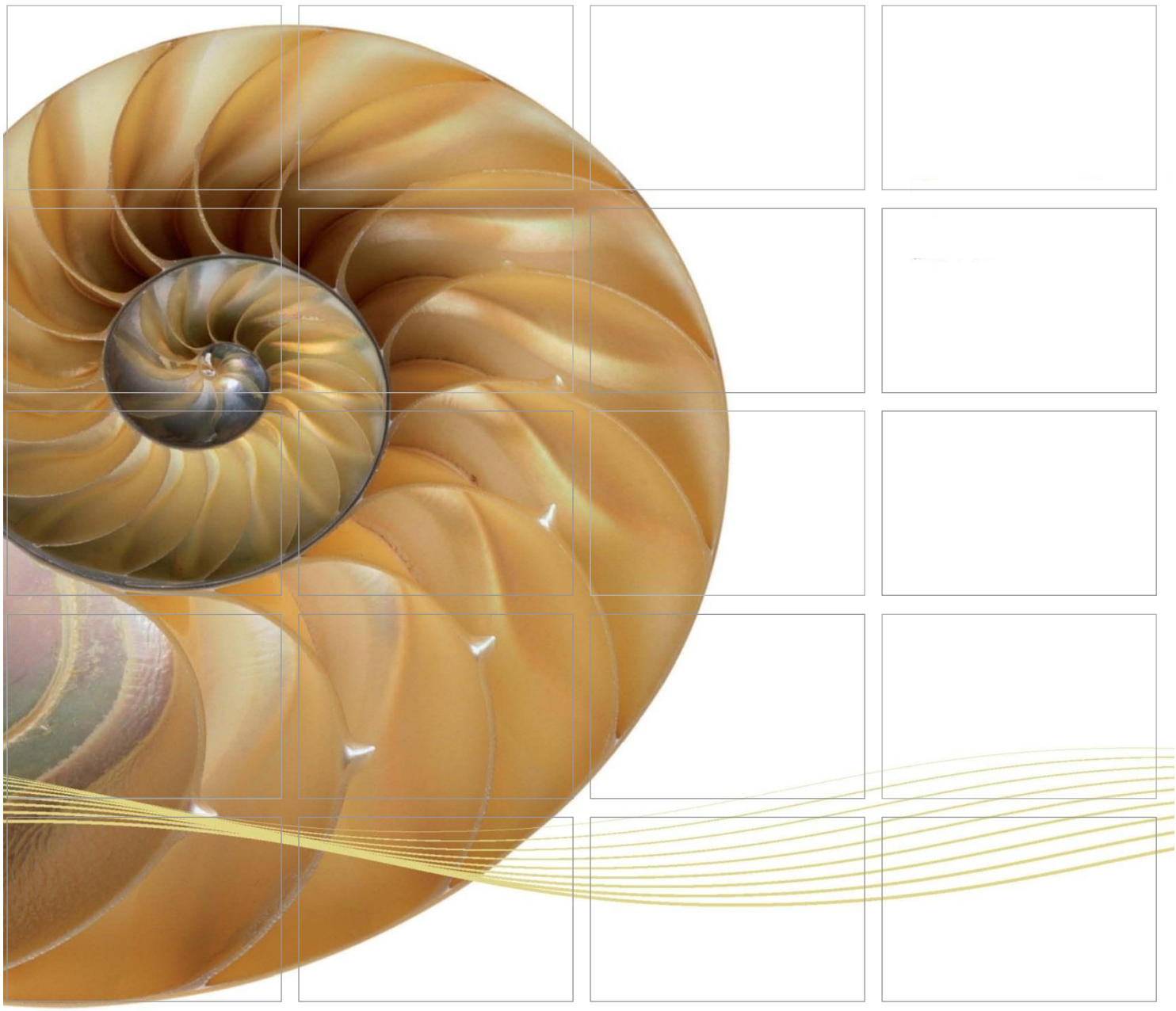
Report



Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section

Twenty-second Quarterly Environmental Monitoring & Audit (EM&A) Report

26 November 2019

Environmental Resources Management
2507, 25/F
One Harbourfront
18 Tak Fung Street
Hunghom, Kowloon
Hong Kong
Telephone 2271 3000
Facsimile 2723 5660
www.erm.com

ERM

The business of sustainability

RAMBOLL

Ref.: HYDHZMBEEM00_0_7773L.19.docx

29 November 2019

By Fax (2293 6300) and By Post

AECOM
Supervising Officer Representative's Office
No.8 Mong Fat Street, Tuen Mun, N.T., Hong Kong

Attention: Messrs. Andy Westmoreland / Roger Man

Dear Sirs,

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/2012/08
TM-CLKL – Northern Connection Sub-sea Tunnel Section
22nd Quarterly EM&A Summary Report for March 2019 to May 2019

Reference is made to the ET's submission of 22nd Quarterly EM&A Summary Report for March 2019 to May 2019 (ET's ref.: "*0212330_22nd Quarterly EM&A_20191126.doc*" dated 26 November 2019) certified by the ET Leader.

Please be informed that we have no adverse comments on the captioned report.

Thank you for your attention. Please do not hesitate to contact the undersigned or the ENPO Leader, Mr. Y. H. Hui, should you have any queries.

Yours sincerely,

F. C. Tsang
Independent Environmental Checker
Tuen Mun–Chek Lap Kok Link

c.c.

HyD	Mr. Patrick Ng	(By Fax: 3188 6614)
HyD	Mr. Cheng Pan	(By Fax: 3188 6614)
AECOM	Mr. Conrad Ng	(By Fax: 3922 9797)
ERM	Dr. Jasmine Ng	(By Fax: 2723 5660)
DBJV	Mr. Bryan Lee	(By Fax: 2293 7499)

Internal: DY, YH, ENPO Site

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Ramboll Hong Kong Limited 英環香港有限公司
21/F, BEA Harbour View Centre, 56 Gloucester Road, Wan Chai, Hong Kong Tel: 852.3465 2888 Fax: 852.3465 2899
www.ramboll.com

Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section

Twenty-second Quarterly Environmental Monitoring & Audit
(EM&A) Report

Document Code: 0212330_22nd Quarterly EM&A_20191126.doc

Environmental Resources Management

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Client: DBJV	Project No: 0212330
Summary: This document presents the Twenty-second Quarterly EM&A Report for Tuen Mun – Chek Lap Kok Link Northern Connection Sub-sea Tunnel Section.	Date: 26 November 2019 Approved by: *Mr Craig Reid* *Partner* Certified by: *Dr Jasmine Ng* *ET Leader*

Revision	Description	By	Checked	Approved	Date
	22nd Quarterly EM&A Report	VAR	JN	CAR	26/11/19

Distribution

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TABLE OF CONTENTS

Under *Contract No. HY/2012/08*, Dragages – Bouygues Joint Venture (DBJV) is commissioned by the Highways Department (HyD) to undertake the design and construction of the Northern Connection Sub-sea Tunnel Section of the Tuen Mun – Chek Lap Kok Link Project (TM-CLK Link Project) while AECOM Asia Company Limited was appointed by HyD as the Supervising Officer. For implementation of the environmental monitoring and audit (EM&A) programme under the Contract, ERM-Hong Kong, Limited (ERM) has been appointed as the Environmental Team (ET) in accordance with *Environmental Permit No. EP-354/2009/A*. Ramboll Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO). Subsequent applications for variation of environmental permits (VEP), *EP-354/2009/B*, *EP-354/2009/C and EP-354/2009/D*, were granted on 28 January 2014, 10 December 2014 and 13 March 2015, respectively.

The construction phase of the Contract commenced on 1 November 2013 and will tentatively be completed by the end of 2019. The impact monitoring of the EM&A programme, including air quality, water quality, marine ecological monitoring and environmental site inspections, were commenced on 1 November 2013.

This is the Twenty-second Quarterly EM&A report presenting the EM&A works carried out during the period from 1 March 2019 to 31 May 2019 for the *Contract No. HY/2012/08 Northern Connection Sub-sea Tunnel Section* (the "Contract") in accordance with the Updated EM&A Manual of the TM-CLK Link Project. As informed by the Contractor, the major activities in the reporting quarter included:

Land-based Works

- Construction of Overhead Ventilation Ducts – TBM tunnel;
- Construction of Thermal barrier – TBM tunnel;
- Construction of Walkway Corbel & Cover – TBM Tunnel;
- Demolition of Amenities and Workshop – Portion N-A:
- RC structure – Portion N-A & S-A;
- ELS Removal - Portion S-A;
- ELS Construction – Portion S-C; and
- D-wall Construction – Portion N-A & S-C
- Seawall Inspection and Remedial Works – Portion N-B

Marine-based Works

- Seawall Modification Works – Portion S-B

A summary of monitoring and audit activities conducted in the reporting period is listed below:

24-hour TSP Monitoring	30 sessions

1-hour TSP Monitoring	30 sessions
Water Quality Monitoring	20 sessions
Impact Dolphin Monitoring	6 sessions
Joint Environmental Site Inspection	13 sessions

Implementation of Marine Mammal Exclusion Zone

Daily marine mammal exclusion zone was in effect during the period of silt curtain installation in open waters under this Contract. No sighting of the Indo-Pacific humpback dolphin (i.e. Chinese White Dolphin) was recorded in the reporting period during the exclusion zone monitoring.

Summary of Breaches of Action/Limit Levels

Breaches of Action and Limit Levels for Air Quality

Four (4) Action level exceedances of 1-hour TSP and One (1) Action level exceedance of 24-hour TSP were recorded in this reporting period. Investigation reports are provided in Appendix J.

Breaches of Action and Limit Levels for Water Quality

Two Action level exceedances of depth-averaged SS were recorded in this reporting period. Investigation reports are provided in Appendix J.

Dolphin Monitoring

Whilst one (1) Limit Level exceedance was observed for the quarterly dolphin monitoring data between March and May 2019, no unacceptable impact from the construction activities of the TM-CLKL Northern Connection Sub-sea Tunnel Section on Chinese White Dolphins was noticeable from general observations during the dolphin monitoring in this reporting quarter.

Environmental Complaints, Non-compliance & Summons

No non-compliance with EIA recommendations, EP conditions and other requirements associated with the construction of this Contract was recorded in this reporting period.

No environmental complaint was received in this reporting period.

No environmental summons was received in this reporting period.

Reporting Change

There was no reporting change required in the reporting period.

Upcoming Works for the Next Reporting Period

Works to be undertaken in the coming quarterly period include the following:
Land-based Works

- Construction of Thermal barrier – TBM tunnel;
- Bitumen Laying – TBM tunnel
- Construction of Walkway Corbel & Cover – TBM Tunnel;
- RC structure – Portion N-A & S-A;
- E&M Platform Installation – Portion S-A
- ELS Removal – Portion S-A;
- D-wall Construction – Portion S-C
- STP Demolition – Portion S-C
- Seawall Inspection and Remedial Works – Portion N-B

Marine-based Works

- Seawall Modification Works – Portion S-B

Future Key Issues

Potential environmental impacts arising from the above upcoming construction activities in the coming quarterly period are expected to be mainly associated with dust, marine ecology, marine water quality and waste management issues.

1 INTRODUCTION

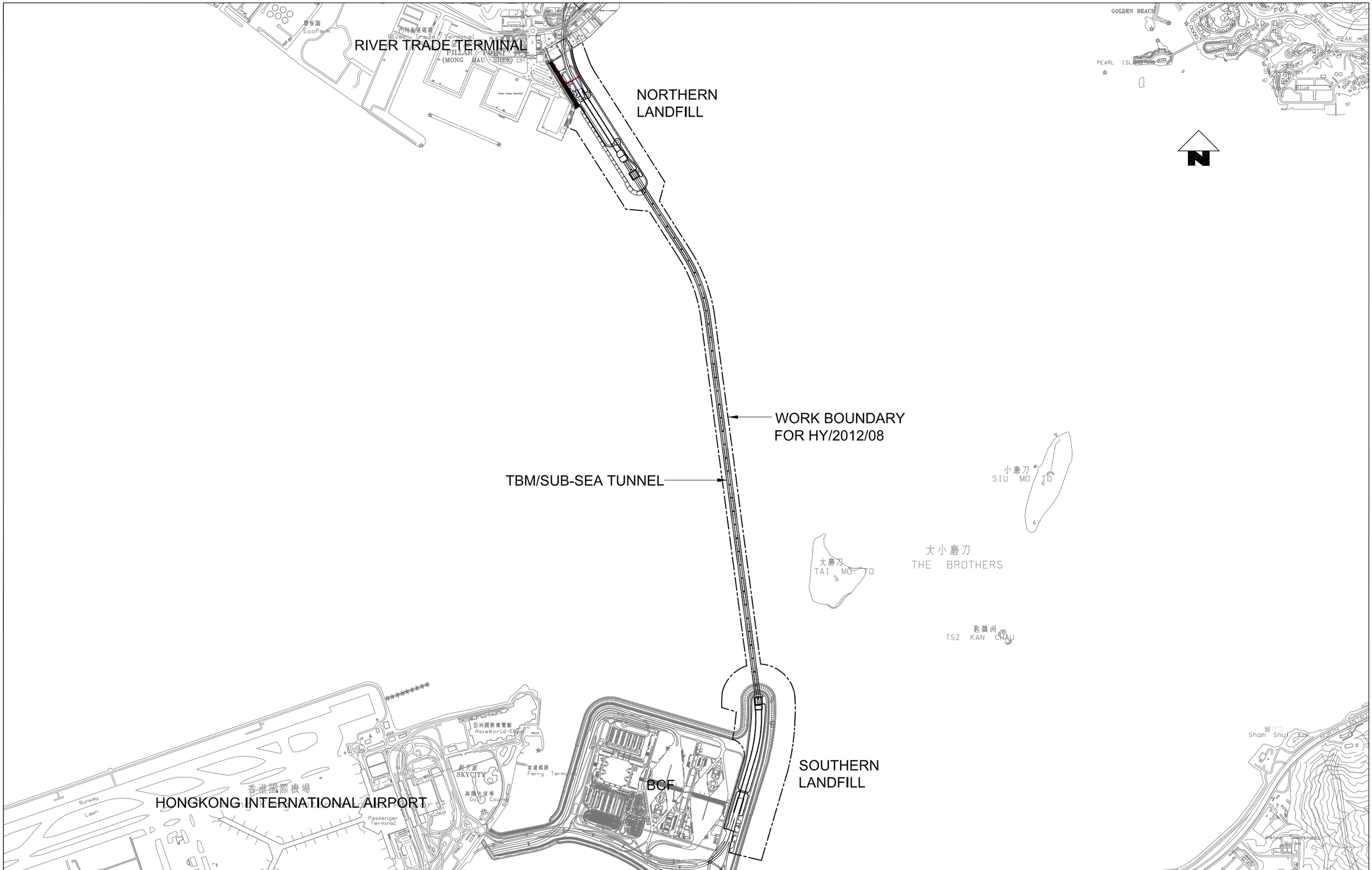
1.1 BACKGROUND

According to the findings of the Northwest New Territories (NWNT) Traffic and Infrastructure Review conducted by the Transport Department, Tuen Mun Road, Ting Kau Bridge, Lantau Link and North Lantau Highway would be operating beyond capacity after 2016. This forecast has been based on the estimated increase in cross boundary traffic, developments in the Northwest New Territories (NWNT), and possible developments in North Lantau, including the Airport developments, the Lantau Logistics Park (LLP) and the Hong Kong – Zhuhai – Macao Bridge (HZMB). In order to cope with the anticipated traffic demand, two new road sections between NWNT and North Lantau – Tuen Mun – Chek Lap Kok Link (TM-CLKL) and Tuen Mun Western Bypass (TMWB) are proposed.

An Environmental Impact Assessment (EIA) of TM-CLKL (the Project) was prepared in accordance with the EIA Study Brief (No. ESB-175/2007) and the *Technical Memorandum of the Environmental Impact Assessment Process* (*EIAO-TM*). The EIA Report was submitted under the Environmental Impact Assessment Ordinance (EIAO) in August 2009. Subsequent to the approval of the EIA Report (EIAO Register Number AEIAR-146/2009), an Environmental Permit (EP-354/2009) for TM-CLKL was granted by the Director of Environmental Protection (DEP) on 4 November 2009, and EP variation (VEP) (EP-354/2009/A) was issued on 8 December 2010. Subsequent applications for variation of environmental permits (VEP), *EP-354/2009/B, EP-354/2009/C* and *EP-354/2009/D*, were granted on 28 January 2014, 10 December 2014 and 13 March 2015, respectively.

Under *Contract No. HY/2012/08*, Dragages – Bouygues Joint Venture (DBJV) is commissioned by the Highways Department (HyD) to undertake the design and construction of the Northern Connection Sub-sea Tunnel Section of TM-CLKL while AECOM Asia Company Limited was appointed by HyD as the Supervising Officer. For implementation of the environmental monitoring and audit (EM&A) programme under the Contract, ERM-Hong Kong, Limited (ERM) has been appointed as the Environmental Team (ET) in accordance with Environmental Permit No. EP-354/2009/A. Ramboll Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO).

Layout of the Contract components is presented in *Figure 1.1*.



				Designed By	PKV
				Drawn By	DAI
				Approved By	SPo PP
A	FIRST ISSUE	11SEP13	PKV	Date	11SEP2013
Rev.	Description	Date	Checked		

Main Contractor

香寶嘉 Dragages HongKong

A member of the Bouygues Construction group

BOUYGUES TRAVAUX PUBLICS

Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

Client

路政署 HIGHWAYS DEPARTMENT

Contractor's Designer

ARUP Ove Arup & Partners Hong Kong Limited

Project

Contract No. HY/2012/08
Tuen Mun - Chek Lap Kok Link -
Northern Connection Sub-Sea Tunnel Section

Drawing Title

Figure 1.1

Drawing no.	TMCLKL8-DBJ-GEN-DWG-00174
Scale	1:25000 @ A3
CADD Ref.	TMCLKL8-DBJ-GEN-DWG-00174-DFT-A
Issue Status	DFT (DRAFT)
Revision	A

The construction phase of the Contract commenced on 1 November 2013 and will tentatively be completed by the end of 2019. The impact monitoring phase of the EM&A programme, including air quality, water quality, marine ecological monitoring and environmental site inspections, were commenced on 1 November 2013.

1.2 SCOPE OF REPORT

This is the Twenty-second Quarterly EM&A Report under the *Contract No. HY/2012/08 Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section*. This report presents a summary of the environmental monitoring and audit works from 1 March 2019 to 31 May 2019.

1.3 ORGANIZATION STRUCTURE

The organization structure of the Contract is shown in *Appendix A*. The key personnel contact names and contact details are summarized in *Table 1.1* below.

Table 1.1 Contact Information of Key Personnel

Party	Position	Name	Telephone	Fax
Highways Department	Engr 22/HZMB	Chow Man Lung, Andrew	2762 4110	2762 4110
	Engr 24/SD	Ken T.M. Cheng	2762 4062	3188 6614
SOR (AECOM Asia Company Limited)	Chief Resident Engineer	Roger Man	2293 6388	2293 6300
		Andrew Westmoreland	2293 6360	2293 6300
ENPO / IEC (Ramboll Hong Kong Ltd.)	ENPO Leader	Y.H. Hui	3465 2850	3465 2899
	IEC	Dr. F.C. Tsang	3465 2851	3465 2899
Contractor (Dragages – Bouygues Joint Venture)	Deputy Environmental Manager	Bryan Lee	2293 7323	2293 7499
	Senior Environmental Officer	Ashley Au	52950766	
	24-hour hotline		2293 7330	
ET (ERM-HK)	ET Leader	Jasmine Ng	2271 3311	2723 5660

1.4 SUMMARY OF CONSTRUCTION WORKS

The construction phase of this Contract was commenced on 1 November 2013. The construction programme is shown in *Appendix B*.

As per DBJV's information, details of major construction works carried out in this reporting period are summarized in *Table 1.2*.

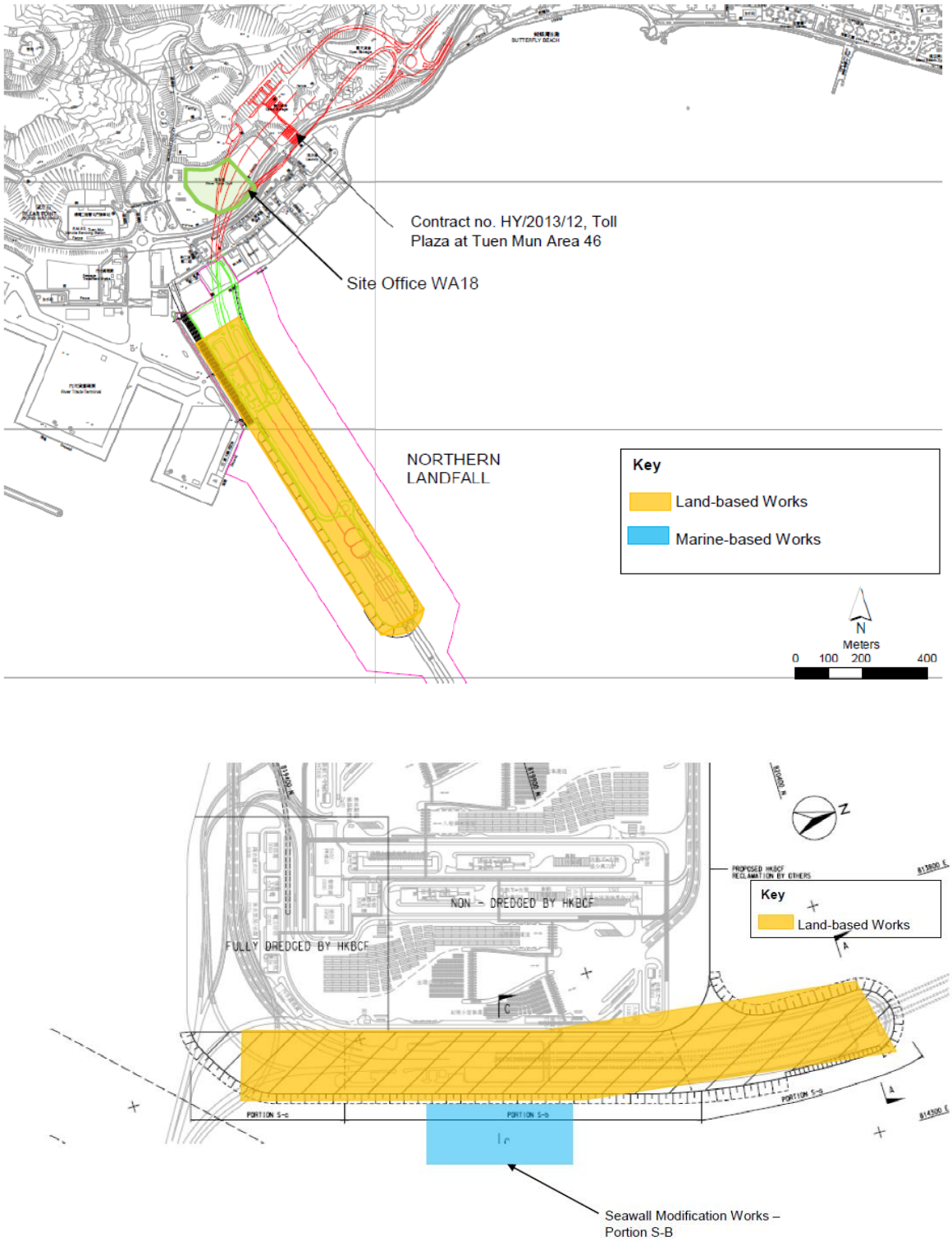
The general layout plan of the site showing the detailed works areas is shown in *Figure 1.2*. The Environmental Sensitive Receivers in the vicinity of the Contract are shown in *Figure 1.3*.

The implementation schedule of environmental mitigation measures is presented in *Appendix C*.

Table 1.2 Summary of Construction Activities Undertaken during the Reporting Period

Construction Activities Undertaken
Land-based Works
• Construction of Overhead Ventilation Ducts – TBM tunnel; • Construction of Thermal barrier – TBM tunnel; • Construction of Walkway Corbel & Cover – TBM Tunnel; • Demolition of Amenities and Workshop – Portion N-A: • RC structure – Portion N-A & S-A; • ELS Removal - Portion S-A; • ELS Construction – Portion S-C; and • D-wall Construction – Portion N-A & S-C • Seawall Inspection and Remedial Works – Portion N-B
Marine-based Works • Seawall Modification Works – Portion S-B

Figure 1.2 Locations of Construction Activities – March to May 2019



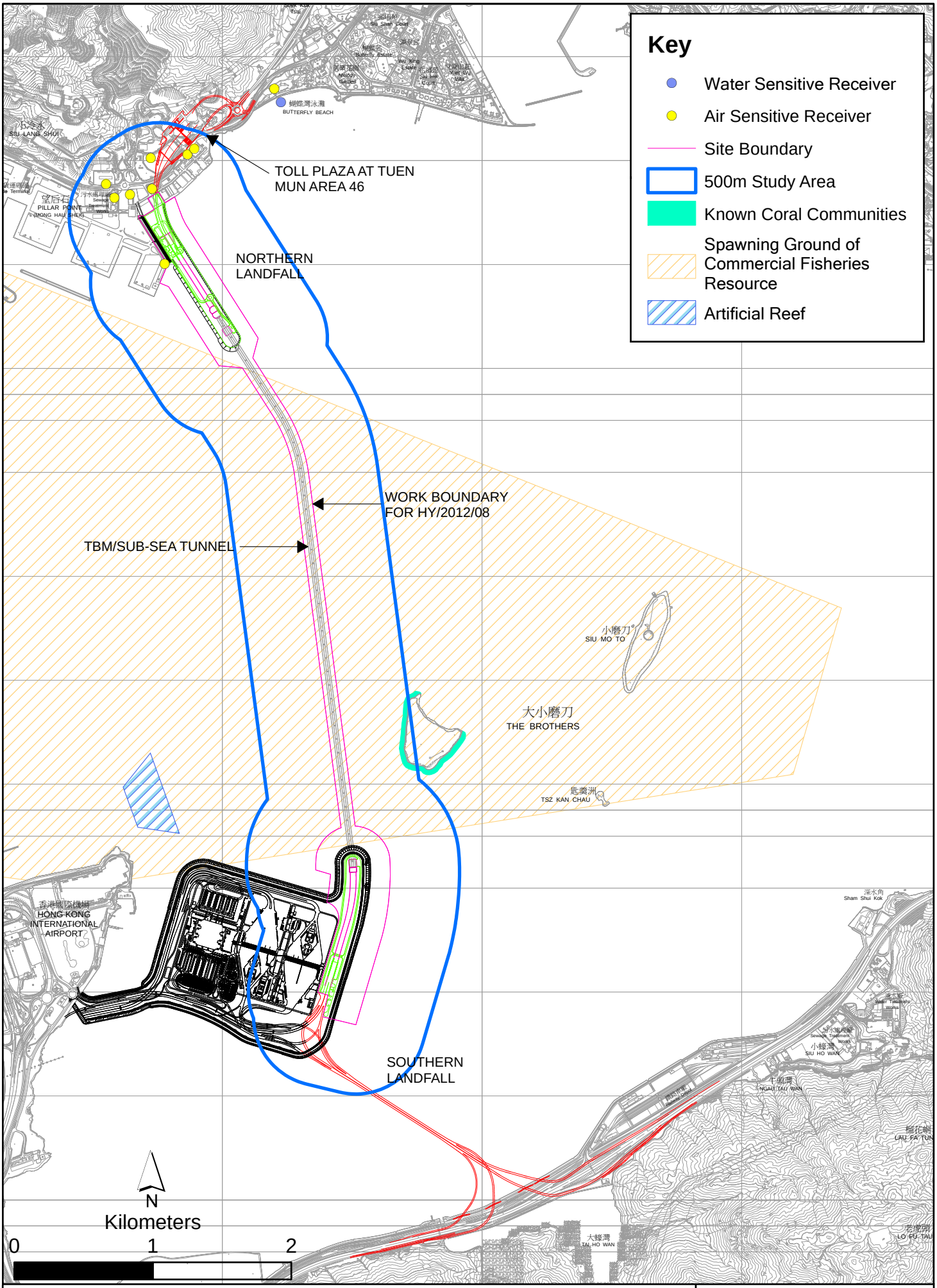


Figure 1.3 Environmental Sensitive Receivers in the vicinity of Contract No. HY/2012/08 Tuen Mun - Chek Lap Kok Link - Northern Connection Sub-Sea Tunnel Section

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Date: 15/4/2014

Environmental Resources Management

The EM&A programme required environmental monitoring for air quality, water quality and marine ecology as well as environmental site inspections for air quality, noise, water quality, waste management, marine ecology and landscape and visual impacts. The EM&A requirements and related findings for each component are summarized in the following sections

2.1 AIR QUALITY

As per the requirements under *Condition 2.4* of *EP-354/2009/D*, the Enhanced TSP Monitoring Plan has been prepared under *Contract No. HY/2012/08*. Details of the monitoring plan are presented in the *Enhanced TSP Monitoring Plan* [1].

2.1.1 Monitoring Requirements and Equipment

In accordance with the Updated EM&A Manual and the *Enhanced TSP Monitoring Plan*, impact 1-hour TSP monitoring was conducted three (3) times in every six (6) days and impact 24-hour TSP monitoring was carried out once in every six (6) days when the highest dust impact was expected. 1-hr and 24-hr TSP monitoring frequency was increased to three times per day every three days and daily every three days respectively as excavation works for launching shaft commenced on 24 October 2014.

High volume samplers (HVSs) were used to carry out the 1-hour and 24-hour TSP monitoring in the reporting quarter at the five (5) air quality monitoring stations in accordance with the requirements stipulated in the Updated EM&A Manual (*Figure 2.1*; *Table 2.1*). Wind anemometer was installed at the rooftop of ASR5 for logging wind speed and wind direction. Details of the equipment deployed are provided in *Table 2.2*.

Table 2.1 Locations of Impact Air Quality Monitoring Stations and Monitoring Dates in this Reporting Period

Monitoring Station	Monitoring Dates	Location	Description	Parameters & Frequency
ASR1	3, 6, 9, 12, 15, 18, 21, 24, 27 and 30 March 2019	Tuen Mun Fireboat Station	Office	TSP monitoring • 1-hour Total Suspended Particulates (1-hour TSP, µg/m³), 3 times in every 6 days • 24-hour Total Suspended Particulates (24-hour TSP, µg/m³), daily for 24-hour in every 6 days Enhanced TSP monitoring (commenced on 24 October 2014) • 1-hour Total Suspended Particulates (1-hour TSP,
ASR5	2, 5, 8, 11, 14, 17, 20, 23, 26 and 29 April 2019	Pillar Point Fire Station	Office	
AQMS1	2, 5, 8, 11, 14, 17, 20, 23, 26 and 29 May 2019	Previous River Trade Golf	Bare ground	
ASR6		Butterfly Beach Laundry	Office	

[1] ERM (2013) Enhanced TSP Monitoring Plan. Submitted on 28 October 2013 and subsequently approved by EPD on 1 November 2013.

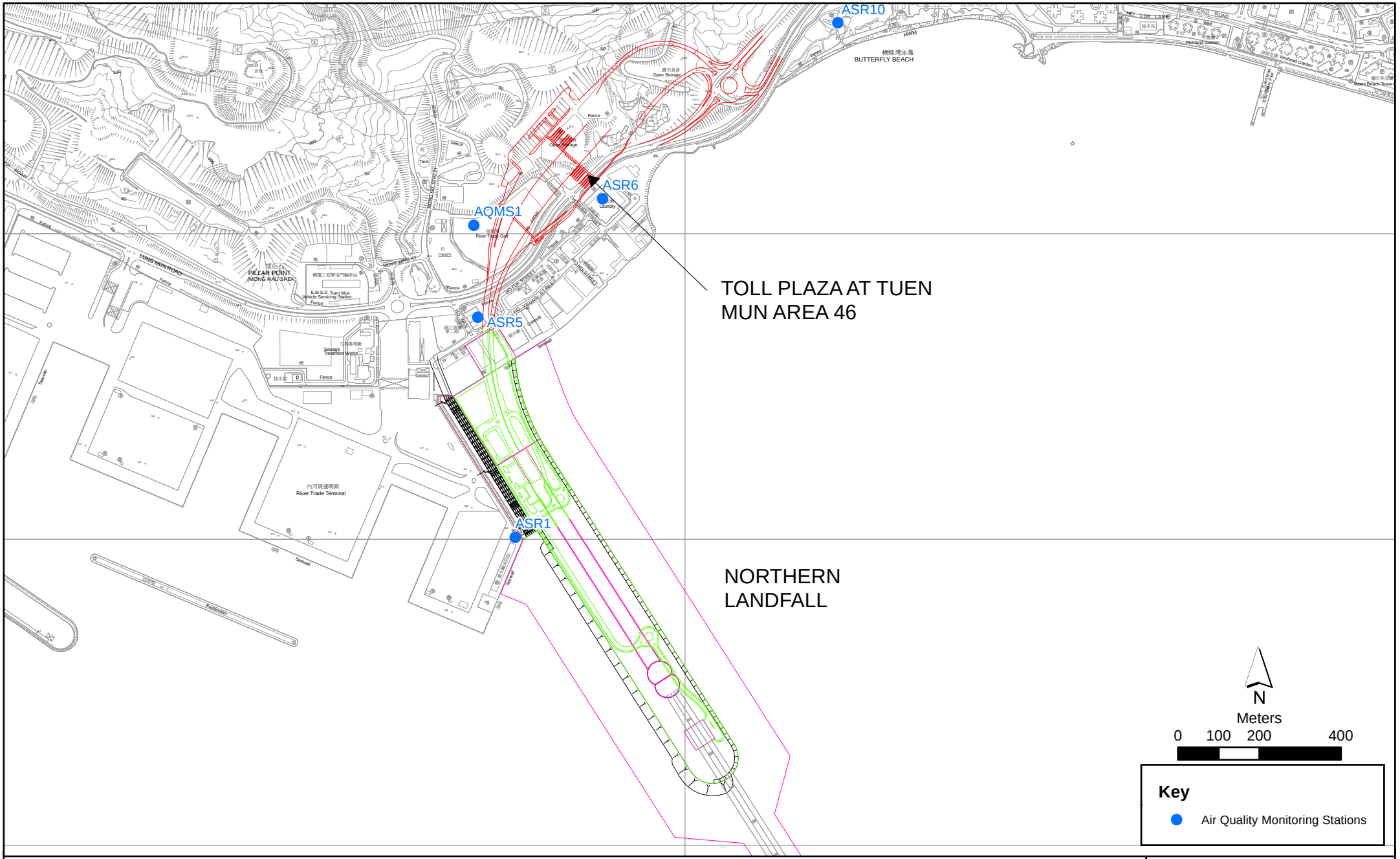

Figure 2.1

Air Quality Monitoring Stations for the Enhanced TSP Monitoring

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Date: 21/2/2014

Environmental Resources Management

ERM

Monitoring Station	Monitoring Dates	Location	Description	Parameters & Frequency
ASR10		Butterfly Beach Park	Recreational uses	μg/m³), 3 times in every 3 days • 24-hour Total Suspended Particulates (24-hour TSP, μg/m³), daily for 24-hour in every 3 days

Table 2.2 Air Quality Monitoring Equipment

Equipment	Brand and Model
High Volume Sampler (1-hour TSP and 24-hour TSP)	Tisch Environmental Mass Flow Controlled Total Suspended Particulate (TSP) High Volume Sampler (Model No. TE-5170)
Wind Meter	Davis (Model: Vantage Pro 2 (S/N: AS160104014)
Wind Anemometer for calibration	Lutron (Model No. AM-4201)

2.1.2 Action & Limit Levels

The Action and Limit Levels of the air quality monitoring is provided in *Appendix D*. The Event and Action plan is presented in *Appendix H*.

2.1.3 Monitoring Schedule for the Reporting Quarter

The schedules for air quality monitoring in the reporting quarter are provided in *Appendix E*.

2.1.4 Results and Observations

Impact air quality monitoring was conducted at all designated monitoring stations in the reporting period under favourable weather conditions. The major dust sources in the reporting period include construction activities under the Contract as well as nearby traffic emissions.

The monitoring results for 1-hour TSP and 24-hour TSP are summarized in *Tables 2.3* and *2.4,* respectively. Monitoring results are presented graphically in *Appendix F* and detailed impact air quality monitoring data were reported in the *Sixty- fifth* to *Sixty-seventh Monthly EM&A Report*.

Table 2.3 Summary of 1-hour TSP Monitoring Results in this Reporting Period

Month/Year	Station	Average (μg/m³)	Range (μg/m³)	Action Level (μg/m³)	Limit Level (μg/m³)
March to May 2019	ASR 1	126	19 - 412	331	500
	ASR 5	127	24 - 321	340	500
	AQMS1	85	16 - 211	335	500
	ASR6	100	19 - 256	338	500
	ASR10	59	15 - 157	337	500

Table 2.4 Summary of 24-hour TSP Monitoring Results in this Reporting Period

Month/Year	Station	Average (μg/m³)	Range (μg/m³)	Action Level (μg/m³)	Limit Level (μg/m³)
March to May	ASR 1	91	32 - 217	213	260

Month/Year	Station	Average (μg/m³)	Range (μg/m³)	Action Level (μg/m³)	Limit Level (μg/m³)
2019	ASR 5	77	37 - 130	238	260
	AQMS1	50	19 - 96	213	260
	ASR6	57	25 - 115	238	260
	ASR10	39	18 - 89	214	260

Four (4) Action level exceedances of 1-hour TSP and One (1) Action level exceedance of 24-hour TSP were recorded in this reporting period. Investigation reports are provided in Appendix J. Summary of Exceedances for Air Quality Impact Monitoring in this Reporting Quarter is detailed in *Table 2.15*.

2.2 *WATER QUALITY MONITORING*

Seawall Modification Works at Portion S-B has commenced on 15 April 2019.

Impact marine water quality monitoring has resumed on 15 April 2019

2.2.1 *Monitoring Requirements & Equipment*

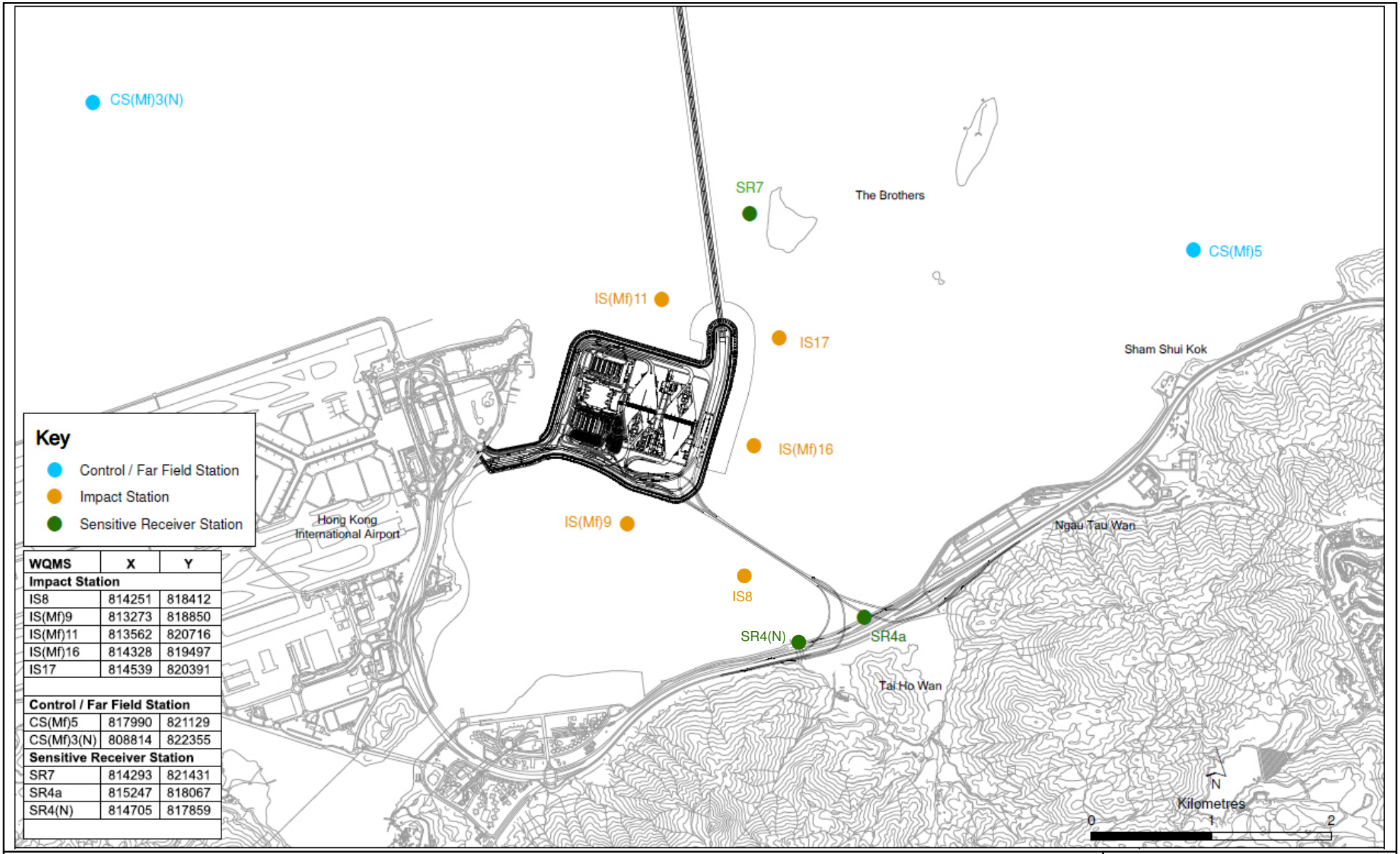
In accordance with the approved Environmental Review Report dated 21 March 2018 for the Change in Design of Vertical Seawall to Sloping Seawall on Southern Landfall, Updated Impact water quality monitoring programme and water quality monitoring stations IS17, SR7 and IS(Mf)11 specified under the EM&A Manual for HZMB HKBCF project will be adopted. (*Figure 2.2*; *Table 2.5*).

Results of water quality monitoring were adopted from the published EM&A data of Contract No. HY/2012/07 Tuen Mun-Chek Lap Kok Link – Southern Connection Viaduct Section .

The Action and Limit Levels of the water quality monitoring were adopted from the EM&A Manual for HZMB HKBCF project. The Action and Limit Levels are provided in Appendix D.

Table 2.5 Locations of Water Quality Monitoring Stations and the Corresponding Monitoring Requirements

Station ID	Type	Coordinates		*Parameters, unit	Depth	Frequency
		Easting	Northing			
IS(Mf)11	Impact Station (Close to HKBCF construction site)	813562	820716	• Temperature(°C) • pH(pH unit) • Turbidity (NTU) • Water depth (m) • Salinity (ppt) • DO (mg/L and % of saturation) • SS (mg/L)	3 water depths: 1m below sea surface, mid-depth and 1m above sea bed. If the water depth is less than 3m, mid-depth sampling only. If water depth less than 6m, mid-depth may be omitted.	Impact monitoring: 3 days per week, at mid-flood and mid-ebb tides during the construction period of the Contract.
IS17	Impact Station (Close to HKBCF construction site)	814539	820391			
SR7	Sensitive receivers (Tai Mo Do)	814293	821431			



WQMS	X	Y
Impact Station		
IS8	814251	818412
IS(Mf)9	813273	818850
IS(Mf)11	813562	820716
IS(Mf)16	814328	819497
IS17	814539	820391
Control / Far Field Station		
CS(Mf)5	817990	821129
CS(Mf)3(N)	808814	822355
Sensitive Receiver Station		
SR7	814293	821431
SR4a	815247	818067
SR4(N)	814705	817859

Figure 2.2

Water Quality Monitoring Stations

Environmental Resources Management

ERM

Station ID	Type	Coordinates	*Parameters, unit	Depth	Frequency

*Notes:
In addition to the parameters presented monitoring location/position, time, water depth, sampling depth, tidal stages, weather conditions and any special phenomena or works underway nearby were also recorded.

Table 2.6 summarizes the equipment used in the impact water quality monitoring programme.

Table 2.6 Water Quality Monitoring Equipment

Equipment	Model
Multi-Parameters	YSI ProDss 17E100747
Multi-Parameters	YSI ProDss 16H104234
Multi-Parameters	YSI ProDss 17H105557
Positioning Equipment	Furuno GP-170
Water Depth Detector	Lowrance Mark 5x / Garmin Striker 4

2.2.2 Action & Limit Levels

The Action and Limit levels of water quality impact monitoring are shown in *Appendix D*. The Event and Action plan is presented in *Appendix I*.

2.2.3 Monitoring Schedule for the Reporting Period

The schedules for water quality monitoring in the reporting quarter are provided in *Appendix E.*

2.2.4 Results and Observations

Impact water quality monitoring was conducted at all designated monitoring stations in the reporting quarter. Results and graphical presentations of impact water quality monitoring are presented in *Appendix G*. Detailed water quality monitoring data were reported in the *Sixty-sixth and Sixty-seventh Monthly EM&A Report*.

2.3 DOLPHIN MONITORING

2.3.1 Monitoring Requirements

Impact dolphin monitoring is required to be conducted by a qualified dolphin specialist team to evaluate whether there have been any effects on the dolphins. In order to fulfil the EM&A requirements and make good use of available resources, the on-going impact line transect dolphin monitoring data collected by HyD's *Contract No. HY/2011/03 Hong Kong-Zhuhai-Macao Bridge. Hong Kong Link Road - Section between Scenic Hill and Hong Kong Boundary Crossing Facilities* on the monthly basis is adopted to avoid duplicates of survey effort.

2.3.2 Monitoring Equipment

Table 2.7 summarizes the equipment used for the impact dolphin monitoring.

Table 2.7 Dolphin Monitoring Equipment

Equipment	Model
Global Positioning System (GPS)	Garmin 18X-PC Geo One Phottix
Camera	Nikon D90 300m 2.8D fixed focus Nikon D90 20-300m zoom lens
Laser Binoculars	Infinitor LRF 1000
Marine Binocular	Bushell 7 x 50 marine binocular with compass and reticules
Vessel for Monitoring	65 foot single engine motor vessel with viewing platform 4.5m above water level

2.3.3 *Monitoring Parameter, Frequencies & Duration*

Dolphin monitoring should cover all transect lines in Northeast Lantau (NEL) and the Northwest Lantau (NWL) survey areas twice per month throughout the entire construction period. The monitoring data should be compatible with, and should be made available for, long-term studies of small cetacean ecology in Hong Kong. In order to provide a suitable long-term dataset for comparison, identical methodology and line transects employed in baseline dolphin monitoring was followed in the impact dolphin monitoring.

2.3.4 *Monitoring Location*

The impact dolphin monitoring was carried out in the NEL and NWL along the line transect as depicted in *Figure 2.3*. The co-ordinates of all transect lines are shown in *Table 2.8* below.

Table 2.8 Impact Dolphin Monitoring Line Transect Co-ordinates

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

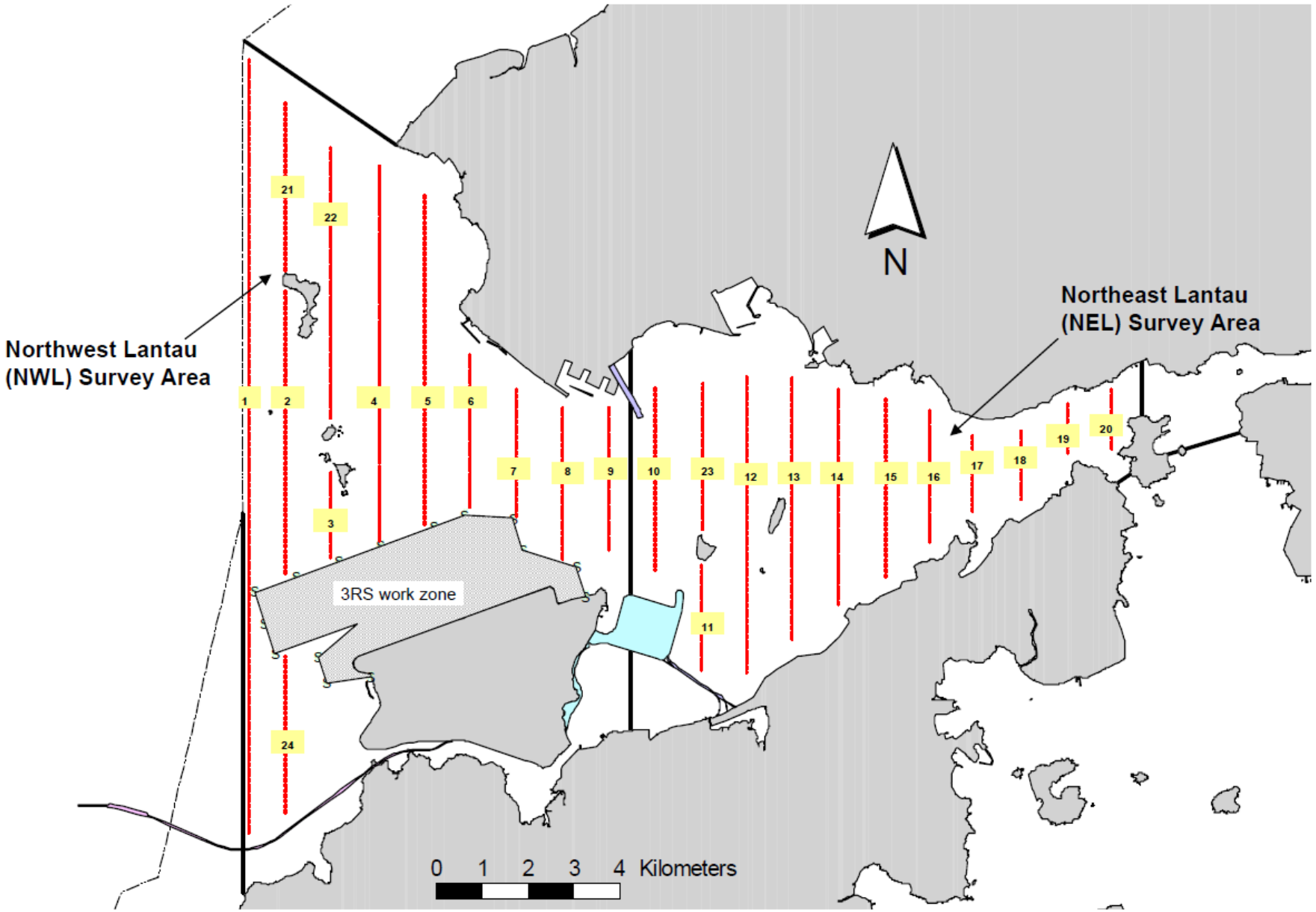


Figure 2.3

Layout of Transect Lines of Dolphin Monitoring in Northwest and Northeast Lantau Areas

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Date: 29/11/2013

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Line No.		Easting	Northing	Line No.		Easting	Northing
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*

Remarks: The coordinates of several starting and ending points have been revised since August 2017 due to the presence of a work zone to the north of the airport platform with intense construction activities in association with the construction of the third runway expansion for the Hong Kong International Airport. Co-ordinates in red and marked with asterisk are revised co-ordinates of transect line.

2.3.5 *Action & Limit Levels*

The Action and Limit levels of dolphin impact monitoring are shown in *Appendix D*. The Event and Action plan is presented in *Appendix I.*

2.3.6 *Monitoring Schedule for the Reporting Period*

The dolphin monitoring schedules for the reporting period are shown in *Appendix E.*

2.3.7 *Results & Observations*

A total of 794.91 km of survey effort was conducted, with 96.2% of the total survey effort being conducted under favourable weather conditions (ie Beaufort Sea State 3 or below with good visibility) in this reporting quarter. Amongst the two areas, 293.34 km and 501.57 km of survey effort were conducted from NEL and NWL survey areas, respectively. The total survey effort conducted on primary and secondary lines were 572.37 km and 222.54 km, respectively. The survey efforts are summarized in *Appendix H.*

A total of 5 groups of 11 Chinese White Dolphins sightings were recorded during the six sets of surveys in this reporting quarter. All five dolphin sightings were made during on-effort search, and four of the five on-effort dolphin sightings were made on primary lines. During this reporting quarter, all dolphin groups were sighted in NWL, while no dolphin was sighted in NEL.

Encounter rates of Chinese White Dolphins are deduced from the survey effort and on-effort sighting data made under favourable conditions (Beaufort 3 or below with good visibility) in the reporting quarter with the results and comparison with baseline results present in *Tables 2.9* and *2.10*.

Table 2.9 Individual Survey Event Encounter Rates

		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 (4 & 11 Mar 2019)	0.00	0.00
	Set 2 (13 & 18 Mar 2019)	0.00	0.00
	Set 3 (10 & 15 Apr 2019)	0.00	0.00
	Set 4 (23 & 25 Apr 2019)	0.00	0.00
	Set 5 (2 & 7 May 2019)	0.00	0.00
	Set 6 (21 & 23 May 2019)	0.00	0.00
NWL	Set 1 (4 & 11 Mar 2019)	0.00	0.00
	Set 2 (13 & 18 Mar 2019)	3.41	6.81
	Set 3 (10 & 15 Apr 2019)	0.00	0.00
	Set 4 (23 & 25 Apr 2019)	1.64	3.27
	Set 5 (2 & 7 May 2019)	1.71	5.13
	Set 6 (21 & 23 May 2019)	0.00	0.00

Note: Dolphin Encounter Rates are deduced from the Two Sets of Surveys (Two Surveys in Each Set) in the reporting quarter in Northeast (NEL) and Northwest Lantau (NWL)

Table 2.10 Quarterly Average Encounter Rates

	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)**	
	March – May 2019	**September – November 2011**	**March – May 2019**	**September – November 2011**
Northeast Lantau	0.0	6.00 ± 5.05	0.0	22.19 ± 26.81
Northwest Lantau	1.13 ± 1.39	9.85 ± 5.85	2.54 ± 3.00	44.66 ± 29.85

Note: Encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions.

Group size of Chinese White Dolphins ranged from 2 – 3 individuals per group in North Lantau region during March to May 2019. The average

dolphin group sizes from these three months were compared with the ones deduced from the baseline period in September to November 2011, as shown in *Table 2.11*.

Table 2.11 Average Dolphin Group Size

	Average Dolphin Group Size	
	March – May 2019	**September – November 2011**
Overall	2.20 ± 0.45 (n = 5)	3.72 ± 3.13 (n = 66)
Northeast Lantau	---	3.18 ± 2.16 (n = 17)
Northwest Lantau	2.20 ± 0.45 (n = 5)	3.92 ± 3.40 (n = 49)

Whilst one limit level exceedance was observed for the quarterly dolphin monitoring data between March to May 2019, no unacceptable impact from the construction activities of this Contract was recorded from the general observations.

Although the dolphins infrequently occurred along the alignment of TM-CLKL Northern Connection Sub-Sea Tunnel Section in the past and during the baseline monitoring period, it is apparent that dolphin usage has been significantly reduced in NEL.

It is critical to monitor the dolphin usage in North Lantau region in the upcoming quarters to determine whether the dolphins are continuously affected by the various construction activities in relation to the HZMB-related works, and whether suitable mitigation measure can be applied to revert the situation.

2.3.8 Implementation of Marine Mammal Exclusion Zone

Daily marine mammal exclusion zone was in effect during the period of silt curtain installation in open waters under this Contract. No sighting of the Indo-Pacific humpback dolphin (i.e. Chinese White Dolphin) was recorded in the reporting period during the exclusion zone monitoring.

2.4 EM&A SITE INSPECTION

Site inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures under the Contract. Thirteen (13) site inspections were carried out in the reporting quarter on 6, 13, 20 and 27 March 2019; 3, 10, 17 and 24 April 2019; 2, 8, 15, 22 and 29 May 2019.

Key observations during the site inspections in this reporting period are summarized in *Table 2.12*.

Table 2.12 Specific Observations and Recommendations during the Weekly Site Inspection in this Reporting Period

Inspection Date	Environmental Observations	Recommendations/ Remarks
6 March 2019	Works Area – Portion S-B • Cement bags should be covered with tarpaulin sheets. Works Area – Portion N-A • Drip tray should be provided for the oil drums.	Works Area – Portion S-B • The Contractor was reminded to cover the cement bags with tarpaulin sheets. Works Area – Portion N-A • The Contractor was reminded to provide drip tray for the oil drums.
13 March 2019	Works Area – TBM tunnel • Cement bags should be covered with tarpaulin sheets. • Drip tray should be provided for the chemicals. Works Area – Portion S-C • Drip tray should be provided for the chemicals. **Reminder from the SOR** Works Area – Portion S-C • Stagnant water trapped in the tarpaulin sheet should be cleared. Works Area – Portion S-A • The tip of the breaker should be wrapped by soundproof mat.	Works Area – TBM tunnel • The Contractor was reminded to cover the cement bags with tarpaulin sheets. • The Contractor was reminded to provide drip tray for the chemicals. Works Area – Portion S-C • The Contractor was reminded to provide drip tray for the chemicals. **Reminder from the SOR** Works Area – Portion S-C • The Contractor was reminded to clear the stagnant water trapped in the tarpaulin sheet. Works Area – Portion S-A • The Contractor was reminded to wrap the tip of the breaker with soundproof mat.
20 March 2019	Works Area – Portion N-A • Drip tray should be provided for the chemicals. **Reminder from the SOR** Works Area – Portion N-A • Ponding water should be cleared for mosquito control. Works Area - Portion S-B • The tip of the breaker should be wrapped by soundproof mat.	Works Area – Portion N-A • The Contractor was reminded to provide drip tray for the chemicals. **Reminder from the SOR** Works Area – Portion N-A • The Contractor was reminded to clear the ponding waterfor mosquito control. Works Area - Portion S-B • The Contractor was reminded to wrap the tip of the breaker with soundproof mat.
27 March 2019	Works Area – Portion N-B • Drip tray should be provided for the chemicals. • New NRMM label should be displayed. Works Area – Portion S-B • Food waste inside the waste skip should be cleaned up. **Reminder from the SOR** Works Area – Portion S-B • Stagnant water trapped underneath the storage materials should be cleared.	Works Area – Portion N-B • The Contractor was reminded to provide drip tray for the chemicals. • The Contractor was reminded to display a new NRMM label. Works Area – Portion S-B • The Contractor was reminded to clean up the food waste inside the waste skip. **Reminder from the SOR** Works Area – Portion S-B • The Contractor was reminded to clear the stagnant water trapped underneath the storage materials.

Inspection Date	Environmental Observations	Recommendations/ Remarks
3 April 2019	Works Area – Portion S-A • Stagnant water and food waste should be cleaned up and better housekeeping should be maintained. **Reminder from the SOR** Works Area – Portion N-A • The breaker tip should be wrapped with soundproof mat. • Recycle bin should be replaced with green rubbish bin and broken water barriers should be replaced. Works Area – Portion S-B The breaker tip should be wrapped with soundproof mat.	Works Area – Portion S-A • The Contractor was reminded to clean up the stagnant water and food waste and maintain better housekeeping. **Reminder from the SOR** Works Area – Portion N-A • The Contractor was reminded to wrap the breaker tip with soundproof mat. • The Contractor was reminded to replace the recycle bin with green rubbish bin and replace the broken water barriers. Works Area – Portion S-B The Contractor was reminded to wrap the breaker tip with soundproof mat.
10 April 2019	Works Area – Portion S-B • The faded NRMM label should be replaced. • Food waste should be disposed of and the lifting eyes should be filled with sand. Works Area – Portion S-A • Drip tray should be provided for the chemicals. Works Area – TBM tunnel • Drip tray should be provided for the chemicals.	Works Area – Portion S-B • The Contractor was reminded to replace the faded NRMM label. • The Contractor was reminded to dispose of the food waste and fill the lifting eyes with sand. Works Area – Portion S-A • The Contractor was reminded to provide drip tray for the chemicals. Works Area – TBM tunnel • The Contractor was reminded to provide drip tray for the chemicals.
17 April 2019	Works Area – Portion N-A • The surface channel should remain unobstructed. • Drip tray and chemical labels should be provided for the chemicals. **Reminder from the SOR** Works Area – Portion S-B • The opening of the water barriers should be capped.	Works Area – Portion N-A • The Contractor was reminded to keep the surface channel unobstructed. • The Contractor was reminded to provide drip tray and chemical labels for the chemicals. **Reminder from the SOR** Works Area – Portion S-B • The Contractor was reminded to cap the opening of the water barriers.
24 April 2019	Works Area – TBM tunnel Drip tray should be provided for the chemicals.	Works Area – TBM tunnel The Contractor was reminded to provide drip tray for the chemicals.
2 May 2019	Works Area – Portion N-A • Drip tray should be provided for chemical containers. **Reminder from the SOR** Works Area – Portion N-A • Lifting eyes should be filled up with sand. Works Area – Portion S-B • Lifting eyes should be filled up with sand.	Works Area – Portion N-A • The Contractor was reminded to provide drip tray for the chemical containers. **Reminder from the SOR** Works Area – Portion N-A • The Contractor was reminded to fill up the lifting eyes with sand. Works Area – Portion S-B • The Contractor was reminded to fill up the lifting eyes with sand.

Inspection Date	Environmental Observations	Recommendations/ Remarks
8 May 2019	Works Area – Portion S-B • Drip tray should be provided for chemical containers. **Reminder from the SOR** Works Area – TBM tunnel • Water barriers should be capped with lids. Works Area – Portion S-B • Stagnant water should be cleared. Works Area – Portion S-C • Stagnant water should be cleared.	Works Area – Portion S-B • The Contractor was reminded to provide drip tray for the chemical containers. **Reminder from the SOR** Works Area – TBM tunnel • The Contractor was reminded to cap the water barriers with lids. Works Area – Portion S-B • The Contractor was reminded to clear the stagnant water. Works Area – Portion S-C • The Contractor was reminded to clear the stagnant water.
15 May 2019	Works Area – Portion S-C • Drip tray should be provided for chemical containers. • Spilled chemical should be cleared. Works Area - Site Office (Northern Landfall) • Housekeeping and site tidiness should be maintained. Works Area - Portion N-A • Drip tray and chemical label should be provided for the chemical containers. • Water spraying should be applied at the main haul road for dust control. **Reminder from the SOR** Works Area – Portion S-C • The lifting eyes should be filled with sand. Works Area - Portion N-A • Stagnant water and rubbish in the cable catch pit should be cleared.	Works Area – Portion S-C • The Contractor was reminded to provide drip tray for the chemical containers. • The Contractor was reminded to clear the spilled chemical. Works Area - Site Office (Northern Landfall) • The Contractor was reminded to maintain housekeeping and site tidiness. Works Area - Portion N-A • The Contractor was reminded to provide drip tray and chemical label for the chemical containers. • The Contractor was reminded to apply water spraying at the main haul road for dust control. **Reminder from the SOR** Works Area – Portion S-C • The Contractor was reminded to fill the lifting eyes with sand. Works Area - Portion N-A • The Contractor was reminded to clear the stagnant water and rubbish in the cable catch pit.

Inspection Date	Environmental Observations	Recommendations/ Remarks
22 May 2019	Works Area – Portion S-B • Rubbish on the water barrier should be removed. Works Area - Portion S-A • Food waste should be removed. • Drip tray and chemical label should be provided for the chemical containers. • Cement bags should be covered with tarpaulin sheet. Works Area – TBM tunnel • Cement bags should be covered with tarpaulin sheet. **Reminder from the SOR** Works Area – Portion S-B • Stagnant water should be cleared. • Stagnant water should be cleared. Works Area - Portion S-A • Stagnant water should be cleared.	Works Area – Portion S-B • The Contractor was reminded to remove the rubbish on the water barrier. Works Area - Portion S-A • The Contractor was reminded to remove the food waste. • The Contractor was reminded to provide drip tray and chemical label for the chemical containers. • The Contractor was reminded to cover the cement bags with tarpaulin sheet. Works Area – TBM tunnel • The Contractor was reminded to cover the cement bags with tarpaulin sheet. **Reminder from the SOR** Works Area – Portion S-B • The Contractor was reminded to clear the stagnant water. • The Contractor was reminded to clear the stagnant water. Works Area - Portion S-A • The Contractor was reminded to clear the stagnant water.
29 May 2019	Works Area – Portion S-A • Rubbish should be cleared. Works Area - Portion S-B • Cement bags should be covered with tarpaulin sheet. Works Area – TBM tunnel • Drip tray should be provided for the chemical containers. • Food waste in the skip should be cleared. **Reminder from the SOR** Works Area – Portion S-A • Stagnant water should be cleared. Works Area - Portion S-C • Stagnant water should be cleared. Works Area - TBM tunnel • Stagnant water should be cleared.	Works Area – Portion S-A • The Contractor was reminded to remove the rubbish. Works Area - Portion S-B • The Contractor was reminded to cover the cement bags with tarpaulin sheet. Works Area – TBM tunnel • The Contractor was reminded to provide drip tray for the chemical containers. • The Contractor was reminded to clear the food waste in the skip. **Reminder from the SOR** Works Area – Portion S-A • Stagnant water should be cleared. Works Area - Portion S-C • Stagnant water should be cleared. Works Area - TBM tunnel • Stagnant water should be cleared.

The Contractor has rectified all of the observations as identified during environmental site inspections in the reporting quarter.

2.5 WASTE MANAGEMENT STATUS

The Contractor had submitted application form for registration as chemical waste producer under the Contract. Sufficient numbers of receptacles were available for general refuse collection and sorting.

Wastes generated during this reporting period include mainly construction wastes (inert and non-inert). Reference has been made to the waste flow table prepared by the Contractor (*Appendix K*). The quantities of different types of wastes are summarized in *Table 2.13*.

Table 2.13 Quantities of Different Waste Generated in the Reporting Period

Month/Year	Inert Construction Waste [a] (tonnes)	Inert Construction Waste Re-used (tonnes)	Non-inert Construction Waste [b] (tonnes)	Recyclable Materials [c] (kg)	Chemical Wastes (kg)	Marine Sediment (m^3)		
						Category L	Category M (M_p & M_f)	Mixed (L+M)
March 2019	120,224	71,419	692	88,660	0	15,512	34,501.5	0
April 2019	130,329	58,956	707	264,790	1,045	12,561	19,851	0
May 2019	67,355	51,297	798	2,120	0	0	0	0

Notes:

(a) Inert construction wastes include hard rock and large broken concrete, and materials disposed as public fill.

(b) Non-inert construction wastes include general refuse disposed at landfill.

(c) Recyclable materials include metals, paper, cardboard, plastics, timber and others.

(d) Updated waste flow table is presented in quarterly report.

The Contractor was advised to properly maintain on site C&D materials and waste collection, sorting and recording system, dispose of C&D materials and wastes at designated ground and maximize reuse/ recycle of C&D materials and wastes. The Contractor was also reminded to properly maintain the site tidiness and dispose of the wastes accumulated on site regularly and properly.

For chemical waste containers, the Contractor was reminded to treat properly and store temporarily in designated chemical waste storage area on site in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.

2.6 ENVIRONMENTAL LICENSES AND PERMITS

The status of environmental licensing and permit is summarized in *Table 2.14* below.

Table 2.14 Summary of Environmental Licensing and Permit Status

License/ Permit	License or Permit No.	Date of Issue	Date of Expiry	License/ Permit Holder	Remarks
Environmental Permit	EP-354/2009/D	13 March 2015	Throughout the Contract	HyD	Application for VEP on 3 March 2015 to supersede EP-354/2009/C
Construction Dust Notification	363510	19 August 2013	Throughout the Contract	DBJV	Northern Landfall
Construction Dust Notification	403620	10 June 2016	Throughout the Contract	DBJV	Southern Landfall
Chemical Waste Registration	5213-422-D2516-02	18 January 2017	Throughout the Contract	DBJV	Northern Landfall
Chemical Waste Registration	5213-951-D2591-01	25 May 2016	Throughout the Contract	DBJV	Southern Landfall
Construction Waste Disposal Account	7018108	28 August 2013	Throughout the Contract	DBJV	Waste disposal in Contract No. HY/2012/08
Construction Waste Disposal Account	7021715	21 March 2019	14 July 2019	DBJV	Vessel Disposal
Waste Water Discharge License	WT00019248-2014	5 June 2014	30 June 2019	DBJV	For site Portion N6 and Reclamation Area E
Waste Water Discharge License	WT00031435-2018	2 August 2018	31 August 2023	DBJV	Southern Landfall
Marine Dumping Permit	EP/MD/19-063	19 November 2018	18 May 2019	DBJV	Type 1 (Open Sea Disposal)
Marine Dumping Permit	EP/MD/19-097	5 February 2019	4 March 2019	DBJV	Type 1 (Dedicated site) and Type 2 (Confined Marine Disposal)
Marine Dumping Permit	EP/MD/19-109	5 March 2019	4 April 2019	DBJV	Type 1 (Dedicated site) and Type 2 (Confined Marine Disposal)
Marine Dumping Permit	EP/MD/19-015	5 September 2018	4 March 2019	DBJV	Catepillar Area
Marine Dumping Permit	EP/MD/19-121	5 April 2019	4 May 2019	DBJV	Type 1 (Dedicated site) and Type 2 (Confined Marine Disposal)
Marine Dumping Permit	EP/MD/20-013	19 May 2019	18 November 2019	DBJV	Type 1 (Open Sea Disposal)
Marine Dumping Permit	EP/MD/20-001	5 May 2019	4 June 2019	DBJV	Type 1 (Dedicated site) and Type 2 (Confined Marine Disposal)
Construction Noise Permit	GW-RW0406-18	27 April 2019	15 October 2019	DBJV	Urmston Road in front of Pillar Point
Construction Noise Permit	GW-RW0406-18	16 October 2018	15 April 2019	DBJV	Urmston Road in front of Pillar Point
Construction Noise Permit	GW-RS0966-18	26 October 2018	14 April 2019	DBJV	Southern Landfall

License/ Permit	License or Permit No.	Date of Issue	Date of Expiry	License/ Permit Holder	Remarks
Construction Noise Permit	GW-RS0224-19	25 March 2019	24 September 2019	DBJV	Southern Landfall
Construction Noise Permit	GW-RW0179-19	27 April 2019	15 October 2019	DBJV	Urmston Road in front of Pillar Point

Notes:
HyD = Highways Department
DBJV = Dragages – Bouygues Joint Venture
VEP = Variation of Environmental Permit

2.7 IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

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

A summary of the Implementation Schedule of Environmental Mitigation Measures (EMIS) is presented in *Appendix C*. The necessary mitigation measures relevant to this Contract were implemented properly.

2.8 SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT

For air quality impact monitoring, a total of thirty monitoring events for both 1-hour TSP and 24-hour TSP were undertaken in which four (4) Action Level exceedance of 1-hour TSP and one (1) Action Level exceedance of 24-hour TSP was recorded. (*Table 2.15*).

Table 2.15 Summary of Exceedances for Air Quality Impact Monitoring in this Reporting Quarter

Station	Exceedance Level	Date of Exceedances		Number of Exceedances	
		1-hr TSP	24-hr TSP	1-hr TSP	24-hr TSP
AQMS1	Action Level	-	-	-	-
	Limit Level	-	-	-	-
ASR1	Action Level	2019-03-27	2019-05-23	1	1
		2019-03-30	-	1	-
		2019-05-11	-	1	-
		2019-05-23	-	1	-
	Limit Level	-	-	-	-
ASR5	Action Level	-	-	-	-
	Limit Level	-	-	-	-
ASR6	Action Level	-	-	-	-
	Limit Level	-	-	-	-
ASR10	Action Level	-	-	-	-
	Limit Level	-	-	-	-
	Total number of Action level Exceedances:			4	1
	Total number of Limit level Exceedances:			0	0

For marine water quality impact monitoring, a total of twenty monitoring events were undertaken in which two Action level exceedances of depth-averaged SS were recorded in the water quality monitoring of this reporting period. (*Table 2.16*).

Table 2.16 Summary of Exceedances for Marine Water Quality Impact Monitoring in this Reporting Quarter

Station	Exceedance Level [(a)]	DO (Surface and Middle)		DO (Bottom)		Turbidity (depth-averaged)		SS (depth-averaged)	
		Mid-ebb	Mid-flood	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood
IS17	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
IS(Mf)11	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
SR7	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
CS(Mf)5	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
CS(Mf)3(N)	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
IS(Mf)16	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
SR4a	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
SR4(N)	AL	-	-	-	-	-	-	-	2019-05-29
	LL	-	-	-	-	-	-	-	-
IS8	AL	-	-	-	-	-	-	2019-05-15	-
	LL	-	-	-	-	-	-	-	-
IS(Mf)9	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
	Total AL Exceedances:	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
	Total LL Exceedances:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Notes:
(a) AL = Action Level; LL = Limit Level

One (1) Limit Level exceedance was observed for the quarterly dolphin monitoring data between March and May 2019, whilst no unacceptable impact from the construction activities of the TM-CLKL Northern Connection Sub-sea Tunnel Section on Chinese White Dolphins was noticeable from general observations.

Cumulative statistics are provided in *Appendix J*.

2.9 SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

The Environmental Complaint Handling Procedure is provided in *Figure 2.4*.

No environmental complaint was received in this reporting period.

No environmental summons was received in this reporting period.

Statistics on complaints, notifications of summons and successful prosecutions are summarized in *Appendix J*.

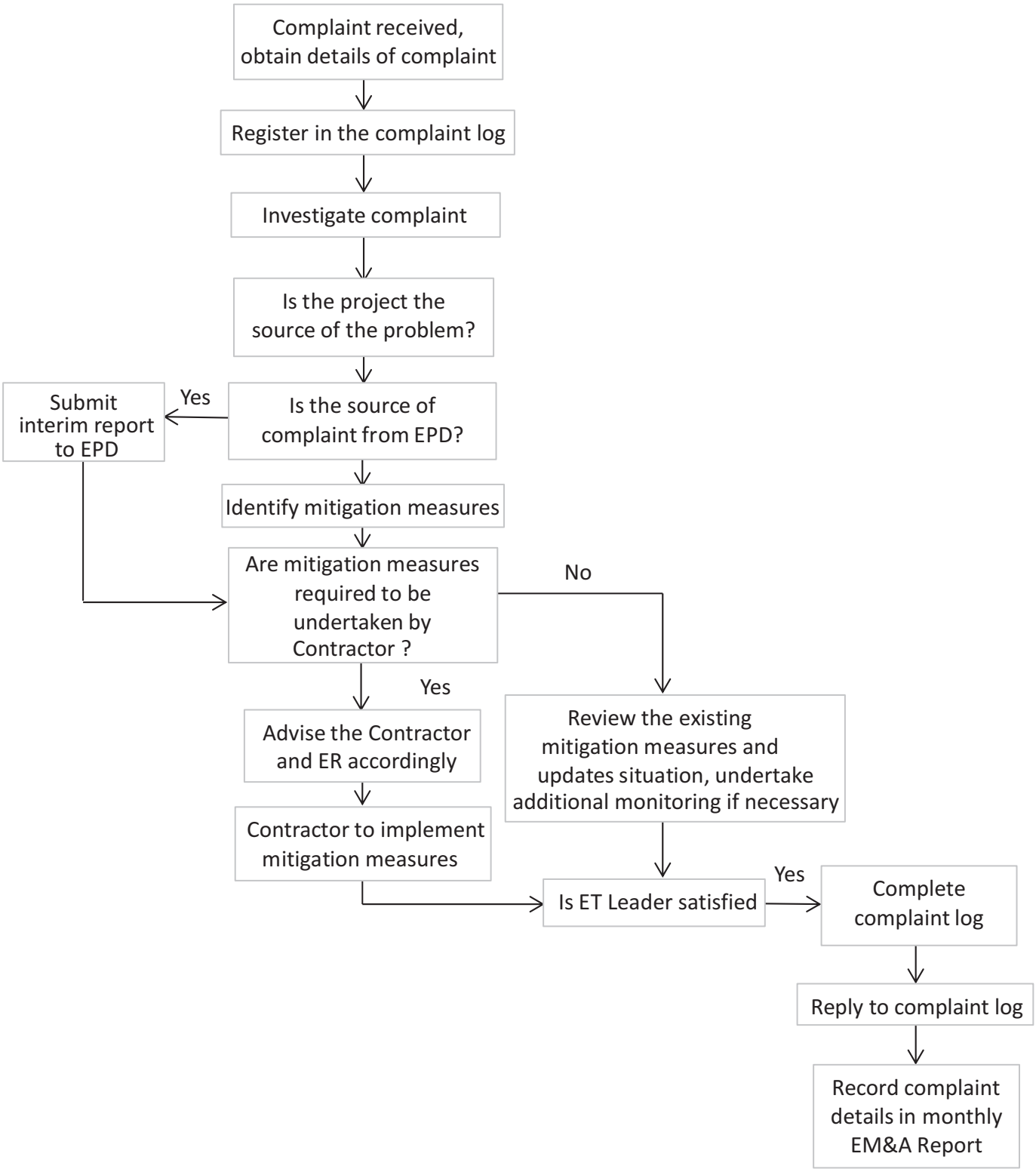

Figure 2.4 Environmental Complaint Handling Procedure

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Environmental Resources Management

ERM

3 FUTURE KEY ISSUES

3.1 CONSTRUCTION ACTIVITIES FOR THE COMING QUARTER

As informed by the Contractor, the major works for the Contract in the coming quarter are summarized in *Table 3.1*.

Table 3.1 Construction Works to Be Undertaken in the Coming Quarter

Works to be undertaken
Land-based Works
• Construction of Thermal barrier – TBM tunnel; • Bitumen Laying – TBM tunnel • Construction of Walkway Corbel & Cover – TBM Tunnel; • RC structure – Portion N-A & S-A; • E&M Platform Installation – Portion S-A • ELS Removal – Portion S-A; • D-wall Construction – Portion S-C • STP Demolition – Portion S-C • Seawall Inspection and Remedial Works – Portion N-B
Marine-based Works
• Seawall Modification Works – Portion S-B

3.2 KEY ISSUES FOR THE COMING QUARTER

Potential environmental impacts arising from the above upcoming construction activities in the coming quarterly period are expected to be mainly associated with dust, marine ecology, marine water quality and waste management issues.

3.3 MONITORING SCHEDULE FOR THE COMING QUARTER

Impact monitoring for air quality and marine ecology (include dolphin monitoring) are scheduled to continue for the next reporting period.

The monitoring programme has been reviewed and was considered as adequate to cater for the nature of works in progress. Change to the monitoring programme was thus not considered to be necessary at this stage. The monitoring programme will be evaluated as appropriate in the next reporting period.

4 CONCLUSIONS

This Twenty-second Quarterly EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 March 2019 to 31 May 2019, in accordance with the Updated EM&A Manual and the requirements of *EP-354/2009/D*.

Air quality (including 1-hour TSP and 24-hour TSP), water quality and dolphin monitoring were carried out in the reporting period. Four (4) Action level exceedances of 1-hour TSP and One (1) Action level exceedance of 24-hour TSP were recorded in the air quality monitoring of this reporting period.

Two Action level exceedances of depth-averaged SS were recorded in this reporting period.

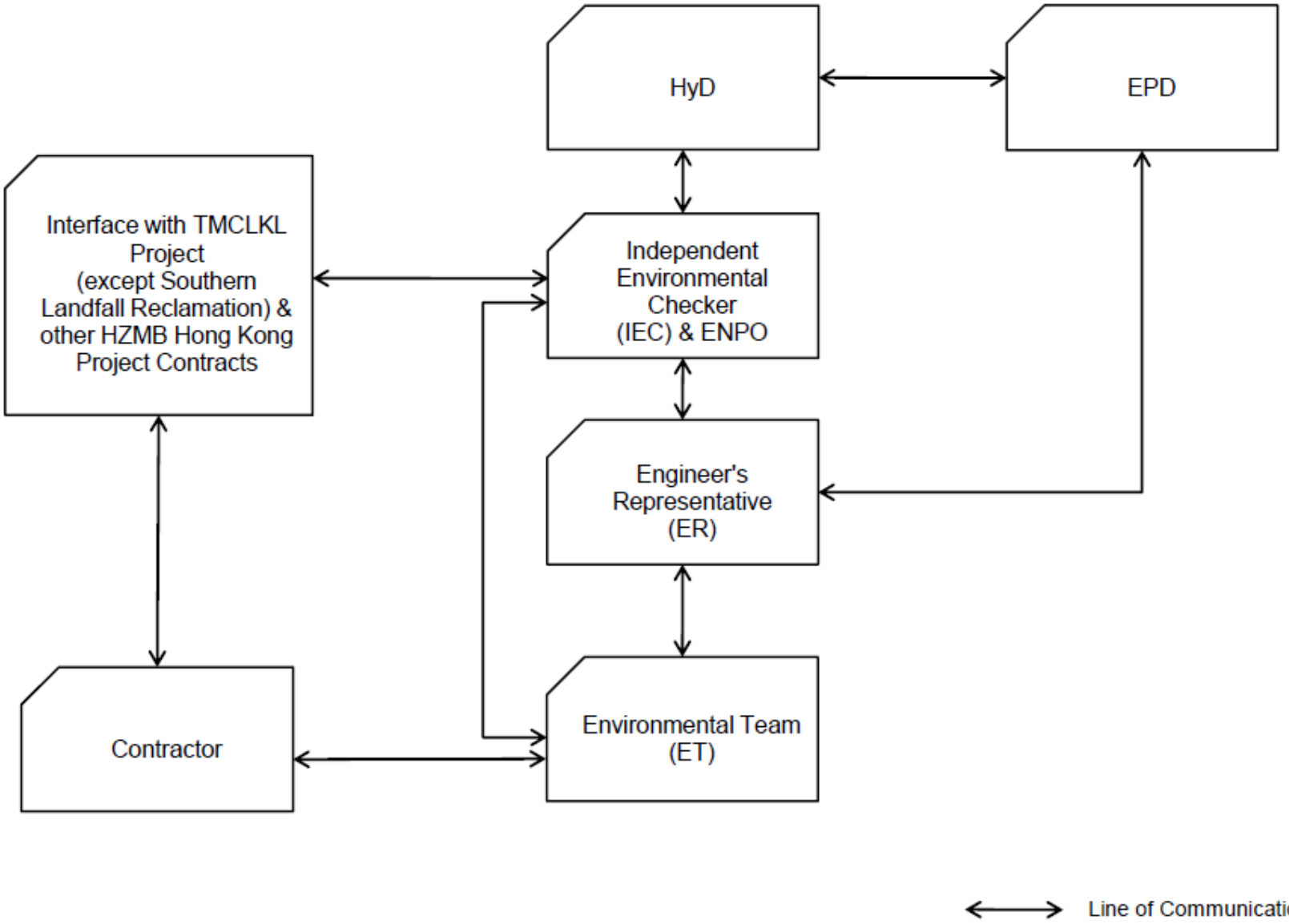
A total of 5 groups of 11 Chinese White Dolphins sightings were recorded during the six sets of surveys in this reporting quarter. All five dolphin sightings were made during on-effort search, and four of the five on-effort dolphin sightings were made on primary lines. Whilst one limit level exceedance was observed for the quarterly dolphin monitoring data between March to May 2019, no unacceptable impact from the construction activities of this Contract was recorded from the general observations. Although the dolphins infrequently occurred along the alignment of TM-CLKL Northern Connection Sub-Sea Tunnel Section in the past and during the baseline monitoring period, it is apparent that dolphin usage has been significantly reduced in NEL. It is critical to monitor the dolphin usage in North Lantau region in the upcoming quarters, to determine whether the dolphins are continuously affected by the various construction activities in relation to the construction works of the Contract, and whether suitable mitigation measure can be applied to improve the situation.

Thirteen weekly environmental site inspections were carried out in the reporting period. Recommendations on remedial actions provided for the deficiencies identified during the site audits were properly implemented by the Contractor. No non-compliance event was recorded during the reporting period.

The monitoring programme has been reviewed and was considered as adequate to cater for the nature of works in progress. Change to the monitoring programme was thus not recommended at this stage. The monitoring programme will be evaluated as appropriate in the next reporting period. The ET will keep track on the construction works to confirm compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

Appendix A

Project Organization for Environmental Works



Appendix A1

Contract No. HY/2012/08 Northern Connection Sub-sea Tunnel Section
Project Organization

DATE: 06/03/2013

Environmental Resources Management

ERM

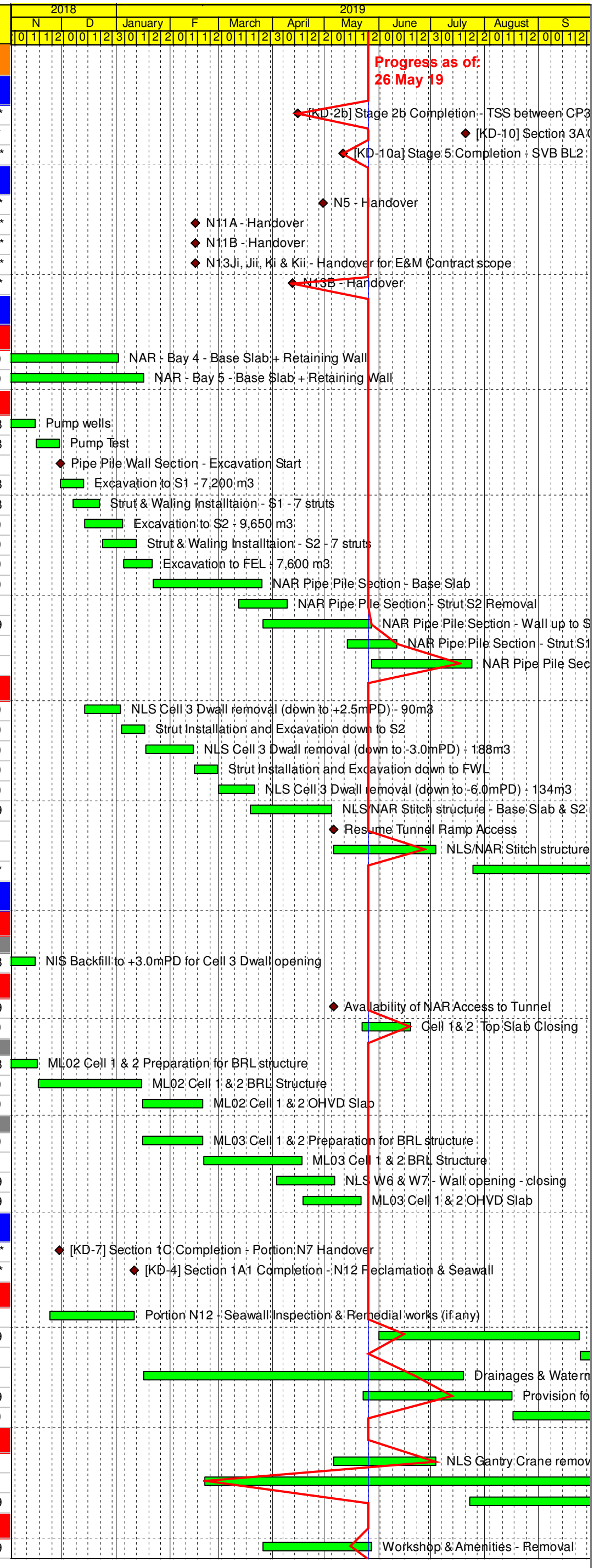
Appendix B

Construction Programme

TMCLKL Northern Connection Sub-sea Tunnel Section

Progress as of: 26 May 19

Activity Name	Orig Dur	Start	Finish
Contract Key Dates			
[KD-2b] Stage 2b Completion - TSS between CP33 to CP13	0		15-Apr-19*
[KD-10] Section 3A Completion - SVB	0		20-Jul-19*
[KD-10a] Stage 5 Completion - SVB BL2	0		11-May-19*
Portion Handover Dates			
N5 - Handover	0		30-Apr-19*
N11A - Handover	0		15-Feb-19*
N11B - Handover	0		15-Feb-19*
N13Ji, Jii, Ki & Kii - Handover for E&M Contract scope	0		15-Feb-19*
N13B - Handover	0		12-Apr-19*
North Approach Ramp			
Portion N12 Section			
NAR - Bay 4 - Base Slab + Retaining Wall	72	06-Oct-18	02-Jan-19
NAR - Bay 5 - Base Slab + Retaining Wall	72	22-Oct-18	16-Jan-19
Access Ramp Section			
Pump wells	35	05-Oct-18	15-Nov-18
Pump Test	12	16-Nov-18	29-Nov-18
Pipe Pile Wall Section - Excavation Start	0	30-Nov-18	
Excavation to S1 - 7,200 m3	12	30-Nov-18	13-Dec-18
Strut & Waling Installtaion - S1 - 7 struts	14	07-Dec-18	22-Dec-18
Excavation to S2 - 9,650 m3	16	14-Dec-18	04-Jan-19
Strut & Waling Installtaion - S2 - 7 struts	15	24-Dec-18	12-Jan-19
Excavation to FEL - 7,600 m3	14	05-Jan-19	21-Jan-19
NAR Pipe Pile Section - Base Slab	48	22-Jan-19	25-Mar-19
NAR Pipe Pile Section - Strut S2 Removal	24	12-Mar-19	09-Apr-19
NAR Pipe Pile Section - Wall up to S1	48	26-Mar-19	27-May-19
NAR Pipe Pile Section - Strut S1 Removal	24	14-May-19	11-Jun-19
NAR Pipe Pile Section - Wall Remaining	48	28-May-19	24-Jul-19
NLS Interface (OAP-NAR-DWG-10442-B)			
NLS Cell 3 Dwall removal (down to +2.5mPD) - 90m3	15	14-Dec-18	03-Jan-19
Strut Installation and Excavation down to S2	12	04-Jan-19	17-Jan-19
NLS Cell 3 Dwall removal (down to -3.0mPD) - 188m3	18	18-Jan-19	14-Feb-19
Strut Installation and Excavation down to FWL	12	15-Feb-19	28-Feb-19
NLS Cell 3 Dwall removal (down to -6.0mPD) - 134m3	18	01-Mar-19	21-Mar-19
NLS/NAR Stitch structure - Base Slab & S2 removed	36	19-Mar-19	04-May-19
Resume Tunnel Ramp Access	0	06-May-19	
NLS/NAR Stitch structure - Remaining Wall Structure & Stru	48	06-May-19	03-Jul-19
NAR Parapet, Cable Trough	58	25-Jul-19	02-Oct-19*
North Launching Shaft			
NLS Cell 1-3 Structure for Cell 3 Dwall opening			
Cell 2			
NIS Backfill to +3.0mPD for Cell 3 Dwall opening	24	19-Oct-18	15-Nov-18
NLS Cell 1-3 Remaining Structure			
Availability of NAR Access to Tunnel	0		06-May-19
Cell 1& 2 Top Slab Closing	24	22-May-19	19-Jun-19
ML02			
ML02 Cell 1 & 2 Preparation for BRL structure	24	20-Oct-18	16-Nov-18
ML02 Cell 1 & 2 BRL Structure	48	17-Nov-18	15-Jan-19
ML02 Cell 1 & 2 OHVD Slab	24	16-Jan-19	19-Feb-19
ML03			
ML03 Cell 1 & 2 Preparation for BRL structure	24	16-Jan-19	19-Feb-19
ML03 Cell 1 & 2 BRL Structure	48	20-Feb-19	17-Apr-19
NLS W6 & W7 - Wall opening - closing	24	03-Apr-19	06-May-19
ML03 Cell 1 & 2 OHVD Slab	24	18-Apr-19	21-May-19
NLF Demobilization & At-grade works			
[KD-7] Section 1C Completion - Portion N7 Handover	0		29-Nov-18*
[KD-4] Section 1A1 Completion - N12 Reclamation & Seawall	0		11-Jan-19*
Portion N12 & Portion N6B			
Portion N12 - Seawall Inspection & Remedial works (if any)	39	24-Nov-18	11-Jan-19
CLP Substation - Prepare for CLP Consent for de-energizat	96	01-Jun-19	24-Sep-19
CLP Substation - De-energization	24	25-Sep-19	24-Oct-19
Drainages & Watermain - Portion N12 & N6B	144	17-Jan-19	19-Jul-19
Provision for Utilities - Portion N12 & N6B	72	23-May-19	16-Aug-19
Utilities parties coordination & Remaining Civil Provision - N	117	17-Aug-19	07-Jan-20
North Launching Shaft			
NLS Gantry Crane removal	48	06-May-19	03-Jul-19
Drainages & Watermain - NLS	194	21-Feb-19	17-Oct-19
Provision for Utilities - NLS	96	23-Jul-19	14-Nov-19
Sloping Seawall			
Workshop & Amenities - Removal	48	26-Mar-19	27-May-19



Planned Milestone

Planned Bar

TMCLK - Northern Connection Sub-sea Tunnel Section

Detailed Works Programme Rev. J

Three Months Rolling Programme Progress as of 26 May 2019

Dragages Hong Kong 香港寶嘉 — A member of the Bouygues Construction group

Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

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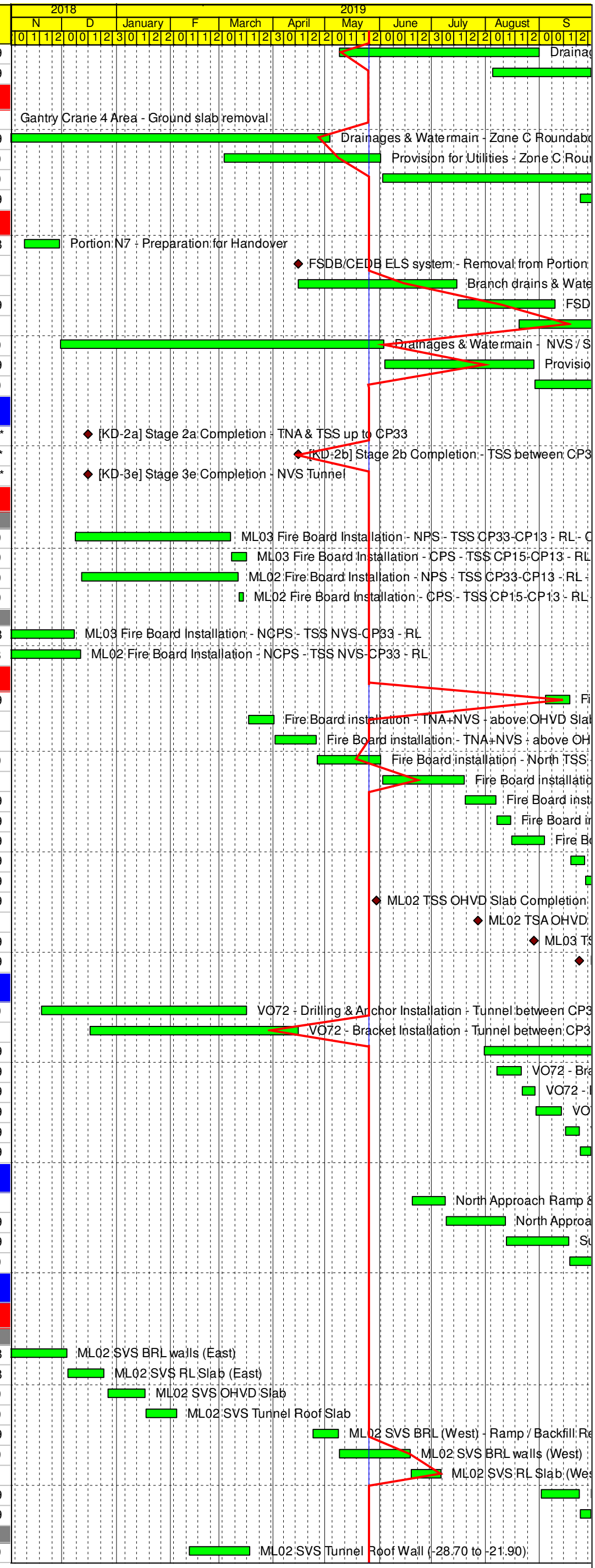
22-Dec-17	Rev. H	WYu	
05-Feb-18	Rev. I AC	WYu	
07-Mar-18	Rev. I	WYu	
18-Jul-18	Rev. J	WYu	

Activity Name	Orig Dur	Start	Finish
Drainages & Watermain - Workshop & Amenities	96	09-May-19	31-Aug-19
Provision for Utilities - Workshop & Amenities	48	05-Aug-19	30-Sep-19
Precast Segment Yard			
Gantry Crane 4 Area - Ground slab removal	17	11-Oct-18	31-Oct-18
Drainages & Watermain - Zone C Roundabout	144	01-Nov-18	03-May-19
Provision for Utilities - Zone C Roundabout	72	04-Mar-19	01-Jun-19
Utilities parties coordination & Remaining Civil Provision - Z	180	03-Jun-19	07-Jan-20
Gantry Crane 2 & 3 - Dismantling	48	24-Sep-19	20-Nov-19
NVS & STP (Portion N7 Interface)			
Portion N7 - Preparation for Handover	18	09-Nov-18	29-Nov-18
FSDB/CEDB ELS system - Removal from Portion X (by C4)	0	15-Apr-19*	
Branch drains & Watermain Terminal Manholes - FSDB/CE	72	15-Apr-19	15-Jul-19
FSDB/CEDB Termainal Manholes	48	16-Jul-19	09-Sep-19
Provision for Utilities - Portion N7 Interface	36	20-Aug-19	02-Oct-19
Drainages & Watermain - NVS / STP	144	30-Nov-18	03-Jun-19
Provision for Utilities - NVS / STP	72	04-Jun-19	28-Aug-19
Utilities parties coordination & Remaining Civil Provision - N	107	29-Aug-19	07-Jan-20
Tunnel - Thermal Barrier			
[KD-2a] Stage 2a Completion - TNA & TSS up to CP33	0		15-Dec-18*
[KD-2b] Stage 2b Completion - TSS between CP33 to CP13	0		15-Apr-19*
[KD-3e] Stage 3e Completion - NVS Tunnel	0		15-Dec-18*
Fire board Installation below OHVD			
Fire Board between CP33 and CP13			
ML03 Fire Board Installation - NPS - TSS CP33-CP13 - RL	68	08-Dec-18	07-Mar-19
ML03 Fire Board Installation - CPS - TSS CP15-CP13 - RL	8	08-Mar-19	16-Mar-19
ML02 Fire Board Installation - NPS - TSS CP33-CP13 - RL	68	12-Dec-18	11-Mar-19
ML02 Fire Board Installation - CPS - TSS CP15-CP13 - RL	3	12-Mar-19	14-Mar-19
Fire board between NLS and CP33			
ML03 Fire Board Installation - NCPS - TSS NVS-CP33 - RL	54	05-Oct-18	07-Dec-18
ML02 Fire Board Installation - NCPS - TSS NVS-CP33 - RL	54	09-Oct-18	11-Dec-18
Fire board Installation above OHVD			
Fire Board Installation - NLS	12	04-Sep-19	18-Sep-19
Fire Board installation - TNA+NVS - above OHVD Slab - ML	13	18-Mar-19	01-Apr-19
Fire Board installation - TNA+NVS - above OHVD Slab - ML	17	02-Apr-19	25-Apr-19
Fire Board installation - North TSS - above OHVD Slab	30	26-Apr-19	01-Jun-19
Fire Board installation - South TSS - above OHVD Slab	39	03-Jun-19	19-Jul-19
Fire Board installation - ML02 TSS CP13 to SVS	15	20-Jul-19	06-Aug-19
Fire Board installation - ML02 TSA	8	07-Aug-19	15-Aug-19
Fire Board installation - ML03 TSS CP13 to SVS	16	16-Aug-19	03-Sep-19
Fire Board installation - ML03 TSA	7	19-Sep-19	26-Sep-19
Fire Board installation - MHS C&C below OHVD	30	27-Sep-19	02-Nov-19
ML02 TSS OHVD Slab Completion	0		30-May-19
ML02 TSA OHVD Slab Completion	0		27-Jul-19
ML03 TSS OHVD Slab Completion	0		28-Aug-19
ML03 TSA OHVD Slab Completion	0		23-Sep-19
Tunnel - Anchor / E&M Bracket (VO72)			
VO72 - Drilling & Anchor Installation - Tunnel between CP33	93	19-Nov-18	16-Mar-19
VO72 - Bracket Installation - Tunnel between CP33 to CP13	93	17-Dec-18	15-Apr-19
VO72 - Drilling & Anchor Installation - Remaining Tunnel	84	31-Jul-19	08-Nov-19
VO72 - Bracket Installation - Tunnel between CP13 to SVS M	13	07-Aug-19	21-Aug-19
VO72 - Bracket Installation - MHS TBM Tunnel ML02 (20R/d)	7	22-Aug-19	29-Aug-19
VO72 - Bracket Installation - Tunnel between CP13 to SVS M	13	30-Aug-19	13-Sep-19
VO72 - Bracket Installation - NLS	7	16-Sep-19	23-Sep-19
VO72 - Bracket Installation - MHS TBM Tunnel ML03 (20R/d)	6	24-Sep-19	30-Sep-19
Tunnel Roadworks			
North Approach Ramp & Launching Shaft	15	20-Jun-19	08-Jul-19
North Approach TBM Tunnel and NVS Tunnel	30	09-Jul-19	12-Aug-19
Sub-sea Tunnel from NVS to CP33	30	13-Aug-19	17-Sep-19
Sub-sea Tunnel from CP33 to CP13	45	18-Sep-19	11-Nov-19
ML02 South Ventilation Shaft			
ML02 SVS Structure			
Tunnel Box			
ML02 SVS BRL walls (East)	36	23-Oct-18	03-Dec-18
ML02 SVS RL Slab (East)	18	04-Dec-18	24-Dec-18
ML02 SVS OHVD Slab	18	27-Dec-18	17-Jan-19
ML02 SVS Tunnel Roof Slab	15	18-Jan-19	04-Feb-19
ML02 SVS BRL (West) - Ramp / Backfill Removal	12	24-Apr-19	08-May-19
ML02 SVS BRL walls (West)	33	09-May-19	18-Jun-19
ML02 SVS RL Slab (West)	15	19-Jun-19	06-Jul-19
ML02 SVS West wall remaining after CP7	18	02-Sep-19	23-Sep-19
ML02 SVS Tunnel - Prepare for E&M Contractor Access	6	24-Sep-19	30-Sep-19
Above Tunnel Vent Duct			
ML02 SVS Tunnel Roof Wall (-28.70 to -21.90)	30	12-Feb-19	18-Mar-19



Planned Milestone
Planned Bar

TMCLK - Northern Connection Sub-sea Tunnel Section

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Three Months Rolling Programme Progress as of 26 May 2019

香港寶嘉 Dragages HongKong
A member of the Bouygues Construction group
Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

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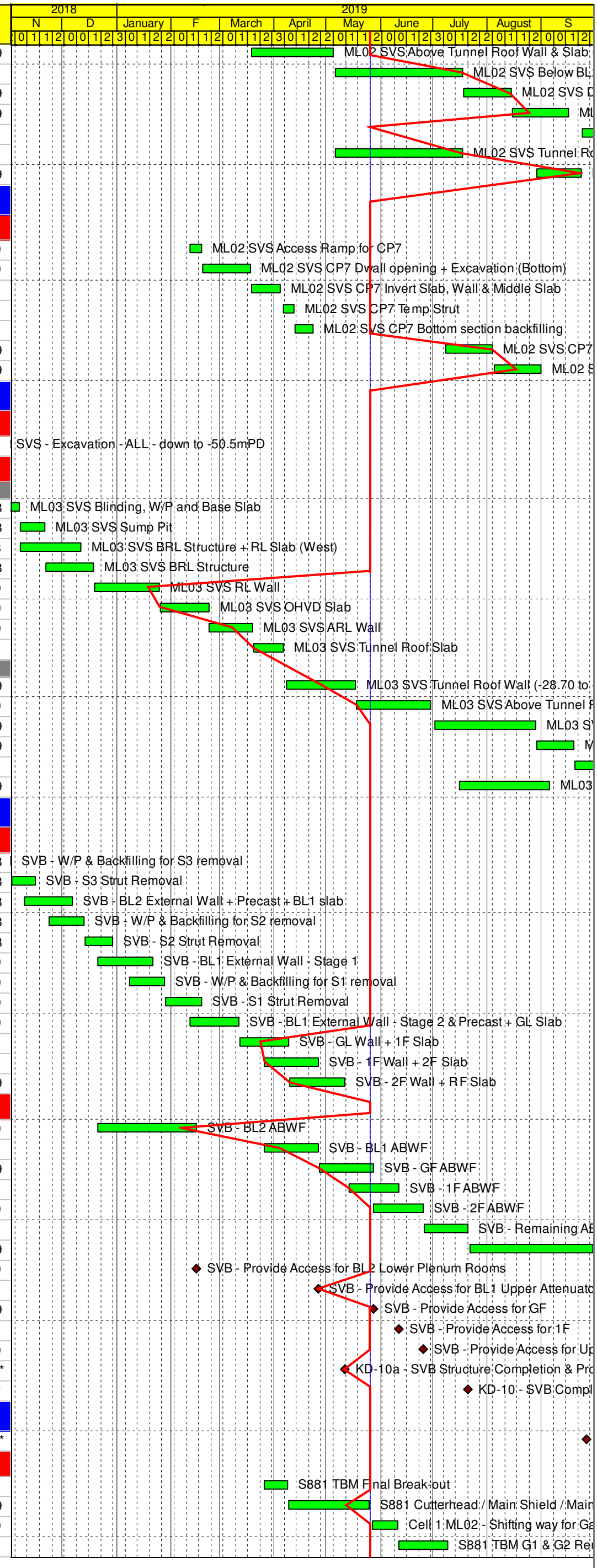
18-Jul-18	Rev. J	WYu	

Activity Name	Orig Dur	Start	Finish
ML02 SVS Above Tunnel Roof Wall & Slab (-21.90 to -18.7	36	19-Mar-19	04-May-19
ML02 SVS Below BL2 Wall & Slab + Backfill (-18.70 to -6.9	60	06-May-19	17-Jul-19
ML02 SVS Dwall opening for Duct connection to SVB S1	24	18-Jul-19	14-Aug-19
ML02 SVS BL2 Wall & Slab (-6.95 to -0.45)	27	15-Aug-19	16-Sep-19
ML02 SVS Dwall opening for Duct connection to SVB S2	27	24-Sep-19	26-Oct-19
ML02 SVS Tunnel Roof to BBL2 W/P & Backfill (-21.90 to -	60	06-May-19	17-Jul-19
ML02 SVS BL2 W/P & Backfill (-8.00 to -0.65)	21	29-Aug-19	23-Sep-19
CP7 South Ventilation Shaft			
ML02 SVS			
ML02 SVS Access Ramp for CP7	6	12-Feb-19	18-Feb-19
ML02 SVS CP7 Dwall opening + Excavation (Bottom)	24	19-Feb-19	18-Mar-19
ML02 SVS CP7 Invert Slab, Wall & Middle Slab	15	19-Mar-19	04-Apr-19
ML02 SVS CP7 Temp Strut	6	06-Apr-19	12-Apr-19
ML02 SVS CP7 Bottom section backfilling	6	13-Apr-19	23-Apr-19
ML02 SVS CP7 Upper Excavation & modify arches	24	08-Jul-19	03-Aug-19
ML02 SVS CP7 Top section - Structure	24	05-Aug-19	31-Aug-19
ML03 South Ventilation Shaft			
Shaft Excavation Stage 2			
ML03 SVS - Excavation - ALL - down to -50.5mPD	6	02-Oct-18	08-Oct-18
ML03 SVS Structure			
Tunnel Box			
ML03 SVS Blinding, W/P and Base Slab	24	09-Oct-18	06-Nov-18
ML03 SVS Sump Pit	12	07-Nov-18	20-Nov-18
ML03 SVS BRL Structure + RL Slab (West)	30	07-Nov-18	11-Dec-18
ML03 SVS BRL Structure	24	21-Nov-18	18-Dec-18
ML03 SVS RL Wall	30	19-Dec-18	25-Jan-19
ML03 SVS OHVD Slab	18	26-Jan-19	22-Feb-19
ML03 SVS ARL Wall	21	23-Feb-19	19-Mar-19
ML03 SVS Tunnel Roof Slab	15	20-Mar-19	06-Apr-19
Above Tunnel Vent Duct			
ML03 SVS Tunnel Roof Wall (-28.70 to -21.90)	30	08-Apr-19	17-May-19
ML03 SVS Above Tunnel Roof Wall & Slab	36	18-May-19	29-Jun-19
ML03 SVS Below BL2 Wall & Slab (-18.70 to -6.95)	50	02-Jul-19	28-Aug-19
ML03 SVS Dwall opening for Duct connection to SVB	18	29-Aug-19	19-Sep-19
ML03 SVS BL2 Duct Connection to SVB	30	20-Sep-19	26-Oct-19
ML03 SVS Tunnel Roof to BBL2 W/P & Backfilli(-21.90 to -	45	16-Jul-19	05-Sep-19
South Ventilation Building			
Structure			
SVB - W/P & Backfilling for S3 removal	18	11-Oct-18	01-Nov-18
SVB - S3 Strut Removal	12	02-Nov-18	15-Nov-18
SVB - BL2 External Wall + Precast + BL1 slab	24	09-Nov-18	06-Dec-18
SVB - W/P & Backfilling for S2 removal	18	23-Nov-18	13-Dec-18
SVB - S2 Strut Removal	12	14-Dec-18	29-Dec-18
SVB - BL1 External Wall - Stage 1	24	21-Dec-18	21-Jan-19
SVB - W/P & Backfilling for S1 removal	18	08-Jan-19	28-Jan-19
SVB - S1 Strut Removal	12	29-Jan-19	18-Feb-19
SVB - BL1 External Wall - Stage 2 & Precast + GL Slab	24	12-Feb-19	11-Mar-19
SVB - GL Wall + 1F Slab	24	12-Mar-19	09-Apr-19
SVB - 1F Wall + 2F Slab	24	26-Mar-19	26-Apr-19
SVB - 2F Wall + RF Slab	24	10-Apr-19	11-May-19
ABWF			
SVB - BL2 ABWF	40	21-Dec-18	15-Feb-19
SVB - BL1 ABWF	24	26-Mar-19	26-Apr-19
SVB - GF ABWF	24	27-Apr-19	27-May-19
SVB - 1F ABWF	24	14-May-19	11-Jun-19
SVB - 2F ABWF	24	28-May-19	25-Jun-19
SVB - Remaining ABWF	21	26-Jun-19	20-Jul-19
SVB - Roof Structure	60	22-Jul-19	30-Sep-19
SVB - Provide Access for BL2 Lower Plenum Rooms	0		15-Feb-19
SVB - Provide Access for BL1 Upper Attenuator Rooms	0		26-Apr-19
SVB - Provide Access for GF	0		27-May-19
SVB - Provide Access for 1F	0		11-Jun-19
SVB - Provide Access for Upper Plenum Rooms	0		25-Jun-19
KD-10a - SVB Structure Completion & Provide Access to BL2	0		11-May-19*
KD-10 - SVB Completion & Provide Access	0		20-Jul-19*
South Approach TBM Tunnel			
[KD-2c] Stage 2c Completion - Remaining TSS & TSA	0		26-Sep-19*
S881 TBM			
S881 TBM Final Break-out	14	26-Mar-19	08-Apr-19
S881 Cutterhead / Main Shield / Main Drive - Cut & remove	36	09-Apr-19	25-May-19
Cell 1 ML02 - Shifting way for Gantry 1 & 2 Removal	12	27-May-19	10-Jun-19
S881 TBM G1 & G2 Removal	24	11-Jun-19	09-Jul-19



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Planned Bar

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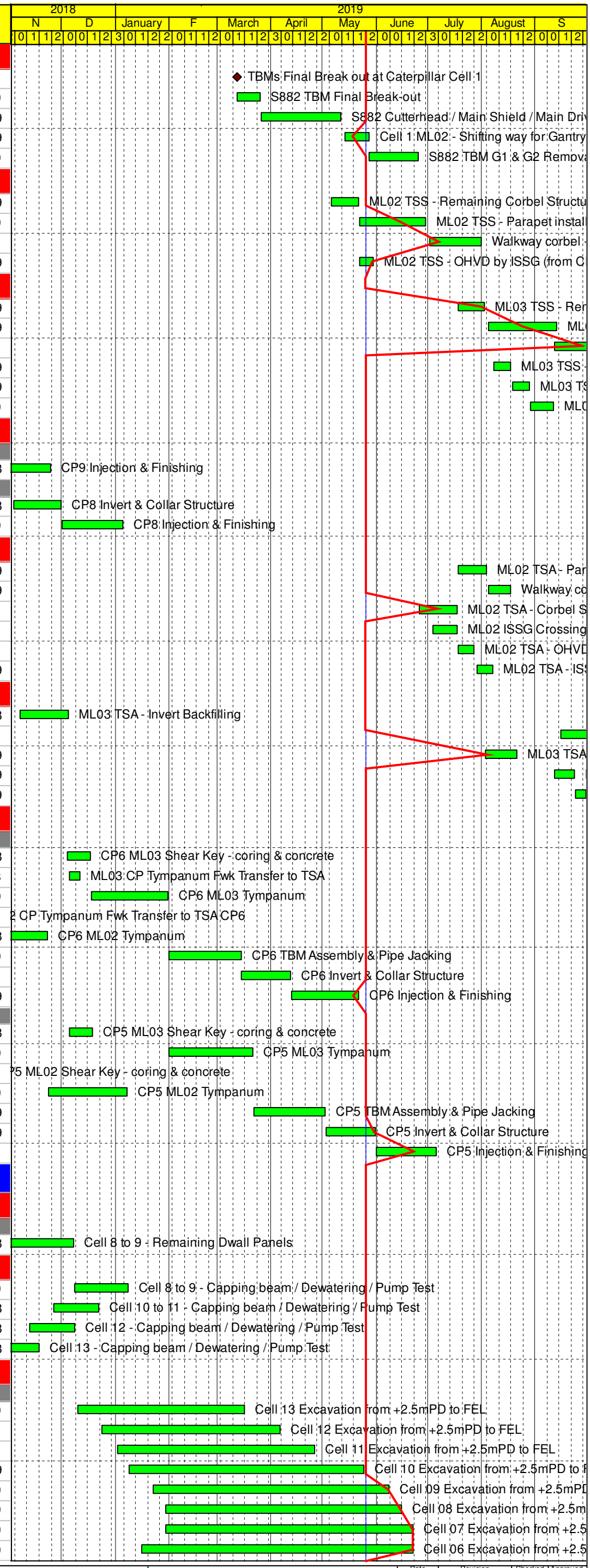
Activity Name	Orig Dur	Start	Finish
S882 TBM			
TBMs Final Break out at Caterpillar Cell 1	0	12-Mar-19	
S882 TBM Final Break-out	14	12-Mar-19	25-Mar-19
S882 Cutterhead / Main Shield / Main Drive - Cut & remove	36	26-Mar-19	11-May-19
Cell 1 ML02 - Shifting way for Gantry 1 & 2 Removal	12	14-May-19	27-May-19
S882 TBM G1 & G2 Removal	24	28-May-19	25-Jun-19
ML02 TSS Internal Structure			
ML02 TSS - Remaining Corbel Structure by ISCG	13	06-May-19	21-May-19
ML02 TSS - Parapet installation	33	22-May-19	29-Jun-19
Walkway corbel - TSS Remaining & SVS ML02 both side	26	02-Jul-19	31-Jul-19
ML02 TSS - OHVD by ISSG (from CP15 to SVS)	8	22-May-19	30-May-19
ML03 TSS Internal Structure			
ML03 TSS - Remaining Corbel Structure by ISCG	14	18-Jul-19	02-Aug-19
ML03 TSS - Parapet installation	35	05-Aug-19	13-Sep-19
Walkway corbel - TSS Remaining & SVS ML03 both side	27	12-Sep-19	16-Oct-19
ML03 TSS - ISSG assembly at CP15	9	08-Aug-19	17-Aug-19
ML03 TSS - OHVD by ISSG (from CP15 to SVS)	9	19-Aug-19	28-Aug-19
ML03 ISSG Crossing at SVS	12	29-Aug-19	11-Sep-19
TSS Cross Passage			
CP9			
CP9 Injection & Finishing	28	24-Oct-18	24-Nov-18
CP8			
CP8 Invert & Collar Structure	24	03-Nov-18	30-Nov-18
CP8 Injection & Finishing	28	01-Dec-18	05-Jan-19
ML02 TSA Internal Structure			
ML02 TSA - Parapet installation	15	18-Jul-19	03-Aug-19
Walkway corbel - MHS TBM ML02 both sides	12	05-Aug-19	17-Aug-19
ML02 TSA - Corbel Structure	18	26-Jun-19	17-Jul-19
ML02 ISSG Crossing at SVS	12	04-Jul-19	17-Jul-19
ML02 TSA - OHVD by ISSG	9	18-Jul-19	27-Jul-19
ML02 TSA - ISSG dismantling	9	29-Jul-19	07-Aug-19
ML03 TSA Internal Structure			
ML03 TSA - Invert Backfilling	24	07-Nov-18	04-Dec-18
ML03 TSA - Parapet installation	16	16-Sep-19	04-Oct-19
ML03 TSA - Corbel Structure	16	03-Aug-19	21-Aug-19
ML03 TSA - OHVD by ISSG	9	12-Sep-19	23-Sep-19
ML03 TSA - Lead time for Fire Proofing	6	24-Sep-19	30-Sep-19
TSA Cross Passage			
CP6			
CP6 ML03 Shear Key - coring & concrete	12	04-Dec-18	17-Dec-18
ML03 CP Tympanum Fwk Transfer to TSA	6	05-Dec-18	11-Dec-18
CP6 ML03 Tympanum	36	18-Dec-18	31-Jan-19
ML02 CP Tympanum Fwk Transfer to TSA CP6	6	04-Oct-18	10-Oct-18
CP6 ML02 Tympanum	36	11-Oct-18	22-Nov-18
CP6 TBM Assembly & Pipe Jacking	42	01-Feb-19	14-Mar-19
CP6 Invert & Collar Structure	24	15-Mar-19	12-Apr-19
CP6 Injection & Finishing	28	13-Apr-19	21-May-19
CP5			
CP5 ML03 Shear Key - coring & concrete	12	05-Dec-18	18-Dec-18
CP5 ML03 Tympanum	36	01-Feb-19	21-Mar-19
CP5 ML02 Shear Key - coring & concrete	12	04-Oct-18	18-Oct-18
CP5 ML02 Tympanum	36	23-Nov-18	07-Jan-19
CP5 TBM Assembly & Pipe Jacking	42	22-Mar-19	02-May-19
CP5 Invert & Collar Structure	24	03-May-19	31-May-19
CP5 Injection & Finishing	28	01-Jun-19	05-Jul-19
MHS Cut-and-cover Tunnel			
N MHS C&C Caterpillar Dwall			
Cell 4 to 8			
Cell 8 to 9 - Remaining Dwall Panels	53	06-Oct-18	07-Dec-18
N MHS C&C Preparation for Excavation			
Cell 8 to 9 - Capping beam / Dewatering / Pump Test	24	08-Dec-18	08-Jan-19
Cell 10 to 11 - Capping beam / Dewatering / Pump Test	24	26-Nov-18	22-Dec-18
Cell 12 - Capping beam / Dewatering / Pump Test	24	12-Nov-18	08-Dec-18
Cell 13 - Capping beam / Dewatering / Pump Test	24	22-Oct-18	17-Nov-18
N MHS C&C Caterpillar Excavation			
MHS C&C Cell 12 to 04			
Cell 13 Excavation from +2.5mPD to FEL	75	10-Dec-18	16-Mar-19
Cell 12 Excavation from +2.5mPD to FEL	80	24-Dec-18	06-Apr-19
Cell 11 Excavation from +2.5mPD to FEL	89	02-Jan-19	26-Apr-19
Cell 10 Excavation from +2.5mPD to FEL	105	09-Jan-19	24-May-19
Cell 09 Excavation from +2.5mPD to FEL	105	23-Jan-19	08-Jun-19
Cell 08 Excavation from +2.5mPD to FEL	105	30-Jan-19	15-Jun-19
Cell 07 Excavation from +2.5mPD to FEL	111	30-Jan-19	22-Jun-19
Cell 06 Excavation from +2.5mPD to FEL	123	16-Jan-19	22-Jun-19



Planned Milestone

Planned Bar

TMCLK - Northern Connection Sub-sea Tunnel Section

Detailed Works Programme Rev. J

Three Months Rolling Programme Progress as of 26 May 2019

Dragages HongKong 香港寶嘉

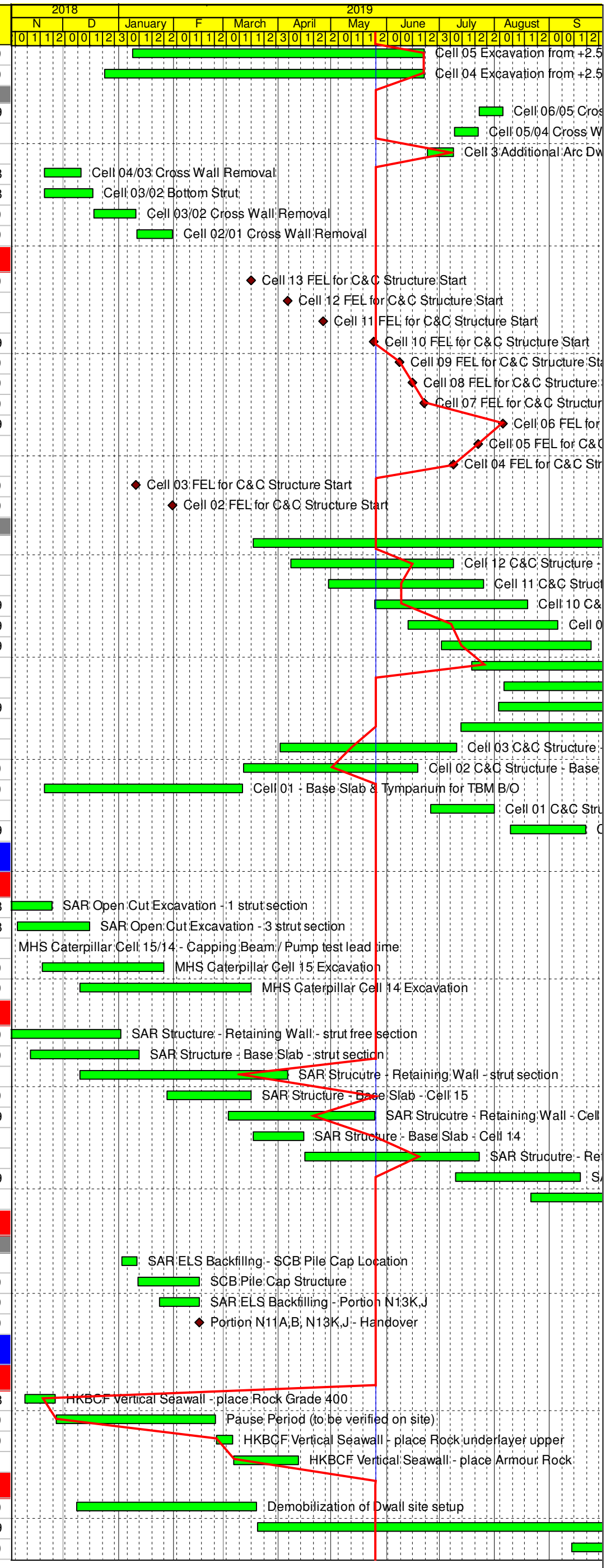
A member of the Bouygues Construction group

BOUYGUES TRAVAUX PUBLICS

Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

Date	Revision	Checked	Approved
22-Dec-17	Rev. H	WYu	
05-Feb-18	Rev. I AC	WYu	
07-Mar-18	Rev. I	WYu	
18-Jul-18	Rev. J	WYu	

Activity Name	Orig Dur	Start	Finish
Cell 05 Excavation from +2.5mPD to FEL	129	09-Jan-19	22-Jun-19
Cell 04 Excavation from +2.5mPD to FEL	140	24-Dec-18	22-Jun-19
Cross Wall Removal			
Cell 06/05 Cross Wall Removal	12	23-Jul-19	05-Aug-19
Cell 05/04 Cross Wall Removal	12	09-Jul-19	22-Jul-19
Cell 3 Additional Arc Dwall Final Removal	12	24-Jun-19	08-Jul-19
Cell 04/03 Cross Wall Removal	18	20-Nov-18	10-Dec-18
Cell 03/02 Bottom Strut	24	20-Nov-18	17-Dec-18
Cell 03/02 Cross Wall Removal	18	18-Dec-18	10-Jan-19
Cell 02/01 Cross Wall Removal	18	11-Jan-19	31-Jan-19
N MHS C&C Caterpillar Structure			
Cell 13 FEL for C&C Structure Start	0		16-Mar-19
Cell 12 FEL for C&C Structure Start	0		06-Apr-19
Cell 11 FEL for C&C Structure Start	0		26-Apr-19
Cell 10 FEL for C&C Structure Start	0		24-May-19
Cell 09 FEL for C&C Structure Start	0		08-Jun-19
Cell 08 FEL for C&C Structure Start	0		15-Jun-19
Cell 07 FEL for C&C Structure Start	0		22-Jun-19
Cell 06 FEL for C&C Structure Start	0		05-Aug-19
Cell 05 FEL for C&C Structure Start	0		22-Jul-19
Cell 04 FEL for C&C Structure Start	0		08-Jul-19
Cell 03 FEL for C&C Structure Start	0		10-Jan-19
Cell 02 FEL for C&C Structure Start	0		31-Jan-19
Main Box Structure			
Cell 13 C&C Sturcture (In-situ) & system fwk assembly	163	18-Mar-19	04-Oct-19
Cell 12 C&C Structure - Base Slab, Wall & Top Slab & OH\	72	08-Apr-19	08-Jul-19
Cell 11 C&C Structure - Base Slab, Wall & Top Slab & OH\	72	29-Apr-19	25-Jul-19
Cell 10 C&C Structure - Base Slab, Wall & Top Slab & OH\	72	25-May-19	19-Aug-19
Cell 09 C&C Structure - Base Slab, Wall & Top Slab & OH\	72	13-Jun-19	05-Sep-19
Cell 08 C&C Structure - Base Slab, Wall & Top Slab & OH\	72	02-Jul-19	24-Sep-19
Cell 07 C&C Structure - Base Slab, Wall & Top Slab & OH\	72	19-Jul-19	14-Oct-19
Cell 06 C&C Structure - Base Slab, Wall & Top Slab & OH\	72	06-Aug-19	31-Oct-19
Cell 05 C&C Structure - Base Slab, Wall & Top Slab & OH\	78	03-Aug-19	05-Nov-19
Cell 04 C&C Structure - Base Slab, Wall & Top Slab & OH\	78	13-Jul-19	15-Oct-19
Cell 03 C&C Structure - Base Slab, Wall & Top Slab & OH\	78	02-Apr-19	10-Jul-19
Cell 02 C&C Structure - Base Slab, Wall & Top Slab & OH\	78	12-Mar-19	18-Jun-19
Cell 01 - Base Slab & Tympanum for TBM B/O	87	20-Nov-18	11-Mar-19
Cell 01 C&C Structure - Wall Structure	30	26-Jun-19	31-Jul-19
Cell 01 C&C Stucture - Top Slab and OHVD Slab	36	10-Aug-19	21-Sep-19
MHS Approach Ramp			
MHS Approach Ramp Excavation			
SAR Open Cut Excavation - 1 strut section	36	13-Oct-18	24-Nov-18
SAR Open Cut Excavation - 3 strut section	36	05-Nov-18	15-Dec-18
MHS Caterpillar Cell 15/14 - Capping Beam / Pump test lea	24	02-Oct-18	30-Oct-18
MHS Caterpillar Cell 15 Excavation	57	19-Nov-18	26-Jan-19
MHS Caterpillar Cell 14 Excavation	75	10-Dec-18	16-Mar-19
MHS Approach Ramp Structure			
SAR Structure - Retaining Wall - strut free section	66	13-Oct-18	02-Jan-19
SAR Structure - Base Slab - strut section	51	12-Nov-18	12-Jan-19
SAR Strucutre - Retaining Wall - strut section	92	10-Dec-18	06-Apr-19
SAR Structure - Base Slab - Cell 15	36	28-Jan-19	16-Mar-19
SAR Strucutre - Retaining Wall - Cell 15	66	04-Mar-19	25-May-19
SAR Structure - Base Slab - Cell 14	24	18-Mar-19	15-Apr-19
SAR Strucutre - Retaining Wall - Cell 14	78	16-Apr-19	23-Jul-19
SAR Strcutrure - Mass Concrete	60	10-Jul-19	18-Sep-19
SAR Structure - Parapet & Walkway	45	21-Aug-19	15-Oct-19
VO73 SCB Foundation & Substructure			
Foundation			
SAR ELS Backfillng - SCB Pile Cap Location	8	03-Jan-19	11-Jan-19
SCB Pile Cap Structure	24	12-Jan-19	15-Feb-19
SAR ELS Backfilling - Portion N13K,J	14	24-Jan-19	15-Feb-19
Portion N11A,B, N13K,J - Handover	0		15-Feb-19
Southern Landfall - Surface			
HKBCF Seawall Modification (schedule TBC)			
HKBCF Vertical Seawall - place Rock Grade 400	15	09-Nov-18	26-Nov-18
Pause Period (to be verified on site)	90	27-Nov-18	24-Feb-19
HKBCF Vertical Seawall - place Rock underlayer upper	9	25-Feb-19	06-Mar-19
HKBCF Vertical Seawall - place Armour Rock	31	07-Mar-19	12-Apr-19
UU / At-grade works			
Demobilization of Dwall site setup	78	08-Dec-18	19-Mar-19
Drainage & Watermain - SLF	216	20-Mar-19	09-Dec-19
Provision for Utilities - SLF West	110	13-Sep-19	29-Jan-20



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Appendix C

Environmental Mitigation and Enhancement Measure Implementation Schedules

Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
Air Quality									
4.8.1	3.8	An effective watering programme of twice daily watering with complete coverage, is estimated to reduce by 50%. This is recommended for all areas in order to reduce dust levels to a minimum;	All areas / throughout construction period	Contractor	TMEIA Avoid smoke impacts and disturbance		Y		✓
4.8.1	3.8	Watering of the construction sites in Lantau for 8 times/day and in Tuen Mun for 12 times/day to reduce dust emissions by 87.5% and 91.7% respectively and shall be undertaken.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓
4.8.1	3.8	The Contractor shall, to the satisfaction of the Engineer, install effective dust suppression measures and take such other measures as may be necessary to ensure that at the Site boundary and any nearby sensitive receiver, dust levels are kept to acceptable levels.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓
4.8.1	3.8	The Contractor shall not burn debris or other materials on the works areas.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓
4.8. 1	3.8	In hot, dry or windy weather, the watering programme shall maintain all exposed road surfaces and dust sources wet.	All unpaved haul roads / throughout construction period in hot, dry or windy weather	Contractor	TMEIA Avoid smoke impacts and disturbance		Y		✓
4.8.1	3.8	Where breaking of oversize rock/concrete is required, watering shall be implemented to control dust. Water spray shall be used during the handling of fill material at the site and at active cuts, excavation and fill sites where dust is likely to be created.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓
4.8. 1	3.8	Open dropping heights for excavated materials shall be controlled to a maximum height of 2m to minimise the fugitive dust arising from unloading.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓
4.8.1	3.8	During transportation by truck, materials shall not be loaded to a level higher than the side and tail boards, and shall be dampened or covered before transport.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
4.8.1	3.8	Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		<>
4.8.1	3.8	No earth, mud, debris, dust and the like shall be deposited on public roads. Wheel washing facility shall be usable prior to any earthworks excavation activity on the site.	All site exits / throughout construction period	Contractor	TMEIA Avoid dust		Y		✓
4.8.1	3.8	Areas of exposed soil shall be minimised to areas in which works have been completed shall be restored as soon as is	All exposed surfaces / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓
4.8.1	3.8	All stockpiles of aggregate or spoil shall be enclosed or covered and water applied in dry or windy condition.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		<>
4.11	Section 3	EM&A in the form of 1 hour and 24 hour dust monitoring and site audit.	All representative existing ASRs / throughout construction period	Contractor	EM&A Manual		Y		✓
WATER QUALITY									
Marine Works (Sequence A)									
6.1 Figure 6.2a Appendix D6a	Annex A	Construction of seawalls to be advanced by at least 200m before the main reclamation dredging and filling can commence. The protection by advanced seawall is a dynamic process depending on the progress of the construction activities and the stage when such protection could be realised is illustrated in Figure 6.2a and detailed in Appendix D6a. The part of the works where such measures can be undertaken for the majority of the time includes the following locations: - TM-CLKL northern reclamation;	All areas/ prior to dredging and backfilling works	Contractor	TM-EIAO		Y		✓
6.1	-	a maximum of 50% public fill to be used for all seawall filling below +2.5mPD for TM-CLKL southern and northern landfalls.	TM-CLKL seawall filling	Contractor	TM-EIAO		Y		✓

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
6.1	-	a maximum of 30% public fill to be used for reclamation filling below +2.5mPD for TM-CLKL southern landfall	TM-CLKL southern landfall reclamation filling	Contractor	TM-EIAO		Y		N/A
6.1	-	a maximum of 100% public fill to be used for reclamation filling below +2.5mPD for TM-CLKL northern landfall	TM-CLKL northern landfall reclamation filling	Contractor	TM-EIAO		Y		✓
6.1	-	Use of cage type silt curtains round allgrab dredgers during the HKBCF, HKLR and TM-CLKL southern reclamation works.	All areas dredging works	Contractor	TM-EIAO		Y		✓
	Figure 1.1 of Annex C	A layer of floating type silt curtain will be applied when dredging and reclamation works are being undertaken at Portion N-a as shown in Figure 1.1 of Annex C of the EM&A Manual.	All areas/ through out marine works	Contractor	TM-EIAO		Y		✓
6.1	-	Trailer suction hopper dredgers shall not allow mud to overflow.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		✓
6.1	-	The use of Lean Material Overboard (LMOB) systems shall be prohibited.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		✓
6.1 Figure 6.2b Appendix D6b	Annex A	For other parts of the reclamation works construction of seawalls to be advanced by at least 200m before the main reclamation dredging and filling can commence. It should be noted that the protection by advanced seawall is a dynamic process depending on the progress of the construction activities and the stage when such protection could be realised is illustrated in Figure 6.2b and detailed in Appendices D6b. The part of the works where such measures can be undertaken for the majority of the time includes the following locations: - TM-CLKL northern reclamation;	TM-CLKL northern landfall, Portion D of HKBCF and HKLR	Contractor	TM-EIAO		Y		✓

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
		- Reclamation filling for Portion D of HKBCF; Reclamation filling for FSD berth of HKBCF; and - Reclamation dredging and filling for Portion 1 of HKLR;							
6.1	-	The filling material for the other parts of the works are the same as Sequence A;	All other areas/backfilling works	Contractor	TM-EIAO		Y		N/A
6.1	5.7	Cage type silt curtain (with steel enclosure) shall be used for grab dredgers working in the site of HKBCF and TM- CLKL southern reclamation. Cage type silt curtains will be applied round all grab dredgers at other works area.	HKBCF, HKLR and TM-CLKL grab dredging	Contractor	TM-EIAO		Y		✓
6.1	Annex A	A layer of floating type silt curtain will be applied around all works as defined in Appendix D6b.	All areas/ through out marine works	Contractor	TM-EIAO		Y		✓
6.1	-	TM-CLKL northern landfall: - Reclamation filling shall not proceed until at least 200m section of leading seawall at both the east and west sides of the reclamation are formed above +2.5 mPD, except for 100m gaps for marine access;	All areas/ through out marine works	Contractor	TM-EIAO		Y		✓
General Marine Works									
6.1	-	Use of TMB for the construction of the submarine tunnel.	Tunnel works / Construction phase	Contractor	TM-EIAO		Y		N/A
6.1	-	Export dredged spoils from NWWCZ.	All areas as much as possible / dredging activities	Contractor	DASO Permit conditions		Y		✓
6.1	-	Where public fill is proposed for filling below +2.5mPD, the fine content in the public fill will be controlled to 25%	All areas/ backfilling works	Contractor	TM-EIAO		Y		N/A
6.1	-	Where sand fill is proposed for filling below +2.5mPD, the fine content in the sand fill will be controlled to 5%.	All areas/ backfilling works	Contractor	TM-EIAO		Y		N.A
6.1	-	Mechanical grabs shall be designed and maintained to avoid spillage and should seal tightly while being lifted.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit		Y		✓

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
					conditions.				
6.1	-	Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		✓
6.1	-	Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		✓
6.1	-	Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		✓
6.1	-	Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		✓
6.1	-	Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action;	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		N/A
6.1	-	All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit		Y		N/A

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						D	C	O	
					conditions.				
6.1	-	The works shall not cause foam, oil, grease, litter or other objectionable matter to be present in the water within and adjacent to the works site.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		✓
6.1	5.2	Silt curtain shall have proved effectiveness from the producer and shall be fully maintained throughout the works by the contractor.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	The daily maximum production rates shall not exceed those assumed in the water quality assessment.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	The dredging and filling works shall be scheduled to spread the works evenly over a working day.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
Land Works									
6.1	-	Wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Sewage effluent and discharges from on- site kitchen facilities shall be directed to Government sewer in accordance with the requirements of the WPCO or collected for disposal offsite. The use of soakaways shall be avoided.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	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.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	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.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
6.1	-	Temporary access roads should be surfaced with crushed stone or gravel.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	5.8	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.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	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.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Wheel wash overflow shall be directed to silt removal facilities before being discharged to the storm drain.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Section of construction road between the wheel washing bay and the public road should be surfaced with crushed stone or coarse gravel.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓

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						D	C	O	
6.1	-	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 WPCO or collected for off site disposal.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A
6.1	-	The Contractor shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance.	All areas/ throughout construction period	Contractor	TM-EIAO Waste Disposal Ordinance		Y		✓
6.1	-	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.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Roadside gullies to trap silt and grit shall be provided prior to discharging the stormwater into the marine environment. The sumps will be maintained and cleaned at regular intervals.	Roadside/design and operation	Design Consultant/ Contractor	TM-EIAO	Y		Y	✓
6.1	Section 5	All construction works shall be subject to routine audit to ensure implementation of all EIA recommendations and good working practice.	All areas/ throughout construction period	Contractor	EM&A Manual		Y		✓
Water Quality Monitoring									
6.1	Section 5	Water quality monitoring shall be undertaken for suspended solids, turbidity, and dissolved oxygen. Nutrients and metal parameters shall also be measured for Mf sediment operations (only HKBCF and HKLR required handling of Mf sediment) during baseline, backfilling and post construction period.	Designated monitoring stations as defined in EM&A Manual, Section 5/ Before, through-out marine construction period, post construction and monthly operational phase water quality	Contractor	EM&A Manual		Y	Y	✓

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
		One year operation phase water quality monitoring at designated stations.	monitoring for a year.						
ECOLOGY									
8.14	6.3	Specification for and implement pre, during and post construction dolphin abundance monitoring.	All Areas/Detailed Design/ during construction works/post construction	Design Consultant/ Contractor	TMEIA	Y	Y	Y	✓
8.14	6.3,6.5	Specification and implementation of 250m dolphin exclusion zone.	All dredging and reclamation areas/Detailed Design/during all reclamation and dredging works	Design Consultant/ Contractor	TMEIA	Y	Y		✓
8.15	6.3, 6.5	Specification and deployment of an artificial reef of an area of 3,600m2 in an area where fishing activities are prohibited.	Area of prohibited fishing activities/Detailed Design/towards end of construction period	TM-CLKL/ HKBCF Design Consultant/TM-CLKL/ HKBCF Contractor	TMEIA	Y		Y	N/A. To be implemented by AFCD.
8.14	6.3, 6.5	Specification and implementation of marine vessel control specifications	All areas/Detailed Design/during construction works	Design Consultant/ Contractor	TMEIA	Y	Y		✓
8.14	6.3, 6.5	Design and implementation of acoustic decoupling methods for dredging and reclamation works	All areas/ Detailed Design/during dredging and reclamation works	Design Consultant/ Contractor	TMEIA	Y	Y		✓
8.15	6.3, 6.4	Pre-construction phase survey and coral translocation	Detailed Design/Prior to construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
8.15	6.5	Audit coral translocation success	Post translocation	Contractor	TMEIA		Y		✓
7.13	6.5	The loss of habitat shall be supplemented by enhancement planting in accordance with the landscape mitigation schedule.	All areas / As soon as accessible	Contractor	TMEIA		Y		N/A.
7.13	6.5	Spoil heaps shall be covered at all times.	All areas / Throughout construction period	Contractor	TMEIA		Y		✓
7.13	6.5	Avoid damage and disturbance to the remaining and surrounding natural habitat	All areas / Throughout construction period	Contractor	TMEIA		Y		✓

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
7.13	6.5	Placement of equipment in designated areas within the existing disturbed land	All areas / Throughout construction period	Contractor	TMEIA		Y		✓
7.13	6.5	Disturbed areas to be reinstated immediately after completion of the works.	All areas / Throughout construction period	Contractor	TMEIA		Y		✓
7.13	6.5	Construction activities should be restricted to the proposed works boundary.	All areas / Throughout construction period	Contractor	TMEIA		Y		✓
LANDSCAPE AND VISUAL									
10.9	7.6	The colour and shape of the toll control buildings, ventilation building and administration building shall adopt a design which could blend it into the vicinity elements, and the details will be developed in detailed design stage (DM2)	All areas/detailed design	Design Consultant	TMEIA	Y			N/A
10.9	7.6	Aesthetic design of the viaduct, retaining wall and other structures will be developed under ACABAS submission (DM5)	All areas/detailed design	Design Consultant	TMEIA	Y			N/A
10.9	7.6	Screening of construction works by hoardings around works area in visually unobtrusive colours, to screen works (CM5)	All areas/detailed design/ during construction/post construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
10.9	7.6	Control night-time lighting and glare by hooding all lights (CM6)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		N/A
10.9	7.6	Ensure no run-off into water body adjacent to the Project Area (CM7)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
10.9	7.6	Avoidance of excessive height and bulk of buildings and structures (CM8)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
10.9	7.6	Aesthetically pleasing design (visually unobtrusive and non-reflective) as regard to the form, material and finishes shall be incorporated to all buildings, engineering structures and associated infrastructure facilities (OM5)	All areas/detailed design/ during construction / during operation	Design Consultant/ Contractor	TMEIA	Y	Y	Y	N/A
10.9	7.6	Avoidance of excessive height and bulk of buildings and structures (OM6)	All areas/detailed design/ during construction / during operation	Design Consultant/ Contractor	TMEIA	Y	Y	Y	N/A
WASTE									

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Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
12.6		The Contractor shall identify a coordinator for the management of waste.	Contract mobilisation	Contractor	TMEIA		Y		✓
12.6		The Contractor shall prepare and implement a Waste Management Plan which specifies procedures such as a ticketing system, to facilitate tracking of loads and to ensure that illegal disposal of wastes does not occur, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. A recording system for the amount of waste generated, recycled and disposed (locations) should be established.	Contract mobilisation	Contractor	TMEIA, Works Branch Technical Circular No. 5/99 for the Trip-ticket System for Disposal of Construction and Demolition Material		Y		✓
12.6		The Contractor shall apply for and obtain the appropriate licenses for the disposal of public fill, chemical waste and effluent discharges.	Contract mobilisation	Contractor	TMEIA, Land (Miscellaneous Provisions) Ordinance (Cap 28); Waste Disposal Ordinance (Cap 354); Dumping at Sea Ordinance (Cap 466); Water Pollution Control Ordinance.		Y		✓
12.6	8.1	Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedures including waste reduction, reuse and recycling.	Contract Mobilisation	Contractor	TMEIA		Y		✓
12.6	8.1	The extent of cutting operation should be optimised where possible. Earth retaining structures and bored pile walls should be proposed to minimise the extent of cutting.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	The surplus surcharge should be transferred to a fill bank	Reclamation areas / after surcharge works	Contractor	TMEIA		Y		N/A
12.6	8.1	Rock armour from the existing seawall should be reused on the new sloping seawall as far as possible	All areas / throughout construction period	Contractor	TMEIA		Y		✓

Legend: D=Design, C=Construction, O=Operation

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
12.6	8.1	The site and surroundings shall be kept tidy and litter free.	All areas / throughout construction period	Contractor	TMEIA		Y		<>
12.6	8.1	No waste shall be burnt on site.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Provisions to be made in contract documents to allow and promote the use of recycled aggregates where appropriate.	Detailed Design	Design Consultant	TMEIA	Y			✓
12.6	8.1	The Contractor shall be prohibited from disposing of C&D materials at any sensitive locations. The Contractor should propose the final disposal sites in the EMP and WMP for approval before implementation.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Stockpiled material shall be covered by tarpaulin and /or watered as appropriate to prevent windblown dust/ surface run off.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Excavated material in trucks shall be covered by tarpaulins to reduce the potential for spillage and dust generation.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Wheel washing facilities shall be used by all trucks leaving the site to prevent transfer of mud onto public roads.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Dredged marine mud shall be disposed of in a gazetted marine disposal ground under the requirements of the Dumping at Seas Ordinance.	Reclamation areas / throughout dredging works	Contractor	TMEIA		Y		✓
12.6	8.1	Standard formwork or pre-fabrication should be used as far as practicable so as to minimise the C&D materials arising. The use of more durable formwork/plastic facing for construction works should be considered. The use of wooden hoardings should be avoided and metal hoarding should be used to facilitate recycling. Purchasing of construction materials should avoid over-ordering and wastage.	All areas / throughout construction period	Contractor	TMEIA		Y		✓

Legend: D=Design, C=Construction, O=Operation

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
12.6	8.1	The Contractor should recycle as many C&D materials (this is a waste section) as possible on-site. The public fill and C&D waste should be segregated and stored in separate containers or skips to facilitate the reuse or recycling of materials and proper disposal. Where practicable, the concrete and masonry should be crushed and used as fill materials. Steel reinforcement bar should be collected for use by scrap steel mills. Different areas of the sites should be considered for segregation and storage activities.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	All falsework will be steel instead of wood.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Chemical waste producers should register with the EPD. Chemical waste should be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes as follows: ƒ suitable for the substance to be held, resistant to corrosion, maintained in good conditions and securely closed; ƒ Having a capacity of <450L unless the specifications have been approved by the EPD; and ƒ Displaying a label in English and Chinese according to the instructions prescribed in Schedule 2 of the Regulations. ƒ Clearly labelled and used solely for the storage of chemical wastes; ƒ Enclosed with at least 3 sides; ƒ Impermeable floor and bund with capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in the area, whichever is greatest; ƒ Adequate ventilation;	All areas / throughout construction period	Contractor	TMEIA		Y		<>

Legend: D=Design, C=Construction, O=Operation

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
		f Sufficiently covered to prevent rainfall entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and *f* Incompatible materials are adequately separated.							
12.6	8.1	Waste oils, chemicals or solvents shall not be disposed of to drain,	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Adequate numbers of portable toilets should be provided for on-site workers. Portable toilets should be maintained in reasonable states, which will not deter the workers from utilising them.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Night soil should be regularly collected by licensed collectors.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	General refuse arising on-site should be stored in enclosed bins or compaction units separately from C&D and chemical wastes. Sufficient dustbins shall be provided for storage of waste as required under the Public Cleansing and Prevention of Nuisances By-laws. In addition, general refuse shall be cleared daily and shall be disposed of to the nearest licensed landfill or refuse transfer station. Burning of refuse on construction sites is prohibited.	All areas / throughout construction period	Contractor	TMEIA		Y		<>
12.6	8.1	All waste containers shall be in a secure area on hardstanding;	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling.	All areas / throughout construction period	Contractor	TMEIA		Y		✓

Legend: D=Design, C=Construction, O=Operation

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
12.6	8.1	Office wastes can be reduced by recycling of paper if such volume is sufficiently large to warrant collection. Participation in a local collection scheme by the Contractor should be advocated. Waste separation facilities for paper, aluminium cans, plastic bottles, etc should be provided on-site.	Site Offices/ throughout construction period	Contractor	TMEIA		Y		✓
12.6	Section 8	EM&A of waste handling, storage, transportation, disposal procedures and documentation through the site audit programme shall be undertaken.	All areas / throughout construction period	Contractor	EM&A Manual		Y		✓
CULTURAL HERITAGE									
11.8	Section 9	EM&A in the form of audit of the mitigation measures	All areas / throughout construction period	Highways Department	EIAO-TM		Y		N/A

*** Remarks:**

✓	Compliance of Mitigation Measures
<>	Compliance of Mitigation but need improvement
x	Non-compliance of Mitigation Measures
▲	Non-compliance of Mitigation Measures but rectified by Contractor
Δ	Deficiency of Mitigation Measures but rectified by Contractor
N/A	Not Applicable in Reporting Period

Legend: D=Design, C=Construction, O=Operation

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

Appendix D

Summary of Action and Limit Levels

Table D1 Action and Limit Levels for 1-hour and 24-hour TSP

Parameters	Action	Limit
24 Hour TSP Level in μg/m³	ASR1 = 213 ASR5 = 238 AQMS1 = 213 ASR6 = 238 ASR10 = 214	260
1 Hour TSP Level in μg /m³	ASR1 = 331 ASR5 = 340 AQMS1 = 335 ASR6 = 338 ASR10 = 337	500

Table D2 Action and Limit Levels for Water Quality

Parameter	Action Level#	Limit Level#
DO in mg/L (a)	Surface and Middle **5.0 mg/L** Bottom **4.7 mg/L**	Surface and Middle **4.2 mg/L** Bottom **3.6 mg/L**
Turbidity in NTU (Depth-averaged (b), (c))	120% of upstream control station at the same tide of the same day and 95%-ile of baseline data, i.e., **27.5 NTU**	130% of upstream control station at the same tide of the same day and 99%-ile of baseline data, i.e., **47.0 NTU**
SS in mg/L (Depth-averaged (b), (c))	120% of upstream control station at the same tide of the same day and 95%-ile of baseline data, i.e., **23.5 mg/L**	130% of upstream control station at the same tide of the same day and 10mg/L for WSD Seawater Intakes at Tuen Mun and 99%-ile of baseline data, i.e., **34.4 mg/L**

Notes:

Baseline data: data from HKZMB Baseline Water Quality Monitoring between 6 and 31 October 2011.

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

(b) "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths

(c) For turbidity and SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

(d) All figures given in the table are used for reference only, and EPD may amend the figures whenever it is considered as necessary

(e) The 1%-ile of baseline data for surface and middle DO is 4.2 mg/L, whilst for bottom DO is 3.6 mg/L.

(f) The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Table D3 Action and Limit Levels for Impact Dolphin Monitoring

	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	

Notes:

1. STG means quarterly encounter rate of number of dolphin sightings, which is **6.00 in NEL** and **9.85 in NWL** during the baseline monitoring period
2. ANI means quarterly encounter rate of total number of dolphins, which is **22.19 in NEL** and **44.66 in NWL** during the baseline monitoring period
3. For North Lantau Social Cluster, AL will be trigger if NEL or NWL fall below the criteria; LL will be triggered if both NEL and NWL fall below the criteria.

Table D4 Derived Value of Action Level (AL) and Limit Level (LL)

	North Lantau Social Cluster	
	NEL	**NWL**
Action Level	STG < 4.2 & ANI< 15.5	STG < 6.9 & ANI < 31.3
Limit Level	NEL = [STG < 2.4 & ANI <8.9] and NWL = [STG < 3.9 & ANI <17.9]	

Appendix E

EM&A Monitoring Schedules

HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Air Quality Impact Monitoring Schedule - March 2019

Air quality monitoring stations: ASR1, ASR5, ASR6, ASR10, AQMS1

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1-Mar	2-Mar
3-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar
1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM
10-Mar	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar	16-Mar
		1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM	
17-Mar	18-Mar	19-Mar	20-Mar	21-Mar	22-Mar	23-Mar
	1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM		
24-Mar	25-Mar	26-Mar	27-Mar	28-Mar	29-Mar	30-Mar
1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM
31-Mar						

HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Air Quality Impact Monitoring Schedule - April 2019

Air quality monitoring stations: ASR1, ASR5, ASR6, ASR10, AQMS1

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1-Apr	2-Apr	3-Apr	4-Apr	Public Holiday 5-Apr	6-Apr
		1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM	
7-Apr	8-Apr	9-Apr	10-Apr	11-Apr	12-Apr	13-Apr
	1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM		
14-Apr	15-Apr	16-Apr	17-Apr	18-Apr	Public Holiday 19-Apr	Public Holiday 20-Apr
1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM
21-Apr	Public Holiday 22-Apr	23-Apr	24-Apr	25-Apr	26-Apr	27-Apr
		1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM	
28-Apr	29-Apr	30-Apr				
	1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM					

HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Air Quality Impact Monitoring Schedule - May 2019

Air quality monitoring stations: ASR1, ASR5, ASR6, ASR10, AQMS1

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			Public Holiday 1-May	2-May	3-May	4-May
				1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM		
5-May	6-May	7-May	8-May	9-May	10-May	11-May
1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM
12-May	Public Holiday 13-May	14-May	15-May	16-May	17-May	18-May
		1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM	
19-May	20-May	21-May	22-May	23-May	24-May	25-May
	1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM		
26-May	27-May	28-May	29-May	30-May	31-May	
1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			

HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Impact Dolphin Monitoring Survey Monitoring Schedule - March 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1-Mar	2-Mar
3-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar
	Impact Dolphin Monitoring					
10-Mar	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar	16-Mar
	Impact Dolphin Monitoring		**Impact Dolphin Monitoring**			
17-Mar	18-Mar	19-Mar	20-Mar	21-Mar	22-Mar	23-Mar
	Impact Dolphin Monitoring					
24-Mar	25-Mar	26-Mar	27-Mar	28-Mar	29-Mar	30-Mar
31-Mar						

HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Impact Dolphin Monitoring Survey Monitoring Schedule - April 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1-Apr	2-Apr	3-Apr	4-Apr	Public Holiday 5-Apr	6-Apr
7-Apr	8-Apr	9-Apr	10-Apr	11-Apr	12-Apr	13-Apr
			Impact Dolphin Monitoring			
14-Apr	15-Apr	16-Apr	17-Apr	18-Apr	Public Holiday 19-Apr	Public Holiday 20-Apr
	Impact Dolphin Monitoring					
21-Apr	Public Holiday 22-Apr	23-Apr	24-Apr	25-Apr	26-Apr	27-Apr
		Impact Dolphin Monitoring		**Impact Dolphin Monitoring**		
28-Apr	29-Apr	30-Apr				

HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Impact Dolphin Monitoring Survey Monitoring Schedule - May 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			Public Holiday 01-May	02-May	03-May	04-May
				Impact Dolphin Monitoring		
05-May	06-May	07-May	08-May	09-May	10-May	11-May
		Impact Dolphin Monitoring				
12-May	Public Holiday 13-May	14-May	15-May	16-May	17-May	18-May
19-May	20-May	21-May	22-May	23-May	24-May	25-May
		Impact Dolphin Monitoring		**Impact Dolphin Monitoring**		
26-May	27-May	28-May	29-May	30-May	31-May	

Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section
Impact Marine Water Quality Monitoring (WQM) Schedule (April 2019)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
7-Apr	8-Apr	9-Apr	10-Apr	11-Apr	12-Apr	13-Apr
14-Apr	15-Apr	16-Apr	17-Apr	18-Apr	19-Apr	20-Apr
	ebb tide 8:34 - 12:04 flood tide 13:37 - 17:07		ebb tide 10:02 - 13:32 flood tide 15:45 - 19:15		ebb tide 11:15 - 14:45 flood tide 17:33 - 21:03	
21-Apr	22-Apr	23-Apr	24-Apr	25-Apr	26-Apr	27-Apr
	ebb tide 13:11 - 16:41 flood tide 6:36 - 10:06		ebb tide 14:36 - 17:00 flood tide 7:37 - 11:07		ebb tide 16:21 - 19:51 flood tide 5:00 - 7:18	
28-Apr	29-Apr	30-Apr				
	ebb tide 8:48 - 12:18 flood tide 13:27 - 16:57					

Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section
Impact Marine Water Quality Monitoring (WQM) Schedule (May 2019)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1-May	2-May	3-May	4-May
					ebb tide 10:41 - 14:11 flood tide 16:45 - 20:15	
5-May	6-May	7-May	8-May	9-May	10-May	11-May
	ebb tide 12:10 - 15:40 flood tide 5:34 - 9:04		ebb tide 13:27 - 16:57 flood tide 6:34 - 10:04		ebb tide 15:04 - 18:34 flood tide 7:47 - 11:17	
12-May	13-May	14-May	15-May	16-May	17-May	18-May
	ebb tide 7:10 - 10:40 flood tide 12:05 - 15:35		ebb tide 8:58 - 12:28 flood tide 14:41 - 18:11		ebb tide 10:17 - 13:47 flood tide 16:40 - 20:10	
19-May	20-May	21-May	22-May	23-May	24-May	25-May
	ebb tide 12:13 - 15:43 flood tide 5:29 - 8:59		ebb tide 13:32 - 17:02 flood tide 6:33 - 10:03		ebb tide 14:55 - 18:25 flood tide 7:40 - 11:10	
26-May	27-May	28-May	29-May	30-May	31-May	
	ebb tide 6:54 - 10:12 flood tide 11:05 - 14:35		ebb tide 8:34 - 12:04 flood tide 13:49 - 17:19		ebb tide 9:39 - 13:09 flood tide 15:42 - 19:12	

Appendix F

Impact Air Quality Monitoring Results

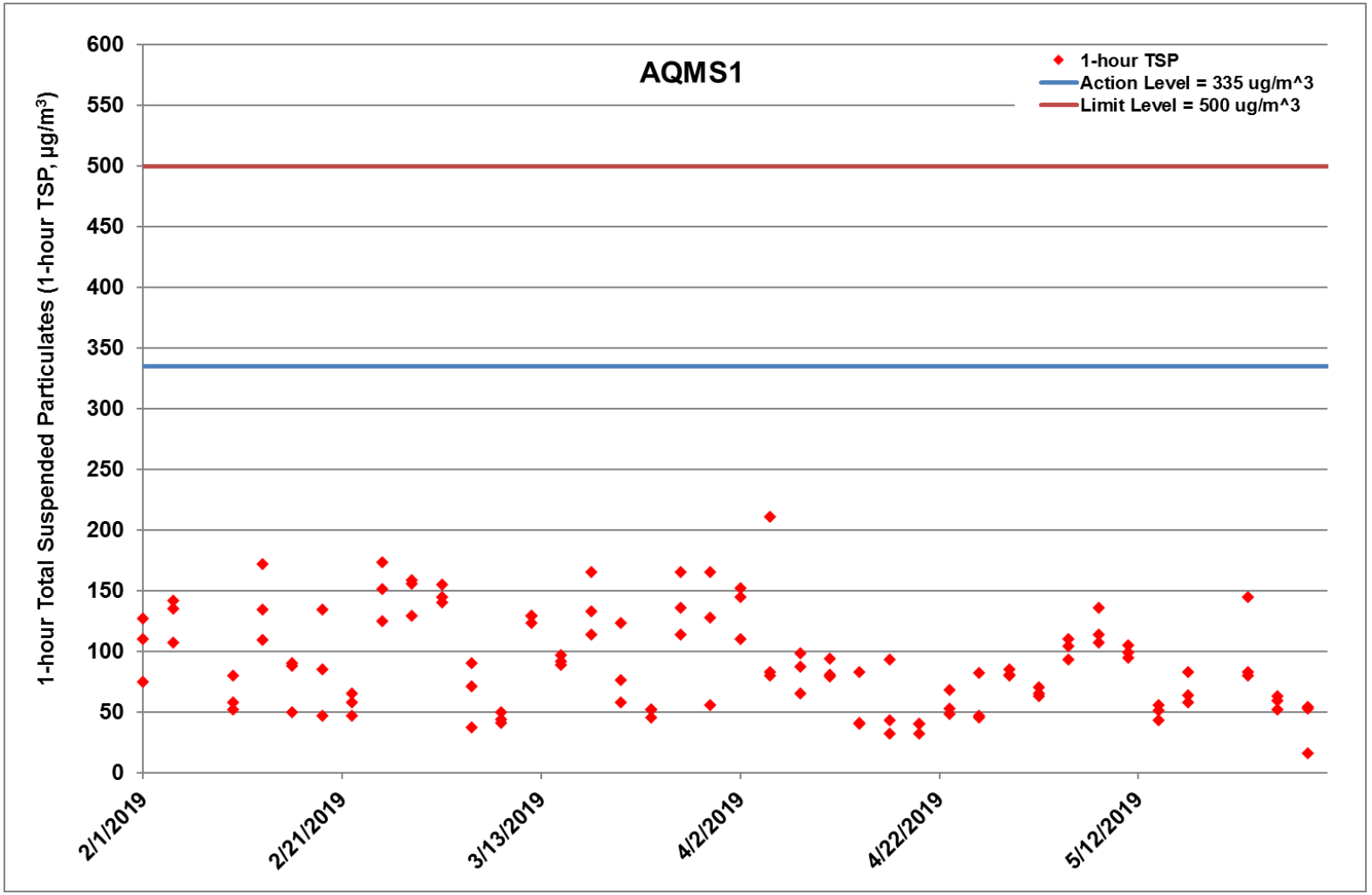

Figure F.1 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at AQMS1 between 1 February 2019 and 31 May 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Demolition of Amenities and Workshop (1/2/2019 – 31/5/2019)

Ref: 0212330_Impact AQM graphs_May 2019_REV a.xlsx

ERM

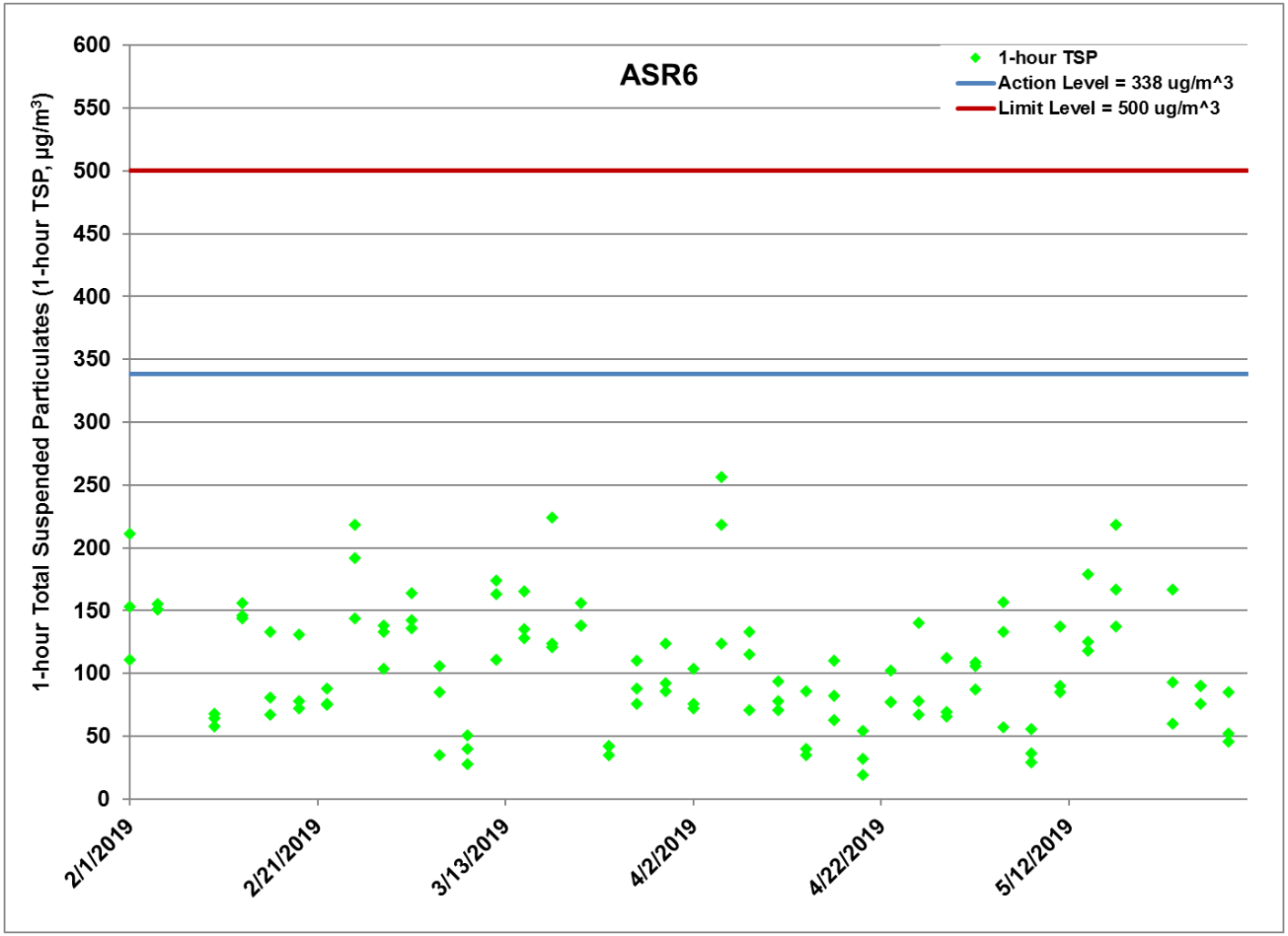

Figure F.2 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR6 between 1 February 2019 and 31 May 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Demolition of Amenities and Workshop (1/2/2019 – 31/5/2019)

Ref: 0212330_Impact AQM graphs_May 2019_REV a.xlsx

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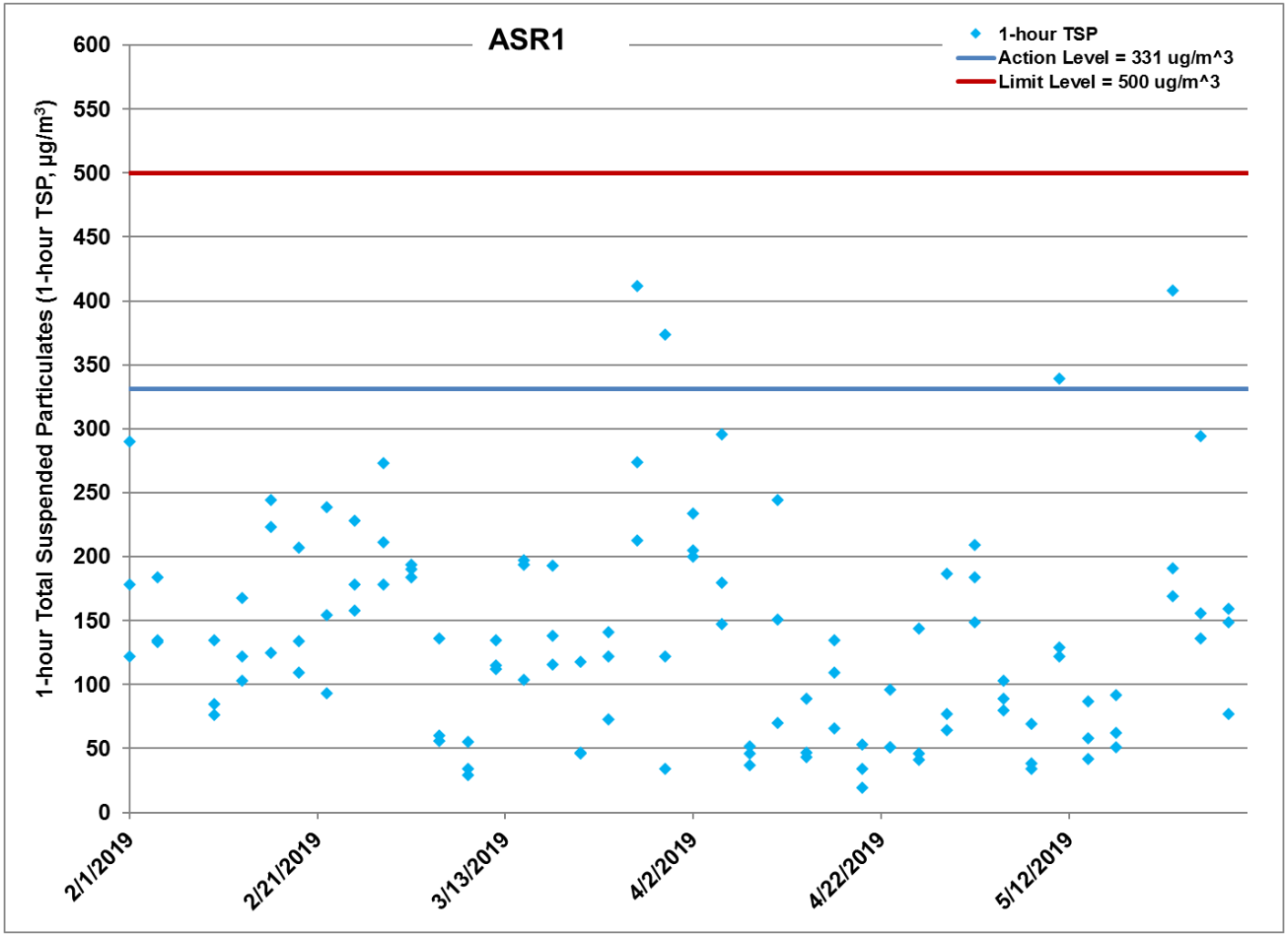

Figure F.3 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR1 between 1 February 2019 and 31 May 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Demolition of Amenities and Workshop (1/2/2019 – 31/5/2019)

Ref: 0212330_Impact AQM graphs_May 2019_REV a.xlsx

ERM

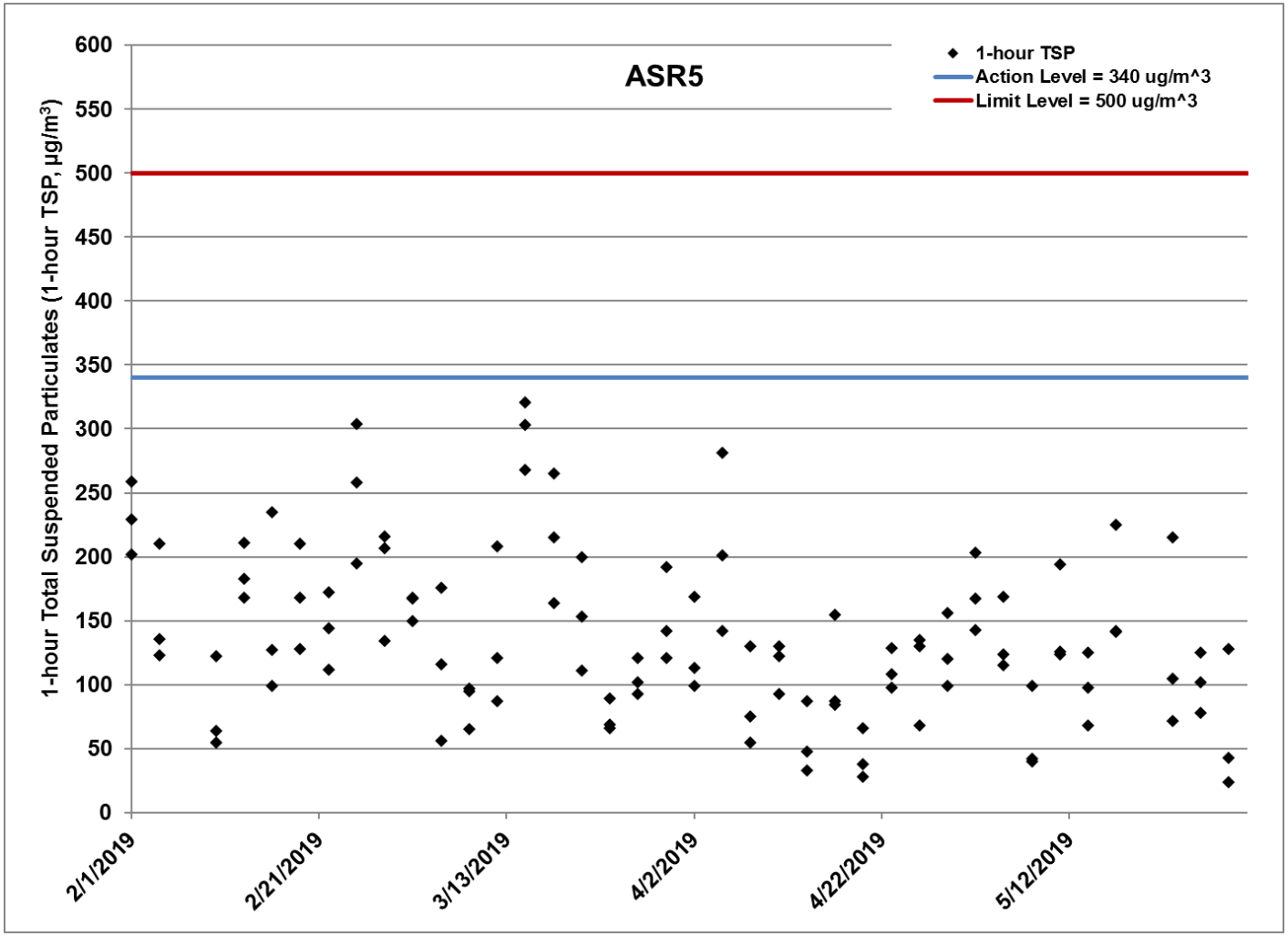

Figure F.4 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR5 between 1 February 2019 and 31 May 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Demolition of Amenities and Workshop (1/2/2019 – 31/5/2019)

Ref: 0212330_Impact AQM graphs_May 2019_REV a.xlsx

ERM

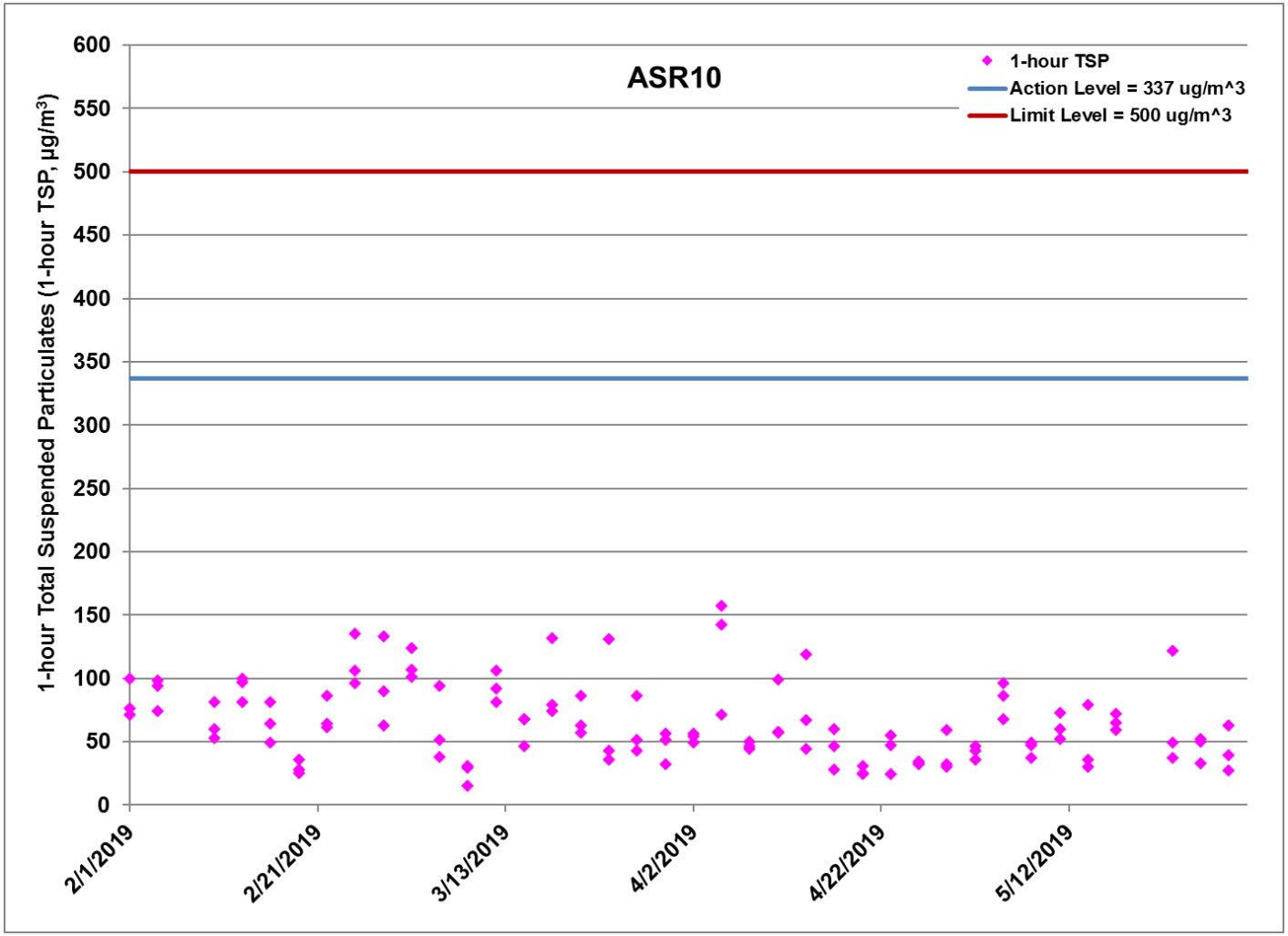

Figure F.5 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR10 between 1 February 2019 and 31 May 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Demolition of Amenities and Workshop (1/2/2019 – 31/5/2019)

Ref: 0212330_Impact AQM graphs_May 2019_REV a.xlsx

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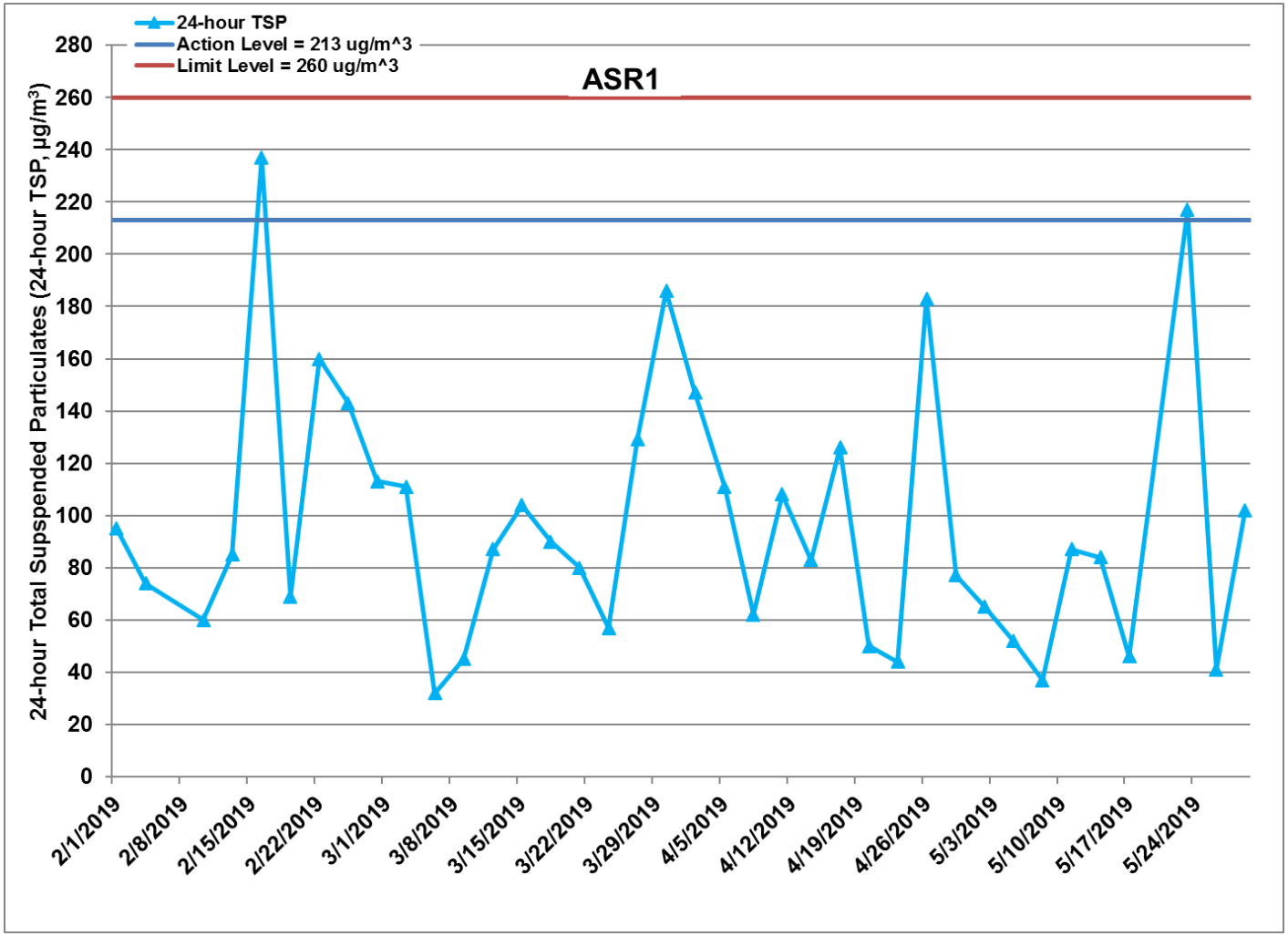

Figure F.6 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR1 between 1 February 2019 and 31 May 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Demolition of Amenities and Workshop (1/2/2019 – 31/5/2019)

Ref: 0212330_Impact AQM graphs_May 2019_REV a.xlsx

ERM

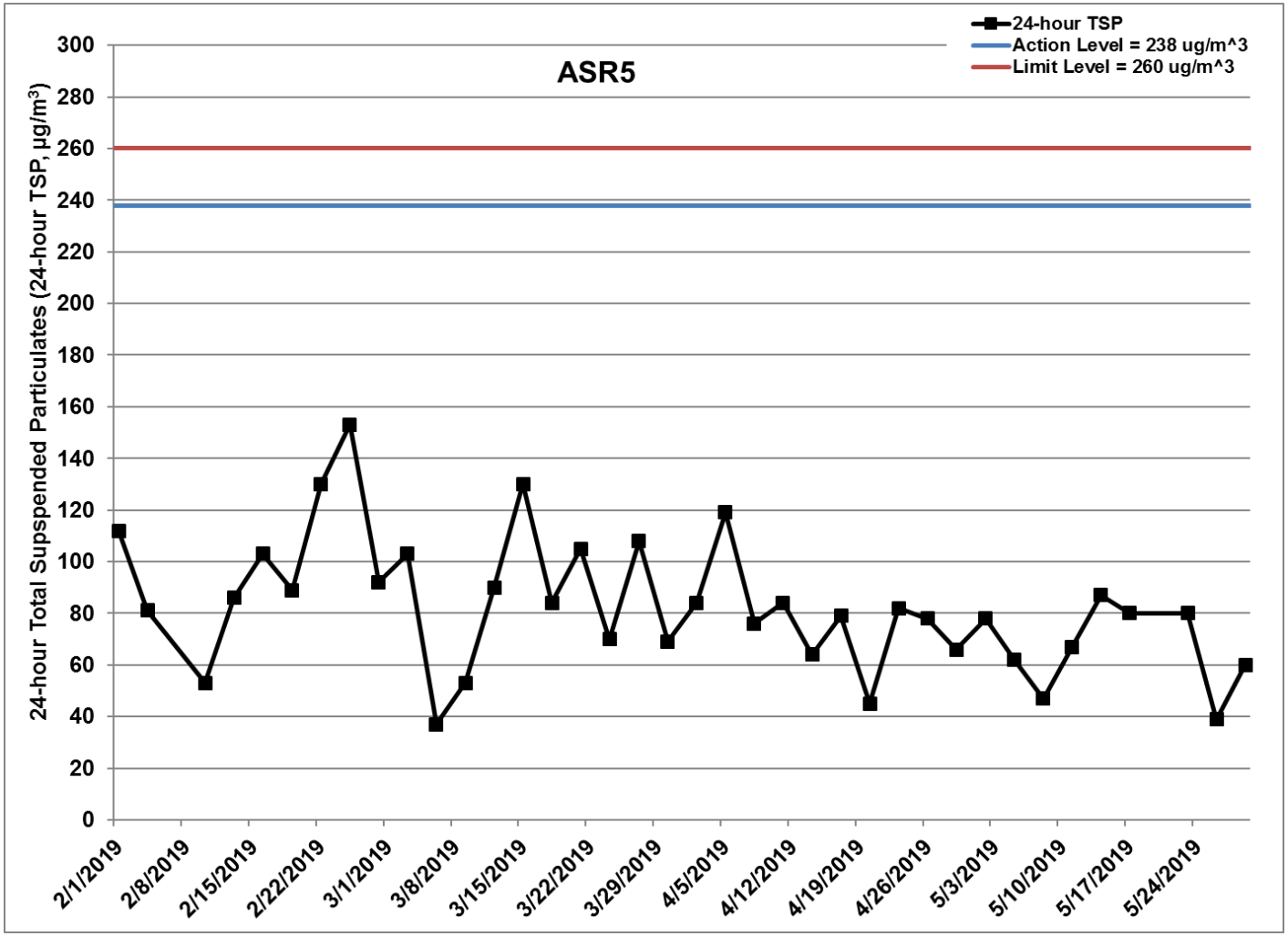

Figure F.7 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR5 between 1 February 2019 and 31 May 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Demolition of Amenities and Workshop (1/2/2019 – 31/5/2019)

Ref: 0212330_Impact AQM graphs_May 2019_REV a.xlsx

ERM

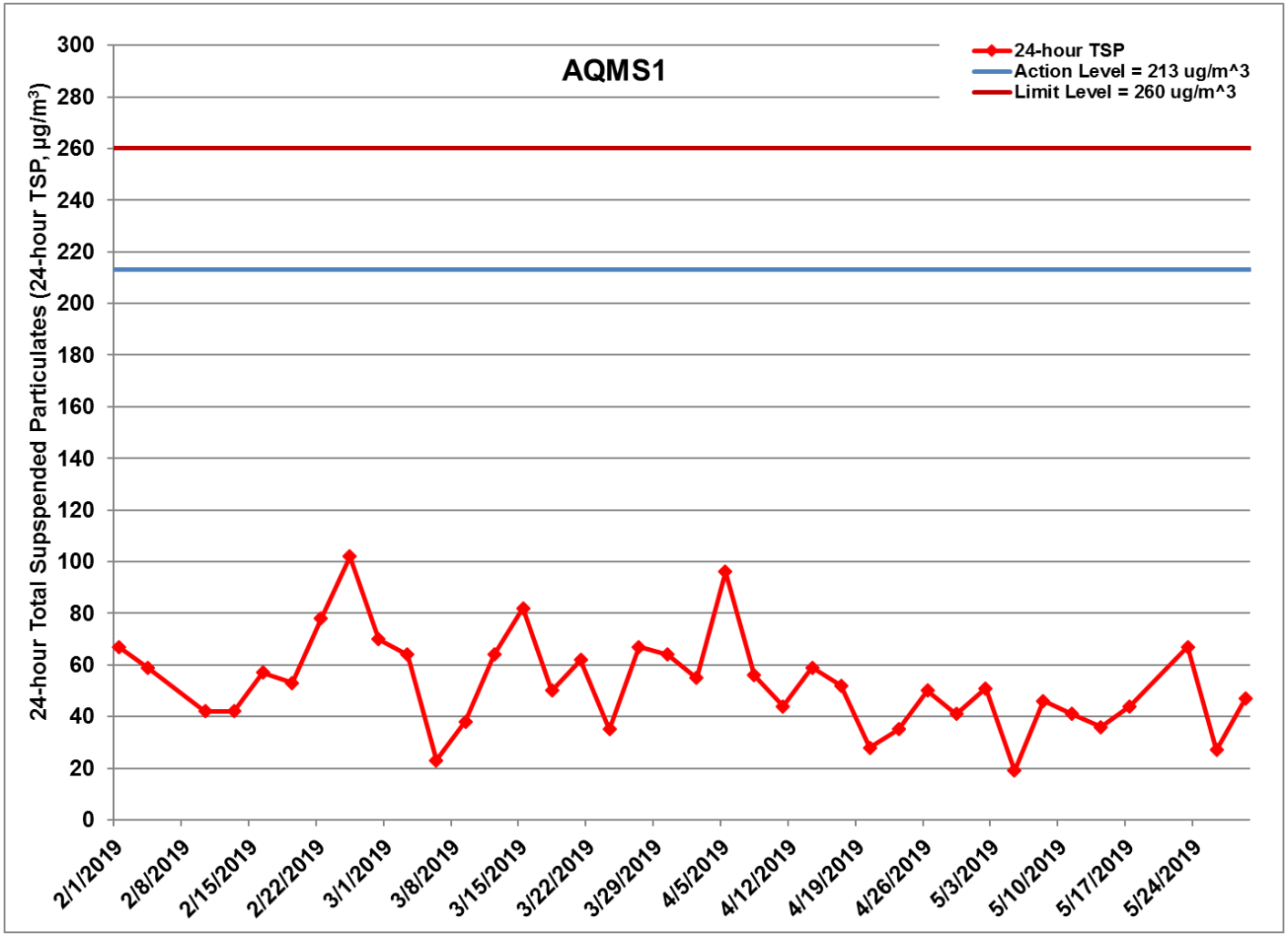

Figure F.8 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at AQMS1 between 1 February 2019 and 31 May 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Demolition of Amenities and Workshop (1/2/2019 – 31/5/2019)

Ref: 0212330_Impact AQM graphs_May 2019_REV a.xlsx

ERM

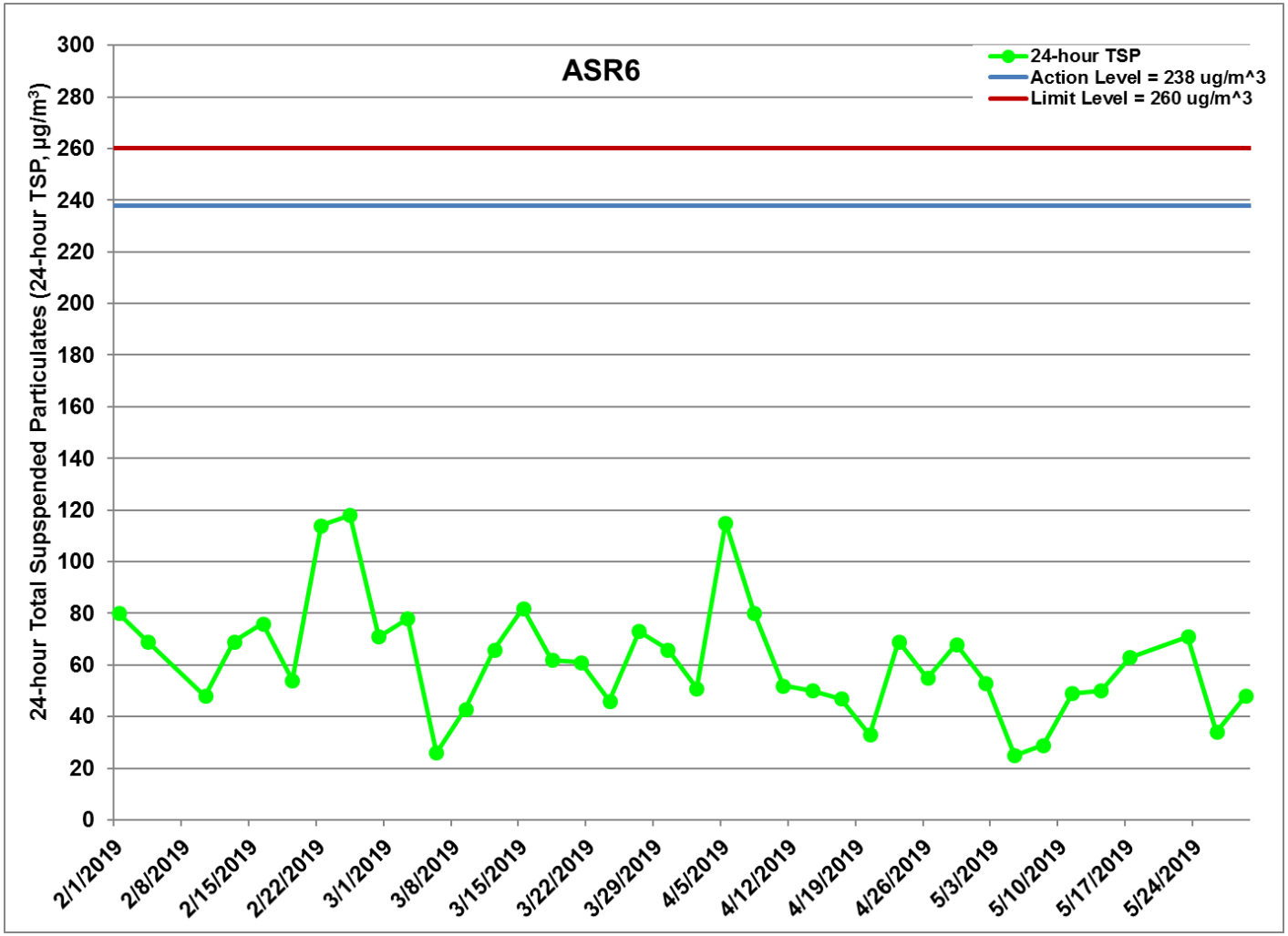

Figure F.9 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR6 between 1 February 2019 and 31 May 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Demolition of Amenities and Workshop (1/2/2019 – 31/5/2019)

Ref: 0212330_Impact AQM graphs_May 2019_REV a.xlsx

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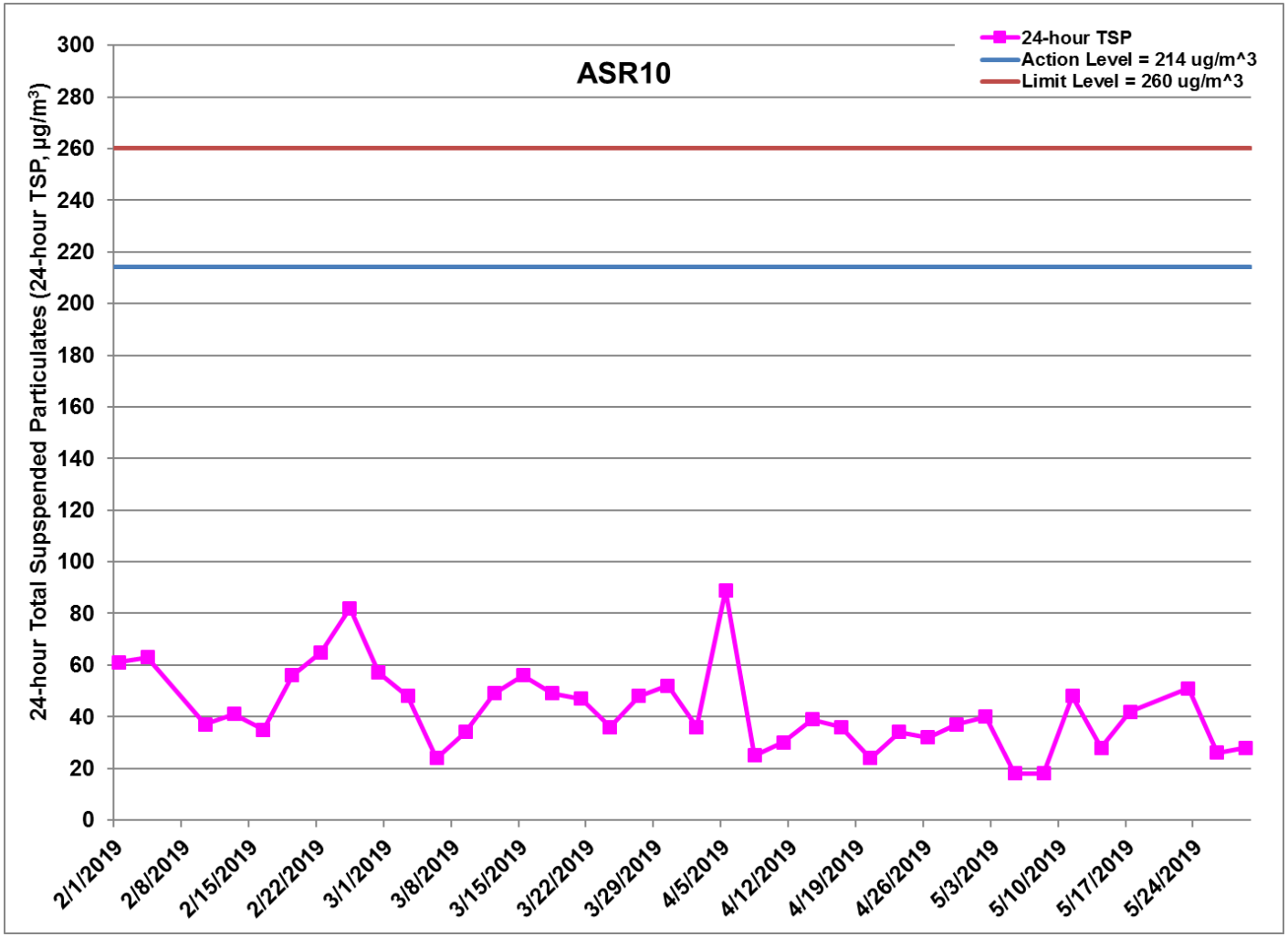


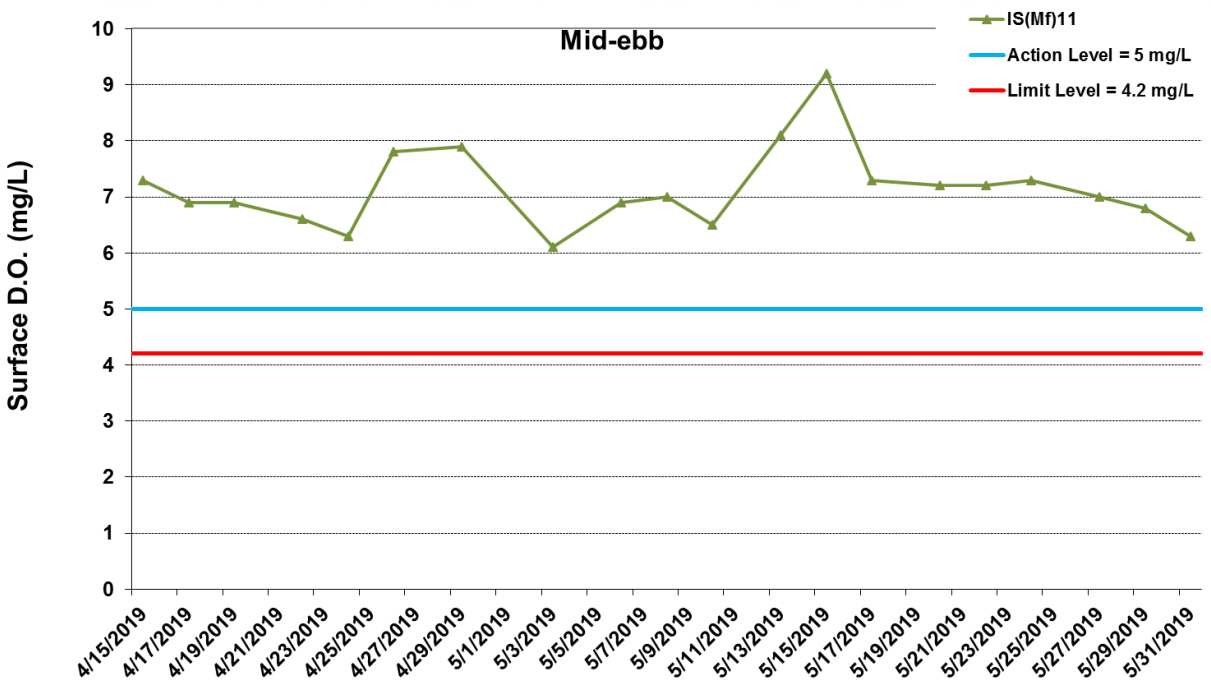
Figure F.10 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR10 between 1 February 2019 and 31 May 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Demolition of Amenities and Workshop (1/2/2019 – 31/5/2019)

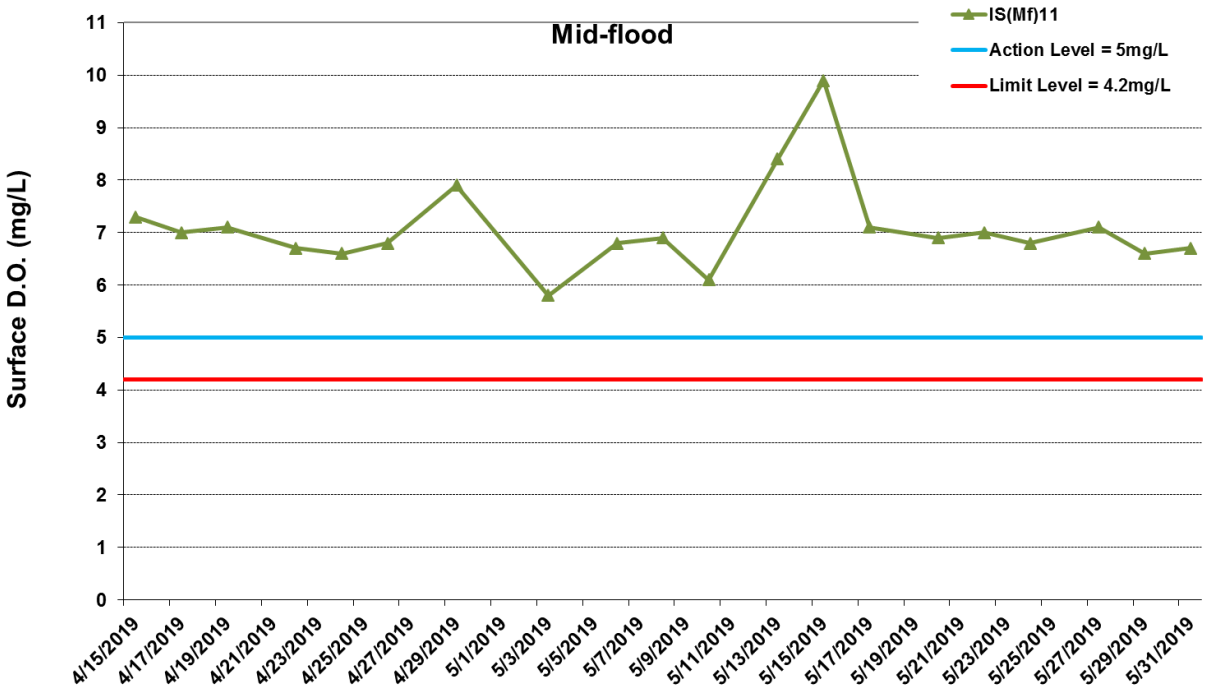
Ref: 0212330_Impact AQM graphs_May 2019_REV a.xlsx

ERM

Appendix G

Impact Water Quality Monitoring Results

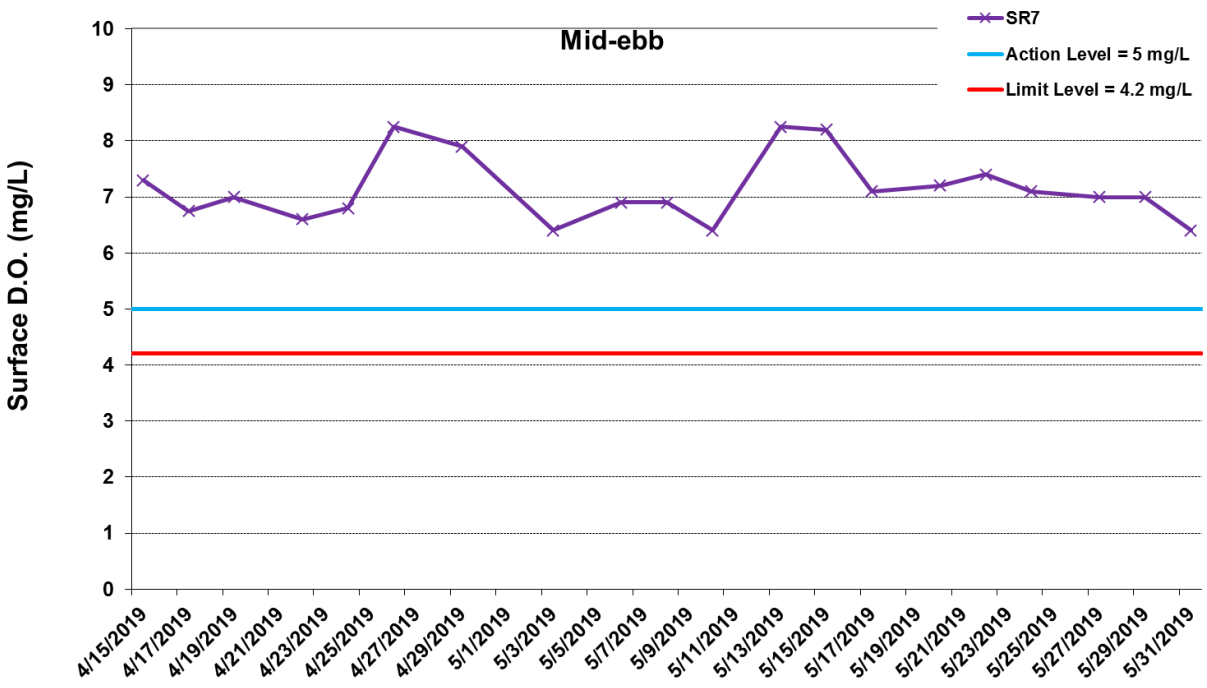


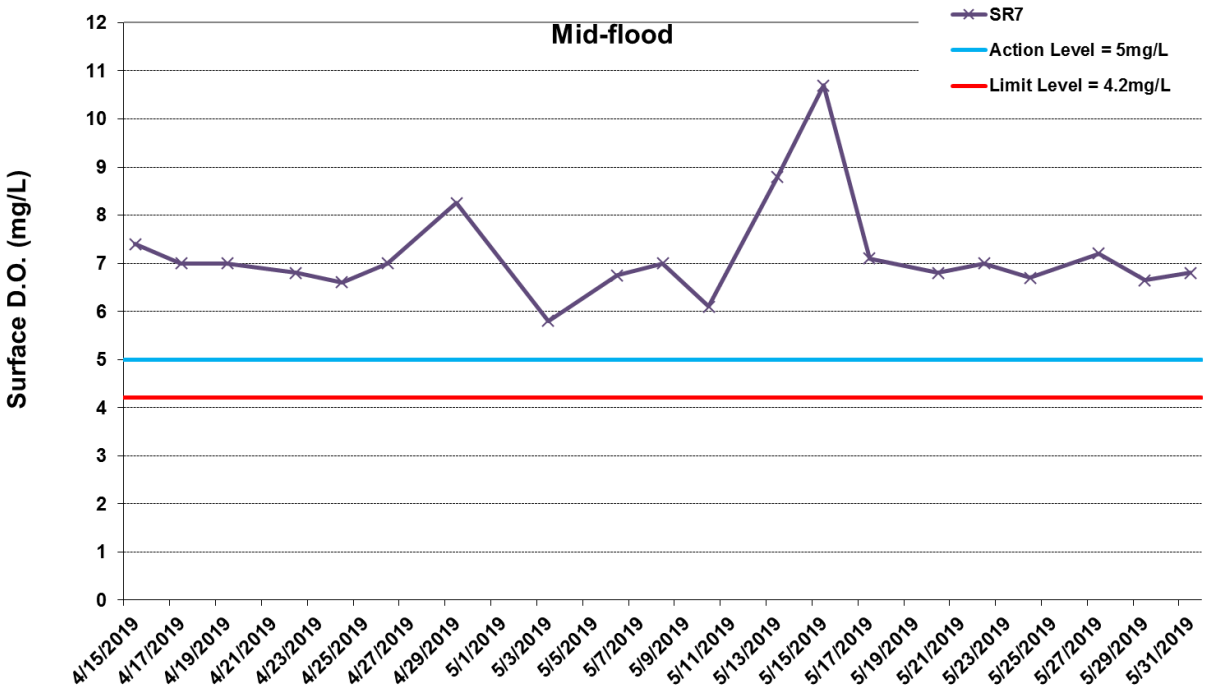


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G1 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 15 April 2019 and 31 May 2019 at IS(Mf)11. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

Ref: 0212330_Impact-WQM_May2019_graphs_Rev a.xls

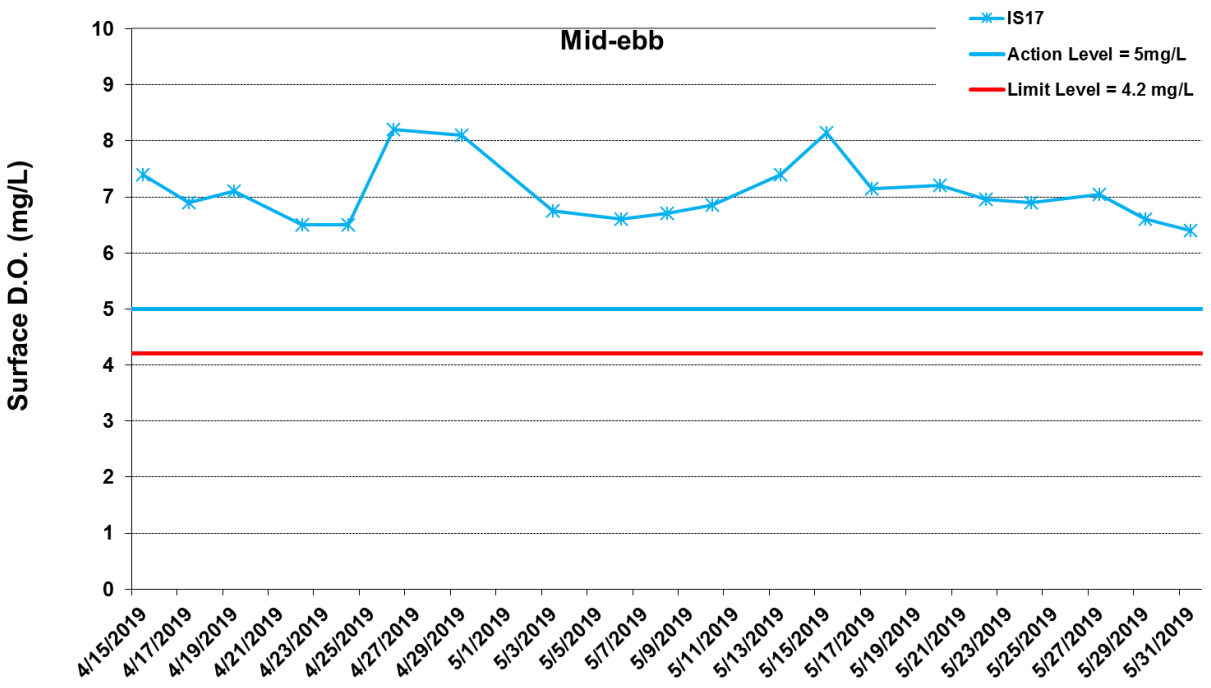


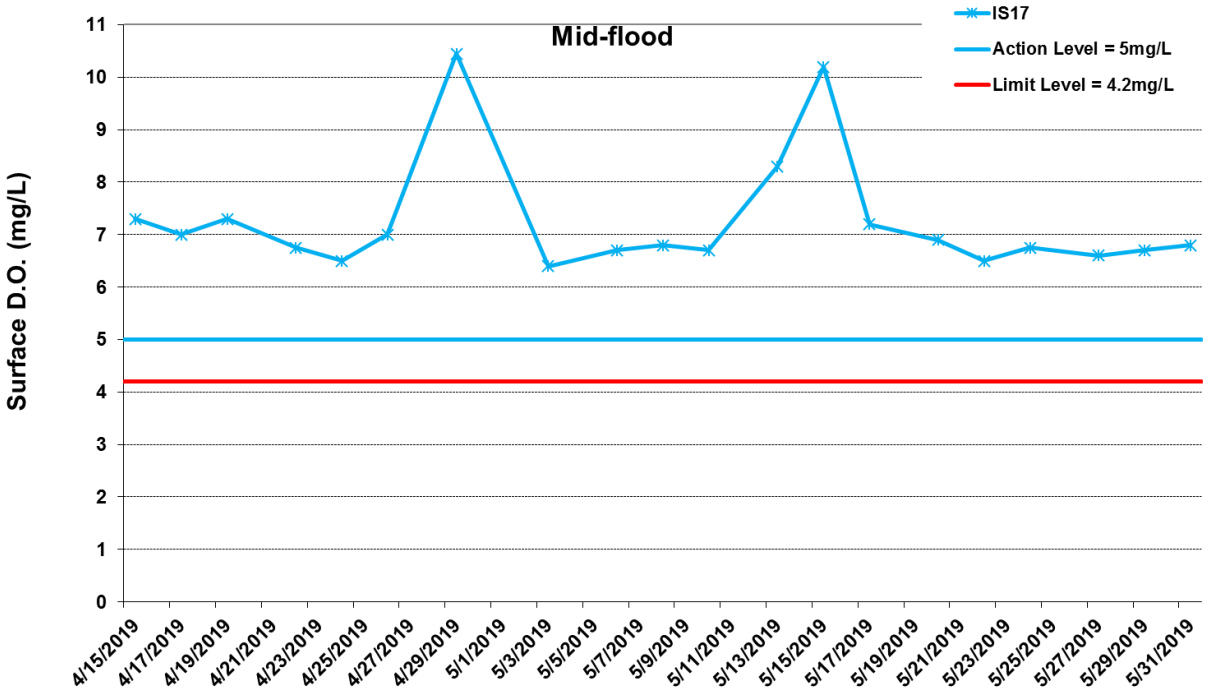


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G2 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 15 April 2019 and 31 May 2019 at SR7. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

Ref: 0212330_Impact-WQM_May2019_graphs_Rev a.xls

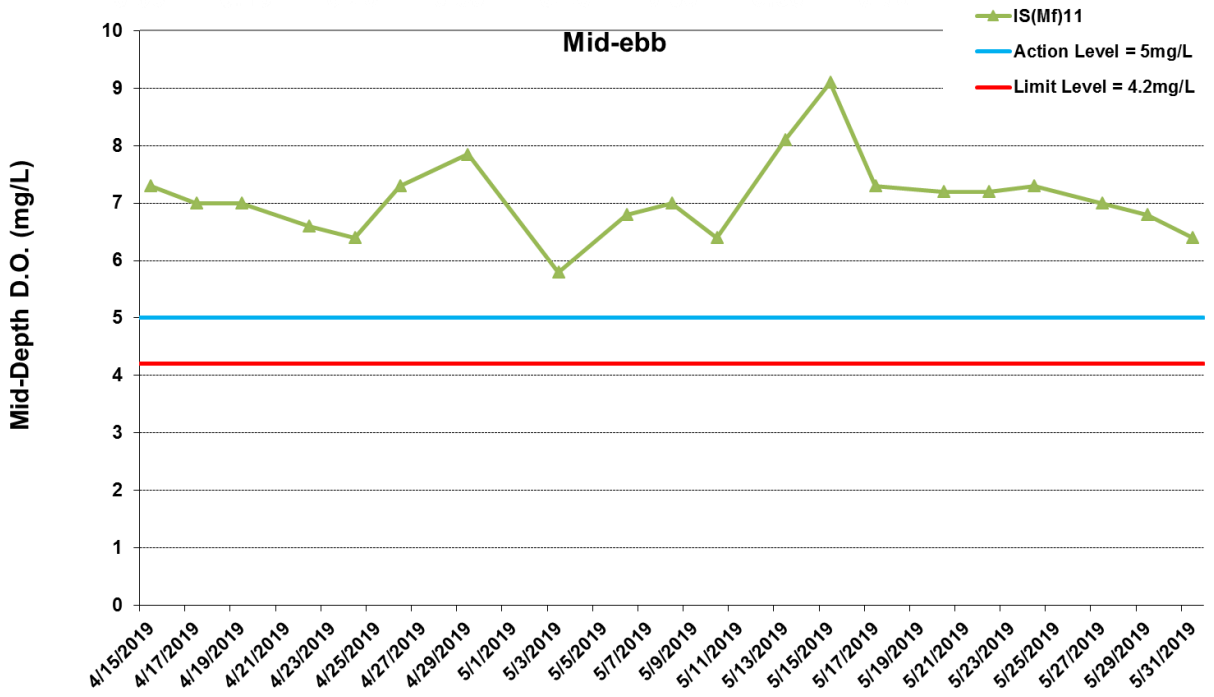


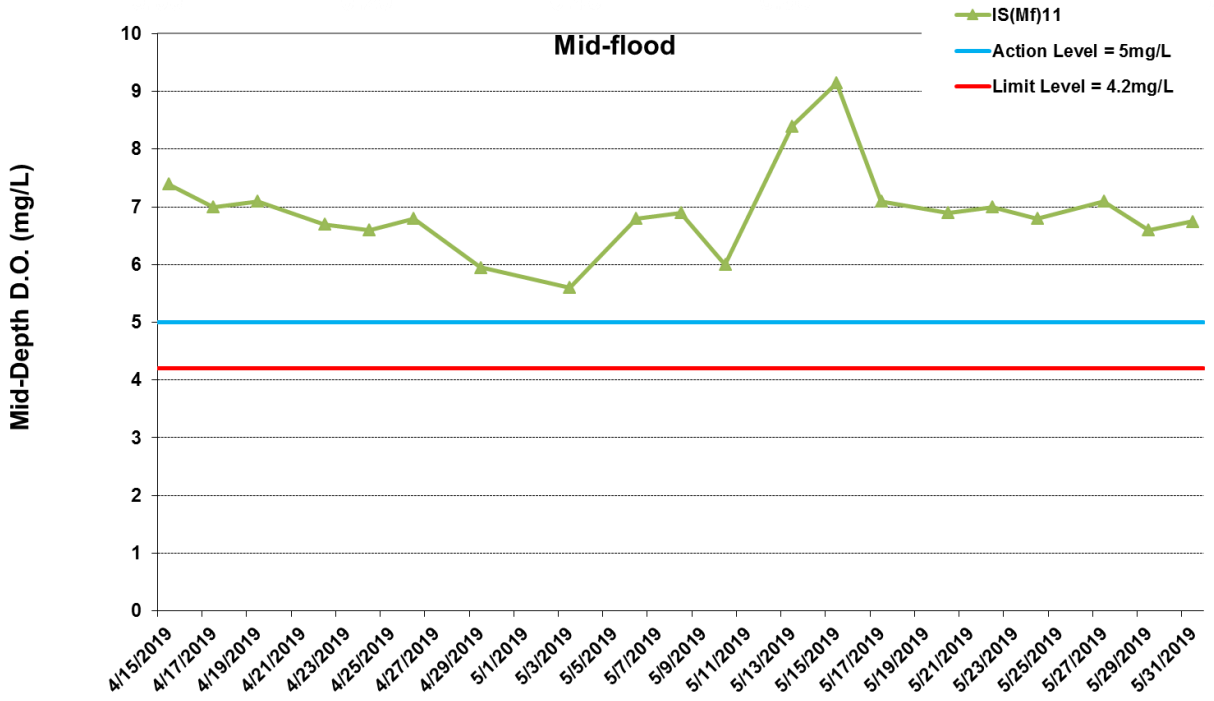


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G3 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 15 April 2019 and 31 May 2019 at IS17. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

Ref: 0212330_Impact-WQM_May2019_graphs_Rev a.xls



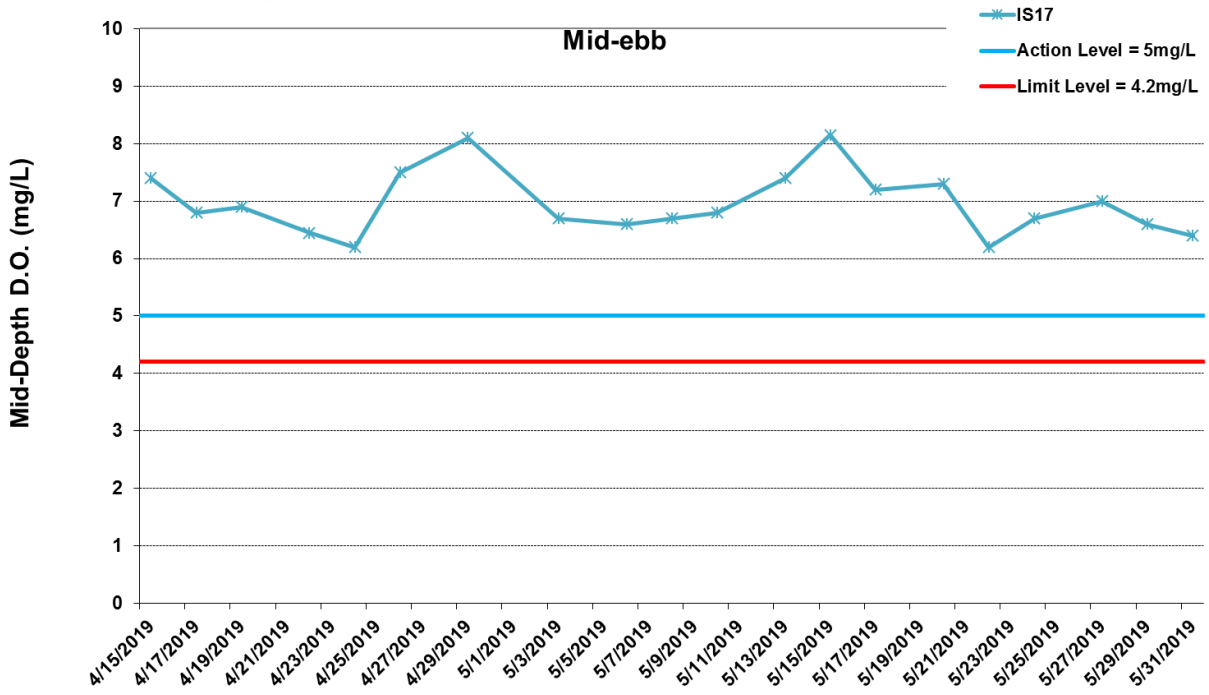


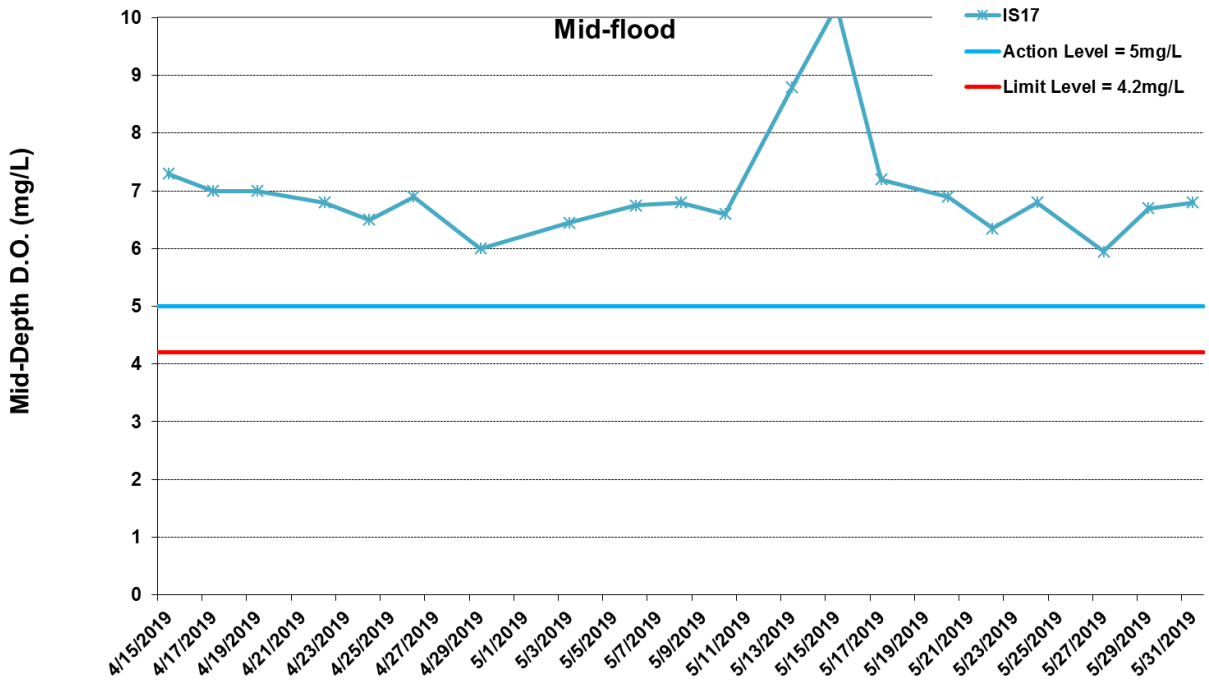
* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

*No data for Stations SR7 due to shallow water depth (< 6m).

Figure G4 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 15 April 2019 and 31 May 2019 at IS(Mf)11. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

Ref: 0212330_Impact-WQM_May2019_graphs_Rev a.xls



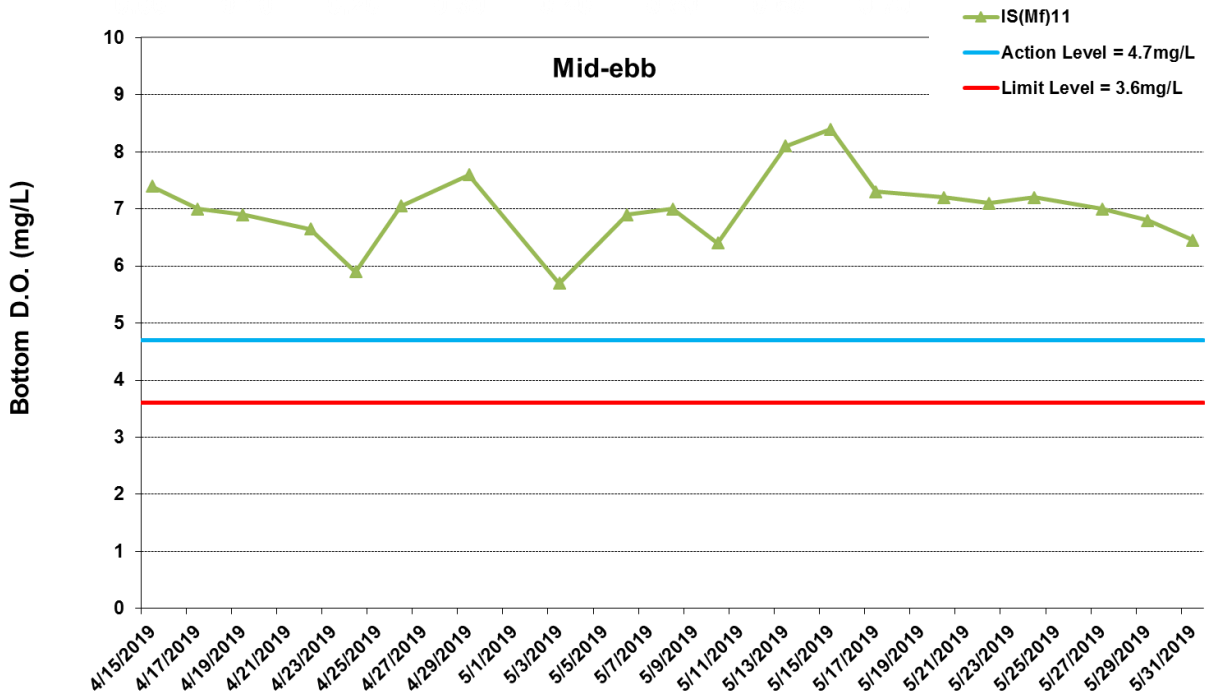


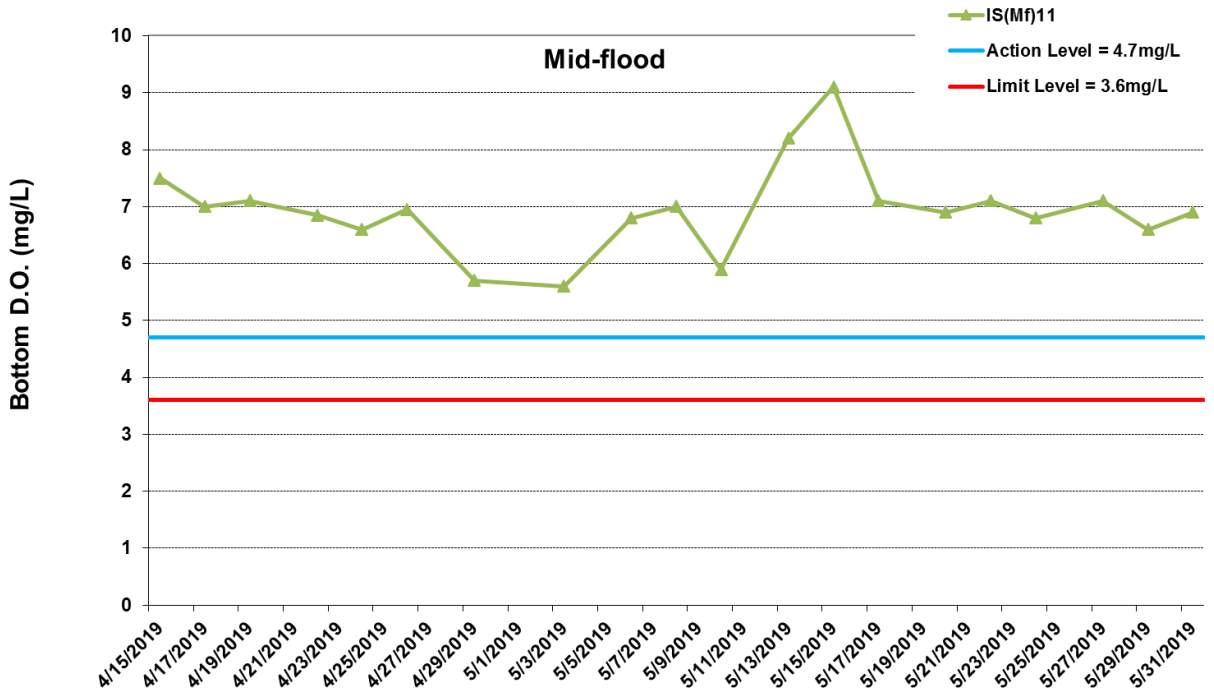
* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

*No data for Stations SR7 due to shallow water depth (< 6m).

Figure G5 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 15 April 2019 and 31 May 2019 at IS17. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

Ref: 0212330_Impact-WQM_May2019_graphs_Rev a.xls

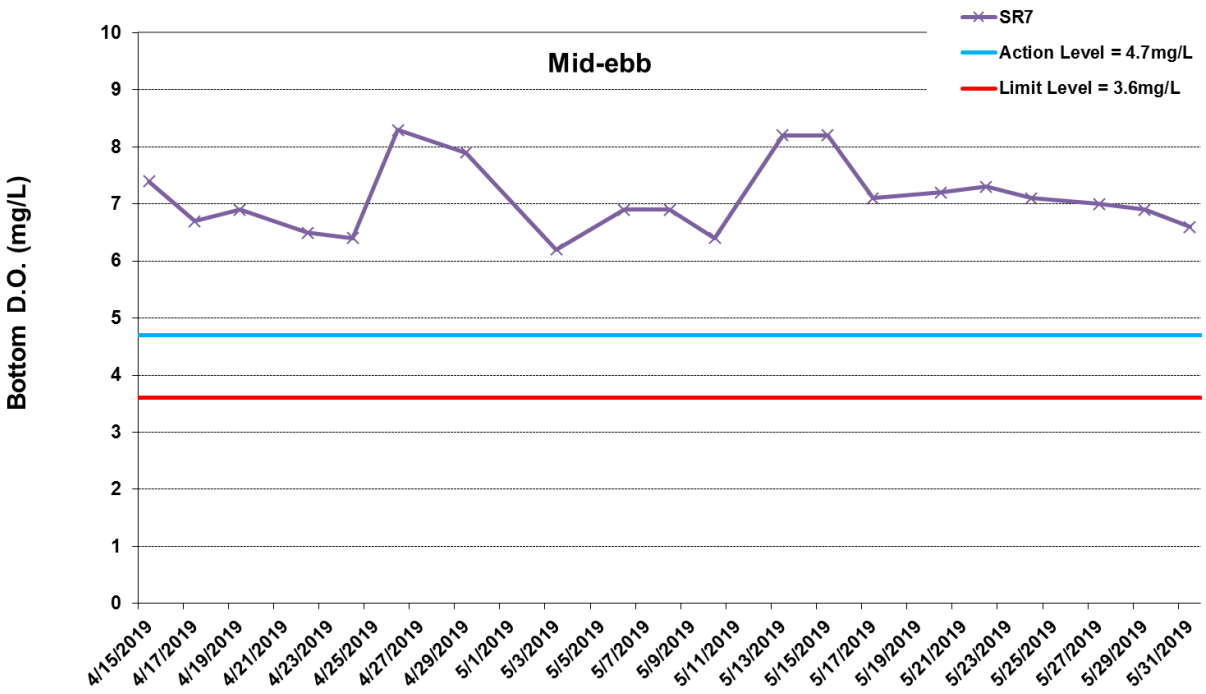


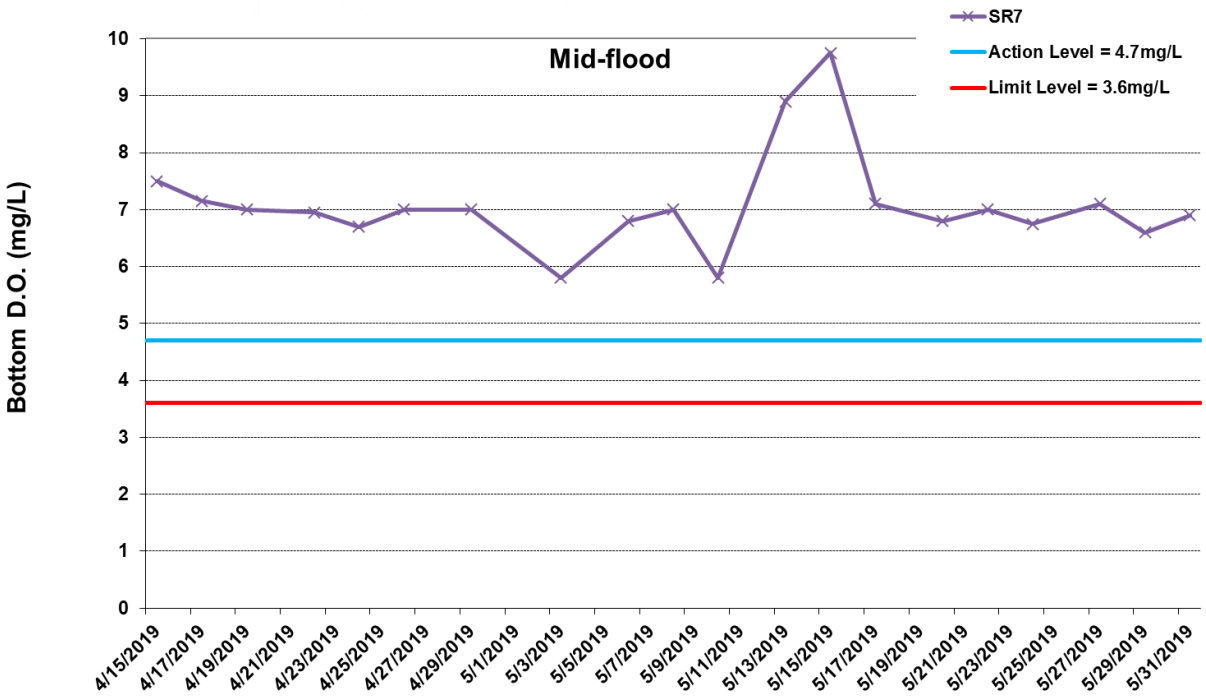


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G6 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 15 April 2019 and 31 May 2019 at IS(Mf)11. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

Ref: 0212330_Impact-WQM_May2019_graphs_Rev a.xls





* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G7 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 15 April 2019 and 31 May 2019 at SR7. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

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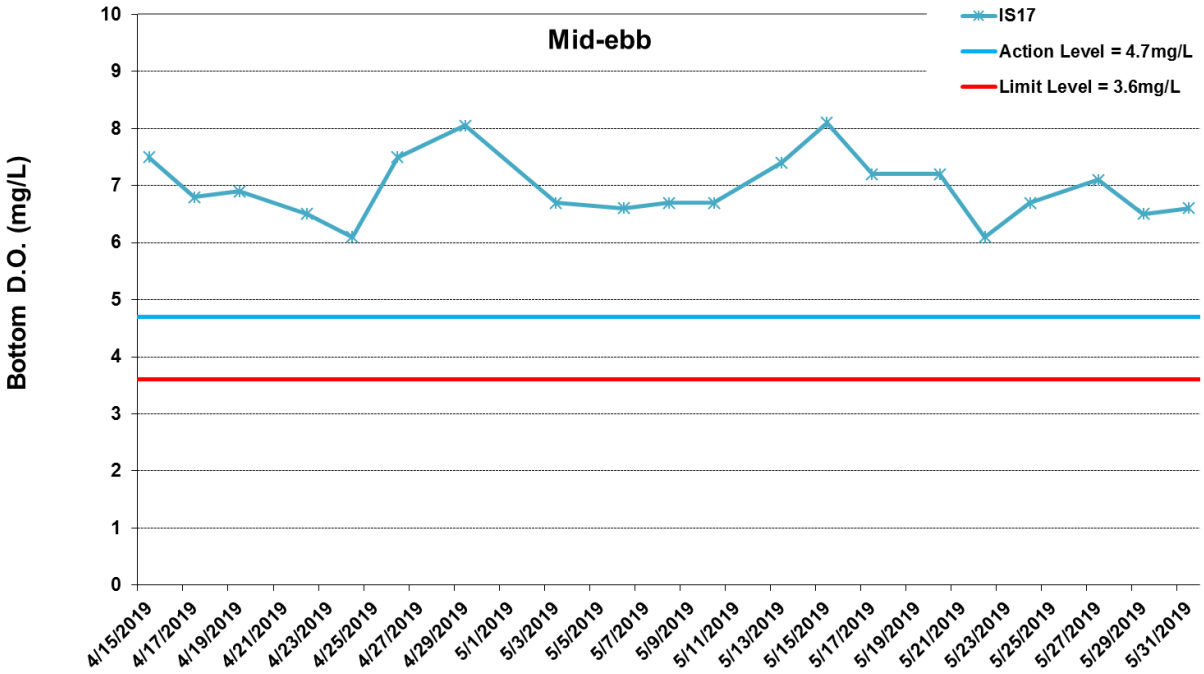

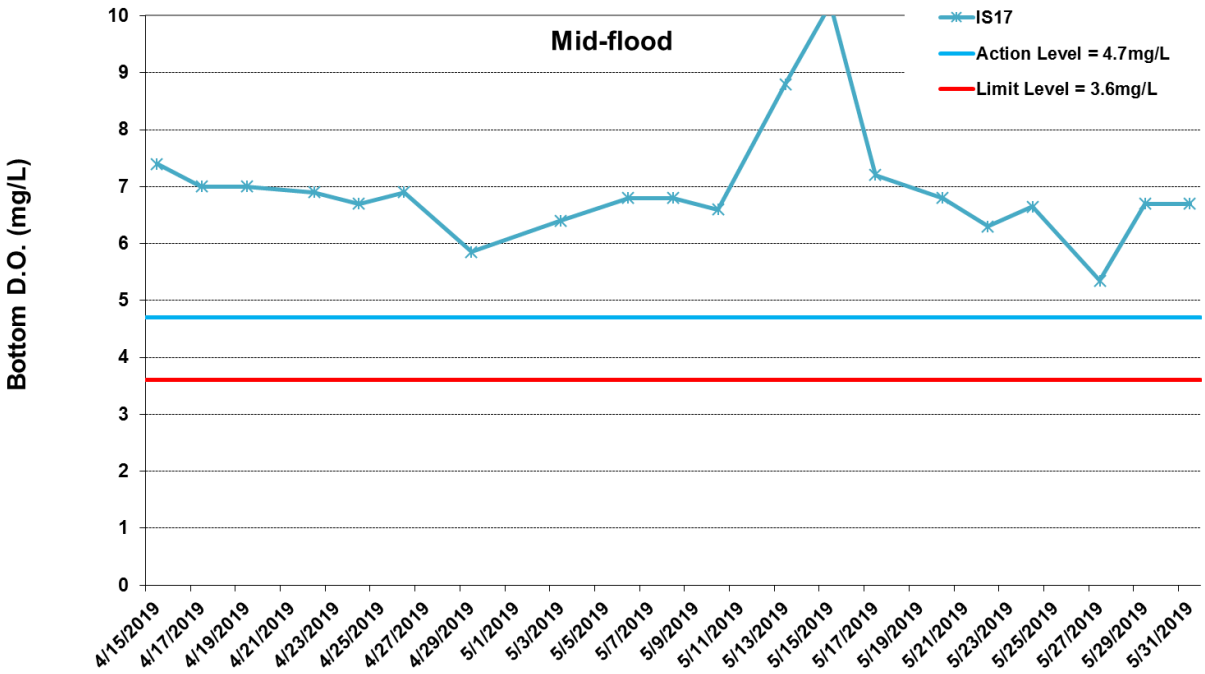

* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G8 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 15 April 2019 and 31 May 2019 at IS17. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

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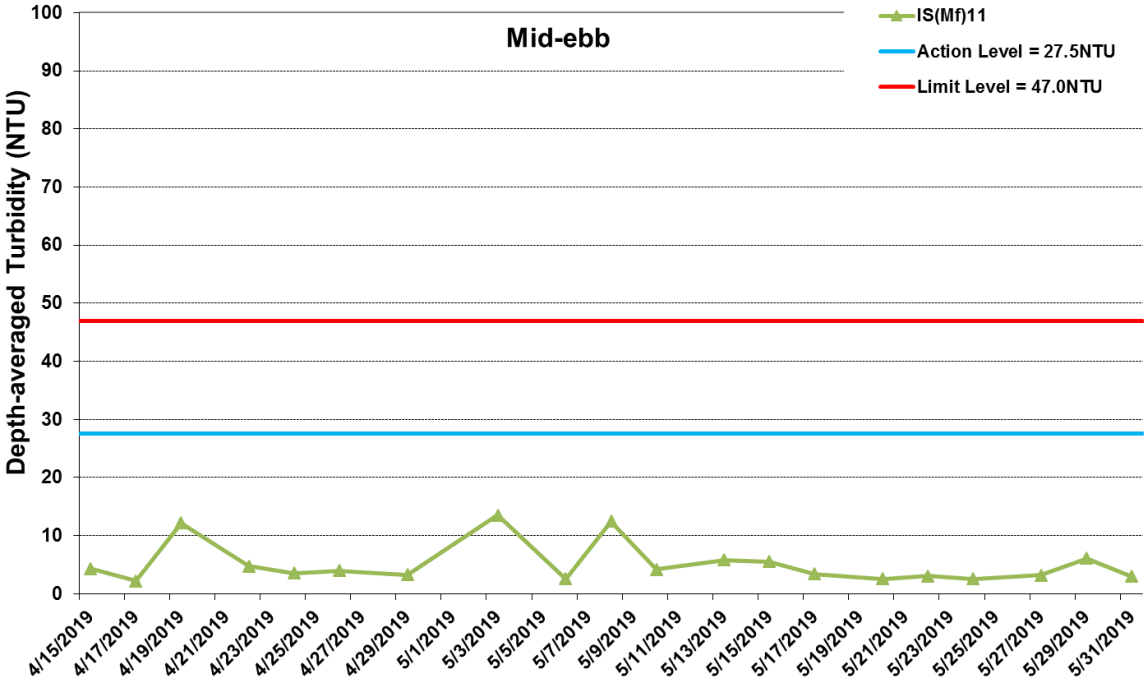
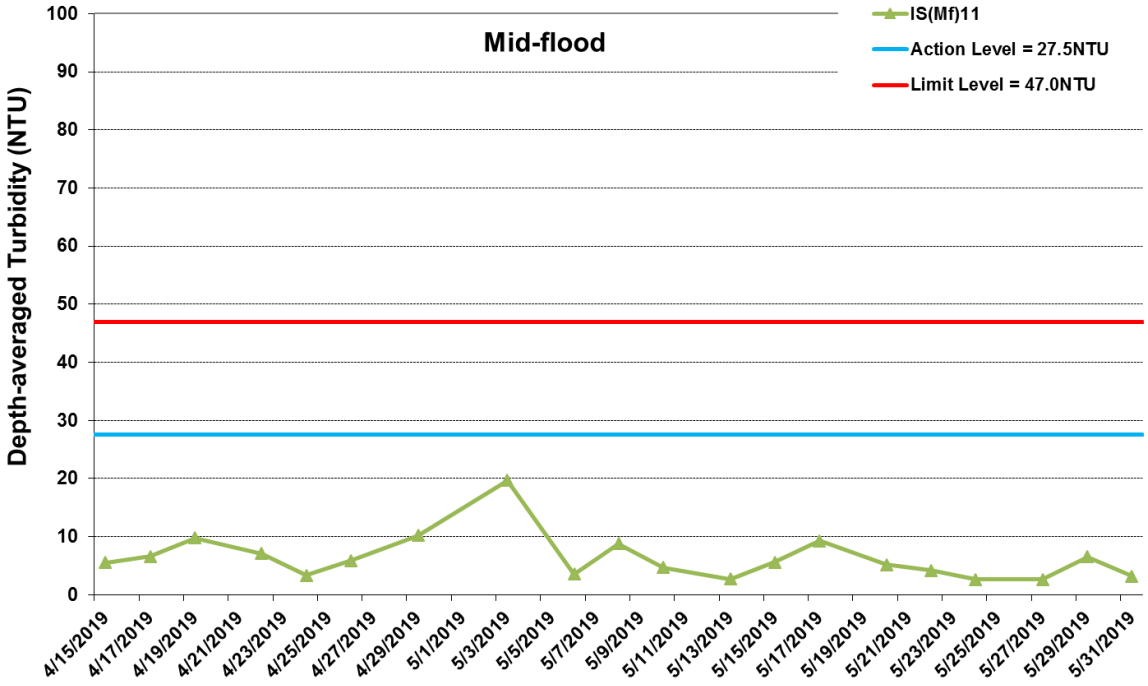
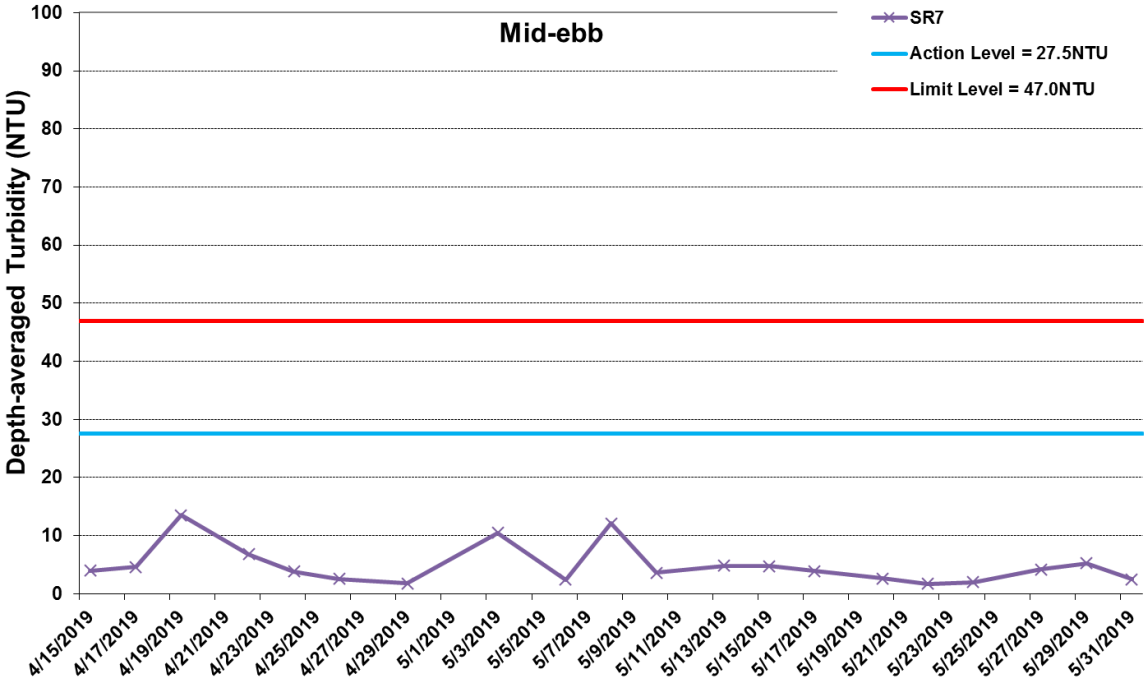


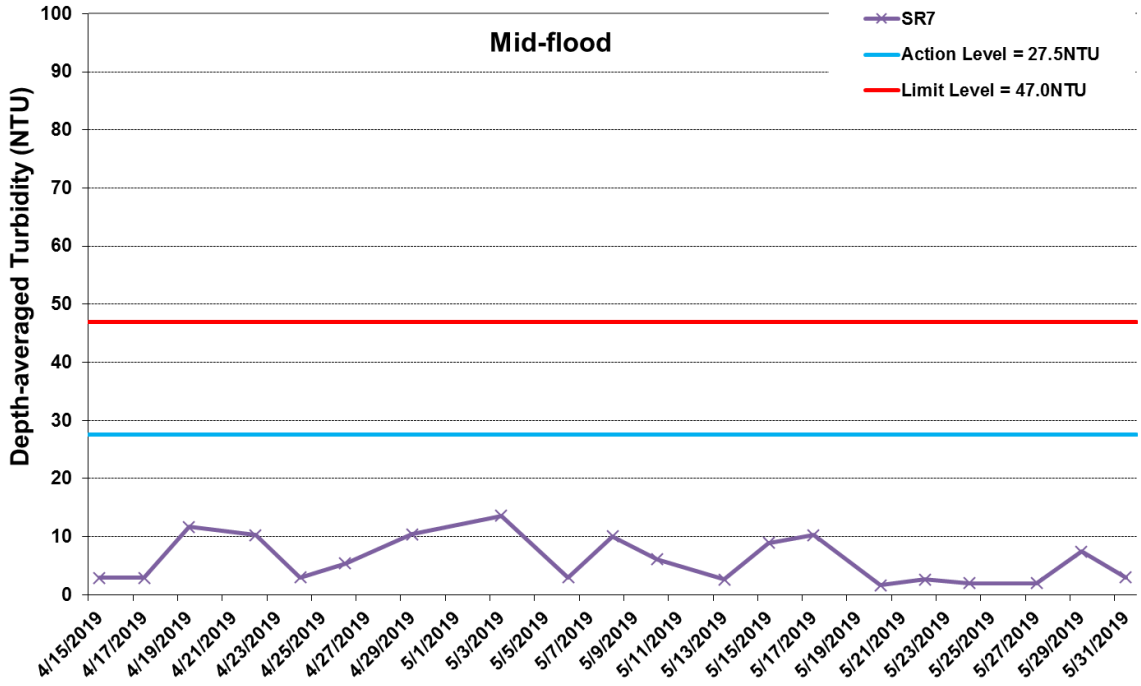


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G9 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 15 April 2019 and 31 May 2019 at IS(Mf)11. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

Ref: 0212330_Impact-WQM_May2019_graphs_Rev a.xls





* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G10 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 15 April 2019 and 31 May 2019 at SR7. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

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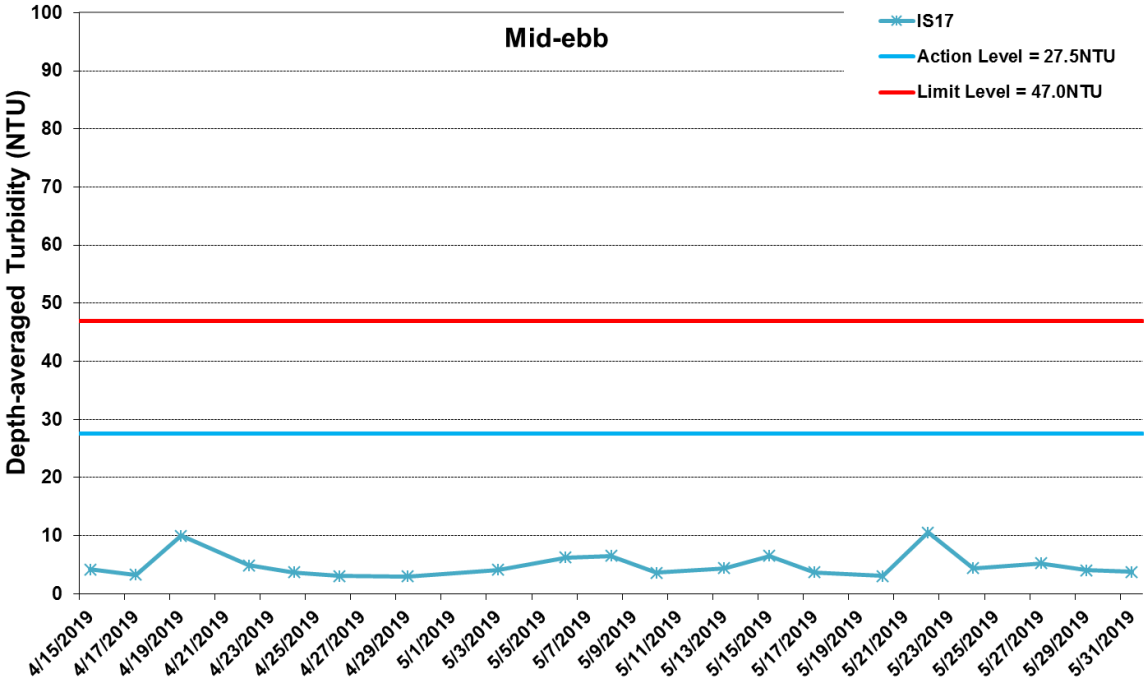

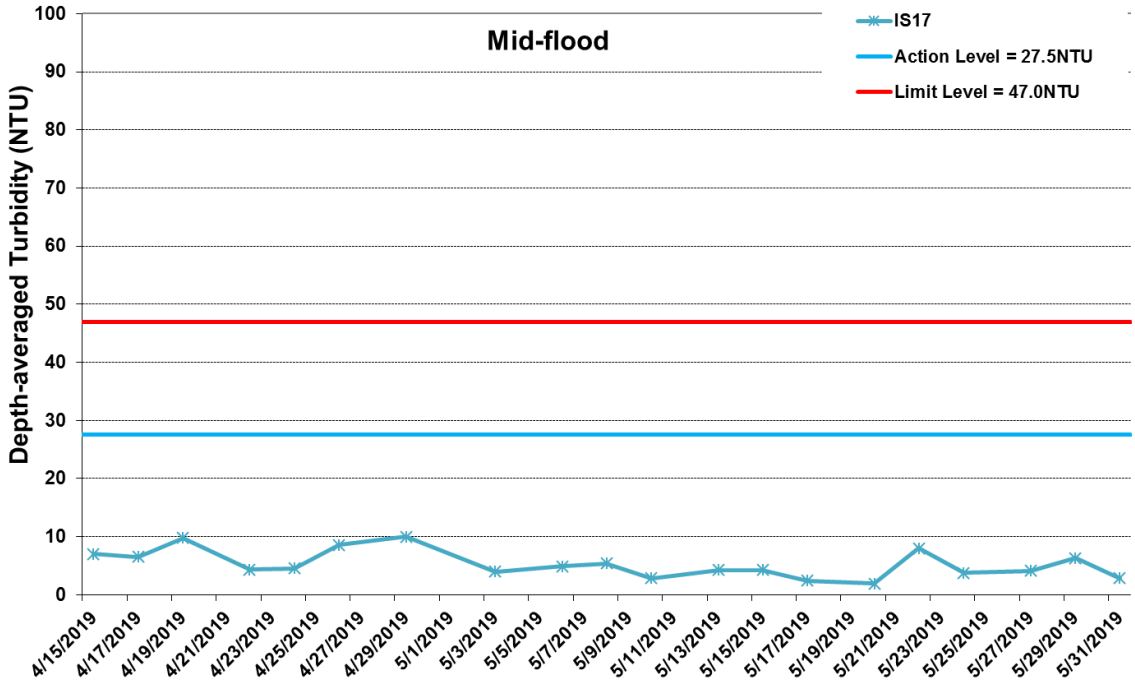

* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G11 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 15 April 2019 and 31 May 2019 at IS17. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

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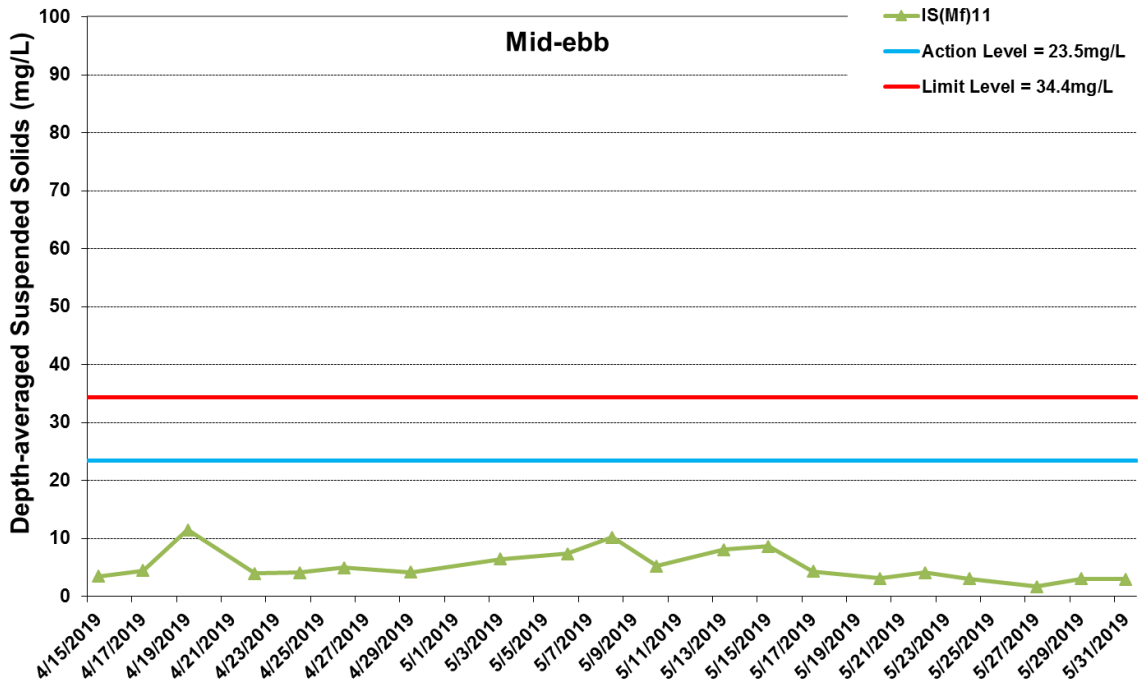
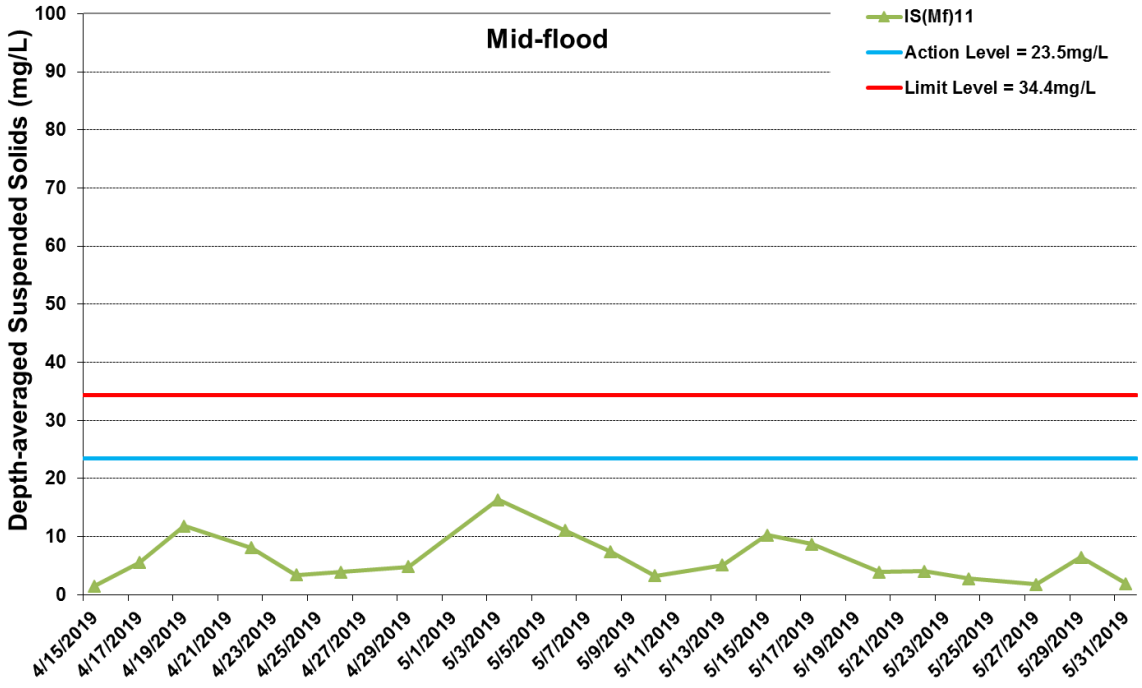
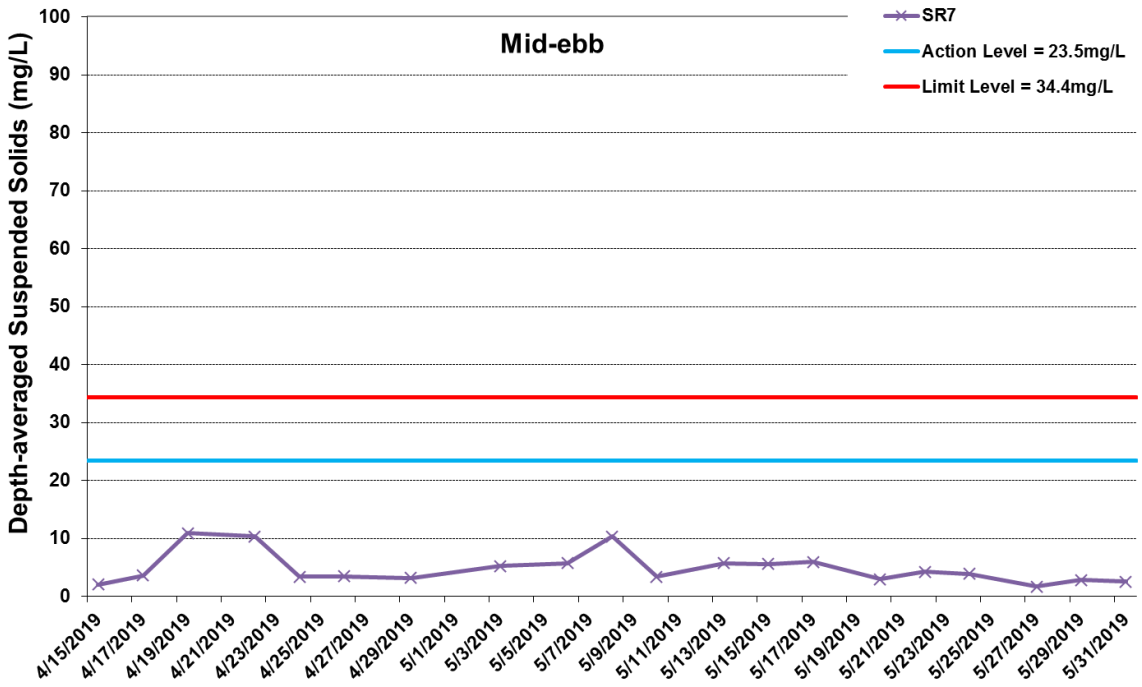


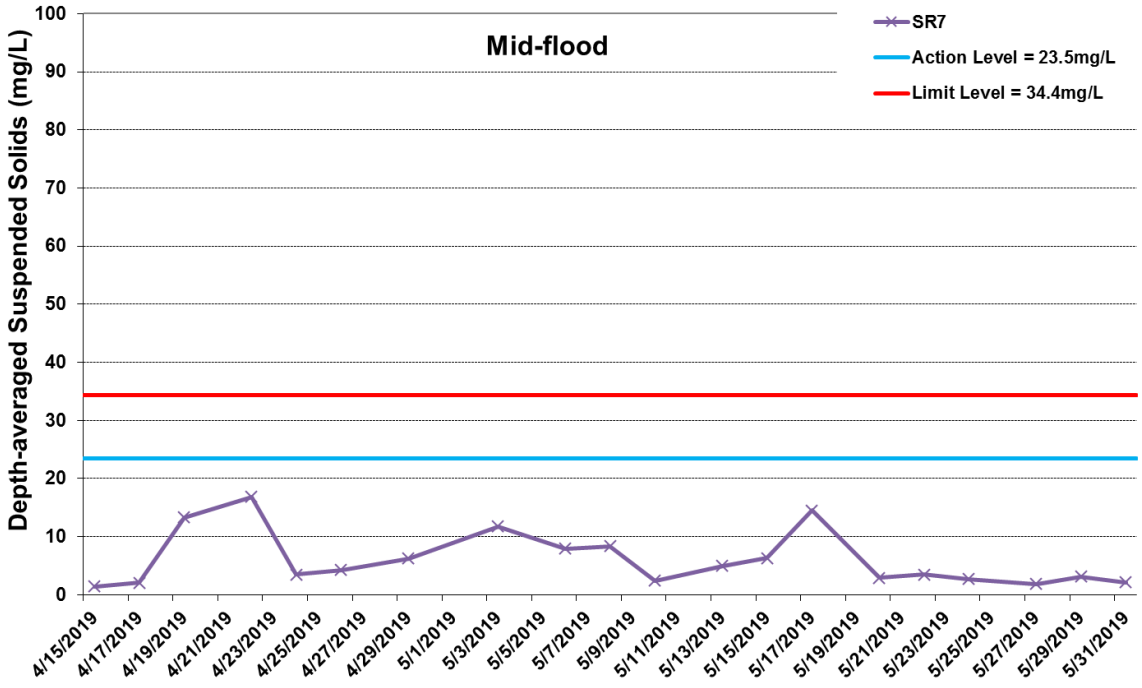


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G12 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 15 April 2019 and 31 May 2019 at IS(Mf)11. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

Ref: 0212330_Impact-WQM_May2019_graphs_Rev a.xls





* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G13 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 15 April 2019 and 31 May 2019 at SR7. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

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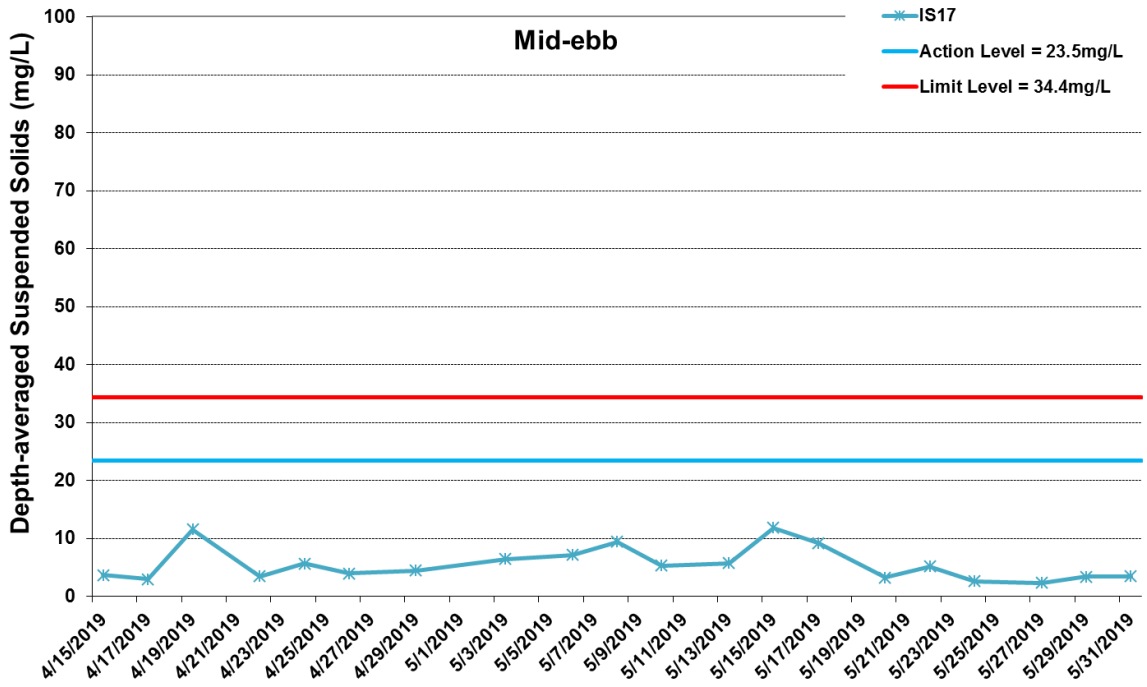

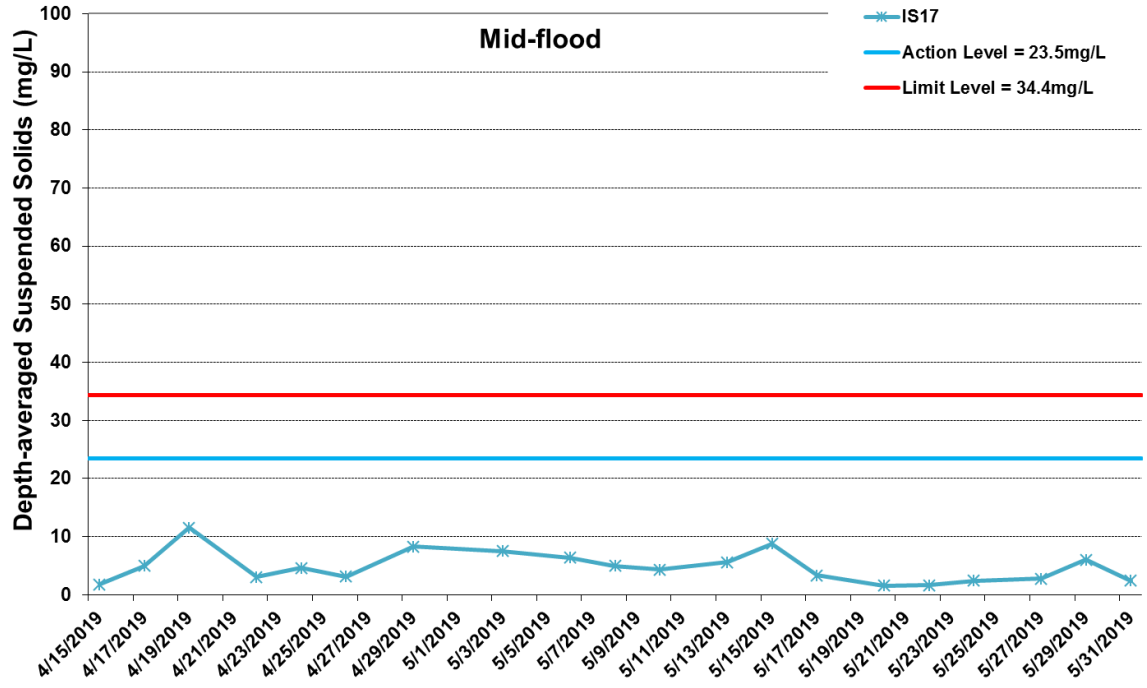

* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G14 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 15 April 2019 and 31 May 2019 at IS17. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Modification works at Southern Landfall (15/4/2019 – 31/5/2019).

Ref: 0212330_Impact-WQM_May2019_graphs_Rev a.xls

Appendix H

Impact Dolphin Monitoring Survey

CONTRACT NO. HY/2012/08
Hong Kong-Zhuhai-Macao Bridge Tuen Mun – Chek Lap Kok Link (Northern Connection Sub-sea Tunnel Section)
Dolphin Quarterly Monitoring

22nd Quarterly Progress Report (March-May 2019)
submitted to Dragages – Bouygues Joint Venture & ERM Hong Kong Ltd.

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

19 August 2019

1. Introduction

1.1. As part of the Hong Kong-Zhuhai-Macao Bridge, the Tuen Mun-Chek Lap Kok Link (TM-CLKL) Northern Connection Sub-sea Tunnel Section (Contract no. HY/2012/08) comprises the sub-sea TBM tunnels (two tubes with cross passages) across the Urmston Road to connect Tuen Area 40 and Hong Kong Boundary Crossing Facilities (HKBCF) of approximately 4 km in length with dual 2-lane carriageway, the tunnels at both the southern landfall and the northern landfall for construction of approach roads to the sub-sea TBM tunnels of approximately 1.5 km in length, as well as the northern landfall reclamation of approximately 16.5 hectares and about 20.km long seawalls. Dragages – Bouygues Joint Venture (hereinafter called the "Contractor") was awarded as the main contractor for the Northern Connection Sub-sea Tunnel Section, and ERM Hong Kong Limited would serve as the Environmental Team to implement the Environmental Monitoring and Audit (EM&A) programme.

1.2. According to the updated EM&A Manual (for TM-CLKL), monthly line-transect vessel surveys for Chinese White Dolphin should be conducted to cover the Northwest (NWL) and Northeast Lantau (NEL) survey areas as in AFCD annual marine mammal monitoring programme. However, as such surveys have been undertaken by the HKLR03 and HKBCF projects in the same areas (i.e. NWL and NEL), a combined monitoring approach is recommended by the Highways Department, that the TM-CLKL EM&A project can utilize the monitoring data collected by HKLR03 or HKBCF project to avoid any redundancy in monitoring effort. Such exemption for the dolphin monitoring will end upon the completion of the dolphin monitoring carried out by HKLR03 contract.

1.3. In November 2013, the Director of Hong Kong Cetacean Research Project (HKCRP), Dr. Samuel Hung, has been appointed by ERM Hong Kong Limited as the dolphin specialist for the TM-CLKL Northern Connection Sub-sea Tunnel Section EM&A project. He is responsible for the dolphin monitoring study, including the data collection on Chinese White Dolphins during the construction phase (i.e. impact period) of the TM-CLKL project in Northwest Lantau (NWL) and Northeast Lantau (NEL) survey areas.

1.4. During the construction period of HKLR, the dolphin specialist would be in charge of reviewing and collating information collected by HKLR03 dolphin monitoring programme to examine any potential impacts of TM-CLKL construction works on the dolphins.

1.5. From the monitoring results, any changes in dolphin occurrence within the study area will be examined for possible causes, and appropriate actions and additional mitigation measures will be recommended as necessary.

1.6. This report is the 22nd quarterly progress report under the TM-CLKL construction phase dolphin monitoring programme submitted to the Contractor, summarizing the results of the surveys findings during the period of March to May 2019, utilizing the survey data collected by HKLR03 impact phase monitoring project.

2. Monitoring Methodology

2.1. Vessel-based Line-transect Survey

2.1.1. According to the requirement of the updated EM&A manual, 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 conducted by HKLR03 project

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 22 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 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^{o} and 90^{o} (in relation to the bow, which is defined as 0^{o}). 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, positions (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.

2.2. 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.

2.3. Data Analysis

2.3.1. Distribution Analysis – The line-transect survey data was integrated with the Geographic Information System (GIS) in order to visualize and interpret different spatial and temporal patterns of dolphin distribution using sighting positions. Location data of dolphin groups were plotted on map layers of Hong Kong using a desktop GIS (ArcView© 3.1) to examine their distribution patterns in details. The dataset was also stratified into different subsets to examine distribution patterns of dolphin groups with different categories of group sizes, young calves and activities.

2.3.2. Encounter rate analysis – Encounter rates of Chinese white dolphins (number of on-effort sightings per 100 km of survey effort, and total number of dolphins sighted on-effort 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 collect under Beaufort 3 or below condition would be used for the encounter rate analyses. Dolphin encounter rates were calculated in two ways for comparisons with the HZMB baseline monitoring results as well as to AFCD long-term marine mammal monitoring results.

Firstly, for the comparison with the HZMB baseline monitoring results, the encounter rates were calculated using primary survey effort alone. The average encounter rate of sightings (STG) and average encounter rate of dolphins (ANI) were deduced based on the encounter rates from six events during the present quarter (i.e. six sets of line-transect surveys in North Lantau), which was also compared with the one deduced from the six events during the baseline period (i.e. six sets of line-transect surveys in North Lantau).

Secondly, the encounter rates were calculated using both primary and secondary survey effort collected under Beaufort 3 or below condition as in AFCD long-term monitoring study. The encounter rate of sightings and dolphins were deduced by dividing the total number of on-effort sightings (STG) and total number of dolphins (ANI) by the amount of survey effort for the present quarterly period.

2.3.3. Quantitative grid analysis on habitat use – To conduct quantitative grid analysis of habitat use, positions of on-effort sightings of Chinese White Dolphins collected during the quarterly impact phase monitoring period were plotted onto 1-km^2 grids among NWL and NEL survey areas on GIS. Sighting densities (number of on-effort sightings per km^2) and dolphin densities (total number of dolphins from on-effort sightings per km^2) were then calculated for each 1 km by 1 km grid with the aid of GIS.

Sighting density grids and dolphin density grids were then further normalized with the amount of survey effort conducted within each grid. The total amount of survey effort spent on each grid was calculated by examining the survey coverage on each line-transect survey to determine how many times the grid was surveyed during the study period. For example, when the survey boat traversed through a specific grid 50 times, 50 units of survey effort were counted for that grid. With the amount of survey effort calculated for each grid, the sighting density and dolphin density of each grid were then normalized (i.e. divided by the unit of survey effort).

The newly-derived unit for sighting density was termed SPSE, representing the number of on-effort **s**ightings **p**er 100 units of **s**urvey **e**ffort. In addition, the derived unit for actual dolphin density was termed DPSE, representing the number of **d**olphins **p**er 100 units of **s**urvey **e**ffort. Among the 1-km^2 grids that were partially covered by land, the percentage of sea area was calculated using GIS tools, and their SPSE and DPSE values were adjusted accordingly. The following formulae were used to estimate SPSE and DPSE in each 1-km^2 grid within the study area:

SPSE = ((S / E) x 100) / SA%
DPSE = ((D / E) x 100) / SA%

where S = total number of on-effort sightings
D = total number of dolphins from on-effort sightings
E = total number of units of survey effort
SA% = percentage of sea area

2.3.4. Behavioural analysis – When dolphins were sighted during vessel surveys, their behaviour was observed. Different activities were categorized (i.e. feeding, socializing, traveling, and milling/resting) and recorded on sighting datasheets. This data was then input into a separate database with sighting information, which can be used to determine the distribution of behavioural data with a desktop GIS. Distribution of sightings of dolphins engaged in different activities and behaviours would then be plotted on GIS and carefully examined to identify important areas for different activities of the dolphins.

2.3.5. Ranging pattern analysis – Location data of individual dolphins that occurred during the 3-month impact phase monitoring period were obtained from the dolphin sighting database and photo-identification catalogue. To deduce home ranges for individual dolphins using the fixed kernel methods, the program Animal Movement Analyst Extension, was loaded as an extension with ArcView© 3.1 along with another extension Spatial Analyst 2.0. Using the fixed kernel method, the program calculated kernel density estimates based on all sighting positions, and provided an active interface to display kernel density plots. The kernel estimator then calculated and displayed the overall ranging area at 95% UD level.

3. Monitoring Results

3.1. Summary of survey effort and dolphin sightings

3.1.1. During the period of March to May 2019, six sets of systematic line-transect vessel surveys were conducted under the HKLR03 monitoring works to cover all transect lines in NWL and NEL survey areas twice per month.

3.1.2. From these HKLR03 surveys, a total of 794.91 km of survey effort was collected, with 96.2% of the total survey effort being conducted under favourable weather conditions (i.e. Beaufort Sea State 3 or below with good visibility). Among the two areas, 293.34 km and 501.57 km of survey effort were conducted in NEL and NWL survey areas respectively.

3.1.3. The total survey effort conducted on primary lines was 572.37 km, while the effort on secondary lines was 222.54 km. Survey effort conducted on both primary and secondary lines were considered as on-effort survey data. A summary table of the survey effort is shown in Appendix I.

3.1.4. During the six sets of HKLR03 monitoring surveys from March to May 2019, only five

groups of 11 Chinese White Dolphins were sighted. All five dolphin sightings were made during on-effort search in this quarter, with four of them being made on primary lines. A summary table of dolphin sightings is shown in Appendix II.

3.1.5. In this quarterly period, all dolphin groups were sighted in NWL, and no dolphin was sighted at all in NEL. In fact, since August 2014, only two sightings of two lone dolphins were made respectively in NEL during HKLR03 monitoring surveys.

3.2. Distribution

3.2.1. Distribution of dolphin sightings made during the HKLR03 monitoring surveys from March to May 2019 is shown in Figure 1. These sightings were all scattered at the western portion of the North Lantau region, with no particular concentration (Figure 1). And as consistently recorded in the previous monitoring quarters, the dolphins were completely absent from the central and eastern portions of North Lantau waters (Figure 1).

3.2.2. Notably, all dolphin sightings were located far away from the TM-CLKL alignment as well as the HKBCF and HKLR03 reclamation sites (Figure 1). However, one group of two dolphins was sighted near the HKLR09 alignment during the quarterly period.

3.2.3. Sighting distribution of dolphins during the present impact phase monitoring period (March-May 2019) was drastically different from the one during the baseline monitoring period (Figure 1). In the present quarter, dolphins have disappeared from the NEL region, which was in stark contrast to their frequent occurrence around the Brothers Islands, near Shum Shui Kok and in the vicinity of HKBCF reclamation site during the baseline period (Figure 1). The nearly complete abandonment of NEL region by the dolphins has been consistently recorded in the past 24 quarters of HKLR03 monitoring, which has resulted in zero to extremely low dolphin encounter rates in this area.

3.2.4. In NWL survey area, dolphin occurrence was also drastically different between the baseline and impact phase periods. During the present impact monitoring period, dolphins were sighted infrequently here, and mainly at the western portion of the North Lantau region. This was in contrary to their frequent occurrences throughout the area during the baseline period (Figure 1).

3.2.5. Another comparison in dolphin distribution was made between the six quarterly periods of spring months in 2014-19 (Figure 2). Among the six spring periods, dolphins were sighted regularly in NWL waters in 2014, but their usage was dramatically reduced to very low levels in the five subsequent spring periods, with their occurrences mostly concentrated at the western portion of North Lantau waters (Figure 2).

3.3. Encounter rate

3.3.1. During the present quarterly period, the encounter rates of Chinese White Dolphins deduced from the survey effort and on-effort sighting data from the primary transect lines under favourable conditions (Beaufort 3 or below) for each set of the HKLR03 surveys in NEL and NWL are shown in Table 2. The average encounter rates deduced from the six sets of HKLR03 surveys were also compared with the ones deduced from the baseline

monitoring period (September – November 2011) (Table 3).

Table 2. Dolphin encounter rates (sightings per 100 km of survey effort) during March-May 2019

SURVEY AREA	DOLPHIN MONITORING DATES	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
Northeast Lantau	Set 1 (4 & 11 Mar 2019)	0.00	0.00
	Set 2 (13 & 18 Mar 2019)	0.00	0.00
	Set 3 (10 & 15 Apr 2019)	0.00	0.00
	Set 4 (23 & 25 Apr 2019)	0.00	0.00
	Set 5 (2 & 7 May 2019)	0.00	0.00
	Set 6 (21 & 23 May 2019)	0.00	0.00
Northwest Lantau	Set 1 (4 & 11 Mar 2019)	0.00	0.00
	Set 2 (13 & 18 Mar 2019)	3.41	6.81
	Set 3 (10 & 15 Apr 2019)	0.00	0.00
	Set 4 (23 & 25 Apr 2019)	1.64	3.27
	Set 5 (2 & 7 May 2019)	1.71	5.13
	Set 6 (21 & 23 May 2019)	0.00	0.00

Table 3. Comparison of average dolphin encounter rates from impact monitoring period (March-May 2019) and baseline monitoring period (September-November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions; ± denotes the standard deviation of the average encounter rates)

	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)	
	March – May 2019	September – November 2011	March – May 2019	September – November 2011
Northeast Lantau	0.0	6.00 ± 5.05	0.0	22.19 ± 26.81
Northwest Lantau	1.13 ± 1.39	9.85 ± 5.85	2.54 ± 3.00	44.66 ± 29.85

3.3.2. To facilitate the comparison with the AFCD long-term monitoring results, the encounter rates were also calculated for the present quarter using both primary and secondary survey effort. The encounter rates of sightings (STG) and dolphins (ANI) in NWL were 1.04 sightings and 2.28 dolphins per 100 km of survey effort respectively, while the encounter rates of sightings (STG) and dolphins (ANI) in NEL were both nil for this quarter.

3.3.3 In NEL, the average dolphin encounter rates (both STG and ANI) in the present three-month impact monitoring period were both zero with no on-effort sighting being

made, and such extremely low occurrence of dolphins in NEL have been consistently recorded in the past 24 quarters of HKLR03 monitoring (Table 4). This is a serious concern as the dolphin occurrence in NEL in the past five years (0.0-1.0 for ER(STG) and 0.0-3.9 for ER(ANI)) have remained exceptionally low when compared to the baseline period (Table 4). Dolphins have been virtually absent from NEL waters since August 2014, with only two lone dolphins sighted there on two separate occasions since then despite consistent and intensive survey effort being conducted in this survey area.

3.3.4. On the other hand, the average dolphin encounter rates (STG and ANI) in NWL during the present impact phase monitoring period (reductions of 88.5% and 94.3% respectively) were only tiny fractions of the ones recorded during the three-month baseline period, indicating a dramatic decline in dolphin usage of this survey area as well during the present impact phase period (Table 5).

3.3.5. When comparing among the seven spring quarters since 2013, the quarterly encounter rates in 2019 dropped to the lowest among all spring quarters during the HKLR03 construction phase (Table 5). Such dramatic drop in dolphin occurrence in NWL should raise serious concerns, and the temporal trend should be closely monitored in the upcoming monitoring quarters as the construction activities of HZMB works will soon be completed in coming months.

3.3.6. A two-way ANOVA with repeated measures and unequal sample size was conducted to examine whether there were any significant differences in the average encounter rates between the baseline and impact monitoring periods. The two variables that were examined included the two periods (baseline and impact phases) and two locations (NEL and NWL).

3.3.7. For the comparison between the baseline period and the present quarter (26th quarter of the impact phase being assessed), the p-values for the differences in average dolphin encounter rates of STG and ANI were 0.0019 and 0.0113 respectively. If the alpha value is set at 0.05, significant differences were detected between the baseline and present quarters in both the average dolphin encounter rates of STG and ANI.

3.3.8. For the comparison between the baseline period and the cumulative quarters in impact phase (i.e. the first 26 quarters of the impact phase being assessed), the p-values for the differences in average dolphin encounter rates of STG and ANI were both 0.000000. Even if the alpha value is set at 0.00001, significant differences were still detected in both the average dolphin encounter rates of STG and ANI (i.e. between the two periods and the locations).

Table 4. Comparison of average dolphin encounter rates in Northeast Lantau survey area from all quarters of HKLR03 impact monitoring period and baseline monitoring period (September-November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions; the encounter rates in **spring** months were highlighted in **blue**; ± denotes the standard deviation of the average encounter rates)

	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)
September-November 2011 (Baseline)	6.00 ± 5.05	22.19 ± 26.81
December 2012-February 2013 (Impact)	3.14 ± 3.21	6.33 ± 8.64
March-May 2013 (Impact)	0.42 ± 1.03	0.42 ± 1.03
June-August 2013 (Impact)	0.88 ± 1.36	3.91 ± 8.36
September-November 2013 (Impact)	1.01 ± 1.59	3.77 ± 6.49
December 2013-February 2014 (Impact)	0.45 ± 1.10	1.34 ± 3.29
March-May 2014 (Impact)	0.00	0.00
June-August 2014 (Impact)	0.42 ± 1.04	1.69 ± 4.15
September-November 2014 (Impact)	0.00	0.00
December 2014-February 2015 (Impact)	0.00	0.00
March-May 2015 (Impact)	0.00	0.00
June-August 2015 (Impact)	0.44 ± 1.08	0.44 ± 1.08
September-November 2015 (Impact)	0.00	0.00
December 2015-February 2016 (Impact)	0.00	0.00
March-May 2016 (Impact)	0.00	0.00
June-August 2016 (Impact)	0.00	0.00
September-November 2016 (Impact)	0.00	0.00
December 2016-February 2017 (Impact)	0.00	0.00
March-May 2017 (Impact)	0.00	0.00
June-August 2017 (Impact)	0.00	0.00
September-November 2017 (Impact)	0.00	0.00
December 2017-February 2018 (Impact)	0.00	0.00
March-May 2018 (Impact)	0.00	0.00
June-August 2018 (Impact)	0.00	0.00
September-November 2018 (Impact)	0.00	0.00
December 2018-February 2019 (Impact)	0.00	0.00
March-May 2019 (Impact)	0.00	0.00

Table 5. Comparison of average dolphin encounter rates in Northwest Lantau survey area from all quarters of HKLR03 impact monitoring period and baseline monitoring period (September-November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions; the encounter rates in **spring** months were highlighted in **blue**; ± denotes the standard deviation of the average encounter rates)

	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)
September-November 2011 (Baseline)	9.85 ± 5.85	44.66 ± 29.85
December 2012-February 2013 (Impact)	8.36 ± 5.03	35.90 ± 23.10
March-May 2013 (Impact)	7.75 ± 3.96	24.23 ± 18.05
June-August 2013 (Impact)	6.56 ± 3.68	27.00 ± 18.71
September-November 2013 (Impact)	8.04 ± 1.10	32.48 ± 26.51
December 2013-February 2014 (Impact)	8.21 ± 2.21	32.58 ± 11.21
March-May 2014 (Impact)	6.51 ± 3.34	19.14 ± 7.19
June-August 2014 (Impact)	4.74 ± 3.84	17.52 ± 15.12
September-November 2014 (Impact)	5.10 ± 4.40	20.52 ± 15.10
December 2014-February 2015 (Impact)	2.91 ± 2.69	11.27 ± 15.19
March-May 2015 (Impact)	0.47 ± 0.73	2.36 ± 4.07
June-August 2015 (Impact)	2.53 ± 3.20	9.21 ± 11.57
September-November 2015 (Impact)	3.94 ± 1.57	21.05 ± 17.19
December 2015-February 2016 (Impact)	2.64 ± 1.52	10.98 ± 3.81
March-May 2016 (Impact)	0.98 ± 1.10	4.78 ± 6.85
June-August 2016 (Impact)	1.72 ± 2.17	7.48 ± 10.98
September-November 2016 (Impact)	2.86 ± 1.98	10.89 ± 10.98
December 2016-February 2017 (Impact)	3.80 ± 3.79	14.52 ± 17.21
March-May 2017 (Impact)	0.93 ± 1.03	5.25 ± 9.53
June-August 2017 (Impact)	2.20 ± 2.88	6.58 ± 8.12
September-November 2017 (Impact)	3.12 ± 1.91	10.35 ± 9.66
December 2017-February 2018 (Impact)	4.75 ± 2.26	15.73 ± 15.94
March-May 2018 (Impact)	2.88 ± 4.81	11.12 ± 22.46
June-August 2018 (Impact)	1.16 ± 1.39	2.87 ± 3.32
September-November 2018 (Impact)	1.51 ± 2.25	2.70 ± 3.78
December 2018-February 2019 (Impact)	2.40 ± 1.88	7.95 ± 6.60
March-May 2019 (Impact)	1.13 ± 1.39	2.54 ± 3.00

3.3.9. As indicated in both dolphin distribution patterns and encounter rates, dolphin usage has been significantly reduced in both NEL and NWL survey areas during the present quarterly period, and such low occurrence of dolphins has also been consistently documented in previous quarters of the past few years.

3.3.10. The dramatic decline in dolphin usage of North Lantau region raises serious concern, as the timing of the decline in dolphin usage in North Lantau waters coincided well with the construction schedule of the HZMB-related projects (Hung 2018). Apparently there has been no sign of recovery of dolphin usage even though almost all marine works associated with the HZMB construction have been completed, and the Brothers Marine Park has been established as a compensation measure for the permanent habitat loss in association with the HKBCF reclamation works.

3.4. Group size

3.4.1. Group size of Chinese White Dolphins ranged from two to three individuals per group in North Lantau region during March to May 2019. The average dolphin group sizes from these three months were compared with the ones deduced from the baseline period in September to November 2011, as shown in Table 6.

Table 6. Comparison of average dolphin group sizes from impact monitoring period (March – May 2019) and baseline monitoring period (September – November 2011) (Note: ± denotes the standard deviation of the average group size)

	Average Dolphin Group Size	
	March – May 2019	**September – November 2011**
Overall	2.20 ± 0.45 (n = 5)	3.72 ± 3.13 (n = 66)
Northeast Lantau	---	3.18 ± 2.16 (n = 17)
Northwest Lantau	2.20 ± 0.45 (n = 5)	3.92 ± 3.40 (n = 49)

3.4.2. The average dolphin group size in NWL waters during March to May 2019 was much lower than the one recorded during the three-month baseline period, but it should also be noted that the sample size of only five dolphin groups in the present quarter was very small when compared to the 66 groups sighted during the baseline period (Table 6).

3.4.3. Notably, all five groups were very small with 2-3 individuals per group only (Appendix II).

3.5. Habitat use

3.5.1. From March to May 2019, only five grids in North Lantau waters recorded dolphin occurrence. The only grid with moderate dolphin density was located to the northeast of Lung Kwu Chau (Figures 3a and 3b). In contrast, the rest of the grids only recorded moderately low densities.

3.5.2. Notably, all grids near TMCLKL alignment did not record any presence of dolphins at all during on-effort search in the present quarterly period (Figures 3a and 3b).

3.5.3. It should be emphasized that the amount of survey effort collected in each grid during the three-month period was fairly low (6-12 units of survey effort for most grids), and therefore the habitat use pattern derived from the three-month dataset should be treated with caution. A more complete picture of dolphin habitat use pattern should be examined when more survey effort for each grid is collected throughout the impact phase monitoring programme.

3.5.4. When compared with the habitat use patterns during the baseline period, dolphin usage in NEL and NWL has drastically diminished in both areas during the present impact monitoring period (Figure 4). During the baseline period, many grids between Siu Mo To and Shum Shui Kok in NEL recorded moderately high to high dolphin densities, which was in stark contrast to the complete absence of dolphins there during the present impact phase period (Figure 4).

3.5.5. The density patterns were also very different in NWL between the baseline and impact phase monitoring periods, with high dolphin usage throughout the area, especially around Sha Chau, near Black Point, to the west of the airport, as well as between Pillar Point and airport platform during the baseline period. In contrast, only one grid with moderate density was located in the western portion of North Lantau waters during the present impact phase period (Figure 4).

3.6. Mother-calf pairs

3.6.1. During the present quarterly period, no young calf was sighted at all among the five groups of dolphins.

3.7. Activities and associations with fishing boats

3.7.1. Among the five dolphin groups, none of them was engaged in feeding, socializing, traveling or milling/resting activity during the quarterly period.

3.7.2. Moreover, none of the five dolphin groups was found to be associated with any operating fishing vessel during the present impact phase period.

3.8. Summary of photo-identification works

3.8.1. From March to May 2019, about 400 digital photographs of Chinese White Dolphins were taken during the impact phase monitoring surveys for the photo-identification work.

3.8.2. In total, five individuals sighted six times altogether were identified (see summary table in Appendix III and photographs of identified individuals in Appendix IV). All of these re-sightings were made in NWL. With the exception of NL123 being re-sighted twice, the other four individuals (i.e. NL182, NL202, NL261 and WL145) were all re-sighted only once during the quarterly monitoring period (Appendix III).

3.8.3. Notably, none of these individuals was sighted in WL waters during the HKLR09 monitoring surveys under the same three-month period of March to May 2019.

3.9. Individual range use

3.9.1. Ranging patterns of the five individuals identified during the three-month study period

were determined by fixed kernel method, and are shown in Appendix V.

3.9.2. All identified dolphins sighted in the present quarter were utilizing NWL waters only, but have completely avoided NEL waters where many of them have utilized as their core areas in the past (Appendix V). This is in contrary to the extensive movements between NEL and NWL survey areas observed in the earlier impact monitoring quarters as well as the baseline period.

3.9.3. Moreover, in contrary to previous monitoring quarters, none of the five individuals have extended their range use to WL waters during the spring quarter of 2019, while one individual (WL145) that has consistently utilized WL waters in the past have extended its range use to NWL survey area during the present quarter (Appendix V).

4. Conclusion

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

4.2. Although the dolphins infrequently occurred along the alignment of TMCLKL northern connection sub-sea tunnel section in the past and during the baseline monitoring period, it is apparent that dolphin usage has been significantly reduced in NEL, and many individuals have shifted away from the important habitat around the Brothers Islands.

4.3. It is critical to monitor the dolphin usage in North Lantau region in the upcoming quarters, to determine whether the dolphins are continuously affected by the various construction activities in relation to the HZMB-related works, and whether suitable mitigation measure can be applied to revert the situation.

5. References

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- Hung, S. K. 2018. Monitoring of marine mammals in Hong Kong waters – data collection: final report (2017-18). An unpublished report submitted to the Agriculture, Fisheries and Conservation Department of Hong Kong SAR Government, 174 pp.

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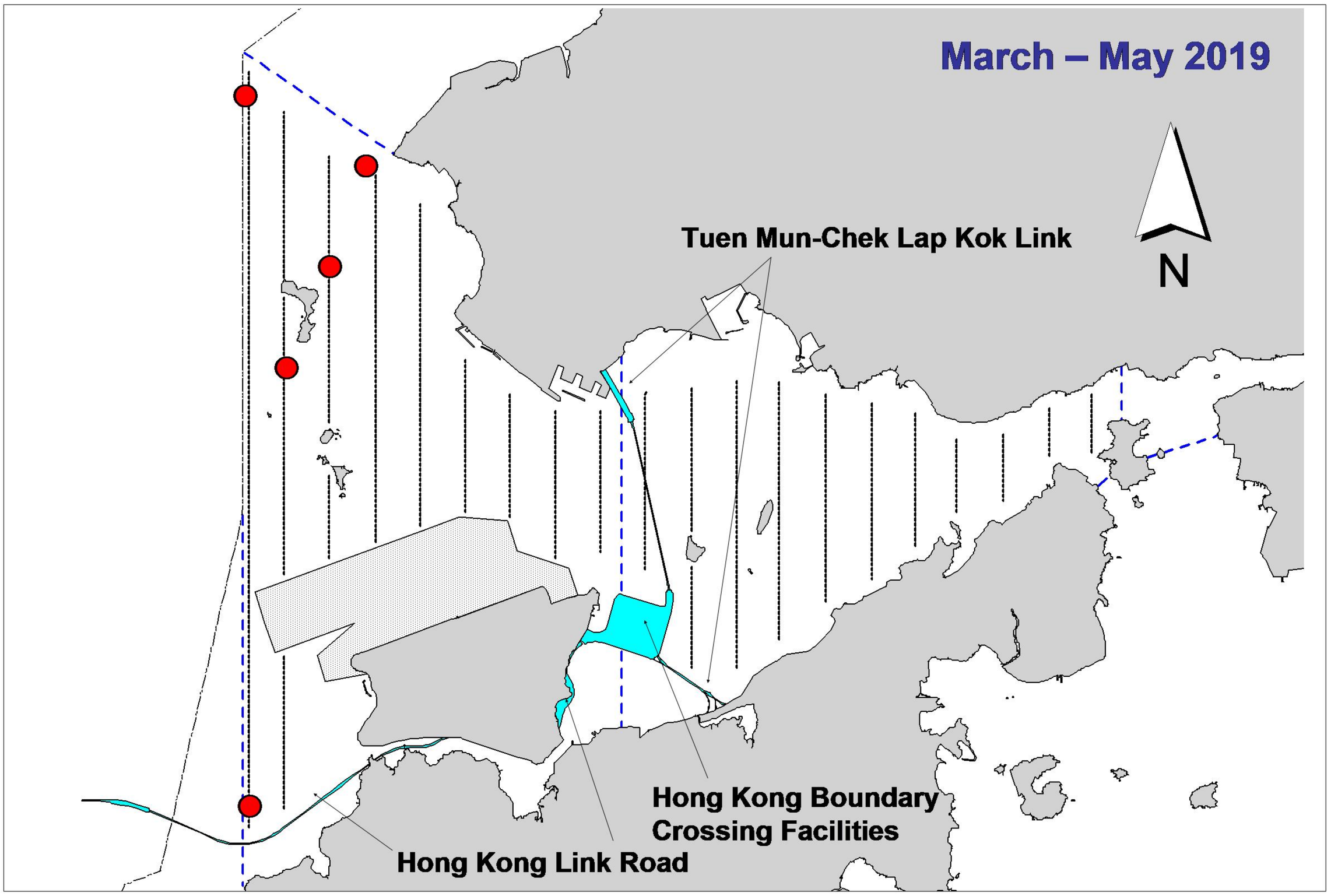


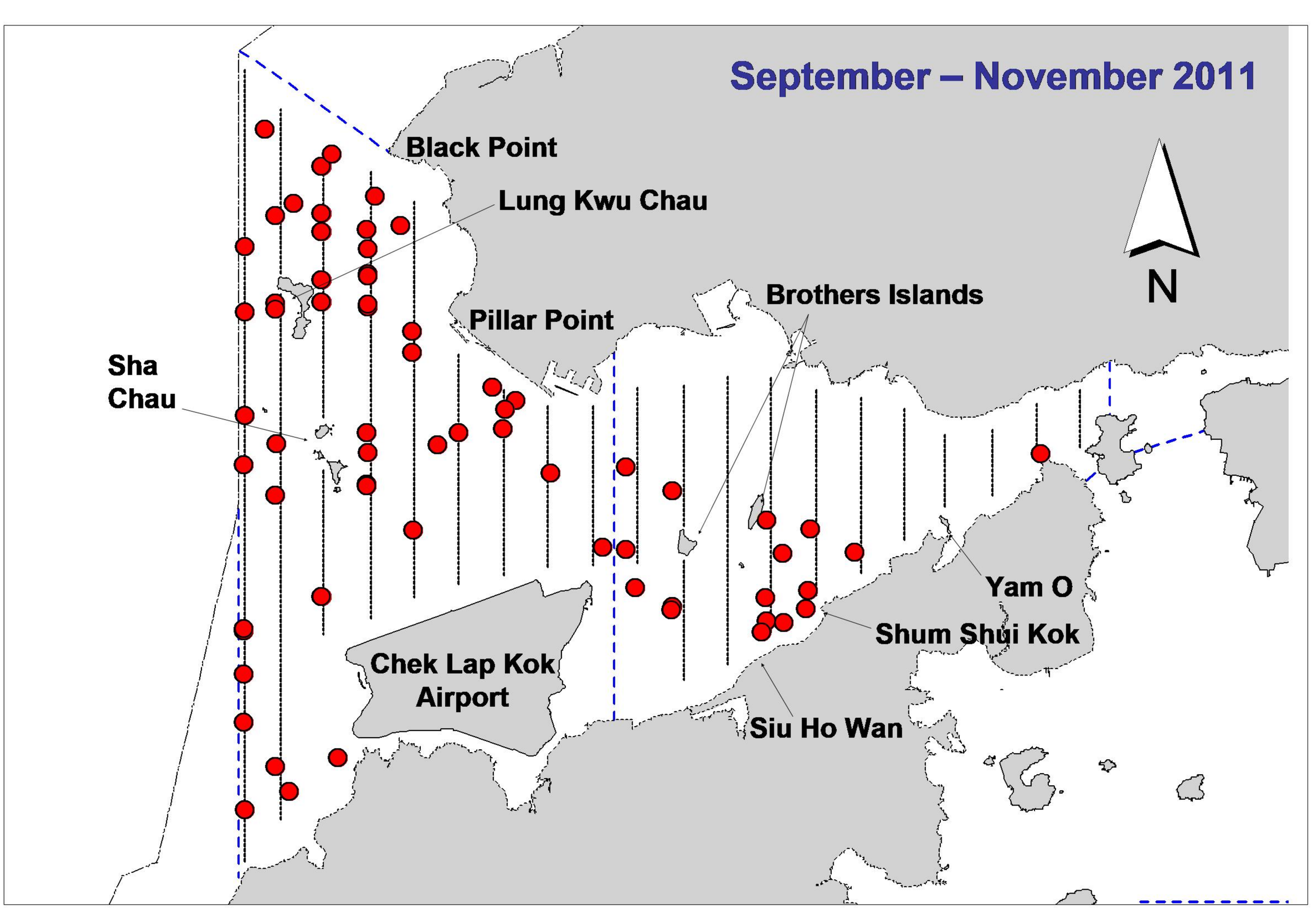


Figure 1. Distribution of Chinese white dolphin sighting in Northwest and Northeast Lantau during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

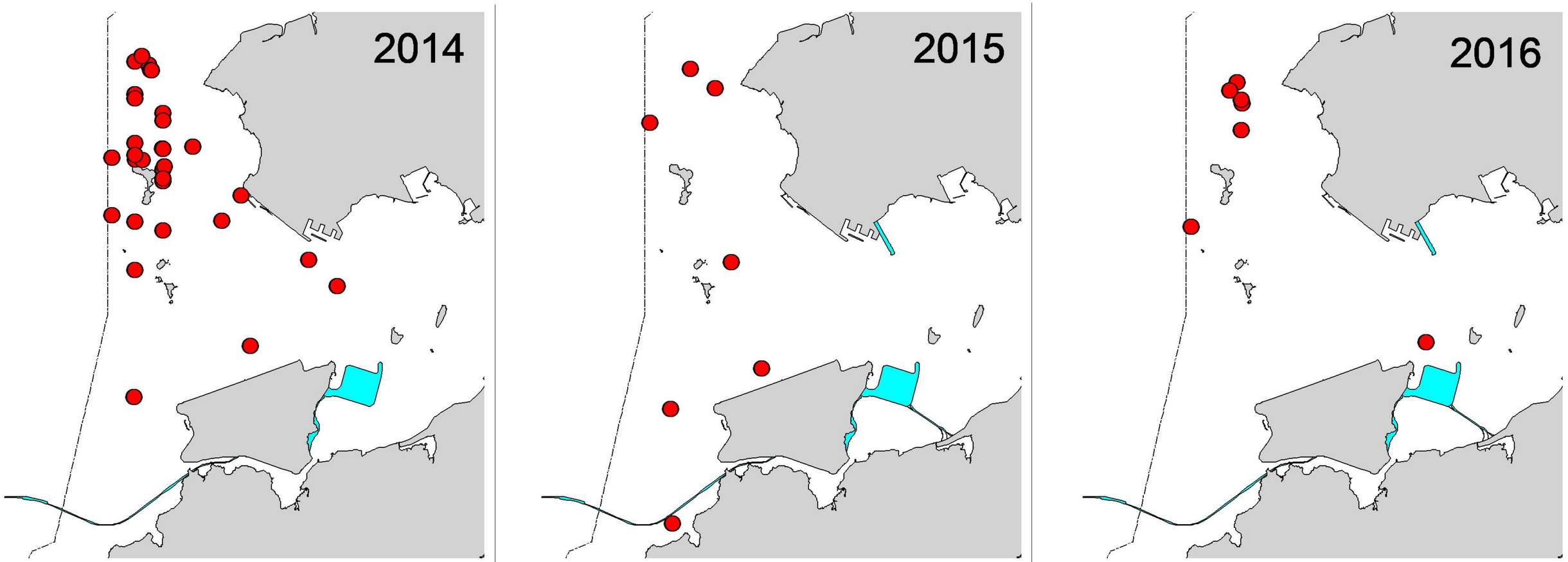


Figure 2. Distribution of Chinese white dolphin sightings in Northwest and Northeast Lantau during the past six spring quarters (March-May) of HKLR03 impact phase in 2014-19

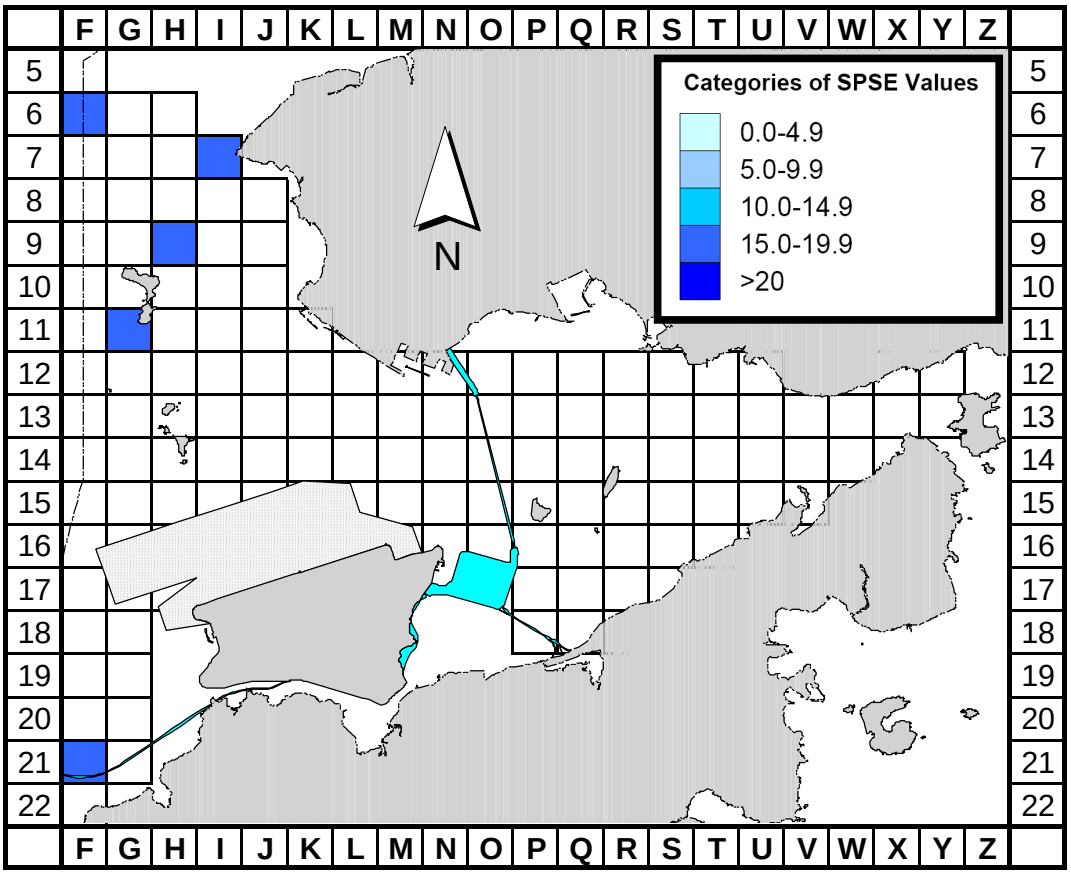


Figure 3a. Sighting density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period monitoring period (March-May 19) (SPSE = no. of on-effort sightings per 100 units of survey effort)

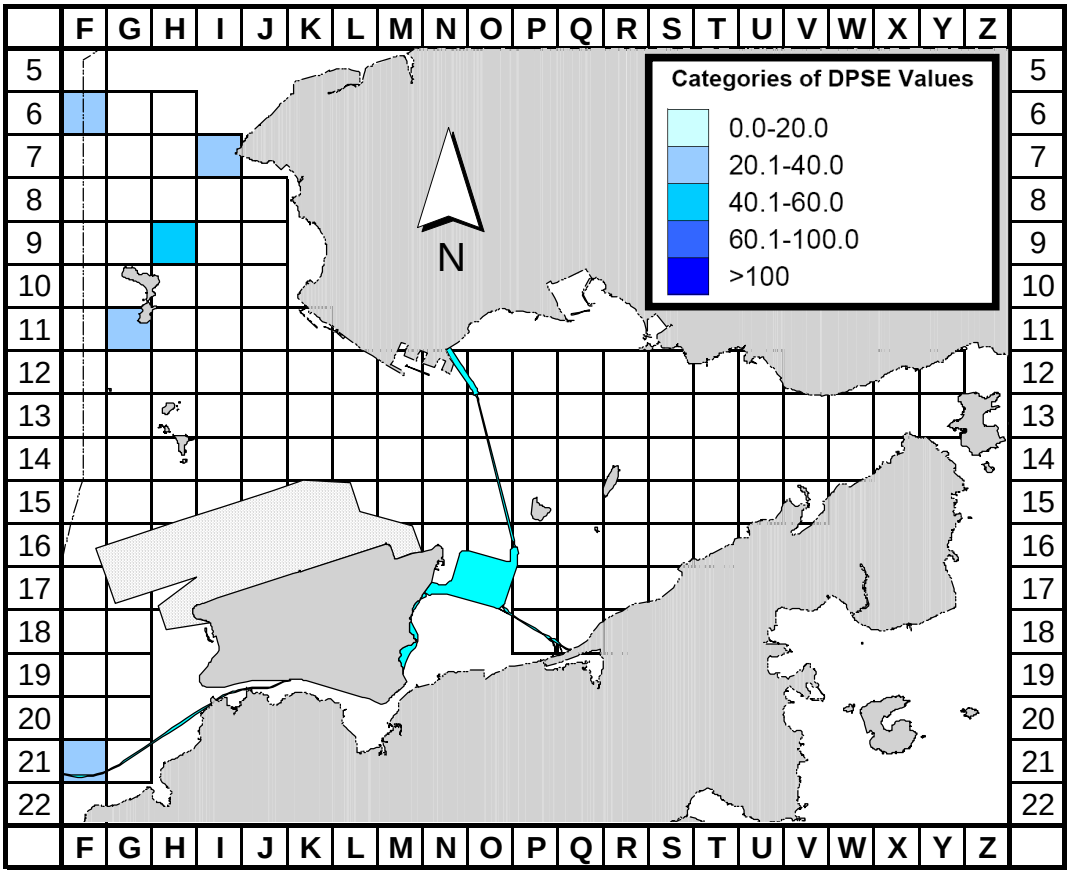


Figure 3b. Density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (March-May 19) (DPSE = no. of dolphins per 100 units of survey effort)

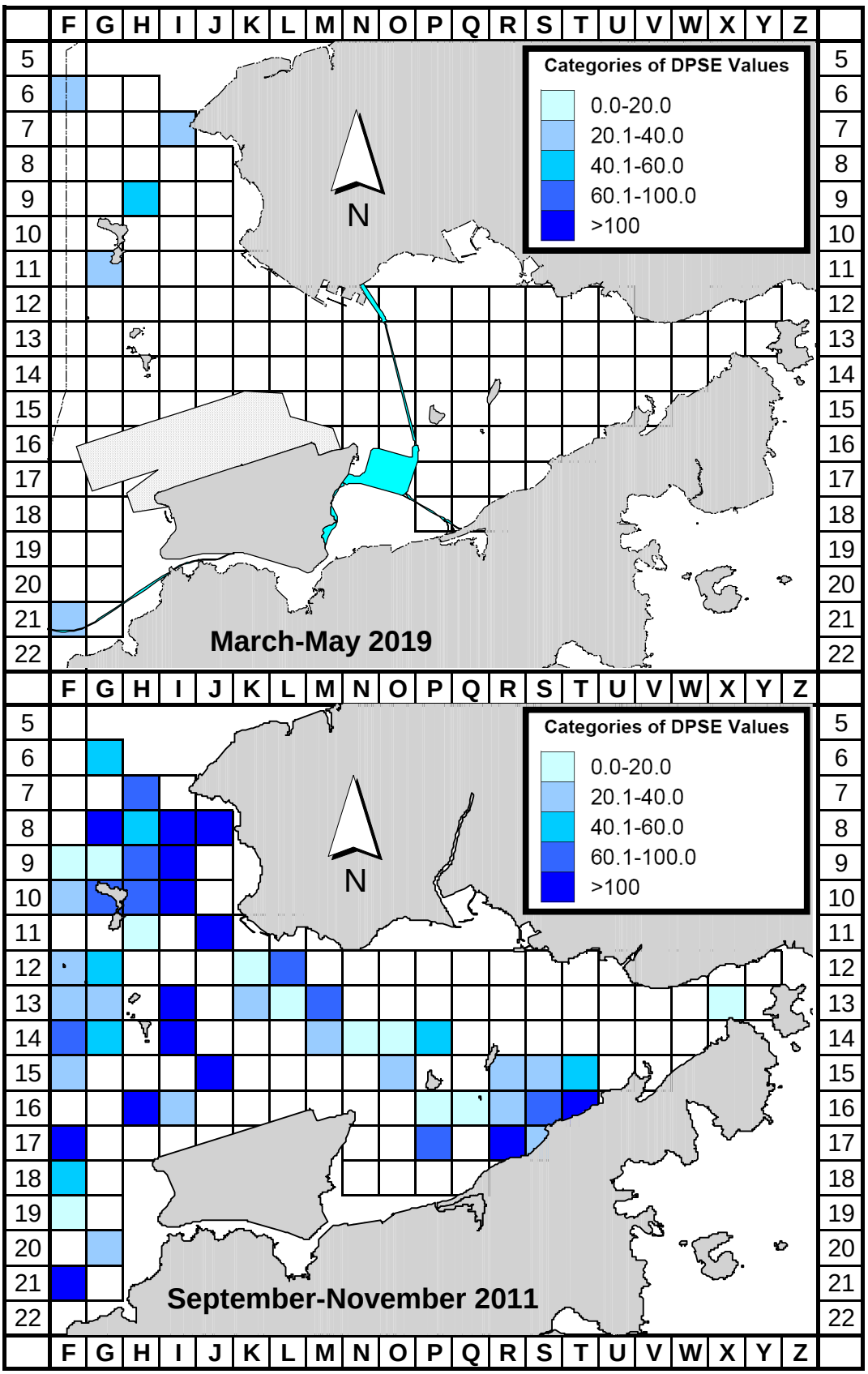


Figure 4. Comparison of density of Chinese white dolphins with corrected survey effort per km^2 in Northwest and Northeast Lantau survey area between the impact monitoring period (March - May 2019) and baseline monitoring period (September-November 2011)
(DPSE = no. of dolphins per 100 units of survey effort)

Appendix I. HKLR03 Survey Effort Database (March-May 2019)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
4-Mar-19	NW LANTAU	2	11.18	SPRING	STANDARD36826	HKLR	P
4-Mar-19	NW LANTAU	3	20.02	SPRING	STANDARD36826	HKLR	P
4-Mar-19	NW LANTAU	2	8.70	SPRING	STANDARD36826	HKLR	S
4-Mar-19	NW LANTAU	3	2.90	SPRING	STANDARD36826	HKLR	S
4-Mar-19	NE LANTAU	2	4.90	SPRING	STANDARD36826	HKLR	P
4-Mar-19	NE LANTAU	3	19.04	SPRING	STANDARD36826	HKLR	P
4-Mar-19	NE LANTAU	4	9.20	SPRING	STANDARD36826	HKLR	P
4-Mar-19	NE LANTAU	2	2.97	SPRING	STANDARD36826	HKLR	S
4-Mar-19	NE LANTAU	3	6.69	SPRING	STANDARD36826	HKLR	S
4-Mar-19	NE LANTAU	4	2.30	SPRING	STANDARD36826	HKLR	S
11-Mar-19	NW LANTAU	2	26.50	SPRING	STANDARD36826	HKLR	P
11-Mar-19	NW LANTAU	2	14.30	SPRING	STANDARD36826	HKLR	S
13-Mar-19	NW LANTAU	1	2.59	SPRING	STANDARD36826	HKLR	P
13-Mar-19	NW LANTAU	2	21.23	SPRING	STANDARD36826	HKLR	P
13-Mar-19	NW LANTAU	3	7.50	SPRING	STANDARD36826	HKLR	P
13-Mar-19	NW LANTAU	1	3.40	SPRING	STANDARD36826	HKLR	S
13-Mar-19	NW LANTAU	2	4.45	SPRING	STANDARD36826	HKLR	S
13-Mar-19	NW LANTAU	3	4.60	SPRING	STANDARD36826	HKLR	S
13-Mar-19	NE LANTAU	2	17.90	SPRING	STANDARD36826	HKLR	P
13-Mar-19	NE LANTAU	3	18.05	SPRING	STANDARD36826	HKLR	P
13-Mar-19	NE LANTAU	2	10.55	SPRING	STANDARD36826	HKLR	S
13-Mar-19	NE LANTAU	3	1.90	SPRING	STANDARD36826	HKLR	S
18-Mar-19	NW LANTAU	2	19.21	SPRING	STANDARD36826	HKLR	P
18-Mar-19	NW LANTAU	3	8.19	SPRING	STANDARD36826	HKLR	P
18-Mar-19	NW LANTAU	2	9.25	SPRING	STANDARD36826	HKLR	S
18-Mar-19	NW LANTAU	3	1.55	SPRING	STANDARD36826	HKLR	S
10-Apr-19	NE LANTAU	1	4.30	SPRING	STANDARD36826	HKLR	P
10-Apr-19	NE LANTAU	2	32.38	SPRING	STANDARD36826	HKLR	P
10-Apr-19	NE LANTAU	2	13.15	SPRING	STANDARD36826	HKLR	S
10-Apr-19	NE LANTAU	3	0.77	SPRING	STANDARD36826	HKLR	S
10-Apr-19	NW LANTAU	2	4.14	SPRING	STANDARD36826	HKLR	P
10-Apr-19	NW LANTAU	3	21.86	SPRING	STANDARD36826	HKLR	P
10-Apr-19	NW LANTAU	4	1.50	SPRING	STANDARD36826	HKLR	P
10-Apr-19	NW LANTAU	2	3.74	SPRING	STANDARD36826	HKLR	S
10-Apr-19	NW LANTAU	3	8.86	SPRING	STANDARD36826	HKLR	S
15-Apr-19	NW LANTAU	2	2.50	SPRING	STANDARD36826	HKLR	P
15-Apr-19	NW LANTAU	3	17.18	SPRING	STANDARD36826	HKLR	P
15-Apr-19	NW LANTAU	4	13.38	SPRING	STANDARD36826	HKLR	P
15-Apr-19	NW LANTAU	2	3.37	SPRING	STANDARD36826	HKLR	S
15-Apr-19	NW LANTAU	3	5.37	SPRING	STANDARD36826	HKLR	S
15-Apr-19	NW LANTAU	4	2.10	SPRING	STANDARD36826	HKLR	S
23-Apr-19	NW LANTAU	2	20.00	SPRING	STANDARD36826	HKLR	P
23-Apr-19	NW LANTAU	3	8.13	SPRING	STANDARD36826	HKLR	P
23-Apr-19	NW LANTAU	2	8.17	SPRING	STANDARD36826	HKLR	S
23-Apr-19	NW LANTAU	3	2.90	SPRING	STANDARD36826	HKLR	S
23-Apr-19	NE LANTAU	2	34.43	SPRING	STANDARD36826	HKLR	P
23-Apr-19	NE LANTAU	3	2.70	SPRING	STANDARD36826	HKLR	P
23-Apr-19	NE LANTAU	2	13.81	SPRING	STANDARD36826	HKLR	S
25-Apr-19	NW LANTAU	2	20.27	SPRING	STANDARD36826	HKLR	P
25-Apr-19	NW LANTAU	3	12.70	SPRING	STANDARD36826	HKLR	P
25-Apr-19	NW LANTAU	2	13.23	SPRING	STANDARD36826	HKLR	S

Appendix I. (cont'd)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
2-May-19	NW LANTAU	2	22.59	SPRING	STANDARD36826	HKLR	P
2-May-19	NW LANTAU	3	4.80	SPRING	STANDARD36826	HKLR	P
2-May-19	NW LANTAU	2	9.51	SPRING	STANDARD36826	HKLR	S
2-May-19	NW LANTAU	3	2.80	SPRING	STANDARD36826	HKLR	S
2-May-19	NE LANTAU	2	22.54	SPRING	STANDARD36826	HKLR	P
2-May-19	NE LANTAU	3	13.82	SPRING	STANDARD36826	HKLR	P
2-May-19	NE LANTAU	2	12.74	SPRING	STANDARD36826	HKLR	S
7-May-19	NW LANTAU	2	14.50	SPRING	STANDARD36826	HKLR	P
7-May-19	NW LANTAU	3	16.55	SPRING	STANDARD36826	HKLR	P
7-May-19	NW LANTAU	4	0.90	SPRING	STANDARD36826	HKLR	P
7-May-19	NW LANTAU	2	8.25	SPRING	STANDARD36826	HKLR	S
7-May-19	NW LANTAU	3	2.00	SPRING	STANDARD36826	HKLR	S
21-May-19	NE LANTAU	2	27.09	SPRING	STANDARD36826	HKLR	P
21-May-19	NE LANTAU	3	9.40	SPRING	STANDARD36826	HKLR	P
21-May-19	NE LANTAU	2	11.51	SPRING	STANDARD36826	HKLR	S
21-May-19	NE LANTAU	3	1.20	SPRING	STANDARD36826	HKLR	S
21-May-19	NW LANTAU	2	9.44	SPRING	STANDARD36826	HKLR	P
21-May-19	NW LANTAU	3	19.68	SPRING	STANDARD36826	HKLR	P
21-May-19	NW LANTAU	4	1.20	SPRING	STANDARD36826	HKLR	P
21-May-19	NW LANTAU	2	8.58	SPRING	STANDARD36826	HKLR	S
21-May-19	NW LANTAU	3	4.60	SPRING	STANDARD36826	HKLR	S
23-May-19	NW LANTAU	2	18.63	SPRING	STANDARD36826	HKLR	P
23-May-19	NW LANTAU	3	10.25	SPRING	STANDARD36826	HKLR	P
23-May-19	NW LANTAU	2	11.32	SPRING	STANDARD36826	HKLR	S
23-May-19	NW LANTAU	3	1.00	SPRING	STANDARD36826	HKLR	S

Appendix II. HKLR03 Chinese White Dolphin Sighting Database (March-May 2019)

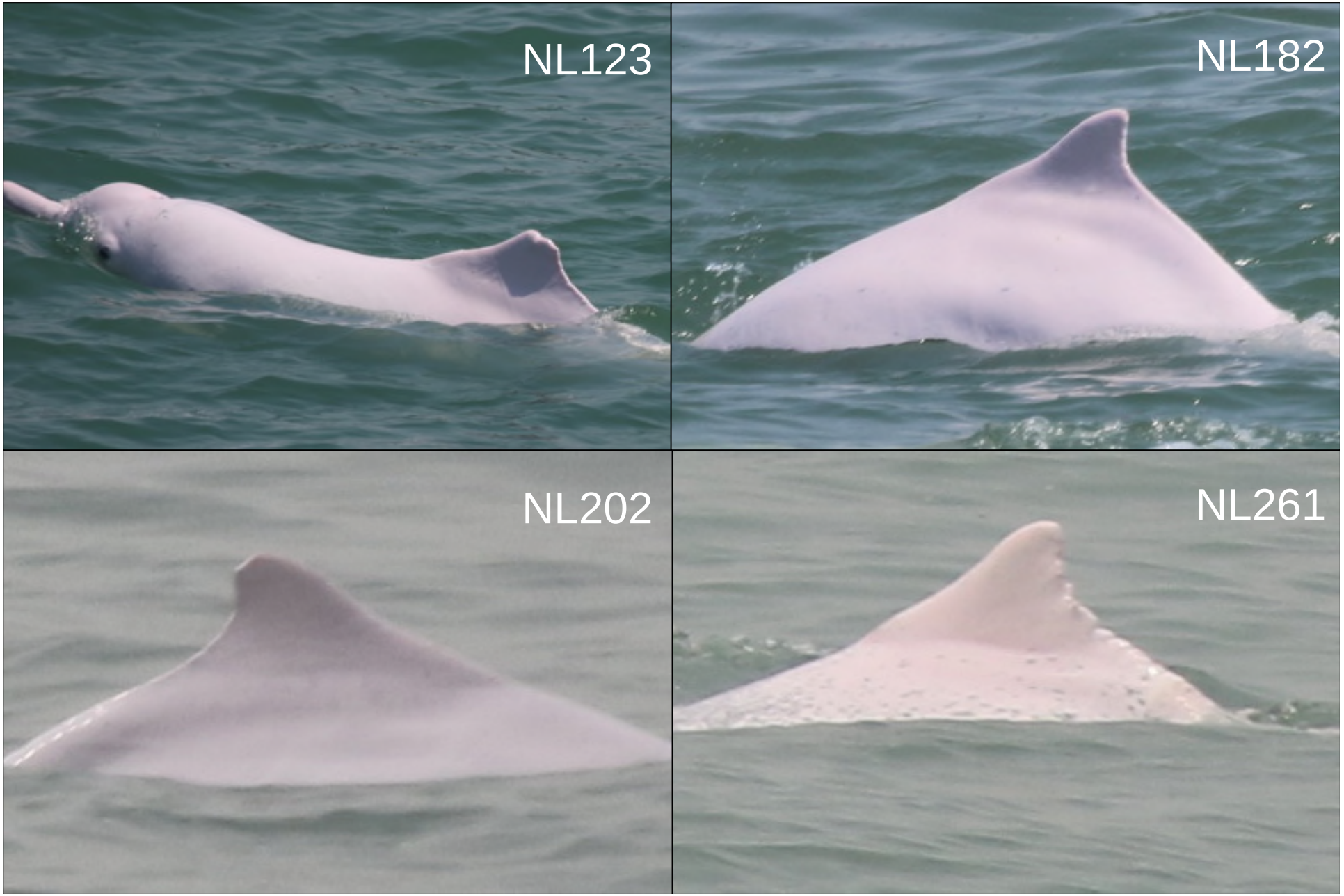
(Abberviations: STG# = Sighting Number; HRD SZ = Dolphin Herd Size; BEAU = Beaufort Sea State; PSD = Perpendicular Distance; BOAT ASSOC. = Fishing Boat Association; P/S: Sighting Made on Primary/Secondary Lines)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
13-Mar-19	1	1018	2	NW LANTAU	2	131	ON	HKLR	815946	804673	SPRING	NONE	P
13-Mar-19	2	1131	2	NW LANTAU	1	371	ON	HKLR	830873	804580	SPRING	NONE	P
18-Mar-19	1	1140	2	NW LANTAU	2	853	ON	HKLR	829406	807254	SPRING	NONE	S
23-Apr-19	1	1102	2	NW LANTAU	2	58	ON	HKLR	825168	805485	SPRING	NONE	P
7-May-19	1	1137	3	NW LANTAU	2	254	ON	HKLR	827293	806457	SPRING	NONE	P

Appendix III. Individual dolphins identified during HKLR03 monitoring surveys in March-May 2019

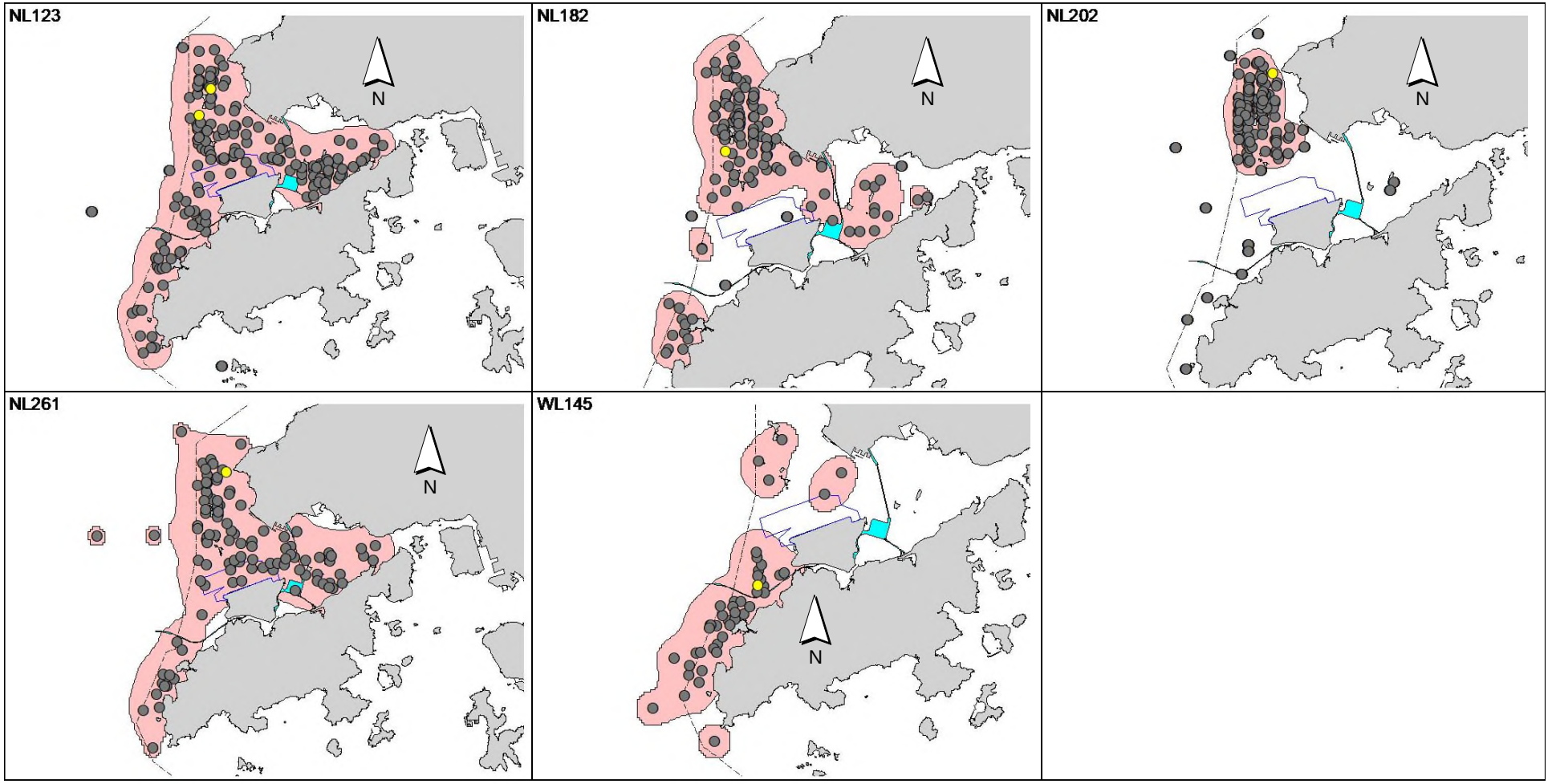
ID#	DATE	STG#	AREA
NL123	23/04/19	1	NW LANTAU
	07/05/19	1	NW LANTAU
NL182	23/04/19	1	NW LANTAU
NL202	18/03/19	1	NW LANTAU
NL261	18/03/19	1	NW LANTAU
WL145	13/03/19	1	NW LANTAU

Appendix IV. Five individual dolphins that were identified during March to May 2019 under HKLR03 impact phase monitoring surveys



Appendix IV. (cont’d)

Appendix V. Ranging patterns (95% kernel ranges) of five individual dolphins that were sighted during HKLR03 impact phase monitoring period (note: yellow dots indicate sightings made in March-May 2019 during HKLR03 monitoring surveys)



Appendix I

Event and Action Plan

Event and Action Plan for Impact Air Monitoring

	Action			
	ET [(a)]	**IEC [(a)]**	**SOR [(a)]**	**Contractor(s)**
Action Level Exceedance				
	1. Identify the source. 2. Repeat measurement to confirm finding. If two consecutive measurements exceed Action Level, the exceedance is then confirmed. 3. Inform the IEC and the SOR. 4. Investigate the cause of exceedance and check Contractor's working procedures to determine possible mitigation to be implemented. 5. If the exceedance is confirmed to be Project related after investigation, increase monitoring frequency to daily. 6. Discuss with the IEC and the Contractor on remedial actions required. 7. If exceedance continues, arrange meeting with the IEC and the SOR. 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET. 2. Check the Contractor's working method. 3. If the exceedance is confirmed to be Project related after investigation, discuss with the ET and the Contractor on possible remedial measures. 4. Advise the SOR on the effectiveness of the proposed remedial measures. 5. Supervise implementation of remedial measures.	1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. Ensure remedial measures properly implemented.	1. Rectify any unacceptable practice 2. Amend working methods if appropriate 3. If the exceedance is confirmed to be Project related, submit proposals for remedial actions to IEC within 3 working days of notification 4. Implement the agreed proposals 5. Amend proposal if appropriate

	Action			
	ET [(a)]	**IEC [(a)]**	**SOR [(a)]**	**Contractor(s)**
Limit Level Exceedance				
	1. Identify the source. 2. Repeat measurement to confirm finding. If two consecutive measurements exceed Limit Level, the exceedance is then confirmed. 3. Inform the IEC, the SOR, the DEP and the Contractor. 4. Investigate the cause of exceedance and check Contractor's working procedures to determine possible mitigation to be implemented. 5. If the exceedance is confirmed to be Project related after investigation, increase monitoring frequency to daily. 6. Carry out analysis of the Contractor's working procedures to determine possible mitigation to be implemented. 7. Arrange meeting with the IEC and the SOR to discuss the remedial actions to be taken. 8. Assess effectiveness of the Contractor's remedial actions and keep the IEC, the DEP and the SOR informed of the results. 9. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET. 2. Check Contractor's working method. 3. If the exceedance is confirmed to be Project related after investigation, discuss with the ET and the Contractor on possible remedial measures. 4. Advise the SOR on the effectiveness of the proposed remedial measures. 5. Supervise implementation of remedial measures.	1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. If the exceedance is confirmed to be Project related after investigation, in consultation with the IEC, agree with the Contractor on the remedial measures to be implemented. 4. Ensure remedial measures are properly implemented. 5. If exceedance continues, consider what activity of the work is responsible and instruct the Contractor to stop that activity of work until the exceedance is abated.	1. Take immediate action to avoid further exceedance. 2. If the exceedance is confirmed to be Project related after investigation, submit proposals for remedial actions to IEC within 3 working days of notification. 3. Implement the agreed proposals. 4. Amend proposal if appropriate. 5. Stop the relevant activity of works as determined by the SOR until the exceedance is abated.

Note: (a) ET – Environmental Team; IEC – Independent Environmental Checker; SOR – Supervising Officer's Representative

Event & Action Plan for Impact Water Quality Monitoring

Event	ET Leader	IEC	SOR	Contractor
Action level being exceeded by one sampling day	1. Repeat *in situ* measurement on next day of exceedance to confirm findings; 2. Identify source(s) of impact; 3. Inform IEC, contractor and SOR; 4. Check monitoring data, all plant, equipment and Contractor's working methods.	1. Check monitoring data submitted by ET and Contractor's working methods.	1. Confirm receipt of notification of non-compliance in writing; 2. Notify Contractor.	1. Inform the SOR and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Amend working methods if appropriate.
Action level being exceeded by two or more consecutive sampling days	1. Repeat measurement on next day of exceedance to confirm findings; 2. Identify source(s) of impact; 3. Inform IEC, Contractor, SOR and EPD; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, SOR and Contractor; 6. Ensure mitigation measures are implemented; 7. Increase the monitoring frequency to daily until no exceedance of Action level;	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 SOR accordingly; 4. Supervise the implementation of mitigation measures.	1. Discuss with IEC on the proposed mitigation measures; 2. Ensure mitigation measures are properly implemented; 3. Assess the effectiveness of the implemented mitigation measures.	1. Inform the Supervising Officer 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 additional mitigation measures to SOR within 3 working days of notification and discuss with ET, IEC and SOR; 5. Implement the agreed mitigation measures.
Limit level being exceeded by one sampling day	1. Repeat measurement on next day of exceedance to confirm findings;	1. Check monitoring data submitted by ET and	1. Confirm receipt of notification of failure in	1. Inform the SOR and confirm notification of the

Event	ET Leader	IEC	SOR	Contractor
	2. Identify source(s) of impact; 3. Inform IEC, Contractor, SOR and EPD; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, SOR and Contractor;	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 SOR accordingly.	writing; 2. Discuss with IEC, ET and Contractor on the proposed mitigation measures; 3. Request Contractor to review the working methods.	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 SOR within 3 working days of notification and discuss with ET, IEC and SOR.
Limit level being exceeded by two or more consecutive sampling days	1. Repeat measurement on next day of exceedance to confirm findings; 2. Identify source(s) of impact; 3. Inform IEC, contractor, SOR and EPD; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, SOR 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;	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 SOR accordingly; 4. Supervise the implementation of mitigation measures.	1. Discuss with IEC, ET and Contractor on the proposed mitigation measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the mitigation measures to be implemented; 4. Ensure mitigation measures are properly implemented; 5. 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.	1. Take immediate action to avoid further exceedance; 2. Submit proposal of mitigation measures to SOR within 3 working days of notification and discuss with ET, IEC and SOR; 3. Implement the agreed mitigation measures; 4. Resubmit proposals of mitigation measures if problem still not under control; 5. As directed by the Supervising Officer, to slow down or to stop all or part of the construction activities until no exceedance of Limit level.

Note: ET – Environmental Team, IEC – Independent Environmental Checker, SOR – Supervising Officer's Representative

Event / Action Plan for Impact Dolphin Monitoring

EVENT	ACTION			
	ET	**IEC**	**SOR**	**Contractor**
Action Level	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, 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.	1. Check monitoring data submitted by ET and Contractor; 2. Discuss monitoring results and finding with the ET and the Contractor.	1. Discuss monitoring with the IEC and any other measures proposed by the ET; 2. If SOR is satisfied with the proposal of any other measures, SOR to signify the agreement in writing on the measures to be implemented.	1. Inform the 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 SOR; 3. Implement the agreed measures.
Limit Level	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;	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, SOR and	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 SOR is satisfied with the	1. Inform the SOR and confirm notification of the non-compliance in writing; 2. Attend the meeting to discuss with ET, IEC and SOR the necessity of additional dolphin monitoring and any other

EVENT	ACTION			
	ET	**IEC**	**SOR**	**Contractor**
	3. Identify source(s) of impact; 4. Inform the IEC, 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, 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.	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 SOR of the results and findings accordingly. 5. Supervise / Audit the implementation of additional monitoring and/or any other mitigation measures and advise SOR the results and findings accordingly.	proposals for additional dolphin monitoring and/or any other mitigation measures submitted by ET and Contractor and verified by IEC, 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.	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.

Note: ET – Environmental Team, IEC – Independent Environmental Checker, SOR – Supervising Officer's Representative

Appendix J

Cumulative Statistics on Exceedances, Complaints, Notifications of Summons and Successful Prosecutions

Table J1 *Cumulative Statistics on Exceedances*

Monitoring Parameters	Action/Limit Level	Total No. recorded in this reporting quarter	Total No. recorded since Contract commencement
1-Hr TSP	Action	4	91
	Limit	0	6
24-Hr TSP	Action	1	10
	Limit	0	4
Water Quality	Action	2	22
	Limit	0	1
Impact Dolphin Monitoring	Action	0	11
	Limit	1	15

Table J2 *Cumulative Statistics on Complaints, Notifications of Summons and Successful Prosecutions*

Reporting Period	Cumulative Statistics		
	Complaints	Notifications of Summons	Successful Prosecutions
This Reporting Period (March to May 2019)	0	0	0
Total No. received since Contract commencement	16	1	0

Email message

Environmental Resources Management

2507, 25/F One Harbourfront
18 Tak Fung Street
Hunghom, Kowloon
Hong Kong
Telephone: (852) 2271 3000
Facsimile: (852) 2723 5660

To	Ramboll Hong Kong, Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Air Quality Impact Monitoring
Date	3 April 2019

ERM

Dear Sir or Madam,

Please find attached the Notification of Exceedance (NOE) of the following Log no.:

0212330_27March2019_1hrTSP_Station ASR1

One Action Level Exceedance was recorded on 27 March 2019.

Regards,

Dr Jasmine Ng
Environmental Team Leader

ERM-Hong Kong, Limited

CONTRACT NO. HY/2012/08
TUEN MUN – CHEK LAP KOK LINK – NORTHERN CONNECTION SUB-SEA TUNNEL SECTION

Air Quality Impact Monitoring
Notification of Exceedance

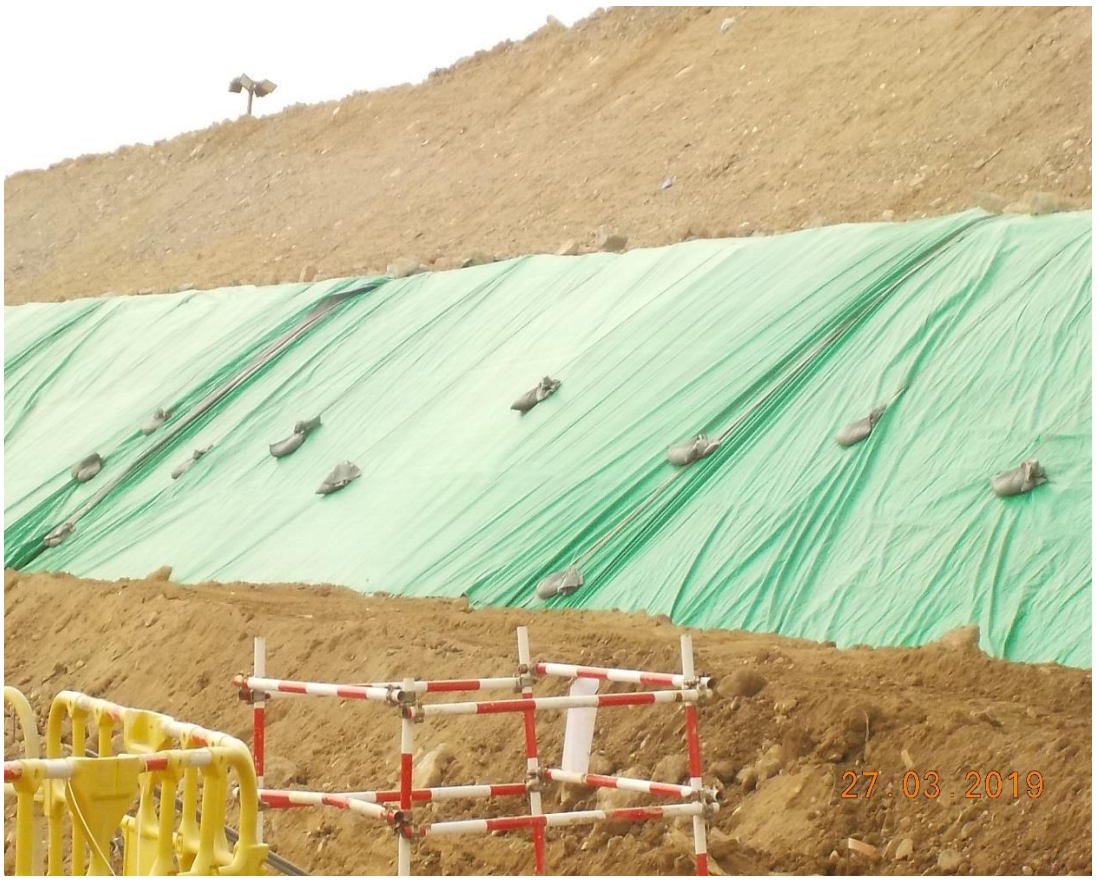
Log No.	**0212330_27March2019_1hrTSP_Station ASR1** **[Total No. of Exceedances = 1]**	
Date	27 March 2019 (Measured) 3 April 2019 (Laboratory results received by ERM)	
Monitoring Station	ASR1, ASR5, ASR6, ASR10 and AQMS1	
Parameter(s) with Exceedance(s)	1-hr TSP	
Action Levels	24-hr TSP (µg/m³)	ASR1 = 213 ASR5 = 238 AQMS1 = 213 ASR6 = 238 ASR10 = 214
	1-hr TSP (µg/m³)	ASR1 = 331 ASR5 = 340 AQMS1 = 335 ASR6 = 338 ASR10 = 337
Limit Levels	1-hr TSP (µg/m³)	500
	24-hr TSP (µg/m³)	260
Measured Levels	Action Level Exceedance for 1-hr TSP is observed at ASR1 (412 µg/m3) during 1333 – 1433 hrs.	
Works Undertaken (at the time of monitoring event)	On 27 March 2019, TBM tunnel works was carried out at tunnel portion and RC structure construction was carried out at Portion N-A.	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedance is unlikely to be due to this Contract, in view of the following: • According to the construction information provided by the Contractor, the majority of construction works on 27 March 2019 was TBM tunnel works and RC structure construction at Portion N-A. During the period of the land-based construction works, the Contractor has implemented the required mitigation measures as per the EP, approved EIA and Updated EM&A Manual (e.g. water spraying on exposed soil within the Project site and associated works areas; exposed soil covered by tarpaulin sheets). • The exceedance is unlikely to be due to this Contract as dust suppression measures were implemented properly on site. Water spraying was applied on site to prevent dust. • Recorded wind speed during the works period was zero. Dust generated from the construction works, if any, will be localized within the site area and was not likely to be dispersed to station ASR1. Based on the above, the exceedance is unlikely to be due to this Contract.	

Actions Taken / To Be Taken	Site inspection was carried out on 27 March 2019. Dust suppression measures were properly implemented. Water spraying was applied to prevent dust. Exposed soil was covered by tarpaulin sheets to prevent dust. Photos are provided in Annex A. The Contractor has been reminded to implement the required mitigation measures as per the EP, approved EIA and Updated EM&A Manual including watering to maintain all exposed road surfaces and dust sources wet, use of sprinklers for water spraying, covering the materials having the potential to create dust by clean tarpaulin, use of water truck and watering on all exposed soil within the Project site throughout the construction period.
Remarks	The monitoring results, wind data and the locations of air quality monitoring stations are attached.

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 27/3/2019



Exposed soil was covered by tarpaulin sheet to prevent dust. (Works Area Portion N-C)

Water spraying was applied at the main haul road to prevent dust. (Works Area Portion N-A)

Air quality monitoring results on 27/3/2019								
Project	Works	Date	Station	Weather	Start time	Parameters	Results	Unit
TMCLKL	HY/2012/08	27/3/2019	AQMS1	Sunny	13:44	1-hour TSP	136	ug/m3
TMCLKL	HY/2012/08	27/3/2019	AQMS1	Sunny	14:46	1-hour TSP	165	ug/m3
TMCLKL	HY/2012/08	27/3/2019	AQMS1	Sunny	15:48	1-hour TSP	114	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR1	Sunny	13:33	1-hour TSP	412	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR1	Sunny	14:35	1-hour TSP	213	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR1	Sunny	15:37	1-hour TSP	274	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR10	Sunny	13:01	1-hour TSP	86	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR10	Sunny	14:03	1-hour TSP	43	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR10	Sunny	15:05	1-hour TSP	51	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR5	Sunny	13:22	1-hour TSP	121	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR5	Sunny	14:24	1-hour TSP	93	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR5	Sunny	15:26	1-hour TSP	102	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR6	Sunny	13:11	1-hour TSP	110	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR6	Sunny	14:13	1-hour TSP	88	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR6	Sunny	15:15	1-hour TSP	76	ug/m3
TMCLKL	HY/2012/08	27/3/2019	AQMS1	Sunny	16:50	24-hour TSP	67	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR1	Sunny	16:39	24-hour TSP	129	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR10	Sunny	16:07	24-hour TSP	48	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR5	Sunny	16:28	24-hour TSP	108	ug/m3
TMCLKL	HY/2012/08	27/3/2019	ASR6	Sunny	16:17	24-hour TSP	73	ug/m3

Meteorological Data for Impact Monitoring in the reporting period			
Date (yy-mm-dd)	**Time (24hrs)**	**Average of Wind Speed (m/s)**	**Average of Wind Direction(degree)**
19/03/27	0:00	0.4	95
19/03/27	1:00	0	-
19/03/27	2:00	0.4	68
19/03/27	3:00	0	-
19/03/27	4:00	0	-
19/03/27	5:00	0	-
19/03/27	6:00	0	-
19/03/27	7:00	1.3	96
19/03/27	8:00	1.3	101
19/03/27	9:00	0	-
19/03/27	10:00	0.4	109
19/03/27	11:00	0	-
19/03/27	12:00	0	-
19/03/27	13:00	0	-
19/03/27	14:00	0	-
19/03/27	15:00	0	-
19/03/27	16:00	0	-
19/03/27	17:00	0	-
19/03/27	18:00	0	-
19/03/27	19:00	0	-
19/03/27	20:00	0	-
19/03/27	21:00	0	-
19/03/27	22:00	0	-
19/03/27	23:00	0	-

Dragages - Bouygues Joint Venture 達基 - 布依格聯營	Contract No. HY/2012/08 Tuen Mun – Chek Lap Kok Link Northern Connection Sub-sea Tunnel Section	**Weekly Water Spraying Record** **每週灑水檢查記錄**

Site Location 地盤位置: Northern Landfall

Date 日期: 25 Mar 2019 to 至 31 Mar 2019

	Time 時間	Monday 星期一	Tuesday 星期二	Wednesday 星期三	Thursday 星期四	Friday 星期五	Saturday 星期六	Sunday 星期日
1	8:00 – 8:45	—	—	—	—	—	—	—
2	8:45 – 9:30	—	—	—	—	—	—	—
3	9:30 – 10:15	—	—	—	—	—	—	—
4	10:15 – 11:00	—	—	—	—	—	—	—
5	11:00 – 11:45	—	—	—	—	—	—	—
6	11:45 – 12:30	—	—	—	—	—	—	—
7	12:30 – 13:15	—	—	—	—	—	—	—
8	13:15 – 14:00	—	—	—	—	—	—	
9	14:00 – 14:45	—	—	—	—	—	—	—
10	14:45 – 15:30	—	—	—	—	—	—	—
11	15:30 – 16:45	—	—	—	—	—	—	—
12	16:45 – 17:30	—	—	—	—	—	—	—
	Verified by Site Foreman 地盤科文簽署確認	7	7	7	7	7	7	7

Night shift 夜間工作 (if necessary 如需要)								
	17:30 – 19:00							
	19:00 – 20:30							
	20:30 – 22:00							
	22:00 – 23:00							

*Please - tick (√) in the box if complete the spraying of water.
circle (O) in the box if it is raining.

*如果 - 已經完成灑水, 請於方格內加上剔號(√)。
是下雨天, 請於方格內加上圓圈(O)。

Remarks:

(1) Pursuant to EP Clause 3.15, the Permit Holder shall undertake watering at least 12 times per day on all exposed soil within the Project site and associated work areas in Tuen Mun area throughout the construction phase.
(2) Spraying position includes the main haul road, open area, slopes, stockpiles and any other dusty materials.
(3) If it is raining, no water spraying is needed.
(4) The no of spraying will be increased due to site condition.

備註:

(1) 根據環境許可證 3.15 條例，在整個施工階段內，許可證持有人須每天至少 12 次在屯門區項目工地和相關的工作區域內的所有暴露土壤灑水。
(2) 灑水位置包括主要運輸道路，空曠地帶，斜坡，存料堆，以及任何其他產生塵埃物料。
(3) 當下雨時，地盤將不需要灑水。
(4) 如果地盤情況更改或有需要時，灑水次數會相應增加。

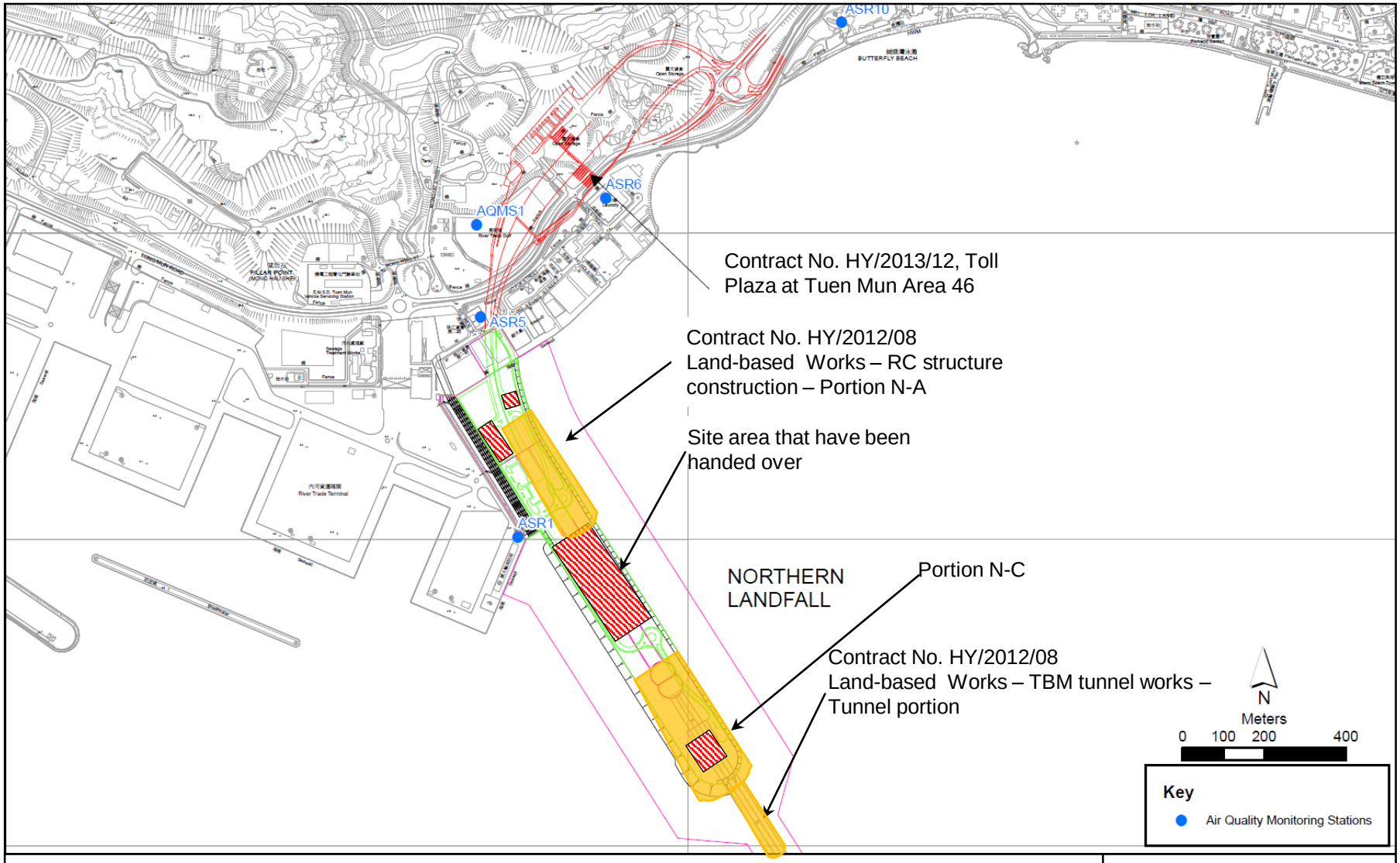


Figure 1

Indicative Construction Works Area on 27 March 2019

DATE: 06/03/2013

Environmental Resources Management

ERM

Email message

Environmental Resources Management

2507, 25/F One Harbourfront
18 Tak Fung Street
Hunghom, Kowloon
Hong Kong
Telephone: (852) 2271 3000
Facsimile: (852) 2723 5660

To	Ramboll Hong Kong, Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Air Quality Impact Monitoring
Date	9 April 2019

ERM

Dear Sir or Madam,

Please find attached the Notification of Exceedance (NOE) of the following Log no.:

0212330_30March2019_1hrTSP_Station ASR1

One Action Level Exceedance was recorded on 30 March 2019.

Regards,

Dr Jasmine Ng
Environmental Team Leader

ERM-Hong Kong, Limited

CONTRACT NO. HY/2012/08
TUEN MUN – CHEK LAP KOK LINK – NORTHERN CONNECTION SUB-SEA TUNNEL SECTION

Air Quality Impact Monitoring
Notification of Exceedance

Log No.	**0212330_30March2019_1hrTSP_Station ASR1** **[Total No. of Exceedances = 1]**	
Date	30 March 2019 (Measured) 9 April 2019 (Laboratory results received by ERM)	
Monitoring Station	ASR1, ASR5, ASR6, ASR10 and AQMS1	
Parameter(s) with Exceedance(s)	1-hr TSP	
Action Levels	24-hr TSP (µg/m³)	ASR1 = 213 ASR5 = 238 AQMS1 = 213 ASR6 = 238 ASR10 = 214
	1-hr TSP (µg/m³)	ASR1 = 331 ASR5 = 340 AQMS1 = 335 ASR6 = 338 ASR10 = 337
Limit Levels	1-hr TSP (µg/m³)	500
	24-hr TSP (µg/m³)	260
Measured Levels	Action Level Exceedance for 1-hr TSP is observed at ASR1 (374 µg/m3) during 1048 – 1148 hrs.	
Works Undertaken (at the time of monitoring event)	On 30 March 2019, TBM tunnel works was carried out at tunnel portion and RC structure construction was carried out at Portion N-A.	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedance is unlikely to be due to this Contract, in view of the following: • According to the construction information provided by the Contractor, the majority of construction works on 30 March 2019 was TBM tunnel works and RC structure construction at Portion N-A. During the period of the land-based construction works, the Contractor has implemented the required mitigation measures as per the EP, approved EIA and Updated EM&A Manual (e.g. water spraying on exposed soil within the Project site and associated works areas; exposed soil covered by tarpaulin sheets). • The exceedance is unlikely to be due to this Contract as dust suppression measures were implemented properly on site. Water spraying was applied on site to prevent dust. • With reference to the recorded wind direction (ranged between 110° and 114°, blowing from an easterly direction) and wind speed (1.8 m/s) during the works period, Stations ASR1 are located downstream to the construction works at Portion N-A. Based on the above, the exceedance is unlikely to be due to this Contract.	

Actions Taken / To Be Taken	According to the photo record provided by the Contractor, dust suppression measures were properly implemented. Water spraying was applied to prevent dust. Exposed soil was covered by tarpaulin sheets to prevent dust. Photos are provided in Annex A. The Contractor has been reminded to implement the required mitigation measures as per the EP, approved EIA and Updated EM&A Manual including watering to maintain all exposed road surfaces and dust sources wet, use of sprinklers for water spraying, covering the materials having the potential to create dust by clean tarpaulin, use of water truck and watering on all exposed soil within the Project site throughout the construction period.
Remarks	The monitoring results, wind data and the locations of air quality monitoring stations are attached.

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 30/3/2019

Exposed soil was covered by tarpaulin sheet to prevent dust. (Works Area Portion N-C)

Water spraying was applied at the main haul road to prevent dust. (Works Area Portion N-A)

Air quality monitoring results on 30/3/2019								
Project	Works	Date	Station	Weather	Start time	Parameters	Results	Unit
TMCLKL	HY/2012/08	30/3/2019	AQMS1	Cloudy	8:55	1-hour TSP	56	ug/m3
TMCLKL	HY/2012/08	30/3/2019	AQMS1	Cloudy	9:57	1-hour TSP	128	ug/m3
TMCLKL	HY/2012/08	30/3/2019	AQMS1	Cloudy	10:59	1-hour TSP	165	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR1	Cloudy	8:44	1-hour TSP	34	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR1	Cloudy	9:46	1-hour TSP	122	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR1	Cloudy	10:48	1-hour TSP	374	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR10	Cloudy	8:10	1-hour TSP	51	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR10	Cloudy	9:12	1-hour TSP	32	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR10	Cloudy	10:14	1-hour TSP	56	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR5	Cloudy	8:32	1-hour TSP	142	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR5	Cloudy	9:34	1-hour TSP	192	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR5	Cloudy	10:36	1-hour TSP	121	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR6	Cloudy	8:20	1-hour TSP	86	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR6	Cloudy	9:22	1-hour TSP	124	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR6	Cloudy	10:24	1-hour TSP	92	ug/m3
TMCLKL	HY/2012/08	30/3/2019	AQMS1	Cloudy	12:01	24-hour TSP	64	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR1	Cloudy	11:50	24-hour TSP	186	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR10	Cloudy	11:16	24-hour TSP	52	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR5	Cloudy	11:38	24-hour TSP	69	ug/m3
TMCLKL	HY/2012/08	30/3/2019	ASR6	Cloudy	11:26	24-hour TSP	66	ug/m3

Meteorological Data for Impact Monitoring in the reporting period			
Date (yy-mm-dd)	**Time (24hrs)**	**Average of Wind Speed (m/s)**	**Average of Wind Direction(degree)**
19/03/30	0:00	0	-
19/03/30	1:00	0	-
19/03/30	2:00	0	-
19/03/30	3:00	0	-
19/03/30	4:00	0	-
19/03/30	5:00	0	-
19/03/30	6:00	0	-
19/03/30	7:00	0	-
19/03/30	8:00	0	-
19/03/30	9:00	0	-
19/03/30	10:00	1.8	110
19/03/30	11:00	1.8	114
19/03/30	12:00	0.9	119
19/03/30	13:00	2.2	105
19/03/30	14:00	0.9	113
19/03/30	15:00	2.7	108
19/03/30	16:00	2.7	109
19/03/30	17:00	2.2	103
19/03/30	18:00	1.8	121
19/03/30	19:00	1.3	120
19/03/30	20:00	0	-
19/03/30	21:00	0.4	101
19/03/30	22:00	0.4	83
19/03/30	23:00	0.4	81

Dragages - Bouygues Joint Venture 達基 - 布依格聯營	Contract No. HY/2012/08 Tuen Mun – Chek Lap Kok Link Northern Connection Sub-sea Tunnel Section	**Weekly Water Spraying Record** **每週灑水檢查記錄**

Site Location 地盤位置: Northern Landfall

Date 日期: 25 Mar 2019 to 至 31 Mar 2019

	Time 時間	Monday 星期一	Tuesday 星期二	Wednesday 星期三	Thursday 星期四	Friday 星期五	Saturday 星期六	Sunday 星期日
1	8:00 – 8:45	—	—	—	—	—	—	—
2	8:45 – 9:30	—	—	—	—	—	—	—
3	9:30 – 10:15	—	—	—	—	—	—	—
4	10:15 – 11:00	—	—	—	—	—	—	—
5	11:00 – 11:45	—	—	—	—	—	—	—
6	11:45 – 12:30	—	—	—	—	—	—	—
7	12:30 – 13:15	—	—	—	—	—	—	—
8	13:15 – 14:00	—	—	—	—	—	—	
9	14:00 – 14:45	—	—	—	—	—	—	—
10	14:45 – 15:30	—	—	—	—	—	—	—
11	15:30 – 16:45	—	—	—	—	—	—	—
12	16:45 – 17:30	—	—	—	—	—	—	—
	Verified by Site Foreman 地盤科文簽署確認	7	7	7	7	7	7	7

Night shift 夜間工作 (if necessary 如需要)								
	17:30 – 19:00							
	19:00 – 20:30							
	20:30 – 22:00							
	22:00 – 23:00							

*Please - tick (√) in the box if complete the spraying of water.
circle (O) in the box if it is raining.

*如果 - 已經完成灑水, 請於方格內加上剔號(√)。
是下雨天, 請於方格內加上圓圈(O)。

Remarks:

(1) Pursuant to EP Clause 3.15, the Permit Holder shall undertake watering at least 12 times per day on all exposed soil within the Project site and associated work areas in Tuen Mun area throughout the construction phase.
(2) Spraying position includes the main haul road, open area, slopes, stockpiles and any other dusty materials.
(3) If it is raining, no water spraying is needed.
(4) The no of spraying will be increased due to site condition.

備註:

(1) 根據環境許可證 3.15 條例，在整個施工階段內，許可證持有人須每天至少 12 次在屯門區項目工地和相關的工作區域內的所有暴露土壤灑水。
(2) 灑水位置包括主要運輸道路，空曠地帶，斜坡，存料堆，以及任何其他產生塵埃物料。
(3) 當下雨時，地盤將不需要灑水。
(4) 如果地盤情況更改或有需要時，灑水次數會相應增加。

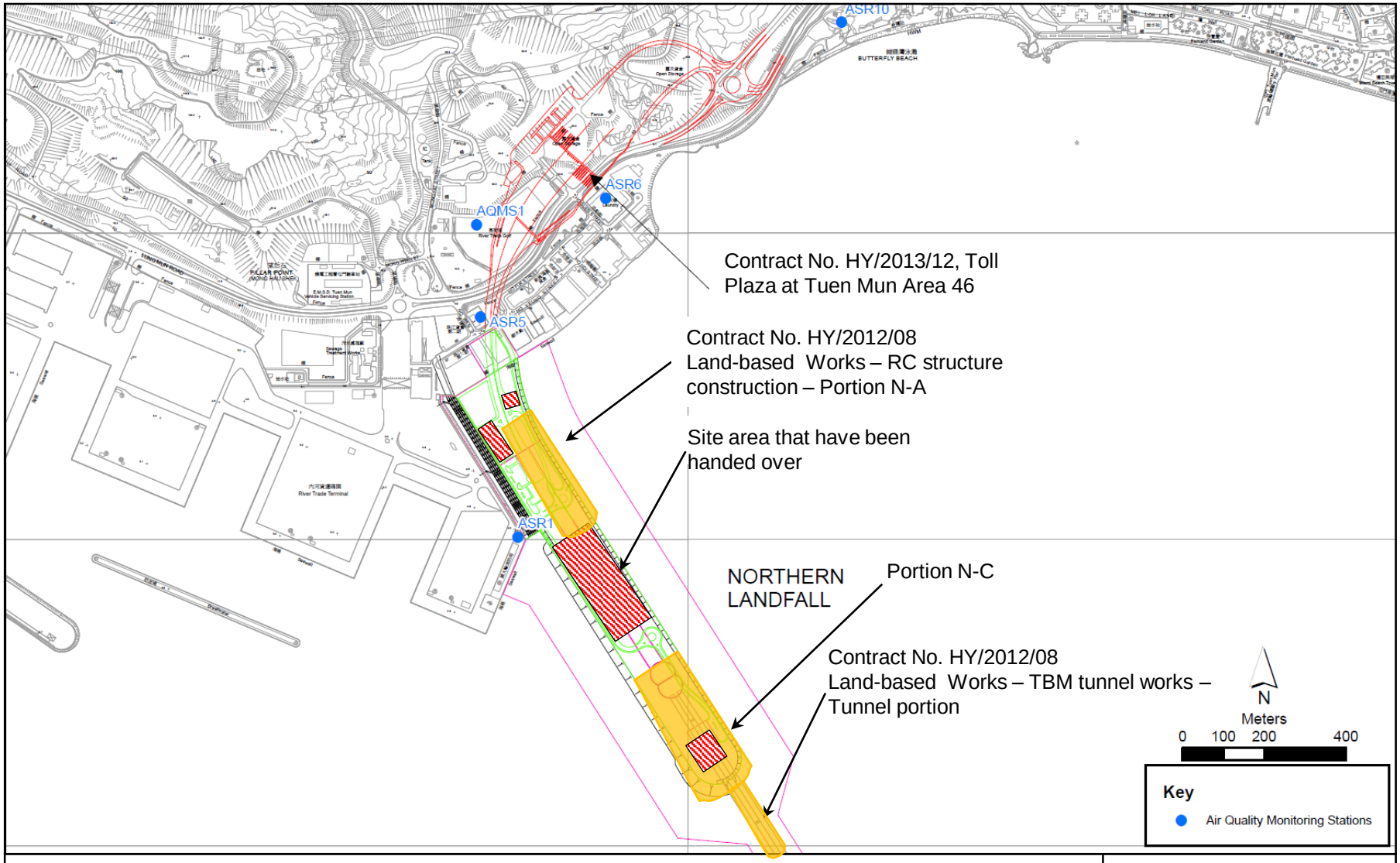


Figure 1

Indicative Construction Works Area on 30 March 2019

DATE: 06/03/2013

Environmental Resources Management

ERM

Email message

Environmental Resources Management

2507, 25/F One Harbourfront
18 Tak Fung Street
Hunghom, Kowloon
Hong Kong
Telephone: (852) 2271 3000
Facsimile: (852) 2723 5660

To	Ramboll Hong Kong, Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Air Quality Impact Monitoring
Date	27 May 2019

ERM

Dear Sir or Madam,

Please find attached the Notification of Exceedance (NOE) of the following Log no.:

0212330_11May2019_1hrTSP_Station ASR1

One Action Level Exceedance was recorded on 11 May 2019.

Regards,

Dr Jasmine Ng
Environmental Team Leader

ERM-Hong Kong, Limited

CONTRACT NO. HY/2012/08
TUEN MUN – CHEK LAP KOK LINK – NORTHERN CONNECTION SUB-SEA TUNNEL SECTION

Air Quality Impact Monitoring
Notification of Exceedance

Log No.	**0212330_11May2019_1hrTSP_Station ASR1** **[Total No. of Exceedances = 1]**	
Date	11 May 2019 (Measured) 24 May 2019 (Laboratory results received by ERM)	
Monitoring Station	ASR1, ASR5, ASR6, ASR10 and AQMS1	
Parameter(s) with Exceedance(s)	1-hr TSP	
Action Levels	24-hr TSP (µg/m³)	ASR1 = 213 ASR5 = 238 AQMS1 = 213 ASR6 = 238 ASR10 = 214
	1-hr TSP (µg/m³)	ASR1 = 331 ASR5 = 340 AQMS1 = 335 ASR6 = 338 ASR10 = 337
Limit Levels	1-hr TSP (µg/m³)	500
	24-hr TSP (µg/m³)	260
Measured Levels	Action Level Exceedance for 1-hr TSP is observed at ASR1 (339 µg/m3) during 0903 – 1003 hrs.	
Works Undertaken (at the time of monitoring event)	On 11 May 2019, TBM tunnel works was carried out at tunnel portion and RC structure construction was carried out at Portion N-A.	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedance is unlikely to be due to this Contract, in view of the following: • According to the construction information provided by the Contractor, the majority of construction works on 11 May 2019 was TBM tunnel works and RC structure construction at Portion N-A. During the period of the land-based construction works, the Contractor has implemented the required mitigation measures as per the EP, approved EIA and Updated EM&A Manual (e.g. water spraying on main haul road within the Project site and associated works areas; exposed soil covered by tarpaulin sheets). • The exceedance is unlikely to be due to this Contract as dust suppression measures were implemented properly on site. Water spraying was applied on site to prevent dust. Photo record is provided in Annex A. • With reference to the recorded wind direction (ranged between 95° and 98°, blowing from an easterly direction) and wind speed (2.7 m/s) during the exceedance hour, Stations ASR1 are located downstream to the construction works at Portion N-A. However, the exceedance was only recorded in the first hour of 1-hour TSP monitoring with the same construction works and dust mitigation measures being carried out. Based on the above, the exceedance is unlikely to be due to this Contract.	

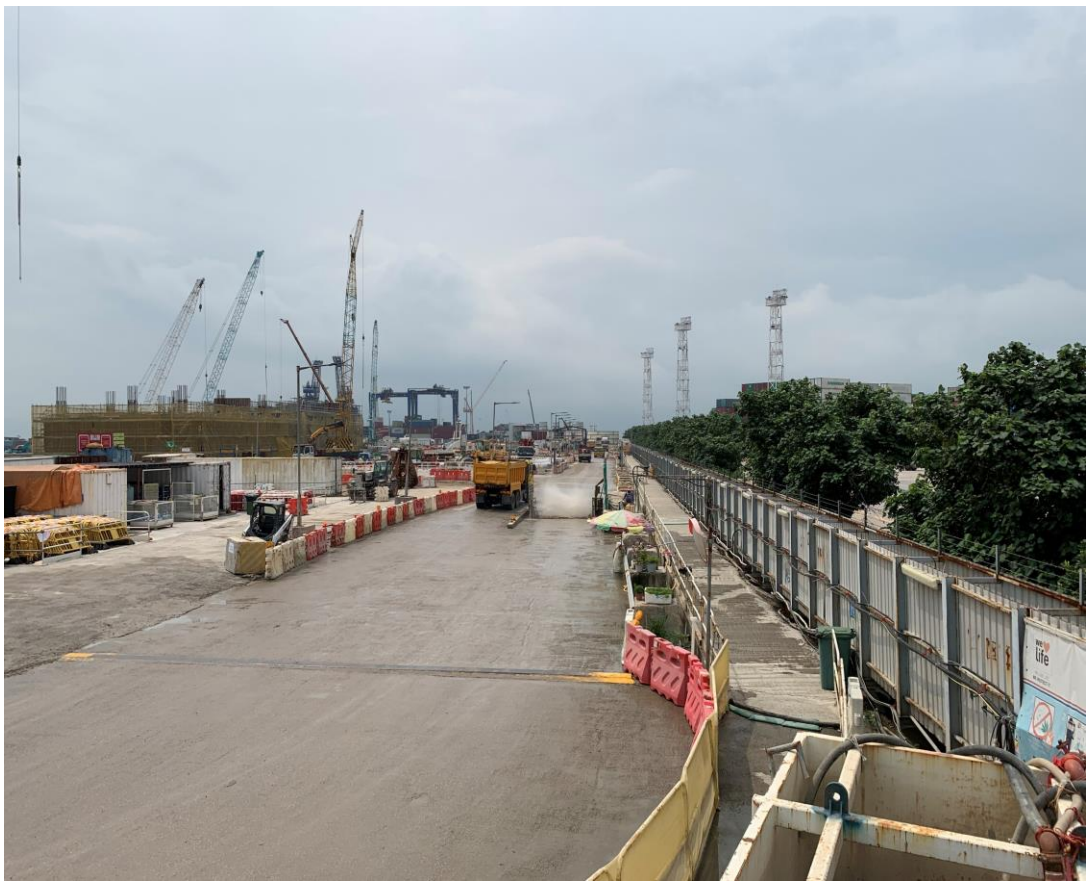
Actions Taken / To Be Taken	According to the photo record provided by the Contractor, dust suppression measures were properly implemented. Water spraying was applied to prevent dust. Exposed soil was covered by tarpaulin sheets to prevent dust. Photos are provided in Annex A. The Contractor has been reminded to implement the required mitigation measures as per the EP, approved EIA and Updated EM&A Manual including watering to maintain all exposed road surfaces and dust sources wet, use of sprinklers for water spraying, covering the materials having the potential to create dust by clean tarpaulin, use of water truck and watering on all exposed soil within the Project site throughout the construction period.
Remarks	The monitoring results, wind data and the locations of air quality monitoring stations are attached.

ERM

Annex A Photos provided by the Contractor

*Note: Photos taken on 11/5/2019

Exposed soil was covered by tarpaulin sheet to prevent dust. (Works Area Portion N-C)



Water spraying was applied at the main haul road to prevent dust. (Works Area Portion N-A)

Air quality monitoring results on 11/5/2019								
Project	Works	Date	Station	Weather	Start time	Parameters	Results	Unit
TMCLKL	HY/2012/08	11/5/2019	AQMS1	Sunny	9:15	1-hour TSP	95	ug/m3
TMCLKL	HY/2012/08	11/5/2019	AQMS1	Sunny	10:17	1-hour TSP	105	ug/m3
TMCLKL	HY/2012/08	11/5/2019	AQMS1	Sunny	11:19	1-hour TSP	99	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR1	Sunny	9:03	1-hour TSP	339	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR1	Sunny	10:05	1-hour TSP	129	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR1	Sunny	11:07	1-hour TSP	122	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR10	Sunny	8:30	1-hour TSP	73	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR10	Sunny	9:32	1-hour TSP	52	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR10	Sunny	10:34	1-hour TSP	60	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR5	Sunny	8:52	1-hour TSP	126	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR5	Sunny	9:54	1-hour TSP	124	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR5	Sunny	10:56	1-hour TSP	194	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR6	Sunny	8:41	1-hour TSP	90	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR6	Sunny	9:43	1-hour TSP	85	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR6	Sunny	10:45	1-hour TSP	137	ug/m3
TMCLKL	HY/2012/08	11/5/2019	AQMS1	Sunny	12:21	24-hour TSP	41	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR1	Sunny	12:09	24-hour TSP	87	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR10	Sunny	11:36	24-hour TSP	48	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR5	Sunny	11:58	24-hour TSP	67	ug/m3
TMCLKL	HY/2012/08	11/5/2019	ASR6	Sunny	11:47	24-hour TSP	49	ug/m3

Meteorological Data for Impact Monitoring in the reporting period			
Date (yy-mm-dd)	**Time (24hrs)**	**Average of Wind Speed (m/s)**	**Average of Wind Direction(degree)**
19/05/11	0:00	0.9	14
19/05/11	1:00	0	-
19/05/11	2:00	0	-
19/05/11	3:00	0.9	46
19/05/11	4:00	0.4	49
19/05/11	5:00	0.4	100
19/05/11	6:00	0.4	39
19/05/11	7:00	0.9	70
19/05/11	8:00	1.8	42
19/05/11	9:00	2.7	98
19/05/11	10:00	2.7	95
19/05/11	11:00	1.8	122
19/05/11	12:00	1.3	218
19/05/11	13:00	1.3	275
19/05/11	14:00	2.2	191
19/05/11	15:00	2.2	194
19/05/11	16:00	2.2	196
19/05/11	17:00	2.2	191
19/05/11	18:00	0.9	84
19/05/11	19:00	2.2	39
19/05/11	20:00	2.2	49
19/05/11	21:00	2.2	60
19/05/11	22:00	3.1	95
19/05/11	23:00	3.1	67

Drogages - Bouygues Joint Venture 寶嘉 - 布依格聯營	Contract No. HY/2012/08 Tuen Mun – Chek Lap Kok Link Northern Connection Sub-sea Tunnel Section	**Weekly Water Spraying Record** **每週灑水檢查記錄**

Site Location 地盤位置: Northern Landfall

Date 日期: 06 May 2019 to 至 12 May 2019

	Time 時間	Monday 星期一	Tuesday 星期二	Wednesday 星期三	Thursday 星期四	Friday 星期五	Saturday 星期六	Sunday 星期日
1	8:00 – 8:45	✓	✓	✓	✓	✓	✓	✓
2	8:45 – 9:30	✓	✓	✓	✓	✓	✓	✓
3	9:30 – 10:15	✓	✓	✓	✓	✓	✓	✓
4	10:15 – 11:00	✓	✓	✓	✓	✓	✓	✓
5	11:00 – 11:45	✓	✓	✓	✓	✓	✓	✓
6	11:45 – 12:30	✓	✓	✓	✓	✓	✓	✓
7	12:30 – 13:15	✓	✓	✓	✓	✓	✓	✓
8	13:15 – 14:00	✓	✓	✓	✓	✓	✓	✓
9	14:00 – 14:45	✓	✓	✓	✓	✓	✓	✓
10	14:45 – 15:30	✓	✓	✓	✓	✓	✓	✓
11	15:30 – 16:45	✓	✓	✓	✓	✓	✓	✓
12	16:45 – 17:30	✓	✓	✓	✓	✓	✓	✓
	Verified by Site Foreman 地盤科文簽署確認	✓	✓	✓	✓	✓	✓	✓

Night shift 夜間工作 (if necessary 如需要)								
	17:30 – 19:00							
	19:00 – 20:30							
	20:30 – 22:00							
	22:00 – 23:00							

*Please - tick (√) in the box if complete the spraying of water.
circle (O) in the box if it is raining.

*如果 - 已經完成灑水, 請於方格內加上剔號(√)。
是下雨天, 請於方格內加上圓圈(O)。

Remarks:

(1) Pursuant to EP Clause 3.15, the Permit Holder shall undertake watering at least 12 times per day on all exposed soil within the Project site and associated work areas in Tuen Mun area throughout the construction phase.
(2) Spraying position includes the main haul road, open area, slopes, stockpiles and any other dusty materials.
(3) If it is raining, no water spraying is needed.
(4) The no of spraying will be increased due to site condition.

備註:

(1) 根據環境許可證 3.15 條例，在整個施工階段內，許可證持有人須每天至少 12 次在屯門區項目工地和相關的工作區域內的所有暴露土壤灑水。
(2) 灑水位置包括主要運輸道路，空曠地帶，斜坡，存料堆，以及任何其他產生塵埃物料。
(3) 當下雨時，地盤將不需要灑水。
(4) 如果地盤情況更改或有需要時，灑水次數會相應增加。

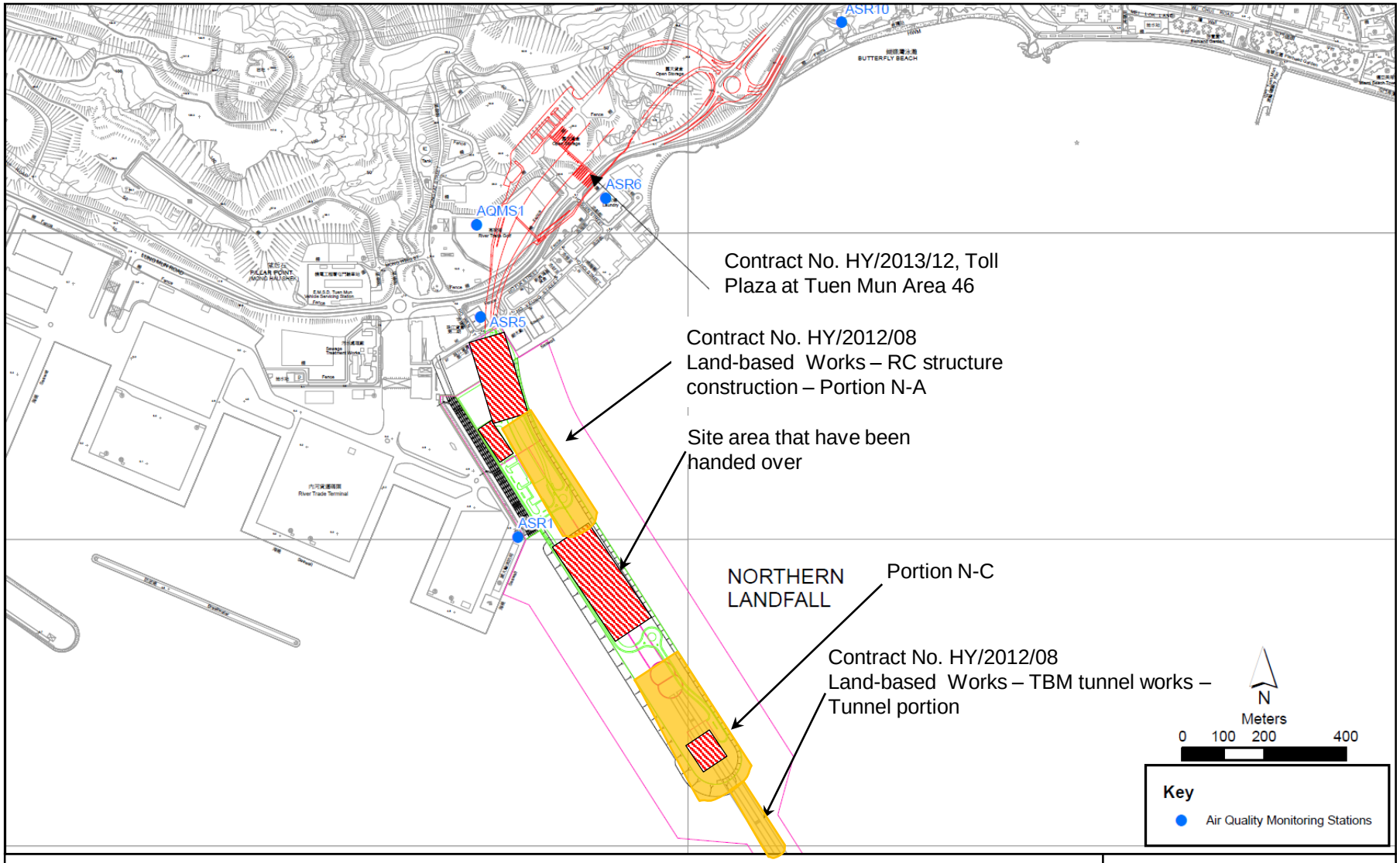


Figure 1

Indicative Construction Works Area on 11 May 2019

DATE: 06/03/2013

Environmental Resources Management

ERM

Email message

Environmental Resources Management

2507, 25/F One Harbourfront
18 Tak Fung Street
Hunghom, Kowloon
Hong Kong
Telephone: (852) 2271 3000
Facsimile: (852) 2723 5660

To	Ramboll Hong Kong, Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Air Quality Impact Monitoring
Date	3 June 2019

ERM

Dear Sir or Madam,

Please find attached the Notification of Exceedance (NOE) of the following Log no.:

0212330_23May2019_1hrTSP_Station ASR1
0212330_23May2019_24hrTSP_Station ASR1

Two Action Level Exceedances were recorded on 23 May 2019.

Regards,

Dr Jasmine Ng
Environmental Team Leader

ERM-Hong Kong, Limited

CONTRACT NO. HY/2012/08
TUEN MUN – CHEK LAP KOK LINK – NORTHERN CONNECTION SUB-SEA TUNNEL SECTION

Air Quality Impact Monitoring
Notification of Exceedance

Log No.	**0212330_23May2019_1hrTSP_Station ASR1** **0212330_23May2019_24hrTSP_Station ASR1** **[Total No. of Exceedances = 2]**	
Date	23 May 2019 (Measured) 2 June 2019 (Laboratory results received by ERM)	
Monitoring Station	ASR1, ASR5, ASR6, ASR10 and AQMS1	
Parameter(s) with Exceedance(s)	1-hr TSP, 24-hr TSP	
Action Levels	24-hr TSP (µg/m^3)	ASR1 = 213 ASR5 = 238 AQMS1 = 213 ASR6 = 238 ASR10 = 214
	1-hr TSP (µg/m^3)	ASR1 = 331 ASR5 = 340 AQMS1 = 335 ASR6 = 338 ASR10 = 337
Limit Levels	1-hr TSP (µg/m^3)	500
	24-hr TSP (µg/m^3)	260
Measured Levels	Action Level Exceedance for 1-hr TSP is observed at ASR1 (408 µg/m3) during 1344 – 1444 hrs. Action Level Exceedance for 24-hr TSP is observed at ASR1 (217 µg/m3) during 1650 – 1650 hrs.	
Works Undertaken (at the time of monitoring event)	On 23 and 24 May 2019, Demolition of Amenities and Workshop and RC structure construction was carried out at Portion N-A.	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedance is unlikely to be due to this Contract, in view of the following: • According to the construction information provided by the Contractor, the majority of construction works on 23 and 24 May 2019 was Demolition of Amenities and Workshop and RC structure construction at Portion N-A. During the period of the land-based construction works, the Contractor has implemented the required mitigation measures as per the EP, approved EIA and Updated EM&A Manual (e.g. water spraying on exposed soil within the Project site and associated works areas). • With reference to the recorded wind direction (ranged between 84^o and 105^o, blowing from an easterly direction) and wind speed (ranged between 2.7 and 4.0 m/s) during the works period, Stations ASR1 are located downstream to the construction works at Portion N-A. However, the exceedance was only recorded in the first hour of 1-hour TSP monitoring with the same construction works and dust mitigation measures being carried out. • With reference to the recorded wind direction (ranged between 59^o and 101^o, blowing from an easterly direction) and wind speed (ranged between 2.7 and 4.9 m/s) during the 24-hour TSP monitoring, Stations ASR1 are located downstream to the construction works at Portion N-A at most time. However, dust suppression measures were implemented properly on site. Water spraying was applied on site to prevent dust. Based on the above, the exceedance is unlikely to be due to this Contract.	

Actions Taken / To Be Taken	According to the photo record provided by the Contractor, dust suppression measures were properly implemented. Water spraying was applied to prevent dust. Photos are provided in Annex A. The Contractor has been reminded to implement the required mitigation measures as per the EP, approved EIA and Updated EM&A Manual including watering to maintain all exposed road surfaces and dust sources wet, use of sprinklers for water spraying, covering the materials having the potential to create dust by clean tarpaulin, use of water truck and watering on all exposed soil within the Project site throughout the construction period.
Remarks	The monitoring results, wind data and the locations of air quality monitoring stations are attached.

ERM

Annex A Photos provided by the Contractor

*Note: Photos taken on 23/5/2019

Water spraying was applied at the main haul road to prevent dust. (Works Area Portion N-C)

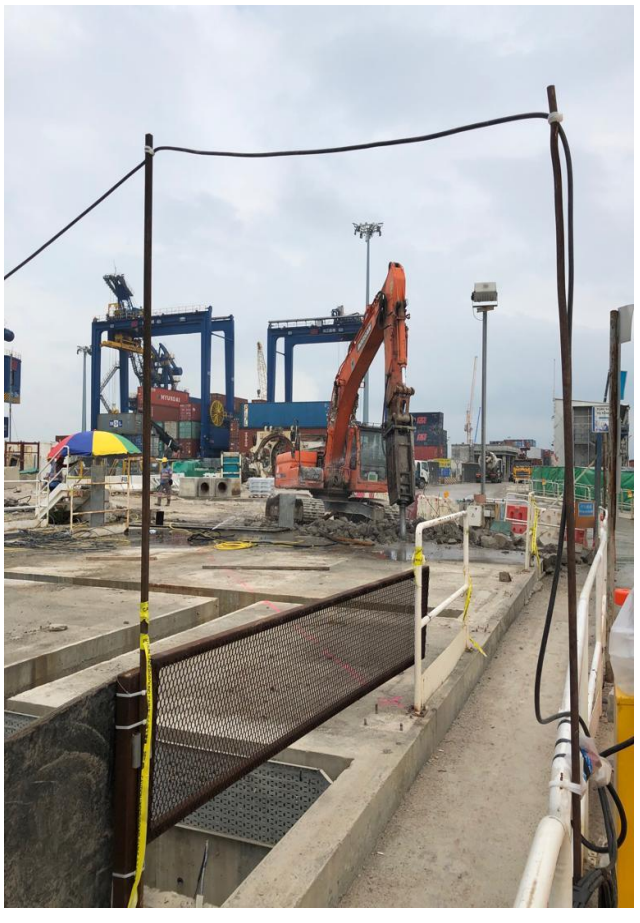
Water spraying was applied at the main haul road to prevent dust. (Works Area Portion N-A)

ERM

Annex A Photos provided by the Contractor

*Note: Photos taken on 24/5/2019

Water spraying was applied during rock breaking to prevent dust. (Works Area Portion N-A)



Water spraying was applied during rock breaking to prevent dust. (Works Area Portion N-A)

Air quality monitoring results on 23/5/2019								
Project	Works	Date	Station	Weather	Start time	Parameters	Results	Unit
TMCLKL	HY/2012/08	23/5/2019	AQMS1	Sunny	13:55	1-hour TSP	145	ug/m3
TMCLKL	HY/2012/08	23/5/2019	AQMS1	Sunny	14:57	1-hour TSP	83	ug/m3
TMCLKL	HY/2012/08	23/5/2019	AQMS1	Sunny	15:59	1-hour TSP	80	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR1	Sunny	13:44	1-hour TSP	408	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR1	Sunny	14:46	1-hour TSP	169	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR1	Sunny	15:48	1-hour TSP	191	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR10	Sunny	13:13	1-hour TSP	122	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR10	Sunny	14:15	1-hour TSP	37	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR10	Sunny	15:17	1-hour TSP	49	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR5	Sunny	13:33	1-hour TSP	215	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR5	Sunny	14:35	1-hour TSP	72	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR5	Sunny	15:37	1-hour TSP	105	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR6	Sunny	13:23	1-hour TSP	167	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR6	Sunny	14:25	1-hour TSP	60	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR6	Sunny	15:27	1-hour TSP	93	ug/m3
TMCLKL	HY/2012/08	23/5/2019	AQMS1	Sunny	17:01	24-hour TSP	67	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR1	Sunny	16:50	24-hour TSP	217	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR10	Sunny	16:19	24-hour TSP	51	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR5	Sunny	16:39	24-hour TSP	80	ug/m3
TMCLKL	HY/2012/08	23/5/2019	ASR6	Sunny	16:29	24-hour TSP	71	ug/m3

Meteorological Data for Impact Monitoring in the reporting period			
Date (yy-mm-dd)	**Time (24hrs)**	**Average of Wind Speed (m/s)**	**Average of Wind Direction(degree)**
19/05/23	0:00	1.8	71
19/05/23	1:00	2.2	83
19/05/23	2:00	2.2	93
19/05/23	3:00	1.8	97
19/05/23	4:00	1.8	60
19/05/23	5:00	1.8	67
19/05/23	6:00	2.2	99
19/05/23	7:00	1.8	82
19/05/23	8:00	2.2	83
19/05/23	9:00	2.7	95
19/05/23	10:00	2.7	82
19/05/23	11:00	3.1	97
19/05/23	12:00	2.2	92
19/05/23	13:00	2.7	84
19/05/23	14:00	4	105
19/05/23	15:00	3.1	84
19/05/23	16:00	3.6	86
19/05/23	17:00	3.1	91
19/05/23	18:00	3.1	101
19/05/23	19:00	3.1	86
19/05/23	20:00	3.6	65
19/05/23	21:00	4	85
19/05/23	22:00	4.5	100
19/05/23	23:00	4.5	82
19/05/24	0:00	3.6	97
19/05/24	1:00	2.7	60
19/05/24	2:00	3.1	75
19/05/24	3:00	3.1	73
19/05/24	4:00	3.1	59
19/05/24	5:00	3.1	60
19/05/24	6:00	3.1	64
19/05/24	7:00	4	91
19/05/24	8:00	4.5	89
19/05/24	9:00	4.9	87
19/05/24	10:00	4.5	100
19/05/24	11:00	4.5	81
19/05/24	12:00	4.5	101
19/05/24	13:00	4.9	100
19/05/24	14:00	4.5	81
19/05/24	15:00	4.5	80
19/05/24	16:00	4.5	80
19/05/24	17:00	4.5	86
19/05/24	18:00	4.5	93
19/05/24	19:00	4	63
19/05/24	20:00	4	75
19/05/24	21:00	4.5	87
19/05/24	22:00	4.9	87
19/05/24	23:00	4.5	84

Drapages - Bouygues Joint Venture	Contract No. HY/2012/08 Tuen Mun – Chek Lap Kok Link Northern Connection Sub-sea Tunnel Section	**Weekly Water Spraying Record** **每週灑水檢查記錄**

Site Location 地盤位置: Northern Landfall

Date 日期: 20 May 2019 to 至 26 May 2019

	Time 時間	Monday 星期一	Tuesday 星期二	Wednesday 星期三	Thursday 星期四	Friday 星期五	Saturday 星期六	Sunday 星期日
1	8:00 – 8:45	✓	✓	✓	✓	✓	✓	✓
2	8:45 – 9:30	✓	✓	✓	✓	✓	✓	✓
3	9:30 – 10:15	✓	✓	✓	✓	✓	✓	✓
4	10:15 – 11:00	✓	✓	✓	✓	✓	✓	✓
5	11:00 – 11:45	✓	✓	✓	✓	✓	✓	✓
6	11:45 – 12:30	✓	✓	✓	✓	✓	✓	✓
7	12:30 – 13:15	✓	✓	✓	✓	✓	✓	✓
8	13:15 – 14:00	✓	✓	✓	✓	✓	✓	✓
9	14:00 – 14:45	✓	✓	✓	✓	✓	✓	✓
10	14:45 – 15:30	✓	✓	✓	✓	✓	✓	✓
11	15:30 – 16:45	✓	✓	✓	✓	✓	✓	✓
12	16:45 – 17:30	✓	✓	✓	✓	✓	✓	✓
	Verified by Site Foreman 地盤科文簽署確認	✓	✓	✓	✓	✓	✓	✓

Night shift 夜間工作 (if necessary 如需要)								
	17:30 – 19:00							
	19:00 – 20:30							
	20:30 – 22:00							
	22:00 – 23:00							

*Please - tick (√) in the box if complete the spraying of water.
circle (O) in the box if it is raining.

*如果 - 已經完成灑水, 請於方格內加上剔號(√)。
是下雨天, 請於方格內加上圓圈(O)。

Remarks:

(1) Pursuant to EP Clause 3.15, the Permit Holder shall undertake watering at least 12 times per day on all exposed soil within the Project site and associated work areas in Tuen Mun area throughout the construction phase.
(2) Spraying position includes the main haul road, open area, slopes, stockpiles and any other dusty materials.
(3) If it is raining, no water spraying is needed.
(4) The no of spraying will be increased due to site condition.

備註:

(1) 根據環境許可證 3.15 條例，在整個施工階段內，許可證持有人須每天至少 12 次在屯門區項目工地和相關的工作區域內的所有暴露土壤灑水。
(2) 灑水位置包括主要運輸道路，空曠地帶，斜坡，存料堆，以及任何其他產生塵埃物料。
(3) 當下雨時，地盤將不需要灑水。
(4) 如果地盤情況更改或有需要時，灑水次數會相應增加。

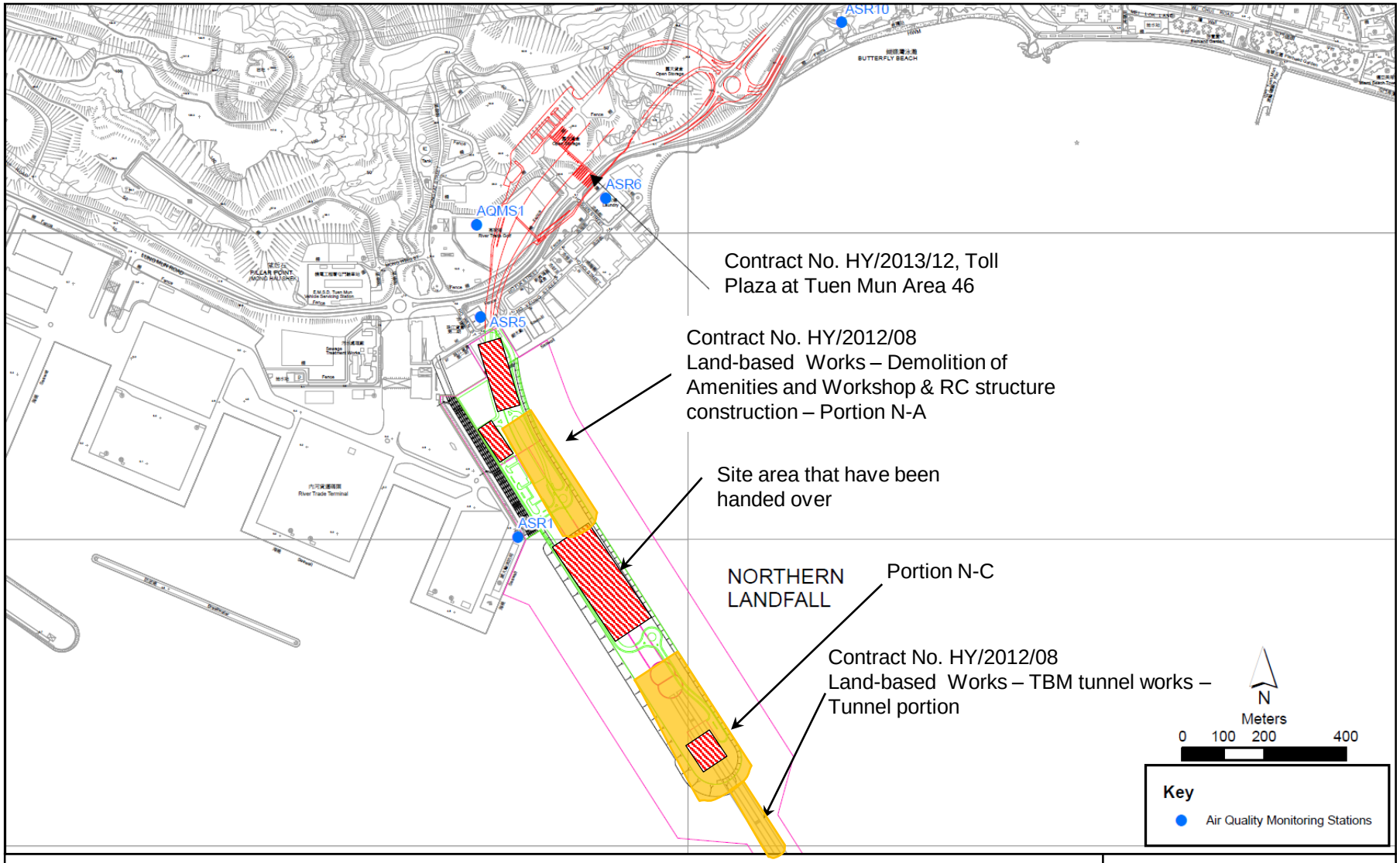


Figure 1

Indicative Construction Works Area on 23 May 2019

DATE: 06/03/2013

Environmental Resources Management

ERM

Email message

Environmental Resources Management

2507,
25/F One Harbourfront,
18 Tak Fung Street,
Hung Hom, Hong Kong
Telephone: (852) 2271 3113
Facsimile: (852) 2723 5660
E-mail: jasmine.ng@erm.com

To	Ramboll Hong Kong Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Water Quality Impact Monitoring
Date	4 June 2019

Dear Sir or Madam,

Please find the Notification of Exceedance (NOE) of the following Log no.:

Action Level Exceedance
0212330_15 May 2019_ Depth-averaged SS_E_Station IS8

A total of one Action Level Exceedance was recorded on 15 May 2019.

Regards,

Dr Jasmine Ng
Environmental Team Leader

ERM-Hong Kong, Limited

CONTRACT NO. HY/2012/08
TUEN MUN – CHEK LAP KOK LINK –
NORTHERN CONNECTION SUB-SEA TUNNEL SECTION

Marine Water Quality Impact Monitoring
Notification of Exceedance

Log No.	**0212330_15 May 2019_ Depth-averaged SS_E_Station IS8** **[Total No. of Exceedances = 1]**	
Date	15 May 2019 (Measured) 16 May 2019 (*In situ* results received by ERM) 24 May 2019 (Laboratory results received by ERM)	
Monitoring Station	CS(Mf)5, SR4a, SR4(N), IS8, IS(Mf)16, IS(Mf)9, CS(Mf)3(N), SR7, IS17, IS(Mf)11	
Parameter(s) with Exceedance(s)	Depth-averaged Suspended Solids (SS, mg/L)	
Action Levels	SS	23.5 mg/L
Limit Levels	SS	34.4 mg/L
Measured Levels	Action Level Exceedance for SS is observed at IS8 (24.7 mg/L) during mid-ebb tide.	
Works Undertaken (at the time of monitoring event)	According to the information provided by the Contractor, seawall modification works was carried out on 15 May 2019.	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedances are unlikely to be due to the Project, in view of the following: • Apart from observed exceedances, SS levels at all other monitoring stations were in compliance with the Action and Limit Levels during both mid-flood and mid-ebb tides on the same day. • Depth-averaged Turbidity levels and average DO levels at all stations were in compliance with the Action and Limit Levels during both mid-ebb and mid-flood tides on the same day. • IS8 is far away (>1.5km) from the Marine works area *(Figure 1)*, thus the observed exceedance should not be affected by the marine works under this Contract. Moreover, IS(Mf)16 is much closer to the works area than IS8 and no exceedance was recorded at IS(Mf)16. Therefore, the exceedance is unlikely to be related to this Contract.	
Actions Taken / To Be Taken	No immediate action is considered necessary. The ET will monitor for future trends in exceedances.	
Remarks	The monitoring results on 15 May 2019 and locations of water quality monitoring stations are attached.	

ERM

Annex A Photos taken by MMO on 15/5/2019

*Note: Photos taken on 15/5/2019

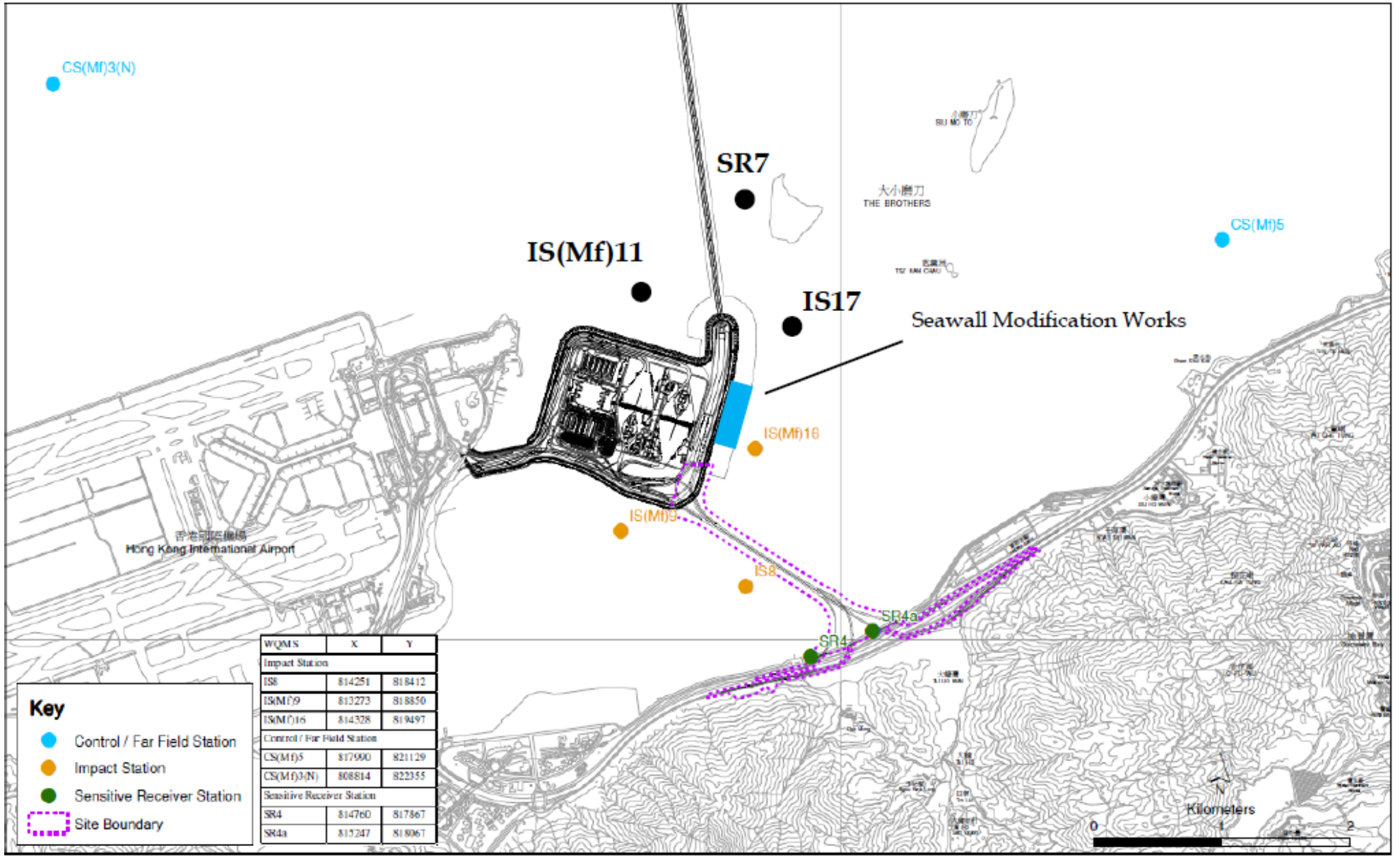
No leakage of wastewater was observed at the marine works area. (Portion S-B)

No leakage of wastewater was observed near IS(Mf)16.

Project	Works	Date (yyyy-mm-dd)	Tide	Station	Start Time	Level	Replicate	Temperature (^{o}C)	pH	Salinity (ppt)	DO (mg/L)	Average DO (mg/L)	Turbidity (NTU)	Depth-Averaged Turbidity	SS (mg/L)	Depth-Averaged SS
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	CS(Mf)5	9:51	Surface	1	26.5	8.1	21.3	8.8	8.6	4.7	4.3	11.5	12.8
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	CS(Mf)5	9:51	Surface	2	26.5	8.2	21.3	8.8		4.8		12.8	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	CS(Mf)5	9:51	Middle	1	26.4	8.1	21.9	8.3		4.1		13.0	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	CS(Mf)5	9:51	Middle	2	26.4	8.1	21.9	8.3		4.2		12.9	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	CS(Mf)5	9:51	Bottom	1	26.5	8.1	23.3	8.2	8.2	4.1		13.0	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	CS(Mf)5	9:51	Bottom	2	26.5	8.1	23.3	8.2		4.0		13.5	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	CS(Mf)3(N)	11:02	Surface	1	25.3	8.1	20.6	8.6	8.4	4.1	4.7	8.0	9.2
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	CS(Mf)3(N)	11:02	Surface	2	25.3	8.1	20.5	8.6		4.0		9.2	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	CS(Mf)3(N)	11:02	Middle	1	25.2	8.1	20.9	8.2		5.0		9.9	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	CS(Mf)3(N)	11:02	Middle	2	25.2	8.1	20.9	8.2		5.0		9.7	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	CS(Mf)3(N)	11:02	Bottom	1	25.2	8.1	21.0	8.2	8.2	5.1		9.2	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	CS(Mf)3(N)	11:02	Bottom	2	25.2	8.1	21.0	8.2		5.1		9.2	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS(Mf)16	10:25	Surface	1	26.4	8.2	21.6	8.6	8.6	10.8	11.0	18.5	18.7
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS(Mf)16	10:25	Surface	2	26.5	8.2	21.6	8.6		10.3		17.9	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS(Mf)16	10:25	Middle	1									
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS(Mf)16	10:25	Middle	2									
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS(Mf)16	10:25	Bottom	1	26.3	8.2	21.8	8.5	8.5	11.5		19.6	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS(Mf)16	10:25	Bottom	2	26.3	8.2	21.8	8.5		11.5		18.8	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	SR4a	10:33	Surface	1	26.4	8.2	21.9	8.6	8.6	6.8	7.0	17.8	18.3
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	SR4a	10:33	Surface	2	26.5	8.2	21.9	8.6		6.8		17.3	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	SR4a	10:33	Middle	1									
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	SR4a	10:33	Middle	2									
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	SR4a	10:33	Bottom	1	26.2	8.2	22.0	8.5	8.5	7.2		18.6	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	SR4a	10:33	Bottom	2	26.2	8.2	22.0	8.5		7.1		19.6	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	SR4(N)	10:38	Surface	1	26.6	8.1	21.6	8.2	8.2	10.3	9.1	13.5	13.7
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	SR4(N)	10:38	Surface	2	26.6	8.1	21.6	8.2		10.5		14.5	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	SR4(N)	10:38	Middle	1									
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	SR4(N)	10:38	Middle	2									
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	SR4(N)	10:38	Bottom	1	26.8	8.1	21.7	8.2	8.2	7.7		13.0	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	SR4(N)	10:38	Bottom	2	26.8	8.1	21.7	8.2		7.8		13.9	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS8	10:43	Surface	1	26.4	8.2	22.1	8.6	8.6	16.1	15.3	25.1	24.7
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS8	10:43	Surface	2	26.4	8.2	22.0	8.6		16.0		25.7	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS8	10:43	Middle	1									
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS8	10:43	Middle	2									
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS8	10:43	Bottom	1	26.3	8.2	22.1	8.6	8.6	14.6		23.4	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS8	10:43	Bottom	2	26.3	8.2	22.1	8.6		14.6		24.4	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS(Mf)9	10:51	Surface	1	27.1	8.3	21.5	9.5	9.5	6.4	6.4	15.7	15.1
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS(Mf)9	10:51	Surface	2	27.1	8.3	21.5	9.5		6.5		14.6	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS(Mf)9	10:51	Middle	1									
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS(Mf)9	10:51	Middle	2									
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS(Mf)9	10:51	Bottom	1	27.1	8.3	21.4	9.4	9.5	6.4		14.4	
TMCLKL	HY/2012/07	2019/05/15	Mid-Ebb	IS(Mf)9	10:51	Bottom	2	27.1	8.3	21.4	9.5		6.3		15.5	

Project	Works	Date (yyyy-mm-dd)	Tide	Station	Start Time	Level	Replicate	Temperature (^{o}C)	pH	Salinity (ppt)	DO (mg/L)	Average DO (mg/L)	Turbidity (NTU)	Depth-Averaged Turbidity	SS (mg/L)	Depth-Averaged SS
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	CS(Mf)5	16:01	Surface	1	26.5	8.3	21.4	9.1	9.1	4.8	5.8	12.0	11.4
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	CS(Mf)5	16:01	Surface	2	26.5	8.3	21.5	9.1		4.9		11.6	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	CS(Mf)5	16:01	Middle	1	26.3	8.3	21.4	9.0		7.1		11.0	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	CS(Mf)5	16:01	Middle	2	26.5	8.3	21.4	9.2		6.0		10.5	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	CS(Mf)5	16:01	Bottom	1	26.3	8.3	21.7	9.1	9.1	6.2		11.9	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	CS(Mf)5	16:01	Bottom	2	26.3	8.3	21.7	9.0		5.6		11.2	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	CS(Mf)3(N)	14:57	Surface	1	26.5	8.3	17.4	10.1	9.0	4.5	4.5	10.9	12.5
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	CS(Mf)3(N)	14:57	Surface	2	26.5	8.3	17.4	10.1		4.4		11.8	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	CS(Mf)3(N)	14:57	Middle	1	25.2	8.0	18.3	7.8		4.4		12.0	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	CS(Mf)3(N)	14:57	Middle	2	25.2	8.0	18.1	7.9		4.4		13.0	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	CS(Mf)3(N)	14:57	Bottom	1	25.7	8.0	20.1	7.9	7.9	4.5		13.6	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	CS(Mf)3(N)	14:57	Bottom	2	25.5	8.0	20.2	7.9		4.5		13.8	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS(Mf)16	15:34	Surface	1	26.6	8.3	21.2	10.1	10.1	9.4	7.3	7.2	8.5
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS(Mf)16	15:34	Surface	2	26.6	8.3	21.2	10.1		9.2		7.7	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS(Mf)16	15:34	Middle	1									
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS(Mf)16	15:34	Middle	2									
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS(Mf)16	15:34	Bottom	1	26.7	8.3	21.2	10.1	10.1	5.2		9.4	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS(Mf)16	15:34	Bottom	2	26.7	8.3	21.2	10.1		5.2		9.7	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	SR4a	15:25	Surface	1	26.9	8.4	21.4	10.3	10.3	3.8	3.9	13.2	13.8
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	SR4a	15:25	Surface	2	26.9	8.4	21.4	10.3		3.9		13.9	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	SR4a	15:25	Middle	1									
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	SR4a	15:25	Middle	2									
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	SR4a	15:25	Bottom	1	26.8	8.4	21.5	9.8	9.8	3.9		14.1	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	SR4a	15:25	Bottom	2	26.8	8.4	21.5	9.8		3.8		14.1	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	SR4(N)	15:22	Surface	1	26.8	8.4	21.2	10.3	10.3	11.3	8.7	9.7	10.9
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	SR4(N)	15:22	Surface	2	26.8	8.4	21.2	10.3		12.6		8.9	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	SR4(N)	15:22	Middle	1									
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	SR4(N)	15:22	Middle	2									
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	SR4(N)	15:22	Bottom	1	26.8	8.4	21.3	10.3	10.3	5.3		12.3	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	SR4(N)	15:22	Bottom	2	26.8	8.4	21.3	10.3		5.4		12.7	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS8	15:17	Surface	1	26.4	8.3	21.3	9.4	9.4	10.7	9.5	14.5	13.7
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS8	15:17	Surface	2	26.4	8.3	21.3	9.4		10.6		14.6	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS8	15:17	Middle	1									
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS8	15:17	Middle	2									
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS8	15:17	Bottom	1	26.4	8.3	21.4	9.4	9.4	8.2		12.2	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS8	15:17	Bottom	2	26.4	8.3	21.4	9.4		8.6		13.3	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS(Mf)9	15:08	Surface	1	26.6	8.3	20.9	9.5	9.5	9.8	9.0	13.0	13.6
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS(Mf)9	15:08	Surface	2	26.6	8.3	20.9	9.5		10.4		13.0	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS(Mf)9	15:08	Middle	1									
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS(Mf)9	15:08	Middle	2									
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS(Mf)9	15:08	Bottom	1	26.5	8.3	21.1	9.5	9.5	7.8		13.8	
TMCLKL	HY/2012/07	2019/05/15	Mid-Flood	IS(Mf)9	15:08	Bottom	2	26.5	8.3	21.1	9.5		7.8		14.4	

Note: Indicates Exceedance of Action Level
Indicates Exceedance of Limit Level



WQMS	X	Y
Impact Station		
IS8	814251	818412
IS(Mf)9	813273	818850
IS(Mf)16	814328	819497
Control / Far Field Station		
CS(Mf)5	817990	821129
CS(Mf)3(N)	808814	822355
Sensitive Receiver Station		
SR4	814760	817867
SR4a	815247	818067

Figure 1

Environmental Resources Management

ERM

Email message

Environmental Resources Management

2507,
25/F One Harbourfront,
18 Tak Fung Street,
Hung Hom, Hong Kong
Telephone: (852) 2271 3113
Facsimile: (852) 2723 5660
E-mail: jasmine.ng@erm.com

To	Ramboll Hong Kong Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Water Quality Impact Monitoring
Date	13 June 2019

Dear Sir or Madam,

Please find the Notification of Exceedance (NOE) of the following Log no.:

Action Level Exceedance
0212330_29 May 2019_ Depth-averaged SS_F_Station SR4(N)

A total of one Action Level Exceedance was recorded on 29 May 2019.

Regards,

Dr Jasmine Ng
Environmental Team Leader

ERM-Hong Kong, Limited

CONTRACT NO. HY/2012/08
TUEN MUN – CHEK LAP KOK LINK –
NORTHERN CONNECTION SUB-SEA TUNNEL SECTION

Marine Water Quality Impact Monitoring
Notification of Exceedance

Log No.	**0212330_29 May 2019_ Depth-averaged SS_F_Station SR4(N)** **[Total No. of Exceedances = 1]**	
Date	29 May 2019 (Measured) 31 May 2019 (*In situ* results received by ERM) 10 June 2019 (Laboratory results received by ERM)	
Monitoring Station	CS(Mf)5, SR4a, SR4(N), IS8, IS(Mf)16, IS(Mf)9, CS(Mf)3(N), SR7, IS17, IS(Mf)11	
Parameter(s) with Exceedance(s)	Depth-averaged Suspended Solids (SS, mg/L)	
Action Levels	SS	23.5 mg/L
Limit Levels	SS	34.4 mg/L
Measured Levels	Action Level Exceedance for SS is observed at SR4(N) (24.4 mg/L) during mid-flood tide.	
Works Undertaken (at the time of monitoring event)	According to the information provided by the Contractor, seawall modification works was carried out on 29 May 2019.	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedances are unlikely to be due to the Project, in view of the following: • Apart from observed exceedances, SS levels at all other monitoring stations were in compliance with the Action and Limit Levels during both mid-flood and mid-ebb tides on the same day. • Depth-averaged Turbidity levels and average DO levels at all stations were in compliance with the Action and Limit Levels during both mid-ebb and mid-flood tides on the same day. • SR4(N) is far away (>2.5km) from the Marine works area *(Figure 1)*, thus the observed exceedance should not be affected by the marine works under this Contract. Moreover, IS(Mf)16 is closer and in the same direction to the works area and no exceedance was recorded at IS(Mf)16. Therefore, the exceedance is unlikely to be related to this Contract.	
Actions Taken / To Be Taken	No immediate action is considered necessary. The ET will monitor for future trends in exceedances.	
Remarks	The monitoring results on 29 May 2019 and locations of water quality monitoring stations are attached.	

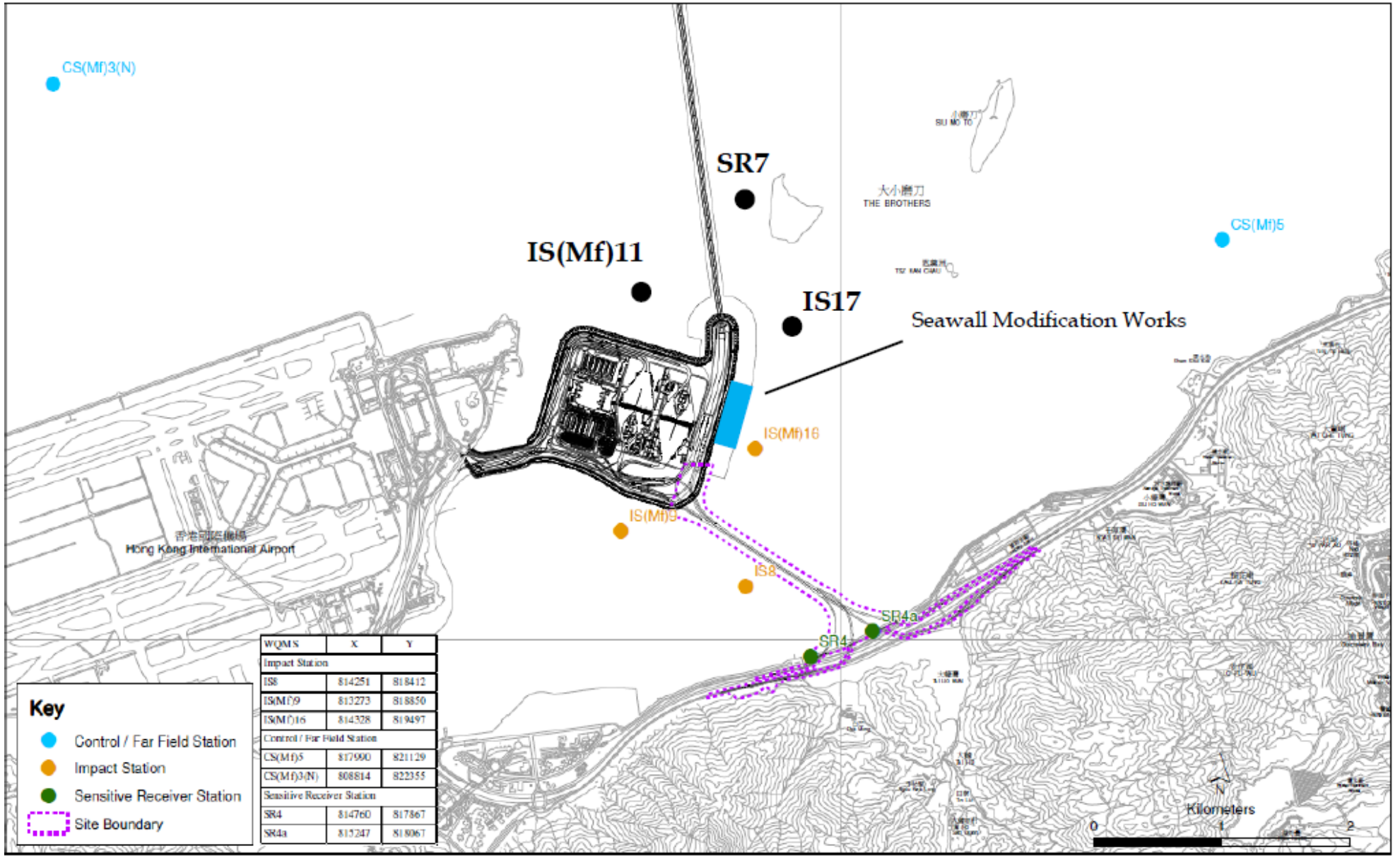
ERM

Annex A Photos taken by MMO on 29/5/2019

*Note: Photos taken on 29/5/2019

No water quality impact was observed at SR4(N)

No water quality impact was observed at SR4(N)



WQMS	X	Y
Impact Station		
IS8	814251	818412
IS(Mf)9	813273	818850
IS(Mf)16	814328	819497
Control / Far Field Station		
CS(Mf)5	817990	821129
CS(Mf)3(N)	808814	822355
Sensitive Receiver Station		
SR4	814760	817867
SR4a	815247	818067

Figure 1

Environmental Resources Management

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Project	Works	Date (yyyy-mm-dd)	Tide	Station	Start Time	Level	Replicate	Temperature (^{o}C)	pH	Salinity (ppt)	DO (mg/L)	Average DO (mg/L)	Turbidity (NTU)	Depth-Averaged Turbidity	SS (mg/L)	Depth-Averaged SS
HY/2012/07	2019/05/29	Mid-Ebb	CS(Mf)5	9:39	Surface	1	1	26.5	8.0	21.3	6.6	6.6	1.7	1.8	0.8	0.7
HY/2012/07	2019/05/29	Mid-Ebb	CS(Mf)5	9:39	Surface	1	2	26.5	8.0	21.3	6.6		1.7		0.9	
HY/2012/07	2019/05/29	Mid-Ebb	CS(Mf)5	9:39	Middle	2	1	26.4	8.0	21.3	6.5		2.2		<0.5	
HY/2012/07	2019/05/29	Mid-Ebb	CS(Mf)5	9:39	Middle	2	2	26.4	8.0	21.3	6.6		2.2		0.6	
HY/2012/07	2019/05/29	Mid-Ebb	CS(Mf)5	9:39	Bottom	3	1	26.4	8.0	23.2	6.5	6.5	1.6		0.8	
HY/2012/07	2019/05/29	Mid-Ebb	CS(Mf)5	9:39	Bottom	3	2	26.4	8.0	23.2	6.5		1.6		1.1	
HY/2012/07	2019/05/29	Mid-Ebb	CS(Mf)3(N)	11:00	Surface	1	1	26.6	7.9	19.3	6.5	6.5	4.6	5.1	2.4	2.7
HY/2012/07	2019/05/29	Mid-Ebb	CS(Mf)3(N)	11:00	Surface	1	2	26.6	7.9	19.3	6.5		4.6		2.3	
HY/2012/07	2019/05/29	Mid-Ebb	CS(Mf)3(N)	11:00	Middle	2	1	26.6	7.9	19.3	6.5		4.5		3.2	
HY/2012/07	2019/05/29	Mid-Ebb	CS(Mf)3(N)	11:00	Middle	2	2	26.6	7.9	19.3	6.5		4.5		2.7	
HY/2012/07	2019/05/29	Mid-Ebb	CS(Mf)3(N)	11:00	Bottom	3	1	26.6	7.9	19.3	6.6	6.6	6.1		3.0	
HY/2012/07	2019/05/29	Mid-Ebb	CS(Mf)3(N)	11:00	Bottom	3	2	26.6	7.9	19.3	6.6		6.1		2.7	
HY/2012/07	2019/05/29	Mid-Ebb	IS(Mf)16	10:09	Surface	1	1	26.4	8.0	19.0	6.6	6.6	3.2	3.5	2.8	2.8
HY/2012/07	2019/05/29	Mid-Ebb	IS(Mf)16	10:09	Surface	1	2	26.4	8.0	19.0	6.6		3.2		2.8	
HY/2012/07	2019/05/29	Mid-Ebb	IS(Mf)16	10:09	Middle	2	1									
HY/2012/07	2019/05/29	Mid-Ebb	IS(Mf)16	10:09	Middle	2	2									
HY/2012/07	2019/05/29	Mid-Ebb	IS(Mf)16	10:09	Bottom	3	1	26.4	8.0	19.1	6.6	6.6	3.7		2.7	
HY/2012/07	2019/05/29	Mid-Ebb	IS(Mf)16	10:09	Bottom	3	2	26.4	8.0	19.1	6.6		3.7		2.8	
HY/2012/07	2019/05/29	Mid-Ebb	SR4a	10:17	Surface	1	1	26.6	8.0	14.7	6.8	6.8	7.6	5.9	5.1	4.3
HY/2012/07	2019/05/29	Mid-Ebb	SR4a	10:17	Surface	1	2	26.6	8.0	14.7	6.8		7.6		5.2	
HY/2012/07	2019/05/29	Mid-Ebb	SR4a	10:17	Middle	2	1									
HY/2012/07	2019/05/29	Mid-Ebb	SR4a	10:17	Middle	2	2									
HY/2012/07	2019/05/29	Mid-Ebb	SR4a	10:17	Bottom	3	1	26.5	8.0	19.7	6.4	6.4	4.2		3.7	
HY/2012/07	2019/05/29	Mid-Ebb	SR4a	10:17	Bottom	3	2	26.5	8.0	19.7	6.4		4.2		4.1	
HY/2012/07	2019/05/29	Mid-Ebb	SR4(N)	10:21	Surface	1	1	26.4	7.9	17.4	6.1	6.1	5.4	5.8	6.2	7.1
HY/2012/07	2019/05/29	Mid-Ebb	SR4(N)	10:21	Surface	1	2	26.4	7.9	17.4	6.1		5.4		5.9	
HY/2012/07	2019/05/29	Mid-Ebb	SR4(N)	10:21	Middle	2	1									
HY/2012/07	2019/05/29	Mid-Ebb	SR4(N)	10:21	Middle	2	2									
HY/2012/07	2019/05/29	Mid-Ebb	SR4(N)	10:21	Bottom	3	1	26.4	7.9	19.8	6.0	6.0	6.2		8.0	
HY/2012/07	2019/05/29	Mid-Ebb	SR4(N)	10:21	Bottom	3	2	26.4	7.9	19.8	6.0		6.2		8.3	
HY/2012/07	2019/05/29	Mid-Ebb	IS8	10:27	Surface	1	1	26.5	8.0	17.5	6.6	6.6	5.6	6.2	8.0	9.1
HY/2012/07	2019/05/29	Mid-Ebb	IS8	10:27	Surface	1	2	26.5	8.0	17.5	6.6		5.6		7.8	
HY/2012/07	2019/05/29	Mid-Ebb	IS8	10:27	Middle	2	1									
HY/2012/07	2019/05/29	Mid-Ebb	IS8	10:27	Middle	2	2									
HY/2012/07	2019/05/29	Mid-Ebb	IS8	10:27	Bottom	3	1	26.4	8.0	18.9	6.5	6.5	6.7		10.3	
HY/2012/07	2019/05/29	Mid-Ebb	IS8	10:27	Bottom	3	2	26.4	8.0	18.9	6.5		6.7		10.1	
HY/2012/07	2019/05/29	Mid-Ebb	IS(Mf)9	10:34	Surface	1	1	26.3	8.0	18.2	6.7	6.7	4.0	4.5	4.3	3.6
HY/2012/07	2019/05/29	Mid-Ebb	IS(Mf)9	10:34	Surface	1	2	26.3	8.0	18.2	6.7		3.9		4.5	
HY/2012/07	2019/05/29	Mid-Ebb	IS(Mf)9	10:34	Middle	2	1									
HY/2012/07	2019/05/29	Mid-Ebb	IS(Mf)9	10:34	Middle	2	2									
HY/2012/07	2019/05/29	Mid-Ebb	IS(Mf)9	10:34	Bottom	3	1	26.3	8.0	17.8	6.7	6.7	5.1		5.2	
HY/2012/07	2019/05/29	Mid-Ebb	IS(Mf)9	10:34	Bottom	3	2	26.3	8.0	17.8	6.7		5.1		5.7	

Project	Works	Date (yyyy-mm-dd)	Tide	Station	Start Time	Level	Replicate	Temperature (^{o}C)	pH	Salinity (ppt)	DO (mg/L)	Average DO (mg/L)	Turbidity (NTU)	Depth-Averaged Turbidity	SS (mg/L)	Depth-Averaged SS
HY/2012/07	2019/05/29	Mid-Flood	CS(Mf)5	15:05	Surface	1	1	26.0	8.1	20.9	6.8	6.7	2.6	3.4	3.0	3.3
HY/2012/07	2019/05/29	Mid-Flood	CS(Mf)5	15:05	Surface	1	2	26.0	8.1	20.9	6.8		2.6		3.3	
HY/2012/07	2019/05/29	Mid-Flood	CS(Mf)5	15:05	Middle	2	1	26.1	8.0	21.1	6.6		4.7		3.1	
HY/2012/07	2019/05/29	Mid-Flood	CS(Mf)5	15:05	Middle	2	2	26.1	8.0	21.1	6.7		4.7		3.2	
HY/2012/07	2019/05/29	Mid-Flood	CS(Mf)5	15:05	Bottom	3	1	25.9	8.0	22.9	6.5	6.5	2.9		3.6	
HY/2012/07	2019/05/29	Mid-Flood	CS(Mf)5	15:05	Bottom	3	2	25.9	8.0	22.9	6.5		2.8		3.5	
HY/2012/07	2019/05/29	Mid-Flood	CS(Mf)3(N)	14:13	Surface	1	1	26.6	7.9	18.9	6.9	6.9	3.9	3.9	1.2	1.4
HY/2012/07	2019/05/29	Mid-Flood	CS(Mf)3(N)	14:13	Surface	1	2	26.6	7.9	18.9	6.9		3.9		1.0	
HY/2012/07	2019/05/29	Mid-Flood	CS(Mf)3(N)	14:13	Middle	2	1	26.6	7.9	18.9	6.8		3.9		1.3	
HY/2012/07	2019/05/29	Mid-Flood	CS(Mf)3(N)	14:13	Middle	2	2	26.6	7.9	18.9	6.8		3.9		1.4	
HY/2012/07	2019/05/29	Mid-Flood	CS(Mf)3(N)	14:13	Bottom	3	1	26.6	7.9	19.0	6.9	6.9	4.0		1.7	
HY/2012/07	2019/05/29	Mid-Flood	CS(Mf)3(N)	14:13	Bottom	3	2	26.6	7.9	19.0	6.9		4.0		1.6	
HY/2012/07	2019/05/29	Mid-Flood	IS(Mf)16	14:39	Surface	1	1	26.3	8.0	19.7	6.7	6.7	3.5	6.2	3.6	4.4
HY/2012/07	2019/05/29	Mid-Flood	IS(Mf)16	14:39	Surface	1	2	26.3	8.0	19.7	6.7		3.5		4.1	
HY/2012/07	2019/05/29	Mid-Flood	IS(Mf)16	14:39	Middle	2	1									
HY/2012/07	2019/05/29	Mid-Flood	IS(Mf)16	14:39	Middle	2	2									
HY/2012/07	2019/05/29	Mid-Flood	IS(Mf)16	14:39	Bottom	3	1	26.4	8.0	19.8	6.7	6.7	8.9		4.7	
HY/2012/07	2019/05/29	Mid-Flood	IS(Mf)16	14:39	Bottom	3	2	26.4	8.0	19.8	6.7		9.0		5.1	
HY/2012/07	2019/05/29	Mid-Flood	SR4a	14:30	Surface	1	1	26.5	8.0	19.8	6.6	6.6	3.4	8.3	5.7	13.1
HY/2012/07	2019/05/29	Mid-Flood	SR4a	14:30	Surface	1	2	26.5	8.0	19.8	6.6		3.4		6.0	
HY/2012/07	2019/05/29	Mid-Flood	SR4a	14:30	Middle	2	1									
HY/2012/07	2019/05/29	Mid-Flood	SR4a	14:30	Middle	2	2									
HY/2012/07	2019/05/29	Mid-Flood	SR4a	14:30	Bottom	3	1	25.9	8.0	18.8	6.9	6.9	13.3		16.5	
HY/2012/07	2019/05/29	Mid-Flood	SR4a	14:30	Bottom	3	2	25.9	8.0	18.8	6.8		13.2		16.7	
HY/2012/07	2019/05/29	Mid-Flood	SR4(N)	14:27	Surface	1	1	26.2	8.0	18.3	6.6	6.6	12.4	12.1	25.0	24.4
HY/2012/07	2019/05/29	Mid-Flood	SR4(N)	14:27	Surface	1	2	26.1	8.0	18.3	6.6		12.3		25.7	
HY/2012/07	2019/05/29	Mid-Flood	SR4(N)	14:27	Middle	2	1									
HY/2012/07	2019/05/29	Mid-Flood	SR4(N)	14:27	Middle	2	2									
HY/2012/07	2019/05/29	Mid-Flood	SR4(N)	14:27	Bottom	3	1	26.2	8.0	18.9	6.6	6.6	11.8		23.2	
HY/2012/07	2019/05/29	Mid-Flood	SR4(N)	14:27	Bottom	3	2	26.2	8.0	18.9	6.6		11.8		23.7	
HY/2012/07	2019/05/29	Mid-Flood	IS8	14:23	Surface	1	1	26.3	8.0	20.2	6.6	6.6	3.5	5.3	2.8	2.8
HY/2012/07	2019/05/29	Mid-Flood	IS8	14:23	Surface	1	2	26.2	8.0	20.0	6.6		3.5		3.3	
HY/2012/07	2019/05/29	Mid-Flood	IS8	14:23	Middle	2	1									
HY/2012/07	2019/05/29	Mid-Flood	IS8	14:23	Middle	2	2									
HY/2012/07	2019/05/29	Mid-Flood	IS8	14:23	Bottom	3	1	26.3	8.0	20.2	6.6	6.6	7.1		2.4	
HY/2012/07	2019/05/29	Mid-Flood	IS8	14:23	Bottom	3	2	26.3	8.0	20.2	6.6		7.0		2.6	
HY/2012/07	2019/05/29	Mid-Flood	IS(Mf)9	14:15	Surface	1	1	26.3	8.0	19.9	6.6	6.6	6.1	5.3	3.9	2.9
HY/2012/07	2019/05/29	Mid-Flood	IS(Mf)9	14:15	Surface	1	2	26.4	8.0	19.9	6.6		6.1		3.7	
HY/2012/07	2019/05/29	Mid-Flood	IS(Mf)9	14:15	Middle	2	1									
HY/2012/07	2019/05/29	Mid-Flood	IS(Mf)9	14:15	Middle	2	2									
HY/2012/07	2019/05/29	Mid-Flood	IS(Mf)9	14:15	Bottom	3	1	26.2	8.0	19.7	6.6	6.6	4.5		3.7	
HY/2012/07	2019/05/29	Mid-Flood	IS(Mf)9	14:15	Bottom	3	2	26.2	8.0	19.7	6.6		4.6		3.9	

Note: Indicates Exceedance of Action Level
Indicates Exceedance of Limit Level

Email message

Environmental Resources Management

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18 Tak Fung Street
Hunghom, Kowloon
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Telephone: (852) 2271 3000
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To	Ramboll Hong Kong, Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Impact Dolphin Monitoring
Date	28 October 2019

ERM

Dear Sir or Madam,

Please find attached the Notification of Exceedance (NOE) of the following Log no.:

0212330_Mar2019/May2019_dolphin_STG&ANI_NEL&NWL

A total of one limit level exceedance was recorded in the quarterly impact dolphin monitoring data between March and May 2019.

Regards,

Dr Jasmine Ng
Environmental Team Leader

ERM-Hong Kong, Limited

CONTRACT NO. HY/2012/08
TUEN MUN – CHEK LAP KOK LINK – NORTHERN CONNECTION SUB-SEA TUNNEL SECTION

Impact Dolphin Monitoring
Notification of Exceedance

Log No.	**0212330_ Mar2019/May2019_dolphin_STG&ANI_NEL&NWL** **[Total No. of Exceedances = 1 Limit Level Exceedance]**	
Date	March - May 2019 (monitored) 25 October 2019 (results received by ERM)	
Monitoring Area	Northeast Lantau (NEL) and Northwest Lantau (NWL)	
Parameter(s) with Exceedance(s)	Quarterly encounter rate of dolphin sightings (STG) Quarterly encounter rate of total number of dolphins (ANI)	
Action Levels	North Lantau Social cluster	NEL: STG < 4.2 & ANI < 15.5 or NWL: STG < 6.9 & ANI < 31.3
Limit Levels		NEL: STG < 2.4 & ANI < 8.9 and NWL: STG < 3.9 & ANI < 17.9
Recorded Levels	NEL	STG = 0 & ANI = 0
	NWL	STG = 1.13 & ANI = 2.54
	One Limit Level Exceedance was recorded in the quarterly impact dolphin monitoring at NEL and NWL between March to May 2019. The exceedance was reported in the approved *Sixty-seventh Monthly EM&A Report* dated 14 June 2019.	
Statistical Analyses	Further to the review of the available and relevant dolphin monitoring data in the EM&A programme by this Contract, statistical analyses were conducted as follows: • A two-way ANOVA with repeated measures and unequal sample size was conducted using Period (2 levels: baseline vs impact – present impact quarter, March 2019 to May 2019) and Location (2 levels: NEL and NWL) as fixed factors to examine whether there were any significant differences in the average encounter rates between the baseline and present impact monitoring quarter. By setting $\alpha = 0.05$ as the significance level in the statistical tests, significant differences in STG ($p = 0.0019$) and ANI ($p = 0.0113$) were detected between Periods. • A two-way ANOVA with repeated measures and unequal sample size was conducted using Cumulative Period (2 levels: baseline vs impact – cumulative quarters, December 2012 to May 2019) and Location (2 levels: NEL and NWL) as fixed factors to examine whether there were any significant differences in the average encounter rates between the baseline and cumulative impact monitoring quarter. By setting $\alpha = 0.00001$ as the significance level in the statistical tests, significant difference in STG ($p = 0.000000$) and in ANI ($p = 0.000000$) between Cumulative Period and Location were detected. *Note: The commencement date under *Contract No. HY/2012/08* is 1 November 2013.	
Works Undertaken (in the monitoring quarter)	In the quarter between March to May 2019, Seawall Modification Works was undertaken under Contract No. HY/2012/08.	

Possible Reason for Action or Limit Level Exceedance(s)	The potential factors that may have contributed to the observed exceedance are reviewed below: • Blocking of CWD travelling corridor: The *Monitoring of Marine Mammals in Hong Kong Waters (2018 – 19)* (1) reported that dolphin usage and traveling activities to the northern side of the airport (dolphin traveling corridor) are affected by frequent high-speed ferry traffic from Sky Pier (not related to this Contract), which is likely a major factor resulting in the decrease in dolphin abundances in North Lantau. • Marine works of the Contract: As per the findings from the EIA report (*Section 8.11.9*), the major influences on the Chinese White Dolphin (CWD) *Sousa chinensis* under this Contract are marine traffics, reclamation and dredging works. The Contractor implemented the marine traffic control in the reporting period as per the requirements in the *EP-354/2009/D* and the updated *EM&A Manual*. Most of the vessels of this Contract also worked within the site boundary, in which the area is seldom used by CWD. Disturbance from vessels of this Contract is considered minor. During this quarter of dolphin monitoring, no adverse impact on CWD due to the activities under this Contract was observed. • Impact on water quality: According to the findings in the water quality monitoring results at the impact monitoring stations between March 2019 and May 2019, there were two (2) Action Level of Suspended Solids (SS) exceedances for water quality impact monitoring in the reporting period. The exceedances were considered not related to this Contract upon further investigation and the investigation reports are presented in *Appendix J of the 22nd Quarterly EM&A Report (March to May 2019).* In view of the above, marine ecological mitigation measures were considered properly implemented, and thus no unacceptable impact on CWD or its habitat was associated with this Contract in this quarter.
Actions Taken / To Be Taken	In the quarter between March and May 2019, Seawall Modification Works were carried out. The existing mitigation measures are recommended to be continuously implemented. Furthermore, it is also recommended to reduce the vessels for marine works as much as possible. The ET will monitor for future trends in exceedance(s). A joint team meeting was held on 11 March 2019 for discussion on CWD trend, with attendance of ENPO, Representatives of Resident Site Staff (RSS), Representatives of Environmental Teams (ETs) for Contract No. HY/2011/03, HY/2013/04, HY/2012/07 and HY/2012/08. The discussion/recommendation as presented in the meeting, which might be relevant to this Contract are summarized below. It was concluded that the HZMB works is one of the contributing factors affecting the dolphins. It was also concluded the contribution of impacts due to the HZMB works as a whole (or individual marine contracts) cannot be quantified or separate from the other stress factors. It was reminded that the ETs shall keep reviewing the implementation status of the dolphin related mitigation measures and remind the contractors to ensure the relevant measures are fully implemented. It was recommended that the marine works of HZMB projects should be completed as soon as possible to reduce the overall duration of impacts and allow the dolphins population to recover as early as possible. The participants were also reminded that the protection measures (e.g. speed limit control) for the BMP shall be implemented so as to provide a better habitat for dolphin recovery. It is noted that even though marine vessels may moor within the mooring site of BMP, commercial activities including loading / unloading / transhipment are not allowed except a permit is obtained. The HZMB works vessels were recommended to avoid the BMP. It was also recommended that the marine works footprint and vessels for the marine works should be reduced as much as possible, and vessels idling / mooring in other part of the North Lantau shall be avoided whenever possible. Dolphin specialists of the Projects confirmed that the CWD sighting nearby north of Sha Chau and Lung Kwu Chau Marine Park has significantly declined. The reason for the decline was likely related to the re-routing of high-speed ferry from Sky Pier. The CWDs in the area should be closely followed.
Remarks	The results of impact dolphin monitoring, the status of implemented marine ecological mitigation measures are documented in the approved *Sixty-fifth* to *Sixty-seventh Monthly EM&A Reports*.

(1) Hung S K Y (2017). Prepared for AFCD. Available at: https://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/files/Final_Report_2016_17.pdf

Appendix K

Waste Flow Table

Monthly Summary Waste Flow Table

Name of Department: HyD **Contract No. / Works Order No.: HY/2012/08**

Monthly Summary Waste Flow Table for August 2019 [to be submitted not later than the 15th day of each month following reporting month] (All quantities shall be rounded off to 3 decimal places.)

Month	Monthly Break-down of Inert Construction & Demolition Materials (i.e. Public Fill Materials)				
	(a)=(b)+(c)+(d)+(e) Total Quantity Generated	(b) Hard Rock and Large Broken Concrete	(c) Reused in the Contract	(d) Reused in other Projects	(e) Disposed of as Public Fill
	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)
Sub-total	2224.407	0.000	76.754	585.369	1562.284
Jan-2019	299.831	0.000	53.419	215.427	30.985
Feb-2019	133.335	0.000	46.021	67.707	19.607
Mar-2019	120.224	0.000	50.455	20.964	48.805
Apr-2019	130.329	0.000	58.956	0.000	71.373
May-2019	67.355	0.000	51.297	0.000	16.058
Jun-2019	4.134	0.000	0.000	0.000	4.134
Half Year Sub-total	755.208	0.000	260.148	304.098	190.962
Jul-2019	3.821	0.000	0.000	0.000	3.821
Aug-2019	2.388	0.000	0.000	0.000	2.388
Sep-2019	3.610	0.000	0.000	0.000	3.610
Oct-2019					
Nov-2019					
Dec-2019					
Project Total Quantities	2989.434	0.000	336.902	889.467	1763.065

Month	**Actual Quantities of Non-inert Construction Waste Generated Monthly**								
	Metals		Paper/ cardboard packaging		Plastics (see Note 3)		Chemical Waste		Others, e.g. General Refuse disposed at Landfill
	(in '000kg)		(in '000kg)		(in '000kg)		(in '000kg)		(in '000ton)
	generated	recycled	generated	recycled	generated	recycled	generated	Disposed	generated
Sub-total	6763.82	6763.82	7.74	7.74	8.70	8.70	60.35	60.35	13.989
Jan-2019	394.55	394.55	0.00	0.00	0.00	0.00	0.00	0.00	0.538
Feb-2019	103.72	103.72	0.62	0.62	0.00	0.00	1.672	1.672	0.578
Mar-2019	88.20	88.20	0.46	0.46	0.00	0.00	0.00	0.00	0.692
Apr-2019	260.89	260.89	0.00	0.00	3.90	3.90	1.045	1.045	0.707
May-2019	0.66	0.66	0.66	0.66	0.00	0.00	0.00	0.00	0.798
Jun-2019	136.75	136.75	0.80	0.80	0.00	0.00	4.14	4.14	0.751
Half Year Sub-total	848.02	848.02	2.54	2.54	3.90	3.90	6.857	6.857	4.064
Jul-2019	444.37	444.37	1.20	1.20	0.00	0.00	0.00	0.00	0.730
Aug-2019	505.93	505.93	0.00	0.00	1.58	1.58	3.80	3.80	0.703
Sep-2019	397.10	397.10	0.60	0.60	1.62	1.62	8.00	8.00	0.711
Oct-2019									
Nov-2019									
Dec-2019									
Project Total Quantities	9095.99	9095.99	12.08	12.08	15.80	15.80	79.007	79.007	20.197

Forecast of Total Quantities of Construction and Demolition Materials to be Generated from the Contract*				
Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed of as Public Fill
(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)
3200.000	0.000	300.000	1000.000	2000.000

Forecast of Total Quantities of Construction and Demolition Materials to be Generated from the Contract*				
Metals	Paper/ cardboard packaging	Plastics (see Note 3)	Chemical Waste	General Refuse disposed of at Landfill
(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000 ton)
9500.00	15.00	15.00	80.00	30.000

Notes:
(1) The performance targets are given in the **ER Appendix 8J Clause 14** and the EM & A Manual(s).
(2) The waste flow table shall also include C&D materials to be imported for use at the Site.
(3) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material.
(4) The Contractor shall also submit the latest forecast of the total amount of C&D materials expected to be generated from the Works, together with a breakdown of the nature where the amount of C&D materials expected to be generated from the Works is equal to or exceeding 50,000 m3. (ER Part 8 Clause 8.8.5 (d) **(i)** refers).
(ii)
(5) Updated waste flow table is presented in the quarterly report.