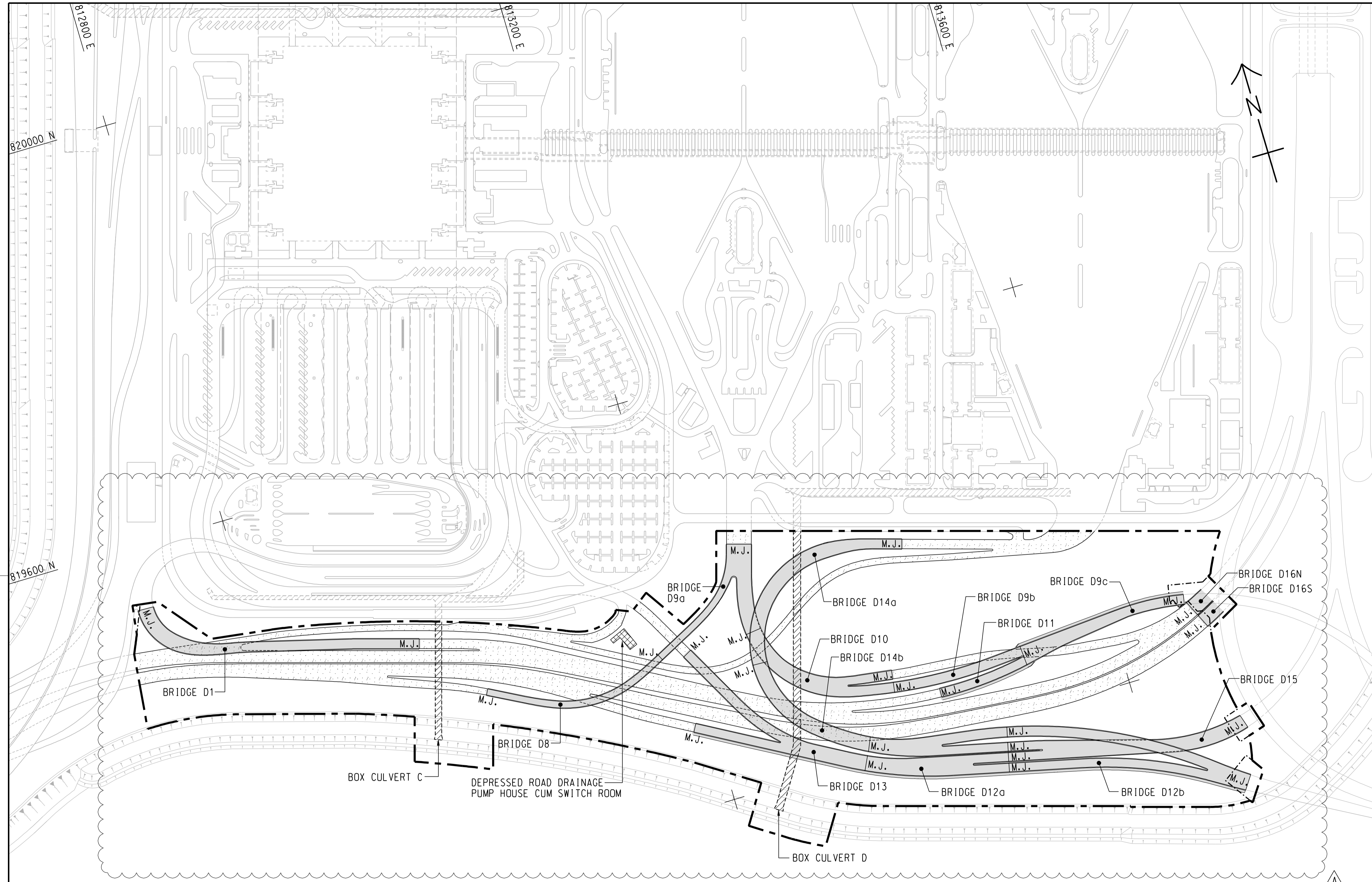
SITE LOCATION PLAN

AECOM +
 Rogers Stirk Harbour + Partners
Aedas
 BURO HAPPOLD ATKINS ADI +

DRG. NO. 60191048/C4/000/C00/1000
 圖紙編號

DESIGNED BY	CONTRACT NO.	APPROVED BY
BWCW	HY/2013/04	TKH
DRAWN BY	STATUS	
MSY	REV.	

SCALE 1 : 25000
 DIMENSIONS ARE IN METRES
 © COPYRIGHT RESERVED
 版權所 有



LOCATION PLAN
SCALE 1 : 25000

- LEGEND:**
- SITE BOUNDARY
 - AT-GRADE WORKS LIMIT
 - MOVEMENT JOINT
 - BRIDGE
 - BUILDING/FACILITIES
 - AT-GRADE ROAD
 - BOX CULVERT

B	WORKING DRAWING	BWCW SCI	APR. 15
A	TENDER ADDENDUM NO. 3	BWCW SCI	MAY. 14
-	TENDER DRAWING	BWCW SCI	FEB. 14

路政署
HIGHWAYS DEPARTMENT
 港珠澳大橋香港工程管理有限公司
 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

HONG KONG-ZHUHAI-MACAO BRIDGE
 HONG KONG BOUNDARY CROSSING FACILITIES
 - INFRASTRUCTURE WORKS STAGE II (SOUTHERN PORTION)

GENERAL ARRANGEMENT

AECOM
 Rogers Stirk Harbour + Partners
 BURO HAPPOLD ATKINS ADI
Aedas

DRG. NO. 60191048/C4/000/C00/1002B
圖紙編號

DESIGNED BY 設計	BWCW	CONTRACT NO. 合約編號	HY/2013/04	P. O. APPROVED 批准人	TKH
-------------------	------	----------------------	------------	-----------------------	-----

DRAWN BY
繪圖
WSY
STATUS
階段
WORKING DRAWING

SCALE
比例
A1 1 : 2000
DIMENSIONS ARE IN
尺寸單位
METRES
© COPYRIGHT RESERVED
版權所有

Plot File by : 2014/5/7 WANGSY

SETTING OUT POINT

POINT	EASTING	NORTHING
301	817467.265	819162.683
302	817314.741	819069.828
303	817327.338	819049.295
304	817440.865	819117.811
305	817340.825	819027.314
306	817387.350	819023.403
307	817387.861	819043.396
308	817466.133	819091.047
309	817469.783	819087.181
310	817513.449	819113.764
311	817347.717	819016.082
312	817620.269	819000.620
313	817445.362	819013.131
314	817450.595	819032.307
315	817495.828	819059.595
316	817522.110	819075.388
317	817566.404	819028.472
318	817568.506	819008.526
319	817531.155	819001.066
320	817533.346	818991.306

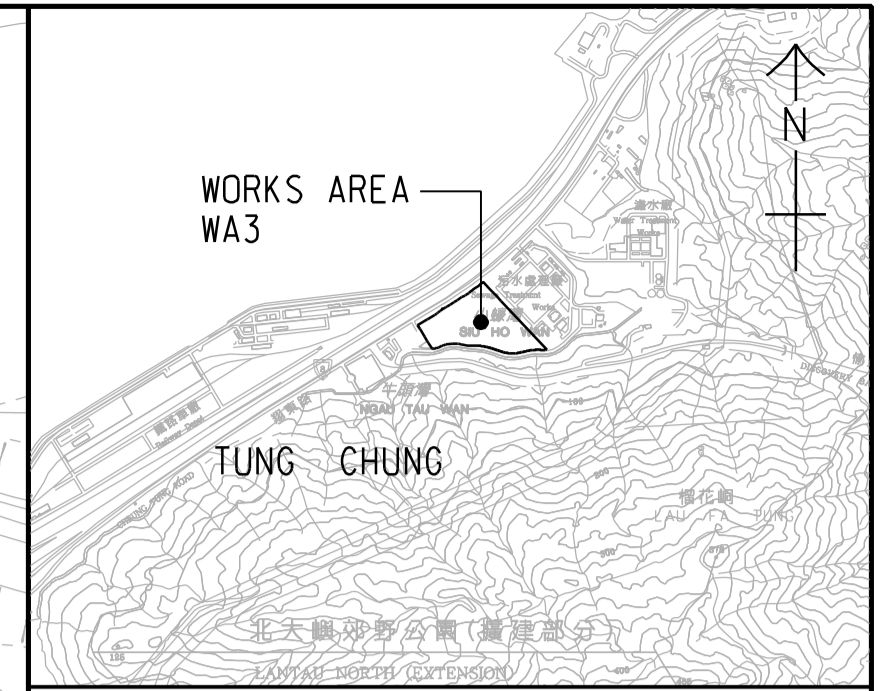
81200 E

81400 E

81600 E

819200 N

819000 N



LOCATION PLAN
SCALE 1 : 25000

NOTES:

- COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
- DIMENSIONS ARE IN MILLIMETER AND CHAINAGE ARE IN METRES UNLESS OTHERWISE SHOWN.

LEGEND:

	WORKS AREA BOUNDARY
	PORTION 3.1
	PORTION 3.2
	PORTION 3.3
	PORTION 3.4
	PORTION 3.5
	PORTION 3.6
	PORTION 3.7
	PORTION 3.8
	PORTION 3.9
	PORTION 3.10

10m WIDE COMMON ACCESS TO BE MAINTAINED BY CONTRACT NO. HY/2010/02

WORKS AREA OCCUPIED BY CONTRACT NO. HY/2010/02

WORKS AREA OCCUPIED BY CONTRACT NO. HY/2011/09

10m WIDE COMMON ACCESS TO BE CONSTRUCTED AND INITIALLY MAINTAINED BY CONTRACT NO. HY/2013/01. UPON COMMENCEMENT OF CONTRACT NO. HY/2013/03, THE MAINTENANCE RESPONSIBILITY SHALL BE TRANSFERRED FROM CONTRACT NO. HY/2013/01 TO CONTRACT NO. HY/2013/03.

WORKS AREA OCCUPIED BY CONTRACT NO. HY/2013/04

WORKS AREA OCCUPIED BY CONTRACT NO. HY/2014/05

WORKS AREA OCCUPIED BY CONTRACT NO. HY/2013/02

WORKS AREA OCCUPIED BY CONTRACT NO. HY/2013/01

WORKS AREA OCCUPIED BY CONTRACT NO. HY/2013/03

WORKS AREA OCCUPIED BY CONTRACT NO. HY/2011/03

Plot File by : 2014/4/11 WANGSY

p:\projects\60191048\drawing\contract\c4\1000\C4_000_C00_1041.dgn

B	WORKING DRAWING	BWCW SCI	APR. 15
A	TENDER ADDENDUM NO. 2	BWCW SCI	APR. 14
-	TENDER DRAWING	BWCW SCI	FEB. 14
REV.	DESCRIPTION	CHKD.	DATE
01	ISSUED FOR TENDER	BWCW	14/04/14

HONG KONG-ZHUHAI-MACAO BRIDGE
HONG KONG-BOUNDARY CROSSING FACILITIES
- INFRASTRUCTURE WORKS STAGE II (SOUTHERN PORTION)

WORKS AREA WA3

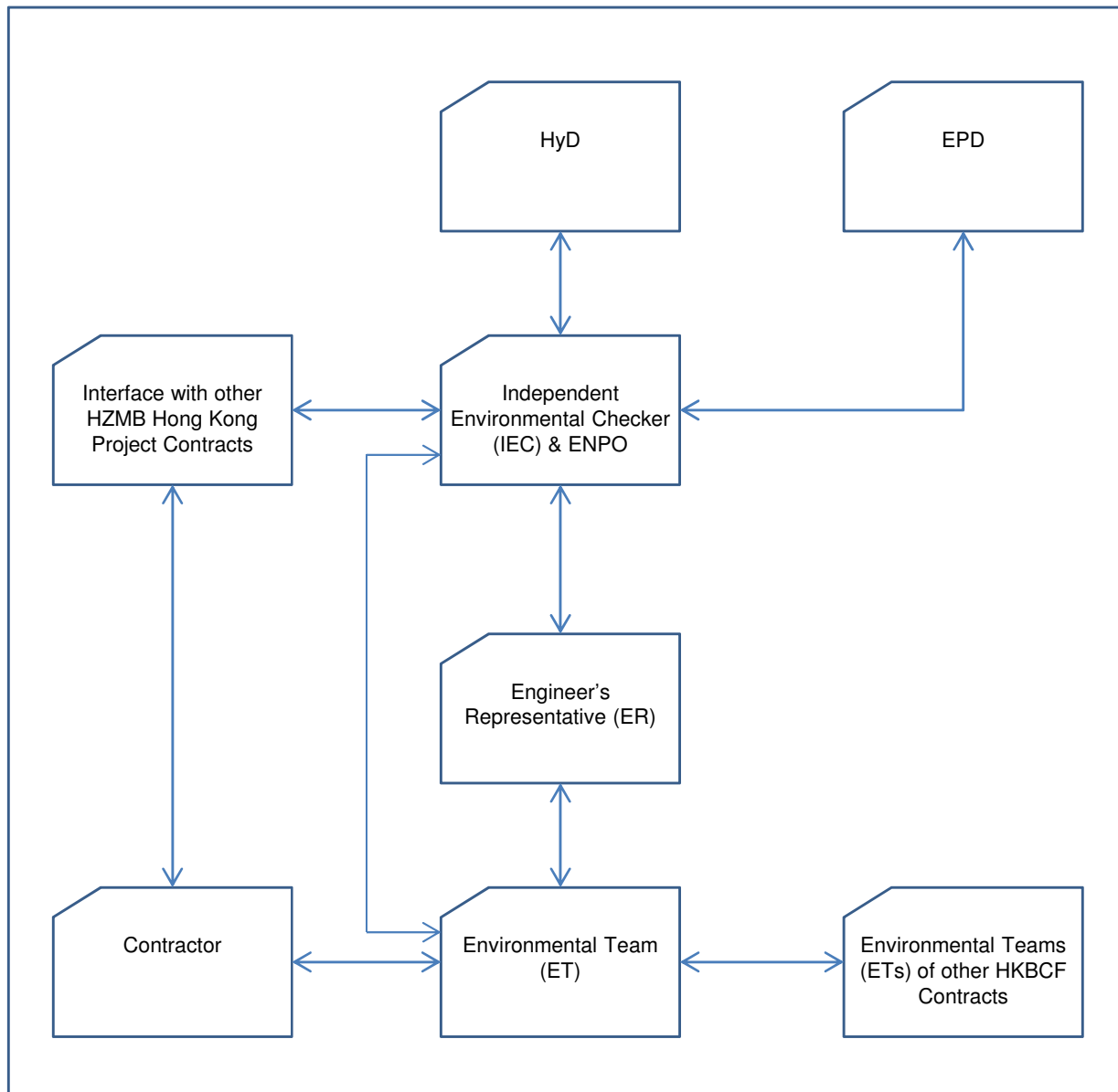
AECOM Aedas
Rogers Stirk Harbour + Partners
BURO HAPPOLD ATKINS ADI

DRG.NO. 60191048/C4/000/C00/1041B
圖紙編號

DESIGNED BY 設計	BWCW	CONTRACT NO. 合約編號	HY/2013/04	P. Dir. APPROVED 批准人	TKH
DRAWN BY 繪圖	WSY	STATUS 階段	WORKING DRAWING		
SCALE 比例	A1 1 : 1000				
DIMENSIONS ARE IN 尺寸單位	METRES	© COPYRIGHT RESERVED 版權所 有			

Appendix B. Project Organization for Environmental Works

Project Organisation for Environmental Works



↔ Line of Communication

Appendix C. Construction Programme

Activity ID	Activity Name	2015				2016				2017				2018				2019				2020				2021																			
		A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N
Essential Works Updates - Tier 1 - 26 C																																													
Contract Key Dates																																													
CON.KD.0005	Letter of Acceptance (LOA)	Letter of Acceptance (LOA)																																											
CON.KD.0010	Commencement Date	Commencement Date																																											
CON.KD.0020	Completion of the whole of the Works (1520)	11-May-19, Completion of the whole of the Works (1520)																																											
Possession Dates																																													
CON.PD.1010	Site Possession of Portion A1 (61) - 8	06-Oct-16, Site Possession of Portion A1 (61) - 8																																											
CON.PD.1020	Site Possession of Portion A2 (61)	11-May-19, Site Possession of Portion A2 (61)																																											
CON.PD.1050	Site Possession of Portion A5 (61)	11-May-19, Site Possession of Portion A5 (61)																																											
CON.PD.1060	Site Possession of Portion A6 (61)	11-May-19, Site Possession of Portion A6 (61)																																											
CON.PD.1070	Site Possession of Portion B1-5 (92)	06-Oct-16, Site Possession of Portion B1-5 (92)																																											
CON.PD.1080	Site Possession of Portion B2 (123)	06-Oct-16, Site Possession of Portion B2 (123)																																											
CON.PD.1130	Site Possession of Portion B5 (123)	06-Oct-16, Site Possession of Portion B5 (123)																																											
CON.PD.1140	Site Possession of Portion C1 (184)	06-Oct-16, Site Possession of Portion C1 (184)																																											
CON.PD.1150	Site Possession of Portion C2 (184)	06-Oct-16, Site Possession of Portion C2 (184)																																											
CON.PD.1160	Site Possession of Portion D1 (183)	06-Oct-16, Site Possession of Portion D1 (183)																																											
CON.PD.1180	Site Possession of Portion D3 (183)	06-Oct-16, Site Possession of Portion D3 (183)																																											
CON.PD.1190	Site Possession of Portion A1 (61) - 2	11-May-19, Site Possession of Portion A1 (61) - 2																																											
CON.PD.1200	Site Possession of Portion A1 (61) - 5	11-May-19, Site Possession of Portion A1 (61) - 5																																											
CON.PD.1210	Site Possession of Portion A1 (61) - 1	11-May-19, Site Possession of Portion A1 (61) - 1																																											
CON.PD.1220	Site Possession of Portion C1 -1 (184)	06-Oct-16, Site Possession of Portion C1 -1 (184)																																											
CON.PD.1230	Site Possession of Portion C1 -2 (184)	06-Oct-16, Site Possession of Portion C1 -2 (184)																																											
CON.PD.1240	Site Possession of Portion B1 -1 (92)	06-Oct-16, Site Possession of Portion B1 -1 (92)																																											
CON.PD.1250	Site Possession of Portion B1 -2 (92)	06-Oct-16, Site Possession of Portion B1 -2 (92)																																											
CON.PD.1260	Site Possession of Portion A1 (61) - 7	06-Oct-16, Site Possession of Portion A1 (61) - 7																																											
CON.PD.1270	Site Possession of Portion B1-3 (92)	06-Oct-16, Site Possession of Portion B1-3 (92)																																											
CON.PD.1280	Site Possession of Portion B1-4 (92)	06-Oct-16, Site Possession of Portion B1-4 (92)																																											
CON.PD.1290	Site Possession of Portion C1 -3 (184)	06-Oct-16, Site Possession of Portion C1 -3 (184)																																											
Site Access Dates																																													
CON.PD.1030	Site Access of Portion A3 (476)	06-Oct-16, Site Access of Portion A3 (476)																																											
CON.PD.1040	Site Access of Portion A4 (627)	29-Nov-16, Site Access of Portion A4 (627)																																											
CON.PD.1090	Site Access of Portion B3 (476)	06-Oct-16, Site Access of Portion B3 (476)																																											
CON.PD.1100	Site Access of Portion B4 (627)	29-Nov-16, Site Access of Portion B4 (627)																																											
CON.PD.1170	Site Access of Portion D2 (488)	06-Oct-16, Site Access of Portion D2 (488)																																											
Contractual Key Dates - Stage / Section I																																													
CON.FOT.KD01	KD01 - Achievement of Stage 1A (525)	06-Oct-16, KD01 - Achievement of Stage 1A (525)																																											
CON.FOT.KD02	KD02 - Achievement of Stage 1B (650)	22-Dec-16, KD02 - Achievement of Stage 1B (650)																																											
CON.FOT.KD03	KD03 - Achievement of Stage 2 (525)	06-Oct-16, KD03 - Achievement of Stage 2 (525)																																											
CON.FOT.KD04	KD04 - Achievement of Stage 3 (465)	06-Oct-16, KD04 - Achievement of Stage 3 (465)																																											
CON.FOT.KD05	KD05 - Achievement of Stage 4 (615)	17-Nov-16, KD05 - Achievement of Stage 4 (615)																																											
CON.FOT.KD06	KD06 - Achievement of Stage 5 (615)	17-Nov-16, KD06 - Achievement of Stage 5 (615)																																											
CON.FOT.KD07	KD07 - Achievement of Stage 6 (270)	06-Oct-16, KD07 - Achievement of Stage 6 (270)																																											
CON.FOT.KD08	KD08 - Completion of Section I of the Works (795)	16-May-17, KD08 - Completion of Section I of the Works (795)																																											
CON.FOT.KD09	KD09 - Completion of Section II of the Works (803)	24-May-17, KD09 - Completion of Section II of the Works (803)																																											
CON.FOT.KD10	KD10 - Completion of Section III of the Works (803)	24-May-17, KD10 - Completion of Section III of the Works (803)																																											
CON.FOT.KD11	KD11 - Completion of Section IV of the Works (565)	06-Oct-16, KD11 - Completion of Section IV of the Works (565)																																											
CON.FOT.KD12	KD12 - Completion of Section V of the Works (803)	24-May-17, KD12 - Completion of Section V of the Works (803)																																											
CON.FOT.KD13	KD13 - Completion of Section VI of the Works (465)	06-Oct-16, KD13 - Completion of Section VI of the Works (465)																																											
CON.FOT.KD14	KD14 - Completion of Section VII of the Works (1155)	11-May-18, KD14 - Completion of Section VII of the Works (1155)																																											
CON.FOT.KD15	KD15 - Completion of Section VIIIA of the Works (795)	16-May-17, KD15 - Completion of Section VIIIA of the Works (795)																																											
CON.FOT.KD16	KD16 - Completion of Section VIIIB of the Works (1155)	11-May-18, KD16 - Completion of Section VIIIB of the Works (1155)																																											
CON.FOT.KD17	KD17 - Achievement of Stage 7 (718)	28-Feb-17, KD17 - Achievement of Stage 7 (718)																																											
CON.FOT.KD17A	KD17A - Completion of Section VIIIC of the Works (795)	16-May-17, KD17A - Completion of Section VIIIC of the Works (795)																																											
CON.FOT.KD18	KD18 - Completion of Section VIID of the Works (1155)	11-May-18, KD18 - Completion of Section VIID of the Works (1155)																																											
CON.FOT.KD19	KD19 - Completion of Section IXA of the Works (1160)	16-May-18, KD19 - Completion of Section IXA of the Works (1160)																																											
CON.FOT.KD20	KD20 - Completion of Section IXB of the Works (1520)	11-May-19, KD20 - Completion of Section IXB of the Works (1520)																																											
Contractual Handover Dates to Employer																																													
CON.HD.1190	Handover of Portion A1 (KD8+28 days)	13-Jun-17, Handover of Portion A1 (KD8+28 days)																																											
CON.HD.1200	Handover of Portion A2 (KD8+28 days)	13-Jun-17, Handover of Portion A2 (KD8+28 days)																																											
CON.HD.1210	Handover of Portion A3 (KD9+28 days)	21-Jun-17, Handover of Portion A3 (KD9+28 days)																																											
CON.HD.1220	Handover of Portion A4 (KD10+28 days)	21-Jun-17, Handover of Portion A4 (KD10+28 days)																																											
CON.HD.1240	Handover of Portion A5 (KD13+0 days)	06-Oct-16, Handover of Portion A5 (KD13+0 days)																																											

Activity ID	Activity Name	2015				2016				2017				2018				2019				2020				2021																			
		A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N
PROC.MA.1610	Detailed Design / Shop Drawings and Materials Submission	Detailed Design / Shop Drawings and Materials Submission																																											
PROC.MA.1615	Engineer's Review / Approval	Engineer's Review / Approval																																											
PROC.MA.1650	Production / Manufacturing / Fabrication	Production / Manufacturing / Fabrication																																											
PROC.MA.1670	Materials Delivery (first delivery)	21-Nov-16 ♦ Materials Delivery (first delivery)																																											
Precast Concrete - Segments																																													
PROC.MA.1760	Moulds Detailed Design Preparation / Submission	Moulds Detailed Design Preparation / Submission																																											
PROC.MA.1765	Engineer's Review / Approval	Engineer's Review / Approval																																											
PROC.MA.1770	Mould Fabrication	Mould Fabrication																																											
PROC.MA.1780	Cast Prototype / Inspection and Approval	Cast Prototype / Inspection and Approval																																											
PROC.MA.2570	Production of Precast Segments	Production of Precast Segments																																											
PROC.MA.2590	Materials Delivery (First Delivery)	14-Nov-16 ♦ Materials Delivery (First Delivery)																																											
Segment Fabrication and Post Pouring																																													
Segment Fabrication Type A																																													
Fab.A1.001	Segment Fabrication for Bridge D1 (96 nos)	Segment Fabrication for Bridge D1 (96 nos)																																											
Segment Fabrication Type C1																																													
Fab.TC1.0010	Segment Fabrication for Bridge D12b (91-106) 16 nos.	Segment Fabrication for Bridge D12b (91-106) 16 nos.																																											
Fab.TC1.0020	Segment Fabrication for Bridge D9c (1-3) 3 nos.	Segment Fabrication for Bridge D9c (1-3) 3 nos.																																											
Fab.TC1.0030	Segment Fabrication for Bridge D14a (1-30) 30 nos.	Segment Fabrication for Bridge D14a (1-30) 30 nos.																																											
Fab.TC1.0040	Segment Fabrication for Bridge D12a (66-80) 15 nos.	Segment Fabrication for Bridge D12a (66-80) 15 nos.																																											
Fab.TC1.0050	Segment Fabrication for Bridge D14b (14-27) 14 nos.	Segment Fabrication for Bridge D14b (14-27) 14 nos.																																											
Fab.TC1.0060	Segment Fabrication for Bridge D14c (1-15) 15 nos.	Segment Fabrication for Bridge D14c (1-15) 15 nos.																																											
Fab.TC1.0080	Segment Fabrication for Bridge D9c (4-14) 11 nos.	Segment Fabrication for Bridge D9c (4-14) 11 nos.																																											
Fab.TC2.00060	Segment Fabrication for Bridge D15 (48-64) 17 nos.	Segment Fabrication for Bridge D15 (48-64) 17 nos.																																											
Fab.TC3.0060	Segment Fabrication for Bridge D15 (31-47) 17 nos.	Segment Fabrication for Bridge D15 (31-47) 17 nos.																																											
Fab.TC4.0030	Segment Fabrication for Bridge D13 (103-129) 27 nos.	Segment Fabrication for Bridge D13 (103-129) 27 nos.																																											
Fab.TC4.0060	Segment Fabrication for Bridge D14c (46-60) 15 nos.	Segment Fabrication for Bridge D14c (46-60) 15 nos.																																											
Segment Fabrication Type C2																																													
Fab.TC1.0070	Segment Fabrication for Bridge D15 (1-15) 15 nos.	Segment Fabrication for Bridge D15 (1-15) 15 nos.																																											
Fab.TC2.00010	Segment Fabrication for Bridge D12b (112-127) 16 nos.	Segment Fabrication for Bridge D12b (112-127) 16 nos.																																											
Fab.TC2.00020	Segment Fabrication for Bridge D14a (31-59) 29 nos.	Segment Fabrication for Bridge D14a (31-59) 29 nos.																																											
Fab.TC2.00030	Segment Fabrication for Bridge D9c (29-42) 14 nos.	Segment Fabrication for Bridge D9c (29-42) 14 nos.																																											
Fab.TC2.00040	Segment Fabrication for Bridge D12a (48-65) 18 nos.	Segment Fabrication for Bridge D12a (48-65) 18 nos.																																											
Fab.TC2.00050	Segment Fabrication for Bridge D14c (16-30) 15 nos.	Segment Fabrication for Bridge D14c (16-30) 15 nos.																																											
Fab.TC3.0010	Segment Fabrication for Bridge D12b (44-84, 107-111) 46 nos.	Segment Fabrication for Bridge D12b (44-84, 107-111) 46 nos.																																											
Fab.TC3.0050	Segment Fabrication for Bridge D14c (31-45) 15 nos.	Segment Fabrication for Bridge D14c (31-45) 15 nos.																																											
Fab.TC4.0070	Segment Fabrication for Bridge D15 (65-78) 14 nos.	Segment Fabrication for Bridge D15 (65-78) 14 nos.																																											
Segment Fabrication Type C3																																													
Fab.TC3.0020	Segment Fabrication for Bridge D9c (15-28) 14 nos.	Segment Fabrication for Bridge D9c (15-28) 14 nos.																																											
Fab.TC3.0030	Segment Fabrication for Bridge D13 (43-70 & 100-102) 31 nos.	Segment Fabrication for Bridge D13 (43-70 & 100-102) 31 nos.																																											
Fab.TC3.0040	Segment Fabrication for Bridge D14b (28-49) 22 nos.	Segment Fabrication for Bridge D14b (28-49) 22 nos.																																											
Fab.TC4.0010	Segment Fabrication for Bridge D12b (1-43, 85-90) 49 nos.	Segment Fabrication for Bridge D12b (1-43, 85-90) 49 nos.																																											
Fab.TC4.0020	Segment Fabrication for Bridge D14a (60-75) 16 nos.	Segment Fabrication for Bridge D14a (60-75) 16 nos.																																											
Fab.TC4.0040	Segment Fabrication for Bridge D12a (81-95) 15 nos.	Segment Fabrication for Bridge D12a (81-95) 15 nos.																																											
Fab.TC4.0050	Segment Fabrication for Bridge D14b (1-13) 13 nos.	Segment Fabrication for Bridge D14b (1-13) 13 nos.																																											
Segment Fabrication Type D2																																													
Fab.T1.0020	Segment Fabrication for Bridge D9a (75-86 & 92-104) 25 nos.	Segment Fabrication for Bridge D9a (75-86 & 92-104) 25 nos.																																											
Fab.T1.0040	Segment Fabrication for Bridge D13 (33-46) 14 nos.	Segment Fabrication for Bridge D13 (33-46) 14 nos.																																											
Fab.T1.0050	Segment Fabrication for Bridge D9a (1-15) 15 nos.	Segment Fabrication for Bridge D9a (1-15) 15 nos.																																											
Fab.T2.0010	Segment Fabrication for Bridge D9a (32-46) 15 nos.	Segment Fabrication for Bridge D9a (32-46) 15 nos.																																											
Fab.T2.0030	Segment Fabrication for Bridge D9b (1-15) 15 nos.	Segment Fabrication for Bridge D9b (1-15) 15 nos.																																											
Fab.T2.0040	Segment Fabrication for Bridge D10 (33-47) 14 nos.	Segment Fabrication for Bridge D10 (33-47) 14 nos.																																											
Fab.T2.0050	Segment Fabrication for Bridge D13 (29-41) 13 nos.	Segment Fabrication for Bridge D13 (29-41) 13 nos.																																											
Fab.T3.0030	Segment Fabrication for Bridge D9a (47-57, 70-74) 16 nos.	Segment Fabrication for Bridge D9a (47-57, 70-74) 16 nos.																																											
Fab.T3.0040	Segment Fabrication for Bridge D10 (68-88 & 27-32) 27 nos.	Segment Fabrication for Bridge D10 (68-88 & 27-32) 27 nos.																																											
Fab.T3.0070	Segment Fabrication for Bridge D15 (1-14) 14 nos.	Segment Fabrication for Bridge D15 (1-14) 14 nos.																																											
Fab.T4.0020	Segment Fabrication for Bridge D10 (61-67 & 89-95) 14 nos.	Segment Fabrication for Bridge D10 (61-67 & 89-95) 14 nos.																																											
Fab.T4.0040	Segment Fabrication for Bridge D8 (48-62) 15 nos.	Segment Fabrication for Bridge D8 (48-62) 15 nos.																																											
Fab.T4.0050	Segment Fabrication for Bridge D13 (78-98) 21 nos.	Segment Fabrication for Bridge D13 (78-98) 21 nos.																																											
Fab.T4.0060	Segment Fabrication for Bridge D10 (96-109) 14 nos.	Segment Fabrication for Bridge D10 (96-109) 14 nos.																																											
Segment Fabrication Type D3																																													
Fab.T1.0010	Segment Fabrication for Bridge D11 (17-31) 15 nos.	Segment Fabrication for Bridge D11 (17-31) 15 nos.																																											
Fab.T1.0030	Segment Fabrication for Bridge D10 (1-26) 26 nos.	Segment Fabrication for Bridge D10 (1-26) 26 nos.																																											
Fab.T1.0060	Segment Fabrication for Bridge D8 (1-16) 16 nos.	Segment Fabrication for Bridge D8 (1-16) 16 nos.																																											
Fab.T1.0070	Segment Fabrication for Bridge D12a (1-16) 16 nos.	Segment Fabrication for Bridge D12a (1-16) 16 nos.																																											
Fab.T2.0020	Segment Fabrication for Bridge D11 (1-16) 16 nos.	Segment Fabrication for Bridge D11 (1-16) 16 nos.																																											
Fab.T2.0060	Segment Fabrication for Bridge D8 (17-31) 15 nos.	Segment Fabrication for Bridge D8 (17-31) 15 nos.																																											

Activity ID	Activity Name	2015				2016				2017				2018				2019				2020				2021																																																																																					
		A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
Mobilisation and Site Establishment																																																																																																															
CONS.A1.0100	Site Possession / Access to Portion A1, A2, A5 & A6	◆ Site Possession / Access to Portion A1, A2, A5 & A6																																																																																																													
CONS.A1.0110	Mobilisation, Site Clearing and Site Set-up	■ Mobilisation, Site Clearing and Site Set-up																																																																																																													
CONS.A1.0120	Install Temporary Facilities / Hygiene Facilities	■ Install Temporary Facilities / Hygiene Facilities																																																																																																													
Gates and Haul Road Construction (as per DW)																																																																																																															
CONS.A1.1010	Site Possession / Access to Portion A1	◆ Site Possession / Access to Portion A1																																																																																																													
CONS.A1.1020	Survey/ Setting Out	■ Survey/ Setting Out																																																																																																													
CONS.A1.1030	Construct Gate 1 at Haul Road	■ Construct Gate 1 at Haul Road																																																																																																													
CONS.B1.1010	Site Possession / Access to Portion B1	◆ Site Possession / Access to Portion B1																																																																																																													
CONS.B1.1020	Mobilisation, Site Survey and Setting Out	■ Mobilisation, Site Survey and Setting Out																																																																																																													
CONS.B1.1030	Construct Gate 3 and Temporary Haul Road	■ Construct Gate 3 and Temporary Haul Road																																																																																																													
CONS.B2.1010	Site Possession / Access to Portion B2 & B5	◆ Site Possession / Access to Portion B2 & B5																																																																																																													
CONS.B2.1020	Site Survey / Setting out	■ Site Survey / Setting out																																																																																																													
CONS.B2.1030	Construct Temporary Haul Road	■ Construct Temporary Haul Road																																																																																																													
Preliminary Bored Pile with Additional Instrum																																																																																																															
CONS.A1.0180	Commence Preliminary Bored Pile at Abutment A1101	◆ Commence Preliminary Bored Pile at Abutment A1101																																																																																																													
CONS.A1.0190	Mobilise Plant & Set-up Support	■ Mobilise Plant & Set-up Support																																																																																																													
CONS.A1.0195.1	Predrilling to Preliminary Bored Pile (D11)	■ Predrilling to Preliminary Bored Pile (D11)																																																																																																													
CONS.A1.0195.2	GI Report and Verification / Agreement to Founding Level	■ GI Report and Verification / Agreement to Founding Level																																																																																																													
CONS.A1.0200	Preliminary Bored Piling with Additional Instrumentation at Abutment A1101 (1 no.	■ Preliminary Bored Piling with Additional Instrumentation at Abutment A1101 (1 no. 2000mm dia x 42m)																																																																																																													
CONS.A1.0210	Pile Curing	■ Pile Curing																																																																																																													
CONS.A1.0220	Pile Load Testing & Submit Report	■ Pile Load Testing & Submit Report																																																																																																													
Replacement Preliminary Bored Pile and Load																																																																																																															
CONS.A1.0195.6	GI Report and Verification / Agreement to Founding Level	■ GI Report and Verification / Agreement to Founding Level																																																																																																													
CONS.A1.0195.7	Engineer's Representative confirmed the replacement bored pile at Pier P908-P1	■ Engineer's Representative confirmed the replacement bored pile at Pier P908-P1																																																																																																													
CONS.A1.0280	Commence Replacement Preliminary Bored Pile at Abutment A1004	◆ Commence Replacement Preliminary Bored Pile at Abutment A1004																																																																																																													
CONS.A1.0290	Mobilise Plant & Set-up Support	■ Mobilise Plant & Set-up Support																																																																																																													
CONS.A1.0300	Replacement Preliminary Bored Piling - Pier P908	■ Replacement Preliminary Bored Piling - Pier P908																																																																																																													
CONS.A1.0310	Pile Curing	■ Pile Curing																																																																																																													
CONS.A1.0320	Pile Load Testing & Submit Report	■ Pile Load Testing & Submit Report																																																																																																													
Preliminary Bored Pile and Load Testing at Ab																																																																																																															
CONS.C1.0400	Commence Preliminary Bored Pile at Abutment A106	◆ Commence Preliminary Bored Pile at Abutment A106																																																																																																													
CONS.C1.0410	Mobilise Plant & Set-up Support	■ Mobilise Plant & Set-up Support																																																																																																													
CONS.C1.0415.1	Predrilling to Preliminary Bored Pile (D1)	■ Predrilling to Preliminary Bored Pile (D1)																																																																																																													
CONS.C1.0415.2	GI Report and Verification / Agreement to Founding Level	■ GI Report and Verification / Agreement to Founding Level																																																																																																													
CONS.C1.0420	Preliminary Bored Piling - Abutment A106 (1 no. 2000mm dia x 52m)	■ Preliminary Bored Piling - Abutment A106 (1 no. 2000mm dia x 52m)																																																																																																													
CONS.C1.0430	Pile Curing	■ Pile Curing																																																																																																													
CONS.C1.0440	Pile Load Testing and Submit Report	■ Pile Load Testing and Submit Report																																																																																																													
Preliminary Driven H Piles and Load Testing																																																																																																															
CONS.A1.4360	Test Pile approved, commence permanent driven h-pile	◆ Test Pile approved, commence permanent driven h-pile																																																																																																													
CONS.C1.0510	Engineer select Preliminary Test Pile (Driven H Pile)	◆ Engineer select Preliminary Test Pile (Driven H Pile)																																																																																																													
CONS.C1.0520	Mobilise Plant & Set-up Support	■ Mobilise Plant & Set-up Support																																																																																																													
CONS.C1.0530.1	Pre-drilling (2 nos) (Sign Gantry - Preliminary Pile)	■ Pre-drilling (2 nos) (Sign Gantry - Preliminary Pile)																																																																																																													
CONS.C1.0530.2	GI Report and Verification / Agreement to Founding Level	■ GI Report and Verification / Agreement to Founding Level																																																																																																													
CONS.C1.0540	Preliminary Driven H Pile (2 nos)	■ Preliminary Driven H Pile (2 nos)																																																																																																													
CONS.C1.0550	Pile Load Testing and Submit Report	■ Pile Load Testing and Submit Report																																																																																																													
Preliminary Pre-Bored H-Pile and Load Testing																																																																																																															
CONS.A1.0195.3	Predrilling to Preliminary Pre-Bored H-Pile - 1 no.	■ Predrilling to Preliminary Pre-Bored H-Pile - 1 no.																																																																																																													
CONS.A1.0195.4	GI Report and Verification / Agreement to Founding Level	■ GI Report and Verification / Agreement to Founding Level																																																																																																													
CONS.A1.0230	Engineer select Preliminary Test Pile (Pre-Bored H-Pile)	◆ Engineer select Preliminary Test Pile (Pre-Bored H-Pile)																																																																																																													
CONS.A1.0240	Mobilise Plant & Set-up Support	■ Mobilise Plant & Set-up Support																																																																																																													
CONS.A1.0250	Preliminary Pre-Bored H-Piling - 1 no.	■ Preliminary Pre-Bored H-Piling - 1 no.																																																																																																													
CONS.A1.0270	Pile Load Testing & Submit Report	■ Pile Load Testing & Submit Report																																																																																																													
Treatment for Bored Piling Excavated Materials																																																																																																															
CONS.EX.1010	Set-up Stockpile for Excavated Marine Mud	■ Set-up Stockpile for Excavated Marine Mud																																																																																																													
CONS.EX.1020	Pilot Test for Marine Mud Treatment	■ Pilot Test for Marine Mud Treatment																																																																																																													
CONS.EX.1030	Solidification / Stabilisation / Approval Method	■ Solidification / Stabilisation / Approval Method																																																																																																													
CONS.EX.1040	Set-up Treatment Facilities and Storage Yard	■ Set-up Treatment Facilities and Storage Yard																																																																																																													
CONS.EX.1050	Full Scale Solidification / Stabilization Treatment and Verification Testing	■ Full Scale Solidification / Stabilization Treatment and Verification Testing																																																																																																													
CONS.EX.1060	Decommissioning of Treatment Facilities	■ Decommissioning of Treatment Facilities																																																																																																													
Site Set Up at Portion C1																																																																																																															
CONS.C1.1010	Site Possession / Access to Portion C1 and C2	◆ Site Possession / Access to Portion C1 and C2																																																																																																													
CONS.C1.1020	Site Possession / Access to Portion D1 and D3	◆ Site Possession / Access to Portion D1 and D3																																																																																																													
CONS.C1.1030	Site Set-Up	■ Site Set-Up																																																																																																													
Pump House cum Switch Room																																																																																																															
CONS.C1.5110	Commence Pump House Cum Switch Room (2B+ GF)	◆ Commence Pump House Cum Switch Room (2B+ GF)																																																																																																													

Activity ID	Activity Name	2015												2016												2017												2018												2019												2020												2021																																																																																																																																																																							
		A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D																																																																																																																																							
CONS.RW.3890	Excavate and Install HV Cable Ducting on Carriageway (East of Pump House - Portion B)																									Excavate and Install HV Cable Ducting on Carriageway (East of Pump House - Portion B and C)																																																																																																																																																																																																																							
CONS.RW.3900	Excavate and Install HV Cable Ducting on Carriageway (West of Pump House - Portion																																																	Excavate and Install HV Cable Ducting on Carriageway (West of Pump House - Portion D)																																																																																																																																																																																															
Drainage and U/G Utilities (West of Pump Hou																																																																																																																																																																																																																																																	
Drainage & UU																																																																																																																																																																																																																																																	
Road SOL 101 / 105 (Phase 1)																																																																																																																																																																																																																																																	
Drainage System																																																																																																																																																																																																																																																	
CONS.RW.22	Survey/ Road Setting Out	Survey/ Road Setting Out																																																																																																																																																																																																																																															
CONS.RW.22	Road Formation to Sub-grade (Cut & Fill)	Road Formation to Sub-grade (Cut & Fill)																																																																																																																																																																																																																																															
CONS.RW.22	Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) +	Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + Testing & Interface Connection																																																																																																																																																																																																																																															
Installation of Underground Utilities																																																																																																																																																																																																																																																	
CONS.RW.23	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection																																																																																																																																																																																																																																															
CONS.RW.23	Excavate and Install Common Telecom Ducting and Telecom Ducting by Others	Excavate and Install Common Telecom Ducting and Telecom Ducting by Others																																																																																																																																																																																																																																															
CONS.RW.23	Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS	Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS																																																																																																																																																																																																																																															
Road SOL 101 / 105 (Phase 2)																																																																																																																																																																																																																																																	
Drainage System																																																																																																																																																																																																																																																	
CONS.RW.34	Survey/ Road Setting Out	Survey/ Road Setting Out																																																																																																																																																																																																																																															
CONS.RW.34	Road Formation to Sub-grade (Cut & Fill)	Road Formation to Sub-grade (Cut & Fill)																																																																																																																																																																																																																																															
CONS.RW.34	Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) +	Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + Testing & Interface Connection																																																																																																																																																																																																																																															
Installation of Underground Utilities																																																																																																																																																																																																																																																	
CONS.RW.34	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection																																																																																																																																																																																																																																															
CONS.RW.34	Excavate and Install Common Telecom Ducting and Telecom Ducting by Others	Excavate and Install Common Telecom Ducting and Telecom Ducting by Others																																																																																																																																																																																																																																															
CONS.RW.34	Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS	Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS																																																																																																																																																																																																																																															
Road SOL 102 /106 /111 and the neighboring la																																																																																																																																																																																																																																																	
Drainage System																																																																																																																																																																																																																																																	
CONS.RW.24	Survey/ Road Setting Out	Survey/ Road Setting Out																																																																																																																																																																																																																																															
CONS.RW.24	Road Formation to Sub-grade (Cut & Fill)	Road Formation to Sub-grade (Cut & Fill)																																																																																																																																																																																																																																															
CONS.RW.24	Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) +	Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + Testing & Interface Connection																																																																																																																																																																																																																																															
Installation of Underground Utilities																																																																																																																																																																																																																																																	
CONS.RW.29	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection																																																																																																																																																																																																																																															
CONS.RW.29	Excavate and Install Common Telecom Ducting and Telecom Ducting by Others	Excavate and Install Common Telecom Ducting and Telecom Ducting by Others																																																																																																																																																																																																																																															
CONS.RW.29	Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS	Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS																																																																																																																																																																																																																																															
Road SOL 102 /106 /111 and the neighboring la																																																																																																																																																																																																																																																	
Drainage System																																																																																																																																																																																																																																																	
CONS.RW.34	Survey/ Road Setting Out	Survey/ Road Setting Out																																																																																																																																																																																																																																															
CONS.RW.34	Road Formation to Sub-grade (Cut & Fill)	Road Formation to Sub-grade (Cut & Fill)																																																																																																																																																																																																																																															
CONS.RW.34	Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) +	Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + Testing & Interface Connection																																																																																																																																																																																																																																															
Installation of Underground Utilities																																																																																																																																																																																																																																																	
CONS.RW.35	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection																																																																																																																																																																																																																																															
CONS.RW.35	Excavate and Install Common Telecom Ducting and Telecom Ducting by Others	Excavate and Install Common Telecom Ducting and Telecom Ducting by Others																																																																																																																																																																																																																																															
CONS.RW.35	Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS	Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS																																																																																																																																																																																																																																															
Road SOL 104 (Phase 1)																																																																																																																																																																																																																																																	
Drainage System																																																																																																																																																																																																																																																	
CONS.RW.24	Survey/ Road Setting Out	Survey/ Road Setting Out																																																																																																																																																																																																																																															
CONS.RW.24	Road Formation to Sub-grade (Cut & Fill)	Road Formation to Sub-grade (Cut & Fill)																																																																																																																																																																																																																																															
CONS.RW.24	Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) +	Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + Testing & Interface Connection																																																																																																																																																																																																																																															
Installation of Underground Utilities																																																																																																																																																																																																																																																	
CONS.RW.24	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection (3 lines)																																																																																																																																																																																																																																															
CONS.RW.24	Excavate and Install Flush WM / Valves & fittings + Testing, Cleaning & Flushing and	Excavate and Install Flush WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection (1 line)																																																																																																																																																																																																																																															
CONS.RW.24	Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS	Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS																																																																																																																																																																																																																																															
Road SOL 104 (Phase 2)																																																																																																																																																																																																																																																	
Drainage System																																																																																																																																																																																																																																																	
CONS.RW.35	Survey/ Road Setting Out	Survey/ Road Setting Out																																																																																																																																																																																																																																															
CONS.RW.35	Road Formation to Sub-grade (Cut & Fill)	Road Formation to Sub-grade (Cut & Fill)																																																																																																																																																																																																																																															
CONS.RW.35	Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) +	Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + Testing & Interface Connection																																																																																																																																																																																																																																															
Installation of Underground Utilities																																																																																																																																																																																																																																																	
CONS.RW.35	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection (3 lines)																																																																																																																																																																																																																																															
CONS.RW.35	Excavate and Install Flush WM / Valves & fittings + Testing, Cleaning & Flushing and	Excavate and Install Flush WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection (1 line)																																																																																																																																																																																																																																															
CONS.RW.35	Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS	Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS																																																																																																																																																																																																																																															
Underground Utilities (ELV, Fresh WM & Teleco																																																																																																																																																																																																																																																	
Work in Portion D1 and D2																																																																																																																																																																																																																																																	
Sewage Rising main at Portion D1																																																																																																																																																																																																																																																	
CONS.RM.101	Commence Works on Rising Main	16-May-17 : Commence Works on Rising Main																																																																																																																																																																																																																																															
CONS.RM.102	Site Survey / Setting Out Sewerage Alignment	Site Survey / Setting Out Sewerage Alignment																																																																																																																																																																																																																																															
CONS.RM.103	Excavate to Invert Level & Install 2 Sewage Rising Main DN100 CHC & CHD	Excavate to Invert Level & Install 2 Sewage Rising Main DN100 CHC & CHD																																																																																																																																																																																																																																															
CONS.RM.104	Construct Thrust Block	Construct Thrust Block																																																																																																																																																																																																																																															
CONS.RM.105	Gravity Flow Testing	Gravity Flow Testing																																																																																																																																																																																																																																															

Activity ID	Activity Name	2015				2016				2017				2018				2019				2020				2021																			
		A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N
CONS.A1.4430	Demobilisation of Temporary Facilities on Site												■ Demobilisation of Temporary Facilities on Site																																
CONS.A1.4440	Site Survey / Site Clearing												■ Site Survey / Site Clearing																																
CONS.A1.4450	Area to Formation Level												■ Area to Formation Level																																
CONS.A1.4460	Sub-Base Material Topping (Area 29,963 m2 x 100mm thk Subbase)												■ Sub-Base Material Topping (Area 29,963 m2 x 100mm thk Subbase)																																
Area 3 (in Portion A6)																																													
Drainage System																																													
CONS.RE.4660	Survey/ Road Setting Out												■ Survey/ Road Setting Out																																
CONS.RE.4670	Road Formation to Sub-grade (Cut & Fill)												■ Road Formation to Sub-grade (Cut & Fill)																																
CONS.RE.4680	Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) +												■ Excavate to invert level and install Drainage System (Drain Pipes & Catchpit/Manholes) + Testing & Interface Co																																
Installation of Underground Utilities																																													
CONS.RE.4690	Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS												■ Excavate and Install ELV/ LV Ducting and Pillar Box for TCSS																																
CONS.RE.4700	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and												■ Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection (3																																
CONS.RE.4710	Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and												■ Excavate and Install Fresh WM / Valves & fittings + Testing, Cleaning & Flushing and Interface Connection (
Roadworks																																													
Area 1 (West of Pump House) (Portion C1)																																													
Road Works																																													
Road SOL 101 / 105 (Phase 1)																																													
Kerbing and Footings for Railing, Fencing, Sigr																																													
CONS.RW.30f	Excavate and Construct Footings for Road Lightings / Railing / Fencing and Signages												■ Excavate and Construct Footings for Road Lightings / Railing / Fencing and Signages																																
CONS.RW.30f	Road Formation to Sub-base												■ Road Formation to Sub-base																																
CONS.RW.30f	Construct Precast Road Kerbings												■ Construct Precast Road Kerbings																																
Road Works to Road Base and Base Course																																													
CONS.RW.30f	Road Formation to Road Base												■ Road Formation to Road Base																																
CONS.RW.30f	Road Formation to Base Course												■ Road Formation to Base Course																																
Installation of Railing and Fencing + Road Ligt																																													
CONS.RW.30f	Install Road Railing and Fencing												■ Install Road Railing and Fencing																																
CONS.RW.30f	Install Road Lighting and Signages												■ Install Road Lighting and Signages																																
Final Paving and Road Markings																																													
CONS.RW.29f	Cleaning and Rectification Works												■ Cleaning and Rectification Works																																
CONS.RW.29f	Final Road Paving (Wearing Course)												■ Final Road Paving (Wearing Course)																																
CONS.RW.29f	Road Markings and Road Signages												■ Road Markings and Road Signages																																
Road SOL 101 / 105 (Phase 2)																																													
Kerbing and Footings for Railing, Fencing, Sigr																																													
CONS.RW.36f	Road Formation to Sub-base												■ Road Formation to Sub-base																																
CONS.RW.36f	Construct Precast Road Kerbings												■ Construct Precast Road Kerbings																																
Road Works to Road Base and Base Course																																													
CONS.RW.36f	Road Formation to Road Base												■ Road Formation to Road Base																																
CONS.RW.36f	Road Formation to Base Course												■ Road Formation to Base Course																																
Installation of Railing and Fencing + Road Ligt																																													
CONS.RW.36f	Install Road Railing and Fencing												■ Install Road Railing and Fencing																																
CONS.RW.36f	Install Road Lighting and Signages												■ Install Road Lighting and Signages																																
Final Paving and Road Markings																																													
CONS.RW.35f	Cleaning and Rectification Works												■ Cleaning and Rectification Works																																
CONS.RW.36f	Final Road Paving (Wearing Course)												■ Final Road Paving (Wearing Course)																																
CONS.RW.36f	Road Markings and Road Signages												■ Road Markings and Road Signages																																
Road SOL 102 /106 /111 (Phase 1)																																													
Kerbing and Footings for Railing, Fencing, Sigr																																													
CONS.RW.32f	Excavate and Construct Footings for Road Lightings / Railing / Fencing and Signages												■ Excavate and Construct Footings for Road Lightings / Railing / Fencing and Signages																																
CONS.RW.32f	Road Formation to Sub-base												■ Road Formation to Sub-base																																
CONS.RW.32f	Construct Precast Road Kerbings												■ Construct Precast Road Kerbings																																
Road Works to Road Base and Base Course																																													
CONS.RW.32f	Road Formation to Road Base												■ Road Formation to Road Base																																
CONS.RW.32f	Road Formation to Base Course												■ Road Formation to Base Course																																
Installation of Railing and Fencing + Road Ligt																																													
CONS.RW.32f	Install Road Railing and Fencing												■ Install Road Railing and Fencing																																
CONS.RW.32f	Install Road Lighting and Signages												■ Install Road Lighting and Signages																																
Final Paving and Road Markings																																													
CONS.RW.32f	Final Road Paving (Wearing Course)												■ Final Road Paving (Wearing Course)																																
CONS.RW.32f	Road Markings and Road Signages												■ Road Markings and Road Signages																																
Road SOL 102 /106 /111 (Phase 2)																																													
Kerbing and Footings for Railing, Fencing, Sigr																																													
CONS.RW.37f	Excavate and Construct Footings for Road Lightings / Railing / Fencing and Signages												■ Excavate and Construct Footings for Road Lightings / Railing / Fencing and Signages																																
CONS.RW.37f	Road Formation to Sub-base												■ Road Formation to Sub-base																																
CONS.RW.37f	Construct Precast Road Kerbings												■ Construct Precast Road Kerbings																																
Road Works to Road Base and Base Course																																													
CONS.RW.36f	Road Formation to Road Base												■ Road Formation to Road Base																																

Appendix D. Event and Action Plan

Event/Action Plan for Air Quality Monitoring

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
ACTION LEVEL				
1. Exceedance for one sample	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform IEC and ER; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method. 	<ol style="list-style-type: none"> 1. Notify Contractor. 	<ol style="list-style-type: none"> 1. Rectify any unacceptable practice; 2. Amend working methods if appropriate.
2. Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Identify source; 2. Inform IEC and ER; 3. Advise the ER on the effectiveness of the proposed remedial measures; 4. Repeat measurements to confirm findings; 5. Increase monitoring frequency to daily; 6. Discuss with IEC and Contractor on remedial actions required; 7. If exceedance continues, arrange meeting with IEC and ER; 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; 5. Supervise Implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Submit proposals for remedial to ER within 3 working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate.

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
LIMIT LEVEL				
1. Exceedance for one sample	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform ER, Contractor and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; 5. Supervise implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.
2. Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Notify IEC, ER, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Event / Action Plan for Construction Noise Monitoring

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Action Level	<ol style="list-style-type: none"> 1. Notify IEC and Contractor; 2. Identify source, investigate the causes of exceedance and propose remedial measures; 3. Report the results of investigation to the IEC, ER and Contractor; 4. Discuss with the Contractor and formulate remedial measures; 5. Increase monitoring frequency to check mitigation effectiveness. 	<ol style="list-style-type: none"> 1. Review the analysed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly; 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures are properly implemented. 	<ol style="list-style-type: none"> 1. Submit noise mitigation proposals to IEC; 2. Implement noise mitigation proposals.
Limit Level	<ol style="list-style-type: none"> 1. Inform IEC, ER, EPD and Contractor; 2. Identify source; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Event / Action Plan for Water Quality Monitoring

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Action level being exceeded by one sampling day	<ol style="list-style-type: none"> 1. Repeat in situ measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform IEC, contractor and ER; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, ER and Contractor; 6. Ensure mitigation measures are implemented; 7. Repeat measurement on next day of exceedance to confirm findings. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET and Contractor's working methods; 2. Discuss with ET and Contractor on possible remedial actions; 3. Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly; 4. Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of non-compliance in writing; 2. Discuss with IEC on the proposed mitigation measures; 3. Make agreement on mitigation measures to be implemented; 4. Ensure mitigation measures are properly implemented. 	<ol style="list-style-type: none"> 1. Inform the ER and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment and consider changes of working methods; 4. Discuss with ET and IEC on possible remedial actions and propose mitigation measures to IEC and ER; 5. Implement the agreed mitigation measures. 6. Amend working methods if appropriate.
Action level being exceeded by two or more consecutive sampling days	<ol style="list-style-type: none"> 1. Repeat in situ measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform IEC, Contractor and ER; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, ER and Contractor; 6. Ensure mitigation measures are implemented; 7. Increase the monitoring frequency to daily until no exceedance of Action level; 8. Repeat measurement on next day of exceedance to confirm findings. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET and Contractor's working method; 2. Discuss with ET and Contractor on possible remedial actions; 3. Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly; 4. Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of non-compliance in writing; 2. Discuss with IEC on the proposed mitigation measures; 3. Make agreement on mitigation measures to be implemented; 4. Ensure mitigation measures are properly implemented; 5. Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> 1. Inform the Engineer and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment and consider changes of working methods; 4. Discuss with ET and IEC on possible remedial actions and propose mitigation measures to IEC and ER within 3 working days of notification; 5. Implement the agreed mitigation measures; 6. Amend working methods if appropriate.

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Limit level being exceeded by one sampling day	<ol style="list-style-type: none"> 1. Repeat <i>in-situ</i> measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform IEC, Contractor, ER and EPD; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, ER and Contractor; 6. Ensure mitigation measures are implemented; 7. Increase the monitoring frequency to daily until no exceedance of Limit level. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET and Contractor's working method; 2. Discuss with ET and Contractor on possible remedial actions; 3. Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly; 4. Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Discuss with IEC, ET and Contractor on the proposed mitigation measures; 3. Request Contractor to critically review the working methods; 4. Ensure mitigation measures are properly implemented; 5. Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> 1. Inform the ER and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment and consider changes of working methods; 4. Submit proposal of mitigation measures to ER within 3 working days of notification and discuss with ET, IEC and ER; 5. Implement the agreed mitigation measures; 6. Amend working methods if appropriate.
Limit level being exceeded by two or more consecutive sampling days	<ol style="list-style-type: none"> 1. Repeat <i>in-situ</i> measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform IEC, contractor, ER and EPD; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, ER and Contractor; 6. Ensure mitigation measures are implemented; 7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET and Contractor's working method; 2. Discuss with ET and Contractor on possible remedial actions; 3. Review the Contractor's mitigation measures whenever necessary to assure their effectiveness and advise the ER accordingly. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Discuss with IEC, ET and Contractor on the proposed mitigation measures; 3. Request Contractor to critically review the working methods; 4. Make agreement on the mitigation measures to be implemented; 5. Ensure mitigation measures are properly implemented; 6. Assess the effectiveness of the implemented mitigation measures; 7. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit level. 	<ol style="list-style-type: none"> 1. Inform the ER and confirm notification of the non-compliance in writing; 2. Take immediate action to avoid further exceedance; 3. Rectify unacceptable practice; 4. Check all plant and equipment and consider changes of working methods; 5. Submit proposal of mitigation measures to ER within 3 working days of notification and discuss with ET, IEC and ER; 6. Implement the agreed mitigation measures; 7. Resubmit proposals of mitigation measures if problem still not under control; 8. As directed by the Engineer, to slow down or to stop all or part of the construction activities until no exceedance of Limit level.

Event / Action Plan for Dolphin Monitoring

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Action Level	<ol style="list-style-type: none"> 1. Repeat statistical data analysis to confirm findings; 2. Review all available and relevant data, including raw data and statistical analysis results of other parameters covered in the EM&A, to ascertain if differences are as a result of natural variation or previously observed seasonal differences; 3. Identify source(s) of impact; 4. Inform the IEC, ER/SOR and Contractor; 5. Check monitoring data. 6. Review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET and Contractor; 2. Discuss monitoring results and finding with the ET and the Contractor. 	<ol style="list-style-type: none"> 1. Discuss monitoring with the IEC and any other measures proposed by the ET; 2. If ER/SOR is satisfied with the proposal of any other measures, ER/SOR to signify the agreement in writing on the measures to be implemented. 	<ol style="list-style-type: none"> 1. Inform the ER/SOR and confirm notification of the non-compliance in writing; 2. Discuss with the ET and the IEC and propose measures to the IEC and the ER/SOR; 3. Implement the agreed measures.

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Limit Level	<ol style="list-style-type: none"> 1. Repeat statistical data analysis to confirm findings; 2. Review all available and relevant data, including raw data and statistical analysis results of other parameters covered in the EM&A, to ascertain if differences are as a result of natural variation or previously observed seasonal differences; 3. Identify source(s) of impact; 4. Inform the IEC, ER/SOR and Contractor of findings; 5. Check monitoring data; 6. Repeat review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary. 7. If ET proves that the source of impact is caused by any of the construction activity by the works contract, ET to arrange a meeting to discuss with IEC, ER/SOR and Contractor the necessity of additional dolphin monitoring and/or any other potential mitigation measures (e.g., consider to modify the perimeter silt curtain or consider to control/temporarily stop relevant construction activity etc.) and submit to IEC a proposal of additional dolphin monitoring and/or mitigation measures where necessary. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET and Contractor; 2. Discuss monitoring results and findings with the ET and the Contractor; 3. Attend the meeting to discuss with ET, ER/SOR and Contractor the necessity of additional dolphin monitoring and any other potential mitigation measures. 4. Review proposals for additional monitoring and any other mitigation measures submitted by ET and Contractor and advise ER/SOR of the results and findings accordingly. 5. Supervise / Audit the implementation of additional monitoring and/or any other mitigation measures and advise ER/SOR the results and findings accordingly. 	<ol style="list-style-type: none"> 1. Attend the meeting to discuss with ET, IEC and Contractor the necessity of additional dolphin monitoring and any other potential mitigation measures. 2. If ER/SOR is satisfied with the proposals for additional dolphin monitoring and/or any other mitigation measures submitted by ET and Contractor and verified by IEC, ER/SOR to signify the agreement in writing on such proposals and any other mitigation measures. 3. Supervise the implementation of additional monitoring and/or any other mitigation measures. 	<ol style="list-style-type: none"> 1. Inform the ER/SOR and confirm notification of the non-compliance in writing; 2. Attend the meeting to discuss with ET, IEC and ER/SOR the necessity of additional dolphin monitoring and any other potential mitigation measures. 3. Jointly submit with ET to IEC a proposal of additional dolphin monitoring and/or any other mitigation measures when necessary. 4. Implement the agreed additional dolphin monitoring and/or any other mitigation measures.

Appendix E. Waste Flow Table

Monthly Summary Waste Flow Table for 2018

Month	Actual Quantities of Inert C&D Materials Generated Monthly						Actual Quantities of C&D Wastes Generated Monthly				
	Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Transported to other Projects (Note 2)	Disposed as Public Fill	Imported Fill	Metals	Paper/ cardboard packaging	Plastics (Note 1)	Chemical Waste	Others, e.g. general refuse
	(in '000m ³)	(in '000m ³)	(in '000m ³)	(in '000m ³)	(in '000m ³)	(in '000m ³)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000m ³)
Jan	0	0	0	0	0	0	0	0	0	0	0.1293
Feb	0	0	0	0	0	0	0	0	0	0.2	0.1397
Mar	0	0	0	0	0	0	0	0	0	0	0.1346
Apr	0	0	0	0	0	0	0	0	0	0	0.2334
May	0	0	0	0	0	0	0	0	0	0	0.1748
Jun	0	0	0	0	0	0	0	0	0	0	0.2044
Sub-total	0.000	0	0	0.000	0	0	0	0	0	0.2	1.0162
Jul	0	0	0	0	0	0	0	0	0	0	0.2036
Aug	0	0	0	0	0	0	0	0	0	0	0.2856
Sep	0	0	0	0	0	0	0	0	0	0	0.2044
Oct	0	0	0	0	0	0	0	0	0	0	0.2183
Nov	5.324	0	0	0	5.324	0	0	0	0	0	0.1643
Dec	8.315	0	0	0	8.315	0	0	0	0	0	0.0880
Total	13.639	0	0	0.000	13.639	0	0	0	0	0.2	2.1804

Note: (1) Plastics refer to plastic bottles / containers, plastic sheets / foam from packaging material

(2) "Other Projects" refers to HKBCF Contract No. HY/2013/03

Monthly Summary of Excavated Marine Sediment for 2018

Month	a. Estimated Volume of Excavated Marine Sediment Generated	b. Estimate Volume of Accumulated Excavated Marine Sediment Treated	c. Reused in the Contract	d. Estimated Volume of Excavated Marine Sediment Transported to Other Projects (Note 1)	e. Estimated Volume of Treated Excavated Marine Sediment Stored on Site (Unused)
	(in m ³)	(in m ³)	(in m ³)	(in m ³)	(in m ³)
Jan	0	0	0	0	0
Feb	0	0	0	0	0
Mar	0	0	0	0	0
Apr	0	0	0	0	0
May	0	0	0	0	0
Jun	0	0	0	0	0
Sub-total	0	0	0	0	0
Jul	0	0	0	0	0
Aug	0	0	0	0	0
Sep	0	0	0	0	0
Oct	0	0	0	0	0
Nov	0	0	0	0	0
Dec	0	0	0	0	0
Total	0	0	0	0	0

Note: (1) "Other Projects" refers to HKBCF Contract No. HY/2013/03. The disposal of excavated marine sediments to allocated dumping site via Contract No. HY/2013/03 has been completed with the last batch disposal on 30 August 2017.

Appendix F. Environmental Licences and Permits

Environmental Licences and Permits

Item No.	Type of Permit / Licence	Reference No.	Application Date	Valid from	Valid until	Remark
1	Environmental Permit under EIAO	EP-353/2009/K	24 Mar 2016	11 Apr 2016	N/A	Issued
2	Construction Dust Notification (HKBCF Southern Portion)	387156	26 Mar 2015	1 Apr 2015	N/A	Notified
3	Construction Waste Disposal Account	7022038	16 Mar 2015	1 Apr 2015	N/A	Account approved
4	Registration as a Chemical Waste Producer (HKBCF Southern Portion)	Waste Producer Number (WPN): 5213-951-C3952-01	27 Mar 2015	27 Apr 2015	N/A	Registration completed
5	Discharge Licence under WPCO (Works Area WA3)	WT00022316-2015	1 Jun 2015	14 Aug 2015	31 Aug 2020	Issued
6	Discharge Licence under WPCO (HKBCF Works Area)	WT00028782-2017	25 May 2017	19 Jul 2017	31 Jul 2022	Issued
7	Construction Noise Permit	GW-RS0974-18	10 Oct 2018	31 Oct 2018	29 Mar 2019	Issued

Appendix G. Implementation Schedule for Environmental Mitigation Measures (EMIS)

Appendix G – Implementation Schedule of Environmental Mitigation Measures (EMIS)

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Location of the measures	Implementation Status
Air Quality				
S5.5.6.1	A1	1) The Contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation	All construction sites	V
S5.5.6.2	A2	2) Proper watering of exposed spoil should be undertaken throughout the construction phase: <ul style="list-style-type: none"> • Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading; • Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads; • A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones; • The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle; • Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores; 	All construction sites	V
S5.5.6.2	A2	<ul style="list-style-type: none"> • When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period; • The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials; • Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously; • Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet; • Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding; • Any skip hoist for material transport should be totally enclosed by impervious sheeting; • Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides 	All construction sites	V
S5.5.6.2	A2	<ul style="list-style-type: none"> • Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed; • Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and • Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies. 	All construction sites	V
S5.5.6.3	A3	3) The Contractor should undertake proper watering on all exposed spoil (with at least 8 times per day) throughout the construction phase.	All construction sites	V
S5.5.6.4	A4	4) Engineer to incorporate the controlled measures into the Particular Specification (PS) for the civil work. The PS should also draw the Contractor's attention to the relevant latest Practice Notes issued by EPD.	All construction sites	V
S5.5.6.4	A5	5) Implement regular dust monitoring under EM&A programme during the construction stage.	Selected representative dust monitoring station	V (covered by Contract No. HY/2013/04 (AMS2, AMS3C, AMS7B) & HY/2011/03 (AMS6))

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Location of the measures	Implementation Status
S5.5.7.1	A6	<p>The following mitigation measures should be adopted to prevent fugitive dust emissions for concrete batching plant:</p> <ul style="list-style-type: none"> • Loading, unloading, handling, transfer or storage of any dusty materials should be carried out in totally enclosed system; • All dust-laden air or waste gas generated by the process operations should be properly extracted and vented to fabric filtering system to meet the emission limits for TSP; • Vents for all silos and cement/pulverised fuel ash (PFA) weighing scale should be fitted with fabric filtering system; • The materials which may generate airborne dusty emissions should be wetted by water spray system; • All receiving hoppers should be enclosed on three sides up to 3m above unloading point; • All conveyor transfer points should be totally enclosed; • All access and route roads within the premises should be paved and wetted; and • Vehicle cleaning facilities should be provided and used by all concrete trucks before leaving the premises to wash off any dust on the wheels and/or body. 	Selected representative dust monitoring station	N/A
S5.5.2.7	A7	<p>The following mitigation measures should be adopted to prevent fugitive dust emissions at barging point:</p> <ul style="list-style-type: none"> • All road surface within the barging facilities will be paved; • Dust enclosures will be provided for the loading ramp; • Vehicles will be required to pass through designated wheels wash facilities; and • Continuous water spray at the loading points. 	All construction sites	N/A
Construction Noise (Air borne)				
S6.4.10	N1	<p>1) Use of good site practices to limit noise emissions by considering the following:</p> <ul style="list-style-type: none"> • only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme; • machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; • plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs; • silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works; • mobile plant should be sited as far away from NSRs as possible and practicable; • material stockpiles, mobile container site office and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities. 	All construction sites	V
S6.4.11	N2	<p>2) Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoardings shall be properly maintained throughout the construction period.</p>	All construction sites	V
S6.4.12	N3	<p>3) Install movable noise barriers (typically density @ 14kg/m²), acoustic mat or full enclosure close to noisy plants including air compressor, generators, saw.</p>	For plant items listed in Appendix 6D of the EIA report at all construction sites	V
S6.4.13	N4	<p>4) Select "Quiet plants" which comply with the BS 5228 Part 1 or TM standards.</p>	For plant items listed in Appendix 6D of the EIA report at all construction sites	V
S6.4.14	N5	<p>5) Sequencing operation of construction plants where practicable.</p>	All construction sites where practicable	V
	N6	<p>6) Implement a noise monitoring under EM&A programme.</p>	Selected representative noise monitoring station	V (covered by Contract No. HY/2013/04)
Sediment				
S7.3	S1	<p>1) The requirements as recommended in ETWB TC(W) 34/2002 Management of Dredged/Excavated Sediment shall be included in the Particular Specification as appropriate.</p>	All construction sites	V

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Location of the measures	Implementation Status
Waste Management (Construction Noise)				
S8.3.8	WM1	<p><u>Construction and Demolition Material</u></p> <p>The following mitigation measures should be implemented in handling the waste:</p> <ul style="list-style-type: none"> • Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement; • Carry out on-site sorting; • Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate; • Adopt 'Selective Demolition' technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible; • Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified; and • Implement an enhanced Waste Management Plan similar to ETWB TC(W) No. 19/2005 – "Environmental Management on Construction Sites" to encourage on-site sorting of C&D materials and to minimize their generation during the course of construction. • In addition, disposal of the C&D materials onto any sensitive locations such as agricultural lands, etc. should be avoided. The Contractor shall propose the final disposal sites to the Project Proponent and get its approval before implementation. 	All construction sites	V
S8.3.9- S8.3.11	WM2	<p><u>C&D Waste</u></p> <ul style="list-style-type: none"> • Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Use of wooden hoardings should not be used, as in other projects. Metal hoarding should be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage. • The Contractor should recycle as much of the C&D materials as possible on-site. Public fill and C&D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage. 	All construction sites	V
S8.2.12- S8.3.15	WM3	<p><u>Chemical Waste</u></p> <ul style="list-style-type: none"> • Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. • Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450 liters unless the specification has been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the regulation. • The storage area for chemical wastes should be clearly labelled and used solely for the storage of chemical waste; enclosed on at least 3 sides; have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20 % of the total volume of waste stored in that area, whichever is the greatest; have adequate ventilation; covered to prevent rainfall entering; and arranged so that incompatible materials are adequately separated. • Disposal of chemical waste should be via a licensed waste collector; be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Centre which also offers a chemical waste collection service and can supply the necessary storage containers; or be to a reuser of the waste, under approval from the EPD. 	All construction sites	V
S8.3.16	WM4	<p><u>Sewage</u></p> <ul style="list-style-type: none"> • Adequate numbers of portable toilets should be provided for the workers. The portable toilets should be maintained in a state, which will not deter the workers from utilizing these portable toilets. Night soil should be collected by licensed collectors regularly. 	All construction sites	V
S8.3.17	WM5	<p><u>General Refuse</u></p> <ul style="list-style-type: none"> • General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and chemical wastes. • A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law. • Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their 	All construction sites	V

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Location of the measures	Implementation Status
		<p>deposit should be provided if feasible.</p> <ul style="list-style-type: none"> • Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered by the Contractor. In addition, waste separation facilities for paper, aluminium cans, plastic bottles etc., should be provided. • Training should be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including reduction, reuse and recycling of wastes. 		
Water Quality (Construction Phase)				
S9.11.1.1	W1	<p><u>Mitigation during the marine works to reduce impacts to within acceptable levels have been recommended and will comprise a series of measures that restrict the method and sequencing of dredging/backfilling, as well as protection measures. Details of the measures are provided below.</u></p> <ul style="list-style-type: none"> • Floating type perimeter silt curtains shall be around the HKBCF site before the commencement of marine works. • Silt curtain shall be fully maintained throughout the works. 	Marine works	V
S9.11.1.7	W2	<p><u>Land Works</u></p> <p>General construction activities on land should also be governed by standard good working practice. Specific measures to be written into the works contracts should include:</p> <ul style="list-style-type: none"> • wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters; • sewage effluent and discharges from on-site kitchen facilities shall be directed to Government sewer in accordance with the requirements of the W PCO or collected for disposal offsite. The use of soakaways shall be avoided; • storm drainage shall be directed to storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels, earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks; • silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including specifically at the onset of and after each rainstorm; • temporary access roads should be surfaced with crushed stone or gravel; • rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities; • measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system; • open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms; • manholes (including any newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers; • discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system; • all vehicles and plant should be cleaned before they leave the construction site to ensure that no earth, mud or debris is deposited by them on roads. A wheel washing bay should be provided at every site exit; • wheel wash overflow shall be directed to silt removal facilities before being discharged to the storm drain; • the section of construction road between the wheel washing bay and the public road should be surfaced with crushed stone or coarse gravel; • wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects; • vehicle and plant servicing areas, vehicle wash bays and lubrication facilities shall be located under roofed areas. The drainage in these covered areas shall be connected to foul sewers via a petrol interceptor in accordance with the requirements of the W PCO or collected for off site disposal; • the Contractors shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately; • waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance; • all fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank; and 	Land-based works areas	V

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Location of the measures	Implementation Status
		<ul style="list-style-type: none"> • surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system. 		
S9.14	W3	Implement a water quality monitoring programme	At identified monitoring locations	V (covered by Contract No. HY/2013/04)
Ecology (Construction Phase)				
S10.7	E2	<ul style="list-style-type: none"> • Install silt curtain during the construction. • Limit dredging and works fronts. • Good site practices. • Site runoff control. 	Marine works and Land-based works areas	V
S10.7	E4	Watering to reduce dust generation; prevention of siltation of freshwater habitats; Site runoff should be desilted, to reduce the potential for suspended sediments, organics and other contaminants to enter streams and standing freshwater	Land-based works areas	V
S10.7	E5	Good site practices, including strictly following the permitted works hours, using quieter machines where practicable, and avoiding excessive lightings during night time	Land-based works areas	V
S10.7	E6	<ul style="list-style-type: none"> • Dolphin Exclusion Zone; • Dolphin watching plan 	Marine works	V
S10.7	E7	<ul style="list-style-type: none"> • Decouple compressors and other equipment on working vessels • Avoidance of percussive piling 	Marine works	V
S10.7	E8	<ul style="list-style-type: none"> • Control vessel speed • Skipper training • Predefined and regular routes for working vessels; avoid Brother Islands. 	Marine Traffic	V
S10.10	E9	<ul style="list-style-type: none"> • Dolphin vessel monitoring 	North Lantau and West Lantau	V (covered by Contract No. HY/2013/04)
Fisheries				
S11.7	F4	<ul style="list-style-type: none"> • Maritime Oil Spill Response Plan (MOSRP); • Contingency plan. 	HKBCF	V
Landscape & Visual (Detailed Design Phase)				
S14.3.3.1	LV1	<p>General design measures include:</p> <ul style="list-style-type: none"> • Roadside planting and planting along the edge of the HKBCF Island is proposed; • Transplanting of mature trees in good health and amenity value where appropriate and reinstatement of areas disturbed during construction by compensatory hydro-seeding and planting; • Protection measures for the trees to be retained during construction activities; • Optimizing the sizes and spacing of the bridge columns; Fine-tuning the location of the bridge columns to avoid visually-sensitive locations; • Maximizing new tree, shrub and other vegetation planting to compensate tree felled and vegetation removed; • Providing planting area around peripheral of HKBCF for tree planting screening effect; • Providing salt-tolerant native trees along the planter strip at affected seawall and newly reclaimed coastline; • For HKBCF, providing aesthetic architectural design on the related buildings (e.g. similar materials for PCB building facade to Airport buildings, roof planting and subtle materials for other facilities buildings and so on), and the related infrastructure (e.g. parapet planting and transparent cover for elevated footbridges) to provide harmonious atmosphere of the HKBCF; and • Fine-tuning the sizes of the structural members to minimize the bulkiness of buildings and adjustment of building arrangement to minimise disturbance to surrounding vegetation in the HKBCF. 	HKBCF	V
Landscape & Visual (Construction Phase)				
S14.3.3.3	LV2	<p><u>Mitigate both Landscape and Visual Impacts</u></p> <p>G1. Grass-hydroseed bare soil surface and stock pile areas.</p> <p>G2. Add planting strip and automatic irrigation system if appropriate at some portions of bridge footbridge to screen bridge and traffic.</p> <p>G3. Not applicable as this is for HKLR.</p> <p>G4. For HKBCF, providing aesthetic architectural design on the related buildings (e.g. similar materials for PCB building facade to Airport buildings, roof planting and subtle materials for other facilities buildings and so on), and the related infrastructure (e.g. parapet planting and transparent cover for elevated footbridges) to provide harmonious</p>	HKBCF	V

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Location of the measures	Implementation Status
		<p>atmosphere of the HKBCF</p> <p>G5. Vegetation reinstatement and upgrading to disturbed areas</p> <p>G6. Maximizing new tree shrub and other vegetation planting to compensate tree felled and vegetation removed</p> <p>G7. Providing planting area around peripheral of HKBCF for tree planting screening effect;</p> <p>G8. Plant salt-tolerant native and shrubs etc along the planter strip at affected seawall.</p> <p>G9. Reserve of loose natural granite rocks for re-use. Provide new coastline to adopt "natural-look" by means of using armour rocks in the form of natural rock materials and planting strip area accommodating screen buffer to enhance "natural-look" of the new coastline.</p>		
S14.3.3.3	LV3	<p><u>Mitigate Visual Impacts</u></p> <p>V1. Minimize time for construction activities during construction period.</p> <p>V2. Provide screen hoarding at the portion of the project site / works areas / storage areas near VSRs who have close low-level views to the Project during HKBCF construction.</p>		V
EM&A				
S15.2.2	EM1	An Independent Environmental Checker needs to be employed as per the EM&A Manual.	All construction sites	V
S15.5 - S15.6	EM2	<p>1) An Environmental Team needs to be employed as per the EM&A Manual.</p> <p>2) Prepare a systematic Environmental Management Plan to ensure effective implementation of the mitigation measures.</p> <p>3) An environmental impact monitoring needs to be implementing by the Environmental Team to ensure all the requirements given in the EM&A Manual are fully complied with.</p>	All construction sites	V
Legend: V = implemented; x = not implemented; N/A = not applicable				

Appendix H. Statistics on Environmental Complaints, Notification of Summons and Successful Prosecutions

Statistics on Environmental Complaints, Notifications of Summons and Successful Prosecutions

Reporting Period	Complaints	Notifications of Summons	Successful Prosecutions
This reporting period	0	0	0
From commencement date of construction to end of reporting month	11	0	0

Appendix I. Environmental Site Inspection and Monitoring Schedule

Impact EM&A Schedule for December 2018

by Mott MacDonald monitoring team

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
			AMS2 - 24 hr TSP AMS3C - 1 & 24 hr TSP AMS7B - 1 & 24 hr TSP NMS2 NMS3C	AMS2 - 1 hr TSP		
	Water Quality Monitoring ^ Dolphin Monitoring		Water Quality Monitoring Dolphin Monitoring Weekly Site Audit		Water Quality Monitoring	
9	10	11	12	13	14	15
		AMS2 - 24 hr TSP AMS3C - 1 & 24 hr TSP AMS7B - 1 & 24 hr TSP NMS2 NMS3C	AMS2 - 1 hr TSP			
	Water Quality Monitoring Dolphin Monitoring		Water Quality Monitoring Dolphin Monitoring	Weekly Site Audit	Water Quality Monitoring ^	
16	17	18	19	20	21	22
	AMS2 - 24 hr TSP AMS3C - 1 & 24 hr TSP AMS7B - 1 & 24 hr TSP NMS2 NMS3C	AMS2 - 1 hr TSP			AMS2 - 24 hr TSP	AMS3C - 1 & 24 hr TSP AMS7B - 1 & 24 hr TSP
	Weekly Site Audit					
23	24	25	26	27	28	29
	AMS2 - 1 hr TSP			AMS2 - 24 hr TSP	AMS2 - 1 hr TSP AMS3C - 1 & 24 hr TSP AMS7B - 1 & 24 hr TSP NMS2 NMS3C	
				Weekly Site Audit		
30	31					

Notes:

Air Quality Monitoring Station - AMS2, AMS3C, AMS7B
 Noise Monitoring Station - NMS2, NMS3C
 WQ - Water Quality Monitoring
 CWD - Chinese White Dolphin
 Weekly Site Audit

Remark:

^ Water quality monitoring programme by ET was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.

Tentative Impact Environmental Monitoring Schedule for January 2019

by Mott MacDonald monitoring team

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2 AMS2 - 24 hr TSP	3 AMS2 - 1 hr TSP AMS3C - 1 & 24 hr TSP AMS7B - 1 & 24 hr TSP NMS2 NMS3C	4	5
			Water Quality Monitoring ^ Dolphin Monitoring Weekly Site Audit	Dolphin Monitoring	Water Quality Monitoring ^	
6	7	8 AMS2 - 24 hr TSP	9 AMS2 - 1 hr TSP AMS3C - 1 & 24 hr TSP AMS7B - 1 & 24 hr TSP NMS2 NMS3C	10	11	12
	Dolphin Monitoring		Weekly Site Audit			
13	14 AMS2 - 24 hr TSP	15 AMS2 - 1 hr TSP AMS3C - 1 & 24 hr TSP AMS7B - 1 & 24 hr TSP NMS2 NMS3C	16	17	18 AMS2 - 24 hr TSP	19
	Dolphin Monitoring		Weekly Site Audit			
20	21 AMS2 - 1 hr TSP AMS3C - 1 & 24 hr TSP AMS7B - 1 & 24 hr TSP NMS2 NMS3C	22	23	24 AMS2 - 24 hr TSP	25 AMS2 - 1 hr TSP	26 AMS3C - 1 & 24 hr TSP AMS7B - 1 & 24 hr TSP NMS2 NMS3C
	Weekly Site Audit					
27	28	29	30 AMS2 - 24 hr TSP	31 AMS2 - 1 hr TSP		
			Weekly Site Audit			

Notes:

Air Quality Monitoring Station - AMS2, AMS3C, AMS7B
 Noise Monitoring Station - NMS2, NMS3C
 WQ - Water Quality Monitoring;
 CWD - Chinese White Dolphin
 Weekly Site Audit

Remark:

^ Water quality monitoring programme by ET was scheduled for 2 and 4 January 2019 in accordance with Contractor's scheduled removal of silt curtain at Box Culvert D on 2-3 January 2019.

Appendix J. Calibration Certificates

EQUIPMENT CALIBRATION RECORD

Type : Laser Dust Monitor
 Manufacturer / Brand : SIBATA
 Model No.: LD-3B
 Equipment No.: LD-3B-002
 Serial No.: 974350
 Sensitivity Adjustment Scale Setting : 622 CPM

Standard Equipment

Equipment : MFC High Volume Air Sampler
 Venue : Tung Chung Pier
 Model No.: TE-5170 Total Suspended Particulate
 Serial No.: S/N3641
 Previous Calibration Date: 12-Jul-2018

Calibration Result

Sensitivity Adjustment Scale Setting (Before Calibration) : 624 CPM
 Sensitivity Adjustment Scale Setting (After Calibration) : 624 CPM

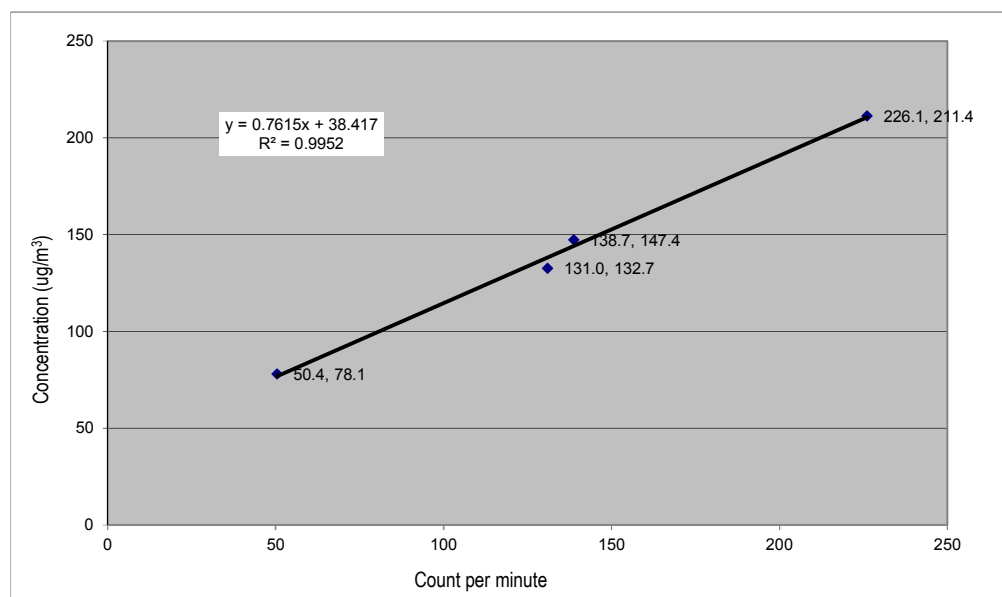
Hour	Date (dd-mm-yy)	Time		Ambient Condition		Concentration (ug/m ³) Y-axis	Total Count	Count/Minute X-axis
				Temp (°C)	R.H. (%)			
1	24-Aug-18	09:07	09:37	29.4	80%	78.1	1513	50.4
2	24-Aug-18	10:00	11:00	30.5	76%	132.7	7857	131.0
3	24-Aug-18	11:12	12:42	30.6	76%	147.4	12486	138.7
4	24-Aug-18	13:21	15:21	31.0	71%	211.4	27133	226.1

Be Linear Regression of Y or X

Slope (K-factor): 0.7615 Intercept,b: 38.417

Correlation coefficient (R): 0.9976

Remark: _____



Recorded by: Shing Mak

Signature: *Shing*

Date: 07-Sep-2018

Checked by: Eva Keung

Signature: *Eva*

Date: 07-Sep-2018

EQUIPMENT CALIBRATION RECORD

Type : Laser Dust Monitor
 Manufacturer / Brand : SIBATA
 Model No.: LD-5R
 Equipment No.: LD-5R-002
 Serial No.: 861988
 Sensitivity Adjustment Scale Setting : 621 CPM

Standard Equipment

Equipment : MFC High Volume Air Sampler
 Venue : Tung Chung Pier
 Model No.: TE-5170 Total Suspended Particulate
 Serial No.: S/N3641
 Previous Calibration Date : 12-Jul-2018

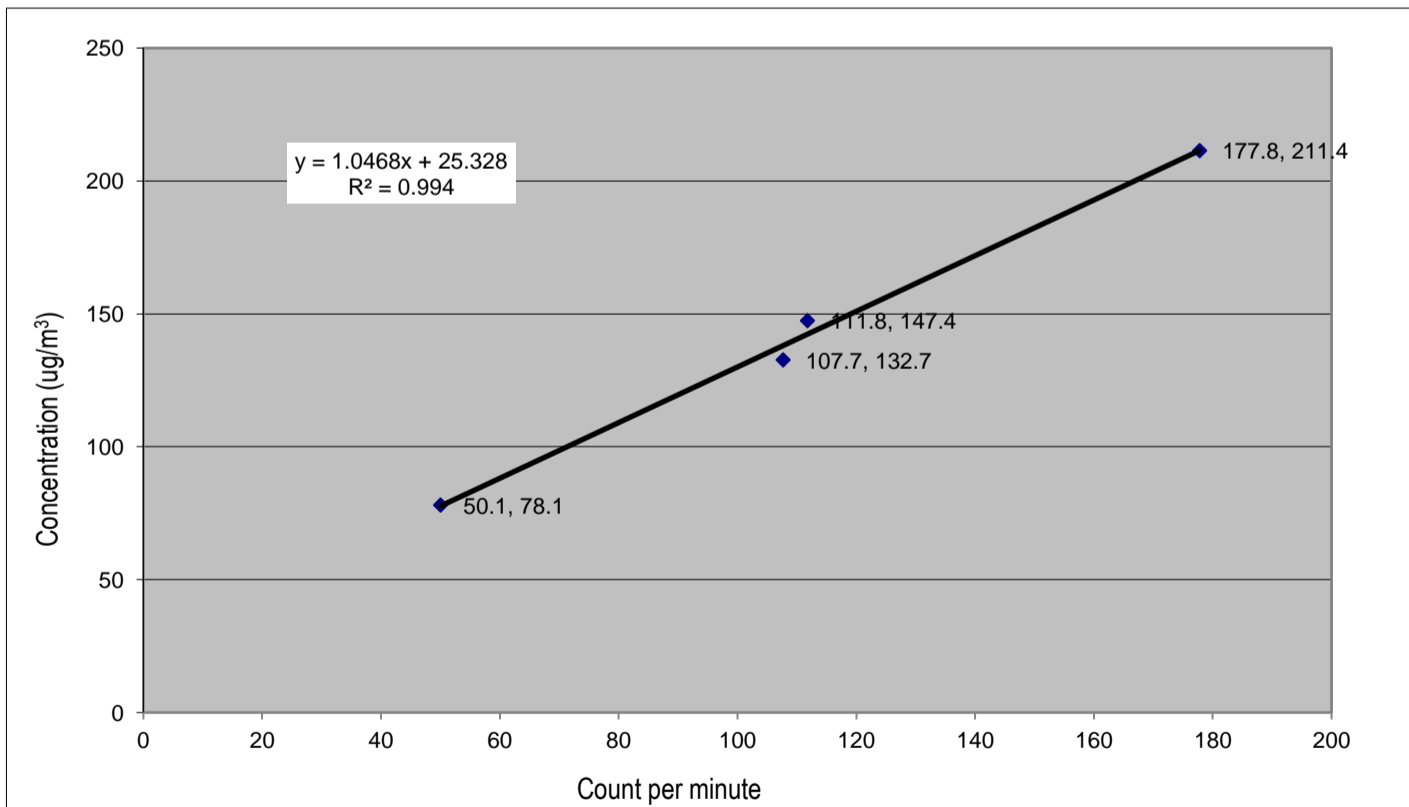
Calibration Result

Sensitivity Adjustment Scale Setting (Before Calibration) : 622 CPM
 Sensitivity Adjustment Scale Setting (After Calibration) : 622 CPM

Hour	Date (dd-mmm-yy)	Time		Ambient Condition		Concentration (ug/m ³) Y-axis	Total Count	Count/Minute X-axis
				Temp (°C)	R.H. (%)			
1	24-Aug-18	09:07	09:37	29.4	80%	78.1	1502	50.1
2	24-Aug-18	10:00	11:00	30.5	76%	132.7	6460	107.7
3	24-Aug-18	11:12	12:42	30.6	76%	147.4	10065	111.8
4	24-Aug-18	13:21	15:21	31.0	71%	211.4	21334	177.8

Be Linear Regression of Y or X
 Slope (K-factor): 1.0468 Intercept,b: 25.328
 Correlation coefficient (R): 0.9970

Remark: _____



Recorded by: Icy Chan

Signature: *Icy*

Date: 07-Sep-2018

Checked by: Eva Keung

Signature: *Eva*

Date: 07-Sep-2018



REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

REPORT NO. : HK1810147
 PROJECT NAME : PERFORMANCE CHECK / CALIBRATION OF DUST METER
 DATE OF ISSUE : 12/2/2018

CUSTOMER : Envirotech Services Company
 ADDRESS : Rm. 113, 1/F., MY LOFT, 9 HOI WING ROAD, TUEN MUN, N.T.

REPORT NO. : HK1810147
 PROJECT ITEM NO. : HK1810147-01
 PERFORMANCE CHECK / CALIBRATED EQUIPMENT
 TYPE : Digital Dust Indicator
 MANUFACTURER : SIBATA
 MODEL NO. : LD-3B
 SERIAL NO. : 245834
 EQUIPMENT NO. : —
 RECEIPT DATE : 8/2/2018
 PERFORMANCE CHECK / CALIBRATION DATE : 9/2/2018

PERFORMANCE CHECK / CALIBRATION Information

CODE	Calibration Parameter	Method Procedure	Reference Method
Dust PC/CAL	Performance Check / Calibration of Dust Meter	CAL003	General Technical Requirements of Environmental Monitoring, Environmental Monitoring & Audit Guidelines for Development Projects in HK

- Notes : 1. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.
 2. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Approved Signatory

Wong Po Yan Pauline
 (Assistant Laboratory Manager)

Issue Date: 12/2/2018



REPORT OF PERFORMANCE CHECK / CALIBRATION

PROJECT NAME : PERFORMANCE CHECK / CALIBRATION OF DUST METER
 DATE OF ISSUE : 12/2/2018
 REPORT NO. : HK1810147

PERFORMANCE CHECK / CALIBRATED EQUIPMENT

TYPE : Digital Dust Indicator
 MANUFACTURER : SIBATA
 MODEL NO. : LD-3B
 SERIAL NO. : 245834
 EQUIPMENT NO. : ---
 SENSITIVITY ADJUSTMENT : ---
 PERFORMANCE CHECK / CALIBRATION DATE : 9/2/2018

STANDARD EQUIPMENT

TYPE : HIGH VOLUME AIR SAMPLER
 MANUFACTURER : TISCH
 MODEL NO. : TE-5170
 EQUIPMENT REF NO. : PTL_HV002
 LAST CALIBRATION DATE : 29/1/2018

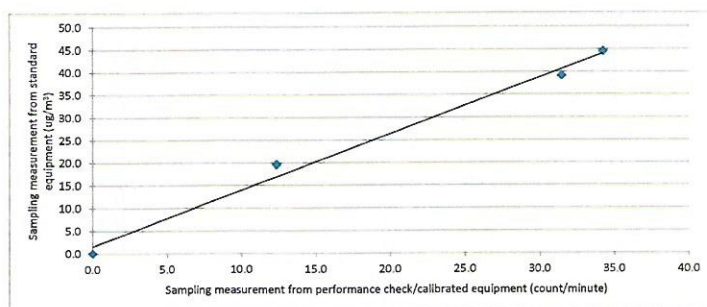
EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Sensitivity Adjustment Scale Setting (Before Performance check / Calibration): 703 CPM
 Sensitivity Adjustment Scale Setting (After Performance check / Calibration): 703 CPM

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m ³ (Standard equipment) (Y - Axis)	Total Count ² (Performance Check / Calibrated equipment)	Concentration in Count/Minute ³ (Performance Check / Calibrated equipment) (X - Axis)
Zero Check ¹	9/2/2018,9:05:00 AM	15.5	1017	0	0	0
1	9/2/2018,11:40:00 AM	15.5	1017	45	2054	34
2	9/2/2018,2:07:00 PM	15.5	1017	39	1888	31
3	9/2/2018,3:09:00 PM	15.5	1017	20	740	12

Linear Regression of Y on X

Slope (K- factor) : 1.2
 Correlation Coefficient : 0.9951
 Validity of Performance Check / Calibration Record : 9/2/2019



- Notes : 1. Zero check conducted as per CAL003 SOP and manufacturer's manual as appropriate.
 2. Total Count was measured by Digital Dust Indicator.
 3. Count/minute was calculated by (Total Count/60)
 4. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.
 5. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Operator: MA Ching Him, Jackey Signature: [Signature] Date: 9/2/2018

Checked by: Wong Po Yan, Pauline Signature: [Signature] Date: 12/2/2018



REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

REPORT NO. : HK1810148
 PROJECT NAME : PERFORMANCE CHECK / CALIBRATION OF DUST METER
 DATE OF ISSUE : 12/2/2018

CUSTOMER : Envirotech Services Company
 ADDRESS : Rm. 113, 1/F., MY LOFT, 9 HOI WING ROAD, TUEN MUN, N.T.

REPORT NO. : HK1810148
 PROJECT ITEM NO. : HK1810148-01
PERFORMANCE CHECK / CALIBRATED EQUIPMENT
 TYPE : Digital Dust Indicator
 MANUFACTURER : SIBATA
 MODEL NO. : LD-5R
 SERIAL NO. : 620402
 EQUIPMENT NO. : ---
 RECEIPT DATE : 8/2/2018
 PERFORMANCE CHECK / CALIBRATION DATE : 9/2/2018

PERFORMANCE CHECK / CALIBRATION Information

CODE	Calibration Parameter	Method Procedure	Reference Method
Dust PC/CAL	Performance Check / Calibration of Dust Meter	CAL003	General Technical Requirements of Environmental Monitoring, Environmental Monitoring & Audit Guidelines for Development Projects in HK

- Notes : 1. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.
 2. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Approved Signatory :

Wong Po Yan Pauline
 (Assistant Laboratory Manager)

Issue Date: 12/2/2018



REPORT OF PERFORMANCE CHECK / CALIBRATION

PROJECT NAME : PERFORMANCE CHECK / CALIBRATION OF DUST METER
 DATE OF ISSUE : 12/2/2018
 REPORT NO. : HK1810148

PERFORMANCE CHECK / CALIBRATED EQUIPMENT

TYPE : Digital Dust Indicator
 MANUFACTURER : SIBATA
 MODEL NO. : LD-5R
 SERIAL NO. : 620402
 EQUIPMENT NO. : ---
 SENSITIVITY ADJUSTMENT : ---
 PERFORMANCE CHECK / CALIBRATION DATE : 9/2/2018

STANDARD EQUIPMENT

TYPE : HIGH VOLUME AIR SAMPLER
 MANUFACTURER : TISCH
 MODEL NO. : TE-5170
 EQUIPMENT REF NO. : PTL_HV002
 LAST CALIBRATION DATE : 29/1/2018

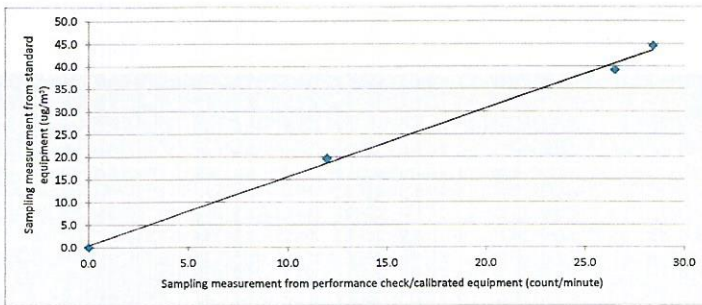
EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Sensitivity Adjustment Scale Setting (Before Performance check / Calibration): 754 CPM
 Sensitivity Adjustment Scale Setting (After Performance check / Calibration): 754 CPM

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m ³ (Standard equipment) (Y - Axis)	Total Count ² (Performance Check / Calibrated equipment)	Concentration in Count/Minute ³ (Performance Check / Calibrated equipment) (X - Axis)
Zero Check ¹	9/2/2018,9:05:00 AM	15.5	1017	0	0	0
1	9/2/2018,11:40:00 AM	15.5	1017	45	1705	28
2	9/2/2018,2:07:00 PM	15.5	1017	39	1590	27
3	9/2/2018,3:09:00 PM	15.5	1017	20	719	12

Linear Regression of Y on X

Slope (K- factor) : 1.5
 Correlation Coefficient : 0.9983
 Validity of Performance Check / Calibration Record : 9/2/2019



- Notes : 1. Zero check conducted as per CAL003 SOP and manufacturer's manual as appropriate.
 2. Total Count was measured by Digital Dust Indicator.
 3. Count/minute was calculated by (Total Count/60)
 4. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.
 5. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Operator: MA Ching Him, Jackey Signature: [Signature] Date: 9/2/2018

Checked by: Wong Po Yan, Pauline Signature: [Signature] Date: 12/2/2018

ENVIROTECH SERVICES CO.

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS2(Tung Chung Development Pier)
Calibrated by : P.F.Yeung
Date : 06/11/2018

Sampler

Model : TE-5170
Serial Number : S/N3641

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454
Service Date : 19 Mar 2018
Slope (m) : 2.05242
Intercept (b) : -0.01383
Correlation Coefficient(r) : 0.99994

Standard Condition

Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1013
Ta(K) : 301

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1 18 holes	12.0	3.447	1.686	56	55.72
2 13 holes	9.6	3.083	1.509	50	49.75
3 10 holes	7.0	2.633	1.289	45	44.78
4 7 holes	4.8	2.180	1.069	38	37.81
5 5 holes	2.6	1.604	0.788	30	29.85

Notes: $Z = \sqrt{\frac{dH(Pa/Pstd)(Tstd/Ta)}$, $X = Z/m - b$, $Y(\text{Corrected Flow}) = IC * \{\sqrt{\frac{Pa}{Pstd}} \sqrt{\frac{Tstd}{Ta}}\}$

Sampler Calibration Relationship

Slope(m): 28.476 Intercept(b): 7.464 Correlation Coefficient(r): 0.9989

Checked by: Magnum Fan

Date: 08/11/2018

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS3C (Ying Tung Estate)
 Calibrated by : P.F.Yeung
 Date : 20/10/2018

Sampler

Model : TE-5170
 Serial Number : S/N 3977

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454
 Service Date : 19 Mar 2018
 Slope (m) : 2.05242
 Intercept (b) : -0.01383
 Correlation Coefficient(r) : 0.99994

Standard Condition

Pstd (hpa) : 1013
 Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1013
 Ta(K) : 297

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1 18 holes	11.4	3.382	1.655	55	55.09
2 13 holes	9.2	3.038	1.487	50	50.08
3 10 holes	6.8	2.612	1.279	45	45.08
4 7 holes	4.6	2.148	1.053	38	38.06
5 5 holes	2.6	1.615	0.793	28	28.05

Notes: $Z = \sqrt{\frac{dH(Pa/Pstd)(Tstd/Ta)}$, $X = Z/m - b$, $Y(\text{Corrected Flow}) = IC * \{\sqrt{\frac{Pa/Pstd}{Tstd/Ta}}\}$

Sampler Calibration Relationship (Linear Regression)

Slope(m): 30.846 Intercept(b): 4.603 Correlation Coefficient(r): 0.9961

Checked by: Magnum Fan

Date: 22/10/2018

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS7B
 Calibrated by : P.F.Yeung
 Date : 26/10/2018

Sampler

Model : TE-5170
 Serial Number : S/N 3976

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454
 Service Date : 19 Mar 2018
 Slope (m) : 2.05242
 Intercept (b) : -0.01383
 Correlation Coefficient(r) : 0.99994

Standard Condition

Pstd (hpa) : 1013
 Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1016
 Ta(K) : 301

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1 18 holes	12.4	3.509	1.716	54	53.81
2 13 holes	9.6	3.087	1.511	48	47.83
3 10 holes	7.2	2.674	1.310	42	41.85
4 7 holes	4.8	2.183	1.070	36	35.87
5 5 holes	2.6	1.607	0.790	28	27.90

Notes: $Z = \sqrt{\frac{dH(Pa/Pstd)(Tstd/Ta)}$, $X = Z/m - b$, $Y(\text{Corrected Flow}) = IC * \{\sqrt{\frac{Pa/Pstd}{Tstd/Ta}}\}$

Sampler Calibration Relationship (Linear Regression)

Slope(m): 27.769 Intercept(b): 5.925 Correlation Coefficient(r): 0.9997

Checked by: Magnum Fan

Date: 22/10/2018

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS3C (Ying Tung Estate)
 Calibrated by : P.F.Yeung
 Date : 20/12/2018

Sampler

Model : TE-5170
 Serial Number : S/N 3977

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454
 Service Date : 19 Mar 2018
 Slope (m) : 2.05242
 Intercept (b) : -0.01383
 Correlation Coefficient(r) : 0.99994

Standard Condition

Pstd (hpa) : 1013
 Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1017
 Ta(K) : 292

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1 18 holes	11.6	3.447	1.686	54	54.66
2 13 holes	9.2	3.070	1.503	50	50.61
3 10 holes	6.8	2.640	1.293	44	44.54
4 7 holes	4.9	2.241	1.098	37	37.45
5 5 holes	2.4	1.568	0.771	30	30.37

Notes: $Z = \sqrt{\frac{dH(Pa/Pstd)(Tstd/Ta)}$, $X = Z/m - b$, $Y(\text{Corrected Flow}) = IC * \{\sqrt{\frac{Pa/Pstd}{Tstd/Ta}}\}$

Sampler Calibration Relationship (Linear Regression)

Slope(m): 27.469

Intercept(b): 8.633

Correlation Coefficient(r): 0.9962

Checked by: Magnum Fan

Date: 27/12/2018

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS7B
 Calibrated by : P.F.Yeung
 Date : 20/12/2018

Sampler

Model : TE-5170
 Serial Number : S/N 3976

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454
 Service Date : 19 Mar 2018
 Slope (m) : 2.05242
 Intercept (b) : -0.01383
 Correlation Coefficient(r) : 0.99994

Standard Condition

Pstd (hpa) : 1013
 Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1017
 Ta(K) : 292

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1 18 holes	12.0	3.506	1.715	55	55.67
2 13 holes	9.3	3.087	1.511	50	50.61
3 10 holes	7.5	2.772	1.357	45	45.55
4 7 holes	4.8	2.218	1.087	37	37.45
5 5 holes	3.0	1.753	0.861	30	30.37

Notes: $Z = \sqrt{dH(Pa/Pstd)(Tstd/Ta)}$, $X = Z/m - b$, $Y(\text{Corrected Flow}) = IC * \{\sqrt{dH(Pa/Pstd)(Tstd/Ta)}\}$

Sampler Calibration Relationship (Linear Regression)

Slope(m): 29.939 Intercept(b): 4.821 Correlation Coefficient(r): 0.9993

Checked by: Magnum Fan

Date: 27/12/2018



RECALIBRATION
DUE DATE:
March 19, 2019

Certificate of Calibration

Calibration Certification Information			
Cal. Date: March 19, 2018	Rootsmeter S/N: 438320	Ta: 294	°K
Operator: Jim Tisch		Pa: 746.8	mm Hg
Calibration Model #: TE-5025A	Calibrator S/N: 2454		

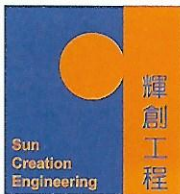
Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4300	3.2	2.00
2	3	4	1	1.0040	6.4	4.00
3	5	6	1	0.9030	7.9	5.00
4	7	8	1	0.8590	8.7	5.50
5	9	10	1	0.7080	12.8	8.00

Data Tabulation					
Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
0.9917	0.6935	1.4113	0.9957	0.6963	0.8874
0.9874	0.9835	1.9959	0.9914	0.9875	1.2549
0.9854	1.0913	2.2315	0.9894	1.0957	1.4030
0.9843	1.1459	2.3405	0.9883	1.1506	1.4715
0.9789	1.3826	2.8227	0.9829	1.3882	1.7747
QSTD	m=	2.05242	QA	m=	1.28519
	b=	-0.01383		b=	-0.00869
	r=	0.99994		r=	0.99994

Calculations	
Vstd= $\Delta Vol \left(\frac{Pa - \Delta P}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)$	Va= $\Delta Vol \left(\frac{Pa - \Delta P}{Pa} \right)$
Qstd= Vstd/ΔTime	Qa= Va/ΔTime
For subsequent flow rate calculations:	
Qstd= $1/m \left(\left(\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)} \right) - b \right)$	Qa= $1/m \left(\left(\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)} \right) - b \right)$

Standard Conditions	
Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH: calibrator manometer reading (in H2O)	
ΔP: rootsmeter manometer reading (mm Hg)	
Ta: actual absolute temperature (°K)	
Pa: actual barometric pressure (mm Hg)	
b: intercept	
m: slope	

RECALIBRATION
US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30



Certificate of Calibration

校正證書

Certificate No. : C183089
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC18-1132)

Date of Receipt / 收件日期 : 31 May 2018

Description / 儀器名稱 : Sound Level Meter

Manufacturer / 製造商 : Rion

Model No. / 型號 : NL-52

Serial No. / 編號 : 00331805

Supplied By / 委託者 : Envirotech Services Co.

Room 113, 1/F, My Loft, 9 Hoi Wing Road, Tuen Mun,
New Territories, Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C

Relative Humidity / 相對濕度 : (50 ± 25)%

Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 10 June 2018

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

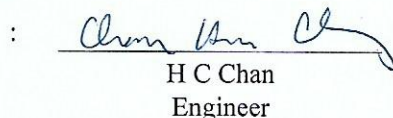
The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By
測試


K C Lee
Engineer

Certified By
核證


H C Chan
Engineer

Date of Issue
簽發日期

14 June 2018

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗所書面批准。

Certificate of Calibration

校正證書

Certificate No. : C183089

證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. Self-calibration was performed before the test.
3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL280	40 MHz Arbitrary Waveform Generator	C180024
CL281	Multifunction Acoustic Calibrator	PA160023

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L _A	A	Fast	94.00	1	94.2	± 1.1

6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 130	L _A	A	Fast	94.00	1	94.2 (Ref.)
				104.00		104.2
				114.00		114.2

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L _A	A	Fast	94.00	1	94.2	Ref.
			Slow			94.2	± 0.3

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗所書面批准。

Certificate of Calibration

校正證書

Certificate No. : C183089

證書編號

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L _A	A	Fast	94.00	63 Hz	67.9	-26.2 ± 1.5
					125 Hz	78.0	-16.1 ± 1.5
					250 Hz	85.5	-8.6 ± 1.4
					500 Hz	91.0	-3.2 ± 1.4
					1 kHz	94.2	Ref.
					2 kHz	95.4	+1.2 ± 1.6
					4 kHz	95.2	+1.0 ± 1.6
					8 kHz	93.2	-1.1 (+2.1 ; -3.1)
					12.5 kHz	89.8	-4.3 (+3.0 ; -6.0)

6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L _C	C	Fast	94.00	63 Hz	93.3	-0.8 ± 1.5
					125 Hz	94.0	-0.2 ± 1.5
					250 Hz	94.2	0.0 ± 1.4
					500 Hz	94.2	0.0 ± 1.4
					1 kHz	94.2	Ref.
					2 kHz	94.1	-0.2 ± 1.6
					4 kHz	93.4	-0.8 ± 1.6
					8 kHz	91.3	-3.0 (+2.1 ; -3.1)
					12.5 kHz	87.9	-6.2 (+3.0 ; -6.0)

Remarks : - UUT Microphone Model No. : UC-59 & S/N : 04870

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB :	63 Hz - 125 Hz	: ± 0.35 dB
	250 Hz - 500 Hz	: ± 0.30 dB
	1 kHz	: ± 0.20 dB
	2 kHz - 4 kHz	: ± 0.35 dB
	8 kHz	: ± 0.45 dB
	12.5 kHz	: ± 0.70 dB
104 dB :	1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB :	1 kHz	: ± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

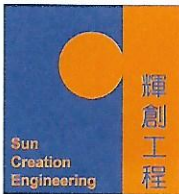
Note :

Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室書面批准。



Certificate of Calibration

校正證書

Certificate No. : C183084
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC18-1101)

Date of Receipt / 收件日期 : 30 May 2018

Description / 儀器名稱 : Precision Acoustic Calibrator

Manufacturer / 製造商 : LARSON DAVIS

Model No. / 型號 : CAL200

Serial No. / 編號 : 11333

Supplied By / 委託者 : Envirotech Services Co.

Room 113, 1/F, My Loft, 9 Hoi Wing Road, Tuen Mun,
New Territories, Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : $(23 \pm 2)^{\circ}\text{C}$

Relative Humidity / 相對濕度 : $(50 \pm 25)\%$

Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 9 June 2018

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.


The results do not exceed manufacturer's specification.

The results are detailed in the subsequent page(s).

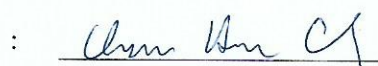
The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By
測試


K C Lee
Engineer

Certified By
核證


H C Chan
Engineer

Date of Issue
簽發日期

14 June 2018

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室所書面批准。

Certificate of Calibration

校正證書

Certificate No. : C183084

證書編號

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL130	Universal Counter	C173864
CL281	Multifunction Acoustic Calibrator	PA160023
TST150A	Measuring Amplifier	C181288

- Test procedure : MA100N.

- Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	93.8	± 0.2	± 0.2
114 dB, 1 kHz	113.8		

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.000	1 kHz ± 1 %	± 1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :

Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗所書面批准。



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. : AH100180
Date of Issue : 26 October 2018
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 : Oct 26, 2018
Date of Calibration : Oct 26, 2018
Date of Next Calibration^(a) : Jan 26, 2019

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	4.05	0.05	Satisfactory
7.42	7.46	0.04	Satisfactory
10.01	9.98	-0.03	Satisfactory

Tolerance of pH should be less than ±0.10 (pH unit)

(2) Temperature

Reading of Ref. thermometer (°C)	Displayed Reading (°C)	Tolerance (°C)	Results
10.8	10.7	-0.1	Satisfactory
23.5	23.4	-0.1	Satisfactory
45.0	45.5	0.5	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 QPT or quoted from relevant international standards.

APPROVED SIGNATORY:


LAM Ho-ye, Emma
Assistant Laboratory Manager



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. : AH100180
Date of Issue : 26 October 2018
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
0.00	0.00	0.00	Satisfactory
1.70	1.81	0.11	Satisfactory
4.79	4.81	0.02	Satisfactory
7.70	7.74	0.04	Satisfactory

Tolerance limit of dissolved oxygen should be less than ± 0.20 (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	153.0	4.2	Satisfactory
0.01	1412	1359	-3.8	Satisfactory
0.1	12890	12520	-2.9	Satisfactory
0.5	58670	57672	-1.7	Satisfactory
1.0	111900	112190	0.3	Satisfactory

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

(5) Salinity

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)	Results
10	10.11	1.1	Satisfactory
20	20.47	2.3	Satisfactory
30	30.18	0.6	Satisfactory

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

(6) Turbidity

Expected Reading (NTU)	Displayed Reading ⁽¹⁾ (NTU)	Tolerance ⁽²⁾ (%)	Results
0	0.40	--	--
10	9.80	-2.0	Satisfactory
20	19.36	-3.2	Satisfactory
100	102.34	2.3	Satisfactory
800	803.10	0.4	Satisfactory

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

~ END OF REPORT ~

Remark(s): -

⁽¹⁾ "Displayed Reading" presents the figures shown on item under calibration/ checking regardless of equipment precision or significant figures.

⁽²⁾ 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.



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. : AH100181
Date of Issue : 26 October 2018
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 : 17H105557
Date of Received : Oct 26, 2018
Date of Calibration : Oct 26, 2018
Date of Next Calibration^(a) : Jan 26, 2019

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	4.07	0.07	Satisfactory
7.42	7.42	0.00	Satisfactory
10.01	10.01	0.00	Satisfactory

Tolerance of pH should be less than ±0.10 (pH unit)

(2) Temperature

Reading of Ref. thermometer (°C)	Displayed Reading (°C)	Tolerance (°C)	Results
10.8	10.7	-0.1	Satisfactory
23.5	23.3	-0.2	Satisfactory
45.0	45.7	0.7	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 QPT or quoted from relevant international standards.

APPROVED SIGNATORY:


LAM Ho-ye, Emma
Assistant Laboratory Manager



REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

Report No. : AH100181
Date of Issue : 26 October 2018
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
0.00	0.00	0.00	Satisfactory
1.70	1.77	0.07	Satisfactory
4.79	4.83	0.04	Satisfactory
7.70	7.81	0.11	Satisfactory

Tolerance limit of dissolved oxygen should be less than ± 0.20 (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	150.0	2.1	Satisfactory
0.01	1412	1439	1.9	Satisfactory
0.1	12890	11949	-7.3	Satisfactory
0.5	58670	58670	0.0	Satisfactory
1.0	111900	111563	-0.3	Satisfactory

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

(5) Salinity

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)	Results
10	10.13	1.3	Satisfactory
20	20.16	0.8	Satisfactory
30	30.26	0.9	Satisfactory

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

(6) Turbidity

Expected Reading (NTU)	Displayed Reading ^(f) (NTU)	Tolerance ^(g) (%)	Results
0	0.30	--	--
10	9.70	-3.0	Satisfactory
20	19.76	-1.2	Satisfactory
100	98.33	-1.7	Satisfactory
800	804.22	0.5	Satisfactory

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

~ END OF REPORT ~

Remark(s): -

^(f) "Displayed Reading" presents the figures shown on item under calibration/ checking regardless of equipment precision or significant figures.

^(g) 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.



專業化驗有限公司

QUALITY PRO TEST-CONSULT LIMITED

Unit 10, 14/F, Wah Wai Centre, 38-40 Au Pui Wau 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. : AH100038
Date of Issue : 04 October 2018
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 : 16H104233
Date of Received : Oct 03, 2018
Date of Calibration : Oct 03, 2018
Date of Next Calibration^(a) : Jan 03, 2019

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	4.01	0.01	Satisfactory
7.42	7.42	0	Satisfactory
10.01	10.00	-0.01	Satisfactory

Tolerance of pH should be less than ± 0.10 (pH unit)

(2) Temperature

Reading of Ref. thermometer (°C)	Displayed Reading (°C)	Tolerance (°C)	Results
7.6	7.5	-0.1	Satisfactory
25.0	24.7	-0.3	Satisfactory
35.5	35.6	0.1	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 QPT or quoted from relevant international standards.

APPROVED SIGNATORY:

LAM Ho-ye, Emma
Assistant Laboratory Manager



REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

Report No. : AH100038
Date of Issue : 04 October 2018
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
0.34	0.28	-0.06	Satisfactory
7.75	7.83	0.08	Satisfactory
8.20	8.02	-0.18	Satisfactory

Tolerance limit of dissolved oxygen should be less than ± 0.20 (mg/L)

(4) Conductivity at 25°C

Conc. of KCl (M)	Expected Reading ($\mu\text{S/cm}$)	Displayed Reading ($\mu\text{S/cm}$)	Tolerance (%)	Results
0.001	146.9	144.8	-1.4	Satisfactory
0.01	1412	1350	-4.4	Satisfactory
0.1	12890	12175	-5.5	Satisfactory
0.5	58670	56033	-4.5	Satisfactory
1.0	111900	108180	-3.3	Satisfactory

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

(5) Salinity

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)	Results
10	9.54	-4.6	Satisfactory
20	19.64	-1.8	Satisfactory
30	29.86	-0.5	Satisfactory

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

(6) Turbidity

Expected Reading (NTU)	Displayed Reading ^(f) (NTU)	Tolerance ^(g) (%)	Results
0	0	--	--
10	10.50	5.0	Satisfactory
20	21.58	7.9	Satisfactory
100	101.89	1.9	Satisfactory
800	788.25	-1.5	Satisfactory

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

~ END OF REPORT ~

Remark(s): -

^(f) "Displayed Reading" presents the figures shown on item under calibration/ checking regardless of equipment precision or significant figures.

^(g) 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.



專業化驗有限公司

QUALITY PRO TEST-CONSULT LIMITED

Unit 10, 14/E, 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. : AH100036
Date of Issue : 04 October 2018
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 : 17E100747
Date of Received : Oct 03, 2018
Date of Calibration : Oct 03, 2018
Date of Next Calibration^(a) : Jan 03, 2019

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	3.99	-0.01	Satisfactory
7.42	7.40	-0.02	Satisfactory
10.01	9.96	-0.05	Satisfactory

Tolerance of pH should be less than ±0.10 (pH unit)

(2) Temperature

Reading of Ref. thermometer (°C)	Displayed Reading (°C)	Tolerance (°C)	Results
7.6	7.1	-0.5	Satisfactory
25.0	24.6	-0.4	Satisfactory
35.5	34.9	-0.6	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 QPT or quoted from relevant international standards.

APPROVED SIGNATORY:


LAM Ho-ye, Emma
Assistant Laboratory Manager



REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

Report No. : AH100036
Date of Issue : 04 October 2018
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
0.34	0.26	-0.08	Satisfactory
7.75	7.82	0.07	Satisfactory
8.20	8.00	-0.20	Satisfactory

Tolerance limit of dissolved oxygen should be less than ± 0.20 (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	145.8	-0.7	Satisfactory
0.01	1412	1380	-2.3	Satisfactory
0.1	12890	12434	-3.5	Satisfactory
0.5	58670	57510	-2.0	Satisfactory
1.0	111900	110518	-1.2	Satisfactory

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

(5) Salinity

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)	Results
10	9.66	-3.4	Satisfactory
20	19.84	-0.8	Satisfactory
30	30.38	1.3	Satisfactory

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

(6) Turbidity

Expected Reading (NTU)	Displayed Reading ^(f) (NTU)	Tolerance ^(g) (%)	Results
0	0.00	--	--
10	10.47	4.7	Satisfactory
20	21.75	8.8	Satisfactory
100	93.90	-6.1	Satisfactory
800	730.06	-8.7	Satisfactory

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

~ END OF REPORT ~

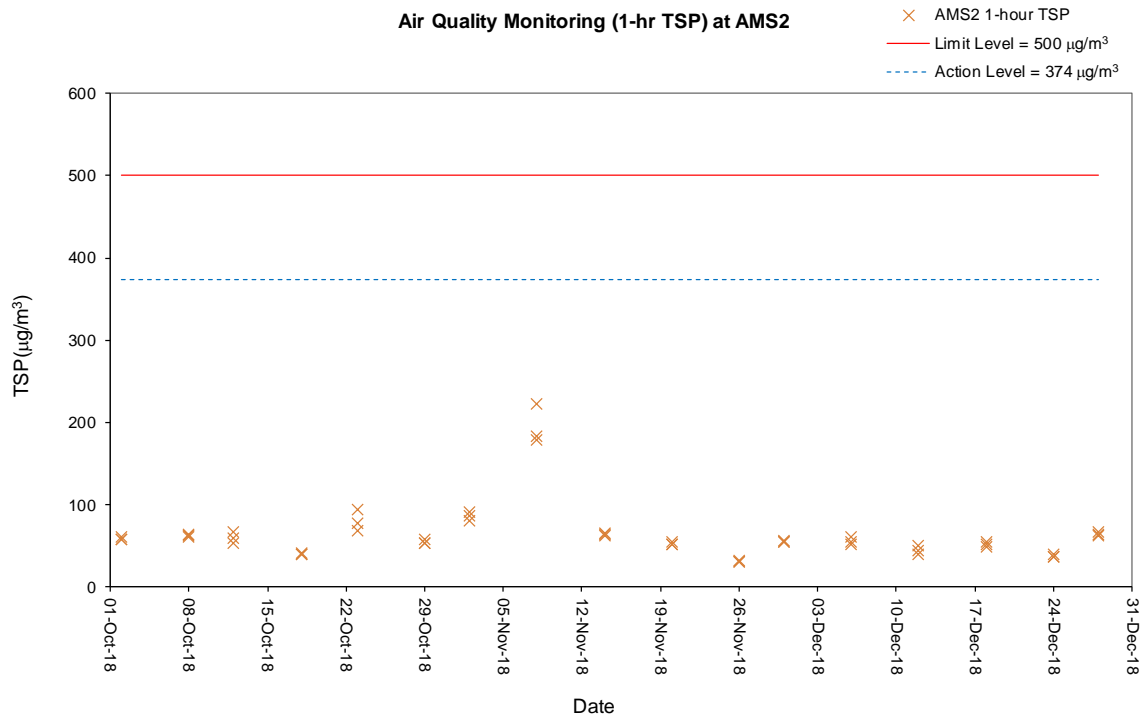
Remark(s): -

^(f) "Displayed Reading" presents the figures shown on item under calibration/ checking regardless of equipment precision or significant figures.

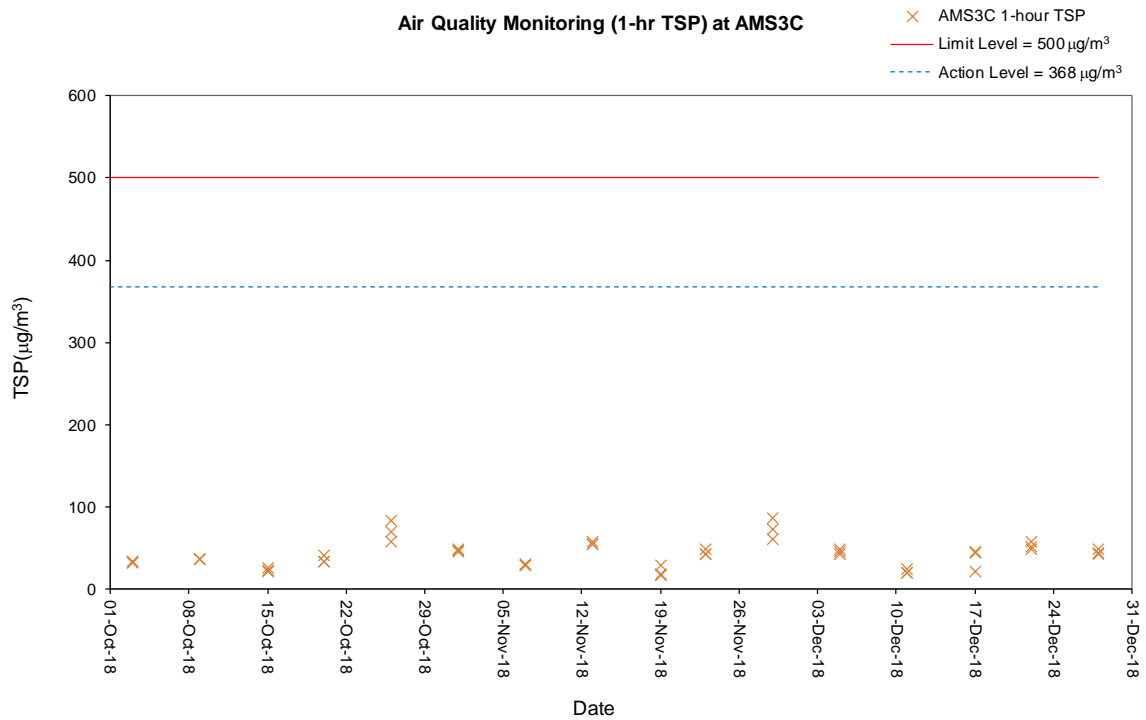
^(g) The "Tolerance Limit" mentioned is the acceptance criteria applicable for similar equipment used by Quality Pro Test-Consult Ltd. or quoted from relevant international standards.

Appendix K. Monitoring Data and Graphical Plots (Air Quality, Noise and Water Quality)

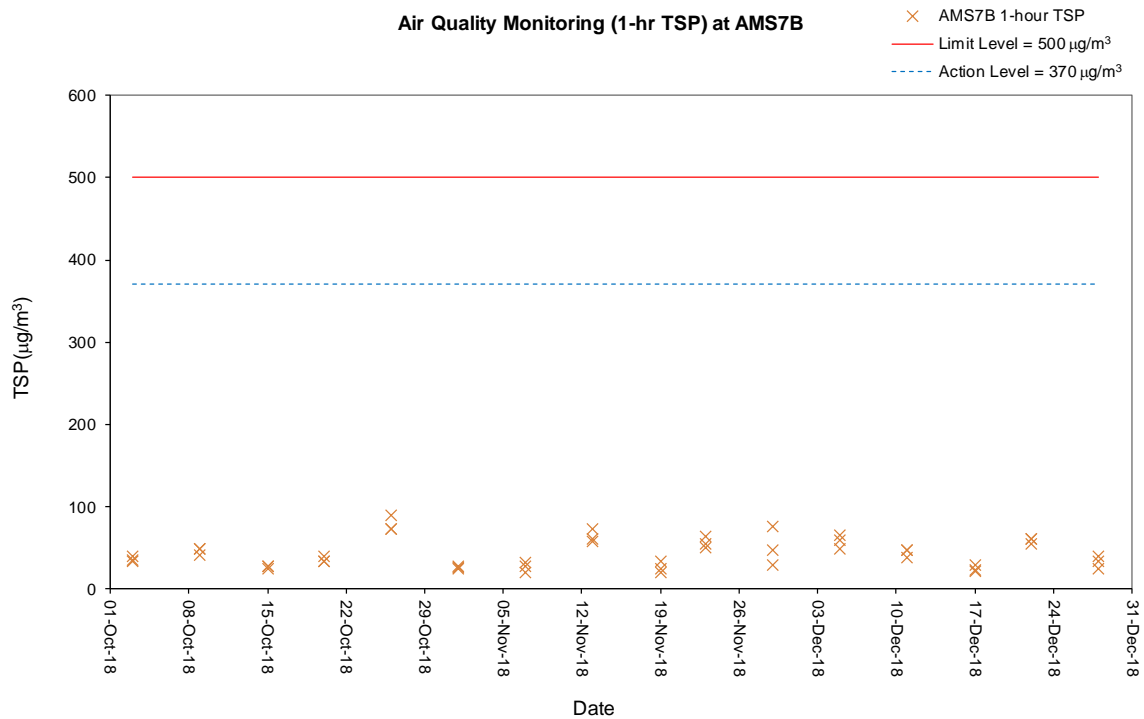
Project	Contract	Station	Date	Parameter	Start Time	Result	Unit
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	06-Dec-18	1-hr TSP	08:56	61	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	06-Dec-18	1-hr TSP	11:02	52	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	06-Dec-18	1-hr TSP	13:00	54	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	12-Dec-18	1-hr TSP	09:08	39	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	12-Dec-18	1-hr TSP	10:08	50	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	12-Dec-18	1-hr TSP	11:08	44	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	18-Dec-18	1-hr TSP	09:01	54	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	18-Dec-18	1-hr TSP	10:01	51	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	18-Dec-18	1-hr TSP	11:01	49	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	24-Dec-18	1-hr TSP	08:56	36	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	24-Dec-18	1-hr TSP	09:56	37	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	24-Dec-18	1-hr TSP	10:56	39	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	28-Dec-18	1-hr TSP	08:54	62	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	28-Dec-18	1-hr TSP	10:00	63	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	28-Dec-18	1-hr TSP	11:00	66	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	05-Dec-18	1-hr TSP	08:03	45	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	05-Dec-18	1-hr TSP	09:03	43	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	05-Dec-18	1-hr TSP	10:03	49	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	11-Dec-18	1-hr TSP	07:58	20	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	11-Dec-18	1-hr TSP	08:58	20	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	11-Dec-18	1-hr TSP	09:58	25	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	17-Dec-18	1-hr TSP	08:01	22	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	17-Dec-18	1-hr TSP	09:01	44	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	17-Dec-18	1-hr TSP	10:01	46	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	22-Dec-18	1-hr TSP	09:17	58	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	22-Dec-18	1-hr TSP	10:17	48	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	22-Dec-18	1-hr TSP	11:17	52	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	28-Dec-18	1-hr TSP	08:05	49	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	28-Dec-18	1-hr TSP	09:05	44	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	28-Dec-18	1-hr TSP	10:05	42	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	05-Dec-18	1-hr TSP	09:56	65	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	05-Dec-18	1-hr TSP	10:56	59	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	05-Dec-18	1-hr TSP	11:56	48	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	11-Dec-18	1-hr TSP	09:44	38	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	11-Dec-18	1-hr TSP	10:44	47	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	11-Dec-18	1-hr TSP	11:44	47	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	17-Dec-18	1-hr TSP	09:42	29	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	17-Dec-18	1-hr TSP	10:42	23	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	17-Dec-18	1-hr TSP	11:42	22	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	22-Dec-18	1-hr TSP	08:26	60	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	22-Dec-18	1-hr TSP	09:26	54	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	22-Dec-18	1-hr TSP	10:26	61	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	28-Dec-18	1-hr TSP	10:09	25	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	28-Dec-18	1-hr TSP	11:09	34	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	28-Dec-18	1-hr TSP	12:09	40	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	05-Dec-18	24-hr TSP	08:00	74	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	11-Dec-18	24-hr TSP	08:00	84	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	17-Dec-18	24-hr TSP	08:00	83	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	21-Dec-18	24-hr TSP	08:00	55	µg/m ³
HKBCF	HY/2013/04	AMS2 Tung Chung Development Pier	27-Dec-18	24-hr TSP	08:00	72	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	05-Dec-18	24-hr TSP	08:11	52	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	11-Dec-18	24-hr TSP	08:03	49	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	17-Dec-18	24-hr TSP	12:34	77	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	22-Dec-18	24-hr TSP	09:10	96	µg/m ³
HKBCF	HY/2013/04	AMS3C Ying Tung Estate Market Rooftop	28-Dec-18	24-hr TSP	08:07	75	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	05-Dec-18	24-hr TSP	10:03	54	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	11-Dec-18	24-hr TSP	09:55	165	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	17-Dec-18	24-hr TSP	09:54	121	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	22-Dec-18	24-hr TSP	08:33	114	µg/m ³
HKBCF	HY/2013/04	AMS7B 3RS Site Office	28-Dec-18	24-hr TSP	10:07	103	µg/m ³



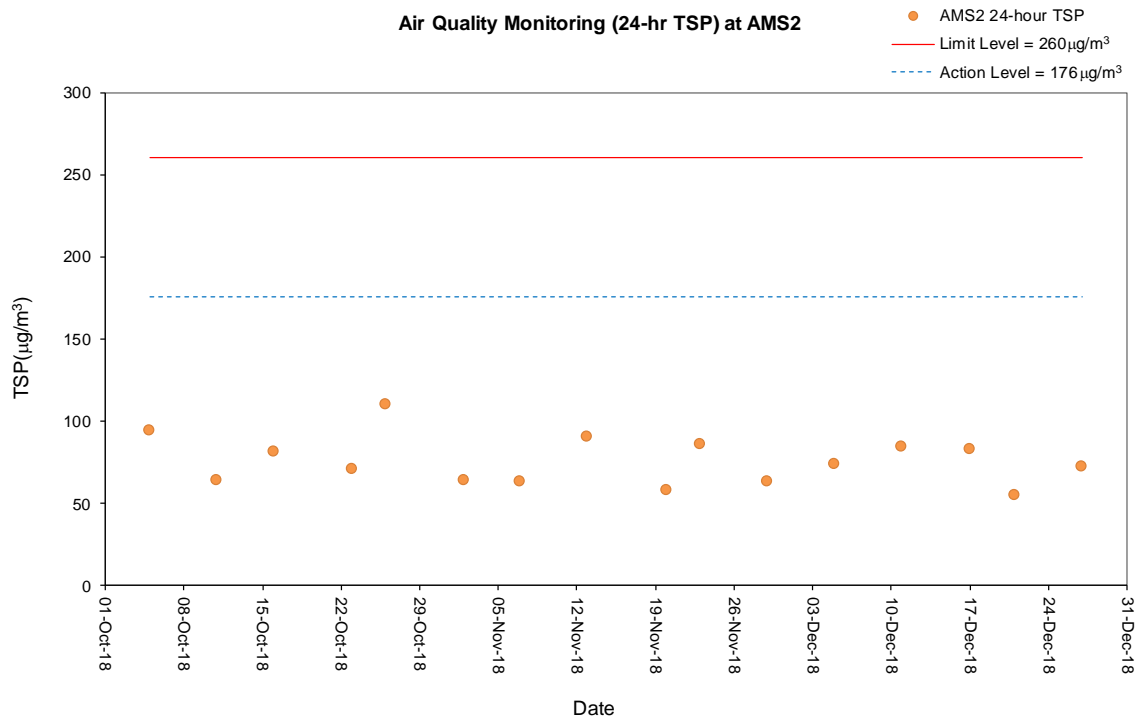
Remark: The air quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 “Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building”. Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.



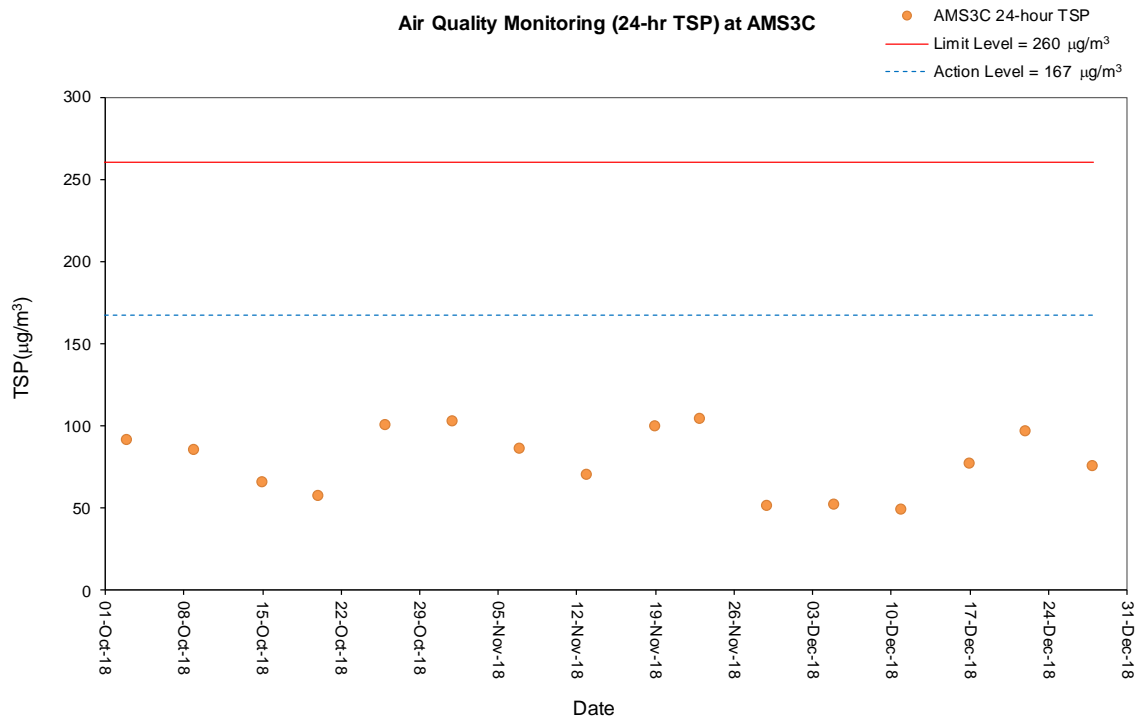
Remark: The air quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 “Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building”. Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.



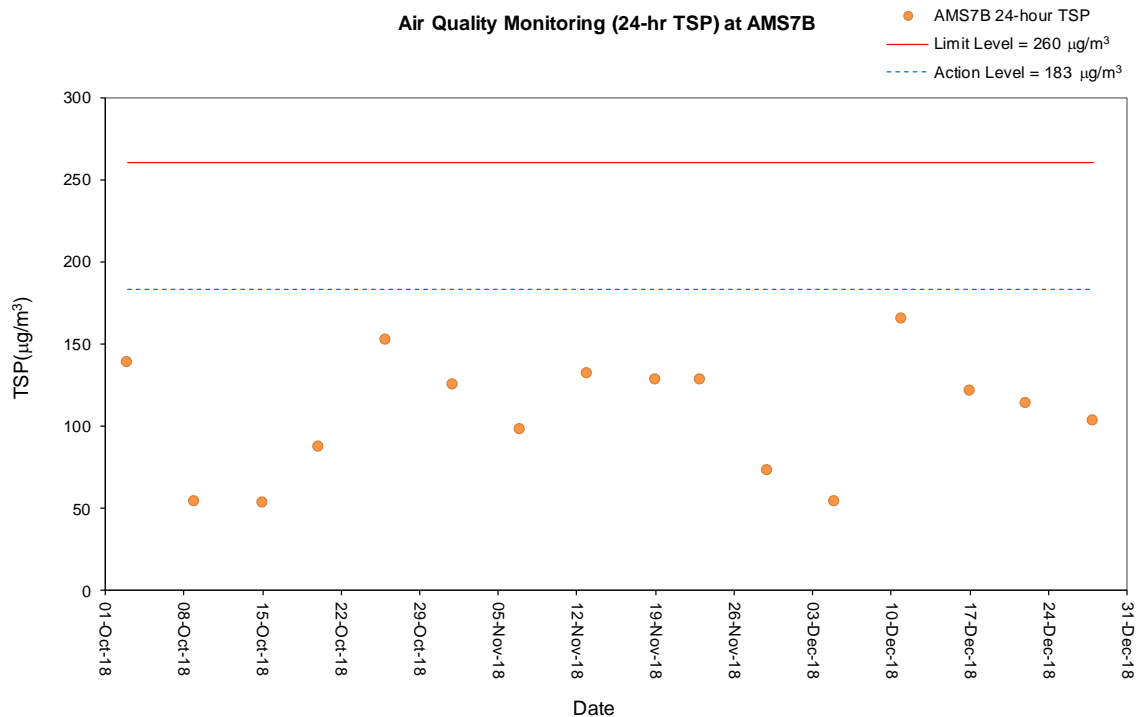
Remark: The air quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 “Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building”. Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.



Remark: The air quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 “Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building”. Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.



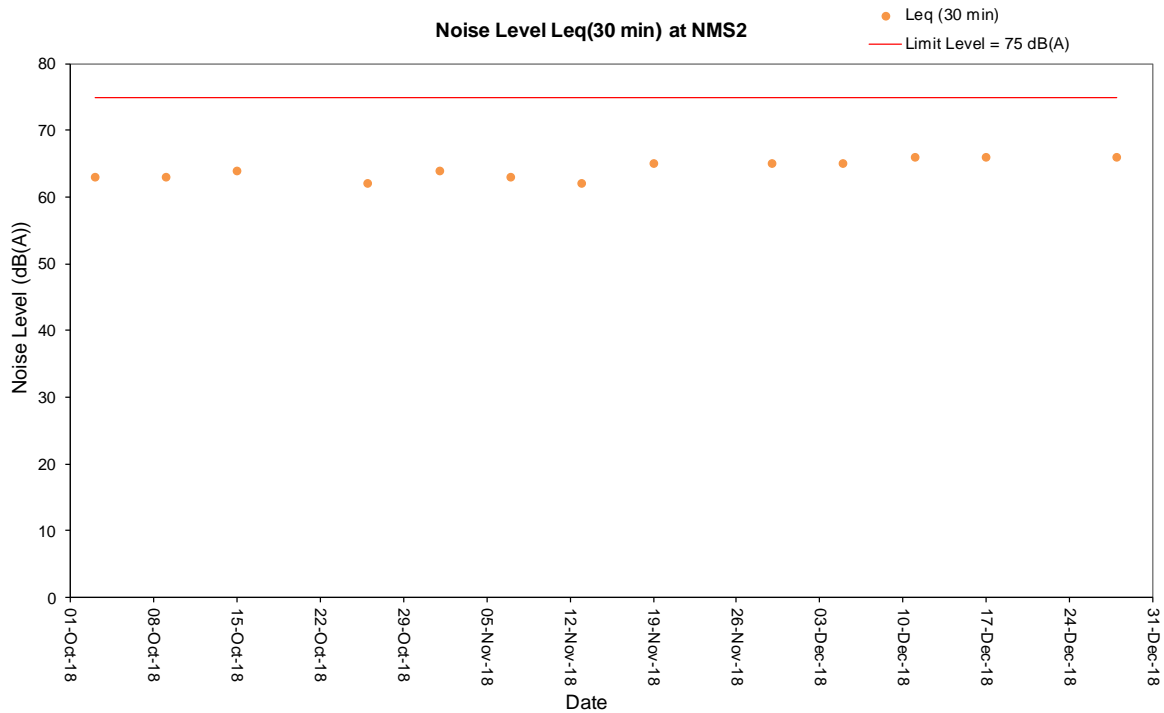
Remark: The air quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 “Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building”. Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.



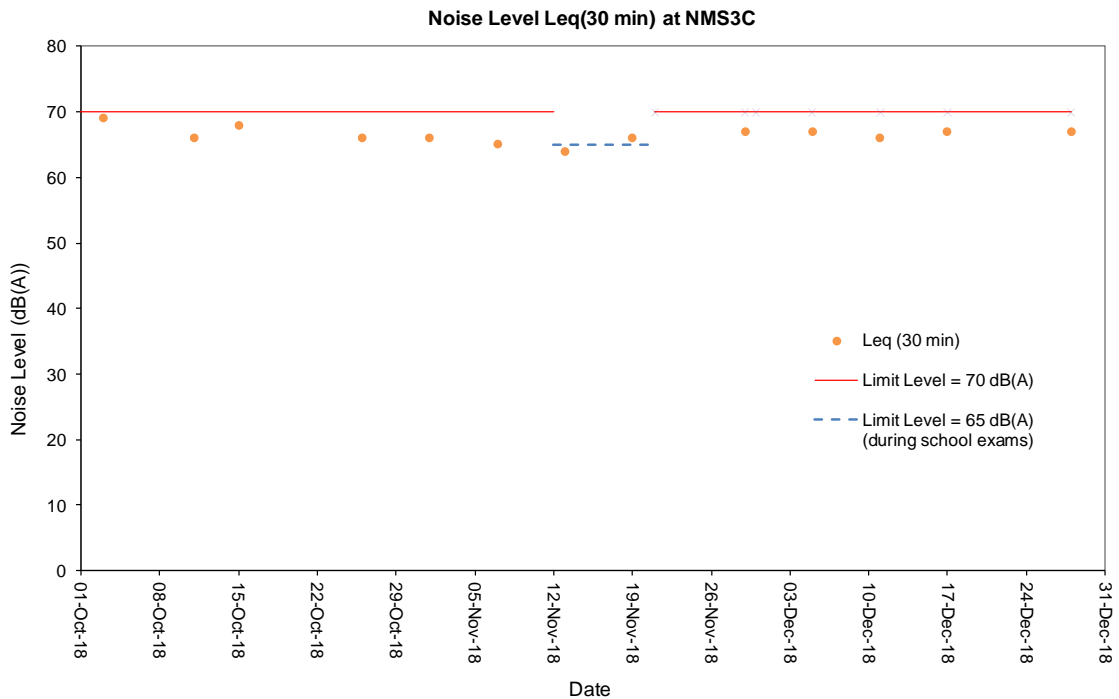
Remark: The air quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 “Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building”. Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.

Project	Contract	Date	Station	Start Time	Noise Level for 30 min, dB(A)			Weather	Wind Speed, m/s	Facade / Free Field	Limit Level, dB(A)
					L _{eq}	L ₁₀	L ₉₀				
HKBCF	HY/2013/04	05-Dec-18	NMS2 Seaview Crescent	10:57	65	69	61	Sunny	<5	Facade	75
HKBCF	HY/2013/04	11-Dec-18	NMS2 Seaview Crescent	10:51	66	69	62	Cloudy	<5	Facade	75
HKBCF	HY/2013/04	17-Dec-18	NMS2 Seaview Crescent	10:45	66	68	62	Sunny	<5	Facade	75
HKBCF	HY/2013/04	28-Dec-18	NMS2 Seaview Crescent	10:58	66	69	61	Fine	<5	Facade	75
HKBCF	HY/2013/04	05-Dec-18	NMS3C Ying Tung Estate Refuse Collection Point	08:20	67	70	63	Sunny	<5	Free Field *	70
HKBCF	HY/2013/04	11-Dec-18	NMS3C Ying Tung Estate Refuse Collection Point	08:11	66	69	62	Cloudy	<5	Free Field *	70
HKBCF	HY/2013/04	17-Dec-18	NMS3C Ying Tung Estate Refuse Collection Point	08:09	67	70	63	Sunny	<5	Free Field *	70
HKBCF	HY/2013/04	28-Dec-18	NMS3C Ying Tung Estate Refuse Collection Point	08:29	67	70	64	Fine	<5	Free Field *	70

Remark: * Free field measurement; noise level shown includes +3dB(A) correction factor



Remark: The noise monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 “Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building”. Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.



Remark: The measured noise level on 19 November 2018 at NMS3C exceeded the noise Limit Level of 65 dB(A) during examination period at Ho Yu College but it was below the baseline level. Therefore, it is not considered as an exceedance. As such the Event and Action Plan was not triggered.

The noise monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 “Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building”. Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-03	Mid-Ebb	SR10A(N)	Fine	Moderate	10:12	12.6	Surface	1st	22.8	8.1	31.0	6.4	6.4	88.7	3.7	3.6	3.0	3.5
							Surface	2nd	22.8	8.1	30.9	6.4						
							Middle	1st	22.8	8.1	31.1	6.4	6.4	88.3	3.8			
							Middle	2nd	22.8	8.1	31.1	6.4						
							Bottom	1st	22.8	8.1	31.1	6.4	6.4	88.9	3.7			
							Bottom	2nd	22.8	8.1	31.1	6.4						
2018-12-03	Mid-Ebb	SR10B(N2)	Fine	Moderate	10:17	5.9	Surface	1st	22.8	8.1	31.0	6.4	6.4	89.1	4.3	4.3	4.4	4.3
							Surface	2nd	22.8	8.1	31.0	6.4						
							Middle	1st	-	-	-	-	6.4	89.3	4.6			
							Middle	2nd	-	-	-	-						
							Bottom	1st	22.8	8.1	31.0	6.4	6.4	89.3	4.2			
							Bottom	2nd	22.8	8.1	31.0	6.4						
2018-12-03	Mid-Ebb	CSA	Fine	Moderate	9:43	32.5	Surface	1st	23.2	8.0	30.2	6.4	6.4	88.4	6.3	8.7	3.5	5.3
							Surface	2nd	23.1	8.0	30.0	6.5						
							Middle	1st	23.2	8.0	30.7	6.3	6.4	89.5	6.5			
							Middle	2nd	23.1	8.0	30.5	6.4						
							Bottom	1st	23.2	8.0	30.8	6.3	6.4	87.8	13.3			
							Bottom	2nd	23.1	8.0	30.6	6.5						
2018-12-03	Mid-Ebb	CS6	Fine	Moderate	9:36	10.2	Surface	1st	23.3	8.0	30.1	6.5	6.5	89.8	5.3	7.3	4.0	4.9
							Surface	2nd	23.3	8.0	29.9	6.6						
							Middle	1st	23.2	8.0	30.5	6.3	6.5	88.9	9.7			
							Middle	2nd	23.2	8.0	30.3	6.5						
							Bottom	1st	23.2	8.0	30.7	6.4	6.5	91.0	9.7			
							Bottom	2nd	23.2	8.0	30.5	6.5						
2018-12-03	Mid-Ebb	CS4	Fine	Moderate	8:44	16.5	Surface	1st	23.2	8.0	28.7	6.6	6.7	90.8	7.5	7.6	5.6	5.1
							Surface	2nd	23.2	8.0	28.5	6.7						
							Middle	1st	23.2	8.0	29.1	6.6	6.7	91.1	7.7			
							Middle	2nd	23.2	8.0	28.9	6.8						
							Bottom	1st	23.2	8.0	29.1	6.6	6.7	91.4	7.7			
							Bottom	2nd	23.2	8.0	29.0	6.8						
2018-12-03	Mid-Ebb	SR6	Fine	Moderate	8:15	4.4	Surface	1st	23.1	8.0	30.0	6.7	6.8	92.9	7.4	8.0	5.3	6.8
							Surface	2nd	23.0	7.9	29.6	6.9						
							Middle	1st	-	-	-	-	6.8	93.1	8.2			
							Middle	2nd	-	-	-	-						
							Bottom	1st	23.1	8.0	30.1	6.7	6.8	95.1	8.8			
							Bottom	2nd	23.0	7.9	29.8	6.9						
2018-12-03	Mid-Ebb	CS(Mf)3(N)	Fine	Moderate	8:31	7.4	Surface	1st	23.2	7.9	28.3	6.6	6.7	90.6	6.1	9.7	4.8	5.2
							Surface	2nd	23.1	8.0	28.5	6.8						
							Middle	1st	23.2	7.8	29.6	6.6	6.7	91.4	11.7			
							Middle	2nd	23.1	7.9	29.4	6.8						
							Bottom	1st	23.2	7.9	29.4	6.6	6.7	91.5	11.8			
							Bottom	2nd	23.1	7.9	29.3	6.8						
2018-12-03	Mid-Ebb	SR5(N)	Fine	Moderate	9:02	9.4	Surface	1st	23.1	8.0	29.2	6.6	6.7	91.3	6.9	7.0	5.3	4.8
							Surface	2nd	23.1	8.0	29.0	6.8						
							Middle	1st	23.2	8.0	29.5	6.6	6.7	91.1	7.1			
							Middle	2nd	23.1	8.0	29.4	6.7						
							Bottom	1st	23.2	8.0	29.6	6.6	6.7	91.3	7.1			
							Bottom	2nd	23.1	8.0	29.4	6.8						
2018-12-03	Mid-Ebb	IS10(N)	Fine	Moderate	9:06	12.6	Surface	1st	23.2	8.0	29.3	6.5	6.5	89.9	4.1	7.4	5.0	5.0
							Surface	2nd	23.2	8.0	29.1	6.7						
							Middle	1st	23.2	8.0	29.8	6.4	6.5	88.3	8.8			
							Middle	2nd	23.2	8.0	29.6	6.5						
							Bottom	1st	23.2	8.0	29.9	6.4	6.5	88.8	9.2			
							Bottom	2nd	23.2	8.0	29.7	6.6						
2018-12-03	Mid-Ebb	IS(Mf)11	Fine	Moderate	9:11	11.2	Surface	1st	23.2	8.0	29.8	6.4	6.5	88.9	4.4	6.9	6.0	5.8
							Surface	2nd	23.2	8.0	29.6	6.6						
							Middle	1st	23.2	8.0	29.9	6.4	6.5	88.8	7.2			
							Middle	2nd	23.2	8.0	29.7	6.6						
							Bottom	1st	23.2	8.0	29.9	6.4	6.5	89.2	9.0			
							Bottom	2nd	23.2	8.0	29.7	6.6						
2018-12-03	Mid-Ebb	CS(Mf)5	Fine	Moderate	9:43	12.3	Surface	1st	22.8	8.1	30.3	6.3	6.3	87.8	4.1	4.1	12.1	11.1
							Surface	2nd	22.8	8.1	30.1	6.4						
							Middle	1st	22.8	8.1	31.1	6.2	6.2	86.6	3.9			
							Middle	2nd	22.8	8.1	31.1	6.2						
							Bottom	1st	22.8	8.1	31.3	6.2	6.2	86.7	4.9			
							Bottom	2nd	22.8	8.1	31.3	6.2						

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth- averaged)								
2018-12-03	Mid-Ebb	SR7	Fine	Moderate	9:17	4.3	Surface	1st	23.2	8.0	29.8	6.4	6.5	88.7	9.3	9.8	4.9	4.8								
							Surface	2nd	23.2	8.0	29.7	6.5		90.8	9.3		4.7									
							Middle	1st	-	-	-	-		-	-		-									
							Middle	2nd	-	-	-	-	-	-	-	-										
							Bottom	1st	23.2	8.0	29.9	6.4	6.5	88.6	10.2	5.2										
							Bottom	2nd	23.2	8.0	29.7	6.5		90.8	10.4	4.5										
2018-12-03	Mid-Ebb	IS17	Fine	Moderate	9:25	9.9	Surface	1st	22.9	8.1	29.9	6.5	6.5	89.4	8.4	8.0	7.3	7.7								
							Surface	2nd	22.9	8.1	29.9	6.5		89.5	8.0		6.8									
							Middle	1st	22.9	8.1	30.2	6.4		88.2	8.3		7.8									
							Middle	2nd	22.9	8.1	30.2	6.4	88.3	8.0	7.2											
							Bottom	1st	22.8	8.1	30.7	6.3	6.3	87.6	7.9		8.3									
							Bottom	2nd	22.8	8.1	30.7	6.3		87.5	7.4		8.5									
							2018-12-03	Mid-Ebb	IS(Mf)16	Fine	Moderate	9:18	5.9	Surface	1st	22.8	8.1		29.6	6.7	6.7	92.2	5.7	9.1	6.1	6.1
														Surface	2nd	22.8	8.1		29.6	6.7		92.3	5.2		5.7	
														Middle	1st	-	-		-	-		-	-		-	
														Middle	2nd	-	-		-	-	-	-	-		-	
Bottom	1st	22.8	8.1	29.9	6.5	6.5								90.1	13.0	5.9										
Bottom	2nd	22.8	8.1	29.9	6.5									90.1	12.4	6.5										
2018-12-03	Mid-Ebb	IS8	Fine	Calm	8:57	3.7								Surface	1st	22.9	8.1	29.9	6.8	6.8	93.7	5.4	5.4	4.0	4.3	
														Surface	2nd	22.9	8.1	29.9	6.8		93.7	4.9		4.7		
														Middle	1st	-	-	-	-		-	-		-		
														Middle	2nd	-	-	-	-	-	-	-		-		
							Bottom	1st	22.9	8.1	30.0	6.8	6.8	94.2	5.7	4.0										
							Bottom	2nd	22.9	8.1	30.0	6.8		94.0	5.4	4.3										
							2018-12-03	Mid-Ebb	SR4(N)	Fine	Calm	9:02	4.2	Surface	1st	22.9	8.1	29.9	6.8	6.8	93.3	4.7	4.6	4.3		4.4
														Surface	2nd	22.9	8.1	29.9	6.8		93.2	4.4		4.3		
														Middle	1st	-	-	-	-		-	-		-		
														Middle	2nd	-	-	-	-	-	-	-		-		
Bottom	1st	22.9	8.1	29.9	6.9	6.9								95.2	4.7	4.3										
Bottom	2nd	22.9	8.1	29.9	6.9									94.9	4.4	4.6										
2018-12-03	Mid-Ebb	IS(Mf)9	Fine	Calm	8:49	3.4								Surface	1st	22.8	8.1	30.0	6.7	6.7	92.0	5.4	6.5	6.8	6.0	
														Surface	2nd	22.8	8.1	30.0	6.7		92.0	5.0		6.7		
														Middle	1st	-	-	-	-		-	-		-		
														Middle	2nd	-	-	-	-	-	-	-		-		
							Bottom	1st	22.8	8.1	30.0	6.8	6.8	94.4	8.2	5.2										
							Bottom	2nd	22.8	8.1	30.0	6.8		93.8	7.5	5.4										
							2018-12-03	Mid-Ebb	IS7	Fine	Calm	8:42	2.9	Surface	1st	-	-	-	-	6.9	-	-	4.2	-		7.8
														Surface	2nd	-	-	-	-		-	-		-		
														Middle	1st	22.9	8.1	30.0	6.9		94.7	4.4		7.8		
														Middle	2nd	22.9	8.1	30.0	6.8	94.6	4.0	7.8				
Bottom	1st	-	-	-	-	-								-	-	-										
Bottom	2nd	-	-	-	-	-								-	-	-										
2018-12-03	Mid-Ebb	IS(Mf)6	Fine	Calm	8:32	2.6								Surface	1st	-	-	-	-	6.9	-	-	10.6	-	7.1	
														Surface	2nd	-	-	-	-		-	-		-		
														Middle	1st	23.0	8.1	30.2	6.9		95.2	11.1		7.4		
														Middle	2nd	23.0	8.1	30.2	6.8	94.8	10.1	6.8				
							Bottom	1st	-	-	-	-	-	-	-	-										
							Bottom	2nd	-	-	-	-	-	-	-	-										
							2018-12-03	Mid-Ebb	IS5	Fine	Calm	8:21	9.2	Surface	1st	23.0	8.1	30.2	6.6	6.6	92.0	5.8	5.9	5.5		6.5
														Surface	2nd	23.0	8.1	30.2	6.6		92.0	5.5		5.8		
														Middle	1st	23.0	8.1	30.2	6.6		91.9	5.9		6.5		
														Middle	2nd	23.0	8.1	30.2	6.6	92.0	5.4	6.7				
Bottom	1st	23.0	8.1	30.3	6.7	6.7								93.6	7.1	7.1										
Bottom	2nd	23.0	8.1	30.3	6.7									93.4	5.8	7.2										
2018-12-03	Mid-Ebb	SR3(N)	Fine	Calm	8:15	3.6								Surface	1st	23.0	8.1	30.3	6.6	6.6	91.2	6.6	6.4	5.2	5.2	
														Surface	2nd	23.0	8.1	30.3	6.6		91.2	6.4		5.6		
														Middle	1st	-	-	-	-		-	-		-		
														Middle	2nd	-	-	-	-	-	-	-				
							Bottom	1st	23.0	8.2	30.3	6.6	6.6	91.6	6.5	4.9										
							Bottom	2nd	23.0	8.1	30.3	6.6		91.5	6.1	4.9										
							2018-12-03	Mid-Flood	SR10A(N)	Cloudy	Moderate	2:51	11.3	Surface	1st	22.8	8.1	30.3	6.6	6.6	90.7	4.4	4.3	3.7		4.6
														Surface	2nd	22.8	8.1	30.3	6.6		90.8	4.1		3.7		
														Middle	1st	22.8	8.1	30.5	6.5		90.1	4.4		4.8		
														Middle	2nd	22.8	8.1	30.5	6.5	90.2	4.1	4.5				
Bottom	1st	22.8	8.1	30.9	6.5	6.5								90.0	4.5	5.2										
Bottom	2nd	22.8	8.1	30.9	6.5									89.9	4.2	5.6										

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)	
2018-12-03	Mid-Flood	SR10B(N2)	Cloudy	Moderate	2:58	5.8	Surface	1st	22.8	8.1	31.4	6.3	6.3	88.1	4.7	4.6	2.5	3.3	
							Surface	2nd	22.8	8.1	31.4	6.3							
							Middle	1st	-	-	-	-	6.4	89.3	4.8				-
							Middle	2nd	-	-	-	-							
							Bottom	1st	22.8	8.1	31.5	6.4	89.0	4.5	-				
							Bottom	2nd	22.8	8.1	31.5	6.4							
2018-12-03	Mid-Flood	CSA	Fine	Moderate	2:14	33.0	Surface	1st	23.2	7.9	29.9	6.5	6.5	90.7	7.7	7.5	4.8	5.2	
							Surface	2nd	23.3	7.9	30.1	6.4							
							Middle	1st	23.2	7.9	29.9	6.5	6.5	90.6	7.6				-
							Middle	2nd	23.3	7.9	30.1	6.4							
							Bottom	1st	23.2	7.9	29.9	6.5	88.5	7.2	-				
							Bottom	2nd	23.3	7.9	30.1	6.4							
2018-12-03	Mid-Flood	CS6	Fine	Moderate	2:19	9.7	Surface	1st	23.2	8.0	29.8	6.5	6.4	90.6	7.3	6.9	5.3	5.5	
							Surface	2nd	23.3	8.0	30.0	6.4							
							Middle	1st	23.2	8.0	29.9	6.5	6.4	88.5	7.0				-
							Middle	2nd	23.3	8.0	30.2	6.3							
							Bottom	1st	23.2	8.0	30.0	6.5	90.6	6.6	-				
							Bottom	2nd	23.3	8.0	30.2	6.3							
2018-12-03	Mid-Flood	CS4	Fine	Moderate	3:12	16.4	Surface	1st	23.3	8.0	28.6	6.7	6.6	92.1	8.3	7.9	6.3	6.0	
							Surface	2nd	23.3	8.1	28.8	6.5							
							Middle	1st	23.2	8.0	29.0	6.7	6.6	89.9	7.4				-
							Middle	2nd	23.3	8.1	29.2	6.5							
							Bottom	1st	23.2	8.0	29.4	6.7	92.2	8.3	-				
							Bottom	2nd	23.2	8.1	29.7	6.5							
2018-12-03	Mid-Flood	SR6	Fine	Moderate	3:41	4.4	Surface	1st	23.1	8.0	29.0	6.9	6.8	94.7	12.8	13.6	8.9	9.2	
							Surface	2nd	23.1	8.1	29.1	6.7							
							Middle	1st	-	-	-	-	6.8	92.3	12.7				-
							Middle	2nd	-	-	-	-							
							Bottom	1st	23.1	8.0	29.4	6.9	93.0	14.3	-				
							Bottom	2nd	23.1	8.1	29.7	6.7							
2018-12-03	Mid-Flood	CS(Mf)3(N)	Fine	Moderate	3:24	7.3	Surface	1st	23.2	7.9	28.4	6.7	6.7	92.5	10.2	14.2	6.6	7.5	
							Surface	2nd	23.3	8.0	28.6	6.5							
							Middle	1st	23.2	7.9	28.6	6.8	6.7	90.2	10.2				-
							Middle	2nd	23.3	8.0	28.7	6.6							
							Bottom	1st	23.2	7.9	28.6	6.8	93.4	10.2	-				
							Bottom	2nd	23.2	8.0	28.8	6.6							
2018-12-03	Mid-Flood	SR5(N)	Fine	Moderate	2:55	9.2	Surface	1st	23.2	8.0	29.2	6.7	6.7	93.2	8.1	8.4	4.3	5.6	
							Surface	2nd	23.3	8.1	29.4	6.5							
							Middle	1st	23.2	8.0	29.6	6.8	6.8	90.8	7.5				-
							Middle	2nd	23.3	8.1	29.8	6.6							
							Bottom	1st	23.2	8.0	29.6	6.8	93.8	9.0	-				
							Bottom	2nd	23.3	8.1	29.8	6.6							
2018-12-03	Mid-Flood	IS10(N)	Fine	Moderate	2:50	12.6	Surface	1st	23.2	8.0	29.4	6.8	6.7	93.9	8.5	11.2	4.6	6.5	
							Surface	2nd	23.2	8.1	29.6	6.7							
							Middle	1st	23.2	8.0	29.7	6.8	6.7	92.5	8.4				-
							Middle	2nd	23.3	8.1	29.9	6.6							
							Bottom	1st	23.2	8.0	29.6	6.8	93.8	12.6	-				
							Bottom	2nd	23.3	8.1	29.8	6.6							
2018-12-03	Mid-Flood	IS(Mf)11	Fine	Moderate	2:45	11.2	Surface	1st	23.2	8.0	29.2	6.8	6.7	94.5	8.6	8.7	8.3	7.2	
							Surface	2nd	23.2	8.0	29.4	6.6							
							Middle	1st	23.2	8.0	29.2	6.8	6.8	92.1	8.9				-
							Middle	2nd	23.2	8.0	29.4	6.7							
							Bottom	1st	23.2	8.0	29.2	6.9	94.6	8.5	-				
							Bottom	2nd	23.2	8.0	29.4	6.7							
2018-12-03	Mid-Flood	CS(Mf)5	Cloudy	Moderate	3:27	12.1	Surface	1st	22.9	8.1	29.8	6.6	6.6	90.9	5.1	6.1	3.2	4.6	
							Surface	2nd	22.9	8.1	29.8	6.6							
							Middle	1st	22.8	8.1	30.0	6.5	6.4	91.0	4.7				-
							Middle	2nd	22.8	8.1	30.0	6.5							
							Bottom	1st	22.8	8.1	31.0	6.4	89.9	5.8	-				
							Bottom	2nd	22.8	8.1	31.0	6.3							
2018-12-03	Mid-Flood	SR7	Fine	Moderate	2:38	4.3	Surface	1st	23.2	8.0	29.4	6.7	6.6	92.8	9.1	9.3	5.5	5.8	
							Surface	2nd	23.2	8.0	29.5	6.5							
							Middle	1st	-	-	-	-	6.7	90.1	9.4				-
							Middle	2nd	-	-	-	-							
							Bottom	1st	23.2	8.0	29.4	6.7	93.3	9.1	-				
							Bottom	2nd	23.2	8.0	29.6	6.6							

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)			
2018-12-03	Mid-Flood	IS17	Cloudy	Moderate	3:46	9.6	Surface	1st	23.0	8.1	29.7	6.7	6.6	92.2	5.4	6.0	5.9	5.5			
							Surface	2nd	23.0	8.1	29.6	6.7							92.4	5.1	5.3
							Middle	1st	22.9	8.1	29.9	6.5							90.2	6.3	5.8
							Middle	2nd	22.9	8.1	29.9	6.5	90.3	6.1	5.3						
							Bottom	1st	22.8	8.1	30.0	6.5	6.5	90.1	6.7				5.2		
							Bottom	2nd	22.8	8.1	30.0	6.5							90.1	6.3	5.4
2018-12-03	Mid-Flood	IS(Mf)16	Cloudy	Moderate	3:55	5.6	Surface	1st	22.8	8.1	29.5	6.7	6.7	92.4	5.3	5.5	6.6	5.4			
							Surface	2nd	22.8	8.1	29.5	6.7							92.4	5.1	6.2
							Middle	1st	-	-	-	-							-	-	-
							Middle	2nd	-	-	-	-	-	-	-						
							Bottom	1st	22.9	8.1	30.0	6.7	6.7	91.9	5.9				4.5		
							Bottom	2nd	22.9	8.1	30.0	6.6							91.8	5.7	4.1
2018-12-03	Mid-Flood	IS8	Cloudy	Calm	4:19	3.5	Surface	1st	23.0	8.2	29.9	6.8	6.8	94.1	5.7	5.6	5.3	5.4			
							Surface	2nd	23.0	8.1	29.9	6.8							94.1	5.4	5.5
							Middle	1st	-	-	-	-							-	-	-
							Middle	2nd	-	-	-	-	-	-	-						
							Bottom	1st	23.0	8.2	29.9	6.8	6.8	94.3	5.7				4.8		
							Bottom	2nd	23.0	8.1	29.9	6.8							94.3	5.5	5.8
2018-12-03	Mid-Flood	SR4(N)	Cloudy	Calm	4:13	4.1	Surface	1st	22.8	8.1	29.8	6.6	6.6	91.1	6.8	7.1	5.4	5.7			
							Surface	2nd	22.8	8.1	29.8	6.6							91.1	6.5	5.9
							Middle	1st	-	-	-	-							-	-	-
							Middle	2nd	-	-	-	-	-	-	-						
							Bottom	1st	22.8	8.2	29.8	6.6	6.6	91.3	7.7				5.7		
							Bottom	2nd	22.8	8.1	29.8	6.6							91.2	7.2	5.7
2018-12-03	Mid-Flood	IS(Mf)9	Cloudy	Calm	4:28	2.9	Surface	1st	-	-	-	-	6.7	-	-	5.0	-	7.3			
							Surface	2nd	-	-	-	-							-	-	-
							Middle	1st	23.0	8.2	30.0	6.7							93.4	5.1	7.0
							Middle	2nd	23.0	8.1	30.0	6.7	93.3	4.8	7.6						
							Bottom	1st	-	-	-	-	-	-	-						
							Bottom	2nd	-	-	-	-	-	-	-						
2018-12-03	Mid-Flood	IS7	Cloudy	Calm	4:47	2.7	Surface	1st	-	-	-	-	6.8	-	-	5.0	-	4.0			
							Surface	2nd	-	-	-	-							-	-	-
							Middle	1st	22.9	8.2	30.0	6.8							94.6	5.1	4.2
							Middle	2nd	22.9	8.1	30.0	6.8	94.5	4.9	3.7						
							Bottom	1st	-	-	-	-	-	-	-						
							Bottom	2nd	-	-	-	-	-	-	-						
2018-12-03	Mid-Flood	IS(Mf)6	Cloudy	Calm	4:58	2.4	Surface	1st	-	-	-	-	6.8	-	-	4.5	-	5.0			
							Surface	2nd	-	-	-	-							-	-	-
							Middle	1st	22.9	8.2	30.0	6.8							94.4	4.6	5.0
							Middle	2nd	22.9	8.1	30.0	6.8	94.3	4.4	5.0						
							Bottom	1st	-	-	-	-	-	-	-						
							Bottom	2nd	-	-	-	-	-	-	-						
2018-12-03	Mid-Flood	IS5	Cloudy	Calm	5:06	9.0	Surface	1st	23.0	8.1	30.1	6.7	6.7	93.5	5.4	5.3	4.6	4.7			
							Surface	2nd	23.0	8.1	30.1	6.8							93.5	5.1	4.5
							Middle	1st	23.0	8.1	30.1	6.7							93.3	5.4	4.6
							Middle	2nd	23.0	8.1	30.1	6.7	93.3	5.2	4.8						
							Bottom	1st	23.0	8.1	30.2	6.7	6.7	93.2	5.5				4.9		
							Bottom	2nd	23.0	8.1	30.2	6.7							93.1	5.3	4.7
2018-12-03	Mid-Flood	SR3(N)	Cloudy	Calm	5:14	3.3	Surface	1st	23.0	8.1	30.2	6.7	6.7	93.3	5.7	5.6	4.3	3.9			
							Surface	2nd	23.0	8.1	30.2	6.7							93.3	5.4	4.2
							Middle	1st	-	-	-	-							-	-	-
							Middle	2nd	-	-	-	-	-	-	-						
							Bottom	1st	23.0	8.2	30.2	6.7	6.7	93.4	5.8				3.6		
							Bottom	2nd	23.0	8.1	30.2	6.7							93.3	5.5	3.6
2018-12-05	Mid-Ebb	SR10A(N)	Cloudy	Moderate	12:04	11.2	Surface	1st	23.1	8.1	30.7	6.5	6.5	90.3	3.2	3.2	4.6	4.7			
							Surface	2nd	23.5	8.1	29.8	6.5							90.9	3.1	4.8
							Middle	1st	23.1	8.1	30.8	6.5							90.7	3.5	4.4
							Middle	2nd	23.5	8.1	29.9	6.5	91.3	3.2	4.3						
							Bottom	1st	23.1	8.1	30.7	6.6	6.6	91.5	3.2				4.7		
							Bottom	2nd	23.5	8.1	29.8	6.6							92.2	3.1	5.2
2018-12-05	Mid-Ebb	SR10B(N2)	Cloudy	Moderate	12:00	5.9	Surface	1st	23.1	8.1	31.0	6.4	6.4	89.4	2.9	3.6	5.0	5.4			
							Surface	2nd	23.4	8.1	30.1	6.4							90.0	3.8	5.0
							Middle	1st	-	-	-	-							-	-	-
							Middle	2nd	-	-	-	-	-	-	-						
							Bottom	1st	23.1	8.1	31.0	6.5	6.5	90.8	3.9				5.9		
							Bottom	2nd	23.4	8.1	30.1	6.5							91.3	3.9	5.6

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-05	Mid-Ebb	CSA	Cloudy	Moderate	11:37	33.2	Surface	1st	23.7	8.1	29.5	6.7	6.5	93.7	6.2	6.7	5.8	4.9
							Surface	2nd	23.7	8.1	29.7	6.7		94.2	6.0		5.6	
							Middle	1st	23.4	8.1	31.0	6.2		87.2	6.7		5.4	
							Middle	2nd	23.4	8.1	31.2	6.2	87.5	6.6	5.6			
							Bottom	1st	23.4	8.1	31.1	6.2	6.2	87.2	7.0	3.3		
							Bottom	2nd	23.4	8.1	31.3	6.2		87.4	7.9	3.5		
2018-12-05	Mid-Ebb	CS6	Cloudy	Moderate	11:29	9.6	Surface	1st	23.7	8.1	29.2	6.7	6.7	93.2	3.6	5.7	4.4	4.8
							Surface	2nd	23.7	8.1	29.4	6.7		93.7	4.0		4.5	
							Middle	1st	23.7	8.1	29.4	6.6		92.1	6.8		5.0	
							Middle	2nd	23.7	8.1	29.6	6.6	92.6	6.4	4.5			
							Bottom	1st	23.5	8.1	30.4	6.5	6.5	90.3	6.5	4.8		
							Bottom	2nd	23.5	8.1	30.6	6.5		90.7	6.9	5.3		
2018-12-05	Mid-Ebb	CS4	Cloudy	Moderate	10:30	16.1	Surface	1st	23.8	8.1	26.7	6.7	6.6	91.6	4.5	6.3	8.3	7.1
							Surface	2nd	23.8	8.1	26.9	6.7		92.1	4.8		8.9	
							Middle	1st	23.6	8.1	29.2	6.5		90.7	7.0		7.0	
							Middle	2nd	23.6	8.1	29.4	6.5	91.2	6.8	7.1			
							Bottom	1st	23.5	8.1	30.0	6.4	6.4	89.2	7.5	5.5		
							Bottom	2nd	23.5	8.1	30.2	6.4		89.6	7.3	5.7		
2018-12-05	Mid-Ebb	SR6	Cloudy	Moderate	10:02	4.3	Surface	1st	23.6	8.0	28.3	6.9	6.9	95.3	5.8	7.6	8.0	7.6
							Surface	2nd	23.6	8.0	28.5	6.9		95.8	5.6		7.3	
							Middle	1st	-	-	-	-		-	-		-	
							Middle	2nd	-	-	-	-	-	-	-			
							Bottom	1st	23.4	8.1	29.1	6.8	6.9	95.0	9.9	7.6		
							Bottom	2nd	23.4	8.1	29.3	6.9		95.5	9.2	7.5		
2018-12-05	Mid-Ebb	CS(Mf)3(N)	Cloudy	Moderate	10:16	7.0	Surface	1st	23.7	8.1	26.8	6.7	6.7	92.5	6.4	11.5	7.7	8.3
							Surface	2nd	23.7	8.1	27.0	6.7		92.9	6.8		8.4	
							Middle	1st	23.6	8.1	27.9	6.7		93.3	9.8		8.0	
							Middle	2nd	23.6	8.1	28.1	6.8	93.8	9.4	7.8			
							Bottom	1st	23.6	8.1	29.0	6.8	6.8	93.9	18.4	9.1		
							Bottom	2nd	23.6	8.1	29.2	6.8		94.4	18.2	8.8		
2018-12-05	Mid-Ebb	SR5(N)	Cloudy	Moderate	10:50	9.1	Surface	1st	23.8	8.1	28.0	6.8	6.7	93.9	4.7	7.3	5.7	5.1
							Surface	2nd	23.9	8.1	28.2	6.8		94.5	5.0		5.5	
							Middle	1st	23.6	8.1	28.8	6.6		91.3	7.9		4.8	
							Middle	2nd	23.7	8.1	29.0	6.6	91.9	7.6	5.3			
							Bottom	1st	23.5	8.1	29.9	6.4	6.4	88.9	9.1	4.5		
							Bottom	2nd	23.5	8.1	30.2	6.4		89.3	9.3	4.8		
2018-12-05	Mid-Ebb	IS10(N)	Cloudy	Moderate	10:55	12.2	Surface	1st	23.7	8.1	28.2	6.7	6.6	93.4	5.3	8.5	6.4	5.9
							Surface	2nd	23.8	8.1	28.4	6.8		93.9	5.2		5.7	
							Middle	1st	23.6	8.1	29.1	6.5		90.2	8.6		5.5	
							Middle	2nd	23.6	8.1	29.3	6.5	90.6	8.8	6.1			
							Bottom	1st	23.5	8.1	29.7	6.4	6.4	89.5	11.2	5.7		
							Bottom	2nd	23.5	8.1	29.9	6.4		89.9	11.7	6.2		
2018-12-05	Mid-Ebb	IS(Mf)11	Cloudy	Moderate	11:00	11.4	Surface	1st	23.7	8.1	28.7	6.7	6.7	92.7	5.3	6.7	7.6	6.7
							Surface	2nd	23.7	8.1	28.8	6.7		93.2	5.6		7.3	
							Middle	1st	23.6	8.1	28.9	6.6		91.3	6.1		6.5	
							Middle	2nd	23.7	8.1	29.1	6.6	91.8	6.5	6.5			
							Bottom	1st	23.6	8.1	29.0	6.6	6.6	91.8	8.8	6.2		
							Bottom	2nd	23.6	8.1	29.2	6.6		92.0	8.1	6.2		
2018-12-05	Mid-Ebb	CS(Mf)5	Cloudy	Moderate	11:30	12.1	Surface	1st	23.3	8.1	29.7	6.5	6.5	90.6	4.1	4.0	3.7	3.6
							Surface	2nd	23.6	8.1	28.9	6.6		91.7	4.0		3.3	
							Middle	1st	23.1	8.1	30.8	6.3		88.3	4.3		3.4	
							Middle	2nd	23.4	8.1	29.9	6.4	88.9	4.1	3.3			
							Bottom	1st	23.1	8.1	30.8	6.4	6.4	89.1	3.7	4.1		
							Bottom	2nd	23.4	8.1	30.0	6.4		89.5	4.0	3.8		
2018-12-05	Mid-Ebb	SR7	Cloudy	Moderate	11:09	4.1	Surface	1st	23.6	8.1	28.8	6.6	6.6	91.8	5.9	7.7	3.5	5.1
							Surface	2nd	23.7	8.1	29.0	6.6		92.2	5.0		3.7	
							Middle	1st	-	-	-	-		-	-		-	
							Middle	2nd	-	-	-	-	-	-	-			
							Bottom	1st	23.6	8.1	28.9	6.6	6.6	91.7	9.7	6.6		
							Bottom	2nd	23.6	8.1	29.1	6.6		92.1	10.0	6.4		
2018-12-05	Mid-Ebb	IS17	Cloudy	Moderate	11:09	7.9	Surface	1st	23.2	8.1	29.8	6.4	6.4	88.7	6.0	5.8	2.9	3.7
							Surface	2nd	23.5	8.1	28.9	6.4		89.6	6.0		2.9	
							Middle	1st	23.2	8.1	30.2	6.4		88.4	5.9		3.0	
							Middle	2nd	23.5	8.1	29.3	6.4	89.1	5.5	3.0			
							Bottom	1st	23.2	8.1	30.2	6.4	6.4	88.6	5.7	5.0		
							Bottom	2nd	23.5	8.1	29.4	6.4		89.2	5.9	5.2		

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-05	Mid-Ebb	IS(Mf)16	Cloudy	Moderate	11:01	5.5	Surface	1st	23.3	8.1	29.0	6.6	6.6	91.1	5.9	5.6	5.0	6.3
							Surface	2nd	23.6	8.1	28.2	6.6						
							Middle	1st	-	-	-	-						
							Middle	2nd	-	-	-	-						
							Bottom	1st	23.3	8.1	29.2	6.6						
							Bottom	2nd	23.6	8.1	28.5	6.6						
2018-12-05	Mid-Ebb	IS8	Cloudy	Moderate	10:39	3.7	Surface	1st	23.3	8.1	29.0	6.6	6.7	91.8	6.2	6.3	3.1	4.1
							Surface	2nd	23.7	8.1	28.2	6.7						
							Middle	1st	-	-	-	-						
							Middle	2nd	-	-	-	-						
							Bottom	1st	23.3	8.1	29.1	6.8						
							Bottom	2nd	23.7	8.1	28.2	6.8						
2018-12-05	Mid-Ebb	SR4(N)	Cloudy	Moderate	10:46	3.5	Surface	1st	23.4	8.1	29.2	6.7	6.7	92.8	4.2	4.4	3.0	3.2
							Surface	2nd	23.8	8.1	28.4	6.7						
							Middle	1st	-	-	-	-						
							Middle	2nd	-	-	-	-						
							Bottom	1st	23.5	8.1	29.3	6.7						
							Bottom	2nd	23.8	8.1	28.5	6.7						
2018-12-05	Mid-Ebb	IS(Mf)9	Cloudy	Moderate	10:31	3.3	Surface	1st	23.4	8.1	29.2	6.7	6.7	92.8	5.6	6.0	6.7	6.5
							Surface	2nd	23.7	8.1	28.4	6.7						
							Middle	1st	-	-	-	-						
							Middle	2nd	-	-	-	-						
							Bottom	1st	23.4	8.1	29.2	6.7						
							Bottom	2nd	23.7	8.1	28.4	6.8						
2018-12-05	Mid-Ebb	IS7	Cloudy	Moderate	10:24	2.9	Surface	1st	-	-	-	-	6.8	-	-	5.5	-	3.5
							Surface	2nd	-	-	-	-						
							Middle	1st	23.4	8.1	29.2	6.8						
							Middle	2nd	23.8	8.1	28.4	6.8						
							Bottom	1st	-	-	-	-						
							Bottom	2nd	-	-	-	-						
2018-12-05	Mid-Ebb	IS(Mf)6	Cloudy	Moderate	10:14	2.9	Surface	1st	-	-	-	-	6.8	-	-	5.2	-	3.0
							Surface	2nd	-	-	-	-						
							Middle	1st	23.6	8.1	29.4	6.7						
							Middle	2nd	23.9	8.1	28.6	6.8						
							Bottom	1st	-	-	-	-						
							Bottom	2nd	-	-	-	-						
2018-12-05	Mid-Ebb	IS5	Cloudy	Moderate	10:09	10.1	Surface	1st	23.5	8.1	29.4	6.6	6.7	92.4	4.2	5.0	2.9	3.6
							Surface	2nd	23.9	8.1	28.6	6.7						
							Middle	1st	23.5	8.1	29.4	6.6						
							Middle	2nd	23.9	8.1	28.6	6.7						
							Bottom	1st	23.5	8.1	29.4	6.6						
							Bottom	2nd	23.9	8.1	28.6	6.6						
2018-12-05	Mid-Ebb	SR3(N)	Cloudy	Calm	10:02	4.1	Surface	1st	23.5	8.1	29.4	6.7	6.7	93.2	5.3	8.3	4.9	4.8
							Surface	2nd	23.9	8.1	28.6	6.7						
							Middle	1st	-	-	-	-						
							Middle	2nd	-	-	-	-						
							Bottom	1st	23.6	8.1	29.4	6.7						
							Bottom	2nd	23.9	8.1	28.6	6.8						
2018-12-05	Mid-Flood	SR10A(N)	Cloudy	Calm	4:58	11.6	Surface	1st	23.2	8.0	30.1	6.8	6.8	94.0	4.3	4.5	5.1	5.7
							Surface	2nd	23.5	7.9	29.2	6.8						
							Middle	1st	23.2	8.0	30.0	6.8						
							Middle	2nd	23.5	7.8	29.1	6.9						
							Bottom	1st	23.3	7.9	29.3	6.9						
							Bottom	2nd	23.6	7.7	28.4	6.9						
2018-12-05	Mid-Flood	SR10B(N2)	Cloudy	Moderate	5:03	5.5	Surface	1st	23.0	8.1	31.2	6.3	6.4	88.1	6.7	6.1	5.9	5.8
							Surface	2nd	23.4	8.1	30.3	6.4						
							Middle	1st	-	-	-	-						
							Middle	2nd	-	-	-	-						
							Bottom	1st	23.0	8.1	31.2	6.4						
							Bottom	2nd	23.4	8.1	30.3	6.4						
2018-12-05	Mid-Flood	CSA	Fine	Moderate	5:17	32.9	Surface	1st	23.6	7.9	29.0	6.6	6.5	92.1	5.8	7.0	7.1	6.6
							Surface	2nd	23.6	7.9	29.2	6.5						
							Middle	1st	23.6	7.9	29.3	6.5						
							Middle	2nd	23.6	7.9	29.5	6.4						
							Bottom	1st	23.6	7.8	29.4	6.5						
							Bottom	2nd	23.6	7.8	29.6	6.4						

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-05	Mid-Flood	CS6	Fine	Moderate	5:29	9.2	Surface	1st	23.6	8.0	28.8	6.6	6.6	91.8	4.6	7.7	6.9	5.7
							Surface	2nd	23.6	8.0	29.1	6.6						
							Middle	1st	23.6	8.0	29.1	6.5	6.5	90.8	8.1			
							Middle	2nd	23.6	8.0	29.3	6.6						
							Bottom	1st	23.6	8.0	29.6	6.4	90.4	10.8				
							Bottom	2nd	23.6	8.0	29.8	6.5						
2018-12-05	Mid-Flood	CS4	Fine	Moderate	6:27	16.3	Surface	1st	23.7	8.0	27.8	6.6	6.6	91.2	5.4	12.4	11.5	11.6
							Surface	2nd	23.7	8.0	28.0	6.6						
							Middle	1st	23.6	8.1	28.9	6.5	6.4	91.7	5.2			
							Middle	2nd	23.6	8.1	29.1	6.5						
							Bottom	1st	23.5	8.1	29.9	6.3	90.5	7.7				
							Bottom	2nd	23.5	8.1	30.1	6.4						
2018-12-05	Mid-Flood	SR6	Fine	Moderate	6:59	4.4	Surface	1st	23.6	8.1	27.9	6.7	6.7	92.8	9.4	12.5	9.3	8.8
							Surface	2nd	23.6	8.1	28.1	6.7						
							Middle	1st	-	-	-	-	6.7	93.2	9.3			
							Middle	2nd	-	-	-	-						
							Bottom	1st	23.6	8.1	28.6	6.7	93.1	15.8				
							Bottom	2nd	23.6	8.1	28.8	6.7						
2018-12-05	Mid-Flood	CS(Mf)3(N)	Fine	Moderate	6:40	7.1	Surface	1st	23.7	8.1	26.5	6.6	6.6	90.0	9.2	12.4	6.6	6.9
							Surface	2nd	23.7	8.1	26.6	6.6						
							Middle	1st	23.7	8.0	26.8	6.6	6.6	90.5	9.1			
							Middle	2nd	23.7	8.0	27.0	6.6						
							Bottom	1st	23.7	8.1	27.1	6.6	90.3	13.2				
							Bottom	2nd	23.7	8.1	27.3	6.6						
2018-12-05	Mid-Flood	SR5(N)	Fine	Moderate	6:10	9.4	Surface	1st	23.6	8.1	28.6	6.6	6.6	91.6	13.9	15.9	14.2	14.4
							Surface	2nd	23.6	8.1	28.8	6.6						
							Middle	1st	23.6	8.1	28.6	6.6	6.6	92.1	13.8			
							Middle	2nd	23.6	8.1	28.8	6.6						
							Bottom	1st	23.6	8.1	28.7	6.6	91.4	14.3				
							Bottom	2nd	23.6	8.1	28.8	6.6						
2018-12-05	Mid-Flood	IS10(N)	Fine	Moderate	6:05	11.9	Surface	1st	23.6	8.0	28.3	6.7	6.7	92.3	7.0	11.6	6.5	6.1
							Surface	2nd	23.7	8.0	28.5	6.7						
							Middle	1st	23.6	8.1	28.6	6.6	6.6	91.6	12.8			
							Middle	2nd	23.7	8.1	28.8	6.6						
							Bottom	1st	23.6	8.1	28.8	6.6	92.0	12.7				
							Bottom	2nd	23.6	8.1	28.9	6.6						
2018-12-05	Mid-Flood	IS(Mf)11	Fine	Moderate	5:59	11.2	Surface	1st	23.7	8.0	28.2	6.7	6.7	92.7	5.5	10.0	5.8	5.8
							Surface	2nd	23.7	8.0	28.4	6.7						
							Middle	1st	23.7	8.0	28.4	6.7	6.7	93.2	5.7			
							Middle	2nd	23.7	8.0	28.6	6.7						
							Bottom	1st	23.7	8.0	28.6	6.6	92.5	7.8				
							Bottom	2nd	23.7	8.0	28.8	6.7						
2018-12-05	Mid-Flood	CS(Mf)5	Cloudy	Moderate	5:30	12.2	Surface	1st	23.3	8.1	29.2	6.5	6.5	90.5	4.9	7.0	4.0	4.5
							Surface	2nd	23.6	8.1	28.4	6.6						
							Middle	1st	23.1	8.1	30.2	6.3	6.3	91.6	4.1			
							Middle	2nd	23.5	8.1	29.4	6.4						
							Bottom	1st	23.1	8.1	30.8	6.3	88.8	6.1				
							Bottom	2nd	23.4	8.1	29.9	6.3						
2018-12-05	Mid-Flood	SR7	Fine	Moderate	5:50	4.3	Surface	1st	23.6	8.0	28.7	6.6	6.6	91.0	12.8	13.7	16.5	17.1
							Surface	2nd	23.6	8.0	28.9	6.6						
							Middle	1st	-	-	-	-	6.5	91.6	13.0			
							Middle	2nd	-	-	-	-						
							Bottom	1st	23.6	8.0	28.7	6.5	90.6	14.8				
							Bottom	2nd	23.6	8.0	28.9	6.5						
2018-12-05	Mid-Flood	IS17	Cloudy	Moderate	5:47	7.7	Surface	1st	23.3	8.1	28.8	6.6	6.7	91.9	6.3	6.2	6.1	5.0
							Surface	2nd	23.6	8.1	28.0	6.7						
							Middle	1st	23.3	8.1	28.8	6.6	6.7	92.7	5.3			
							Middle	2nd	23.6	8.1	28.0	6.7						
							Bottom	1st	23.3	8.1	28.8	6.7	91.8	7.1				
							Bottom	2nd	23.6	8.1	28.0	6.7						
2018-12-05	Mid-Flood	IS(Mf)16	Cloudy	Moderate	5:55	5.8	Surface	1st	23.3	8.1	28.9	6.6	6.6	91.1	5.9	8.5	3.5	4.3
							Surface	2nd	23.6	8.1	28.1	6.6						
							Middle	1st	-	-	-	-	6.7	91.8	8.3			
							Middle	2nd	-	-	-	-						
							Bottom	1st	23.3	8.1	29.2	6.6	92.7	9.0				
							Bottom	2nd	23.6	8.1	28.4	6.7						

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)	
2018-12-05	Mid-Flood	IS8	Cloudy	Moderate	6:15	4.3	Surface	1st	23.4	8.1	29.2	6.7	6.7	92.3	4.6	4.7	5.0	5.3	
							Surface	2nd	23.7	8.1	28.3	6.7							
							Middle	1st	-	-	-	-	6.8	93.8	4.8				5.5
							Middle	2nd	-	-	-	-							
							Bottom	1st	23.3	8.1	29.4	6.8	94.6	4.6	5.2				
							Bottom	2nd	23.6	8.1	28.5	6.8							
2018-12-05	Mid-Flood	SR4(N)	Cloudy	Moderate	6:09	4.5	Surface	1st	23.2	8.1	29.2	6.6	6.6	91.4	6.1	6.2	3.9	4.4	
							Surface	2nd	23.6	8.1	28.3	6.6							
							Middle	1st	-	-	-	-	6.8	93.3	6.7				4.5
							Middle	2nd	-	-	-	-							
							Bottom	1st	23.2	8.1	29.3	6.7	93.8	6.1	5.0				
							Bottom	2nd	23.5	8.1	28.4	6.8							
2018-12-05	Mid-Flood	IS(Mf)9	Cloudy	Moderate	6:27	2.9	Surface	1st	-	-	-	-	6.6	-	-	6.7	-	4.3	
							Surface	2nd	-	-	-	-							
							Middle	1st	23.3	8.1	29.2	6.6	-	91.3	6.6				4.0
							Middle	2nd	23.6	8.1	28.3	6.6							
							Bottom	1st	-	-	-	-	-	-	-				4.6
							Bottom	2nd	-	-	-	-							
2018-12-05	Mid-Flood	IS7	Cloudy	Moderate	6:27	2.7	Surface	1st	-	-	-	-	6.7	-	-	4.0	-	6.3	
							Surface	2nd	-	-	-	-							
							Middle	1st	23.4	8.1	29.4	6.7	-	92.8	4.1				6.0
							Middle	2nd	23.7	8.1	28.5	6.7							
							Bottom	1st	-	-	-	-	-	-	-				6.6
							Bottom	2nd	-	-	-	-							
2018-12-05	Mid-Flood	IS(Mf)6	Cloudy	Moderate	6:34	2.8	Surface	1st	-	-	-	-	6.7	-	-	4.1	-	6.7	
							Surface	2nd	-	-	-	-							
							Middle	1st	23.4	8.1	29.4	6.7	-	92.8	4.2				6.9
							Middle	2nd	23.8	8.1	28.6	6.7							
							Bottom	1st	-	-	-	-	-	-	-				6.5
							Bottom	2nd	-	-	-	-							
2018-12-05	Mid-Flood	IS5	Cloudy	Moderate	6:47	9.8	Surface	1st	23.4	8.1	29.4	6.7	6.7	92.6	4.3	4.6	4.9	3.8	
							Surface	2nd	23.8	8.1	28.5	6.7							
							Middle	1st	23.5	8.1	29.5	6.6	-	92.5	4.7				3.5
							Middle	2nd	23.8	8.1	28.7	6.7							
							Bottom	1st	23.5	8.1	29.5	6.7	6.7	93.0	4.8				3.1
							Bottom	2nd	23.8	8.1	28.7	6.7							
2018-12-05	Mid-Flood	SR3(N)	Cloudy	Moderate	6:54	4.2	Surface	1st	23.5	8.1	29.4	6.7	6.8	93.4	4.7	5.7	3.3	4.8	
							Surface	2nd	23.8	8.1	28.6	6.8							
							Middle	1st	-	-	-	-	-	-	-				3.6
							Middle	2nd	-	-	-	-							
							Bottom	1st	23.5	8.1	29.4	6.8	6.8	94.8	6.6				6.2
							Bottom	2nd	23.8	8.1	28.6	6.8							
2018-12-07	Mid-Ebb	SR10A(N)	Cloudy	Moderate	13:21	13.5	Surface	1st	23.2	8.1	30.1	6.5	6.5	90.2	6.9	8.7	7.6	7.9	
							Surface	2nd	23.5	8.1	29.9	6.5							
							Middle	1st	23.2	8.1	30.4	6.4	-	89.7	9.8				7.2
							Middle	2nd	23.5	8.1	30.1	6.5							
							Bottom	1st	23.2	8.1	30.4	6.5	6.5	89.9	9.8				9.3
							Bottom	2nd	23.5	8.1	30.1	6.5							
2018-12-07	Mid-Ebb	SR10B(N2)	Cloudy	Moderate	13:26	5.7	Surface	1st	23.1	8.1	31.1	6.4	6.4	88.8	8.6	8.9	10.0	9.8	
							Surface	2nd	23.4	8.0	30.8	6.4							
							Middle	1st	-	-	-	-	-	-	-				9.9
							Middle	2nd	-	-	-	-							
							Bottom	1st	23.1	8.1	31.1	6.6	6.6	91.7	9.1				10.0
							Bottom	2nd	23.4	8.0	30.8	6.6							
2018-12-07	Mid-Ebb	CSA	Cloudy	Moderate	12:59	32.5	Surface	1st	23.6	8.1	28.6	6.7	6.7	92.4	5.4	6.0	6.2	5.3	
							Surface	2nd	23.6	8.1	29.3	6.7							
							Middle	1st	23.5	8.1	28.8	6.6	-	92.0	5.6				4.7
							Middle	2nd	23.6	8.1	29.5	6.6							
							Bottom	1st	23.5	8.1	29.2	6.6	6.6	91.4	6.9				4.8
							Bottom	2nd	23.6	8.1	29.9	6.6							
2018-12-07	Mid-Ebb	CS6	Cloudy	Moderate	12:51	9.6	Surface	1st	23.6	8.1	28.5	6.6	6.6	91.5	5.1	10.1	5.8	6.0	
							Surface	2nd	23.6	8.1	29.3	6.6							
							Middle	1st	23.6	8.1	28.7	6.6	-	91.3	6.3				6.3
							Middle	2nd	23.6	8.1	29.5	6.6							
							Bottom	1st	23.6	8.1	29.4	6.5	6.5	90.7	17.2				6.1
							Bottom	2nd	23.6	8.1	30.1	6.5							

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth- averaged)
2018-12-07	Mid-Ebb	CS4	Rainy	Moderate	11:55	17.2	Surface	1st	23.6	8.1	27.6	6.6	6.6	90.7	5.4	10.7	9.0	10.1
							Surface	2nd	23.6	8.1	28.4	6.6		91.1	5.9		9.8	
							Middle	1st	23.6	8.1	28.4	6.5		90.6	8.8		9.6	
							Middle	2nd	23.6	8.1	29.1	6.5	91.0	9.0	10.0			
							Bottom	1st	23.5	8.1	29.0	6.5	6.5	90.3	17.1		11.0	
							Bottom	2nd	23.6	8.1	29.8	6.5		90.7	18.0		11.2	
2018-12-07	Mid-Ebb	SR6	Rainy	Moderate	11:27	4.5	Surface	1st	23.4	8.1	28.3	6.8	6.8	93.4	12.7	16.0	16.8	16.1
							Surface	2nd	23.4	8.1	29.0	6.8		93.8	12.7		16.5	
							Middle	1st	-	-	-	-		-	-		-	
							Middle	2nd	-	-	-	-	-	-	-			
							Bottom	1st	23.4	8.1	28.4	6.8	6.8	93.5	19.4		15.9	
							Bottom	2nd	23.4	8.1	29.2	6.8		93.8	19.3		15.1	
2018-12-07	Mid-Ebb	CS(Mf)3(N)	Rainy	Moderate	11:41	7.2	Surface	1st	23.6	8.1	26.6	6.4	6.5	88.3	14.2	17.1	11.4	13.1
							Surface	2nd	23.6	8.1	27.3	6.4		88.6	14.7		11.1	
							Middle	1st	23.5	8.1	26.6	6.5		88.8	16.1		12.8	
							Middle	2nd	23.6	8.1	27.3	6.5	89.1	16.3	12.1			
							Bottom	1st	23.5	8.1	26.6	6.5	6.5	88.9	20.4		15.8	
							Bottom	2nd	23.6	8.1	27.3	6.5		89.2	20.8		15.3	
2018-12-07	Mid-Ebb	SR5(N)	Rainy	Moderate	12:13	9.3	Surface	1st	23.5	8.1	28.9	6.7	6.7	92.6	13.0	16.6	7.1	6.8
							Surface	2nd	23.5	8.1	29.6	6.7		93.0	13.4		6.9	
							Middle	1st	23.5	8.1	28.9	6.7		92.3	15.9		6.6	
							Middle	2nd	23.5	8.1	29.6	6.6	92.7	15.9	7.0			
							Bottom	1st	23.5	8.1	28.9	6.6	6.6	92.2	20.8		6.8	
							Bottom	2nd	23.5	8.1	29.6	6.6		92.5	20.5		6.3	
2018-12-07	Mid-Ebb	IS10(N)	Rainy	Moderate	12:19	12.6	Surface	1st	23.5	8.1	28.5	6.6	6.6	92.1	7.0	10.4	8.1	8.7
							Surface	2nd	23.6	8.1	29.3	6.6		92.5	7.8		8.0	
							Middle	1st	23.5	8.1	28.7	6.6		92.1	10.6		8.8	
							Middle	2nd	23.5	8.1	29.5	6.6	92.5	10.1	9.1			
							Bottom	1st	23.5	8.1	28.8	6.6	6.6	92.1	13.4		9.2	
							Bottom	2nd	23.5	8.1	29.6	6.6		92.6	13.2		9.0	
2018-12-07	Mid-Ebb	IS(Mf)11	Rainy	Moderate	12:23	11.3	Surface	1st	23.5	8.1	28.5	6.7	6.6	92.2	8.4	9.1	7.7	7.4
							Surface	2nd	23.6	8.1	29.3	6.6		92.6	8.8		7.9	
							Middle	1st	23.6	8.1	28.7	6.6		92.1	9.3		7.2	
							Middle	2nd	23.6	8.1	29.5	6.6	92.5	9.1	7.2			
							Bottom	1st	23.5	8.1	28.7	6.6	6.6	92.2	9.8		7.3	
							Bottom	2nd	23.6	8.1	29.5	6.6		92.5	9.3		7.0	
2018-12-07	Mid-Ebb	CS(Mf)5	Cloudy	Moderate	12:52	12.5	Surface	1st	23.2	8.2	29.8	6.6	6.6	91.7	7.1	9.6	5.9	6.2
							Surface	2nd	23.5	8.1	29.6	6.6		92.2	7.2		6.3	
							Middle	1st	23.2	8.2	30.2	6.6		91.3	10.1		5.9	
							Middle	2nd	23.5	8.1	29.9	6.6	91.7	10.4	6.3			
							Bottom	1st	23.2	8.2	30.1	6.6	6.6	92.1	11.4		6.5	
							Bottom	2nd	23.5	8.1	29.8	6.6		92.5	11.1		6.5	
2018-12-07	Mid-Ebb	SR7	Rainy	Moderate	12:31	4.4	Surface	1st	23.5	8.1	28.4	6.6	6.6	91.9	8.8	12.6	7.0	6.6
							Surface	2nd	23.6	8.1	29.2	6.6		92.2	8.2		6.4	
							Middle	1st	-	-	-	-		-	-		-	
							Middle	2nd	-	-	-	-	-	-	-			
							Bottom	1st	23.5	8.1	28.8	6.7	6.7	92.3	17.0		6.6	
							Bottom	2nd	23.5	8.1	29.6	6.6		92.5	16.3		6.5	
2018-12-07	Mid-Ebb	IS17	Rainy	Moderate	12:33	9.8	Surface	1st	23.2	8.1	29.5	6.7	6.7	92.6	7.6	7.8	8.1	9.4
							Surface	2nd	23.5	8.1	29.2	6.7		93.2	7.3		8.9	
							Middle	1st	23.2	8.1	29.7	6.7		93.4	8.2		9.6	
							Middle	2nd	23.5	8.1	29.4	6.7	93.8	8.0	9.9			
							Bottom	1st	23.2	8.1	29.7	6.9	6.9	95.1	7.9		9.4	
							Bottom	2nd	23.5	8.1	29.4	6.8		95.3	7.9		10.2	
2018-12-07	Mid-Ebb	IS(Mf)16	Rainy	Moderate	12:26	5.5	Surface	1st	23.2	8.1	29.6	6.7	6.7	93.1	8.2	8.2	10.0	9.4
							Surface	2nd	23.5	8.1	29.3	6.7		93.4	8.1		10.0	
							Middle	1st	-	-	-	-		-	-		-	
							Middle	2nd	-	-	-	-	-	-	-			
							Bottom	1st	23.2	8.1	29.6	6.9	6.9	95.3	8.2		8.4	
							Bottom	2nd	23.5	8.1	29.4	6.8		95.1	8.4		9.0	
2018-12-07	Mid-Ebb	IS8	Rainy	Calm	12:05	4.0	Surface	1st	23.1	8.2	29.4	6.6	6.6	91.0	7.5	8.0	6.6	6.1
							Surface	2nd	23.5	8.1	29.1	6.6		91.5	7.7		6.6	
							Middle	1st	-	-	-	-		-	-		-	
							Middle	2nd	-	-	-	-	-	-	-			
							Bottom	1st	23.2	8.2	29.5	6.6	6.6	91.3	8.5		5.5	
							Bottom	2nd	23.5	8.1	29.3	6.6		91.8	8.3		5.7	

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-07	Mid-Ebb	SR4(N)	Rainy	Calm	12:10	4.3	Surface	1st	23.1	8.2	29.5	6.7	6.7	93.0	6.0	6.6	6.3	8.5
							Surface	2nd	23.4	8.1	29.2	6.7		93.3	6.5		6.9	
							Middle	1st	-	-	-	-	-	-	-	-	-	-
							Middle	2nd	-	-	-	-	-	-	-	-	-	-
							Bottom	1st	23.1	8.2	29.6	6.9	6.9	95.9	6.9	10.4		
							Bottom	2nd	23.4	8.1	29.3	6.9		95.9	7.0	10.3		
2018-12-07	Mid-Ebb	IS(Mf)9	Rainy	Calm	11:58	2.9	Surface	1st	-	-	-	-	6.8	-	-	9.1	-	6.2
							Surface	2nd	-	-	-	-		-	-		-	
							Middle	1st	23.2	8.2	29.6	6.8	94.4	9.2	6.0			
							Middle	2nd	23.5	8.1	29.3	6.8	94.4	9.0	6.4			
							Bottom	1st	-	-	-	-	-	-	-	-	-	
							Bottom	2nd	-	-	-	-	-	-	-	-	-	
2018-12-07	Mid-Ebb	IS7	Rainy	Calm	11:50	2.5	Surface	1st	-	-	-	-	7.0	-	-	7.4	-	6.9
							Surface	2nd	-	-	-	-		-	-		-	
							Middle	1st	23.2	8.2	29.5	7.0	97.3	7.4	6.9			
							Middle	2nd	23.5	8.1	29.3	7.0	97.7	7.4	6.9			
							Bottom	1st	-	-	-	-	-	-	-	-	-	
							Bottom	2nd	-	-	-	-	-	-	-	-	-	
2018-12-07	Mid-Ebb	IS(Mf)6	Rainy	Calm	11:42	2.3	Surface	1st	-	-	-	-	6.7	-	-	6.3	-	7.5
							Surface	2nd	-	-	-	-		-	-		-	
							Middle	1st	23.2	8.1	29.5	6.7	92.7	6.3	7.3			
							Middle	2nd	23.5	8.1	29.2	6.7	93.3	6.2	7.7			
							Bottom	1st	-	-	-	-	-	-	-	-	-	
							Bottom	2nd	-	-	-	-	-	-	-	-	-	
2018-12-07	Mid-Ebb	IS5	Rainy	Calm	11:35	7.4	Surface	1st	23.3	8.2	29.6	6.7	6.8	93.4	6.3	8.7	9.4	8.1
							Surface	2nd	23.6	8.1	29.3	6.7		93.7	6.3		9.8	
							Middle	1st	23.2	8.2	29.7	6.8	94.2	6.3	7.0			
							Middle	2nd	23.5	8.1	29.4	6.8	94.3	6.6	7.7			
							Bottom	1st	23.2	8.2	29.7	7.0	96.5	13.7	7.5			
							Bottom	2nd	23.5	8.1	29.4	6.9	96.4	12.9	7.2			
2018-12-07	Mid-Ebb	SR3(N)	Rainy	Calm	11:28	4.4	Surface	1st	23.2	8.2	29.7	6.7	6.7	93.2	7.3	7.7	7.8	8.0
							Surface	2nd	23.5	8.1	29.4	6.7		93.6	7.4		7.3	
							Middle	1st	-	-	-	-	-	-	-	-	-	
							Middle	2nd	-	-	-	-	-	-	-	-	-	
							Bottom	1st	23.2	8.2	29.7	6.8	94.1	8.0	8.5			
							Bottom	2nd	23.5	8.1	29.4	6.8	94.4	8.1	8.3			
2018-12-07	Mid-Flood	SR10A(N)	Rainy	Moderate	6:25	11.5	Surface	1st	23.1	8.2	31.0	6.4	6.5	89.6	5.0	5.7	8.3	8.1
							Surface	2nd	23.4	8.1	30.7	6.4		90.1	5.3		8.8	
							Middle	1st	23.1	8.2	31.2	6.5	90.8	5.3	8.0			
							Middle	2nd	23.4	8.1	30.9	6.5	91.1	5.2	7.8			
							Bottom	1st	23.0	8.2	31.2	6.7	94.0	6.9	8.0			
							Bottom	2nd	23.3	8.1	30.9	6.7	93.9	6.7	7.7			
2018-12-07	Mid-Flood	SR10B(N2)	Rainy	Moderate	6:34	6.3	Surface	1st	23.1	8.2	31.2	6.4	6.5	89.7	5.4	5.9	7.7	6.7
							Surface	2nd	23.4	8.1	30.9	6.4		90.1	5.4		7.6	
							Middle	1st	23.0	8.2	31.2	6.5	90.9	5.6	6.7			
							Middle	2nd	23.4	8.1	30.9	6.5	91.0	5.6	6.1			
							Bottom	1st	23.0	8.2	31.2	6.7	93.2	6.7	5.8			
							Bottom	2nd	23.4	8.1	30.9	6.7	93.2	6.7	6.1			
2018-12-07	Mid-Flood	CSA	Rainy	Moderate	6:56	33.0	Surface	1st	23.4	8.2	29.7	6.5	6.4	90.5	6.6	12.0	8.4	7.9
							Surface	2nd	23.4	8.2	30.5	6.5		90.8	6.3		8.5	
							Middle	1st	23.4	8.2	30.4	6.3	88.7	10.1	7.9			
							Middle	2nd	23.4	8.2	31.2	6.3	88.9	10.3	7.1			
							Bottom	1st	23.4	8.2	30.5	6.3	93.3	19.1	7.5			
							Bottom	2nd	23.4	8.2	31.2	6.3	93.3	19.4	7.8			
2018-12-07	Mid-Flood	CS6	Rainy	Moderate	7:06	9.6	Surface	1st	23.4	8.2	29.5	6.5	6.5	90.6	3.2	5.4	5.9	6.7
							Surface	2nd	23.5	8.2	29.9	6.6		91.8	3.0		6.0	
							Middle	1st	23.4	8.2	30.5	6.3	88.7	6.2	6.2			
							Middle	2nd	23.5	8.2	30.2	6.5	91.0	6.1	7.0			
							Bottom	1st	23.4	8.2	31.3	6.3	93.0	6.8	7.3			
							Bottom	2nd	23.4	8.2	31.3	6.3	93.0	6.8	7.9			
2018-12-07	Mid-Flood	CS4	Rainy	Moderate	8:04	17.4	Surface	1st	23.5	8.2	27.6	6.6	6.7	91.3	9.3	10.8	10.2	9.4
							Surface	2nd	23.5	8.2	28.3	6.6		91.6	9.0		10.9	
							Middle	1st	23.5	8.2	28.7	6.7	92.3	8.9	8.8			
							Middle	2nd	23.5	8.2	29.5	6.7	92.7	8.2	8.9			
							Bottom	1st	23.4	8.2	29.0	6.6	92.2	14.5	8.9			
							Bottom	2nd	23.5	8.2	29.8	6.6	92.4	14.8	8.5			

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)							
2018-12-07	Mid-Flood	SR6	Rainy	Moderate	8:39	4.4	Surface	1st	23.2	8.2	28.9	7.0	7.0	96.2	9.9	13.6	24.1	23.9							
							Surface	2nd	23.3	8.2	29.6	7.0		96.5	9.8		24.4								
							Middle	1st	-	-	-	-	-	-	-	-	-								
								2nd	-	-	-	-	-	-	-	-	-								
							Bottom	1st	23.3	8.2	29.0	6.9	6.9	95.8	17.2	23.6									
								2nd	23.3	8.2	29.7	6.9		96.1	17.6	23.3									
2018-12-07	Mid-Flood	CS(Mf)3(N)	Rainy	Moderate	8:18	7.3	Surface	1st	23.4	8.1	27.2	6.7	6.7	91.8	7.8	9.3	24.3	23.2							
							Surface	2nd	23.5	8.1	27.9	6.7		92.0	7.6		23.6								
							Middle	1st	23.4	8.2	27.6	6.8	93.0	8.8	22.1										
								2nd	23.5	8.2	28.3	6.7	93.3	8.6	23.0										
							Bottom	1st	23.4	8.2	28.8	6.8	6.8	94.3	11.3	23.1									
								2nd	23.4	8.2	29.5	6.8		94.4	11.4	22.8									
							2018-12-07	Mid-Flood	SR5(N)	Rainy	Moderate	7:47	9.2	Surface	1st	23.5	8.2	28.7	6.7	6.7	92.9	5.4	6.3	20.2	20.3
														Surface	2nd	23.5	8.2	29.5	6.7		93.3	5.3		21.0	
Middle	1st	23.5	8.2	28.8	6.6	91.9								6.4	21.6										
	2nd	23.5	8.2	29.6	6.6	92.2								6.2	21.9										
Bottom	1st	23.5	8.2	28.9	6.6	6.6								92.2	7.1	18.6									
	2nd	23.5	8.2	29.7	6.6									92.4	7.1	18.7									
2018-12-07	Mid-Flood	IS10(N)	Rainy	Moderate	7:42	12.4								Surface	1st	23.5	8.2	28.2	6.7	6.7	92.0	6.1	6.7	10.0	9.2
														Surface	2nd	23.5	8.2	28.9	6.7		92.5	6.1		9.4	
							Middle	1st	23.5	8.1	28.7	6.6	91.9	6.2	9.3										
								2nd	23.5	8.1	29.4	6.6	92.3	6.7	9.8										
							Bottom	1st	23.5	8.1	28.8	6.7	6.7	92.5	7.3	8.4									
								2nd	23.6	8.1	29.5	6.7		92.8	7.9	8.1									
							2018-12-07	Mid-Flood	IS(Mf)11	Rainy	Moderate	7:33	11.6	Surface	1st	23.5	8.2	28.1	6.7	6.7	91.9	5.9	10.8	11.5	11.1
														Surface	2nd	23.5	8.2	28.8	6.7		92.3	5.4		11.0	
Middle	1st	23.5	8.2	28.8	6.6	91.9								8.6	11.2										
	2nd	23.5	8.2	29.5	6.6	92.2								8.2	11.7										
Bottom	1st	23.5	8.1	28.9	6.6	6.6								92.0	18.6	10.0									
	2nd	23.5	8.1	29.7	6.6									92.1	18.3	11.0									
2018-12-07	Mid-Flood	CS(Mf)5	Cloudy	Moderate	7:02	12.7								Surface	1st	23.1	8.2	30.1	6.5	6.5	90.2	5.6	6.5	10.6	9.0
														Surface	2nd	23.4	8.1	29.8	6.5		91.0	5.9		10.7	
							Middle	1st	23.1	8.1	30.8	6.4	89.9	6.8	9.8										
								2nd	23.4	8.1	30.5	6.5	90.4	7.0	9.6										
							Bottom	1st	23.1	8.1	30.9	6.5	6.6	90.3	6.9	6.5									
								2nd	23.4	8.1	30.6	6.6		91.7	7.0	6.6									
							2018-12-07	Mid-Flood	SR7	Rainy	Moderate	7:25	4.5	Surface	1st	23.4	8.2	28.7	6.7	6.7	92.2	6.2	7.8	10.0	9.7
														Surface	2nd	23.5	8.2	29.5	6.6		92.5	6.0		9.7	
Middle	1st	-	-	-	-	-								-	-	-									
	2nd	-	-	-	-	-								-	-	-									
Bottom	1st	23.5	8.1	28.8	6.7	6.7								92.6	9.6	9.2									
	2nd	23.5	8.1	29.6	6.7									92.7	9.3	9.9									
2018-12-07	Mid-Flood	IS17	Cloudy	Moderate	7:21	10.2								Surface	1st	23.2	8.2	29.8	6.5	6.5	90.2	8.4	8.3	7.4	7.4
														Surface	2nd	23.5	8.1	29.5	6.5		90.9	8.2		7.0	
							Middle	1st	23.2	8.2	30.3	6.5	90.2	8.6	7.0										
								2nd	23.5	8.1	30.0	6.5	90.7	8.4	7.5										
							Bottom	1st	23.2	8.1	30.4	6.5	6.5	90.8	8.2	7.5									
								2nd	23.5	8.1	30.1	6.5		91.4	8.2	8.1									
							2018-12-07	Mid-Flood	IS(Mf)16	Cloudy	Calm	7:30	5.7	Surface	1st	23.1	8.1	29.5	6.6	6.6	91.6	8.3	9.7	5.5	6.0
														Surface	2nd	23.4	8.1	29.2	6.6		92.3	8.1		6.1	
Middle	1st	-	-	-	-	-								-	-	-									
	2nd	-	-	-	-	-								-	-	-									
Bottom	1st	23.2	8.2	30.0	6.6	6.6								91.9	11.1	6.4									
	2nd	23.5	8.1	29.7	6.6									92.2	11.2	6.1									
2018-12-07	Mid-Flood	IS8	Cloudy	Calm	7:52	4.5	Surface	1st	23.1	8.2	29.5	6.7	6.7	93.2	10.1	12.0	6.1	6.0							
							Surface	2nd	23.4	8.1	29.2	6.7		93.4	10.1		6.7								
							Middle	1st	-	-	-	-	-	-	-	-									
								2nd	-	-	-	-	-	-	-	-									
							Bottom	1st	23.1	8.2	29.5	6.9	6.9	96.0	13.8	5.2									
								2nd	23.4	8.1	29.2	6.9		96.0	13.9	5.9									
							2018-12-07	Mid-Flood	SR4(N)	Cloudy	Calm	7:45	4.3	Surface	1st	23.1	8.2	29.4	6.6	6.6	91.7	5.7	6.1	4.3	4.3
														Surface	2nd	23.4	8.1	29.1	6.6		91.9	6.0		4.9	
Middle	1st	-	-	-	-	-								-	-	-									
	2nd	-	-	-	-	-								-	-	-									
Bottom	1st	23.1	8.2	29.4	6.8	6.8								94.4	6.2	3.8									
	2nd	23.4	8.1	29.1	6.8									94.3	6.3	-									

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-07	Mid-Flood	IS(Mf)9	Rainy	Calm	7:59	4.3	Surface	1st	23.1	8.2	29.5	6.8	6.8	93.4	11.8	13.0	10.1	9.1
							Surface	2nd	23.4	8.1	29.2	6.7		93.7	11.6		9.2	
							Middle	1st	-	-	-	-	-	-	-		-	
							Middle	2nd	-	-	-	-	-	-	-		-	
							Bottom	1st	23.1	8.2	29.6	6.9	6.9	95.9	14.4		8.1	
							Bottom	2nd	23.4	8.1	29.3	6.9		95.8	14.3		8.9	
2018-12-07	Mid-Flood	IS7	Rainy	Calm	8:07	2.9	Surface	1st	-	-	-	-	6.9	-	-	6.1	-	5.6
							Surface	2nd	-	-	-	-		-	-		-	
							Middle	1st	23.0	8.2	29.4	6.9	94.7	6.2	5.2			
							Middle	2nd	23.3	8.1	29.2	6.8	94.9	6.0	6.0			
							Bottom	1st	-	-	-	-	-	-	-			
							Bottom	2nd	-	-	-	-	-	-	-			
2018-12-07	Mid-Flood	IS(Mf)6	Rainy	Calm	8:17	2.7	Surface	1st	-	-	-	-	6.8	-	-	8.8	-	5.3
							Surface	2nd	-	-	-	-		-	-		-	
							Middle	1st	23.2	8.2	29.7	6.8	94.3	8.6	5.3			
							Middle	2nd	23.5	8.1	29.5	6.8	94.3	8.9	5.3			
							Bottom	1st	-	-	-	-	-	-	-			
							Bottom	2nd	-	-	-	-	-	-	-			
2018-12-07	Mid-Flood	IS5	Rainy	Calm	8:24	8.2	Surface	1st	23.2	8.2	29.8	6.7	6.7	92.4	7.5	7.9	6.3	7.0
							Surface	2nd	23.5	8.1	29.6	6.7		93.0	7.5		6.7	
							Middle	1st	23.2	8.2	29.9	6.7	92.7	8.0	6.8			
							Middle	2nd	23.5	8.1	29.6	6.7	93.1	7.9	7.3			
							Bottom	1st	23.2	8.2	29.9	6.8	6.8	93.8	8.2		7.2	
							Bottom	2nd	23.5	8.1	29.6	6.7		94.0	8.1		7.8	
2018-12-07	Mid-Flood	SR3(N)	Rainy	Calm	8:31	4.3	Surface	1st	23.2	8.2	29.8	6.7	6.7	92.4	7.1	7.2	7.0	7.1
							Surface	2nd	23.5	8.0	29.5	6.7		92.8	7.2		7.4	
							Middle	1st	-	-	-	-	-	-	-			
							Middle	2nd	-	-	-	-	-	-	-			
							Bottom	1st	23.2	8.2	29.8	6.7	6.7	92.7	7.1		7.1	
							Bottom	2nd	23.5	8.0	29.5	6.7		93.2	7.3		6.8	
2018-12-10	Mid-Ebb	SR10A(N)	Cloudy	Moderate	15:02	11.5	Surface	1st	22.3	8.2	32.4	6.7	6.8	93.5	5.9	6.5	9.5	11.4
							Surface	2nd	22.3	8.2	31.6	6.8		93.3	5.9		10.0	
							Middle	1st	22.3	8.2	32.4	6.8	93.9	6.7	10.8			
							Middle	2nd	22.3	8.2	31.6	6.8	93.9	6.8	10.9			
							Bottom	1st	22.3	8.2	32.4	6.9	6.9	95.4	6.8		13.7	
							Bottom	2nd	22.2	8.2	31.6	6.9		94.8	6.6		13.4	
2018-12-10	Mid-Ebb	SR10B(N2)	Cloudy	Moderate	15:08	6.8	Surface	1st	22.3	8.2	32.4	6.8	6.8	94.0	6.4	6.3	8.8	8.2
							Surface	2nd	22.3	8.2	31.6	6.8		93.7	6.3		8.5	
							Middle	1st	22.3	8.2	32.4	6.8	94.5	6.3	8.1			
							Middle	2nd	22.3	8.2	31.6	6.9	94.6	6.2	8.6			
							Bottom	1st	22.3	8.2	32.4	7.0	7.0	96.5	6.2		7.7	
							Bottom	2nd	22.3	8.2	31.6	7.0		96.0	6.1		7.4	
2018-12-10	Mid-Ebb	CSA	Cloudy	Moderate	14:46	31.8	Surface	1st	22.4	8.1	32.2	6.7	6.7	93.1	7.8	8.3	5.3	6.8
							Surface	2nd	22.4	8.1	32.2	6.7		93.1	7.8		5.7	
							Middle	1st	22.4	8.1	32.3	6.7	93.3	8.3	6.5			
							Middle	2nd	22.4	8.1	32.3	6.7	93.3	8.4	6.1			
							Bottom	1st	22.4	8.1	32.4	6.8	6.8	94.3	8.6		8.5	
							Bottom	2nd	22.4	8.1	32.4	6.8		94.2	8.7		8.8	
2018-12-10	Mid-Ebb	CS6	Cloudy	Moderate	14:36	9.6	Surface	1st	22.4	8.1	32.2	6.7	6.8	93.3	8.1	8.8	7.9	7.1
							Surface	2nd	22.4	8.1	32.2	6.7		93.3	8.1		8.2	
							Middle	1st	22.4	8.1	32.3	6.8	94.2	8.5	7.2			
							Middle	2nd	22.4	8.1	32.3	6.8	94.1	8.4	6.9			
							Bottom	1st	22.4	8.1	32.3	6.9	6.9	96.0	9.7		6.0	
							Bottom	2nd	22.4	8.1	32.3	6.9		95.8	9.7		6.4	
2018-12-10	Mid-Ebb	CS4	Cloudy	Rough	13:43	17.9	Surface	1st	21.9	8.0	31.2	6.9	6.9	94.0	9.0	11.4	7.0	7.8
							Surface	2nd	21.9	8.0	31.2	6.9		94.1	9.0		7.5	
							Middle	1st	22.1	8.0	31.4	6.8	93.0	11.8	7.0			
							Middle	2nd	22.1	8.0	31.4	6.8	93.0	11.9	7.4			
							Bottom	1st	22.2	8.0	31.5	6.9	6.9	95.4	13.2		9.2	
							Bottom	2nd	22.2	8.0	31.5	6.9		95.2	13.3		8.6	
2018-12-10	Mid-Ebb	SR6	Cloudy	Rough	13:15	4.4	Surface	1st	21.3	8.0	31.4	7.2	7.2	97.1	16.6	17.5	26.7	26.5
							Surface	2nd	21.3	8.0	31.4	7.2		97.1	16.6		25.9	
							Middle	1st	-	-	-	-	-	-	-			
							Middle	2nd	-	-	-	-	-	-	-			
							Bottom	1st	21.3	8.0	31.4	7.2	7.2	97.5	18.4		26.6	
							Bottom	2nd	21.3	8.0	31.4	7.2		97.5	18.4		26.8	

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)	
2018-12-10	Mid-Ebb	CS(Mf)3(N)	Cloudy	Rough	13:29	6.7	Surface	1st	21.5	8.0	30.6	7.1	7.2	96.5	16.2	16.8	20.3	22.1	
							Surface	2nd	21.5	8.0	30.6	7.1							
							Middle	1st	21.4	8.0	30.8	7.3	7.5	101.1	17.1				25.0
							Middle	2nd	21.4	8.0	30.8	7.3							
							Bottom	1st	21.4	8.0	30.9	7.5	100.8	17.2	25.6				
							Bottom	2nd	21.4	8.0	30.9	7.5							
2018-12-10	Mid-Ebb	SR5(N)	Cloudy	Moderate	14:00	8.8	Surface	1st	21.7	8.0	30.9	6.9	6.9	93.8	10.0	11.3	7.6	8.2	
							Surface	2nd	21.7	8.0	30.9	6.9							
							Middle	1st	21.8	8.0	31.0	6.9	7.1	96.9	12.5				8.3
							Middle	2nd	21.8	8.0	31.0	6.9							
							Bottom	1st	21.9	8.0	31.2	7.1	96.7	12.5	9.0				
							Bottom	2nd	21.9	8.0	31.2	7.1							
2018-12-10	Mid-Ebb	IS10(N)	Cloudy	Moderate	14:06	12.1	Surface	1st	21.7	8.1	30.9	6.9	6.9	93.9	10.0	10.9	8.9	9.3	
							Surface	2nd	21.7	8.1	30.9	6.9							
							Middle	1st	21.8	8.1	31.0	6.9	7.0	95.5	11.9				10.2
							Middle	2nd	21.8	8.1	31.0	6.9							
							Bottom	1st	21.8	8.1	31.0	7.0	95.2	11.9	9.6				
							Bottom	2nd	21.8	8.1	31.0	7.0							
2018-12-10	Mid-Ebb	IS(Mf)11	Cloudy	Moderate	14:12	11.1	Surface	1st	21.7	8.1	30.9	6.9	6.9	93.9	10.3	11.3	11.2	15.7	
							Surface	2nd	21.7	8.1	30.9	6.9							
							Middle	1st	21.9	8.1	31.1	6.9	7.0	95.0	12.0				22.9
							Middle	2nd	21.8	8.1	31.0	6.9							
							Bottom	1st	21.9	8.1	31.2	7.0	96.8	5.2	9.0				
							Bottom	2nd	22.0	8.1	31.2	6.9							
2018-12-10	Mid-Ebb	CS(Mf)5	Cloudy	Moderate	14:32	12.3	Surface	1st	22.2	8.2	31.9	6.8	6.8	93.7	5.1	4.9	7.7	8.4	
							Surface	2nd	22.1	8.2	31.1	6.8							
							Middle	1st	22.3	8.2	32.2	6.8	7.0	96.8	5.3				9.2
							Middle	2nd	22.2	8.2	31.3	6.8							
							Bottom	1st	22.3	8.2	32.2	7.0	96.6	5.3	9.0				
							Bottom	2nd	22.2	8.2	31.4	7.0							
2018-12-10	Mid-Ebb	SR7	Cloudy	Moderate	14:18	4.0	Surface	1st	22.0	8.1	31.3	6.9	6.9	94.1	10.6	11.1	10.3	10.5	
							Surface	2nd	22.0	8.1	31.3	6.9							
							Middle	1st	-	-	-	-	6.9	94.9	11.6				10.8
							Middle	2nd	-	-	-	-							
							Bottom	1st	22.1	8.1	31.5	6.9	94.7	11.5	9.7				
							Bottom	2nd	22.1	8.1	31.5	6.9							
2018-12-10	Mid-Ebb	IS17	Cloudy	Moderate	14:14	9.6	Surface	1st	21.9	8.2	31.3	6.8	6.8	93.3	5.9	6.3	7.5	9.0	
							Surface	2nd	21.9	8.2	30.5	6.8							
							Middle	1st	22.1	8.2	31.5	6.8	7.1	96.8	6.5				10.0
							Middle	2nd	22.0	8.2	30.7	6.8							
							Bottom	1st	22.1	8.2	31.6	7.0	96.5	6.5	10.8				
							Bottom	2nd	22.0	8.2	30.8	7.1							
2018-12-10	Mid-Ebb	IS(Mf)16	Cloudy	Calm	14:08	5.7	Surface	1st	21.6	8.2	31.0	7.0	7.0	95.2	7.2	7.3	6.1	6.7	
							Surface	2nd	21.6	8.2	30.3	7.0							
							Middle	1st	-	-	-	-	7.2	97.6	7.4				7.3
							Middle	2nd	-	-	-	-							
							Bottom	1st	21.6	8.2	31.0	7.2	97.1	7.4	6.8				
							Bottom	2nd	21.5	8.2	30.3	7.2							
2018-12-10	Mid-Ebb	IS8	Cloudy	Calm	13:47	3.7	Surface	1st	21.4	8.2	30.7	7.1	7.1	95.4	6.3	6.9	7.9	7.6	
							Surface	2nd	21.3	8.2	29.8	7.1							
							Middle	1st	-	-	-	-	7.2	97.7	7.4				7.7
							Middle	2nd	-	-	-	-							
							Bottom	1st	21.4	8.2	30.8	7.2	97.5	7.7	7.0				
							Bottom	2nd	21.4	8.2	30.0	7.2							
2018-12-10	Mid-Ebb	SR4(N)	Cloudy	Calm	13:53	3.6	Surface	1st	21.2	8.2	30.3	7.0	7.0	93.8	5.5	5.3	10.6	9.0	
							Surface	2nd	21.1	8.2	29.5	7.0							
							Middle	1st	-	-	-	-	7.2	96.2	5.3				7.5
							Middle	2nd	-	-	-	-							
							Bottom	1st	21.1	8.2	30.2	7.2	95.4	5.2	7.7				
							Bottom	2nd	21.1	8.2	29.5	7.2							
2018-12-10	Mid-Ebb	IS(Mf)9	Cloudy	Calm	13:41	3.5	Surface	1st	21.6	8.2	30.8	6.9	6.9	93.7	8.5	9.0	8.3	9.0	
							Surface	2nd	21.6	8.2	30.0	6.9							
							Middle	1st	-	-	-	-	7.0	94.9	9.6				9.9
							Middle	2nd	-	-	-	-							
							Bottom	1st	21.7	8.2	30.9	7.0	95.0	9.6	9.9				
							Bottom	2nd	21.6	8.2	30.1	7.0							

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-10	Mid-Ebb	IS7	Cloudy	Calm	13:34	2.8	Surface	1st	-	-	-	-	7.1	-	-	5.4	-	6.0
							Surface	2nd	-	-	-	-		-	-			
							Middle	1st	21.4	8.2	30.4	7.1	96.0	5.2	6.1			
							Middle	2nd	21.4	8.2	29.6	7.1	95.4	5.5	5.9			
							Bottom	1st	-	-	-	-	-	-	-			
							Bottom	2nd	-	-	-	-	-	-	-			
2018-12-10	Mid-Ebb	IS(Mf)6	Cloudy	Calm	13:28	2.6	Surface	1st	-	-	-	-	7.0	-	-	6.0	-	5.4
							Surface	2nd	-	-	-	-		-	-			
							Middle	1st	21.2	8.2	30.2	7.0	93.4	6.0	5.5			
							Middle	2nd	21.1	8.2	29.4	7.0	93.4	6.0	5.3			
							Bottom	1st	-	-	-	-	-	-	-			
							Bottom	2nd	-	-	-	-	-	-	-			
2018-12-10	Mid-Ebb	IS5	Cloudy	Calm	13:22	8.6	Surface	1st	21.4	8.2	30.2	6.8	6.8	91.5	6.3	6.3	7.7	7.1
							Surface	2nd	21.3	8.2	29.4	6.8		91.2	6.3		7.4	
							Middle	1st	21.3	8.2	30.2	6.8	91.6	6.1	7.6			
							Middle	2nd	21.3	8.2	29.4	6.8	91.4	6.3	7.5			
							Bottom	1st	21.3	8.2	30.2	6.9	92.2	6.2	6.0			
							Bottom	2nd	21.3	8.2	29.4	6.9	92.1	6.5	6.3			
2018-12-10	Mid-Ebb	SR3(N)	Cloudy	Calm	13:16	4.4	Surface	1st	21.3	8.2	30.2	6.9	6.9	93.1	7.3	8.1	9.7	8.3
							Surface	2nd	21.2	8.2	29.5	6.9		92.9	7.5		8.9	
							Middle	1st	-	-	-	-	-	-	-			
							Middle	2nd	-	-	-	-	-	-	-			
							Bottom	1st	21.2	8.2	30.3	6.9	93.2	8.9	7.7			
							Bottom	2nd	21.1	8.2	29.4	7.0	93.1	8.7	7.0			
2018-12-10	Mid-Flood	SR10A(N)	Cloudy	Moderate	8:23	12.8	Surface	1st	22.3	8.1	32.0	6.7	6.7	93.2	6.1	6.3	11.0	11.0
							Surface	2nd	22.3	8.1	31.2	6.7		92.8	6.2		10.7	
							Middle	1st	22.3	8.0	32.0	6.7	93.3	6.3	10.0			
							Middle	2nd	22.3	8.1	31.2	6.8	93.0	6.3	10.7			
							Bottom	1st	22.3	8.0	32.0	6.8	93.4	6.6	11.3			
							Bottom	2nd	22.3	8.0	31.2	6.8	93.4	6.5	12.1			
2018-12-10	Mid-Flood	SR10B(N2)	Cloudy	Moderate	8:29	5.8	Surface	1st	22.4	8.2	32.3	6.7	6.7	92.9	7.7	7.9	13.0	12.2
							Surface	2nd	22.4	8.2	31.5	6.7		92.3	7.7		12.7	
							Middle	1st	-	-	-	-	-	-	-			
							Middle	2nd	-	-	-	-	-	-	-			
							Bottom	1st	22.4	8.2	32.3	6.9	95.2	8.0	11.8			
							Bottom	2nd	22.3	8.2	31.5	6.9	94.8	8.3	11.3			
2018-12-10	Mid-Flood	CSA	Cloudy	Moderate	8:39	32.0	Surface	1st	22.0	7.9	31.0	6.9	6.9	94.0	9.3	9.2	11.2	9.0
							Surface	2nd	22.0	7.9	31.1	6.9		94.0	9.2		10.2	
							Middle	1st	22.2	7.9	31.3	6.8	93.0	9.1	8.5			
							Middle	2nd	22.2	7.9	31.3	6.8	93.0	9.1	9.2			
							Bottom	1st	22.2	7.8	31.3	6.8	93.9	9.1	7.2			
							Bottom	2nd	22.2	7.9	31.3	6.8	93.7	9.1	7.9			
2018-12-10	Mid-Flood	CS6	Cloudy	Moderate	8:48	9.1	Surface	1st	22.1	8.0	31.2	6.9	6.9	94.4	8.8	10.8	5.0	6.9
							Surface	2nd	22.0	8.0	31.1	6.9		94.4	8.8		5.2	
							Middle	1st	22.3	8.0	31.5	6.9	95.7	10.4	5.5			
							Middle	2nd	22.2	8.0	31.5	6.9	95.6	10.3	5.5			
							Bottom	1st	22.3	8.0	31.6	7.1	97.4	13.4	9.9			
							Bottom	2nd	22.3	8.0	31.6	7.0	97.1	12.9	10.4			
2018-12-10	Mid-Flood	CS4	Cloudy	Rough	9:42	8.5	Surface	1st	21.9	8.0	30.6	6.9	6.9	93.4	13.0	14.3	13.4	14.2
							Surface	2nd	21.9	8.0	30.6	6.9		93.4	12.8		14.5	
							Middle	1st	22.2	8.0	31.1	6.8	92.8	12.8	14.2			
							Middle	2nd	22.1	8.0	31.0	6.8	92.8	12.9	13.9			
							Bottom	1st	22.3	8.0	31.5	6.9	95.2	19.1	14.0			
							Bottom	2nd	22.3	8.0	31.5	6.9	95.0	15.3	14.9			
2018-12-10	Mid-Flood	SR6	Cloudy	Rough	10:11	4.6	Surface	1st	21.5	8.0	30.3	7.2	7.2	96.6	16.4	16.6	19.2	19.0
							Surface	2nd	21.5	8.0	30.3	7.2		96.6	16.2		18.7	
							Middle	1st	-	-	-	-	-	-	-			
							Middle	2nd	-	-	-	-	-	-	-			
							Bottom	1st	21.5	8.0	30.4	7.3	98.6	16.8	18.7			
							Bottom	2nd	21.5	8.0	30.4	7.3	98.3	17.0	19.3			
2018-12-10	Mid-Flood	CS(Mf)3(N)	Cloudy	Rough	9:54	6.5	Surface	1st	21.7	8.0	30.3	7.0	7.1	95.5	16.0	17.4	14.6	17.6
							Surface	2nd	21.7	8.0	30.3	7.0		95.5	15.9		15.6	
							Middle	1st	21.7	8.0	30.4	7.1	96.2	16.2	19.7			
							Middle	2nd	21.7	8.0	30.3	7.1	96.2	15.9	18.9			
							Bottom	1st	21.7	8.0	30.3	7.4	100.7	20.7	18.5			
							Bottom	2nd	21.7	8.0	30.3	7.4	100.2	19.5	18.1			

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-10	Mid-Flood	SR5(N)	Cloudy	Moderate	9:24	9.0	Surface	1st	21.7	8.1	31.1	7.0	7.1	95.0	19.6	20.5	21.0	22.8
							Surface	2nd	21.7	8.1	31.1	7.0						
							Middle	1st	21.7	8.1	31.1	7.1						
							Middle	2nd	21.7	8.1	31.1	7.1	7.1	96.2	19.4			
							Bottom	1st	21.7	8.1	31.1	7.1						
							Bottom	2nd	21.7	8.1	31.1	7.1						
2018-12-10	Mid-Flood	IS10(N)	Cloudy	Moderate	9:19	11.9	Surface	1st	21.8	8.1	31.0	6.9	6.9	94.1	11.9	13.6	12.3	12.4
							Surface	2nd	21.8	8.1	31.0	6.9						
							Middle	1st	21.7	8.1	31.1	6.9						
							Middle	2nd	21.7	8.1	31.1	6.9	7.0	94.6	14.9			
							Bottom	1st	21.7	8.1	31.1	7.0						
							Bottom	2nd	21.7	8.1	31.1	7.0						
2018-12-10	Mid-Flood	IS(Mf)11	Cloudy	Moderate	9:13	11.5	Surface	1st	21.9	8.0	31.0	6.9	6.9	93.6	11.3	11.4	6.9	8.8
							Surface	2nd	21.9	8.0	31.0	6.8						
							Middle	1st	21.9	8.0	31.0	6.9						
							Middle	2nd	21.9	8.0	31.0	6.9	7.0	94.0	11.2			
							Bottom	1st	21.9	8.0	31.0	7.0						
							Bottom	2nd	21.9	8.0	31.0	7.0						
2018-12-10	Mid-Flood	CS(Mf)5	Cloudy	Moderate	8:57	11.8	Surface	1st	22.1	8.2	31.4	6.8	6.9	93.8	8.1	9.5	10.4	11.1
							Surface	2nd	22.0	8.2	30.6	6.8						
							Middle	1st	22.1	8.2	31.5	6.9						
							Middle	2nd	22.1	8.2	30.7	6.9	7.0	94.2	8.5			
							Bottom	1st	22.1	8.2	31.5	6.9						
							Bottom	2nd	22.0	8.2	30.7	7.0						
2018-12-10	Mid-Flood	SR7	Cloudy	Moderate	9:06	4.4	Surface	1st	21.6	8.0	31.0	7.1	7.1	96.1	15.8	17.6	12.2	13.0
							Surface	2nd	21.6	8.0	31.0	7.1						
							Middle	1st	-	-	-	-						
							Middle	2nd	-	-	-	-	7.2	96.9	19.4			
							Bottom	1st	21.5	8.0	31.0	7.2						
							Bottom	2nd	21.5	8.0	31.0	7.1						
2018-12-10	Mid-Flood	IS17	Cloudy	Moderate	9:13	9.5	Surface	1st	21.6	8.2	30.9	7.0	7.1	94.9	4.7	13.2	8.4	9.7
							Surface	2nd	21.5	8.2	30.1	7.1						
							Middle	1st	21.8	8.2	31.1	7.0						
							Middle	2nd	21.7	8.2	30.3	7.1	7.2	95.9	17.0			
							Bottom	1st	21.7	8.2	31.1	7.2						
							Bottom	2nd	21.7	8.2	30.3	7.2						
2018-12-10	Mid-Flood	IS(Mf)16	Cloudy	Moderate	9:22	5.6	Surface	1st	21.9	8.2	30.9	6.8	6.9	93.3	12.0	13.8	20.4	19.0
							Surface	2nd	21.8	8.2	30.1	6.9						
							Middle	1st	-	-	-	-						
							Middle	2nd	-	-	-	-	7.1	94.9	15.8			
							Bottom	1st	21.9	8.2	30.9	7.0						
							Bottom	2nd	21.8	8.2	30.1	7.1						
2018-12-10	Mid-Flood	IS8	Cloudy	Calm	9:42	3.3	Surface	1st	21.5	8.2	30.4	6.9	6.9	92.6	7.0	7.2	11.6	10.9
							Surface	2nd	21.4	8.2	29.6	6.9						
							Middle	1st	-	-	-	-						
							Middle	2nd	-	-	-	-	6.9	93.1	7.4			
							Bottom	1st	21.5	8.2	30.5	6.9						
							Bottom	2nd	21.4	8.2	29.8	6.9						
2018-12-10	Mid-Flood	SR4(N)	Cloudy	Calm	9:36	4.0	Surface	1st	21.3	8.2	30.1	6.8	6.9	92.0	5.8	6.1	8.3	8.5
							Surface	2nd	21.3	8.2	29.4	6.9						
							Middle	1st	-	-	-	-						
							Middle	2nd	-	-	-	-	7.1	95.0	6.5			
							Bottom	1st	21.4	8.2	30.4	7.0						
							Bottom	2nd	21.3	8.2	29.6	7.1						
2018-12-10	Mid-Flood	IS(Mf)9	Cloudy	Calm	9:49	2.9	Surface	1st	-	-	-	-	6.9	-	-	9.1	-	12.5
							Surface	2nd	-	-	-	-						
							Middle	1st	21.6	8.2	30.5	6.9						
							Middle	2nd	21.6	8.2	29.8	6.9	-	-	-			
							Bottom	1st	-	-	-	-						
							Bottom	2nd	-	-	-	-						
2018-12-10	Mid-Flood	IS7	Cloudy	Calm	9:57	2.7	Surface	1st	-	-	-	-	6.8	-	-	7.2	-	11.6
							Surface	2nd	-	-	-	-						
							Middle	1st	21.5	8.2	30.3	6.8						
							Middle	2nd	21.4	8.2	29.5	6.8	-	-	-			
							Bottom	1st	-	-	-	-						
							Bottom	2nd	-	-	-	-						

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)							
2018-12-10	Mid-Flood	IS(Mf)6	Cloudy	Calm	10:05	2.4	Surface	1st	-	-	-	-	7.1	-	-	8.1	-	8.6							
							Surface	2nd	-	-	-	-		-	-										
							Middle	1st	21.2	8.2	30.2	7.0	94.5	8.1	8.2										
							Middle	2nd	21.2	8.2	29.4	7.1	94.2	8.0	8.9										
							Bottom	1st	-	-	-	-	-	-	-										
							Bottom	2nd	-	-	-	-	-	-	-										
2018-12-10	Mid-Flood	IS5	Cloudy	Calm	10:11	7.6	Surface	1st	21.4	8.2	30.2	6.8	6.8	91.8	8.0	8.1	12.3	12.0							
							Surface	2nd	21.3	8.2	29.4	6.8		91.5	7.9		12.1								
							Middle	1st	21.4	8.2	30.2	6.8	91.9	8.5	12.4										
							Middle	2nd	21.3	8.2	29.4	6.9	91.9	8.3	11.5										
							Bottom	1st	21.4	8.2	30.2	6.9	93.2	7.6	11.1										
							Bottom	2nd	21.3	8.2	29.4	7.0	93.1	8.0	12.3										
							2018-12-10	Mid-Flood	SR3(N)	Cloudy	Calm	10:18	4.2	Surface	1st	21.4	8.2	30.2	6.8	6.9	92.2	7.8	8.3	9.4	10.2
														Surface	2nd	21.3	8.2	29.4	6.9		92.2	8.0		9.6	
Middle	1st	-	-	-	-	-								-	-										
Middle	2nd	-	-	-	-	-								-	-										
Bottom	1st	21.3	8.2	30.2	7.0	94.7								8.8	11.1										
Bottom	2nd	21.3	8.2	29.4	7.1	94.5								8.7	10.8										
2018-12-12	Mid-Ebb	SR10A(N)	Cloudy	Moderate	16:35	10.1								Surface	1st	21.8	8.3	32.3	7.0	7.0	96.3	4.6	5.1	7.2	6.8
														Surface	2nd	21.9	8.3	32.3	7.0		96.2	4.5		7.2	
							Middle	1st	21.8	8.3	32.4	7.1	96.8	5.4	6.6										
							Middle	2nd	21.8	8.3	32.4	7.0	96.7	5.7	6.2										
							Bottom	1st	21.8	8.3	32.4	7.1	97.4	5.1	6.7										
							Bottom	2nd	21.8	8.3	32.4	7.1	97.4	5.3	6.9										
							2018-12-12	Mid-Ebb	SR10B(N2)	Cloudy	Moderate	16:39	5.8	Surface	1st	21.8	8.3	32.3	7.2	7.2	98.9	4.4	4.4	6.9	7.1
														Surface	2nd	21.8	8.3	32.3	7.2		98.7	4.3		7.5	
Middle	1st	-	-	-	-	-								-	-										
Middle	2nd	-	-	-	-	-								-	-										
Bottom	1st	21.8	8.2	32.3	7.4	101.7								4.4	6.9										
Bottom	2nd	21.8	8.2	32.3	7.4	101.5								4.4	6.9										
2018-12-12	Mid-Ebb	CSA	Cloudy	Rough	16:08	33.5								Surface	1st	21.5	8.1	33.3	6.9	6.9	95.1	5.4	5.9	4.5	4.0
														Surface	2nd	21.5	8.1	33.3	6.9		95.1	5.4		4.3	
							Middle	1st	21.6	8.1	33.4	6.9	94.8	6.1	4.6										
							Middle	2nd	21.6	8.1	33.4	6.9	94.8	6.1	4.1										
							Bottom	1st	21.6	8.1	33.4	6.9	95.3	6.3	3.0										
							Bottom	2nd	21.6	8.1	33.4	6.9	95.2	6.2	3.5										
							2018-12-12	Mid-Ebb	CS6	Cloudy	Rough	16:00	9.7	Surface	1st	21.5	8.1	33.4	7.0	7.1	96.7	6.0	10.1	5.5	5.2
														Surface	2nd	21.5	8.1	33.4	7.0		96.6	5.9		5.5	
Middle	1st	21.5	8.1	33.4	7.1	98.2								7.3	5.1										
Middle	2nd	21.5	8.1	33.4	7.1	98.0								7.1	5.8										
Bottom	1st	21.5	8.1	33.4	7.3	100.6								17.1	4.8										
Bottom	2nd	21.5	8.1	33.4	7.3	100.3								17.1	4.3										
2018-12-12	Mid-Ebb	CS4	Cloudy	Rough	15:07	16.4								Surface	1st	21.2	8.1	32.8	7.0	7.0	94.9	6.2	7.0	4.8	3.8
														Surface	2nd	21.2	8.1	32.8	7.0		94.9	6.1		4.9	
							Middle	1st	21.3	8.1	32.9	7.0	96.3	7.5	3.4										
							Middle	2nd	21.3	8.1	32.9	7.0	96.1	7.4	3.3										
							Bottom	1st	21.3	8.1	32.9	7.2	97.8	7.4	3.2										
							Bottom	2nd	21.3	8.1	32.9	7.1	97.7	7.4	3.4										
							2018-12-12	Mid-Ebb	SR6	Cloudy	Moderate	14:44	4.1	Surface	1st	20.0	8.2	32.7	7.5	7.5	100.2	13.7	14.9	14.2	13.9
														Surface	2nd	20.0	8.2	32.7	7.5		100.2	13.6		14.9	
Middle	1st	-	-	-	-	-								-	-										
Middle	2nd	-	-	-	-	-								-	-										
Bottom	1st	20.0	8.2	32.8	7.6	101.2								16.2	13.1										
Bottom	2nd	20.0	8.2	32.8	7.6	101.1								16.2	13.5										
2018-12-12	Mid-Ebb	CS(Mf)3(N)	Cloudy	Rough	14:54	7.3	Surface	1st	20.0	8.1	32.2	7.5	7.5	99.2	10.7	11.0	8.8	8.3							
							Surface	2nd	20.0	8.1	32.2	7.5		99.2	10.7		8.5								
							Middle	1st	20.0	8.1	32.2	7.5	99.8	10.6	9.8										
							Middle	2nd	20.0	8.1	32.2	7.5	99.7	10.6	9.4										
							Bottom	1st	19.8	8.1	32.2	7.8	103.4	11.7	6.8										
							Bottom	2nd	19.8	8.1	32.2	7.8	103.0	11.7	6.2										
							2018-12-12	Mid-Ebb	SR5(N)	Cloudy	Rough	15:24	9.5	Surface	1st	21.1	8.1	32.7	6.9	7.0	94.4	7.5	8.1	5.5	5.6
														Surface	2nd	21.1	8.1	32.7	6.9		94.4	7.5		5.8	
Middle	1st	21.1	8.1	32.8	7.0	95.8								8.4	5.6										
Middle	2nd	21.1	8.1	32.8	7.0	95.7								8.5	5.7										
Bottom	1st	21.1	8.1	32.8	7.1	96.7								8.3	6.0										
Bottom	2nd	21.1	8.1	32.8	7.1	96.6								8.3	5.0										

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-12	Mid-Ebb	IS10(N)	Cloudy	Rough	15:30	12.4	Surface	1st	20.6	8.1	32.3	7.1	7.1	95.0	8.4	9.5	6.3	6.5
							Surface	2nd	20.6	8.1	32.3	7.1						
							Middle	1st	20.6	8.1	32.3	7.1	7.2	95.7	10.0			
							Middle	2nd	20.6	8.1	32.3	7.1						
							Bottom	1st	20.6	8.1	32.3	7.2	96.4	10.0				
							Bottom	2nd	20.6	8.1	32.3	7.2						
2018-12-12	Mid-Ebb	IS(Mf)11	Cloudy	Moderate	15:34	11.1	Surface	1st	20.4	8.1	32.2	7.1	7.0	94.7	9.0	9.8	7.2	6.5
							Surface	2nd	20.4	8.1	32.2	7.1						
							Middle	1st	21.0	8.1	32.6	6.9	7.0	93.9	10.2			
							Middle	2nd	21.0	8.1	32.6	6.9						
							Bottom	1st	21.0	8.1	32.7	7.0	94.9	10.1				
							Bottom	2nd	21.0	8.1	32.7	7.0						
2018-12-12	Mid-Ebb	CS(Mf)5	Cloudy	Moderate	16:03	12.1	Surface	1st	21.8	8.3	32.2	7.0	7.0	95.6	4.3	5.1	6.1	6.7
							Surface	2nd	21.8	8.3	32.2	7.0						
							Middle	1st	21.8	8.3	32.2	7.0	7.1	95.8	5.1			
							Middle	2nd	21.8	8.3	32.2	7.0						
							Bottom	1st	21.8	8.3	32.2	7.1	96.6	5.8				
							Bottom	2nd	21.8	8.3	32.2	7.0						
2018-12-12	Mid-Ebb	SR7	Cloudy	Moderate	15:41	4.3	Surface	1st	21.3	8.1	33.0	7.1	7.1	96.5	8.1	8.3	7.2	6.6
							Surface	2nd	21.3	8.1	33.0	7.1						
							Middle	1st	-	-	-	-	7.2	98.5	8.6			
							Middle	2nd	-	-	-	-						
							Bottom	1st	21.2	8.1	33.0	7.2	98.1	8.6				
							Bottom	2nd	21.2	8.1	33.0	7.2						
2018-12-12	Mid-Ebb	IS17	Cloudy	Moderate	15:44	7.3	Surface	1st	21.3	8.3	31.6	7.1	7.2	96.7	5.9	5.7	7.5	7.7
							Surface	2nd	21.3	8.3	31.6	7.1						
							Middle	1st	21.4	8.2	31.8	7.2	7.5	97.4	5.7			
							Middle	2nd	21.4	8.2	31.8	7.2						
							Bottom	1st	21.4	8.2	31.8	7.6	99.6	5.6				
							Bottom	2nd	21.4	8.2	31.8	7.3						
2018-12-12	Mid-Ebb	IS(Mf)16	Cloudy	Moderate	15:38	5.0	Surface	1st	20.7	8.3	31.2	7.4	7.4	98.5	7.6	7.7	6.8	6.7
							Surface	2nd	20.7	8.3	31.2	7.4						
							Middle	1st	-	-	-	-	7.4	99.4	7.7			
							Middle	2nd	-	-	-	-						
							Bottom	1st	20.7	8.2	31.3	7.4	99.3	7.8				
							Bottom	2nd	20.7	8.2	31.3	7.4						
2018-12-12	Mid-Ebb	IS8	Cloudy	Moderate	15:19	3.9	Surface	1st	20.5	8.2	30.7	7.4	7.4	97.6	5.7	5.9	6.9	6.9
							Surface	2nd	20.5	8.3	30.7	7.3						
							Middle	1st	-	-	-	-	7.6	102.1	6.2			
							Middle	2nd	-	-	-	-						
							Bottom	1st	20.5	8.2	31.0	7.7	99.0	6.1				
							Bottom	2nd	20.6	8.2	31.0	7.4						
2018-12-12	Mid-Ebb	SR4(N)	Cloudy	Moderate	15:23	4.1	Surface	1st	20.2	8.2	30.4	7.7	7.7	101.5	5.7	5.9	4.7	4.6
							Surface	2nd	20.2	8.2	30.4	7.7						
							Middle	1st	-	-	-	-	7.8	103.3	6.3			
							Middle	2nd	-	-	-	-						
							Bottom	1st	20.2	8.2	30.4	7.8	102.8	6.0				
							Bottom	2nd	20.2	8.2	30.4	7.8						
2018-12-12	Mid-Ebb	IS(Mf)9	Cloudy	Moderate	15:12	3.7	Surface	1st	20.5	8.2	30.8	7.7	7.7	101.5	8.4	8.4	5.8	5.4
							Surface	2nd	20.5	8.2	30.8	7.6						
							Middle	1st	-	-	-	-	7.8	102.9	8.4			
							Middle	2nd	-	-	-	-						
							Bottom	1st	20.5	8.2	30.8	7.8	102.7	8.4				
							Bottom	2nd	20.5	8.2	30.8	7.7						
2018-12-12	Mid-Ebb	IS7	Cloudy	Moderate	15:06	2.7	Surface	1st	-	-	-	-	7.4	-	-	7.0	-	5.4
							Surface	2nd	-	-	-	-						
							Middle	1st	20.4	8.2	30.4	7.4	7.0	97.1	7.0			
							Middle	2nd	20.4	8.2	30.4	7.3						
							Bottom	1st	-	-	-	-	-	-	-			
							Bottom	2nd	-	-	-	-						
2018-12-12	Mid-Ebb	IS(Mf)6	Cloudy	Moderate	14:59	2.8	Surface	1st	-	-	-	-	7.5	-	-	7.2	-	4.5
							Surface	2nd	-	-	-	-						
							Middle	1st	20.3	8.2	30.5	7.5	7.2	98.8	7.2			
							Middle	2nd	20.3	8.2	30.5	7.4						
							Bottom	1st	-	-	-	-	-	-	-			
							Bottom	2nd	-	-	-	-						

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-12	Mid-Ebb	IS5	Cloudy	Moderate	14:53	9.0	Surface	1st	20.4	8.2	30.4	7.1	7.1	93.9	8.5	9.0	8.8	6.9
							Surface	2nd	20.4	8.2	30.4	7.1						
							Middle	1st	20.5	8.2	30.4	7.1	7.2	95.7	9.1			
							Middle	2nd	20.5	8.2	30.4	7.1						
							Bottom	1st	20.4	8.2	30.4	7.2	95.6	9.2				
							Bottom	2nd	20.5	8.2	30.4	7.2						
2018-12-12	Mid-Ebb	SR3(N)	Cloudy	Moderate	14:46	4.3	Surface	1st	20.4	8.2	30.4	7.3	7.3	96.3	7.4	7.3	8.2	8.2
							Surface	2nd	20.4	8.2	30.4	7.3						
							Middle	1st	-	-	-	-	7.4	97.3	7.3			
							Middle	2nd	-	-	-	-						
							Bottom	1st	20.4	8.2	30.4	7.4	97.1	7.3				
							Bottom	2nd	20.3	8.2	30.4	7.3						
2018-12-12	Mid-Flood	SR10A(N)	Cloudy	Moderate	10:51	10.5	Surface	1st	21.8	8.2	32.1	7.0	7.1	95.1	5.0	5.0	4.7	4.6
							Surface	2nd	21.8	8.2	32.1	7.0						
							Middle	1st	21.7	8.0	32.1	7.1	7.2	95.9	5.1			
							Middle	2nd	21.8	8.0	32.1	7.1						
							Bottom	1st	21.7	8.0	32.1	7.2	97.7	5.0				
							Bottom	2nd	21.7	8.0	32.1	7.2						
2018-12-12	Mid-Flood	SR10B(N2)	Cloudy	Moderate	10:55	6.1	Surface	1st	21.8	8.2	32.1	6.9	6.9	94.6	5.2	5.0	5.8	4.6
							Surface	2nd	21.8	8.2	32.1	6.9						
							Middle	1st	21.8	8.2	32.1	6.9	6.9	94.8	4.9			
							Middle	2nd	21.8	8.2	32.1	6.9						
							Bottom	1st	21.8	8.2	32.1	6.9	94.8	5.0				
							Bottom	2nd	21.8	8.2	32.1	6.9						
2018-12-12	Mid-Flood	CSA	Cloudy	Rough	10:39	33.4	Surface	1st	21.2	8.1	32.8	6.9	6.9	93.8	4.9	5.5	3.4	3.3
							Surface	2nd	21.2	8.1	32.8	6.9						
							Middle	1st	21.4	8.1	33.0	6.8	6.8	93.8	6.0			
							Middle	2nd	21.4	8.1	33.0	6.8						
							Bottom	1st	21.4	8.1	33.1	6.8	93.8	6.0				
							Bottom	2nd	21.4	8.1	33.1	6.8						
2018-12-12	Mid-Flood	CS6	Cloudy	Rough	10:49	9.6	Surface	1st	21.4	8.1	33.1	7.0	7.0	95.5	6.0	7.0	5.2	4.3
							Surface	2nd	21.4	8.1	33.1	7.0						
							Middle	1st	21.4	8.1	33.1	7.0	7.1	96.6	7.4			
							Middle	2nd	21.4	8.1	33.1	7.0						
							Bottom	1st	21.4	8.1	33.1	7.1	97.3	7.5				
							Bottom	2nd	21.4	8.1	33.1	7.1						
2018-12-12	Mid-Flood	CS4	Cloudy	Rough	11:41	16.8	Surface	1st	20.9	8.1	32.4	7.1	7.1	96.0	10.9	11.5	8.7	10.5
							Surface	2nd	20.9	8.1	32.4	7.1						
							Middle	1st	20.9	8.1	32.5	7.1	7.3	99.1	12.4			
							Middle	2nd	20.9	8.1	32.5	7.1						
							Bottom	1st	20.9	8.1	32.6	7.3	98.9	12.3				
							Bottom	2nd	21.0	8.1	32.6	7.3						
2018-12-12	Mid-Flood	SR6	Cloudy	Rough	12:09	4.2	Surface	1st	20.0	8.1	32.3	7.5	7.5	99.0	11.0	11.3	11.5	13.5
							Surface	2nd	20.0	8.1	32.3	7.4						
							Middle	1st	-	-	-	-	7.5	100.2	11.7			
							Middle	2nd	-	-	-	-						
							Bottom	1st	20.0	8.1	32.3	7.5	100.2	11.7				
							Bottom	2nd	20.0	8.1	32.3	7.5						
2018-12-12	Mid-Flood	CS(MI)3(N)	Cloudy	Rough	11:53	7.3	Surface	1st	20.4	8.1	32.2	7.3	7.3	97.0	12.1	14.6	12.7	15.8
							Surface	2nd	20.4	8.1	32.2	7.3						
							Middle	1st	20.4	8.1	32.2	7.3	7.5	99.6	16.6			
							Middle	2nd	20.4	8.1	32.2	7.3						
							Bottom	1st	20.3	8.1	32.2	7.5	99.5	16.4				
							Bottom	2nd	20.3	8.1	32.2	7.4						
2018-12-12	Mid-Flood	SR5(N)	Cloudy	Rough	11:25	9.5	Surface	1st	20.3	8.1	32.3	7.2	7.2	96.7	11.6	13.5	9.6	10.7
							Surface	2nd	20.3	8.1	32.3	7.2						
							Middle	1st	20.4	8.1	32.3	7.2	7.2	96.5	15.3			
							Middle	2nd	20.4	8.1	32.3	7.2						
							Bottom	1st	20.4	8.1	32.3	7.2	96.7	13.9				
							Bottom	2nd	20.4	8.1	32.3	7.2						
2018-12-12	Mid-Flood	IS10(N)	Cloudy	Rough	11:20	12.4	Surface	1st	20.5	8.1	32.2	7.1	7.2	95.6	13.8	14.0	11.7	13.0
							Surface	2nd	20.5	8.1	32.2	7.1						
							Middle	1st	20.6	8.1	32.3	7.2	7.3	97.6	13.8			
							Middle	2nd	20.6	8.1	32.3	7.2						
							Bottom	1st	20.6	8.1	32.3	7.3	97.4	13.9				
							Bottom	2nd	20.6	8.1	32.3	7.3						

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-12	Mid-Flood	IS(Mf)11	Cloudy	Rough	11:13	11.3	Surface	1st	20.7	8.1	32.4	7.1	7.1	95.3	11.2	11.9	9.1	10.1
							Surface	2nd	20.7	8.1	32.4	7.1						
							Middle	1st	20.7	8.1	32.4	7.1	7.2	96.2	11.8			
							Middle	2nd	20.7	8.1	32.4	7.1						
							Bottom	1st	20.7	8.1	32.4	7.2	97.4	12.8				
							Bottom	2nd	20.7	8.1	32.4	7.2						
2018-12-12	Mid-Flood	CS(Mf)5	Cloudy	Moderate	11:24	12.6	Surface	1st	21.6	8.3	31.8	7.0	7.0	94.6	5.3	8.3	6.0	5.8
							Surface	2nd	21.6	8.3	31.8	7.0						
							Middle	1st	21.6	8.3	31.8	7.0	7.1	94.8	7.7			
							Middle	2nd	21.6	8.3	31.8	7.0						
							Bottom	1st	21.7	8.2	31.9	7.1	96.1	11.9				
							Bottom	2nd	21.7	8.2	31.9	7.1						
2018-12-12	Mid-Flood	SR7	Cloudy	Rough	11:07	4.2	Surface	1st	20.8	8.1	32.6	7.2	7.2	97.2	13.7	13.7	13.1	14.8
							Surface	2nd	20.8	8.1	32.6	7.2						
							Middle	1st	-	-	-	-	7.3	98.6	13.8			
							Middle	2nd	-	-	-	-						
							Bottom	1st	20.8	8.1	32.6	7.3	98.5	13.7				
							Bottom	2nd	20.8	8.1	32.6	7.3						
2018-12-12	Mid-Flood	IS17	Cloudy	Moderate	11:45	7.7	Surface	1st	20.8	8.3	31.3	7.3	7.4	98.1	7.9	8.5	6.8	11.4
							Surface	2nd	20.8	8.3	31.3	7.3						
							Middle	1st	20.7	8.3	31.3	7.4	7.8	103.6	8.6			
							Middle	2nd	20.7	8.3	31.3	7.4						
							Bottom	1st	20.7	8.2	31.3	7.8	103.1	8.7				
							Bottom	2nd	20.7	8.2	31.3	7.8						
2018-12-12	Mid-Flood	IS(Mf)16	Cloudy	Moderate	11:51	5.2	Surface	1st	20.7	8.3	31.0	7.3	7.3	96.9	15.0	12.1	16.9	14.3
							Surface	2nd	20.7	8.3	30.9	7.3						
							Middle	1st	-	-	-	-	7.7	102.1	9.2			
							Middle	2nd	-	-	-	-						
							Bottom	1st	20.6	8.2	31.1	7.7	101.9	9.1				
							Bottom	2nd	20.6	8.3	31.1	7.7						
2018-12-12	Mid-Flood	IS8	Cloudy	Moderate	12:11	3.6	Surface	1st	20.6	8.2	30.8	7.4	7.4	98.5	9.7	9.5	48.2	37.4
							Surface	2nd	20.6	8.2	30.8	7.4						
							Middle	1st	-	-	-	-	7.9	104.4	8.8			
							Middle	2nd	-	-	-	-						
							Bottom	1st	20.7	8.2	30.9	7.9	104.1	10.0				
							Bottom	2nd	20.7	8.2	30.9	7.9						
2018-12-12	Mid-Flood	SR4(N)	Cloudy	Moderate	12:06	4.3	Surface	1st	20.4	8.2	30.5	7.4	7.4	97.9	6.3	9.2	26.3	28.7
							Surface	2nd	20.4	8.2	30.5	7.4						
							Middle	1st	-	-	-	-	7.9	104.1	12.0			
							Middle	2nd	-	-	-	-						
							Bottom	1st	20.5	8.2	30.7	7.9	103.7	12.4				
							Bottom	2nd	20.5	8.2	30.7	7.9						
2018-12-12	Mid-Flood	IS(Mf)9	Cloudy	Moderate	12:17	3.3	Surface	1st	20.6	8.2	30.6	7.3	7.3	96.5	12.9	13.0	23.2	26.1
							Surface	2nd	20.6	8.2	30.6	7.3						
							Middle	1st	-	-	-	-	7.3	96.9	13.2			
							Middle	2nd	-	-	-	-						
							Bottom	1st	20.5	8.2	30.6	7.3	96.9	13.2				
							Bottom	2nd	20.5	8.2	30.6	7.3						
2018-12-12	Mid-Flood	IS7	Cloudy	Moderate	12:26	2.8	Surface	1st	-	-	-	-	7.7	-	-	9.4	-	27.7
							Surface	2nd	-	-	-	-						
							Middle	1st	20.4	8.2	30.4	7.7	-	101.2	9.4			
							Middle	2nd	20.4	8.2	30.4	7.7						
							Bottom	1st	-	-	-	-	-	-	-			
							Bottom	2nd	-	-	-	-						
2018-12-12	Mid-Flood	IS(Mf)6	Cloudy	Moderate	12:30	2.6	Surface	1st	-	-	-	-	7.3	-	-	7.7	-	3.9
							Surface	2nd	-	-	-	-						
							Middle	1st	20.5	8.2	30.4	7.3	-	96.0	7.7			
							Middle	2nd	20.5	8.2	30.4	7.3						
							Bottom	1st	-	-	-	-	-	-	-			
							Bottom	2nd	-	-	-	-						
2018-12-12	Mid-Flood	IS5	Cloudy	Moderate	12:39	8.9	Surface	1st	20.4	8.2	30.4	7.2	7.3	94.4	14.1	14.4	3.1	3.7
							Surface	2nd	20.4	8.2	30.4	7.2						
							Middle	1st	20.4	8.2	30.4	7.3	-	95.7	13.9			
							Middle	2nd	20.4	8.2	30.4	7.3						
							Bottom	1st	20.4	8.2	30.4	7.4	7.4	97.0	15.3			
							Bottom	2nd	20.4	8.2	30.4	7.4						

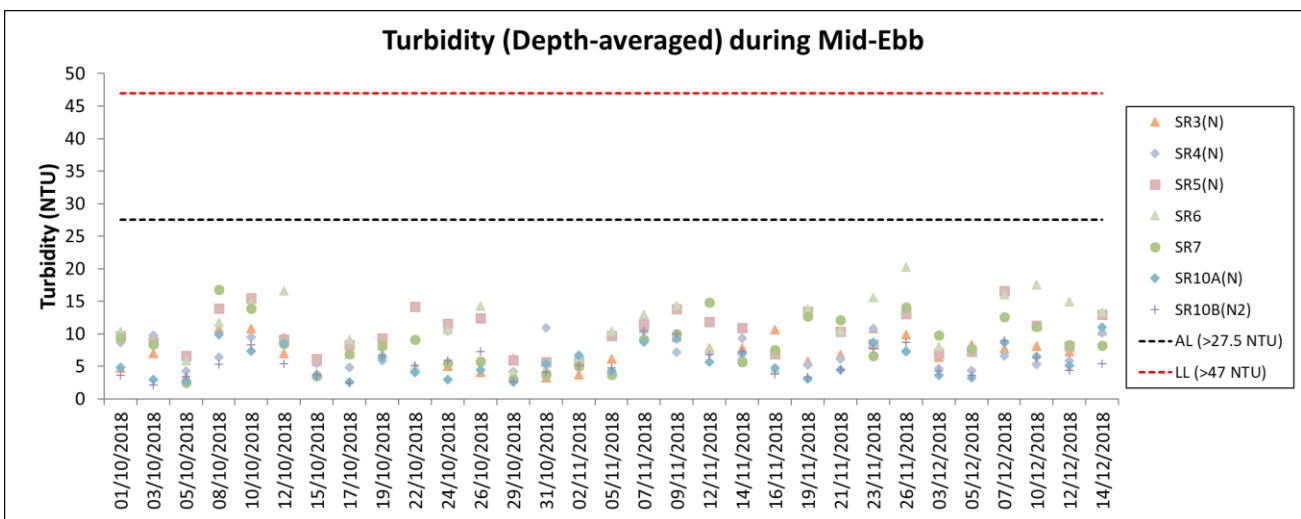
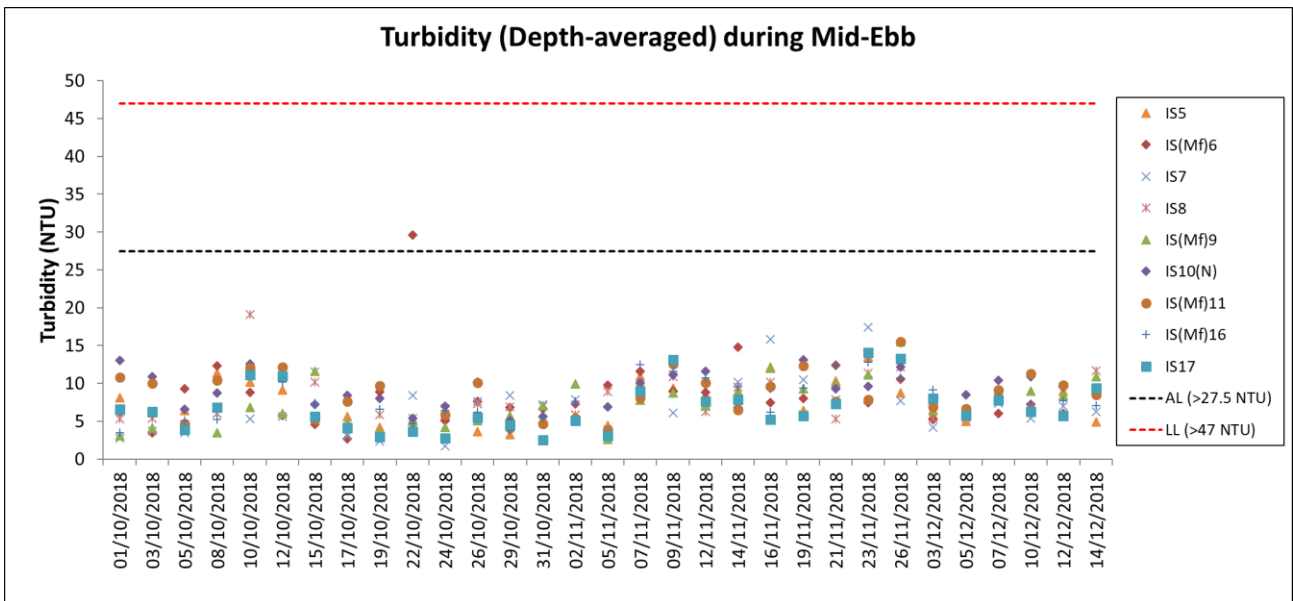
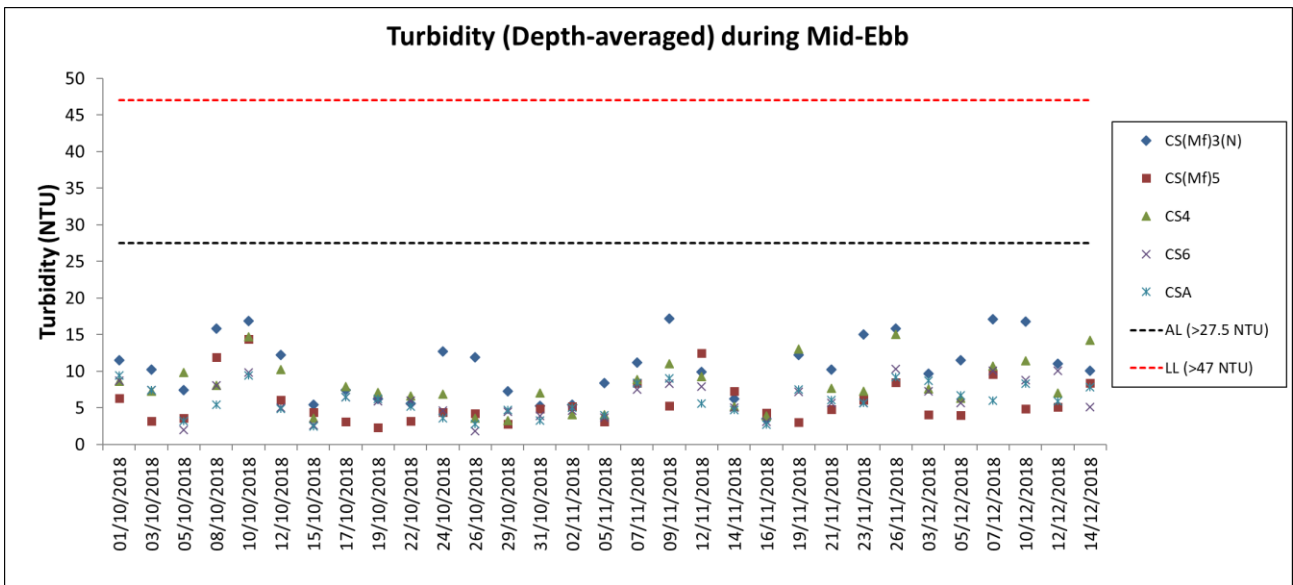
Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)	
2018-12-12	Mid-Flood	SR3(N)	Cloudy	Moderate	12:46	3.6	Surface	1st	20.4	8.2	30.5	7.4	7.4	98.0	8.7	9.2	3.7	3.7	
							Surface	2nd	20.4	8.2	30.5	7.4							
							Middle	1st	-	-	-	-	8.0	105.6	9.9				-
							Middle	2nd	-	-	-	-							
							Bottom	1st	20.4	8.2	30.4	8.0	8.0	105.2	9.6				4.0
							Bottom	2nd	20.4	8.2	30.3	8.0							3.8
2018-12-14	Mid-Ebb	SR10A(N)	Fine	Moderate	4:43	12.5	Surface	1st	21.1	8.0	33.5	7.0	7.1	96.2	8.4	11.0	5.9	6.5	
							Surface	2nd	21.1	8.0	33.5	7.0							
							Middle	1st	21.0	8.0	33.5	7.1	7.2	97.6	13.3				5.6
							Middle	2nd	21.0	8.0	33.5	7.1							
							Bottom	1st	21.0	8.0	33.5	7.2	7.2	97.5	13.3				7.9
							Bottom	2nd	21.0	8.0	33.5	7.1							7.2
2018-12-14	Mid-Ebb	SR10B(N2)	Fine	Moderate	4:52	6.5	Surface	1st	21.1	8.0	33.5	7.0	7.0	95.4	3.2	5.4	5.5	5.5	
							Surface	2nd	21.1	8.0	33.5	7.0							
							Middle	1st	21.1	8.0	33.5	7.0	7.0	95.4	5.6				5.1
							Middle	2nd	21.1	8.0	33.5	7.0							
							Bottom	1st	21.1	8.0	33.5	7.0	7.0	95.6	7.4				5.8
							Bottom	2nd	21.1	8.0	33.5	7.0							5.5
2018-12-14	Mid-Ebb	CSA	Cloudy	Moderate	5:00	33.1	Surface	1st	21.3	8.3	32.4	7.1	7.1	96.4	5.3	7.8	8.1	8.1	
							Surface	2nd	21.3	8.3	32.4	7.1							
							Middle	1st	21.3	8.2	32.5	7.1	7.1	97.0	12.9				8.2
							Middle	2nd	21.3	8.2	32.5	7.1							
							Bottom	1st	21.3	8.2	32.5	7.1	7.1	97.0	12.4				8.1
							Bottom	2nd	21.3	8.2	32.5	7.1							8.3
2018-12-14	Mid-Ebb	CS6	Cloudy	Moderate	5:15	8.6	Surface	1st	21.3	8.3	32.4	7.1	7.1	96.2	5.1	5.1	6.9	6.8	
							Surface	2nd	21.3	8.3	32.4	7.1							
							Middle	1st	21.3	8.3	32.5	7.0	7.0	96.1	5.2				6.3
							Middle	2nd	21.3	8.3	32.5	7.0							
							Bottom	1st	21.4	8.3	32.5	7.0	7.0	96.1	5.1				6.7
							Bottom	2nd	21.4	8.3	32.5	7.0							6.8
2018-12-14	Mid-Ebb	CS4	Cloudy	Moderate	6:08	16.2	Surface	1st	19.8	8.3	32.3	7.5	7.5	99.2	13.1	14.2	20.6	20.1	
							Surface	2nd	19.8	8.3	32.3	7.5							
							Middle	1st	19.8	8.3	32.3	7.5	7.5	99.1	13.7				19.0
							Middle	2nd	19.8	8.3	32.3	7.5							
							Bottom	1st	19.9	8.3	32.3	7.5	7.5	99.0	16.1				20.4
							Bottom	2nd	19.9	8.3	32.3	7.5							20.0
2018-12-14	Mid-Ebb	SR6	Cloudy	Moderate	6:30	4.5	Surface	1st	19.8	8.3	32.3	7.5	7.5	99.1	12.7	13.3	19.3	19.9	
							Surface	2nd	19.8	8.3	32.3	7.5							
							Middle	1st	-	-	-	-	7.5	99.0	14.6				19.5
							Middle	2nd	-	-	-	-							
							Bottom	1st	19.9	8.3	32.3	7.5	7.5	99.0	13.1				20.5
							Bottom	2nd	19.9	8.3	32.3	7.5							20.1
2018-12-14	Mid-Ebb	CS(Mf)3(N)	Cloudy	Moderate	6:15	7.0	Surface	1st	20.0	8.3	31.7	7.4	7.4	97.9	9.5	10.1	12.0	12.6	
							Surface	2nd	20.0	8.3	31.7	7.4							
							Middle	1st	19.9	8.3	31.7	7.4	7.4	97.9	9.6				12.3
							Middle	2nd	19.9	8.3	31.7	7.4							
							Bottom	1st	19.9	8.3	31.7	7.4	7.4	97.7	11.3				12.6
							Bottom	2nd	19.9	8.3	31.7	7.4							13.0
2018-12-14	Mid-Ebb	SR5(N)	Cloudy	Moderate	5:52	9.2	Surface	1st	19.8	8.3	32.3	7.5	7.5	99.0	12.7	13.0	20.4	20.2	
							Surface	2nd	19.8	8.3	32.3	7.5							
							Middle	1st	19.8	8.3	32.3	7.5	7.4	98.9	12.3				20.0
							Middle	2nd	19.8	8.3	32.3	7.5							
							Bottom	1st	19.8	8.3	32.3	7.4	7.4	98.5	14.0				20.0
							Bottom	2nd	19.8	8.3	32.3	7.4							20.4
2018-12-14	Mid-Ebb	IS10(N)	Cloudy	Moderate	5:47	12.4	Surface	1st	19.7	8.3	32.1	7.4	7.4	98.2	7.8	8.6	17.1	18.6	
							Surface	2nd	19.7	8.3	32.1	7.4							
							Middle	1st	19.7	8.3	32.1	7.4	7.4	98.1	8.4				17.7
							Middle	2nd	19.7	8.3	32.1	7.4							
							Bottom	1st	19.7	8.3	32.1	7.4	7.4	97.9	9.5				18.3
							Bottom	2nd	19.7	8.3	32.1	7.4							18.6
2018-12-14	Mid-Ebb	IS(Mf)11	Cloudy	Moderate	5:39	11.2	Surface	1st	19.7	8.3	32.1	7.4	7.4	98.3	8.6	8.5	12.6	13.9	
							Surface	2nd	19.7	8.3	32.1	7.4							
							Middle	1st	19.7	8.3	32.1	7.4	7.4	98.2	8.5				12.0
							Middle	2nd	19.7	8.3	32.1	7.4							
							Bottom	1st	19.7	8.3	32.1	7.4	7.4	98.2	8.4				13.2
							Bottom	2nd	19.7	8.3	32.1	7.4							13.8

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-14	Mid-Ebb	CS(Mf)5	Fine	Moderate	5:12	11.5	Surface	1st	21.1	8.0	33.5	7.0	7.0	95.1	5.7	8.4	5.0	5.5
							Surface	2nd	21.1	8.0	33.5	7.0						
							Middle	1st	21.1	8.0	33.5	6.9	7.0	95.0	7.6			
							Middle	2nd	21.1	8.0	33.5	6.9						
							Bottom	1st	21.1	8.0	33.5	7.0	95.1	11.8				
							Bottom	2nd	21.1	8.0	33.5	7.0						
2018-12-14	Mid-Ebb	SR7	Cloudy	Moderate	5:33	4.2	Surface	1st	19.7	8.3	32.1	7.5	7.5	98.4	8.0	8.2	10.1	11.5
							Surface	2nd	19.7	8.3	32.1	7.5						
							Middle	1st	-	-	-	-	7.5	98.5	8.3			
							Middle	2nd	-	-	-	-						
							Bottom	1st	19.7	8.3	32.1	7.5	98.4	8.5				
							Bottom	2nd	19.7	8.3	32.1	7.5						
2018-12-14	Mid-Ebb	IS17	Fine	Moderate	5:24	9.5	Surface	1st	21.1	8.0	33.5	6.9	6.9	95.0	5.5	9.4	3.5	4.1
							Surface	2nd	21.1	8.0	33.5	6.9						
							Middle	1st	21.1	8.0	33.5	6.9	6.9	94.9	10.5			
							Middle	2nd	21.1	8.0	33.5	6.9						
							Bottom	1st	21.1	8.0	33.5	6.9	94.9	12.3				
							Bottom	2nd	21.1	8.0	33.5	6.9						
2018-12-14	Mid-Ebb	IS(Mf)16	Fine	Moderate	5:34	5.6	Surface	1st	21.1	8.0	33.5	6.9	6.9	94.8	4.3	7.1	6.5	6.7
							Surface	2nd	21.1	8.0	33.5	6.9						
							Middle	1st	-	-	-	-	6.9	94.7	9.8			
							Middle	2nd	-	-	-	-						
							Bottom	1st	21.1	8.0	33.5	6.9	94.6	15.9				
							Bottom	2nd	21.1	8.0	33.5	6.9						
2018-12-14	Mid-Ebb	IS8	Fine	Moderate	6:02	3.4	Surface	1st	19.1	7.9	32.6	7.2	7.2	94.5	7.7	11.7	5.2	6.4
							Surface	2nd	19.1	8.0	32.6	7.2						
							Middle	1st	-	-	-	-	7.2	94.6	15.9			
							Middle	2nd	-	-	-	-						
							Bottom	1st	19.2	8.0	32.7	7.2	94.5	7.4				
							Bottom	2nd	19.2	8.0	32.7	7.2						
2018-12-14	Mid-Ebb	SR4(N)	Fine	Moderate	5:51	3.2	Surface	1st	19.1	8.0	32.5	7.3	7.3	95.0	6.6	10.2	4.5	5.8
							Surface	2nd	19.1	8.0	32.5	7.3						
							Middle	1st	-	-	-	-	7.3	95.0	13.7			
							Middle	2nd	-	-	-	-						
							Bottom	1st	19.1	8.0	32.5	7.3	95.0	13.8				
							Bottom	2nd	19.1	8.0	32.5	7.3						
2018-12-14	Mid-Ebb	IS(Mf)9	Fine	Moderate	6:11	3.2	Surface	1st	19.2	7.9	32.6	7.2	7.2	94.5	5.6	10.9	5.7	6.6
							Surface	2nd	19.1	7.9	32.6	7.2						
							Middle	1st	-	-	-	-	7.2	94.4	16.0			
							Middle	2nd	-	-	-	-						
							Bottom	1st	19.1	7.9	32.6	7.2	94.4	16.3				
							Bottom	2nd	19.1	7.9	32.6	7.2						
2018-12-14	Mid-Ebb	IS7	Fine	Moderate	6:17	2.7	Surface	1st	-	-	-	-	7.2	-	-	6.3	-	6.3
							Surface	2nd	-	-	-	-						
							Middle	1st	19.1	8.0	32.4	7.2	7.2	94.0	6.3			
							Middle	2nd	19.1	8.0	32.4	7.2						
							Bottom	1st	-	-	-	-	-	-	-			
							Bottom	2nd	-	-	-	-						
2018-12-14	Mid-Ebb	IS(Mf)6	Fine	Moderate	6:22	2.5	Surface	1st	-	-	-	-	7.2	-	-	6.0	-	6.4
							Surface	2nd	-	-	-	-						
							Middle	1st	19.0	8.0	32.4	7.2	7.2	93.8	6.0			
							Middle	2nd	19.0	8.0	32.4	7.2						
							Bottom	1st	-	-	-	-	-	-	-			
							Bottom	2nd	-	-	-	-						
2018-12-14	Mid-Ebb	IS5	Fine	Moderate	6:28	8.2	Surface	1st	19.0	8.0	32.4	7.2	7.2	93.6	3.1	4.9	7.3	7.3
							Surface	2nd	19.0	8.0	32.3	7.2						
							Middle	1st	19.1	8.0	32.5	7.2	7.2	93.9	5.4			
							Middle	2nd	19.1	8.0	32.5	7.2						
							Bottom	1st	19.1	8.0	32.4	7.2	93.7	6.2				
							Bottom	2nd	19.1	8.0	32.4	7.2						
2018-12-14	Mid-Ebb	SR3(N)	Fine	Moderate	6:32	3.5	Surface	1st	19.1	8.0	32.4	7.2	7.2	93.6	6.4	10.4	5.9	6.5
							Surface	2nd	19.1	8.0	32.4	7.2						
							Middle	1st	-	-	-	-	7.2	93.5	14.3			
							Middle	2nd	-	-	-	-						
							Bottom	1st	19.1	8.0	32.4	7.2	93.6	14.3				
							Bottom	2nd	19.1	8.0	32.4	7.2						

Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-14	Mid-Flood	SR10A(N)	Fine	Moderate	13:20	13.7	Surface	1st	21.0	8.1	33.5	7.1	7.2	97.0	6.1	8.1	6.9	7.1
							Surface	2nd	21.0	8.1	33.5	7.1						
							Middle	1st	21.0	8.1	33.5	7.2						
							Middle	2nd	21.0	8.1	33.5	7.2	7.2	98.8	11.8			
							Bottom	1st	21.0	8.1	33.5	7.2						
							Bottom	2nd	21.0	8.1	33.5	7.2						
2018-12-14	Mid-Flood	SR10B(N2)	Fine	Moderate	13:24	6.2	Surface	1st	21.1	8.1	33.5	7.1	7.2	96.8	7.3	13.1	6.9	6.8
							Surface	2nd	21.1	8.1	33.5	7.1						
							Middle	1st	21.0	8.1	33.5	7.2						
							Middle	2nd	21.0	8.1	33.5	7.2	7.3	99.9	16.5			
							Bottom	1st	21.0	8.1	33.5	7.3						
							Bottom	2nd	21.0	8.1	33.5	7.3						
2018-12-14	Mid-Flood	CSA	Cloudy	Moderate	13:03	32.8	Surface	1st	21.4	8.3	32.5	7.0	7.0	95.8	3.9	4.3	4.9	5.7
							Surface	2nd	21.4	8.3	32.5	7.0						
							Middle	1st	21.4	8.3	32.5	7.0						
							Middle	2nd	21.4	8.3	32.5	7.0	7.0	95.5	4.5			
							Bottom	1st	21.4	8.3	32.5	7.0						
							Bottom	2nd	21.4	8.3	32.5	7.0						
2018-12-14	Mid-Flood	CS6	Cloudy	Moderate	12:53	8.7	Surface	1st	21.2	8.3	32.5	7.1	7.1	96.2	5.4	5.7	7.2	7.1
							Surface	2nd	21.2	8.3	32.5	7.1						
							Middle	1st	21.2	8.3	32.5	7.1						
							Middle	2nd	21.2	8.3	32.5	7.1	7.2	97.3	5.7			
							Bottom	1st	21.2	8.3	32.5	7.2						
							Bottom	2nd	21.2	8.3	32.5	7.1						
2018-12-14	Mid-Flood	CS4	Cloudy	Moderate	11:56	16.3	Surface	1st	20.9	8.3	32.3	7.2	7.2	97.3	5.4	5.7	6.7	7.5
							Surface	2nd	20.9	8.3	32.3	7.2						
							Middle	1st	20.9	8.3	32.3	7.2						
							Middle	2nd	20.9	8.3	32.3	7.2	7.2	97.0	6.0			
							Bottom	1st	20.8	8.3	32.3	7.2						
							Bottom	2nd	20.8	8.3	32.3	7.2						
2018-12-14	Mid-Flood	SR6	Cloudy	Moderate	11:33	4.4	Surface	1st	20.2	8.3	31.6	7.4	7.4	97.9	7.6	8.0	10.5	10.5
							Surface	2nd	20.2	8.3	31.6	7.4						
							Middle	1st	-	-	-	-						
							Middle	2nd	-	-	-	-	7.4	98.6	8.4			
							Bottom	1st	20.2	8.3	31.6	7.4						
							Bottom	2nd	20.2	8.3	31.6	7.4						
2018-12-14	Mid-Flood	CS(Mf)3(N)	Cloudy	Moderate	11:44	7.0	Surface	1st	20.2	8.3	32.2	7.4	7.4	98.2	6.8	7.8	8.3	8.5
							Surface	2nd	20.2	8.3	32.2	7.4						
							Middle	1st	20.2	8.3	32.2	7.3						
							Middle	2nd	20.2	8.3	32.2	7.3	7.4	98.0	7.7			
							Bottom	1st	20.2	8.3	32.2	7.4						
							Bottom	2nd	20.2	8.3	32.2	7.4						
2018-12-14	Mid-Flood	SR5(N)	Cloudy	Moderate	12:15	9.1	Surface	1st	20.4	8.3	32.0	7.2	7.2	96.5	7.4	9.3	9.4	11.1
							Surface	2nd	20.4	8.3	32.0	7.2						
							Middle	1st	20.5	8.3	32.1	7.2						
							Middle	2nd	20.5	8.3	32.1	7.2	7.2	96.9	12.6			
							Bottom	1st	20.5	8.3	32.1	7.2						
							Bottom	2nd	20.5	8.3	32.1	7.2						
2018-12-14	Mid-Flood	IS10(N)	Cloudy	Moderate	12:20	12.3	Surface	1st	20.1	8.3	32.1	7.3	7.3	96.9	8.7	9.9	12.5	12.8
							Surface	2nd	20.1	8.3	32.1	7.3						
							Middle	1st	20.1	8.3	32.1	7.3						
							Middle	2nd	20.1	8.3	32.1	7.3	7.3	97.4	10.9			
							Bottom	1st	20.0	8.3	32.1	7.3						
							Bottom	2nd	20.0	8.3	32.1	7.3						
2018-12-14	Mid-Flood	IS(Mf)11	Cloudy	Moderate	12:25	11.0	Surface	1st	20.1	8.3	32.1	7.3	7.3	96.8	7.9	7.9	9.6	11.1
							Surface	2nd	20.1	8.3	32.1	7.3						
							Middle	1st	20.1	8.3	32.1	7.3						
							Middle	2nd	20.1	8.3	32.1	7.3	7.3	96.8	7.6			
							Bottom	1st	20.0	8.3	32.1	7.3						
							Bottom	2nd	20.0	8.3	32.1	7.3						
2018-12-14	Mid-Flood	CS(Mf)5	Fine	Moderate	12:47	13.2	Surface	1st	20.9	8.1	33.5	7.1	7.1	96.2	6.8	8.1	7.3	7.7
							Surface	2nd	20.9	8.1	33.5	7.1						
							Middle	1st	20.9	8.1	33.5	7.1						
							Middle	2nd	20.9	8.1	33.5	7.1	7.2	97.0	8.7			
							Bottom	1st	20.9	8.1	33.5	7.2						
							Bottom	2nd	20.9	8.1	33.5	7.2						

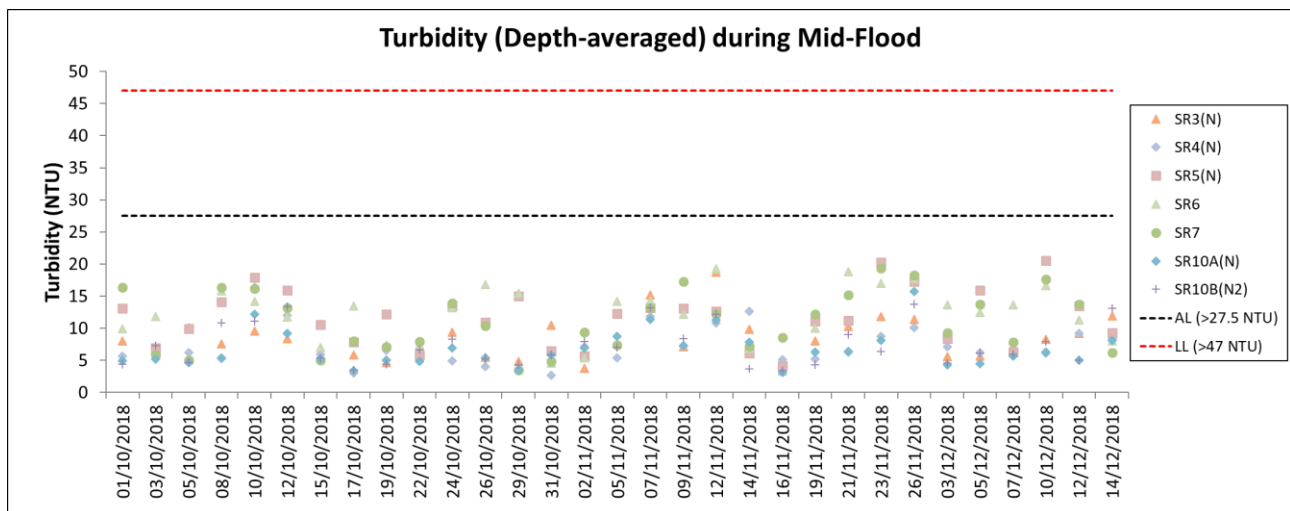
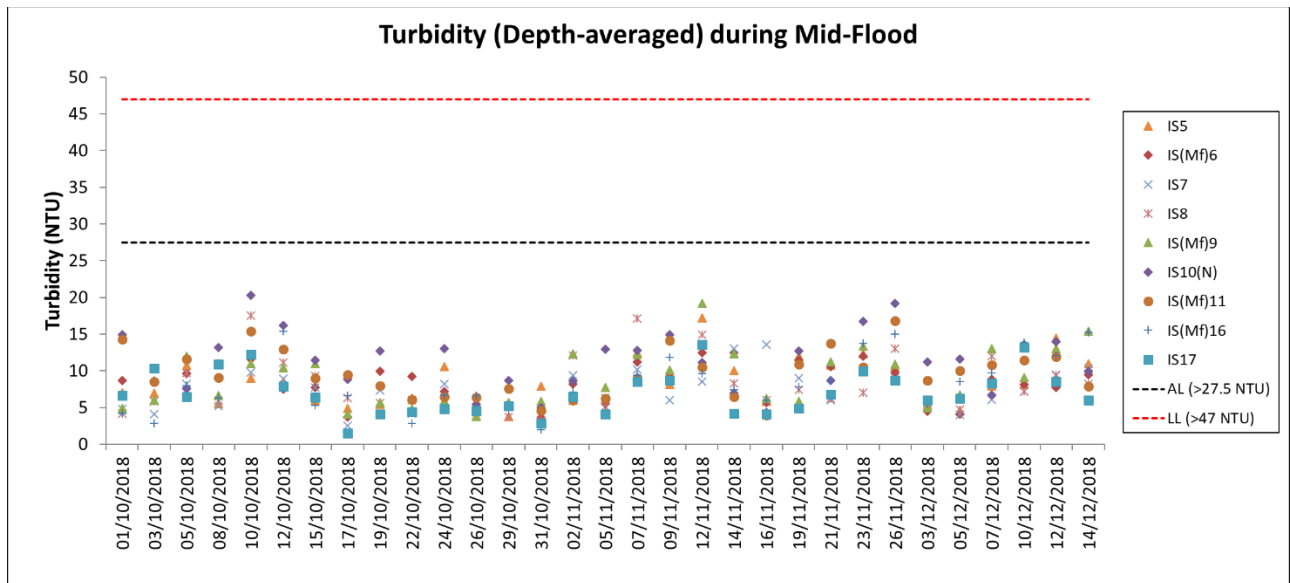
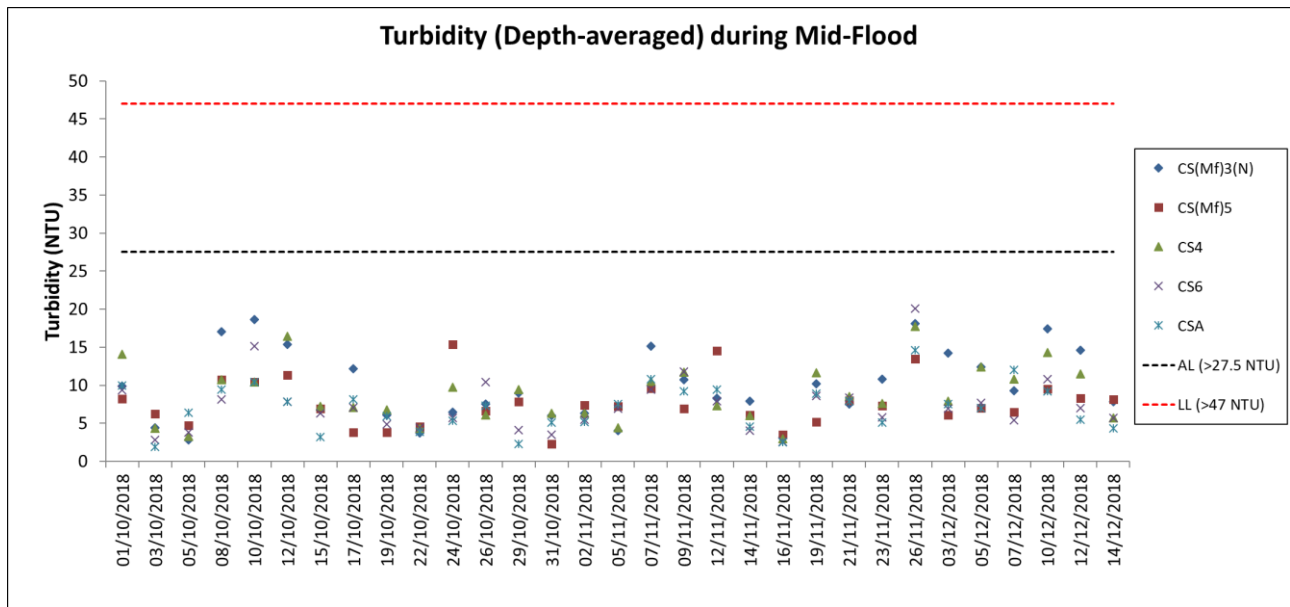
Date (yyyy-mm-dd)	Tide	Station	Weather	Sea condition	Sampling Time	Water Depth (m)	Sampling Water Level	Replicate	Water Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average of DO (mg/L)	DO Saturation (%)	Turbidity (NTU)	Turbidity (NTU) (depth-averaged)	SS	SS (mg/L) (depth-averaged)
2018-12-14	Mid-Flood	SR7	Cloudy	Moderate	12:34	4.1	Surface	1st	20.4	8.3	32.2	7.3	7.3	97.2	5.9	6.2	7.5	7.7
							Surface	2nd	20.4	8.3	32.2	7.3		97.1	5.8		7.4	
							Middle	1st	-	-	-	-	-	-	-	-	-	
							Middle	2nd	-	-	-	-	-	-	-	-	-	
							Bottom	1st	20.3	8.3	32.2	7.4	7.4	98.9	6.4	7.8		
							Bottom	2nd	20.3	8.3	32.2	7.4		98.7	6.5	8.0		
2018-12-14	Mid-Flood	IS17	Fine	Moderate	12:28	10.1	Surface	1st	20.3	8.1	33.3	7.3	7.3	97.5	5.9	6.0	4.5	7.5
							Surface	2nd	20.3	8.1	33.3	7.3		97.5	5.9		4.6	
							Middle	1st	20.4	8.1	33.3	7.3	7.6	97.9	6.0	7.6		
							Middle	2nd	20.4	8.1	33.3	7.3		97.9	6.0	7.9		
							Bottom	1st	20.4	8.1	33.3	7.6	7.6	102.6	6.0	10.0		
							Bottom	2nd	20.4	8.1	33.3	7.6		102.6	6.0	10.2		
2018-12-14	Mid-Flood	IS(Mf)16	Fine	Moderate	12:22	5.2	Surface	1st	19.9	8.1	33.0	7.3	7.3	97.6	14.2	15.2	6.3	7.4
							Surface	2nd	19.9	8.1	33.0	7.3		97.6	14.2		6.0	
							Middle	1st	-	-	-	-	-	-	-	-	-	
							Middle	2nd	-	-	-	-	-	-	-	-	-	
							Bottom	1st	19.9	8.1	33.1	7.4	7.4	98.2	16.1	8.6		
							Bottom	2nd	19.9	8.1	33.1	7.4		98.2	16.1	8.8		
2018-12-14	Mid-Flood	IS8	Fine	Moderate	12:05	4.6	Surface	1st	20.2	8.1	32.8	7.2	7.2	96.4	8.2	8.2	16.4	17.7
							Surface	2nd	20.2	8.1	32.8	7.2		96.4	8.2		16.8	
							Middle	1st	-	-	-	-	-	-	-	-	-	
							Middle	2nd	-	-	-	-	-	-	-	-	-	
							Bottom	1st	20.2	8.1	32.9	7.3	7.3	98.4	8.2	18.6		
							Bottom	2nd	20.2	8.1	32.9	7.3		98.4	8.2	18.9		
2018-12-14	Mid-Flood	SR4(N)	Fine	Moderate	12:09	3.8	Surface	1st	20.0	8.1	32.6	7.1	7.1	95.3	7.9	8.4	8.4	9.8
							Surface	2nd	20.0	8.1	32.6	7.1		95.3	7.9		8.0	
							Middle	1st	-	-	-	-	-	-	-	-	-	
							Middle	2nd	-	-	-	-	-	-	-	-	-	
							Bottom	1st	20.3	8.1	33.0	7.4	7.4	99.3	8.8	11.2		
							Bottom	2nd	20.3	8.1	33.0	7.4		99.3	8.8	11.6		
2018-12-14	Mid-Flood	IS(Mf)9	Fine	Moderate	11:58	4.2	Surface	1st	19.6	8.1	32.4	7.3	7.3	96.5	13.8	15.4	9.4	10.6
							Surface	2nd	19.6	8.1	32.4	7.3		96.5	13.8		9.6	
							Middle	1st	-	-	-	-	-	-	-	-	-	
							Middle	2nd	-	-	-	-	-	-	-	-	-	
							Bottom	1st	19.6	8.1	32.4	7.8	7.8	101.7	16.9	11.7		
							Bottom	2nd	19.6	8.1	32.4	7.7		101.7	16.9	11.8		
2018-12-14	Mid-Flood	IS7	Fine	Moderate	11:51	2.8	Surface	1st	-	-	-	-	7.8	-	-	10.3	-	10.2
							Surface	2nd	-	-	-	-		-	-		-	
							Middle	1st	19.3	8.0	32.3	7.8	7.8	101.9	10.3	10.4		
							Middle	2nd	19.3	8.0	32.3	7.8		101.9	10.3	10.0		
							Bottom	1st	-	-	-	-	-	-	-	-	-	
							Bottom	2nd	-	-	-	-	-	-	-	-	-	
2018-12-14	Mid-Flood	IS(Mf)6	Fine	Moderate	11:44	2.6	Surface	1st	-	-	-	-	7.7	-	-	9.5	-	10.9
							Surface	2nd	-	-	-	-		-	-		-	
							Middle	1st	19.4	8.1	32.3	7.7	7.7	101.4	9.5	11.0		
							Middle	2nd	19.4	8.1	32.3	7.7		101.4	9.5	10.8		
							Bottom	1st	-	-	-	-	-	-	-	-	-	
							Bottom	2nd	-	-	-	-	-	-	-	-	-	
2018-12-14	Mid-Flood	IS5	Fine	Moderate	11:38	9.5	Surface	1st	19.2	8.1	32.2	7.7	7.7	99.0	8.7	11.0	9.1	9.4
							Surface	2nd	19.2	8.1	32.2	7.7		98.0	8.7		8.8	
							Middle	1st	19.1	8.1	32.2	7.8	7.8	99.1	12.0	9.0		
							Middle	2nd	19.1	8.1	32.2	7.6		99.1	12.0	9.1		
							Bottom	1st	19.1	8.1	32.2	7.7	7.7	100.4	12.3	10.0		
							Bottom	2nd	19.1	8.1	32.2	7.7		100.4	12.3	10.2		
2018-12-14	Mid-Flood	SR3(N)	Fine	Moderate	11:33	3.6	Surface	1st	19.1	8.1	32.2	7.4	7.4	95.8	11.7	11.9	11.2	11.7
							Surface	2nd	19.1	8.1	32.2	7.3		95.8	11.7		11.0	
							Middle	1st	-	-	-	-	-	-	-	-	-	
							Middle	2nd	-	-	-	-	-	-	-	-	-	
							Bottom	1st	19.1	8.1	32.2	7.4	7.4	96.3	12.0	12.1		
							Bottom	2nd	19.1	8.1	32.2	7.4		96.3	12.0	12.3		

Remark: The water quality monitoring programme by ET was resumed on 3 December 2018 to align with the Contractor’s tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.



Remarks:

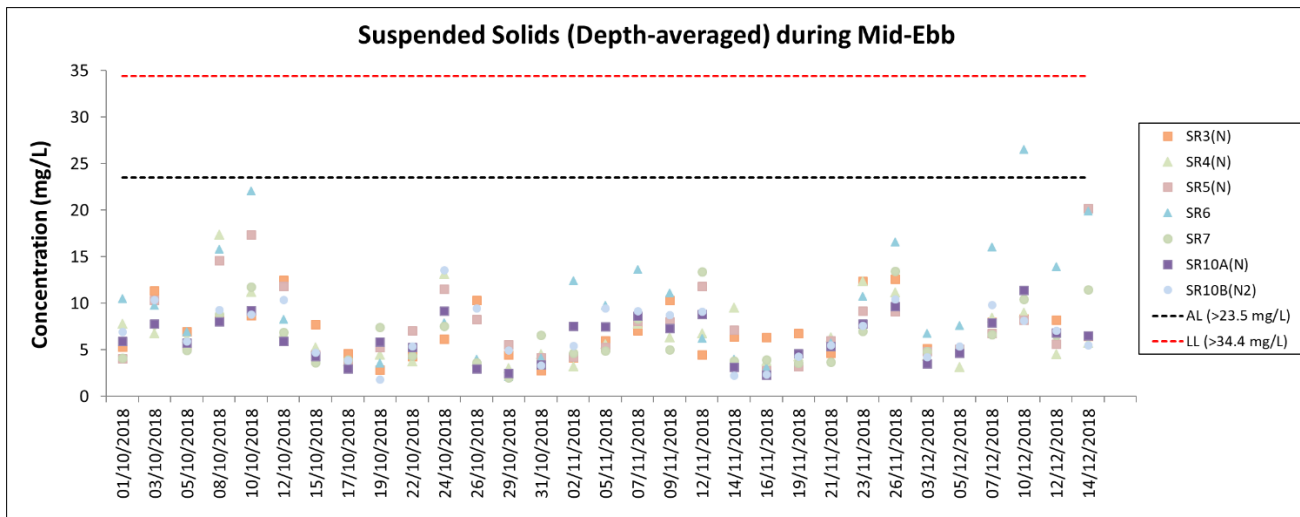
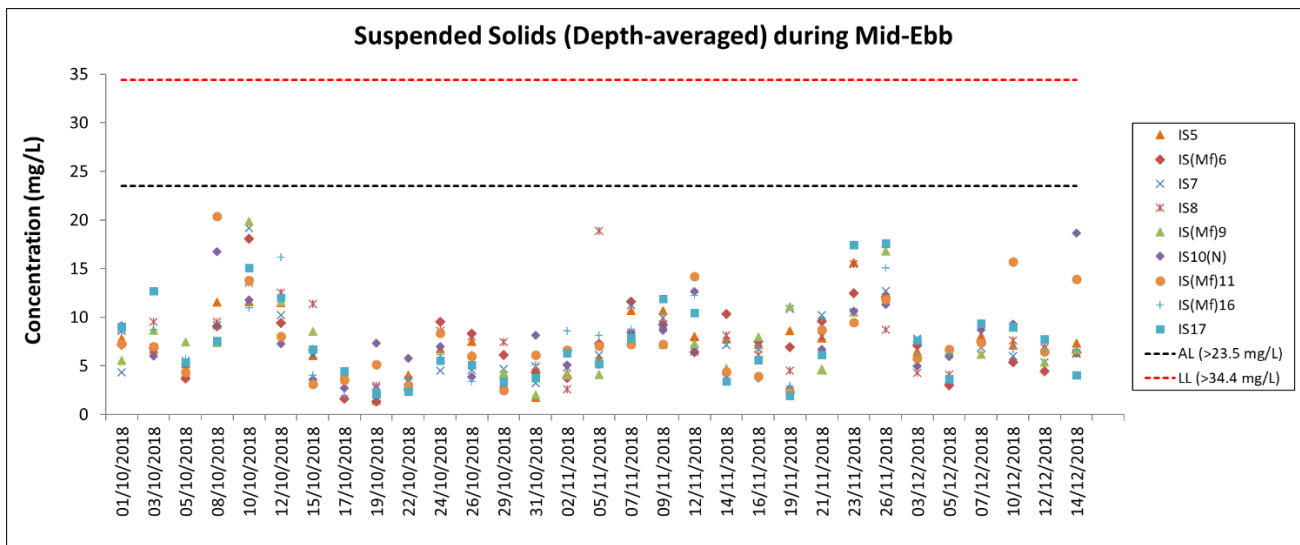
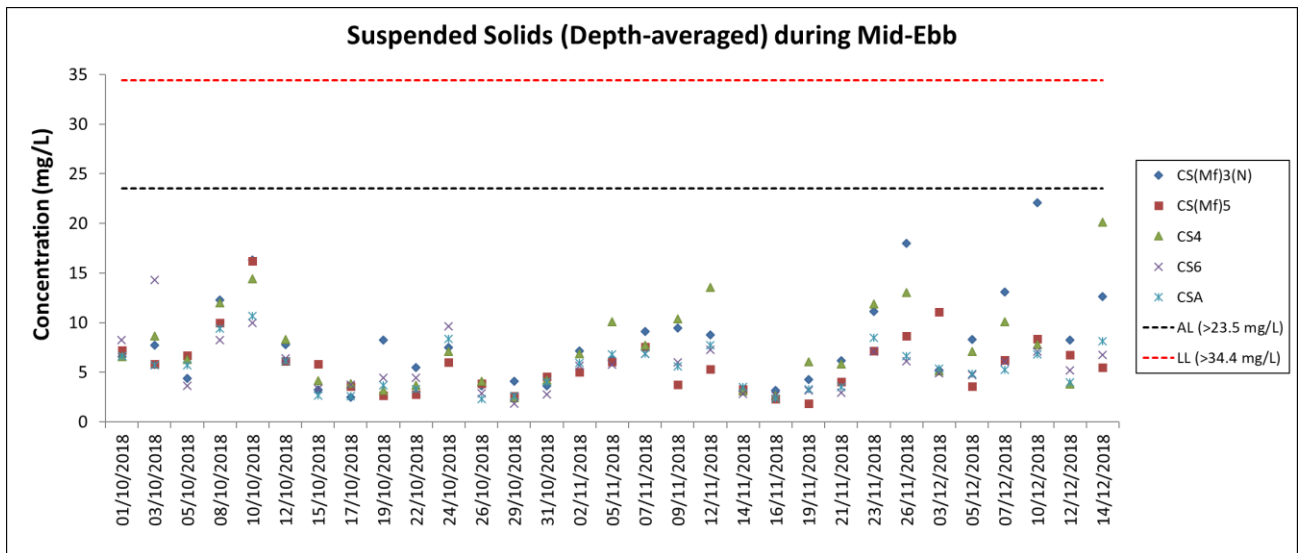
1. The water quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 "Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building". Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.
2. The water quality monitoring programme by ET was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.



Remarks:

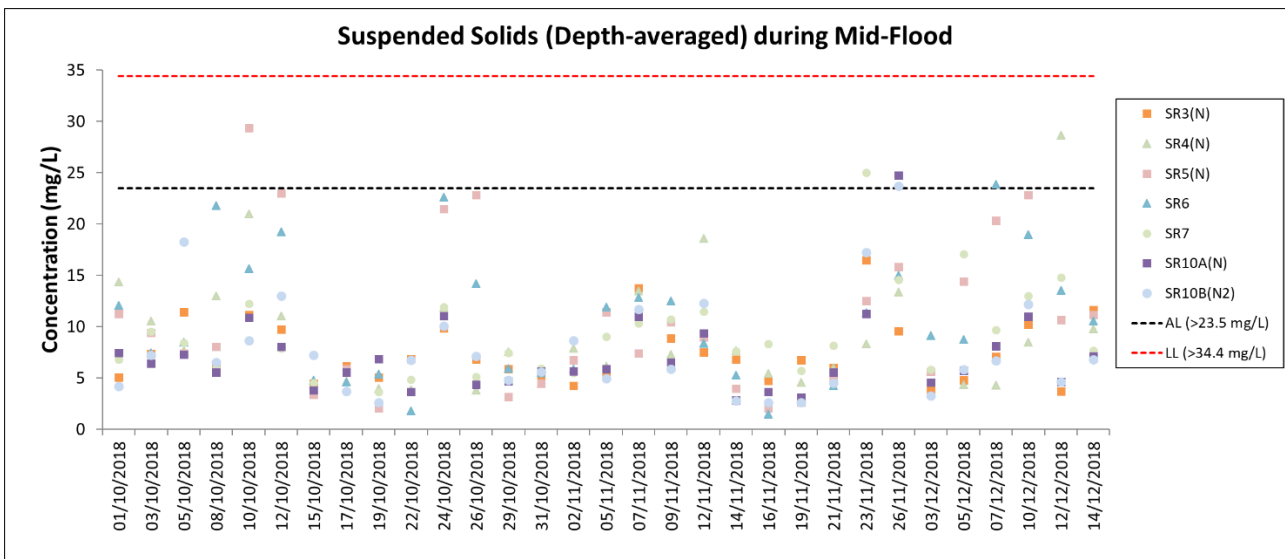
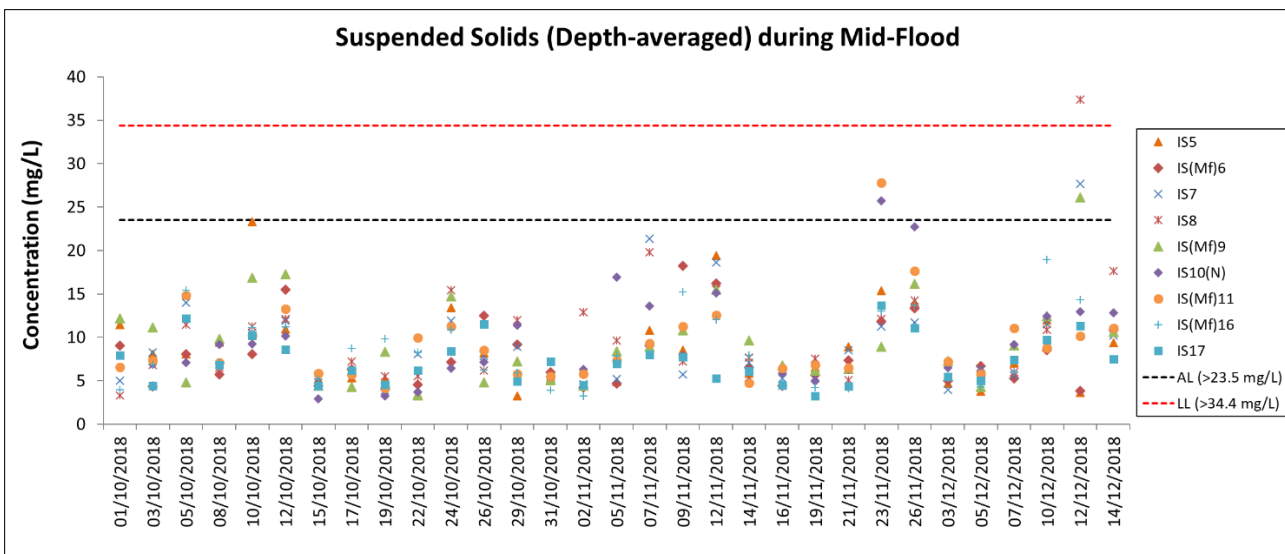
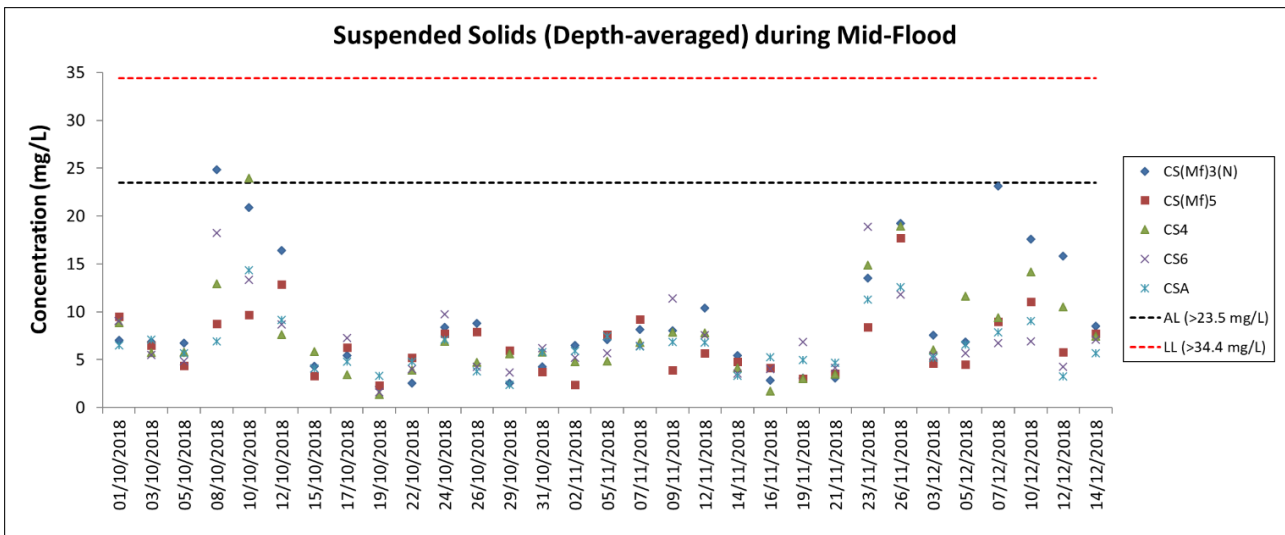
1. The water quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 "Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building". Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.

2. The water quality monitoring programme by ET was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.



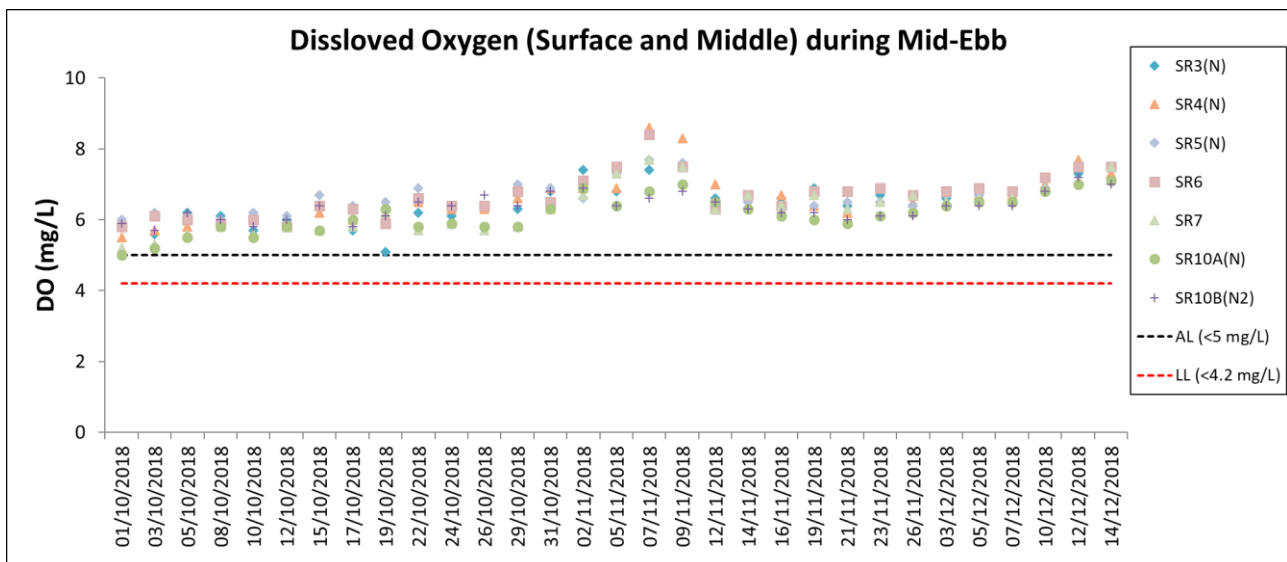
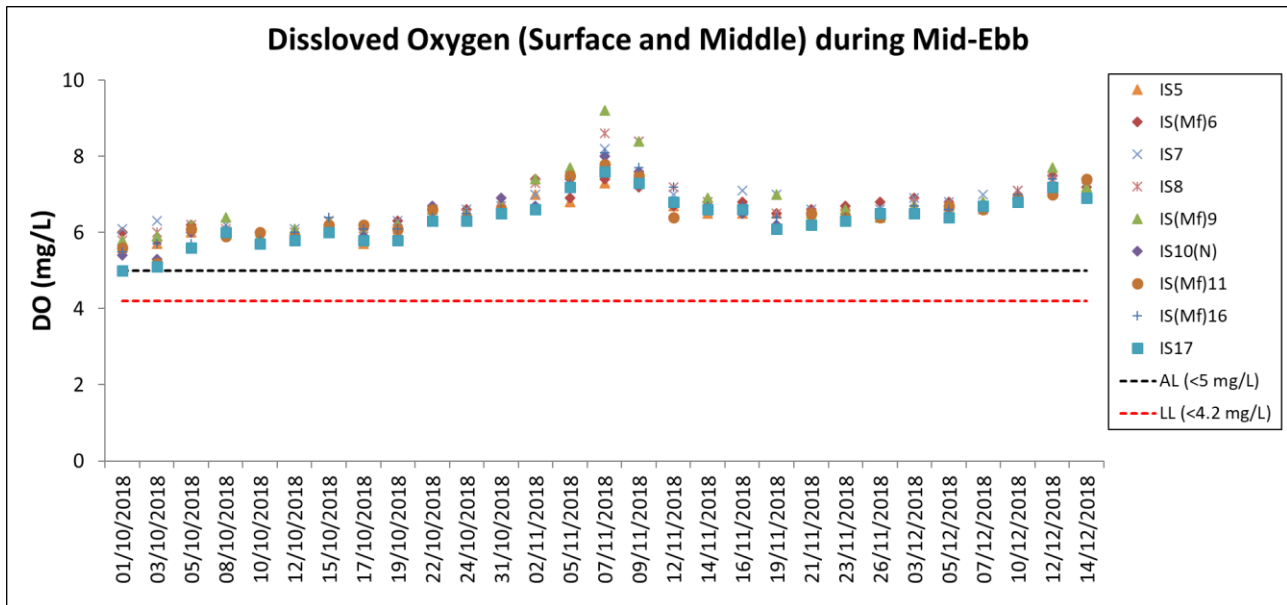
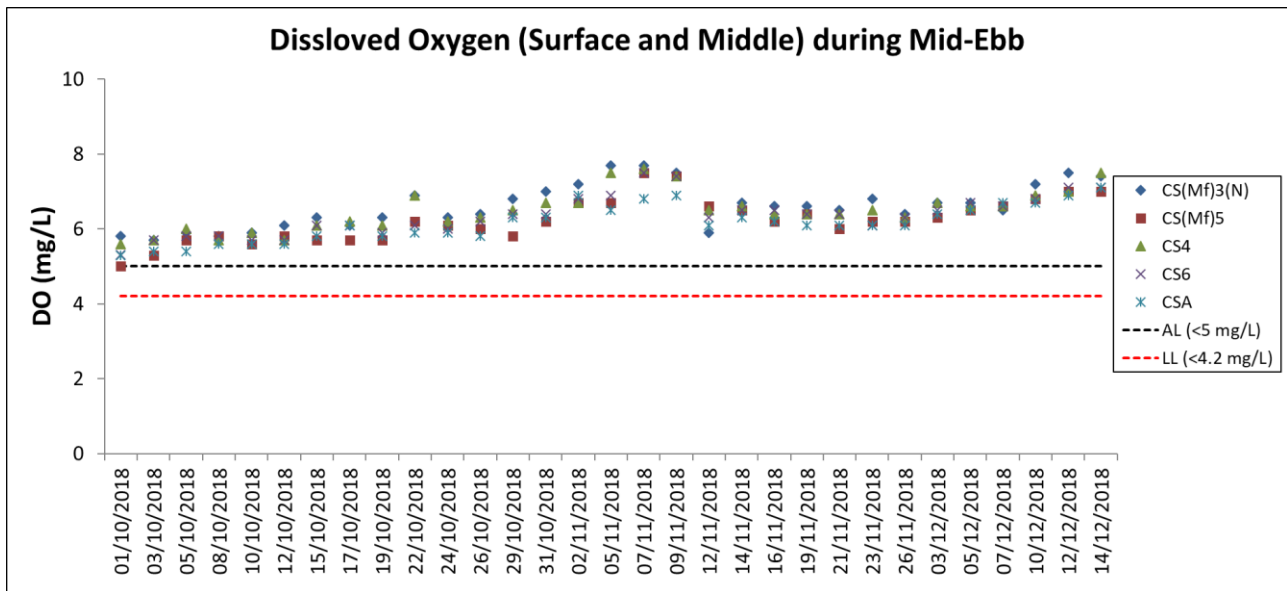
Remarks:

1. The water quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 "Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building". Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.
2. The water quality monitoring programme by ET was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.



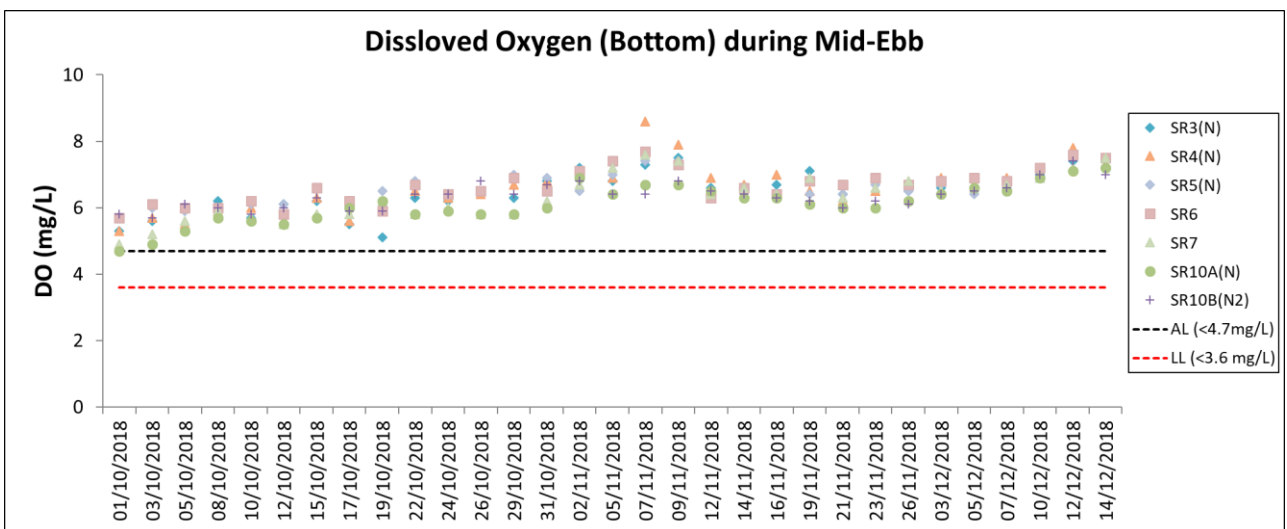
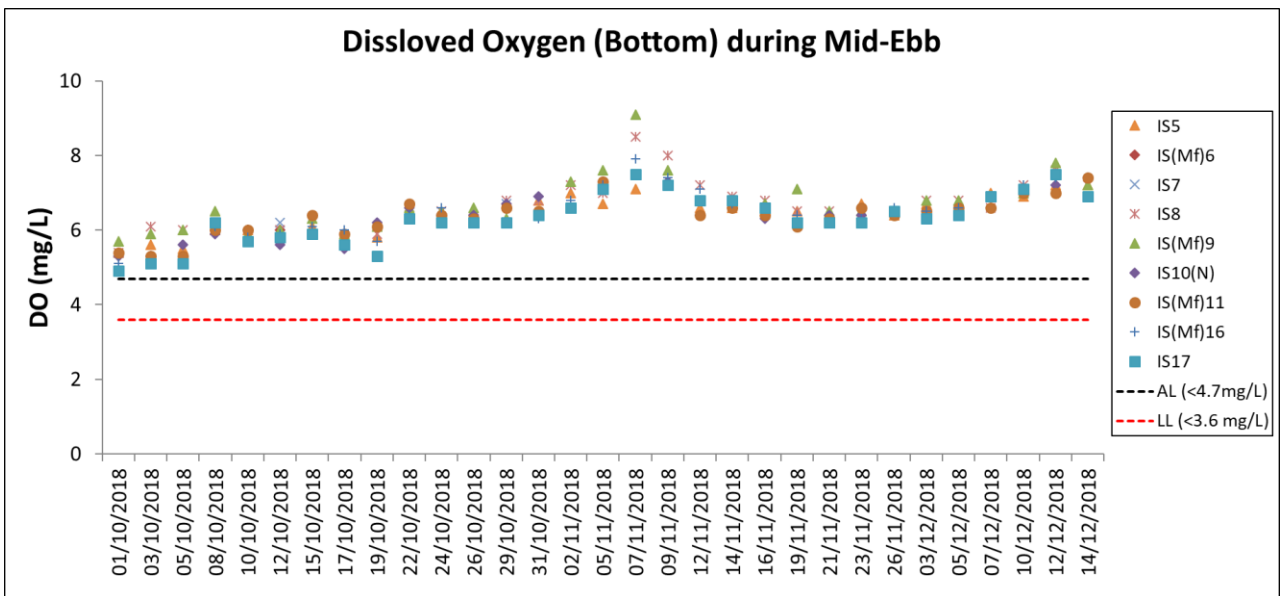
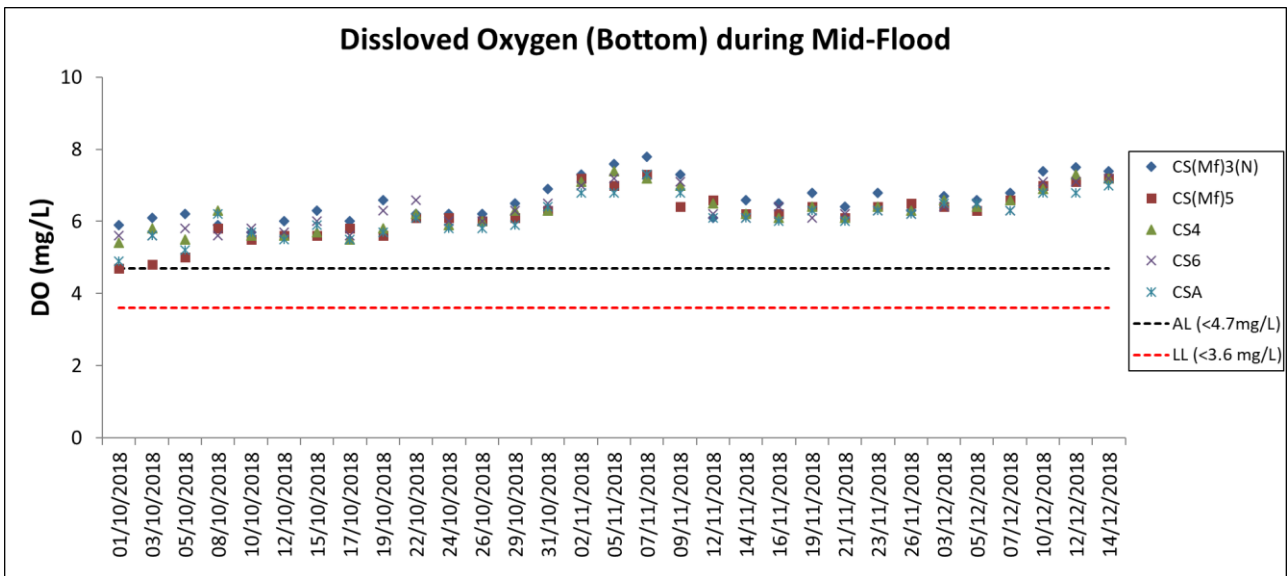
Remarks:

1. The water quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 "Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building". Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.
2. The water quality monitoring programme by ET was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.



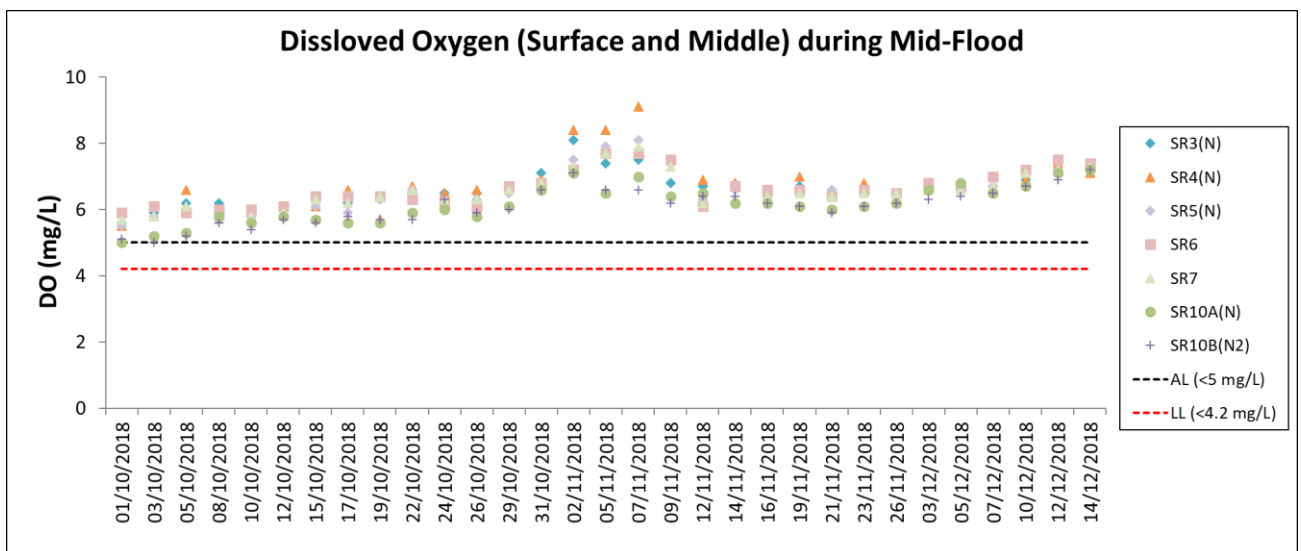
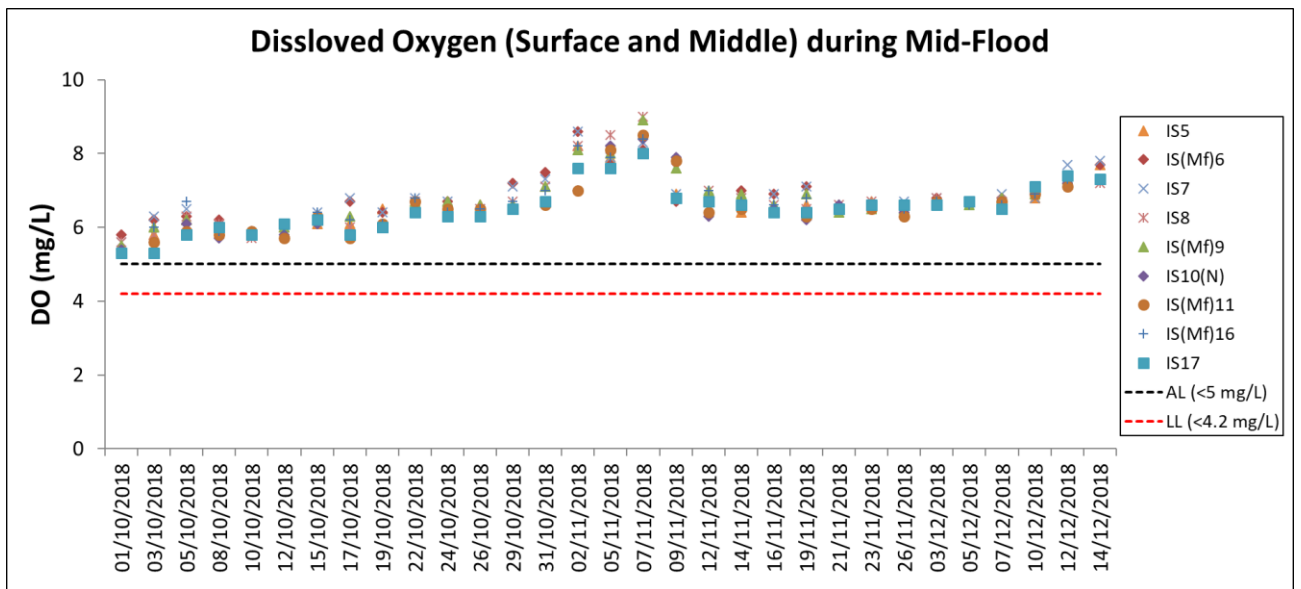
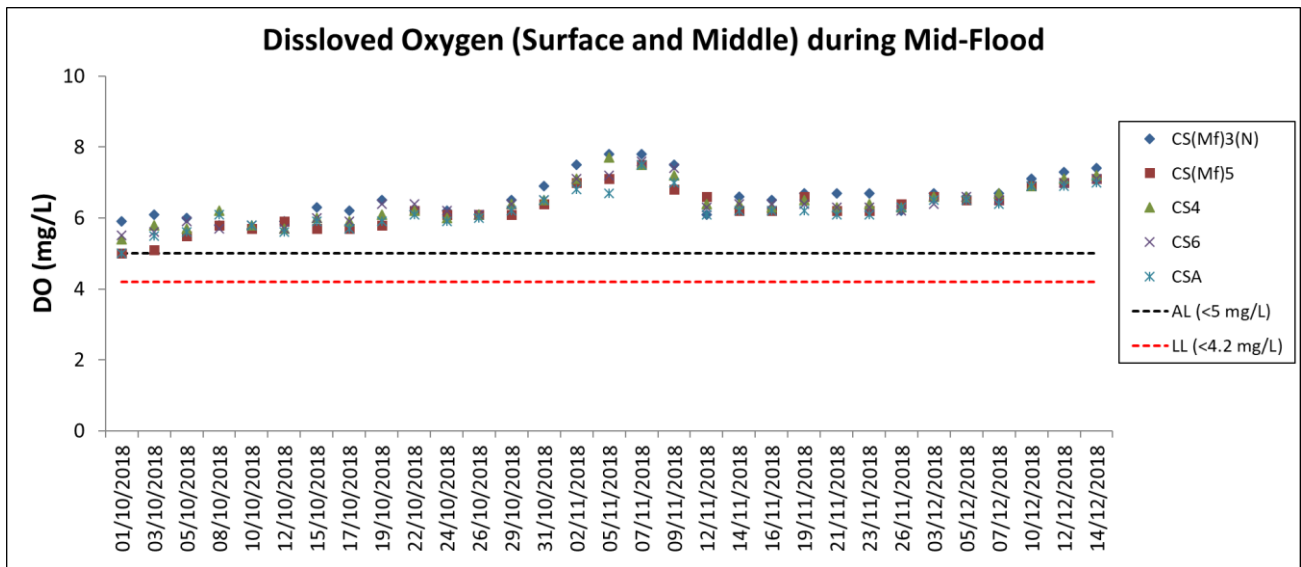
Remarks:

1. The water quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 "Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building". Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.
2. The water quality monitoring programme by ET was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.



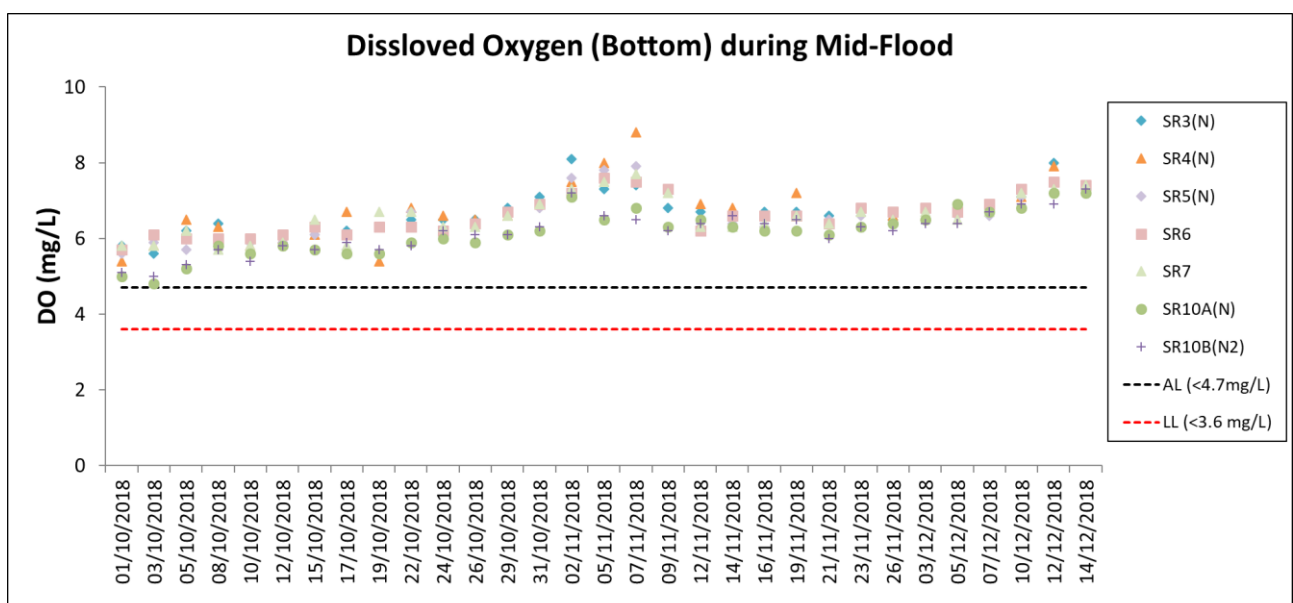
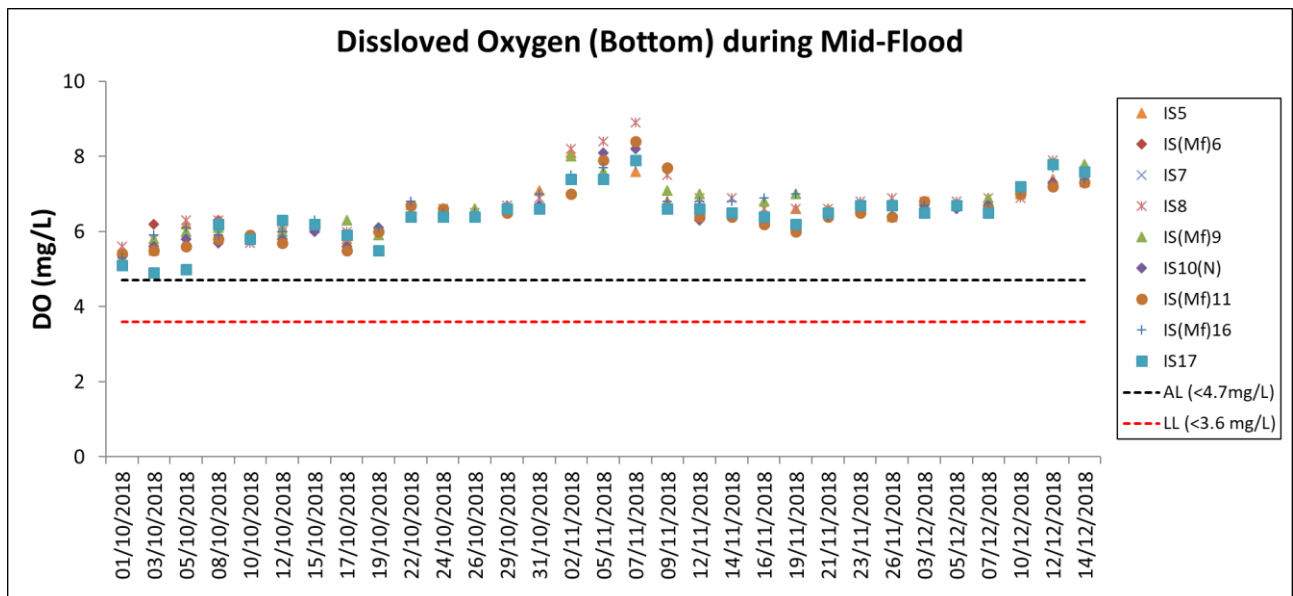
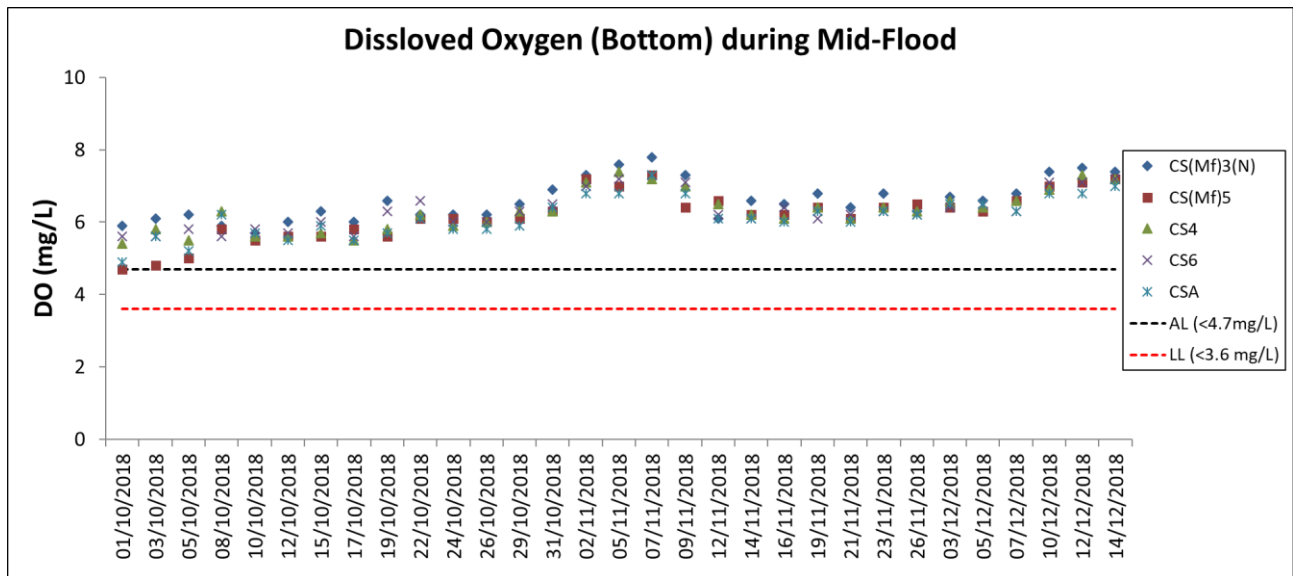
Remarks:

1. The water quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 "Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building". Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.
2. The water quality monitoring programme by ET was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.



Remarks:

1. The water quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 "Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building". Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.
2. The water quality monitoring programme by ET was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.



Remarks:

1. The water quality monitoring before 1 October 2018 was conducted by Contract No. HY/2013/01 "Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building". Please refer the monitoring results in September 2018 in the published Monthly EM&A Report for Contract No. HY/2013/01.
2. The water quality monitoring programme by ET was resumed on 3 December 2018 to align with the Contractor's tentative schedule of marine works, and again temporarily suspended after completion of water quality monitoring on 14 December 2018 after the Contractor confirmed that no marine works were scheduled for the remainder of the reporting month.

Appendix L. Dolphin Monitoring Results

CONTRACT NO. HY/2013/04

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing
Facilities – Infrastructure Works Stage II (Southern Portion)
Dolphin Monthly Monitoring**

Monthly Progress Report (December 2018)

*Submitted to Mott MacDonald Hong Kong Limited &
China State Construction Engineering (Hong Kong) Limited*

Submitted by
Samuel K.Y. Hung, Ph.D.,
Hong Kong Cetacean Research Project

20 December 2018

1. Introduction

- 1.1. For the Hong Kong-Zhuhai-Macao Bridge (HZMB) Hong Kong Boundary Crossing Facilities (HKBCF), the construction of the Infrastructure Works Stage II (Southern Portion) requires the contractor (i.e. China State Construction Engineering (Hong Kong) Limited) and the associated environmental team (Mott MacDonald Hong Kong Limited) to implement the Environmental Monitoring and Audit (EM&A) programme.
- 1.2. According to the HKBCF EM&A Manual, monthly line-transect vessel surveys for Chinese White Dolphins should be conducted to cover the Northwest (NWL) and Northeast Lantau (NEL) survey areas, which should be the same as in AFCD annual marine mammal monitoring programme. However, as such construction-phase monitoring surveys have been undertaken by the HKLR03 project in the same areas (i.e. NWL and NEL), a combined monitoring approach is recommended by the Highways Department, that the HKBCF EM&A project should utilize the monitoring data collected by HKLR03 project to avoid any redundancy in monitoring effort.
- 1.3. In October 2018, the Director of Hong Kong Cetacean Research Project (HKCRP), Dr. Samuel Hung, has been appointed by the environmental team as the dolphin specialist for the HKBCF EM&A project. He is responsible for the dolphin monitoring study,

including the collection and collation of dolphin monitoring data from the HKLR03 project to examine any potential impacts of HKBCF constructions works on the dolphins. From the monitoring results, any changes in dolphin occurrence within the study area will be reviewed for possible causes, and appropriate actions and additional mitigation measures will be recommended as necessary.

- 1.4. The present monthly progress report of this HKBCF construction-phase dolphin monitoring programme is submitted to the environmental team and the contractor, summarizing the results of the survey findings during the month of December 2018 by utilizing the survey data collected from the HKLR03 project.

2. Monitoring Methodology

2.1. Vessel-based Line-transect Survey

- 2.1.1. According to the requirement of the updated EM&A manual, the dolphin monitoring programme should cover all transect lines in NEL and NWL survey areas (see Figure 1) twice per month throughout the entire construction period. The co-ordinates of all transect lines are shown in Table 1.

Table 1 Co-ordinates of transect lines

Line No.		Easting	Northing		Line No.		Easting	Northing
1	Start Point	804671	815456		13	Start Point	816506	819480
1	End Point	804671	831404		13	End Point	816506	824859
2	Start Point	805476	820800		14	Start Point	817537	820220
2	End Point	805476	826654		14	End Point	817537	824613
3	Start Point	806464	821150		15	Start Point	818568	820735
3	End Point	806464	822911		15	End Point	818568	824433
4	Start Point	807518	821500		16	Start Point	819532	821420
4	End Point	807518	829230		16	End Point	819532	824209
5	Start Point	808504	821850		17	Start Point	820451	822125
5	End Point	808504	828602		17	End Point	820451	823671
6	Start Point	809490	822150		18	Start Point	821504	822371

6	End Point	809490	825352		18	End Point	821504	823761
7	Start Point	810499	822000		19	Start Point	822513	823268
7	End Point	810499	824613		19	End Point	822513	824321
8	Start Point	811508	821123		20	Start Point	823477	823402
8	End Point	811508	824254		20	End Point	823477	824613
9	Start Point	812516	821303		21	Start Point	805476	827081
9	End Point	812516	824254		21	End Point	805476	830562
10	Start Point	813525	821176		22	Start Point	806464	824033
10	End Point	813525	824657		22	End Point	806464	829598
11	Start Point	814556	818853		23	Start Point	814559	821739
11	End Point	814556	820992		23	End Point	814559	824768
12	Start Point	815542	818807		24	Start Point	805476	815900
12	End Point	815542	824882		24	End Point	805476	819100

2.1.2. The HKLR03 survey team used standard line-transect methods (Buckland et al. 2001) to conduct the systematic vessel surveys, and followed the same technique of data collection that has been adopted over the last 20 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 2017, 2018). For each monitoring vessel survey, a 15-m inboard vessel with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area.

2.1.3. Two experienced observers (a data recorder and a primary observer) made up the on-effort survey team, and the survey vessel transited different transect lines at a constant speed of 13-15 km per hour. The data recorder searched with unaided eyes and filled out the datasheets, while the primary observer searched for dolphins and porpoises continuously through 7 x 50 *Fujinon* marine binoculars. Both observers searched the sea ahead of the vessel, between 270° and 90° (in relation to the bow, which is defined as 0°). One to two additional experienced observers were available on the boat to work in shift (i.e. rotate every 30 minutes) in order to minimize fatigue of the survey team members. All observers were experienced in small cetacean survey techniques and identifying local cetacean species.

2.1.4. During on-effort survey periods, the survey team recorded effort data including time, position (latitude and longitude), weather conditions (Beaufort sea state and visibility),

and distance traveled in each series (a continuous period of search effort) with the assistance of a handheld GPS (*Garmin eTrex Legend*).

- 2.1.5. Data including time, position and vessel speed were also automatically and continuously logged by handheld GPS throughout the entire survey for subsequent review.
- 2.1.6. When dolphins were sighted, the survey team would end the survey effort, and immediately record the initial sighting distance and angle of the dolphin group from the survey vessel, as well as the sighting time and position. Then the research vessel was diverted from its course to approach the animals for species identification, group size estimation, assessment of group composition, and behavioural observations. The perpendicular distance (PSD) of the dolphin group to the transect line was later calculated from the initial sighting distance and angle.
- 2.1.7. Survey effort being conducted along the parallel transect lines that were perpendicular to the coastlines (as indicated in Figure 1) was labeled as “primary” survey effort, while the survey effort conducted along the connecting lines between parallel lines was labeled as “secondary” survey effort. According to HKCRP long-term dolphin monitoring data, encounter rates of Chinese White Dolphins deduced from effort and sighting data collected along primary and secondary lines were similar in NEL and NWL survey areas. Therefore, both primary and secondary survey effort were presented as on-effort survey effort in this report.
- 2.1.8. Encounter rates of Chinese White Dolphins (number of on-effort sightings per 100 km of survey effort and number of dolphins from all on-effort sightings per 100 km of survey effort) were calculated in NEL and NWL survey areas in relation to the amount of survey effort conducted during each month of monitoring survey. Only data collected under Beaufort 3 or below condition would be used for encounter rate analysis. Dolphin encounter rates were calculated using primary survey effort alone, as well as the combined survey effort from both primary and secondary lines.

2.2. *Photo-identification Work*

- 2.2.1. When a group of Chinese White Dolphins were sighted during the line-transect survey, the HKLR03 survey team would end effort and approach the group slowly from the side and behind to take photographs of them. Every attempt was made to photograph every dolphin in the group, and even photograph both sides of the dolphins, since the colouration and markings on both sides may not be symmetrical.
- 2.2.2. A professional digital camera (*Canon EOS 7D model*), equipped with long telephoto

lenses (100-400 mm zoom), were available on board for researchers to take sharp, close-up photographs of dolphins as they surfaced. The images were shot at the highest available resolution and stored on Compact Flash memory cards for downloading onto a computer.

- 2.2.3. All digital images taken in the field were first examined, and those containing potentially identifiable individuals were sorted out. These photographs would then be examined in greater detail, and were carefully compared to the existing Chinese White Dolphin photo-identification catalogue maintained by HKCRP since 1995.
- 2.2.4. Chinese White Dolphins can be identified by their natural markings, such as nicks, cuts, scars and deformities on their dorsal fin and body, and their unique spotting patterns were also used as secondary identifying features (Jefferson 2000).
- 2.2.5. All photographs of each individual were then compiled and arranged in chronological order, with data including the date and location first identified (initial sighting), re-sightings, associated dolphins, distinctive features, and age classes entered into a computer database.

3. Monitoring Results

3.1. Vessel-based Line-transect Survey

- 3.1.1. Under the HKLR03 dolphin monitoring programme, two sets of systematic line-transect vessel surveys were conducted on the 3rd, 5th, 10th and 12th of December 2018, to cover all transect lines in NWL and NEL survey areas twice during the monitoring month. The survey routes of each survey day are presented in Figures 2-5.
- 3.1.2. From the two sets of HKLR03 surveys conducted in December 2018, 261.96 km of survey effort was collected, with 90.3% of the total survey effort being conducted under favourable weather conditions (i.e. Beaufort Sea State 3 or below with good visibility) (Appendix I).
- 3.1.3. Among the NEL and NWL survey areas, 97.00 km and 164.96 km of survey effort were conducted respectively. Moreover, the total survey effort conducted on primary and secondary lines were 193.46 km and 68.50 km respectively (Appendix I).
- 3.1.4. Only two groups of six Chinese White Dolphins were sighted during the two sets of HKLR03 monitoring surveys conducted in December 2018 (Appendix II). Both dolphin

groups were sighted in NWL, while no dolphin was sighted at all in NEL. Notably, the two dolphin sightings were both made on primary lines during on-effort search (Appendix II). None of them was associated with any operating fishing vessel.

- 3.1.5. Distribution of dolphin sightings made in this monitoring month is shown in Figure 6. The two dolphin groups were sighted to the west of Lung Kwu Chau and near Lung Kwu Tan respectively (Figure 6). Notably, they were made very far away from the HKBCF reclamation site, as well as the HKLR03 reclamation site and TMCLKL/HKLR09 alignments (Figure 6).
- 3.1.6. From the HKLR03 surveys conducted in December 2018, the encounter rates of Chinese White Dolphins deduced from the survey effort and on-effort sighting data made under favourable conditions (Beaufort 3 or below) are shown in Tables 2 & 3.

Table 2. Dolphin encounter rates deduced from the two sets of HKLR03 surveys (two surveys in each set) conducted in December 2018 in Northeast (NEL) and Northwest Lantau (NWL)

		Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)	Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)
		Primary Lines Only	Primary Lines Only
NEL	Set 1: December 3 rd / 5 th	0.0	0.0
	Set 2: December 10 th / 12 th	0.0	0.0
NWL	Set 1: December 3 rd / 5 th	4.0	11.9
	Set 2: December 10 th / 12 th	0.0	0.0

Table 3. Overall dolphin encounter rates (sightings per 100 km of survey effort) from the two sets of HKLR03 surveys conducted in December 2018 on primary lines only as well as both primary lines and secondary lines in Northeast (NEL) and Northwest Lantau (NWL)

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)		Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)	
	Primary Lines Only	Both Primary and Secondary Lines	Primary Lines Only	Both Primary and Secondary Lines
Northeast Lantau	0.0	0.0	0.0	0.0
Northwest Lantau	1.9	1.4	5.7	4.3

- 3.1.7. The average dolphin group size recorded during the December's surveys was just 3.0

individuals per group, as there were only two groups of one and five dolphins being sighted respectively (Appendix II). Such average was lower than the ones recorded in previous monitoring months.

3.2. *Photo-identification Work*

3.2.1. During the two sets of HKLR03 surveys conducted in December 2018, three known individual dolphins were sighted three times in total (Appendices III and IV). All three known individuals were re-sighted only once.

3.2.2. None of these identified individuals was sighted with any young calf during their re-sightings in this monitoring month.

4. **Conclusion**

4.1. During this month of dolphin monitoring, no adverse impact from the construction activities of the HKBCF on Chinese White Dolphins was noticeable from general observations.

4.2. Due to monthly variation in dolphin occurrence within the study area, it would be more appropriate to draw conclusion on whether any impacts on dolphins have been detected related to the construction activities of the HKBCF in the quarterly EM&A reports, where comparison on distribution, group size and encounter rates of dolphins between the quarterly impact monitoring period and baseline monitoring period will be made.

5. **References**

Buckland, S. T., Anderson, D. R., Burnham, K. P., Laake, J. L., Borchers, D. L., and Thomas, L. 2001. Introduction to distance sampling: estimating abundance of biological populations. Oxford University Press, London.

Hung, S. K. 2017. Monitoring of Marine Mammals in Hong Kong waters: final report (2016-17). An unpublished report submitted to the Agriculture, Fisheries and Conservation Department, 162 pp.

Hung, S. K. 2018. Monitoring of Marine Mammals in Hong Kong waters: final report (2017-18). An unpublished report submitted to the Agriculture, Fisheries and Conservation Department, 163 pp.

Jefferson, T. A. 2000. Population biology of the Indo-Pacific hump-backed dolphin in Hong Kong waters. *Wildlife Monographs* 144:1-65.

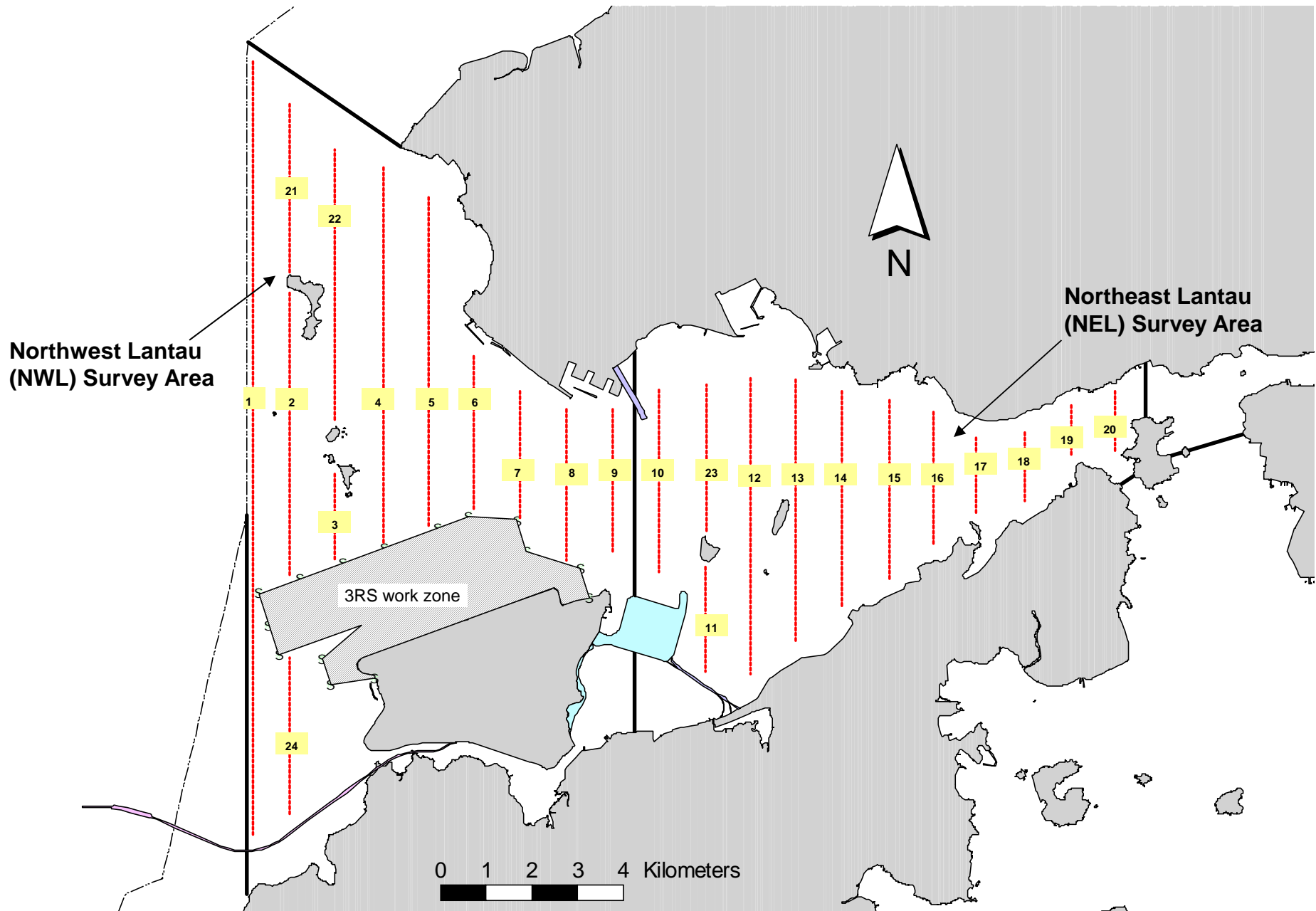


Figure 1. Transect Line Layout in Northwest and Northeast Lantau Survey Areas

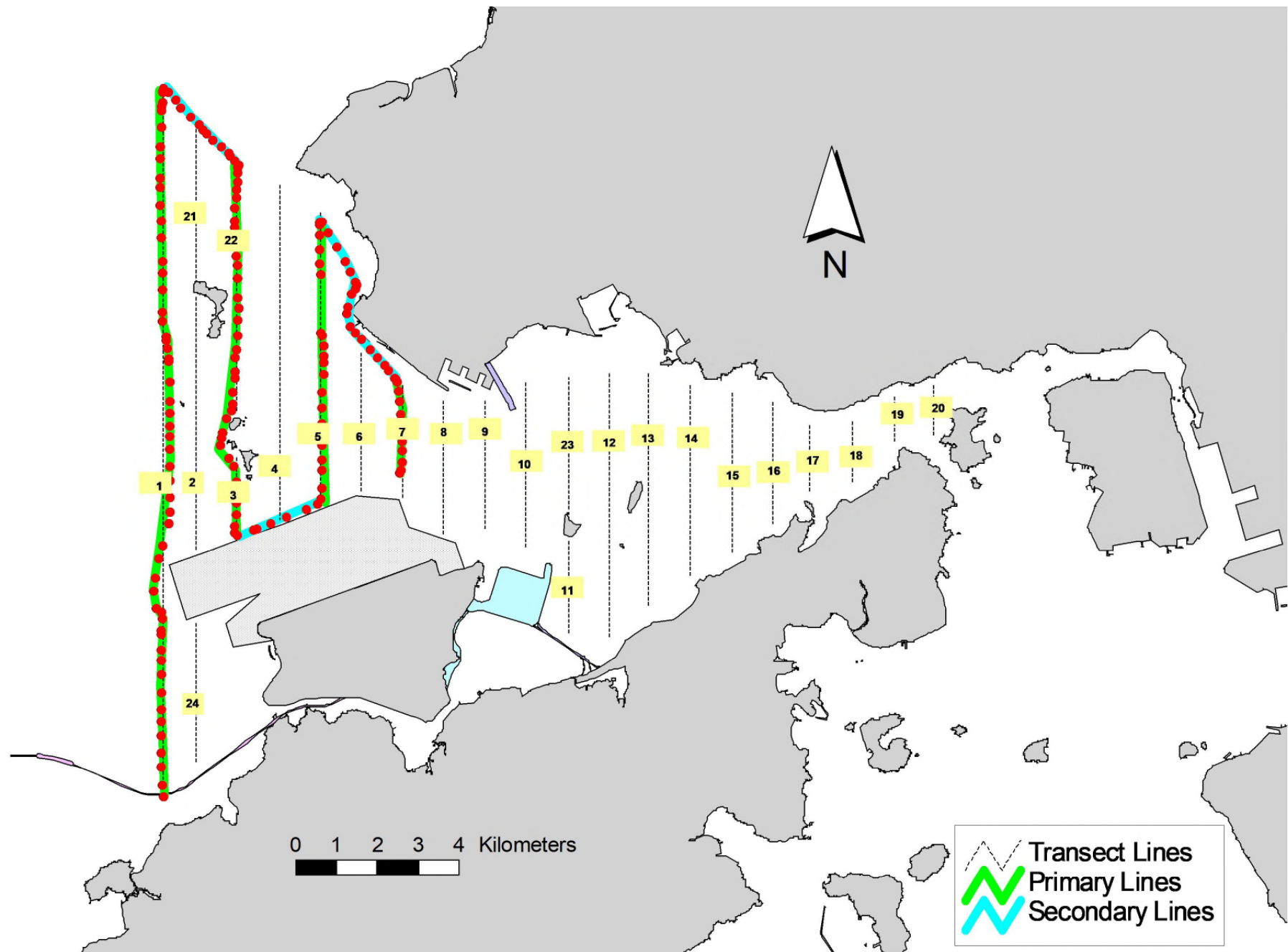


Figure 2. Survey Route on December 3rd, 2018 (from HKLR03 project)

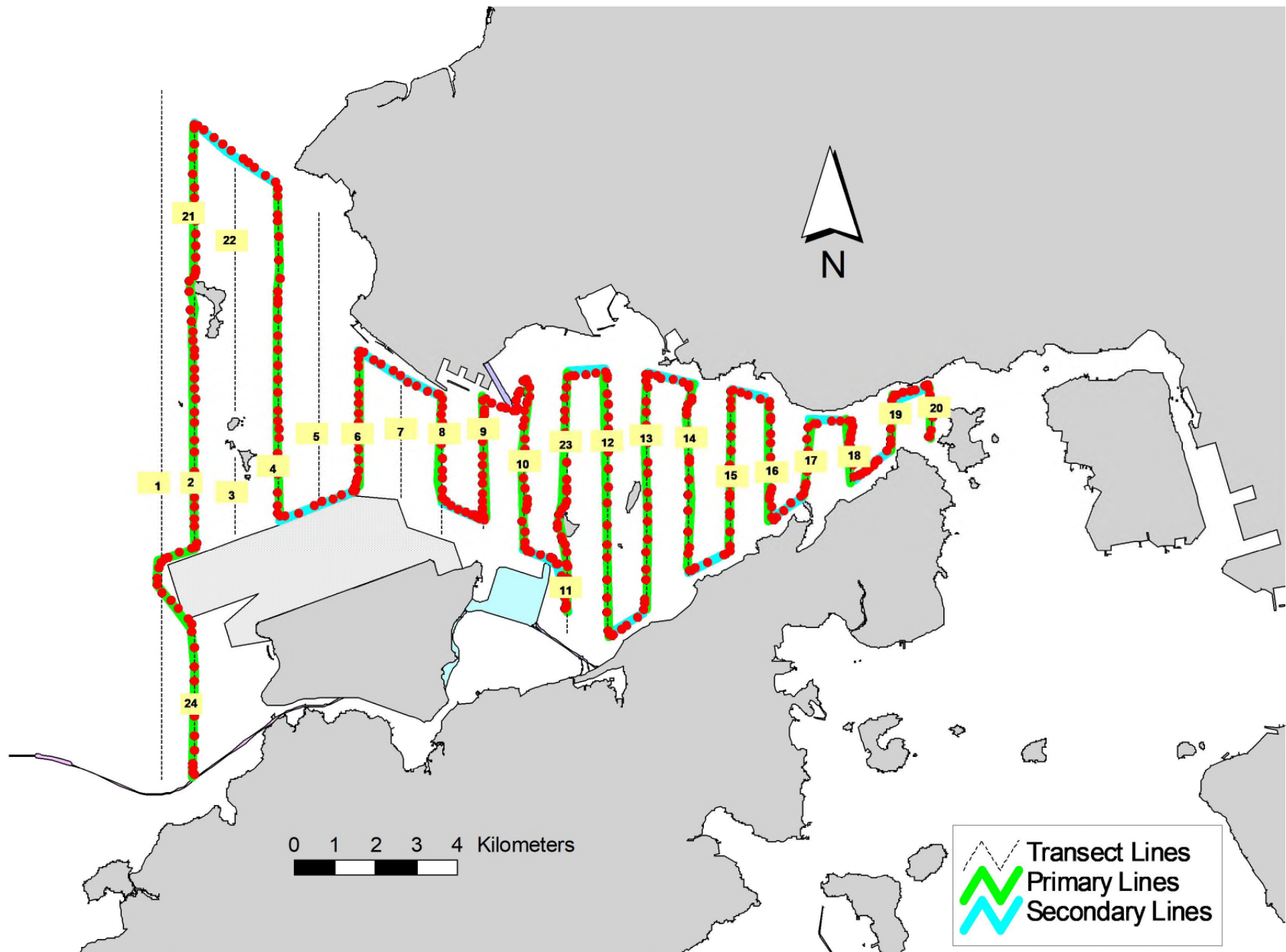


Figure 3. Survey Route on December 5th, 2018 (from HKLR03 project)

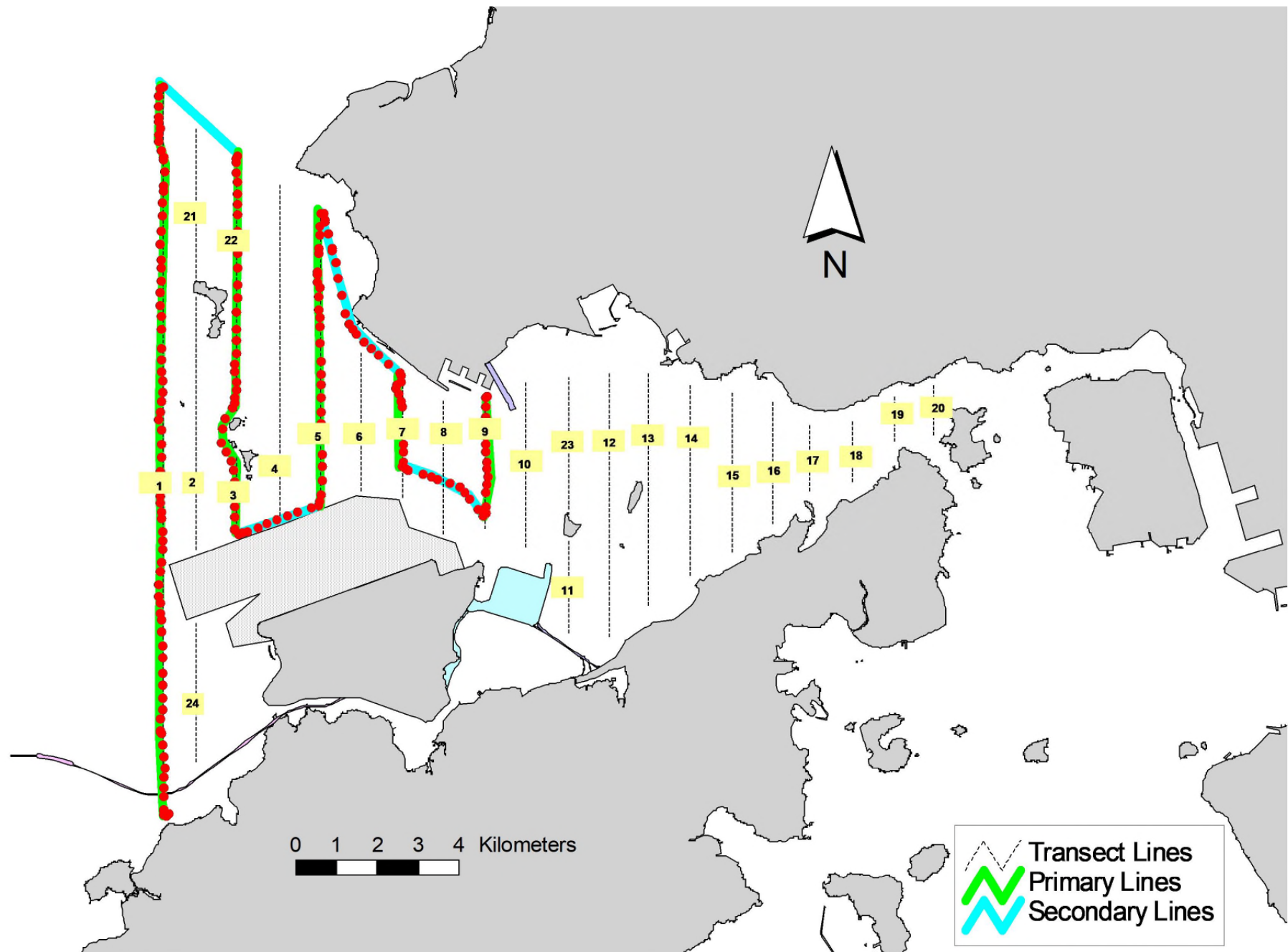


Figure 4. Survey Route on December 10th, 2018 (from HKLR03 project)

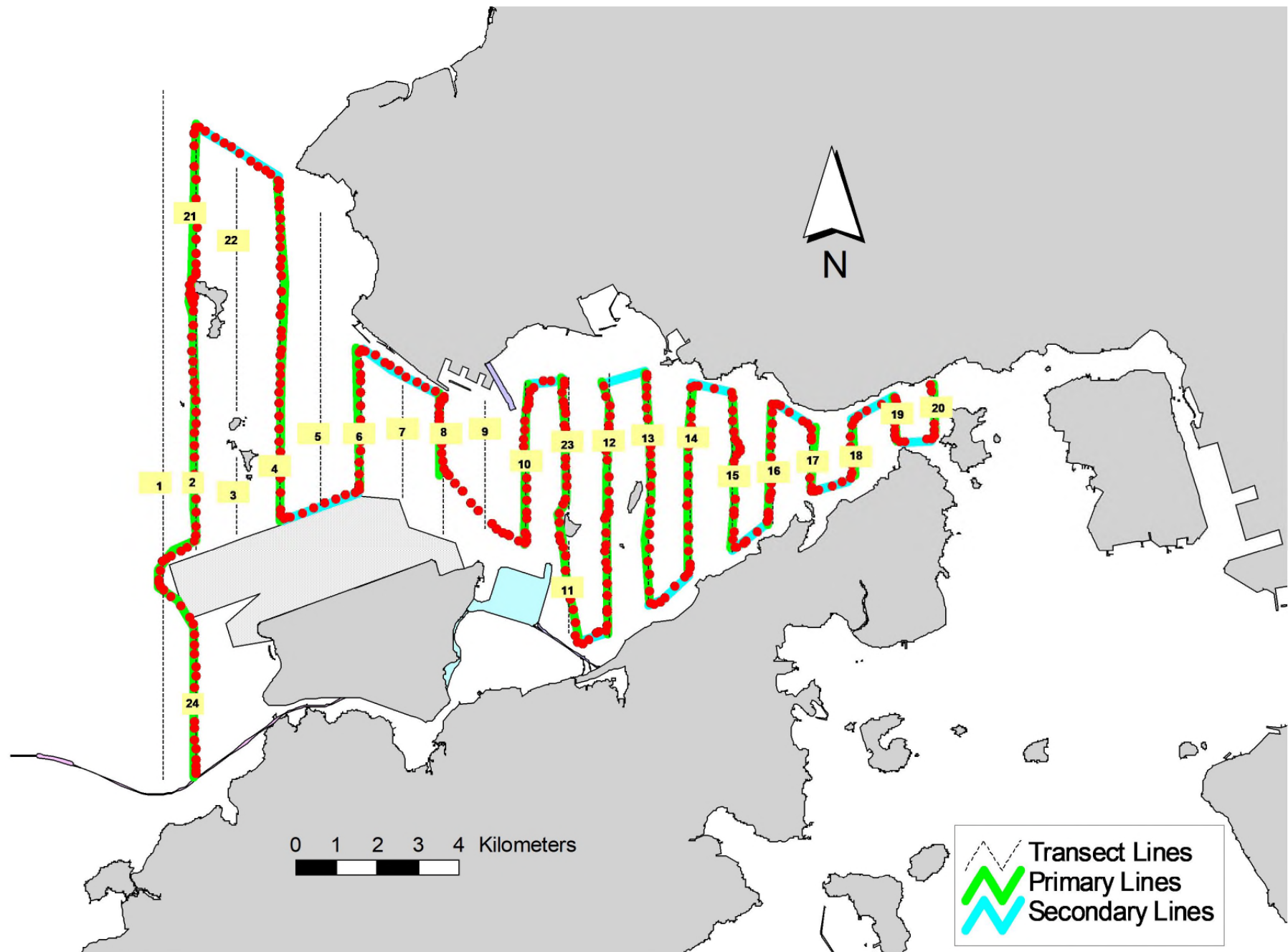


Figure 5. Survey Route on December 12th, 2018 (from HKLR03 project)

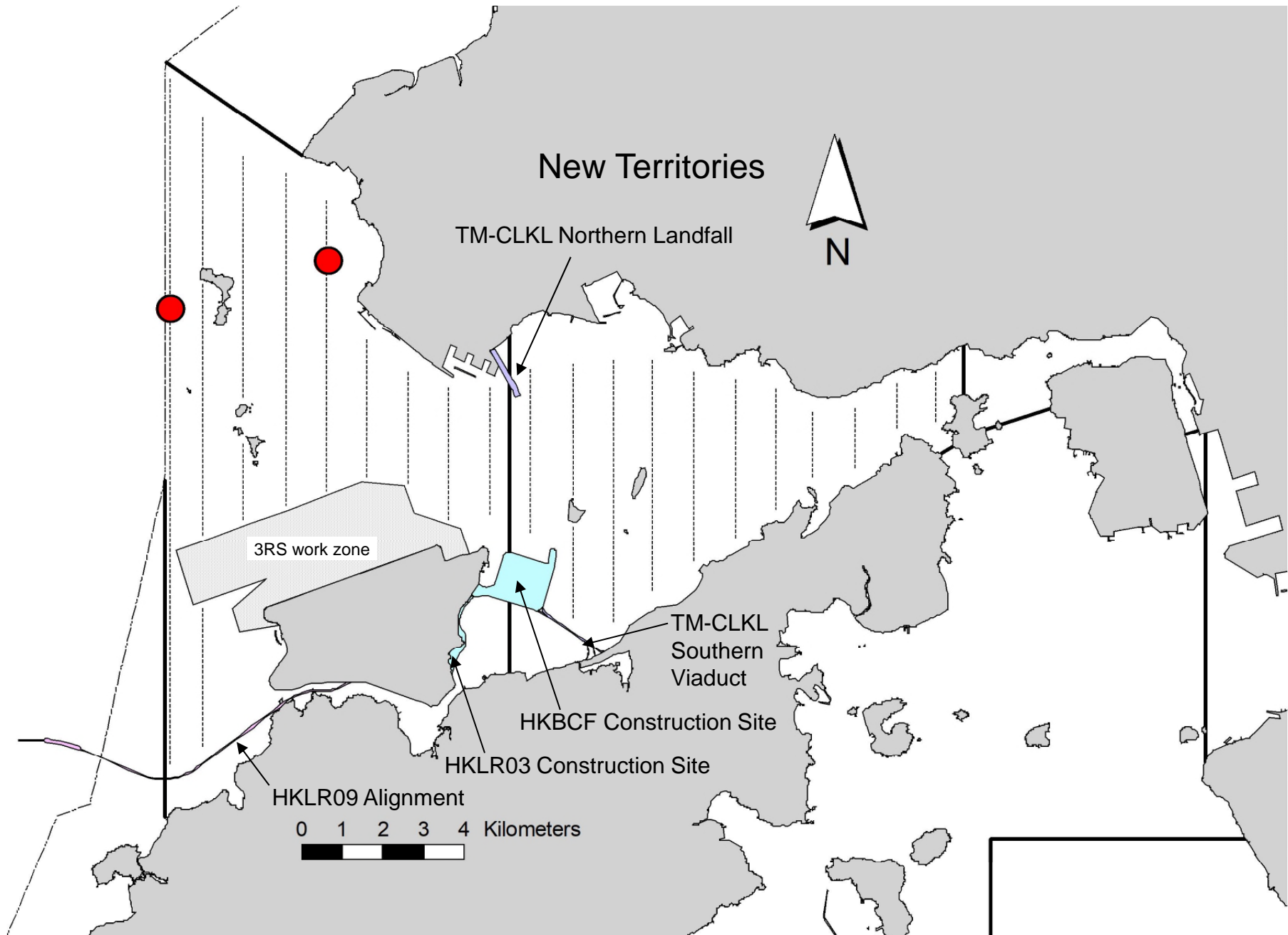


Figure 6. Distribution of Chinese White Dolphin Sightings during December 2018 HKLR03 Monitoring Surveys

Appendix I. HKLR03 Survey Effort Database (December 2018)

(Abbreviations: BEAU = Beaufort Sea State; P = Primary Line Effort; S = Secondary Line Effort)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
3-Dec-18	NW LANTAU	2	27.00	WINTER	STANDARD36826	HKLR	P
3-Dec-18	NW LANTAU	3	4.18	WINTER	STANDARD36826	HKLR	P
3-Dec-18	NW LANTAU	2	10.68	WINTER	STANDARD36826	HKLR	S
5-Dec-18	NW LANTAU	3	19.43	WINTER	STANDARD36826	HKLR	P
5-Dec-18	NW LANTAU	4	9.90	WINTER	STANDARD36826	HKLR	P
5-Dec-18	NW LANTAU	3	6.57	WINTER	STANDARD36826	HKLR	S
5-Dec-18	NW LANTAU	4	4.30	WINTER	STANDARD36826	HKLR	S
5-Dec-18	NE LANTAU	2	8.60	WINTER	STANDARD36826	HKLR	P
5-Dec-18	NE LANTAU	3	26.18	WINTER	STANDARD36826	HKLR	P
5-Dec-18	NE LANTAU	4	1.10	WINTER	STANDARD36826	HKLR	P
5-Dec-18	NE LANTAU	2	6.60	WINTER	STANDARD36826	HKLR	S
5-Dec-18	NE LANTAU	3	6.22	WINTER	STANDARD36826	HKLR	S
10-Dec-18	NW LANTAU	2	13.34	WINTER	STANDARD36826	HKLR	P
10-Dec-18	NW LANTAU	3	22.85	WINTER	STANDARD36826	HKLR	P
10-Dec-18	NW LANTAU	2	8.98	WINTER	STANDARD36826	HKLR	S
10-Dec-18	NW LANTAU	3	1.73	WINTER	STANDARD36826	HKLR	S
12-Dec-18	NW LANTAU	2	7.60	WINTER	STANDARD36826	HKLR	P
12-Dec-18	NW LANTAU	3	10.12	WINTER	STANDARD36826	HKLR	P
12-Dec-18	NW LANTAU	4	7.55	WINTER	STANDARD36826	HKLR	P
12-Dec-18	NW LANTAU	2	2.10	WINTER	STANDARD36826	HKLR	S
12-Dec-18	NW LANTAU	3	6.10	WINTER	STANDARD36826	HKLR	S
12-Dec-18	NW LANTAU	4	2.53	WINTER	STANDARD36826	HKLR	S
12-Dec-18	NE LANTAU	2	33.02	WINTER	STANDARD36826	HKLR	P
12-Dec-18	NE LANTAU	3	2.59	WINTER	STANDARD36826	HKLR	P
12-Dec-18	NE LANTAU	2	12.69	WINTER	STANDARD36826	HKLR	S

Appendix II. HKLR03 Chinese White Dolphin Sighting Database (December 2018)

(Abberviations: STG# = Sighting Number; HRD SZ = Dolphin Herd Size; BEAU = Beaufort Sea State; PSD = Perpendicular Distance; BOAT ASSOC. = Fishing Boat Association; P/S: Sighting Made on Primary/Secondary Lines)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
3-Dec-18	1	1046	5	NW LANTAU	2	821	ON	HKLR	827178	808517	WINTER	NONE	P
3-Dec-18	2	1247	1	NW LANTAU	3	962	ON	HKLR	826056	804663	WINTER	NONE	P

Appendix III. Individual dolphins identified during HKLR03 monitoring surveys in (December 2018)

ID#	DATE	STG#	AREA
CH34	03/12/18	1	NW LANTAU
NL182	03/12/18	1	NW LANTAU
NL202	03/12/18	2	NW LANTAU



Appendix IV. Photographs of Identified Individual Dolphins in December 2018 (HKLR03)

Appendix M. Wind Data

Wind Data

Date	Time	Wind Speed (m/s)	Wind Direction
01/12/2018	12:00 AM	0.9	SSE
01/12/2018	1:00 AM	1.3	NW
01/12/2018	2:00 AM	1.8	NW
01/12/2018	3:00 AM	1.8	NW
01/12/2018	4:00 AM	1.3	NW
01/12/2018	5:00 AM	0.9	NW
01/12/2018	6:00 AM	0.4	SE
01/12/2018	7:00 AM	1.3	NW
01/12/2018	8:00 AM	0.9	NW
01/12/2018	9:00 AM	1.3	NW
01/12/2018	10:00 AM	1.8	NW
01/12/2018	11:00 AM	1.8	NW
01/12/2018	12:00 PM	1.8	NW
01/12/2018	1:00 PM	1.8	NW
01/12/2018	2:00 PM	1.8	NW
01/12/2018	3:00 PM	1.3	NW
01/12/2018	4:00 PM	1.3	NW
01/12/2018	5:00 PM	1.8	NW
01/12/2018	6:00 PM	2.2	NW
01/12/2018	7:00 PM	1.8	NW
01/12/2018	8:00 PM	1.3	NW
01/12/2018	9:00 PM	0.9	NW
01/12/2018	10:00 PM	1.3	NW
01/12/2018	11:00 PM	0.9	NW
02/12/2018	12:00 AM	0.9	N
02/12/2018	1:00 AM	1.3	NE
02/12/2018	2:00 AM	1.8	NE
02/12/2018	3:00 AM	0.9	ESE
02/12/2018	4:00 AM	1.3	NW
02/12/2018	5:00 AM	0.9	SE
02/12/2018	6:00 AM	0.9	SE
02/12/2018	7:00 AM	1.3	E
02/12/2018	8:00 AM	1.3	ENE
02/12/2018	9:00 AM	1.3	NW
02/12/2018	10:00 AM	1.8	NE
02/12/2018	11:00 AM	1.3	NE
02/12/2018	12:00 PM	1.3	NW
02/12/2018	1:00 PM	1.3	NW
02/12/2018	2:00 PM	1.8	NW
02/12/2018	3:00 PM	1.8	NW
02/12/2018	4:00 PM	0.9	NW
02/12/2018	5:00 PM	0.9	NW
02/12/2018	6:00 PM	0.4	NNE
02/12/2018	7:00 PM	0.9	NNE
02/12/2018	8:00 PM	1.8	E
02/12/2018	9:00 PM	2.7	ENE
02/12/2018	10:00 PM	2.7	E
02/12/2018	11:00 PM	2.2	E
03/12/2018	12:00 AM	1.3	E
03/12/2018	1:00 AM	0.9	NE
03/12/2018	2:00 AM	0	NW
03/12/2018	3:00 AM	0.4	E
03/12/2018	4:00 AM	0.4	ENE
03/12/2018	5:00 AM	0.4	E
03/12/2018	6:00 AM	0.4	NE
03/12/2018	7:00 AM	0.4	ENE
03/12/2018	8:00 AM	0.9	NW
03/12/2018	9:00 AM	1.3	NW

Wind Data

Date	Time	Wind Speed (m/s)	Wind Direction
03/12/2018	10:00 AM	1.3	NW
03/12/2018	11:00 AM	1.3	NW
03/12/2018	12:00 PM	1.3	NW
03/12/2018	1:00 PM	1.3	NW
03/12/2018	2:00 PM	0.9	NW
03/12/2018	3:00 PM	1.3	NNW
03/12/2018	4:00 PM	0.4	NW
03/12/2018	5:00 PM	0.9	N
03/12/2018	6:00 PM	0.9	NW
03/12/2018	7:00 PM	0	NNE
03/12/2018	8:00 PM	0.4	NW
03/12/2018	9:00 PM	0.4	NW
03/12/2018	10:00 PM	0.9	ENE
03/12/2018	11:00 PM	0.4	NE
04/12/2018	12:00 AM	0	NE
04/12/2018	1:00 AM	0.4	SSE
04/12/2018	2:00 AM	0	SSE
04/12/2018	3:00 AM	0	S
04/12/2018	4:00 AM	0	NW
04/12/2018	5:00 AM	0	WNW
04/12/2018	6:00 AM	0	WNW
04/12/2018	7:00 AM	0	WNW
04/12/2018	8:00 AM	0.4	NE
04/12/2018	9:00 AM	0.4	NE
04/12/2018	10:00 AM	0	NE
04/12/2018	11:00 AM	0.4	NNE
04/12/2018	12:00 PM	0.4	NNE
04/12/2018	1:00 PM	0.4	NW
04/12/2018	2:00 PM	0	WNW
04/12/2018	3:00 PM	0.4	WNW
04/12/2018	4:00 PM	0.4	WNW
04/12/2018	5:00 PM	0.4	WNW
04/12/2018	6:00 PM	0	WNW
04/12/2018	7:00 PM	0	---
04/12/2018	8:00 PM	0	---
04/12/2018	9:00 PM	0	---
04/12/2018	10:00 PM	0	---
04/12/2018	11:00 PM	0	---
05/12/2018	12:00 AM	0	---
05/12/2018	1:00 AM	0	---
05/12/2018	2:00 AM	0	---
05/12/2018	3:00 AM	0	---
05/12/2018	4:00 AM	0	---
05/12/2018	5:00 AM	0	---
05/12/2018	6:00 AM	0	---
05/12/2018	7:00 AM	0	---
05/12/2018	8:00 AM	0.4	ENE
05/12/2018	9:00 AM	1.8	ENE
05/12/2018	10:00 AM	2.7	NW
05/12/2018	11:00 AM	2.7	NW
05/12/2018	12:00 PM	2.7	NW
05/12/2018	1:00 PM	3.1	NW
05/12/2018	2:00 PM	2.2	NW
05/12/2018	3:00 PM	2.2	NW
05/12/2018	4:00 PM	2.2	NW
05/12/2018	5:00 PM	2.7	NW
05/12/2018	6:00 PM	2.7	NW
05/12/2018	7:00 PM	3.1	NW

Wind Data

Date	Time	Wind Speed (m/s)	Wind Direction
05/12/2018	8:00 PM	2.7	NW
05/12/2018	9:00 PM	2.2	NNW
05/12/2018	10:00 PM	2.2	N
05/12/2018	11:00 PM	2.2	ENE
06/12/2018	12:00 AM	2.2	SE
06/12/2018	1:00 AM	2.2	SE
06/12/2018	2:00 AM	2.2	SE
06/12/2018	3:00 AM	2.2	SE
06/12/2018	4:00 AM	1.8	NW
06/12/2018	5:00 AM	1.3	NW
06/12/2018	6:00 AM	1.3	NW
06/12/2018	7:00 AM	1.8	NW
06/12/2018	8:00 AM	1.8	NW
06/12/2018	9:00 AM	1.3	NW
06/12/2018	10:00 AM	0.9	NNW
06/12/2018	11:00 AM	1.3	NW
06/12/2018	12:00 PM	1.3	NW
06/12/2018	1:00 PM	1.3	NE
06/12/2018	2:00 PM	0.4	NW
06/12/2018	3:00 PM	1.3	NE
06/12/2018	4:00 PM	0.9	ENE
06/12/2018	5:00 PM	0.9	WNW
06/12/2018	6:00 PM	0.4	NW
06/12/2018	7:00 PM	0.9	NNW
06/12/2018	8:00 PM	0.9	NW
06/12/2018	9:00 PM	1.3	NW
06/12/2018	10:00 PM	0.4	SSE
06/12/2018	11:00 PM	0.9	NW
07/12/2018	12:00 AM	0.4	NW
07/12/2018	1:00 AM	0.4	ENE
07/12/2018	2:00 AM	0.4	NW
07/12/2018	3:00 AM	0.9	ENE
07/12/2018	4:00 AM	0.9	ENE
07/12/2018	5:00 AM	0.4	ENE
07/12/2018	6:00 AM	0.4	S
07/12/2018	7:00 AM	0.4	SSE
07/12/2018	8:00 AM	0.9	SSE
07/12/2018	9:00 AM	0.4	SSE
07/12/2018	10:00 AM	0.4	N
07/12/2018	11:00 AM	0.9	N
07/12/2018	12:00 PM	0.9	NE
07/12/2018	1:00 PM	1.8	NE
07/12/2018	2:00 PM	1.3	NE
07/12/2018	3:00 PM	0.9	SSE
07/12/2018	4:00 PM	1.8	NE
07/12/2018	5:00 PM	2.2	ENE
07/12/2018	6:00 PM	1.8	E
07/12/2018	7:00 PM	1.3	NE
07/12/2018	8:00 PM	0.4	N
07/12/2018	9:00 PM	0	ESE
07/12/2018	10:00 PM	0.4	NW
07/12/2018	11:00 PM	0.4	NW
08/12/2018	12:00 AM	1.3	NE
08/12/2018	1:00 AM	0.9	NE
08/12/2018	2:00 AM	0.9	NNE
08/12/2018	3:00 AM	2.2	NNE
08/12/2018	4:00 AM	2.7	NNE
08/12/2018	5:00 AM	3.1	NNE

Wind Data

Date	Time	Wind Speed (m/s)	Wind Direction
08/12/2018	6:00 AM	2.2	NNE
08/12/2018	7:00 AM	0.4	NW
08/12/2018	8:00 AM	0	S
08/12/2018	9:00 AM	1.3	N
08/12/2018	10:00 AM	1.8	N
08/12/2018	11:00 AM	1.3	N
08/12/2018	12:00 PM	1.3	NNW
08/12/2018	1:00 PM	0.9	NNW
08/12/2018	2:00 PM	0.9	N
08/12/2018	3:00 PM	0.4	S
08/12/2018	4:00 PM	0.9	N
08/12/2018	5:00 PM	2.2	N
08/12/2018	6:00 PM	2.2	N
08/12/2018	7:00 PM	1.8	N
08/12/2018	8:00 PM	1.8	N
08/12/2018	9:00 PM	1.8	NW
08/12/2018	10:00 PM	2.2	N
08/12/2018	11:00 PM	2.2	N
09/12/2018	12:00 AM	2.2	N
09/12/2018	1:00 AM	0.9	NE
09/12/2018	2:00 AM	0.9	NE
09/12/2018	3:00 AM	1.3	N
09/12/2018	4:00 AM	1.3	N
09/12/2018	5:00 AM	1.8	N
09/12/2018	6:00 AM	2.7	N
09/12/2018	7:00 AM	2.7	N
09/12/2018	8:00 AM	2.2	N
09/12/2018	9:00 AM	2.2	N
09/12/2018	10:00 AM	2.2	N
09/12/2018	11:00 AM	0.9	NNE
09/12/2018	12:00 PM	0.9	N
09/12/2018	1:00 PM	0.4	NW
09/12/2018	2:00 PM	0.9	S
09/12/2018	3:00 PM	0.9	WNW
09/12/2018	4:00 PM	0.9	NW
09/12/2018	5:00 PM	1.8	N
09/12/2018	6:00 PM	1.3	N
09/12/2018	7:00 PM	1.8	N
09/12/2018	8:00 PM	1.8	N
09/12/2018	9:00 PM	0.4	NW
09/12/2018	10:00 PM	0.9	N
09/12/2018	11:00 PM	1.3	NE
10/12/2018	12:00 AM	1.3	N
10/12/2018	1:00 AM	0.4	N
10/12/2018	2:00 AM	0.4	S
10/12/2018	3:00 AM	0.4	NE
10/12/2018	4:00 AM	0.9	SSE
10/12/2018	5:00 AM	0.9	S
10/12/2018	6:00 AM	1.8	N
10/12/2018	7:00 AM	2.2	N
10/12/2018	8:00 AM	1.3	NNW
10/12/2018	9:00 AM	0.9	NW
10/12/2018	10:00 AM	1.3	NW
10/12/2018	11:00 AM	0.9	N
10/12/2018	12:00 PM	0.4	NNW
10/12/2018	1:00 PM	0.9	NNW
10/12/2018	2:00 PM	0.4	SSE
10/12/2018	3:00 PM	0	SSE

Wind Data

Date	Time	Wind Speed (m/s)	Wind Direction
10/12/2018	4:00 PM	0.4	SSE
10/12/2018	5:00 PM	0	SSE
10/12/2018	6:00 PM	0.4	SSE
10/12/2018	7:00 PM	0.4	SSE
10/12/2018	8:00 PM	0	SSE
10/12/2018	9:00 PM	0.4	S
10/12/2018	10:00 PM	0	SSE
10/12/2018	11:00 PM	0.4	NNW
11/12/2018	12:00 AM	0.4	SSE
11/12/2018	1:00 AM	0.4	NW
11/12/2018	2:00 AM	0	SSE
11/12/2018	3:00 AM	0	SSE
11/12/2018	4:00 AM	0	WSW
11/12/2018	5:00 AM	0.4	N
11/12/2018	6:00 AM	0.4	NW
11/12/2018	7:00 AM	1.3	N
11/12/2018	8:00 AM	1.3	NW
11/12/2018	9:00 AM	0.9	NW
11/12/2018	10:00 AM	1.8	N
11/12/2018	11:00 AM	1.3	SSE
11/12/2018	12:00 PM	1.3	NNW
11/12/2018	1:00 PM	1.3	NW
11/12/2018	2:00 PM	1.3	SSE
11/12/2018	3:00 PM	1.8	SSE
11/12/2018	4:00 PM	1.8	SSE
11/12/2018	5:00 PM	1.8	N
11/12/2018	6:00 PM	1.8	NNW
11/12/2018	7:00 PM	1.3	NW
11/12/2018	8:00 PM	1.3	NW
11/12/2018	9:00 PM	1.3	NW
11/12/2018	10:00 PM	1.8	NW
11/12/2018	11:00 PM	1.8	NW
12/12/2018	12:00 AM	2.2	NNW
12/12/2018	1:00 AM	1.8	NNW
12/12/2018	2:00 AM	1.8	NW
12/12/2018	3:00 AM	1.3	WNW
12/12/2018	4:00 AM	0.9	NNW
12/12/2018	5:00 AM	1.3	N
12/12/2018	6:00 AM	1.3	NNW
12/12/2018	7:00 AM	2.2	N
12/12/2018	8:00 AM	2.2	N
12/12/2018	9:00 AM	2.2	N
12/12/2018	10:00 AM	1.3	N
12/12/2018	11:00 AM	1.8	NE
12/12/2018	12:00 PM	0.9	N
12/12/2018	1:00 PM	1.3	NNE
12/12/2018	2:00 PM	0.9	NW
12/12/2018	3:00 PM	0.9	NW
12/12/2018	4:00 PM	0.9	NW
12/12/2018	5:00 PM	0.9	NNW
12/12/2018	6:00 PM	1.3	NW
12/12/2018	7:00 PM	0.9	NW
12/12/2018	8:00 PM	1.8	N
12/12/2018	9:00 PM	2.2	NNE
12/12/2018	10:00 PM	1.3	NNW
12/12/2018	11:00 PM	1.8	NNW
13/12/2018	12:00 AM	1.8	NNW
13/12/2018	1:00 AM	1.3	NNW

Wind Data

Date	Time	Wind Speed (m/s)	Wind Direction
13/12/2018	2:00 AM	1.3	NNW
13/12/2018	3:00 AM	1.3	NNE
13/12/2018	4:00 AM	2.2	N
13/12/2018	5:00 AM	0.9	NNW
13/12/2018	6:00 AM	0.9	NNW
13/12/2018	7:00 AM	1.3	NNW
13/12/2018	8:00 AM	1.3	NW
13/12/2018	9:00 AM	1.3	N
13/12/2018	10:00 AM	0.9	NNW
13/12/2018	11:00 AM	0.9	NNW
13/12/2018	12:00 PM	0.4	NNW
13/12/2018	1:00 PM	0.9	SSE
13/12/2018	2:00 PM	1.3	SSE
13/12/2018	3:00 PM	1.3	SSE
13/12/2018	4:00 PM	0.9	SSE
13/12/2018	5:00 PM	0.9	NNW
13/12/2018	6:00 PM	1.8	NNW
13/12/2018	7:00 PM	1.3	NNW
13/12/2018	8:00 PM	0.9	NNE
13/12/2018	9:00 PM	0.9	NNW
13/12/2018	10:00 PM	0.9	NNW
13/12/2018	11:00 PM	0.9	N
14/12/2018	12:00 AM	0.9	NNE
14/12/2018	1:00 AM	0.9	N
14/12/2018	2:00 AM	1.3	NNE
14/12/2018	3:00 AM	1.3	NNE
14/12/2018	4:00 AM	1.3	NNE
14/12/2018	5:00 AM	2.2	NNE
14/12/2018	6:00 AM	1.8	N
14/12/2018	7:00 AM	1.3	N
14/12/2018	8:00 AM	0.4	NW
14/12/2018	9:00 AM	1.3	N
14/12/2018	10:00 AM	0.9	N
14/12/2018	11:00 AM	0.9	N
14/12/2018	12:00 PM	0.9	NNW
14/12/2018	1:00 PM	0.9	NW
14/12/2018	2:00 PM	0.9	NNW
14/12/2018	3:00 PM	0.4	NW
14/12/2018	4:00 PM	0.4	N
14/12/2018	5:00 PM	0.4	NW
14/12/2018	6:00 PM	0.4	NNW
14/12/2018	7:00 PM	0	SE
14/12/2018	8:00 PM	0	---
14/12/2018	9:00 PM	0	---
14/12/2018	10:00 PM	0	---
14/12/2018	11:00 PM	0	---
15/12/2018	12:00 AM	0	---
15/12/2018	1:00 AM	0	---
15/12/2018	2:00 AM	0	---
15/12/2018	3:00 AM	0	WNW
15/12/2018	4:00 AM	0.4	NNE
15/12/2018	5:00 AM	0	WNW
15/12/2018	6:00 AM	0	WNW
15/12/2018	7:00 AM	0.9	NNE
15/12/2018	8:00 AM	1.3	NNE
15/12/2018	9:00 AM	1.8	NNE
15/12/2018	10:00 AM	0.4	NNW
15/12/2018	11:00 AM	0.4	NE

Wind Data

Date	Time	Wind Speed (m/s)	Wind Direction
15/12/2018	12:00 PM	0.4	ENE
15/12/2018	1:00 PM	0.4	NE
15/12/2018	2:00 PM	0.9	NNW
15/12/2018	3:00 PM	0.9	NW
15/12/2018	4:00 PM	0.4	WNW
15/12/2018	5:00 PM	0.4	WNW
15/12/2018	6:00 PM	0.4	SSE
15/12/2018	7:00 PM	0.4	SSE
15/12/2018	8:00 PM	0.4	SSE
15/12/2018	9:00 PM	0.4	SSE
15/12/2018	10:00 PM	0.4	S
15/12/2018	11:00 PM	0.4	SSE
16/12/2018	12:00 AM	0.4	SSE
16/12/2018	1:00 AM	0.4	S
16/12/2018	2:00 AM	0.4	SSE
16/12/2018	3:00 AM	0.4	SSE
16/12/2018	4:00 AM	0.4	SSE
16/12/2018	5:00 AM	0.4	S
16/12/2018	6:00 AM	0.4	SW
16/12/2018	7:00 AM	0.4	S
16/12/2018	8:00 AM	0.4	S
16/12/2018	9:00 AM	0.9	S
16/12/2018	10:00 AM	0.4	S
16/12/2018	11:00 AM	0.9	S
16/12/2018	12:00 PM	0.4	S
16/12/2018	1:00 PM	0.9	S
16/12/2018	2:00 PM	0.4	S
16/12/2018	3:00 PM	0.4	S
16/12/2018	4:00 PM	0.4	SW
16/12/2018	5:00 PM	0.4	SSE
16/12/2018	6:00 PM	0.4	SSE
16/12/2018	7:00 PM	0.9	NW
16/12/2018	8:00 PM	0.9	WNW
16/12/2018	9:00 PM	0.9	N
16/12/2018	10:00 PM	0.4	S
16/12/2018	11:00 PM	0.9	WNW
17/12/2018	12:00 AM	0.9	NW
17/12/2018	1:00 AM	0.9	WNW
17/12/2018	2:00 AM	1.3	NW
17/12/2018	3:00 AM	0.9	WNW
17/12/2018	4:00 AM	0.9	SSE
17/12/2018	5:00 AM	0.9	S
17/12/2018	6:00 AM	0.4	SSW
17/12/2018	7:00 AM	0.9	NW
17/12/2018	8:00 AM	0.9	NW
17/12/2018	9:00 AM	0.9	NE
17/12/2018	10:00 AM	1.8	NE
17/12/2018	11:00 AM	0.4	NE
17/12/2018	12:00 PM	0.4	NW
17/12/2018	1:00 PM	0.4	SW
17/12/2018	2:00 PM	0.4	NW
17/12/2018	3:00 PM	0.4	N
17/12/2018	4:00 PM	0.4	WNW
17/12/2018	5:00 PM	0.4	SSE
17/12/2018	6:00 PM	0	SSE
17/12/2018	7:00 PM	0	---
17/12/2018	8:00 PM	0	---
17/12/2018	9:00 PM	0	---

Wind Data

Date	Time	Wind Speed (m/s)	Wind Direction
17/12/2018	10:00 PM	0	---
17/12/2018	11:00 PM	0	---
18/12/2018	12:00 AM	0	---
18/12/2018	1:00 AM	0	---
18/12/2018	2:00 AM	0	---
18/12/2018	3:00 AM	0	NE
18/12/2018	4:00 AM	0	SE
18/12/2018	5:00 AM	0	S
18/12/2018	6:00 AM	0.4	ENE
18/12/2018	7:00 AM	0.4	E
18/12/2018	8:00 AM	0	SE
18/12/2018	9:00 AM	0	ESE
18/12/2018	10:00 AM	1.3	NNE
18/12/2018	11:00 AM	1.3	NNE
18/12/2018	12:00 PM	1.3	NNE
18/12/2018	1:00 PM	1.3	NE
18/12/2018	2:00 PM	1.8	NW
18/12/2018	3:00 PM	1.3	NW
18/12/2018	4:00 PM	1.8	NW
18/12/2018	5:00 PM	1.8	NW
18/12/2018	6:00 PM	1.3	NW
18/12/2018	7:00 PM	1.3	NW
18/12/2018	8:00 PM	1.8	NW
18/12/2018	9:00 PM	1.8	NW
18/12/2018	10:00 PM	1.3	NW
18/12/2018	11:00 PM	1.3	NW
19/12/2018	12:00 AM	1.3	NW
19/12/2018	1:00 AM	1.8	NW
19/12/2018	2:00 AM	1.3	NW
19/12/2018	3:00 AM	1.3	NW
19/12/2018	4:00 AM	0.9	NW
19/12/2018	5:00 AM	0.4	SSE
19/12/2018	6:00 AM	0.4	WNW
19/12/2018	7:00 AM	0.9	NW
19/12/2018	8:00 AM	0.9	NW
19/12/2018	9:00 AM	1.8	NW
19/12/2018	10:00 AM	1.8	SE
19/12/2018	11:00 AM	1.8	NW
19/12/2018	12:00 PM	1.8	NNE
19/12/2018	1:00 PM	1.8	N
19/12/2018	2:00 PM	1.8	NE
19/12/2018	3:00 PM	1.3	NW
19/12/2018	4:00 PM	1.8	N
19/12/2018	5:00 PM	2.2	NW
19/12/2018	6:00 PM	1.8	E
19/12/2018	7:00 PM	2.2	E
19/12/2018	8:00 PM	1.8	SE
19/12/2018	9:00 PM	0.9	ENE
19/12/2018	10:00 PM	1.3	NW
19/12/2018	11:00 PM	2.2	ENE
20/12/2018	12:00 AM	2.2	E
20/12/2018	1:00 AM	2.2	ENE
20/12/2018	2:00 AM	2.2	NE
20/12/2018	3:00 AM	2.2	E
20/12/2018	4:00 AM	2.7	NW
20/12/2018	5:00 AM	1.3	ENE
20/12/2018	6:00 AM	2.2	N
20/12/2018	7:00 AM	1.8	NW

Wind Data

Date	Time	Wind Speed (m/s)	Wind Direction
20/12/2018	8:00 AM	1.3	NE
20/12/2018	9:00 AM	0.9	ENE
20/12/2018	10:00 AM	1.8	E
20/12/2018	11:00 AM	0.4	SE
20/12/2018	12:00 PM	0.4	WNW
20/12/2018	1:00 PM	0.4	NW
20/12/2018	2:00 PM	0.4	N
20/12/2018	3:00 PM	0.4	NNW
20/12/2018	4:00 PM	0.4	SSE
20/12/2018	5:00 PM	0.4	ENE
20/12/2018	6:00 PM	1.3	SSE
20/12/2018	7:00 PM	0.4	S
20/12/2018	8:00 PM	0	NNW
20/12/2018	9:00 PM	0.9	S
20/12/2018	10:00 PM	0.9	N
20/12/2018	11:00 PM	1.3	N
21/12/2018	12:00 AM	1.3	N
21/12/2018	1:00 AM	0.9	NE
21/12/2018	2:00 AM	1.3	E
21/12/2018	3:00 AM	0.9	ENE
21/12/2018	4:00 AM	0.9	SE
21/12/2018	5:00 AM	0.4	NW
21/12/2018	6:00 AM	0.4	NW
21/12/2018	7:00 AM	0.4	NW
21/12/2018	8:00 AM	1.3	NNW
21/12/2018	9:00 AM	1.3	NW
21/12/2018	10:00 AM	1.8	E
21/12/2018	11:00 AM	1.3	SE
21/12/2018	12:00 PM	0.9	SE
21/12/2018	1:00 PM	1.3	ENE
21/12/2018	2:00 PM	2.2	NW
21/12/2018	3:00 PM	1.8	N
21/12/2018	4:00 PM	1.3	NW
21/12/2018	5:00 PM	1.3	NW
21/12/2018	6:00 PM	1.8	NW
21/12/2018	7:00 PM	2.2	NW
21/12/2018	8:00 PM	1.8	N
21/12/2018	9:00 PM	1.3	NW
21/12/2018	10:00 PM	1.3	N
21/12/2018	11:00 PM	1.8	NW
22/12/2018	12:00 AM	2.2	NW
22/12/2018	1:00 AM	1.8	NW
22/12/2018	2:00 AM	1.3	NW
22/12/2018	3:00 AM	1.8	NW
22/12/2018	4:00 AM	1.8	N
22/12/2018	5:00 AM	1.8	ENE
22/12/2018	6:00 AM	1.3	NW
22/12/2018	7:00 AM	0.9	SSE
22/12/2018	8:00 AM	0.9	SE
22/12/2018	9:00 AM	1.3	E
22/12/2018	10:00 AM	0.9	NE
22/12/2018	11:00 AM	0.4	NNE
22/12/2018	12:00 PM	0	NNE
22/12/2018	1:00 PM	0.4	NE
22/12/2018	2:00 PM	0.4	NW
22/12/2018	3:00 PM	0.9	WNW
22/12/2018	4:00 PM	0.4	NW
22/12/2018	5:00 PM	0	NW

Wind Data

Date	Time	Wind Speed (m/s)	Wind Direction
22/12/2018	6:00 PM	0	ENE
22/12/2018	7:00 PM	0	NE
22/12/2018	8:00 PM	0	N
22/12/2018	9:00 PM	0	N
22/12/2018	10:00 PM	0.4	N
22/12/2018	11:00 PM	0	SE
23/12/2018	12:00 AM	0	SSE
23/12/2018	1:00 AM	0	SSE
23/12/2018	2:00 AM	0	ENE
23/12/2018	3:00 AM	0	---
23/12/2018	4:00 AM	0	---
23/12/2018	5:00 AM	0	---
23/12/2018	6:00 AM	0	SE
23/12/2018	7:00 AM	0.9	ENE
23/12/2018	8:00 AM	0.4	SE
23/12/2018	9:00 AM	0.9	ENE
23/12/2018	10:00 AM	0.9	NE
23/12/2018	11:00 AM	0.9	NE
23/12/2018	12:00 PM	0.9	NE
23/12/2018	1:00 PM	1.3	NNE
23/12/2018	2:00 PM	2.7	NNE
23/12/2018	3:00 PM	0.9	NE
23/12/2018	4:00 PM	0.4	NNW
23/12/2018	5:00 PM	0.4	NE
23/12/2018	6:00 PM	0.4	NW
23/12/2018	7:00 PM	0.4	NE
23/12/2018	8:00 PM	0.9	N
23/12/2018	9:00 PM	0.4	NNE
23/12/2018	10:00 PM	0.9	N
23/12/2018	11:00 PM	0.9	N
24/12/2018	12:00 AM	2.2	NNE
24/12/2018	1:00 AM	0.9	NNE
24/12/2018	2:00 AM	0.4	NE
24/12/2018	3:00 AM	0.4	ENE
24/12/2018	4:00 AM	0.9	NNE
24/12/2018	5:00 AM	1.3	NNE
24/12/2018	6:00 AM	1.3	N
24/12/2018	7:00 AM	0.4	WNW
24/12/2018	8:00 AM	0.4	N
24/12/2018	9:00 AM	0.4	NW
24/12/2018	10:00 AM	0	W
24/12/2018	11:00 AM	0.9	N
24/12/2018	12:00 PM	0.9	NE
24/12/2018	1:00 PM	1.3	NE
24/12/2018	2:00 PM	0.9	NE
24/12/2018	3:00 PM	0.4	NE
24/12/2018	4:00 PM	0.9	NE
24/12/2018	5:00 PM	1.3	NE
24/12/2018	6:00 PM	0.9	NE
24/12/2018	7:00 PM	0.4	NE
24/12/2018	8:00 PM	0	N
24/12/2018	9:00 PM	0.4	NE
24/12/2018	10:00 PM	0	NE
24/12/2018	11:00 PM	0	---
25/12/2018	12:00 AM	0.9	ENE
25/12/2018	1:00 AM	0.4	SE
25/12/2018	2:00 AM	0.9	SSE
25/12/2018	3:00 AM	1.3	SE

Wind Data

Date	Time	Wind Speed (m/s)	Wind Direction
25/12/2018	4:00 AM	1.3	SE
25/12/2018	5:00 AM	0.9	SE
25/12/2018	6:00 AM	0.9	SE
25/12/2018	7:00 AM	1.3	E
25/12/2018	8:00 AM	1.3	ENE
25/12/2018	9:00 AM	0.9	NW
25/12/2018	10:00 AM	1.3	NW
25/12/2018	11:00 AM	1.3	NE
25/12/2018	12:00 PM	1.8	NE
25/12/2018	1:00 PM	1.3	NNE
25/12/2018	2:00 PM	0.4	NNE
25/12/2018	3:00 PM	0.9	NE
25/12/2018	4:00 PM	0.4	NE
25/12/2018	5:00 PM	0	NE
25/12/2018	6:00 PM	0	NE
25/12/2018	7:00 PM	0	SSE
25/12/2018	8:00 PM	0	SSE
25/12/2018	9:00 PM	0	---
25/12/2018	10:00 PM	0	SSE
25/12/2018	11:00 PM	0	---
26/12/2018	12:00 AM	0	---
26/12/2018	1:00 AM	0	SSE
26/12/2018	2:00 AM	0	SSE
26/12/2018	3:00 AM	0	SSE
26/12/2018	4:00 AM	0	SSE
26/12/2018	5:00 AM	0	---
26/12/2018	6:00 AM	0	---
26/12/2018	7:00 AM	0	SSE
26/12/2018	8:00 AM	0	SSE
26/12/2018	9:00 AM	0	SSE
26/12/2018	10:00 AM	0.4	ENE
26/12/2018	11:00 AM	0.4	N
26/12/2018	12:00 PM	0.4	WNW
26/12/2018	1:00 PM	0.4	WNW
26/12/2018	2:00 PM	0.4	WNW
26/12/2018	3:00 PM	0.4	WNW
26/12/2018	4:00 PM	0.4	NNE
26/12/2018	5:00 PM	0.9	NNE
26/12/2018	6:00 PM	0.4	NNE
26/12/2018	7:00 PM	0	SSE
26/12/2018	8:00 PM	0	SE
26/12/2018	9:00 PM	0	SE
26/12/2018	10:00 PM	0	SE
26/12/2018	11:00 PM	0	SE
27/12/2018	12:00 AM	0	SSW
27/12/2018	1:00 AM	0.4	SSE
27/12/2018	2:00 AM	0.4	SSE
27/12/2018	3:00 AM	0	S
27/12/2018	4:00 AM	0	S
27/12/2018	5:00 AM	0.4	ENE
27/12/2018	6:00 AM	1.3	ENE
27/12/2018	7:00 AM	1.8	NE
27/12/2018	8:00 AM	1.3	NE
27/12/2018	9:00 AM	2.2	ENE
27/12/2018	10:00 AM	2.2	NE
27/12/2018	11:00 AM	1.8	ENE
27/12/2018	12:00 PM	0.9	N
27/12/2018	1:00 PM	0.4	ENE

Wind Data

Date	Time	Wind Speed (m/s)	Wind Direction
27/12/2018	2:00 PM	0.4	N
27/12/2018	3:00 PM	0.4	WNW
27/12/2018	4:00 PM	0.4	WNW
27/12/2018	5:00 PM	0.4	WNW
27/12/2018	6:00 PM	0	SE
27/12/2018	7:00 PM	0.4	ESE
27/12/2018	8:00 PM	1.8	NE
27/12/2018	9:00 PM	0.9	ENE
27/12/2018	10:00 PM	0.9	NW
27/12/2018	11:00 PM	1.3	NW
28/12/2018	12:00 AM	1.3	SE
28/12/2018	1:00 AM	1.3	SE
28/12/2018	2:00 AM	1.8	NE
28/12/2018	3:00 AM	3.1	ENE
28/12/2018	4:00 AM	2.7	ENE
28/12/2018	5:00 AM	2.2	NE
28/12/2018	6:00 AM	2.2	NE
28/12/2018	7:00 AM	1.3	SE
28/12/2018	8:00 AM	0.9	NW
28/12/2018	9:00 AM	2.2	NE
28/12/2018	10:00 AM	2.7	NE
28/12/2018	11:00 AM	2.2	NE
28/12/2018	12:00 PM	2.2	NE
28/12/2018	1:00 PM	1.8	N
28/12/2018	2:00 PM	1.8	N
28/12/2018	3:00 PM	2.2	NNE
28/12/2018	4:00 PM	3.6	NNE
28/12/2018	5:00 PM	4	NE
28/12/2018	6:00 PM	4	ENE
28/12/2018	7:00 PM	3.6	ENE
28/12/2018	8:00 PM	3.1	NE
28/12/2018	9:00 PM	2.7	ENE
28/12/2018	10:00 PM	2.7	NE
28/12/2018	11:00 PM	2.7	NNE
29/12/2018	12:00 AM	1.8	NE
29/12/2018	1:00 AM	2.2	NNE
29/12/2018	2:00 AM	2.7	NNE
29/12/2018	3:00 AM	2.2	NNE
29/12/2018	4:00 AM	3.1	NNE
29/12/2018	5:00 AM	2.7	NNE
29/12/2018	6:00 AM	2.7	NE
29/12/2018	7:00 AM	2.7	NE
29/12/2018	8:00 AM	2.2	NE
29/12/2018	9:00 AM	2.7	NNE
29/12/2018	10:00 AM	2.2	NE
29/12/2018	11:00 AM	2.2	NE
29/12/2018	12:00 PM	3.1	NNE
29/12/2018	1:00 PM	2.7	NNE
29/12/2018	2:00 PM	3.1	N
29/12/2018	3:00 PM	3.6	N
29/12/2018	4:00 PM	4.5	NNE
29/12/2018	5:00 PM	4	NNE
29/12/2018	6:00 PM	4	NNE
29/12/2018	7:00 PM	3.1	NE
29/12/2018	8:00 PM	2.7	NE
29/12/2018	9:00 PM	1.8	NE
29/12/2018	10:00 PM	0.9	NNE
29/12/2018	11:00 PM	0.9	NW

Wind Data

Date	Time	Wind Speed (m/s)	Wind Direction
30/12/2018	12:00 AM	2.2	ENE
30/12/2018	1:00 AM	2.2	N
30/12/2018	2:00 AM	2.7	NNE
30/12/2018	3:00 AM	3.1	NNE
30/12/2018	4:00 AM	2.2	NNE
30/12/2018	5:00 AM	2.7	NNE
30/12/2018	6:00 AM	4	NNE
30/12/2018	7:00 AM	3.6	N
30/12/2018	8:00 AM	3.6	N
30/12/2018	9:00 AM	2.7	N
30/12/2018	10:00 AM	2.7	NNE
30/12/2018	11:00 AM	1.8	NE
30/12/2018	12:00 PM	2.2	N
30/12/2018	1:00 PM	2.2	N
30/12/2018	2:00 PM	1.3	N
30/12/2018	3:00 PM	1.8	SSE
30/12/2018	4:00 PM	0.9	NW
30/12/2018	5:00 PM	2.2	NNW
30/12/2018	6:00 PM	1.8	NNW
30/12/2018	7:00 PM	1.8	NW
30/12/2018	8:00 PM	1.3	NNW
30/12/2018	9:00 PM	0.9	NW
30/12/2018	10:00 PM	1.3	NW
30/12/2018	11:00 PM	1.3	NW
31/12/2018	12:00 AM	0.9	NW
31/12/2018	1:00 AM	0.9	NNW
31/12/2018	2:00 AM	0.9	S
31/12/2018	3:00 AM	0.4	NW
31/12/2018	4:00 AM	0.9	S
31/12/2018	5:00 AM	0.9	NW
31/12/2018	6:00 AM	1.3	NW
31/12/2018	7:00 AM	0.9	NW
31/12/2018	8:00 AM	0.9	NW
31/12/2018	9:00 AM	0.9	NW
31/12/2018	10:00 AM	0.9	SSE
31/12/2018	11:00 AM	0.9	SSE
31/12/2018	12:00 PM	0.9	SSE
31/12/2018	1:00 PM	0.9	NW
31/12/2018	2:00 PM	1.3	SSE
31/12/2018	3:00 PM	1.3	NW
31/12/2018	4:00 PM	1.3	NW
31/12/2018	5:00 PM	1.3	SSE
31/12/2018	6:00 PM	1.3	NW
31/12/2018	7:00 PM	1.3	NW
31/12/2018	8:00 PM	1.3	NW
31/12/2018	9:00 PM	1.3	NNW
31/12/2018	10:00 PM	1.3	NW
31/12/2018	11:00 PM	0.9	NW

Appendix N. Investigation Report

Incident Report on Action Level or Limit Level Non-compliance

Contract	Contract No. HY/2013/04 HZMB HKBCF – Infrastructure Works Stage II (Southern Portion)																																																										
Ref. No.	E097																																																										
Date	7 December 2018																																																										
Time (hh:mm)	See below																																																										
Monitoring Location	SR6																																																										
Parameter	Water Quality – Suspended Solids (in mg/L)																																																										
Action Level	See below																																																										
Limit Level	See below																																																										
Measured Level	Action & Limit Level (AL & LL) / Measured Level:																																																										
	Param.	Unit	Station	Depth	Action Level	Limit Level	Measurement at Mid-Ebb Tide	Measurement at Mid-Flood Tide																																																			
	SS	mg/L	SR6	Depth Average	23.5 and 120% (i.e. 9.4 for mid-flood) of upstream control station's SS at the same tide of the same day	34.4 and 130% (i.e. 10.2 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes	16.1	23.9																																																			
Sampling Time: <table border="1"> <thead> <tr> <th></th> <th>Mid-Ebb</th> <th>Mid-Flood</th> </tr> </thead> <tbody> <tr><td>IS5</td><td>11:35</td><td>08:24</td></tr> <tr><td>IS(Mf)6</td><td>11:42</td><td>08:17</td></tr> <tr><td>IS7</td><td>11:50</td><td>08:07</td></tr> <tr><td>IS8</td><td>12:05</td><td>07:52</td></tr> <tr><td>IS(Mf)9</td><td>11:58</td><td>07:59</td></tr> <tr><td>IS10(N)</td><td>12:19</td><td>07:42</td></tr> <tr><td>IS(Mf)11</td><td>12:23</td><td>07:33</td></tr> <tr><td>IS(Mf)16</td><td>12:26</td><td>07:30</td></tr> <tr><td>IS17</td><td>12:33</td><td>07:21</td></tr> <tr><td>SR3(N)</td><td>11:28</td><td>08:31</td></tr> <tr><td>SR4(N)</td><td>12:10</td><td>07:45</td></tr> <tr><td>SR5(N)</td><td>12:13</td><td>07:47</td></tr> <tr><td>SR6</td><td>11:27</td><td>08:39</td></tr> <tr><td>SR7</td><td>12:31</td><td>07:25</td></tr> <tr><td>SR10A(N)</td><td>13:21</td><td>06:25</td></tr> <tr><td>SR10B(N2)</td><td>13:26</td><td>06:34</td></tr> </tbody> </table>										Mid-Ebb	Mid-Flood	IS5	11:35	08:24	IS(Mf)6	11:42	08:17	IS7	11:50	08:07	IS8	12:05	07:52	IS(Mf)9	11:58	07:59	IS10(N)	12:19	07:42	IS(Mf)11	12:23	07:33	IS(Mf)16	12:26	07:30	IS17	12:33	07:21	SR3(N)	11:28	08:31	SR4(N)	12:10	07:45	SR5(N)	12:13	07:47	SR6	11:27	08:39	SR7	12:31	07:25	SR10A(N)	13:21	06:25	SR10B(N2)	13:26	06:34
	Mid-Ebb	Mid-Flood																																																									
IS5	11:35	08:24																																																									
IS(Mf)6	11:42	08:17																																																									
IS7	11:50	08:07																																																									
IS8	12:05	07:52																																																									
IS(Mf)9	11:58	07:59																																																									
IS10(N)	12:19	07:42																																																									
IS(Mf)11	12:23	07:33																																																									
IS(Mf)16	12:26	07:30																																																									
IS17	12:33	07:21																																																									
SR3(N)	11:28	08:31																																																									
SR4(N)	12:10	07:45																																																									
SR5(N)	12:13	07:47																																																									
SR6	11:27	08:39																																																									
SR7	12:31	07:25																																																									
SR10A(N)	13:21	06:25																																																									
SR10B(N2)	13:26	06:34																																																									
Remarks: Bold means AL exceedance Bold with underline means LL exceedance Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4 Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA																																																											
Possible reason for Action or Limit Level Non-compliance	<p>On 7 December 2018, 1 no. AL exceedance of suspended solids at station SR6 was recorded during mid-flood tide.</p> <p><u>Contract No. HY/2013/01</u></p> <p>As confirmed with the RSS and ET of Contract No. HY/2013/01, there were no marine transportation and no marine-based works performed under the Contract after January 2018. No site runoff within the Contract site was observed. All wastewater generated from construction site which potentially contained organic matter was collected by the registered collector. No organic matter discharge/accumulation at active works area was observed on the date of exceedance. Therefore, it is concluded that the exceedance was not related to the Contract.</p> <p><u>Contract No. HY/2013/02</u></p> <p>As confirmed with RSS, marine works were completed on 10 September 2017. ET of Contract No. HY/2013/02 confirmed that no organic matter discharge/accumulation was observed at active works areas on the date of exceedance. Therefore, it is concluded that the exceedance was not related to the Contract.</p>																																																										

	<p><u>Contract No. HY/2013/03</u> As confirmed with RSS, there were no marine-based works performed under the contract after October 2018. ET of Contract No. HY/2013/03 confirmed that no organic matter discharge/accumulation was observed at the works areas on the date of exceedance. Therefore, it is concluded that the exceedance was not related to the Contract.</p> <p><u>Contract No. HY/2013/04</u> According to the Contractor of HY/2013/04, all marine-based segment deliveries were completed in January 2018 and no marine-based works were conducted under the contract on 7 December 2018. Furthermore, there was no visible observation of any discharge or accumulation of organic matter at the active works areas within HY/2013/04 site area on 7 December 2018. HY/2013/04 site shoreline interfacing with open waters was inspected during ET's regular weekly site inspections on 5 December 2018 (between 10:20 and 10:30) and 13 December 2018 (between 10:10 and 10:30). There were no observations (including with respect to the appearance of the open waters) in relation to the same shoreline during both inspections. The silt curtain at Box Culvert D was inspected and was found to be structurally intact. It was concluded that the exceedance was not due to HY/2013/04.</p> <p><u>Contract No. HY/2014/05</u> This Contract did not involve any marine transportation or marine-based works. No site runoff within the Contract site was observed. Therefore, it is concluded that the exceedance was not related to the Contract.</p>
<p>Actions taken / to be taken</p>	<p><u>Contract No. HY/2013/01</u> Although the exceedance was considered not due to HY/2013/01, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.</p> <p><u>Contract No. HY/2013/02</u> Although the exceedance was considered not due to HY/2013/02, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.</p> <p><u>Contract No. HY/2013/03</u> Although the exceedance was considered not due to HY/2013/03, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.</p> <p><u>Contract No. HY/2013/04</u> Actions were taken under Event and Action Plan (EAP): 1. In situ measurement was repeated to confirm findings; 2. After considering the above-mentioned investigation results, it appears that it was unlikely that the exceedance was attributed to active construction activities of this Contract; 3. IEC, Contractor and ER were informed via email; 4. Monitoring data, all plant, equipment and Contractor's working methods were checked; 5. Since it is considered that the exceedance was unlikely to be contract related, as such, Actions 5-7 under the EAP are not considered applicable. However, the Contractor was also reminded to implement environmental</p>

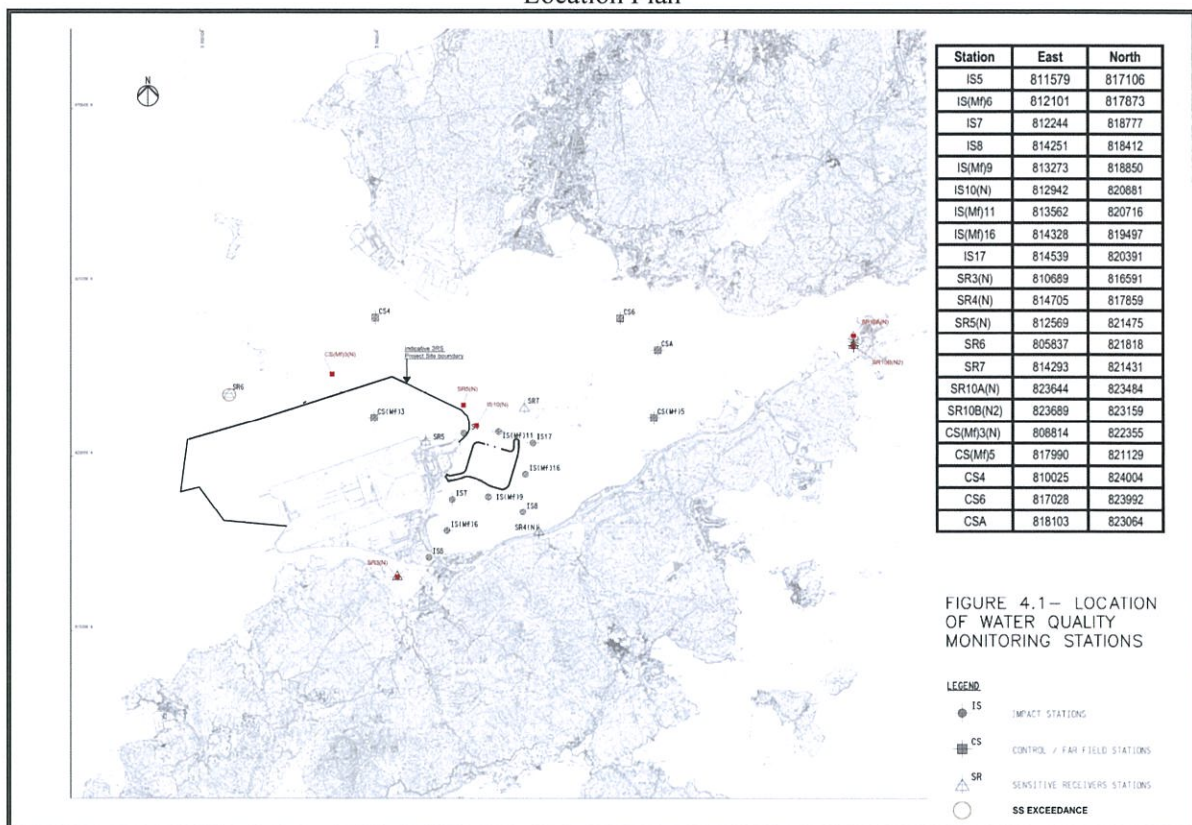
	mitigation measures in accordance with Environmental Mitigation Implementation Schedule. <u>Contract No. HY/2014/05</u> Although the exceedance was considered not due to HY/2014/05, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.
Remarks	ET of HY/2013/04 notified the exceedance as follows: <ul style="list-style-type: none"> 27 December 2018 (Notification No. 20181207_NOE_r0)

(Location Plan – please refer below)

Prepared by: Gary Chow
 Designation: Environmental Team Leader (Contract No. HY/2013/04)
 Signature: 

Date: 18 January 2019

Location Plan



Incident Report on Action Level or Limit Level Non-compliance

Contract	Contract No. HY/2013/04 HZMB HKBCF – Infrastructure Works Stage II (Southern Portion)							
Ref. No.	E098							
Date	12 December 2018							
Time (hh:mm)	See below							
Monitoring Location	IS8, SR4(N), IS(Mf)9, IS7							
Parameter	Water Quality – Suspended Solids (in mg/L)							
Action Level	See below							
Limit Level	See below							
Measured Level	Action & Limit Level (AL & LL) / Measured Level:							
	Param.	Unit	Station	Depth	Action Level	Limit Level	Measurement at Mid-Ebb Tide	Measurement at Mid-Flood Tide
	SS	mg/L	IS8	Depth Average	23.5 and 120% (i.e. 5.3 for mid-flood) of upstream control station's SS at the same tide of the same day	34.4 and 130% (i.e. 5.8 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes	6.9	<u>37.4</u>
	SS	mg/L	SR4(N)	Depth Average	23.5 and 120% (i.e. 5.3 for mid-flood) of upstream control station's SS at the same tide of the same day	34.4 and 130% (i.e. 5.8 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes	4.6	<u>28.7</u>
	SS	mg/L	IS(Mf)9	Depth Average	23.5 and 120% (i.e. 5.3 for mid-flood) of upstream control station's SS at the same tide of the same day	34.4 and 130% (i.e. 5.8 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes	5.4	<u>26.1</u>
SS	mg/L	IS7	Depth Average	23.5 and 120% (i.e. 5.3 for mid-flood) of upstream control station's SS at the same tide of the same day	34.4 and 130% (i.e. 5.8 for mid-flood) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes	5.4	<u>27.7</u>	
Sampling Time:								
		Mid-Ebb	Mid-Flood					
IS5		14:53	12:39					
IS(Mf)6		14:59	12:30					
IS7		15:06	12:26					
IS8		15:19	12:11					
IS(Mf)9		15:12	12:17					
IS10(N)		15:30	11:20					
IS(Mf)11		15:34	11:13					
IS(Mf)16		15:38	11:51					
IS17		15:44	11:45					
SR3(N)		14:46	12:46					
SR4(N)		15:23	12:06					
SR5(N)		15:24	11:25					
SR6		14:44	12:09					
SR7		15:41	11:07					
SR10A(N)		16:35	10:51					
SR10B(N2)		16:39	10:55					
Remarks:								
Bold means AL exceedance								
Bold with underline means LL exceedance								
Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4								
Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA								

<p>Possible reason for Action or Limit Level Non-compliance</p>	<p>On 12 December 2018, 3 no. AL exceedances of suspended solids at stations SR4(N), IS(Mf)9 and IS7 and 1 no. LL exceedance at station IS8 were recorded during mid-flood tide.</p> <p><u>Contract No. HY/2013/01</u></p> <p>As confirmed with the RSS and ET of Contract No. HY/2013/01, there were no marine transportation and no marine-based works performed under the Contract after January 2018. No site runoff within the Contract site was observed. All wastewater generated from construction site which potentially contained organic matter was collected by the registered collector. No organic matter discharge/accumulation at active works area was observed on the date of exceedance. Therefore, it is concluded that the exceedances were not related to the Contract.</p> <p><u>Contract No. HY/2013/02</u></p> <p>As confirmed with RSS, marine works were completed on 10 September 2017. ET of Contract No. HY/2013/02 confirmed that no organic matter discharge/accumulation was observed at active works areas on the date of exceedance. Therefore, it is concluded that the exceedances were not related to the Contract.</p> <p><u>Contract No. HY/2013/03</u></p> <p>As confirmed with RSS, there were no marine-based works performed under the contract after October 2018. ET of Contract No. HY/2013/03 confirmed that no organic matter discharge/accumulation was observed at the works areas on the date of exceedance. Therefore, it is concluded that the exceedances were not related to the Contract.</p> <p><u>Contract No. HY/2013/04</u></p> <p>According to the Contractor of HY/2013/04, all marine-based segment deliveries were completed in January 2018 and no marine-based works were conducted under the contract on 12 December 2018. Furthermore, there was no visible observation of any discharge or accumulation of organic matter at the active works areas within HY/2013/04 site area on 12 December 2018.</p> <p>HY/2013/04 site shoreline interfacing with open waters was inspected during ET's regular weekly site inspections on 5 December 2018 (between 10:20 and 10:30) and 13 December 2018 (between 10:10 and 10:30). There were no observations (including with respect to the appearance of the open waters) in relation to the same shoreline during both inspections. The silt curtain at Box Culvert D was inspected and was found to be structurally intact.</p> <p>It was concluded that the exceedances were not due to HY/2013/04.</p> <p><u>Contract No. HY/2014/05</u></p> <p>This Contract did not involve any marine transportation or marine-based works. No site runoff within the Contract site was observed. Therefore, it is concluded that the exceedances were not related to the Contract.</p>
<p>Actions taken / to be taken</p>	<p><u>Contract No. HY/2013/01</u></p> <p>Although the exceedances were considered not due to HY/2013/01, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.</p> <p><u>Contract No. HY/2013/02</u></p> <p>Although the exceedances were considered not due to HY/2013/02, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.</p>

	<p><u>Contract No. HY/2013/03</u> Although the exceedances were considered not due to HY/2013/03, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.</p> <p><u>Contract No. HY/2013/04</u> Actions were taken under Event and Action Plan (EAP):</p> <ol style="list-style-type: none"> 1. In situ measurement was repeated to confirm findings; 2. After considering the above-mentioned investigation results, it appears that it was unlikely that the exceedances were attributed to active construction activities of this Contract; 3. EPD, IEC, Contractor and ER were informed via email; 4. Monitoring data, all plant, equipment and Contractor's working methods were checked; 5. Since it is considered that the exceedances were unlikely to be contract related, as such, Actions 5-7 under the EAP are not considered applicable. <p>However, the Contractor was also reminded to implement environmental mitigation measures in accordance with Environmental Mitigation Implementation Schedule.</p> <p><u>Contract No. HY/2014/05</u> Although the exceedances were considered not due to HY/2014/05, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.</p>
Remarks	<p>ET of HY/2013/04 notified the exceedances as follows:</p> <ul style="list-style-type: none"> • 27 December 2018 (Notification No. 20181212_NOE_r0)

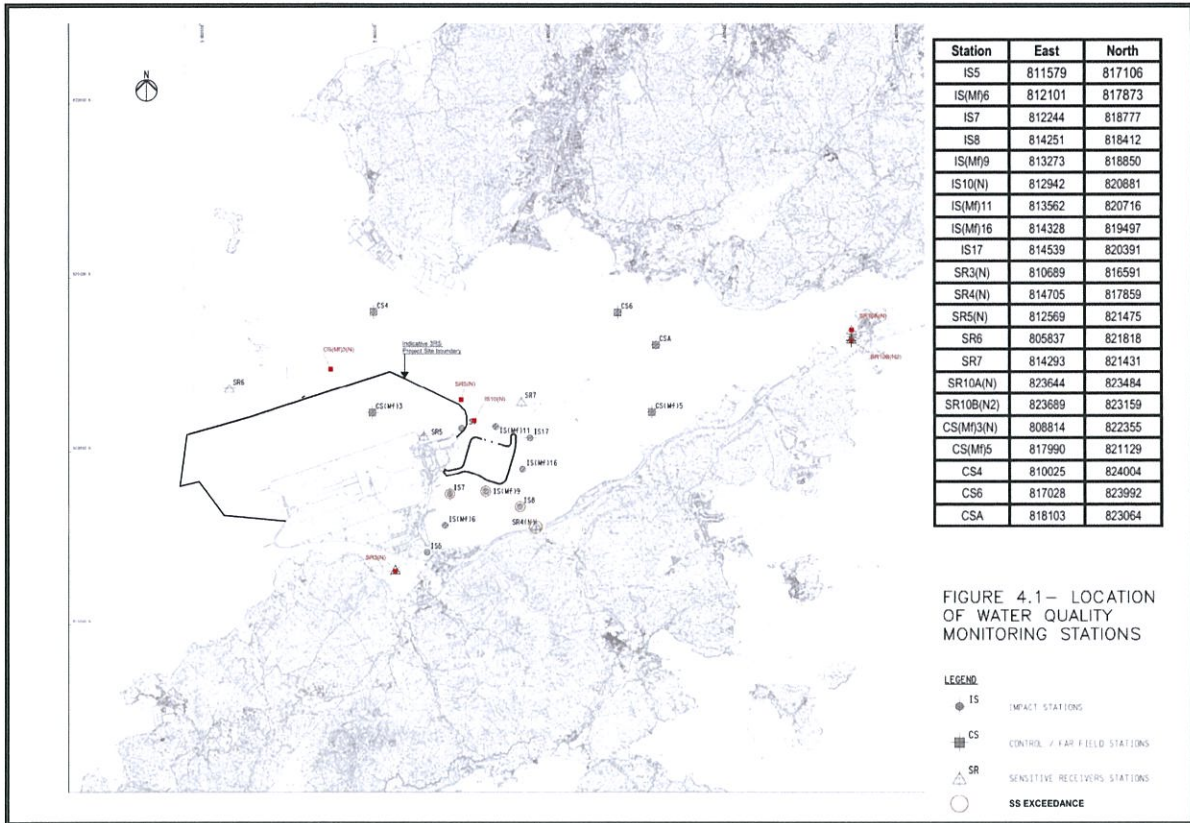
(Location Plan – please refer below)

Prepared by: Gary Chow
 Designation: Environmental Team Leader (Contract No. HY/2013/04)
 Signature:



Date: 18 January 2019

Location Plan




Incident Report on Action Level or Limit Level Non-compliance

Contract	Contract No. HY/2013/04 HZMB HKBCF – Infrastructure Works Stage II (Southern Portion)							
Ref. No.	E099							
Date	10 December 2018							
Time (hh:mm)	See below							
Monitoring Location	SR6							
Parameter	Water Quality – Suspended Solids (in mg/L)							
Action Level	See below							
Limit Level	See below							
Measured Level	Action & Limit Level (AL & LL) / Measured Level:							
	Param.	Unit	Station	Depth	Action Level	Limit Level	Measurement at Mid-Ebb Tide	Measurement at Mid-Flood Tide
	SS	mg/L	SR6	Depth Average	23.5 and 120% (i.e. 17.9 for mid-ebb) of upstream control station's SS at the same tide of the same day	34.4 and 130% (i.e. 19.4 for mid-ebb) of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes	26.5	19.0
	Sampling Time:							
					Mid-Ebb	Mid-Flood		
					IS5	13:22	10:11	
					IS(Mf)6	13:28	10:05	
					IS7	13:34	09:57	
					IS8	13:47	09:42	
					IS(Mf)9	13:41	09:49	
					IS10(N)	14:06	09:19	
					IS(Mf)11	14:12	09:13	
					IS(Mf)16	14:08	09:22	
					IS17	14:14	09:13	
					SR3(N)	13:16	10:18	
					SR4(N)	13:53	09:36	
					SR5(N)	14:00	09:24	
					SR6	13:15	10:11	
					SR7	14:18	09:06	
					SR10A(N)	15:02	08:23	
					SR10B(N2)	15:08	08:29	
	Remarks:							
	Bold means AL exceedance							
	Bold with underline means LL exceedance							
	Upstream control stations of mid-ebb tide: CS(Mf)3(N) and CS4							
	Upstream control stations of mid-flood tide: CS(Mf)5, CS6 and CSA							
Possible reason for Action or Limit Level Non-compliance	<p>On 10 December 2018, 1 no. AL exceedance of suspended solids at station SR6 was recorded during mid-ebb tide.</p> <p><u>Contract No. HY/2013/01</u></p> <p>As confirmed with the RSS and ET of Contract No. HY/2013/01, there were no marine transportation and no marine-based works performed under the Contract after January 2018. No site runoff within the Contract site was observed. All wastewater generated from construction site which potentially contained organic matter was collected by the registered collector. No organic matter discharge/accumulation at active works area was observed on the date of exceedance. Therefore, it is concluded that the exceedance was not related to the Contract.</p> <p><u>Contract No. HY/2013/02</u></p> <p>As confirmed with RSS, marine works were completed on 10 September 2017. ET of Contract No. HY/2013/02 confirmed that no organic matter discharge/</p>							

	<p>accumulation was observed at active works areas on the date of exceedance. Therefore, it is concluded that the exceedance was not related to the Contract.</p> <p><u>Contract No. HY/2013/03</u></p> <p>As confirmed with RSS, there were no marine-based works performed under the contract after October 2018. ET of Contract No. HY/2013/03 confirmed that no organic matter discharge/accumulation was observed at the works areas on the date of exceedance. Therefore, it is concluded that the exceedance was not related to the Contract.</p> <p><u>Contract No. HY/2013/04</u></p> <p>According to the Contractor of HY/2013/04, all marine-based segment deliveries were completed in January 2018 and no marine-based works were conducted under the contract on 12 December 2018. Furthermore, there was no visible observation of any discharge or accumulation of organic matter at the active works areas within HY/2013/04 site area on 12 December 2018.</p> <p>HY/2013/04 site shoreline interfacing with open waters was inspected during ET's regular weekly site inspections on 5 December 2018 (between 10:20 and 10:30) and 13 December 2018 (between 10:10 and 10:30). There were no observations (including with respect to the appearance of the open waters) in relation to the same shoreline during both inspections. The silt curtain at Box Culvert D was inspected and was found to be structurally intact.</p> <p>It was concluded that the exceedance was not due to HY/2013/04.</p> <p><u>Contract No. HY/2014/05</u></p> <p>This Contract did not involve any marine transportation or marine-based works. No site runoff within the Contract site was observed. Therefore, it is concluded that the exceedance was not related to the Contract.</p>
<p>Actions taken / to be taken</p>	<p><u>Contract No. HY/2013/01</u></p> <p>Although the exceedance was considered not due to HY/2013/01, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.</p> <p><u>Contract No. HY/2013/02</u></p> <p>Although the exceedance was considered not due to HY/2013/02, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.</p> <p><u>Contract No. HY/2013/03</u></p> <p>Although the exceedance was considered not due to HY/2013/03, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.</p> <p><u>Contract No. HY/2013/04</u></p> <p>Actions were taken under Event and Action Plan (EAP):</p> <ol style="list-style-type: none"> 1. In situ measurement was repeated to confirm findings; 2. After considering the above-mentioned investigation results, it appears that it was unlikely that the exceedance was attributed to active construction activities of this Contract; 3. IEC, Contractor and ER were informed via email; 4. Monitoring data, all plant, equipment and Contractor's working methods were checked; 5. Since it is considered that the exceedance was unlikely to be contract related, as

	<p>such, Actions 5-7 under the EAP are not considered applicable.</p> <p>However, the Contractor was also reminded to implement environmental mitigation measures in accordance with Environmental Mitigation Implementation Schedule.</p> <p>Contract No. HY/2014/05</p> <p>Although the exceedance was considered not due to HY/2014/05, the Contractor is reminded to implement all necessary water quality mitigation measures identified in the EM&A Manual.</p>
Remarks	<p>ET of HY/2013/04 notified the exceedances as follows:</p> <ul style="list-style-type: none"> 3 January 2019 (Notification No. 20181210_NOE_r0)

(Location Plan – please refer below)

Prepared by: Gary Chow
 Designation: Environmental Team Leader (Contract No. HY/2013/04)
 Signature: 
 Date: 18 January 2019

Location Plan

