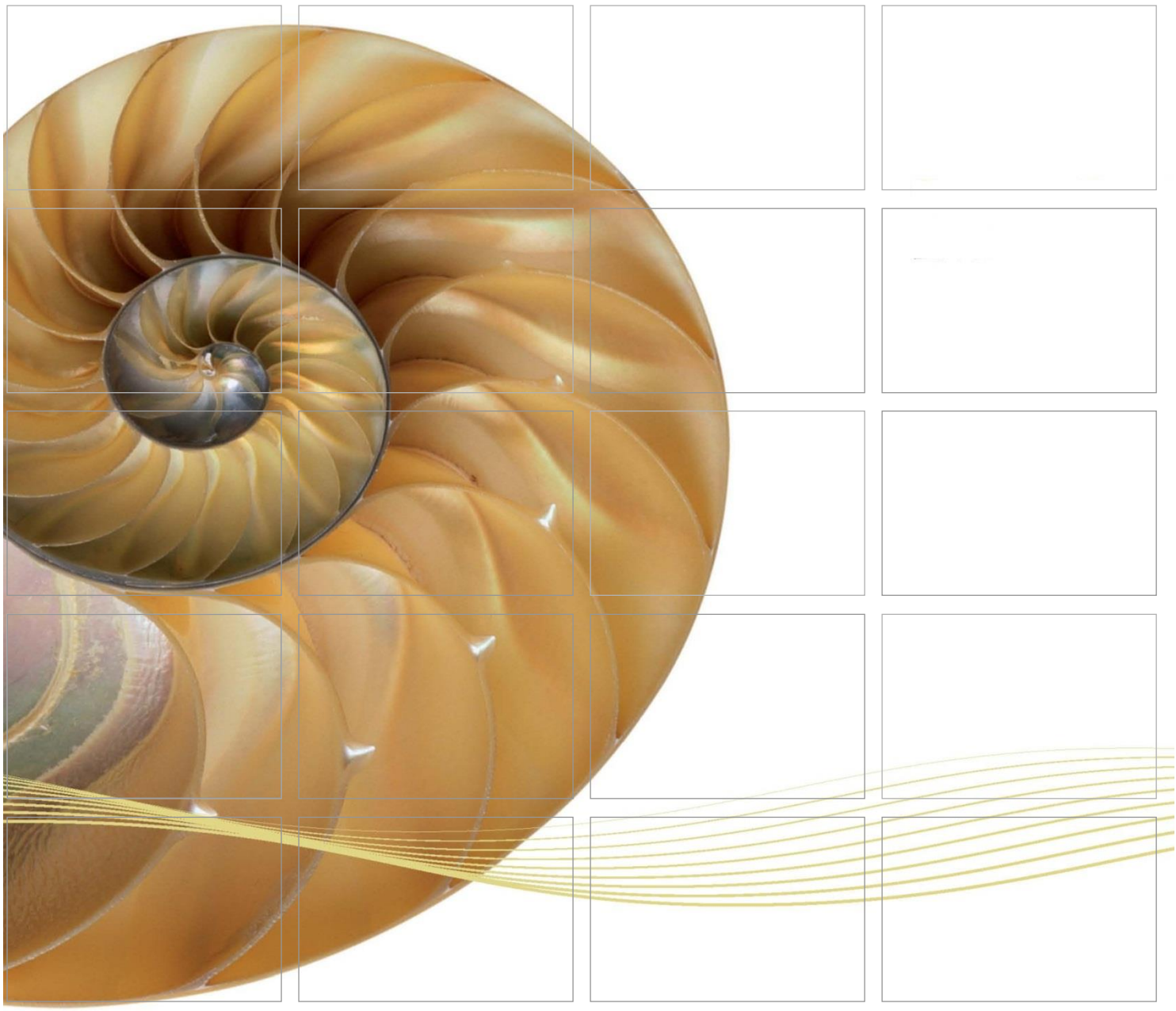
Report



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

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

18 October 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_7716L.19

21 October 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
21st Quarterly EM&A Summary Report for December 2018 to February 2019

Reference is made to the ET's submission of 21st Quarterly EM&A Summary Report for December 2018 to February 2019 (ET's ref.: "*0212330_21st Quarterly EM&A_20191017.doc*" dated 18 October 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

\\aphkfps3\Drive Q\Projects\HYDHZMBEEM00\02_Proj_Mgt\02_Corr\2019\HYDHZMBEEM00_0_7716L.19.docx

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-first Quarterly Environmental Monitoring & Audit (EM&A) Report

Document Code: 0212330_21st Quarterly EM&A_20191017.doc

Environmental Resources Management

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Client: DBJV	Project No: 0212330
Summary: This document presents the Twenty-first Quarterly EM&A Report for Tuen Mun – Chek Lap Kok Link Northern Connection Sub-sea Tunnel Section.	Date: 18 October 2019 Approved by:  *Mr Craig Reid* *Partner* Certified by:  *Dr Jasmine Ng* *ET Leader*

Revision	Description	By	Checked	Approved	Date
	21st Quarterly EM&A Report	VAR	JN	CAR	18/10/19

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-first Quarterly EM&A report presenting the EM&A works carried out during the period from 1 December 2018 to 28 February 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 Cross Passage Tympanum – TBM tunnel;
- Cross Passage Lining Installation – TBM Tunnel;
- Cross Passage Construction by Pipe Jacking – TBM Tunnel;
- Corbel & OVHD Construction – TBM Tunnel;
- Parapet wall and fireboard Installation – TBM Tunnel;
- RC structure – Portion N-A & S-A;
- Bulk Excavation – Portion N-A; and
- D-wall Construction – Portion S-A

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	29 sessions
1-hour TSP Monitoring	29 sessions

Water Quality Monitoring	13 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 Sousa chinensis (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

Eight (8) Action Level exceedance and One (1) Limit Level exceedance of 1-hour TSP was recorded. One (1) Action Level exceedance of 24-hour TSP was recorded. Investigation reports are provided in Appendix J.

Breaches of Action and Limit Levels for Water Quality

No exceedances were recorded in the water quality monitoring of this reporting month.

Dolphin Monitoring

Whilst one (1) Limit Level exceedance was observed for the quarterly dolphin monitoring data between December 2018 and February 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 Cross Passage Tympanum – TBM tunnel;
- Cross Passage Lining Installation – TBM Tunnel;
- Cross Passage Construction by Pipe Jacking – TBM Tunnel;
- Corbel & OVHD Construction – TBM Tunnel;
- RC structure – Portion N-A & S-A; and
- D-wall Construction – Portion N-A

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 and waste management issues.

1 INTRODUCTION

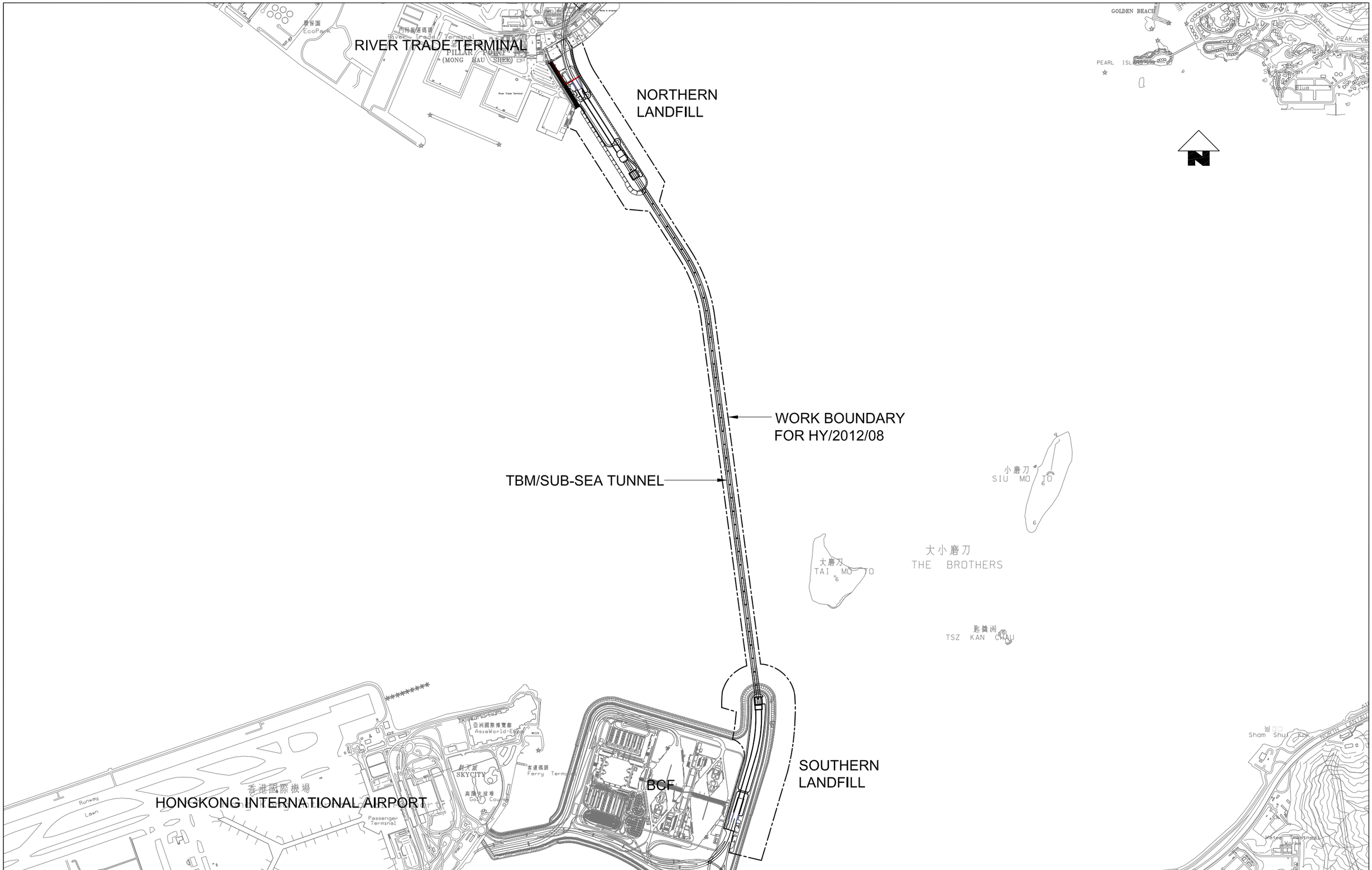
1.1 BACKGROUND

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-first 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 December 2018 to 28 February 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
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*.

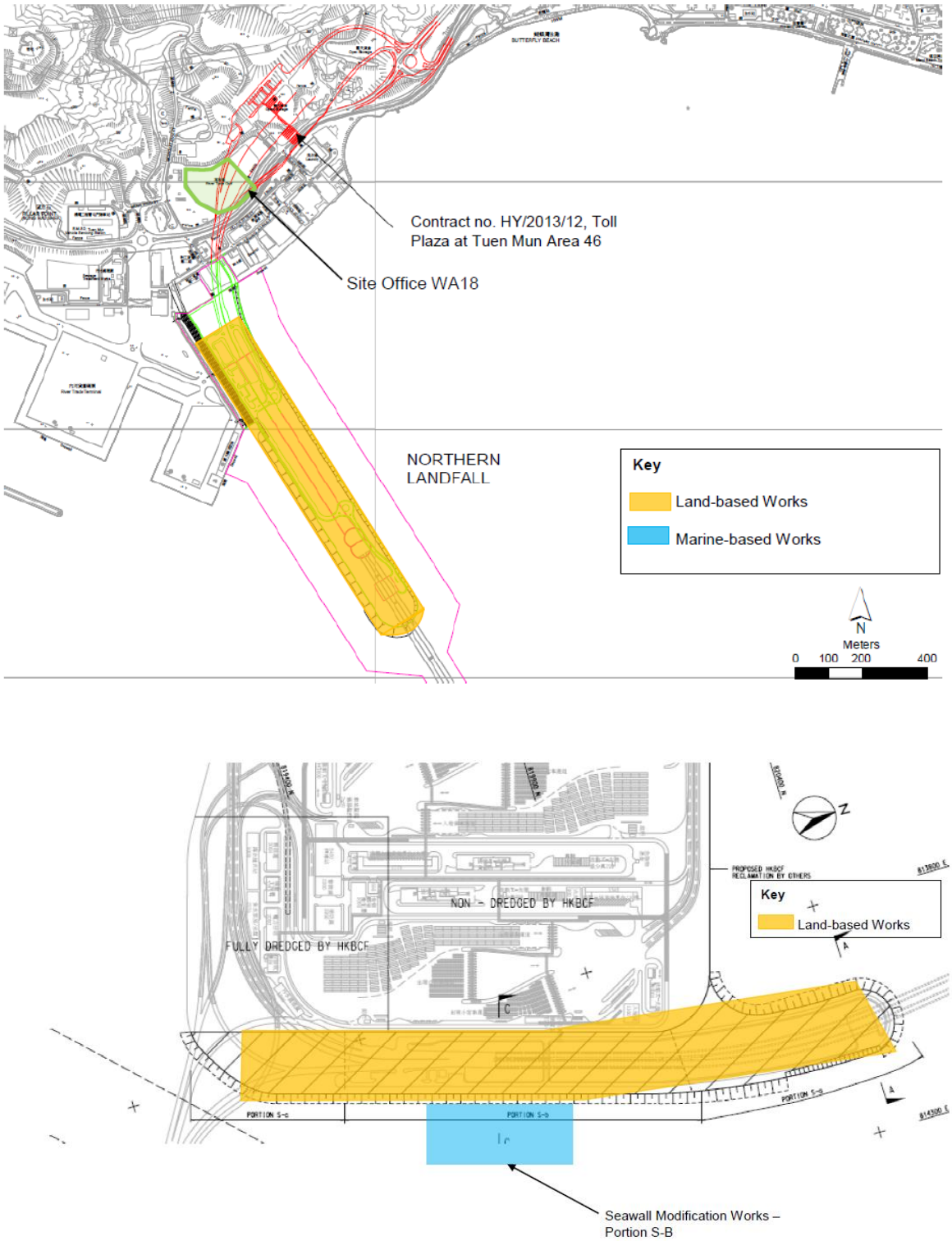
The general layout plan of the site showing the detailed works areas is shown in *Figure 1.2*. The Environmental Sensitive Receivers in the vicinity of the Project are shown in *Figure 1.3*.

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 Cross Passage Tympanum – TBM tunnel; • Cross Passage Lining Installation – TBM Tunnel; • Cross Passage Construction by Pipe Jacking – TBM Tunnel; • Corbel & OVHD Construction – TBM Tunnel; • Parapet wall and fireboard Installation – TBM Tunnel; • RC structure – Portion N-A & S-A; • Bulk Excavation – Portion N-A; and • D-wall Construction – Portion S-A
Marine-based Works • Seawall Modification Works – Portion S-B

Figure 1.2 Locations of Construction Activities – December 2018 to February 2019



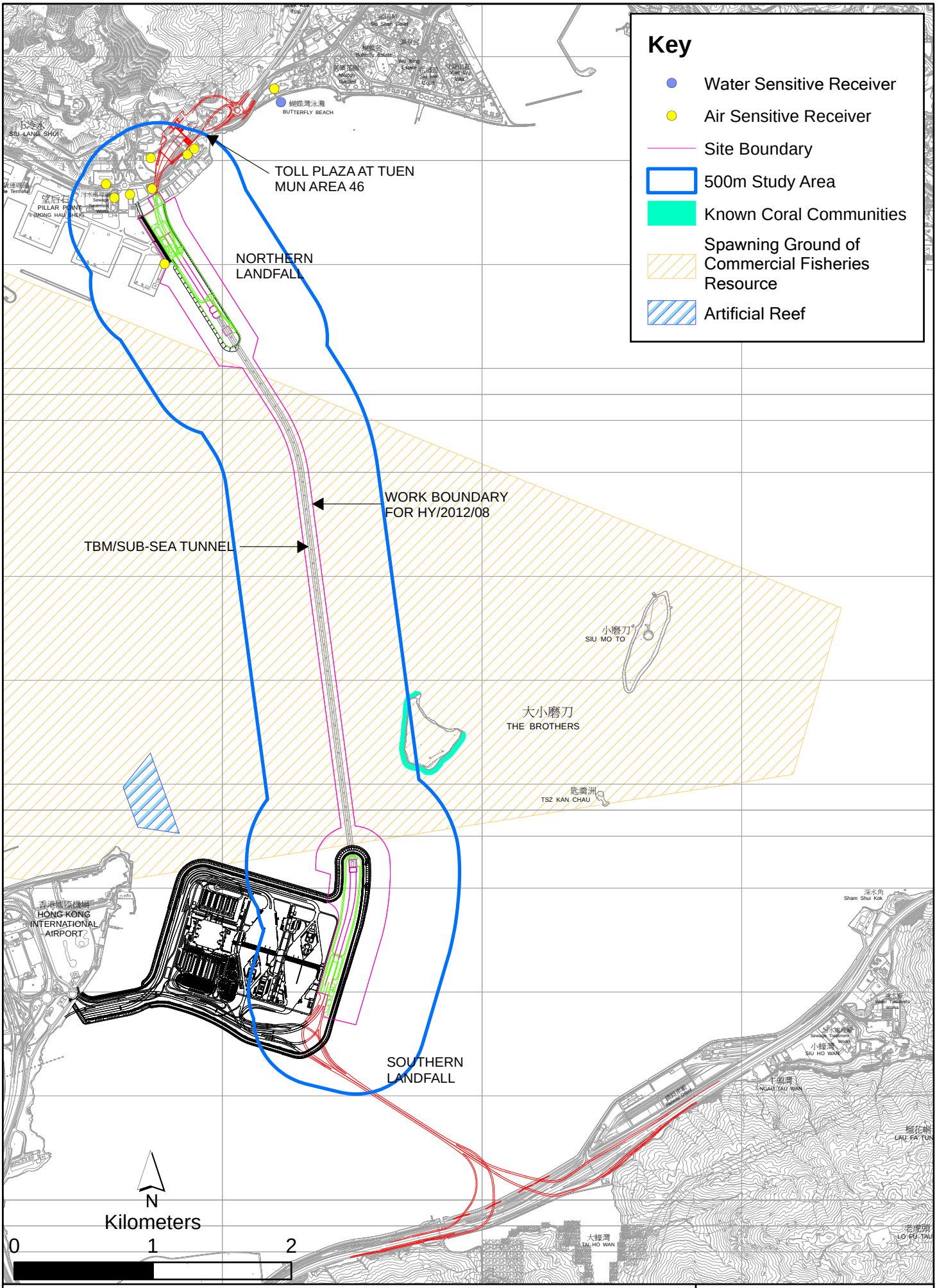


Figure 1.3 Environmental Sensitive Receivers in the vicinity of Contract No. HY/2012/08 Tuen Mun - Chek Lap Kok Link - Northern Connection Sub-Sea Tunnel Section

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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 December 2018	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 January 2019	Pillar Point Fire Station	Office	
AQMS1	1, 4, 10, 13, 16, 19, 22, 25 and 28 February 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.

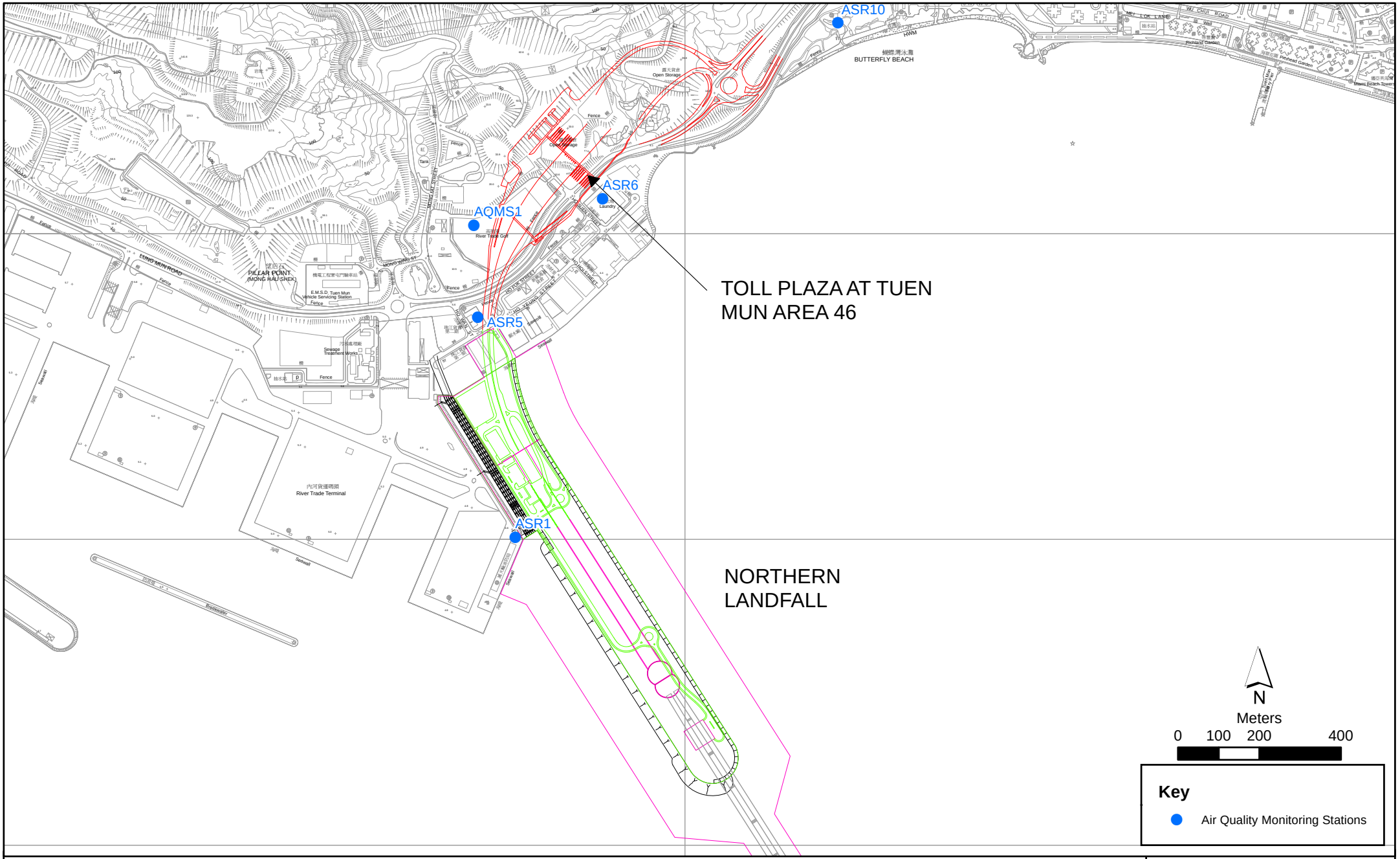

Figure 2.1

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- second* to *Sixty-fourth 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)
December 2018 to February 2019	ASR 1	167	63 - 519	331	500
	ASR 5	194	55 - 399	340	500
	AQMS1	115	47 - 221	335	500
	ASR6	139	58 - 478	338	500
	ASR10	93	25 - 223	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)
December	ASR 1	108	59 - 237	213	260

Month/Year	Station	Average (μg/m³)	Range (μg/m³)	Action Level (μg/m³)	Limit Level (μg/m³)
2018 to	ASR 5	120	53 - 196	238	260
February 2019	AQMS1	72	35 - 127	213	260
	ASR6	97	48 - 191	238	260
	ASR10	74	35 - 137	214	260

Eight (8) Action Level exceedance and One (1) Limit Level exceedance of 1-hour TSP was recorded. One (1) Action Level exceedance of 24-hour TSP was recorded. 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 7 January 2019 and temporarily suspended after January 2019.

Impact marine water quality monitoring was resumed on 2 January 2019 and temporarily suspended after January 2019. Water Quality Monitoring will be resumed prior to the commencement of stage 2 of sloping seawall construction in June 2019.

2.2.1 *Monitoring Requirements & Equipment*

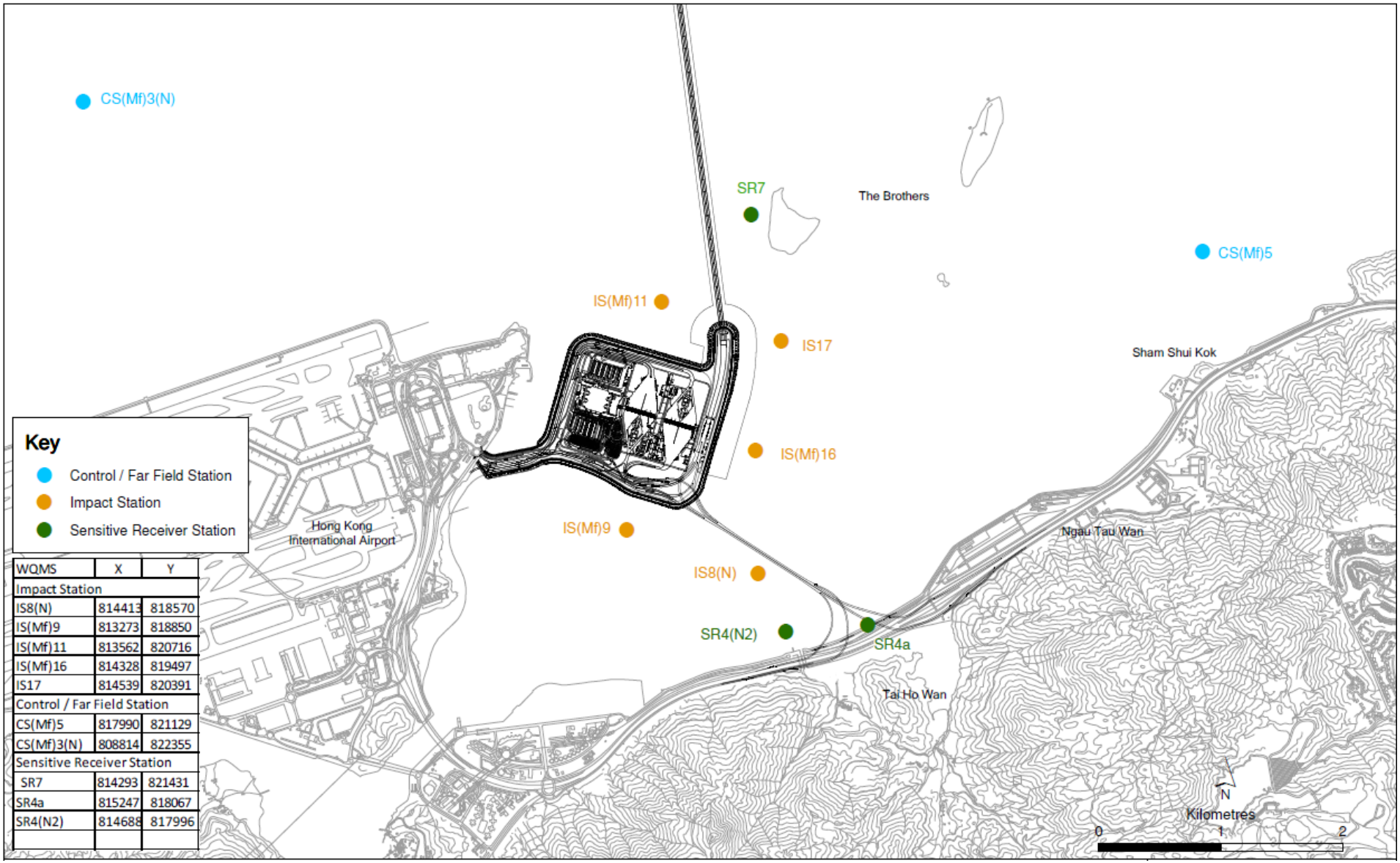
In accordance with the approved Environmental Review Report dated 21 March 2018 for the Change in Design of Vertical Seawall to Sloping Seawall on Southern Landfall, Updated Impact water quality monitoring programme and water quality monitoring stations IS17, SR7 and IS(Mf)11 specified under the EM&A 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) 8	813562	820716	• Temperature(°C) • pH(pH unit) • Turbidity (NTU) • Water depth (m) • Salinity (ppt)	3 water depths: 1m below sea surface, mid-depth and 1m above sea bed. If the water depth is	Impact monitoring: 3 days per week, at mid-flood and mid-ebb



WQMS	X	Y
Impact Station		
IS8(N)	814413	818570
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(N2)	814688	817996

Figure 2.2

Water Quality Monitoring Stations

Environmental Resources Management

ERM

Station ID	Type	Coordinates		*Parameters, unit	Depth	Frequency
IS17	Impact Station (Close to HKBCF construction site)	814539	820391	• DO (mg/L and % of saturation) • SS (mg/L)	less than 3m, mid-depth sampling only. If water depth less than 6m, mid-depth may be omitted.	tides during the construction period of the Contract.
SR7	Sensitive receivers (Tai Mo Do)	814293	821431			

*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
Multi-Parameters	YSI ProDss 16H104233
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-third 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

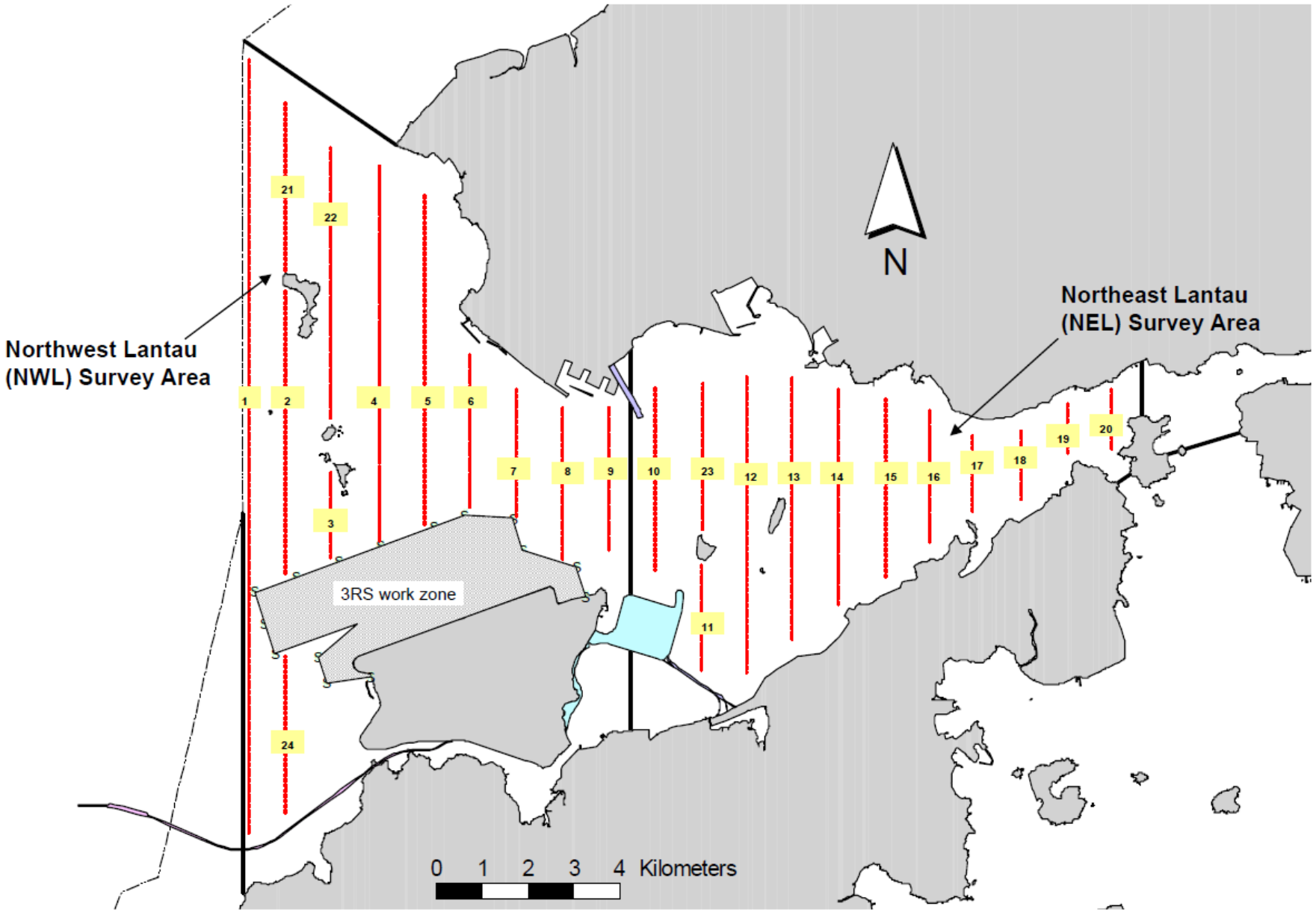


Figure 2.3

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

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Date: 29/11/2013

Environmental Resources Management

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Line No.		Easting	Northing	Line No.		Easting	Northing
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*

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 801.74 km of survey effort was conducted, with 94.7% 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, 302.10 km and 499.64 km of survey effort were conducted from NEL and NWL survey areas, respectively. The total survey effort conducted on primary and secondary lines were 579.99 km and 221.75 km, respectively. The survey efforts are summarized in *Appendix H*.

A total of 12 groups of 38 Chinese White Dolphins sightings were recorded during the six sets of surveys in this reporting quarter. Ten of the twelve dolphin sightings were made during on-effort search, and eight of the ten 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 (3 & 5 Dec 2018)	0.00	0.00
	Set 2 (10 & 12 Dec 2018)	0.00	0.00
	Set 3 (2 & 3 Jan 2019)	0.00	0.00
	Set 4 (7 & 14 Jan 2019)	0.00	0.00
	Set 5 (1 & 14 Feb 2019)	0.00	0.00
	Set 6 (20, 25 & 26 Feb 2019)	0.00	0.00
NWL	Set 1 (3 & 5 Dec 2018)	3.95	11.86
	Set 2 (10 & 12 Dec 2018)	0.00	0.00
	Set 3 (2 & 3 Jan 2019)	3.32	14.94
	Set 4 (7 & 14 Jan 2019)	0.00	0.00
	Set 5 (1 & 14 Feb 2019)	3.86	7.72
	Set 6 (20, 25 & 26 Feb 2019)	3.29	13.16

Note: Dolphin Encounter Rates are deduced from the Two Sets of Surveys (Two/Three 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)**	
	December 2018 – February 2019	**September – November 2011**	**December 2018 – February 2019**	**September – November 2011**
Northeast Lantau	0.0	6.00 ± 5.05	0.0	22.19 ± 26.81
Northwest Lantau	2.40 ± 1.88	9.85 ± 5.85	7.95 ± 6.60	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 1 – 7 individuals per group in North Lantau region during December 2018 to February 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	
	December 2018 – February 2019	**September – November 2011**
Overall	3.17 ± 1.80 (n = 12)	3.72 ± 3.13 (n = 66)
Northeast Lantau	---	3.18 ± 2.16 (n = 17)
Northwest Lantau	3.17 ± 1.80 (n = 12)	3.92 ± 3.40 (n = 49)

Whilst one limit level exceedance was observed for the quarterly dolphin monitoring data between December 2018 and February 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 Sousa chinensis (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 5, 12, 19 and 27 December 2018; 2, 9, 16, 23 and 30 January 2019; 8, 13, 20 and 28 February 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
5 December 2018	Works Area – Portion N-C • Chemical label should be provided for oil drums. Works Area – Portion N-A • Accumulated waste in the waste skip should be removed. • Drip tray and chemical label should be provided for the chemical containers. Works Area – Portion S-B • Rubbish in the drainage channel should be cleared.	Works Area – Portion N-C • The Contractor was reminded to provide chemical label for the oil drums. Works Area – Portion N-A • The Contractor was reminded to remove accumulated waste in the waste skip. • The Contractor was reminded to provide drip tray and chemical label for the chemical containers. Works Area – Portion S-B • The Contractor was reminded to clear the rubbish in the drainage channel.
12 December 2018	Works Area – Portion S-A • Drip tray should be provided for the chemical containers.	Works Area – Portion S-A • The Contractor was reminded to provide drip tray for the chemical containers.
19 December 2018	Works Area – Portion S-B • Drip tray shoould be provided for the chemical containers. Works Area – Portion N-C • Water discharge should be diverted to the drainage system. Works Area – Portion N-A • Drip try should be provided for the chemical containers.	Works Area – Portion S-B • The Contractor was reminded to provide drip tray for the chemical containers. Works Area – Portion N-C • The Contractor was reminded to divert the water discharge to the drainage system. Works Area – Portion N-A • The Contractor was reminded to provide drip tray for the chemical containers.
27 December 2018	No Environmental Observation was recorded during the site audit. **Reminder from the SOR** Works Area - Portion N-A 1. Stagnant water in the drip tray should be removed. Works Area - Portion S-A • 2. Stagnant water should be removed.	No Environmental Observation was recorded during the site audit. **Reminder from the SOR** Works Area - Portion N-A 1. The Contractor was reminded to remove the stagnant water in the drip tray. Works Area - Portion S-A • 2. The Contractor was reminded to remove the stagnant water.
2 January 2019	Works Area – Portion S-C • The cement bags stock should be covered to prevent dust. • Water spraying should be applied to prevent dust when carrying breaking works.	Works Area – Portion S-C • The Contractor was reminded to cover the cement bags stock to prevent dust. • The Contractor was reminded to apply water spraying to prevent dust when carrying breaking works.

Inspection Date	Environmental Observations	Recommendations/ Remarks
9 January 2019	Works Area – Portion N-C • The cement bags stock should be covered to prevent dust. Works Area - Portion N-A • Chemical label and drip tray should be provided for the chemical drums. Works Area - Portion S-B • Housekeeping should be maintained.	Works Area – Portion N-C • The Contractor was reminded to cover the cement bags stock to prevent dust. Works Area - Portion N-A • The Contractor was reminded to provide chemical label and drip tray for the chemical drums. Works Area - Portion S-B • The Contractor was reminded to maintain the housekeeping.
16 January 2019	Works Area – Portion N-C • Chemical label and drip tray should be provided for the chemical drums. Works Area – Portion S-A • Water spraying should be applied during rock breaking works. **Reminder from the SOR** Works Area – Portion N-C • Stagnant water should be removed for mosquito control.	Works Area – Portion N-C • The Contractor was reminded to provide chemical label and drip tray for the chemical drums. Works Area – Portion S-A • The Contractor was reminded to apply water spraying during rock breaking works. **Reminder from the SOR** Works Area – Portion N-C • The Contractor was reminded to remove the stagnant water for mosquito control.
23 January 2019	Works Area – Portion N-A • Chemical label and drip tray should be provided for the chemical drums. Works Area - Portion S-A • Chemical label and drip tray should be provided for the chemical drums.	Works Area – Portion N-A • The Contractor was reminded to provide chemical label and drip tray for the chemical drums. Works Area - Portion S-A • The Contractor was reminded to provide chemical label and drip tray for the chemical drums.
30 January 2019	Works Area – TBM tunnel • Cement bags should be covered with tarpaulin sheets. Works Area - Portion S-A • Drip tray should be provided for the chemical drums. • Drip tray should be provided for the air compressor. Works Area - Portion S-B • NRMM label should be displayed on the crawler crane. • Oil leakage from the air compressor should be cleared.	Works Area – TBM tunnel • The Contractor was reminded to cover the cement bags with tarpaulin sheets. Works Area - Portion S-A • The Contractor was reminded to provide drip tray for the chemical drums. • The Contractor was reminded to provide drip tray for the air compressor. Works Area - Portion S-B • The Contractor was reminded to display the NRMM label on the crawler crane. • The Contractor was reminded to clear the oil leakage from the air compressor.
8 February 2019	Works Area – Portion N-A • Debris trapped in the surface channel should be removed.	Works Area – Portion N-A • The Contractor was reminded to remove the debris trapped in the surface channel.
13 February 2019	Works Area – Portion S-B • Chemical labels should be provided for the chemical drums. **Reminder from the SOR** Works Area – TBM tunnel • Stagnant water should be pumped away.	Works Area – Portion S-B • The Contractor was reminded to provide chemical labels for the chemical drums. **Reminder from the SOR** Works Area – TBM tunnel • The Contractor was reminded to pump away the stagnant water.

Inspection Date	Environmental Observations	Recommendations/ Remarks
20 February 2019	Works Area – Portion N-A • Accumulated waste in the waste skip should be removed. • The water pipe should be connected to the wetsep for wastewater treamtment. Works Area – Portion S-A • Drip tray should be provided for the chemical drums. Works Area - Portion S-B • Spilled oil on the ground should be cleared. • Accumulated waste in the waste skip should be removed. **Reminder from the SOR** Works Area – Portion N-A • Stagnant water at the top of the chemical drums should be cleared. • Stagnant water trapped inside the concrete bricks containment should be cleared.	Works Area – Portion N-A • The Contractor was reminded to remove the accumulated waste in the waste skip. • The Contractor was reminded to connect the water pipe to the wetsep for wastewater treatment. Works Area – Portion S-A • The Contractor was reminded to provide drip tray for the chemical drums. Works Area - Portion S-B • The Contractor was reminded to clear the spilled oil on the ground. • The Contractor was reminded to remove the accumulated waste in the waste skip. **Reminder from the SOR** Works Area – Portion N-A • The Contractor was reminded to clear the stagnant water at the top of the chemical drums. • The Contractor was reminded to clear the stagnant water trapped inside the concrete bricks containment.
28 February 2019	Works Area – TBM tunnel • Exposed cement bags should be covered. **Reminder from the SOR** Works Area – Portion S-B • Stagnant water trapped in the I-beam should be cleared. • Stagnant water and rubbish trapped in the tank should be cleared.	Works Area – TBM tunnel • The Contractor was reminded to cover the exposed cement bags. **Reminder from the SOR** Works Area – Portion S-B • The Contractor was reminded to clear the stagnant water trapped in the I-beam. • The Contractor was reminded to clear the stagnant water and rubbish trapped in the tank.

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)
December 2018	146,997	137,101	519	213,450	0	0	0	0
January 2019	299,831	268,846	538	394,550	0	0	1,095	0
February 2019	133,335	113,728	578	104,340	1,672	0	1,115	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.

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	18 October 2018	17 January 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/19-057	5 November 2018	4 December 2018	DBJV	Type 1 (Dedicated site) and Type 2 (Confined Marine Disposal)
Marine Dumping Permit	EP/MD/19-083	5 January 2019	4 February 2019	DBJV	Type 1 (Dedicated site) and Type 2 (Confined Marine 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
Construction Noise Permit	GW-RW0344-18	20 August 2018	19 February 2019	DBJV	WA23 @ Tsing Yi
Construction Noise Permit	GW-RS0598-18	15 July 2018	14 January 2019	DBJV	Southern Landfall
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
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 twenty-nine monitoring events for both 1-hour TSP and 24-hour TSP were undertaken in which eight (8) Action Level exceedance and one (1) Limit Level exceedance of 1-hour TSP was recorded. 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	2018-12-09	-	1	-
		2019-12-12	-	1	-
		2019-01-11	-	1	-
		-	2019-02-16	-	1
	Limit Level	2019-01-17	-	1	-
ASR5	Action Level	2019-01-08	-	1	-
		2019-01-11	-	1	-
		2019-01-17	-	1	-
		2019-01-26	-	1	-
	Limit Level	-	-		-
ASR6	Action Level	2019-12-18	-	1	-
	Limit Level	-	-	-	-
ASR10	Action Level	-	-	-	-
	Limit Level	-	-	-	-
	Total number of Action level Exceedances:			8	1
	Total number of Limit level Exceedances:			1	0

For marine water quality impact monitoring, a total of thirteen monitoring events were undertaken in which no exceedances 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	-	-	-	-	-	-	-	-
	Total AL Exceedances:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	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 December 2018 and February 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*.

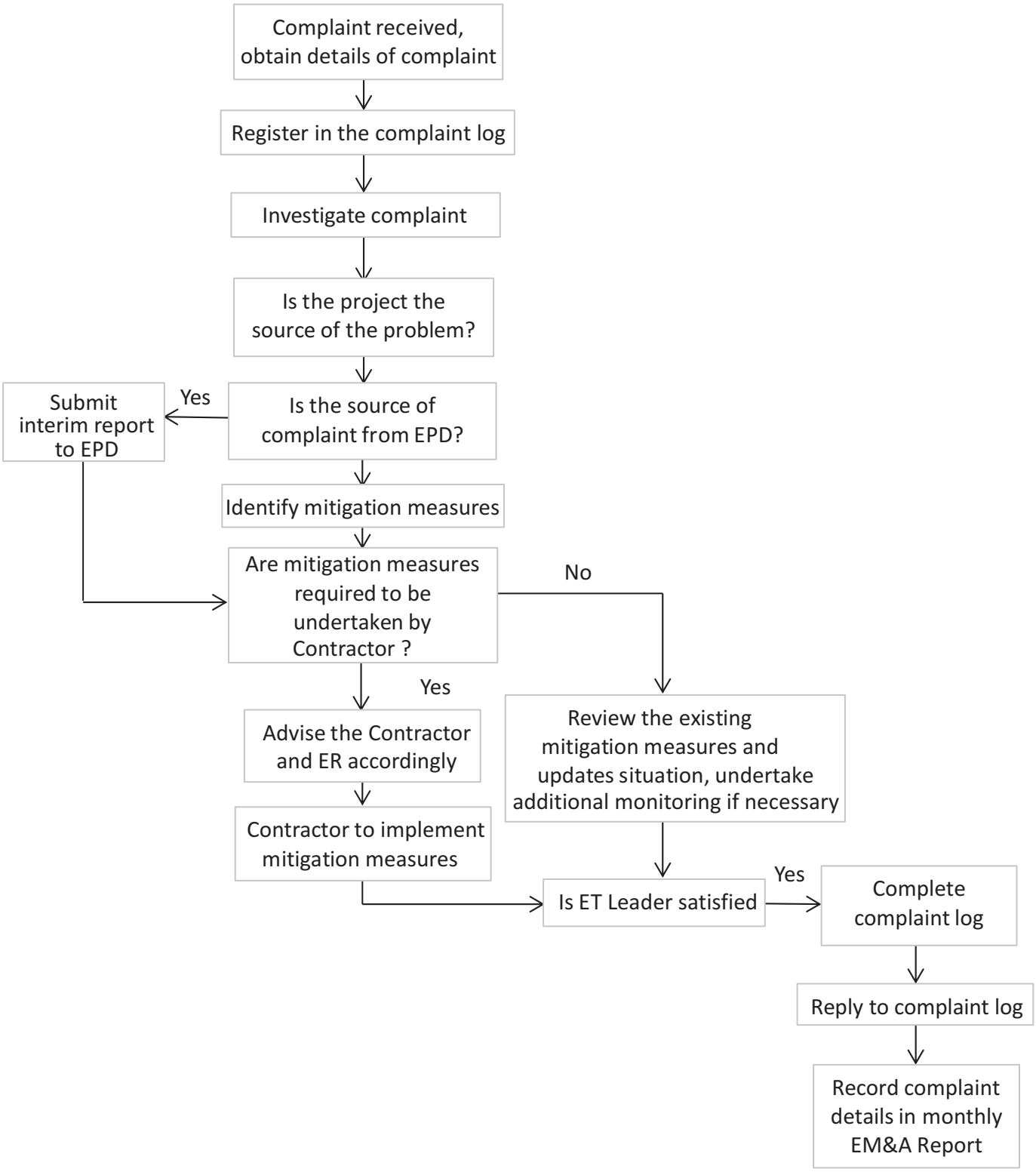

Figure 2.4 Environmental Complaint Handling Procedure

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Environmental Resources Management

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3 FUTURE KEY ISSUES

3.1 CONSTRUCTION ACTIVITIES FOR THE COMING QUARTER

As informed by the Contractor, the major works for the Project 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 Cross Passage Tympanum – TBM tunnel; • Cross Passage Lining Installation – TBM Tunnel; • Cross Passage Construction by Pipe Jacking – TBM Tunnel; • Corbel & OVHD Construction – TBM Tunnel; • RC structure – Portion N-A & S-A; and • D-wall Construction – Portion N-A

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 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-first Quarterly EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 December 2018 to 28 February 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 and dolphin monitoring were carried out in the reporting period. Eight (8) Action Level exceedance and One (1) Limit Level exceedance of 1-hour TSP was recorded. One (1) Action Level exceedance of 24-hour TSP was recorded in the air quality monitoring of this reporting period.

No exceedances were recorded in the water quality monitoring of this reporting month.

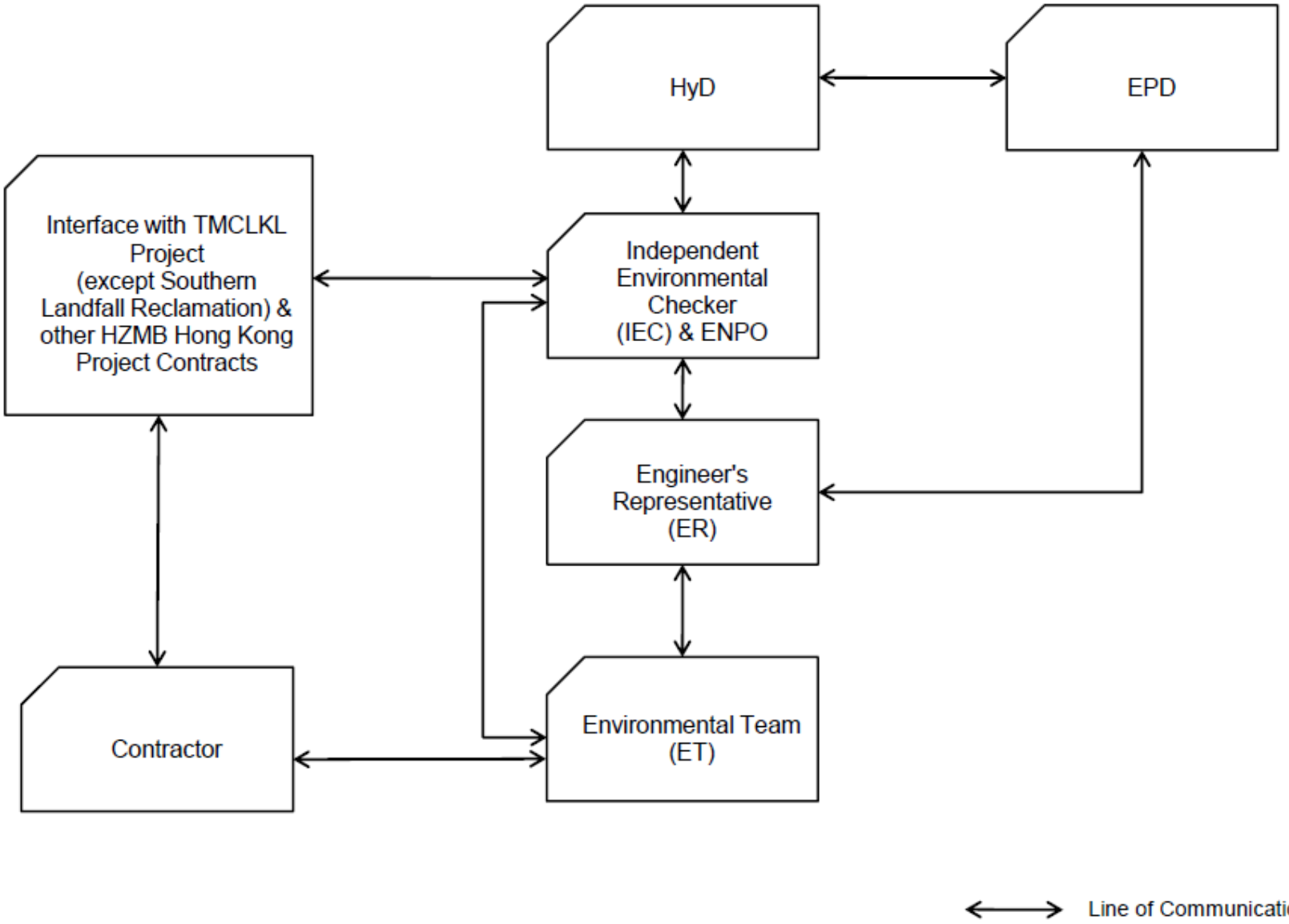
A total of 12 groups of 38 Chinese White Dolphins sightings were recorded during the six sets of surveys in this reporting quarter. Ten of the twelve dolphin sightings were made during on-effort search, and eight of the ten on-effort dolphin sightings were made on primary lines. Whilst one limit level exceedance was observed for the quarterly dolphin monitoring data between December 2018 and February 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

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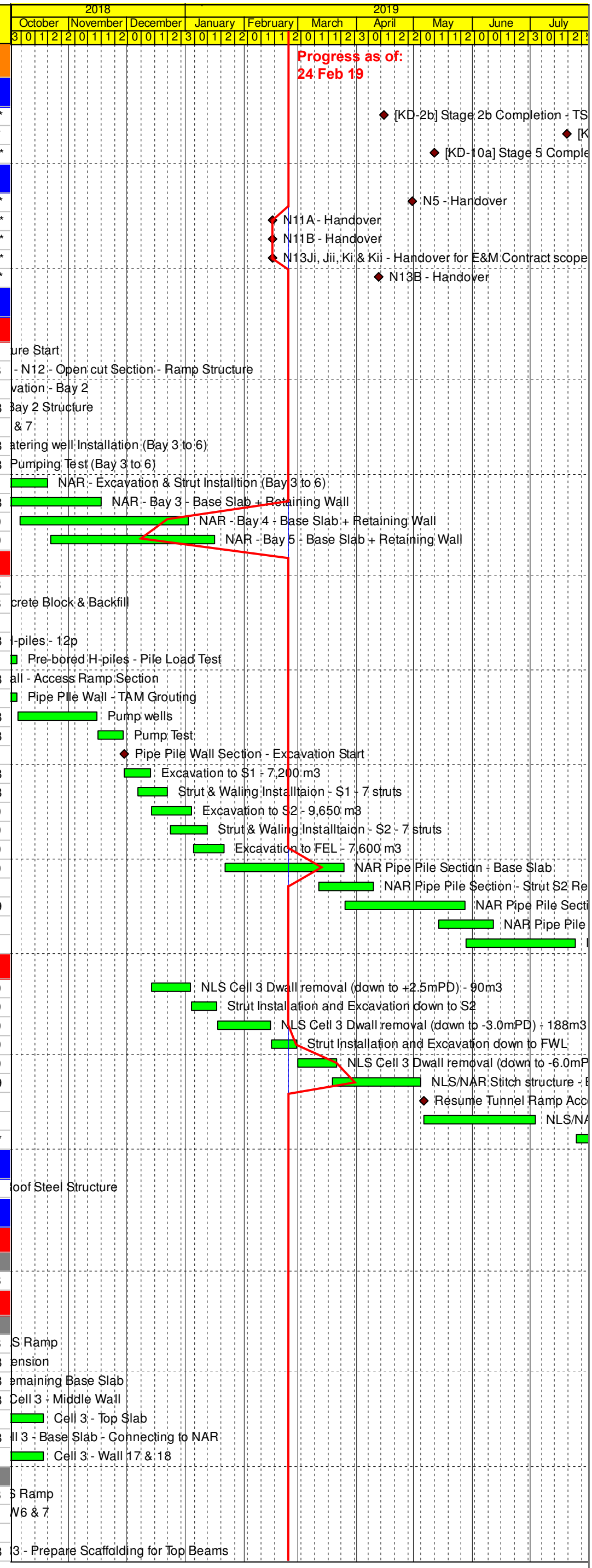
Appendix B

Construction Programme

TMCLKL Northern Connection Sub-sea Tunnel Sect

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 - N12 - Open Cut Section - Structure Start	0	04-Jun-18	
NAR - N12 - Open cut Section - Ramp Structure	84	04-Jun-18	11-Sep-18
NAR - N12 - Open Cut Excavation - Bay 2	12	20-Jun-18	04-Jul-18
NAR - N12 - Bay 2 Structure	36	06-Jul-18	16-Aug-18
NAR - Sheet Pile at bay 6 & 7	18	20-Jun-18	11-Jul-18
NAR - Dewatering well Installation (Bay 3 to 6)	36	12-Jul-18	22-Aug-18
NAR - Pumping Test (Bay 3 to 6)	12	23-Aug-18	05-Sep-18
NAR - Excavation & Strut Installtion (Bay 3 to 6)	36	06-Sep-18	20-Oct-18
NAR - Bay 3 - Base Slab + Retaining Wall	48	20-Sep-18	17-Nov-18
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			
NLS Temp Access Ramp - Closure	0		04-Jun-18
NLS Temp Access Ramp - Concrete Block & Backfill	18	04-Jun-18	25-Jun-18
Predrilling - 4 G.I.	12	26-Jun-18	10-Jul-18
Pre-bored H-piles - 12p	36	11-Jul-18	21-Aug-18
Pre-bored H-piles - Pile Load Test	36	22-Aug-18	04-Oct-18
Pipe Pile Wall - Access Ramp Section	36	11-Jul-18	21-Aug-18
Pipe PIle Wall - TAM Grouting	36	22-Aug-18	04-Oct-18
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 Ventilation Building			
North Vent Bldg - Roof Steel Structure	48	04-Jun-18	31-Jul-18
North Launching Shaft			
NLS Cell 1 False Tunnel			
ML03			
Cell 1 - Alimak Removal	15	06-Jun-18	23-Jun-18
NLS Cell 1-3 Structure for Cell 3 Dwall opening			
Cell 3			
Cell 3 - Removal of existing NLS Ramp	18	04-Jun-18	25-Jun-18
Cell 3 - Dwall extension	35	26-Jun-18	06-Aug-18
Cell 3 - Remaining Base Slab	18	07-Aug-18	27-Aug-18
Cell 3 - Middle Wall	24	28-Aug-18	24-Sep-18
Cell 3 - Top Slab	18	26-Sep-18	18-Oct-18
Cell 3 - Base Slab - Connecting to NAR	18	28-Aug-18	17-Sep-18
Cell 3 - Wall 17 & 18	24	18-Sep-18	18-Oct-18
Cell 2			
Cell 2 - Removal of remaining NLS Ramp	12	04-Jun-18	16-Jun-18
Cell 2 - Expose Coupler for W6 & 7	12	19-Jun-18	03-Jul-18
Cell 2 - Wall 6 & 7	24	04-Jul-18	31-Jul-18
Cell 2 - ML03 - Prepare Scaffolding for Top Beams	18	01-Aug-18	21-Aug-18



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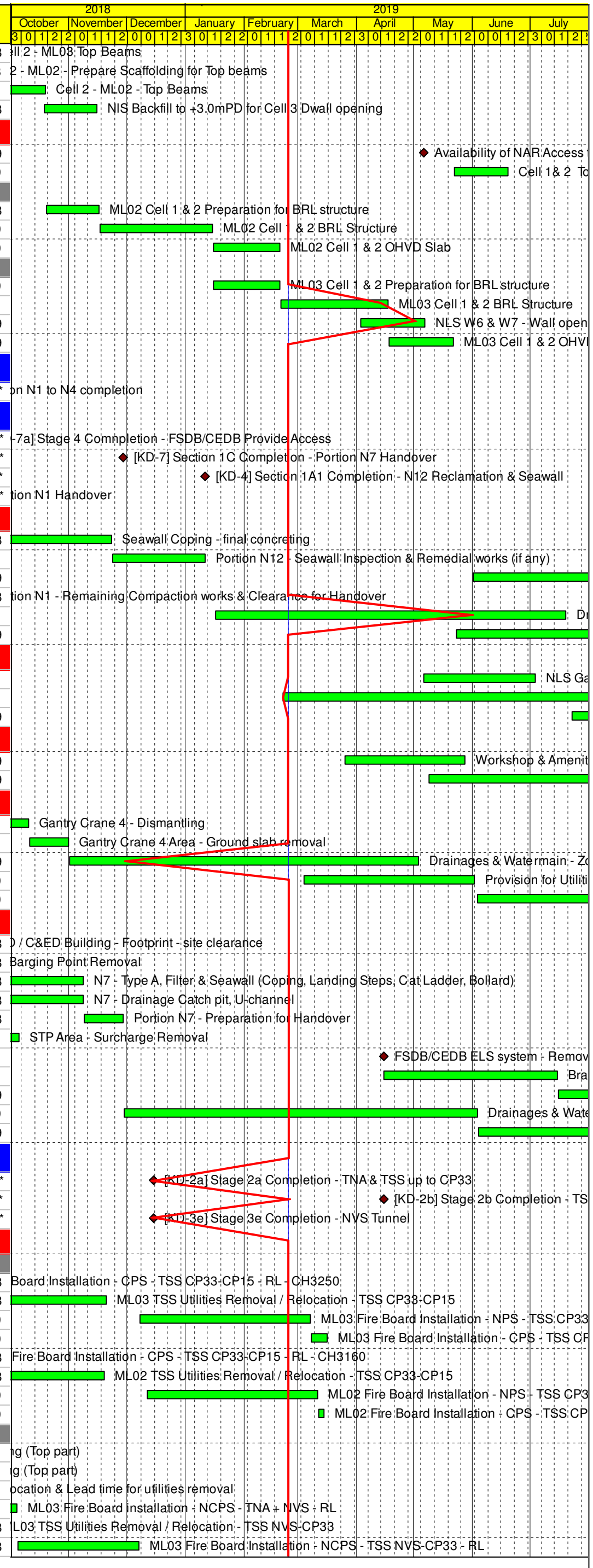
Activity Name	Orig Dur	Start	Finish
Cell 2 - ML03 Top Beams	24	22-Aug-18	18-Sep-18
Cell 2 - ML02 - Prepare Scaffolding for Top beams	18	22-Aug-18	11-Sep-18
Cell 2 - ML02 - Top Beams	24	19-Sep-18	19-Oct-18
NIS Backfill to +3.0mPD for Cell 3 Dwall opening	24	19-Oct-18	15-Nov-18
NLS Cell 1-3 Remaining Structure			
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
North - Phase 2 Reclamation			
[KD-5] Section 1A2 Completion - Portion N1 to N4 completion	0		04-Jun-18*
NLF Demobilization & At-grade works			
[KD-7a] Stage 4 Comnpletion - FSDB/CEDB Provide Access	0		15-Sep-18*
[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 N1 Handover	0		15-Sep-18*
Portion N12 & Portion N6B			
Seawall Coping - final concreting	48	27-Sep-18	23-Nov-18
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
Portion N1 - Remaining Compaction works & Clearance for	88	04-Jun-18	15-Sep-18
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
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
Drainages & Watermain - Workshop & Amenities	96	09-May-19	31-Aug-19
Precast Segment Yard			
Gantry Crane 4 - Dismantling	36	28-Aug-18	10-Oct-18
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
NVS & STP (Portion N7 Interface)			
FSD / C&ED Building - Footprint - site clearance	29	14-Aug-18	15-Sep-18
STP Barging Point Removal	24	14-Aug-18	10-Sep-18
N7 - Type A, Filter & Seawall (Coping, Landing Steps, Cat L	48	11-Sep-18	08-Nov-18
N7 - Drainage Catch pit, U-channel	36	26-Sep-18	08-Nov-18
Portion N7 - Preparation for Handover	18	09-Nov-18	29-Nov-18
STP Area - Surcharge Removal	72	12-Jul-18	05-Oct-18
FSDB/CEDB ELS system - Removal from Portion X (by C4)	0	15-Apr-19*	
Branch drains & Watermain Terminal Manholes - FSDB/CEI	72	15-Apr-19	15-Jul-19
FSDB/CEDB Termainal Manholes	48	16-Jul-19	09-Sep-19
Drainages & Watermain - NVS / STP	144	30-Nov-18	03-Jun-19
Provision for Utilities - NVS / STP	72	04-Jun-19	28-Aug-19
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 - CPS - TSS CP33-CP15 - RL	60	14-Jun-18	24-Aug-18
ML03 TSS Utilities Removal / Relocation - TSS CP33-CP15	48	22-Sep-18	20-Nov-18
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 - CPS - TSS CP33-CP15 - RL	65	23-Jun-18	07-Sep-18
ML02 TSS Utilities Removal / Relocation - TSS CP33-CP15	48	21-Sep-18	19-Nov-18
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 SVS False Tunnel Dismantling (Top part)	0	14-Jun-18	
ML02 SVS False Tunnel Dismantling (Top part)	0	13-Jun-18	
ML03 Vent Duct Relocation & Lead time for utilities removal	36	14-Jun-18	27-Jul-18
ML03 Fire Board installation - NCPS - TNA + NVS - RL	33	25-Aug-18	04-Oct-18
ML03 TSS Utilities Removal / Relocation - TSS NVS-CP33	48	28-Jul-18	21-Sep-18
ML03 Fire Board Installation - NCPS - TSS NVS-CP33 - RL	54	05-Oct-18	07-Dec-18



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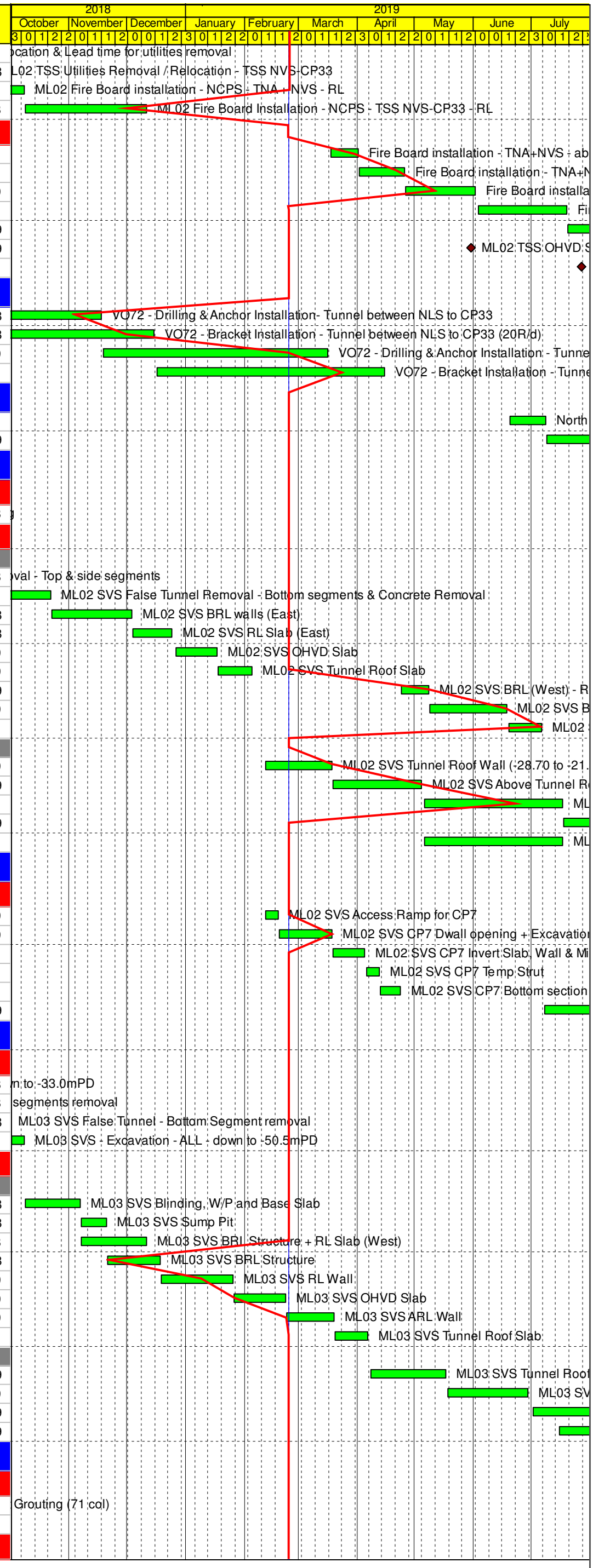
Activity Name	Orig Dur	Start	Finish
ML02 Vent Duct Relocation & Lead time for utilities removal	36	13-Jun-18	26-Jul-18
ML02 TSS Utilities Removal / Relocation - TSS NVS-CP33	48	27-Jul-18	20-Sep-18
ML02 Fire Board installation - NCPS - TNA + NVS - RL	24	08-Sep-18	08-Oct-18
ML02 Fire Board Installation - NCPS - TSS NVS-CP33 - RL	54	09-Oct-18	11-Dec-18
Fire board Installation above OHVD			
Fire Board installation - 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
ML02 TSS OHVD Slab Completion	0		30-May-19
ML02 TSA OHVD Slab Completion	0		27-Jul-19
Tunnel - Anchor / E&M Bracket (VO72)			
VO72 - Drilling & Anchor Installation- Tunnel between NLS tc	115	04-Jul-18	17-Nov-18
VO72 - Bracket Installation - Tunnel between NLS to CP33 (2	115	01-Aug-18	15-Dec-18
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
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
ML02 South Ventilation Shaft			
Concrete Bell Options			
ML02 SVS Bouyancy Slab Breaking	8	04-Jun-18	12-Jun-18
ML02 SVS Structure			
Tunnel Box			
ML02 SVS False Tunnel Removal - Top & side segments	12	13-Jun-18	27-Jun-18
ML02 SVS False Tunnel Removal - Bottom segments & Cc	39	04-Sep-18	22-Oct-18
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
Above Tunnel Vent Duct			
ML02 SVS Tunnel Roof Wall (-28.70 to -21.90)	30	12-Feb-19	18-Mar-19
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 Tunnel Roof to BBL2 W/P & Backfill (-21.90 to -	60	06-May-19	17-Jul-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
ML03 South Ventilation Shaft			
Shaft Excavation Stage 2			
ML03 SVS - Excavation - ALL - down to -33.0mPD	9	04-Jun-18 A	13-Jun-18
ML03 SVS False Tunnel - Top segments removal	12	14-Jun-18	28-Jun-18
ML03 SVS False Tunnel - Bottom Segment removal	18	08-Sep-18	29-Sep-18
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 Tunnel Roof to BBL2 W/P & Backfilli(-21.90 to -	45	16-Jul-19	05-Sep-19
South Ventilation Building			
ELS Foundation			
SVB - Remaining Jet Grouting (71 col)	30	20-Jun-18	25-Jul-18
SVB - Pumping Test	6	19-Jul-18	25-Jul-18
Cofferdam Excavation			



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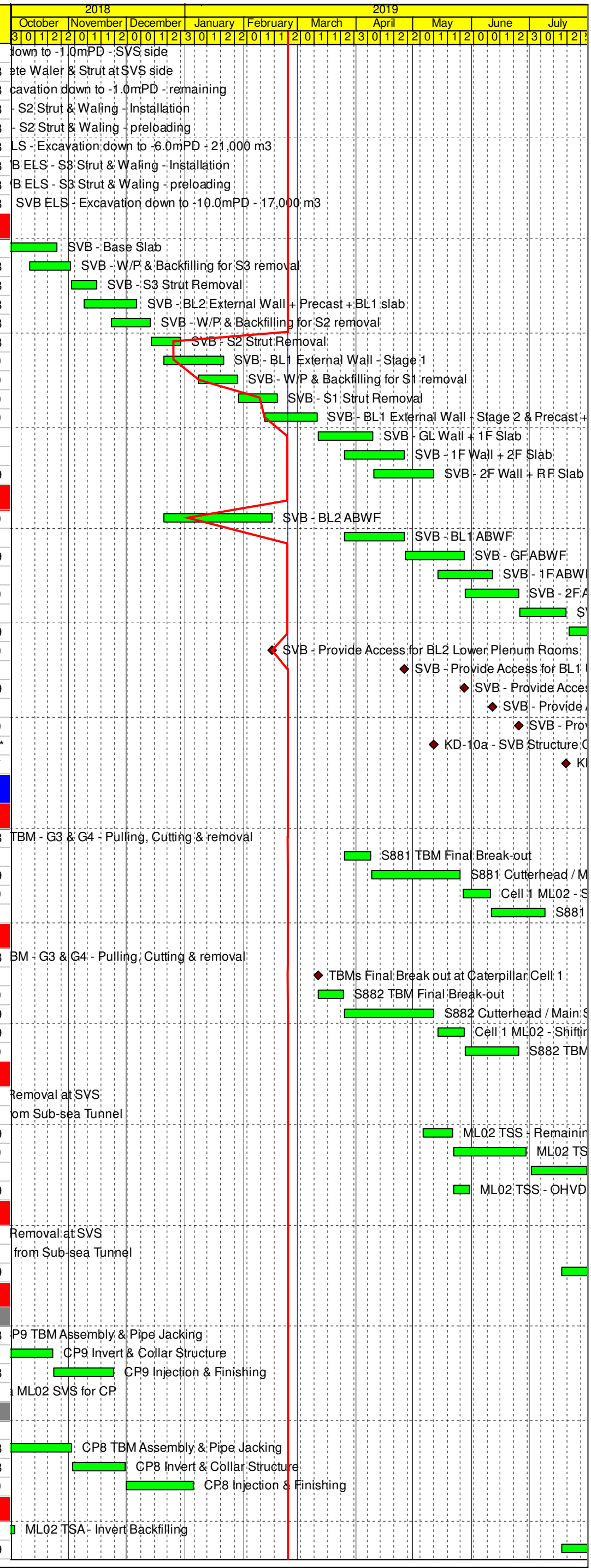
Activity Name	Orig Dur	Start	Finish
SVB ELS - Excavation down to -1.0mPD - SVS side	6	12-Jul-18	18-Jul-18
SVB ELS - Concrete Waler & Strut at SVS side	15	19-Jul-18	04-Aug-18
SVB ELS - Excavation down to -1.0mPD - remaining	12	02-Aug-18	15-Aug-18
SVB ELS - S2 Strut & Waling - Installation	16	09-Aug-18	27-Aug-18
SVB ELS - S2 Strut & Waling - preloading	0	28-Aug-18	28-Aug-18
SVB ELS - Excavation down to -6.0mPD - 21,000 m3	18	17-Aug-18	06-Sep-18
SVB ELS - S3 Strut & Waling - Installation	16	30-Aug-18	17-Sep-18
SVB ELS - S3 Strut & Waling - preloading	0	18-Sep-18	18-Sep-18
SVB ELS - Excavation down to -10.0mPD - 17,000 m3	15	11-Sep-18	28-Sep-18
Structure			
SVB - Base Slab	30	18-Sep-18	25-Oct-18
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			
S881 TBM			
S881 TBM - G3 & G4 - Pulling, Cutting & removal	36	28-Jul-18	07-Sep-18
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
S882 TBM			
S882 TBM - G3 & G4 - Pulling, Cutting & removal	36	24-Jul-18	03-Sep-18
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 Temp Gallery B Removal at SVS	6	28-Jun-18	05-Jul-18
S882 ISIG Removal from Sub-sea Tunnel	15	06-Jul-18	23-Jul-18
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 Temp Gallery B Removal at SVS	6	29-Jun-18	06-Jul-18
ML03 ISIG Removal from Sub-sea Tunnel	18	07-Jul-18	27-Jul-18
ML03 TSS - Remaining Corbel Structure by ISCG	14	18-Jul-19	02-Aug-19
TSS Cross Passage			
CP9			
CP9 TBM Assembly & Pipe Jacking	57	27-Jul-18	21-Sep-18
CP9 Invert & Collar Structure	24	22-Sep-18	23-Oct-18
CP9 Injection & Finishing	28	24-Oct-18	24-Nov-18
Slurry Pipe Setup via ML02 SVS for CP	24	28-Jun-18	26-Jul-18
CP8			
CP8 ML02 Tympanum	36	04-Jun-18	17-Jul-18
CP8 TBM Assembly & Pipe Jacking	42	22-Sep-18	02-Nov-18
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 - Invert Backfilling	24	04-Sep-18	03-Oct-18
ML02 TSA - Parapet installation	15	18-Jul-19	03-Aug-19



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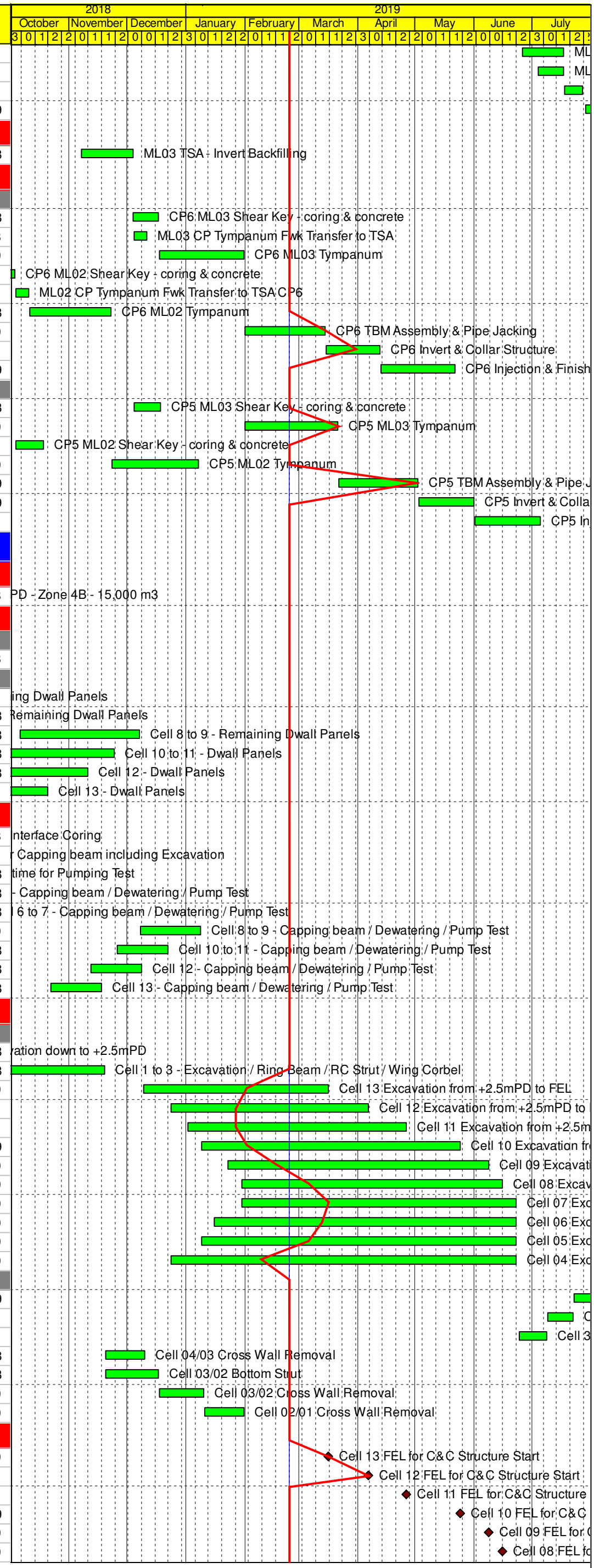
ML02 TSA - Corbel Structure	18	26-Jun-19	17-Jul-19
ML02 ISSG Crossing at SVS	12	04-Jul-19	17-Jul-19
ML02 TSA - OHVD by ISSG	9	18-Jul-19	27-Jul-19
ML02 TSA - ISSG dismantling	9	29-Jul-19	07-Aug-19
ML03 TSA Internal Structure			
ML03 TSA - Invert Backfilling	24	07-Nov-18	04-Dec-18
TSA Cross Passage			
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
CP6 ML02 Shear Key - coring & concrete	12	18-Sep-18	03-Oct-18
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			
MHS C&C Band Drain, Surcharge & Dwall			
Surcharge Removal to +5.5mPD - Zone 4B - 15,000 m3	3	27-Jun-18	29-Jun-18
N MHS C&C Caterpillar Dwall			
Cell 1 to 3 - Remaining Panels			
Cell 1 to 3 - Remaining Panels	12	11-Jun-18	25-Jun-18
Cell 4 to 8			
Cell 4 to 5 - Remaining Dwall Panels	40	11-Jun-18	28-Jul-18
Cell 6 to 7 - Remaining Dwall Panels	58	11-Jun-18	18-Aug-18
Cell 8 to 9 - Remaining Dwall Panels	53	06-Oct-18	07-Dec-18
Cell 10 to 11 - Dwall Panels	75	27-Aug-18	24-Nov-18
Cell 12 - Dwall Panels	69	20-Aug-18	10-Nov-18
Cell 13 - Dwall Panels	57	13-Aug-18	20-Oct-18
N MHS C&C Preparation for Excavation			
Cell 1 to 3 - Lead time for Dwall Interface Coring	12	08-Jun-18	22-Jun-18
Cell 1 to 3 - Lead time for Capping beam including Excavatio	18	23-Jun-18	14-Jul-18
Cell 1 to 3 - Lead time for Pumping Test	18	16-Jul-18	04-Aug-18
Cell 4 to 5 - Capping beam / Dewatering / Pump Test	24	30-Jul-18	25-Aug-18
Cell 6 to 7 - Capping beam / Dewatering / Pump Test	24	20-Aug-18	15-Sep-18
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 1 to 3 - Excavation down to +2.5mPD	18	16-Jul-18	04-Aug-18
Cell 1 to 3 - Excavation / Ring Beam / RC Strut / Wing Cort	88	06-Aug-18	19-Nov-18
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
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



Planned Milestone

Planned Bar

TMCLK - Northern Connection Sub-sea Tunnel Section

Detailed Works Programme Rev. J

Three Months Rolling Programme Progress as of 24 Feb 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

BOUYGUES TRAVAUX PUBLICS

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 07 FEL for C&C Structure Start	0		22-Jun-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 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
MHS Approach Ramp			
Band Drain & Surcharge			
Surcharge Removal to +5.5mPD - Zone 3 - 30,000 m3	15	08-Jun-18	26-Jun-18
MHS Ramp Dwall, Treatment & King Post			
Caterpillar Cell 14 to 15 - Dwall Panels	75	04-Jul-18	29-Sep-18
SAR Straight Wall - Dwall Panels	66	08-Jun-18	25-Aug-18
SAR Open Cut - Sheet Pile Installation	48	08-Jun-18	04-Aug-18
SAR Open Cut - Dewatering Well - along sheet piles	36	30-Jun-18	11-Aug-18
SAR Open Cut - Dewatering Well - along Dwall	15	13-Aug-18	29-Aug-18
SAR Open Cut - Pump Test	12	30-Aug-18	12-Sep-18
SAR Open Cut ELS - King Post Installation	18	06-Aug-18	25-Aug-18
MHS Approach Ramp Excavation			
SAR Open Cut Excavation - Above +2.5mPD	12	30-Aug-18	12-Sep-18
SAR Open Cut Excavation - strut free section	36	13-Sep-18	27-Oct-18
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 - Base Slab - strut free section	60	13-Sep-18	24-Nov-18
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
VO73 SCB Foundation & Substructure			
Foundation			
SCB Foundation - Predrilling & Toe level confirmation	30	08-Jun-18	14-Jul-18
SCB Foundation - Barrettes - within SAR cofferdam	24	16-Jul-18	11-Aug-18
SCB Foundation - Barrettes - outside SAR cofferdam	24	13-Aug-18	08-Sep-18
SCB Foundation - Verification Coring - within SAR cofferdam	27	13-Aug-18	12-Sep-18
SCB Foundation - Verification Coring - outside SAR cofferc	27	10-Sep-18	12-Oct-18
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 underlayer bottom	9	01-Aug-18*	10-Aug-18
Pause Period (to be verified on site)	90	11-Aug-18	08-Nov-18
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

Planned Milestone
Planned Bar

TMCLK - Northern Connection Sub-sea Tunnel Section

Detailed Works Programme Rev. J

Three Months Rolling Programme Progress as of 24 Feb 2019

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

BOUYGUES TRAVAUX PUBLICS

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	

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		✓

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	
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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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	-	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		✓

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	
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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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		✓

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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	
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		✓

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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	
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		<>

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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	
		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		✓

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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	
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

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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 - December 2018

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

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1-Dec
2-Dec	3-Dec	4-Dec	5-Dec	6-Dec	7-Dec	8-Dec
	1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM		
9-Dec	10-Dec	11-Dec	12-Dec	13-Dec	14-Dec	15-Dec
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
16-Dec	17-Dec	18-Dec	19-Dec	20-Dec	21-Dec	22-Dec
		1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM	
23-Dec	24-Dec	Public Holiday 25-Dec	Public Holiday 26-Dec	27-Dec	28-Dec	29-Dec
	1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM		
30-Dec	31-Dec					
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 - January 2019

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

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		Public Holiday 1-Jan	2-Jan	3-Jan	4-Jan	5-Jan
			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM
6-Jan	7-Jan	8-Jan	9-Jan	10-Jan	11-Jan	12-Jan
		1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM	
13-Jan	14-Jan	15-Jan	16-Jan	17-Jan	18-Jan	19-Jan
	1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM		
20-Jan	21-Jan	22-Jan	23-Jan	24-Jan	25-Jan	26-Jan
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
27-Jan	28-Jan	29-Jan	30-Jan	31-Jan		
		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 - February 2019

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

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1-Feb	2-Feb
					1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM	
3-Feb	4-Feb	Public Holiday 5-Feb	Public Holiday 6-Feb	Public Holiday 7-Feb	8-Feb	9-Feb
	1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			No AQM on 7/2 due to site closure.		
10-Feb	11-Feb	12-Feb	13-Feb	14-Feb	15-Feb	16-Feb
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
17-Feb	18-Feb	19-Feb	20-Feb	21-Feb	22-Feb	23-Feb
		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-Feb	25-Feb	26-Feb	27-Feb	28-Feb		
	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 Landfall
Impact Marine Water Quality Monitoring (WQM) Schedule (December 2018)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1/Dec
2/Dec	3/Dec	4/Dec	5/Dec	6/Dec	7/Dec	8/Dec
	ebb tide 8:14 - 11:44 flood tide 2:13 - 5:43		ebb tide 10:02 - 13:32 flood tide 4:20 - 7:50		ebb tide 11:27 - 14:57 flood tide 5:59 - 9:29	
9/Dec	10/Dec	11/Dec	12/Dec	13/Dec	14/Dec	15/Dec
	ebb tide 13:15 - 16:45 flood tide 8:03 - 11:33		ebb tide 14:43 - 16:43 flood tide 9:27 - 12:57		ebb tide 4:43 - 6:35 flood tide 11:32 - 15:02	
16/Dec	17/Dec	18/Dec	19/Dec	20/Dec	21/Dec	22/Dec
	ebb tide 5:57 - 9:27 flood tide 13:24 - 16:54		ebb tide 8:12 - 11:42 flood tide 14:23 - 17:53		ebb tide 10:00 - 13:30 flood tide 15:33 - 19:03	
23/Dec	24/Dec	25/Dec	26/Dec	27/Dec	28/Dec	29/Dec
	ebb tide 12:28 - 15:58 flood tide 7:10 - 10:40		ebb tide 14:06 - 16:21 flood tide 8:49 - 12:19		ebb tide 4:21 - 6:36 flood tide 10:34 - 14:04	
30/Dec	31/Dec					
	ebb tide 6:37 - 10:07 flood tide 13:13 - 16:43					

HY/2012/08 - Tuen Mun - Chek Lap Kok Link - Northern Landfall
Impact Marine Water Quality Monitoring (WQM) Schedule (January 2019)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1/Jan	2/Jan	3/Jan	4/Jan	5/Jan
			ebb tide 9:00 - 12:30 flood tide 14:31 - 18:01		ebb tide 10:34 - 14:04 flood tide 6:01 - 8:48	
6/Jan	7/Jan	8/Jan	9/Jan	10/Jan	11/Jan	12/Jan
	ebb tide 12:19 - 15:49 flood tide 7:09 - 10:39		ebb tide 13:28 - 16:58 flood tide 8:14 - 11:44		ebb tide 14:41 - 18:11 flood tide 9:14 - 12:44	
13/Jan	14/Jan	15/Jan	16/Jan	17/Jan	18/Jan	19/Jan
	ebb tide 3:52 - 7:22 flood tide 11:12 - 14:42		ebb tide 6:12 - 9:42 flood tide 12:40 - 16:10		ebb tide 8:48 - 12:18 flood tide 14:14 - 17:44	
20/Jan	21/Jan	22/Jan	23/Jan	24/Jan	25/Jan	26/Jan
	ebb tide 11:31 - 15:01 flood tide 6:12 - 9:42		ebb tide 13:03 - 16:33 flood tide 7:40 - 11:10		ebb tide 14:39 - 18:09 flood tide 9:05 - 12:35	
27/Jan	28/Jan	29/Jan	30/Jan	31/Jan		
	ebb tide 4:37 - 8:07 flood tide 11:22 - 14:52		ebb tide 7:35 - 11:05 flood tide 13:02 - 16:32			

HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Impact Dolphin Monitoring Survey Monitoring Schedule - December 2018

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

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

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

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

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

Appendix F

Impact Air Quality Monitoring Results

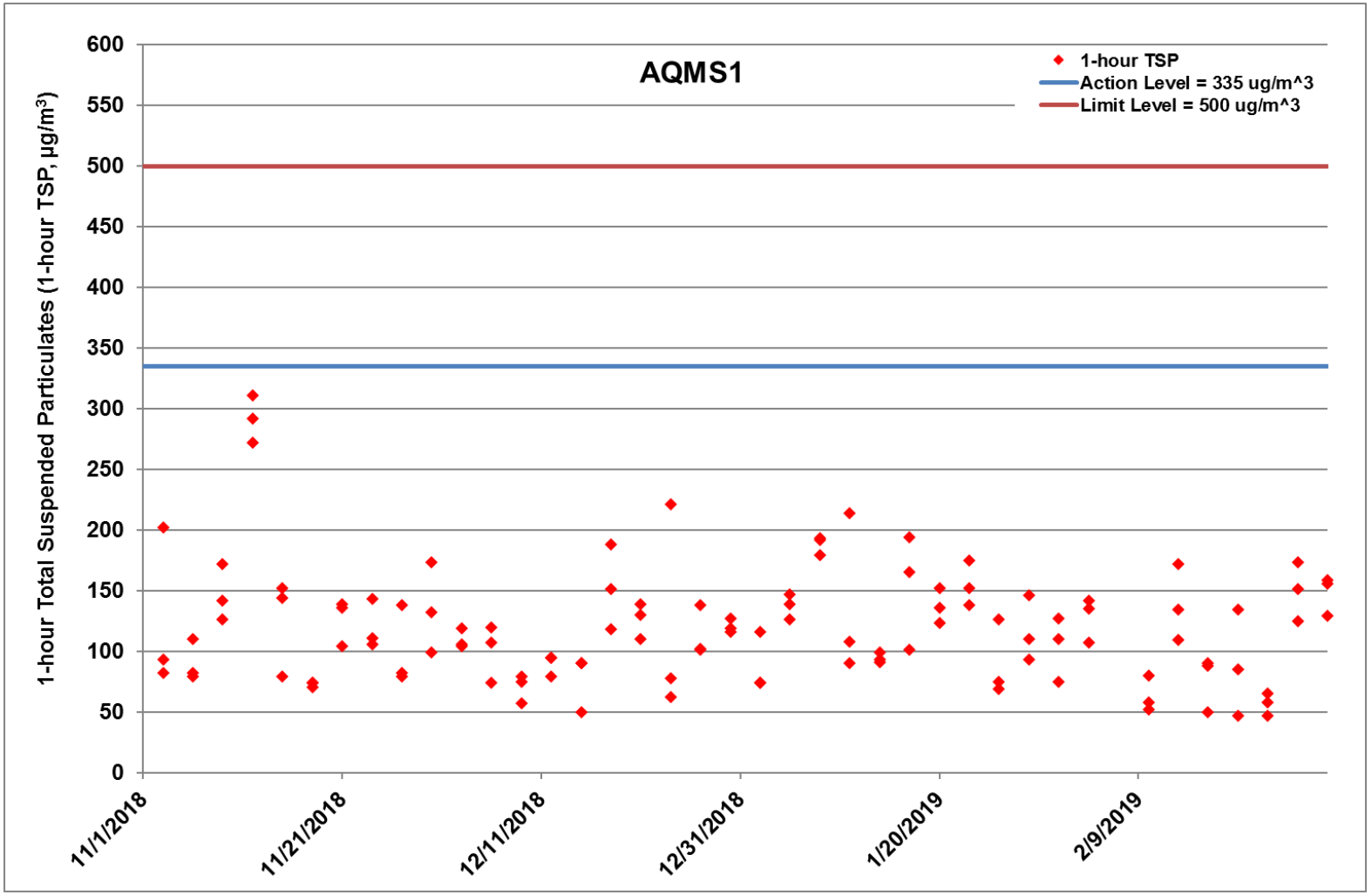


Figure F.1 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at AQMS1 between 1 November 2018 and 28 February 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Slurry wall construction, TBM Tunnel Works (1/11/2018 – 28/2/2019)

Ref: 0212330_Impact AQM graphs_February 2019_REV a.xlsx

ERM

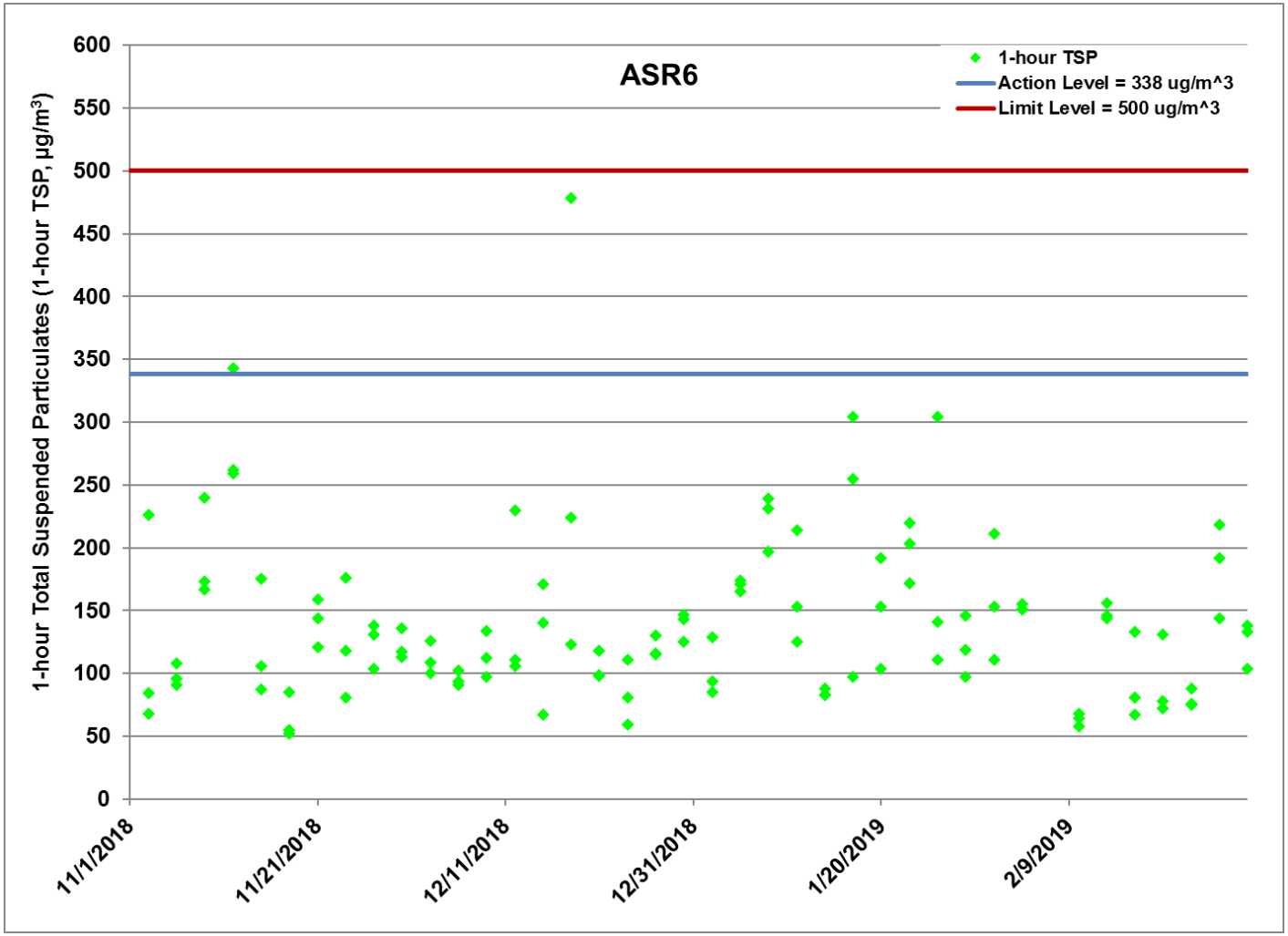


Figure F.2 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR6 between 1 November 2018 and 28 February 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Slurry wall construction, TBM Tunnel Works (1/11/2018 – 28/2/2019)

Ref: 0212330_Impact AQM graphs_February 2019_REV a.xlsx

ERM

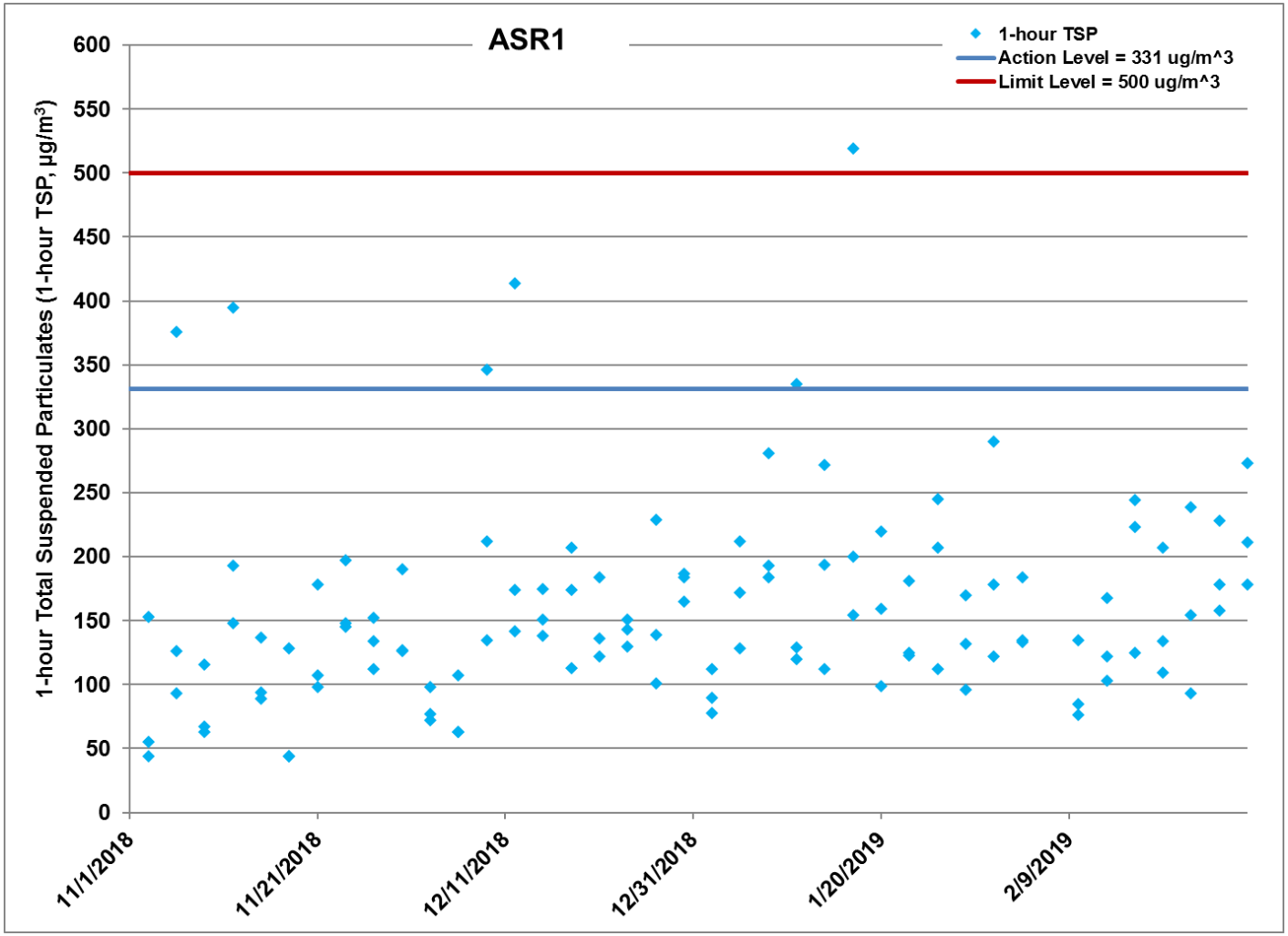


Figure F.3 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR1 between 1 November 2018 and 28 February 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Slurry wall construction, TBM Tunnel Works (1/11/2018 – 28/2/2019)

Ref: 0212330_Impact AQM graphs_February 2019_REV a.xlsx

ERM

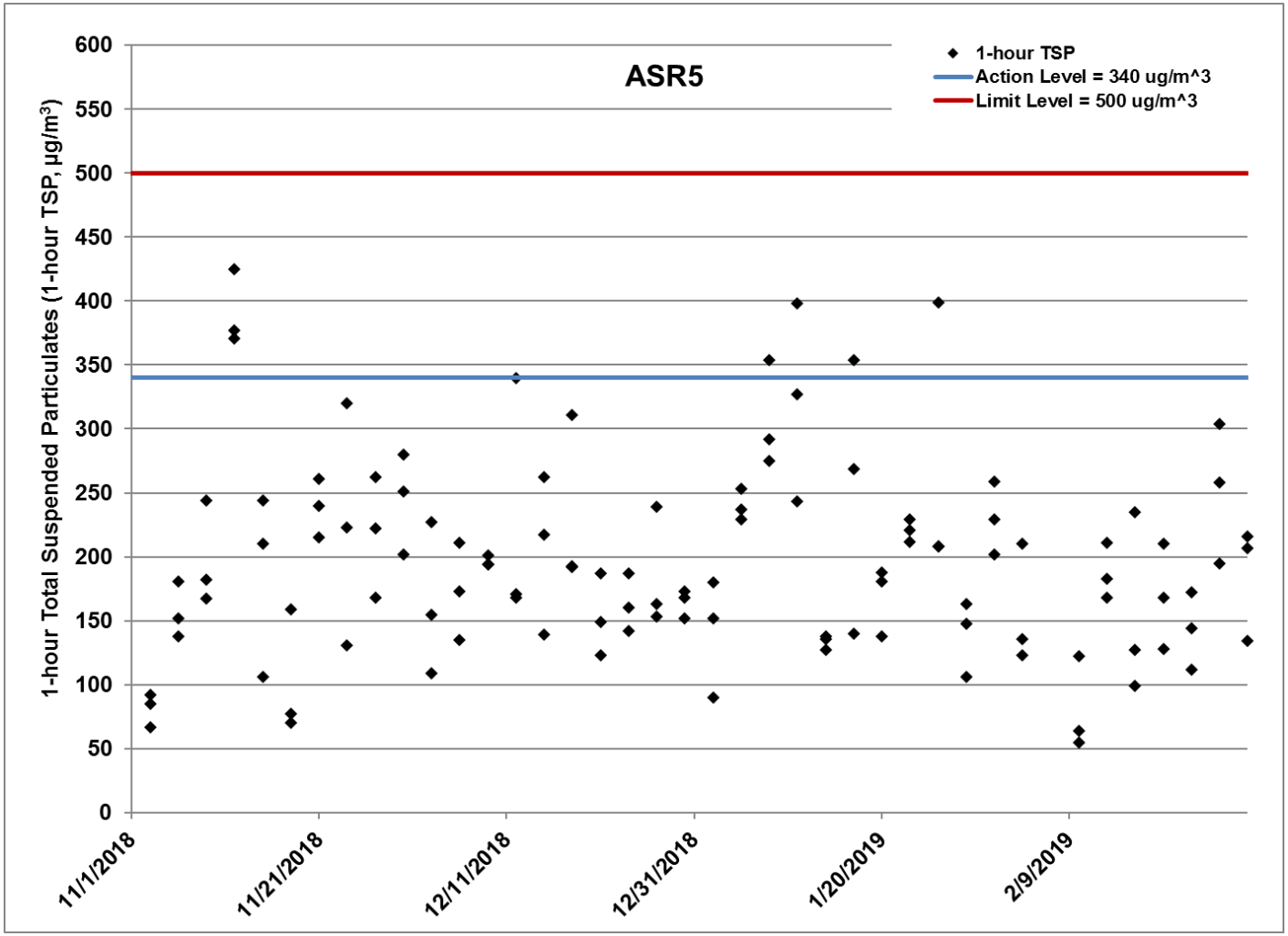


Figure F.4 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR5 between 1 November 2018 and 28 February 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Slurry wall construction, TBM Tunnel Works (1/11/2018 – 28/2/2019)

Ref: 0212330_Impact AQM graphs_February 2019_REV a.xlsx

ERM

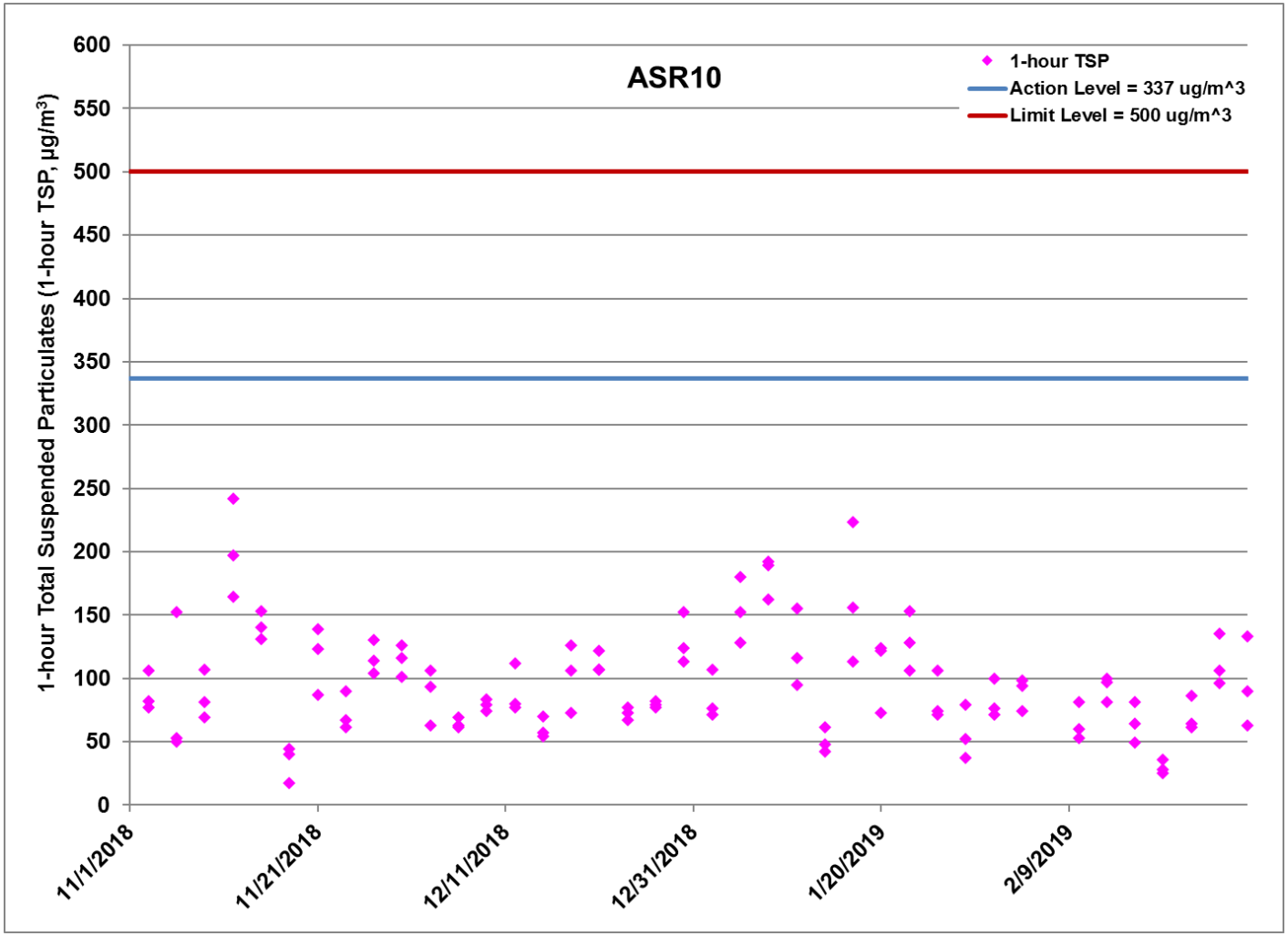


Figure F.5 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR10 between 1 November 2018 and 28 February 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Slurry wall construction, TBM Tunnel Works (1/11/2018 – 28/2/2019)

Ref: 0212330_Impact AQM graphs_February 2019_REV a.xlsx

ERM

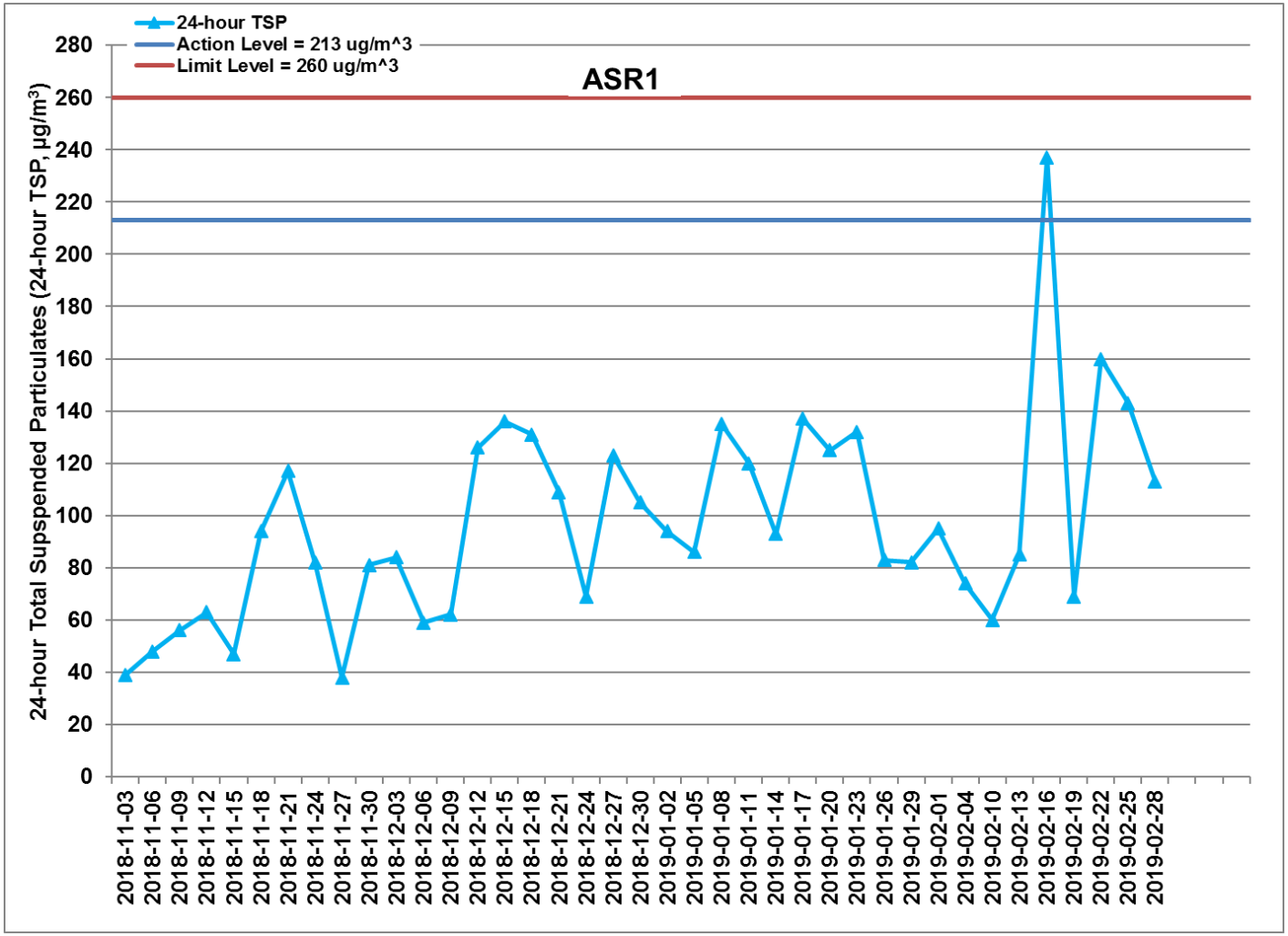


Figure F.6 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR1 between 1 November 2018 and 28 February 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Slurry wall construction, TBM Tunnel Works (1/11/2018 – 28/2/2019)

Ref: 0212330_Impact AQM graphs_February 2019_REV a.xlsx

ERM

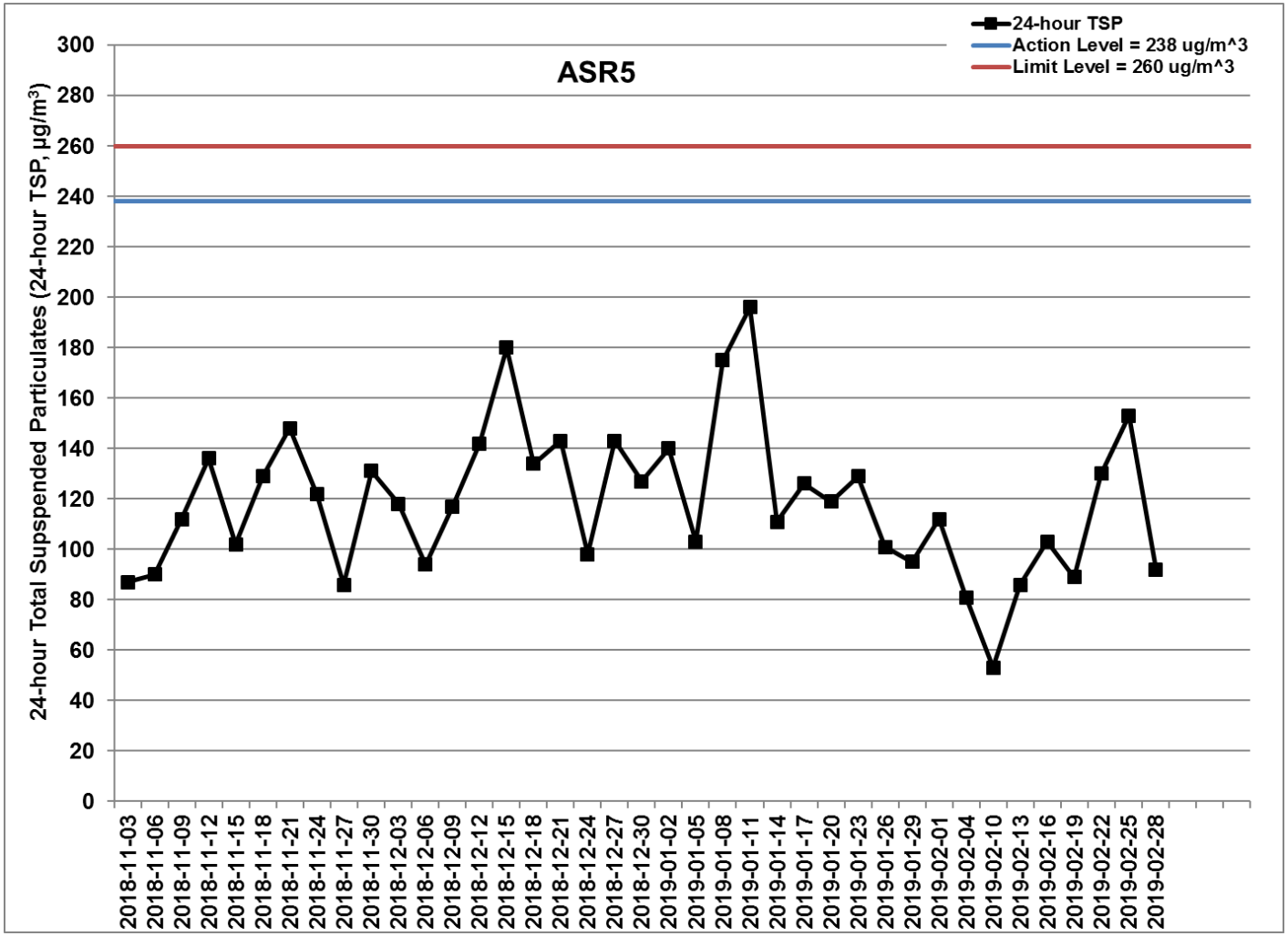


Figure F.7 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR5 between 1 November 2018 and 28 February 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Slurry wall construction, TBM Tunnel Works (1/11/2018 – 28/2/2019)

Ref: 0212330_Impact AQM graphs_February 2019_REV a.xlsx

ERM

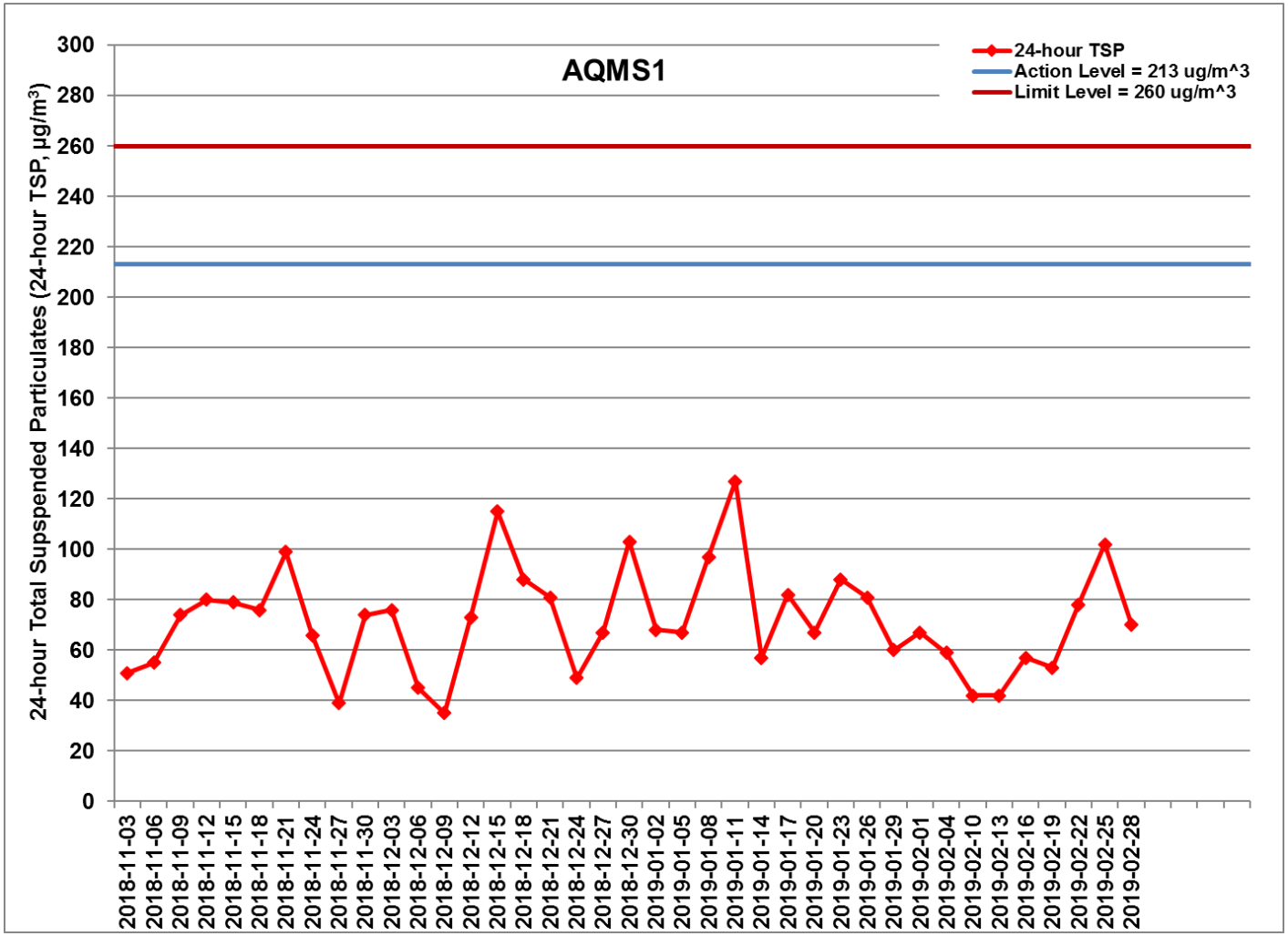


Figure F.8 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at AQMS1 between 1 November 2018 and 28 February 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Slurry wall construction, TBM Tunnel Works (1/11/2018 – 28/2/2019)

Ref: 0212330_Impact AQM graphs_February 2019_REV a.xlsx

ERM

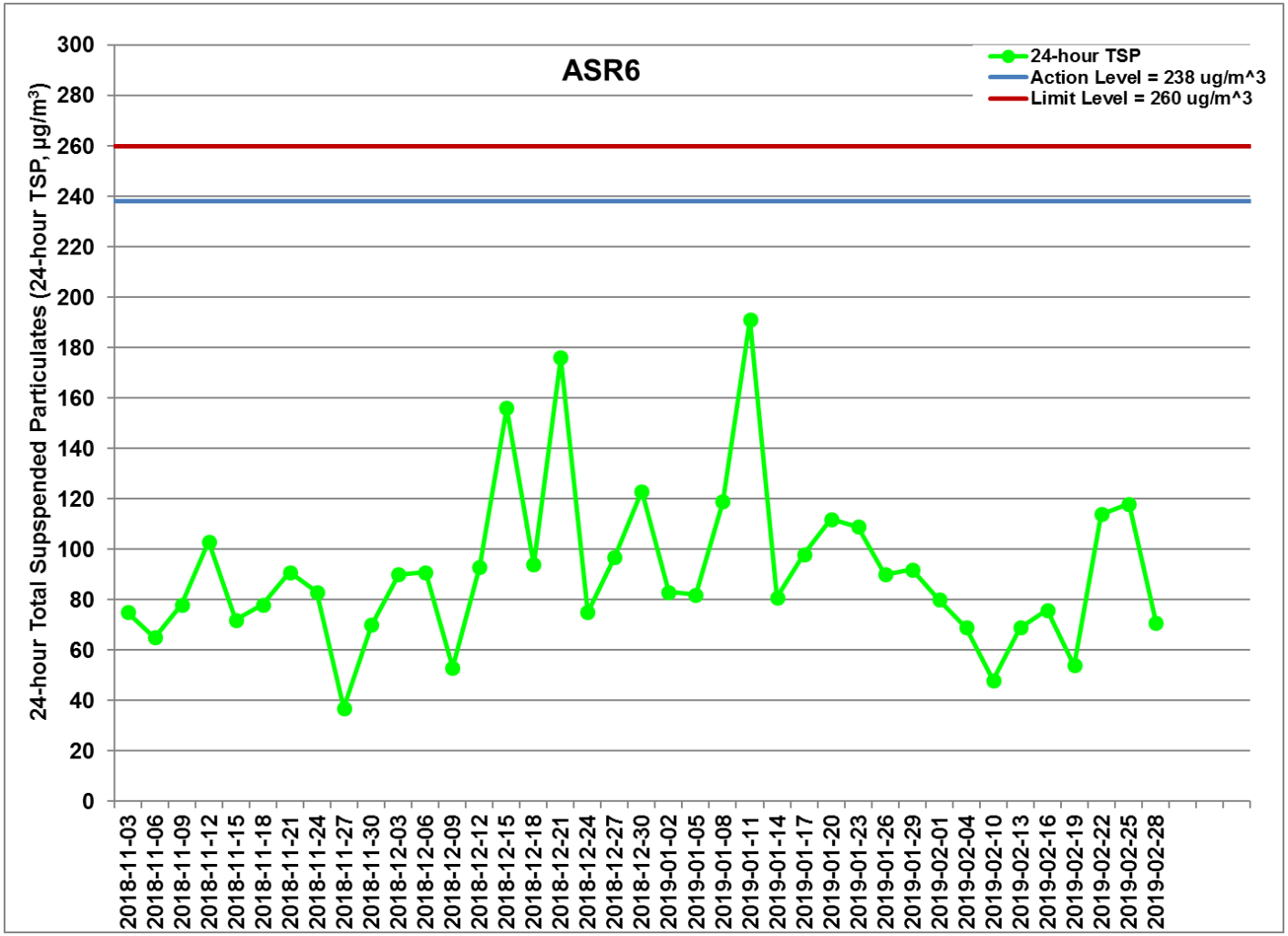


Figure F.9 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR6 between 1 November 2018 and 28 February 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Slurry wall construction, TBM Tunnel Works (1/11/2018 – 28/2/2019)

Ref: 0212330_Impact AQM graphs_February 2019_REV a.xlsx

ERM

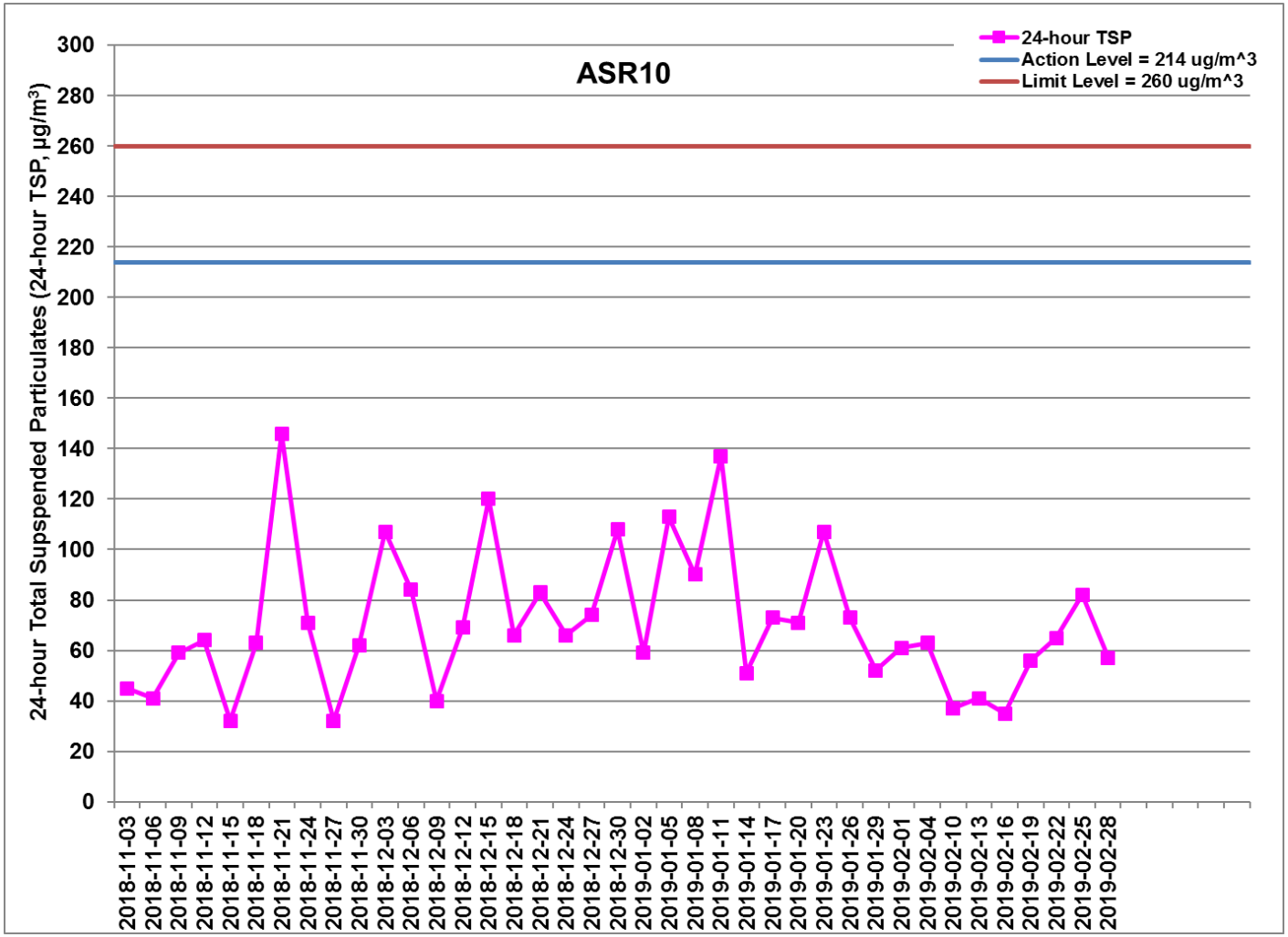


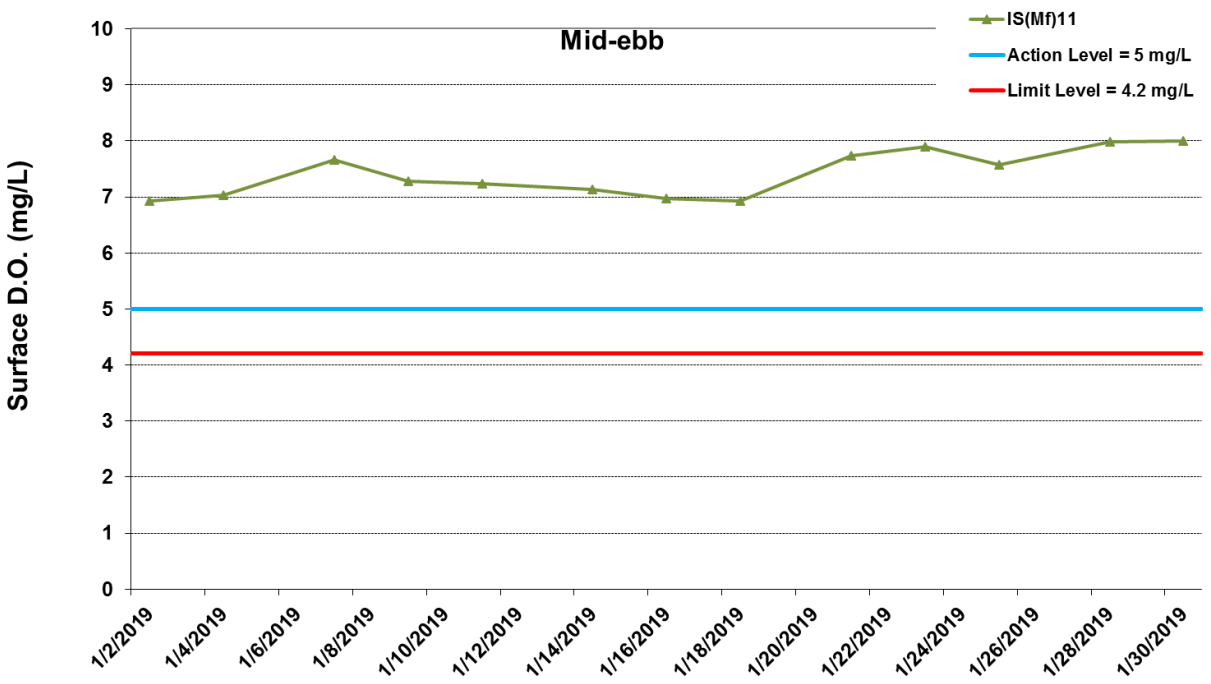
Figure F.10 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR10 between 1 November 2018 and 28 February 2019 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: RC structure, Slurry wall construction, TBM Tunnel Works (1/11/2018 – 28/2/2019)

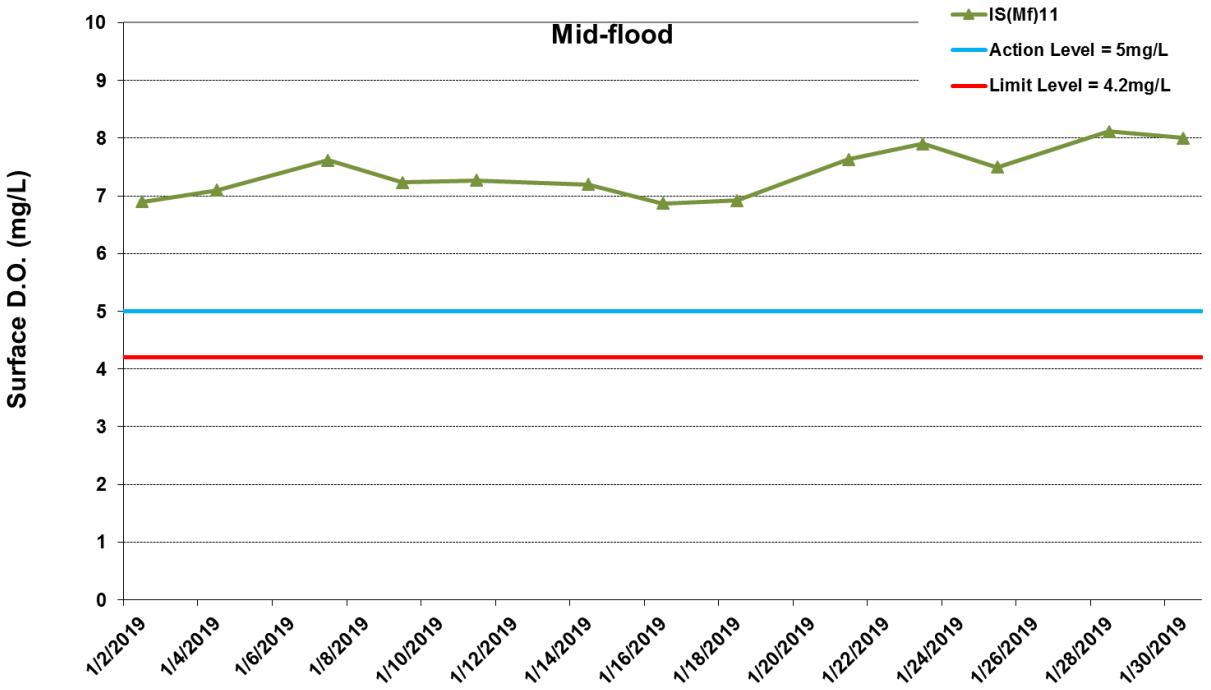
Ref: 0212330_Impact AQM graphs_February 2019_REV a.xlsx

ERM

Appendix G

Impact Water Quality Monitoring Results

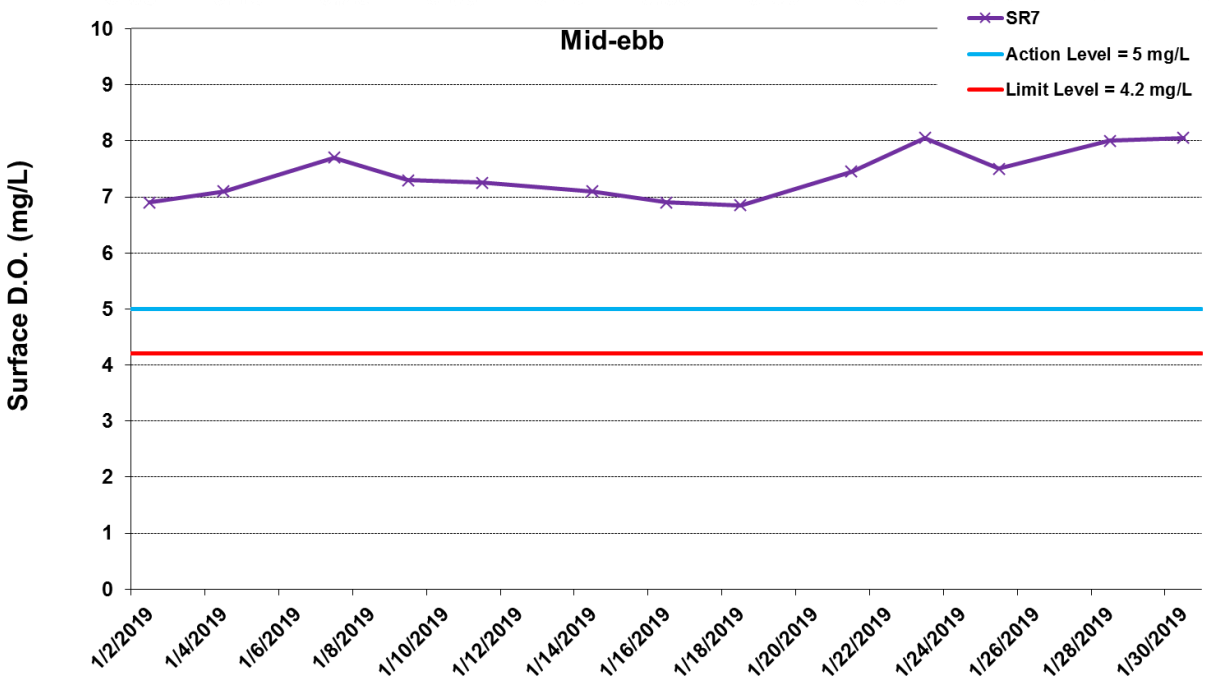


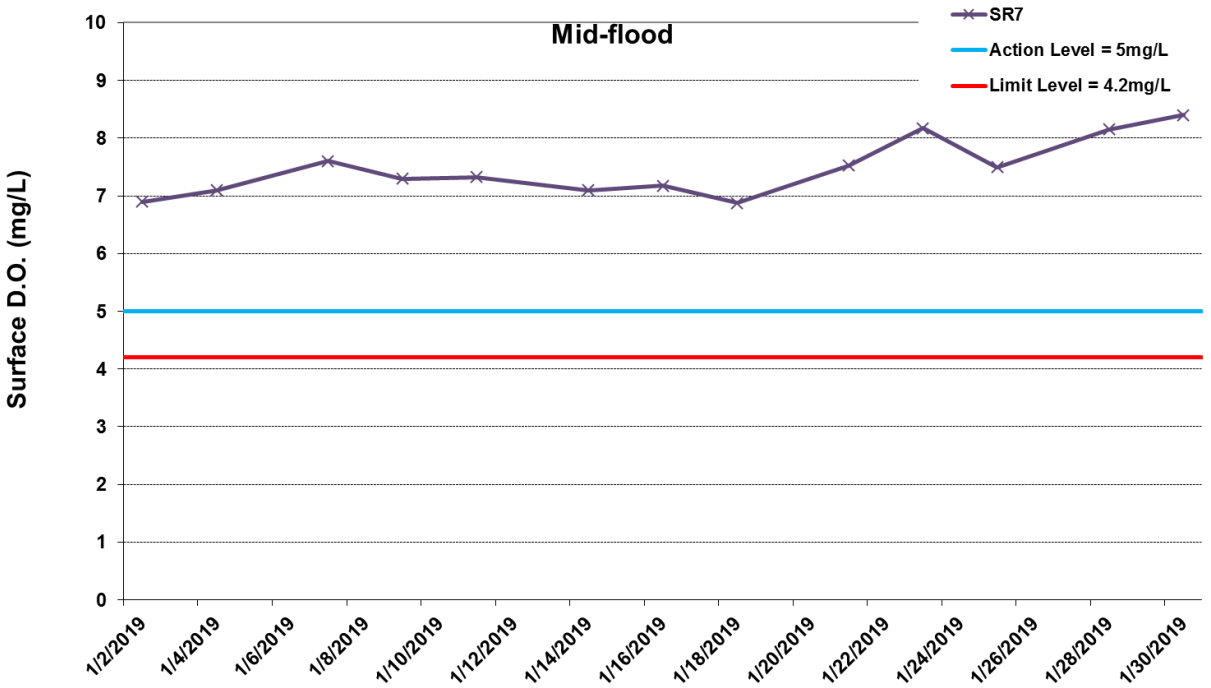


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G1 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_graphs_Rev a.xls

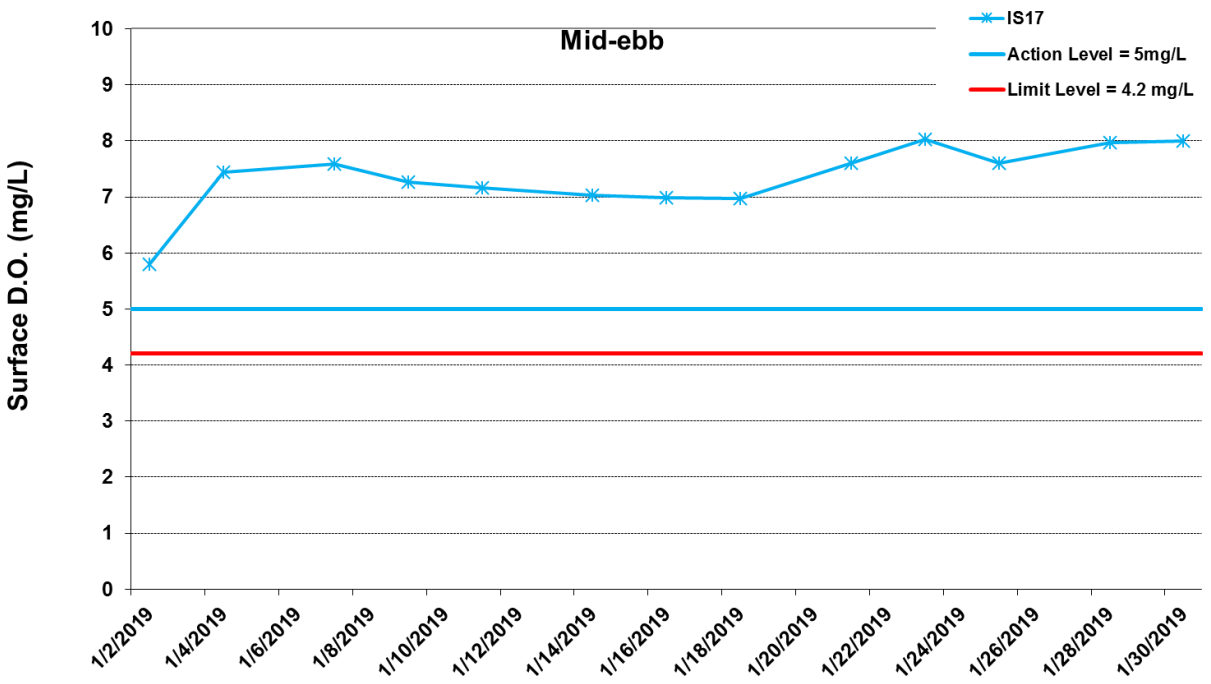


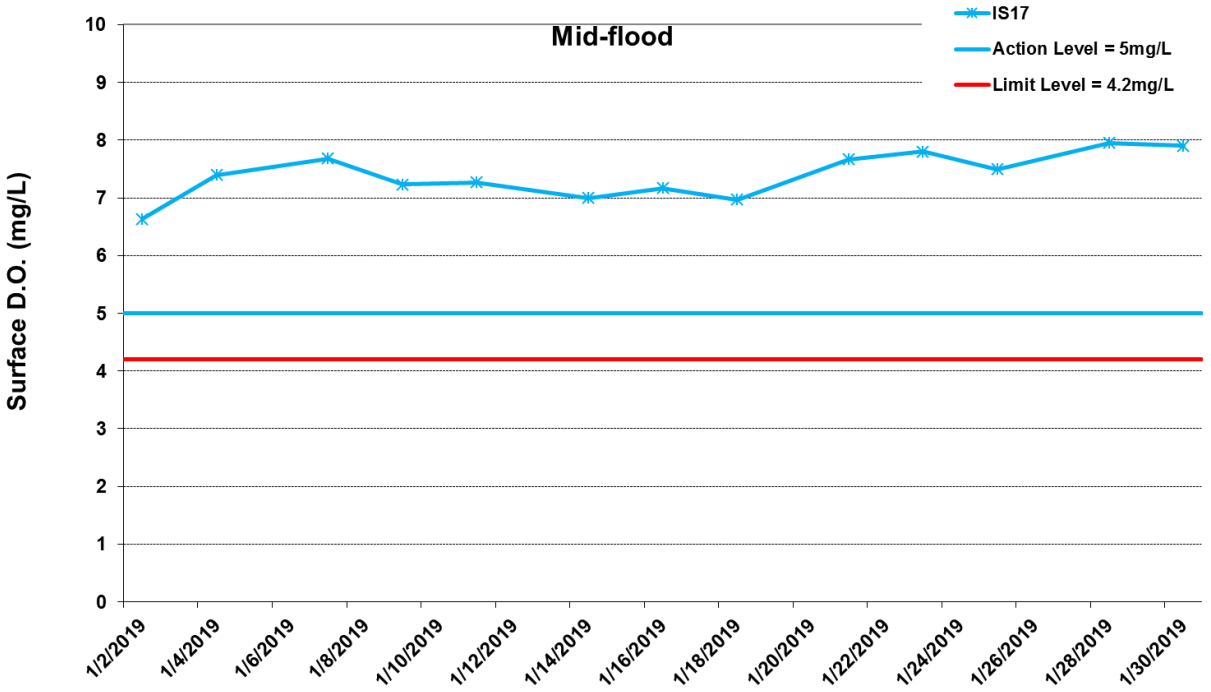


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G2 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_graphs_Rev a.xls

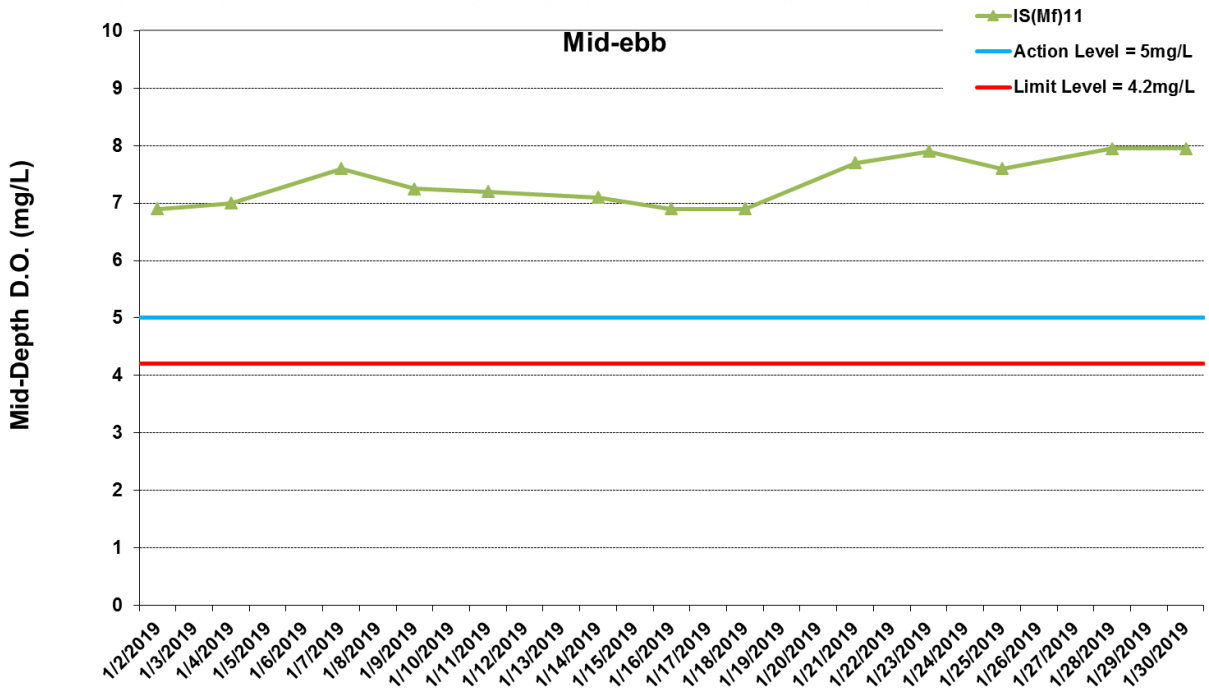


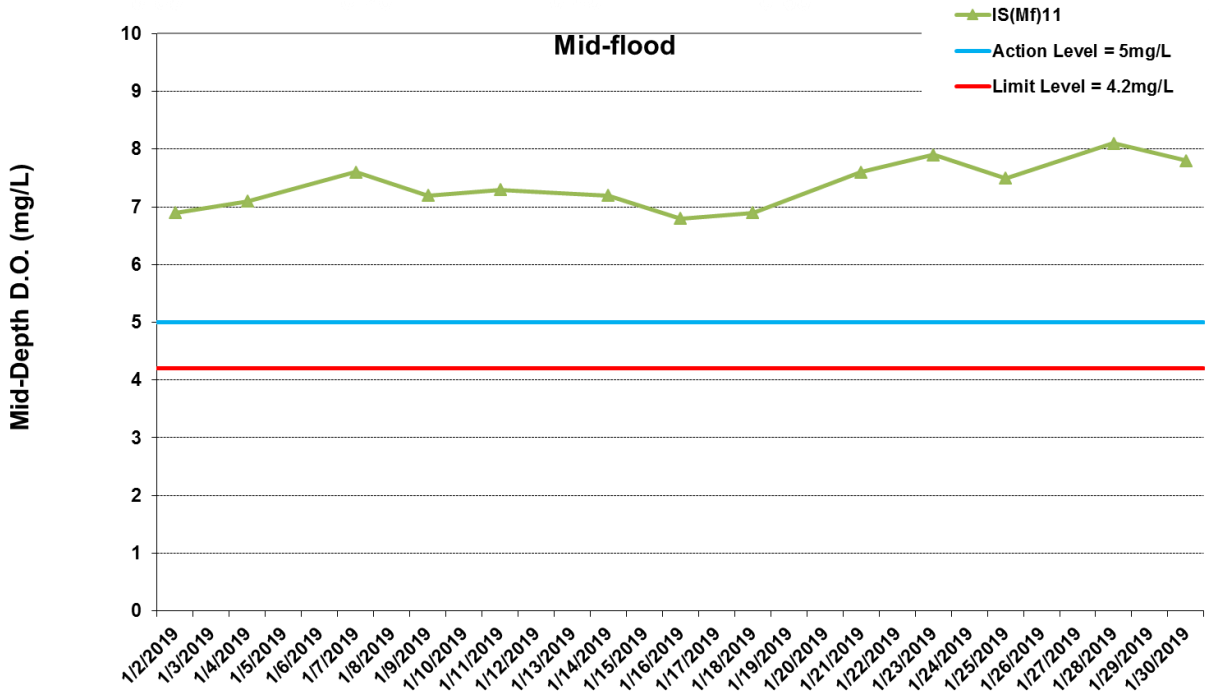


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G3 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_graphs_Rev a.xls



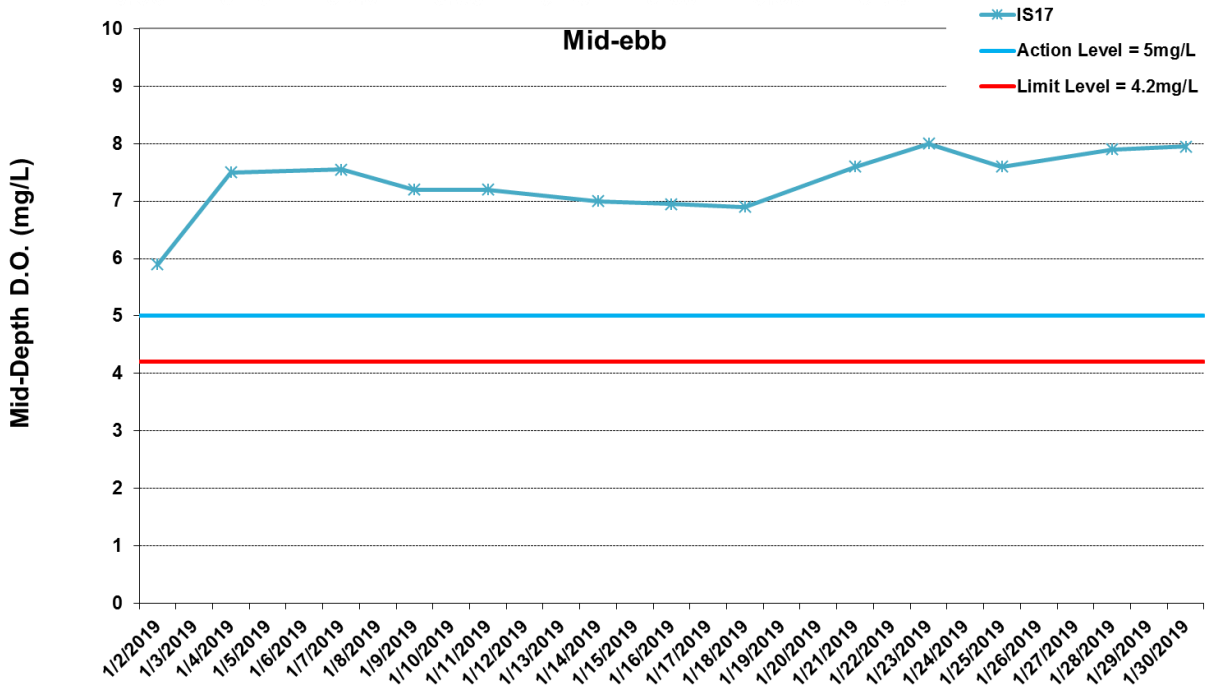


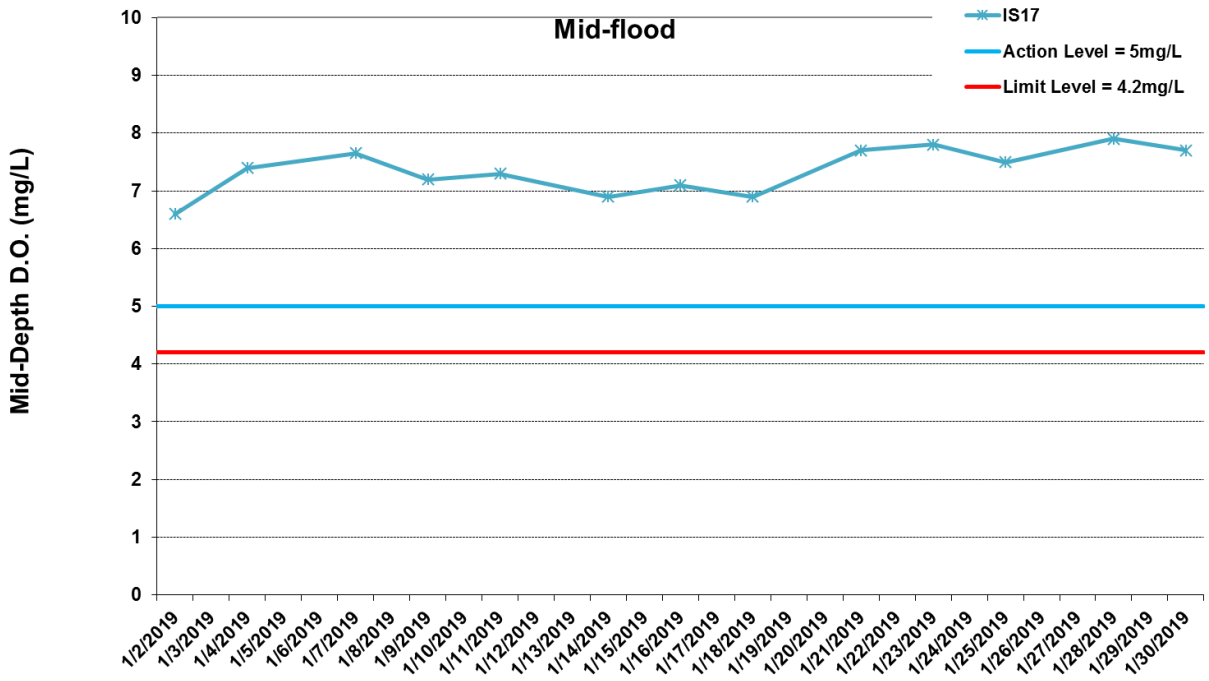
* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

*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 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_graphs_Rev a.xls



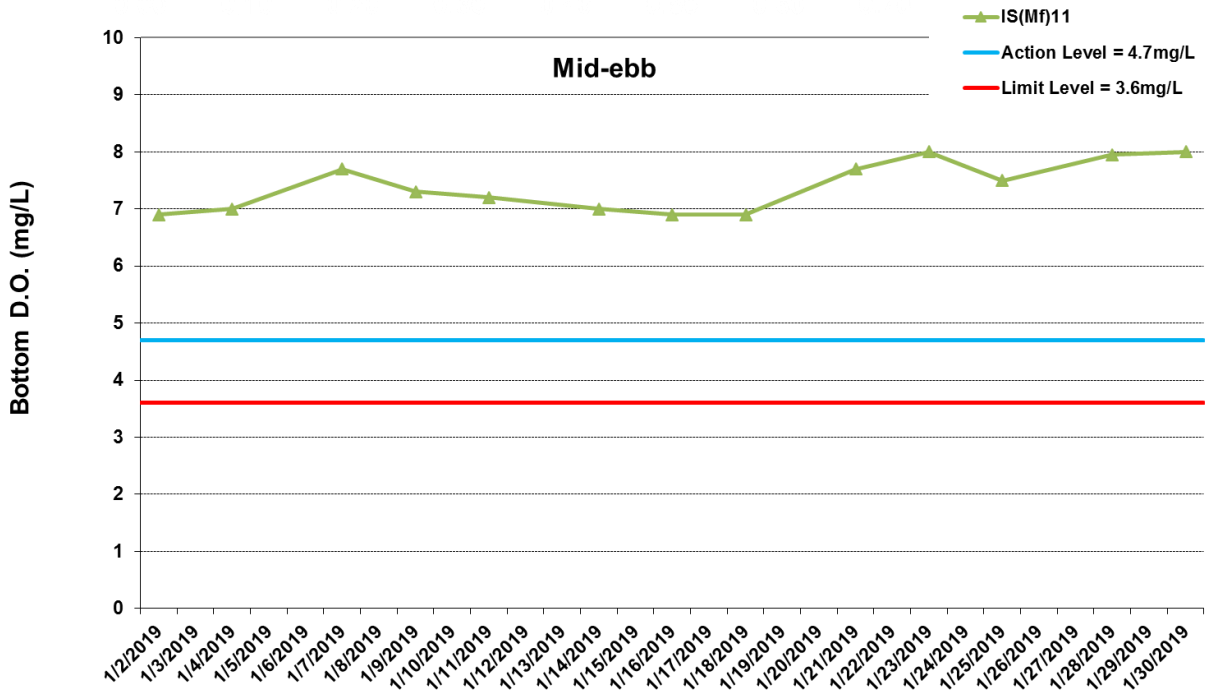


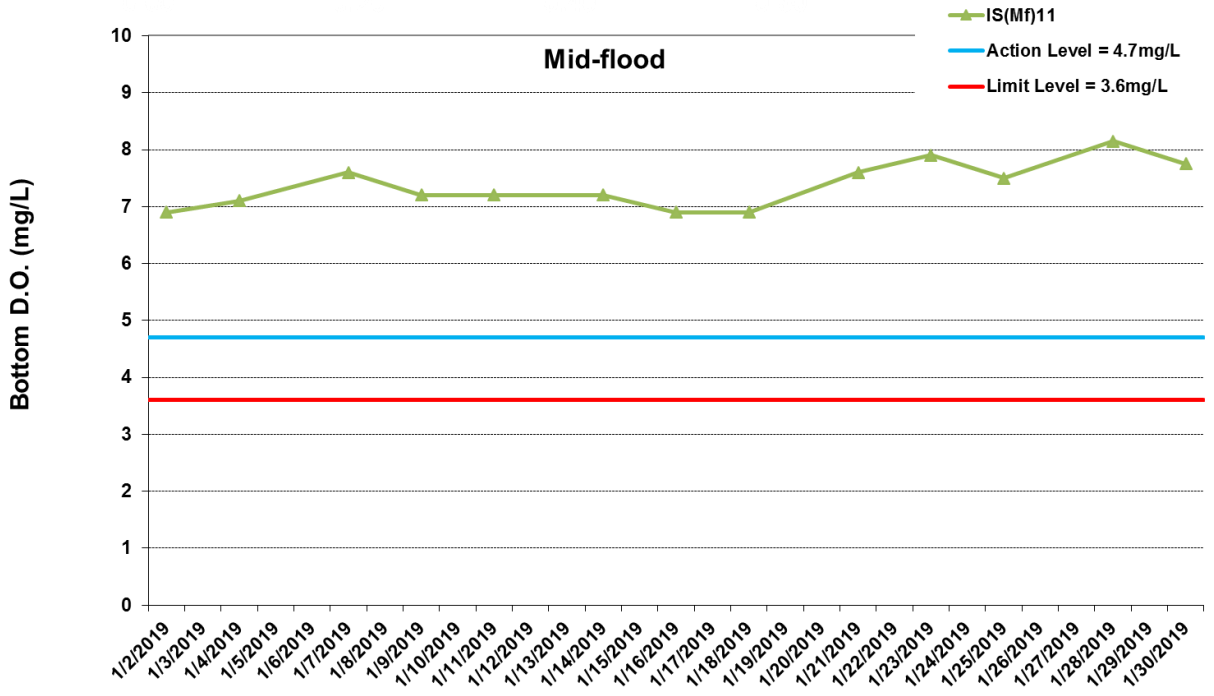
* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

*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 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_graphs_Rev a.xls

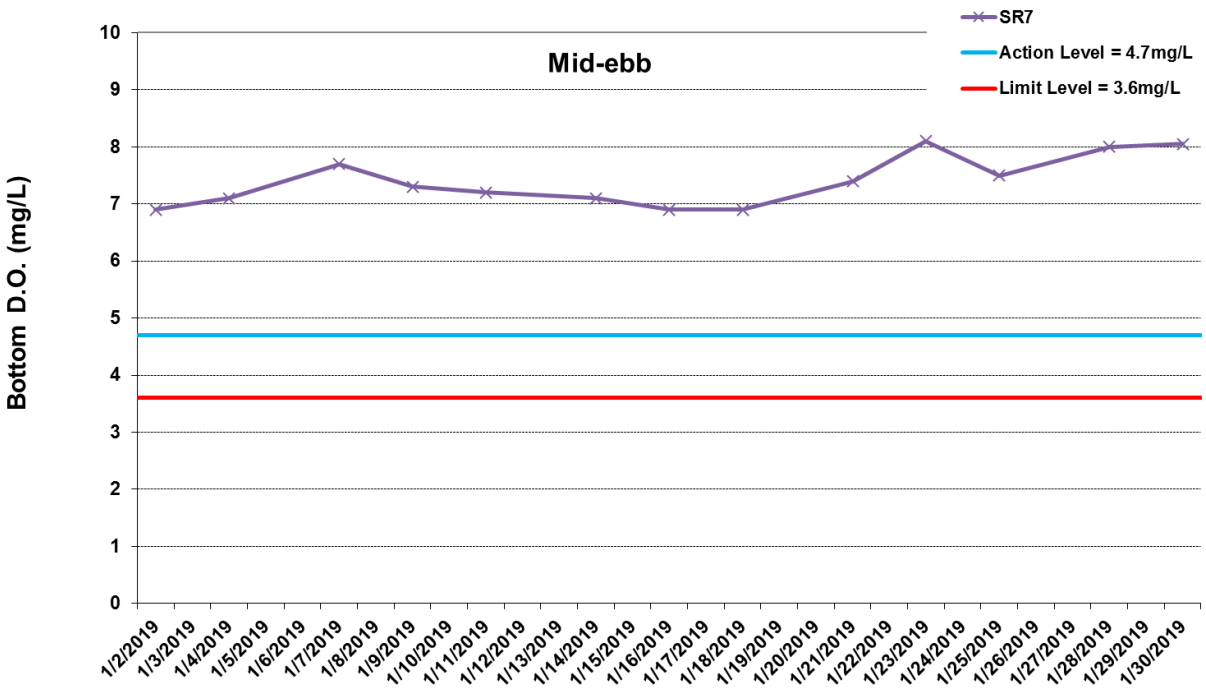


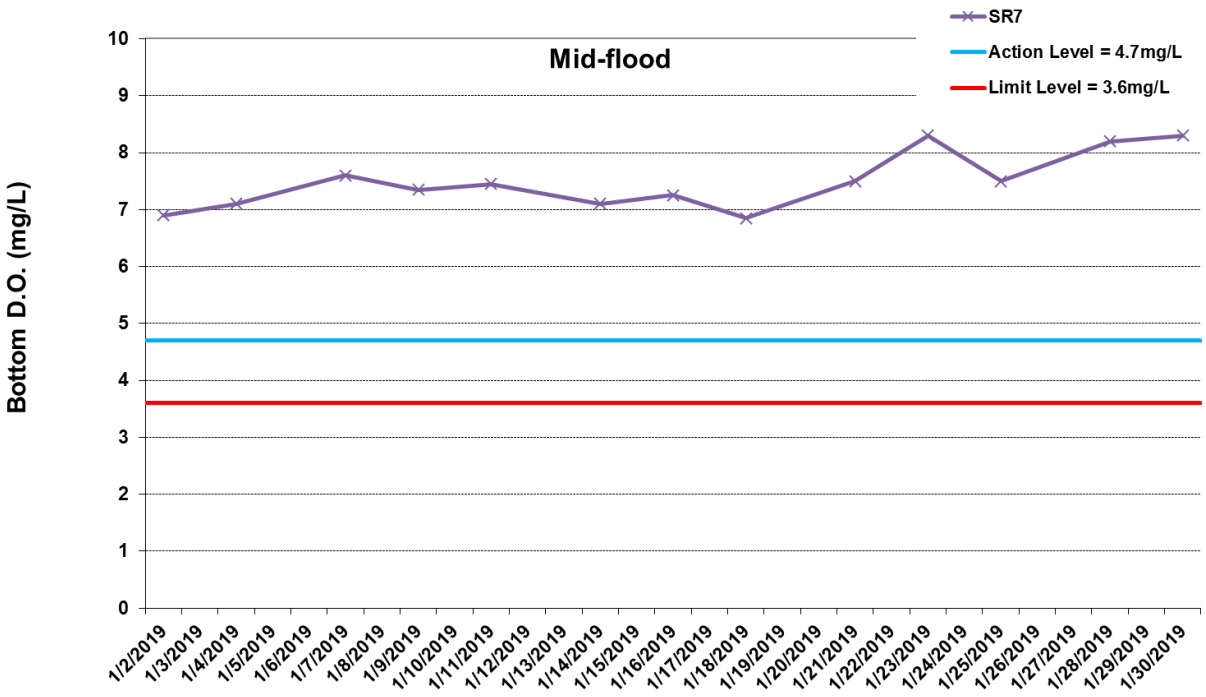


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G6 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_graphs_Rev a.xls

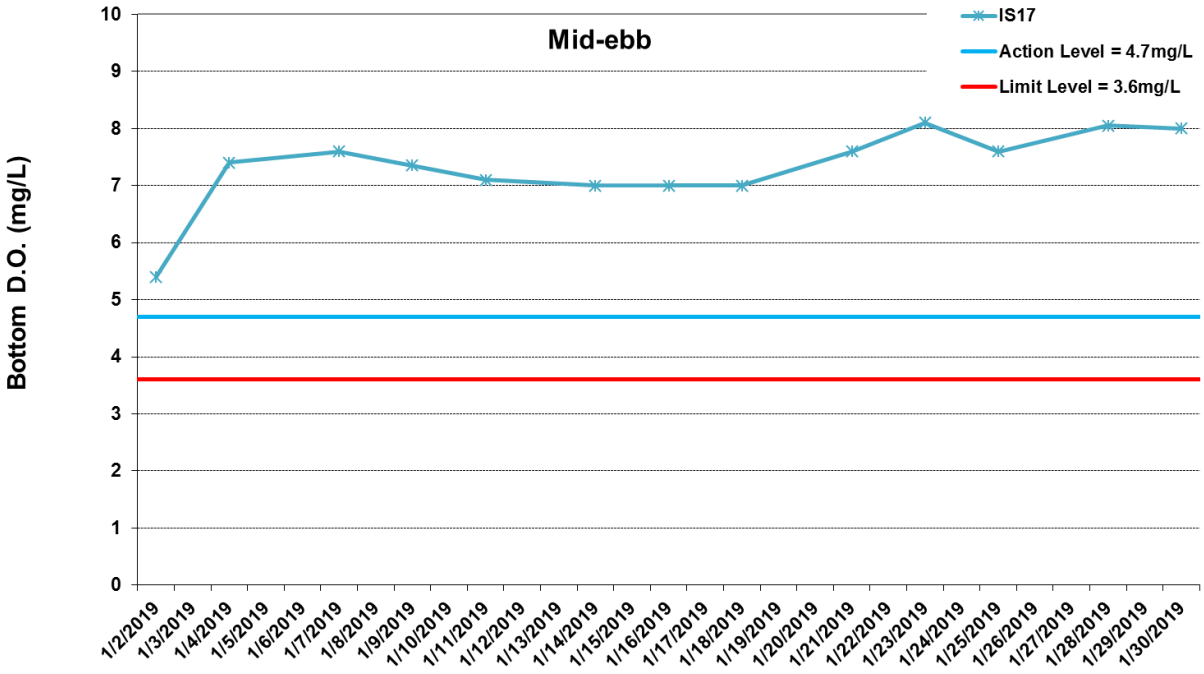


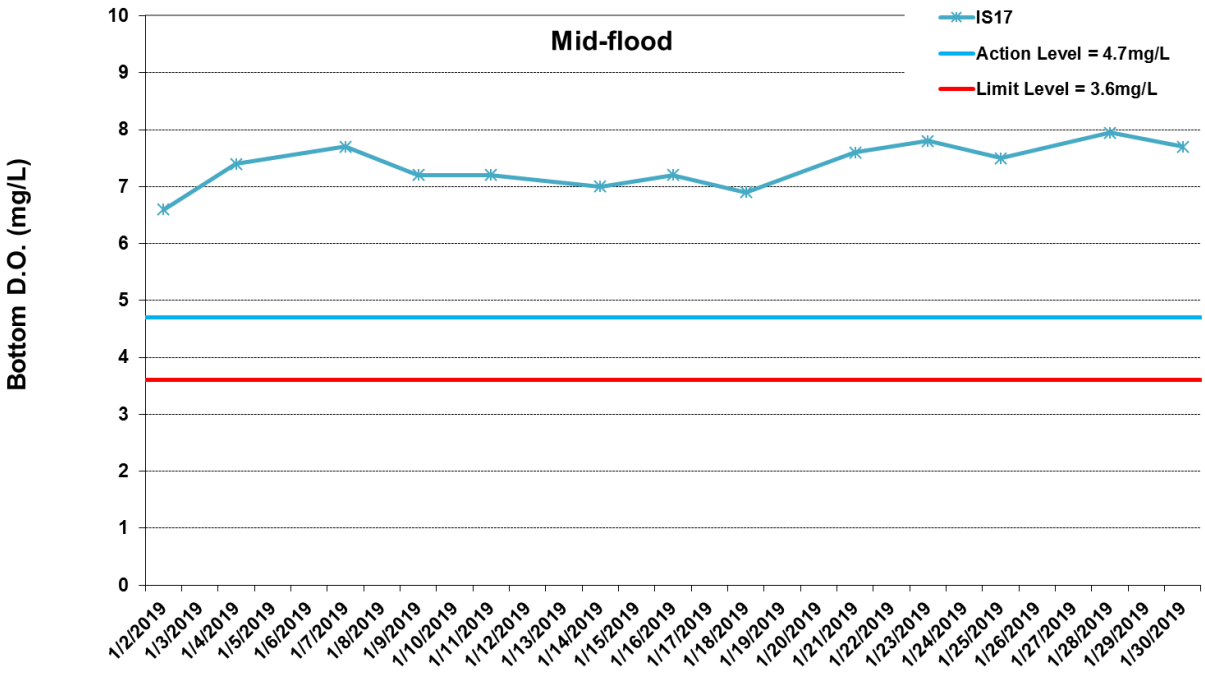


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G7 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_graphs_Rev a.xls

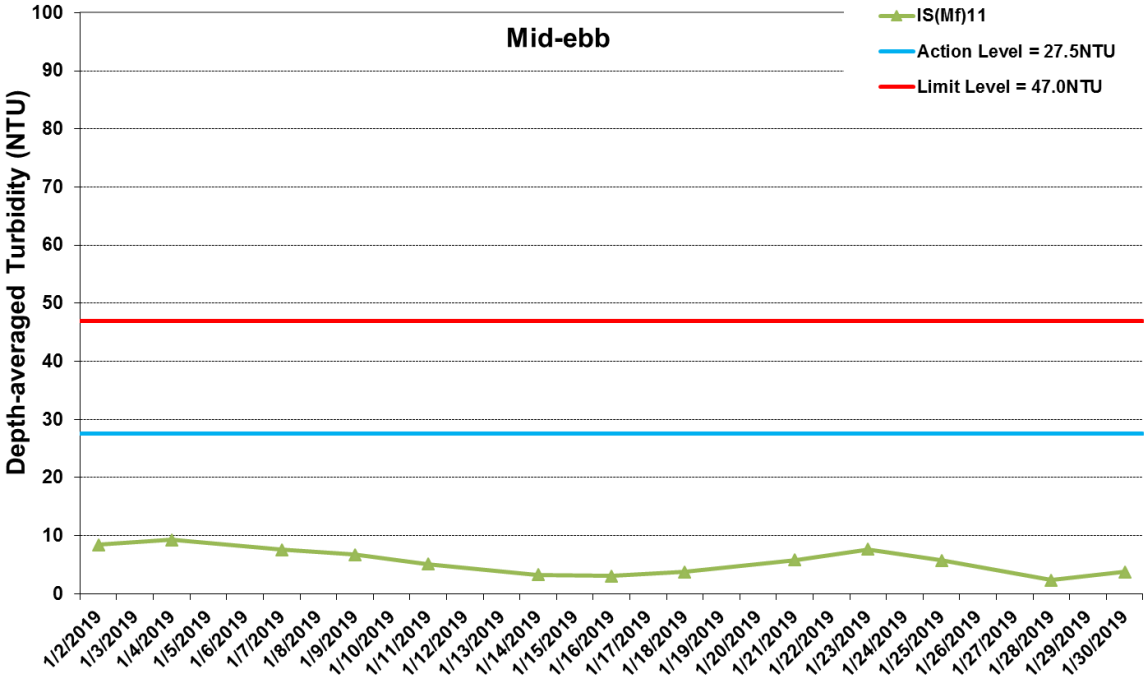


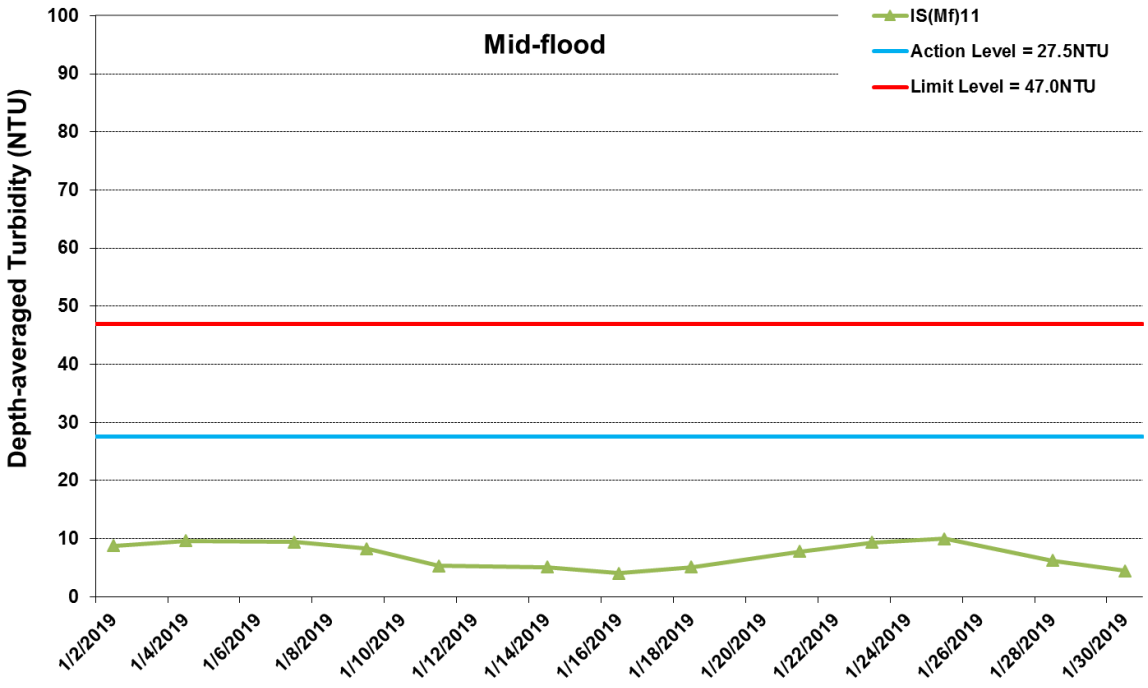


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G8 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_graphs_Rev a.xls

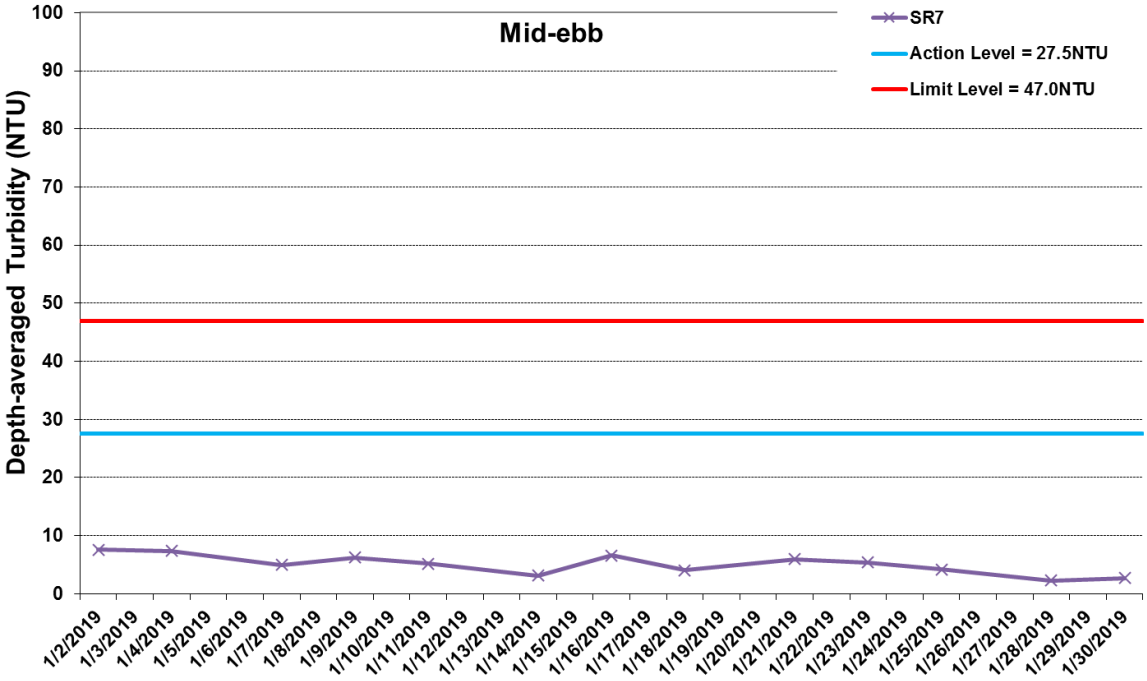


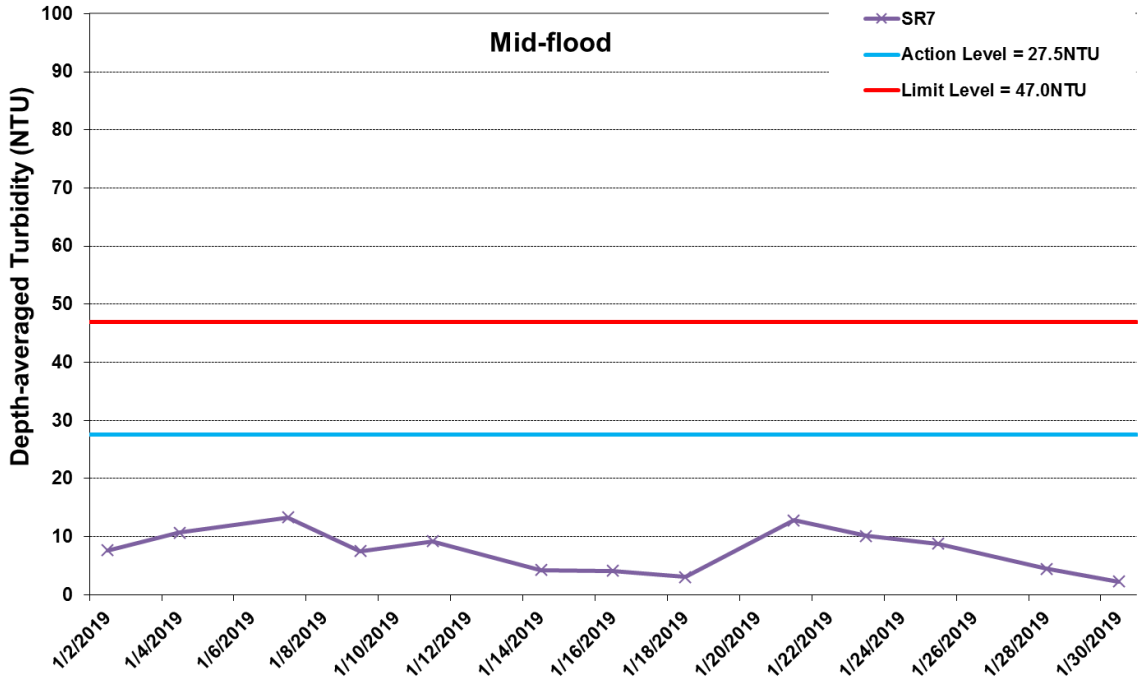


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G9 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_graphs_Rev a.xls

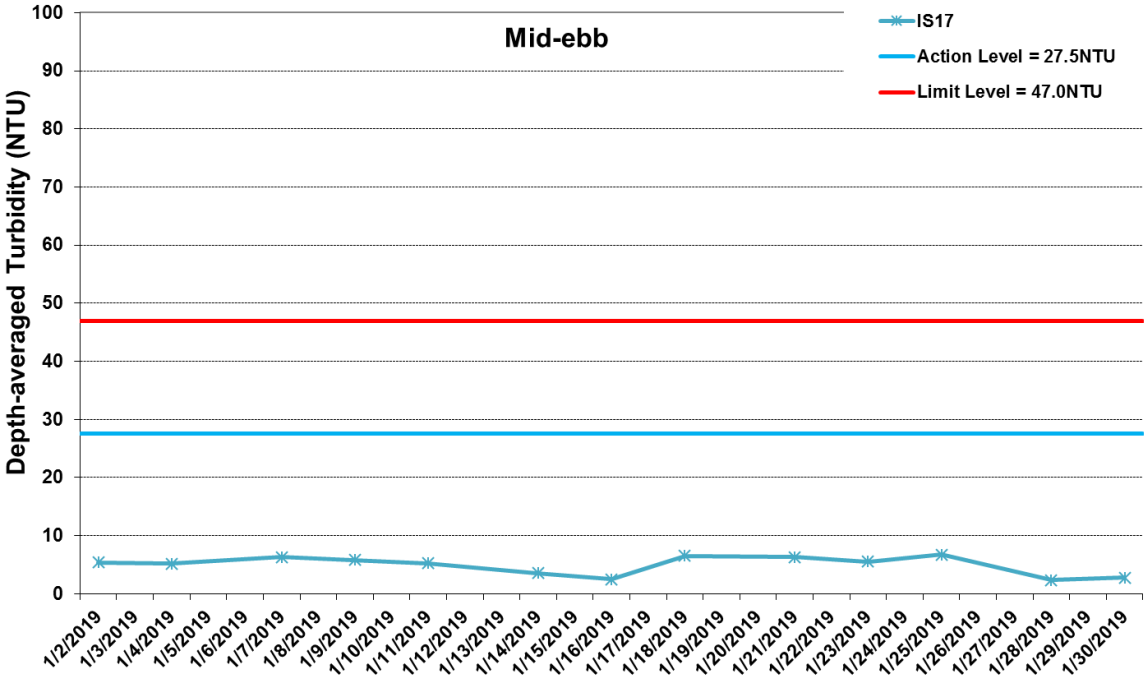


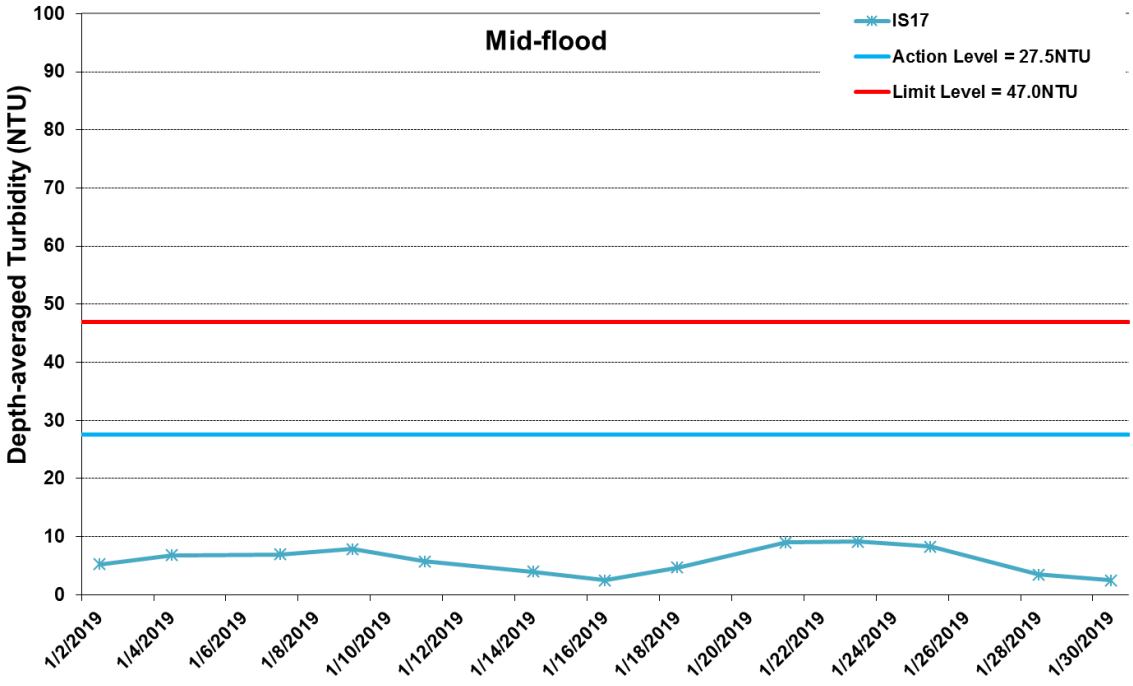


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G10 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_graphs_Rev a.xls

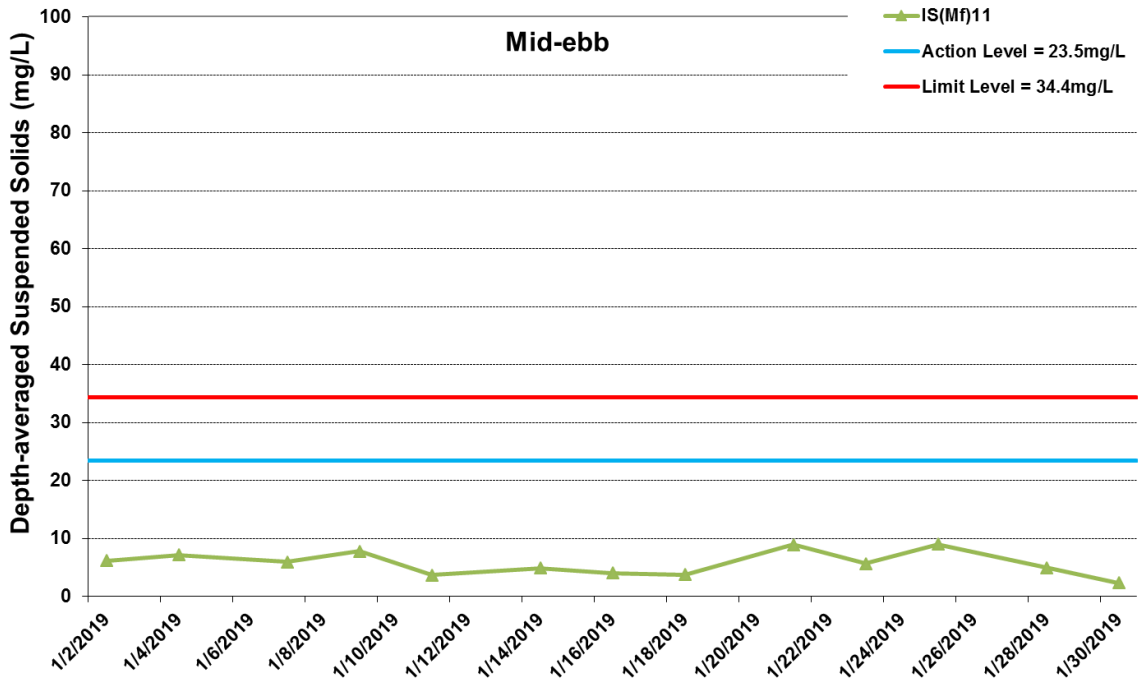


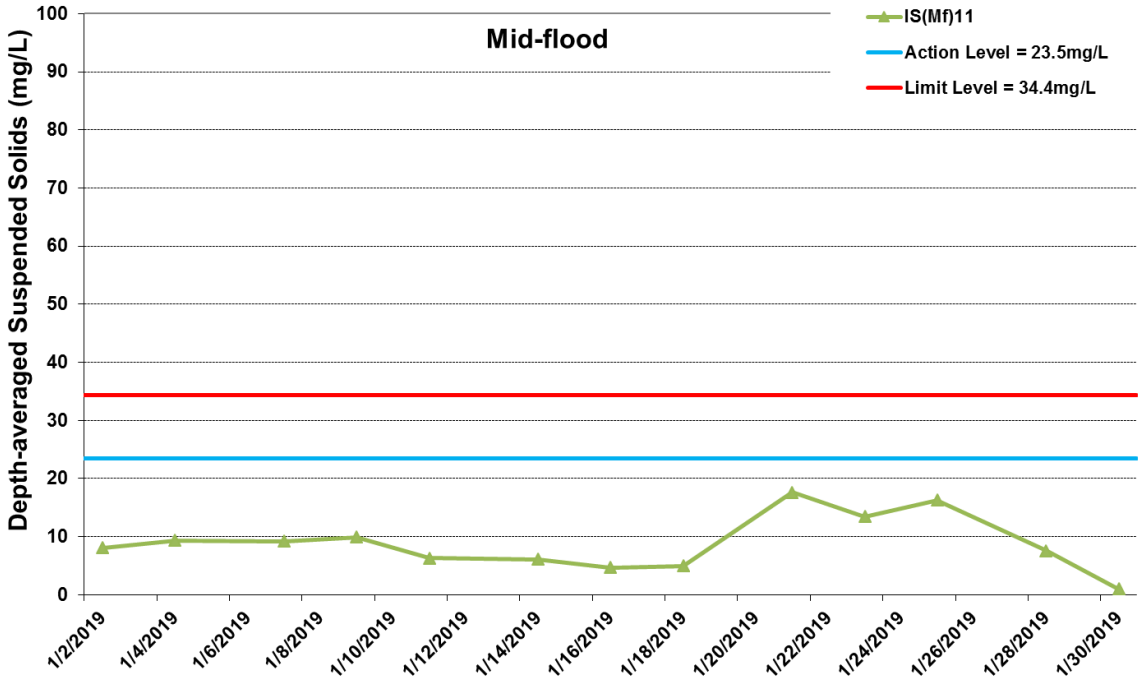


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G11 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_graphs_Rev a.xls

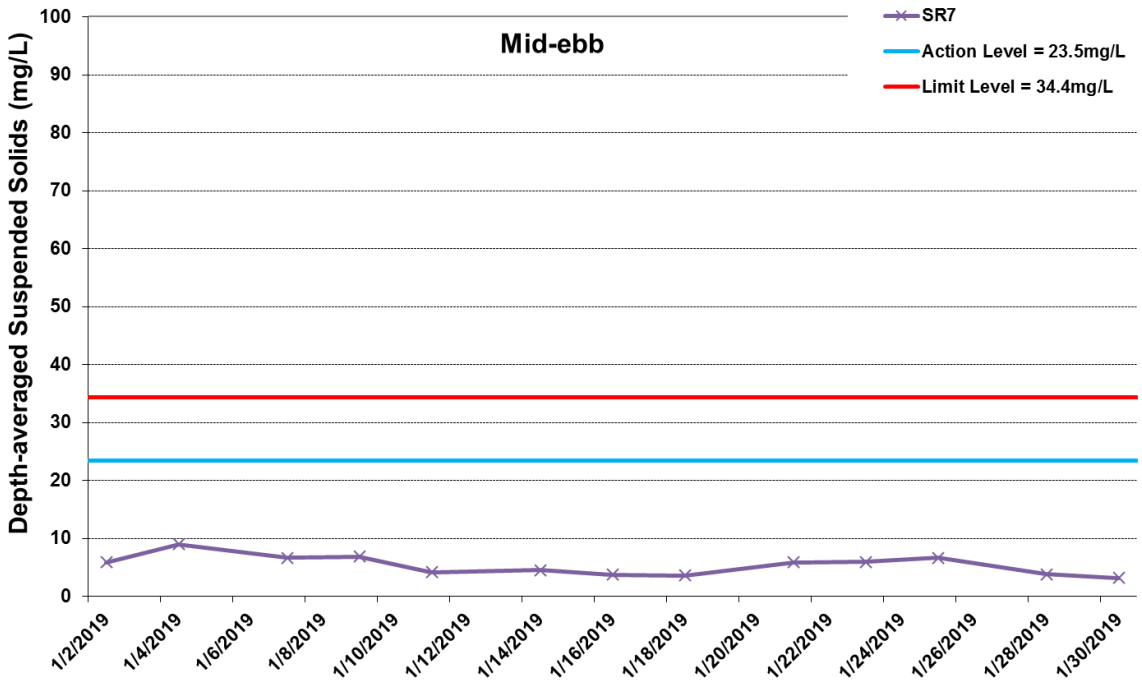


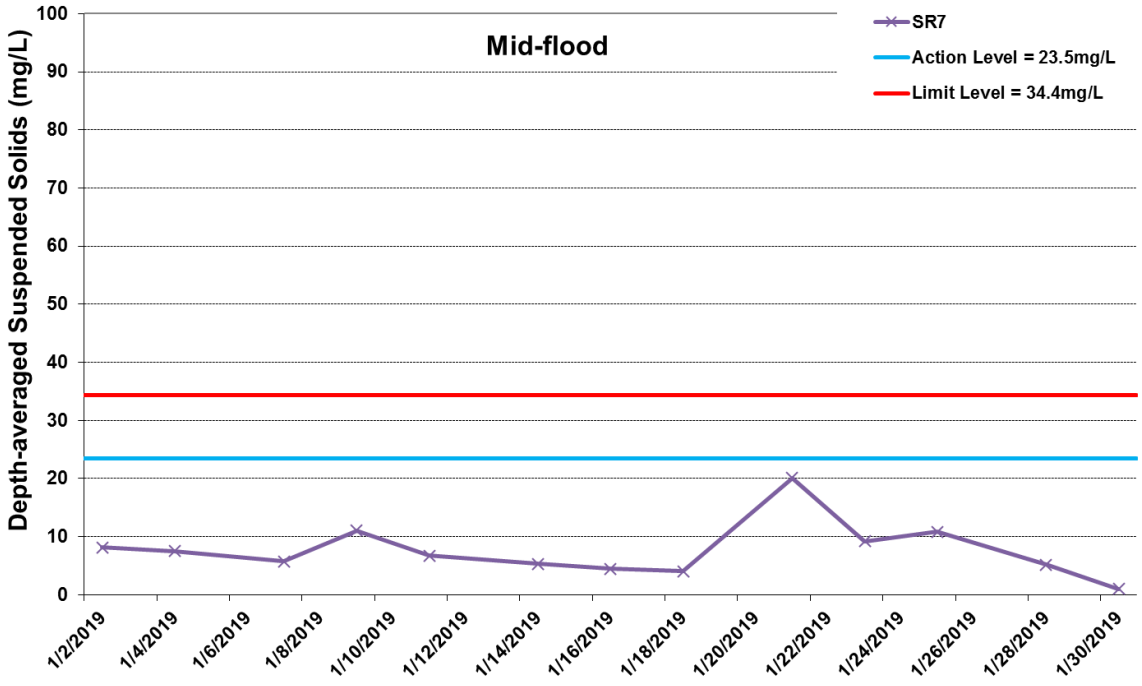


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G12 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_graphs_Rev a.xls

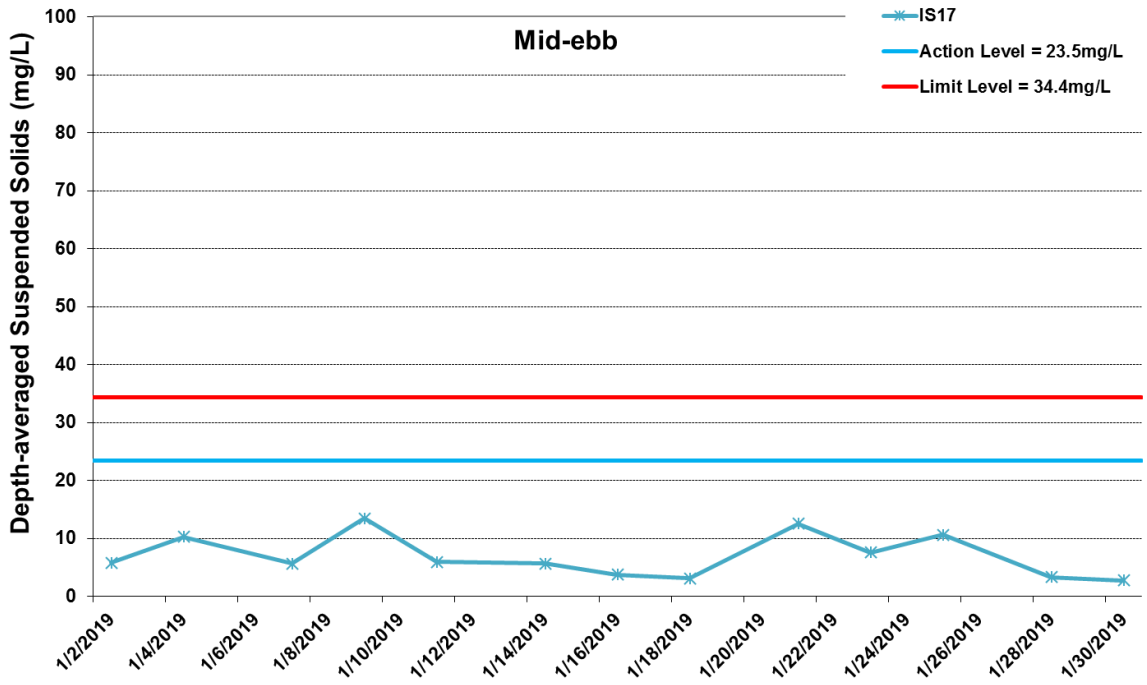


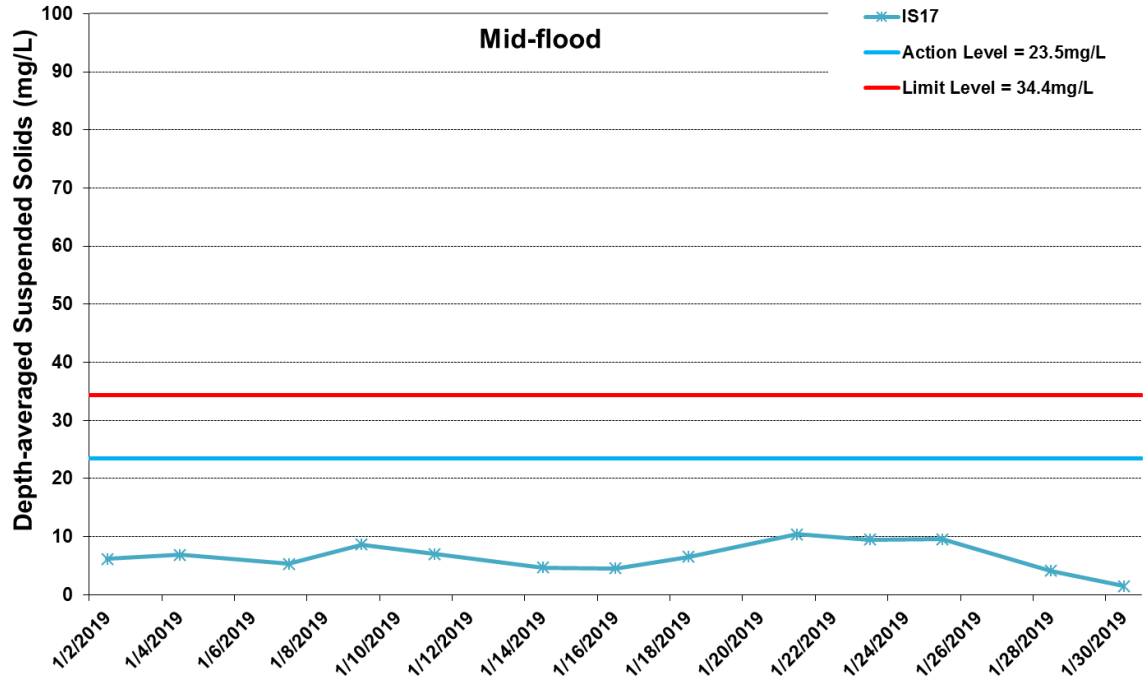


* The AL/LL for WQM stations, IS(Mf)11, IS17 and SR7, are adopted from HZMB HKBCF project.

Figure G13 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_graphs_Rev a.xls





* 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 1 January 2019 and 31 January 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 (1/1/2019 – 31/1/2019).

Ref: 0212330_Impact-WQM_January2019_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

21st Quarterly Progress Report (December 2018 – February 2019)
submitted to Dragages – Bouygues Joint Venture & ERM Hong Kong Ltd.

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

12 April 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 21st 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 December 2018 to February 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 2017, 2018). For each monitoring vessel survey, a 15-m inboard vessel with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area.

2.1.3. Two experienced observers (a data recorder and a primary observer) made up the on-effort survey team, and the survey vessel transited different transect lines at a constant speed of 13-15 km per hour. The data recorder searched with unaided eyes and filled out the datasheets, while the primary observer searched for dolphins and porpoises continuously through 7 x 50 *Fujinon* marine binoculars. Both observers searched the sea ahead of the vessel, between 270^{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 December 2018 to February 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 801.74 km of survey effort was collected, with 94.7% 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, 302.10 km and 499.64 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 579.99 km, while the effort on secondary lines was 221.75 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 December 2018 to February 2019, 12 groups of 38 Chinese White Dolphins were sighted. Ten of the 12 dolphin

sightings were made during on-effort search in this quarter, and eight of the ten on-effort dolphin sightings were 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 December 2018 to February 2019 is shown in Figure 1. All sightings were 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 alignment of TM-CLKL as well as the HKBCF and HKLR03 reclamation sites (Figure 1). However, two dolphin groups were sighted near the alignment of HKLR09 during the quarterly period.

3.2.3. Sighting distribution of dolphins during the present impact phase monitoring period (December 2018-February 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 23 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 significantly different between the baseline and impact phase periods. During the present impact monitoring period, dolphins were less frequently sighted here, and mainly at the western portion of the area, which 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 winter months in 2013-19 (Figure 2). Among the six winter periods, dolphins were sighted regularly in NWL waters in 2013-14, but their usage there have progressively reduced in the five subsequent winter 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 December 2018 – February 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 (3 & 5 Dec 2018)	0.00	0.00
	Set 2 (10 & 12 Dec 2018)	0.00	0.00
	Set 3 (2 & 3 Jan 2019)	0.00	0.00
	Set 4 (7 & 14 Jan 2019)	0.00	0.00
	Set 5 (1 & 14 Feb 2019)	0.00	0.00
	Set 6 (20, 25 & 26 Feb 2019)	0.00	0.00
Northwest Lantau	Set 1 (3 & 5 Dec 2018)	3.95	11.86
	Set 2 (10 & 12 Dec 2018)	0.00	0.00
	Set 3 (2 & 3 Jan 2019)	3.32	14.94
	Set 4 (7 & 14 Jan 2019)	0.00	0.00
	Set 5 (1 & 14 Feb 2019)	3.86	7.72
	Set 6 (20, 25 & 26 Feb 2019)	3.29	13.16

Table 3. Comparison of average dolphin encounter rates from impact monitoring period (December 2018 – February 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)	
	December 2018 – February 2019	September – November 2011	December 2018 – February 2019	September – November 2011
Northeast Lantau	0.0	6.00 ± 5.05	0.0	22.19 ± 26.81
Northwest Lantau	2.40 ± 1.88	9.85 ± 5.85	7.95 ± 6.60	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 2.15 sightings and 7.11 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 23 quarters of HKLR03 monitoring (Table 4). This is a serious concern as the dolphin occurrence in NEL in the past few 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 75.6% and 82.2% respectively) were only small 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 winter quarters since 2013-14, the quarterly encounter rates in 2018-19 dropped to the lowest among all winter 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 (25th quarter of the impact phase being assessed), the p-values for the differences in average dolphin encounter rates of STG and ANI were 0.0041 and 0.0221 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 25 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 **winter** 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**

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 **winter** 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**

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 2017, 2018). Apparently there has been little 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 one to seven individuals per group in North Lantau region during December 2018 to February 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 (December 2018 – February 2019) and baseline monitoring period (September – November 2011) (Note: ± denotes the standard deviation of the average group size)

	Average Dolphin Group Size	
	December 2018 – February 2019	**September – November 2011**
Overall	3.17 ± 1.80 (n = 12)	3.72 ± 3.13 (n = 66)
Northeast Lantau	---	3.18 ± 2.16 (n = 17)
Northwest Lantau	3.17 ± 1.80 (n = 12)	3.92 ± 3.40 (n = 49)

3.4.2. The average dolphin group size in NWL waters during December 2018 to February 2019 was lower than the one recorded during the three-month baseline period, but it should also be noted that the sample size of 12 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, with the exception of the three medium-sized groups with 5-7 animals, the other nine groups were small with 1-4 animals per group only (Appendix II).

3.4.4. Distribution of the larger dolphin groups with five individuals or more per group during the present quarter is shown in Figure 3, with comparison to the one in baseline period. The three medium-sized groups were distributed at the mouth of Deep Bay, near Lung Kwu Tan and between Sha Chau and Lung Kwu Chau respectively. Such distribution pattern was very different from the baseline period, when the larger dolphin groups were frequently sighted and evenly distributed in NWL waters, with a few also being sighted in NEL waters (Figure 3).

3.5. Habitat use

3.5.1. From December 2018 to February 2019, only nine grids in North Lantau waters recorded

dolphin occurrence. Among them, the ones with moderately high dolphin densities were located near Lung Kwu Tan, between Sha Chau and Lung Kwu Chau, as well as to the north of the airport adjacent to the third runway expansion reclamation work site (Figures 4a and 4b). In contrast, the rest of the grids only recorded low to moderate densities.

3.5.2. Notably, all grids near HKLR03/HKBCF reclamation sites as well as TMCLKL/HKLR09 alignments did not record any presence of dolphins at all during on-effort search in the present quarterly period (Figures 4a and 4b).

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 5). 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 5).

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 several grids with moderate to high densities were scattered in the western portion of North Lantau waters during the present impact phase period (Figure 5).

3.6. Mother-calf pairs

3.6.1. During the present quarterly period, only one unspotted juvenile was sighted with its mother in the North Lantau region. In fact, that was the only young calf being sighted in the past two years of HKLR03 monitoring. This young calf was spotted with its mother (WL145, a known individual from the photo-identification catalogue) at the southwest corner of NWL survey area, or adjacent to the HKLR09 alignment (Figure 6).

3.6.2. It should be noted that the rare occurrence of young calves in the present quarter as well as in recent years of HKLR03 monitoring was very different from their regular occurrence in North Lantau waters during the baseline period (Figure 6). This should be of a serious concern, and such calf occurrence should be closely monitored in the upcoming quarters.

3.7. Activities and associations with fishing boats

3.7.1. Among the 12 dolphin groups, two of them were engaged in feeding activity, while none was engaged in socializing, traveling or milling/resting activity during the quarterly period.

3.7.2. The percentage of sightings associated with feeding activity (16.7%) was higher than the one recorded during the baseline period (11.6%), but it should be noted the sample sizes on total numbers of dolphin sightings were very different between the two periods.

3.7.3. Distribution of dolphins engaged in various activities during the present three-month period and baseline period is shown in Figure 7. The two dolphin groups engaged in feeding activities were located to the north of the airport platform and adjacent to the HKLR09 alignment respectively, and this was very different from the baseline period when various dolphin activities occurred throughout the North Lantau region (Figure 7).

3.7.4. Notably, none of the 12 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 December 2018 to February 2019, about 1,200 digital photographs of Chinese White Dolphins were taken during the impact phase monitoring surveys for the photo-identification work.

3.8.2. In total, 16 individuals sighted 31 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. Five of the 16 individuals (i.e. CH34, NL123, NL136, NL182 and NL202) were re-sighted 3-4 times, while the rest were re-sighted only once or twice during the quarterly monitoring period (Appendix III).

3.8.3. Notably, only one individual (NL259) was sighted in WL waters during the HKLR09 monitoring surveys under the same three-month period.

3.9. Individual range use

3.9.1. Ranging patterns of the 16 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. Furthermore, in contrary to previous monitoring quarters, only one of the 16 individuals (NL259) have extended their range use to WL waters during the same winter quarter of 2018-19, while four individuals (i.e. WL98, WL243, WL273 and WL281) that have consistently utilized WL waters in the past have extended their range use to NWL waters during the present quarter.

3.9.4. In the upcoming quarters, individual range use and movements should be continuously monitored to examine whether there has been any consistent shifts of individual home ranges from North Lantau to West or Southwest Lantau and vice versa, as such shift could

possibly be related to the HZMB-related construction works.

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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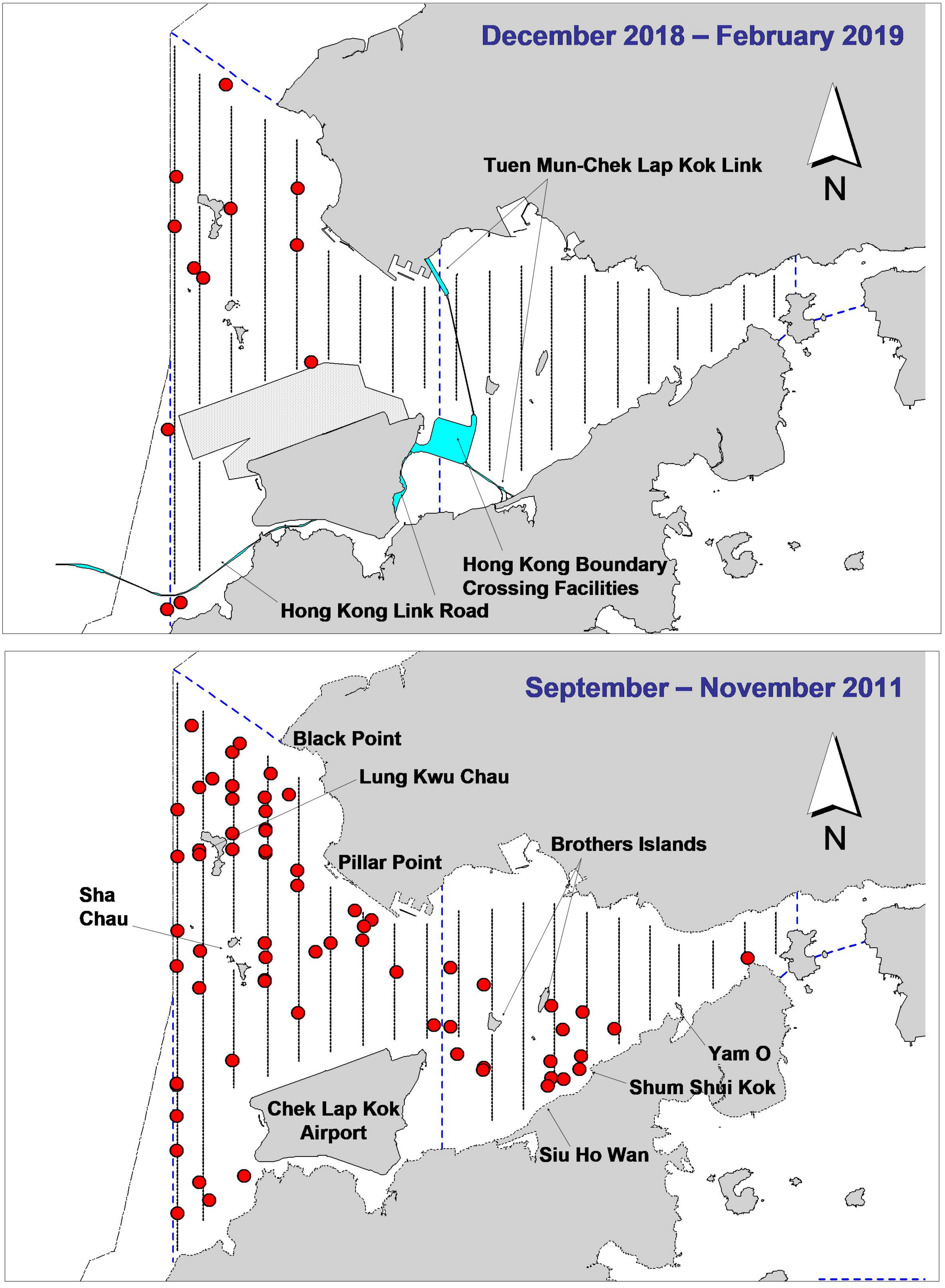


Figure 1. Distribution of Chinese white dolphin sighting in Northwest and Northeast Lantau during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

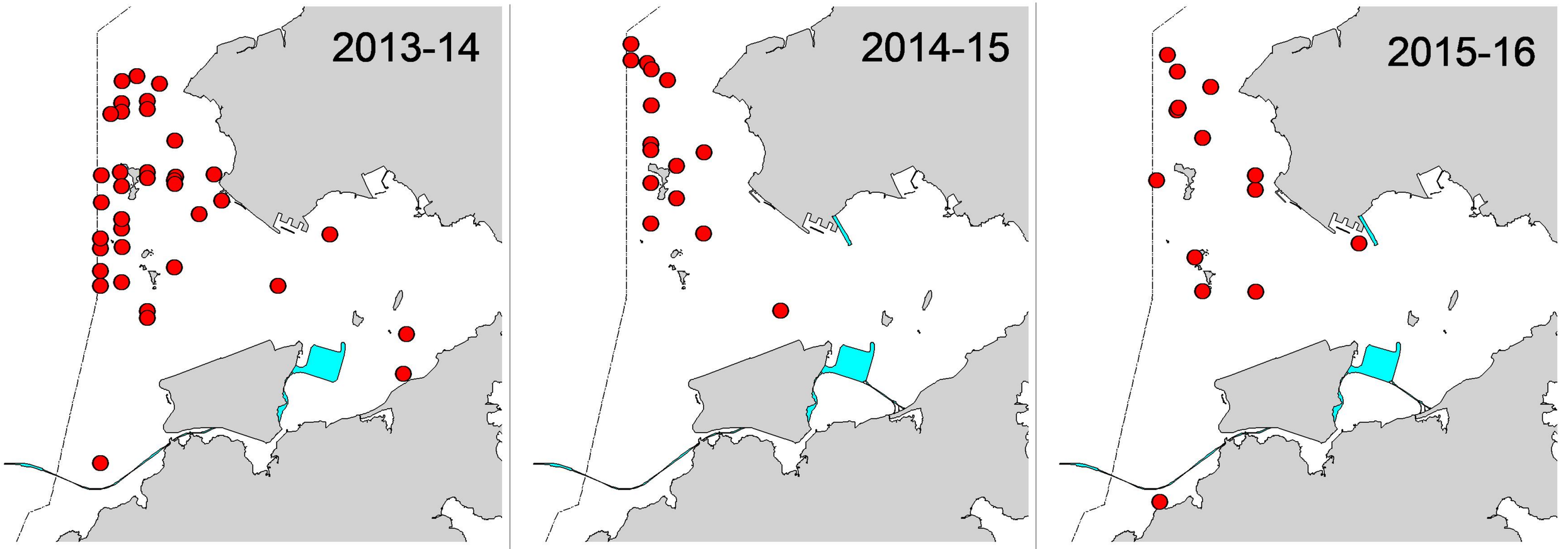


Figure 2. Distribution of Chinese white dolphin sightings in Northwest and Northeast Lantau during the past six winter quarters (December-February) of HKLR03 impact phase in 2013-19

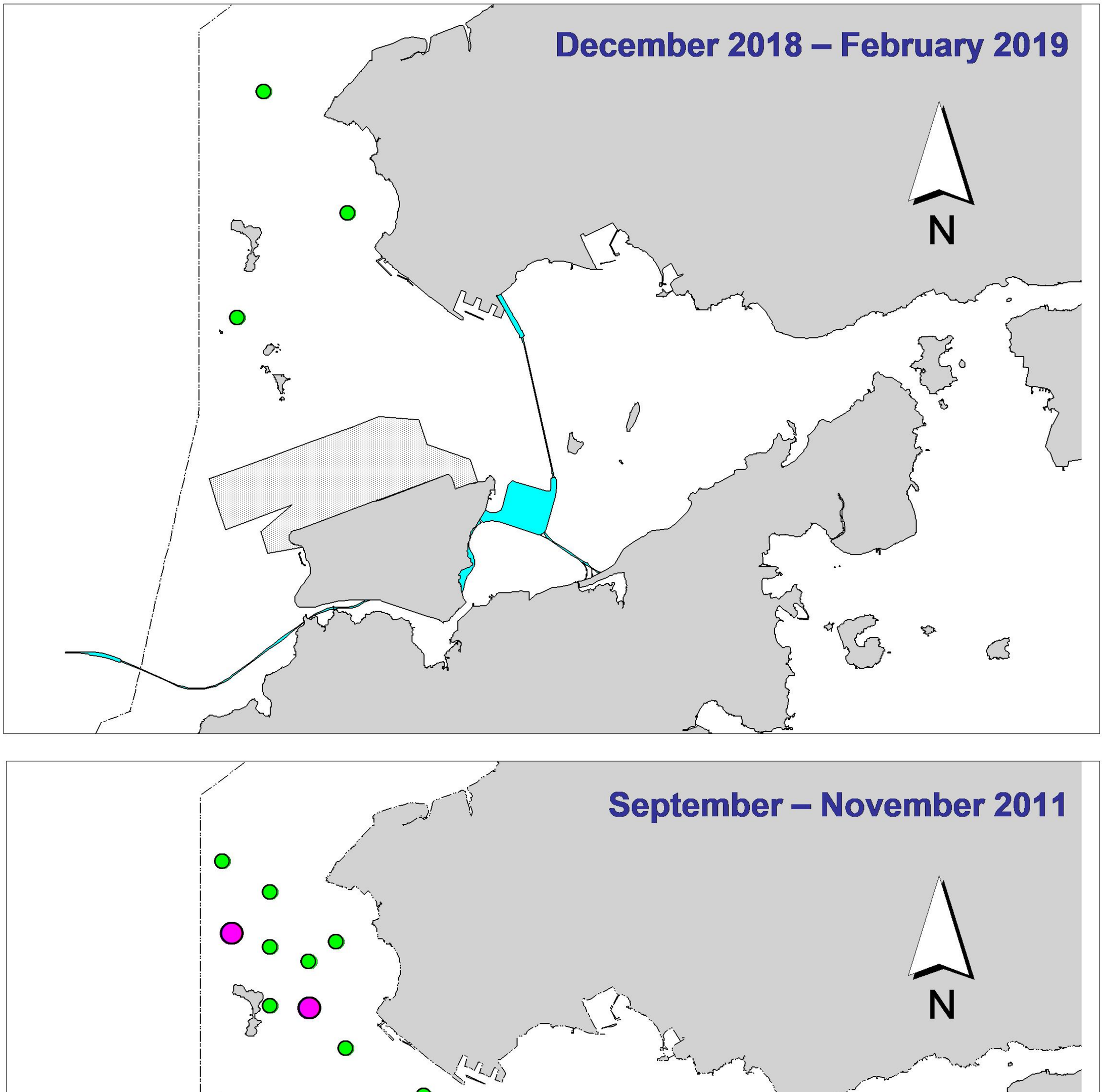


Figure 3. Distribution of Chinese white dolphins with larger group sizes during HKLR03 impact phase (top) and baseline monitoring surveys (bottom) (green dots: group sizes of 5 or more; purple dots: group sizes of 10 or more)

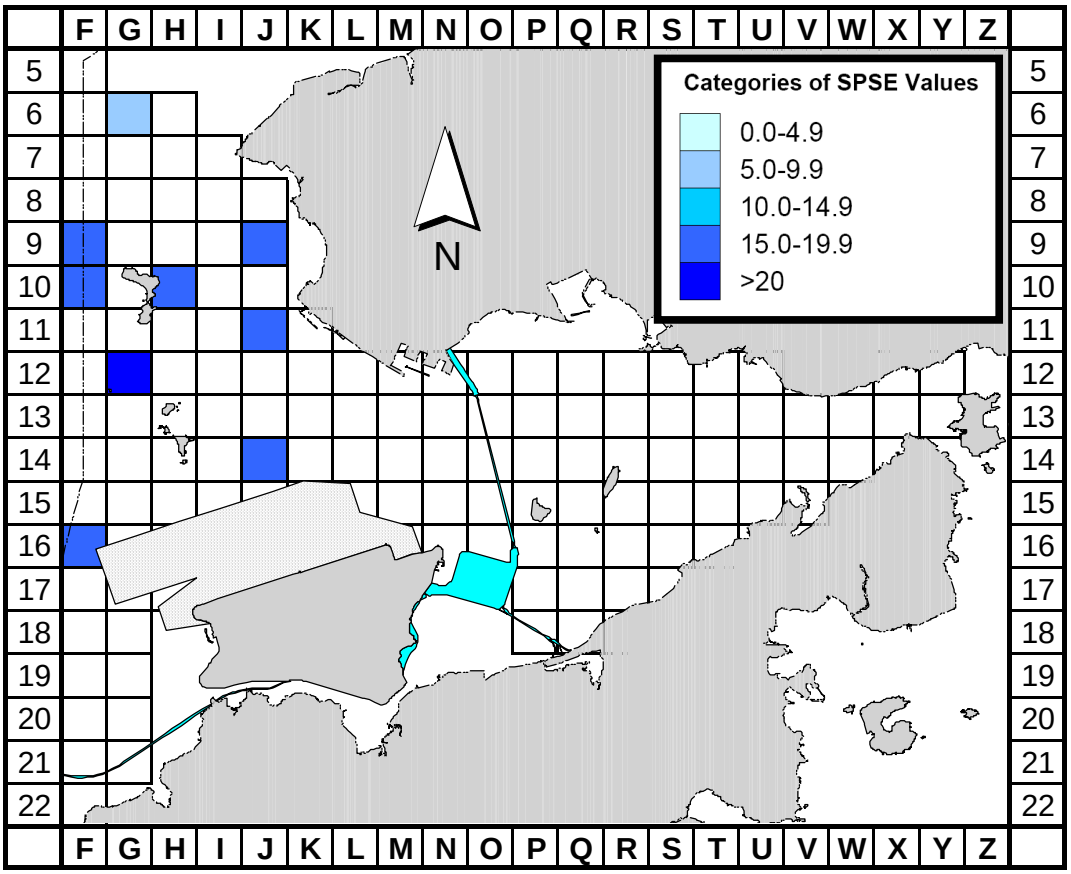


Figure 4a. Sighting density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period monitoring period (Dec 18-Feb 19) (SPSE = no. of on-effort sightings per 100 units of survey effort)

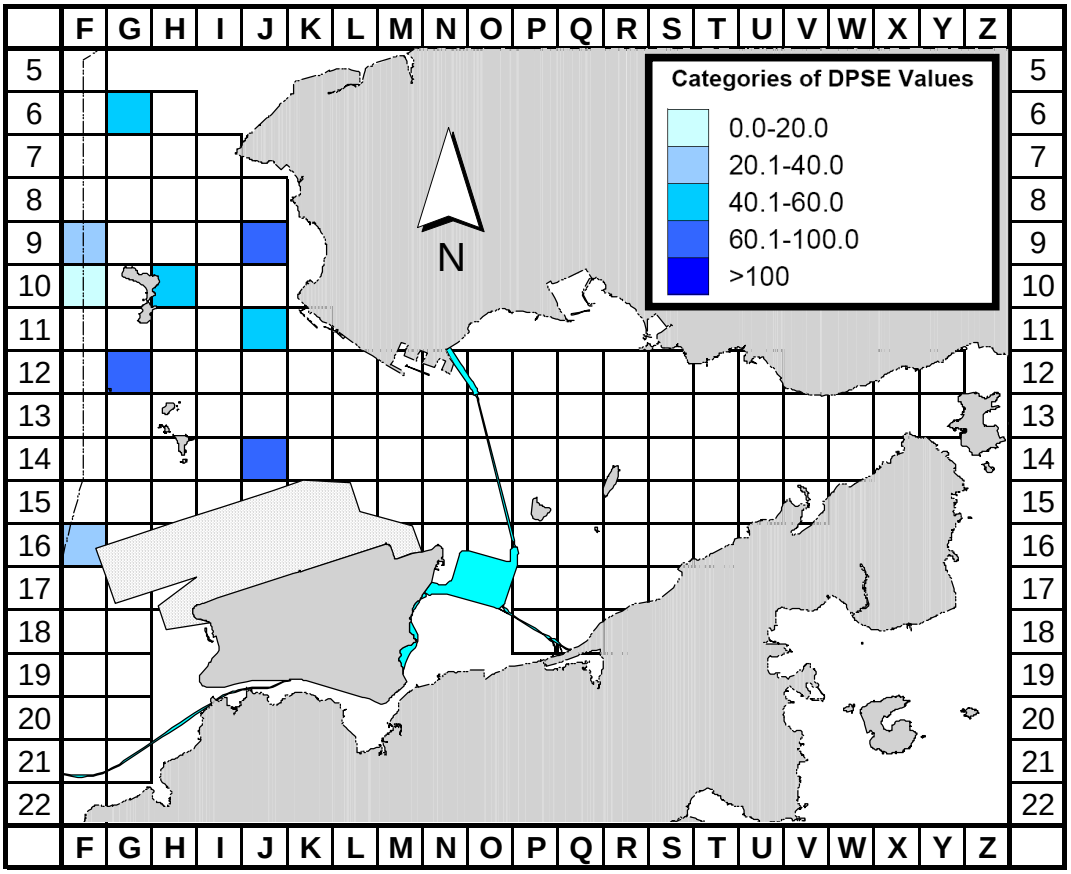


Figure 4b. Density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (Dec 18-Feb 19) (DPSE = no. of dolphins per 100 units of survey effort)

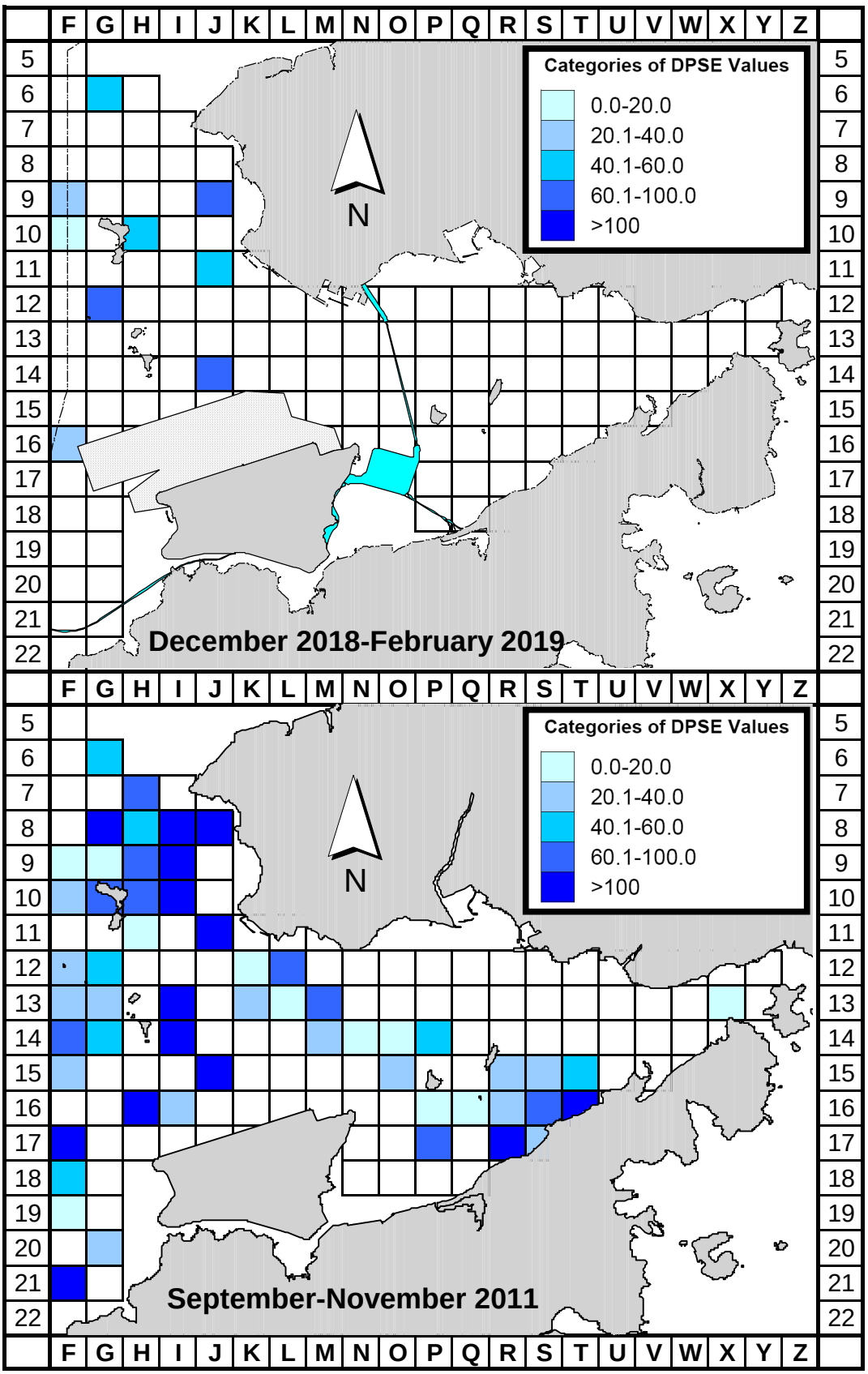


Figure 5. Comparison of density of Chinese white dolphins with corrected survey effort per km^2 in Northwest and Northeast Lantau survey area between the impact monitoring period (December 2018-February 2019) and baseline monitoring period (September-November 2011)
(DPSE = no. of dolphins per 100 units of survey effort)

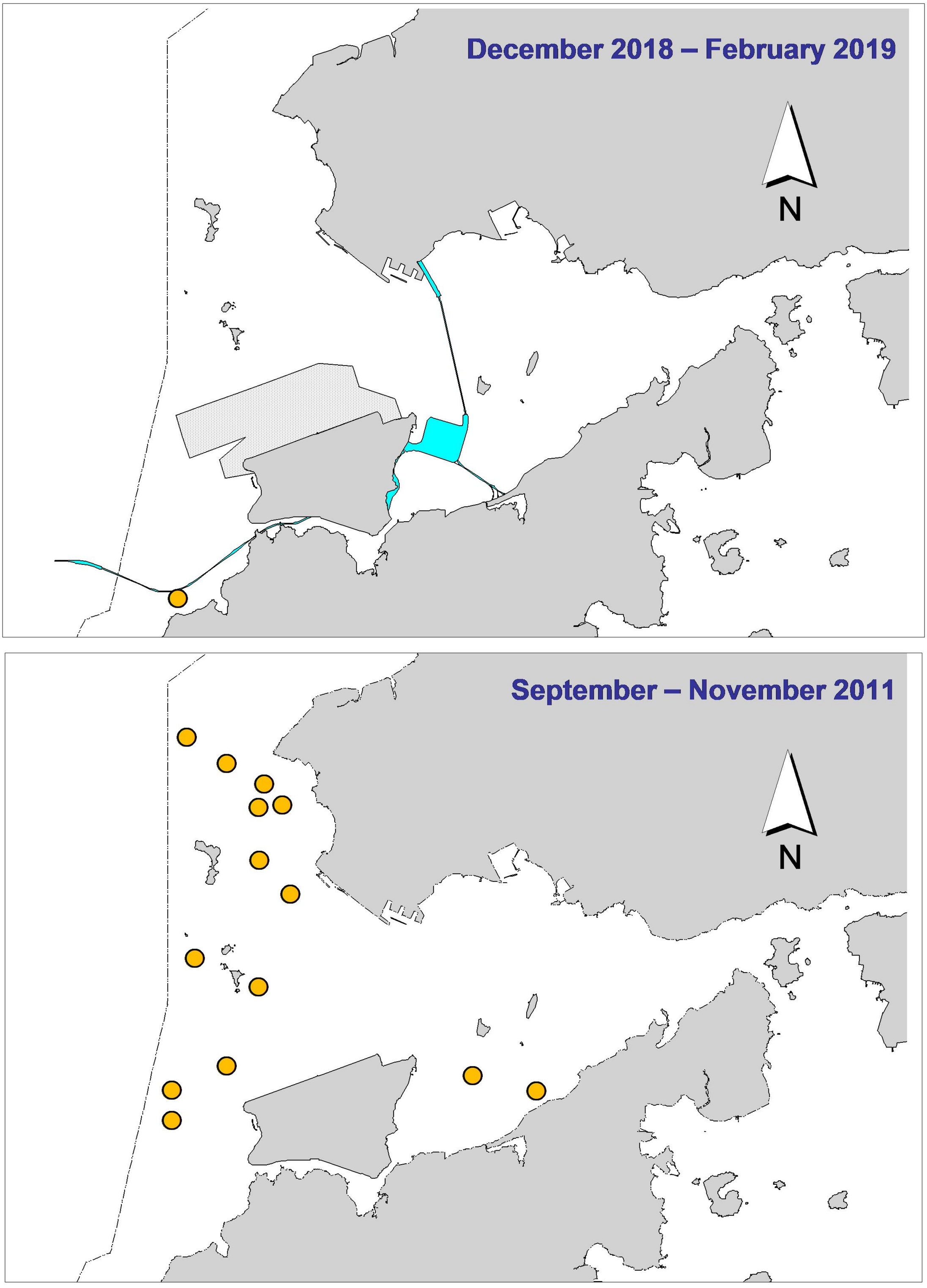


Figure 6. Distribution of young calves of Chinese white dolphins during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

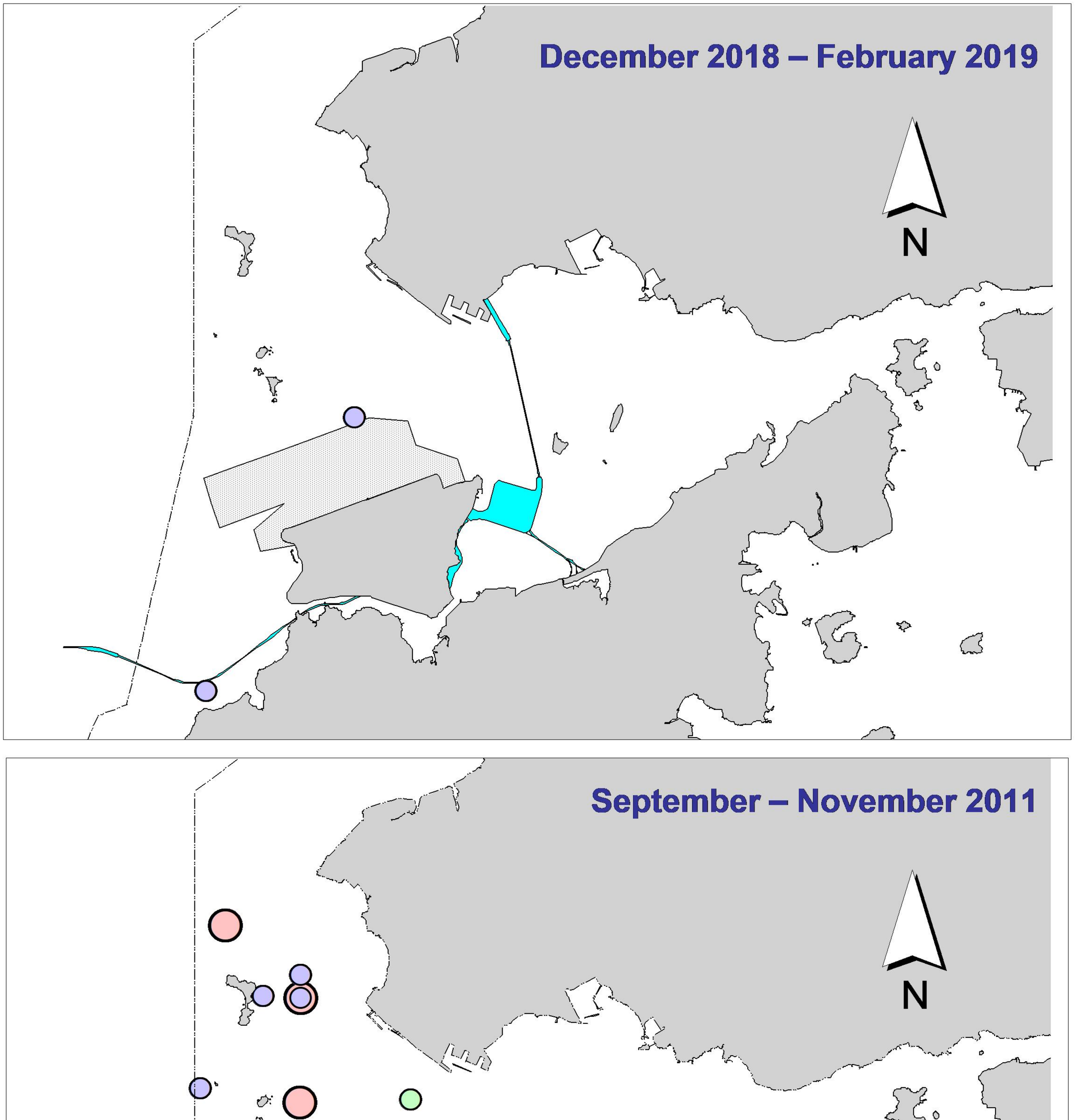


Figure 7. Distribution of Chinese white dolphins engaged in feeding (purple dots), socializing (pink dots) and traveling (green dots) activities during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

Appendix I. HKLR03 Survey Effort Database (December 2018-February 2019)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
3-Dec-18	NW LANTAU	2	27.00	WINTER	STANDARD36826	HKLR	P
3-Dec-18	NW LANTAU	3	4.18	WINTER	STANDARD36826	HKLR	P
3-Dec-18	NW LANTAU	2	10.68	WINTER	STANDARD36826	HKLR	S
5-Dec-18	NW LANTAU	3	19.43	WINTER	STANDARD36826	HKLR	P
5-Dec-18	NW LANTAU	4	9.90	WINTER	STANDARD36826	HKLR	P
5-Dec-18	NW LANTAU	3	6.57	WINTER	STANDARD36826	HKLR	S
5-Dec-18	NW LANTAU	4	4.30	WINTER	STANDARD36826	HKLR	S
5-Dec-18	NE LANTAU	2	8.60	WINTER	STANDARD36826	HKLR	P
5-Dec-18	NE LANTAU	3	26.18	WINTER	STANDARD36826	HKLR	P
5-Dec-18	NE LANTAU	4	1.10	WINTER	STANDARD36826	HKLR	P
5-Dec-18	NE LANTAU	2	6.60	WINTER	STANDARD36826	HKLR	S
5-Dec-18	NE LANTAU	3	6.22	WINTER	STANDARD36826	HKLR	S
10-Dec-18	NW LANTAU	2	13.34	WINTER	STANDARD36826	HKLR	P
10-Dec-18	NW LANTAU	3	22.85	WINTER	STANDARD36826	HKLR	P
10-Dec-18	NW LANTAU	2	8.98	WINTER	STANDARD36826	HKLR	S
10-Dec-18	NW LANTAU	3	1.73	WINTER	STANDARD36826	HKLR	S
12-Dec-18	NW LANTAU	2	7.60	WINTER	STANDARD36826	HKLR	P
12-Dec-18	NW LANTAU	3	10.12	WINTER	STANDARD36826	HKLR	P
12-Dec-18	NW LANTAU	4	7.55	WINTER	STANDARD36826	HKLR	P
12-Dec-18	NW LANTAU	2	2.10	WINTER	STANDARD36826	HKLR	S
12-Dec-18	NW LANTAU	3	6.10	WINTER	STANDARD36826	HKLR	S
12-Dec-18	NW LANTAU	4	2.53	WINTER	STANDARD36826	HKLR	S
12-Dec-18	NE LANTAU	2	33.02	WINTER	STANDARD36826	HKLR	P
12-Dec-18	NE LANTAU	3	2.59	WINTER	STANDARD36826	HKLR	P
12-Dec-18	NE LANTAU	2	12.69	WINTER	STANDARD36826	HKLR	S
2-Jan-19	NW LANTAU	2	5.20	WINTER	STANDARD36826	HKLR	P
2-Jan-19	NW LANTAU	3	23.70	WINTER	STANDARD36826	HKLR	P
2-Jan-19	NW LANTAU	2	5.40	WINTER	STANDARD36826	HKLR	S
2-Jan-19	NW LANTAU	3	3.96	WINTER	STANDARD36826	HKLR	S
2-Jan-19	NW LANTAU	4	2.14	WINTER	STANDARD36826	HKLR	S
2-Jan-19	NE LANTAU	2	17.54	WINTER	STANDARD36826	HKLR	P
2-Jan-19	NE LANTAU	3	17.80	WINTER	STANDARD36826	HKLR	P
2-Jan-19	NE LANTAU	2	8.76	WINTER	STANDARD36826	HKLR	S
2-Jan-19	NE LANTAU	3	5.80	WINTER	STANDARD36826	HKLR	S
3-Jan-19	NW LANTAU	2	31.36	WINTER	STANDARD36826	HKLR	P
3-Jan-19	NW LANTAU	2	11.88	WINTER	STANDARD36826	HKLR	S
7-Jan-19	NW LANTAU	2	21.80	WINTER	STANDARD36826	HKLR	P
7-Jan-19	NW LANTAU	3	10.90	WINTER	STANDARD36826	HKLR	P
7-Jan-19	NW LANTAU	2	2.20	WINTER	STANDARD36826	HKLR	S
7-Jan-19	NW LANTAU	3	9.60	WINTER	STANDARD36826	HKLR	S
7-Jan-19	NE LANTAU	2	35.83	WINTER	STANDARD36826	HKLR	P
7-Jan-19	NE LANTAU	2	12.07	WINTER	STANDARD36826	HKLR	S
14-Jan-19	NW LANTAU	2	26.88	WINTER	STANDARD36826	HKLR	P
14-Jan-19	NW LANTAU	2	13.92	WINTER	STANDARD36826	HKLR	S
1-Feb-19	NW LANTAU	2	6.59	WINTER	STANDARD36826	HKLR	P
1-Feb-19	NW LANTAU	3	20.70	WINTER	STANDARD36826	HKLR	P
1-Feb-19	NW LANTAU	4	5.70	WINTER	STANDARD36826	HKLR	P
1-Feb-19	NW LANTAU	1	1.06	WINTER	STANDARD36826	HKLR	S
1-Feb-19	NW LANTAU	2	5.60	WINTER	STANDARD36826	HKLR	S
1-Feb-19	NW LANTAU	3	4.30	WINTER	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
1-Feb-19	NE LANTAU	1	2.60	WINTER	STANDARD36826	HKLR	P
1-Feb-19	NE LANTAU	2	33.86	WINTER	STANDARD36826	HKLR	P
1-Feb-19	NE LANTAU	1	2.30	WINTER	STANDARD36826	HKLR	S
1-Feb-19	NE LANTAU	2	10.14	WINTER	STANDARD36826	HKLR	S
14-Feb-19	NW LANTAU	2	11.58	WINTER	STANDARD36826	HKLR	P
14-Feb-19	NW LANTAU	3	12.95	WINTER	STANDARD36826	HKLR	P
14-Feb-19	NW LANTAU	4	3.30	WINTER	STANDARD36826	HKLR	P
14-Feb-19	NW LANTAU	2	1.76	WINTER	STANDARD36826	HKLR	S
14-Feb-19	NW LANTAU	3	7.76	WINTER	STANDARD36826	HKLR	S
20-Feb-19	NW LANTAU	2	15.35	WINTER	STANDARD36826	HKLR	P
20-Feb-19	NW LANTAU	3	12.38	WINTER	STANDARD36826	HKLR	P
20-Feb-19	NW LANTAU	2	7.25	WINTER	STANDARD36826	HKLR	S
20-Feb-19	NW LANTAU	3	5.06	WINTER	STANDARD36826	HKLR	S
25-Feb-19	NW LANTAU	2	27.52	WINTER	STANDARD36826	HKLR	P
25-Feb-19	NW LANTAU	3	5.53	WINTER	STANDARD36826	HKLR	P
25-Feb-19	NW LANTAU	2	11.35	WINTER	STANDARD36826	HKLR	S
25-Feb-19	NE LANTAU	1	4.41	WINTER	STANDARD36826	HKLR	P
25-Feb-19	NE LANTAU	2	15.20	WINTER	STANDARD36826	HKLR	P
25-Feb-19	NE LANTAU	1	6.35	WINTER	STANDARD36826	HKLR	S
25-Feb-19	NE LANTAU	2	5.24	WINTER	STANDARD36826	HKLR	S
26-Feb-19	NE LANTAU	3	12.70	WINTER	STANDARD36826	HKLR	P
26-Feb-19	NE LANTAU	4	3.51	WINTER	STANDARD36826	HKLR	P
26-Feb-19	NE LANTAU	5	1.64	WINTER	STANDARD36826	HKLR	P
26-Feb-19	NE LANTAU	3	8.80	WINTER	STANDARD36826	HKLR	S
26-Feb-19	NE LANTAU	4	0.55	WINTER	STANDARD36826	HKLR	S

Appendix II. HKLR03 Chinese White Dolphin Sighting Database (December 2018-February 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
3-Dec-18	1	1046	5	NW LANTAU	2	821	ON	HKLR	827178	808517	WINTER	NONE	P
3-Dec-18	2	1247	1	NW LANTAU	3	962	ON	HKLR	826056	804663	WINTER	NONE	P
3-Jan-19	1	1151	7	NW LANTAU	2	614	ON	HKLR	830239	806267	WINTER	NONE	P
3-Jan-19	2	1234	2	NW LANTAU	2	71	ON	HKLR	827529	804728	WINTER	NONE	P
14-Jan-19	1	1319	2	NW LANTAU	2	ND	OFF	HKLR	814949	804866	WINTER	NONE	N/A
14-Jan-19	2	1336	3	NW LANTAU	2	ND	OFF	HKLR	814739	804443	WINTER	NONE	N/A
1-Feb-19	1	1233	3	NW LANTAU	3	219	ON	HKLR	825495	808493	WINTER	NONE	P
14-Feb-19	1	1024	2	NW LANTAU	3	341	ON	HKLR	820043	804465	WINTER	NONE	S
14-Feb-19	2	1102	1	NW LANTAU	3	197	ON	HKLR	824826	805278	WINTER	NONE	P
14-Feb-19	3	1356	4	NW LANTAU	3	82	ON	HKLR	822050	808930	WINTER	NONE	S
20-Feb-19	1	1220	5	NW LANTAU	3	878	ON	HKLR	824548	805556	WINTER	NONE	P
25-Feb-19	1	1146	3	NW LANTAU	2	147	ON	HKLR	826584	806435	WINTER	NONE	P

Appendix III. Individual dolphins identified during HKLR03 monitoring surveys in December 2018 - February 2019

ID#	DATE	STG#	AREA
CH34	03/12/18	1	NW LANTAU
	03/01/19	1	NW LANTAU
	20/02/19	1	NW LANTAU
	25/02/19	1	NW LANTAU
NL33	03/01/19	1	NW LANTAU
	14/01/19	2	NW LANTAU
NL98	03/01/19	2	NW LANTAU
	25/02/19	1	NW LANTAU
NL123	01/02/19	1	NW LANTAU
	14/02/19	3	NW LANTAU
	20/02/19	1	NW LANTAU
NL136	03/01/19	1	NW LANTAU
	20/02/19	1	NW LANTAU
	25/02/19	1	NW LANTAU
NL182	03/12/18	1	NW LANTAU
	03/01/19	1	NW LANTAU
	01/02/19	1	NW LANTAU
NL202	03/12/18	2	NW LANTAU
	03/01/19	1	NW LANTAU
	01/02/19	1	NW LANTAU
	20/02/19	1	NW LANTAU
NL259	14/01/19	2	NW LANTAU
NL321	14/02/19	3	NW LANTAU
NL322	03/01/19	1	NW LANTAU
	14/01/19	2	NW LANTAU
NL331	14/02/19	1	NW LANTAU
WL17	14/02/19	3	NW LANTAU
WL98	14/01/19	1	NW LANTAU
WL243	14/02/19	1	NW LANTAU
WL273	03/01/19	1	NW LANTAU
WL281	20/02/19	1	NW LANTAU

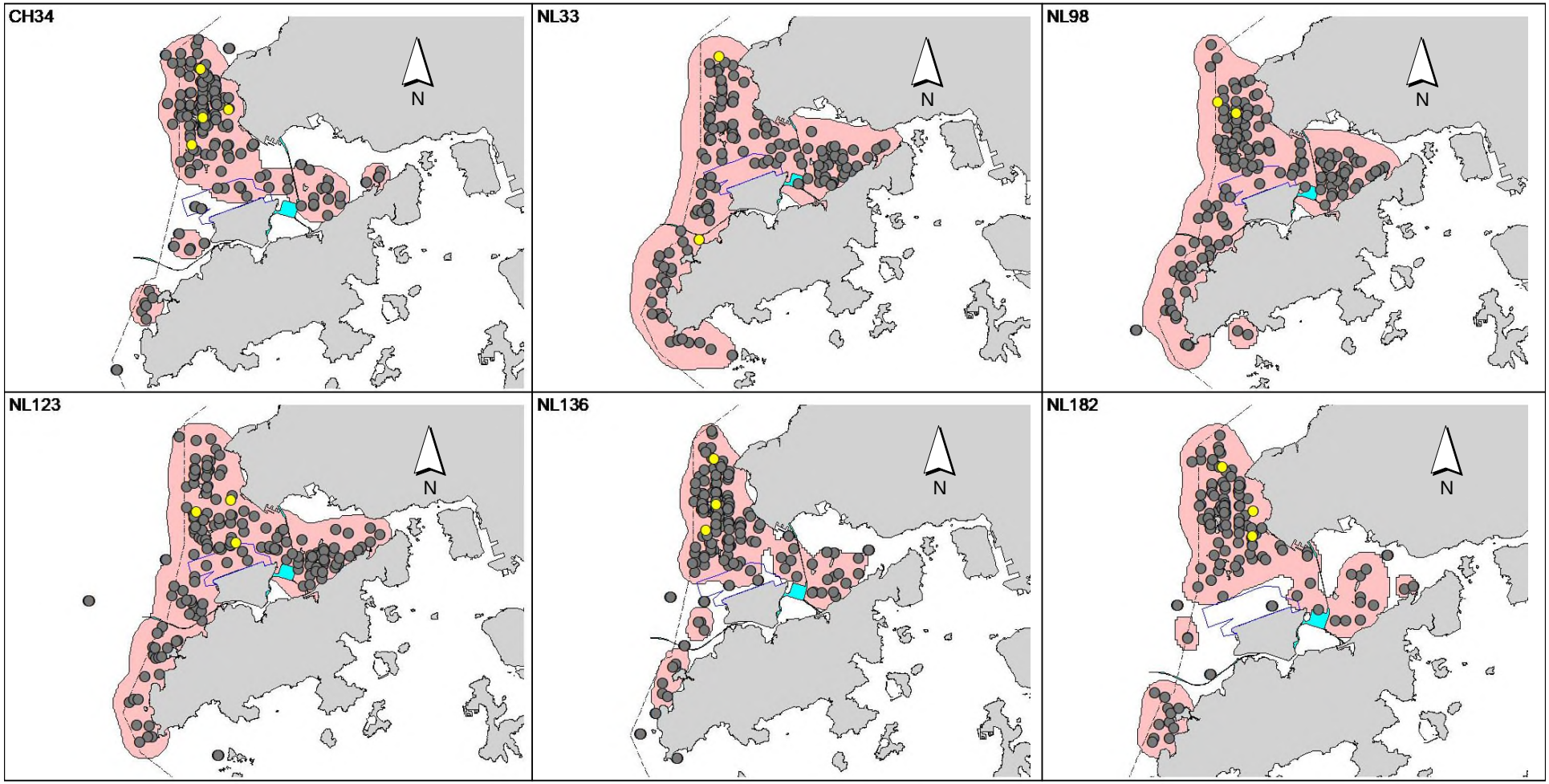
Appendix IV. Sixteen individual dolphins that were identified during December 2018 to February 2019 under HKLR03 impact phase monitoring surveys

Appendix IV. (cont'd)

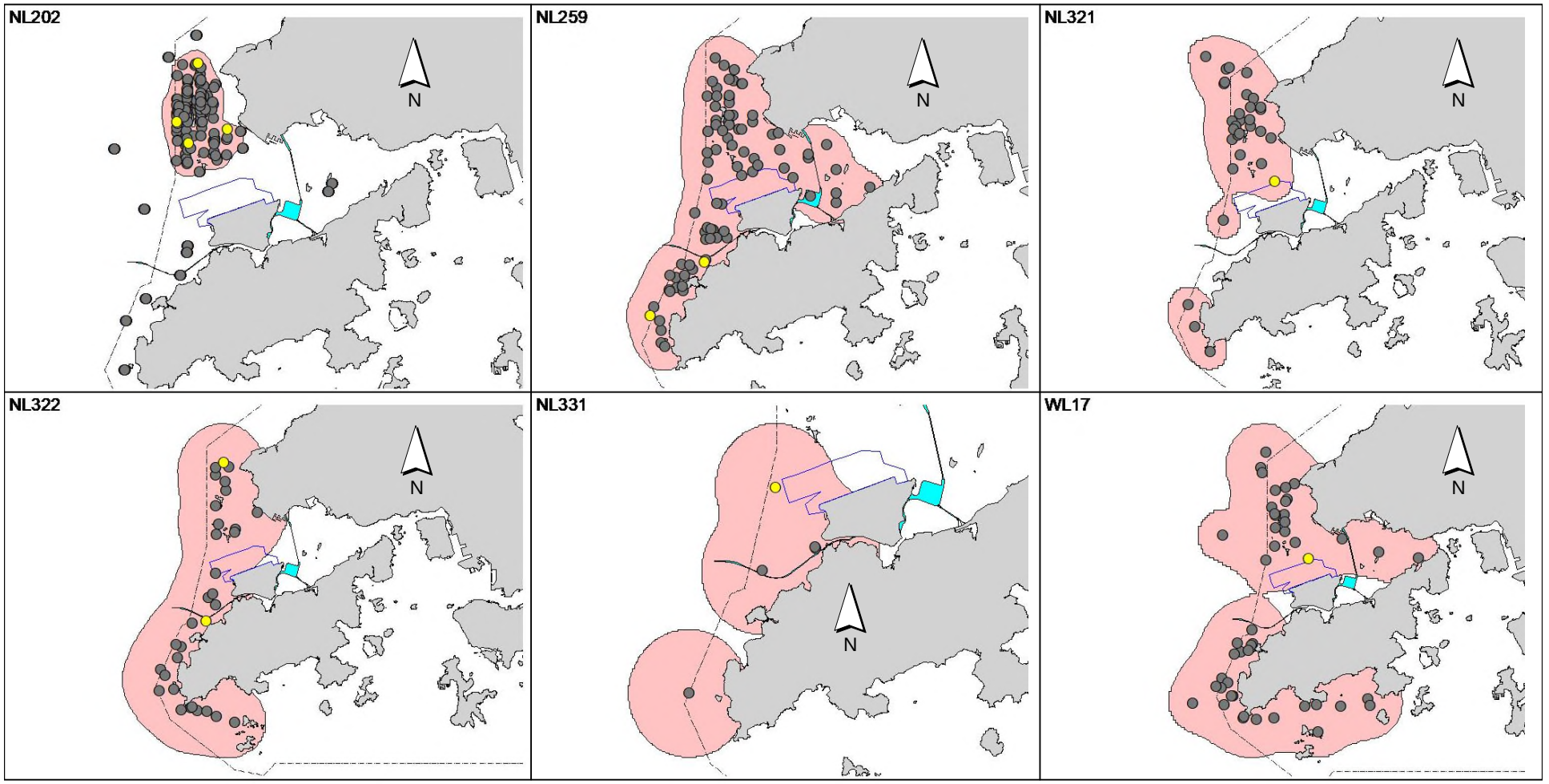
Appendix IV. (cont'd)

Appendix IV. (cont'd)

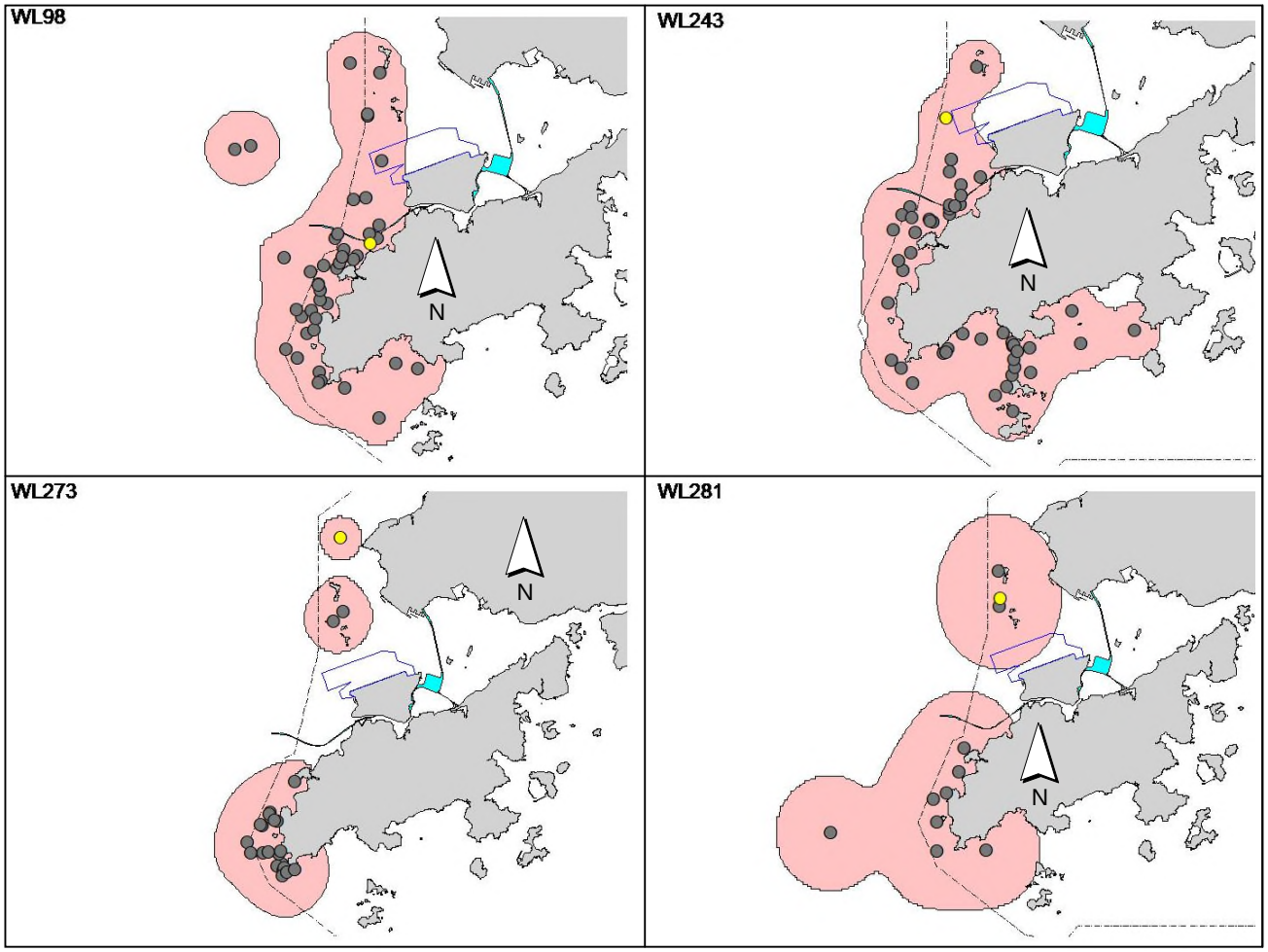
Appendix V. Ranging patterns (95% kernel ranges) of 16 individual dolphins that were sighted during HKLR03 impact phase monitoring period (note: yellow dots indicate sightings made in Dec 2018 – Feb 2019 during HKLR03 and HKLR09 monitoring surveys)



Appendix V. (cont'd)



Appendix V. (cont'd)



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	8	87
	Limit	1	6
24-Hr TSP	Action	1	9
	Limit	0	4
Water Quality	Action	0	20
	Limit	0	1
Impact Dolphin Monitoring	Action	0	11
	Limit	1	14

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 (December 2018 to February 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	14 December 2018

Dear Sir or Madam,

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

0212330_9December2018_1hrTSP_Station ASR1

One Action Level Exceedance was recorded on 9 December 2018.

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_9December2018_1hrTSP_Station ASR1** **[Total No. of Exceedances = 1]**	
Date	9 December 2018 (Measured) 14 December 2018 (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 (346 µg/m3) during 1044 – 1144 hrs.	
Works Undertaken (at the time of monitoring event)	On 9 December 2018, no construction works was carried out on site.	
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, no construction works was carried out on site on 9 December 2018. 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 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. Based on the above, the exceedances are unlikely to be due to this Contract.	

Actions Taken / To Be Taken	According to the construction information provided by the Contractor, no construction works was carried out on 9 December 2018. Dust suppression measures were properly implemented. Water spraying was applied to prevent dust. Photo record is provided in Annex A. Photos taken during AQM are also provided. 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 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 9/12/2018

Water truck was used for dust control. (Works Area Portion N-C)

Water spraying was applied on the main haul road. (Works Area Portion N-C)

ERM

Annex A Photos provided by the Contractor

*Note: Photos taken on 9/12/2018

Water spraying was applied on the main haul road. (Works Area Portion N-A)

Dusty material was covered by tarpaulin sheets. (Works Area Portion N-A)

Annex A Photos taken during AQM

*Note: Photos taken on 9/12/2018

ASR1

ASR1

Air quality monitoring results on 9/12/2018								
Project	Works	Date	Station	Weather	Start time	Parameters	Results	Unit
TMCLKL	HY/2012/08	9/12/2018	AQMS1	Cloudy	8:52	1-hour TSP	79	ug/m3
TMCLKL	HY/2012/08	9/12/2018	AQMS1	Cloudy	9:54	1-hour TSP	57	ug/m3
TMCLKL	HY/2012/08	9/12/2018	AQMS1	Cloudy	10:56	1-hour TSP	75	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR1	Cloudy	8:40	1-hour TSP	135	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR1	Cloudy	9:42	1-hour TSP	212	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR1	Cloudy	10:44	1-hour TSP	346	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR10	Cloudy	8:05	1-hour TSP	74	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR10	Cloudy	9:07	1-hour TSP	79	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR10	Cloudy	10:09	1-hour TSP	83	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR5	Cloudy	8:28	1-hour TSP	201	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR5	Cloudy	9:30	1-hour TSP	194	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR5	Cloudy	10:32	1-hour TSP	194	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR6	Cloudy	8:16	1-hour TSP	134	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR6	Cloudy	9:18	1-hour TSP	97	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR6	Cloudy	10:20	1-hour TSP	112	ug/m3
TMCLKL	HY/2012/08	9/12/2018	AQMS1	Cloudy	11:58	24-hour TSP	35	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR1	Cloudy	11:46	24-hour TSP	62	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR10	Cloudy	11:09	24-hour TSP	40	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR5	Cloudy	11:34	24-hour TSP	117	ug/m3
TMCLKL	HY/2012/08	9/12/2018	ASR6	Cloudy	11:22	24-hour TSP	53	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)**
18/12/09	0:00	2.7	21
18/12/09	1:00	3.1	34
18/12/09	2:00	2.2	55
18/12/09	3:00	2.2	39
18/12/09	4:00	1.3	18
18/12/09	5:00	1.3	56
18/12/09	6:00	1.8	56
18/12/09	7:00	1.8	38
18/12/09	8:00	2.2	36
18/12/09	9:00	2.7	14
18/12/09	10:00	1.8	32
18/12/09	11:00	0.9	43
18/12/09	12:00	0.9	41
18/12/09	13:00	1.3	348
18/12/09	14:00	2.2	331
18/12/09	15:00	3.1	326
18/12/09	16:00	1.8	330
18/12/09	17:00	1.3	13
18/12/09	18:00	1.3	4
18/12/09	19:00	1.8	18
18/12/09	20:00	1.8	53
18/12/09	21:00	0.9	336
18/12/09	22:00	1.3	27
18/12/09	23:00	1.3	44

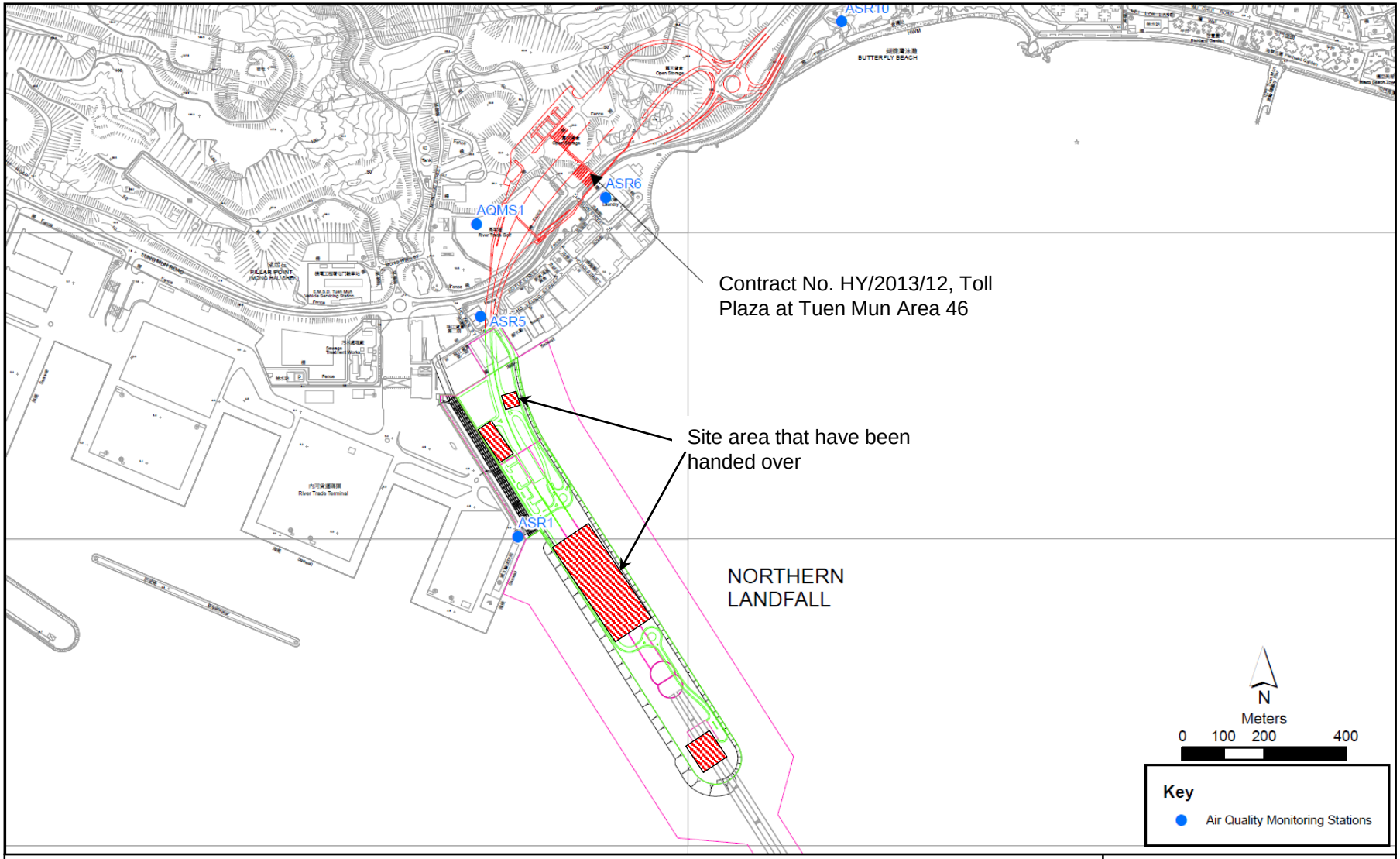


Figure 1

No construction works was carried out on 9 December 2018

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	24 December 2018

Dear Sir or Madam,

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

0212330_12December2018_1hrTSP_Station ASR1

One Action Level Exceedance was recorded on 12 December 2018.

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_12December2018_1hrTSP_Station ASR1** **[Total No. of Exceedances = 1]**	
Date	12 December 2018 (Measured) 24 December 2018 (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 (414 µg/m3) during 1331 – 1431 hrs.	
Works Undertaken (at the time of monitoring event)	On 12 December 2018, TBM tunnel works and surcharge removal was carried out at Portion N-C on the site.	
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 12 December 2018 was TBM tunnel works and surcharge removal. 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 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. Based on the above, the exceedances are unlikely to be due to this Contract.	

Actions Taken / To Be Taken	According to the construction information provided by the Contractor, TBM tunnel works and surcharge removal was carried out on 12 December 2018. Dust suppression measures were properly implemented. Water spraying was applied to prevent dust. Photos are provided in Annex A. Photos taken during AQM are also 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 site) throughout the construction period.
Remarks	The monitoring results and the locations of air quality monitoring stations are attached.

ERM

Annex A Photos provided by the Contractor

*Note: Photos taken on 12/12/2018

Water truck was used for dust control during surcharge removal. (Works Area Portion N-C)

Water spraying was applied on the main haul road. (Works Area Portion N-C)

ERM

Annex A Photos taken during AQM

*Note: Photos taken on 12/12/2018

No significant dust impact was observed during AQM at ASR1.

Air quality monitoring results on 12/12/2018								
Project	Works	Date	Station	Weather	Start time	Parameters	Results	Unit
TMCLKL	HY/2012/08	12/12/2018	AQMS1	Cloudy	13:41	1-hour TSP	95	ug/m3
TMCLKL	HY/2012/08	12/12/2018	AQMS1	Cloudy	14:43	1-hour TSP	79	ug/m3
TMCLKL	HY/2012/08	12/12/2018	AQMS1	Cloudy	15:45	1-hour TSP	95	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR1	Cloudy	13:31	1-hour TSP	414	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR1	Cloudy	14:33	1-hour TSP	174	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR1	Cloudy	15:35	1-hour TSP	142	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR10	Cloudy	13:00	1-hour TSP	112	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR10	Cloudy	14:02	1-hour TSP	77	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR10	Cloudy	15:04	1-hour TSP	80	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR5	Cloudy	13:20	1-hour TSP	340	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR5	Cloudy	14:22	1-hour TSP	171	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR5	Cloudy	15:24	1-hour TSP	168	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR6	Cloudy	13:10	1-hour TSP	230	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR6	Cloudy	14:12	1-hour TSP	111	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR6	Cloudy	15:14	1-hour TSP	106	ug/m3
TMCLKL	HY/2012/08	12/12/2018	AQMS1	Cloudy	16:47	24-hour TSP	73	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR1	Cloudy	16:27	24-hour TSP	126	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR10	Cloudy	16:06	24-hour TSP	69	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR5	Cloudy	16:26	24-hour TSP	142	ug/m3
TMCLKL	HY/2012/08	12/12/2018	ASR6	Cloudy	16:16	24-hour TSP	93	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)**
18/12/12	0:00	1.8	313
18/12/12	1:00	1.8	282
18/12/12	2:00	1.8	297
18/12/12	3:00	1.8	306
18/12/12	4:00	1.8	316
18/12/12	5:00	0.9	348
18/12/12	6:00	1.3	281
18/12/12	7:00	1.3	55
18/12/12	8:00	1.8	295
18/12/12	9:00	1.3	298
18/12/12	10:00	1.8	19
18/12/12	11:00	1.3	344
18/12/12	12:00	0.9	321
18/12/12	13:00	1.3	347
18/12/12	14:00	2.2	304
18/12/12	15:00	1.3	306
18/12/12	16:00	1.8	322
18/12/12	17:00	1.8	303
18/12/12	18:00	0.9	289
18/12/12	19:00	0.9	327
18/12/12	20:00	1.3	3
18/12/12	21:00	0.9	260
18/12/12	22:00	1.8	18
18/12/12	23:00	1.8	40

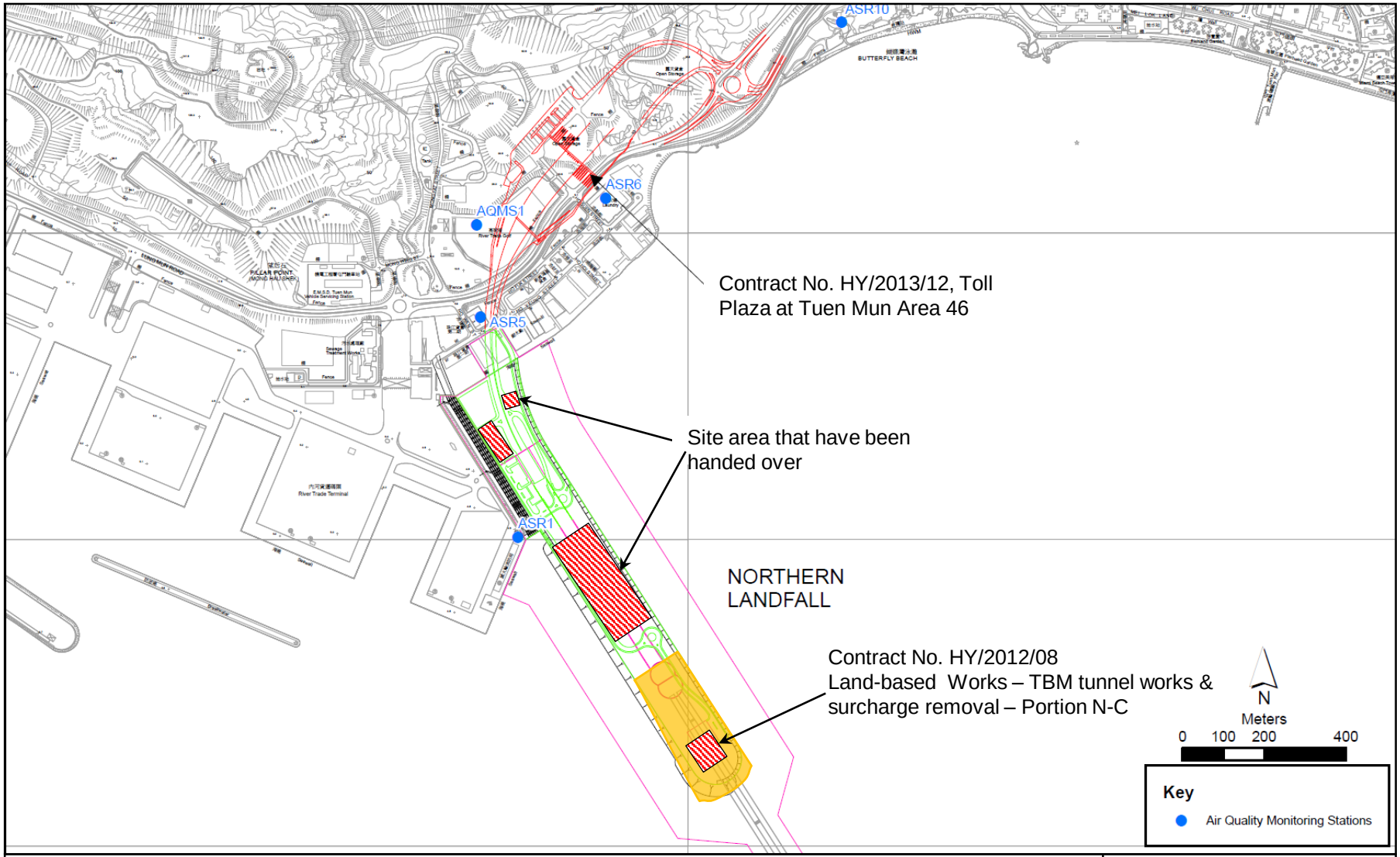


Figure 1

Indicative Construction Works Area on 12 December 2018

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	28 December 2018

ERM

Dear Sir or Madam,

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

0212330_18December2018_1hrTSP_Station ASR6

One Action Level Exceedance was recorded on 18 December 2018.

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_18December2018_1hrTSP_Station ASR6** **[Total No. of Exceedances = 1]**	
Date	18 December 2018 (Measured) 26 December 2018 (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 ASR6 (478 µg/m3) during 1416 – 1516 hrs.	
Works Undertaken (at the time of monitoring event)	On 18 December 2018, TBM tunnel works and surcharge removal was carried out at Portion N-C.	
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 18 December 2018 was TBM tunnel works and surcharge removal. 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 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. Based on the above, the exceedances are unlikely to be due to this Contract.	

Actions Taken / To Be Taken	According to the construction information provided by the Contractor, TBM tunnel works and surcharge removal was carried out on 18 December 2018. 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 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 18/12/2018

Water spraying was applied on the main haul road. (Works Area Portion N-A)

Water spraying was applied on the main haul road. (Works Area Portion N-A)

ERM

Annex A Photos provided by the Contractor

*Note: Photos taken on 18/12/2018

Water spraying was applied on the main haul road. (Works Area Portion N-A)

Water spraying was applied on the main haul road. (Works Area Portion N-C)

Air quality monitoring results on 18/12/2018								
Project	Works	Date	Station	Weather	Start time	Parameters	Results	Unit
TMCLKL	HY/2012/08	18/12/2018	AQMS1	Sunny	13:49	1-hour TSP	118	ug/m3
TMCLKL	HY/2012/08	18/12/2018	AQMS1	Sunny	14:51	1-hour TSP	188	ug/m3
TMCLKL	HY/2012/08	18/12/2018	AQMS1	Sunny	15:53	1-hour TSP	151	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR1	Sunny	13:37	1-hour TSP	207	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR1	Sunny	14:39	1-hour TSP	113	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR1	Sunny	15:41	1-hour TSP	174	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR10	Sunny	13:03	1-hour TSP	126	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR10	Sunny	14:05	1-hour TSP	73	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR10	Sunny	15:07	1-hour TSP	106	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR5	Sunny	13:26	1-hour TSP	311	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR5	Sunny	14:30	1-hour TSP	193	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR5	Sunny	15:32	1-hour TSP	192	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR6	Sunny	13:14	1-hour TSP	224	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR6	Sunny	14:16	1-hour TSP	478	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR6	Sunny	15:18	1-hour TSP	123	ug/m3
TMCLKL	HY/2012/08	18/12/2018	AQMS1	Sunny	16:55	24-hour TSP	88	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR1	Sunny	16:43	24-hour TSP	131	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR10	Sunny	16:09	24-hour TSP	66	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR5	Sunny	16:34	24-hour TSP	134	ug/m3
TMCLKL	HY/2012/08	18/12/2018	ASR6	Sunny	16:20	24-hour TSP	94	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)**
18/12/18	0:00	1.3	339
18/12/18	1:00	0.9	335
18/12/18	2:00	0.4	50
18/12/18	3:00	0.9	335
18/12/18	4:00	0.9	56
18/12/18	5:00	0.4	81
18/12/18	6:00	0.9	81
18/12/18	7:00	0.9	99
18/12/18	8:00	1.3	83
18/12/18	9:00	1.3	86
18/12/18	10:00	1.3	35
18/12/18	11:00	1.8	31
18/12/18	12:00	1.3	130
18/12/18	13:00	3.1	140
18/12/18	14:00	3.6	103
18/12/18	15:00	3.1	114
18/12/18	16:00	4	132
18/12/18	17:00	4	110
18/12/18	18:00	2.7	84
18/12/18	19:00	2.2	101
18/12/18	20:00	1.8	36
18/12/18	21:00	1.8	34
18/12/18	22:00	1.8	43
18/12/18	23:00	1.8	49

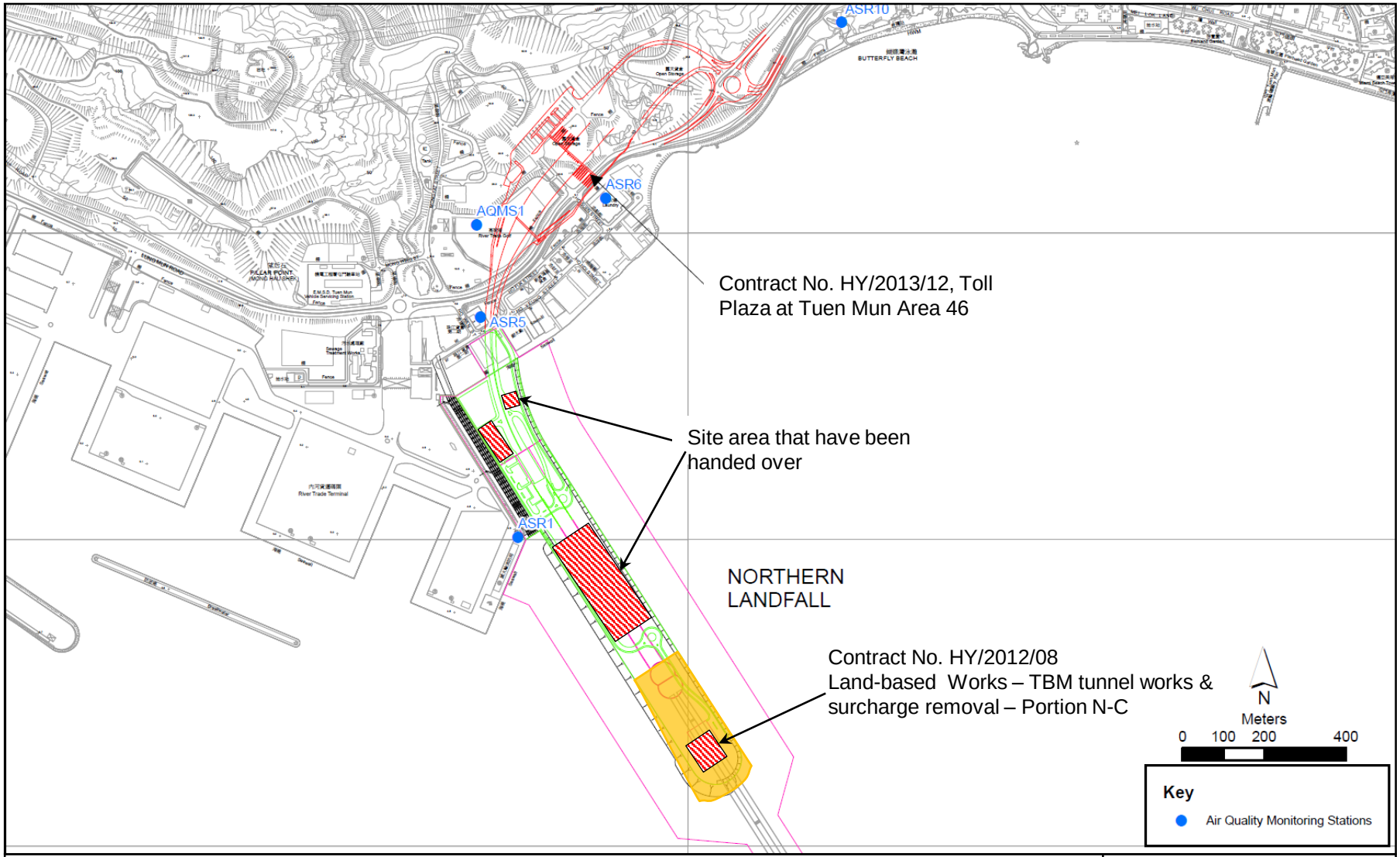


Figure 1

Indicative Construction Works Area on 18 December 2018

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	17 January 2019

ERM

Dear Sir or Madam,

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

0212330_8January2019_1hrTSP_Station ASR5

One Action Level Exceedance was recorded on 8 January 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_8January2019_1hrTSP_Station ASR5** **[Total No. of Exceedances = 1]**	
Date	8 January 2019 (Measured) 17 January 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 ASR5 (354 µg/m3) during 1320 – 1420 hrs.	
Works Undertaken (at the time of monitoring event)	On 8 January 2019, TBM tunnel works and surcharge removal was carried out at Portion N-C.	
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 8 January 2019 was TBM tunnel works and surcharge removal. 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. Based on the above, the exceedances are unlikely to be due to this Contract.	

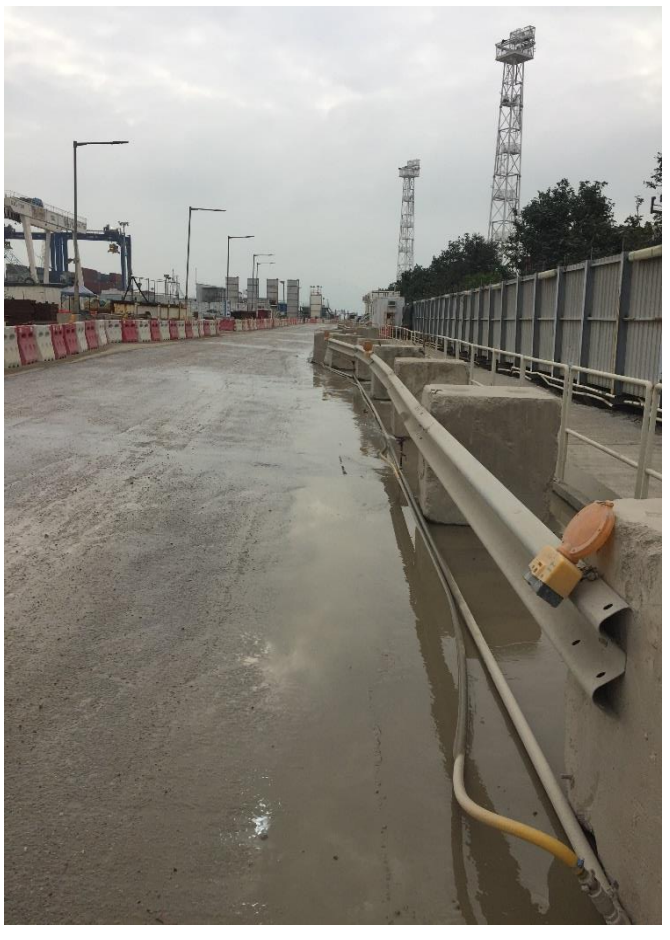
Actions Taken / To Be Taken	According to the construction information provided by the Contractor, TBM tunnel works and surcharge removal was carried out on 8 January 2019. Dust suppression measures were properly implemented. Water spraying was applied to prevent dust. Photos are provided in Annex A. Water spraying record is also provided. 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 8/1/2019

Water truck is used for water spraying at the works area. (Works Area Portion N-C)



Water spraying was applied on the main haul road. (Works Area Portion N-A)

ERM

Annex A Photos taken during AQM

*Note: Photos taken on 8/1/2019

ASR5

ASR5

Air quality monitoring results on 8/1/2019								
Project	Works	Date	Station	Weather	Start time	Parameters	Results	Unit
TMCLKL	HY/2012/08	2019-01-08	AQMS1	Cloudy	13:41	1-hour TSP	179	ug/m3
TMCLKL	HY/2012/08	2019-01-08	AQMS1	Cloudy	14:43	1-hour TSP	192	ug/m3
TMCLKL	HY/2012/08	2019-01-08	AQMS1	Cloudy	15:45	1-hour TSP	193	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR1	Cloudy	13:30	1-hour TSP	184	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR1	Cloudy	14:32	1-hour TSP	281	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR1	Cloudy	15:34	1-hour TSP	193	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR10	Cloudy	13:00	1-hour TSP	162	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR10	Cloudy	14:02	1-hour TSP	189	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR10	Cloudy	15:04	1-hour TSP	192	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR5	Cloudy	13:20	1-hour TSP	354	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR5	Cloudy	14:22	1-hour TSP	292	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR5	Cloudy	15:24	1-hour TSP	275	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR6	Cloudy	13:10	1-hour TSP	239	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR6	Cloudy	14:12	1-hour TSP	231	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR6	Cloudy	15:14	1-hour TSP	197	ug/m3
TMCLKL	HY/2012/08	2019-01-08	AQMS1	Cloudy	16:47	24-hour TSP	97	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR1	Cloudy	16:36	24-hour TSP	135	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR10	Cloudy	16:06	24-hour TSP	90	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR5	Cloudy	16:26	24-hour TSP	175	ug/m3
TMCLKL	HY/2012/08	2019-01-08	ASR6	Cloudy	16:16	24-hour TSP	119	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)**
19/01/08	0:00	0	-
19/01/08	1:00	0	-
19/01/08	2:00	0	-
19/01/08	3:00	0.4	47
19/01/08	4:00	0.9	44
19/01/08	5:00	1.3	93
19/01/08	6:00	0.9	111
19/01/08	7:00	1.3	95
19/01/08	8:00	0.4	88
19/01/08	9:00	0.9	113
19/01/08	10:00	0.4	163
19/01/08	11:00	0.9	159
19/01/08	12:00	1.3	228
19/01/08	13:00	0.9	210
19/01/08	14:00	0.9	204
19/01/08	15:00	0.9	221
19/01/08	16:00	0.4	250
19/01/08	17:00	0.9	182
19/01/08	18:00	1.8	345
19/01/08	19:00	1.3	309
19/01/08	20:00	1.3	295
19/01/08	21:00	0.9	299
19/01/08	22:00	1.3	297
19/01/08	23:00	0.4	346

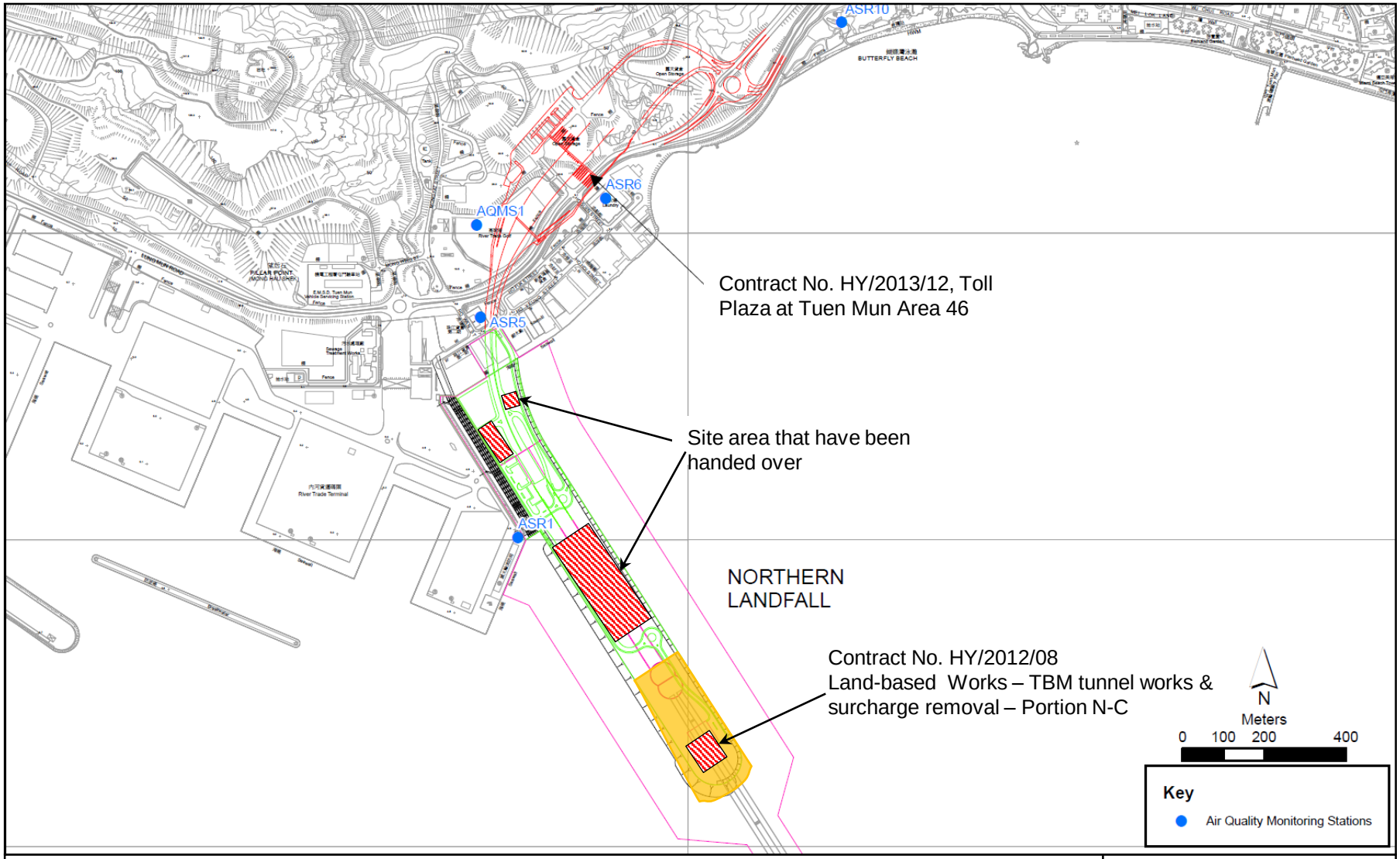


Figure 1

Indicative Construction Works Area on 8 January 2019

DATE: 06/03/2013

Environmental Resources Management

ERM

Dragages - Bouygues Joint Venture 冒路 - 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: 5 Jan 2019 to 至 11 Jan 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。

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	17 January 2019

ERM

Dear Sir or Madam,

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

0212330_11January2019_1hrTSP_Station ASR1
0212330_11January2019_1hrTSP_Station ASR5

Two Action Level Exceedances were recorded on 11 January 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_11January2019_1hrTSP_Station ASR1** **0212330_11January2019_1hrTSP_Station ASR5** **[Total No. of Exceedances = 2]**	
Date	11 January 2019 (Measured) 17 January 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/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 (335 µg/m3) during 1339 – 1439 hrs. Action Level Exceedance for 1-hr TSP is observed at ASR5 (398 µg/m3) during 1327 – 1427 hrs.	
Works Undertaken (at the time of monitoring event)	On 11 January 2019, TBM tunnel works and surcharge removal was carried out at Portion N-C.	
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 January 2019 was TBM tunnel works and surcharge removal. 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. Based on the above, the exceedances are unlikely to be due to this Contract.	

Actions Taken / To Be Taken	Follow-up site inspection was carried out on 23 January 2019. 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 taken during site inspection

*Note: Photos taken on 23/1/2019

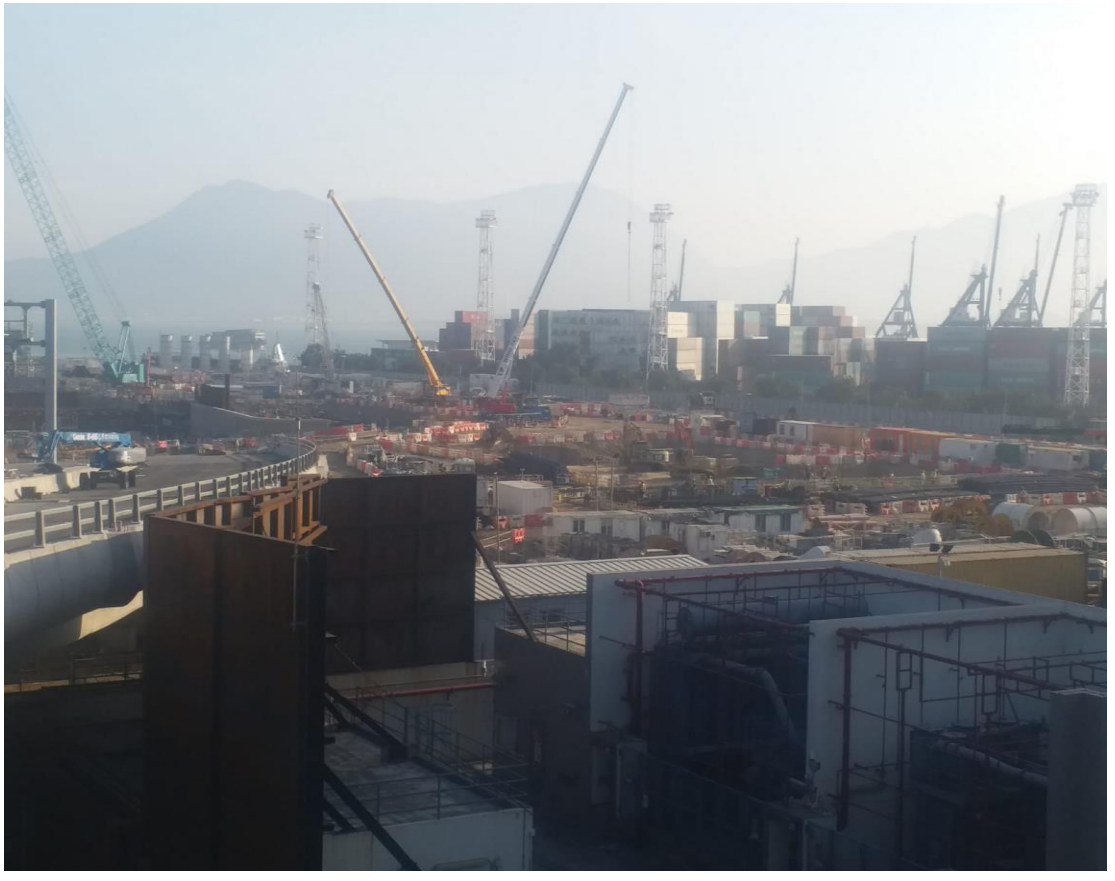
Water truck is used for water spraying at works area. (Works Area Portion N-C)

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

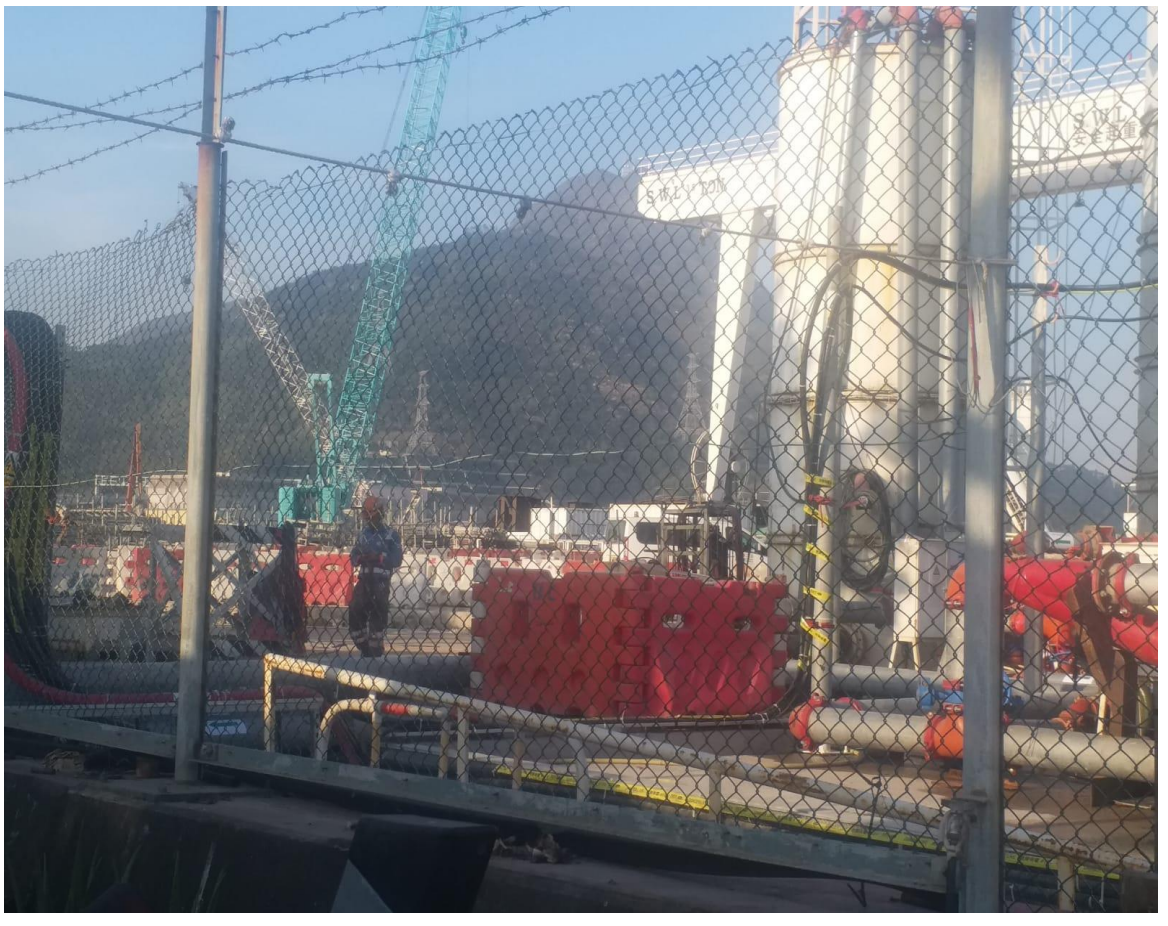
ERM

Annex A Photos taken during AQM

*Note: Photos taken on 11/1/2019



ASR5



ASR1

Air quality monitoring results on 11/1/2019								
Project	Works	Date	Station	Weather	Start time	Parameters	Results	Unit
TMCLKL	HY/2012/08	11/1/2019	AQMS1	Cloudy	13:50	1-hour TSP	214	ug/m3
TMCLKL	HY/2012/08	11/1/2019	AQMS1	Cloudy	14:52	1-hour TSP	90	ug/m3
TMCLKL	HY/2012/08	11/1/2019	AQMS1	Cloudy	15:54	1-hour TSP	108	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR1	Cloudy	13:39	1-hour TSP	335	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR1	Cloudy	14:41	1-hour TSP	129	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR1	Cloudy	15:43	1-hour TSP	120	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR10	Cloudy	13:05	1-hour TSP	116	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR10	Cloudy	14:07	1-hour TSP	155	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR10	Cloudy	15:09	1-hour TSP	95	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR5	Cloudy	13:27	1-hour TSP	398	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR5	Cloudy	14:29	1-hour TSP	327	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR5	Cloudy	15:31	1-hour TSP	243	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR6	Cloudy	13:16	1-hour TSP	214	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR6	Cloudy	14:18	1-hour TSP	125	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR6	Cloudy	15:20	1-hour TSP	153	ug/m3
TMCLKL	HY/2012/08	11/1/2019	AQMS1	Cloudy	16:56	24-hour TSP	127	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR1	Cloudy	16:45	24-hour TSP	120	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR10	Cloudy	16:11	24-hour TSP	137	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR5	Cloudy	16:33	24-hour TSP	196	ug/m3
TMCLKL	HY/2012/08	11/1/2019	ASR6	Cloudy	16:22	24-hour TSP	191	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)**
19/01/11	0:00	0	-
19/01/11	1:00	0	-
19/01/11	2:00	0	-
19/01/11	3:00	0	-
19/01/11	4:00	0.9	89
19/01/11	5:00	0.4	113
19/01/11	6:00	1.3	51
19/01/11	7:00	1.8	71
19/01/11	8:00	0.9	137
19/01/11	9:00	0.9	284
19/01/11	10:00	0.9	162
19/01/11	11:00	1.3	223
19/01/11	12:00	0.9	160
19/01/11	13:00	0.9	112
19/01/11	14:00	1.3	155
19/01/11	15:00	2.2	69
19/01/11	16:00	1.8	55
19/01/11	17:00	0.9	90
19/01/11	18:00	0.4	88
19/01/11	19:00	0	-
19/01/11	20:00	0	-
19/01/11	21:00	0	-
19/01/11	22:00	0	-
19/01/11	23:00	0	-

Dragages - Bouygues Joint Venture 實基 - 布迪格聯營	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: 7 Jan 2019 to 至 13 Jan 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。

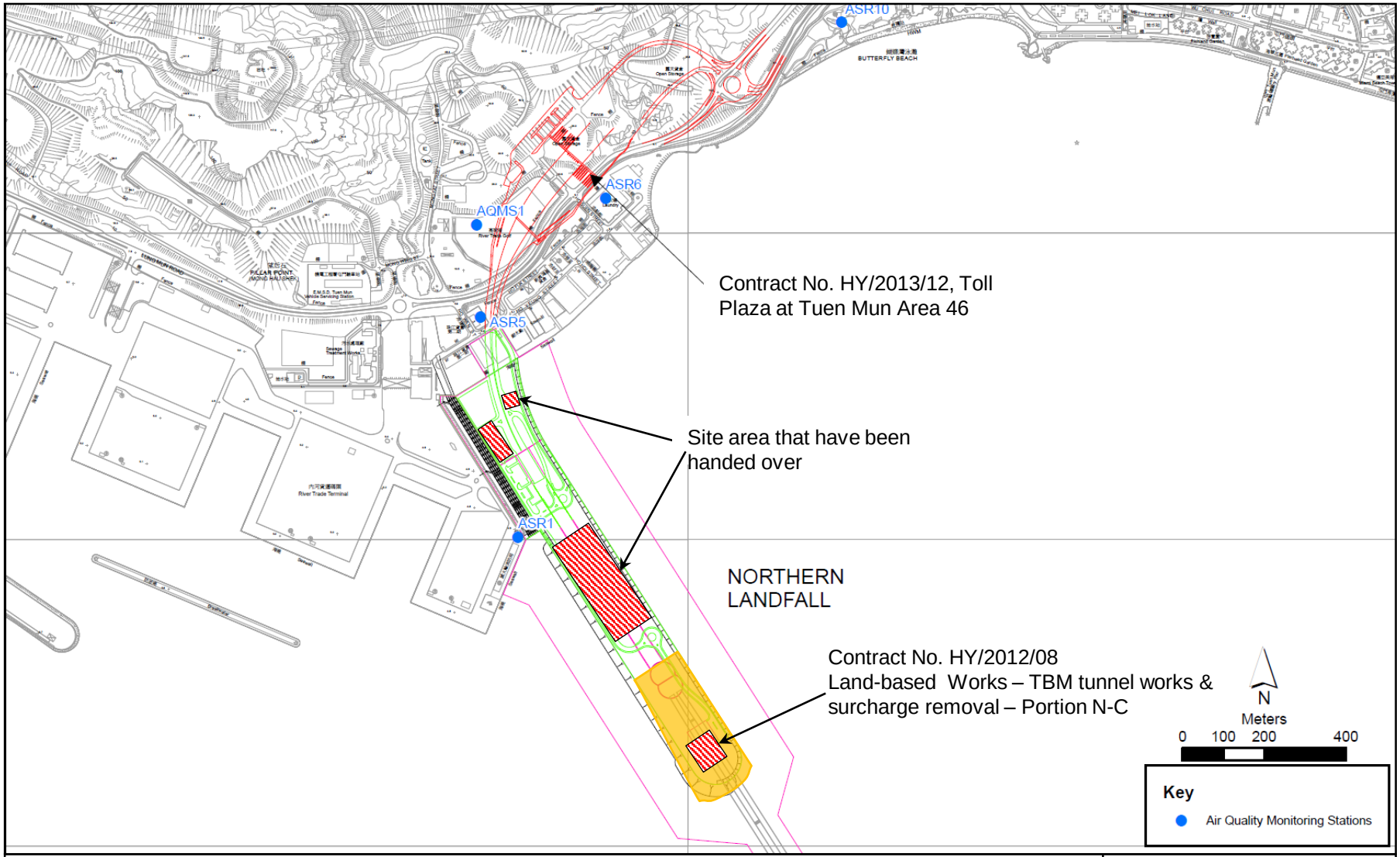


Figure 1

Indicative Construction Works Area on 11 January 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	29 January 2019

ERM

Dear Sir or Madam,

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

0212330_17January2019_1hrTSP_Station ASR1
0212330_17January2019_1hrTSP_Station ASR5

One Action Level and one Limit Level Exceedances were recorded on 17 January 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_17January2019_1hrTSP_Station ASR1** **0212330_17January2019_1hrTSP_Station ASR5** **[Total No. of Exceedances = 2]**	
Date	17 January 2019 (Measured) 29 January 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 ASR5 (354 µg/m3) during 1552 – 1652 hrs. Limit Level Exceedance for 1-hr TSP is observed at ASR1 (519 µg/m3) during 1604 – 1704 hrs.	
Works Undertaken (at the time of monitoring event)	On 17 January 2019, TBM tunnel works and surcharge removal was carried out at Portion N-C.	
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 17 January 2019 was TBM tunnel works and surcharge removal. 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 truck was used for water spraying at the works area to prevent dust. • With reference to the recorded wind direction (ranged between 284° and 351°, blowing from a north-westerly direction) and wind speed (ranged from 0.9 to 2.2 m/s) during the period of the observed 1-hr TSP exceedances, Stations ASR1 and ASR5 are located upstream to the construction works at Portion N-C. Thus the observed exceedances should not be affected by the dust, if any, generated by the construction activities under this Contract. Based on the above, the exceedances are unlikely to be due to this Contract.	

Actions Taken / To Be Taken	According to the construction information provided by the Contractor, TBM tunnel works and surcharge removal was carried out on 17 January 2019. Dust suppression measures were properly implemented. Water spraying was applied to prevent dust. Photos taken on 17 January 2019 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 17/1/2019

Water truck is used for water spraying to prevent dust. (Works Area Portion N-A)

Water truck is used for water spraying at works area. (Works Area Portion N-C)

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 17/1/2019

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

ERM

Annex A Photos taken during AQM

*Note: Photos taken on 17/1/2019

ASR5

ASR1

Air quality monitoring results on 17/1/2019								
Project	Works	Date	Station	Weather	Start time	Parameters	Results	Unit
TMCLKL	HY/2012/08	17/1/2019	AQMS1	Cloudy	14:13	1-hour TSP	101	ug/m3
TMCLKL	HY/2012/08	17/1/2019	AQMS1	Cloudy	15:14	1-hour TSP	194	ug/m3
TMCLKL	HY/2012/08	17/1/2019	AQMS1	Cloudy	16:16	1-hour TSP	165	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR1	Cloudy	14:00	1-hour TSP	154	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR1	Cloudy	15:02	1-hour TSP	200	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR1	Cloudy	16:04	1-hour TSP	519	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR10	Cloudy	13:26	1-hour TSP	223	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR10	Cloudy	14:28	1-hour TSP	156	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR10	Cloudy	15:30	1-hour TSP	113	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR5	Cloudy	13:48	1-hour TSP	140	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR5	Cloudy	14:50	1-hour TSP	269	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR5	Cloudy	15:52	1-hour TSP	354	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR6	Cloudy	13:37	1-hour TSP	97	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR6	Cloudy	14:39	1-hour TSP	304	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR6	Cloudy	15:41	1-hour TSP	255	ug/m3
TMCLKL	HY/2012/08	17/1/2019	AQMS1	Cloudy	17:18	24-hour TSP	82	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR1	Cloudy	17:06	24-hour TSP	137	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR10	Cloudy	16:32	24-hour TSP	73	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR5	Cloudy	16:54	24-hour TSP	126	ug/m3
TMCLKL	HY/2012/08	17/1/2019	ASR6	Cloudy	16:43	24-hour TSP	98	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)**
19/01/17	0:00	1.3	342
19/01/17	1:00	1.8	340
19/01/17	2:00	2.2	32
19/01/17	3:00	1.8	30
19/01/17	4:00	1.8	22
19/01/17	5:00	1.8	49
19/01/17	6:00	1.8	17
19/01/17	7:00	1.3	55
19/01/17	8:00	0.9	32
19/01/17	9:00	1.8	45
19/01/17	10:00	2.2	47
19/01/17	11:00	2.2	52
19/01/17	12:00	1.8	29
19/01/17	13:00	2.2	207
19/01/17	14:00	2.2	274
19/01/17	15:00	3.1	276
19/01/17	16:00	2.2	284
19/01/17	17:00	0.9	351
19/01/17	18:00	1.8	90
19/01/17	19:00	1.3	85
19/01/17	20:00	0.9	32
19/01/17	21:00	1.3	37
19/01/17	22:00	1.3	42
19/01/17	23:00	1.3	44

Dragages - 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: 14 Jan 2019 to 至 20 Jan 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。

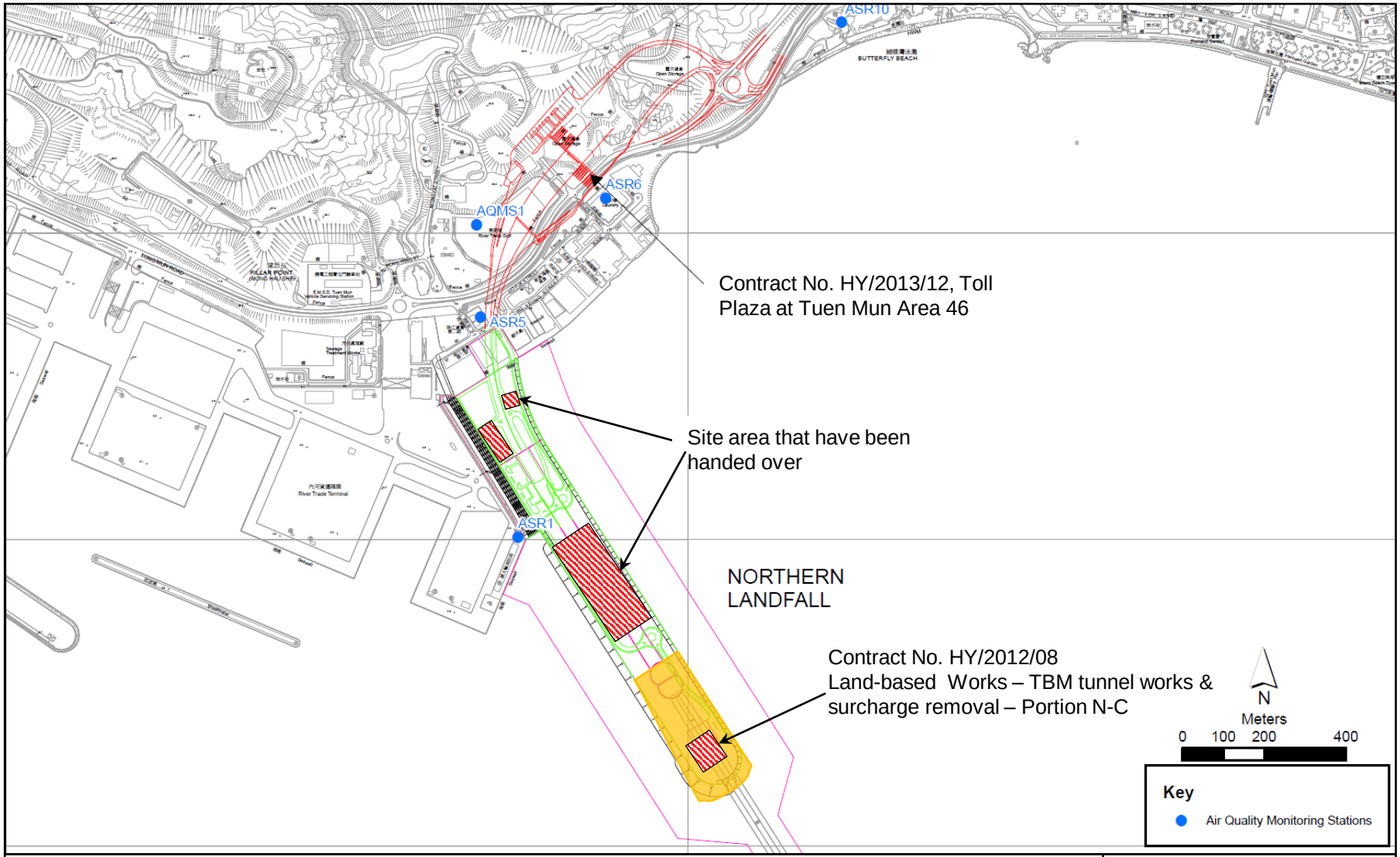


Figure 1

Indicative Construction Works Area on 17 January 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	8 February 2019

ERM

Dear Sir or Madam,

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

0212330_26January2019_1hrTSP_Station ASR5

One Action Level Exceedance was recorded on 26 January 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_26January2019_1hrTSP_Station ASR5** **[Total No. of Exceedances = 1]**	
Date	26 January 2019 (Measured) 8 February 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/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 ASR5 (399 µg/m3) during 0830 – 0930 hrs.	
Works Undertaken (at the time of monitoring event)	On 26 January 2019, TBM tunnel works and surcharge removal was carried out at Portion N-C.	
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 26 January 2019 was TBM tunnel works and surcharge removal. 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 143^o and 158^o, blowing from a south-easterly direction) and wind speed (ranged from 1.3 to 2.2 m/s) during the period of the observed 1-hr TSP exceedances, Stations ASR5 are located downstream to the construction works at Portion N-C. However, with similar wind direction and wind speed in the 2nd and 3rd hour of the 1-hour TSP monitoring, no exceedances were recorded. According to the water spraying record, water spraying was also applied every 45 minutes to prevent dust. Based on the above, the exceedance is unlikely to be due to this Contract.	

Actions Taken / To Be Taken	Follow-up site inspection was carried out on 8 February 2019. Dust suppression measures were properly implemented. Water spraying was applied to prevent dust. Photos are provided in Annex A. Photos taken during AQM are also provided. 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.

Annex A Photos taken during site inspection

*Note: Photos taken on 8/2/2019

Water truck was used for water spraying to prevent dust. (Works Area Portion N-A)

Water spraying was applied on the main haul road. (Works Area Portion N-C)

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 8/2/2019

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

ERM

Annex A Photos taken during AQM

*Note: Photos taken on 26/1/2019

ASR5

ASR5

Air quality monitoring results on 26/1/2019								
Project	Works	Date	Station	Weather	Start time	Parameters	Results	Unit
TMCLKL	HY/2012/08	26/1/2019	AQMS1	Sunny	8:53	1-hour TSP	126	ug/m3
TMCLKL	HY/2012/08	26/1/2019	AQMS1	Sunny	9:55	1-hour TSP	69	ug/m3
TMCLKL	HY/2012/08	26/1/2019	AQMS1	Sunny	10:57	1-hour TSP	75	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR1	Sunny	8:42	1-hour TSP	245	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR1	Sunny	9:44	1-hour TSP	207	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR1	Sunny	10:46	1-hour TSP	112	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR10	Sunny	8:08	1-hour TSP	106	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR10	Sunny	9:10	1-hour TSP	74	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR10	Sunny	10:12	1-hour TSP	71	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR5	Sunny	8:30	1-hour TSP	399	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR5	Sunny	9:32	1-hour TSP	208	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR5	Sunny	10:34	1-hour TSP	208	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR6	Sunny	8:19	1-hour TSP	304	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR6	Sunny	9:21	1-hour TSP	111	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR6	Sunny	10:23	1-hour TSP	141	ug/m3
TMCLKL	HY/2012/08	26/1/2019	AQMS1	Sunny	11:59	24-hour TSP	81	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR1	Sunny	11:48	24-hour TSP	83	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR10	Sunny	11:14	24-hour TSP	73	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR5	Sunny	11:36	24-hour TSP	101	ug/m3
TMCLKL	HY/2012/08	26/1/2019	ASR6	Sunny	11:25	24-hour TSP	90	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)**
19/01/26	0:00	0	-
19/01/26	1:00	0	-
19/01/26	2:00	0.4	12
19/01/26	3:00	2.2	34
19/01/26	4:00	2.2	47
19/01/26	5:00	2.2	39
19/01/26	6:00	2.7	47
19/01/26	7:00	1.8	14
19/01/26	8:00	1.3	143
19/01/26	9:00	2.2	158
19/01/26	10:00	2.2	154
19/01/26	11:00	1.8	221
19/01/26	12:00	2.2	215
19/01/26	13:00	1.3	220
19/01/26	14:00	1.3	254
19/01/26	15:00	2.2	213
19/01/26	16:00	2.2	232
19/01/26	17:00	1.3	94
19/01/26	18:00	1.8	96
19/01/26	19:00	1.8	95
19/01/26	20:00	2.2	85
19/01/26	21:00	2.7	94
19/01/26	22:00	3.6	86
19/01/26	23:00	3.1	95

Dragages Hong Kong 香港嘉道	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: 21 Jun 2019 to 至 27 Jun 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。

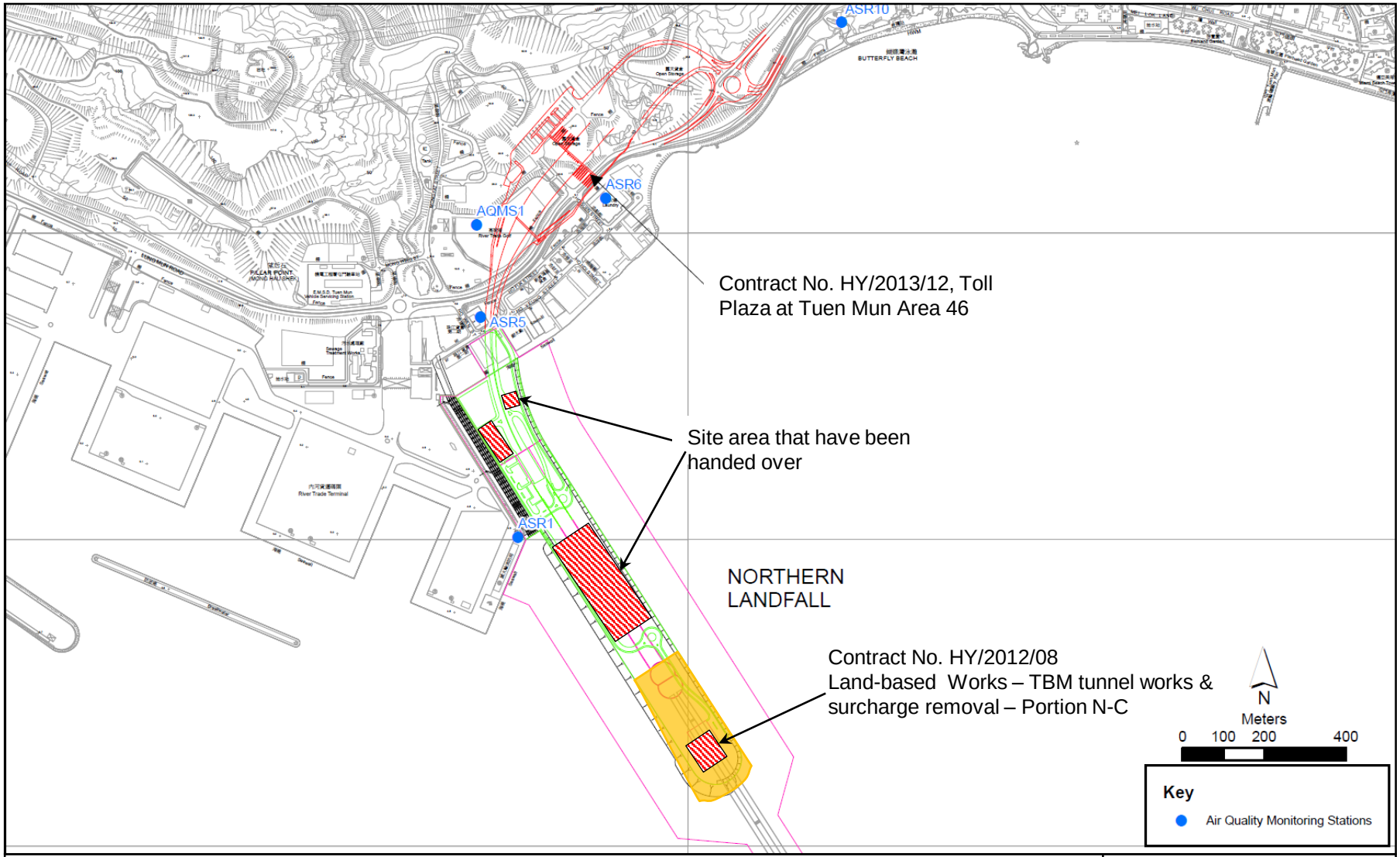


Figure 1

Indicative Construction Works Area on 26 January 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	26 February 2019

Dear Sir or Madam,

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

0212330_16February2019_24hrTSP_Station ASR1

One Action Level Exceedance was recorded on 16 February 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_16February2019_24hrTSP_Station ASR1** **[Total No. of Exceedances = 1]**	
Date	16 February 2019 (Measured) 25 February 2019 (Laboratory results received by ERM)	
Monitoring Station	ASR1, ASR5, ASR6, ASR10 and AQMS1	
Parameter(s) with Exceedance(s)	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 24-hr TSP is observed at ASR1 (237 µg/m3) during 1158 – 1158 hrs.	
Works Undertaken (at the time of monitoring event)	On 16 February 2019, TBM tunnel works was carried out at Portion N-C and slurry wall 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 16 February 2019 was TBM tunnel works and slurry wall construction. 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. • From 11:00 to 18:00 on 16 February 2019, slurry wall construction was carried out at Portion N-A and TBM tunnel works was carried out at Portion N-C. From 18:00 on 16 February 2019 to 11:00 on 17 February 2019, no construction works were carried out on site. With reference to the recorded wind direction (ranged between 80^o and 122^o, blowing from an easterly direction) and wind speed (ranged from 1.3 to 3.1 m/s) during the works period, Stations ASR1 are located downstream to the construction works at Portion N-A. After 18:00, no construction works were carried out on site so no dust impact would be expected. Exposed soil was covered by tarpaulin sheets to prevent dust. Based on the above, the exceedance is unlikely to be due to this Contract.	

Actions Taken / To Be Taken	Follow-up site inspection was carried out on 20 February 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. Photos taken during AQM are also provided. 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 16/2/2019

Water truck was used for water spraying to prevent dust. (Works Area Portion N-A)

ERM

Annex A Photos provided by the Contractor

*Note: Photos taken on 17/2/2019

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

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

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 20/2/2019

Water truck was used for water spraying to prevent dust. (Works Area Portion N-A)

ERM

Annex A Photos taken during AQM

*Note: Photos taken on 16/2/2019

ASR1

ASR1

Air quality monitoring results on 16/2/2019								
Project	Works	Date	Station	Weather	Start time	Parameters	Results	Unit
TMCLKL	HY/2012/08	16/2/2019	AQMS1	Cloudy	9:03	1-hour TSP	50	ug/m3
TMCLKL	HY/2012/08	16/2/2019	AQMS1	Cloudy	10:05	1-hour TSP	88	ug/m3
TMCLKL	HY/2012/08	16/2/2019	AQMS1	Cloudy	11:07	1-hour TSP	90	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR1	Cloudy	8:52	1-hour TSP	244	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR1	Cloudy	9:54	1-hour TSP	223	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR1	Cloudy	10:56	1-hour TSP	125	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR10	Cloudy	8:22	1-hour TSP	81	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR10	Cloudy	9:24	1-hour TSP	49	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR10	Cloudy	10:26	1-hour TSP	64	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR5	Cloudy	8:41	1-hour TSP	235	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR5	Cloudy	9:43	1-hour TSP	99	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR5	Cloudy	10:45	1-hour TSP	127	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR6	Cloudy	8:32	1-hour TSP	133	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR6	Cloudy	9:34	1-hour TSP	81	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR6	Cloudy	10:36	1-hour TSP	67	ug/m3
TMCLKL	HY/2012/08	16/2/2019	AQMS1	Cloudy	12:09	24-hour TSP	57	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR1	Cloudy	11:58	24-hour TSP	237	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR10	Cloudy	11:28	24-hour TSP	35	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR5	Cloudy	11:47	24-hour TSP	103	ug/m3
TMCLKL	HY/2012/08	16/2/2019	ASR6	Cloudy	11:38	24-hour TSP	76	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)**
19/02/16	11:00	1.3	120
19/02/16	12:00	2.7	112
19/02/16	13:00	3.1	122
19/02/16	14:00	3.1	80
19/02/16	15:00	2.7	82
19/02/16	16:00	3.1	99
19/02/16	17:00	3.1	88
19/02/16	18:00	2.7	110
19/02/16	19:00	3.1	118
19/02/16	20:00	3.6	119
19/02/16	21:00	3.6	101
19/02/16	22:00	4	80
19/02/16	23:00	4.5	96
19/02/17	0:00	4	82
19/02/17	1:00	3.6	91
19/02/17	2:00	3.1	83
19/02/17	3:00	3.1	86
19/02/17	4:00	3.6	95
19/02/17	5:00	4.5	98
19/02/17	6:00	3.6	101
19/02/17	7:00	4	84
19/02/17	8:00	4.9	83
19/02/17	9:00	5.4	80
19/02/17	10:00	4.9	81
19/02/17	11:00	4.9	79

Dragages Hong Kong / Bouygues Construction group Dragages - 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: 11 Feb 2019 to 至 17 Feb 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。

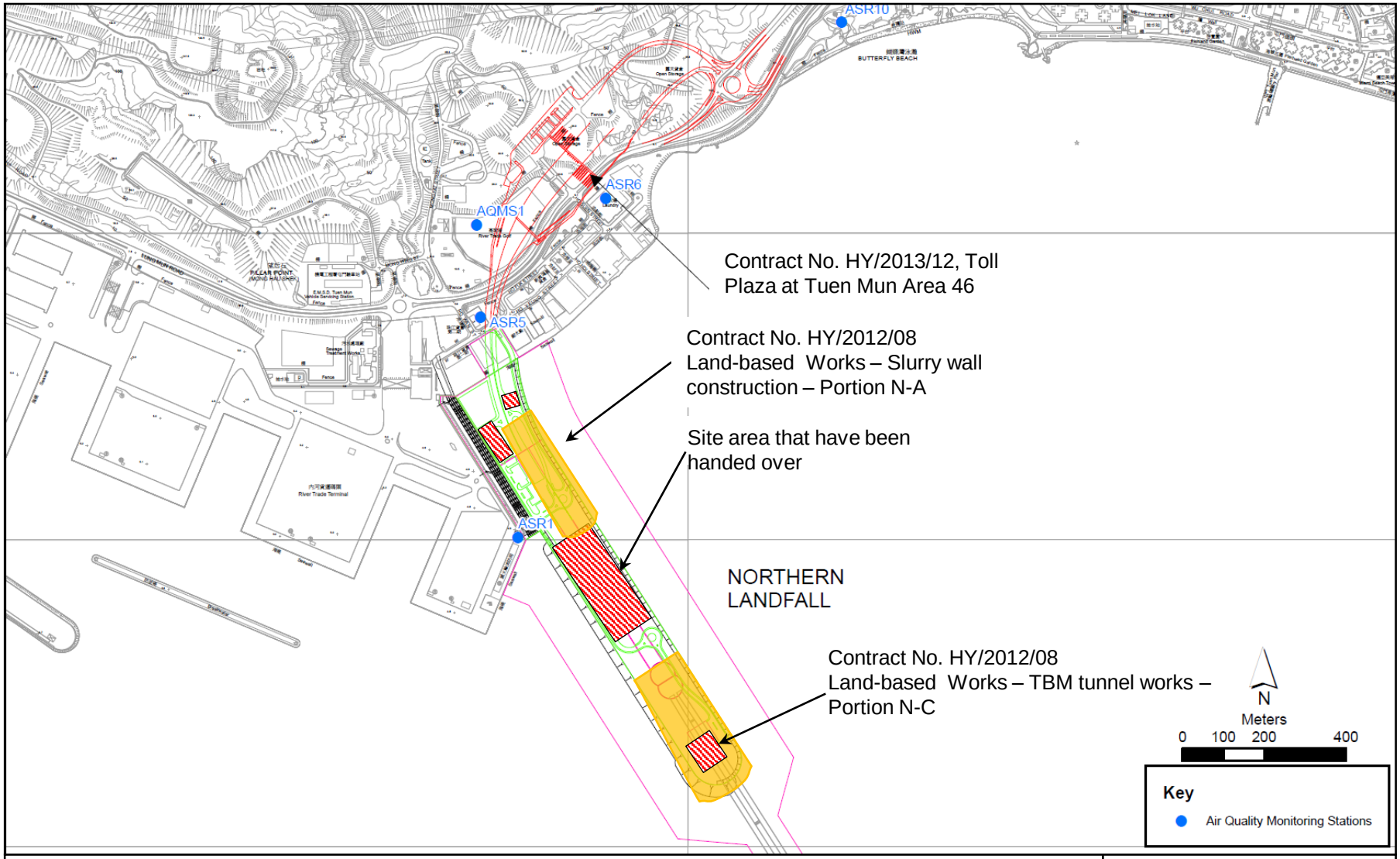


Figure 1

Indicative Construction Works Area on 16 February 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 Impact Dolphin Monitoring
Date	27 August 2019

ERM

Dear Sir or Madam,

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

0212330_Dec2018/Feb2019_dolphin_STG&ANI_NEL&NWL

A total of one limit level exceedance was recorded in the quarterly impact dolphin monitoring data between December 2018 and February 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_ Dec2018/Feb2019_dolphin_STG&ANI_NEL&NWL** **[Total No. of Exceedances = 1 Limit Level Exceedance]**	
Date	December 2018 to February 2019 (monitored) 12 April 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 = 2.40 & ANI = 7.95
	One Limit Level Exceedance was recorded in the quarterly impact dolphin monitoring at NEL and NWL between December 2018 and February 2019. The exceedance was reported in the approved *Sixty-fourth Monthly EM&A Report* dated 12 March 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, December 2018 to February 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 ($p = 0.0041$) and ANI ($p = 0.0221$) 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 November 2018) 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 December 2018 and February 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 (2017 – 18)* (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 December 2018 and February 2019, there was no exceedance recorded during water quality impact monitoring in the reporting period. 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 December 2018 and February 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-second to Sixty-Fourth 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

Appendix D – Monthly Summary Waste Flow Table

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

Monthly Summary Waste Flow Table for December 2018 [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, 2013-2017	1221.977	0.000	0.000	0.000	1221.977
Jan-2018	7.165	0.000	0.000	0.000	7.165
Feb-2018	1.762	0.000	0.000	0.000	1.762
Mar-2018	66.457	0.000	0.000	62.274	4.183
Apr-2018	123.942	0.000	0.000	50.648	73.294
May-2018	127.964	0.000	0.000	62.822	65.142
Jun-2018	102.987	0.000	0.000	55.385	47.602
Half Year Sub-total	430.277	0.000	0.000	231.129	199.148
Jul-2018	43.768	0.000	0.000	0.000	43.768
Aug-2018	57.809	0.000	0.000	40.722	17.087
Sep-2018	39.763	0.000	0.000	11.276	28.487
Oct-2018	108.689	0.000	20.471	79.694	28.342
Nov-2018	155.310	0.000	25.702	116.028	13.580
Dec-2018	146.997	0.000	30.581	106.520	9.896
Project Total Quantities	2224.407	0.000	76.754	585.369	1562.284

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, 2013-2017	619.38	619.38	4.15	4.15	6.87	6.87	33.15	33.15	8.259
Jan-2018	241.50	241.50	0.20	0.20	0.00	0.00	2.80	2.80	0.272
Feb-2018	256.94	256.94	0.20	0.20	0.00	0.00	0.00	0.00	0.258
Mar-2018	229.36	229.36	0.00	0.00	0.00	0.00	2.00	2.00	0.459
Apr-2018	195.55	195.55	0.00	0.00	0.00	0.00	8.60	8.60	0.281
May-2018	93.01	93.01	0.30	0.30	0.00	0.00	10.40	10.40	0.686
Jun-2018	0.00	0.00	0.00	0.00	1.06	1.06	0.00	0.00	0.408
Half Year Sub-total	1016.36	1016.36	0.70	0.70	1.06	1.06	23.80	23.80	2.364
Jul-2018	0.00	0.00	0.86	0.86	0.77	0.77	0.00	0.00	0.768
Aug-2018	980.56	980.56	0.00	0.00	0.00	0.00	2.00	2.00	0.749
Sep-2018	838.04	838.04	0.00	0.00	0.00	0.00	0.00	0.00	0.445
Oct-2018	2702.35	2702.35	1.02	1.02	0.00	0.00	0.00	0.00	0.437
Nov-2018	394.69	394.69	0.00	0.00	0.00	0.00	1.40	1.40	0.448
Dec-2018	212.44	212.44	1.01	1.01	0.00	0.00	0.00	0.00	0.519
Project Total Quantities	6763.82	6763.82	7.74	7.74	8.70	8.70	60.35	60.35	13.989

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	Metals	Paper/ cardboard packaging	Plastics (see Note 3)	Chemical Waste	General Refuse disposed of at Landfill
(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000 ton)
2850.000	0.000	50.000	800.000	2000.000	7000.00	10.00	9.50	65.00	15.000

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 m^3. (**ER Part 8 Clause 8.8.5 (d) (ii)** refers).

Monthly Summary Waste Flow Table

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

Monthly Summary Waste Flow Table for February 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					
Apr-2019					
May-2019					
Jun-2019					
Half Year Sub-total	433.166	0.000	99.440	283.134	50.592
Jul-2019					
Aug-2019					
Sep-2019					
Oct-2019					
Nov-2019					
Dec-2019					
Project Total Quantities	2657.573	0.000	176.194	868.503	1612.876

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									
Apr-2019									
May-2019									
Jun-2019									
Half Year Sub-total	498.27	498.27	0.62	0.62	0.00	0.00	1.672	1.672	1.116
Jul-2019									
Aug-2019									
Sep-2019									
Oct-2019									
Nov-2019									
Dec-2019									
Project Total Quantities	7262.09	7262.09	8.36	8.36	8.70	8.70	62.022	62.022	15.105

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	200.000	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)
8000.00	10.00	9.50	65.00	20.000

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 m^3. (**ER Part 8 Clause 8.8.5 (d) (ii)** refers).