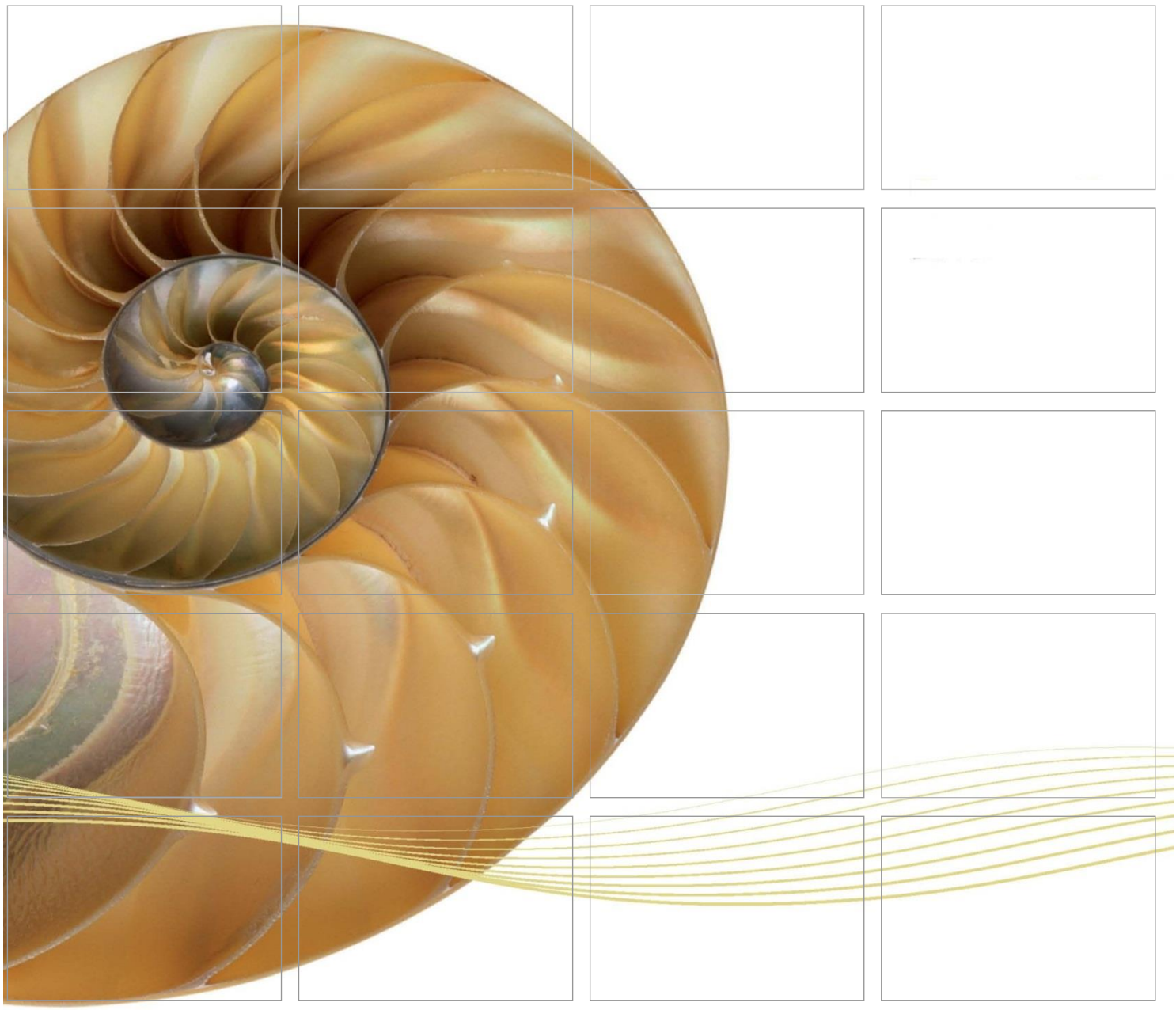
Report



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

Seventeenth Quarterly Environmental Monitoring & Audit (EM&A) Report

29 August 2018

Environmental Resources Management
2507, 25/F
One Harbourfront
18 Tak Fung Street
Hunghom, Kowloon
Hong Kong
Telephone 2271 3000
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The business of sustainability

RAMBOLL

Ref.: HYDHZMBEEM00_0_6792L.18 31 August 2018

AECOM By Fax (2293 6300) and By Post
Supervising Officer Representative's Office
No.8 Mong Fat Street, Tuen Mun,
New Territories, Hong Kong

Attention: Mr. Andy Westmoreland

Dear Mr. Westmoreland,

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
Seventeenth Quarterly EM&A Report (December 2017 – February 2018)

Reference is made to the Seventeenth Quarterly Environmental Monitoring and Audit (EM&A) Report (December 2017 - February 2018) (ET's ref.: "*0212330_17th Quarterly EM&A_20180829.doc*" dated 29 August 2018) certified by the ET Leader and provided to us via e-mail on 31 August 2018.

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. Stephen Chan (By Fax: 3188 6614)
HyD – Mr. Tony Pang (By Fax: 3188 6614)
AECOM – Mr. Conrad Ng (By Fax: 3922 9797)
ERM – Dr. Jasmine Ng (By Fax: 2723 5660)
Dragages – Bouygues JV - Mr. Bryan Lee (By Fax: 2293 7499)

Internal: DY, YH, DF, ENPO Site

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Ramboll Hong Kong Limited 英環香港有限公司
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Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section

Seventeenth Quarterly Environmental Monitoring & Audit (EM&A) Report

Document Code: 0212330_17th Quarterly EM&A_20180829.doc

Environmental Resources Management

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Client: DBJV	Project No: 0212330
Summary: This document presents the Seventeenth Quarterly EM&A Report for Tuen Mun – Chek Lap Kok Link Northern Connection Sub-sea Tunnel Section.	Date: 29 August 2018 Approved by: *Mr Craig Reid* *Partner* Certified by: *Dr Jasmine Ng* *ET Leader*

Revision	Description	By	Checked	Approved	Date
	17th Quarterly EM&A Report	VAR	JN	CAR	29/08/18

Distribution

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OHSAS 18001:2007 Certificate No. OHS 515956

ISO 9001 : 2008 Certificate No. FS 32515

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 Project commenced on 1 November 2013 and will tentatively be completed by the end of 2018. 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 Seventeenth Quarterly EM&A report presenting the EM&A works carried out during the period from 1 December 2017 to 28 February 2018 for the *Contract No. HY/2012/08 Northern Connection Sub-sea Tunnel Section* (the "Project") 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

- Box Culvert Extension at Works Area – Portion N-A;
- Construction of North Ventilation Building – Portion N-C;
- Construction of Cross Passage Tympanum – TBM tunnel;
- Cross Passage Lining Installation – TBM Tunnel;
- Cross Passage Construction by Pipe Jacking – TBM Tunnel;
- Excavation of Sub-sea Tunnel – TBM tunnel;
- Corbel & OVHD Construction – TBM Tunnel;
- Parapet wall Installation – TBM Tunnel;
- Bulk Excavation – Portion S-A;
- CSM treatment, Jet Grouting works and D-wall Construction; and
- Ground Freezing Works – Portion S-A

Marine-based Works

- Seawall Construction and Filling works – Portion N-A; and
- Seawall Enhancement works – Portion N-C

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 dredging, reclamation or marine sheet piling works in open waters under this Contract. No sighting of the Indo-Pacific humpback dolphin Sousa chinensis (i.e. Chinese White Dolphin) was recorded in December 2017 during the exclusion zone monitoring.

Summary of Breaches of Action/Limit Levels

Breaches of Action and Limit Levels for Air Quality

Fifteen (15) Action Level exceedances of 1-hour TSP were recorded in the air quality monitoring of this reporting period. Two (2) Action Level and three (3) Limit Level exceedances of 24-hour TSP were recorded. Investigation report is provided in Appendix J.

Breaches of Action and Limit Levels for Water Quality

Four (4) Action Level exceedances of Suspended Solids (SS) were recorded in the water quality monitoring of this reporting period. Investigation reports are provided in Appendix J.

Dolphin Monitoring

Whilst two (2) Action Level exceedances were observed for the quarterly dolphin monitoring data between December 2017 and February 2018, 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.

One (1) environmental complaint case regarding air, noise and light pollution at Tuen Mun Pier was referred by IEC on 30 January 2018.

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

- Box Culvert Extension at Works Area – Portion N-A;
- Construction of North Ventilation Building – Portion N-C;
- Construction of Cross Passage Tympanum – TBM tunnel;
- Cross Passage Lining Installation – TBM Tunnel;
- Excavation of Sub-sea Tunnel – TBM tunnel;
- Corbel Construction – TBM Tunnel;
- Bulk Excavation – Portion S-A;
- TBM Excavation – Portion S-A;
- CSM treatment, Jet Grouting works and D-wall Construction; and
- Ground Freezing Works – Portion S-A

Marine-based Works

- Seawall Modification Works – Portion S-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, marine water quality and waste management issues.

1 INTRODUCTION

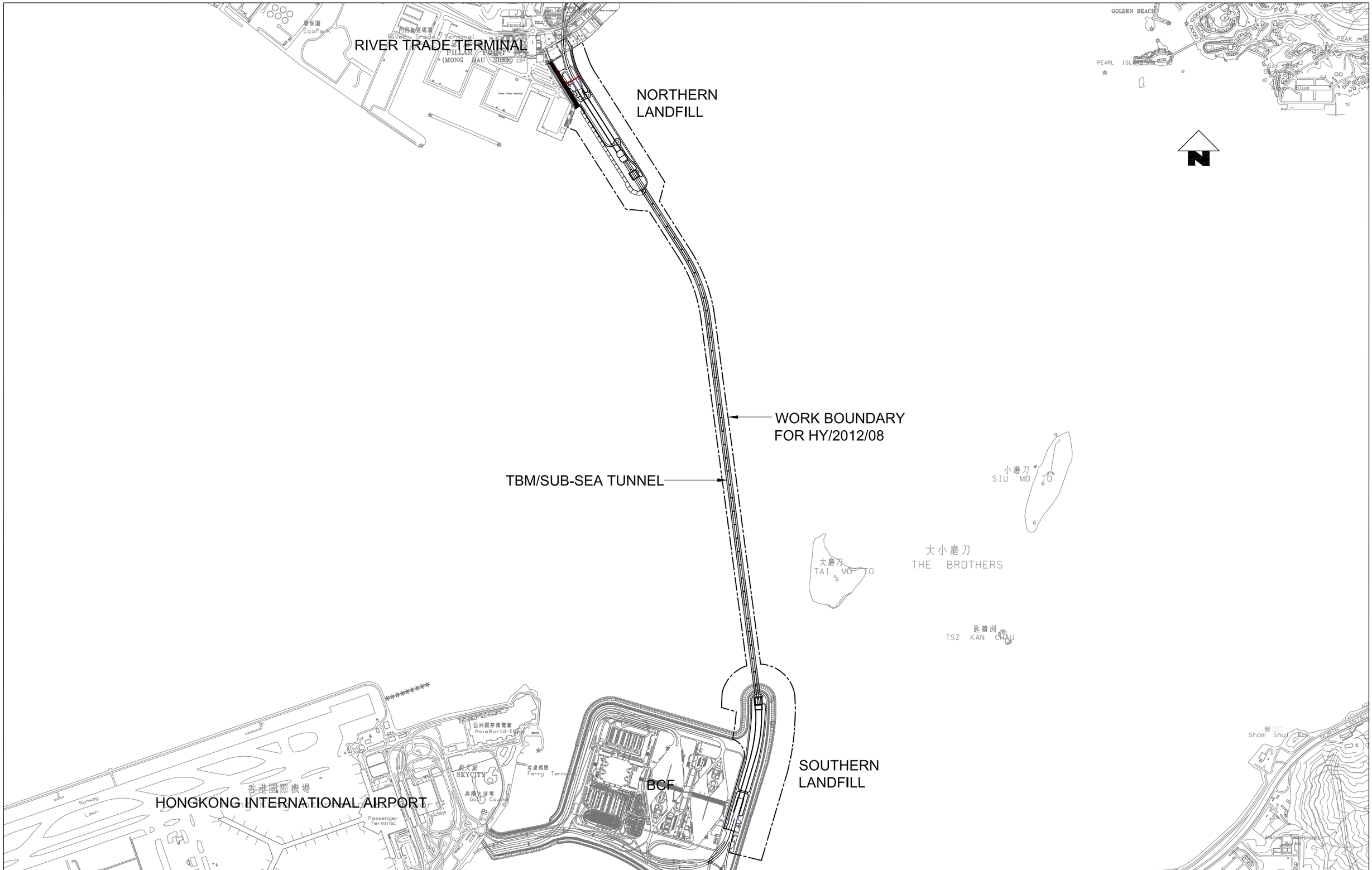
1.1 BACKGROUND

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

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

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

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



Rev.	Description	Date	Checked
A	FIRST ISSUE	11SEP13	PKV

Designed By: PKV
Drawn By: DAI
Approved By: SPo PP
Date: 11SEP2013

Main Contractor: Dragages - Bouygues Joint Venture 實嘉 - 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 2018. 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 Seventeenth 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 2017 to 28 February 2018.

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)	Environmental Officer	Bryan Lee	2293 7323	2293 7499
	24-hour complaint hotline	Rachel Lam	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*.

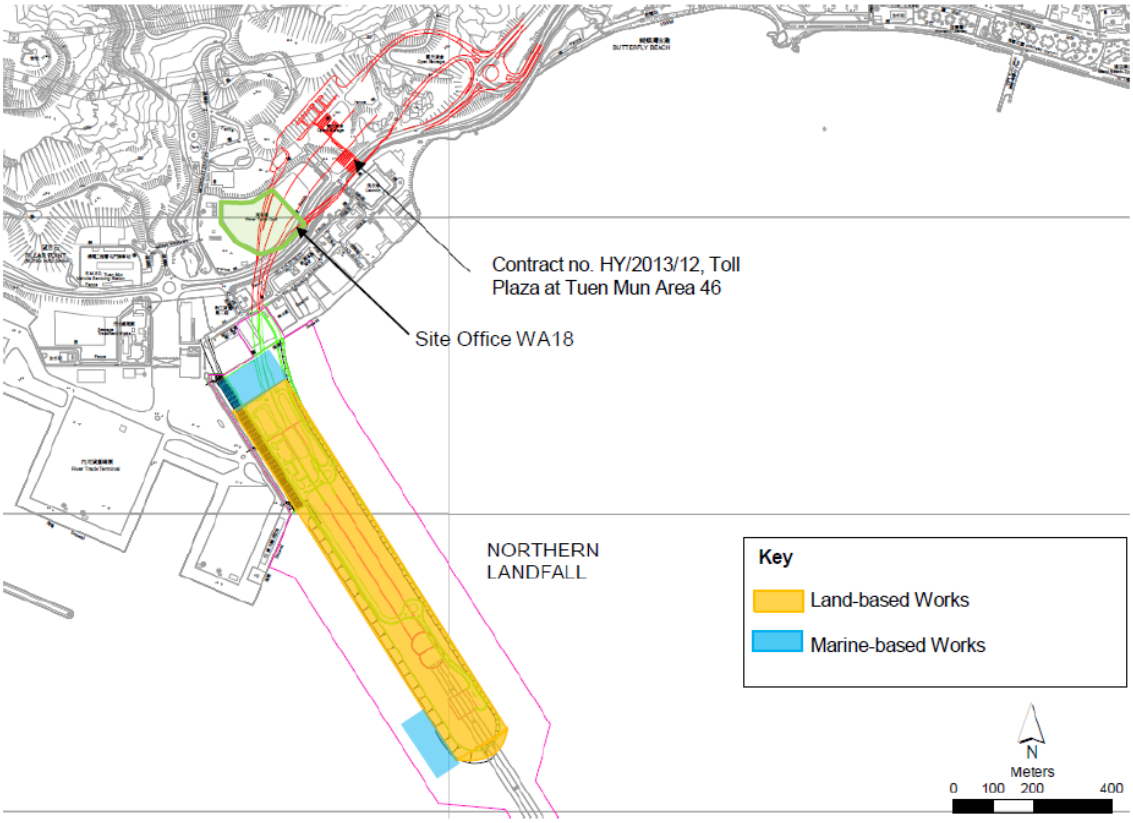
The general layout plan of the site showing the detailed works areas is shown in *Figure 1.2*. The Environmental Sensitive Receivers in the vicinity of the Project are shown in *Figure 1.3*.

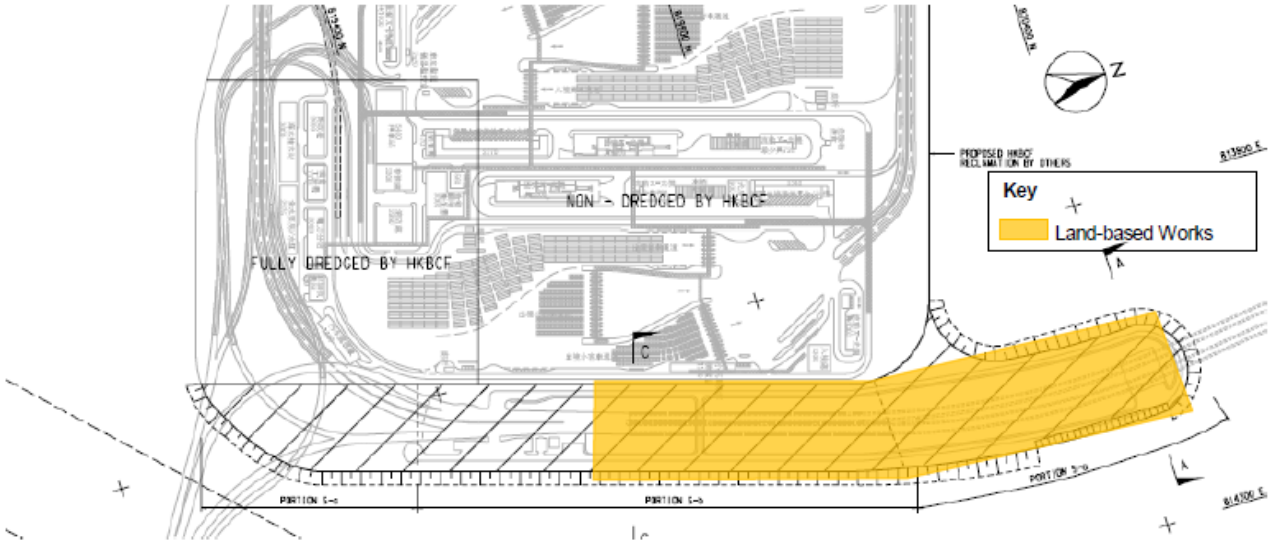
The implementation schedule of environmental mitigation measures is presented in *Appendix C*.

Table 1.2 Summary of Construction Activities Undertaken during the Reporting Period

Construction Activities Undertaken
Land-based Works
• Box Culvert Extension at Works Area – Portion N-A; • Construction of North Ventilation Building – Portion N-C; • Construction of Cross Passage Tympanum – TBM tunnel; • Cross Passage Lining Installation – TBM Tunnel; • Cross Passage Construction by Pipe Jacking – TBM Tunnel; • Excavation of Sub-sea Tunnel – TBM tunnel; • Corbel & OVHD Construction – TBM Tunnel; • Parapet wall Installation – TBM Tunnel; • Bulk Excavation – Portion S-A; • CSM treatment, Jet Grouting works and D-wall Construction; and • Ground Freezing Works – Portion S-A
Marine-based Works • Seawall Construction and Filling works – Portion N-A; and • Seawall Enhancement works – Portion N-C

Figure 1.2 Locations of Construction Activities – December 2017 to February 2018





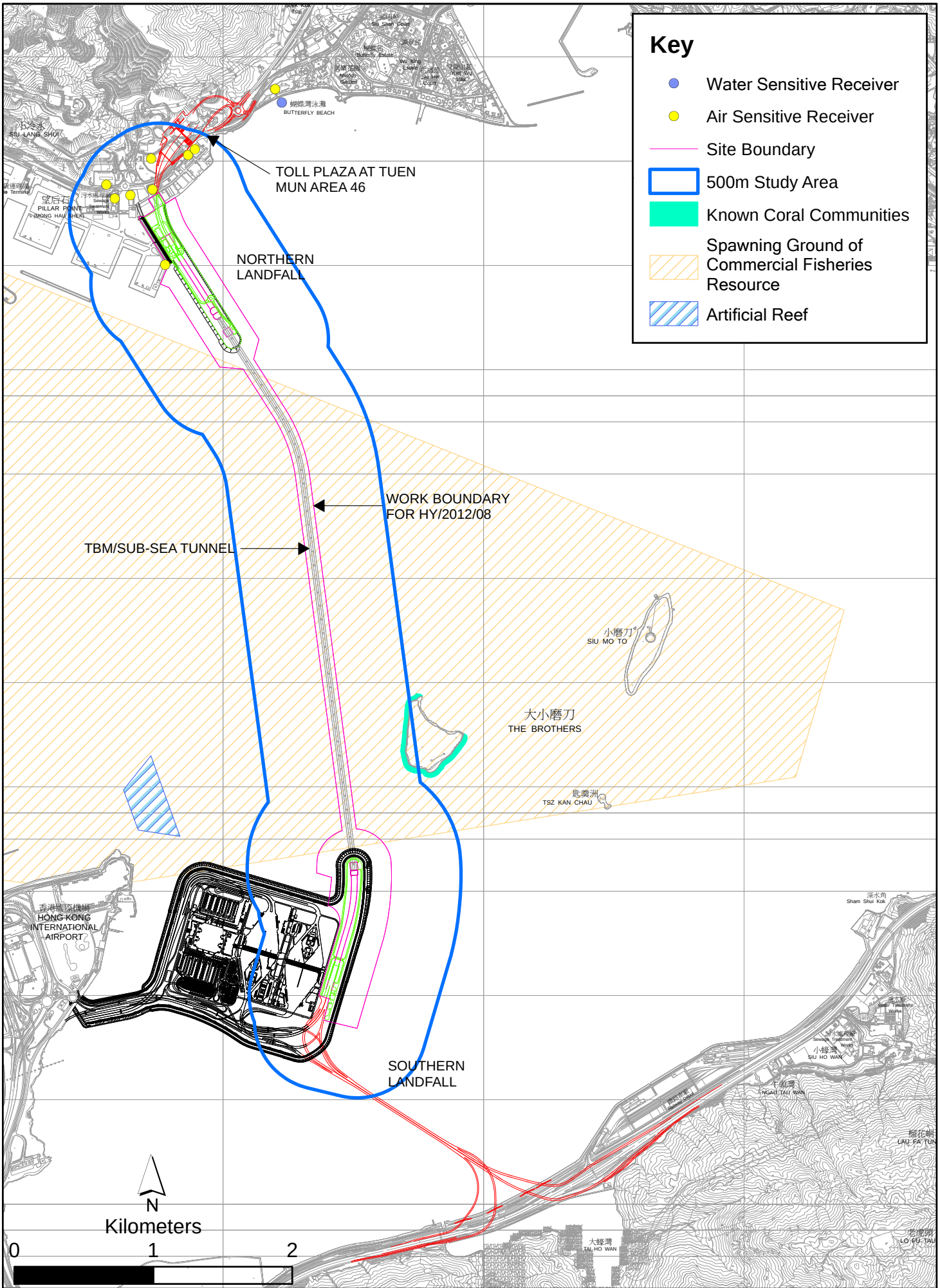


Figure 1.3 Environmental Sensitive Receivers in the vicinity of Contract No. HY/2012/08 Tuen Mun - Chek Lap Kok Link - Northern Connection Sub-Sea Tunnel Section

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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	2, 5, 8, 11, 14, 17, 20, 23, 26 and 29 December 2017	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	1, 4, 7, 10, 13, 16, 19, 22, 25, 28 and 31 January 2018	Pillar Point Fire Station	Office	
AQMS1	3, 6, 9, 12, 15, 21, 24 and 27 February 2018	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.

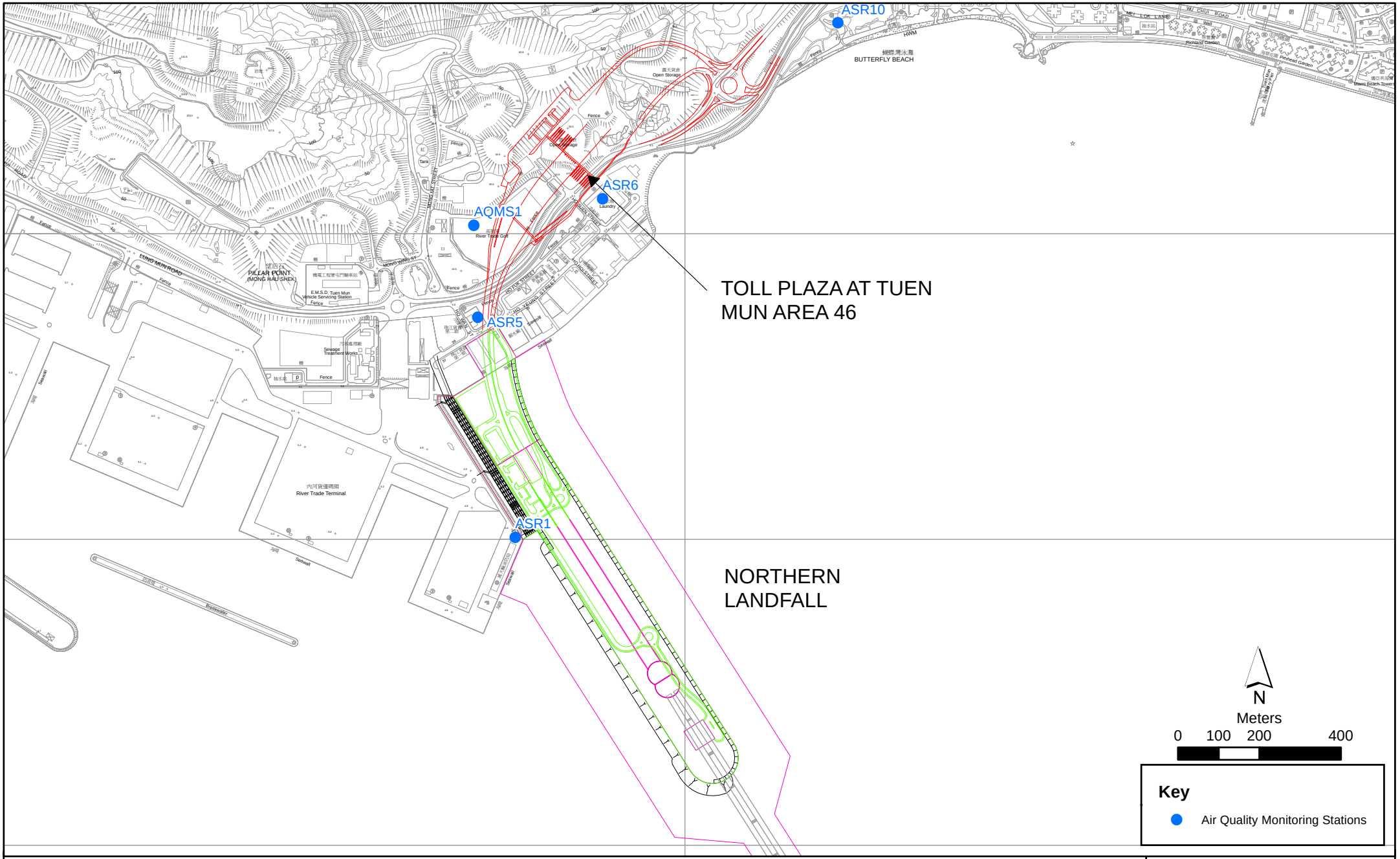

Figure 2.1

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 I*.

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 *Fiftieth* to *Fifty-second 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 2017 to February 2018	ASR 1	159	13 - 443	331	500
	ASR 5	196	13 - 455	340	500
	AQMS1	118	14 - 324	335	500
	ASR6	140	13 - 322	338	500
	ASR10	113	13 - 333	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	120	21 - 328	213	260

Month/Year	Station	Average (μg/m³)	Range (μg/m³)	Action Level (μg/m³)	Limit Level (μg/m³)
2017 to	ASR 5	131	23 - 279	238	260
February 2018	AQMS1	84	16 - 177	213	260
	ASR6	101	21 - 178	238	260
	ASR10	79	22 - 250	214	260

Fifteen (15) Action Level exceedances of 1-hour TSP were recorded in the air quality monitoring of this reporting period. Two (2) Action Level and three (3) Limit Level exceedances of 24-hour TSP were recorded. Summary of Exceedances for Air Quality Impact Monitoring in this Reporting Quarter is detailed in *Table 2.15*.

2.2 WATER QUALITY MONITORING

2.2.1 Monitoring Requirements & Equipment

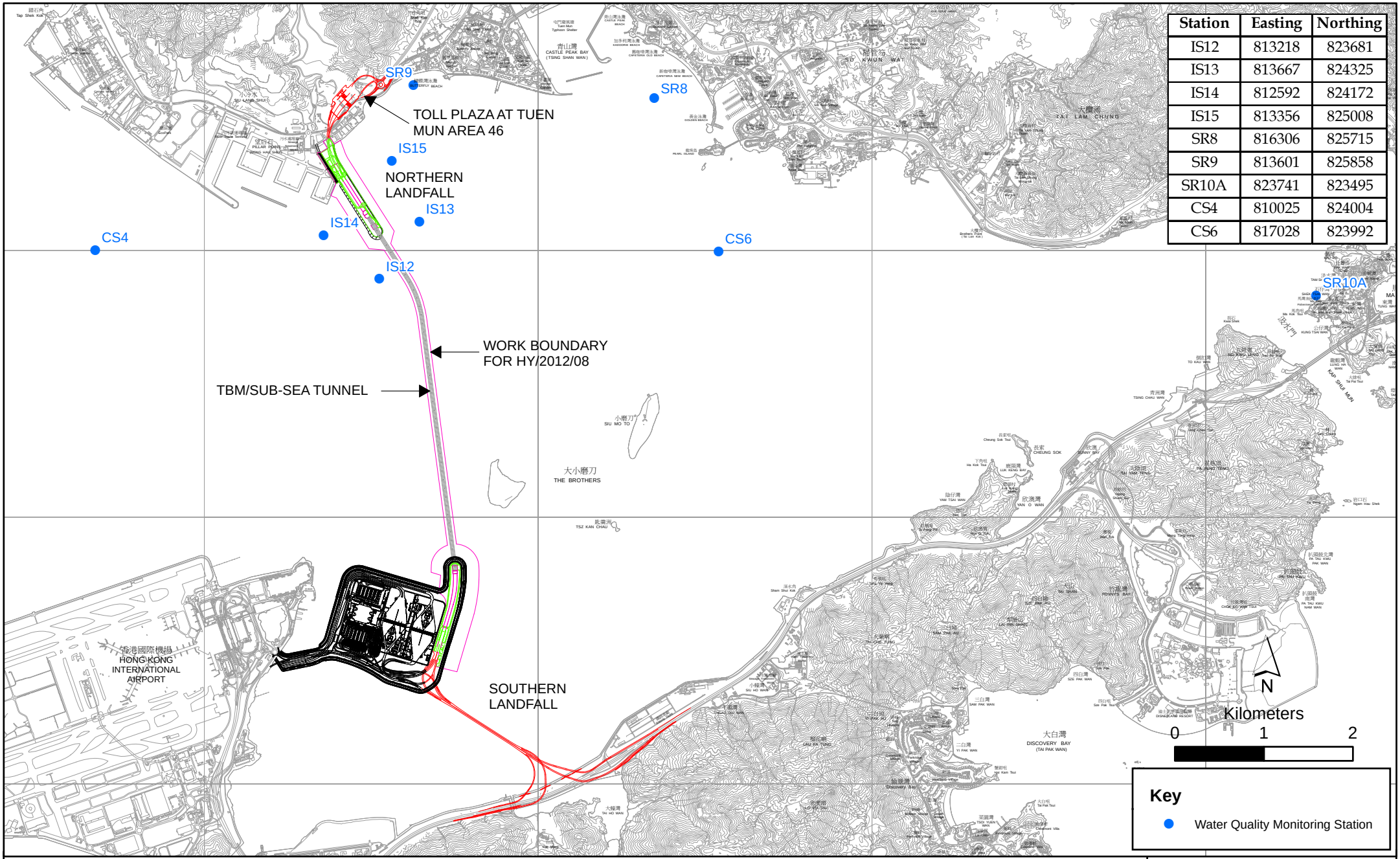
In accordance with the Updated EM&A Manual, impact water quality monitoring was carried out three days per week during the construction period at nine (9) water quality monitoring stations (*Figure 2.2*; *Table 2.5*).

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

Station ID	Type	Coordinates		*Parameters, unit	Depth	Frequency
		Easting	Northing			
IS12	Impact Station	813218	823681	• Temperature(°C)	3 water depths: 1m below sea surface, mid-depth and 1m above sea bed. If the water depth is less than 3m, mid-depth sampling only. If water depth less than 6m, mid-depth may be omitted.	Impact monitoring: 3 days per week, at mid-flood and mid-ebb tides during the construction period of the Contract.
IS13	Impact Station	813667	824325	• pH(pH unit)		
IS14	Impact Station	812592	824172	• Turbidity (NTU)		
IS15	Impact Station	813356	825008	• Water depth (m)		
CS4	Control / Far Field Station	810025	824004	• Salinity (ppt)		
CS6	Control / Far Field Station	817028	823992	• DO (mg/L and % of saturation)		
SR8	Sensitive receiver (Gazettal beaches in Tuen Mun)	816306	825715	• SS (mg/L)		
SR9	Sensitive receiver (Butterfly Beach)	813601	825858			
SR10A	Sensitive receiver (Ma Wan FCZ)	823741	823495			

*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.



Station	Easting	Northing
IS12	813218	823681
IS13	813667	824325
IS14	812592	824172
IS15	813356	825008
SR8	816306	825715
SR9	813601	825858
SR10A	823741	823495
CS4	810025	824004
CS6	817028	823992

Figure 2.2

Water Quality Monitoring Station

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Date: 15/11/2013

Environmental Resources Management

ERM

Table 2.6 Water Quality Monitoring Equipment

Equipment	Model
Multi-Parameters	YSI ProDss 16J101715
Multi-Parameters	YSI ProDss 17E102520
Multi-Parameters	YSI ProDss 16H104234
Multi-Parameters	YSI ProDss 17H105557
Multi-Parameters	YSI 6920 000109DF
Multi-Parameters	YSI 6920V2 00019CB2
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 *Fiftieth* to *Fifty-second Monthly EM&A Report*.

Since seawall block installation for Phase II reclamation commenced on 1 November 2017, impact water quality monitoring resumed on 1 November 2017. In this reporting period, a total of thirteen (13) monitoring events were undertaken in which Four (4) Action Level exceedances of Suspended Solids (SS) for impact water quality monitoring were recorded. Seawall Enhancement Works at Northern Landfall has been completed on 31 December 2017. Notification of suspension of water quality monitoring has been approved by EPD on 2 March 2018.

2.3 DOLPHIN MONITORING

2.3.1 Monitoring Requirements

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

2.3.2 *Monitoring Equipment*

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

Table 2.7 Dolphin Monitoring Equipment

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

2.3.3 *Monitoring Parameter, Frequencies & Duration*

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

2.3.4 *Monitoring Location*

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

Table 2.8 Impact Dolphin Monitoring Line Transect Co-ordinates

Line No.		Easting	Northing	Line No.		Easting	Northing
1	Start Point	804671	815456	13	Start Point	816506	819480
1	End Point	804671	831404	13	End Point	816506	824859
2	Start Point	805476	820800*	14	Start Point	817537	820220
2	End Point	805476	826654	14	End Point	817537	824613
3	Start Point	806464	821150*	15	Start Point	818568	820735
3	End Point	806464	822911	15	End Point	818568	824433
4	Start Point	807518	821500*	16	Start Point	819532	821420
4	End Point	807518	829230	16	End Point	819532	824209
5	Start Point	808504	821850*	17	Start Point	820451	822125
5	End Point	808504	828602	17	End Point	820451	823671
6	Start Point	809490	822150*	18	Start Point	821504	822371
6	End Point	809490	825352	18	End Point	821504	823761

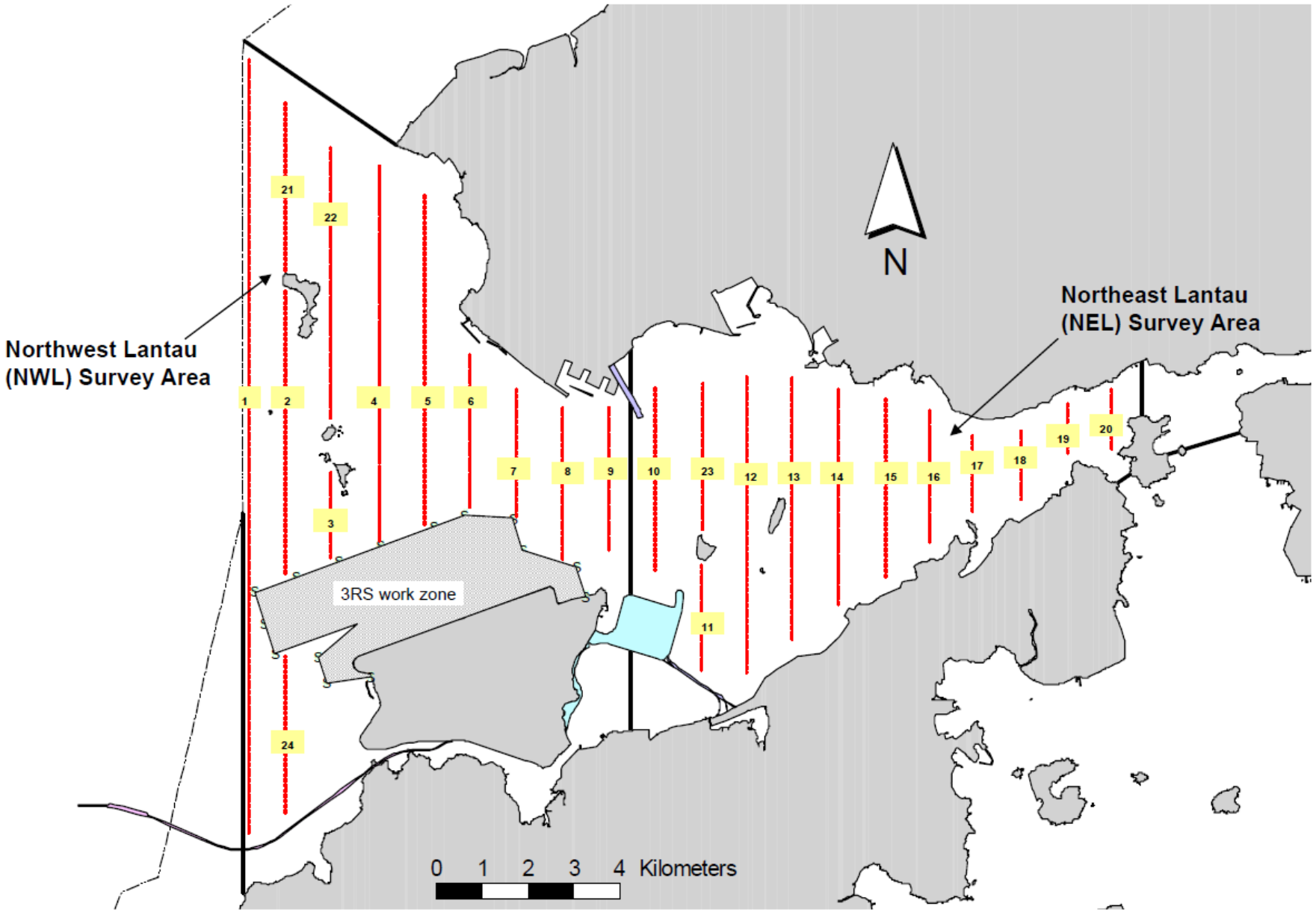

Figure 2.3

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

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Date: 29/11/2013

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Line No.		Easting	Northing	Line No.		Easting	Northing
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 797.53 km of survey effort was conducted, with 88.8% 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, 296.70 km and 500.83 km of survey effort were conducted from NEL and NWL survey areas, respectively. The total survey effort conducted on primary and secondary lines were 582.13 km and 215.40 km, respectively. The survey efforts are summarized in *Appendix H*.

A total of 17 groups of 45 Chinese White Dolphins sightings were recorded during the six sets of surveys in this reporting quarter. Sixteen of the seventeen dolphin sightings were made during on-effort search, and fourteen of the sixteen 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: Dec 5th/12th	0.00	0.00
	Set 2: Dec 15th/20th	0.00	0.00
	Set 3: Jan 2nd/8th	0.00	0.00
	Set 4: Jan 16th /25th	0.00	0.00
	Set 5: Feb 2nd/9th	0.00	0.00
	Set 6: Feb 14th/22nd	0.00	0.00
NWL	Set 1: Dec 5th/12th	1.66	8.32
	Set 2: Dec 15th/20th	8.39	22.37
	Set 3: Jan 2nd/8th	5.68	45.42
	Set 4: Jan 16th /25th	3.43	3.43
	Set 5: Feb 2nd/9th	4.38	6.56
	Set 6: Feb 14th/22nd	4.97	8.29

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

Table 2.10 Quarterly Average Encounter Rates

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)		Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)	
	December 2017 – February 2018	September – November 2011	December 2017 – February 2018	September – November 2011
Northeast Lantau	0.0	6.00 ± 5.05	0.0	22.19 ± 26.81
Northwest Lantau	4.75 ± 2.26	9.85 ± 5.85	15.73 ± 15.94	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 - 8 individuals per group in North Lantau region during December 2017 to February 2018. 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 2017 – February 2018	September – November 2011
Overall	2.65 ± 2.50 (n = 17)	3.72 ± 3.13 (n = 66)
Northeast Lantau	---	3.18 ± 2.16 (n = 17)
Northwest Lantau	2.65 ± 2.50 (n = 17)	3.92 ± 3.40 (n = 49)

Whilst two action level exceedances were observed for the quarterly dolphin monitoring data between December 2017 and February 2018, 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 dredging, reclamation or marine sheet piling works in open waters under this Contract. No sighting of the Indo-Pacific humpback dolphin Sousa chinensis (i.e. Chinese White Dolphin) was recorded in December 2017 during the exclusion zone monitoring.

2.4 *EM&A SITE INSPECTION*

Site inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures under the Contract. Thirteen (13) site inspections were carried out in the reporting quarter on 6, 13, 20 and 27 December 2017; 3, 10, 17, 24 and 31 January 2018; 7, 14, 21 and 28 February 2018.

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

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

Inspection Date	Environmental Observations	Recommendations/ Remarks
6 December 2017	Works Area – TBM tunnel • Cement bags should be covered with tarpaulin sheets. • Drip tray and proper chemical label should be provided to the chemical containers. Works Area - Portion S-A • Drip tray and proper chemical label should be provided to the chemical containers.	Works Area – TBM tunnel • The Contractor was reminded to cover the cement bags with tarpaulin sheets. • The Contractor was reminded to provide drip tray and proper chemical label to the chemical containers. Works Area - Portion S-A • The Contractor was reminded to provide drip tray and proper chemical label to the chemical containers.
13 December 2017	Works Area –Portion S-B • Drip tray and proper chemical label should be provided to the chemical containers. Works Area - Portion N-C • Drip tray and proper chemical label should be provided to the chemical containers. Works Area –Portion N-B • Proper NRMM label should be displayed on the soil compacter. • Chemical label should be displayed on the chemical container.	Works Area –Portion S-B • The Contractor was reminded to provide drip tray and proper chemical label to the chemical containers. Works Area - Portion N-C • The Contractor was reminded to provide drip tray and proper chemical label to the chemical containers. Works Area –Portion N-B • The Contractor was reminded to display proper NRMM label on the soil compacter. • The Contractor was reminded to display chemical label on the chemical container.
20 December 2017	Works Area – Portion S-B • Chemical waste should be removed or stored in chemical storage area.	Works Area – Portion S-B • The Contractor was reminded to remove or store the chemical waste in chemical storage area.

Inspection Date	Environmental Observations	Recommendations/ Remarks
27 December 2017	Works Area – Portion N-C • Drip tray and proper chemical label should be provided to the oil drums.	Works Area – Portion N-C • The Contractor was reminded to provide drip tray and proper chemical label to the oil drums.
3 January 2018	Works Area – Portion S-A • Accumulated waste in the skip should be removed.	Works Area – Portion S-A • The Contractor was reminded to remove the accumulated waste in the skip.
10 January 2018	Works Area –Portion S-A • Drip tray and proper chemical label should be provided for the chemical container. • Trapped water in the drip tray should be removed. Works Area –Portion N-A • Trapped water should be pumped off to wastewater treatment facilities. • The slope of the surcharge should be covered entirely by tarpaulin sheets.	Works Area –Portion S-A • The Contractor was reminded to provide drip tray and proper chemical label for the chemical container. • The Contractor was reminded to remove trapped water in the drip tray. Works Area –Portion N-A • The Contractor was reminded to pump off the trapped water to wastewater treatment facilities. • The Contractor was reminded to cover the slope of the surcharge by tarpaulin sheets entirely.
17 January 2018	Works Area – TBM tunnel • Drip tray and proper chemical label should be provided for the chemical container. Works Area - Portion S-C • Trapped water in the drip tray should be removed. • Trapped water in the drip tray should be removed.	Works Area – TBM tunnel • The Contractor was reminded to provide drip tray and proper chemical label for the chemical container. Works Area - Portion S-C • The Contractor was reminded to remove trapped water in the drip tray. • The Contractor was reminded to remove trapped water in the drip tray.
24 January 2018	Works Area – Portion N-C • Chemical container should be placed in proper storage area. • Drip tray and proper chemical label should be provided for the chemical container. Works Area - Portion S-B • Drip tray should be provided for the chemical container.	Works Area – Portion N-C • The Contractor was reminded to place the chemical container in proper storage area. • The Contractor was reminded to provide drip tray and proper chemical label for the chemical container. Works Area - Portion S-B • The Contractor was reminded to provide drip tray for the chemical container.
31 January 2018	Works Area – Portion N-C • Accumulated general refuse in the skip should be removed. Works Area - Portion N-A • Surcharge stockpiles should be entirely covered with tarpaulin sheets. Works Area - Portion S-B • Cement bags should be entirely covered with tarpaulin sheets.	Works Area – Portion N-C • The Contractor was reminded to remove the accumulated general refuse in the skip. Works Area - Portion N-A • The Contractor was reminded to cover the surcharge stockpiles entirely with tarpaulin sheets. Works Area - Portion S-B • The Contractor was reminded to cover the cement bags entirely with tarpaulin sheets.

Inspection Date	Environmental Observations	Recommendations/ Remarks
7 February 2018	Works Area – TBM tunnel • Waste skip should be classified into inert waste type and non-inert waste type. Works Area –Portion S-B • Drip tray should be provided for the oil drums. • Cement bags should be entirely covered with tarpaulin sheets.	Works Area – TBM tunnel • The Contractor was reminded to classify the waste skip into inert waste type and non-inert waste type. Works Area –Portion S-B • The Contractor was reminded to provide drip tray for the oil drums. • The Contractor was reminded to cover the cement bags entirely with tarpaulin sheets.
14 February 2018	Works Area –Portion N-C • Accumulated waste in the skip should be removed. • Drip tray should be provided for the chemical containers. Works Area –Portion S-A • Drip tray should be provided for the chemical containers.	Works Area –Portion N-C • The Contractor was reminded to remove the accumulated waste in the skip. • The Contractor was reminded to provide drip tray for the chemical containers. Works Area –Portion S-A • The Contractor was reminded to provide drip tray for the chemical containers.
21 February 2018	Works Area – Portion S-B • Water spraying should be applied on site regularly. • Drip tray should be provided for the chemical containers. • The grout mixer should be entirely covered by tarpaulin sheets with 3 sides and the top. Works Area - TBM tunnel • Drip tray should be provided for the chemical containers. • Drip tray should be provided for the chemical containers.	Works Area – Portion S-B • The Contractor was reminded to apply water spraying on site regularly. • The Contractor was reminded to provide drip tray for the chemical containers. • The Contractor was reminded to cover the grout mixer entirely by tarpaulin sheets with 3 sides and the top. Works Area - TBM tunnel • The Contractor was reminded to provide drip tray for the chemical containers. • The Contractor was reminded to provide drip tray for the chemical containers.
28 February 2018	Works Area – Portion N-C • Drip tray should be provided for the water proofing material. • Stagnant water in the wheelbarrow should be removed. • Cement bags should be covered with tarpaulin sheeting. Works Area - Portion S-B Drip tray should be cleaned up to avoid oil leakage.	Works Area – Portion N-C • The Contractor was reminded to provide drip tray for the water proofing material. • The Contractor was reminded to remove the stagnant water in the wheelbarrow. • The Contractor was reminded to cover the cement bags with tarpaulin sheeting. Works Area - Portion S-B The Contractor was reminded to clean up the drip tray to avoid oil leakage.

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) and chemical wastes. 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
December 2017	3574	0	121	0	0	0	3942
January 2018	7,165	0	272	200	2800	0	11,357
February 2018	1,762	0	258	200	0	0	2,840
Total	12,501	0	651	400	2,800	0	18,139

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
Waste Water Discharge License	WT00017707-2013	18 November 2013	30 November 2018	DBJV	For site WA18
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	WT00018433-2014	6 March 2014	31 March 2019	DBJV	N6 Site
Waste Water Discharge License	WT00025944-2016	15 December 2016	31 December 2021	DBJV	Southern Landfall
Marine Dumping Permit	EP/MD/18-118	21 January 2018	20 February 2018	DBJV	Type 1 (Dedicated site) and Type 2 (Confined Marine Disposal)
Marine Dumping Permit	EP/MD/18-098	21 December 2017	20 January 2018	DBJV	Type 1 (Dedicated site) and Type 2 (Confined Marine Disposal)
Marine Dumping Permit	EP/MD/18-125	21 February 2018	20 March 2018	DBJV	Type 1 (Dedicated site) and Type 2 (Confined Marine Disposal)
Construction Noise Permit	GW-RW0538-17	16 October 2017	15 April 2018	DBJV	For Urmston Road in front of Pillar Point
Construction Noise Permit	GW-RW0641-17	16 December 2017	6 December 2018	DBJV	WA23 @ Tsing Yi
Construction Noise Permit	PP-RS0026-17	1 December 2017	29 March 2018	DBJV	Southern Landfall (Percussive Piling)
Construction Noise Permit	GW-RS0878-17	11 October 2017	2 April 2018	DBJV	Southern Landfall
Construction Noise Permit	GW-RW0060-18	20 February 2018	19 August 2018	DBJV	WA23 @ Tsing Yi
Construction Noise Permit	GW-RS0027-18	22 January 2018	14 July 2018	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 fifteen (15) Action Level exceedances of 1-hour TSP were recorded in the air quality monitoring of this reporting period. Two (2) Action Level and three (3) Limit Level exceedances of 24-hour TSP were 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	2018-12-08	-	-	-
		2018-12-11	2018-12-11	2	1
		2018-12-20	-	1	-
		2017-12-26	-	1	-
		2018-02-03	-	1	-
	Limit Level	-	2018-12-08	-	1
ASR5	Action Level	2017-12-08	-	1	-
		2018-12-20	-	1	-
		2018-12-11	-	1	-
		2018-01-13	-	1	-
		2018-01-16	-	3	-
		2018-01-22	-	2	-
		2018-02-03	-	1	-
	Limit Level	2017-12-08	-	-	1
		2017-12-17	-	-	1
ASR6	Action Level	-	-	-	-
	Limit Level	-	-	-	-
ASR10	Action Level	-	2017-12-29-	-	1
	Limit Level	-	-	-	-
	Total number of Action level Exceedances:			15	2
	Total number of Limit level Exceedances:			0	3

For marine water quality impact monitoring, a total of thirteen monitoring events were undertaken in which Four (4) Action Level exceedances of Suspended Solids (SS) were recorded in the water quality monitoring of this reporting period. (*Table 2.17*). In addition, the construction impact on depth-

averaged SS was assessed to compare the quarterly mean values of depth-averaged SS with the relevant ambient mean values. Results showed that the quarterly mean values of depth-averaged SS at all monitoring stations are well below the ambient mean values (*Table 2.16*). Therefore, no further action is required in accordance with the Updated EM&A Manual.

Table 2.16 Comparison between Quarterly Mean and Ambient Mean Values of Depth-averaged Suspended Solids

Station	Baseline Mean		Ambient Mean [(a)]		Quarterly Mean (December 2017)	
	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood
CS4	10.2	9.0	13.3	11.7	7.98	11.13
CS6	10.9	11.7	14.1	15.2	6.17	8.08
IS12	9.2	9.5	12.0	12.3	10.66	9.32
IS13	10.0	10.5	13.0	13.7	10.75	11.28
IS14	10.4	9.7	13.5	12.6	8.30	12.04
IS15	9.6	11.0	12.5	14.2	8.12	12.18
SR10A	10.3	10.2	13.3	13.3	7.04	9.93
SR8	10.1	11.3	13.1	14.7	8.64	9.46
SR9	8.8	9.9	11.4	12.8	7.23	8.78
Grand Total	**10.0**	**10.3**	**13.0**	**13.4**	**8.32**	**10.24**

Notes:
(a) Ambient mean value is defined as a 30% increase of the baseline mean value

Table 2.17 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
CS4	AL	-	-	-	-	-	-		
	LL	-	-	-	-	-	-		
CS6	AL	-	-	-	-	-	-		
	LL	-	-	-	-	-	-		
IS12	AL	-	-	-	-	-	-		
	LL	-	-	-	-	-	-		
IS13	AL	-	-	-	-	-	-		
	LL	-	-	-	-	-	-		
IS14	AL	-	-	-	-	-	-		2017-12-08
	LL	-	-	-	-	-	-		
IS15	AL	-	-	-	-	-	-		2017-12-06 2017-12-08
	LL	-	-	-	-	-	-		
SR8	AL	-	-	-	-	-	-		
	LL	-	-	-	-	-	-		
SR9	AL	-	-	-	-	-	-		
	LL	-	-	-	-	-	-		
SR10A	AL	-	-	-	-	-	-		2017-12-08
	LL	-	-	-	-	-	-		
	Total AL Exceedances:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**
	Total LL Exceedances:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

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

Two (2) Action Level exceedances were observed for the quarterly dolphin monitoring data between December 2017 and February 2018, 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*.

One (1) environmental complaint case regarding air, noise and light pollution at Tuen Mun Pier was referred by IEC on 30 January 2018.

No environmental summons was received in this reporting period.

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

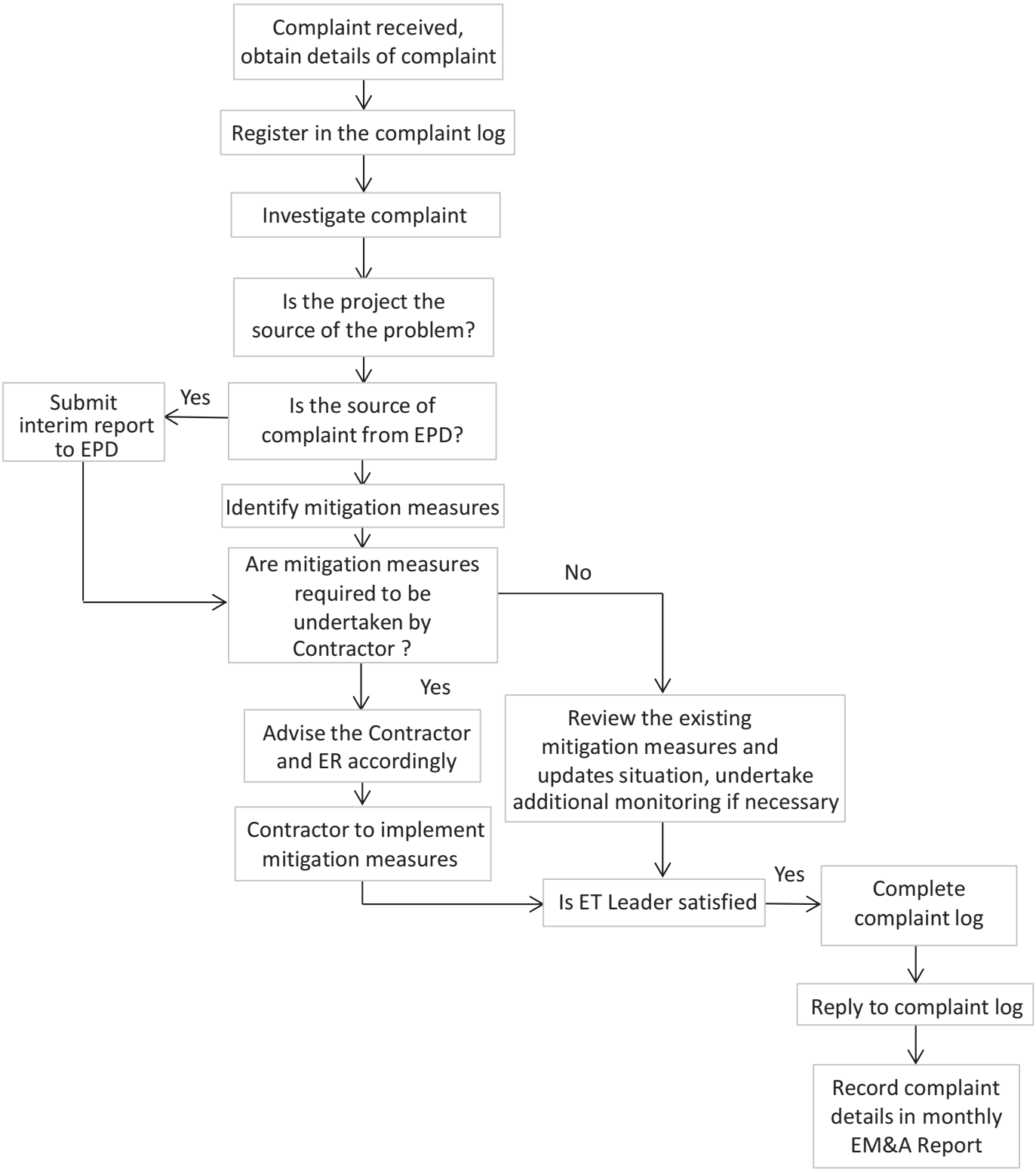

Figure 2.4 Environmental Complaint Handling Procedure

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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 • Box Culvert Extension at Works Area – Portion N-A; • Construction of North Ventilation Building – Portion N-C; • Construction of Cross Passage Tympanum – TBM tunnel; • Cross Passage Lining Installation – TBM Tunnel; • Excavation of Sub-sea Tunnel – TBM tunnel; • Corbel Construction – TBM Tunnel; • Bulk Excavation – Portion S-A; • TBM Excavation – Portion S-A; • CSM treatment, Jet Grouting works and D-wall Construction; and • Ground Freezing Works – Portion S-A *Marine-based Works* • Seawall Modification Works – Portion S-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 water quality, 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 Seventeenth Quarterly EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 December 2017 to 28 February 2017, in accordance with the Updated EM&A Manual and the requirements of *EP-354/2009/D*.

Air quality (including 1-hour TSP and 24-hour TSP), water quality monitoring and dolphin monitoring were carried out in the reporting period. Fifteen (15) Action Level exceedances of 1-hour TSP were recorded in the air quality monitoring of this reporting period. Two (2) Action Level and three (3) Limit Level exceedances of 24-hour TSP were recorded.

Four (4) Action Level exceedances of Suspended Solids (SS) were recorded in the water quality monitoring of this reporting period.

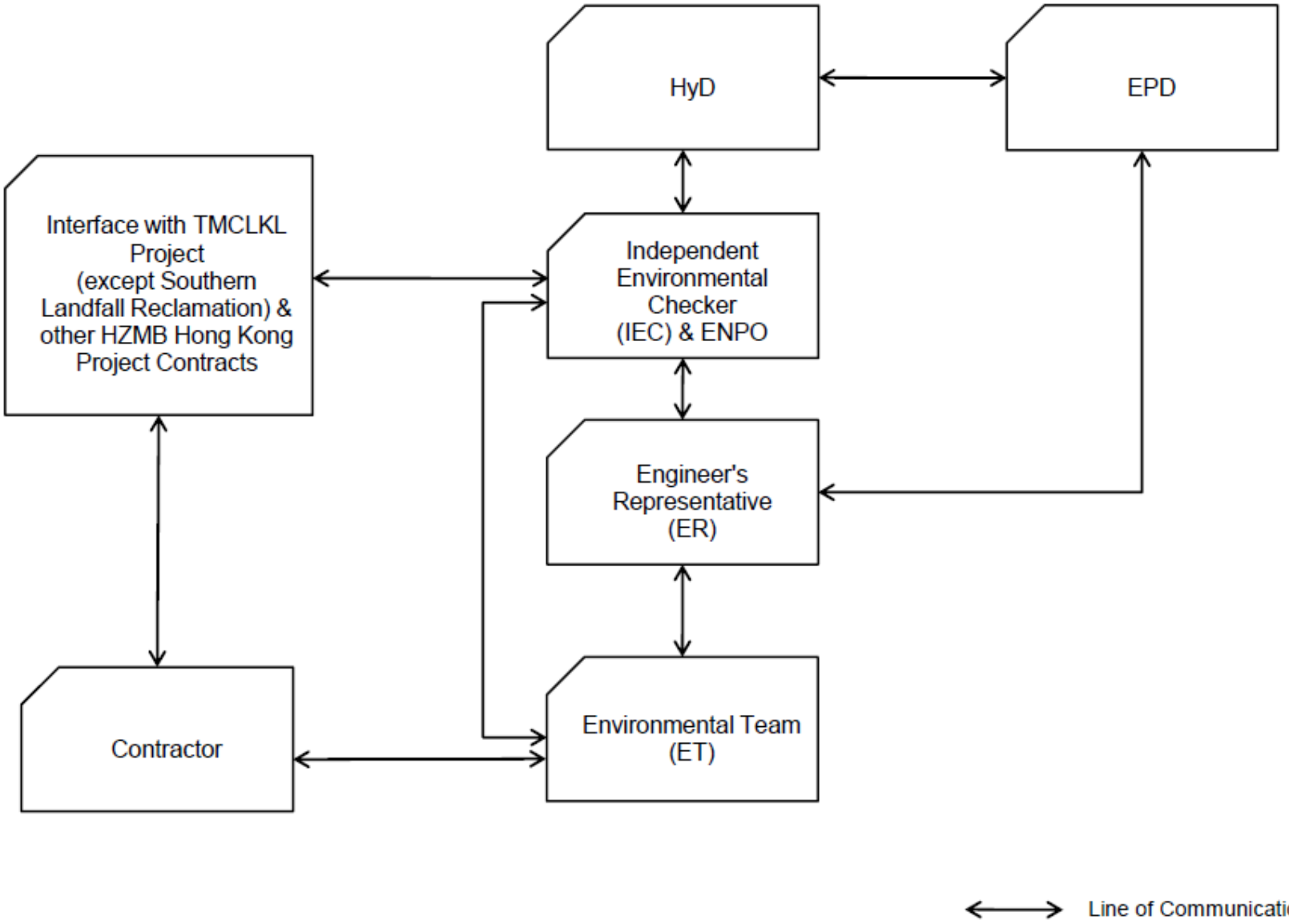
A total of 17 groups of 45 Chinese White Dolphins sightings were recorded during the six sets of surveys in this reporting quarter. Sixteen of the seventeen dolphin sightings were made during on-effort search, and fourteen of the sixteen on-effort dolphin sightings were made on primary lines. Whilst two action level exceedances were observed for the quarterly dolphin monitoring data between December 2017 and February 2018, no unacceptable impact from the construction activities of this Contract was recorded from the general observations. Although the dolphins infrequently occurred along the alignment of TM-CLKL Northern Connection Sub-Sea Tunnel Section in the past and during the baseline monitoring period, it is apparent that dolphin usage has been significantly reduced in NEL. It is critical to monitor the dolphin usage in North Lantau region in the upcoming quarters, to determine whether the dolphins are continuously affected by the various construction activities in relation to the construction works of the Contract, and whether suitable mitigation measure can be applied to improve the situation.

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

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

Appendix A

Project Organization for Environmental Works



Appendix A1

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

DATE: 06/03/2013

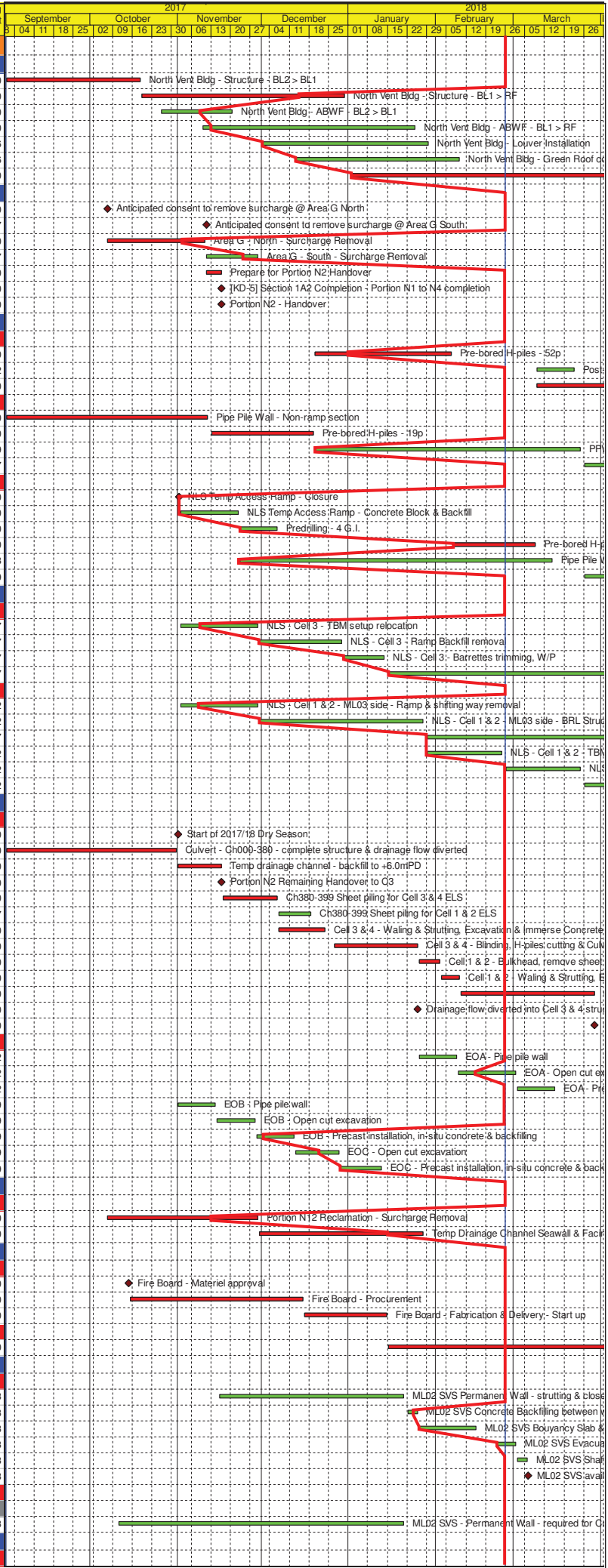
Environmental Resources Management

ERM

Appendix B

Construction Programme

#	Activity Name	Orig Dur	Start	Finish	Remaining Float
1	**TMCLKL Northern Connection Sub-sea Tunnel Section**				
2	**North Ventilation Building**				
3	North Vent Bldg - Structure - BL2 > BL1	39	01-Sep-17*	18-Oct-17	0
4	North Vent Bldg - Structure - BL1 > RF	60	19-Oct-17	30-Dec-17	0
5	North Vent Bldg - ABWF - BL2 > BL1	21	26-Oct-17	20-Nov-17	60
6	North Vent Bldg - ABWF - BL1 > RF	62	10-Nov-17	24-Jan-18	60
7	North Vent Bldg - Louver Installation	48	01-Dec-17	29-Jan-18	56
8	North Vent Bldg - Green Roof construction	48	13-Dec-17	09-Feb-18	46
9	North Vent Bldg - Rood Steel Structure	80	02-Jan-18	16-Apr-18	0
10	**North - Phase 2 Reclamation**				
11	Anticipated consent to remove surcharge @ Area G North	0	07-Oct-17*		0
12	Anticipated consent to remove surcharge @ Area G South	0	11-Nov-17*		17
13	Area G - North - Surcharge Removal	29	07-Oct-17	10-Nov-17	0
14	Area G - South - Surcharge Removal	16	11-Nov-17	29-Nov-17	17
15	Prepare for Portion N2 Handover	5	11-Nov-17	16-Nov-17	0
16	[KD-5] Section 1A2 Completion - Portion N1 to N4 completion	0		16-Nov-17*	0
17	Portion N2 - Handover	0		16-Nov-17	1020
18	**North Approach Ramp**				
19	**Portion N12 Section**				
20	Pre-bored H-piles - 52p	39	20-Dec-17	06-Feb-18	0
21	Post-drilling after grout strength gain (2p)	12	09-Mar-18	22-Mar-18	12
22	Pile Load Test Process (83p * 1% = 1p)	24	09-Mar-18	10-Apr-18	0
23	**Non-Access Ramp Section**				
24	Pipe Pile Wall - Non-ramp section	59	01-Sep-17*	11-Nov-17	0
25	Pre-bored H-piles - 19p	32	13-Nov-17	19-Dec-17	0
26	PPW - TAM Grouting - Non-ramp section	73	20-Dec-17	24-Mar-18	219
27	Sheet Piles installation	16	26-Mar-18	17-Apr-18	237
28	**Access Ramp Section**				
29	NLS Temp Access Ramp - Closure	0		01-Nov-17*	0
30	NLS Temp Access Ramp - Concrete Block & Backfill	18	02-Nov-17	22-Nov-17	50
31	Predrilling - 4 G.I.	12	23-Nov-17	06-Dec-17	50
32	Pre-bored H-piles - 12p	20	07-Feb-18	08-Mar-18	0
33	Pipe Pile Wall - Access Ramp Section	87	23-Nov-17	14-Mar-18	228
34	PPW - TAM Grouting	34	26-Mar-18	09-May-18	219
35	**North Launching Shaft**				
36	**Cell 3**				
37	NLS - Cell 3 - TBM setup relocation	24	02-Nov-17	29-Nov-17	247
38	NLS - Cell 3 - Ramp Backfill removal	24	30-Nov-17	29-Dec-17	247
39	NLS - Cell 3 - Barrettes trimming, W/P	12	30-Dec-17	13-Jan-18	247
40	NLS - Cell 3 - Base slab, Wall & Top Slab	84	15-Jan-18	04-May-18	247
41	**Cell 1 & 2**				
42	NLS - Cell 1 & 2 - ML03 side - Ramp & shifting way removal	24	02-Nov-17	29-Nov-17	22
43	NLS - Cell 1 & 2 - ML03 side - BRL Structure	48	30-Nov-17	27-Jan-18	22
44	NLS - Cell 1 - ML03 - BRL+RL+TS+backfill both sides	72	29-Jan-18	04-May-18	97
45	NLS - Cell 1 & 2 - TBM setup relocation from ML02 to ML03	18	29-Jan-18	24-Feb-18	22
46	NLS - Cell 1 & 2 - ML02 side - Ramp & shifting way removal	24	26-Feb-18	24-Mar-18	22
47	NLS - Cell 1 & 2 - ML02 side - BRL Structure	48	26-Mar-18	26-May-18	22
48	**Box Culvert Extension**				
49	**Main Culvert Structure (Ch000-399)**				
50	Start of 2017/18 Dry Season	0	01-Nov-17*		0
51	Culvert - Ch000-380 - complete structure & drainage flow diverted	49	01-Sep-17*	31-Oct-17	0
52	Temp drainage channel - backfill to +6.0mPD	14	01-Nov-17	16-Nov-17	0
53	Portion N2 Remaining Handover to C3	0		16-Nov-17	0
54	Ch380-399 Sheet piling for Cell 3 & 4 ELS	17	17-Nov-17	06-Dec-17	0
55	Ch380-399 Sheet piling for Cell 1 & 2 ELS	10	07-Dec-17	18-Dec-17	37
56	Cell 3 & 4 - Waling & Strutting, Excavation & Immerse Concrete	15	07-Dec-17	23-Dec-17	0
57	Cell 3 & 4 - Blinding, H-piles cutting & Culvert Structure	25	27-Dec-17	25-Jan-18	0
58	Cell 1 & 2 - Bulkhead, remove sheet pile & drainage flow diverted	7	26-Jan-18	02-Feb-18	0
59	Cell 1 & 2 - Waling & Strutting, Excavation & Immerse Concrete	6	03-Feb-18	09-Feb-18	0
60	Cell 3 & 4 - Blinding, H-piles cutting & Culvert Structure	35	10-Feb-18	29-Mar-18	0
61	Drainage flow diverted into Cell 3 & 4 structure	0		25-Jan-18	0
62	Drainage flow diverted into 4 cells structure	0		29-Mar-18	0
63	**EOA/ EOB / EOC**				
64	EOA - Pipe pile wall	12	26-Jan-18	08-Feb-18	12
65	EOA - Open cut excavation	12	09-Feb-18	01-Mar-18	12
66	EOA - Precast installation, in-situ concrete & backfilling	12	02-Mar-18	15-Mar-18	12
67	EOB - Pipe pile wall	12	01-Nov-17	14-Nov-17	59
68	EOB - Open cut excavation	12	15-Nov-17	28-Nov-17	59
69	EOB - Precast installation, in-situ concrete & backfilling	12	29-Nov-17	12-Dec-17	59
70	EOC - Open cut excavation	12	13-Dec-17	28-Dec-17	59
71	EOC - Precast installation, in-situ concrete & backfilling	12	29-Dec-17	12-Jan-18	59
72	**NLF Demobilization & At-grade works**				
73	**Portion N12 & Portion N6B**				
74	Portion N12 Reclamation - Surcharge Removal	45	07-Oct-17*	29-Nov-17	0
75	Temp Drainage Channel Seawall & Facing Stone Coping Installation	48	30-Nov-17	27-Jan-18	0
76	**North Approach & Sub-sea Tunnel - Thermal Barrier**				
77	**Fire Board - Approval/Procurement/Delivery**				
78	Fire Board - Materiel approval	0		14-Oct-17*	0
79	Fire Board - Procurement	62	15-Oct-17	15-Dec-17	0
80	Fire Board - Fabrication & Delivery - Start up	30	16-Dec-17	14-Jan-18	0
81	**Fire board Installation below OHVD**				
82	Fire Board installation - TNA+NVS - below OHVD Slab	81	15-Jan-18	30-Apr-18	0
83	**ML02 South Ventilation Shaft**				
84	**Concrete Bell Options**				
85	ML02 SVS Permanent Wall - strutting & close opening	54	16-Nov-17	20-Jan-18	83
86	ML02 SVS Concrete Backfilling between walls	4	22-Jan-18	25-Jan-18	83
87	ML02 SVS Bouyancy Slab & concrete block	18	26-Jan-18	15-Feb-18	83
88	ML02 SVS Evacuation for Shaft Flooding	6	23-Feb-18	01-Mar-18	83
89	ML02 SVS Shaft Flooding	3	02-Mar-18	05-Mar-18	83
90	ML02 SVS available for S882 Crossing	0	06-Mar-18		83
91	**ML02 SVS Structure**				
92	**Tunnel Box**				
93	ML02 SVS - Permanent Wall - required for Concrete Bell	84	11-Oct-17	20-Jan-18	83
94	**ML03 South Ventilation Shaft**				
95	**Shaft Excavation Stage 1**				



Page 1 of 2

Data Date: 01-Sep-17

Project ID: DWPH0010

Planned Milestone

Planned Bar

Concrete

TMCLK Northern Connection Sub-sea Tunnel Section

Detailed Works Programme Rev. H

Three Months Rolling Programme Progress as of 25 Feb 18

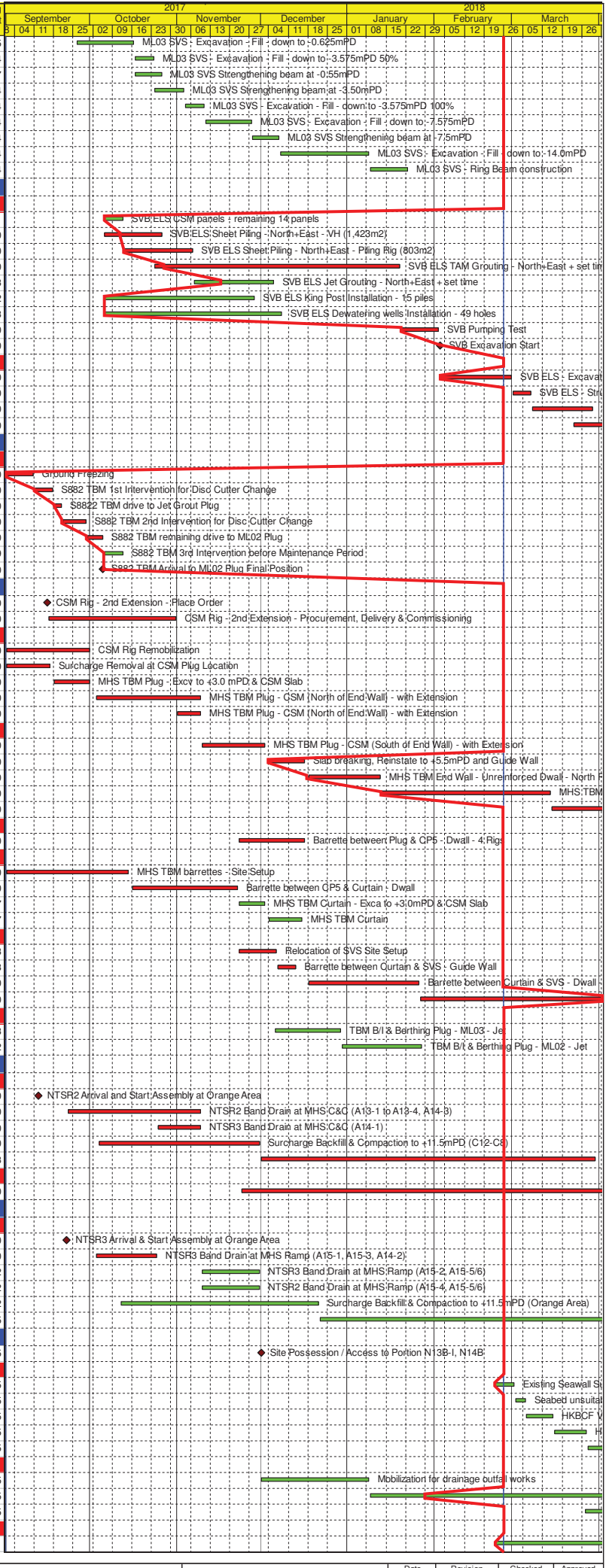
Dragages HongKong 香港寶嘉

A member of the Bouygues Construction group

Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

Date	Revision	Checked	Approved
22Dec17	Rev. H	WYu	

#	Activity Name	Orig Dur	Start	Finish	Remaining Float
96	ML03 SVS - Excavation - Fill - down to -0.625mPD	16	26-Sep-17*	16-Oct-17	75
97	ML03 SVS - Excavation - Fill - down to -3.575mPD 50%	6	17-Oct-17	23-Oct-17	74
98	ML03 SVS Strengthening beam at -0.55mPD	9	17-Oct-17	26-Oct-17	1037
99	ML03 SVS Strengthening beam at -3.50mPD	9	24-Oct-17	03-Nov-17	74
100	ML03 SVS - Excavation - Fill - down to -3.575mPD 100%	6	04-Nov-17	10-Nov-17	74
101	ML03 SVS - Excavation - Fill - down to -7.575mPD	14	11-Nov-17	27-Nov-17	74
102	ML03 SVS Strengthening beam at -7.5mPD	9	28-Nov-17	07-Dec-17	74
103	ML03 SVS - Excavation - Fill - down to -14.0mPD	24	08-Dec-17	08-Jan-18	74
104	ML03 SVS - Ring Beam construction	12	09-Jan-18	22-Jan-18	74
105	**South Ventilation Building**				
106	**SVB Remaining ELS Scope after S882 Rescue**				
107	SVB ELS CSM panels - remaining 14 panels	6	06-Oct-17	12-Oct-17	81
108	SVB ELS Sheet Piling - North+East - VH (1,423m2)	18	06-Oct-17	26-Oct-17	0
109	SVB ELS Sheet Piling - North+East - Piling Rig (803m2)	20	13-Oct-17	06-Nov-17	0
110	SVB ELS TAM Grouting - North+East + set time	72	24-Oct-17	19-Jan-18	0
111	SVB ELS Jet Grouting - North+East + set time	25	07-Nov-17	05-Dec-17	53
112	SVB ELS King Post Installation - 15 piles	45	06-Oct-17	28-Nov-17	42
113	SVB ELS Dewatering wells Installation - 49 holes	54	06-Oct-17	08-Dec-17	33
114	SVB Pumping Test	12	20-Jan-18	02-Feb-18	0
115	SVB Excavation Start	0	03-Feb-18		0
116	**ELS**				
117	SVB ELS - Excavation - down to +2.5mPD	16	03-Feb-18*	28-Feb-18	0
118	SVB ELS - Strut layer S1 & Strengthening beam	6	01-Mar-18	07-Mar-18	0
119	SVB ELS - Excavation - down to -1.0mPD	19	08-Mar-18	29-Mar-18	0
120	SVB ELS - Strut layer S2 & Strengthening beam	21	23-Mar-18	20-Apr-18	0
121	**S882 TBM Rescue**				
122	**S882 TBM Rescue by Ground Freezing**				
123	Ground Freezing	10	01-Sep-17*	10-Sep-17	0
124	S882 TBM 1st Intervention for Disc Cutter Change	7	11-Sep-17	17-Sep-17	0
125	S8822 TBM drive to Jet Grout Plug	3	18-Sep-17	20-Sep-17	0
126	S882 TBM 2nd Intervention for Disc Cutter Change	9	21-Sep-17	29-Sep-17	0
127	S882 TBM remaining drive to ML02 Plug	6	30-Sep-17	05-Oct-17	0
128	S882 TBM 3rd Intervention before Maintenance Period	7	06-Oct-17	12-Oct-17	249
129	S882 TBM Arrival to ML02 Plug Final Position	0		05-Oct-17	0
130	**MHS TBM Treatment & Plug**				
131	CSM Rig - 2nd Extension - Place Order	0		15-Sep-17*	0
132	CSM Rig - 2nd Extension - Procurement, Delivery & Commissioning	36	16-Sep-17	31-Oct-17	0
133	**MHS TBM plug**				
134	CSM Rig Remobilization	26	01-Sep-17	30-Sep-17	0
135	Surcharge Removal at CSM Plug Location	14	01-Sep-17	16-Sep-17	0
136	MHS TBM Plug - Excv to +3.0 mPD & CSM Slab	12	18-Sep-17*	30-Sep-17	0
137	MHS TBM Plug - CSM (North of End Wall) - with Extension	31	03-Oct-17	09-Nov-17	0
138	MHS TBM Plug - CSM (North of End Wall) - with Extension	8	01-Nov-17	09-Nov-17	0
139	**MHS C&C End Wall**				
140	MHS TBM Plug - CSM (South of End Wall) - with Extension	20	10-Nov-17	02-Dec-17	0
141	Slab breaking, Reinstate to +5.5mPD and Guide Wall	12	04-Dec-17	16-Dec-17	0
142	MHS TBM End Wall - Unreinforced Dwall - North Row	20	18-Dec-17	12-Jan-18	0
143	MHS TBM End Wall - Reinforced Dwall - South Row	46	13-Jan-18	14-Mar-18	0
144	MHS TBM End Wall - Unreinforced Dwall - Middle Row	20	15-Mar-18	11-Apr-18	0
145	**Barrette between Plug & CP5**				
146	Barrette between Plug & CP5 - Dwall - 4 Rigs	21	23-Nov-17	16-Dec-17	0
147	**Barrette beween CP5 & TBM Curtain**				
148	MHS TBM barrettes - Site Setup	36	01-Sep-17*	14-Oct-17	0
149	Barrette between CP5 & Curtain - Dwall	32	16-Oct-17*	22-Nov-17	0
150	MHS TBM Curtain - Exca to +3.0mPD & CSM Slab	9	23-Nov-17	02-Dec-17	87
151	MHS TBM Curtain	11	04-Dec-17	15-Dec-17	87
152	**Barrette between Curtain & SVS**				
153	Relocation of SVS Site Setup	12	23-Nov-17	06-Dec-17	3
154	Barrette between Curtain & SVS - Guide Wall	6	07-Dec-17	13-Dec-17	3
155	Barrette between Curtain & SVS - Dwall - ML03	32	18-Dec-17	26-Jan-18	0
156	Barrette between Curtain & SVS - Dwall - ML02	48	27-Jan-18	03-Apr-18	0
157	**Jet Columns for TBM B/I & Berthing at SVS**				
158	TBM B/I & Berthing Plug - ML03 - Jet	19	06-Dec-17*	29-Dec-17	53
159	TBM B/I & Berthing Plug - ML02 - Jet	24	30-Dec-17	27-Jan-18	92
160	**MHS Cut-and-cover Tunnel**				
161	**MHS C&C Band Drain, Surcharge & Dwall**				
162	NTSR2 Arrival and Start Assembly at Orange Area	0		12-Sep-17*	0
163	NTSR2 Band Drain at MHS C&C (A13-1 to A13-4, A14-3)	38	23-Sep-17	09-Nov-17	0
164	NTSR3 Band Drain at MHS C&C (A14-1)	13	25-Oct-17	09-Nov-17	0
165	Surcharge Backfill & Compaction to +11.5mPD (C12-C8)	48	04-Oct-17	30-Nov-17	0
166	4 months Consolidation Period (C12-C8)	120	01-Dec-17	30-Mar-18	3
167	**MHS C&C Dwall**				
168	MHS C&C Dwall (Cell 08 to Cell 01)	305	24-Nov-17	07-Dec-18	0
169	**MHS Approach Ramp**				
170	**Band Drain & Surcharge**				
171	NTSR3 Arrival & Start Assembly at Orange Area	0		22-Sep-17*	0
172	NTSR3 Band Drain at MHS Ramp (A15-1, A15-3, A14-2)	18	03-Oct-17	24-Oct-17	0
173	NTSR3 Band Drain at MHS Ramp (A15-2, A15-5/6)	18	10-Nov-17	30-Nov-17	142
174	NTSR2 Band Drain at MHS Ramp (A15-4, A15-5/6)	18	10-Nov-17	30-Nov-17	142
175	Surcharge Backfill & Compaction to +11.5mPD (Orange Area)	60	12-Oct-17	21-Dec-17	142
176	4 months Consolidation Period (Orange Area)	120	22-Dec-17	20-Apr-18	185
177	**Southern Landfall - Surface**				
178	Site Possession / Access to Portion N13B-I, N14B	0	01-Dec-17*		25
179	**HKBCF Seawall Modification**				
180	Existing Seawall Survey at Vertical Seawall	6	23-Feb-18*	01-Mar-18	25
181	Seabed unsuitable material removal	3	02-Mar-18	05-Mar-18	25
182	HKBCF Vertical Seawall - place Rock underlayer bottom	9	06-Mar-18	15-Mar-18	25
183	HKBCF Vertical Seawall - place Rock Grade 400	10	16-Mar-18	27-Mar-18	25
184	HKBCF Vertical Seawall - place Rock underlayer upper	9	28-Mar-18	11-Apr-18	25
185	**Drainage Outfall**				
186	Mobilization for drainage outfall works	30	01-Dec-17	08-Jan-18	25
187	SLF Drainage Outfall - No. 1,3-5, 8 & 9	72	09-Jan-18	13-Apr-18	25
188	SLF Drainage Outfall - No. 7	24	27-Mar-18	27-Apr-18	25
189	**Retaining Wall Interface with C1**				
190	Retaining Wall - Excv, Footing & Reinstate to +5.5mPD	48	23-Feb-18*	24-Apr-18	31



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Data Date: 01-Sep-17

Project ID: DWPH0010

◆ Planned Milestone

Planned Bar

Concrete

TMCLK Northern Connection Sub-sea Tunnel Section

Detailed Works Programme Rev. H

Three Months Rolling Programme Progress as of 25 Feb 18

Dragages Hong Kong 香港寶嘉

A member of the Bouygues Construction group

Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

Date	Revision	Checked	Approved
22Dec17	Rev. H	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		✓

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	-	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		✓

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

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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		✓

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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	-	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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						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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						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.

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 2017

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

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

HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Air Quality Impact Monitoring Schedule - January 2018

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	6-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		
7-Jan	8-Jan	9-Jan	10-Jan	11-Jan	12-Jan	13-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
14-Jan	15-Jan	16-Jan	17-Jan	18-Jan	19-Jan	20-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	
21-Jan	22-Jan	23-Jan	24-Jan	25-Jan	26-Jan	27-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		
28-Jan	29-Jan	30-Jan	31-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			

HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Air Quality Impact Monitoring Schedule - February 2018

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

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

HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Impact Dolphin Monitoring Survey Monitoring Schedule - December 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1-Dec	2-Dec
3-Dec	4-Dec	5-Dec	6-Dec	7-Dec	8-Dec	9-Dec
		Impact Dolphin Monitoring				
10-Dec	11-Dec	12-Dec	13-Dec	14-Dec	15-Dec	16-Dec
		Impact Dolphin Monitoring			**Impact Dolphin Monitoring**	
17-Dec	18-Dec	19-Dec	20-Dec	21-Dec	22-Dec	23-Dec
			Impact Dolphin Monitoring			
24-Dec	Public Holiday 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 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	Public Holiday 1-Jan	2-Jan	3-Jan	4-Jan	5-Jan	6-Jan
		Impact Dolphin Monitoring				
7-Jan	8-Jan	9-Jan	10-Jan	11-Jan	12-Jan	13-Jan
	Impact Dolphin Monitoring					
14-Jan	15-Jan	16-Jan	17-Jan	18-Jan	19-Jan	20-Jan
		Impact Dolphin Monitoring				
21-Jan	22-Jan	23-Jan	24-Jan	25-Jan	26-Jan	27-Jan
				Impact Dolphin Monitoring		
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 2018

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

HY/2012/08 - Tuen Mun - Chek Lap Kok Link - Northern Landfall
Impact Marine Water Quality Monitoring (WQM) Schedule (December 2017)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1/Dec	2/Dec
					ebb tide 9:02 - 12:32 flood tide 15:09 - 18:39	
3/Dec	4/Dec	5/Dec	6/Dec	7/Dec	8/Dec	9/Dec
	ebb tide 11:36 - 15:06 flood tide 6:04 - 9:34		ebb tide 13:16 - 16:46 flood tide 7:54 - 11:24		ebb tide 15:01 - 18:31 flood tide 9:44 - 13:14	
10/Dec	11/Dec	12/Dec	13/Dec	14/Dec	15/Dec	16/Dec
	ebb tide 5:19 - 8:49 flood tide 12:53 - 16:23		ebb tide 7:49 - 11:19 flood tide 14:12 - 17:42		ebb tide 9:39 - 13:09 flood tide 4:08 - 7:38	
17/Dec	18/Dec	19/Dec	20/Dec	21/Dec	22/Dec	23/Dec
	ebb tide 11:32 - 15:02 flood tide 6:15 - 9:45		ebb tide 12:40 - 16:10 flood tide 7:25 - 10:55		ebb tide 13:50 - 17:20 flood tide 8:34 - 12:04	
24/Dec	25/Dec	26/Dec	27/Dec	28/Dec	29/Dec	30/Dec
	ebb tide 16:29 - 19:59 flood tide 10:48 - 14:18		ebb tide 4:51 - 8:21 flood tide 12:24 - 15:54		ebb tide 7:27 - 10:57 flood tide 13:45 - 17:15	

Appendix F

Impact Air Quality Monitoring Results

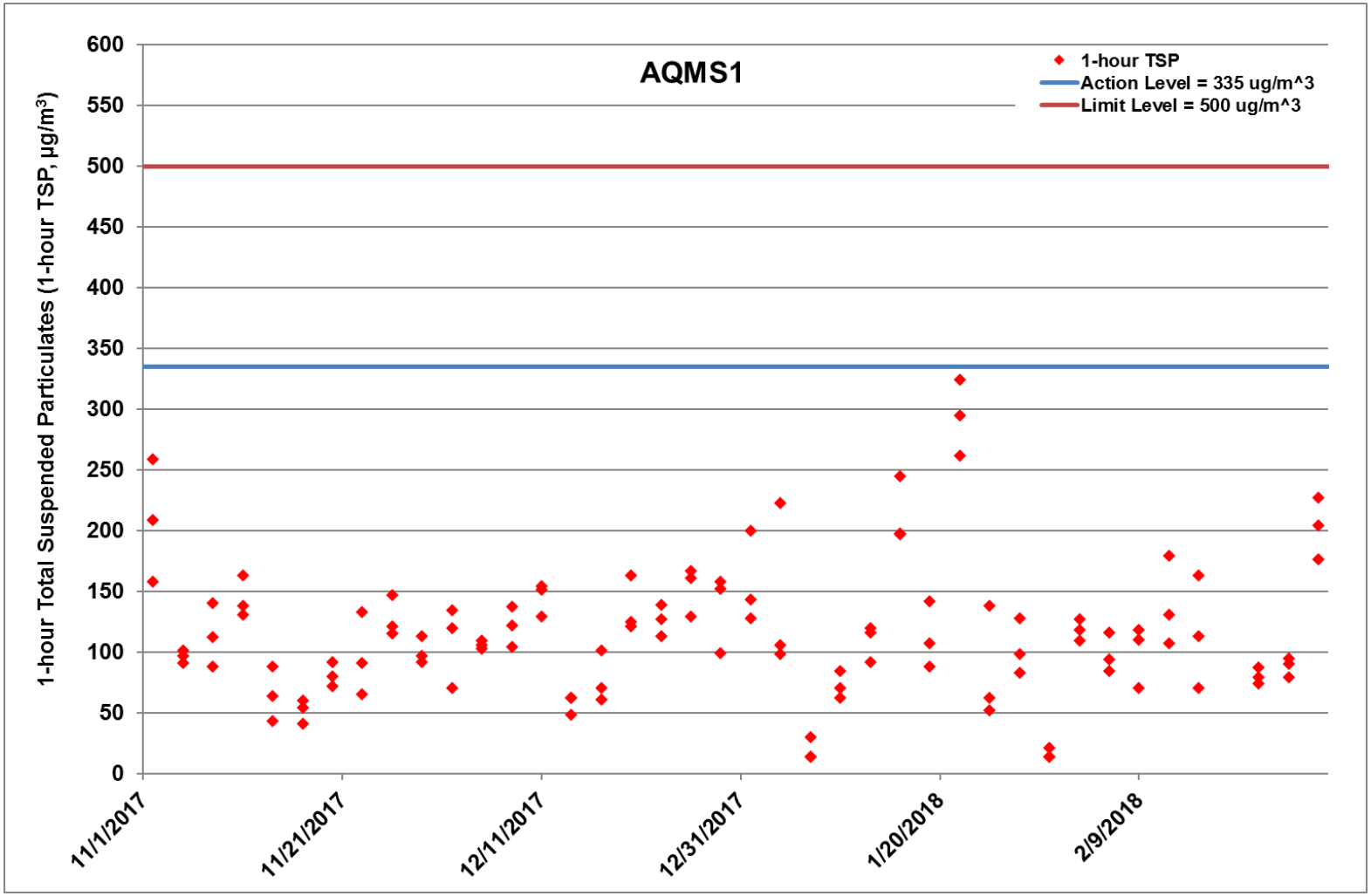


Figure F.1 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at AQMS1 between 1 November 2017 and 28 February 2018 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Box Culvert Extension, Construction of North Ventilation Building (1/11/2017 – 28/2/2018)

Ref: 0212330_Impact AQM graphs_February 2018_REV a.xlsx

ERM

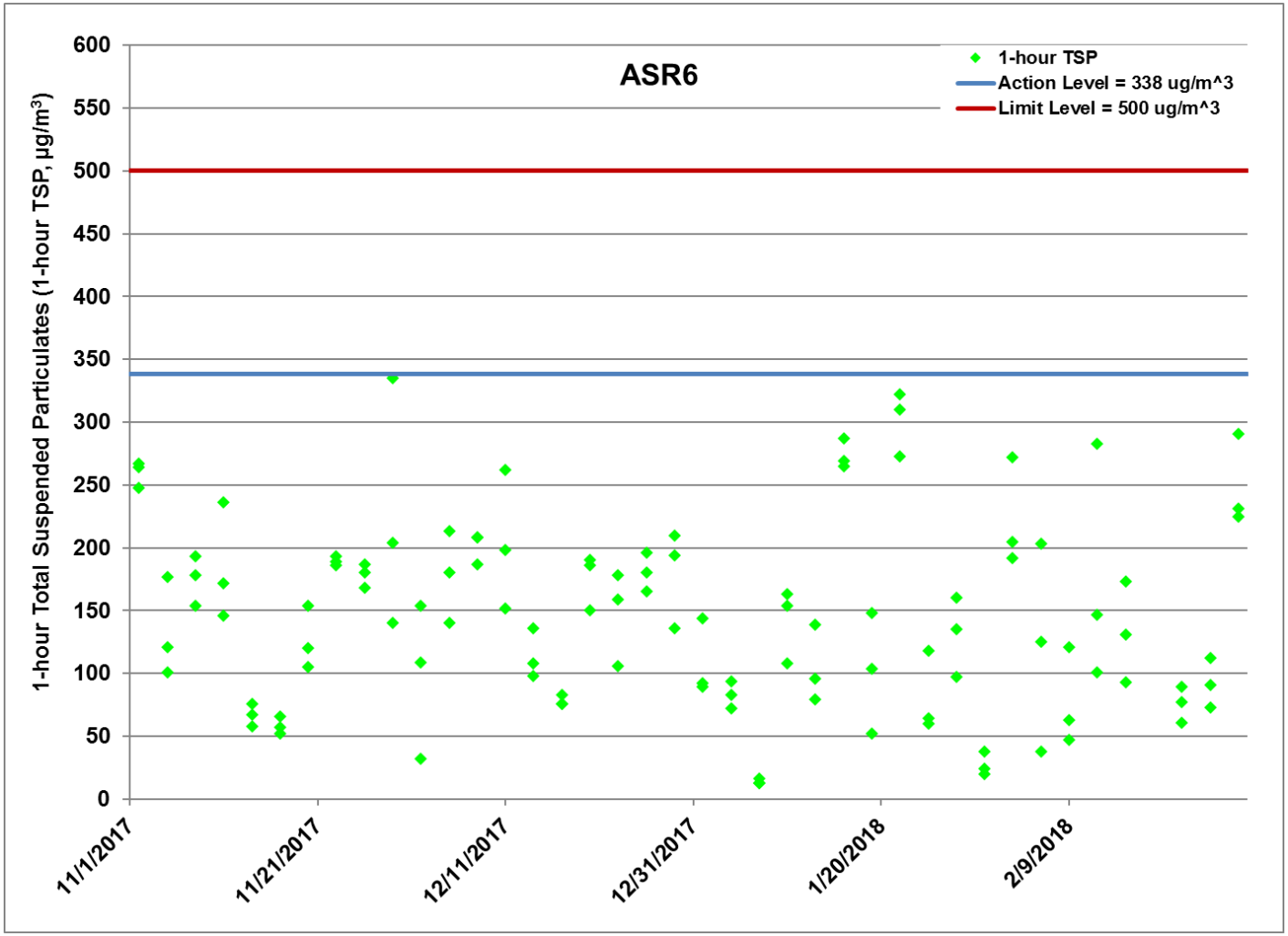


Figure F.2 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR6 between 1 November 2017 and 28 February 2018 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Box Culvert Extension, Construction of North Ventilation Building (1/11/2017 – 28/2/2018)

Ref: 0212330_Impact AQM graphs_February 2018_REV a.xlsx

ERM

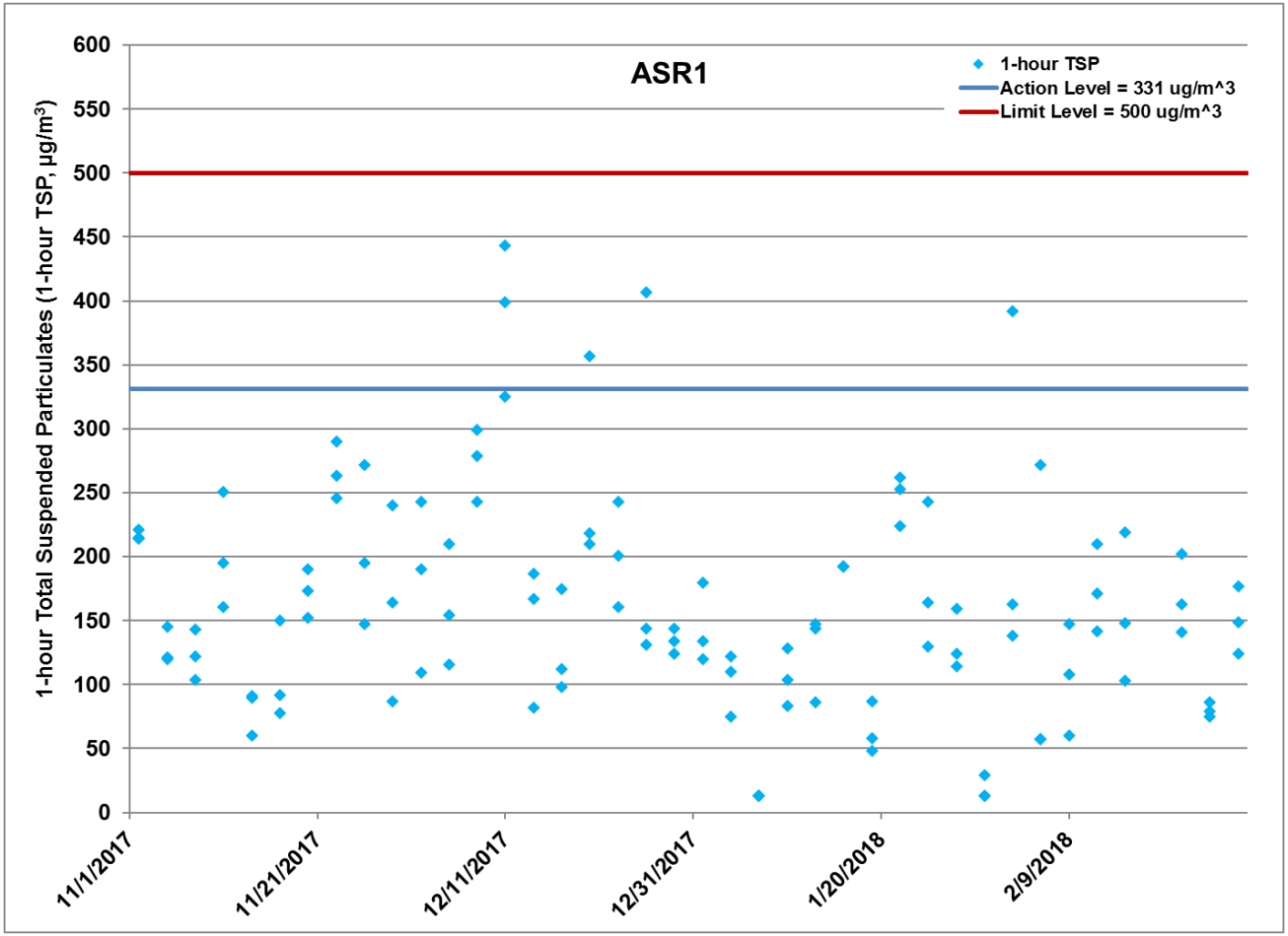


Figure F.3 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR1 between 1 November 2017 and 28 February 2018 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Box Culvert Extension, Construction of North Ventilation Building (1/11/2017 – 28/2/2018)

Ref: 0212330_Impact AQM graphs_February 2018_REV a.xlsx

ERM

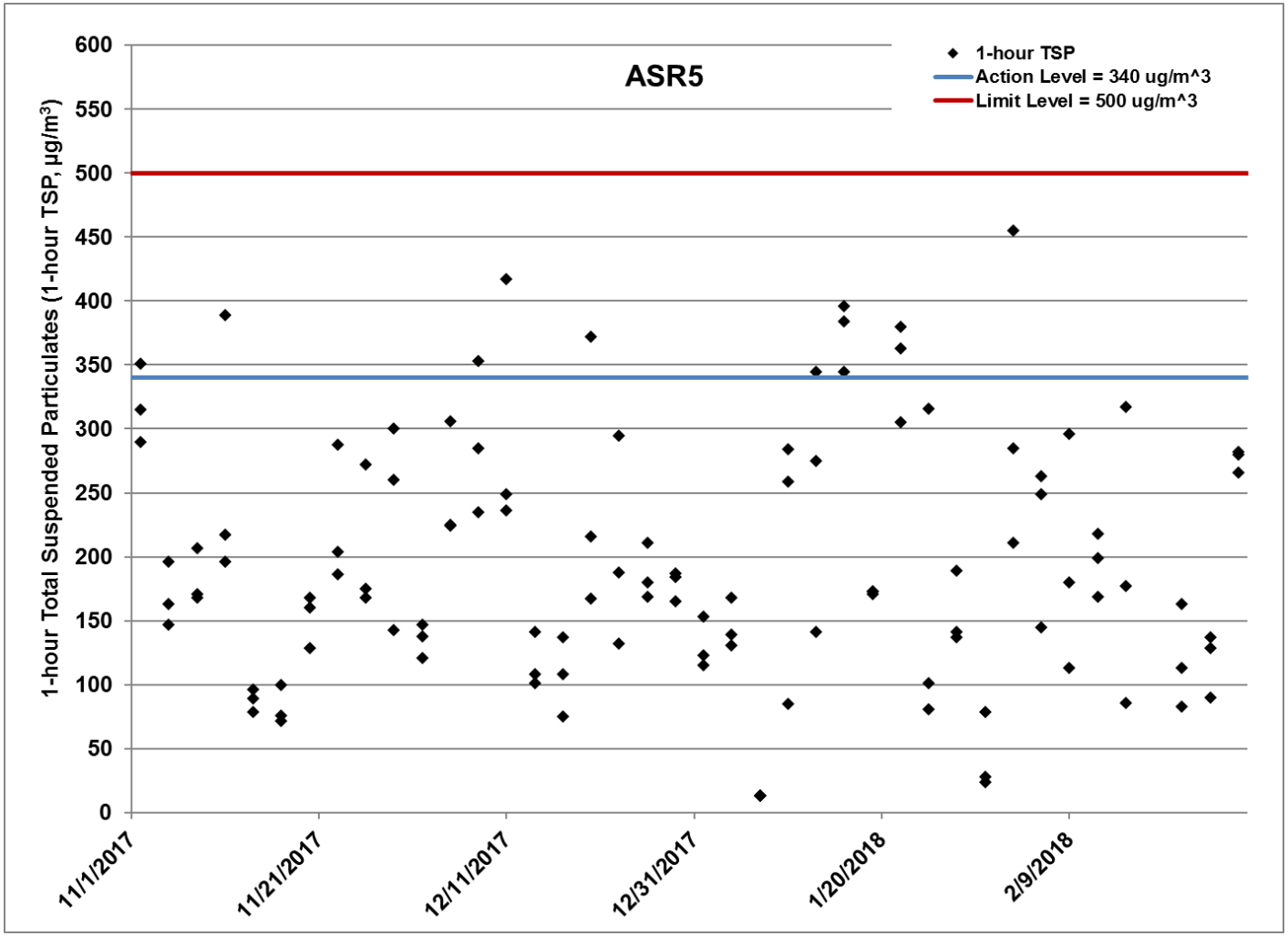


Figure F.4 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR5 between 1 November 2017 and 28 February 2018 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Box Culvert Extension, Construction of North Ventilation Building (1/11/2017 – 28/2/2018)

Ref: 0212330_Impact AQM graphs_February 2018_REV a.xlsx

ERM

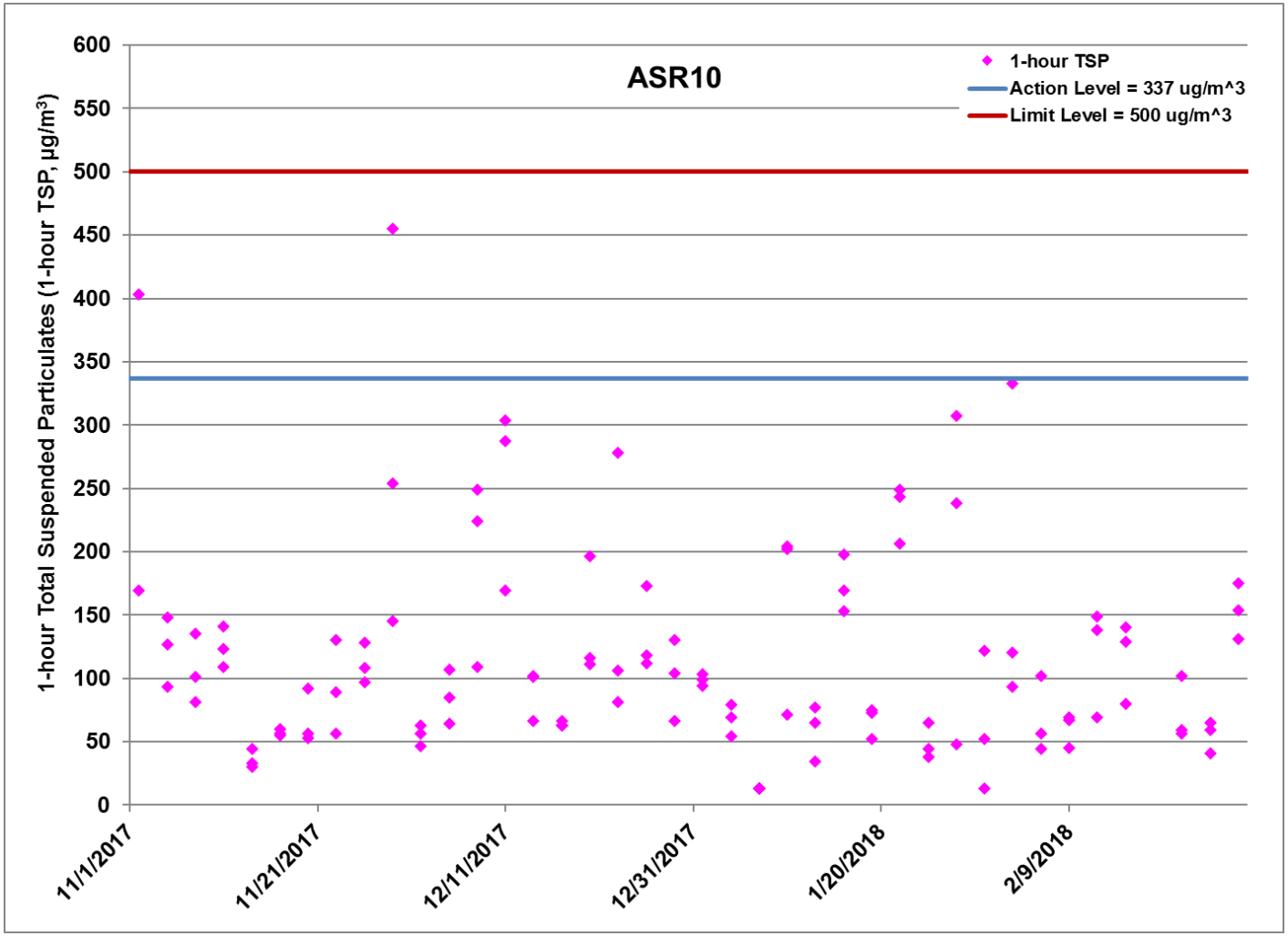


Figure F.5 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR10 between 1 November 2017 and 28 February 2018 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Box Culvert Extension, Construction of North Ventilation Building (1/11/2017 – 28/2/2018)

Ref: 0212330_Impact AQM graphs_February 2018_REV a.xlsx

ERM

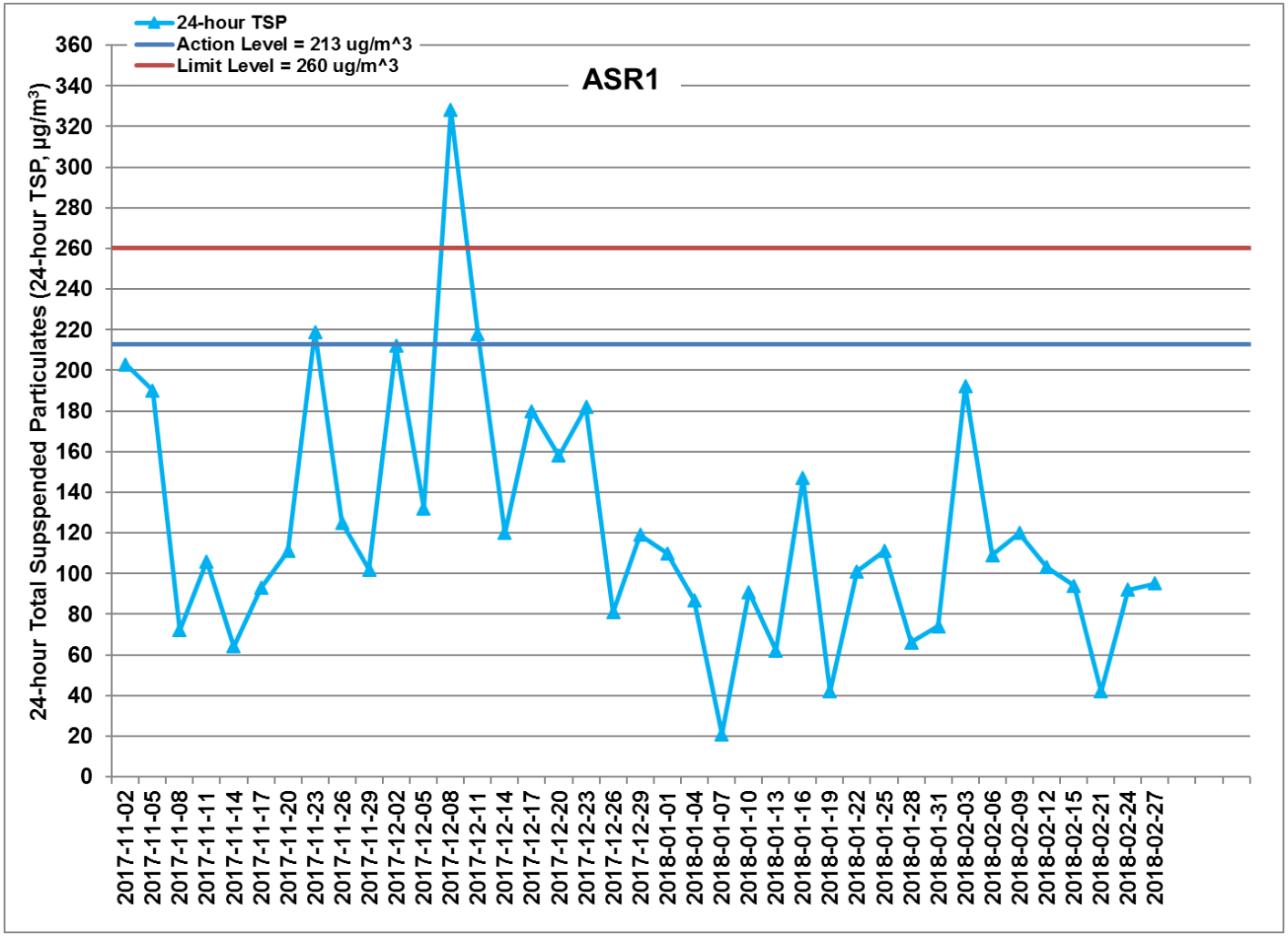


Figure F.6 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR1 between 1 November 2017 and 28 February 2018 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Box Culvert Extension, Construction of North Ventilation Building (1/11/2017 – 28/2/2018)

Ref: 0212330_Impact AQM graphs_February 2018_REV a.xlsx

ERM

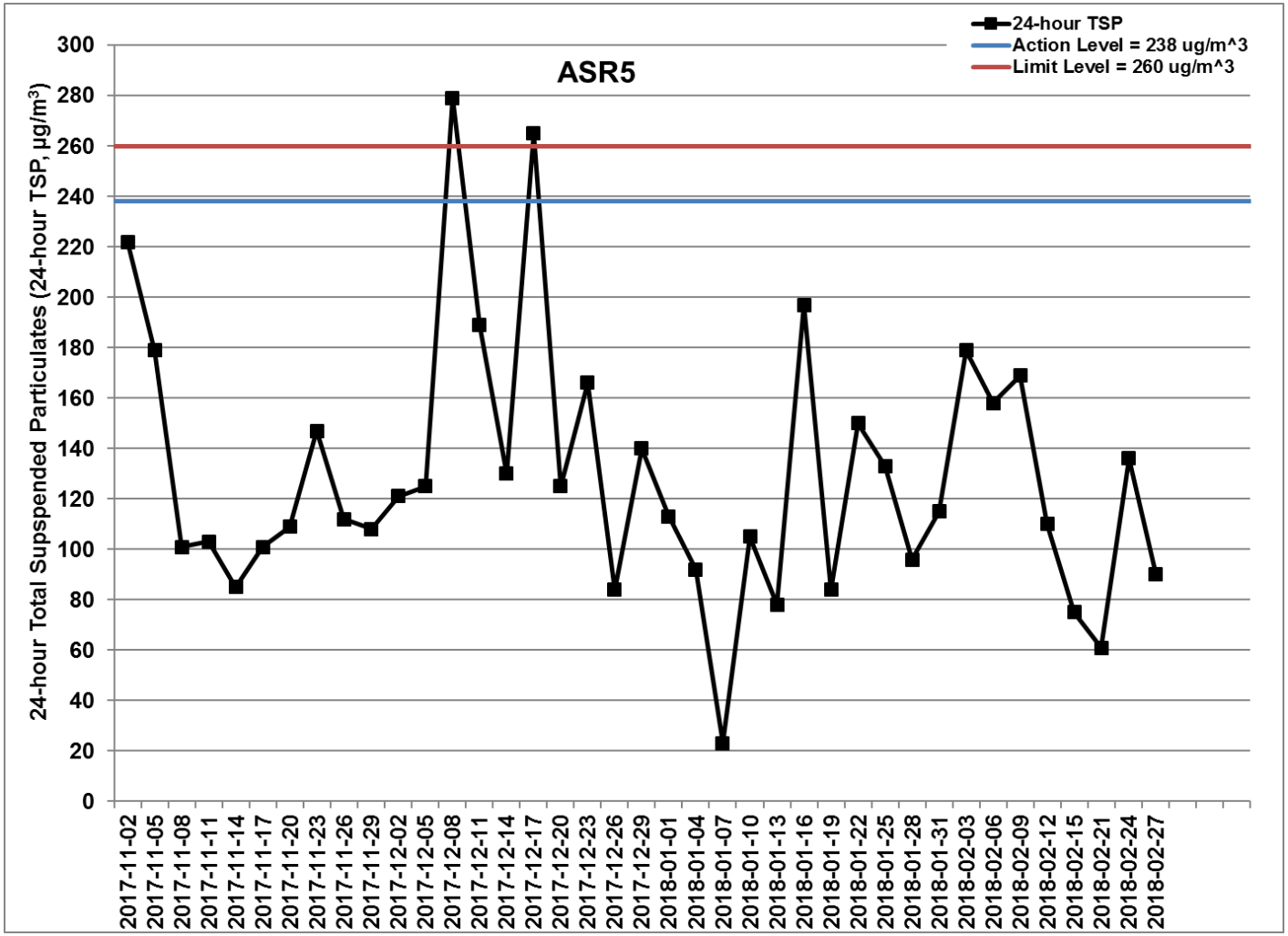


Figure F.7 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR5 between 1 November 2017 and 28 February 2018 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Box Culvert Extension, Construction of North Ventilation Building (1/11/2017 – 28/2/2018)

Ref: 0212330_Impact AQM graphs_February 2018_REV a.xlsx

ERM

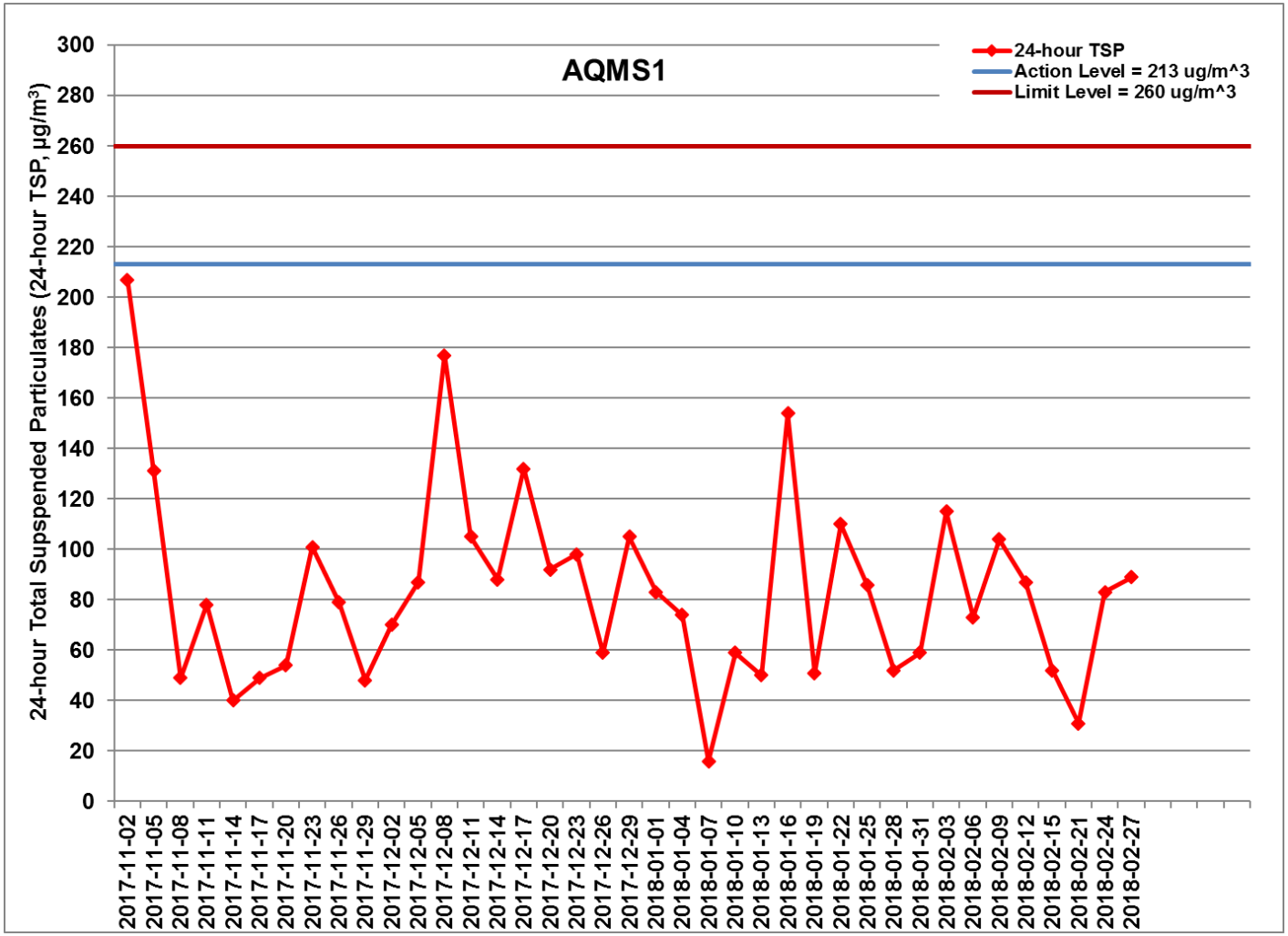


Figure F.8 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at AQMS1 between 1 November 2017 and 28 February 2018 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Box Culvert Extension, Construction of North Ventilation Building (1/11/2017 – 28/2/2018)

Ref: 0212330_Impact AQM graphs_February 2018_REV a.xlsx

ERM

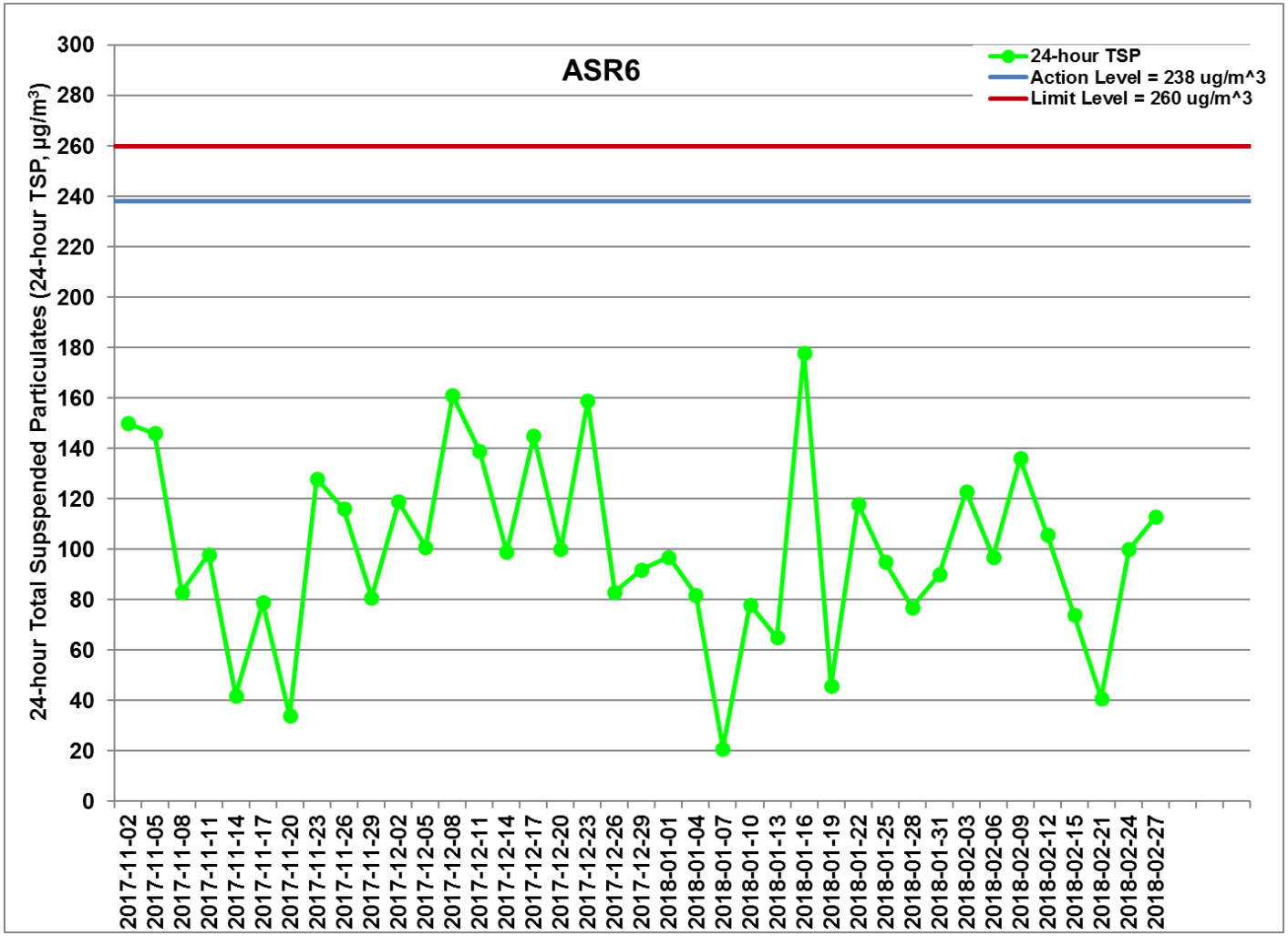


Figure F.9 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR6 between 1 November 2017 and 28 February 2018 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Box Culvert Extension, Construction of North Ventilation Building (1/11/2017 – 28/2/2018)

Ref: 0212330_Impact AQM graphs_February 2018_REV a.xlsx

ERM

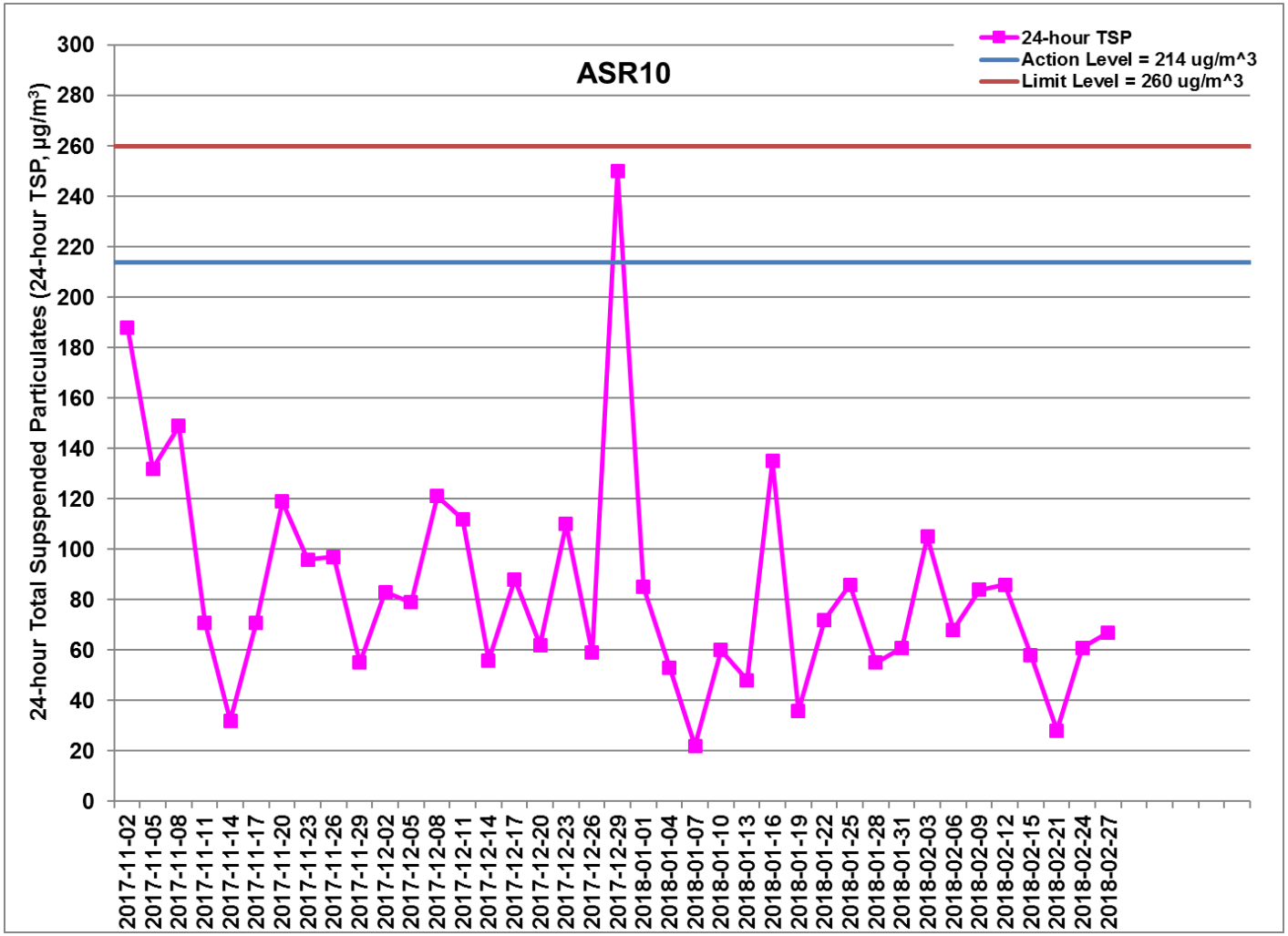


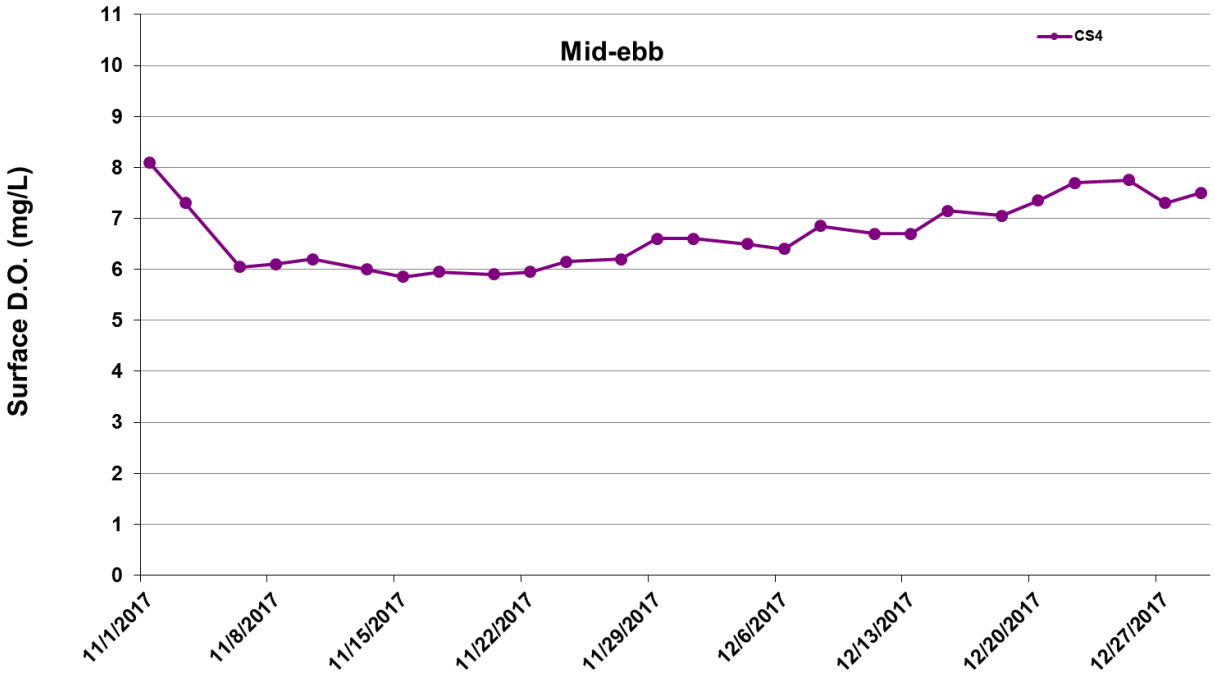
Figure F.10 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR10 between 1 November 2017 and 28 February 2018 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Box Culvert Extension, Construction of North Ventilation Building (1/11/2017 – 28/2/2018)

Ref: 0212330_Impact AQM graphs_February 2018_REV a.xlsx

ERM

Appendix G

Impact Water Quality Monitoring Results



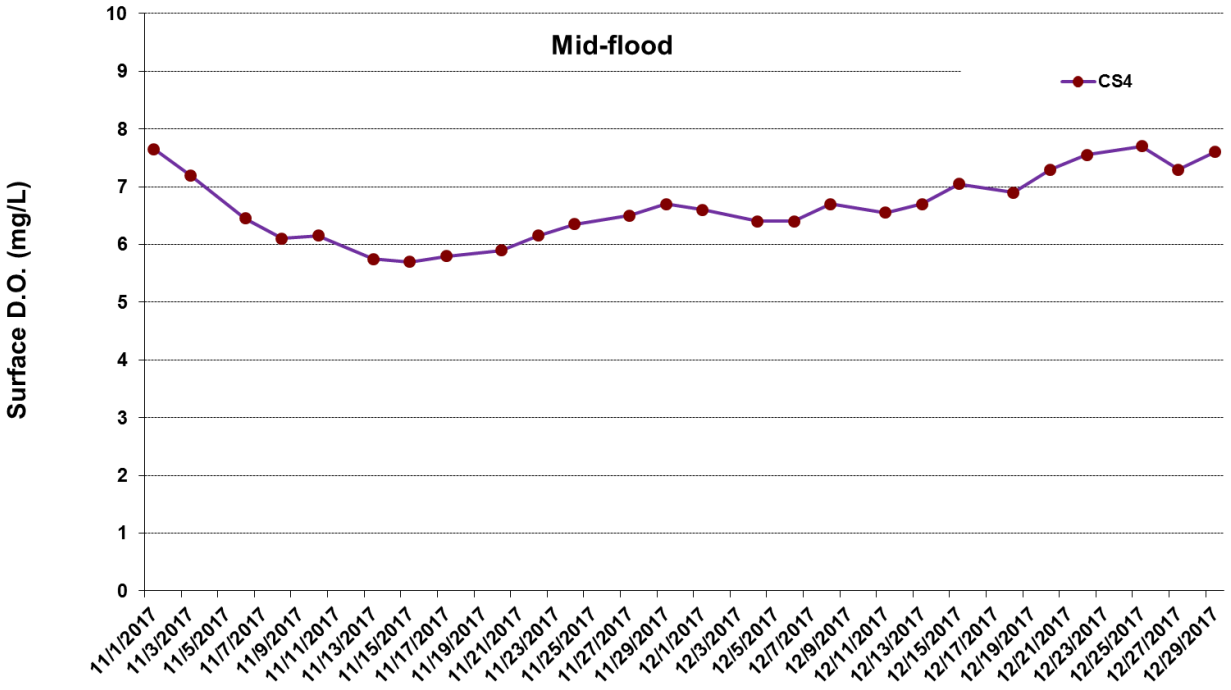
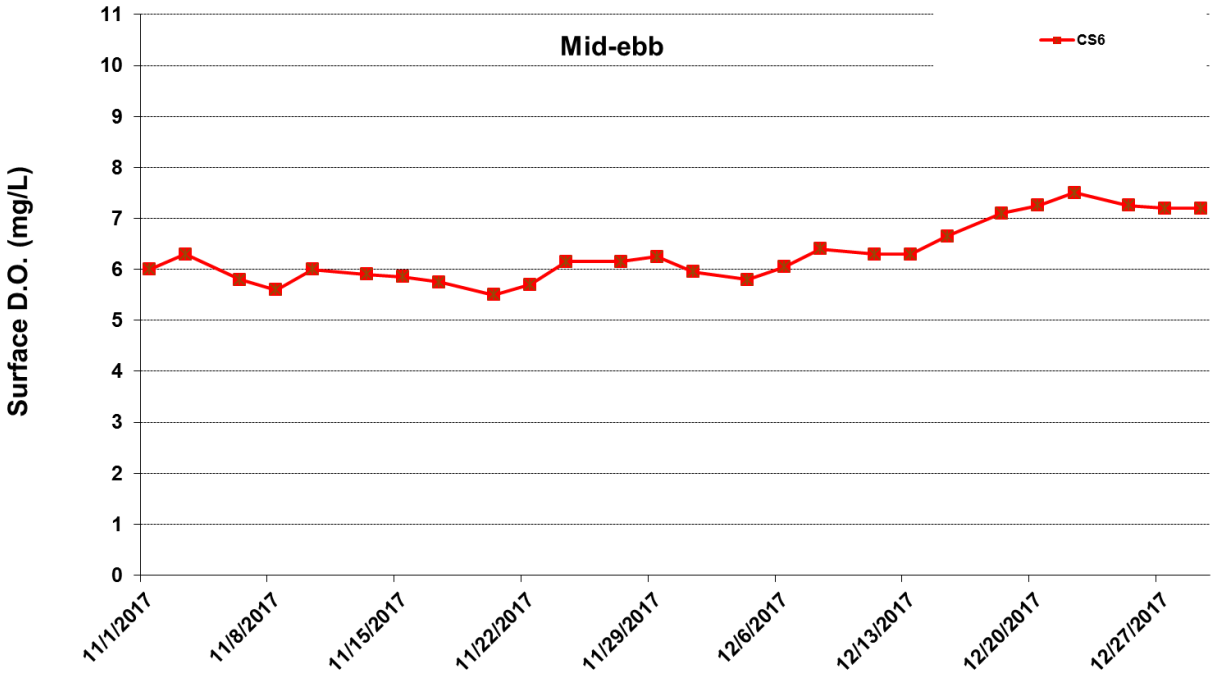


Figure G.1 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 November 2017 and 31 December 2017 at CS4. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



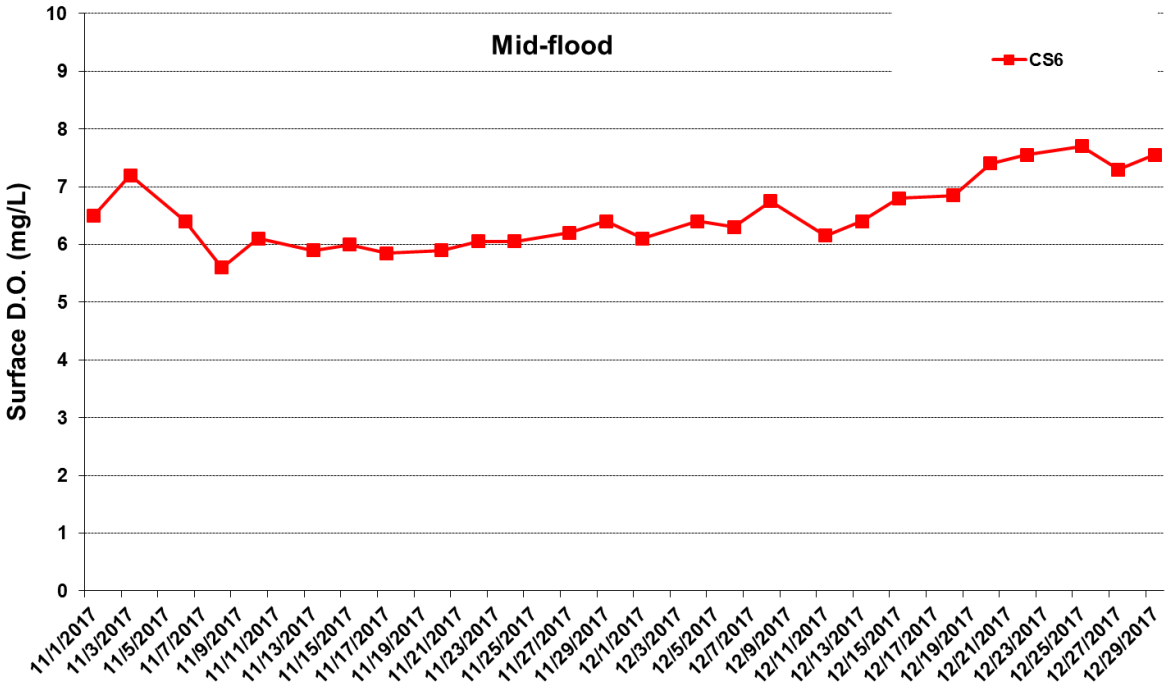
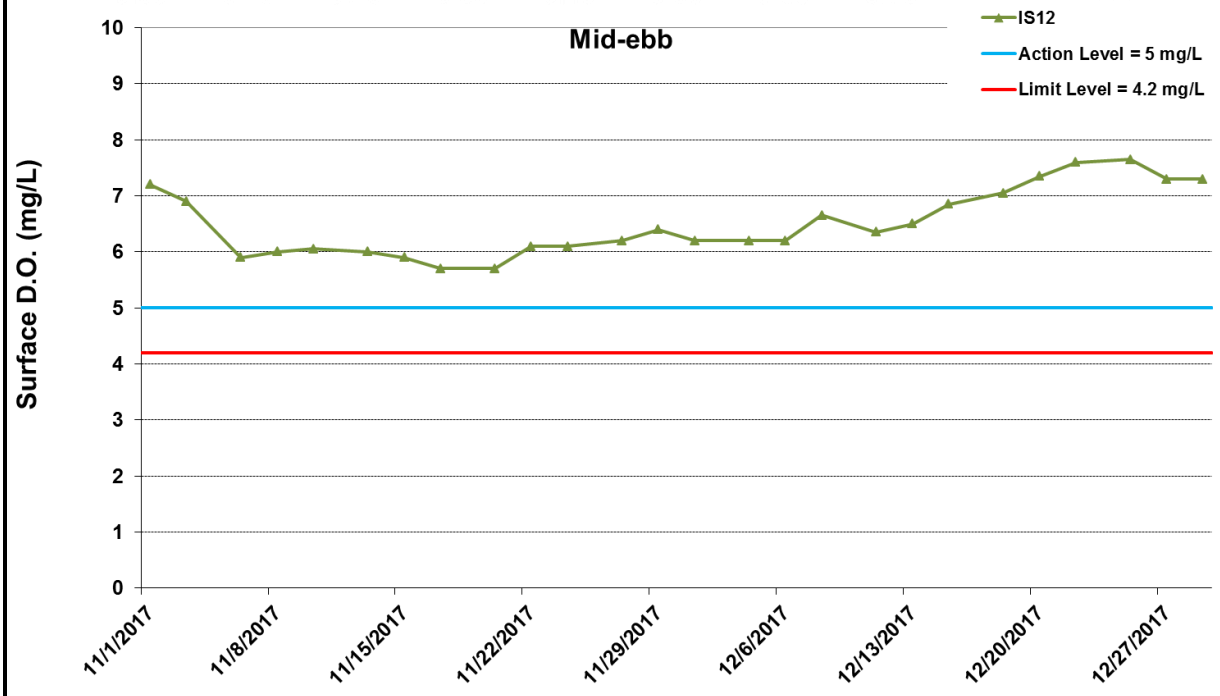


Figure G.2 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 November 2017 and 31 December 2017 at CS4. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



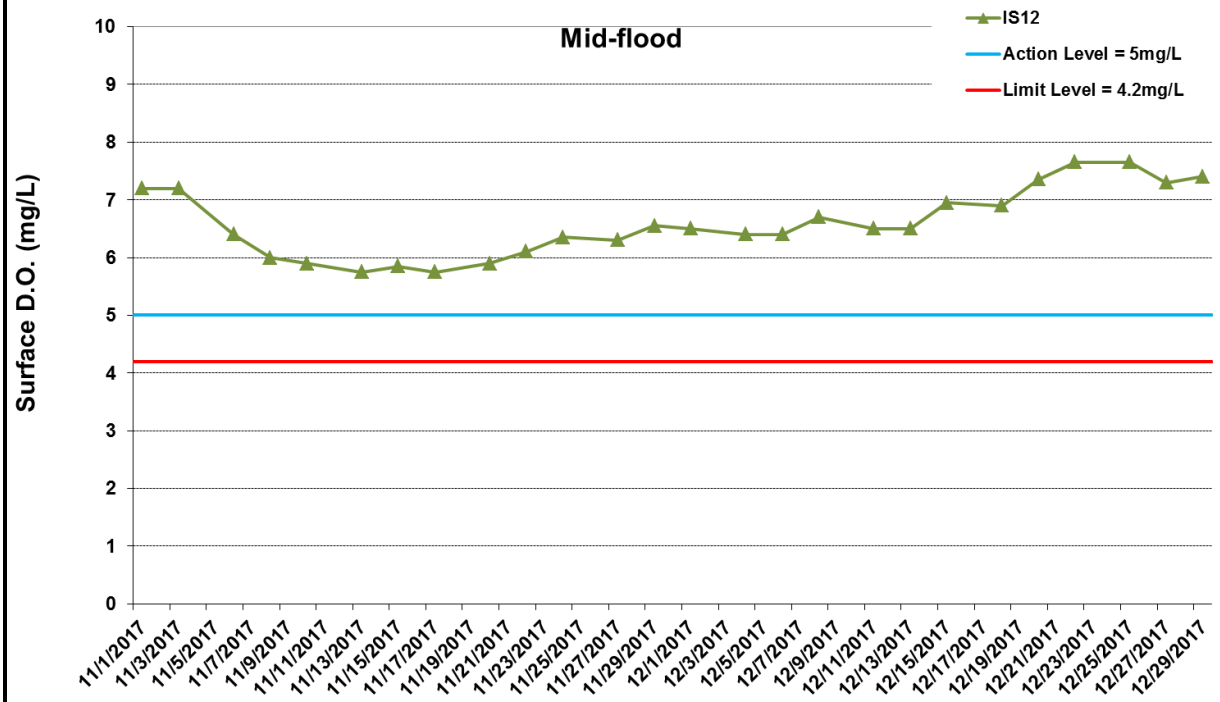
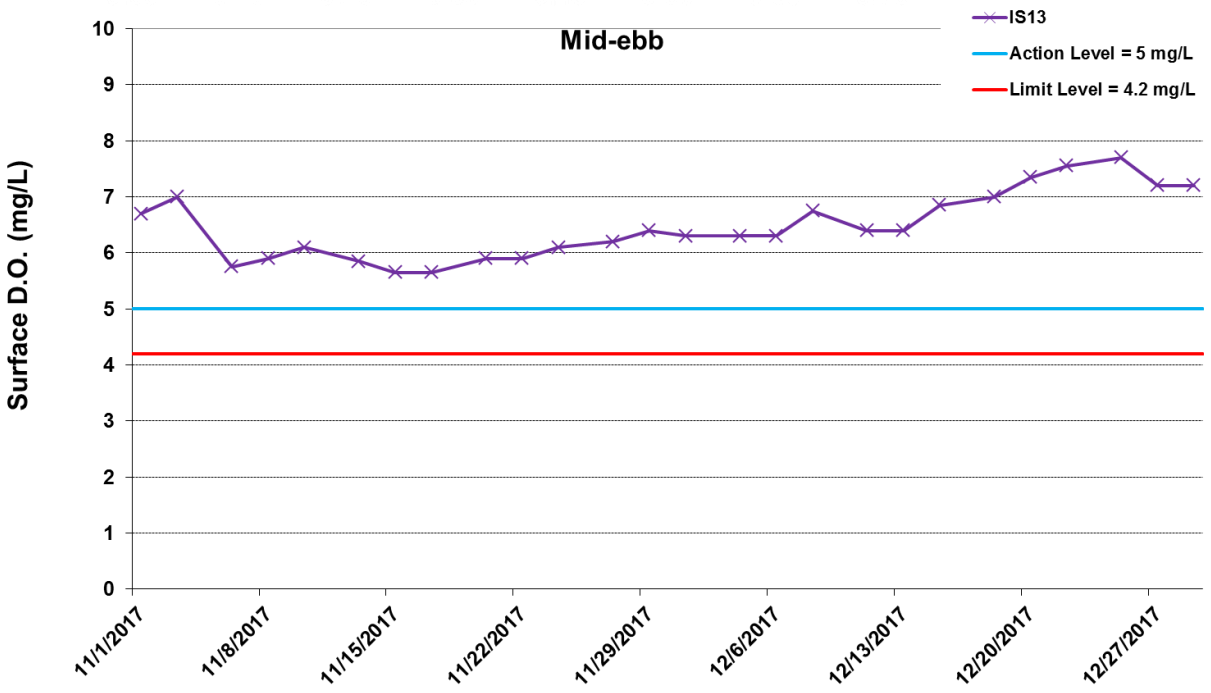


Figure G.3 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 November 2017 and 31 December 2017 at IS12. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



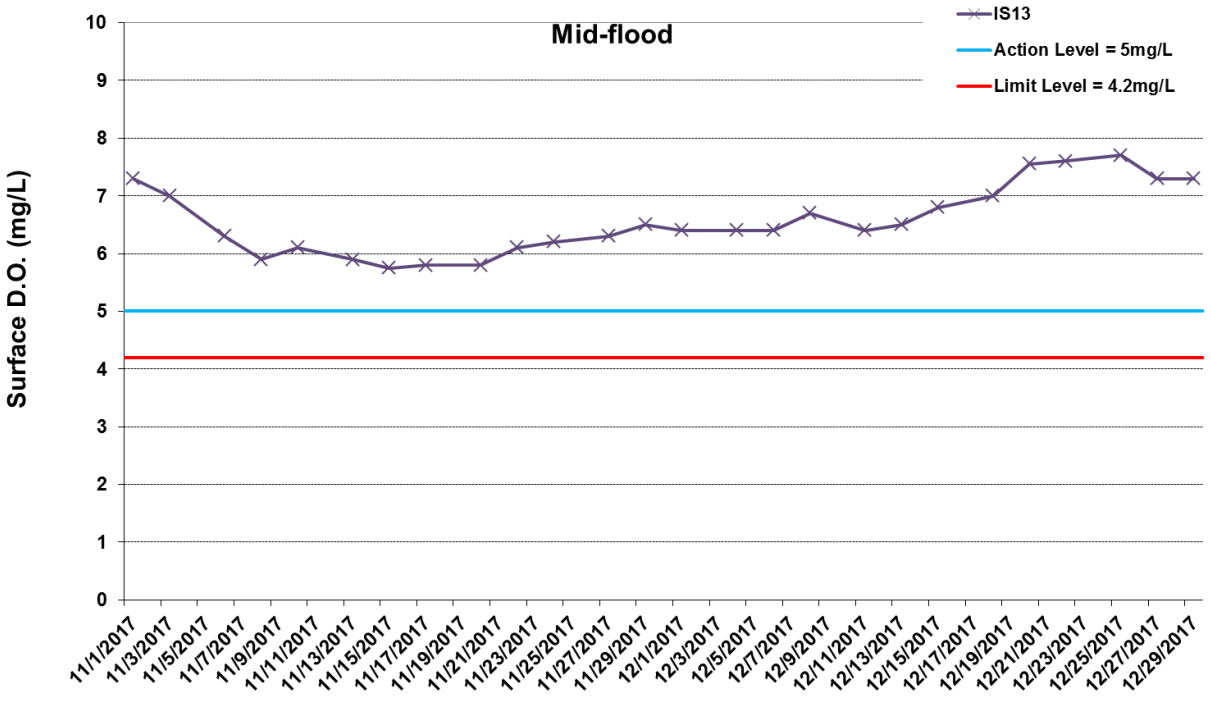
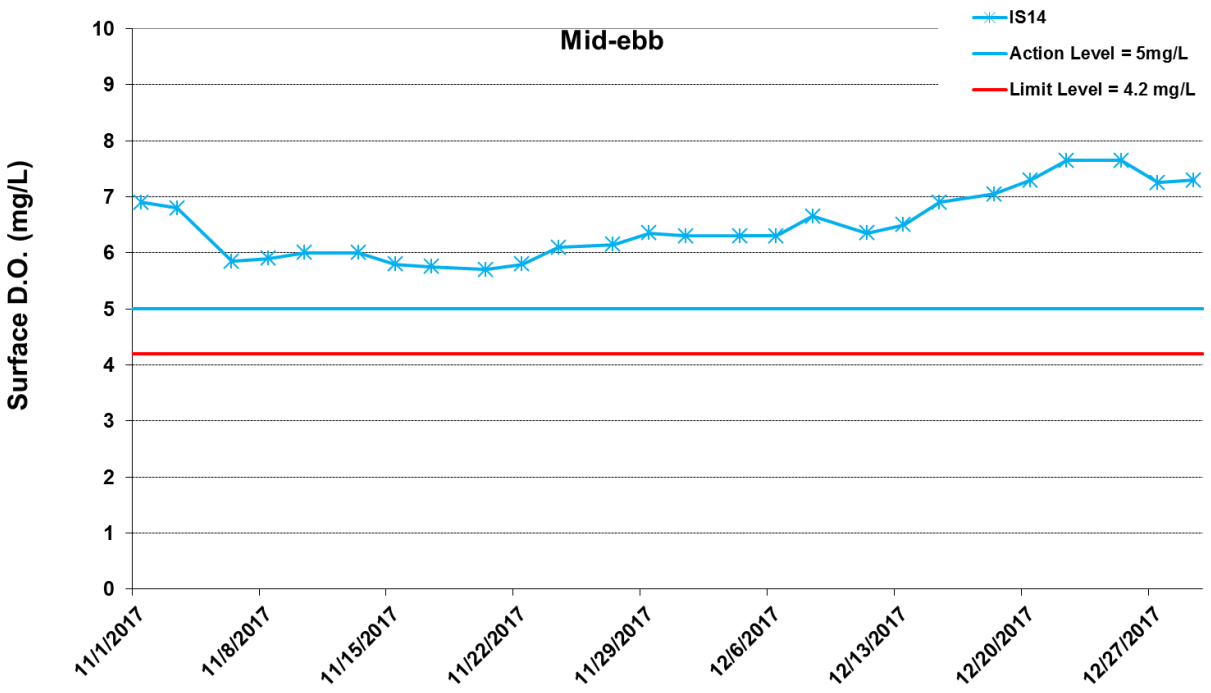


Figure G.4 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 November 2017 and 31 December 2017 at IS13. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



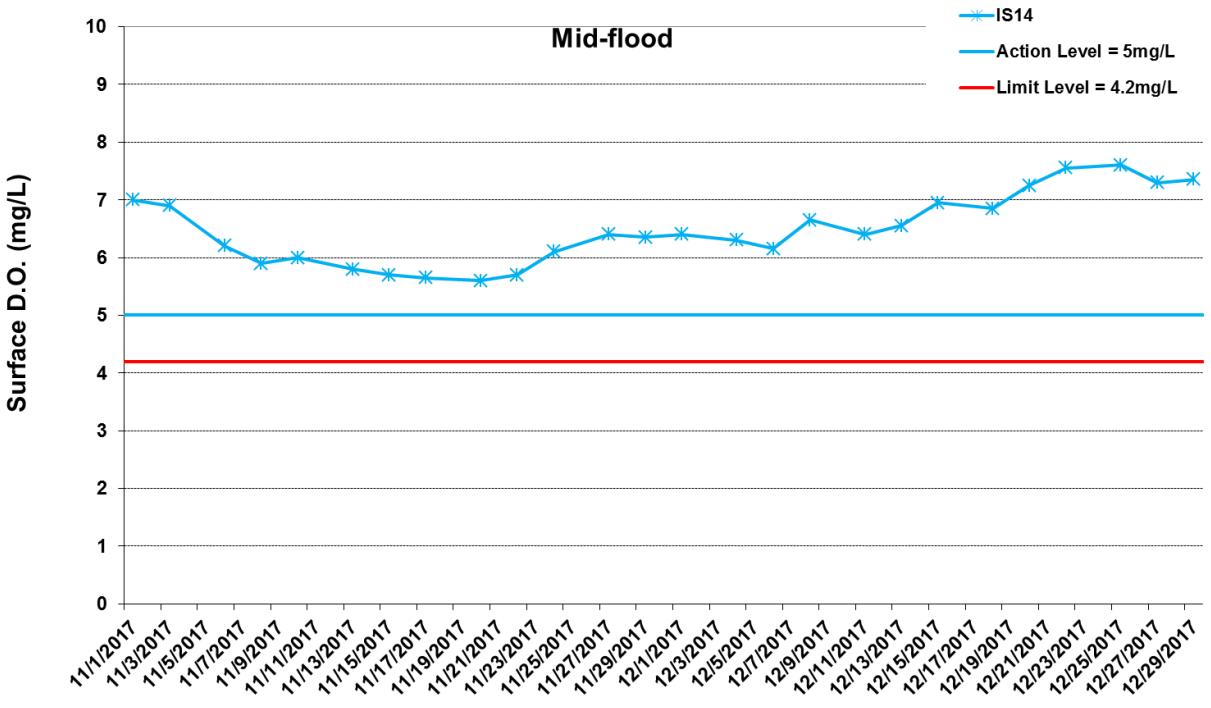
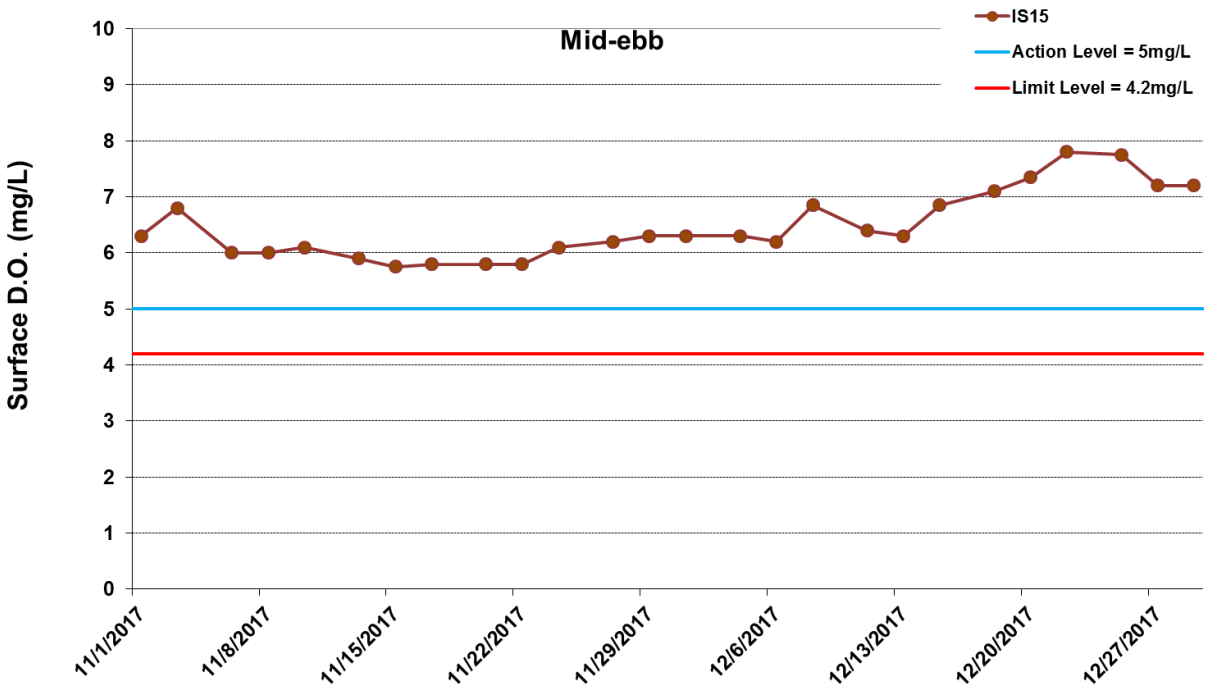


Figure G.5 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 November 2017 and 31 December 2017 at IS14. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



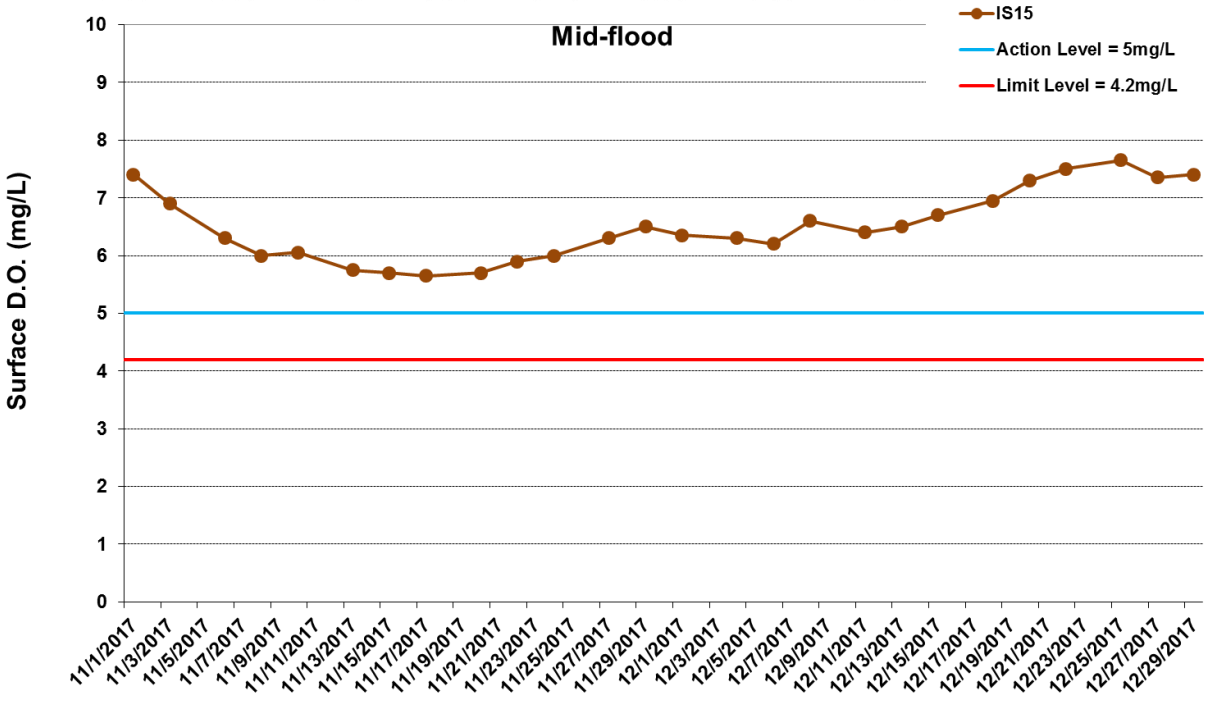
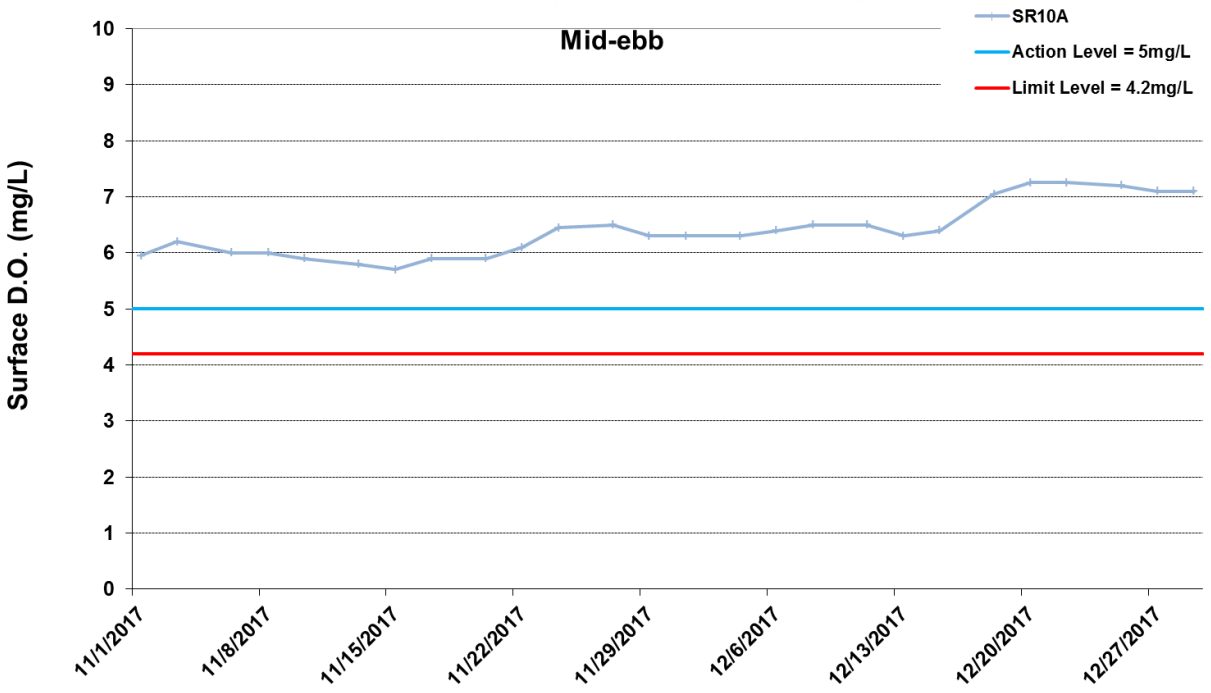


Figure G.6 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 November 2017 and 31 December 2017 at IS15. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



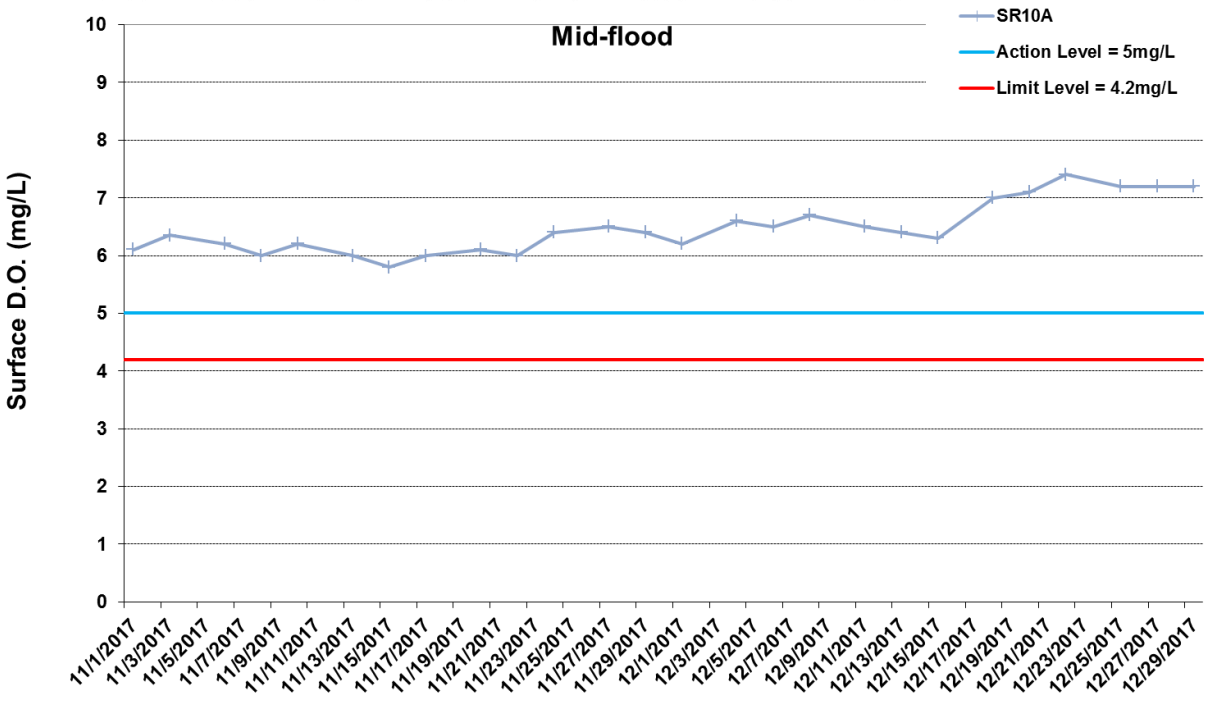
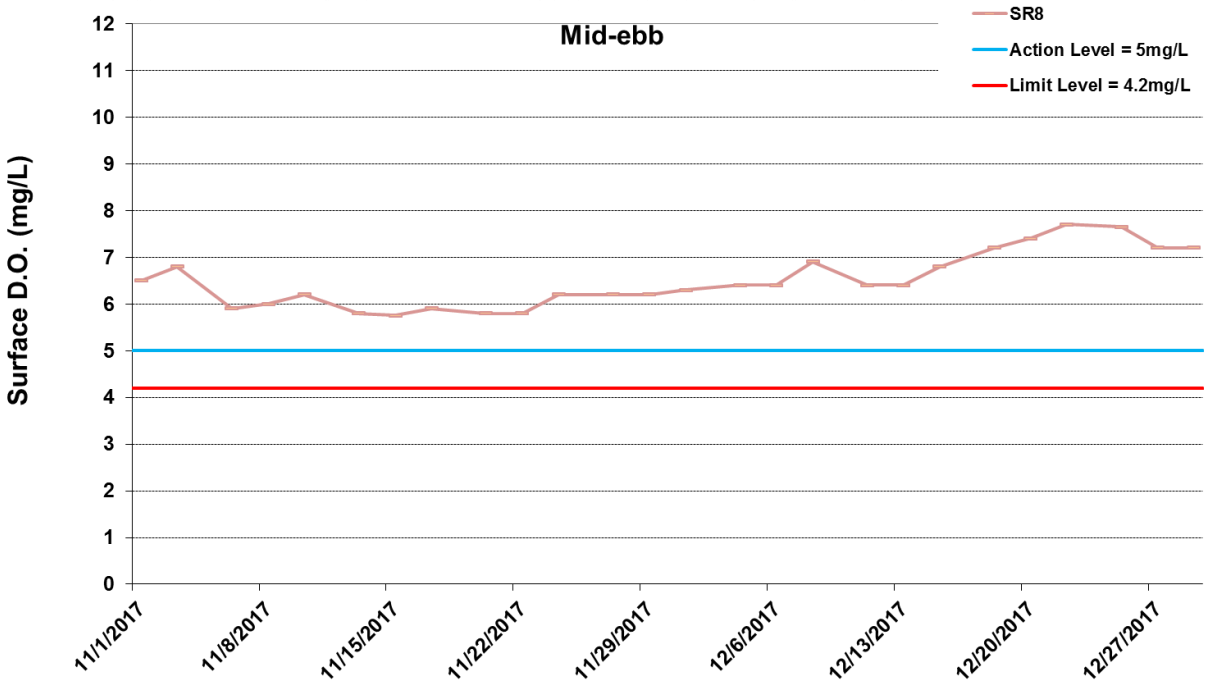


Figure G.7 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 November 2017 and 31 December 2017 at SR10A. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



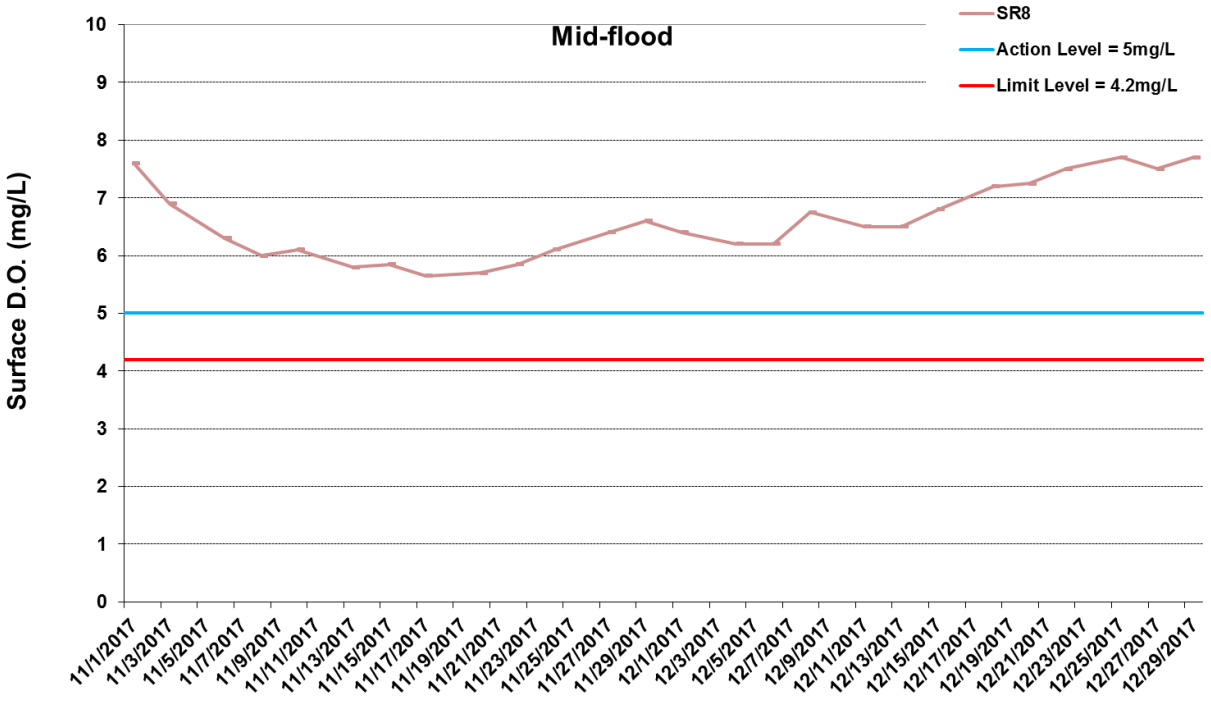
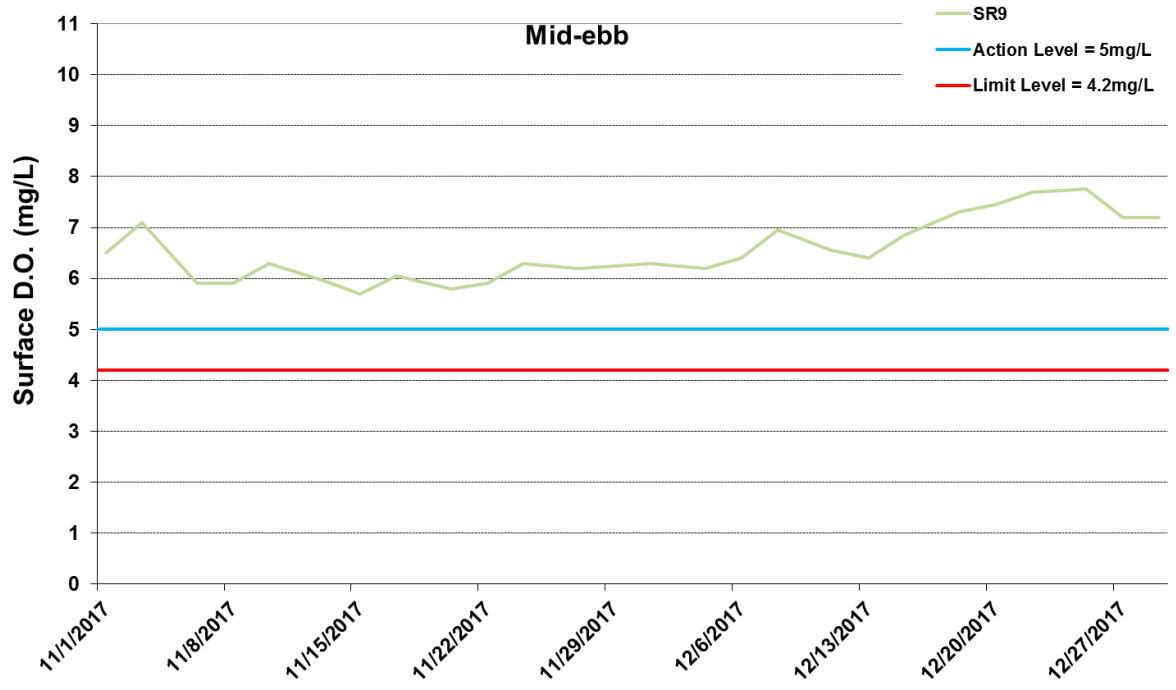


Figure G.8 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 November 2017 and 31 December 2017 at SR8. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



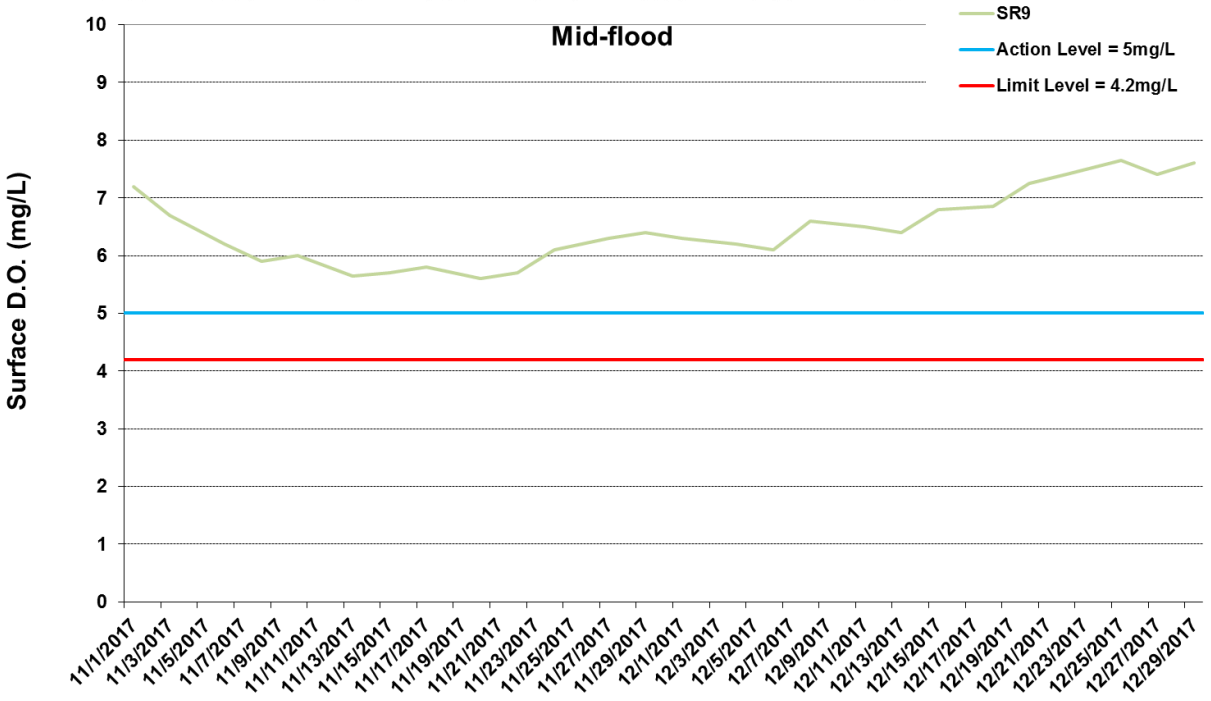
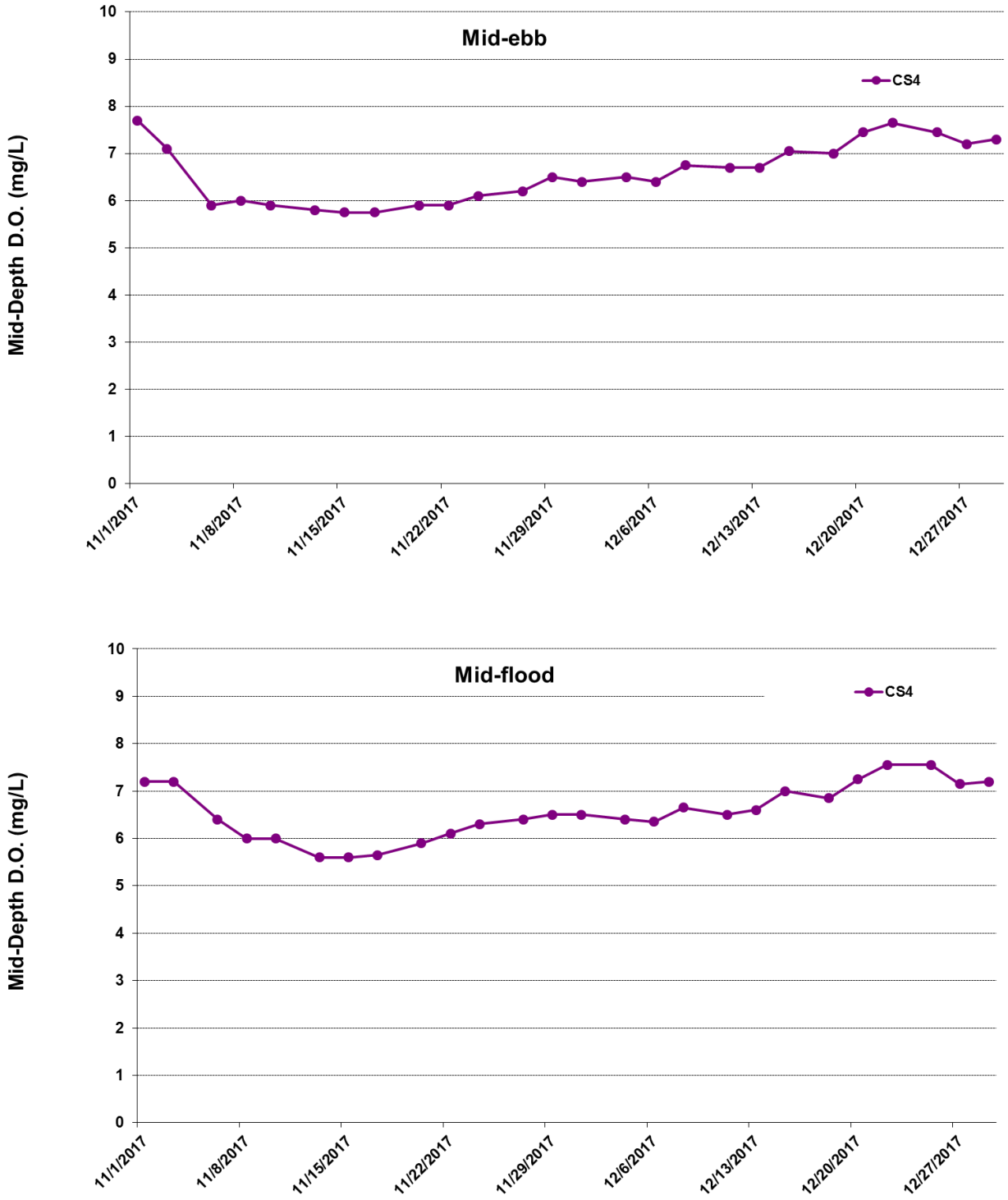


Figure G.9 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 November 2017 and 31 December 2017 at SR9. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

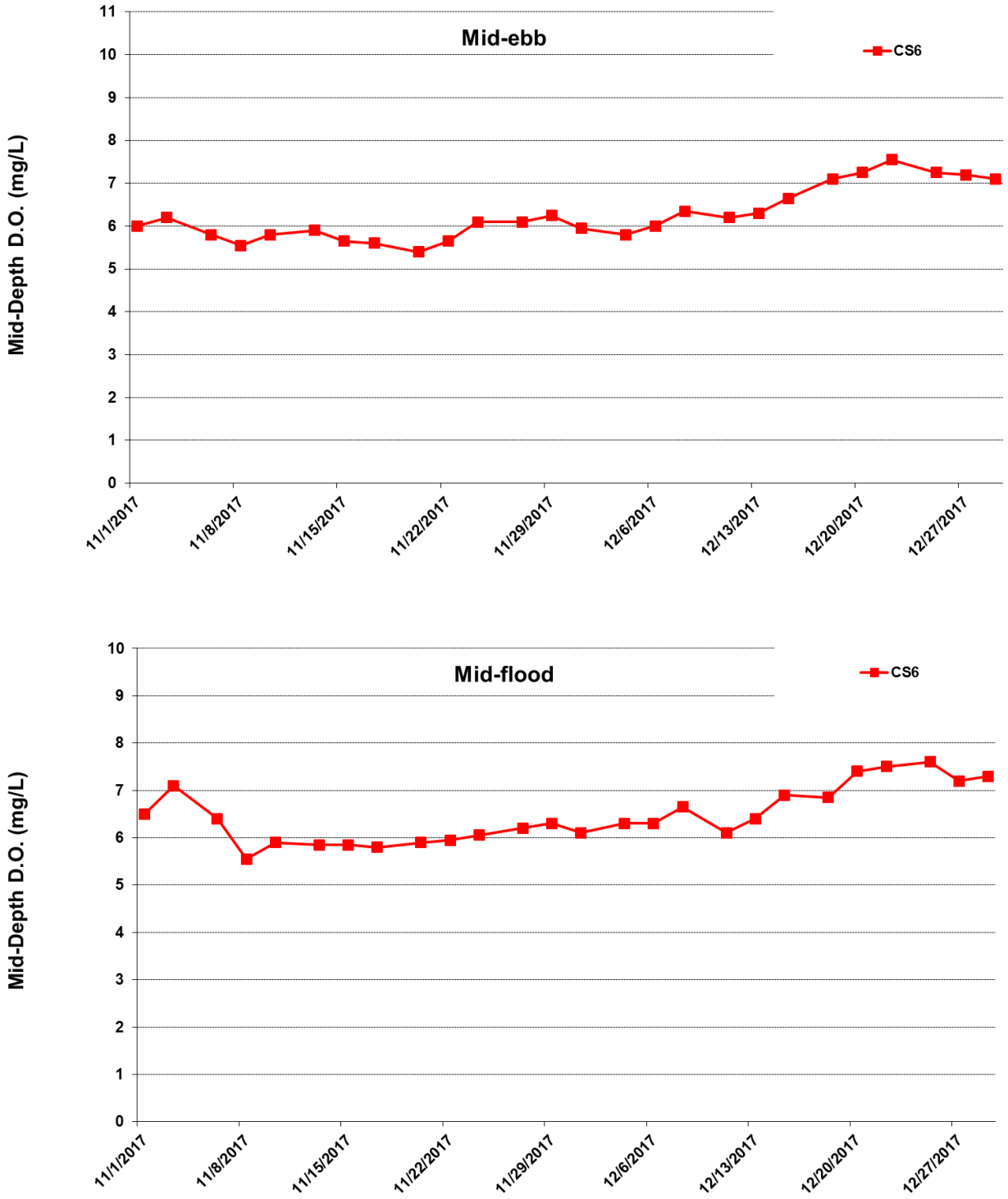
Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G.10 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 November 2017 and 31 December 2017 at CS4. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

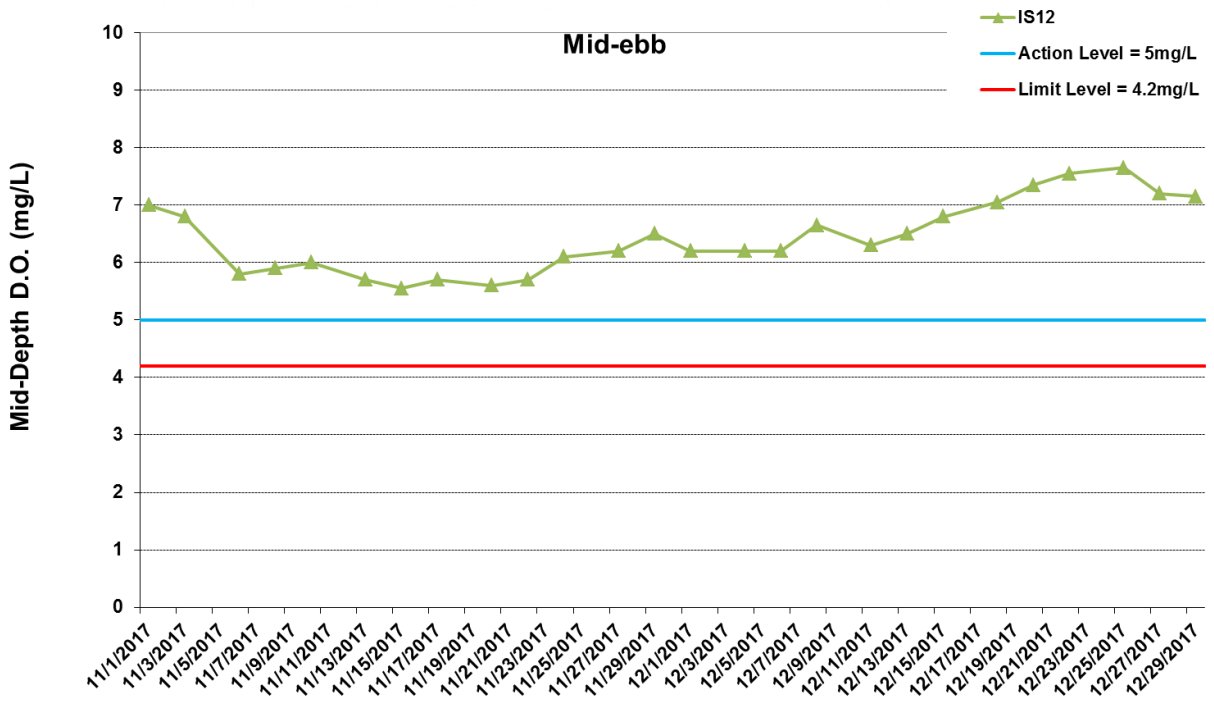
Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls

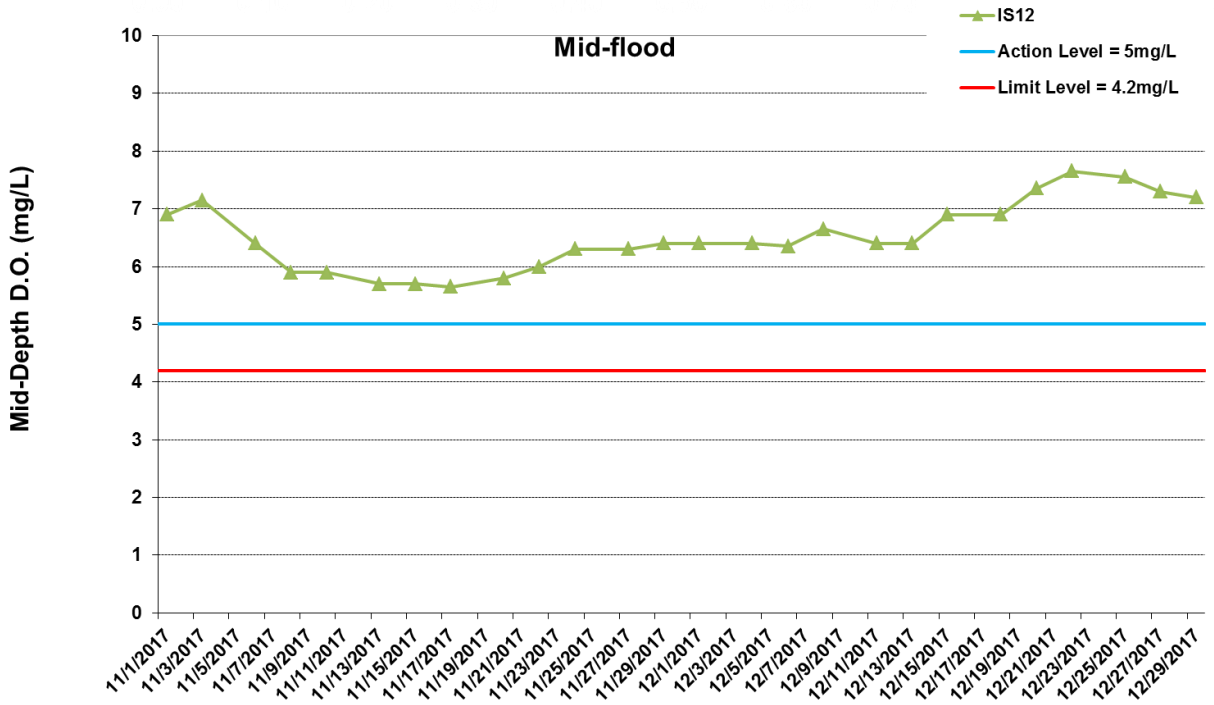


*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G.11 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 November 2017 and 31 December 2017 at CS6. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls

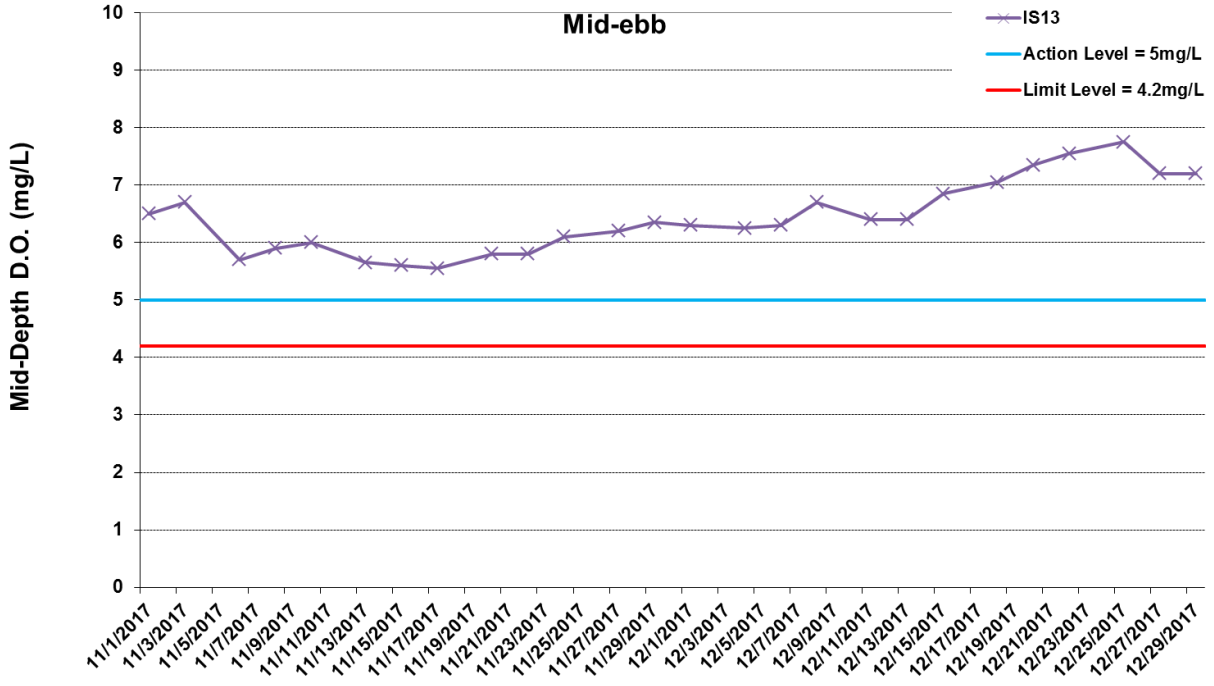


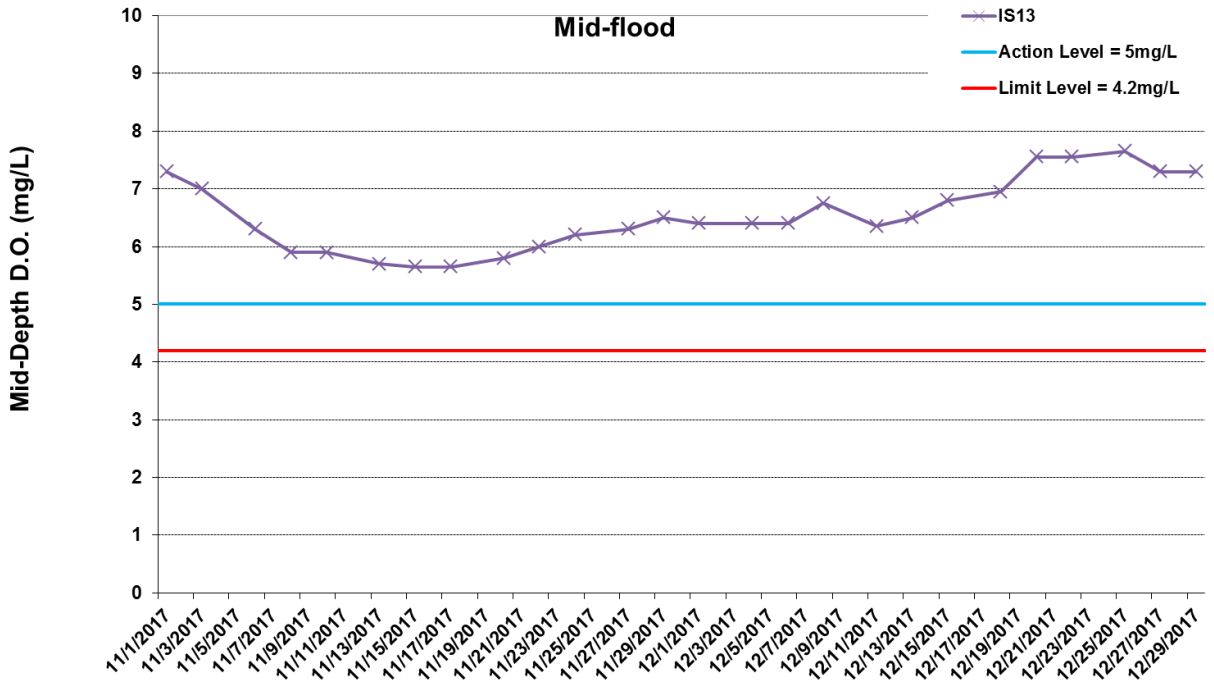


*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G.12 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 November 2017 and 31 December 2017 at IS12. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls

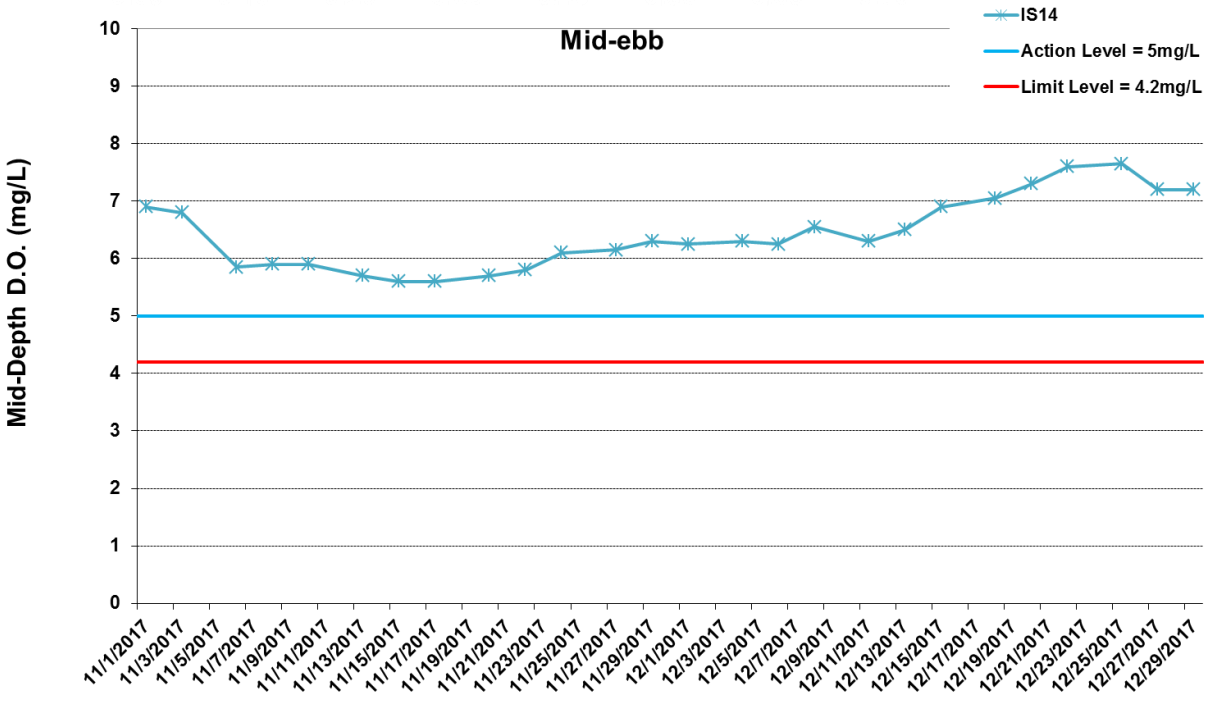


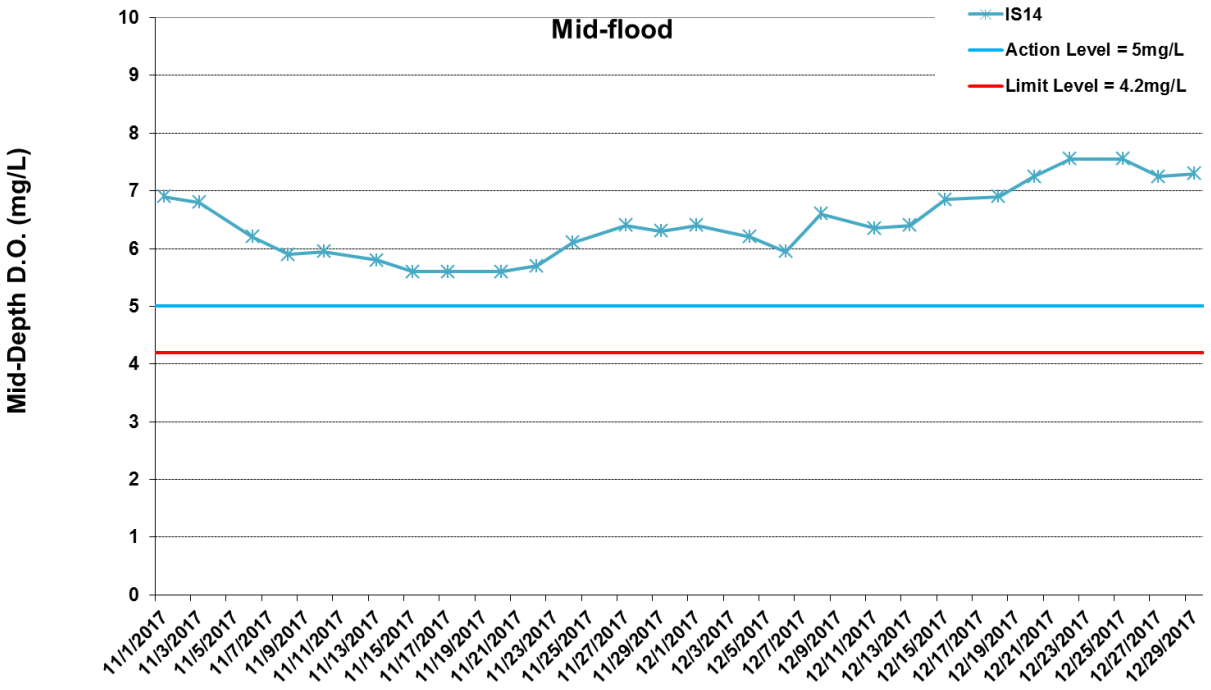


*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G.13 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 November 2017 and 31 December 2017 at IS13. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls

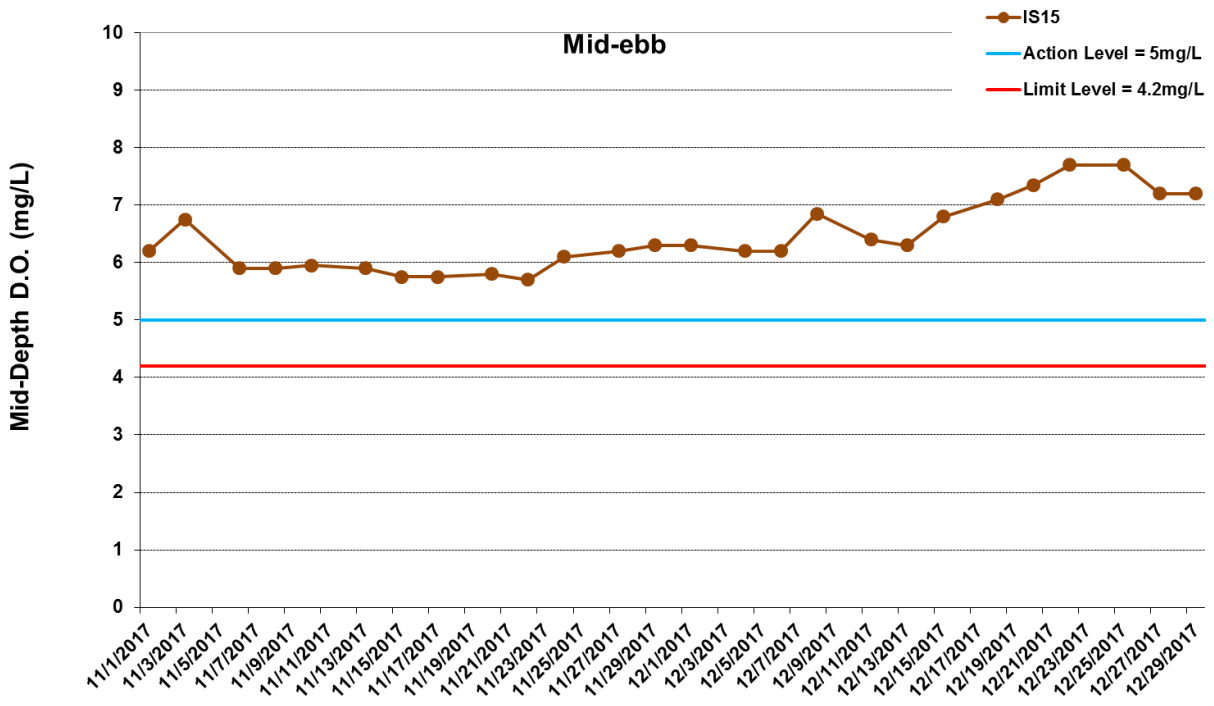


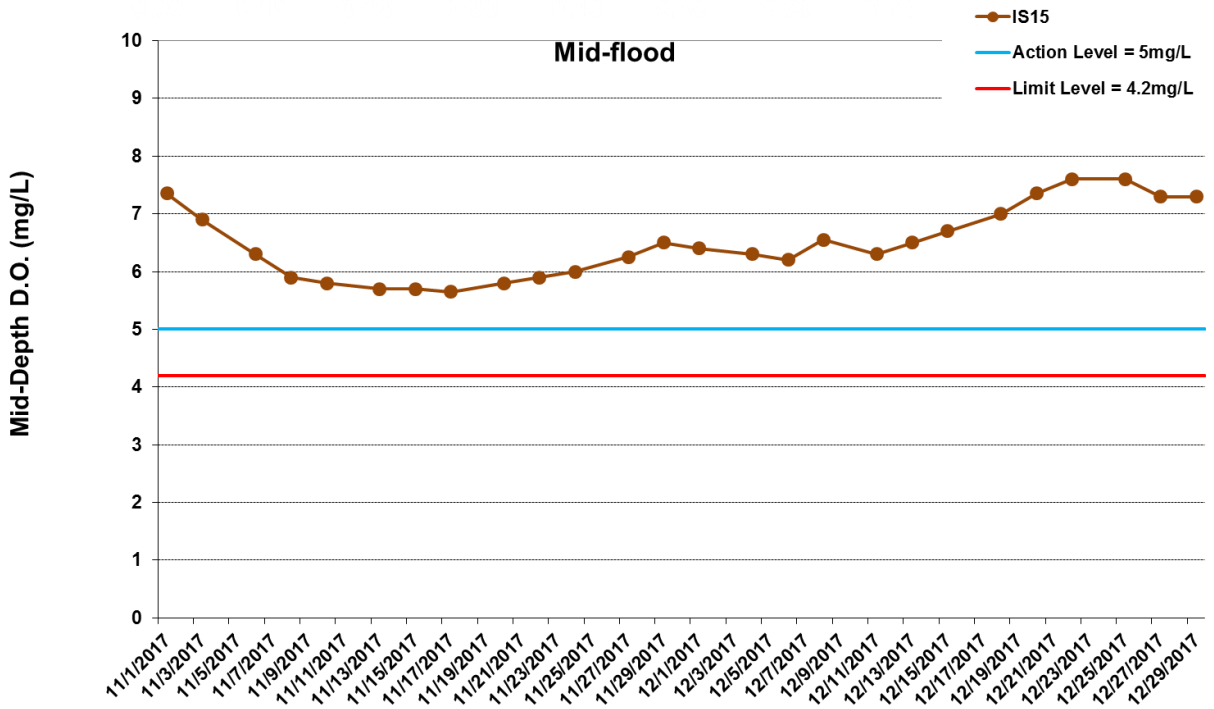


*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G.14 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 November 2017 and 31 December 2017 at IS14. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls

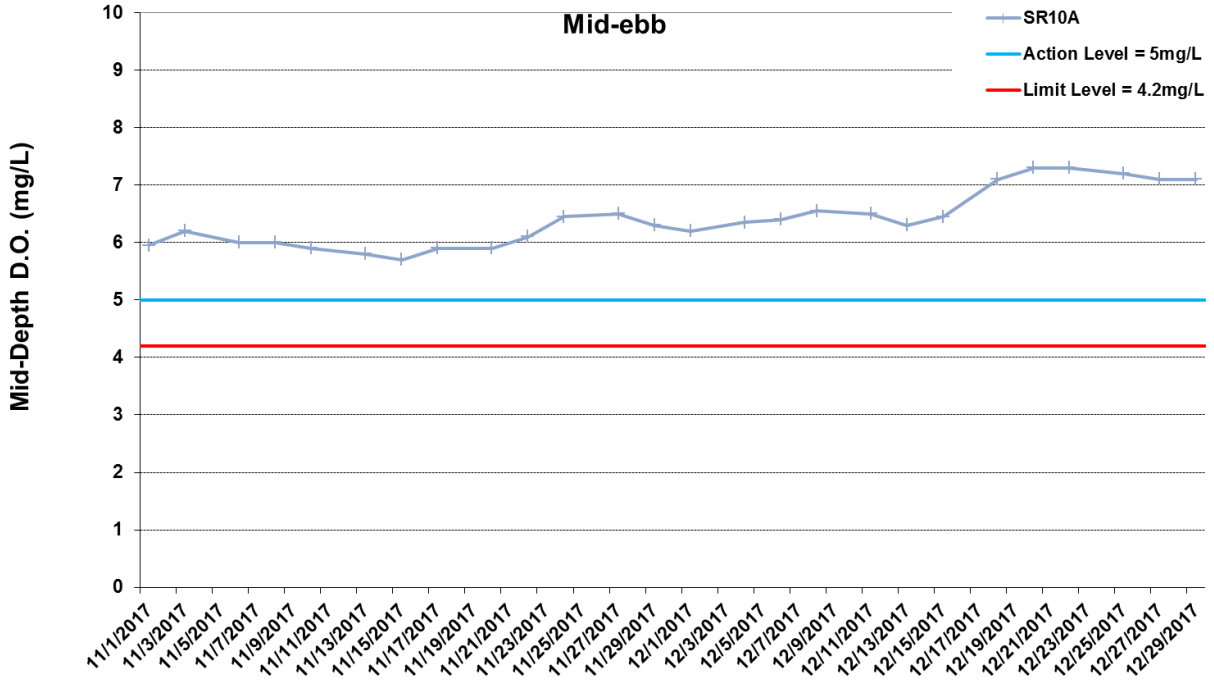


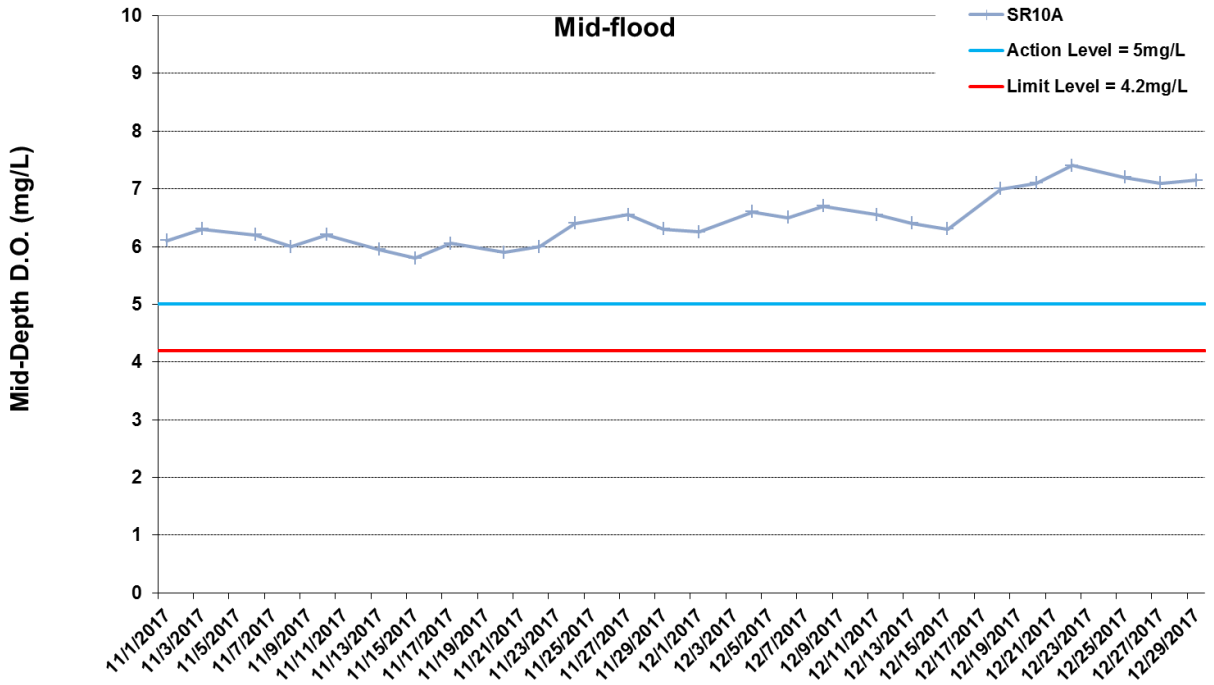


*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G.15 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 November 2017 and 31 December 2017 at IS15. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls





*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G.16 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 November 2017 and 31 December 2017 at SR10A. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls

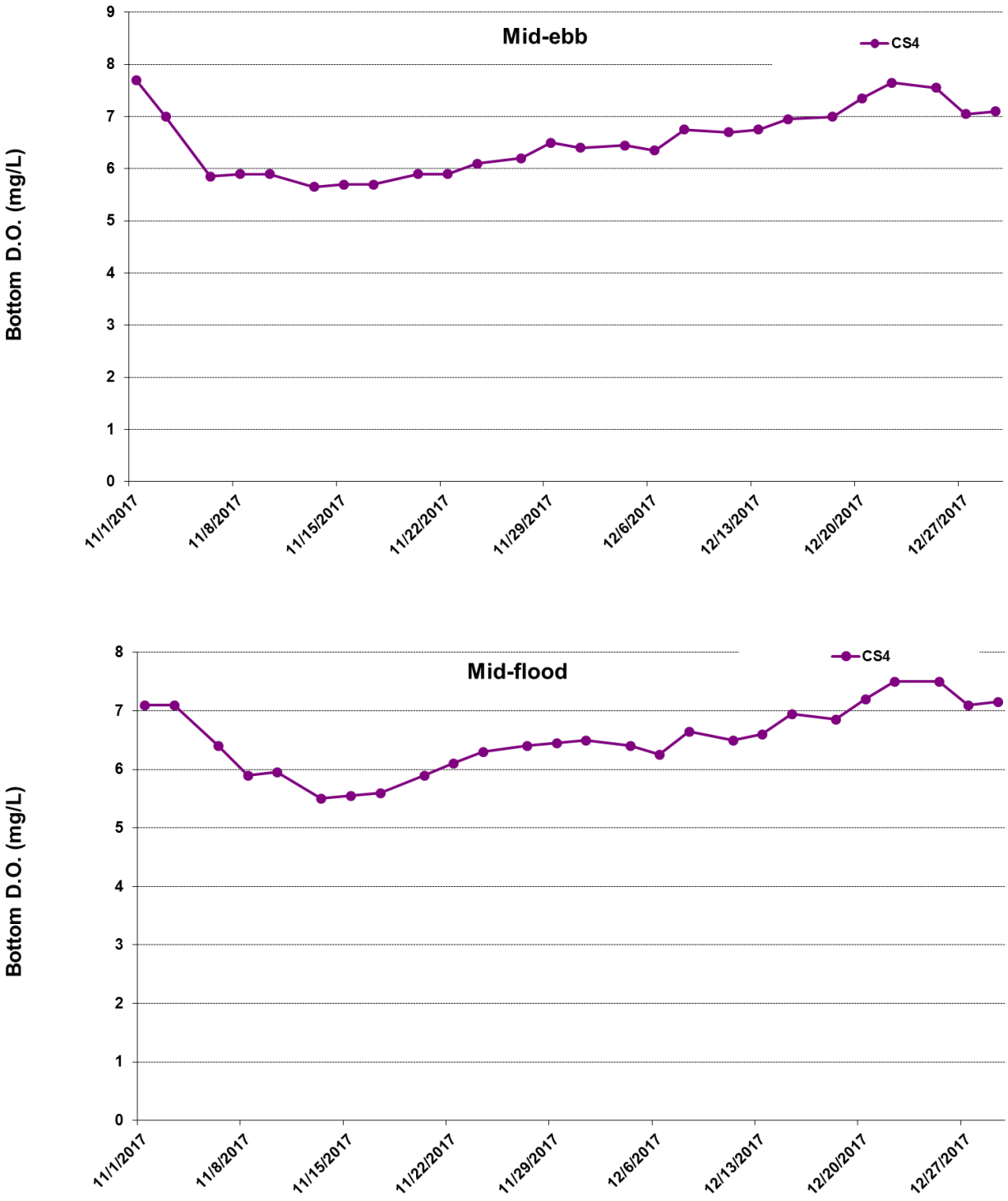


Figure G.17 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 November 2017 and 31 December 2017 at CS4. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls

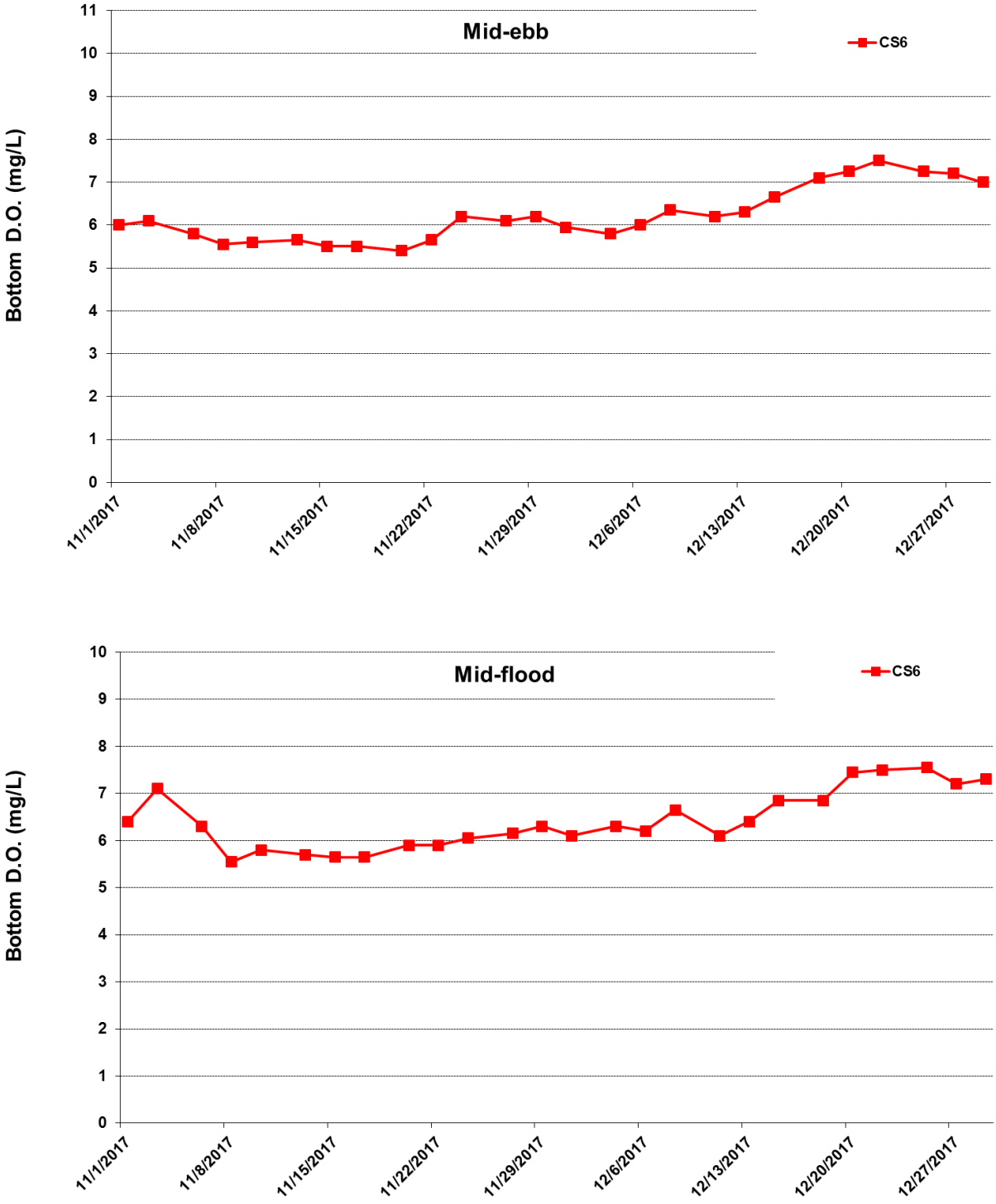


Figure G.18 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 November 2017 and 31 December 2017 at CS6. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls

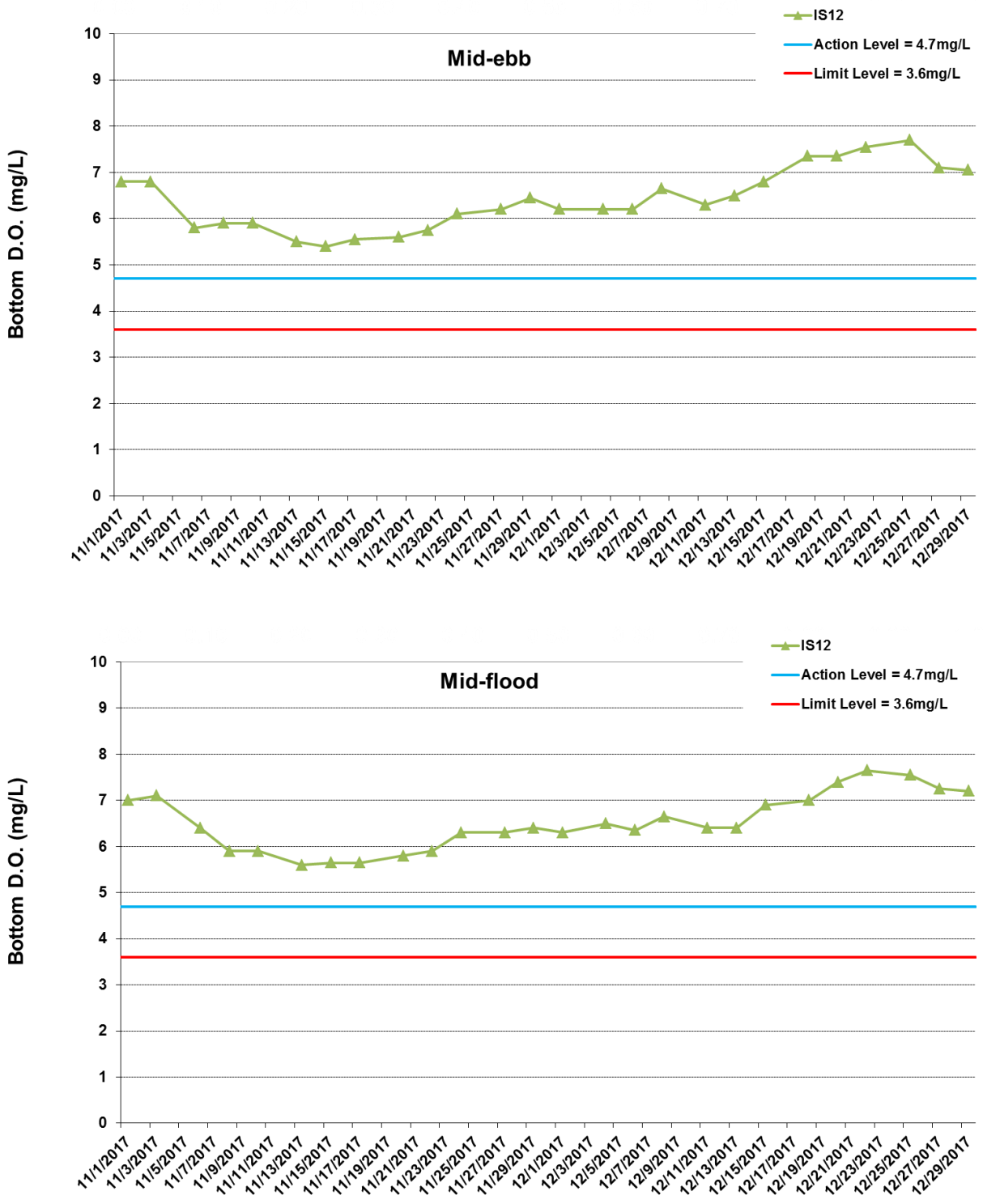


Figure G.19 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 November 2017 and 31 December 2017 at IS12. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls

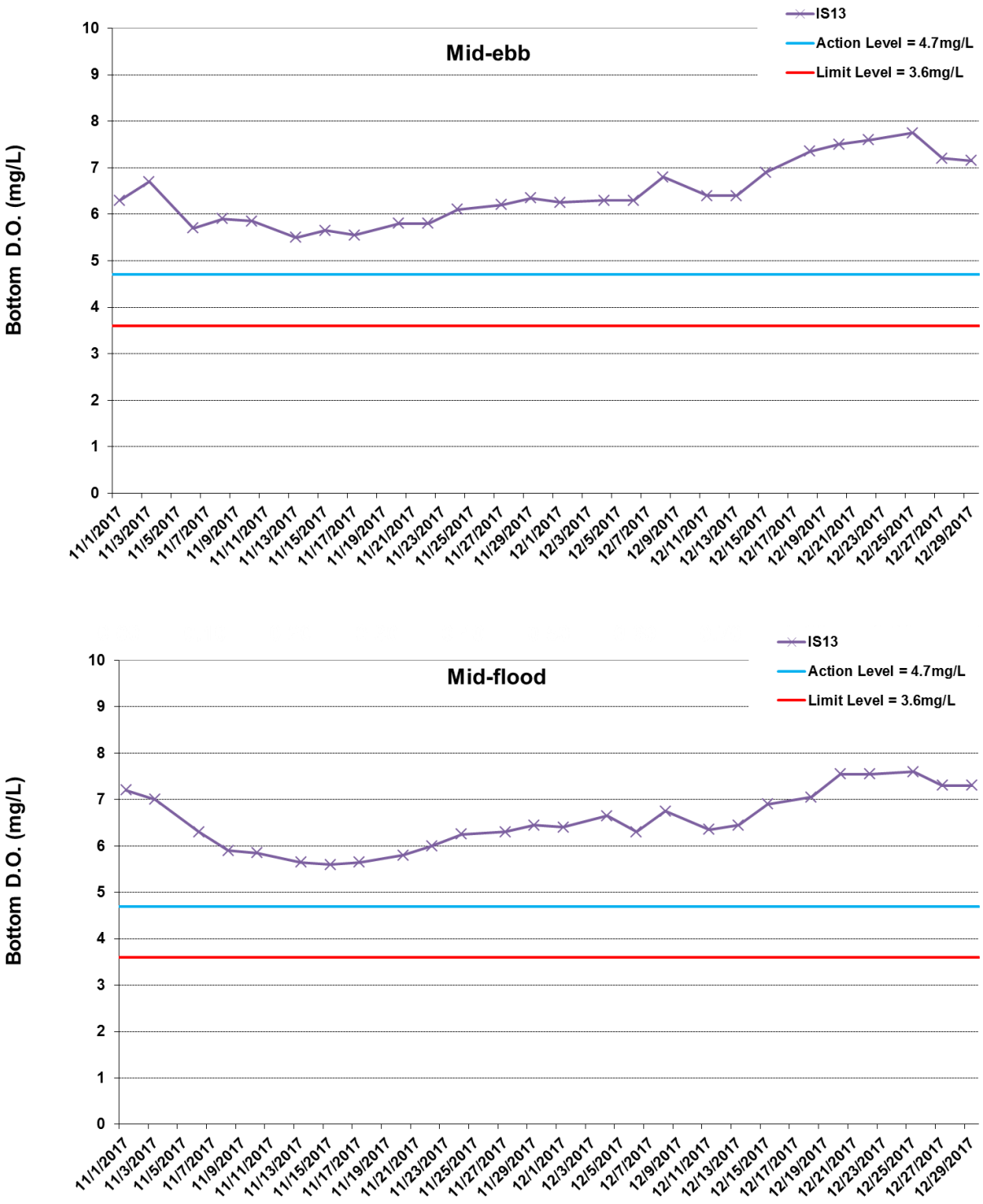
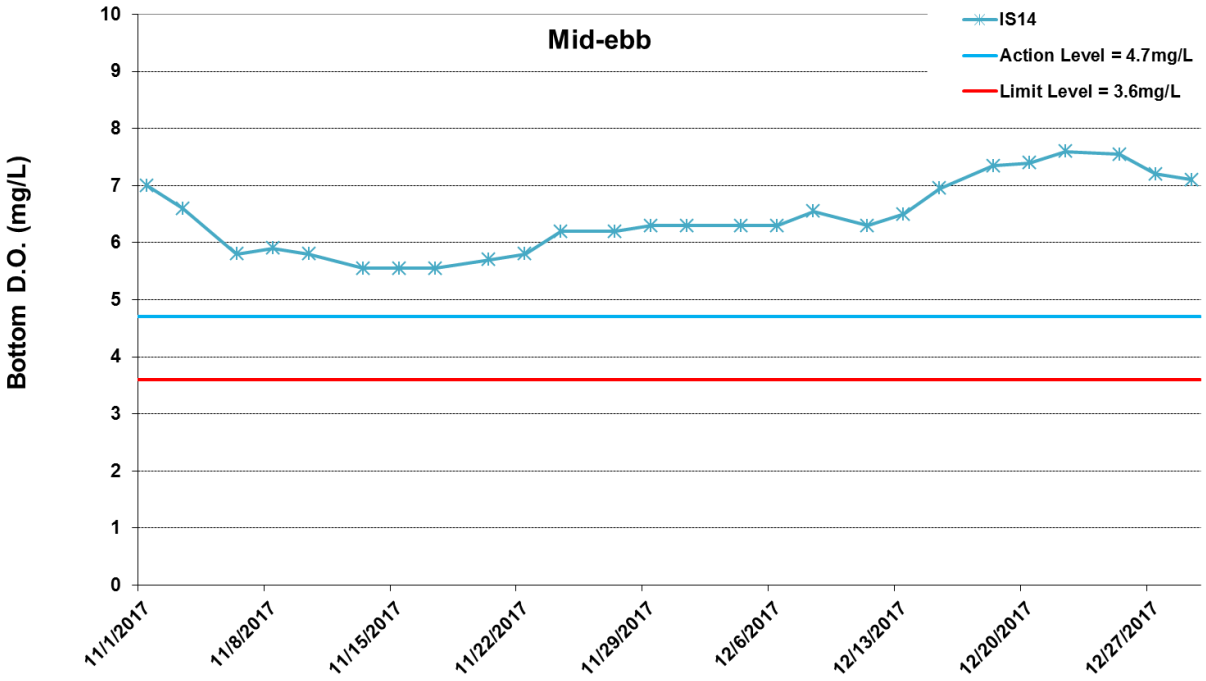


Figure G.20 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 November 2017 and 31 December 2017 at IS13. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



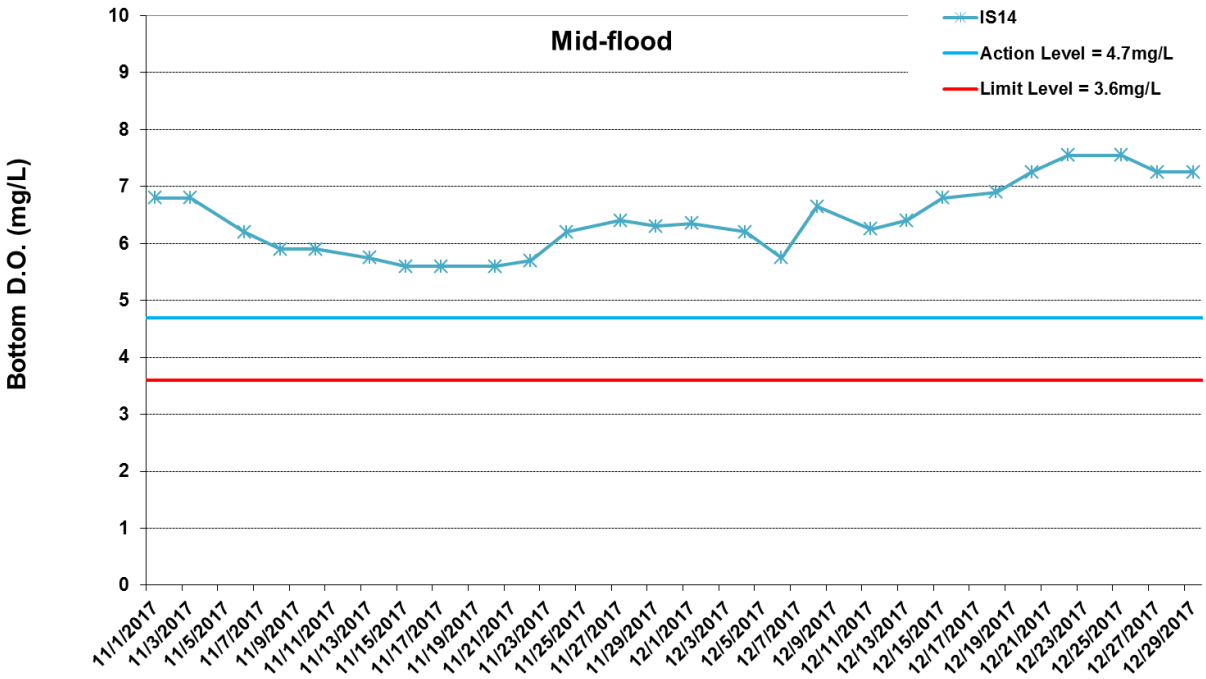
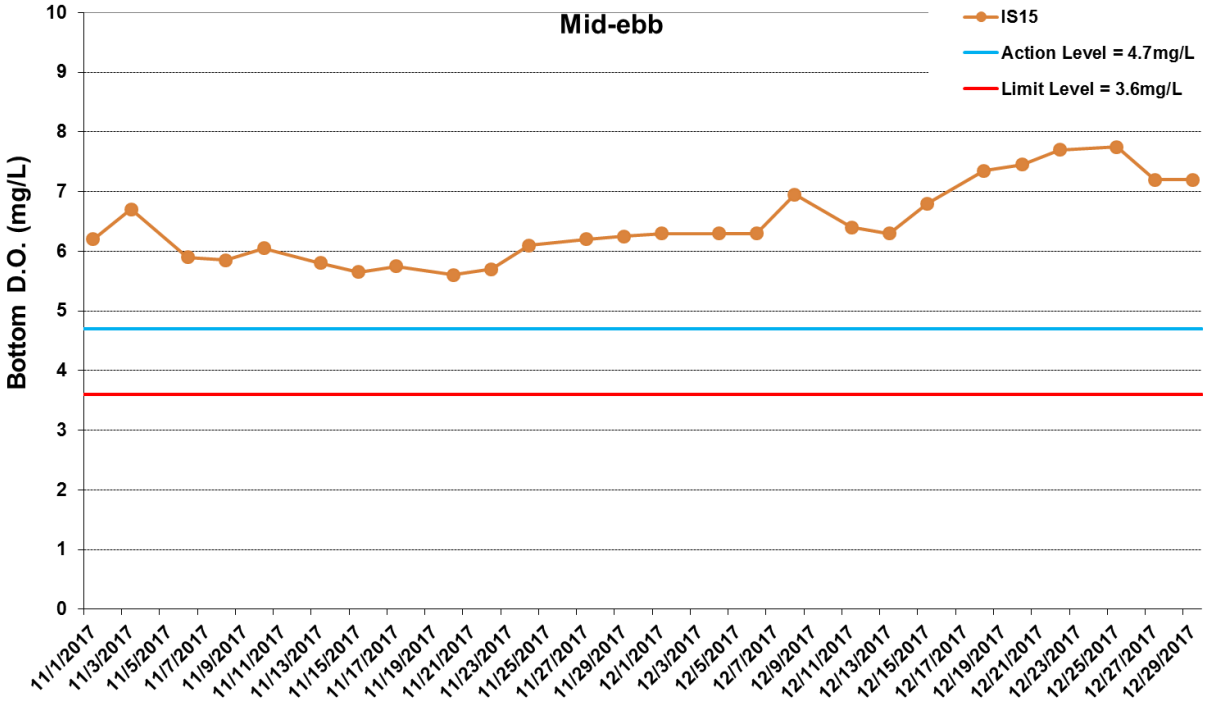


Figure G.21 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 November 2017 and 31 December 2017 at IS14. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



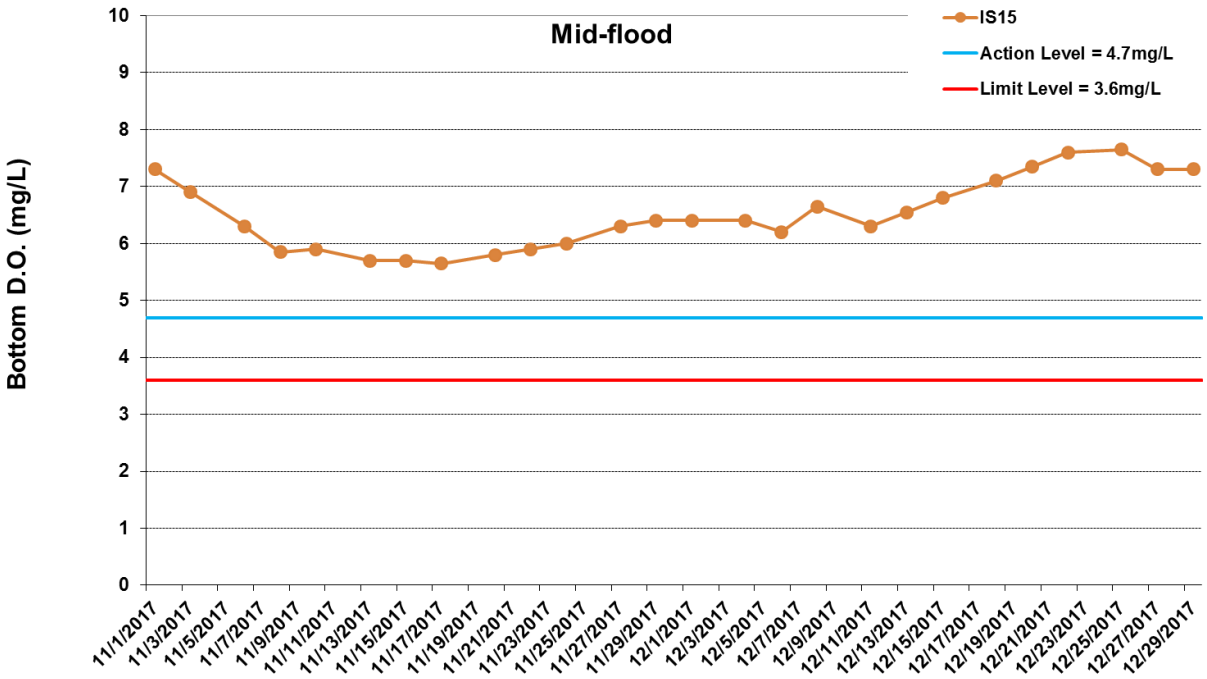


Figure G.22 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 November 2017 and 31 December 2017 at IS15. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls

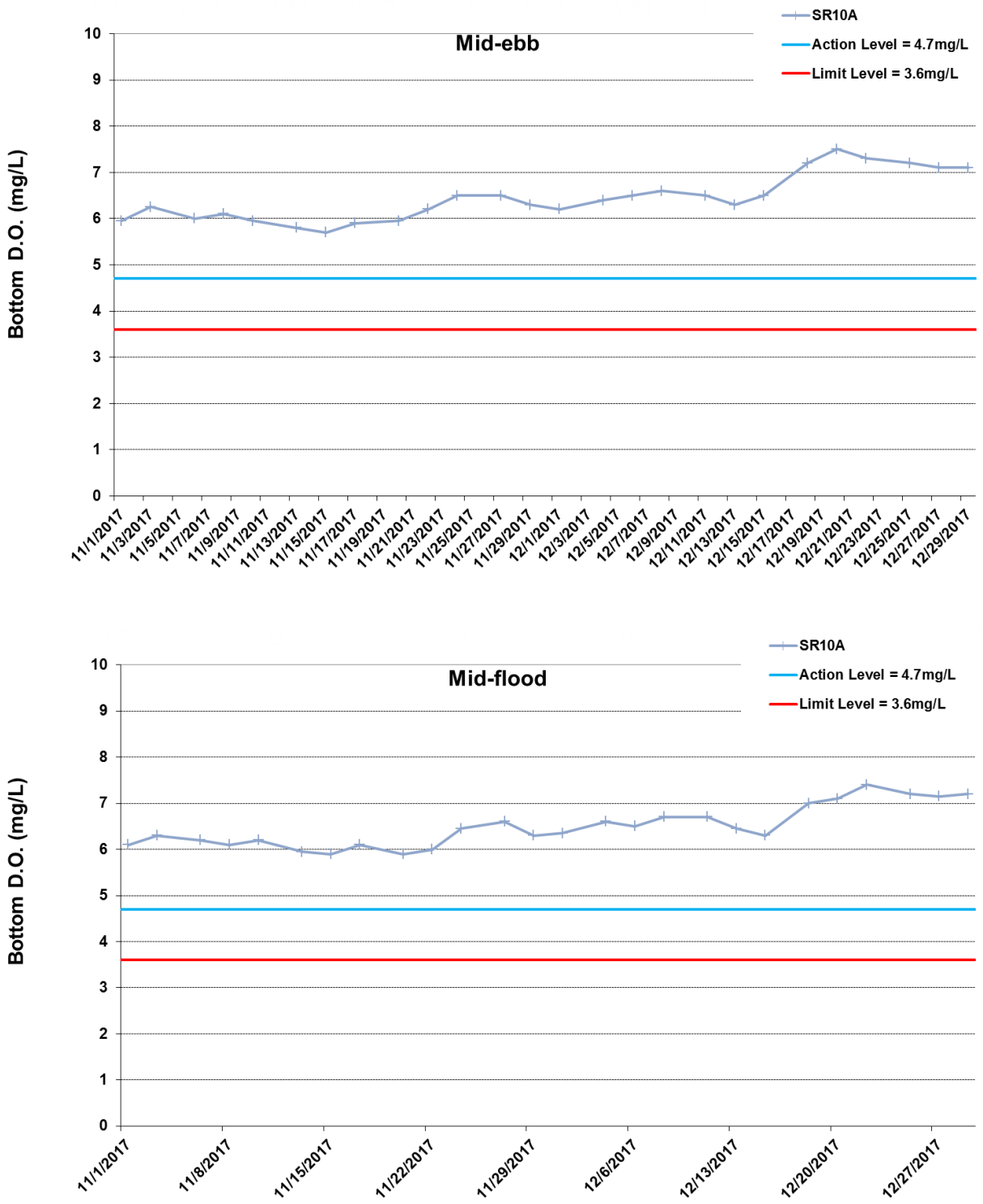
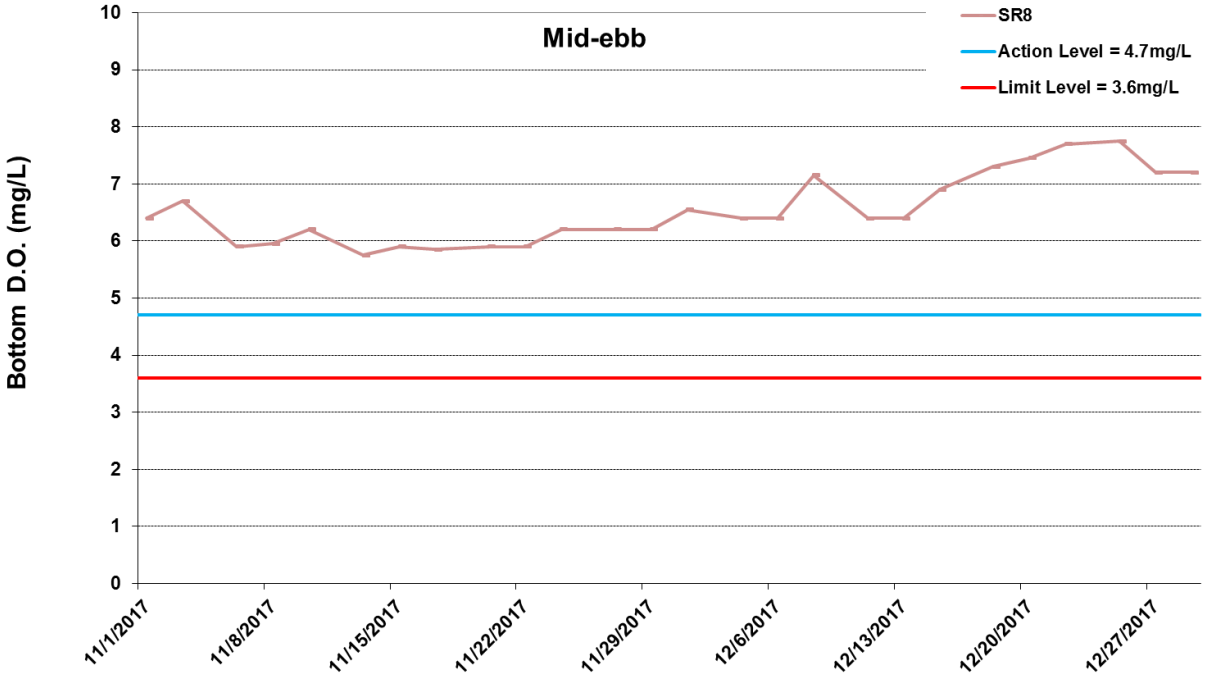


Figure G.23 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 November 2017 and 31 December 2017 at SR10A. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



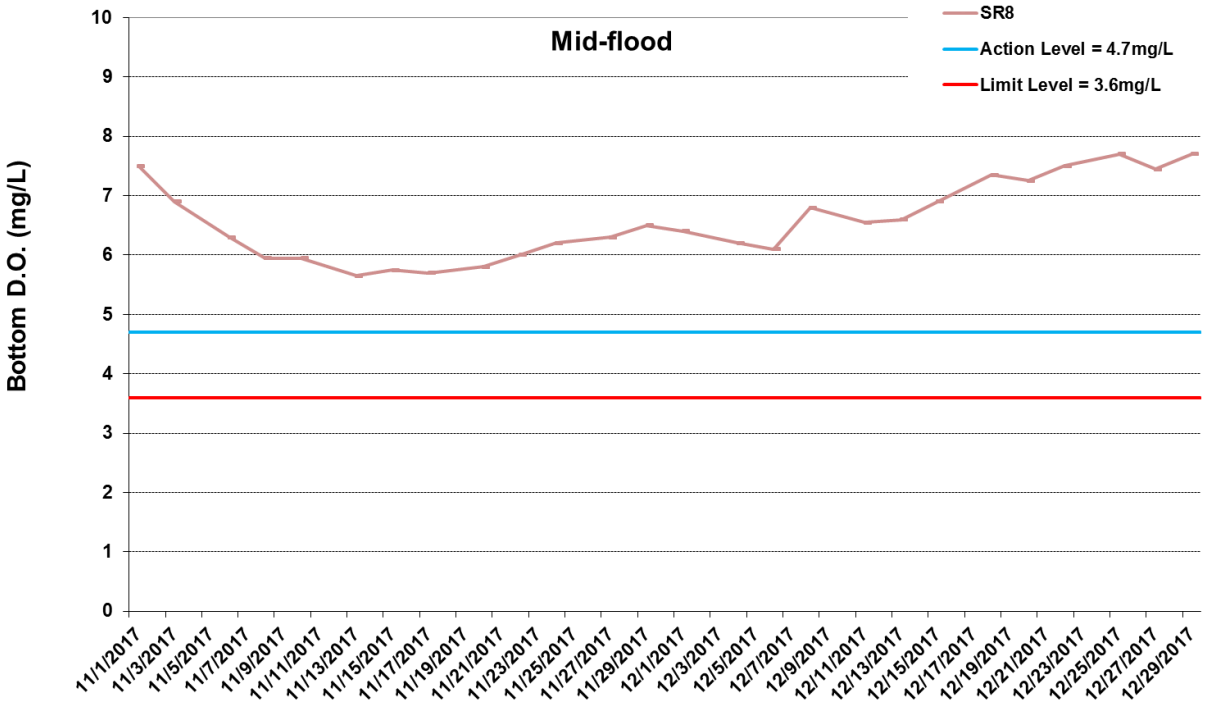


Figure G.24 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 November 2017 and 31 December 2017 at SR8. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls

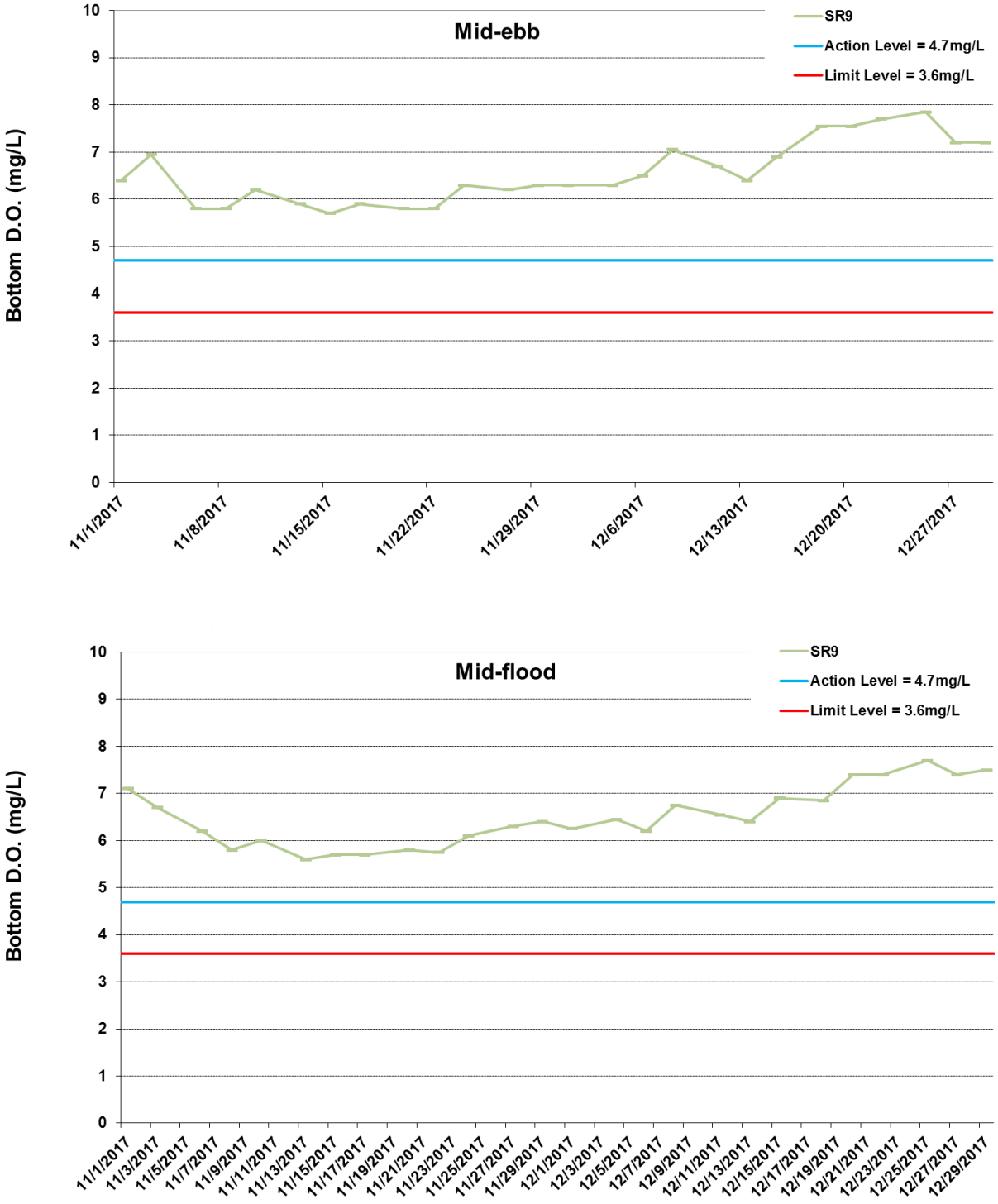
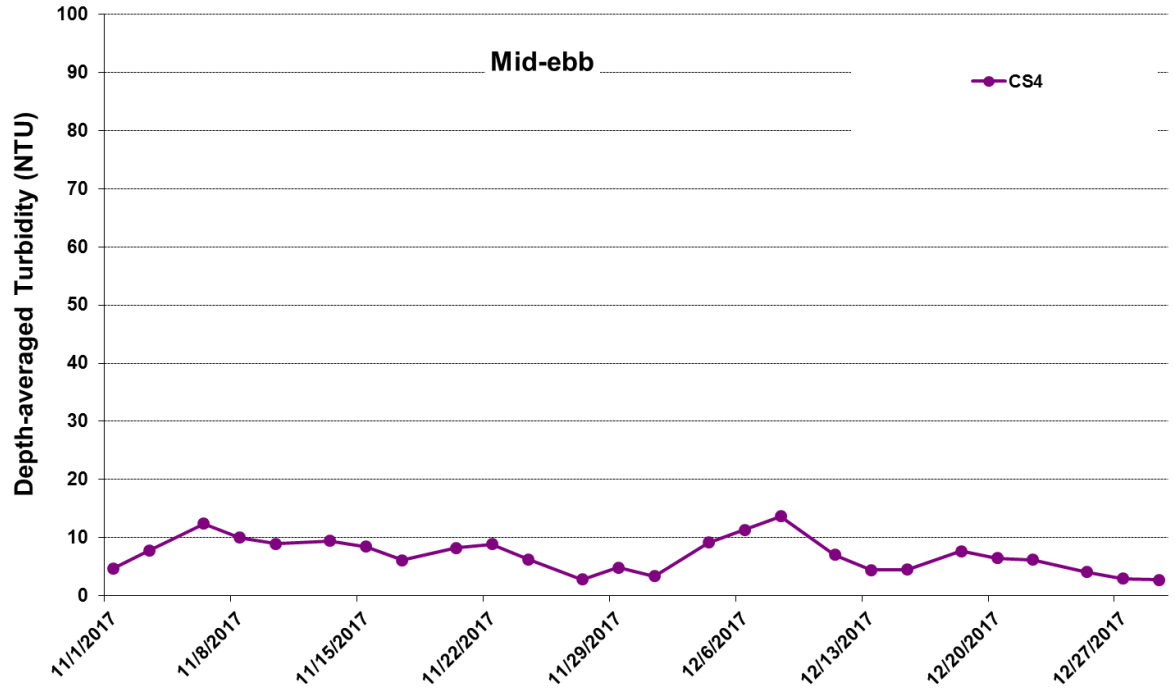


Figure G.25 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 November 2017 and 31 December 2017 at SR9. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



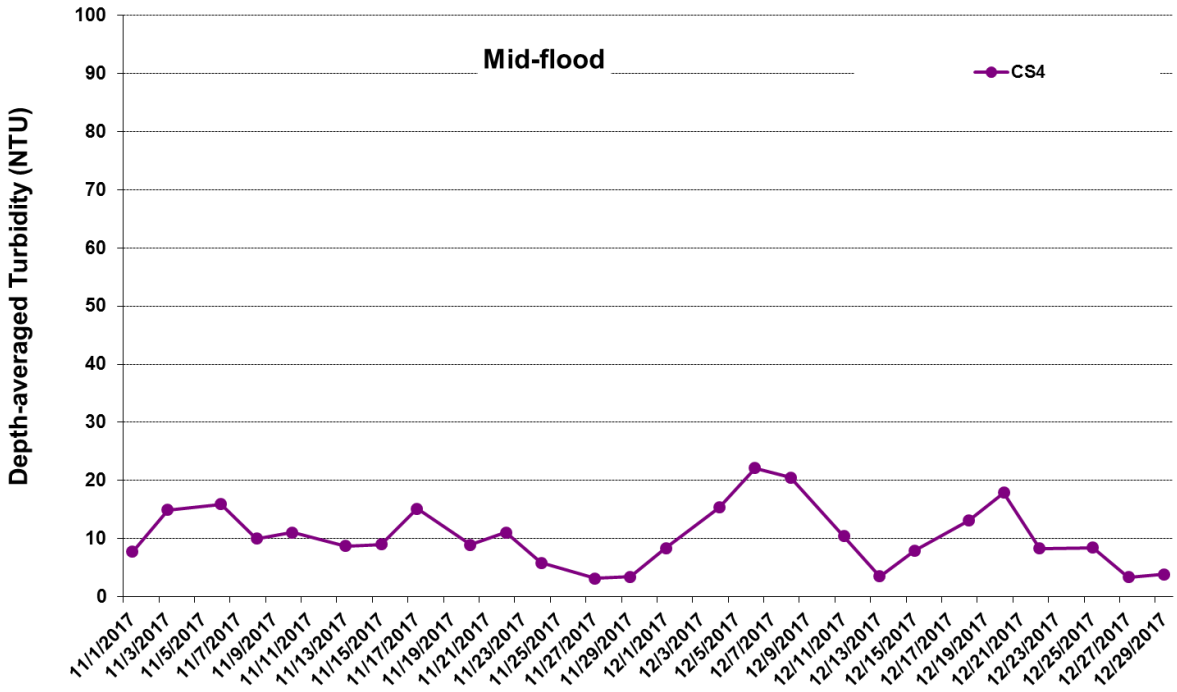
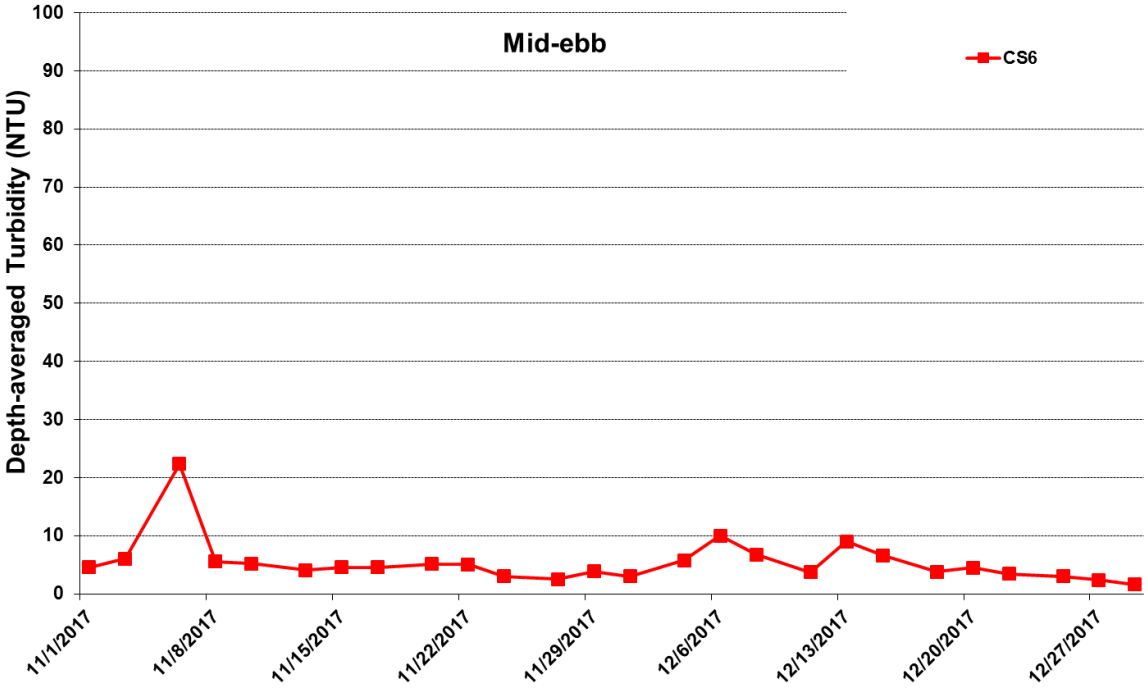


Figure G.26 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 1 November 2017 and 31 December 2017 at CS4. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



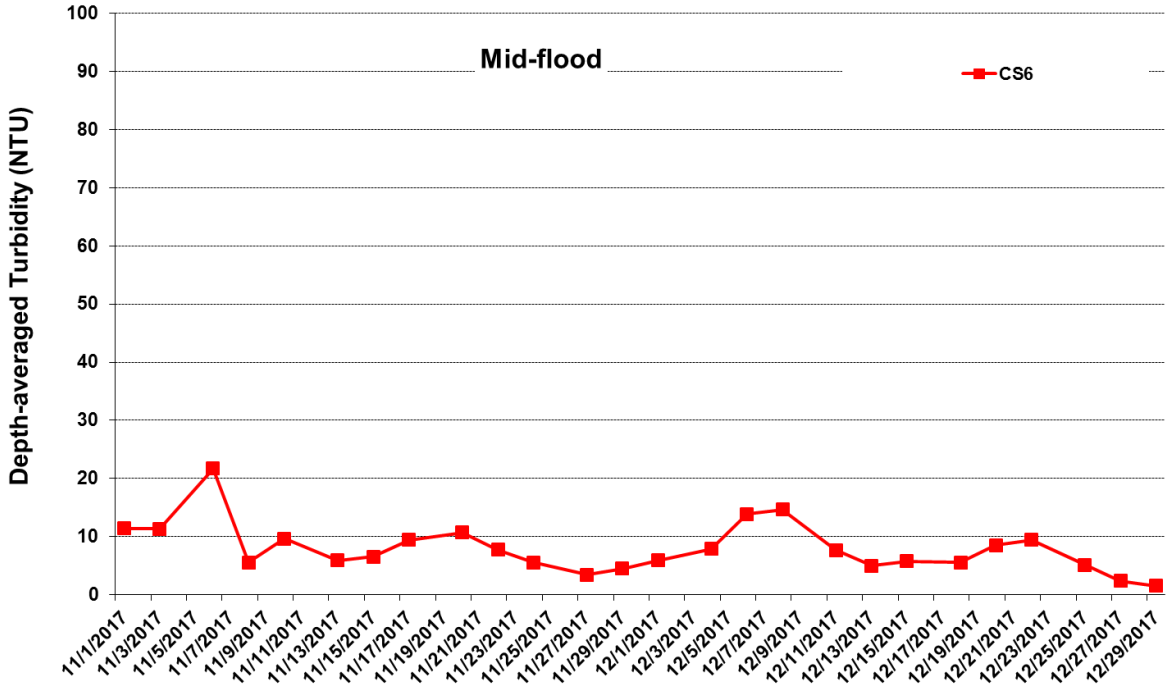
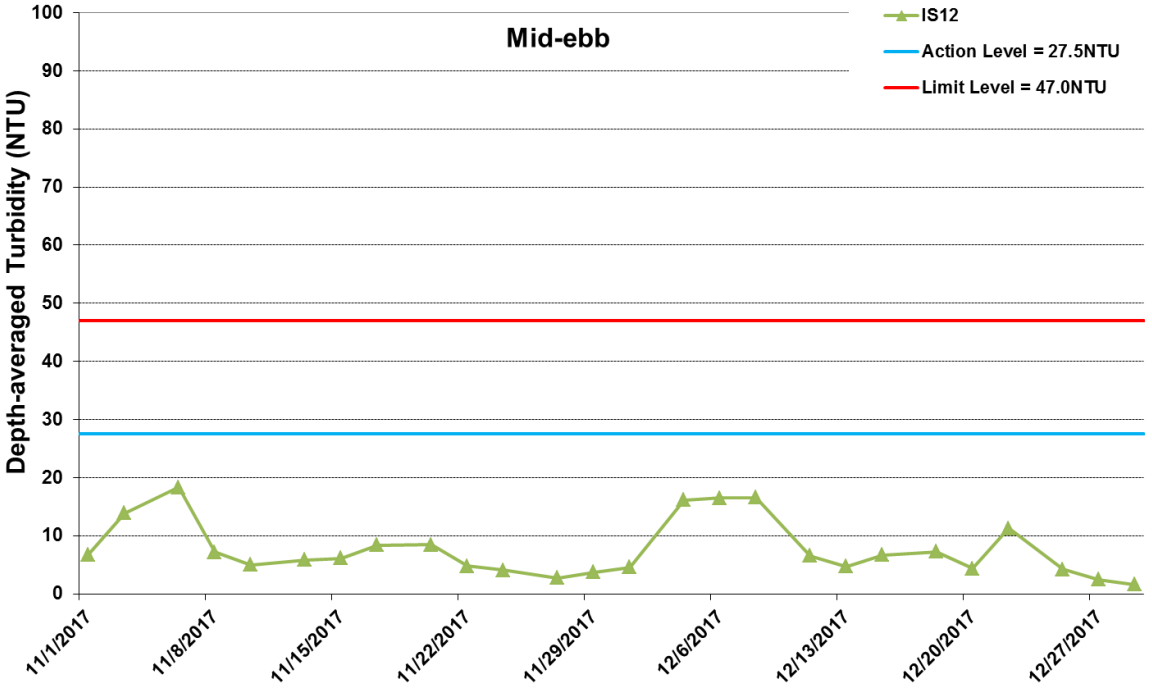


Figure G.27 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 1 November 2017 and 31 December 2017 at CS6. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



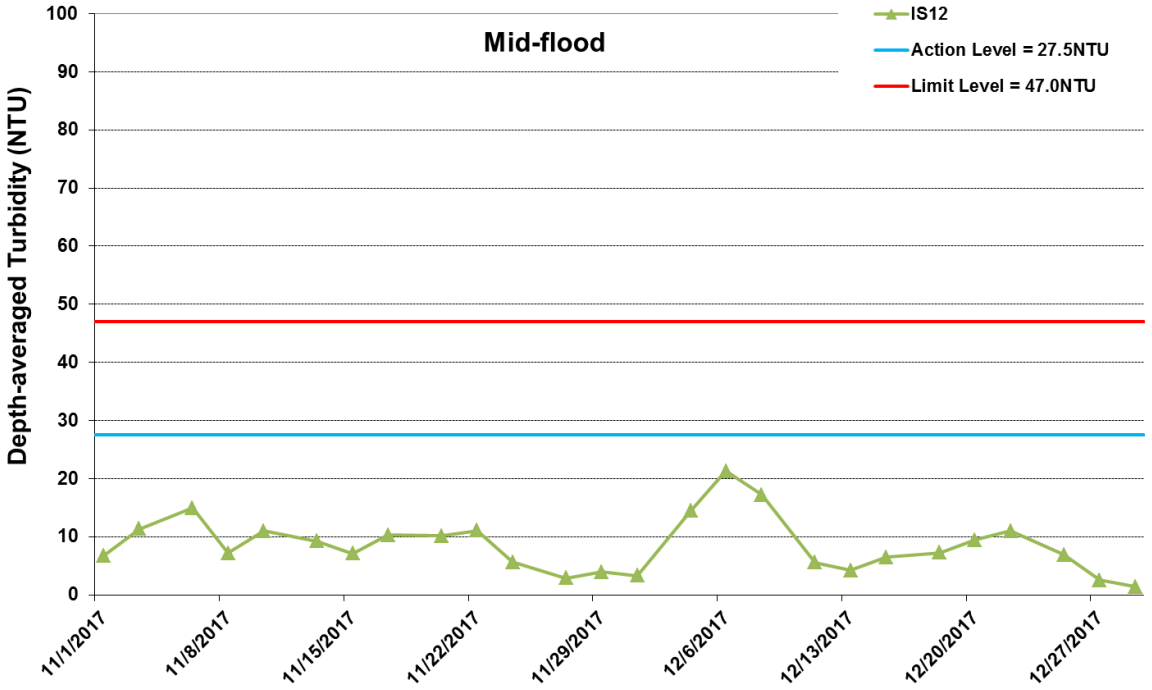
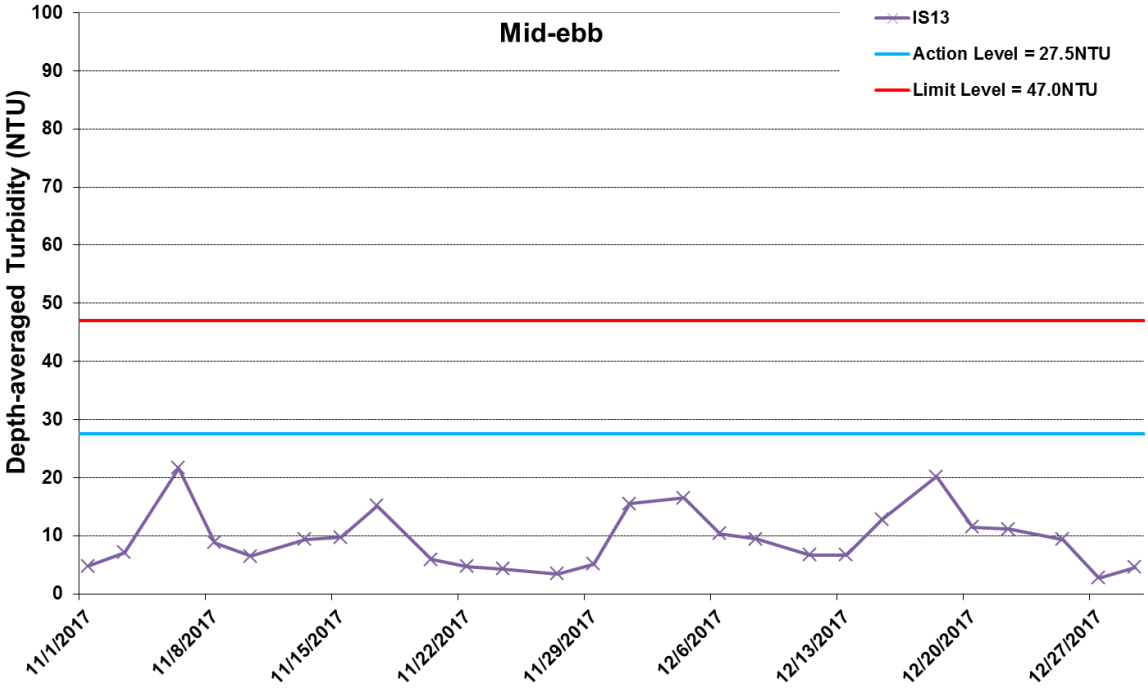


Figure G.28 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 1 November 2017 and 31 December 2017 at IS12. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



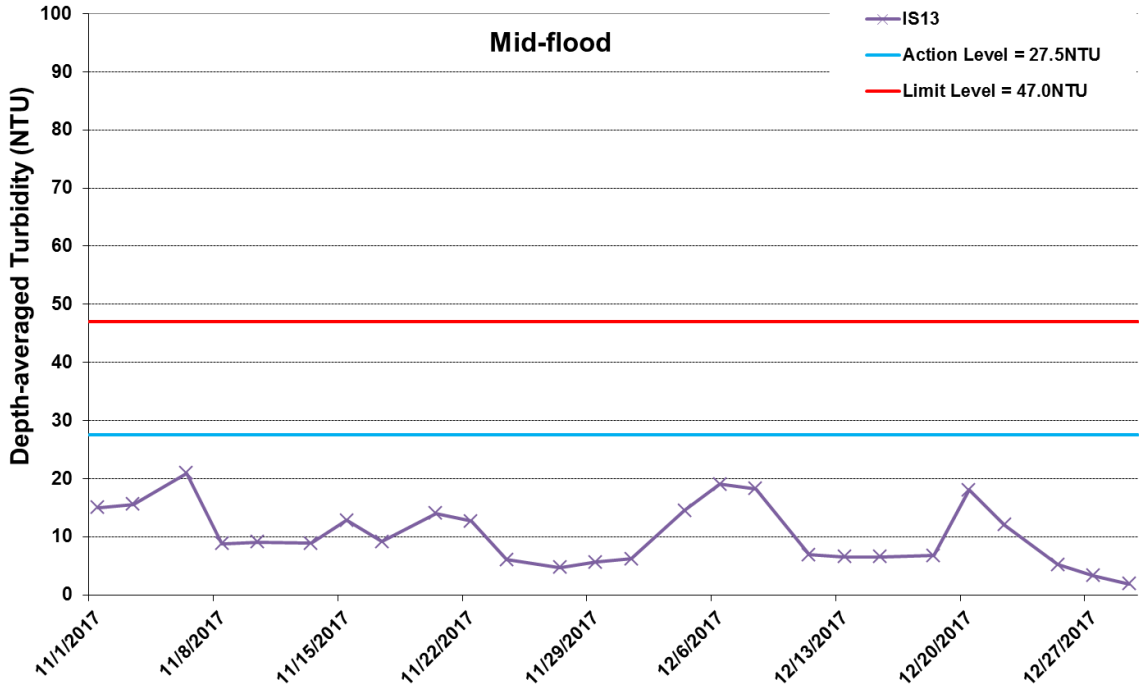
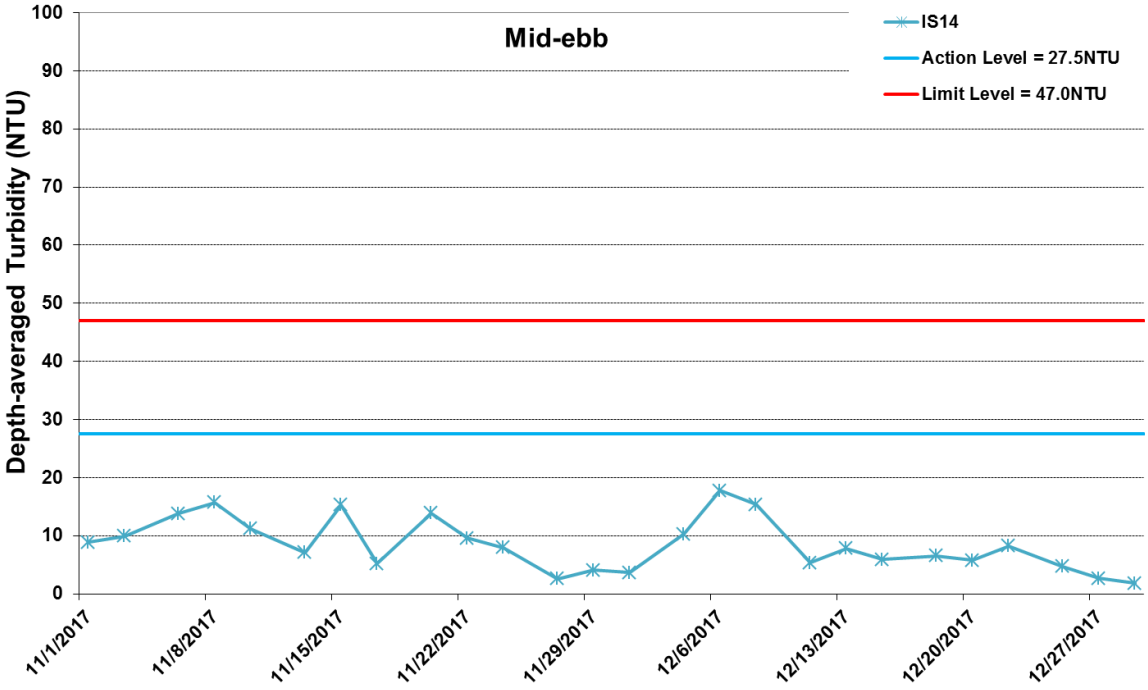


Figure G.29 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 1 November 2017 and 31 December 2017 at IS13. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



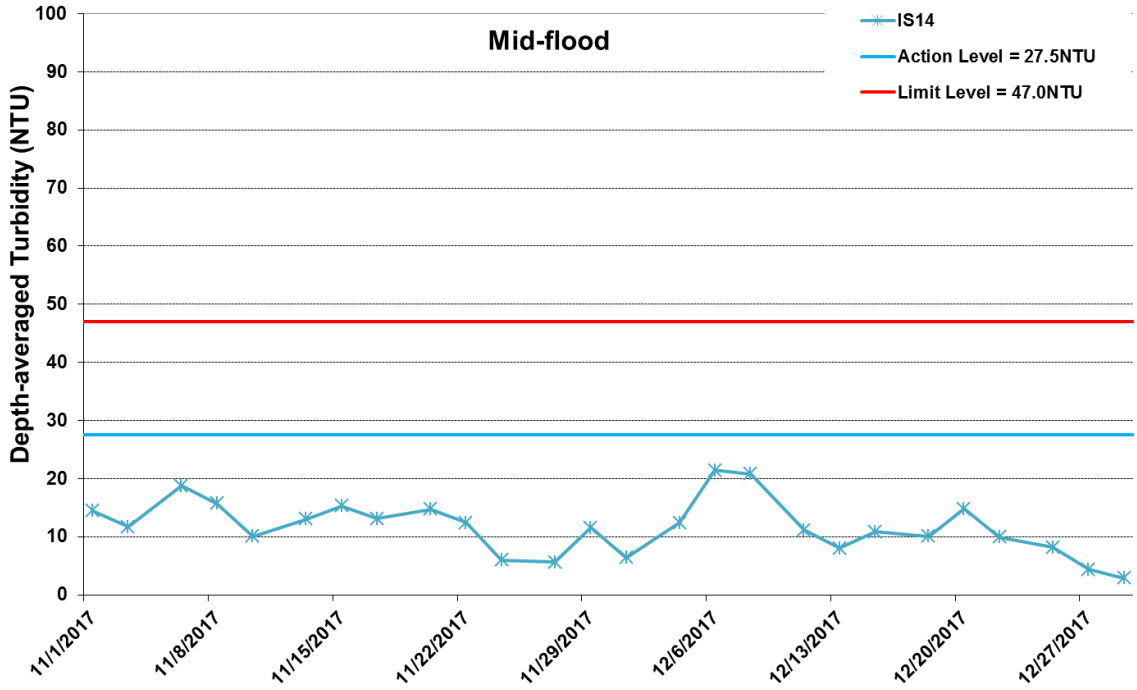
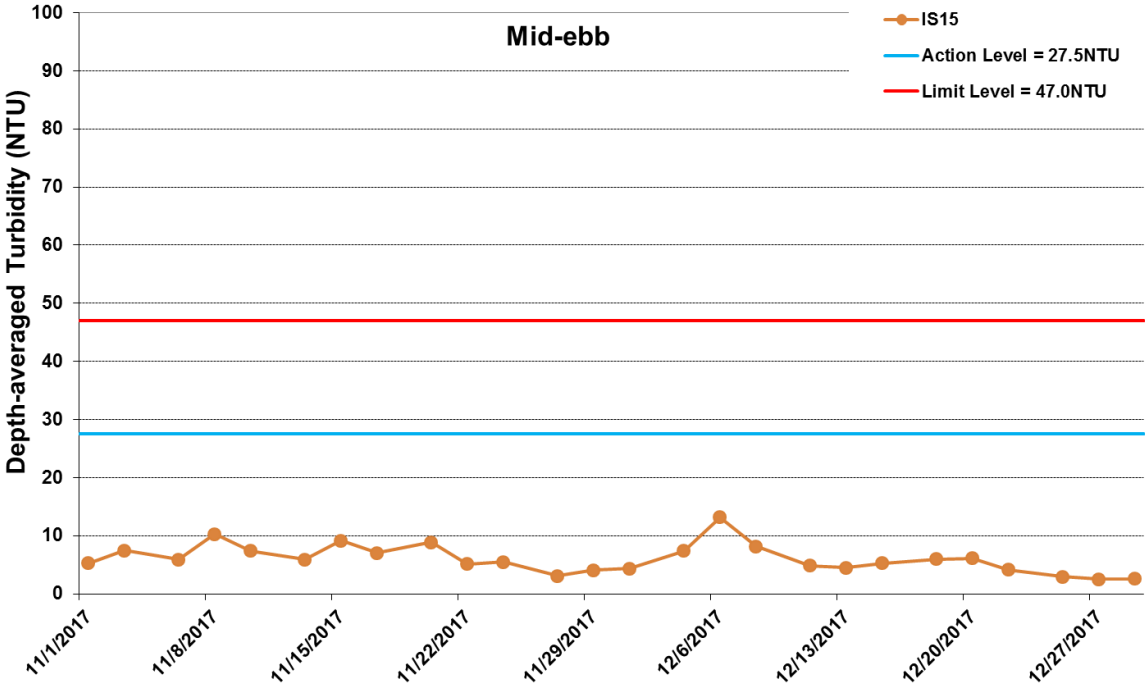


Figure G.30 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 1 November 2017 and 31 December 2017 at IS14. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



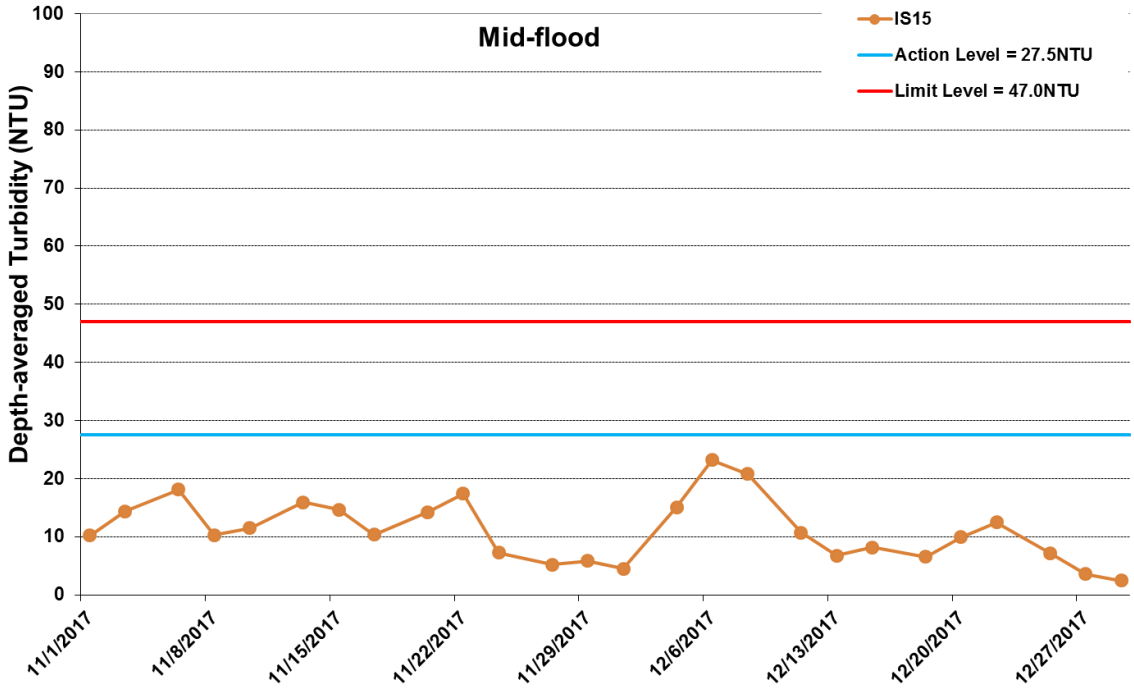
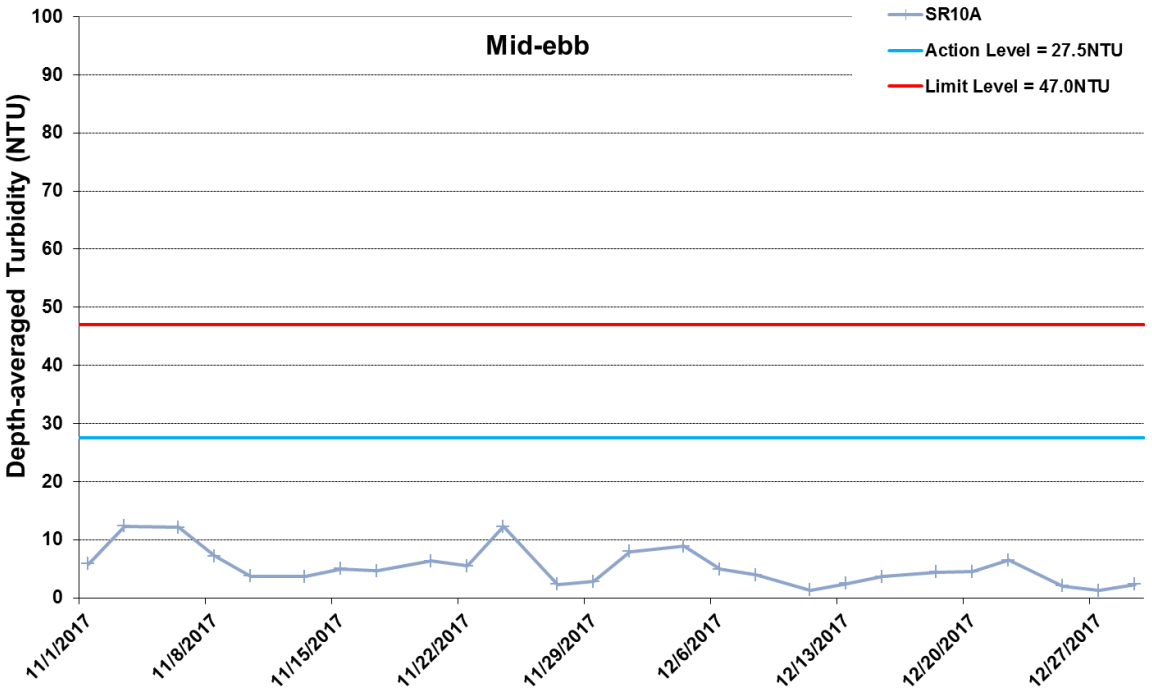


Figure G.31 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 1 November 2017 and 31 December 2017 at IS15. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



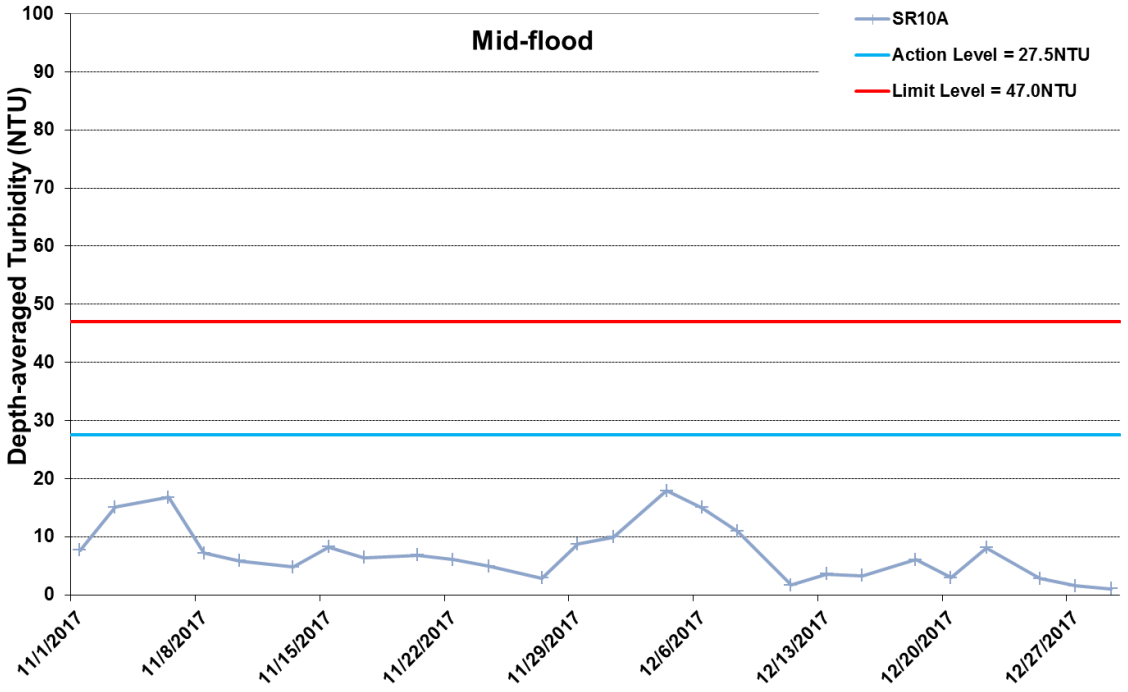
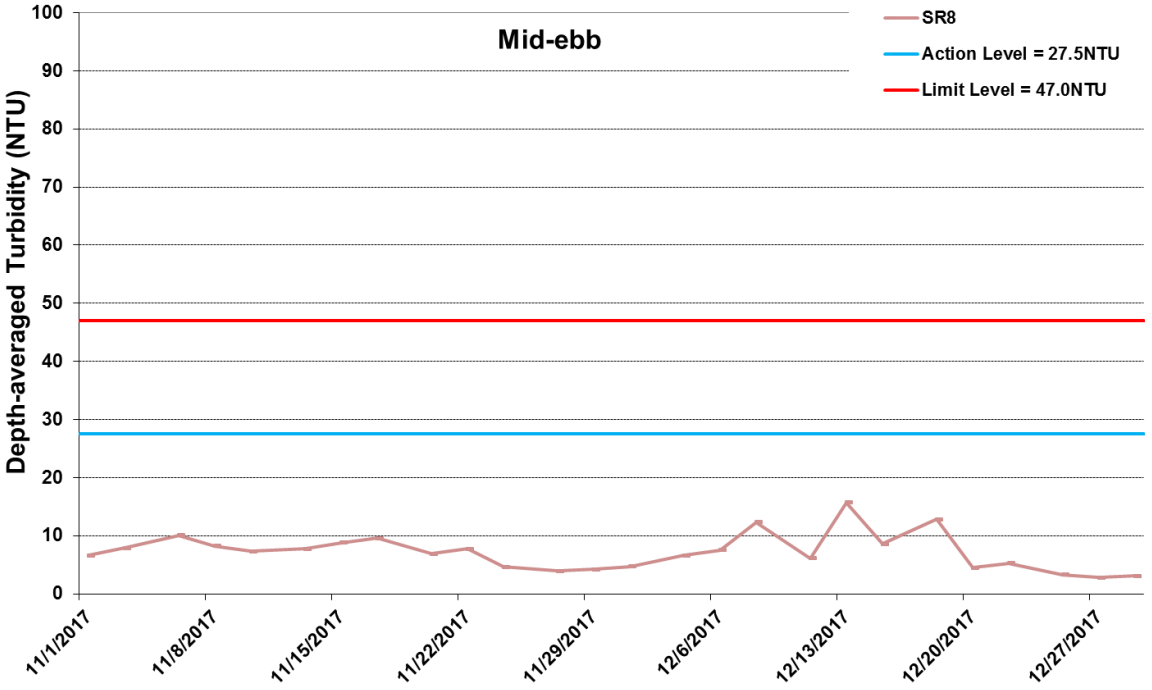


Figure G.32 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 1 November 2017 and 31 December 2017 at SR10A. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



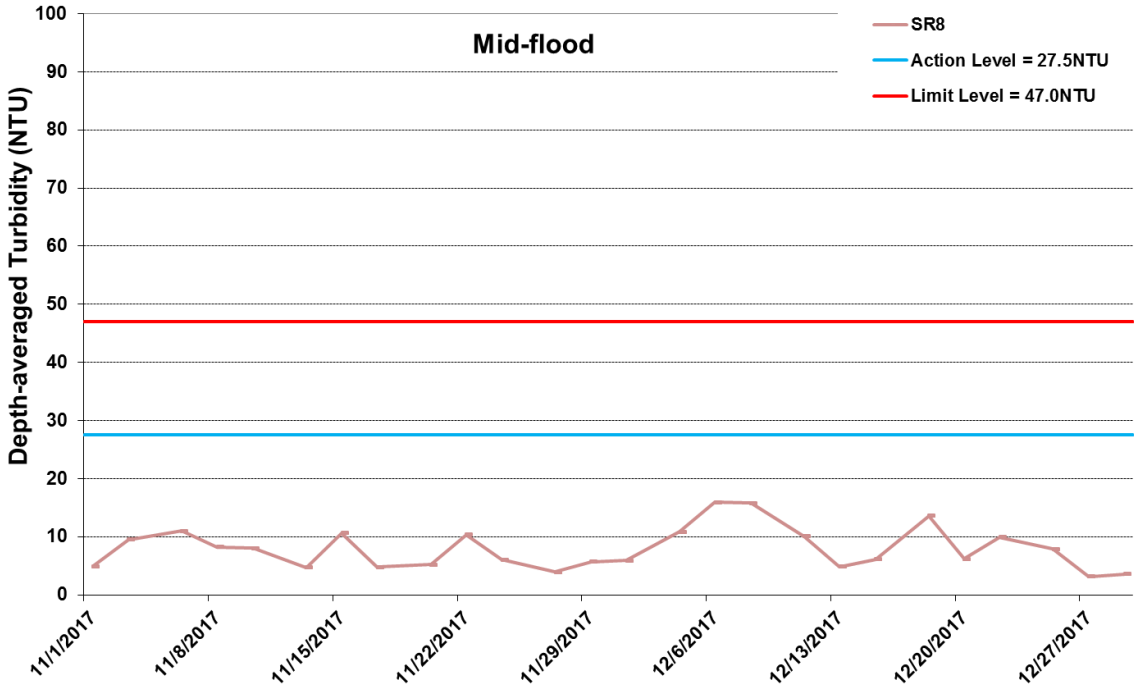
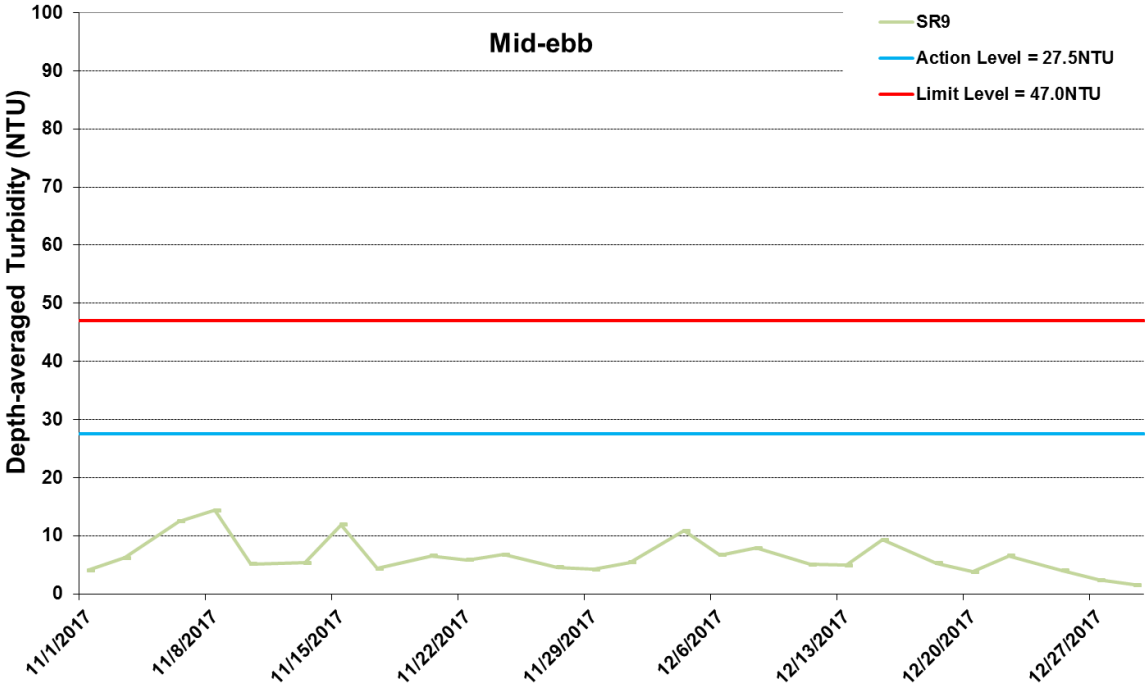


Figure G.33 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 1 November 2017 and 31 December 2017 at SR8. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



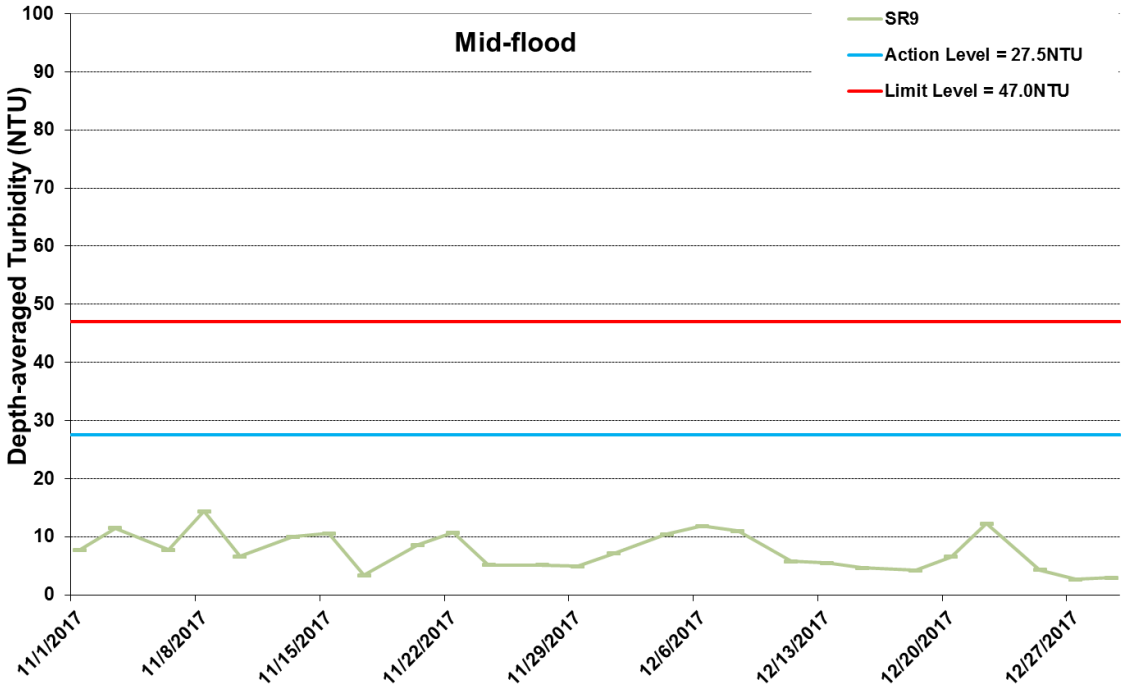
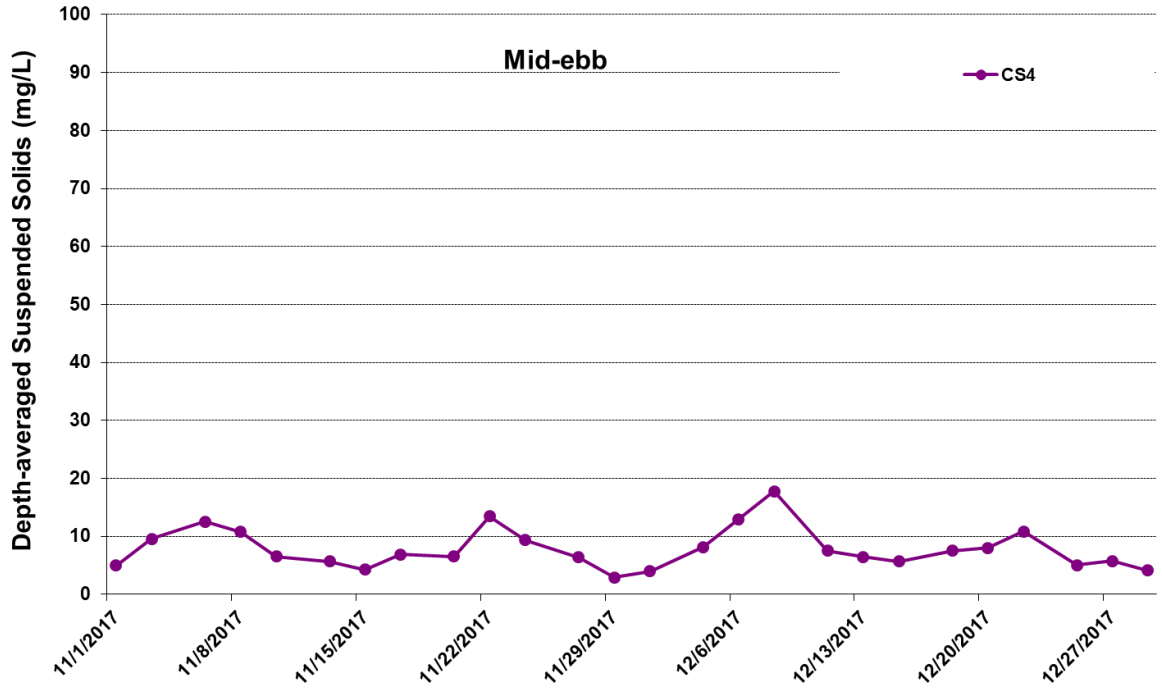


Figure G.34 Impact Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 1 November 2017 and 31 December 2017 at SR9. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



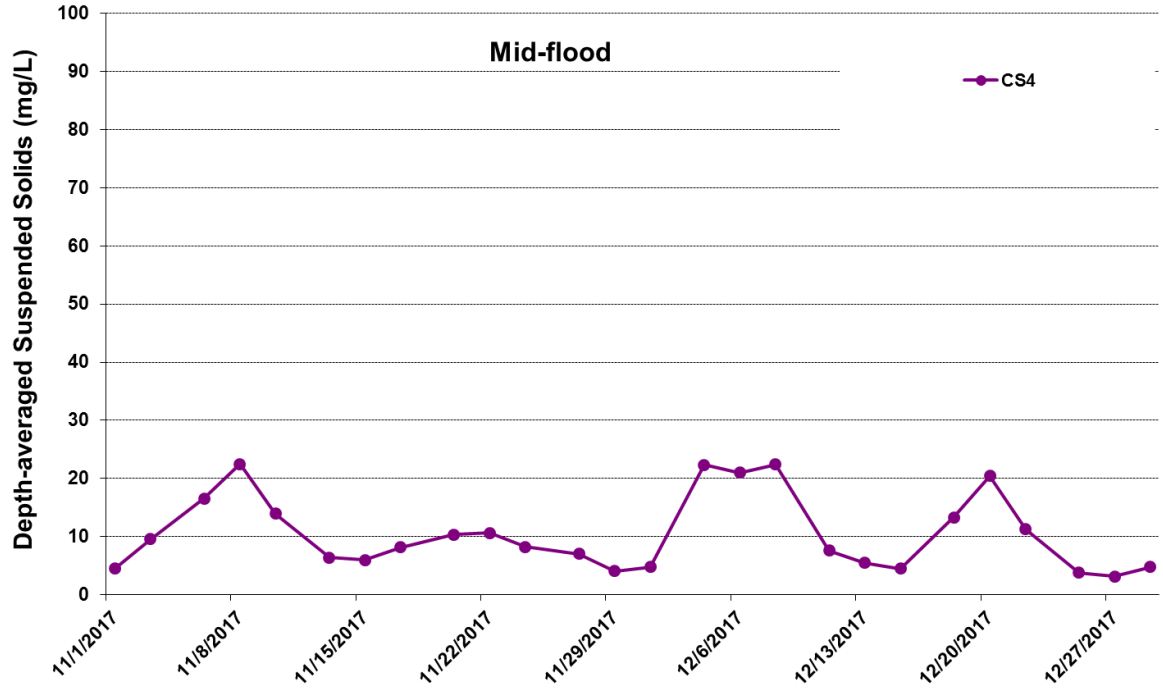


Figure G.35 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 November 2017 and 31 December 2017 at CS4. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls

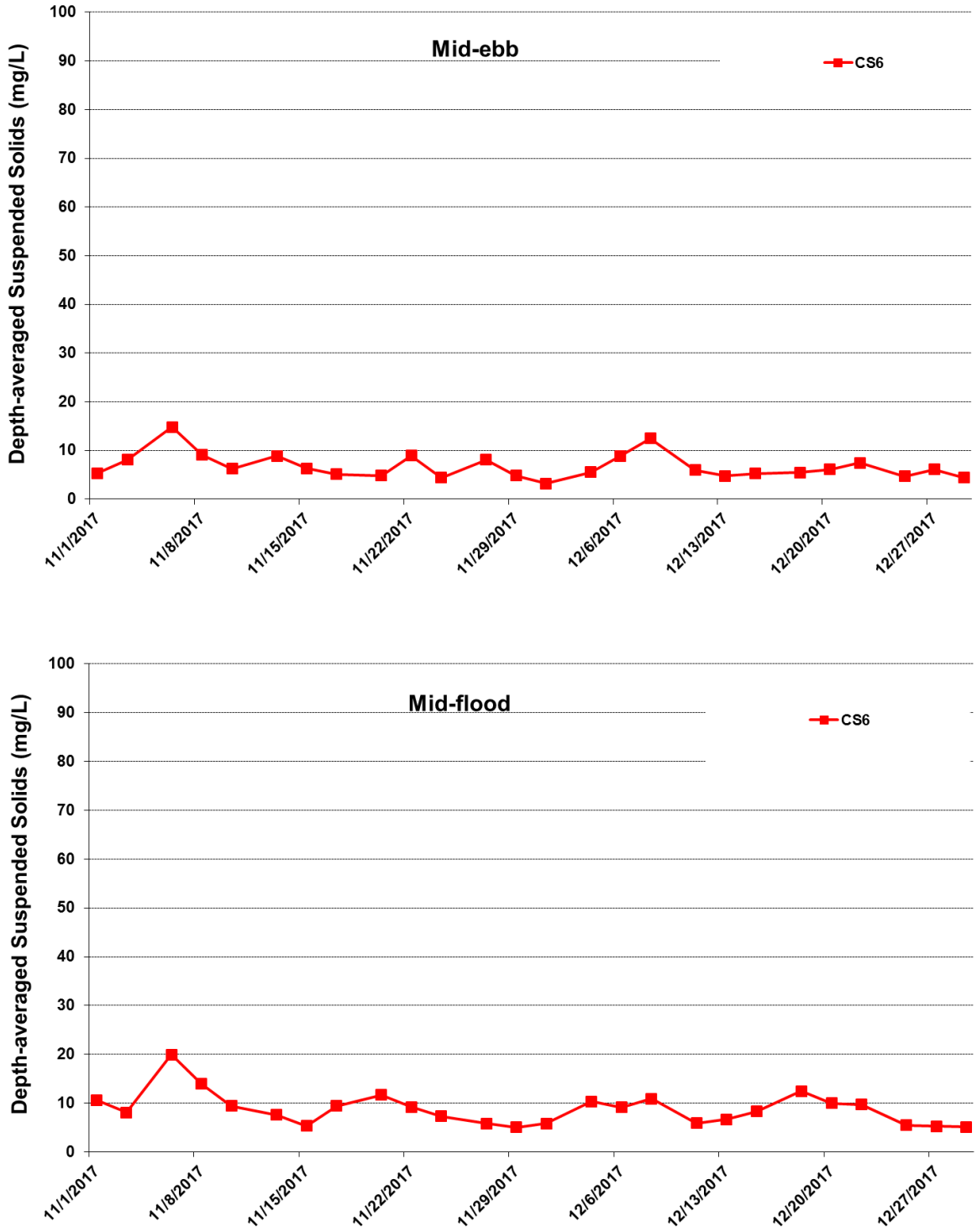
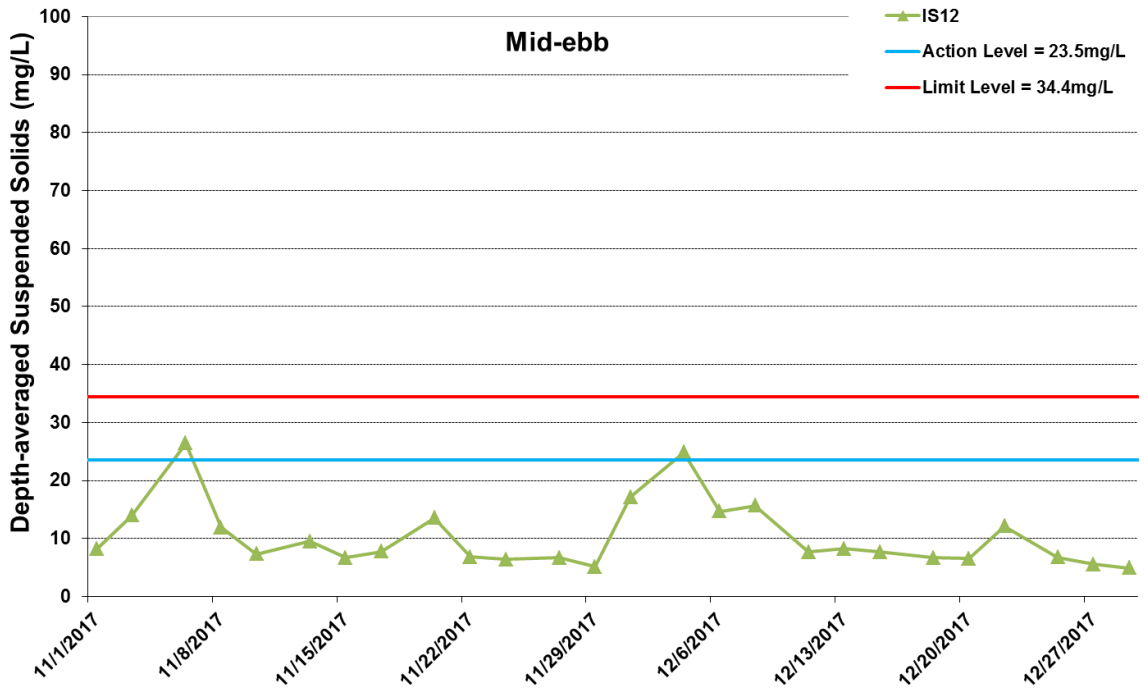


Figure G.36 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 November 2017 and 31 December 2017 at CS6. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



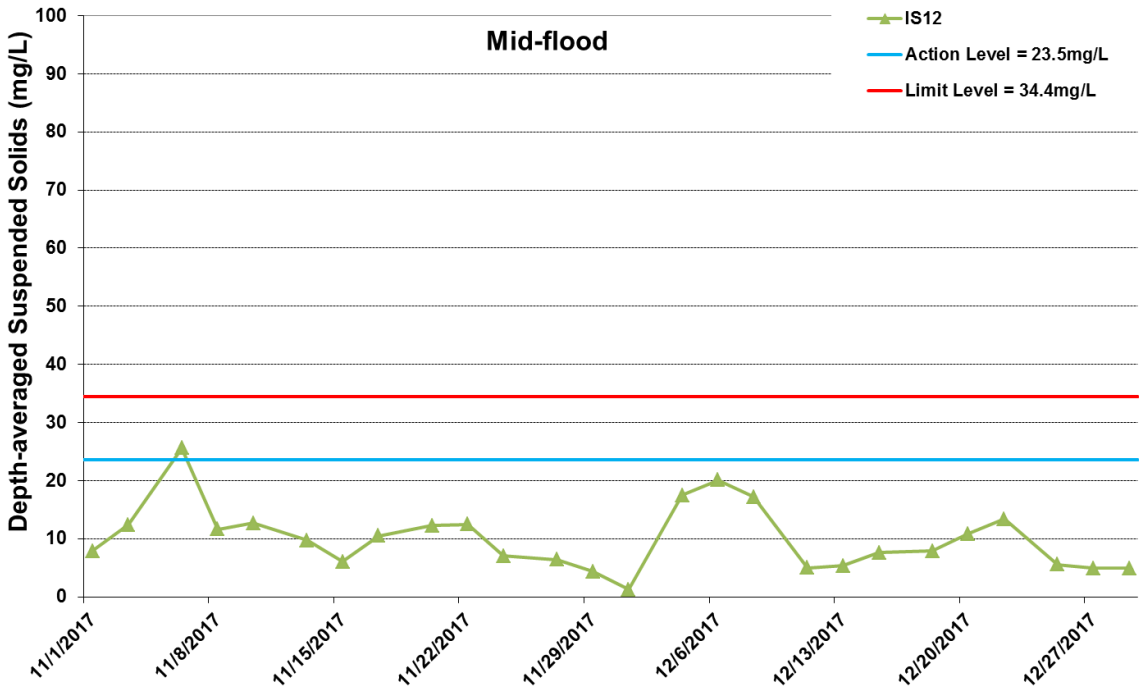
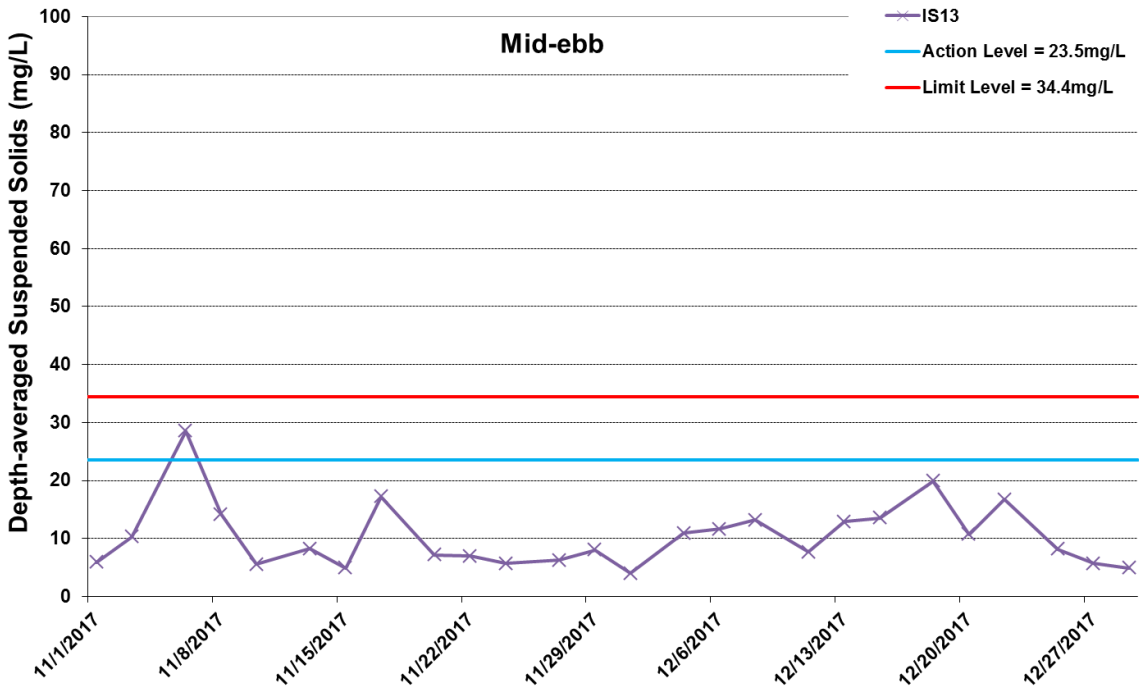


Figure G.37 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 November 2017 and 31 December 2017 at IS12. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



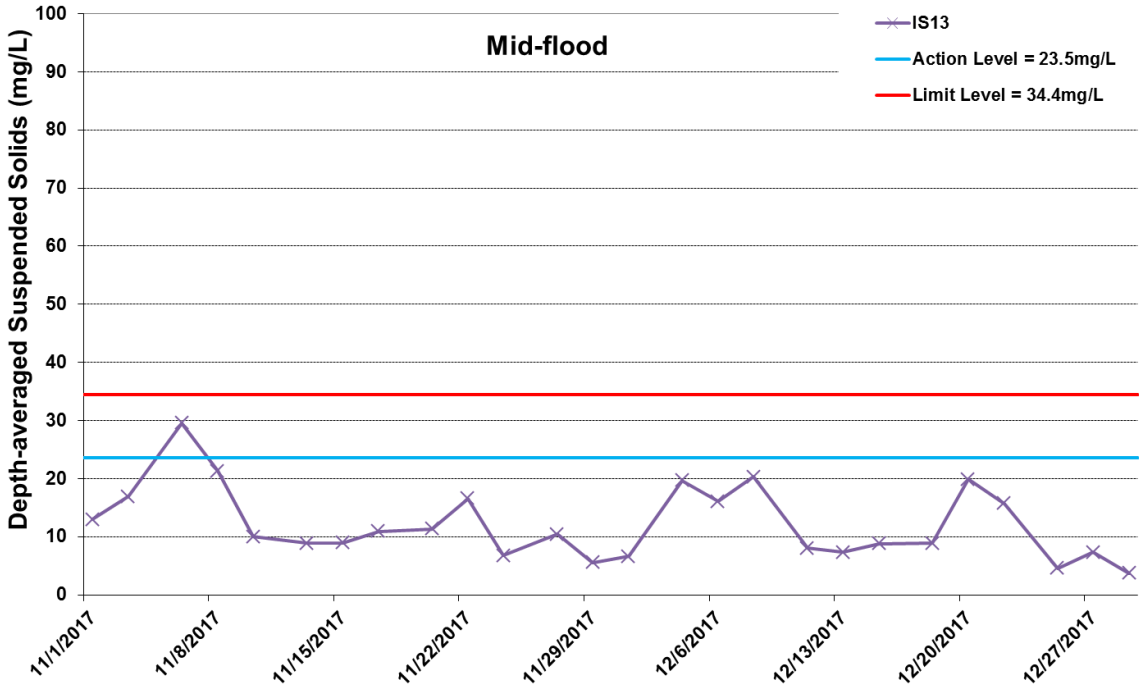
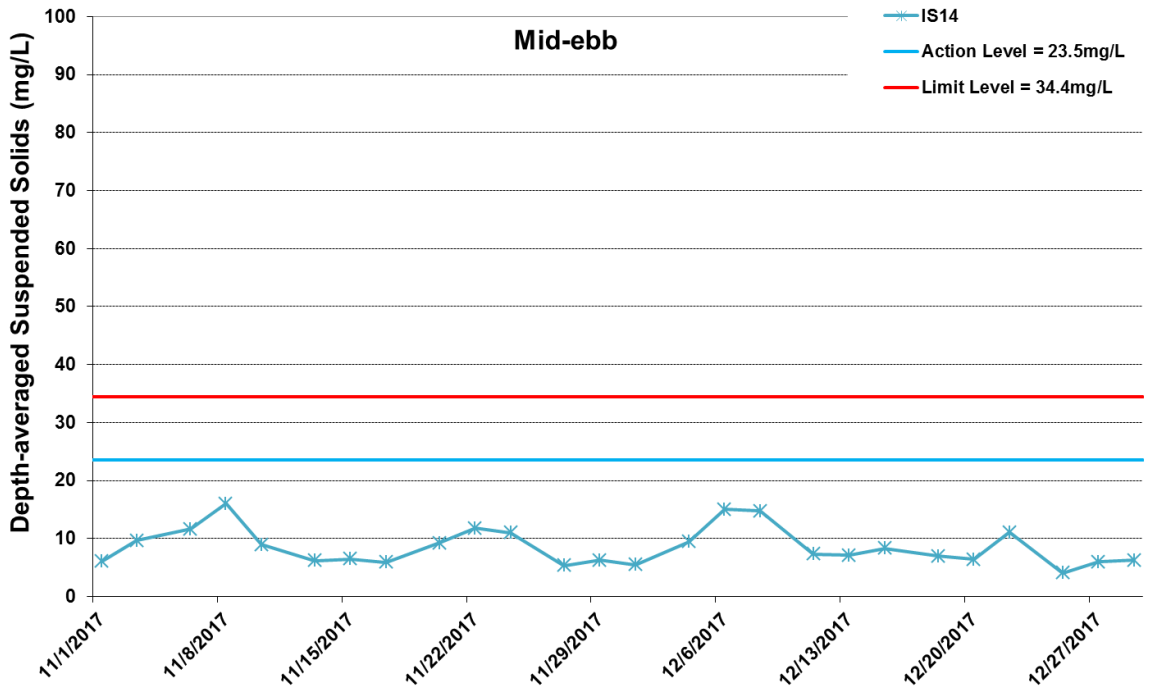


Figure G.38 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 November 2017 and 31 December 2017 at IS13. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



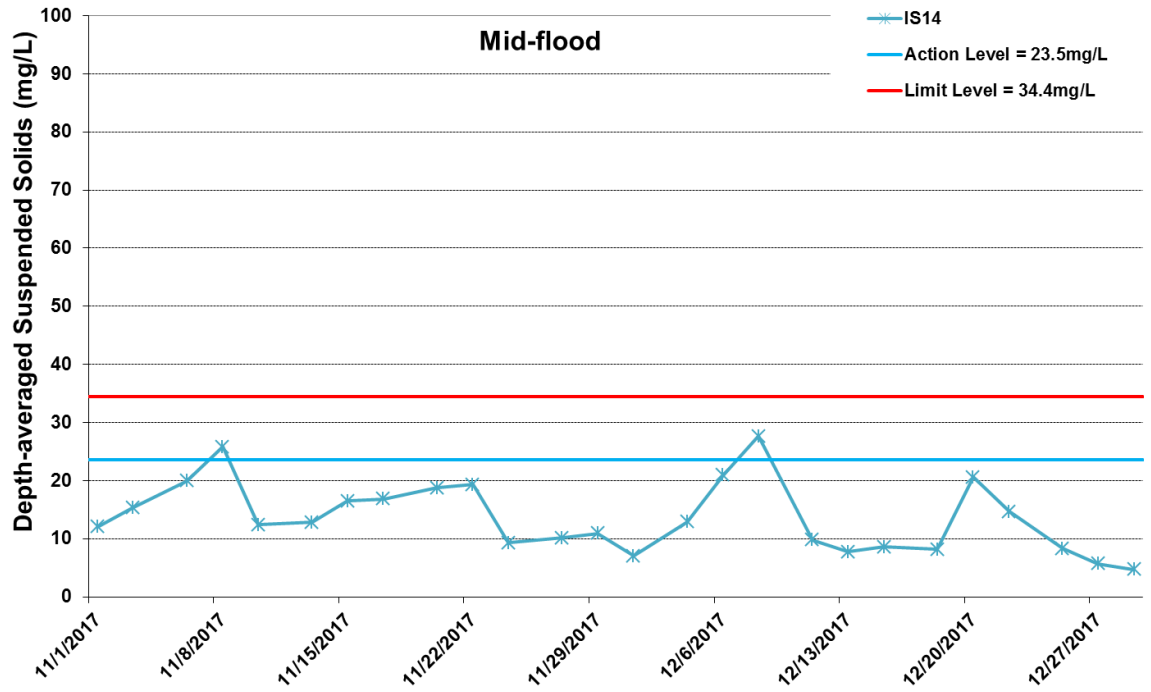
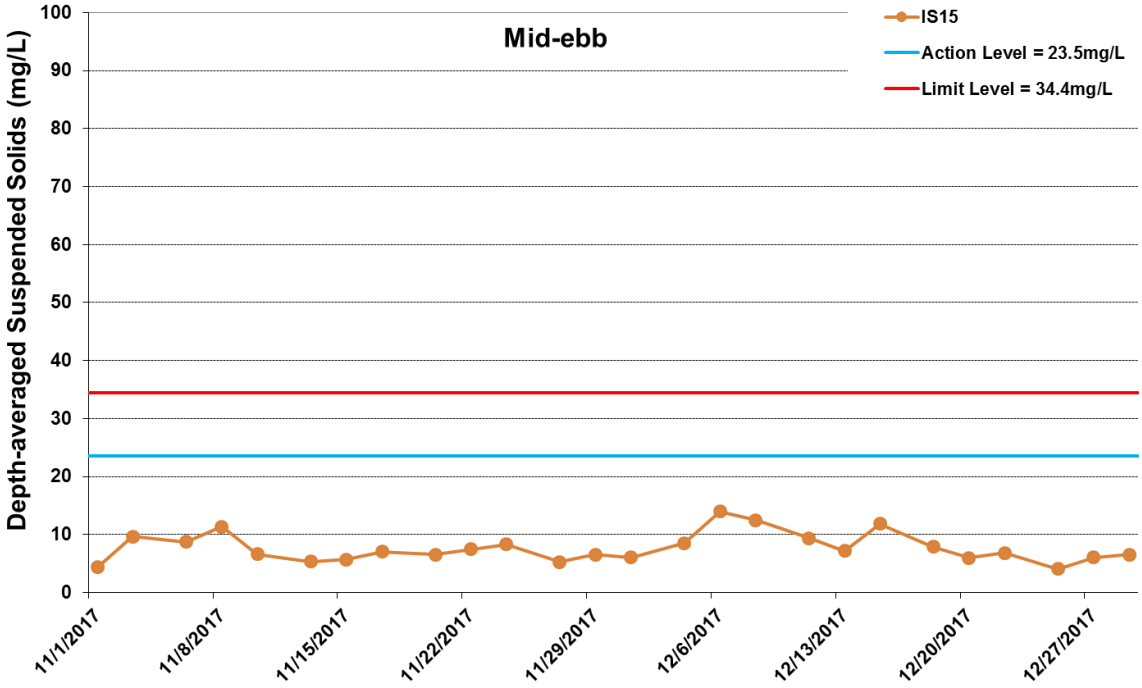


Figure G.39 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 November 2017 and 31 December 2017 at IS14. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



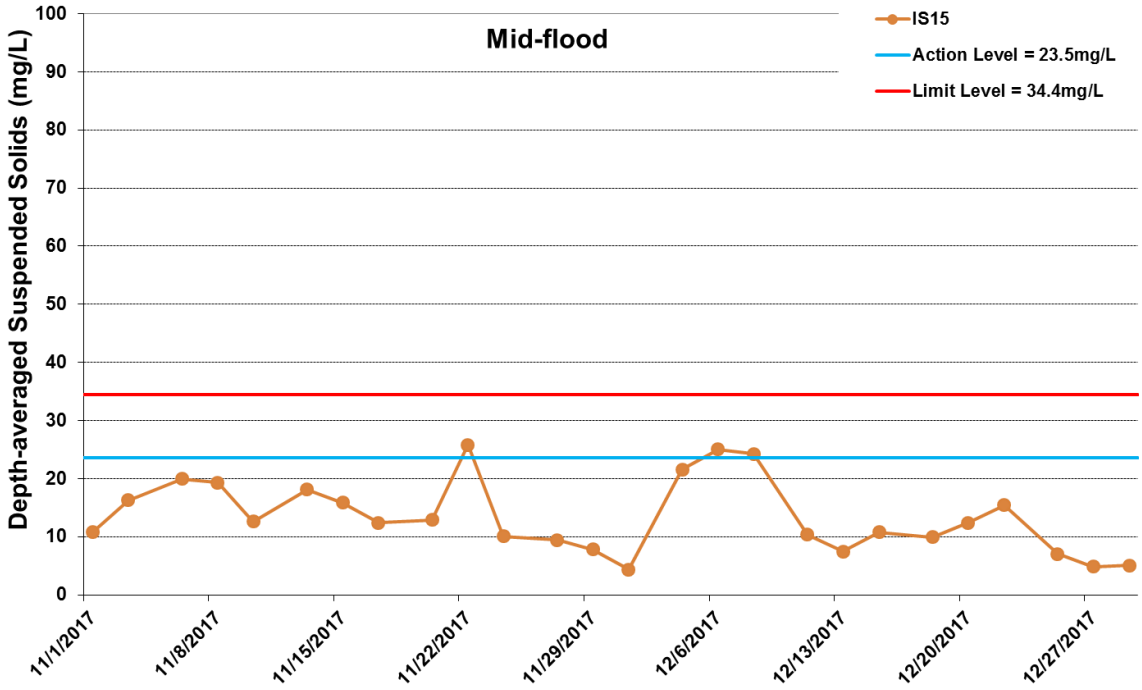
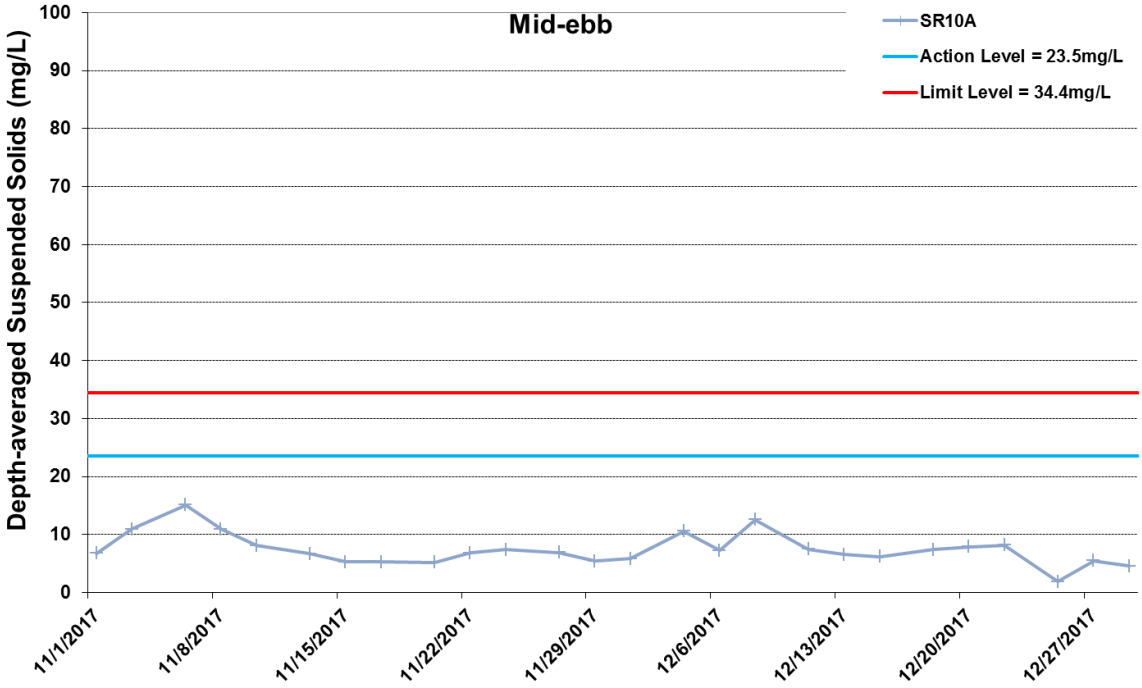


Figure G.40 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 November 2017 and 31 December 2017 at IS15. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



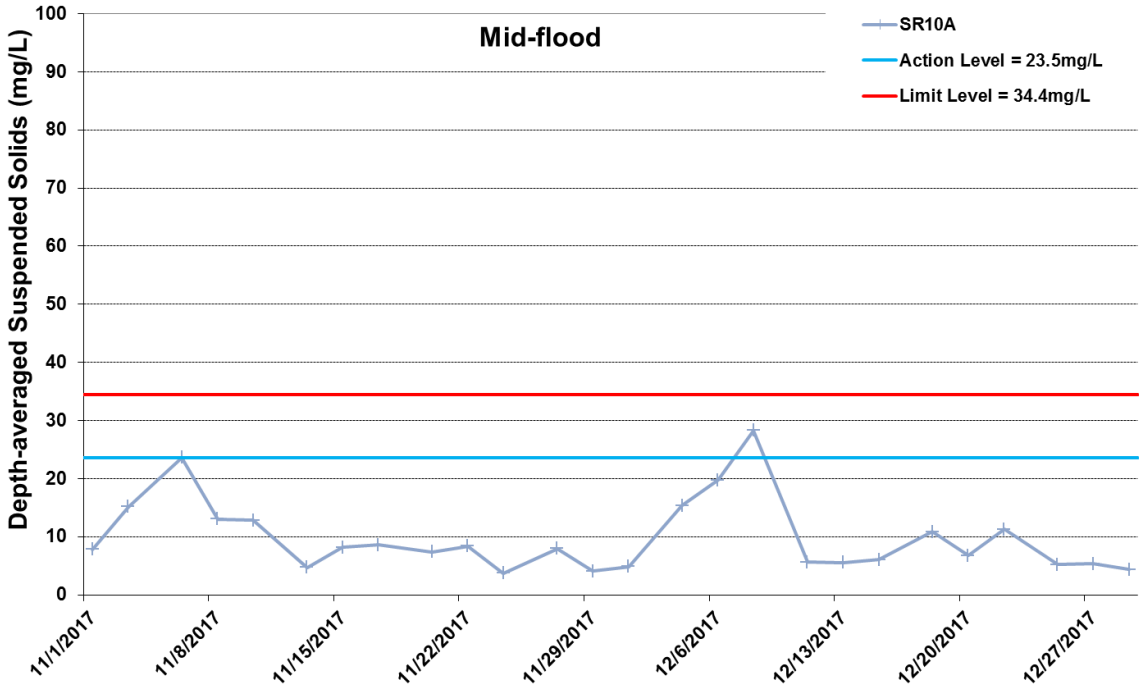
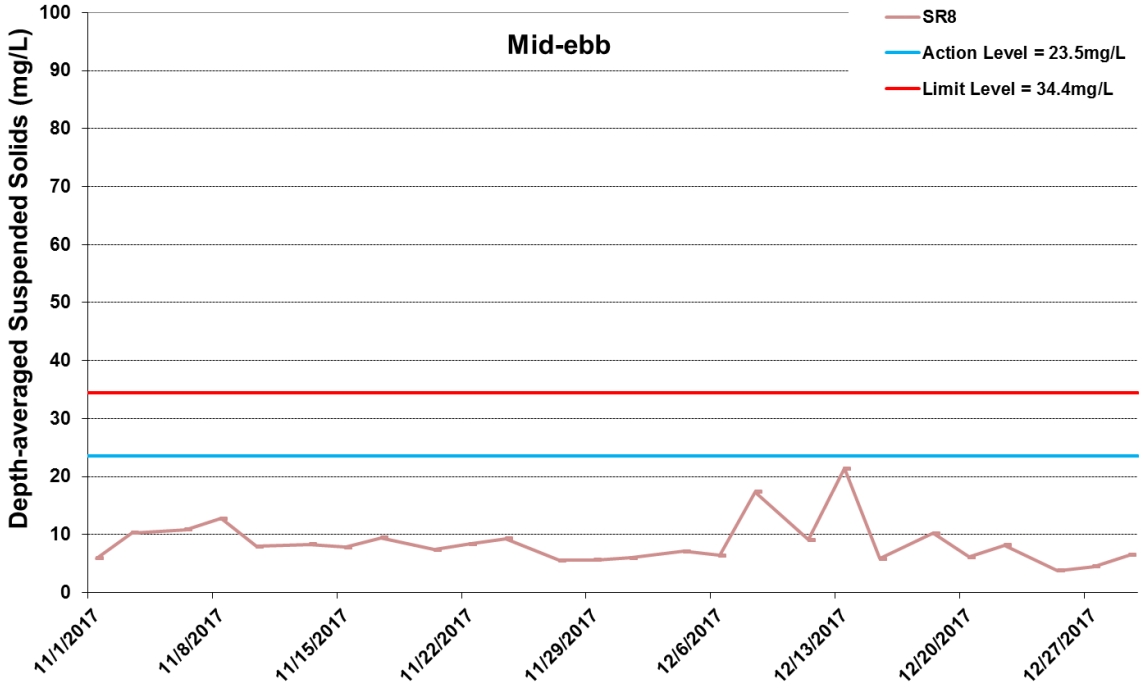


Figure G.41 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 November 2017 and 31 December 2017 at SR10A. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



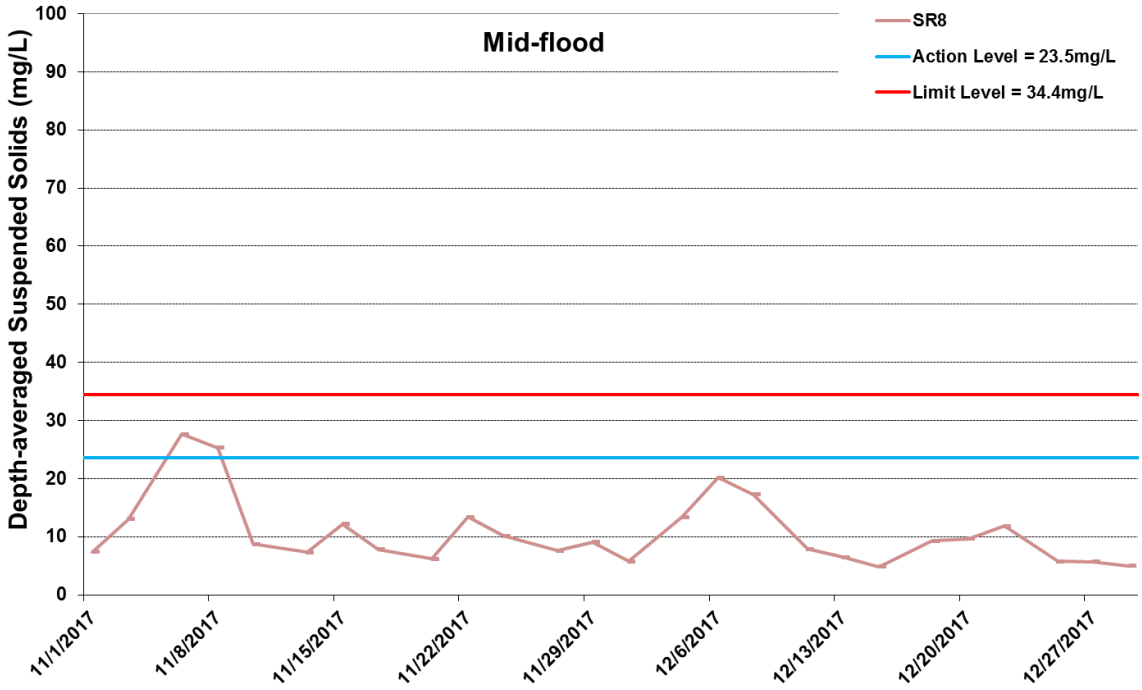
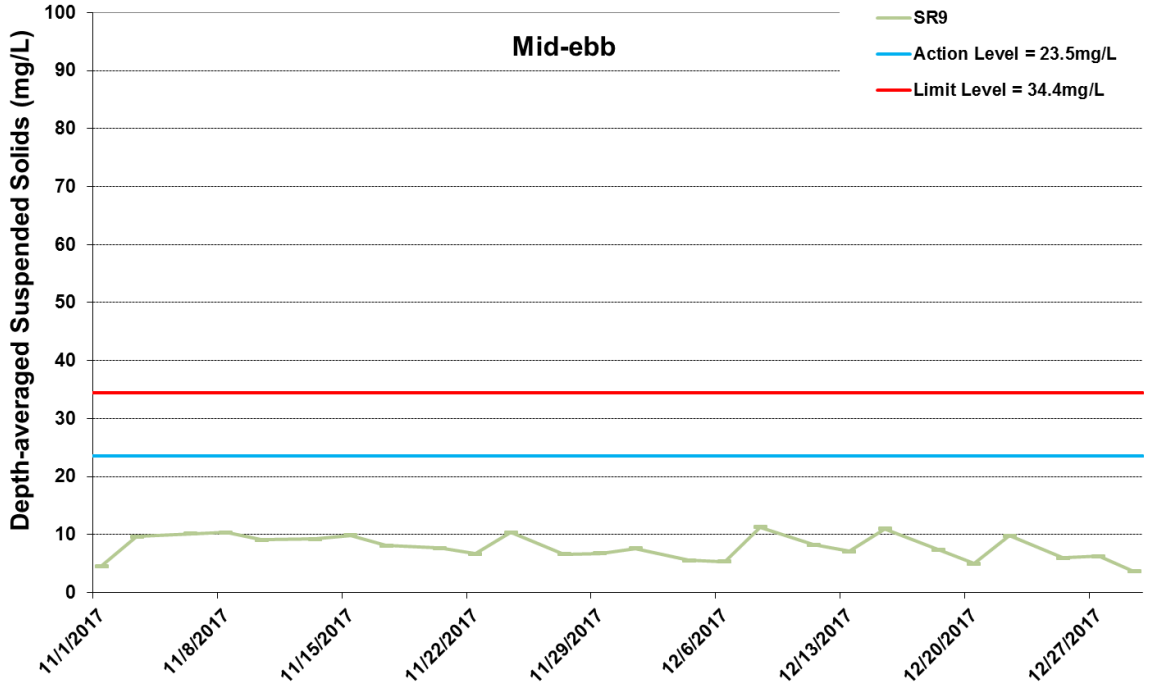


Figure G.42 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 November 2017 and 31 December 2017 at SR8. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_graphs_Rev a.xls



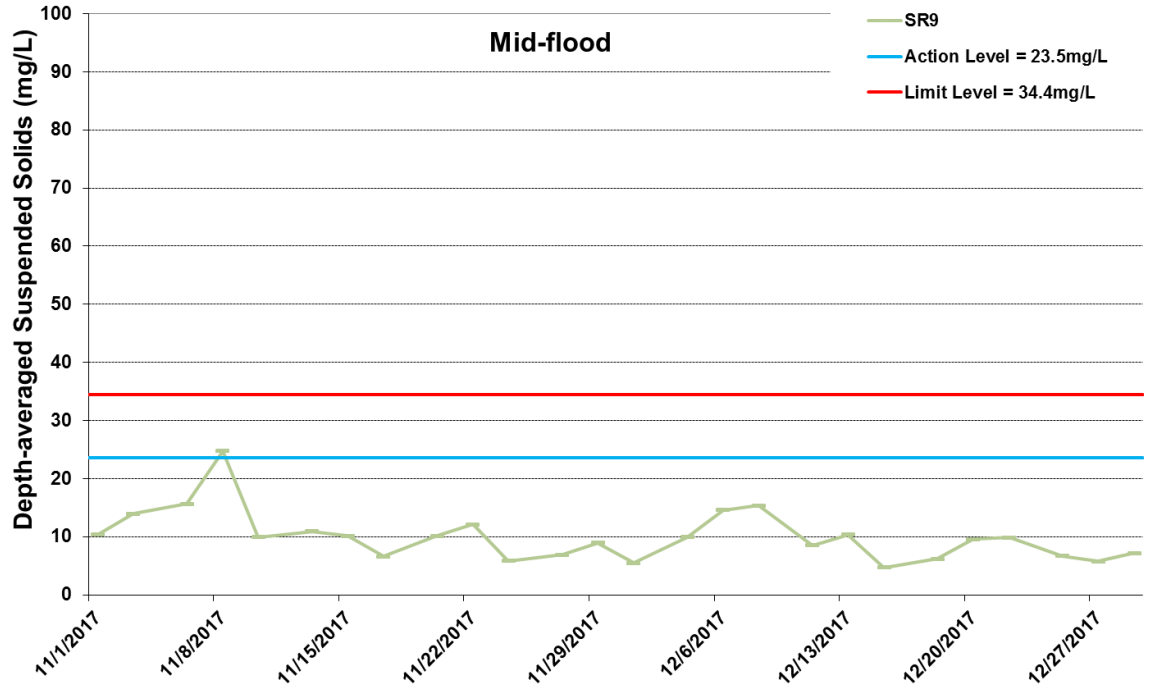


Figure G.43 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 November 2017 and 31 December 2017 at SR9. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine works included: Seawall Enhancement works at Portion N-C (1/11/2017 – 31/12/2017).

Ref: 0212330_Impact-WQM_December2017_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

17th Quarterly Progress Report (December 2017 – February 2018)
submitted to Dragages – Bouygues Joint Venture & ERM Hong Kong Ltd.

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

20 June 2018

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 17th 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 2017 to February 2018, 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 20 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 2017). For each monitoring vessel survey, a 15-m inboard vessel with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area.

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 2017 to February 2018, 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 797.53 km of survey effort was collected, with 88.8% 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, 296.70 km and 500.83 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 582.13 km, while the effort on secondary lines was 215.40 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 2017 to February 2018, 17 groups of 45 Chinese White Dolphins were sighted. All except one dolphin

sighting were made during on-effort search in this quarter, and 14 of the 16 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. However, it should be noted that a rare dolphin sighting with five individuals was made recently in NEL in February 2018 during a HKBCF monitoring survey.

3.2. Distribution

3.2.1. Distribution of dolphin sightings made during the HKLR03 monitoring surveys from December 2017 to February 2018 is shown in Figure 1. The majority of sightings were made at the western end of the North Lantau region, with higher concentration of sightings to the west and northwest of Lung Kwu Chau (Figure 1). Several sightings were also made between Lung Kwu Chau and Sha Chau, to the west of the airport platform, near Lung Kwu Tan and Pillar Point (Figure 1). 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. All dolphin sightings were located far away from the alignments of TM-CLKL as well as the HKBCF and HKLR03 reclamation sites (Figure 1). However, several dolphin groups were sighted near the alignment of HKLR09.

3.2.3. Sighting distribution of dolphins during the present impact phase monitoring period (December 2017-February 2018) 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 19 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 end 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 2012-18 (Figure 2). Among the six winter periods, dolphins were sighted regularly in NWL waters in 2012-13 and 2013-14, but their usage there was progressively reduced in the four subsequent winter periods, with their only occurrences mostly concentrated at the western end of the survey area (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 2017 – February 2018

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 (5 & 12 Dec 2017)	0.00	0.00
	Set 2 (15 & 20 Dec 2017)	0.00	0.00
	Set 3 (2 & 8 Jan 2018)	0.00	0.00
	Set 4 (16 & 25 Jan 2018)	0.00	0.00
	Set 5 (2 & 9 Feb 2018)	0.00	0.00
	Set 6 (14 & 22 Feb 2018)	0.00	0.00
Northwest Lantau	Set 1 (5 & 12 Dec 2017)	1.66	8.32
	Set 2 (15 & 20 Dec 2017)	8.39	22.37
	Set 3 (2 & 8 Jan 2018)	5.68	45.42
	Set 4 (16 & 25 Jan 2018)	3.43	3.43
	Set 5 (2 & 9 Feb 2018)	4.38	6.56
	Set 6 (14 & 22 Feb 2018)	4.97	8.29

Table 3. Comparison of average dolphin encounter rates from impact monitoring period (December 2017 – February 2018) 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 2017 – February 2018	September – November 2011	December 2017 – February 2018	September – November 2011
Northeast Lantau	0.0	6.00 ± 5.05	0.0	22.19 ± 26.81
Northwest Lantau	4.75 ± 2.26	9.85 ± 5.85	15.73 ± 15.94	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 3.6 sightings and 10.2 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 19 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 January 2014, with only three groups of six dolphins sighted there 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 68.3% and 76.8% respectively) were only a fraction 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. However, it is important to note that the quarterly encounter rate in the present monitoring period appeared to have rebounded from the previous lows. Both ER(STG) and ER(ANI) in NWL survey area in the present quarter reached the highest in the past three years, and were higher than the previous three winter quarters in 2014-15, 2015-16 and 2016-17 (Table 5). It remained to be seen whether such rebound in dolphin occurrence in NWL waters would be persistent in upcoming quarters. Such temporal trend should be closely monitored in the upcoming monitoring quarters as the construction activities of HZMB works continue to diminish in coming months.

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**

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**

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 (21st quarter of

the impact phase being assessed), the p-values for the differences in average dolphin encounter rates of STG and ANI were 0.0127 and 0.0470 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 21 quarters of the impact phase being assessed), the p-values for the differences in average dolphin encounter rates of STG and ANI were 0.000000 and 0.000000 respectively. 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).

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). Apparently there was little sign of recovery of dolphin usage even though almost all marine works associated with the HZMB construction have been completed.

3.4. Group size

3.4.1. Group size of Chinese White Dolphins ranged from one to eight individuals per group in North Lantau region during December 2017 to February 2018. 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 2017 – February 2018) and baseline monitoring period (September – November 2011) (Note: ± denotes the standard deviation of the average group size)

	Average Dolphin Group Size	
	December 2017 – February 2018	**September – November 2011**
Overall	2.65 ± 2.50 (n = 17)	3.72 ± 3.13 (n = 66)
Northeast Lantau	---	3.18 ± 2.16 (n = 17)
Northwest Lantau	2.65 ± 2.50 (n = 17)	3.92 ± 3.40 (n = 49)

3.4.2. The average dolphin group size in NWL waters during December 2017 to February 2018 was noticeably lower than the one recorded during the three-month baseline period, but it should also be noted that the sample size of 17 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, 13 of these 17 dolphin groups were composed of 1-3 individuals only, while there were only four medium-sized groups with 5-8 dolphins per group (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 four medium-sized groups with 5-8 dolphins were all distributed around Lung Kwu Chau (Figure 3). Such distribution pattern was very different from the baseline period, when the larger dolphin groups were frequently sighted and evenly distributed in NWL waters, and a few were also sighted in NEL waters (Figure 3).

3.5. Habitat use

3.5.1. From December 2017 to February 2018, the grids that recorded moderately high to high dolphin densities were all located around Lung Kwu Chau (Figures 4a and 4b). The rest of the grids that recorded dolphin occurrence were low in densities, and scattered near Lung Kwu Tan, Pillar Point and to the northwest and southwest of the airport platform (Figures 4a and 4b).

3.5.2. Notably, all grids near HKLR03/HKBCF reclamation sites as well as TMCLKL alignment did not record any presence of dolphins at all during on-effort search in the present quarterly period (Figures 4a and 4b). However, one grid (i.e. Grid G21) overlapped with the HKLR09 alignment recorded very low dolphin density (Figure 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 moderately high to high dolphin densities were located around Lung Kwu Chau during the present impact phase period (Figure 5).

3.6. Mother-calf pairs

3.6.1. During the present quarterly period, no young calf was sighted at all among the 17 groups of dolphins.

3.7. Activities and associations with fishing boats

3.7.1. Only one of the 17 dolphin groups were engaged in feeding activity, while no group was

engaged in socializing, traveling or milling/resting activity during the three-month study period.

3.7.2. The percentage of sightings associated with feeding activity (5.9%) was much lower than the one recorded during the baseline period (11.6%). However, 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 6. The only dolphin group engaged in feeding activity was sighted to the north of Lung Kwu Chau (Figure 6). When compared to the baseline period, distribution of various dolphin activities during the present impact phase monitoring period was drastically different with a much more restricted area of occurrences (Figure 6).

3.7.4. Notably, one group of eight dolphins was found to be associated with an operating purse-seiner to the north of Lung Kwu Chau during the present impact phase period.

3.8. Summary of photo-identification works

3.8.1. From December 2017 to February 2018, over 2,000 digital photographs of Chinese White Dolphins were taken during the impact phase monitoring surveys for the photo-identification work.

3.8.2. In total, 23 individuals sighted 32 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. Seven individuals (i.e. NL33, NL123, NL136, NL269, NL272, NL286 and NL322) were re-sighted twice, while another individual (NL182) were re-sighted thrice during the three-month period (Appendix III).

3.8.3. Notably, eight of these 23 individuals (i.e. CH34, NL123, NL136, NL182, NL226, NL261, NL272 and NL296) were also sighted in Northwest Lantau during the HKBCF monitoring surveys under the same three-month period. Moreover, only one individual (WL273) was also sighted in West Lantau waters during the HKLR09 monitoring surveys from December 2017 to February 2018, showing its extensive individual movements across different survey areas.

3.9. Individual range use

3.9.1. Ranging patterns of the 23 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. On the other hand, several individuals, including WL62, WL251, WL273 and WL288,

have consistently utilized WL waters in the past, but have extended their range use to NWL 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 (see Hung 2017).

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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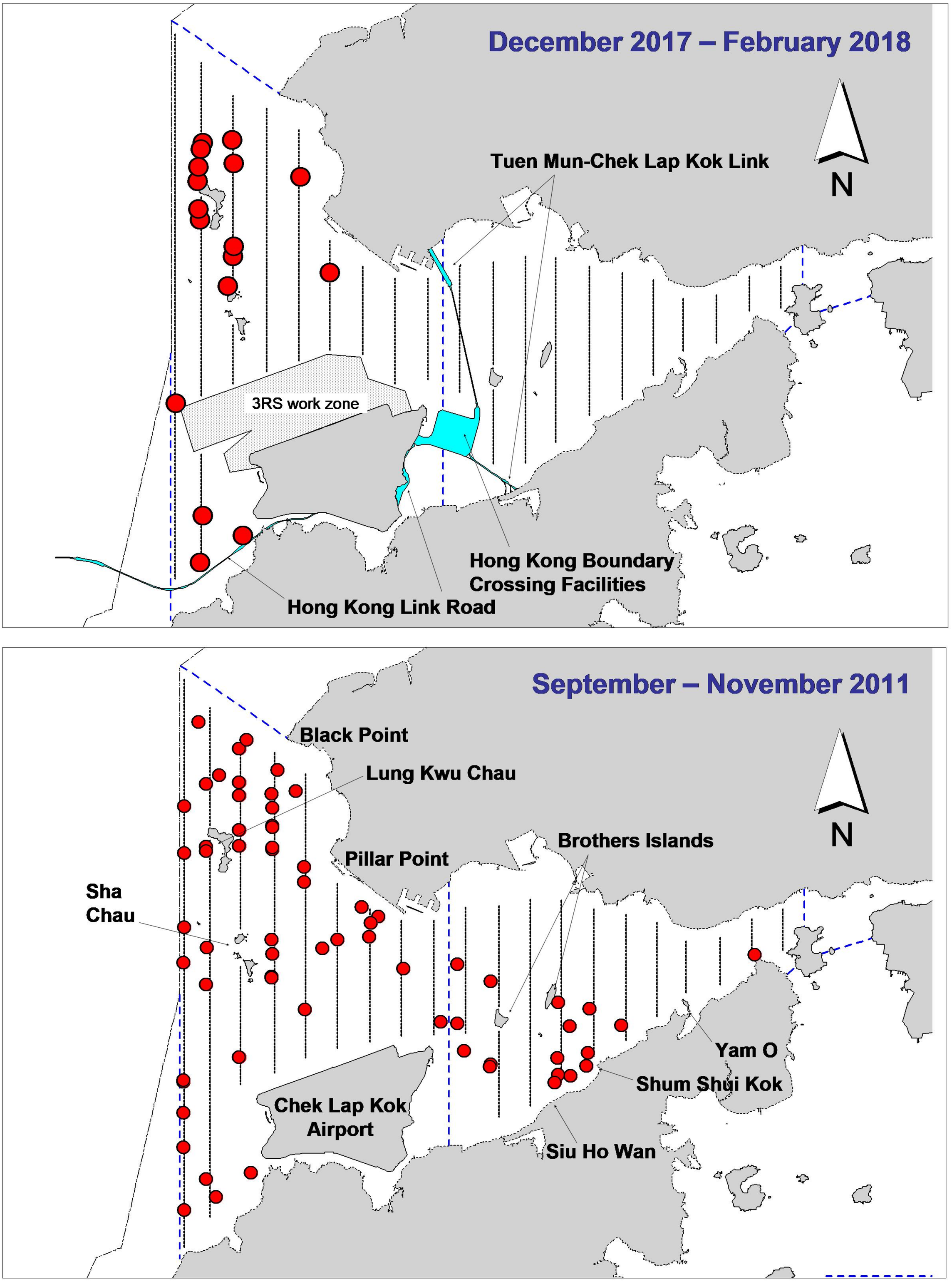


Figure 1. Distribution of Chinese white dolphin sighting in Northwest and Northeast Lantau during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

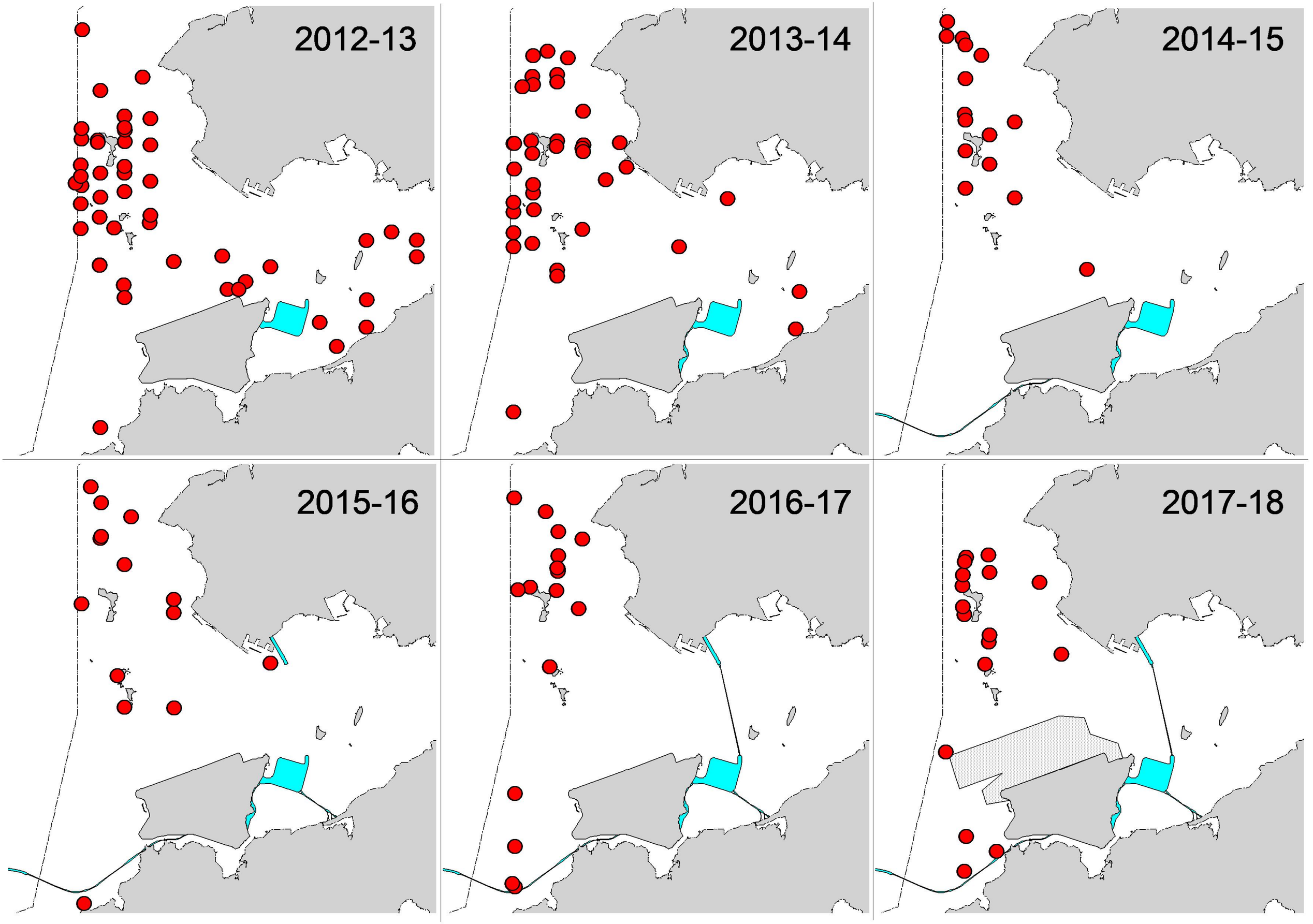


Figure 2. Distribution of Chinese white dolphin sightings in Northwest and Northeast Lantau during the past six winter quarters (December-February) of HKLR03 impact phase in 2012-18

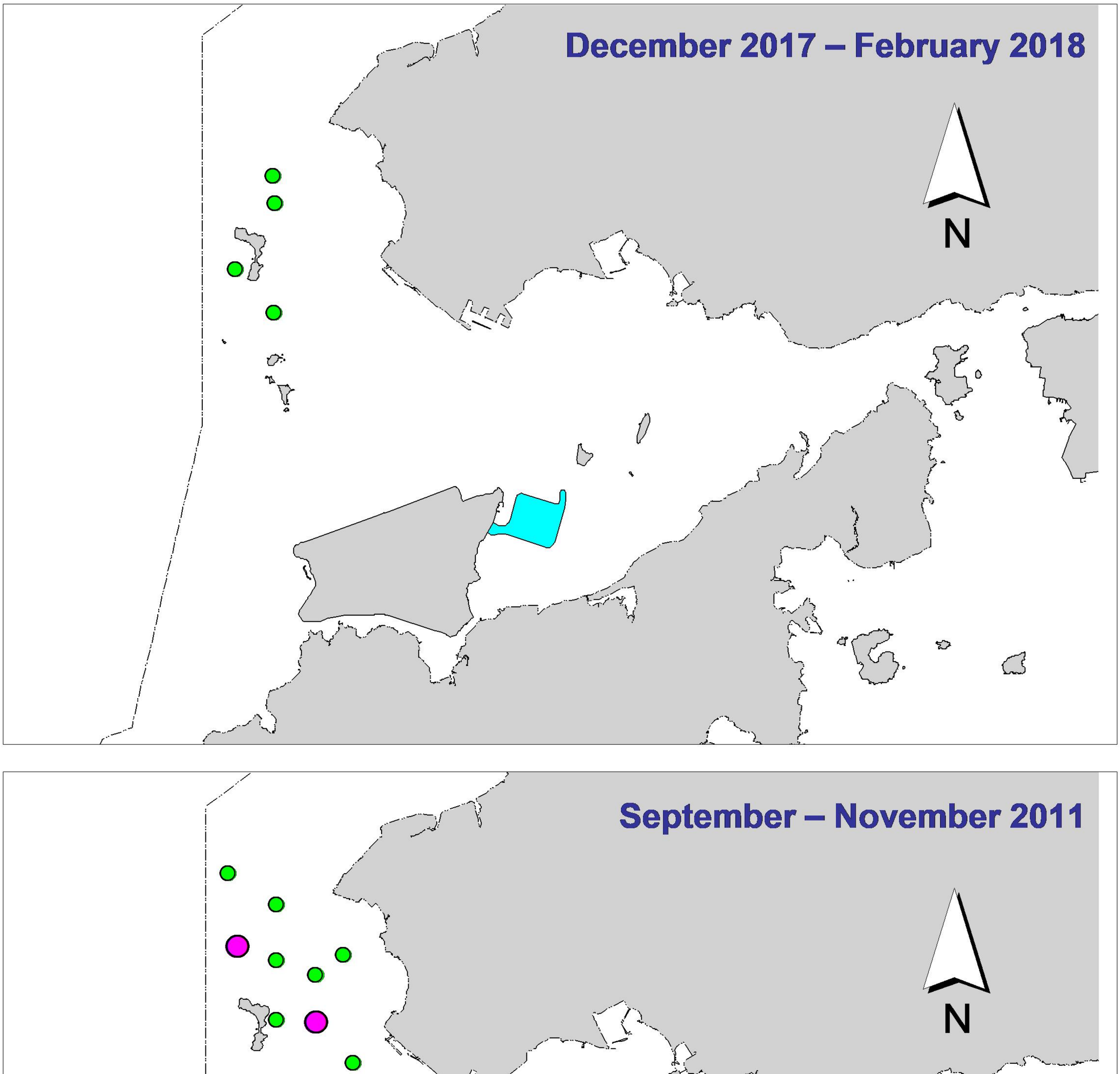


Figure 3. Distribution of Chinese white dolphins with larger group sizes during HKLR03 impact phase (top) and baseline monitoring surveys (bottom) (green dots: group sizes of 5 or more; purple dots: group sizes of 10 or more)

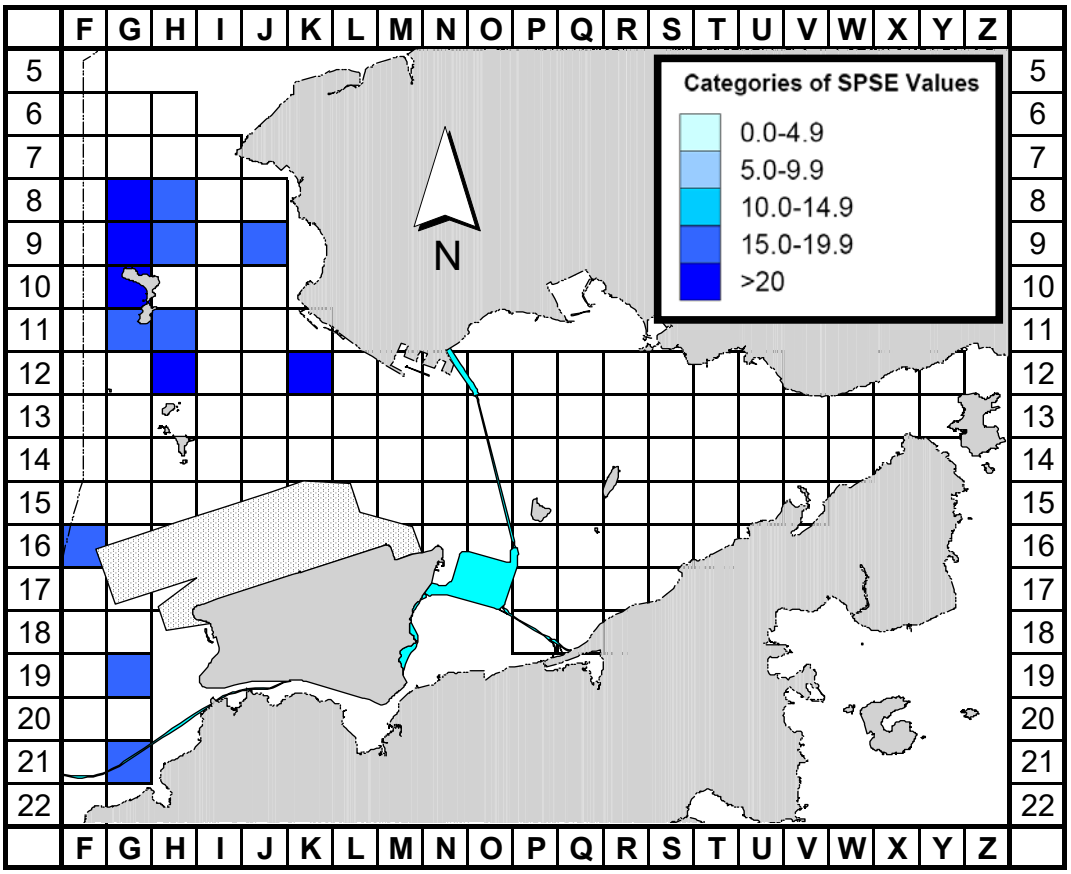


Figure 4a. Sighting density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period monitoring period (Dec 17-Feb 18) (SPSE = no. of on-effort sightings per 100 units of survey effort)

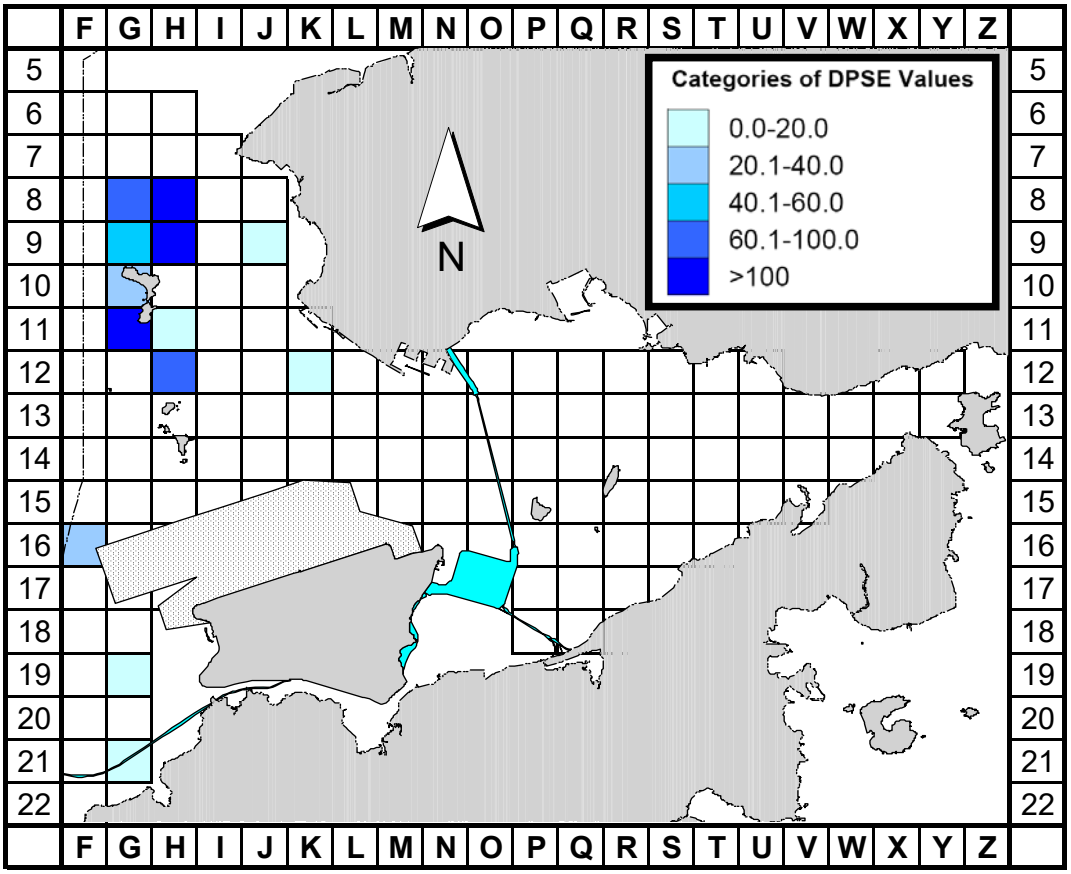


Figure 4b. Density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (Dec 17- Feb 18) (DPSE = no. of dolphins per 100 units of survey effort)

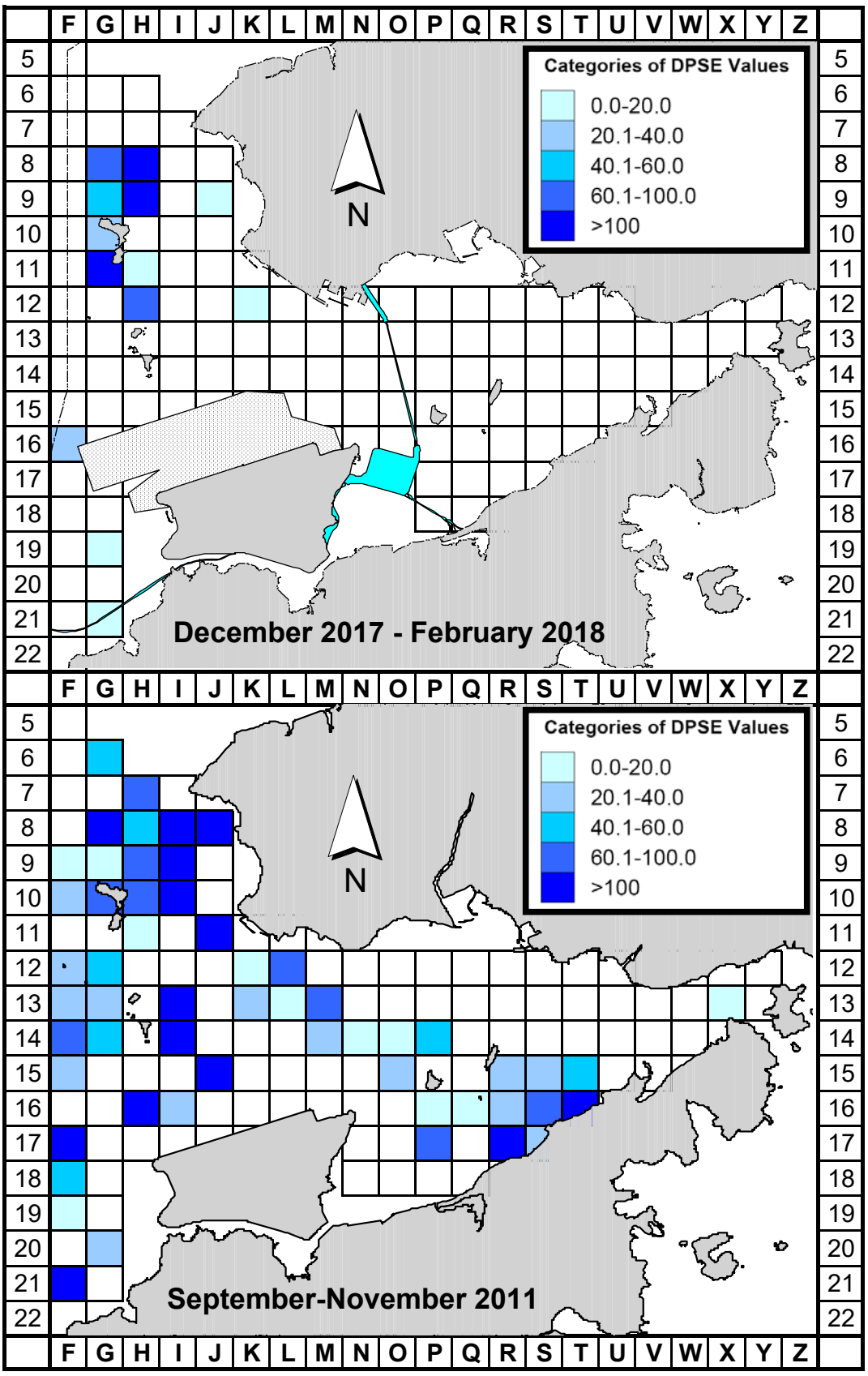


Figure 5. Comparison of density of Chinese white dolphins with corrected survey effort per km^2 in Northwest and Northeast Lantau survey area between the impact monitoring period (December 2017 - February 2018) and baseline monitoring period (September-November 2011)
(DPSE = no. of dolphins per 100 units of survey effort)

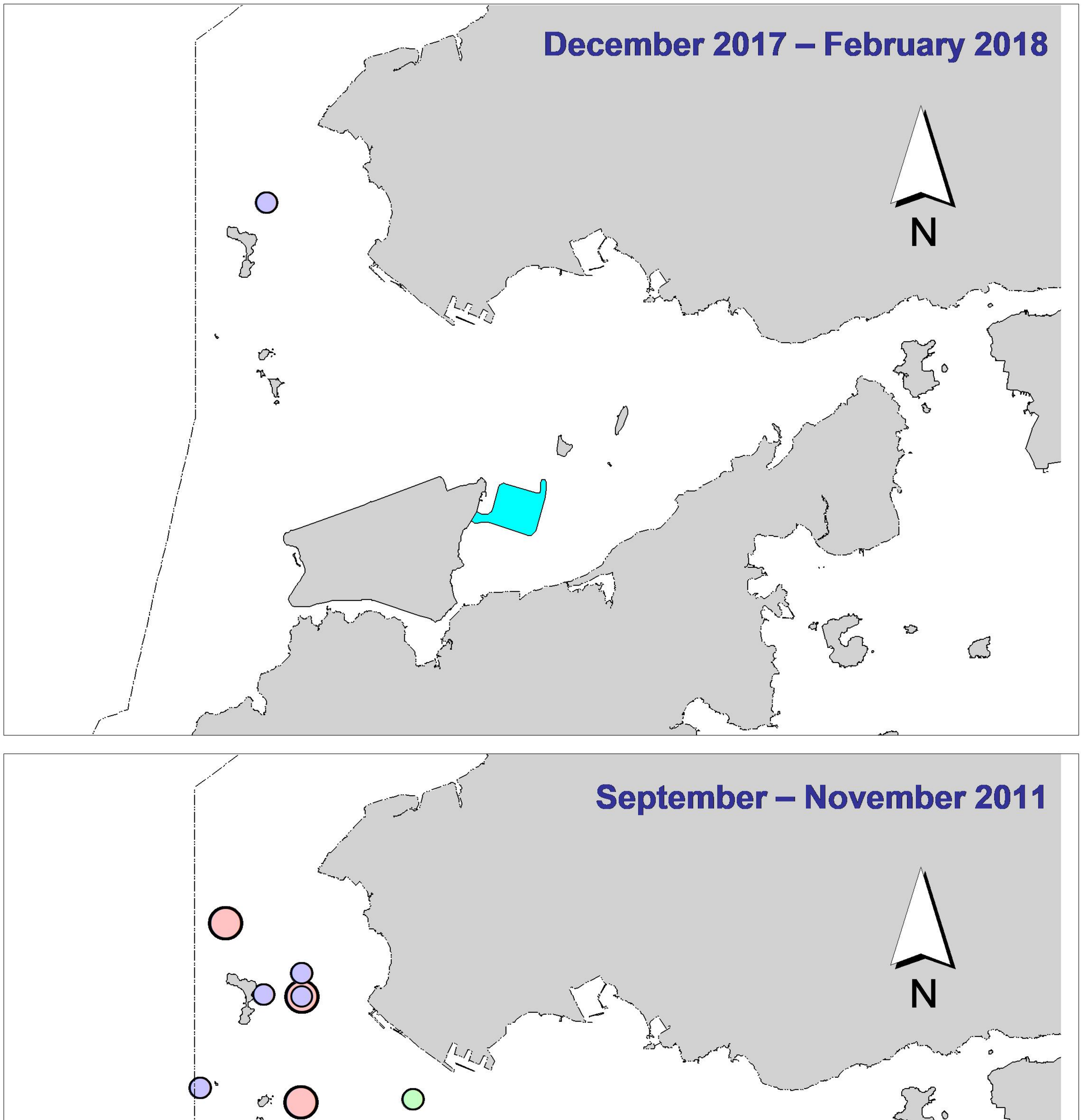


Figure 6. Distribution of Chinese white dolphins engaged in feeding (purple dots), socializing (pink dots) and traveling (green dots) activities during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

Appendix I. HKLR03 Survey Effort Database (Dec 2017 - Feb 2018)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
5-Dec-17	NW LANTAU	2	17.27	WINTER	STANDARD36826	HKLR	P
5-Dec-17	NW LANTAU	3	15.02	WINTER	STANDARD36826	HKLR	P
5-Dec-17	NW LANTAU	2	7.80	WINTER	STANDARD36826	HKLR	S
5-Dec-17	NW LANTAU	3	3.81	WINTER	STANDARD36826	HKLR	S
5-Dec-17	NE LANTAU	2	33.41	WINTER	STANDARD36826	HKLR	P
5-Dec-17	NE LANTAU	3	2.11	WINTER	STANDARD36826	HKLR	P
5-Dec-17	NE LANTAU	2	13.18	WINTER	STANDARD36826	HKLR	S
5-Dec-17	NE LANTAU	3	0.60	WINTER	STANDARD36826	HKLR	S
12-Dec-17	NW LANTAU	2	24.51	WINTER	STANDARD36826	HKLR	P
12-Dec-17	NW LANTAU	3	3.30	WINTER	STANDARD36826	HKLR	P
12-Dec-17	NW LANTAU	2	11.89	WINTER	STANDARD36826	HKLR	S
12-Dec-17	NW LANTAU	3	0.90	WINTER	STANDARD36826	HKLR	S
15-Dec-17	NW LANTAU	1	3.85	WINTER	STANDARD36826	HKLR	P
15-Dec-17	NW LANTAU	2	21.86	WINTER	STANDARD36826	HKLR	P
15-Dec-17	NW LANTAU	3	2.68	WINTER	STANDARD36826	HKLR	P
15-Dec-17	NW LANTAU	1	2.79	WINTER	STANDARD36826	HKLR	S
15-Dec-17	NW LANTAU	2	6.92	WINTER	STANDARD36826	HKLR	S
15-Dec-17	NW LANTAU	3	2.43	WINTER	STANDARD36826	HKLR	S
15-Dec-17	NE LANTAU	1	11.59	WINTER	STANDARD36826	HKLR	P
15-Dec-17	NE LANTAU	2	21.70	WINTER	STANDARD36826	HKLR	P
15-Dec-17	NE LANTAU	3	4.60	WINTER	STANDARD36826	HKLR	P
15-Dec-17	NE LANTAU	1	3.31	WINTER	STANDARD36826	HKLR	S
15-Dec-17	NE LANTAU	2	6.80	WINTER	STANDARD36826	HKLR	S
15-Dec-17	NE LANTAU	3	1.90	WINTER	STANDARD36826	HKLR	S
20-Dec-17	NW LANTAU	2	1.39	WINTER	STANDARD36826	HKLR	P
20-Dec-17	NW LANTAU	3	5.99	WINTER	STANDARD36826	HKLR	P
20-Dec-17	NW LANTAU	4	25.69	WINTER	STANDARD36826	HKLR	P
20-Dec-17	NW LANTAU	3	5.43	WINTER	STANDARD36826	HKLR	S
20-Dec-17	NW LANTAU	4	5.50	WINTER	STANDARD36826	HKLR	S
2-Jan-18	NW LANTAU	2	27.79	WINTER	STANDARD36826	HKLR	P
2-Jan-18	NW LANTAU	3	3.97	WINTER	STANDARD36826	HKLR	P
2-Jan-18	NW LANTAU	2	10.12	WINTER	STANDARD36826	HKLR	S
2-Jan-18	NW LANTAU	3	0.60	WINTER	STANDARD36826	HKLR	S
8-Jan-18	NW LANTAU	3	3.47	WINTER	STANDARD36826	HKLR	P
8-Jan-18	NW LANTAU	4	9.99	WINTER	STANDARD36826	HKLR	P
8-Jan-18	NW LANTAU	5	14.91	WINTER	STANDARD36826	HKLR	P
8-Jan-18	NW LANTAU	4	6.80	WINTER	STANDARD36826	HKLR	S
8-Jan-18	NW LANTAU	5	3.73	WINTER	STANDARD36826	HKLR	S
8-Jan-18	NE LANTAU	2	6.71	WINTER	STANDARD36826	HKLR	P
8-Jan-18	NE LANTAU	3	29.79	WINTER	STANDARD36826	HKLR	P
8-Jan-18	NE LANTAU	4	0.64	WINTER	STANDARD36826	HKLR	P
8-Jan-18	NE LANTAU	2	5.70	WINTER	STANDARD36826	HKLR	S
8-Jan-18	NE LANTAU	3	7.36	WINTER	STANDARD36826	HKLR	S
16-Jan-18	NW LANTAU	2	27.70	WINTER	STANDARD36826	HKLR	P
16-Jan-18	NW LANTAU	3	5.45	WINTER	STANDARD36826	HKLR	P
16-Jan-18	NW LANTAU	2	8.15	WINTER	STANDARD36826	HKLR	S
16-Jan-18	NW LANTAU	3	2.70	WINTER	STANDARD36826	HKLR	S
25-Jan-18	NE LANTAU	2	17.96	WINTER	STANDARD36826	HKLR	P
25-Jan-18	NE LANTAU	3	18.90	WINTER	STANDARD36826	HKLR	P
25-Jan-18	NE LANTAU	2	7.54	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
25-Jan-18	NE LANTAU	3	4.20	WINTER	STANDARD36826	HKLR	S
25-Jan-18	NE LANTAU	4	1.40	WINTER	STANDARD36826	HKLR	S
25-Jan-18	NW LANTAU	2	7.23	WINTER	STANDARD36826	HKLR	P
25-Jan-18	NW LANTAU	3	17.92	WINTER	STANDARD36826	HKLR	P
25-Jan-18	NW LANTAU	4	2.72	WINTER	STANDARD36826	HKLR	P
25-Jan-18	NW LANTAU	2	4.02	WINTER	STANDARD36826	HKLR	S
25-Jan-18	NW LANTAU	3	6.52	WINTER	STANDARD36826	HKLR	S
25-Jan-18	NW LANTAU	4	1.95	WINTER	STANDARD36826	HKLR	S
2-Feb-18	NW LANTAU	2	2.34	WINTER	STANDARD36826	HKLR	P
2-Feb-18	NW LANTAU	3	16.30	WINTER	STANDARD36826	HKLR	P
2-Feb-18	NW LANTAU	4	15.00	WINTER	STANDARD36826	HKLR	P
2-Feb-18	NW LANTAU	2	2.86	WINTER	STANDARD36826	HKLR	S
2-Feb-18	NW LANTAU	3	6.78	WINTER	STANDARD36826	HKLR	S
2-Feb-18	NW LANTAU	4	1.12	WINTER	STANDARD36826	HKLR	S
9-Feb-18	NE LANTAU	1	4.00	WINTER	STANDARD36826	HKLR	P
9-Feb-18	NE LANTAU	2	30.78	WINTER	STANDARD36826	HKLR	P
9-Feb-18	NE LANTAU	1	1.00	WINTER	STANDARD36826	HKLR	S
9-Feb-18	NE LANTAU	2	12.02	WINTER	STANDARD36826	HKLR	S
9-Feb-18	NW LANTAU	1	5.87	WINTER	STANDARD36826	HKLR	P
9-Feb-18	NW LANTAU	2	21.20	WINTER	STANDARD36826	HKLR	P
9-Feb-18	NW LANTAU	1	2.32	WINTER	STANDARD36826	HKLR	S
9-Feb-18	NW LANTAU	2	8.91	WINTER	STANDARD36826	HKLR	S
14-Feb-18	NW LANTAU	1	2.80	WINTER	STANDARD36826	HKLR	P
14-Feb-18	NW LANTAU	2	24.71	WINTER	STANDARD36826	HKLR	P
14-Feb-18	NW LANTAU	2	12.25	WINTER	STANDARD36826	HKLR	S
14-Feb-18	NE LANTAU	1	3.84	WINTER	STANDARD36826	HKLR	P
14-Feb-18	NE LANTAU	2	22.25	WINTER	STANDARD36826	HKLR	P
14-Feb-18	NE LANTAU	3	10.09	WINTER	STANDARD36826	HKLR	P
14-Feb-18	NE LANTAU	2	12.04	WINTER	STANDARD36826	HKLR	S
14-Feb-18	NE LANTAU	3	1.28	WINTER	STANDARD36826	HKLR	S
22-Feb-18	NW LANTAU	2	11.27	WINTER	STANDARD36826	HKLR	P
22-Feb-18	NW LANTAU	3	21.56	WINTER	STANDARD36826	HKLR	P
22-Feb-18	NW LANTAU	2	5.32	WINTER	STANDARD36826	HKLR	S
22-Feb-18	NW LANTAU	3	5.45	WINTER	STANDARD36826	HKLR	S

Appendix II. HKLR03 Chinese White Dolphin Sighting Database (December 2017 - February 2018)

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

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
5-Dec-17	1	1150	5	NW LANTAU	3	155	ON	HKLR	824890	806432	WINTER	NONE	P
15-Dec-17	1	1011	1	NW LANTAU	2	7	ON	HKLR	815955	805415	WINTER	NONE	P
15-Dec-17	2	1106	6	NW LANTAU	2	151	ON	HKLR	825966	805414	WINTER	NONE	P
15-Dec-17	3	1242	1	NW LANTAU	1	176	ON	HKLR	824441	809449	WINTER	NONE	P
2-Jan-18	1	1141	8	NW LANTAU	2	93	ON	HKLR	827614	806458	WINTER	PURSE-SEINE	P
2-Jan-18	2	1204	8	NW LANTAU	2	285	ON	HKLR	828301	806418	WINTER	NONE	P
8-Jan-18	1	1105	2	NW LANTAU	5	42	ON	HKLR	827107	805345	WINTER	NONE	P
16-Jan-18	1	1137	1	NW LANTAU	2	309	ON	HKLR	825178	806453	WINTER	NONE	P
25-Jan-18	1	1440	1	NW LANTAU	3	237	ON	HKLR	827516	805356	WINTER	NONE	P
2-Feb-18	1	1134	1	NW LANTAU	3	33	ON	HKLR	824048	806286	WINTER	NONE	S
9-Feb-18	1	956	1	NW LANTAU	1	ND	OFF	HKLR	816739	806756	WINTER	NONE	
9-Feb-18	2	1013	1	NW LANTAU	1	99	ON	HKLR	817306	805490	WINTER	NONE	P
9-Feb-18	3	1031	2	NW LANTAU	2	687	ON	HKLR	820619	804662	WINTER	NONE	P
9-Feb-18	4	1116	2	NW LANTAU	1	387	ON	HKLR	828225	805491	WINTER	NONE	S
14-Feb-18	1	1052	1	NW LANTAU	2	55	ON	HKLR	826276	805353	WINTER	NONE	P
14-Feb-18	2	1107	3	NW LANTAU	2	1047	ON	HKLR	828037	805429	WINTER	NONE	P
22-Feb-18	1	1040	1	NW LANTAU	3	137	ON	HKLR	827222	808537	WINTER	NONE	P

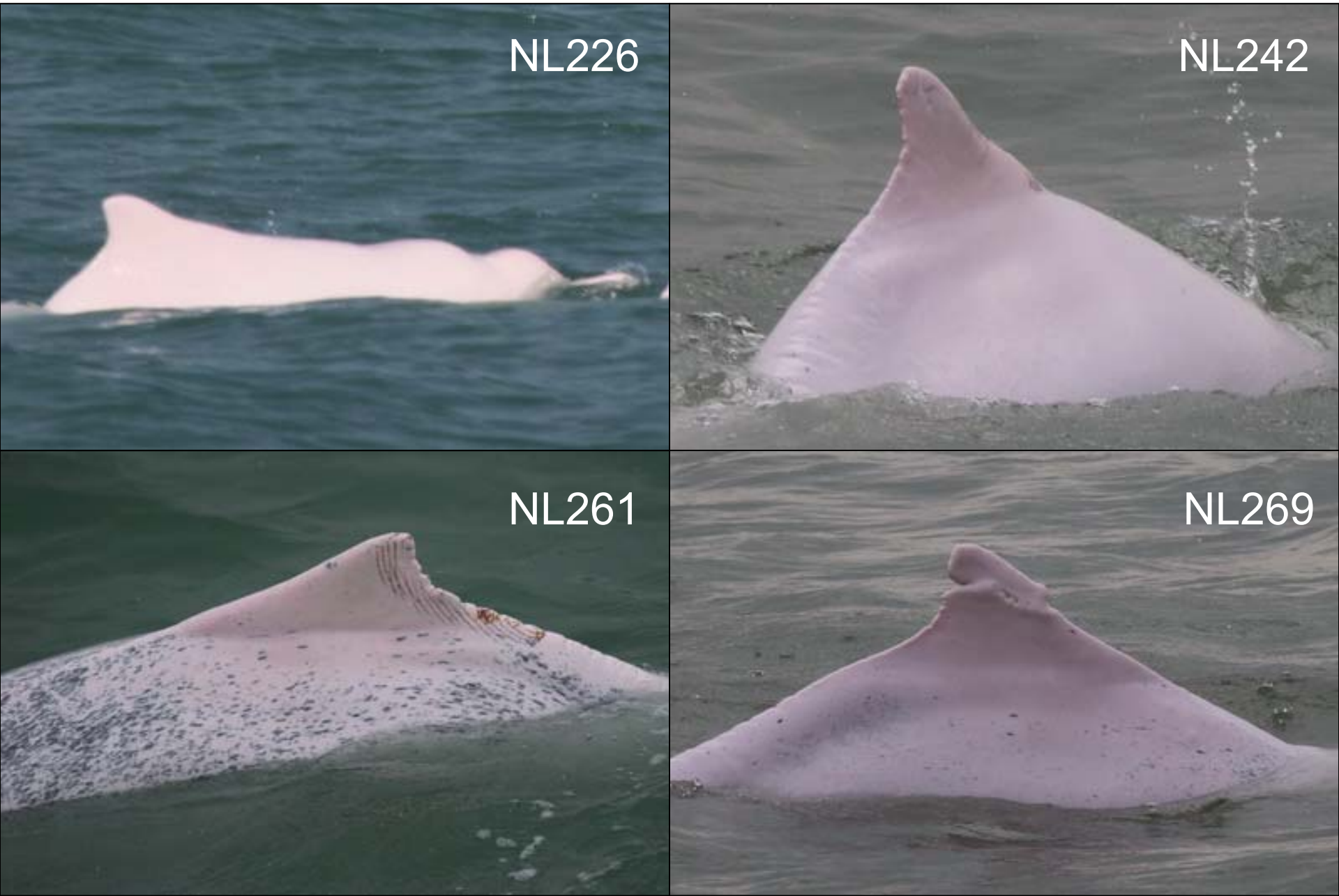
Appendix III. Individual dolphins identified during HKLR03 monitoring surveys in December 2017 - February 2018

ID#	DATE	STG#	AREA
CH34	15/12/17	2	NW LANTAU
NL33	15/12/17	2	NW LANTAU
	02/01/18	2	NW LANTAU
NL46	05/12/17	1	NW LANTAU
NL98	02/01/18	1	NW LANTAU
NL123	02/01/18	2	NW LANTAU
	25/01/18	1	NW LANTAU
NL136	15/12/17	2	NW LANTAU
	02/01/18	1	NW LANTAU
NL182	15/12/17	2	NW LANTAU
	02/01/18	1	NW LANTAU
	22/02/18	1	NW LANTAU
NL202	09/02/18	4	NW LANTAU
NL226	02/01/18	1	NW LANTAU
NL242	05/12/17	1	NW LANTAU
NL261	15/12/17	2	NW LANTAU
NL269	05/12/17	1	NW LANTAU
	02/01/18	1	NW LANTAU
NL272	02/01/18	1	NW LANTAU
	16/01/18	1	NW LANTAU
NL286	02/01/18	2	NW LANTAU
	09/02/18	4	NW LANTAU
NL296	05/12/17	1	NW LANTAU
NL311	02/01/18	1	NW LANTAU
NL322	15/12/17	2	NW LANTAU
	02/01/18	2	NW LANTAU
WL11	14/02/18	1	NW LANTAU
WL28	09/02/18	3	NW LANTAU
WL62	15/12/17	3	NW LANTAU
WL251	02/01/18	2	NW LANTAU
WL273	05/12/17	1	NW LANTAU
WL288	09/02/18	3	NW LANTAU

Appendix IV. Twenty-three individual dolphins that were identified during December 2017 to February 2018 under HKLR03 impact phase monitoring surveys

Appendix IV. (cont'd)

Appendix IV. (cont'd)

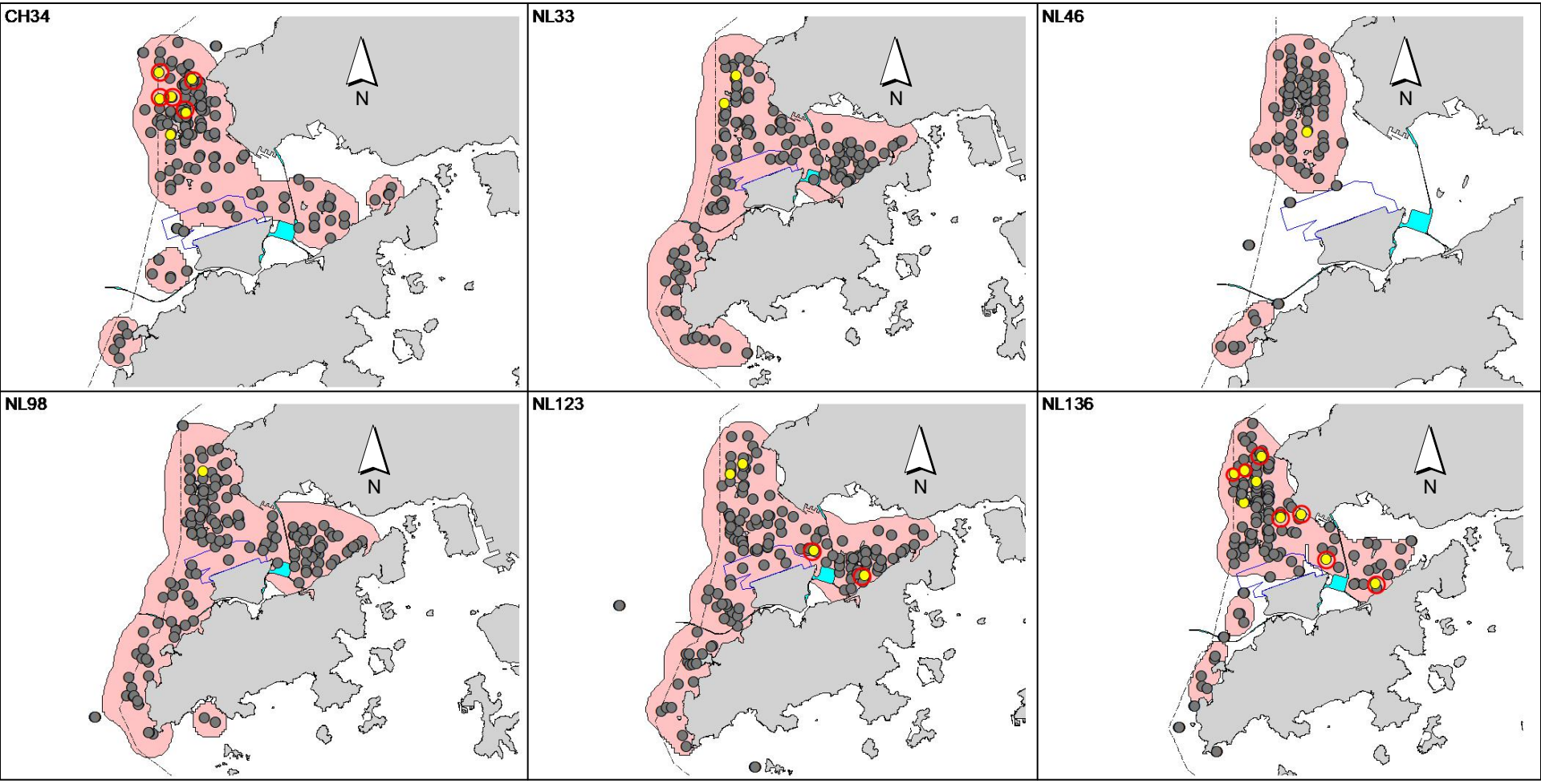


Appendix IV. (cont'd)

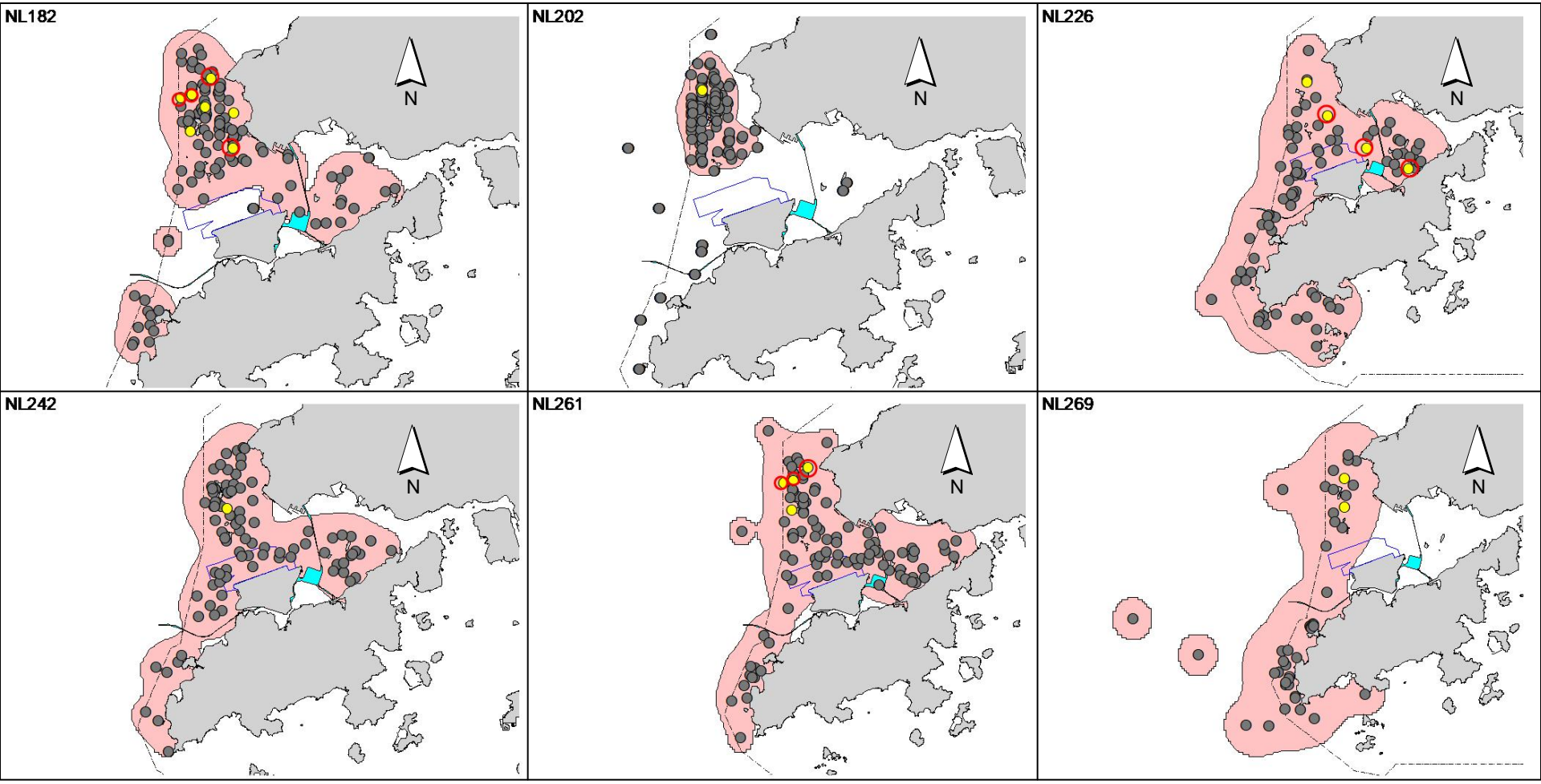
Appendix IV. (cont'd)

Appendix IV. (cont'd)

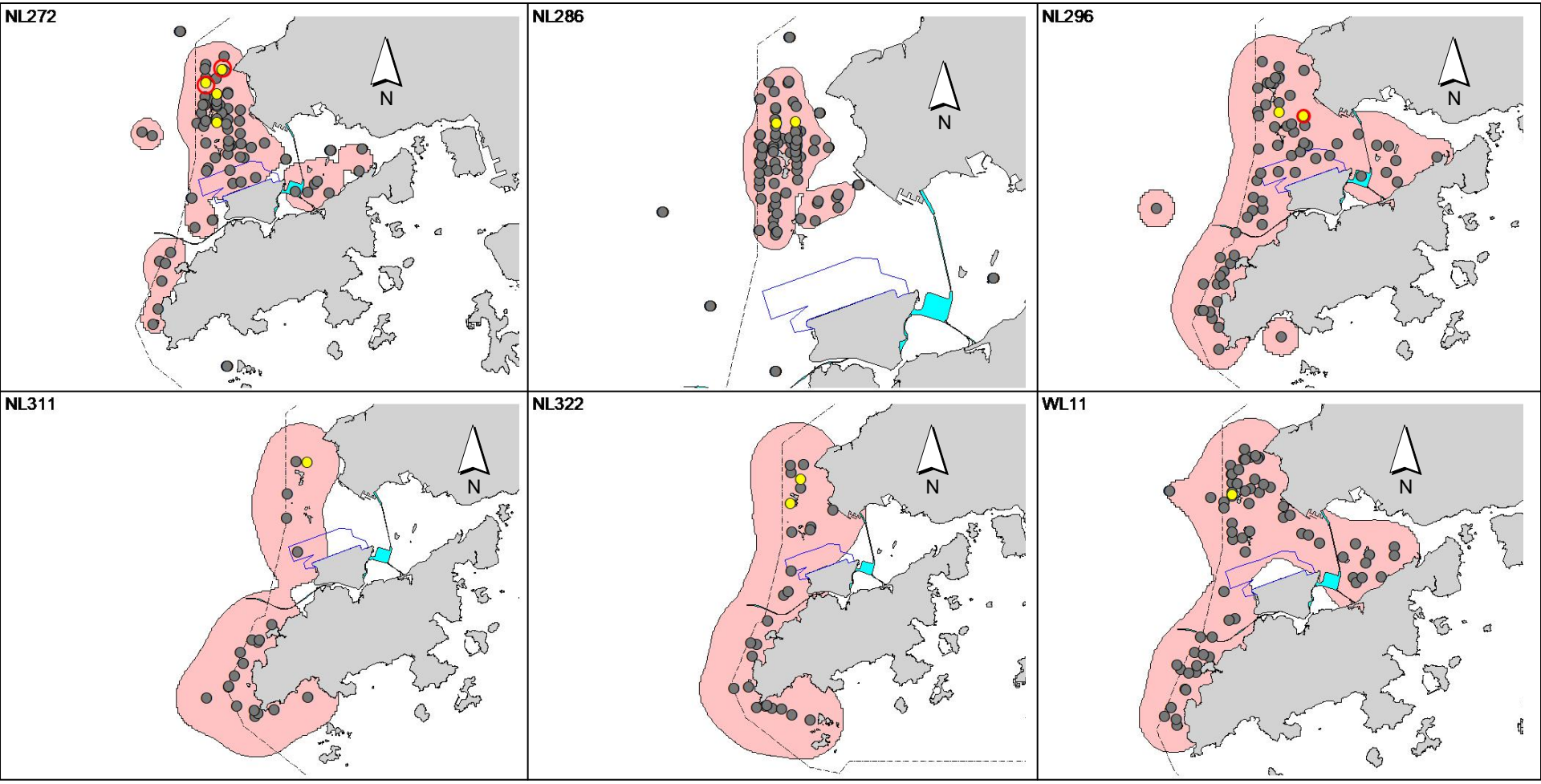
Appendix V. Ranging patterns (95% kernel ranges) of 23 individual dolphins that were sighted during HKLR03 impact phase monitoring period (note: yellow dots indicate sightings made in Dec 2017 – Feb 2018 during HKLR03 and HKLR09 monitoring surveys; the yellow dots with the red circles indicate the ones made during HKBCF monitoring surveys)



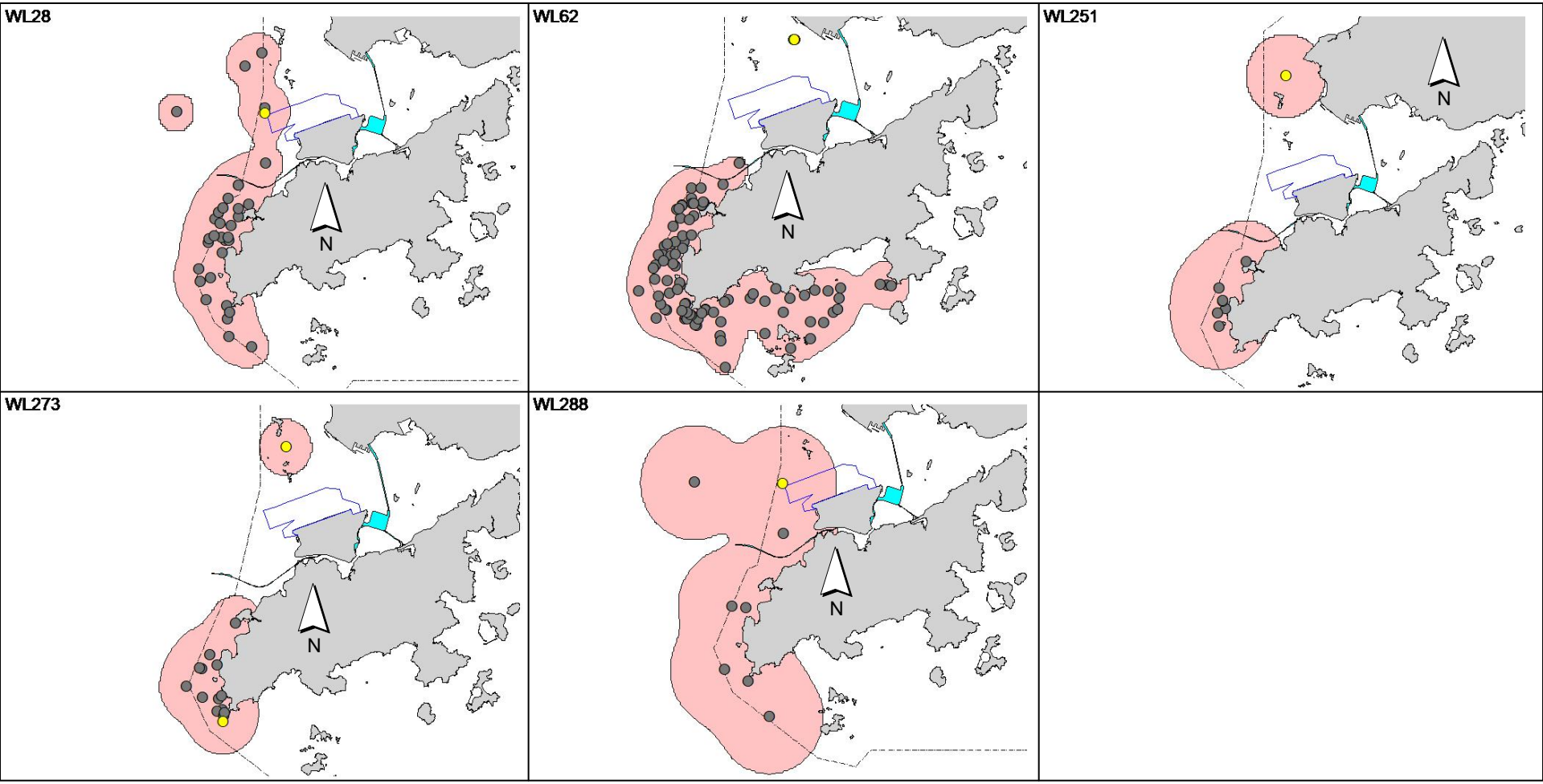
Appendix V. (cont'd)



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 project commencement
1-Hr TSP	Action	15	63
	Limit	0	4
24-Hr TSP	Action	2	8
	Limit	3	4
Water Quality	Action	4	20
	Limit	0	1
Impact Dolphin Monitoring	Action	2	11
	Limit	0	11

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 2017 to February 2018)	1	0	0
Total No. received since project commencement	16	1	0

Email message

Environmental Resources Management

16/F Berkshire House,
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3113
Facsimile: (852) 2723 5660
E-mail: jovy.tam@erm.com

To	Ramboll Environ - 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	19 December 2017

ERM

Dear Sir or Madam,

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

0212330_8December2017_1hrTSP_Station ASR5
0212330_8December2017_24hrTSP_Station ASR1
0212330_8December2017_24hrTSP_Station ASR5

One Action Level and Two Limit Level Exceedances were recorded on 8 December 2017.

Regards,

Mr Jovy Tam
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_8December2017_1hrTSP_Station ASR5** **0212330_8December2017_24hrTSP_Station ASR1** **0212330_8December2017_24hrTSP_Station ASR5** **[Total No. of Exceedances = 3]**	
Date	8 December 2017 (Measured) 15 December 2017 (Laboratory results received by ERM)	
Monitoring Station	ASR1, ASR5, ASR6, ASR10 and AQMS1	
Parameter(s) with Exceedance(s)	1-hr TSP 24-hr TSP	
Action Levels	24-hr TSP (µg/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 (353 µg/m3) during 1334 – 1434 hrs. Limit Level Exceedance for 24-hr TSP is observed at ASR1 (328 µg/m3) during 1651 – 1651 hrs. Limit Level Exceedance for 24-hr TSP is observed at ASR5 (279 µg/m3) during 1640 – 1640 hrs.	
Works Undertaken (at the time of monitoring event)	On 8 December 2017, Box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building at Portion N-C.	

Possible Reason for Action or Limit Level Exceedance(s)	The exceedances are unlikely to be due to the Project, in view of the following: • According to the construction information provided by the Contractor, the majority of ground construction works on 8 December 2017 were box culvert extension at Works Area Portion N-A and Construction of Ventilation Building at Portions N-C. The exceedances for are unlikely to be due to the project as 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) during the period of recorded exceedances. • The limit level exceedance for 24-hr TSP at ASR5 is unlikely to be due to the project as the average wind direction was from ASR5 to the site area during the construction period. From 16:00 (8 Dec) to 20:00 (8 Dec), average wind direction was from ASR5 to the site area. From 20:00 (8 Dec) to 07:00 (9 Dec), there was no ground construction works. From 07:00 (9 Dec) to 17:00 (9 Dec), most of the time the average wind direction was from ASR5 to the site area, except that from 12:00 to 14:00. Generally Station ASR5 are located upstream of the major construction activities at Portion N-A, thus they should not be affected by the dust, if any, generated by the construction activities and the exceedance for 24-hour TSP is unlikely to be due to the concerned construction activities. • The limit level exceedance for 24-hr TSP at ASR1 is unlikely to be due to the project as dust suppression measures were implemented properly on site. Water spraying was applied. Exposed soil at Portion N-A was also covered by tarpaulin sheets. Photo record on 8 December 2017 is provided in Annex A. Based on the above, the exceedances are unlikely to be due to the project.
Actions Taken / To Be Taken	Site inspection was carried out on 13 December 2017 to audit proper implementation of mitigation measures. Dust suppression measures were also properly implemented during the site inspections. Photo record is provided in Annex A. Based on the above, no additional action is required. 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. The Contractor was also reminded to ensure all dust mitigating measures are provided at Portion N-A and Portion N-C, where the construction works are carried out.
Remarks	The monitoring results and the locations of air quality monitoring stations are attached.

ERM

Annex A Photos provided by the Contractor

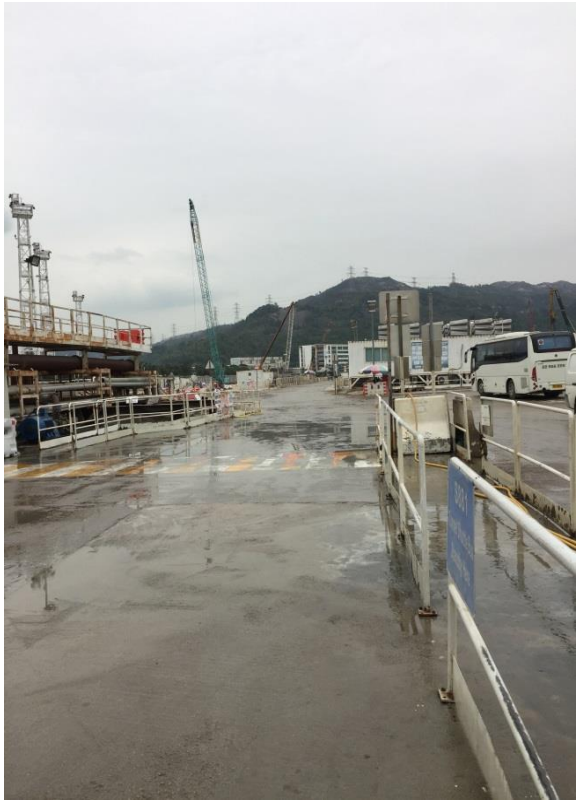
Water spraying was applied frequently during dry conditions. (Works Area Portion N-A)

Exposed soil at Portion N-A was also covered by tarpaulin sheets. (Works Area Portion N-A)

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 13/12/2017



Water spraying was applied frequently during dry conditions.(Works Area Portion N-B)

Exposed soil at Portion N-A was also covered by tarpaulin sheets. (Works Area Portion N-A)

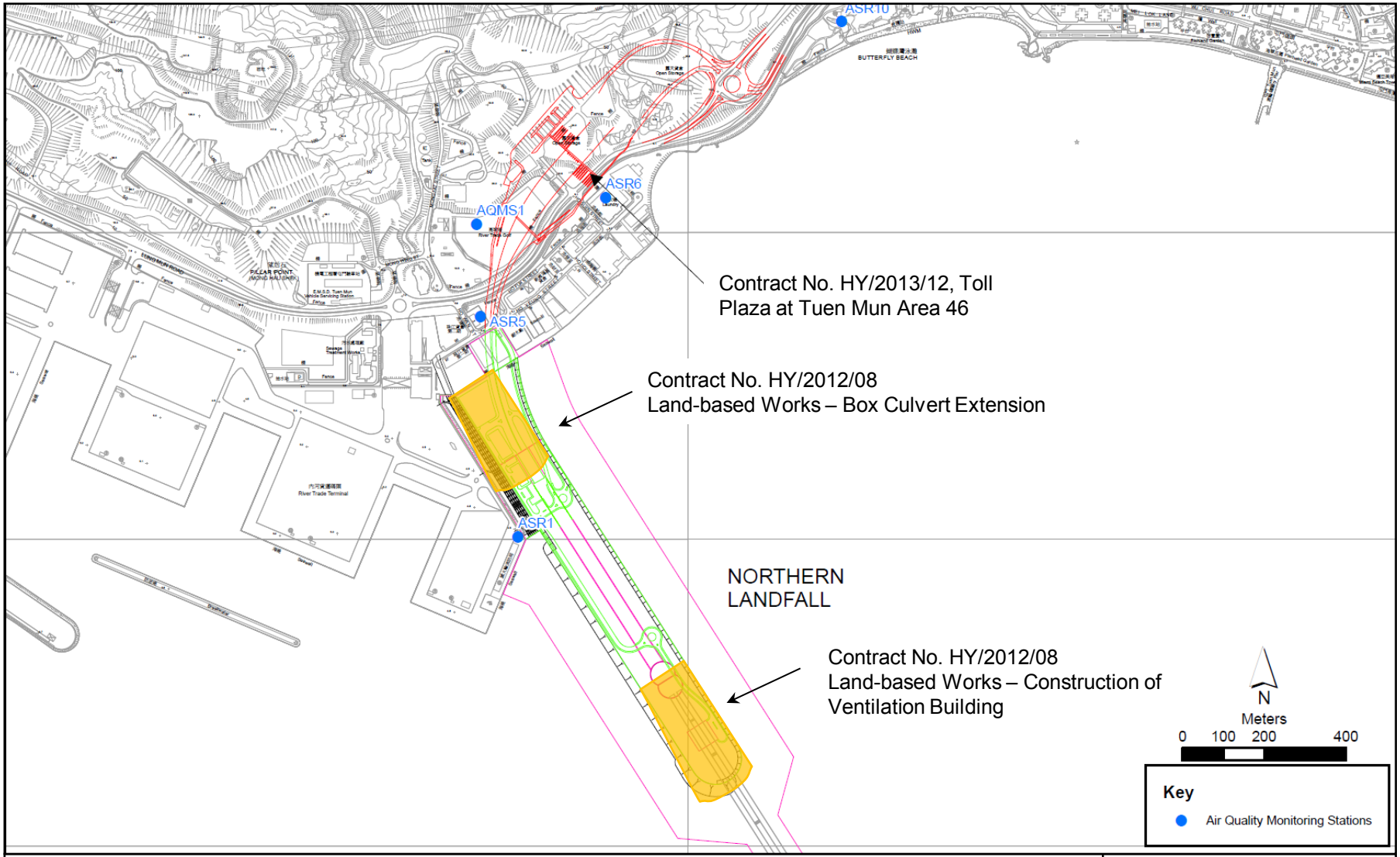


Figure 1

Indicative Construction Works Area on 8 December 2017

DATE: 06/03/2013

Environmental Resources Management

ERM

TMCLKL	HY/2012/08	8/12/2017	AQMS1	Sunny	13:56	1-hour TSP	122	ug/m3
TMCLKL	HY/2012/08	8/12/2017	AQMS1	Sunny	14:58	1-hour TSP	137	ug/m3
TMCLKL	HY/2012/08	8/12/2017	AQMS1	Sunny	16:00	1-hour TSP	104	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR1	Sunny	13:45	1-hour TSP	279	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR1	Sunny	14:47	1-hour TSP	299	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR1	Sunny	15:49	1-hour TSP	243	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR10	Sunny	13:11	1-hour TSP	109	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR10	Sunny	14:13	1-hour TSP	224	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR10	Sunny	15:15	1-hour TSP	249	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR5	Sunny	13:34	1-hour TSP	353	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR5	Sunny	14:36	1-hour TSP	285	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR5	Sunny	15:38	1-hour TSP	235	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR6	Sunny	13:22	1-hour TSP	187	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR6	Sunny	14:24	1-hour TSP	208	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR6	Sunny	15:26	1-hour TSP	208	ug/m3
TMCLKL	HY/2012/08	8/12/2017	AQMS1	Sunny	17:02	24-hour TSP	177	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR1	Sunny	16:51	24-hour TSP	328	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR10	Sunny	16:17	24-hour TSP	121	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR5	Sunny	16:40	24-hour TSP	279	ug/m3
TMCLKL	HY/2012/08	8/12/2017	ASR6	Sunny	16:28	24-hour TSP	161	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)**
08/12/17	0:00	0.9	344
08/12/17	1:00	1.3	358
08/12/17	2:00	1.3	349
08/12/17	3:00	0.4	325
08/12/17	4:00	0.9	351
08/12/17	5:00	0.4	319
08/12/17	6:00	0.9	322
08/12/17	7:00	0.9	315
08/12/17	8:00	1.3	350
08/12/17	9:00	2.2	12
08/12/17	10:00	2.7	16
08/12/17	11:00	2.2	46
08/12/17	12:00	2.2	42
08/12/17	13:00	2.2	19
08/12/17	14:00	2.2	41
08/12/17	15:00	2.2	355
08/12/17	16:00	2.2	343
08/12/17	17:00	1.8	352
08/12/17	18:00	1.3	321
08/12/17	19:00	0.9	95
08/12/17	20:00	1.3	351
08/12/17	21:00	2.7	5
08/12/17	22:00	3.6	20
08/12/17	23:00	4.5	4
09/12/17	0:00	4	13
09/12/17	1:00	3.6	11
09/12/17	2:00	3.1	17
09/12/17	3:00	3.1	10
09/12/17	4:00	3.1	43
09/12/17	5:00	1.8	40
09/12/17	6:00	0.9	348
09/12/17	7:00	0.9	223
09/12/17	8:00	1.3	312
09/12/17	9:00	2.2	43
09/12/17	10:00	1.8	39
09/12/17	11:00	1.8	92
09/12/17	12:00	1.3	168
09/12/17	13:00	1.8	205
09/12/17	14:00	1.8	223
09/12/17	15:00	1.3	274
09/12/17	16:00	1.3	288
09/12/17	17:00	0.9	284
09/12/17	18:00	1.3	311
09/12/17	19:00	0.9	341
09/12/17	20:00	0.9	352
09/12/17	21:00	0.4	18
09/12/17	22:00	0.9	315
09/12/17	23:00	0.9	92

Email message

Environmental Resources Management

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Quarry Bay, Hong Kong
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Facsimile: (852) 2723 5660
E-mail: jovy.tam@erm.com

To	Ramboll Environ - Hong Kong, Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Air Quality Impact Monitoring
Date	27 December 2017

ERM

Dear Sir or Madam,

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

0212330_11December2017_1hrTSP_Station ASR1
0212330_11December2017_1hrTSP_Station ASR1
0212330_11December2017_1hrTSP_Station ASR5
0212330_11December2017_24hrTSP_Station ASR1

Four Action Level Exceedances were recorded on 11 December 2017.

Regards,

Mr Jovy Tam
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_11December2017_1hrTSP_Station ASR1** **0212330_11December2017_1hrTSP_Station ASR1** **0212330_11December2017_1hrTSP_Station ASR5** **0212330_11December2017_24hrTSP_Station ASR1** **[Total No. of Exceedances = 4]**	
Date	11 December 2017 (Measured) 26 December 2017 (Laboratory results received by ERM)	
Monitoring Station	ASR1, ASR5, ASR6, ASR10 and AQMS1	
Parameter(s) with Exceedance(s)	1-hr TSP, 24-hr TSP	
Action Levels	24-hr TSP (µg/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 (399 µg/m3) during 1337 – 1437 hrs. Action Level Exceedance for 1-hr TSP is observed at ASR1 (443 µg/m3) during 1439 – 1539 hrs. Action Level Exceedance for 1-hr TSP is observed at ASR5 (417 µg/m3) during 1323 – 1423 hrs. Action Level Exceedance for 24-hr TSP is observed at ASR1 (218 µg/m3) during 1643 – 1643 hrs.	
Works Undertaken (at the time of monitoring event)	On 11 December 2017, box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building at Portion N-C.	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedances are unlikely to be due to the Project, in view of the following: • According to the construction information provided by the Contractor, the majority of ground construction works on 11 December 2017 were box culvert extension at Works Area Portion N-A and Construction of Ventilation Building at Portions N-C. The exceedances for are unlikely to be due to the project as 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) during the period of recorded exceedances. • The exceedances are unlikely to be due to the project as dust suppression measures were implemented properly on site. Water spraying was applied. Exposed soil at Portion N-A was also covered by tarpaulin sheets. Photo record on 11 December 2017 is provided in Annex A. Based on the above, the exceedances are unlikely to be due to the project.	

Actions Taken / To Be Taken	Site inspection was carried out on 13 December 2017 to audit proper implementation of mitigation measures. Dust suppression measures were also properly implemented during the site inspections. Photo record is provided in Annex A. Based on the above, no additional action is required. A meeting amongst the ET, IEC, SOR and the Contractor was held on 29 December 2017 to discuss the action / limit level exceedances of 24-hour TSP at ASR1 on 8 and 11 December 2017. As reported by the Contractor, dust suppression measures were properly implemented on 8 and 11 December 2017. At Works Area Portion N-A, which is closest to the AQM stations where exceedances were recorded, water spraying was applied to avoid dust and exposed soil was covered by tarpaulin sheets. It was concluded that the AQM exceedances are unlikely to be due to the project based on the above. The Contractor was reminded to implement the required mitigation measures as per the EP, approved EIA and Updated EM&A Manual. The ET was also reminded to carry out regular checking and maintenance on the AQM equipment to ensure the accuracy of the monitoring data. 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. The Contractor was also reminded to ensure all dust mitigating measures are provided at Portion N-A and Portion N-C, where the construction works are carried out.
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 11/12/2017

Water spraying was applied frequently during dry conditions. (Works Area Portion N-C)

Exposed soil at Portion N-A was also covered by tarpaulin sheets. (Works Area Portion N-A)

ERM

Annex A Photos provided by the Contractor

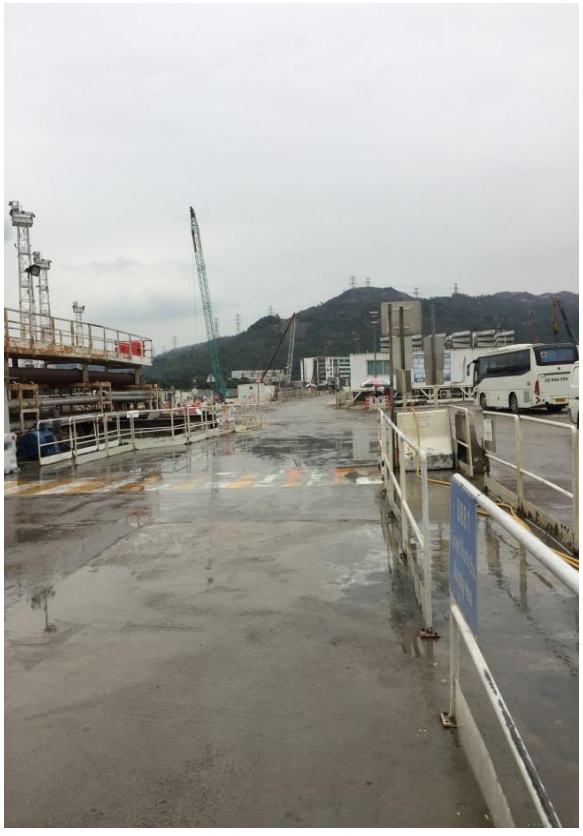
*Note: Photos taken on 11/12/2017

Water spraying was applied frequently during dry conditions. (Works Area Portion N-C)

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 13/12/2017



Water spraying was applied frequently during dry conditions.(Works Area Portion N-B)

Exposed soil at Portion N-A was also covered by tarpaulin sheets. (Works Area Portion N-A)

ERM

Annex A Photos taken at the AQM stations

*Note: Photos taken on 11/12/2017

ASR1

ASR5

TMCLKL	HY/2012/08	11/12/2017	AQMS1	Sunny	13:48	1-hour TSP	154	ug/m3
TMCLKL	HY/2012/08	11/12/2017	AQMS1	Sunny	14:50	1-hour TSP	151	ug/m3
TMCLKL	HY/2012/08	11/12/2017	AQMS1	Sunny	15:52	1-hour TSP	129	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR1	Sunny	13:37	1-hour TSP	399	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR1	Sunny	14:39	1-hour TSP	443	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR1	Sunny	15:41	1-hour TSP	325	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR10	Sunny	13:00	1-hour TSP	169	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR10	Sunny	14:02	1-hour TSP	287	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR10	Sunny	15:04	1-hour TSP	304	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR5	Sunny	13:23	1-hour TSP	417	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR5	Sunny	14:25	1-hour TSP	249	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR5	Sunny	15:27	1-hour TSP	236	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR6	Sunny	13:11	1-hour TSP	262	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR6	Sunny	14:13	1-hour TSP	152	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR6	Sunny	15:15	1-hour TSP	198	ug/m3
TMCLKL	HY/2012/08	11/12/2017	AQMS1	Sunny	16:54	24-hour TSP	105	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR1	Sunny	16:43	24-hour TSP	218	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR10	Sunny	16:06	24-hour TSP	112	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR5	Sunny	16:29	24-hour TSP	189	ug/m3
TMCLKL	HY/2012/08	11/12/2017	ASR6	Sunny	16:17	24-hour TSP	139	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)**
11/12/17	0:00	1.3	352
11/12/17	1:00	3.6	15
11/12/17	2:00	3.6	44
11/12/17	3:00	2.2	42
11/12/17	4:00	1.8	41
11/12/17	5:00	2.2	40
11/12/17	6:00	1.8	52
11/12/17	7:00	2.2	51
11/12/17	8:00	1.8	39
11/12/17	9:00	1.3	38
11/12/17	10:00	1.3	99
11/12/17	11:00	1.3	223
11/12/17	12:00	1.8	219
11/12/17	13:00	1.3	271
11/12/17	14:00	2.2	315
11/12/17	15:00	1.8	326
11/12/17	16:00	1.3	309
11/12/17	17:00	0.9	311
11/12/17	18:00	0.9	317
11/12/17	19:00	1.8	116
11/12/17	20:00	1.8	100
11/12/17	21:00	1.3	94
11/12/17	22:00	1.3	90
11/12/17	23:00	0.9	69
12/12/17	0:00	2.2	85
12/12/17	1:00	1.3	67
12/12/17	2:00	1.8	74
12/12/17	3:00	1.3	5
12/12/17	4:00	1.3	358
12/12/17	5:00	1.3	43
12/12/17	6:00	0.9	14
12/12/17	7:00	1.3	52
12/12/17	8:00	1.3	44
12/12/17	9:00	1.8	41
12/12/17	10:00	1.3	40
12/12/17	11:00	1.8	21
12/12/17	12:00	1.8	17
12/12/17	13:00	1.8	52
12/12/17	14:00	1.8	18
12/12/17	15:00	1.8	11
12/12/17	16:00	1.3	10
12/12/17	17:00	2.7	96
12/12/17	18:00	2.7	94
12/12/17	19:00	2.2	88
12/12/17	20:00	1.8	74
12/12/17	21:00	1.8	91
12/12/17	22:00	3.1	95
12/12/17	23:00	3.6	86

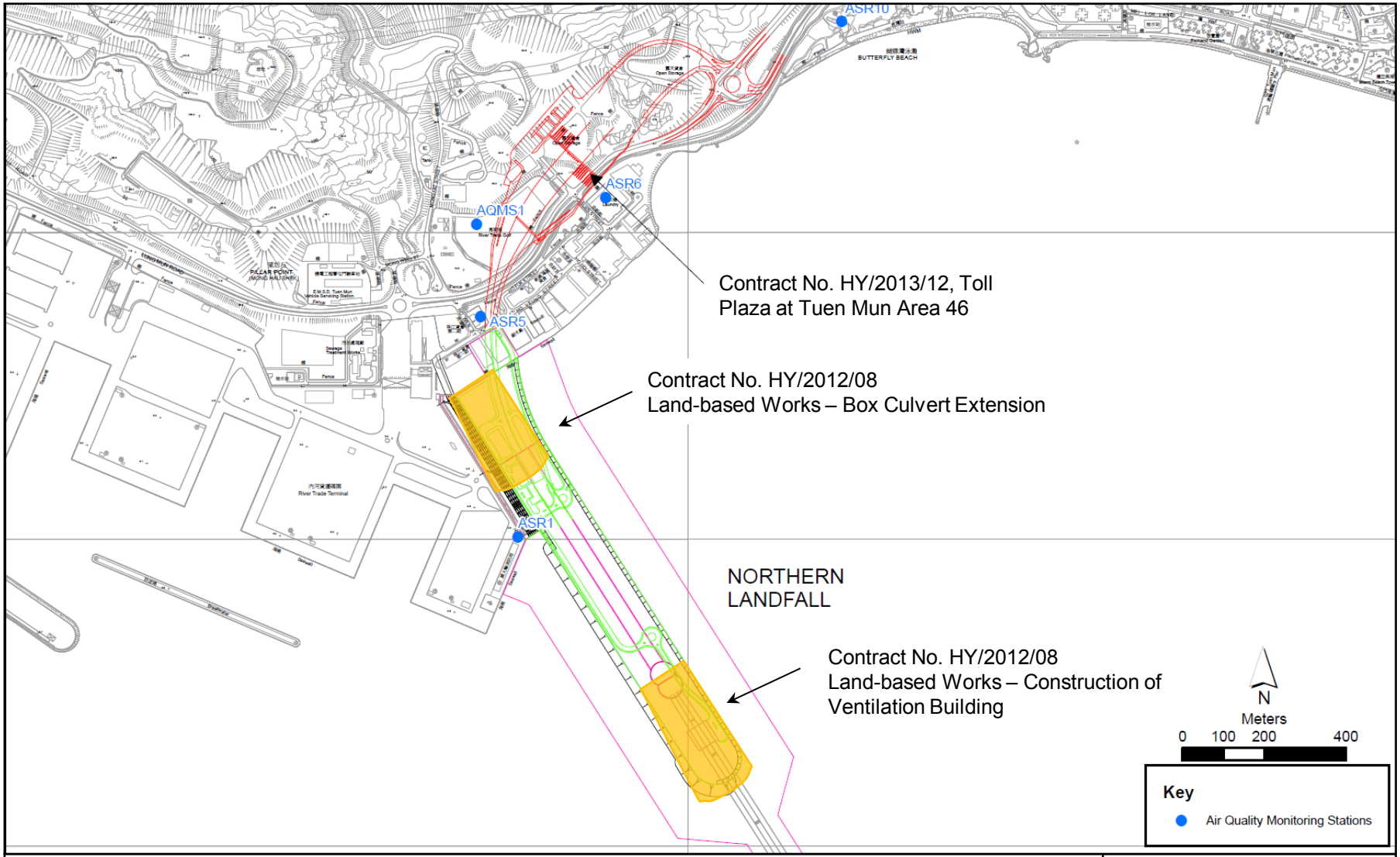


Figure 1

Indicative Construction Works Area on 11 December 2017

DATE: 06/03/2013

Environmental Resources Management

ERM

Email message

Environmental Resources Management

16/F Berkshire House,
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3113
Facsimile: (852) 2723 5660
E-mail: jovy.tam@erm.com

To	Ramboll Environ - 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 2017

ERM

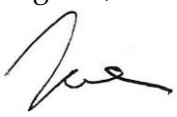
Dear Sir or Madam,

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

0212330_17December2017_24hrTSP_Station ASR5

One Limit Level Exceedance was recorded on 17 December 2017.

Regards,



Mr Jovy Tam
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_17December2017_24hrTSP_Station ASR5** **[Total No. of Exceedances = 1]**	
Date	17 December 2017 (Measured) 27 December 2017 (Laboratory results received by ERM)	
Monitoring Station	ASR1, ASR5, ASR6, ASR10 and AQMS1	
Parameter(s) with Exceedance(s)	1-hr TSP, 24-hr TSP	
Action Levels	24-hr TSP (µg/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	Limit Level Exceedance for 24-hr TSP is observed at ASR5 (265 µg/m3) during 1631 – 1631 hrs.	
Works Undertaken (at the time of monitoring event)	From 16:31 (17 Dec) to 07:00 (18 Dec), there were no ground construction works. From 07:00 to 16:31 (18 Dec), box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building at Portion N-C.	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedances are unlikely to be due to the Project, in view of the following: • According to the construction information provided by the Contractor, the majority of ground construction works on 18 December 2017 were box culvert extension at Works Area Portion N-A and Construction of Ventilation Building at Portions N-C. 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 limit level exceedance for 24-hr TSP is unlikely to be due to the project as the average wind direction was from ASR5 to the site area during the major construction period. From 16:31 (17 Dec) to 07:00 (18 Dec), there were no ground construction works. From 07:00 to 17:00(18 Dec), the average wind direction ranged between 268° to 324° and station ASR5 are located upstream of the major construction activities at Portion N-A, thus they should not be affected by the dust, if any, generated by the construction activities. • As there were no ground construction works during more than half of the 24-hr TSP monitoring period, the construction works of this Contract on 18 Dec 2017 were unlikely to cause limit level exceedance of 24-hr TSP. Based on the above, the exceedances are unlikely to be due to the project.	

Actions Taken / To Be Taken	Site inspection was carried out on 27 December 2017 to audit proper implementation of mitigation measures. Dust suppression measures were also properly implemented during the site inspections. Photo record is provided in Annex A. Based on the above, no additional action is required. 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. The Contractor was also reminded to ensure all dust mitigating measures are provided at Portion N-A and Portion N-C, where the construction works are carried out.
Remarks	The monitoring results, wind data and the locations of air quality monitoring stations are attached.

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 27/12/2017

Water spraying was applied frequently during dry conditions.(Works Area Portion N-A)

Exposed soil at Portion N-A was also covered by tarpaulin sheets. (Works Area Portion N-A)

TMCLKL	HY/2012/08	17/12/2017	AQMS1	Sunny	13:48	1-hour TSP	101	ug/m3
TMCLKL	HY/2012/08	17/12/2017	AQMS1	Sunny	14:50	1-hour TSP	61	ug/m3
TMCLKL	HY/2012/08	17/12/2017	AQMS1	Sunny	15:52	1-hour TSP	70	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR1	Sunny	13:37	1-hour TSP	175	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR1	Sunny	14:39	1-hour TSP	112	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR1	Sunny	15:41	1-hour TSP	98	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR10	Sunny	13:02	1-hour TSP	63	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR10	Sunny	14:04	1-hour TSP	66	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR10	Sunny	15:06	1-hour TSP	63	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR5	Sunny	13:25	1-hour TSP	137	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR5	Sunny	14:27	1-hour TSP	108	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR5	Sunny	15:29	1-hour TSP	75	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR6	Sunny	13:14	1-hour TSP	83	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR6	Sunny	14:16	1-hour TSP	76	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR6	Sunny	15:18	1-hour TSP	76	ug/m3
TMCLKL	HY/2012/08	17/12/2017	AQMS1	Sunny	16:54	24-hour TSP	132	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR1	Sunny	16:43	24-hour TSP	180	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR10	Sunny	16:08	24-hour TSP	88	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR5	Sunny	16:31	24-hour TSP	265	ug/m3
TMCLKL	HY/2012/08	17/12/2017	ASR6	Sunny	16:20	24-hour TSP	145	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)**
17/12/17	16:00	1.8	340
17/12/17	17:00	1.3	285
17/12/17	18:00	1.3	290
17/12/17	19:00	1.3	213
17/12/17	20:00	0.9	225
17/12/17	21:00	0.9	274
17/12/17	22:00	0.9	353
17/12/17	23:00	1.3	44
18/12/17	0:00	1.3	351
18/12/17	1:00	1.8	348
18/12/17	2:00	2.2	356
18/12/17	3:00	2.2	16
18/12/17	4:00	2.2	19
18/12/17	5:00	1.8	20
18/12/17	6:00	0.9	194
18/12/17	7:00	0.9	268
18/12/17	8:00	2.2	319
18/12/17	9:00	2.2	321
18/12/17	10:00	2.2	319
18/12/17	11:00	3.1	324
18/12/17	12:00	2.7	316
18/12/17	13:00	2.7	320
18/12/17	14:00	2.7	323
18/12/17	15:00	2.2	317
18/12/17	16:00	1.8	312
18/12/17	17:00	1.3	311

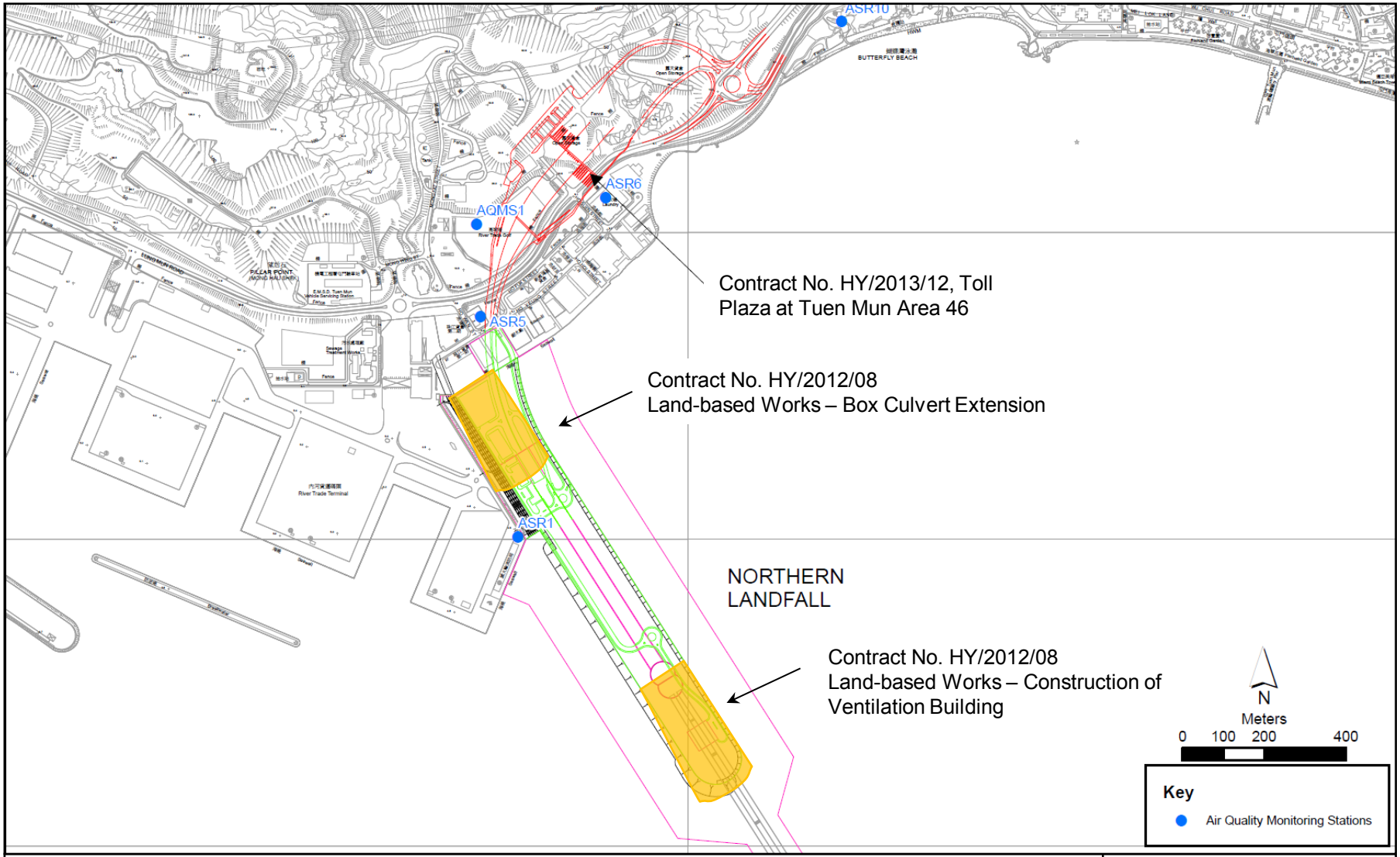


Figure 1

Indicative Construction Works Area on 17 December 2017

DATE: 06/03/2013

Environmental Resources Management

ERM

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: 11th Dec 2017 to 至 17th Dec 2017

	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。

Dragages Hong Kong	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: 18th Dec 2017 to 至 24th Dec. 2017

	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

16/F Berkshire House,
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3113
Facsimile: (852) 2723 5660
E-mail: jovy.tam@erm.com

To	Ramboll Environ - 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	2 January 2018

ERM

Dear Sir or Madam,

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

0212330_20December2017_1hrTSP_Station ASR1
0212330_20December2017_1hrTSP_Station ASR5

Two Action Level Exceedances were recorded on 20 December 2017.

Regards,

Mr Jovy Tam
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_20December2017_1hrTSP_Station ASR1** **0212330_20December2017_1hrTSP_Station ASR5** **[Total No. of Exceedances = 2]**	
Date	20 December 2017 (Measured) 1 January 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 (357 µg/m3) during 1356 – 1456 hrs. Action Level Exceedance for 1-hr TSP is observed at ASR5 (372 µg/m3) during 1344 – 1444 hrs.	
Works Undertaken (at the time of monitoring event)	On 20 December 2017, box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building at Portion N-C.	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedances are unlikely to be due to the Project, in view of the following: • According to the construction information provided by the Contractor, the majority of ground construction works on 20 December 2017 were box culvert extension at Works Area Portion N-A and Construction of Ventilation Building at Portions N-C. 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 exceedances are unlikely to be due to the project as dust suppression measures were implemented properly on the works area. Water spraying was applied at Portion N-A and N-C. Exposed soil at Portion N-A was also covered by tarpaulin sheets to prevent dust. Based on the above, the exceedances are unlikely to be due to the project.	

Actions Taken / To Be Taken	Follow-up site inspection was carried out on 4 January 2018. Box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building was carried out at Portion N-C. Water spraying was applied frequently. Exposed soil at Portion N-A was covered by tarpaulin sheets and water spraying was also applied to prevent dust. Photo record is provided in Annex A. As dust suppression measures were properly implemented during the site inspections. Based on the above, no additional action is required. 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. The Contractor was also reminded to ensure all dust mitigating measures are provided at Portion N-A and Portion N-C, where the construction works are carried out.
Remarks	The monitoring results and the locations of air quality monitoring stations are attached.

TMCLKL	HY/2012/08	20/12/2017	AQMS1	Sunny	14:08	1-hour TSP	163	ug/m3
TMCLKL	HY/2012/08	20/12/2017	AQMS1	Sunny	15:10	1-hour TSP	125	ug/m3
TMCLKL	HY/2012/08	20/12/2017	AQMS1	Sunny	16:12	1-hour TSP	121	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR1	Sunny	13:56	1-hour TSP	357	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR1	Sunny	14:58	1-hour TSP	210	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR1	Sunny	16:00	1-hour TSP	218	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR10	Sunny	13:22	1-hour TSP	111	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR10	Sunny	14:24	1-hour TSP	116	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR10	Sunny	15:26	1-hour TSP	196	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR5	Sunny	13:44	1-hour TSP	372	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR5	Sunny	14:46	1-hour TSP	216	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR5	Sunny	15:48	1-hour TSP	167	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR6	Sunny	13:33	1-hour TSP	186	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR6	Sunny	14:25	1-hour TSP	150	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR6	Sunny	15:37	1-hour TSP	190	ug/m3
TMCLKL	HY/2012/08	20/12/2017	AQMS1	Sunny	17:14	24-hour TSP	92	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR1	Sunny	17:02	24-hour TSP	158	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR10	Sunny	16:28	24-hour TSP	62	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR5	Sunny	16:50	24-hour TSP	125	ug/m3
TMCLKL	HY/2012/08	20/12/2017	ASR6	Sunny	16:39	24-hour TSP	100	ug/m3

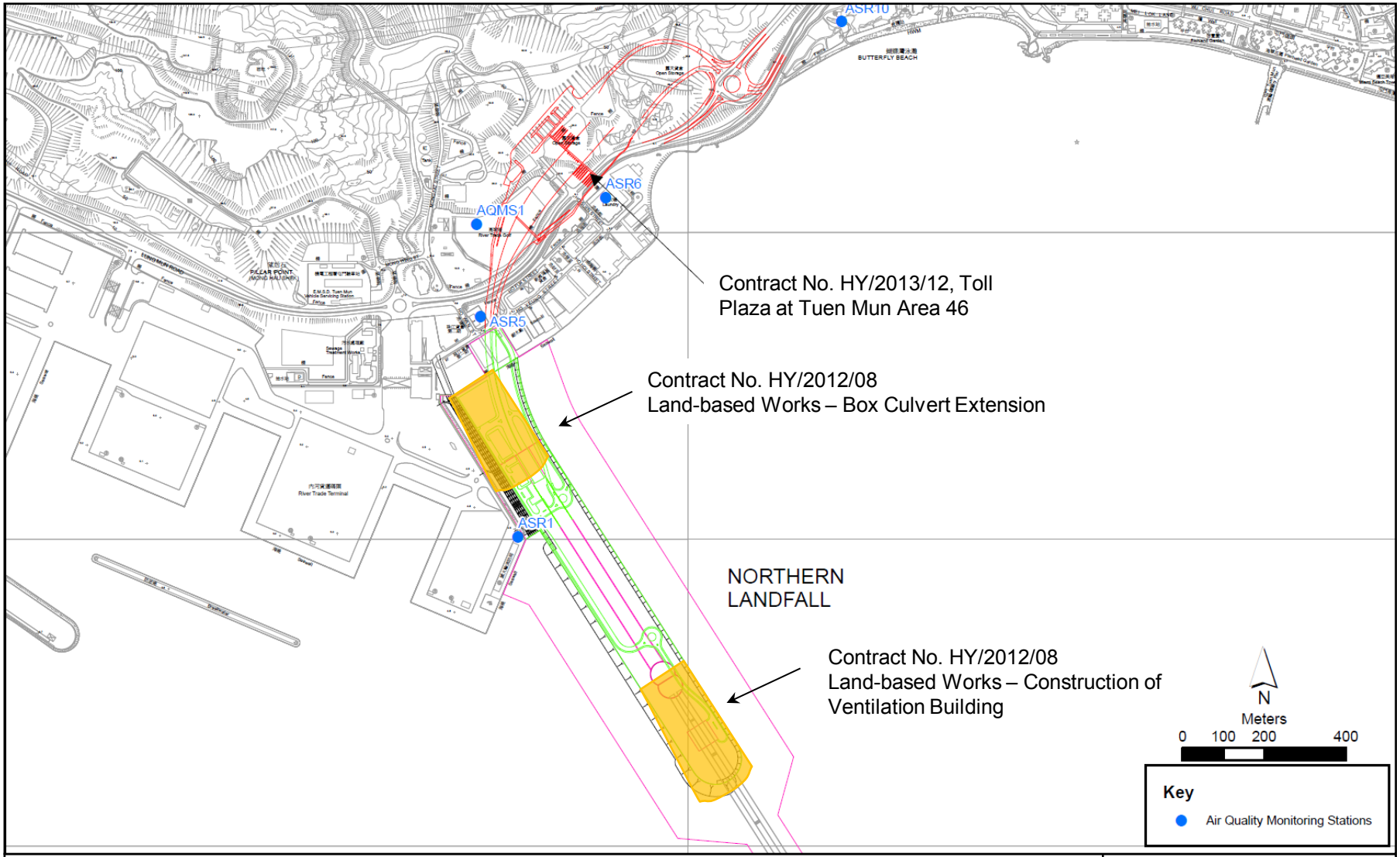


Figure 1

Indicative Construction Works Area on 20 December 2017

DATE: 06/03/2013

Environmental Resources Management

ERM

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 4/1/2017

Water spraying was applied frequently during dry conditions.(Works Area Portion N-A)

Exposed soil at Portion N-A was covered by tarpaulin sheets. (Works Area Portion N-A)

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 4/1/2017

Water spraying was applied on the exposed soil. (Works Area Portion N-A)

Water spraying was applied frequently during dry conditions.(Works Area Portion N-B)

Meteorological Data for Impact Monitoring in the reporting period			
Date (yyyy-mm-dd)	**Time (24hrs)**	**Average of Wind Speed (m/s)**	**Average of Wind Direction(degree)**
2017-12-20	0:00	4.9	11
2017-12-20	1:00	4.9	5
2017-12-20	2:00	4	2
2017-12-20	3:00	2.7	7
2017-12-20	4:00	3.6	359
2017-12-20	5:00	4.5	3
2017-12-20	6:00	3.6	4
2017-12-20	7:00	2.2	344
2017-12-20	8:00	1.3	305
2017-12-20	9:00	2.7	46
2017-12-20	10:00	3.6	42
2017-12-20	11:00	3.1	19
2017-12-20	12:00	2.2	44
2017-12-20	13:00	2.2	351
2017-12-20	14:00	2.2	350
2017-12-20	15:00	1.3	344
2017-12-20	16:00	0.9	348
2017-12-20	17:00	1.8	339
2017-12-20	18:00	0.9	346
2017-12-20	19:00	0.9	352
2017-12-20	20:00	0.9	70
2017-12-20	21:00	1.3	93
2017-12-20	22:00	1.3	88
2017-12-20	23:00	0.9	355

Email message

Environmental Resources Management

16/F Berkshire House,
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3113
Facsimile: (852) 2723 5660
E-mail: jovy.tam@erm.com

To	Ramboll Environ - 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	5 January 2018

ERM

Dear Sir or Madam,

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

0212330_26December2017_1hrTSP_Station ASR1

One Action Level Exceedance was recorded on 26 December 2017.

Regards,

Mr Jovy Tam
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_26December2017_1hrTSP_Station ASR1** **[Total No. of Exceedances = 1]**	
Date	26 December 2017 (Measured) 5 January 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 (407 µg/m3) during 1121 - 1221 hrs.	
Works Undertaken (at the time of monitoring event)	On 26 December 2017, TBM works were carried out.	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedances are unlikely to be due to the Project, in view of the following: • According to the construction information provided by the Contractor, there were only TBM works on 26 December 2017 and there were no ground construction works. 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 exceedances are unlikely to be due to the project as dust suppression measures were implemented properly on the works area. Water spraying was applied during dry conditions. Exposed soil at Portion N-A was also covered by tarpaulin sheets to prevent dust. Based on the above, the exceedances are unlikely to be due to the project.	

Actions Taken / To Be Taken	Follow-up site inspection was carried out on 10 January 2018. Box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building was carried out at Portion N-C. Water spraying was applied frequently. Exposed soil at Portion N-A was covered by tarpaulin sheets and water spraying was also applied to prevent dust. Photo record is provided in Annex A. As dust suppression measures were properly implemented during the site inspections. Based on the above, no additional action is required. 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. The Contractor was also reminded to ensure all dust mitigating measures are provided at Portion N-A and Portion N-C, where the construction works are carried out.
Remarks	The monitoring results and the locations of air quality monitoring stations are attached.

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 10/1/2017

Water spraying was applied frequently during dry conditions.(Works Area Portion N-C)

Exposed soil at Portion N-A was covered by tarpaulin sheets. (Works Area Portion N-A)

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 10/1/2017

Water spraying was applied frequently during dry conditions.(Works Area Portion N-C)

Water spraying was applied frequently during dry conditions.(Works Area Portion N-B)

TMCLKL	HY/2012/08	26/12/2017	AQMS1	Sunny	9:27	1-hour TSP	129	ug/m3
TMCLKL	HY/2012/08	26/12/2017	AQMS1	Sunny	10:29	1-hour TSP	167	ug/m3
TMCLKL	HY/2012/08	26/12/2017	AQMS1	Sunny	11:31	1-hour TSP	161	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR1	Sunny	9:17	1-hour TSP	131	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR1	Sunny	10:19	1-hour TSP	144	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR1	Sunny	11:21	1-hour TSP	407	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR10	Sunny	8:45	1-hour TSP	112	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR10	Sunny	9:47	1-hour TSP	173	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR10	Sunny	10:49	1-hour TSP	118	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR5	Sunny	9:06	1-hour TSP	180	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR5	Sunny	10:08	1-hour TSP	211	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR5	Sunny	11:10	1-hour TSP	169	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR6	Sunny	8:55	1-hour TSP	196	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR6	Sunny	9:57	1-hour TSP	180	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR6	Sunny	10:59	1-hour TSP	165	ug/m3
TMCLKL	HY/2012/08	26/12/2017	AQMS1	Sunny	12:33	24-hour TSP	59	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR1	Sunny	12:23	24-hour TSP	81	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR10	Sunny	11:51	24-hour TSP	59	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR5	Sunny	12:12	24-hour TSP	84	ug/m3
TMCLKL	HY/2012/08	26/12/2017	ASR6	Sunny	12:01	24-hour TSP	83	ug/m3

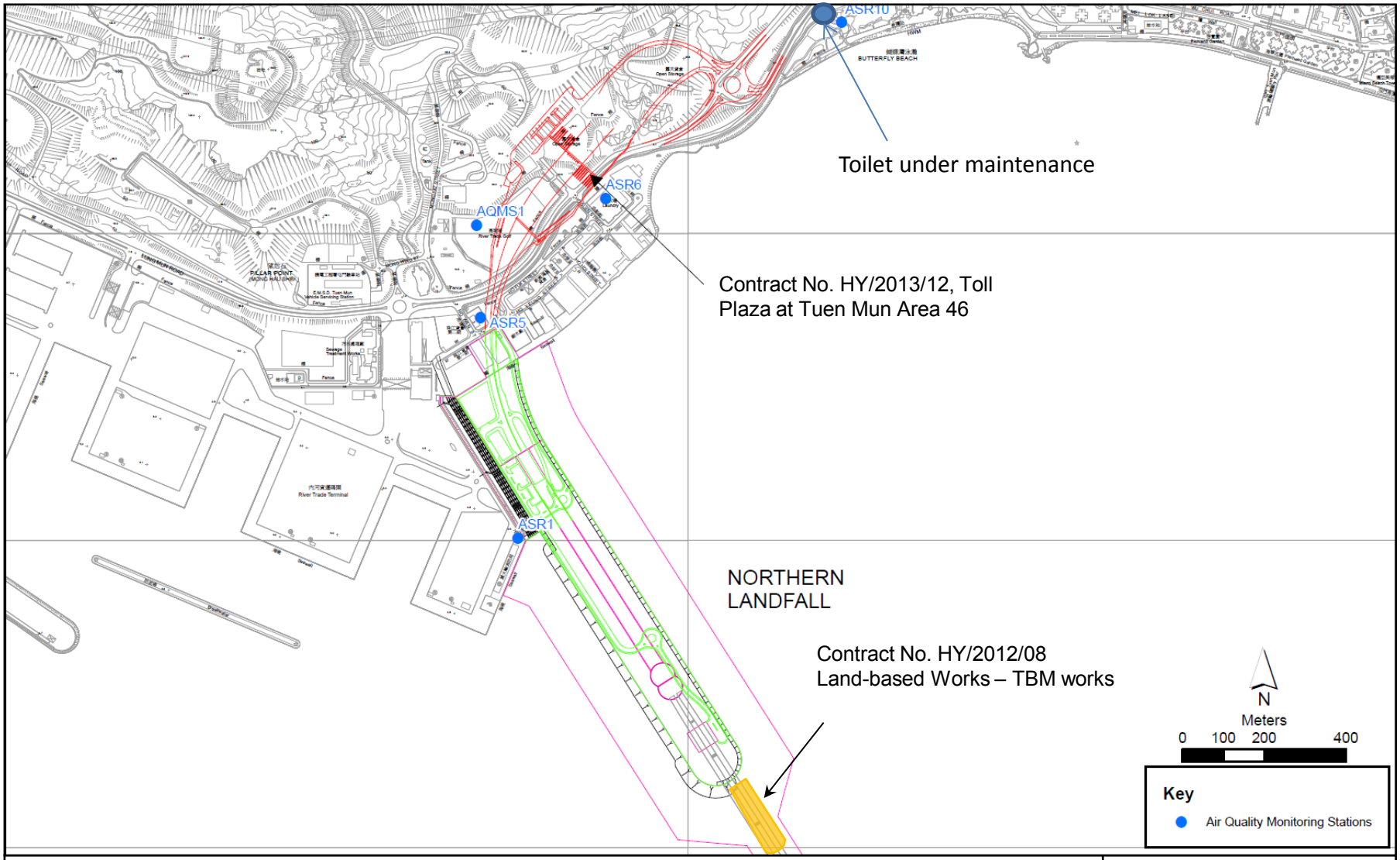


Figure 1

Indicative Construction Works Area on 26 December 2017

DATE: 06/03/2013

Environmental Resources Management

ERM

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)**
26/12/17	0:00	1.3	94
26/12/17	1:00	2.2	88
26/12/17	2:00	1.3	70
26/12/17	3:00	1.8	92
26/12/17	4:00	0.9	50
26/12/17	5:00	0.9	14
26/12/17	6:00	0.9	73
26/12/17	7:00	1.3	95
26/12/17	8:00	1.3	91
26/12/17	9:00	1.3	47
26/12/17	10:00	1.8	12
26/12/17	11:00	1.8	10
26/12/17	12:00	1.3	19
26/12/17	13:00	1.8	225
26/12/17	14:00	1.3	269
26/12/17	15:00	1.3	264
26/12/17	16:00	0.9	230
26/12/17	17:00	0.4	257
26/12/17	18:00	0.4	312
26/12/17	19:00	1.8	93
26/12/17	20:00	3.1	91
26/12/17	21:00	3.1	89
26/12/17	22:00	2.7	90
26/12/17	23:00	2.7	93

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: 25th Dec. 2017 to 至 31st Dec. 2017

	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

16/F Berkshire House,
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3113
Facsimile: (852) 2723 5660
E-mail: jovy.tam@erm.com

To	Ramboll Environ - 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	10 January 2018

Dear Sir or Madam,

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

0212330_29December2017_24hrTSP_Station ASR10

One Action Level Exceedance was recorded on 29 December 2017.

Regards,

Mr Jovy Tam
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

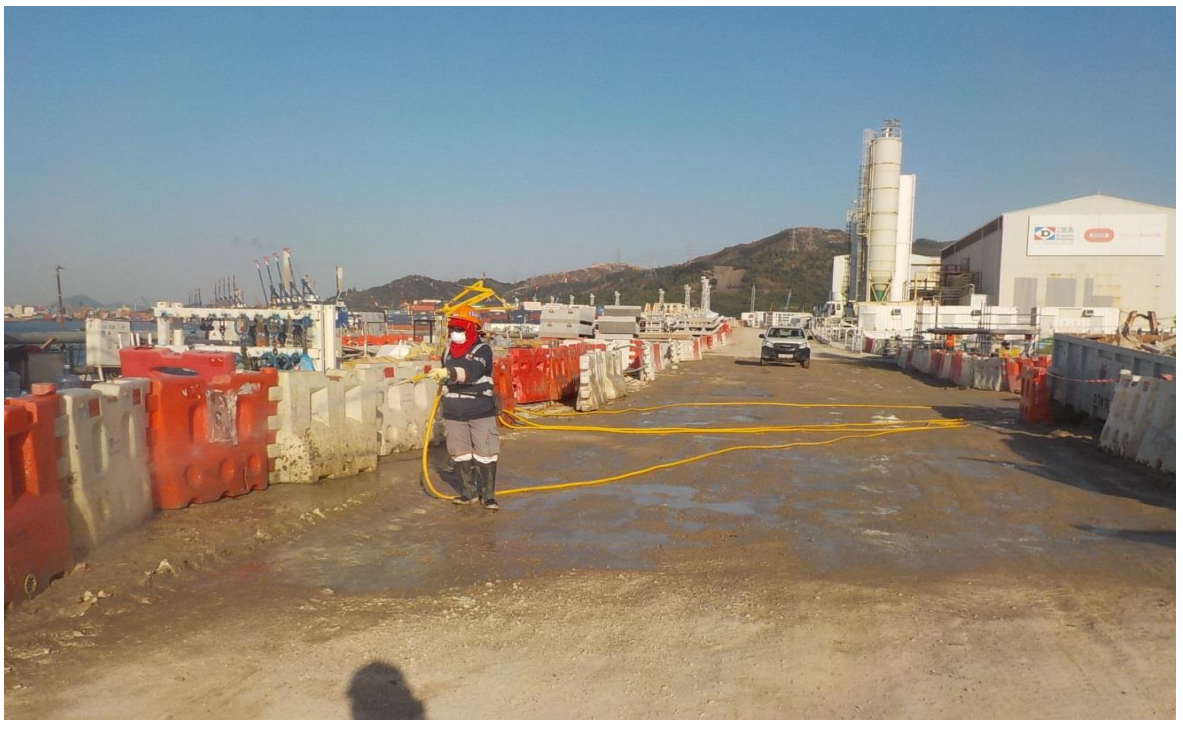
Log No.	**0212330_29December2017_24hrTSP_Station ASR10** **[Total No. of Exceedances = 1]**	
Date	29 December 2017 (Measured) 5 January 2018 (Laboratory results received by ERM)	
Monitoring Station	ASR1, ASR5, ASR6, ASR10 and AQMS1	
Parameter(s) with Exceedance(s)	24-hr TSP	
Action Levels	24-hr TSP (µg/m³)	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 24-hr TSP is observed at ASR10 (250 µg/m3) during 1606 – 1606 hrs.	
Works Undertaken (at the time of monitoring event)	On 29 December 2017, box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building at Portion N-C.	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedance is unlikely to be due to the Project, in view of the following: • According to the construction information provided by the Contractor, the majority of ground construction works on 29 and 30 December 2017 were box culvert extension at Works Area Portion N-A and Construction of Ventilation Building at Portions N-C. 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). • As reported in previous investigation report, the toilet near ASR10 is now under renovation. Dusty environment was observed during previous AQM inspection. The tentative completion date of the works will be on 12 February 2018. The exceedance is likely to be due to the renovation works at the toilet nearby. Based on the above, the exceedances are unlikely to be due to the project.	

Actions Taken / To Be Taken	Site inspection was carried out on 10 January 2018. Box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building was carried out at Portion N-C. Water spraying was applied frequently. Exposed soil at Portion N-A was covered by tarpaulin sheets and water spraying was also applied to prevent dust. Photo record is provided in Annex A. As dust suppression measures were properly implemented during the site inspections. Based on the above, no additional action is required. 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. The Contractor was also reminded to ensure all dust mitigating measures are provided at Portion N-A and Portion N-C, where the construction works are carried out.
Remarks	The monitoring results and the locations of air quality monitoring stations are attached.

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 10/1/2018



Water spraying was applied frequently during dry conditions.(Works Area Portion N-C)

Exposed soil at Portion N-A was covered by tarpaulin sheets. (Works Area Portion N-A)

ERM

Annex A Photos taken during site inspection

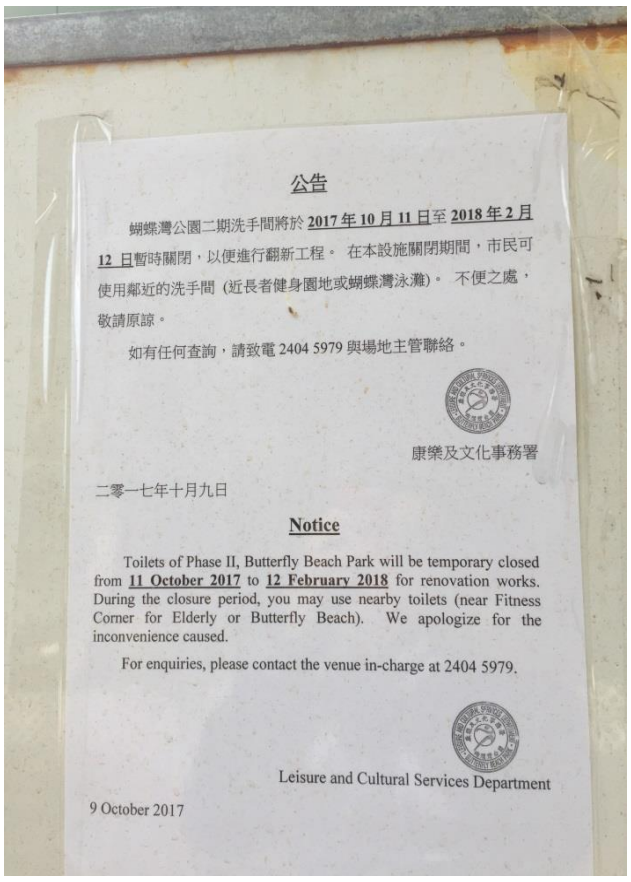
*Note: Photos taken on 10/1/2018

Water spraying was applied frequently during dry conditions.(Works Area Portion N-C)

Water spraying was applied frequently during dry conditions.(Works Area Portion N-B)

ERM

Annex A Photos taken during AQM inspection


公告

蝴蝶灣公園二期洗手間將於 2017 年 10 月 11 日至 2018 年 2 月 12 日暫時關閉，以便進行翻新工程。 在本設施關閉期間，市民可使用鄰近的洗手間 (近長者健身園地或蝴蝶灣泳灘)。 不便之處，敬請原諒。

如有任何查詢，請致電 2404 5979 與場地主管聯絡。

康樂及文化事務署

二零一七年十月九日

Notice

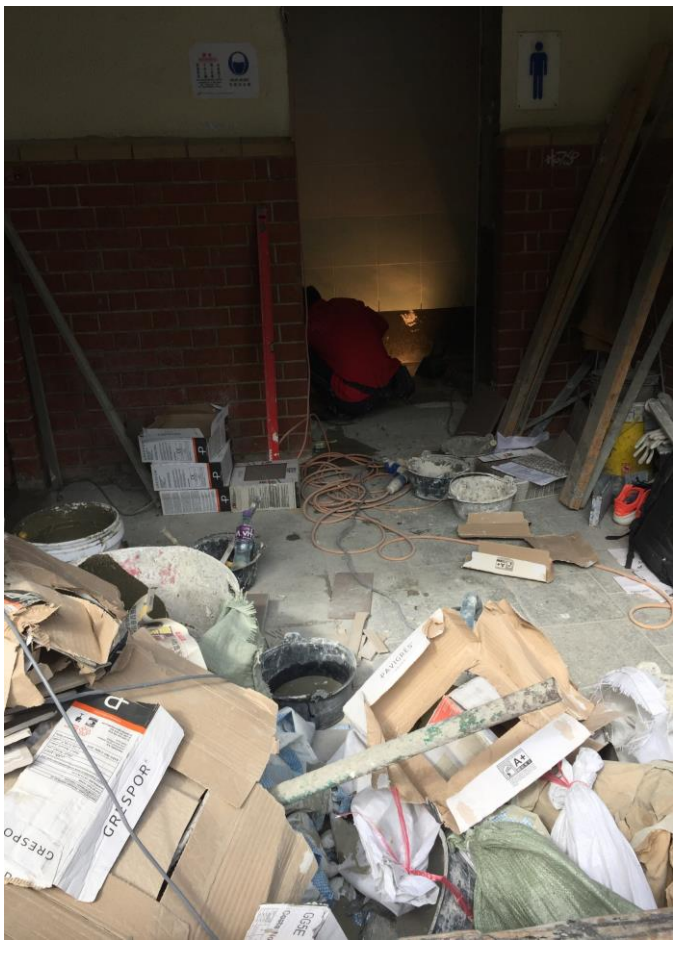
Toilets of Phase II, Butterfly Beach Park will be temporary closed from 11 October 2017 to 12 February 2018 for renovation works. During the closure period, you may use nearby toilets (near Fitness Corner for Elderly or Butterfly Beach). We apologize for the inconvenience caused.

For enquiries, please contact the venue in-charge at 2404 5979.

Leisure and Cultural Services Department

9 October 2017

Renovation works at the toilet near ASR10



Dusty environment was observed at ASR10. (Photos on 25/1/2018)

TMCLKL	HY/2012/08	29/12/2017	AQMS1	Sunny	13:43	1-hour TSP	158	ug/m3
TMCLKL	HY/2012/08	29/12/2017	AQMS1	Sunny	14:45	1-hour TSP	152	ug/m3
TMCLKL	HY/2012/08	29/12/2017	AQMS1	Sunny	15:47	1-hour TSP	99	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR1	Sunny	13:32	1-hour TSP	124	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR1	Sunny	14:34	1-hour TSP	144	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR1	Sunny	15:36	1-hour TSP	134	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR10	Sunny	13:00	1-hour TSP	66	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR10	Sunny	14:02	1-hour TSP	104	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR10	Sunny	15:04	1-hour TSP	130	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR5	Sunny	13:21	1-hour TSP	165	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR5	Sunny	14:23	1-hour TSP	184	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR5	Sunny	15:25	1-hour TSP	187	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR6	Sunny	13:10	1-hour TSP	136	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR6	Sunny	14:12	1-hour TSP	210	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR6	Sunny	15:14	1-hour TSP	194	ug/m3
TMCLKL	HY/2012/08	29/12/2017	AQMS1	Sunny	16:49	24-hour TSP	105	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR1	Sunny	16:38	24-hour TSP	119	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR10	Sunny	16:06	24-hour TSP	250	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR5	Sunny	16:27	24-hour TSP	140	ug/m3
TMCLKL	HY/2012/08	29/12/2017	ASR6	Sunny	16:16	24-hour TSP	92	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)**
17/12/29	16:00	1.8	51
17/12/29	17:00	2.7	46
17/12/29	18:00	4	43
17/12/29	19:00	4	52
17/12/29	20:00	3.6	48
17/12/29	21:00	3.1	44
17/12/29	22:00	2.7	47
17/12/29	23:00	3.1	46
17/12/30	0:00	3.6	53
17/12/30	1:00	2.7	41
17/12/30	2:00	0.9	50
17/12/30	3:00	0.9	12
17/12/30	4:00	1.3	43
17/12/30	5:00	1.8	44
17/12/30	6:00	1.3	50
17/12/30	7:00	0.9	52
17/12/30	8:00	1.3	72
17/12/30	9:00	1.3	171
17/12/30	10:00	1.8	42
17/12/30	11:00	2.7	192
17/12/30	12:00	1.8	228
17/12/30	13:00	1.3	274
17/12/30	14:00	2.2	195
17/12/30	15:00	2.2	190
17/12/30	16:00	1.3	188
17/12/30	17:00	1.3	226

Email message

Environmental Resources Management

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25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3113
Facsimile: (852) 2723 5660
E-mail: jovy.tam@erm.com

To	Ramboll Environ - 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	13 January 2018

ERM

Dear Sir or Madam,

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

0212330_13January2017_1hrTSP_Station ASR5

One Action Level Exceedance was recorded on 13 January 2018.

Regards,

Mr Jovy Tam
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_13January2018_1hrTSP_Station ASR5** **[Total No. of Exceedances = 1]**	
Date	13 January 2018 (Measured) 29 January 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 ASR5 (345 µg/m3) during 0841 – 0941 hrs.	
Works Undertaken (at the time of monitoring event)	On 13 January 2018, box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building at Portion N-C.	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedance is unlikely to be due to the Project, in view of the following: • According to the construction information provided by the Contractor, the majority of ground construction works on 13 January 2018 were box culvert extension at Works Area Portion N-A and Construction of Ventilation Building at Portions N-C. 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 exceedances are unlikely to be due to the project as dust suppression measures were implemented properly on site. Water spraying was applied. Exposed soil at Portion N-A was also covered by tarpaulin sheets. Photo record on 31 January 2018 is provided in Annex A. Based on the above, the exceedances are unlikely to be due to the project.	

Actions Taken / To Be Taken	Joint site inspection by SOR, Contractor, ENPO and ET was carried out on 31 January 2018. Box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building was carried out at Portion N-C. Exposed soil at Portion N-A was covered by tarpaulin sheets and water spraying was also applied to prevent dust. Photo record is provided in Annex A. Dust suppression measures were properly implemented during the site inspections. Based on the above, no additional action is required. 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. The Contractor was also reminded to ensure all dust mitigating measures are provided at Portion N-A and Portion N-C, where the construction works are carried out.
Remarks	The monitoring results and the locations of air quality monitoring stations are attached.

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 31/1/2018

Water spraying was applied on inert C&D waste to avoid dust impact during transportation. (Works Area Portion N-A)

Exposed soil at Portion N-A was covered by tarpaulin sheets. (Works Area Portion N-A)

Annex A Photos provided by the Contractor

*Note: Photos taken on 13/1/2018

Water spraying was applied frequently during dry condition. (Works Area Portion N-B)

Water spraying was applied frequently during dry condition. (Works Area Portion N-B)

TMCLKL	HY/2012/08	13/1/2018	AQMS1	Sunny	9:04	1-hour TSP	116	ug/m3
TMCLKL	HY/2012/08	13/1/2018	AQMS1	Sunny	10:06	1-hour TSP	92	ug/m3
TMCLKL	HY/2012/08	13/1/2018	AQMS1	Sunny	11:08	1-hour TSP	120	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR1	Sunny	8:53	1-hour TSP	147	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR1	Sunny	9:55	1-hour TSP	144	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR1	Sunny	10:57	1-hour TSP	86	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR10	Sunny	8:20	1-hour TSP	77	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR10	Sunny	9:22	1-hour TSP	65	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR10	Sunny	10:24	1-hour TSP	34	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR5	Sunny	8:41	1-hour TSP	345	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR5	Sunny	9:43	1-hour TSP	275	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR5	Sunny	10:45	1-hour TSP	141	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR6	Sunny	8:30	1-hour TSP	139	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR6	Sunny	9:32	1-hour TSP	96	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR6	Sunny	10:34	1-hour TSP	79	ug/m3
TMCLKL	HY/2012/08	13/1/2018	AQMS1	Sunny	12:10	24-hour TSP	50	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR1	Sunny	11:59	24-hour TSP	62	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR10	Sunny	11:26	24-hour TSP	48	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR5	Sunny	11:47	24-hour TSP	78	ug/m3
TMCLKL	HY/2012/08	13/1/2018	ASR6	Sunny	11:36	24-hour TSP	65	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)**
18/01/13	0:00	0.9	95
18/01/13	1:00	0.9	12
18/01/13	2:00	0.9	10
18/01/13	3:00	1.3	16
18/01/13	4:00	0.9	350
18/01/13	5:00	0.9	2
18/01/13	6:00	0.9	46
18/01/13	7:00	1.3	12
18/01/13	8:00	1.8	48
18/01/13	9:00	1.3	51
18/01/13	10:00	1.3	56
18/01/13	11:00	1.8	50
18/01/13	12:00	3.1	130
18/01/13	13:00	3.1	116
18/01/13	14:00	3.6	128
18/01/13	15:00	2.7	135
18/01/13	16:00	2.2	134
18/01/13	17:00	2.7	95
18/01/13	18:00	2.7	66
18/01/13	19:00	1.3	51
18/01/13	20:00	0.9	47
18/01/13	21:00	1.3	5
18/01/13	22:00	2.2	93
18/01/13	23:00	3.1	71

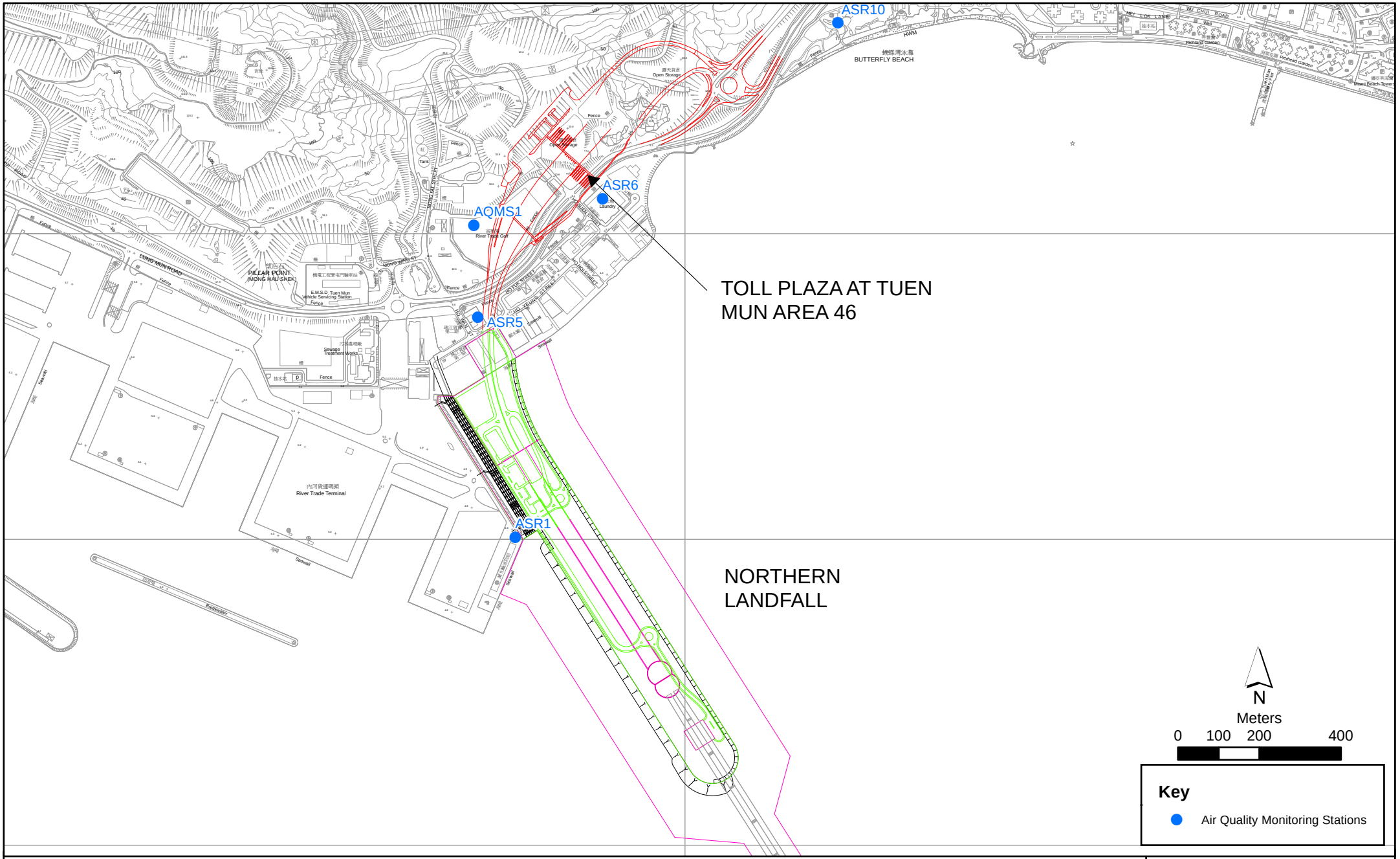

Figure 2.1

Air Quality Monitoring Stations for the Enhanced TSP Monitoring

File: T:\GIS\CONTRACT\0212330\Mxd\0212330_ASR_for_Enhanced_TSP_monitoring.mxd
Date: 21/2/2014

Environmental Resources Management

ERM

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: 08 Jan 2018 to 至 14 Jan 2018.

	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 – 9:00	✓	✓	✓	✓	✓	✓	✓
2	9:00 – 10:00	✓	✓	✓	✓	✓	✓	✓
3	10:00 – 11:00	✓	✓	✓	✓	✓	✓	✓
4	11:00 – 12:00	✓	✓	✓	✓	✓	✓	✓
5	12:00 – 13:00	✓	✓	✓	✓	✓	✓	✓
6	13:00 – 14:00	✓	✓	✓	✓	✓	✓	✓
7	14:00 – 15:00	✓	✓	✓	✓	✓	✓	✓
8	15:00 – 16:00	✓	✓	✓	✓	✓	✓	✓
9	16:00 – 17:00	✓	✓	✓	✓	✓	✓	✓
	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 3.16, the Permit Holder shall undertake watering at least 8 times per day on all exposed soil within the Project site and associated work areas in North Lantau 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 3.16 條例，在整個施工階段內，許可證持有人須每天至少 8 次在北大嶼山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

16/F Berkshire House,
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3113
Facsimile: (852) 2723 5660
E-mail: jovy.tam@erm.com

To	Ramboll Environ - 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	16 January 2018

ERM

Dear Sir or Madam,

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

0212330_16January2018_1hrTSP_Station ASR5
0212330_16January2018_1hrTSP_Station ASR5
0212330_16January2018_1hrTSP_Station ASR5

Three Action Level Exceedances were recorded on 16 January 2018.

Regards,

Mr Jovy Tam
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_16January2018_1hrTSP_Station ASR5** **[Total No. of Exceedances = 3]**	
Date	16 January 2018 (Measured) 26 January 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/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 (396 µg/m3) during 1322 – 1422 hrs. Action Level Exceedance for 1-hr TSP is observed at ASR5 (384 µg/m3) during 1424 – 1524 hrs. Action Level Exceedance for 1-hr TSP is observed at ASR5 (345 µg/m3) during 1526 – 1626 hrs.	
Works Undertaken (at the time of monitoring event)	On 16 January 2018, box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building at Portion N-C.	

Possible Reason for Action or Limit Level Exceedance(s)	The exceedance is unlikely to be due to the Project, in view of the following: • According to the construction information provided by the Contractor, the majority of ground construction works on 16 January 2018 were box culvert extension at Works Area Portion N-A and Construction of Ventilation Building at Portions N-C. 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 exceedances are unlikely to be due to the project as dust suppression measures were implemented properly on site. Water spraying was applied. Exposed soil at Portion N-A was also covered by tarpaulin sheets. Photo record on 31 January 2018 is provided in Annex A. • Whilst exceedances of Action Level was observed at ASR5, the 24-hr TSP level at the monitoring station (ASR5 = 197 μg/m3) on 16 January 2018 was in compliance with the Action and Limit Levels. • A meeting among SOR, ENPO, Contractor and ET regarding the continuously exceedances recorded (on 13 January and 16 January 2018) at ASR5 as per the Event and Action Plan under the EM&A Manual was held on 31 January 2018. It was noted that mitigation measures have been implemented to reduce the possible dust impact by the construction works. The Contractor was recommended to increase the frequency of water spraying and was reminded to cover all the stockpiles with tarpaulin sheets to prevent dust impact. Based on the above, the exceedances are unlikely to be due to the project.
Actions Taken / To Be Taken	Joint site inspection by SOR, Contractor, ET and ENPO was carried out on 31 January 2018. Box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building was carried out at Portion N-C. Exposed soil at Portion N-A was covered by tarpaulin sheets and water spraying was also applied to prevent dust. Photo record is provided in Annex A. Dust suppression measures were properly implemented during the site inspections. Based on the above, no additional action is required. 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. The Contractor was also reminded to ensure all dust mitigating measures are provided at Portion N-A and Portion N-C, where the construction works are carried out.
Remarks	The monitoring results and the locations of air quality monitoring stations are attached.

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 31/1/2018

Water spraying was applied on inert C&D waste to avoid dust impact during transportation. (Works Area Portion N-A)

Exposed soil at Portion N-A was covered by tarpaulin sheets. (Works Area Portion N-A)

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 31/1/2018

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

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

ERM

Annex A Photos provided by the Contractor

*Note: Photos taken on 16/1/2018

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

Water spraying was applied to prevent dust impact. (Works Area Portion N-B)

TMCLKL	HY/2012/08	16/1/2018	AQMS1	Sunny	13:45	1-hour TSP	198	ug/m3
TMCLKL	HY/2012/08	16/1/2018	AQMS1	Sunny	14:47	1-hour TSP	245	ug/m3
TMCLKL	HY/2012/08	16/1/2018	AQMS1	Sunny	15:49	1-hour TSP	197	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR1	Sunny	13:34	1-hour TSP	192	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR1	Sunny	14:36	1-hour TSP	192	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR1	Sunny	15:38	1-hour TSP	192	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR10	Sunny	13:00	1-hour TSP	153	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR10	Sunny	14:02	1-hour TSP	198	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR10	Sunny	15:04	1-hour TSP	169	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR5	Sunny	13:22	1-hour TSP	396	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR5	Sunny	14:24	1-hour TSP	384	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR5	Sunny	15:26	1-hour TSP	345	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR6	Sunny	13:11	1-hour TSP	269	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR6	Sunny	14:13	1-hour TSP	287	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR6	Sunny	15:15	1-hour TSP	265	ug/m3
TMCLKL	HY/2012/08	16/1/2018	AQMS1	Sunny	16:51	24-hour TSP	154	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR1	Sunny	16:40	24-hour TSP	147	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR10	Sunny	16:06	24-hour TSP	135	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR5	Sunny	16:28	24-hour TSP	197	ug/m3
TMCLKL	HY/2012/08	16/1/2018	ASR6	Sunny	16:17	24-hour TSP	178	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)**
18/01/16	0:00	0.4	22
18/01/16	1:00	0.4	312
18/01/16	2:00	0.4	72
18/01/16	3:00	0.4	70
18/01/16	4:00	0.4	43
18/01/16	5:00	0.4	356
18/01/16	6:00	0.4	351
18/01/16	7:00	0.4	350
18/01/16	8:00	0.4	84
18/01/16	9:00	0.9	191
18/01/16	10:00	1.8	235
18/01/16	11:00	2.2	224
18/01/16	12:00	3.1	182
18/01/16	13:00	1.8	259
18/01/16	14:00	1.8	268
18/01/16	15:00	1.3	230
18/01/16	16:00	1.3	226
18/01/16	17:00	0.9	94
18/01/16	18:00	0.9	349
18/01/16	19:00	0.9	352
18/01/16	20:00	0	339
18/01/16	21:00	0.4	306
18/01/16	22:00	0.4	298
18/01/16	23:00	0	288

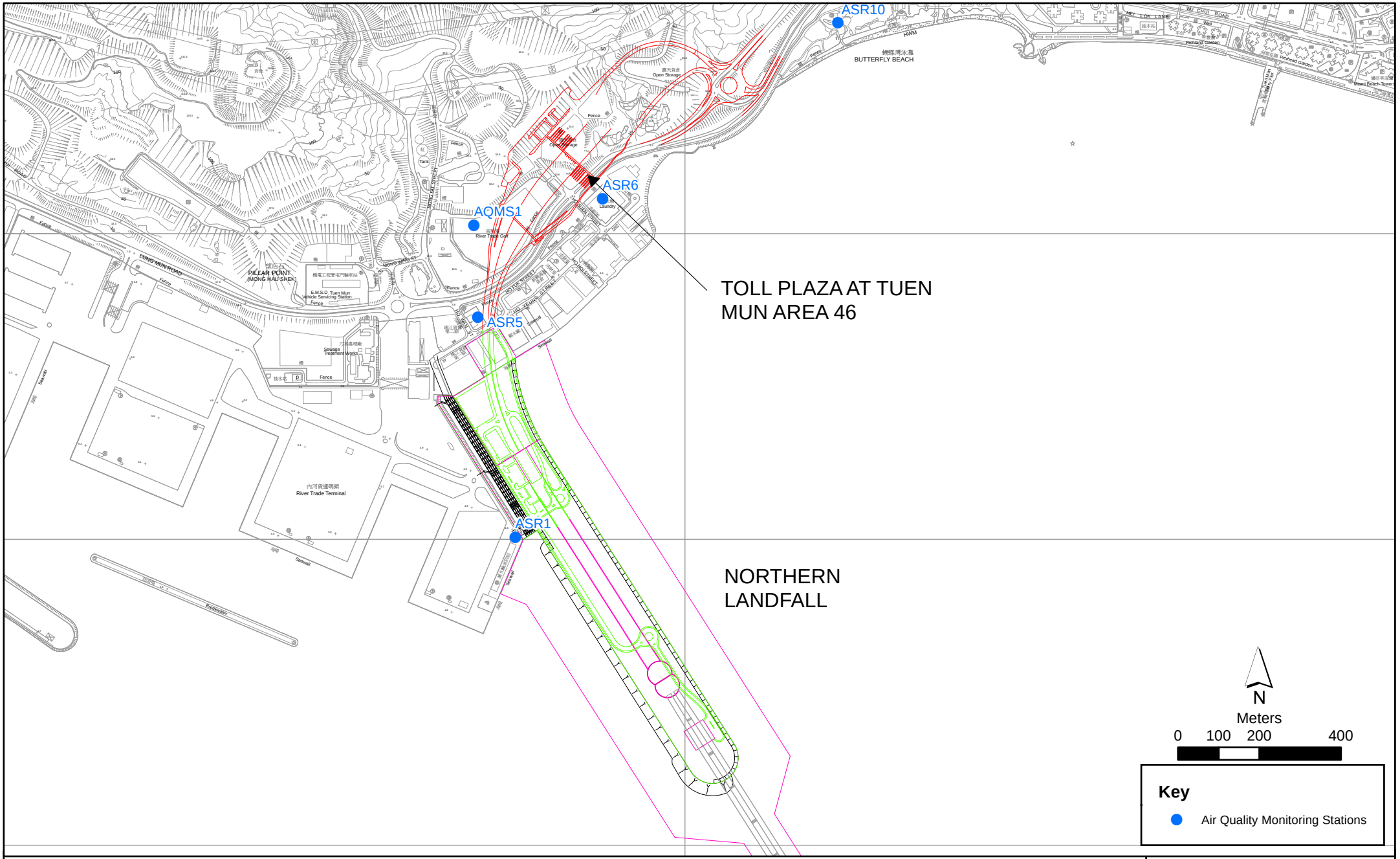

Figure 2.1

Air Quality Monitoring Stations for the Enhanced TSP Monitoring

File: T:\GIS\CONTRACT\0212330\Mxd\0212330_ASR_for_Enhanced_TSP_monitoring.mxd
Date: 21/2/2014

Environmental Resources Management

ERM

Weekly Water Spraying Record 每週灑水檢查記錄

Site Location 地盤位置: Northern Landfall

Date 日期: 15 Jan 2018 to 至 21 Jan 2018

	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 – 9:00	√	√	√	√	√	√	√
2	9:00 – 10:00	√	√	√	√	√	√	√
3	10:00 – 11:00	√	√	√	√	√	√	√
4	11:00 – 12:00	√	√	√	√	√	√	√
5	12:00 – 13:00	√	√	√	√	√	√	√
6	13:00 – 14:00	√	√	√	√	√	√	√
7	14:00 – 15:00	√	√	√	√	√	√	√
8	15:00 – 16:00	√	√	√	√	√	√	√
9	16:00 – 17:00	√	√	√	√	√	√	√
	Verified by Site Foreman 地盤科文簽署確認	[signature]	[signature]	[signature]	[signature]	[signature]	[signature]	[signature]

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 3.16, the Permit Holder shall undertake watering at least 8 times per day on all exposed soil within the Project site and associated work areas in North Lantau 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. 16 條例, 在整個施工階段內, 許可證持有人須每天至少 8 次在北大嶼山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

16/F Berkshire House,
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3113
Facsimile: (852) 2723 5660
E-mail: jovy.tam@erm.com

To	Ramboll Hong Kong, Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Air Quality Impact Monitoring
Date	31 January 2018

Dear Sir or Madam,

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

0212330_22January2017_1hrTSP_Station ASR5
0212330_22January2017_1hrTSP_Station ASR5

Two Action Level Exceedances were recorded on 22 January 2018.

Regards,

Mr Jovy Tam
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_22January2018_1hrTSP_Station ASR5** **0212330_22January2018_1hrTSP_Station ASR5** **[Total No. of Exceedances = 2]**	
Date	22 January 2018 (Measured) 30 January 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 ASR5 (363 µg/m3) during 1340 – 1440 hrs. Action Level Exceedance for 1-hr TSP is observed at ASR5 (380 µg/m3) during 1442 – 1542 hrs.	
Works Undertaken (at the time of monitoring event)	On 22 January 2018, box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building at Portion N-C.	

Possible Reason for Action or Limit Level Exceedance(s)	The exceedance is unlikely to be due to the Project, in view of the following: • According to the construction information provided by the Contractor, the majority of ground construction works on 22 January 2018 were box culvert extension at Works Area Portion N-A and Construction of Ventilation Building at Portions N-C. 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 exceedances are unlikely to be due to the project as dust suppression measures were implemented properly on site. Water spraying was applied. Exposed soil at Portion N-A was also covered by tarpaulin sheets. Photo record on 31 January 2018 is provided in Annex A. • Whilst exceedances of Action Level was observed at ASR5, the 24-hr TSP level at the monitoring station (ASR5 = 150 μg/m3) on 22 January 2018 was in compliance with the Action and Limit Levels. • After the three consecutive 1-hour TSP action level exceedances on 16 January 2018 and two consecutive 1-hour TSP action level exceedances on 22 January 2018 at ASR5 were recorded, a meeting among SOR, ENPO, Contractor and ET regarding the continuously exceedances recorded (on 13 January and 16 January 2018) at ASR5 as per the Event and Action Plan under the EM&A Manual was held on 31 January 2018. It was noted that mitigation measures have been implemented to reduce the possible dust impact by the construction works. The Contractor was recommended to increase the frequency of water spraying and was reminded to cover all the stockpiles with tarpaulin sheets to prevent dust impact. Based on the above, the exceedances are unlikely to be due to the project.
Actions Taken / To Be Taken	Joint site inspection by SOR, Contractor, ET and ENPO were carried out on 31 January 2018. Box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building was carried out at Portion N-C. Exposed soil at Portion N-A was covered by tarpaulin sheets and water spraying was also applied to prevent dust. Photo record is provided in Annex A. Dust suppression measures were properly implemented during the site inspections. Based on the above, no additional action is required. 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. The Contractor was also reminded to ensure all dust mitigating measures are provided at Portion N-A and Portion N-C, where the construction works are carried out.
Remarks	The monitoring results and the locations of air quality monitoring stations are attached.

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 31/1/2018

Water spraying was applied on inert C&D waste to avoid dust impact during transportation. (Works Area Portion N-A)

Exposed soil at Portion N-A was covered by tarpaulin sheets. (Works Area Portion N-A)

ERM

Annex A Photos taken during site inspection

*Note: Photos taken on 31/1/2018

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

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

ERM

Annex A Photos provided by the Contractor

*Note: Photos taken on 22/1/2018

Water spraying was applied to prevent dust impact. (Works Area Portion N-B)

Exposed soil at Portion N-A was covered by tarpaulin sheets. (Works Area Portion N-A)

TMCLKL	HY/2012/08	22/1/2018	AQMS1	Sunny	14:03	1-hour TSP	295	ug/m3
TMCLKL	HY/2012/08	22/1/2018	AQMS1	Sunny	15:05	1-hour TSP	324	ug/m3
TMCLKL	HY/2012/08	22/1/2018	AQMS1	Sunny	16:07	1-hour TSP	262	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR1	Sunny	13:52	1-hour TSP	262	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR1	Sunny	14:54	1-hour TSP	253	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR1	Sunny	15:56	1-hour TSP	224	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR10	Sunny	13:18	1-hour TSP	243	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR10	Sunny	14:20	1-hour TSP	249	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR10	Sunny	15:22	1-hour TSP	206	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR5	Sunny	13:40	1-hour TSP	363	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR5	Sunny	14:42	1-hour TSP	380	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR5	Sunny	15:44	1-hour TSP	305	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR6	Sunny	13:29	1-hour TSP	322	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR6	Sunny	14:31	1-hour TSP	310	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR6	Sunny	15:33	1-hour TSP	273	ug/m3
TMCLKL	HY/2012/08	22/1/2018	AQMS1	Sunny	17:09	24-hour TSP	110	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR1	Sunny	16:58	24-hour TSP	101	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR10	Sunny	16:24	24-hour TSP	72	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR5	Sunny	16:46	24-hour TSP	150	ug/m3
TMCLKL	HY/2012/08	22/1/2018	ASR6	Sunny	16:35	24-hour TSP	118	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)**
18/01/22	0:00	0.4	300
18/01/22	1:00	0	305
18/01/22	2:00	0	306
18/01/22	3:00	0.4	312
18/01/22	4:00	0	331
18/01/22	5:00	0	306
18/01/22	6:00	0	315
18/01/22	7:00	0	310
18/01/22	8:00	0.4	119
18/01/22	9:00	0.4	169
18/01/22	10:00	1.3	228
18/01/22	11:00	1.3	231
18/01/22	12:00	1.8	229
18/01/22	13:00	1.3	256
18/01/22	14:00	0.9	251
18/01/22	15:00	1.3	62
18/01/22	16:00	0.9	65
18/01/22	17:00	0.9	70
18/01/22	18:00	1.8	61
18/01/22	19:00	1.8	66
18/01/22	20:00	1.8	59
18/01/22	21:00	0.9	72
18/01/22	22:00	0.9	71
18/01/22	23:00	0.9	93

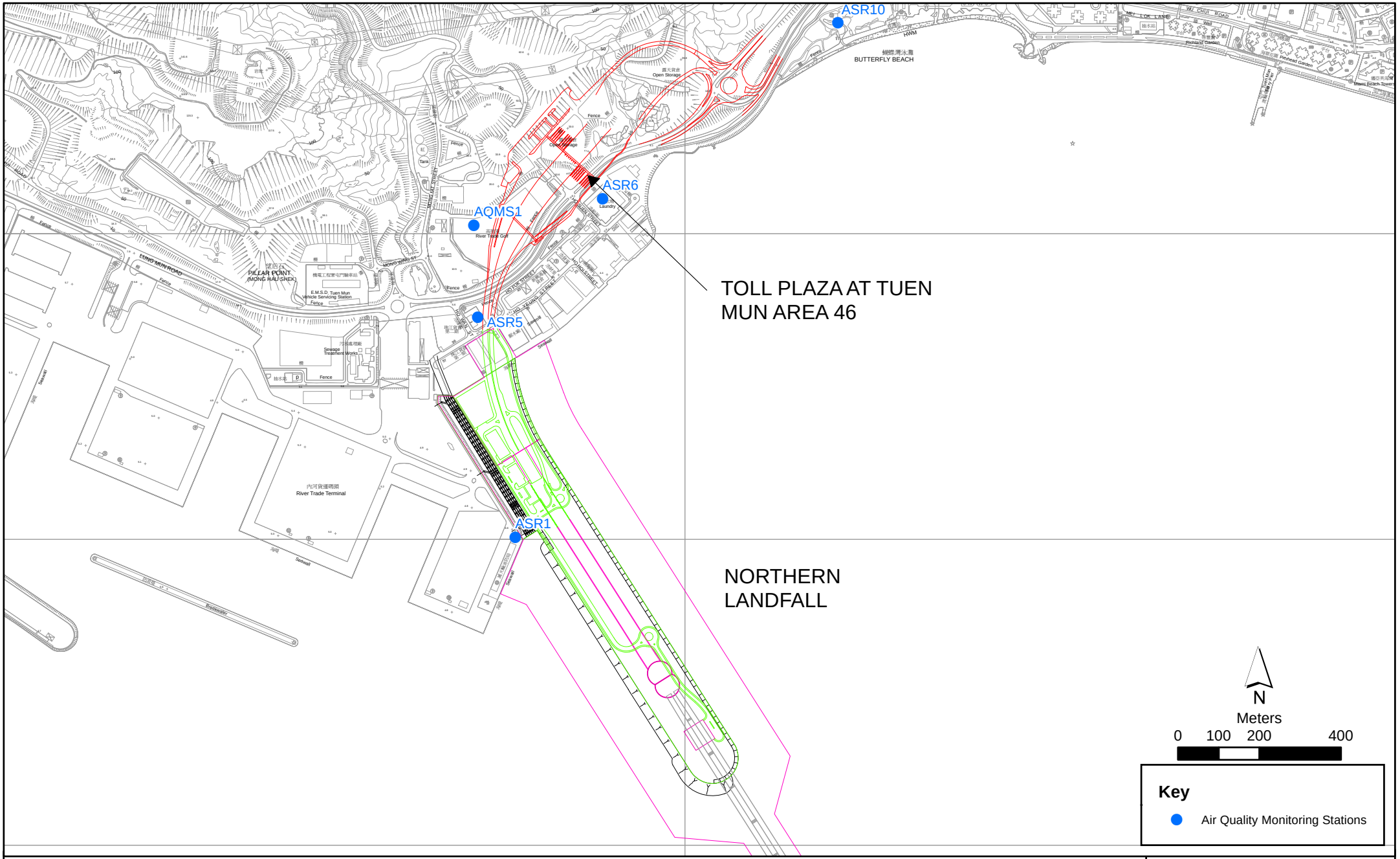

Figure 2.1

Air Quality Monitoring Stations for the Enhanced TSP Monitoring

File: T:\GIS\CONTRACT\0212330\Mxd\0212330_ASR_for_Enhanced_TSP_monitoring.mxd
Date: 21/2/2014

Environmental Resources Management

ERM

Dragages Hong Kong / 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: 22 Jan 2018 to 至 28 Jan 2018

	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 – 9:00	✓	✓	✓	✓	✓	✓	✓
2	9:00 – 10:00	✓	✓	✓	✓	✓	✓	✓
3	10:00 – 11:00	✓	✓	✓	✓	✓		✓
4	11:00 – 12:00	✓	✓	✓	✓	✓	✓	✓
5	12:00 – 13:00	✓	✓	✓	✓	✓	✓	✓
6	13:00 – 14:00	✓	✓	✓	✓	✓	✓	✓
7	14:00 – 15:00	✓		✓	✓	✓	✓	✓
8	15:00 – 16:00	✓	✓	✓	✓	✓	✓	✓
9	16:00 – 17:00	✓	✓	✓	✓	✓	✓	✓
	Verified by Site Foreman 地盤科文簽署確認	[signature]	[signature]	[signature]	[signature]	[signature]	[signature]	[signature]

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 3.16, the Permit Holder shall undertake watering at least 8 times per day on all exposed soil within the Project site and associated work areas in North Lantau 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 3.16 條例，在整個施工階段內，許可證持有人須每天至少 8 次在北大嶼山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。

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_3February2018_1hrTSP_Station ASR1** **0212330_3February2018_1hrTSP_Station ASR5** **[Total No. of Exceedances = 2]**	
Date	3 February 2018 (Measured) 13 February 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/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 (392 µg/m3) during 0900 – 1000 hrs. Action Level Exceedance for 1-hr TSP is observed at ASR5 (455 µg/m3) during 0849 – 0949 hrs.	
Works Undertaken (at the time of monitoring event)	On 3 February 2018, box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building at Portion N-C.	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedance is unlikely to be due to the Project, in view of the following: • According to the construction information provided by the Contractor, the majority of ground construction works on 3 February 2018 were box culvert extension at Works Area Portion N-A and Construction of Ventilation Building at Portions N-C. 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 exceedances are unlikely to be due to the project as dust suppression measures were implemented properly on site. Water spraying was applied. Exposed soil at Portion N-A was also covered by tarpaulin sheets. Based on the above, the exceedances are unlikely to be due to the project.	

Actions Taken / To Be Taken	Follow up site inspection was carried out on 14 February 2018. Box culvert extension was carried out at Works Area Portion N-A and Construction of Ventilation Building was carried out at Portion N-C. Exposed soil at Portion N-A was covered by tarpaulin sheets and water spraying was also applied to prevent dust. Photo record is provided in Annex A. Photos taken during AQM were also provided. No significant dust impact was observed at ASR1 and ASR5. Dust suppression measures were properly implemented during the site inspections. Based on the above, no additional action is required. 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. The Contractor was also reminded to ensure all dust mitigating measures are provided at Portion N-A and Portion N-C, where the construction works are carried out.
Remarks	The monitoring results and the locations of air quality monitoring stations are attached.

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Annex A Photos taken during site inspection

*Note: Photos taken on 14/2/2018

Water spraying was applied frequently on site.
(Works Area Portion N-A)

Exposed soil at Portion N-A was covered by tarpaulin sheets. (Works Area Portion N-A)

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Annex A Photos taken during AQM on 3/2/2018

*Note: Photos taken on 3/2/2018

ASR1

ASR5

TMCLKL	HY/2012/08	3/2/2018	AQMS1	Sunny	9:12	1-hour TSP	109	ug/m3
TMCLKL	HY/2012/08	3/2/2018	AQMS1	Sunny	10:14	1-hour TSP	127	ug/m3
TMCLKL	HY/2012/08	3/2/2018	AQMS1	Sunny	11:16	1-hour TSP	118	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR1	Sunny	9:00	1-hour TSP	392	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR1	Sunny	10:02	1-hour TSP	138	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR1	Sunny	11:04	1-hour TSP	163	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR10	Sunny	8:27	1-hour TSP	120	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR10	Sunny	9:29	1-hour TSP	93	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR10	Sunny	10:31	1-hour TSP	333	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR5	Sunny	8:49	1-hour TSP	455	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR5	Sunny	9:51	1-hour TSP	285	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR5	Sunny	10:53	1-hour TSP	211	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR6	Sunny	8:38	1-hour TSP	272	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR6	Sunny	9:40	1-hour TSP	192	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR6	Sunny	10:42	1-hour TSP	205	ug/m3
TMCLKL	HY/2012/08	3/2/2018	AQMS1	Sunny	12:18	24-hour TSP	115	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR1	Sunny	12:06	24-hour TSP	192	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR10	Sunny	11:33	24-hour TSP	105	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR5	Sunny	11:55	24-hour TSP	179	ug/m3
TMCLKL	HY/2012/08	3/2/2018	ASR6	Sunny	11:44	24-hour TSP	123	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)**
18/02/03	0:00	1.3	272
18/02/03	1:00	1.8	351
18/02/03	2:00	2.2	353
18/02/03	3:00	1.8	349
18/02/03	4:00	3.1	355
18/02/03	5:00	2.2	12
18/02/03	6:00	2.7	16
18/02/03	7:00	3.1	13
18/02/03	8:00	2.2	11
18/02/03	9:00	3.1	49
18/02/03	10:00	2.2	45
18/02/03	11:00	2.7	20
18/02/03	12:00	2.2	14
18/02/03	13:00	1.3	13
18/02/03	14:00	0.9	285
18/02/03	15:00	0.9	311
18/02/03	16:00	1.3	46
18/02/03	17:00	1.3	47
18/02/03	18:00	1.3	64
18/02/03	19:00	0.9	62
18/02/03	20:00	0.9	63
18/02/03	21:00	0.9	66
18/02/03	22:00	1.3	42
18/02/03	23:00	2.2	40
18/02/04	0:00	2.7	50
18/02/04	1:00	3.1	51
18/02/04	2:00	3.1	48
18/02/04	3:00	3.1	10
18/02/04	4:00	3.1	51
18/02/04	5:00	3.1	16
18/02/04	6:00	3.1	55
18/02/04	7:00	3.1	39
18/02/04	8:00	3.6	40
18/02/04	9:00	3.1	42
18/02/04	10:00	2.7	50
18/02/04	11:00	1.8	43
18/02/04	12:00	1.8	38
18/02/04	13:00	1.8	344
18/02/04	14:00	1.3	357
18/02/04	15:00	1.3	344
18/02/04	16:00	1.3	328
18/02/04	17:00	1.3	305
18/02/04	18:00	1.8	351
18/02/04	19:00	1.8	352
18/02/04	20:00	1.3	7
18/02/04	21:00	1.3	348
18/02/04	22:00	2.2	2
18/02/04	23:00	1.3	260
18/02/06	0:00	2.2	20
18/02/06	1:00	3.1	13
18/02/06	2:00	3.6	4
18/02/06	3:00	3.1	19
18/02/06	4:00	3.1	42
18/02/06	5:00	3.1	55
18/02/06	6:00	2.7	10
18/02/06	7:00	3.1	49
18/02/06	8:00	3.1	51

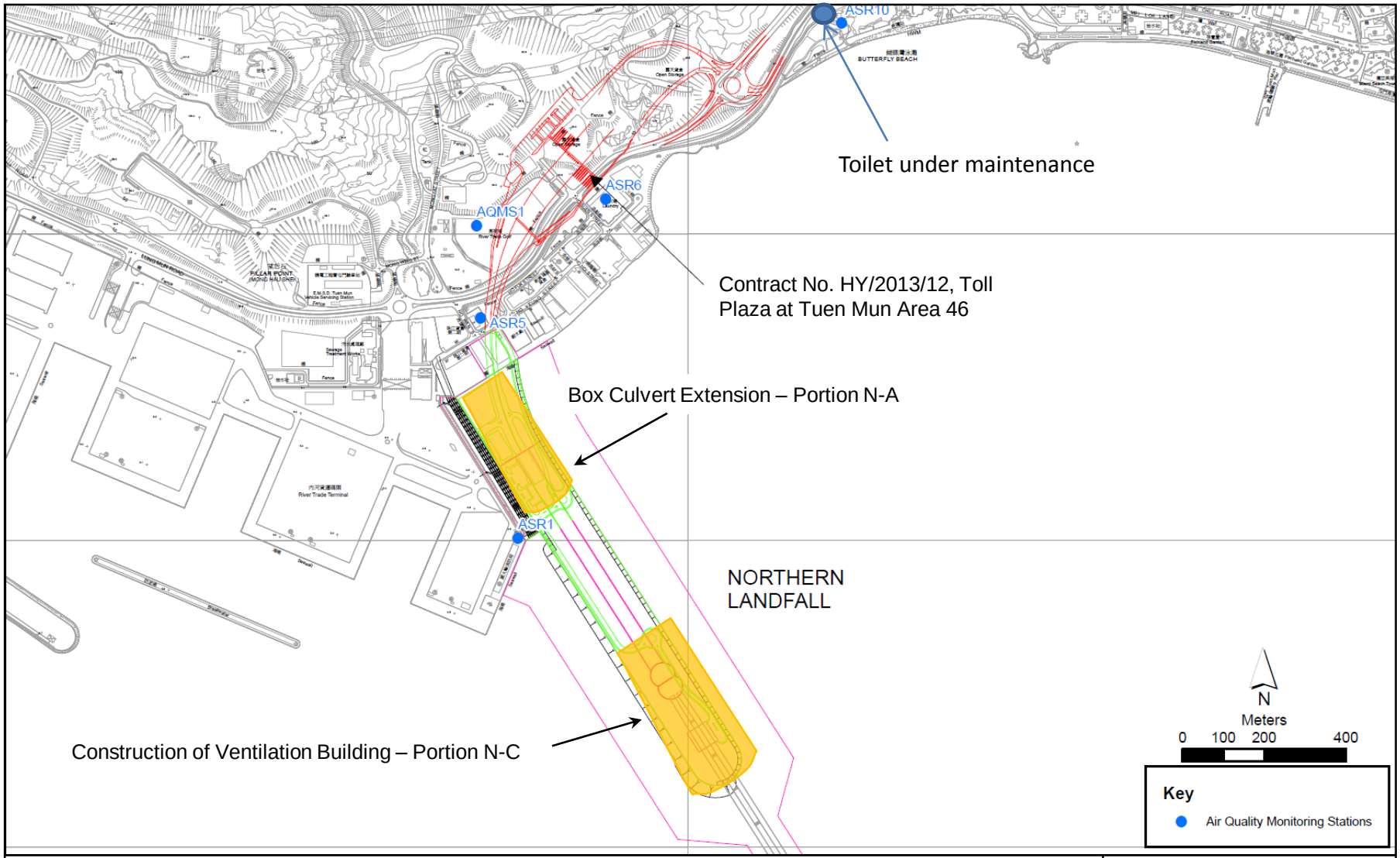


Figure 1

Indicative Construction Works Area on 3 February 2018

DATE: 06/03/2013

Environmental Resources Management

ERM

Dragages Hong Kong / Bouygues Travaux Publics — 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: 29 Jan 2018 to 至 04 Feb 2018

	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

16/F Berkshire House,
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3113
Facsimile: (852) 2723 5660
E-mail: jovy.tam@erm.com

To	ENVIRON - Hong Kong, Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Water Quality Impact Monitoring
Date	6 December 2017

Dear Sir or Madam,

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

Action Level Exceedance
0212330_6December 2017_Depth-averaged SS_F_Station_IS15

A total of one Action Level Exceedance was recorded on 6 December 2017.

Regards,

Mr Jovy Tam
Environmental Team Leader

ERM-Hong Kong, Limited

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

Marine Water Quality Impact Monitoring
Notification of Exceedance

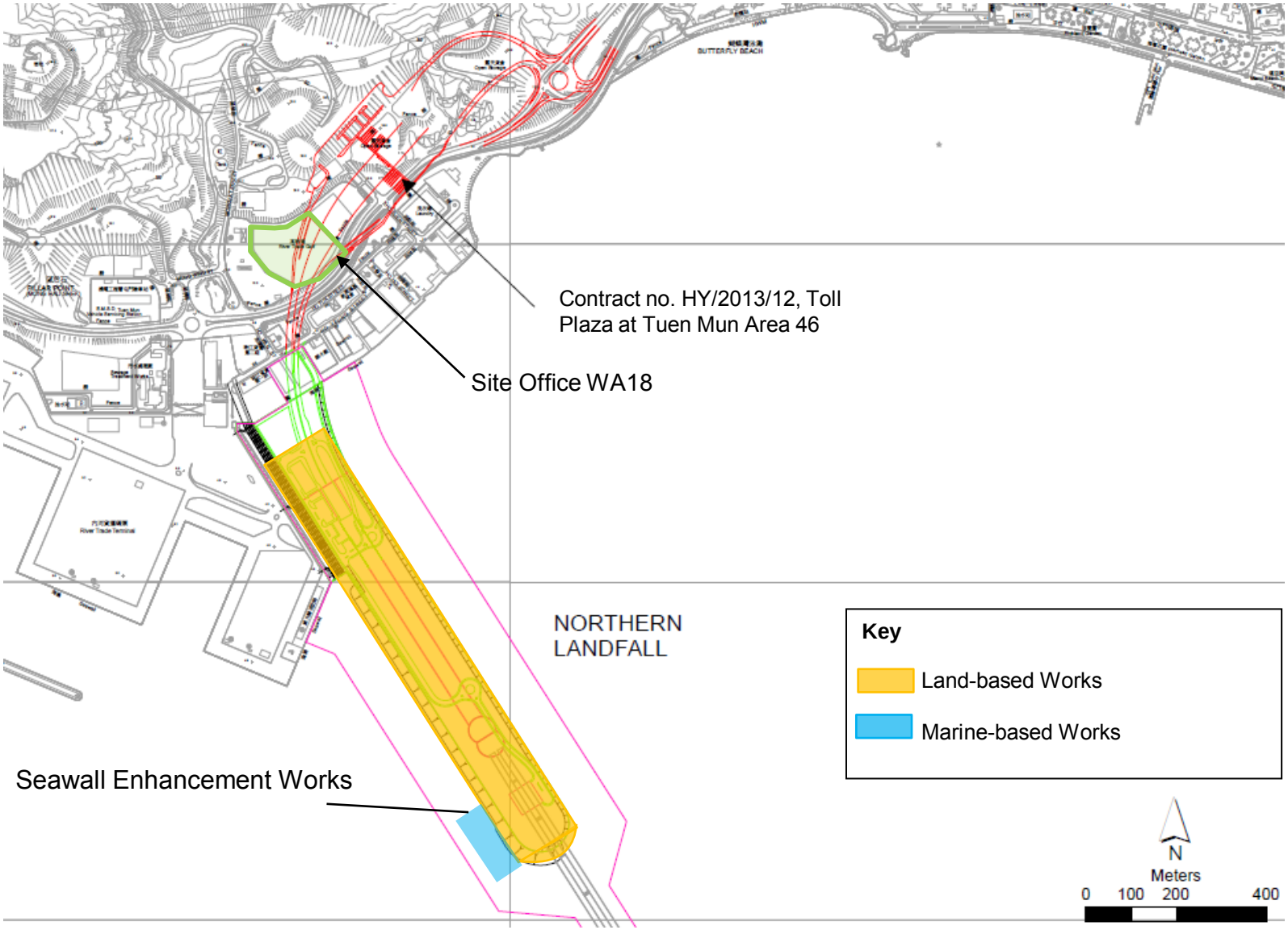
Log No.	**0212330_6December 2017_Depth-averaged SS_F_Station_IS15 [Total No. of Exceedances = 1]**	
Date	6 December 2017 (Measured) 9 December 2017 (*In situ* results received by ERM) 13 December 2017 (Laboratory results received by ERM)	
Monitoring Station	CS4, CS6, SR8, SR9, SR10A, IS12, IS13, IS14, IS15	
Parameter(s) with Exceedance(s)	Depth-averaged Suspended Solids (SS, mg/L)	
Action Levels	SS	120% of upstream control station at the same tide of the same day (i.e., CS6: 9.1 x 120% = 10.9 mg/L for mid-flood; CS4: 13.0 x 120% = 15.6 mg/L for mid-ebb) and 95%-ile of baseline data (i.e., 23.5 mg/L).
Limit Levels	SS	130% of upstream control station at the same tide of the same day and 10mg/L for WSD Seawater Intakes at Tuen Mun (i.e., CS6: 9.1 x 130% = 11.8 mg/L for mid-flood; CS4: 13.0 x 130% = 16.9 mg/L for mid-ebb) and 99%-ile of baseline data. (i.e., 34.4 mg/L)
Measured Levels	Action Level Exceedance for SS is observed at IS15 (25.0 mg/L) during mid-flood tide.	
Works Undertaken (at the time of monitoring event)	According to the information provided by the Contractor, marine works conducted on 6 December 2017 included: • Seawall Enhancement Works at Portion N-C	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedances are unlikely to be due to the Project, in view of the following: • Apart from observed exceedances, SS levels at all other monitoring stations were in compliance with the Action and Limit Levels during both mid-flood and mid-ebb tides on the same day. • The average current flow direction during flood tide was from CS6 to CS4. The current flow direction did not favour the dispersion of suspended solids to IS15, if any, generated by the marine works under this Contract. Consider the normal average SS value recorded at IS12 and IS14, which is the closest WQM station to the marine-based construction area, the observed exceedances at other remote stations were unlikely to be due to the marine works of this Contract. • Depth-averaged Turbidity levels at all stations were in compliance with the Action and Limit Levels during both tides on the same day. Likewise, dissolved oxygen (DO) at all levels were also in compliance with the Action and Limit Levels in both mid-ebb and mid-flood tides.	
Actions Taken / To Be Taken	No immediate action is considered necessary. The ET will monitor for future trends in exceedances.	
Remarks	The monitoring results and the locations of water quality monitoring stations are attached.	

ERM

Annex A Photos taken during Water Quality Monitoring

*Note: Photos taken on 6/12/2017

IS15 - Flood tide



Environmental Resources Management

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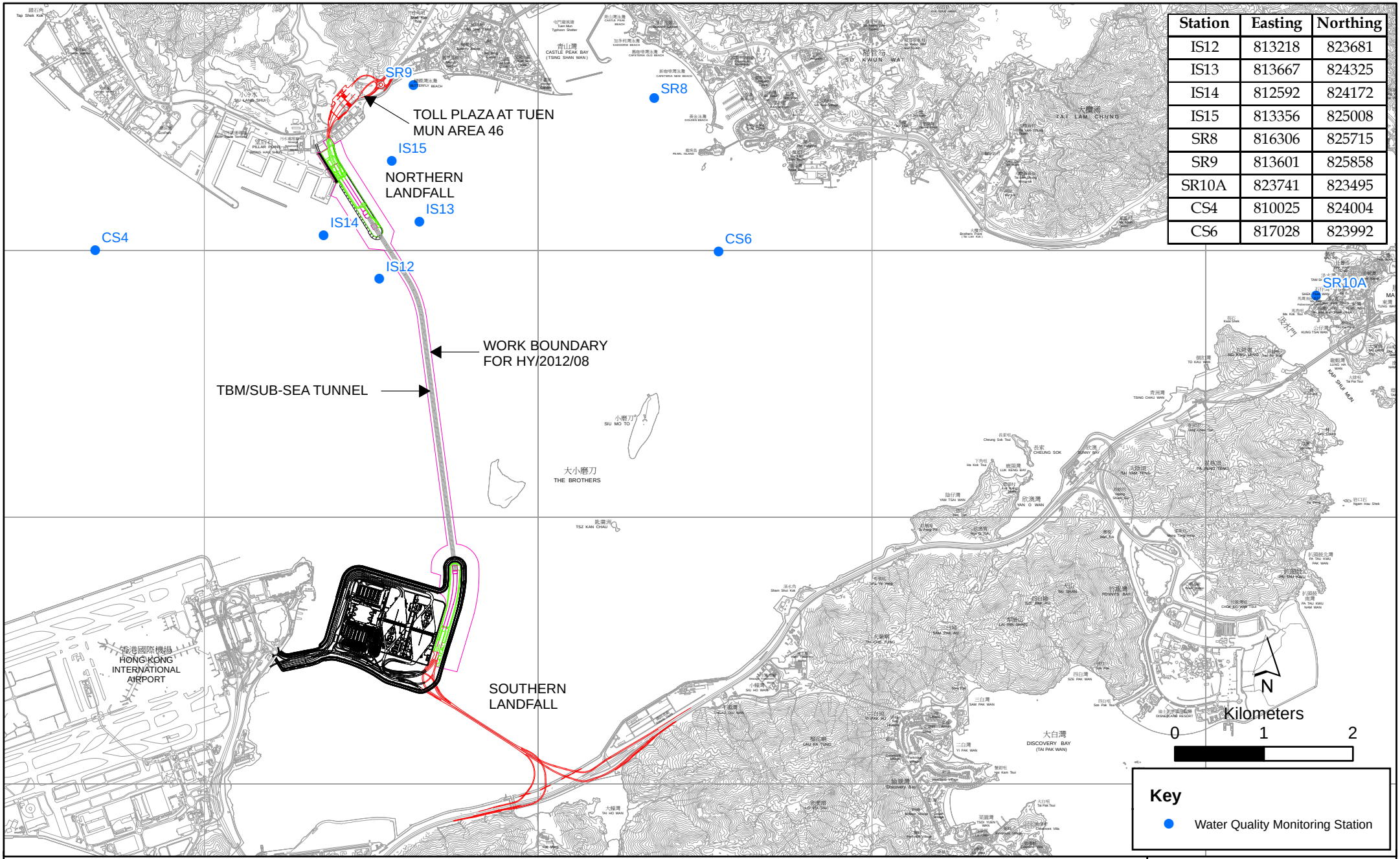

Station	Easting	Northing
IS12	813218	823681
IS13	813667	824325
IS14	812592	824172
IS15	813356	825008
SR8	816306	825715
SR9	813601	825858
SR10A	823741	823495
CS4	810025	824004
CS6	817028	823992

Figure 2.2

Water Quality Monitoring Station

File: T:\GIS\CONTRACT\0212330\Mxd\0212330_WQMS.mxd
Date: 15/11/2013

Environmental Resources Management

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Project	Works	Date (yyyy-mm-dd)	Tide	Station	Start Time	Level	Lev_Cod	Replicate	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average DO (mg/L)	Turbidity (NTU)	Depth-Averaged Turbidity	SS (mg/L)	Depth-Averaged SS
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	CS6	14:35	Surface	1	1	22.1	8.1	32.8	6.1	6.0	6.2	10.0	7.8	8.9
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	CS6	14:35	Surface	1	2	22.1	8.1	32.8	6.0		5.7		7.8	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	CS6	14:35	Middle	2	1	22.1	8.1	32.8	6.0		8.8		8.6	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	CS6	14:35	Middle	2	2	22.1	8.1	32.8	6.0		8.3		8.2	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	CS6	14:35	Bottom	3	1	22.1	8.1	32.8	6.0	6.0	15.5		10.2	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	CS6	14:35	Bottom	3	2	22.1	8.1	32.8	6.0		15.5		10.5	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	CS4	13:27	Surface	1	1	22.0	8.2	32.6	6.4	6.4	7.0	11.3	10.9	13.0
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	CS4	13:27	Surface	1	2	22.0	8.1	32.6	6.4		6.2		11.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	CS4	13:27	Middle	2	1	21.8	8.2	32.6	6.4		12.2		11.5	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	CS4	13:27	Middle	2	2	21.9	8.1	32.6	6.4		11.2		12.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	CS4	13:27	Bottom	3	1	21.8	8.2	32.6	6.4	6.4	15.7		16.8	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	CS4	13:27	Bottom	3	2	21.9	8.1	32.6	6.3		15.6		15.0	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR8	14:19	Surface	1	1	22.1	8.2	32.7	6.4	6.4	7.6	7.5	5.4	6.4
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR8	14:19	Surface	1	2	22.1	8.1	32.7	6.4		6.8		6.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR8	14:19	Middle	2	1									
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR8	14:19	Middle	2	2									
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR8	14:19	Bottom	3	1	22.0	8.2	32.7	6.4	6.4	8.2		7.1	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR8	14:19	Bottom	3	2	22.0	8.1	32.7	6.4		7.4		6.7	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR9	14:03	Surface	1	1	22.2	8.2	32.7	6.4	6.4	6.7	6.7	4.4	5.4
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR9	14:03	Surface	1	2	22.3	8.1	32.7	6.4		6.2		5.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR9	14:03	Middle	2	1									
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR9	14:03	Middle	2	2									
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR9	14:03	Bottom	3	1	22.1	8.2	32.7	6.5	6.5	7.0		5.9	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR9	14:03	Bottom	3	2	22.1	8.1	32.7	6.5		6.8		5.7	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR10A	15:34	Surface	1	1	22.0	8.1	32.7	6.4	6.4	4.4	4.9	7.6	7.3
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR10A	15:34	Surface	1	2	22.1	8.0	32.5	6.4		5.2		7.8	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR10A	15:34	Middle	2	1	22.0	8.1	32.8	6.4		5.3		7.2	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR10A	15:34	Middle	2	2	22.1	8.0	32.5	6.4		5.3		7.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR10A	15:34	Bottom	3	1	21.9	8.1	32.8	6.5	6.5	4.8		6.9	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	SR10A	15:34	Bottom	3	2	22.1	8.0	32.5	6.5		4.5		6.6	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS12	13:44	Surface	1	1	22.0	8.2	32.7	6.2	6.2	11.4	16.5	12.0	14.7
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS12	13:44	Surface	1	2	22.0	8.1	32.7	6.2		11.2		12.2	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS12	13:44	Middle	2	1	22.0	8.2	32.7	6.2		13.3		15.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS12	13:44	Middle	2	2	22.0	8.1	32.7	6.2		13.4		15.3	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS12	13:44	Bottom	3	1	22.0	8.2	32.7	6.2	6.2	24.6		17.1	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS12	13:44	Bottom	3	2	22.0	8.1	32.7	6.2		24.8		16.1	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS13	13:51	Surface	1	1	22.0	8.2	32.7	6.3	6.3	9.2	10.4	9.5	11.6
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS13	13:51	Surface	1	2	22.1	8.1	32.7	6.3		9.2		10.1	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS13	13:51	Middle	2	1	22.0	8.2	32.7	6.3		11.4		13.3	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS13	13:51	Middle	2	2	22.1	8.1	32.7	6.3		10.7		11.8	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS13	13:51	Bottom	3	1	22.0	8.2	32.7	6.3	6.3	10.9		13.1	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS13	13:51	Bottom	3	2	22.1	8.1	32.7	6.3		10.8		11.9	

Project	Works	Date (yyyy-mm-dd)	Tide	Station	Start Time	Level	Lev_Cod	Replicate	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average DO (mg/L)	Turbidity (NTU)	Depth-Averaged Turbidity	SS (mg/L)	Depth-Averaged SS
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS14	13:38	Surface	1	1	22.0	8.2	32.7	6.3	6.3	13.3	17.8	9.2	15.0
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS14	13:38	Surface	1	2	22.0	8.1	32.7	6.3		12.3		11.0	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS14	13:38	Middle	2	1	22.0	8.2	32.7	6.3		16.3		15.5	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS14	13:38	Middle	2	2	22.0	8.1	32.7	6.2		15.8		15.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS14	13:38	Bottom	3	1	22.0	8.2	32.7	6.3	6.3	24.6		19.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS14	13:38	Bottom	3	2	22.0	8.1	32.7	6.3		24.3		19.6	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS15	13:57	Surface	1	1	22.0	8.2	32.7	6.2	6.2	10.8	13.2	12.9	14.0
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS15	13:57	Surface	1	2	22.1	8.1	32.7	6.2		11.1		11.5	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS15	13:57	Middle	2	1	22.0	8.2	32.7	6.2		13.1		12.6	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS15	13:57	Middle	2	2	22.1	8.1	32.7	6.2		12.8		12.6	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS15	13:57	Bottom	3	1	22.0	8.2	32.7	6.3	6.3	15.7		17.1	
TMCLKL	HY/2012/08	2017/12/06	Mid-Ebb	IS15	13:57	Bottom	3	2	22.0	8.1	32.7	6.3		15.4		17.0	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	CS6	8:50	Surface	1	1	22.0	8.2	32.6	6.3	6.3	10.3	13.9	8.6	9.1
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	CS6	8:50	Surface	1	2	22.0	8.1	32.6	6.3		9.8		7.7	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	CS6	8:50	Middle	2	1	22.0	8.2	32.6	6.3		14.6		9.1	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	CS6	8:50	Middle	2	2	22.0	8.1	32.6	6.3		14.9		9.6	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	CS6	8:50	Bottom	3	1	22.0	8.2	32.6	6.2	6.2	16.8		9.8	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	CS6	8:50	Bottom	3	2	22.0	8.1	32.6	6.2		16.9		10.0	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	CS4	10:07	Surface	1	1	21.7	8.2	32.3	6.4	6.4	14.3	22.2	18.4	21.0
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	CS4	10:07	Surface	1	2	21.8	8.1	32.3	6.4		14.6		18.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	CS4	10:07	Middle	2	1	21.7	8.2	32.3	6.4		23.0		21.2	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	CS4	10:07	Middle	2	2	21.8	8.1	32.3	6.3		23.5		22.5	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	CS4	10:07	Bottom	3	1	21.8	8.2	32.4	6.3	6.3	28.9		23.3	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	CS4	10:07	Bottom	3	2	21.8	8.1	32.4	6.2		28.6		22.2	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR8	9:01	Surface	1	1	21.9	8.2	32.8	6.2	6.2	15.3	15.9	16.5	20.2
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR8	9:01	Surface	1	2	21.9	8.1	32.8	6.2		14.6		15.3	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR8	9:01	Middle	2	1									
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR8	9:01	Middle	2	2									
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR8	9:01	Bottom	3	1	21.8	8.2	32.8	6.1	6.1	16.8		24.9	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR8	9:01	Bottom	3	2	21.9	8.1	32.8	6.1		17.0		23.9	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR9	9:17	Surface	1	1	21.8	8.2	32.7	6.1	6.1	11.2	11.8	15.1	14.6
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR9	9:17	Surface	1	2	21.8	8.1	32.7	6.1		11.3		14.8	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR9	9:17	Middle	2	1									
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR9	9:17	Middle	2	2									
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR9	9:17	Bottom	3	1	21.8	8.2	32.7	6.2	6.2	12.4		14.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR9	9:17	Bottom	3	2	21.8	8.1	32.7	6.2		12.3		14.1	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR10A	8:20	Surface	1	1	21.8	8.1	32.6	6.5	6.5	13.5	15.0	16.6	19.7
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR10A	8:20	Surface	1	2	21.9	8.0	32.4	6.5		13.1		16.8	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR10A	8:20	Middle	2	1	21.8	8.1	32.6	6.5		14.9		20.7	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR10A	8:20	Middle	2	2	21.9	8.0	32.4	6.5		14.7		21.9	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR10A	8:20	Bottom	3	1	21.8	8.1	32.6	6.5	6.5	16.9		21.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	SR10A	8:20	Bottom	3	2	21.9	8.0	32.4	6.5		16.7		20.8	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS12	9:38	Surface	1	1	21.8	8.2	32.4	6.4	6.4	13.3	21.3	15.7	20.1
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS12	9:38	Surface	1	2	21.8	8.1	32.4	6.4		12.9		15.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS12	9:38	Middle	2	1	21.8	8.2	32.4	6.4		19.8		22.5	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS12	9:38	Middle	2	2	21.8	8.2	32.4	6.3		20.3		22.2	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS12	9:38	Bottom	3	1	21.8	8.2	32.4	6.4	6.4	30.8		22.0	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS12	9:38	Bottom	3	2	21.8	8.1	32.4	6.3		30.5		22.5	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS13	9:32	Surface	1	1	21.9	8.2	32.5	6.4	6.4	12.6	19.0	14.9	16.0
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS13	9:32	Surface	1	2	21.9	8.1	32.5	6.4		12.4		13.8	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS13	9:32	Middle	2	1	21.9	8.2	32.5	6.4		15.4		14.9	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS13	9:32	Middle	2	2	21.9	8.1	32.5	6.4		14.8		14.1	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS13	9:32	Bottom	3	1	21.9	8.2	32.6	6.3	6.3	29.3		19.5	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS13	9:32	Bottom	3	2	22.0	8.1	32.6	6.3		29.7		19.0	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS14	9:47	Surface	1	1	21.9	8.2	32.6	6.2	6.1	15.5	21.4	16.4	20.9
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS14	9:47	Surface	1	2	22.0	8.1	32.6	6.1		15.7		17.3	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS14	9:47	Middle	2	1	21.9	8.2	32.7	6.1		20.1		22.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS14	9:47	Middle	2	2	21.9	8.1	32.7	5.8		20.0		21.4	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS14	9:47	Bottom	3	1	21.9	8.2	32.7	5.8	5.8	28.5		24.0	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS14	9:47	Bottom	3	2	21.9	8.1	32.7	5.7		28.8		24.1	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS15	9:24	Surface	1	1	22.0	8.2	32.7	6.2	6.2	18.5	23.2	20.3	25.0
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS15	9:24	Surface	1	2	22.0	8.1	32.7	6.2		18.4		21.8	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS15	9:24	Middle	2	1	22.0	8.2	32.7	6.2		21.4		25.2	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS15	9:24	Middle	2	2	22.0	8.1	32.7	6.2		20.9		24.6	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS15	9:24	Bottom	3	1	22.0	8.2	32.7	6.2	6.2	30.2		28.5	
TMCLKL	HY/2012/08	2017/12/06	Mid-Flood	IS15	9:24	Bottom	3	2	22.0	8.1	32.7	6.2		29.6		29.6	

Email message

Environmental Resources Management

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To	ENVIRON - Hong Kong, Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Water Quality Impact Monitoring
Date	8 December 2017

Dear Sir or Madam,

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

Action Level Exceedance
0212330_8December2017_Depth-averaged SS_F_Station_SR10A
0212330_8December2017_Depth-averaged SS_F_Station_IS14
0212330_8December2017_Depth-averaged SS_F_Station_IS15

A total of three Action Level Exceedances were recorded on 8 December 2017.

Regards,

Mr Jovy Tam
Environmental Team Leader

ERM-Hong Kong, Limited

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

Marine Water Quality Impact Monitoring
Notification of Exceedance

Log No.	**0212330_8December2017_Depth-averaged SS_F_Station_SR10A** **0212330_8December2017_Depth-averaged SS_F_Station_IS14** **0212330_8December2017_Depth-averaged SS_F_Station_IS15** **[Total No. of Exceedances = 3]**	
Date	8 December 2017 (Measured) 9 December 2017(*In situ* results received by ERM) 14 December 2017 (Laboratory results received by ERM)	
Monitoring Station	CS4, CS6, SR8, SR9, SR10A, IS12, IS13, IS14, IS15	
Parameter(s) with Exceedance(s)	Depth-averaged Suspended Solids (SS, mg/L)	
Action Levels	SS	120% of upstream control station at the same tide of the same day (i.e., CS6: 10.9 x 120% = 13.1 mg/L for mid-flood; CS4: 17.8 x 120% = 21.4 mg/L for mid-ebb) and 95%-ile of baseline data (i.e., 23.5 mg/L).
Limit Levels	SS	130% of upstream control station at the same tide of the same day and 10mg/L for WSD Seawater Intakes at Tuen Mun (i.e., CS6: 10.9 x 130% = 14.2 mg/L for mid-flood; CS4: 17.8 x 130% = 23.1 mg/L for mid-ebb) and 99%-ile of baseline data. (i.e., 34.4 mg/L)
Measured Levels	Action Level Exceedance for SS is observed at SR10A (28.3 mg/L) during mid-flood tide. Action Level Exceedance for SS is observed at IS14 (27.6 mg/L) during mid-flood tide. Action Level Exceedance for SS is observed at IS15 (24.3 mg/L) during mid-flood tide.	
Works Undertaken (at the time of monitoring event)	According to the information provided by the Contractor, marine works conducted on 8 December 2017 included: • Seawall Enhancement Works at Portion N-C	
Possible Reason for Action or Limit Level Exceedance(s)	The exceedances are unlikely to be due to the Project, in view of the following: • Apart from observed exceedances, SS levels at all other monitoring stations were in compliance with the Action and Limit Levels during both mid-flood and mid-ebb tides on the same day. • No malpractice was observed during the sampling process. • Exceedance at SR10A was unlikely to be due to the marine works of this Contract as SR10A is far away from the marine works area. It is unlikely to be affected by the suspended solids, if any, generated by the marine works under this Contract. • According to the marine mammal observer, there was no seawall enhancement works at Portion N-C in the morning on 8 December 2017. Therefore, the observed exceedance at IS14 was unlikely to be due to the marine works of this Contract. • The average current flow direction during flood tide was from CS6 to CS4. The current flow direction did not favour the dispersion of suspended solids to IS15, if any, generated by the marine works under this Contract. Therefore, the observed exceedances at IS15 were unlikely to be due to the marine works of this Contract. • Depth-averaged Turbidity levels at all stations were in compliance with the Action and Limit Levels during both tides on the same day. Likewise, dissolved oxygen (DO) at all levels were also in compliance with the Action and Limit Levels in both mid-ebb and mid-flood tides.	

Actions Taken / To Be Taken	No immediate action is considered necessary. The ET will monitor for future trends in exceedances.
Remarks	The monitoring results and the locations of water quality monitoring stations are attached.

ERM

Annex A Photos taken during Water Quality Monitoring

*Note: Photos taken on 8/12/2017

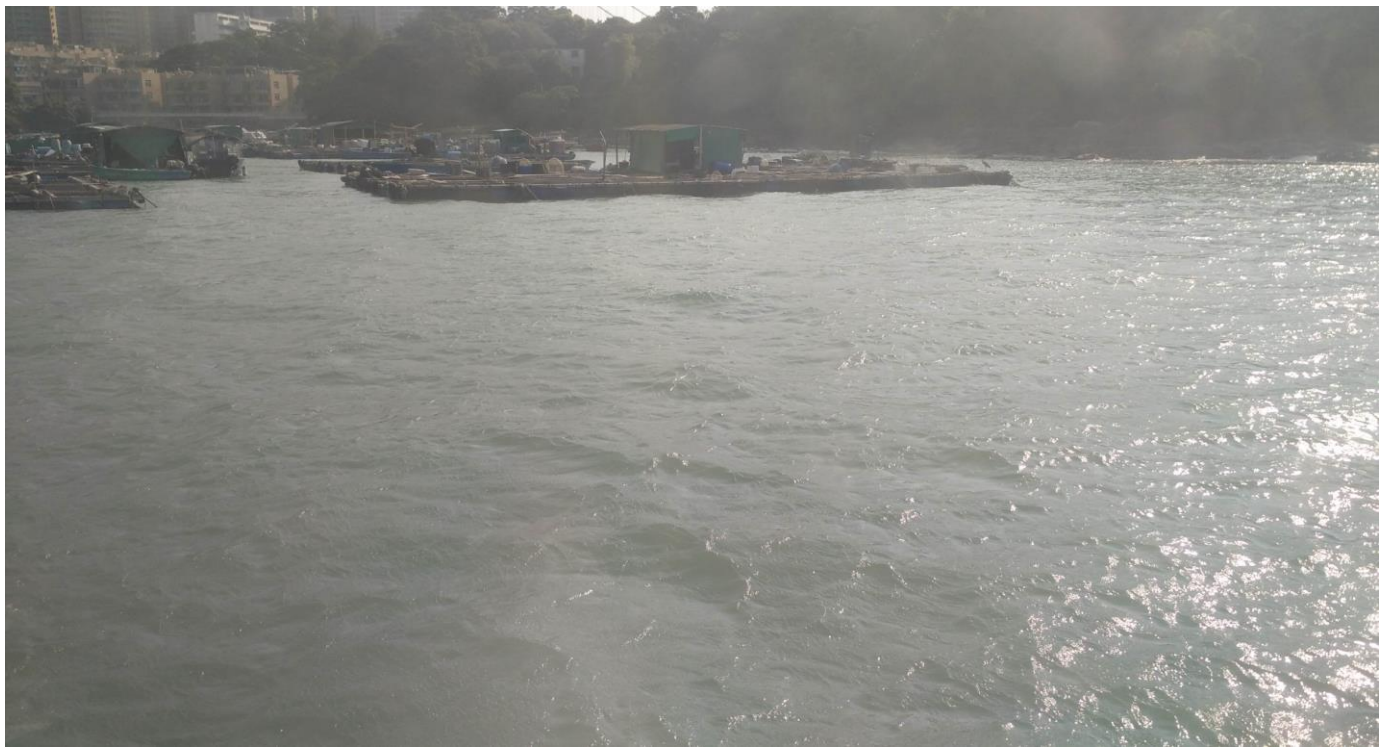
IS15 - Flood tide

IS14 - Flood tide

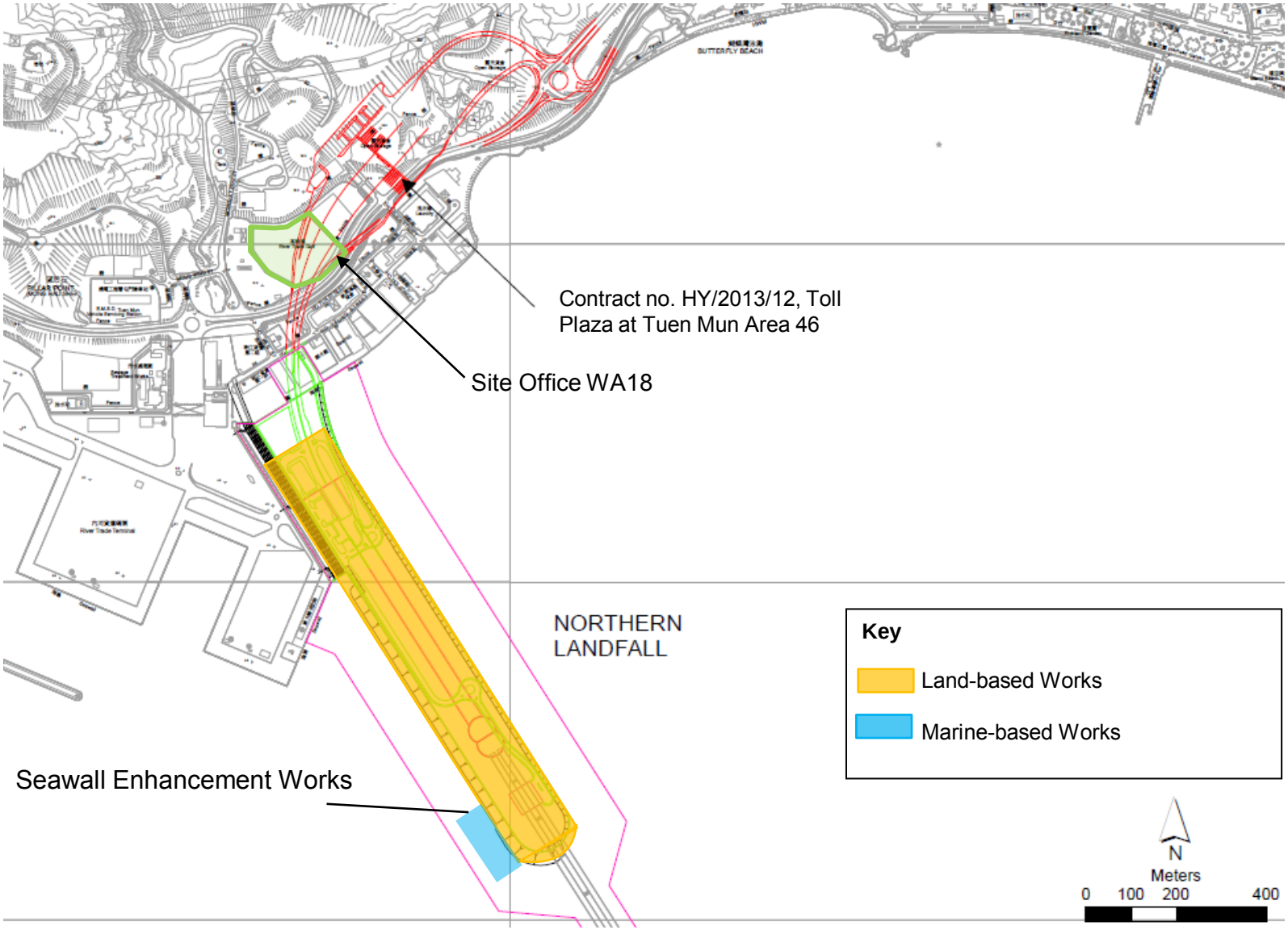
ERM

Annex A Photos taken during Water Quality Monitoring

*Note: Photos taken on 8/12/2017



SR10A - Flood tide



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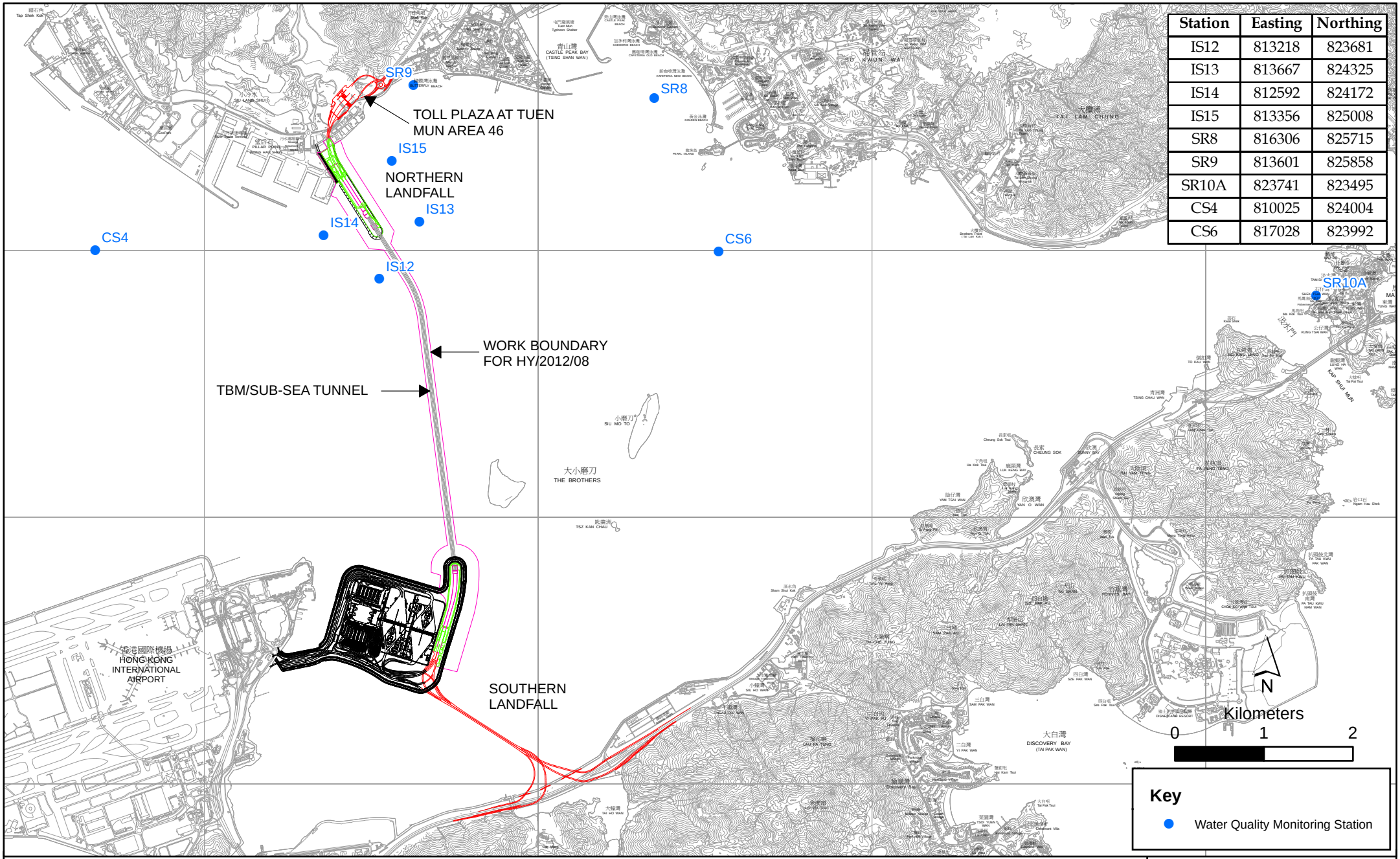

Station	Easting	Northing
IS12	813218	823681
IS13	813667	824325
IS14	812592	824172
IS15	813356	825008
SR8	816306	825715
SR9	813601	825858
SR10A	823741	823495
CS4	810025	824004
CS6	817028	823992

Figure 2.2

Water Quality Monitoring Station

File: T:\GIS\CONTRACT\0212330\Mxd\0212330_WQMS.mxd
Date: 15/11/2013

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Project	Works	Date (yyyy-mm-dd)	Tide	Station	Start Time	Level	Lev_Cod	Replicate	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average DO (mg/L)	Turbidity (NTU)	Depth-Averaged Turbidity	SS (mg/L)	Depth-Averaged SS
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	CS6	17:43	Surface	1	1	21.5	8.1	32.4	6.4	6.4	6.3	6.7	11.4	12.5
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	CS6	17:43	Surface	1	2	21.8	7.9	30.1	6.4		5.7		11.5	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	CS6	17:43	Middle	2	1	21.5	8.1	32.4	6.3		7.1		11.0	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	CS6	17:43	Middle	2	2	21.8	7.9	30.1	6.4		6.8		10.6	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	CS6	17:43	Bottom	3	1	21.6	8.1	32.4	6.3	6.4	7.4		15.7	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	CS6	17:43	Bottom	3	2	21.8	7.9	30.2	6.4		7.1		14.5	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	CS4	16:30	Surface	1	1	21.1	8.2	31.3	6.8	6.8	12.7	13.7	16.8	17.8
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	CS4	16:30	Surface	1	2	21.4	8.0	29.7	6.9		12.8		16.2	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	CS4	16:30	Middle	2	1	21.2	8.1	31.7	6.7		13.6		18.4	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	CS4	16:30	Middle	2	2	21.4	7.9	30.0	6.8		13.4		17.2	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	CS4	16:30	Bottom	3	1	21.3	8.1	31.9	6.7	6.8	14.9		19.2	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	CS4	16:30	Bottom	3	2	21.6	7.9	30.3	6.8		14.5		18.8	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR8	17:28	Surface	1	1	21.3	8.1	32.0	6.8	6.9	12.8	12.3	16.4	17.4
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR8	17:28	Surface	1	2	21.6	7.9	30.1	7.0		12.4		17.6	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR8	17:28	Middle	2	1									
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR8	17:28	Middle	2	2									
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR8	17:28	Bottom	3	1	21.3	8.1	32.0	7.1	7.2	12.2		17.7	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR8	17:28	Bottom	3	2	21.6	7.9	30.2	7.2		11.8		17.7	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR9	17:12	Surface	1	1	21.5	8.1	32.0	6.9	7.0	8.0	7.9	10.9	11.3
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR9	17:12	Surface	1	2	21.7	7.9	30.0	7.0		7.9		9.0	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR9	17:12	Middle	2	1									
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR9	17:12	Middle	2	2									
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR9	17:12	Bottom	3	1	21.5	8.1	32.0	7.0	7.1	8.0		12.7	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR9	17:12	Bottom	3	2	21.7	7.9	30.0	7.1		7.6		12.5	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR10A	17:06	Surface	1	1	21.6	8.1	32.3	6.5	6.5	3.8	3.9	11.0	12.5
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR10A	17:06	Surface	1	2	21.5	8.1	32.5	6.5		3.8		12.5	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR10A	17:06	Middle	2	1	21.6	8.1	32.3	6.5		4.1		12.5	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR10A	17:06	Middle	2	2	21.5	8.1	32.5	6.6		4.1		13.7	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR10A	17:06	Bottom	3	1	21.6	8.0	32.3	6.6	6.6	3.9		12.4	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	SR10A	17:06	Bottom	3	2	21.5	8.1	32.5	6.6		3.9		13.1	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS12	16:52	Surface	1	1	21.4	8.1	32.1	6.6	6.7	13.9	16.6	12.9	15.7
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS12	16:52	Surface	1	2	21.7	7.9	30.9	6.7		13.8		13.8	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS12	16:52	Middle	2	1	21.4	8.1	32.1	6.6		17.5		16.8	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS12	16:52	Middle	2	2	21.7	7.9	30.9	6.7		17.7		17.8	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS12	16:52	Bottom	3	1	21.4	8.1	32.1	6.6	6.7	18.2		16.6	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS12	16:52	Bottom	3	2	21.7	7.9	31.0	6.7		18.3		16.2	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS13	16:59	Surface	1	1	21.4	8.1	32.1	6.7	6.7	9.0	9.4	12.1	13.2
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS13	16:59	Surface	1	2	21.7	7.9	30.2	6.8		8.2		11.5	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS13	16:59	Middle	2	1	21.5	8.1	32.2	6.6		9.2		12.3	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS13	16:59	Middle	2	2	21.7	7.9	30.3	6.8		9.2		11.4	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS13	16:59	Bottom	3	1	21.5	8.1	32.2	6.7	6.8	10.2		15.6	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS13	16:59	Bottom	3	2	21.7	7.9	30.5	6.9		10.8		16.1	

Project	Works	Date (yyyy-mm-dd)	Tide	Station	Start Time	Level	Lev_Cod	Replicate	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average DO (mg/L)	Turbidity (NTU)	Depth-Averaged Turbidity	SS (mg/L)	Depth-Averaged SS
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS14	16:46	Surface	1	1	21.4	8.1	32.1	6.6		9.8		14.2	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS14	16:46	Surface	1	2	21.7	7.9	30.9	6.7	6.6	9.3		13.4	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS14	16:46	Middle	2	1	21.5	8.1	32.2	6.5		14.3	15.3	14.4	14.7
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS14	16:46	Middle	2	2	21.7	7.9	31.0	6.6		14.2		14.0	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS14	16:46	Bottom	3	1	21.5	8.1	32.3	6.5	6.6	21.6		16.9	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS14	16:46	Bottom	3	2	21.8	7.9	31.1	6.6		22.8		15.4	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS15	17:05	Surface	1	1	21.4	8.1	32.0	6.8		7.4		10.8	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS15	17:05	Surface	1	2	21.6	7.9	30.0	6.9	6.9	6.7		9.0	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS15	17:05	Middle	2	1	21.4	8.1	32.0	6.8		8.5	8.1	11.8	12.5
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS15	17:05	Middle	2	2	21.7	7.9	30.1	6.9		7.8		11.0	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS15	17:05	Bottom	3	1	21.5	8.1	32.0	6.9	7.0	9.4		15.9	
TMCLKL	HY/2012/08	2017/12/08	Mid-Ebb	IS15	17:05	Bottom	3	2	21.7	7.9	30.2	7.0		8.9		16.5	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	CS6	9:54	Surface	1	1	21.4	8.1	31.8	6.7		9.8		9.3	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	CS6	9:54	Surface	1	2	21.7	7.9	30.0	6.8	6.7	8.6		8.9	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	CS6	9:54	Middle	2	1	21.4	8.1	31.8	6.6		12.4	14.6	11.4	10.9
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	CS6	9:54	Middle	2	2	21.7	7.9	29.9	6.7		12.5		11.7	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	CS6	9:54	Bottom	3	1	21.4	8.1	32.0	6.6	6.7	22.2		11.7	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	CS6	9:54	Bottom	3	2	21.7	7.9	30.1	6.7		22.3		12.6	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	CS4	11:04	Surface	1	1	21.3	8.1	31.5	6.7		16.9		22.4	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	CS4	11:04	Surface	1	2	21.5	7.9	30.4	6.7	6.7	16.8		21.6	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	CS4	11:04	Middle	2	1	21.3	8.1	31.5	6.6		19.7	20.5	22.2	22.4
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	CS4	11:04	Middle	2	2	21.5	7.9	30.4	6.7		20.7		22.2	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	CS4	11:04	Bottom	3	1	21.3	8.1	31.6	6.6	6.7	24.5		23.3	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	CS4	11:04	Bottom	3	2	21.6	7.9	30.5	6.7		24.5		22.6	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR8	10:06	Surface	1	1	21.3	8.2	32.1	6.7		15.3		15.9	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR8	10:06	Surface	1	2	21.6	8.1	30.9	6.8	6.8	15.5		16.0	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR8	10:06	Middle	2	1							15.8		17.3
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR8	10:06	Middle	2	2									
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR8	10:06	Bottom	3	1	21.3	8.2	32.1	6.8	6.8	15.9		18.8	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR8	10:06	Bottom	3	2	21.6	8.1	30.9	6.8		16.5		18.3	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR9	10:21	Surface	1	1	21.4	8.1	32.2	6.6		11.8		14.5	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR9	10:21	Surface	1	2	21.6	7.9	31.0	6.6	6.6	11.9		14.6	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR9	10:21	Middle	2	1							11.0		15.4
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR9	10:21	Middle	2	2									
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR9	10:21	Bottom	3	1	21.4	8.1	32.2	6.7	6.8	10.7		16.6	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR9	10:21	Bottom	3	2	21.7	7.9	31.1	6.8		9.6		15.7	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR10A	9:48	Surface	1	1	21.5	8.1	32.0	6.7		11.6		25.7	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR10A	9:48	Surface	1	2	21.4	8.1	32.2	6.7	6.7	10.0		24.9	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR10A	9:48	Middle	2	1	21.5	8.1	32.0	6.7		11.9	10.9	29.1	28.3
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR10A	9:48	Middle	2	2	21.4	8.1	32.2	6.7		10.0		30.3	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR10A	9:48	Bottom	3	1	21.5	8.1	32.0	6.7	6.7	11.8		29.4	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	SR10A	9:48	Bottom	3	2	21.4	8.1	32.2	6.7		10.1		30.3	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS12	10:39	Surface	1	1	21.5	8.1	31.8	6.7		11.8		15.4	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS12	10:39	Surface	1	2	21.7	7.9	30.6	6.7	6.7	11.5		16.0	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS12	10:39	Middle	2	1	21.5	8.1	31.8	6.6		15.4	17.2	17.8	17.2
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS12	10:39	Middle	2	2	21.7	7.9	30.7	6.7		15.5		18.4	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS12	10:39	Bottom	3	1	21.5	8.1	31.8	6.6	6.7	25.3		17.1	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS12	10:39	Bottom	3	2	21.7	7.9	30.7	6.7		23.8		18.3	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS13	10:33	Surface	1	1	21.5	8.1	31.9	6.7		15.3		19.7	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS13	10:33	Surface	1	2	21.8	7.9	30.7	6.7	6.7	14.8		18.7	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS13	10:33	Middle	2	1	21.5	8.1	31.9	6.7		17.6	18.2	18.0	20.3
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS13	10:33	Middle	2	2	21.7	7.9	30.8	6.8		18.5		18.9	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS13	10:33	Bottom	3	1	21.4	8.1	31.9	6.7	6.8	21.4		22.7	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS13	10:33	Bottom	3	2	21.7	7.9	30.9	6.8		21.8		23.6	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS14	10:46	Surface	1	1	21.4	8.1	32.0	6.6		17.9		26.3	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS14	10:46	Surface	1	2	21.7	7.9	30.9	6.7	6.6	17.6		25.0	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS14	10:46	Middle	2	1	21.4	8.1	32.0	6.6		20.1	20.8	27.6	27.6
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS14	10:46	Middle	2	2	21.7	7.9	30.9	6.6		19.8		27.3	

Project	Works	Date (yyyy-mm-dd)	Tide	Station	Start Time	Level	Lev_Cod	Replicate	Temperature (°C)	pH	Salinity (ppt)	DO (mg/L)	Average DO (mg/L)	Turbidity (NTU)	Depth-Averaged Turbidity	SS (mg/L)	Depth-Averaged SS
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS14	10:46	Bottom	3	1	21.4	8.1	32.1	6.6	6.7	24.7		29.6	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS14	10:46	Bottom	3	2	21.7	7.9	31.0	6.7		24.5		30.0	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS15	10:27	Surface	1	1	21.4	8.2	32.1	6.6	6.6	18.1	20.8	22.1	24.3
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS15	10:27	Surface	1	2	21.7	8.1	31.0	6.6		18.7		22.0	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS15	10:27	Middle	2	1	21.4	8.1	32.1	6.5		21.7		25.3	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS15	10:27	Middle	2	2	21.6	7.9	31.0	6.6		22.4		25.1	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS15	10:27	Bottom	3	1	21.4	8.1	32.1	6.6	6.7	21.4		25.9	
TMCLKL	HY/2012/08	2017/12/08	Mid-Flood	IS15	10:27	Bottom	3	2	21.6	7.9	31.0	6.7		22.5		25.1	

Note:

Indicates Ex 2017/11/01

Indicates Ex 2017/11/01

Email message

Environmental Resources Management

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To	Ramboll Hong Kong, Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Impact Dolphin Monitoring
Date	15 June 2018

ERM

Dear Sir or Madam,

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

0212330_Dec2017/Feb2018_dolphin_STG&ANI_NEL&NWL

A total of two action level exceedances were recorded in the quarterly impact dolphin monitoring data between December 2017 and February 2018.

Regards,

Mr Jovy Tam
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_ Dec2017/Feb2018_dolphin_STG&ANI_NEL&NWL** **[Total No. of Exceedances = 2 Action Level Exceedance]**	
Date	December 2017 to February 2018 (monitored) 19 June 2018 (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 = 4.75 & ANI = 15.73
	Two Action Level Exceedances were recorded in the quarterly impact dolphin monitoring at NEL and NWL between December 2017 and February 2018. The exceedance was reported in the approved *Fifty-second Monthly EM&A Report* dated 13 March 2018.	
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 2017 to February 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 present impact monitoring quarter. By setting $\alpha = 0.05$ as the significance level in the statistical tests, significant differences in STG ($p = 0.0127$) and ANI ($p = 0.0470$) 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 August 2017) 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 2017 and February 2018, marine based works were carried out. Seawall Construction and Filling works was carried out at Portion N-A. Seawall Enhancement works was carried out at Portion N-C.	

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 (2016 – 17)* (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. Seawall enhancement works and the seawall construction and filling works were completed on 19 December 2017. 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 2017 and February 2018, there were four (4) Action Level of Suspended Solids (SS) exceedances for water quality impact monitoring in the reporting period. The exceedances were considered not related to this Contract upon further investigation and the investigation report is presented in *Appendix J* of the 17th Quarterly EM&A report. 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.

(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

Actions Taken / To Be Taken	In the quarter between December 2017 and February 2018, marine based works were carried out. Seawall Construction and Filling works was carried out at Portion N-A. Seawall Enhancement works was carried out at Portion N-C. Below are the mitigation measures implemented by the Contractor throughout the marine works period, including: 1. 250m dolphin exclusion zone; 2. Acoustic decoupling plan; 3. Training to workers; 4. Marine Travel Route Plan 5. Idling and mooring of working vessels within site boundary 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 7 March 2018 for discussion on CWD trend, with attendance of ENPO, Representatives of Resident Site Staff (RSS), Representatives of Environmental Teams (ETs) for Contract No. HY/2013/01, HY/2011/03, HY/2011/09, HY/2012/07 and HY/2012/08. The discussion/recommendation as recorded in the minutes of 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. ENPO presented the interim CWD survey results in mainland waters obtained from Hong Kong-Zhuhai-Macao Bridge Authority that some CWDs that previously more often sighted in Hong Kong waters have expanded their ranges into mainland waters, and some with reduced usage in Hong Kong waters, while they are partially accounted for the local decline. 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. The ETs were also reminded to update the Brothers Marine Park (BMP) boundary in the Regular Marine Travel Route Plan. 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 *Fiftieth* to *Fifty-second Monthly EM&A Reports*.

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

ENVIRONMENTAL COMPLAINT/ENQUIRY INVESTIGATION REPORT

Our Reference: 0212330_Complaint LOG_20180130_15

Basic Information of Complaint/Enquiry

Reference Number:	Not disclosed
Date of Complaint/Enquiry Received	30/1/2018
Location of Complaint/Enquiry	Tuen Mun Pier
Nature of Complaint/Enquiry	Air, noise and light pollution
Complaint/Enquiry Received by	EPD
Via	Email
Complainant/Enquirer	Not disclosed

Details of Complaint/Enquiry

On 30 January 2018, a complaint case regarding noise and light pollution at midnight and air pollution in daylight hours from the River Trade Terminal and Northern Landfall of Tuen Mun - Chek Lap Kok Link (TMCLKL) opposite Tuen Mun Pier was received by EPD.

The complainant enquiries:

1. Why there was construction works at 12:00am and from 3:00am to 5:00am?
2. The noise before 11:00pm.
3. The extensive lighting at early morning.
4. No water spraying was applied and dust was dispersed to Tuen Mun Pier
5. Barges causing dust impact at Tuen Mun Pier.

The SOR, the Environmental Team (ET) and the Contractor (DBJV) received the complaint notification from IEC on 30 January 2018.

Investigation Report

Upon receiving the case notification from IEC on 30 January 2018, the Contractor had promptly checked the construction schedule at Northern Landfall of January 2018.

During daylight hours, the major ground construction works carried out were Box Culvert Extension at Portion N-A and Construction of Ventilation Building at Portion N-C. During night-time and mid-night hours, there were no ground construction works.

Joint site investigation was conducted with IEC and SOR at 9: 30 am on 31 January 2018. No dust impact was observed. 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). Night-time inspection on 1 February 2018 was carried out by ET at the site and Tuen Mun Pier to investigate the noise impact and light pollution problem. No significant noise impact was observed. Consider the distance between the site and Tuen Mun Pier (Around 2km), the residents near Tuen Mun Pier are not likely to be affected by the noise, if any, generated by the construction activities on site. The construction activities were also complied with the conditions specified in the Construction Noise Permit. Night-time lighting was observed. Photo record of the inspection is provided in Annex A.

According to the Contractor, night-time lighting is essential to illuminate the main access road in order to provide a safe and efficient working environment for the site staff. Traffic routes within the site were also illuminated for the transportation of construction materials. As there was no ground construction works at night-time, noise impact was not expected and was not observed during the inspection. The Contractor also reported that they have only one barge working at daylight hours near the site which is responsible for the transportation of C&D wastes. Most barges near the site are not working under this Contract. Photo record is provided in Annex A.

Based on the above, the complaint is not valid.

Mitigation Measures and Follow-Up Actions Recommended to/ Undertaken by Contractor

The Contractor has been reminded to implement all relevant mitigation measures of light impact to avoid causing visual impact.

The following mitigation measures have been implemented by the Contractor to minimize the light pollution and visual impact during night-time:

1. All lights shall not project skyward. For those lighting that may spill out into the sky, they should be capped at the top to avoid causing glare.

2. Avoid over-illumination. Trim down any unnecessary lighting on site.

3. All lighting should be directed to the site only.

4. Brief the frontline staff to switch off unnecessary lighting on site.

The Contractor are also recommended to fit caps at the lightings at STP to restrict the direction of beam and area of illumination and adopt soft roadside light.

The Contractor has been reminded to adhere strictly to implement all relevant mitigation measures of air quality impact recommended or specified in the EP (EP-354/2009/D), the approved EIA and Updated EM&A Manual to avoid causing dust impact:

1. Watering to maintain all exposed road surfaces and dust sources wet.

2. Use of wheel washing facilities.

3. Use of sprinklers for water spraying.

4. Materials having the potential to create dust covered by a clean tarpaulin.

5. use of water truck and watering on all exposed soil within the Project site

The Contractor has also been reminded to comply with the conditions specified in the Construction Noise Permit.

Date of File Closed : 14 February 2018

Approved and Filed by:

(Jovy Tam, ET Leader)
Date: 14 February 2018

ERM

Annex A Photo taken during the site inspection on 31 January 2018

Direction of the lighting at STP is adjusted towards the ground.

Direction of the lighting at STP is adjusted towards the ground.

ERM

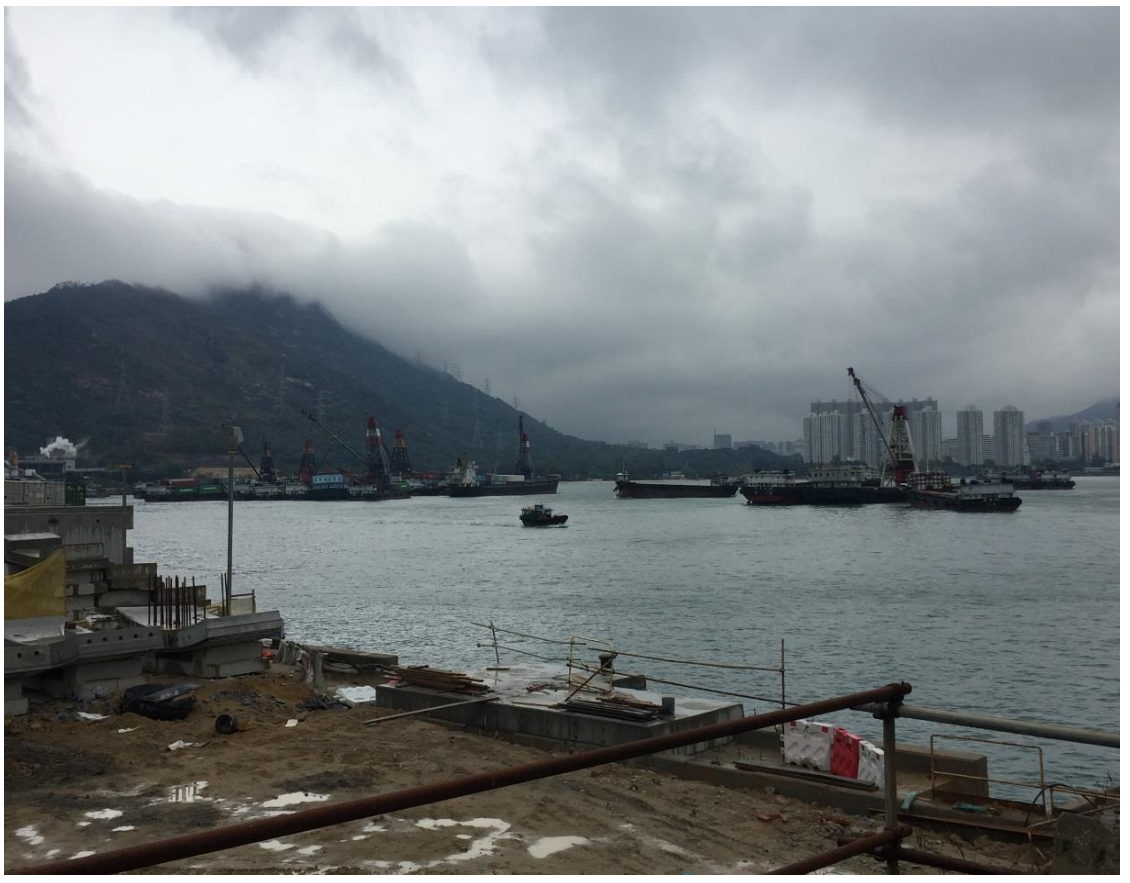
Annex A Photo taken during the site inspection on 31 January 2018

Water spraying is applied.

Exposed soil is covered by tarpaulin sheets

ERM

Annex A Photo taken during the site inspection on 31 January 2018



Barges not under this Contract are observed near the site

Barges not under this Contract are observed near the site

ERM

Annex A Photo taken during the site inspection on 31 January 2018

Barge for transportation of C&D material

ERM

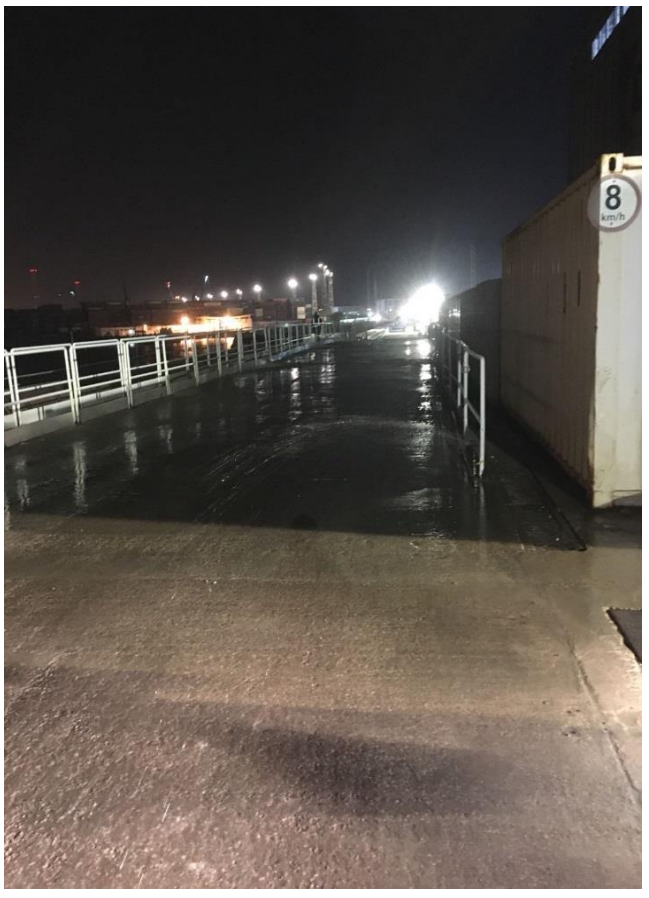
Annex A Photo taken during the site inspection on 1 February 2018

View of the site from Tuen Mun Pier

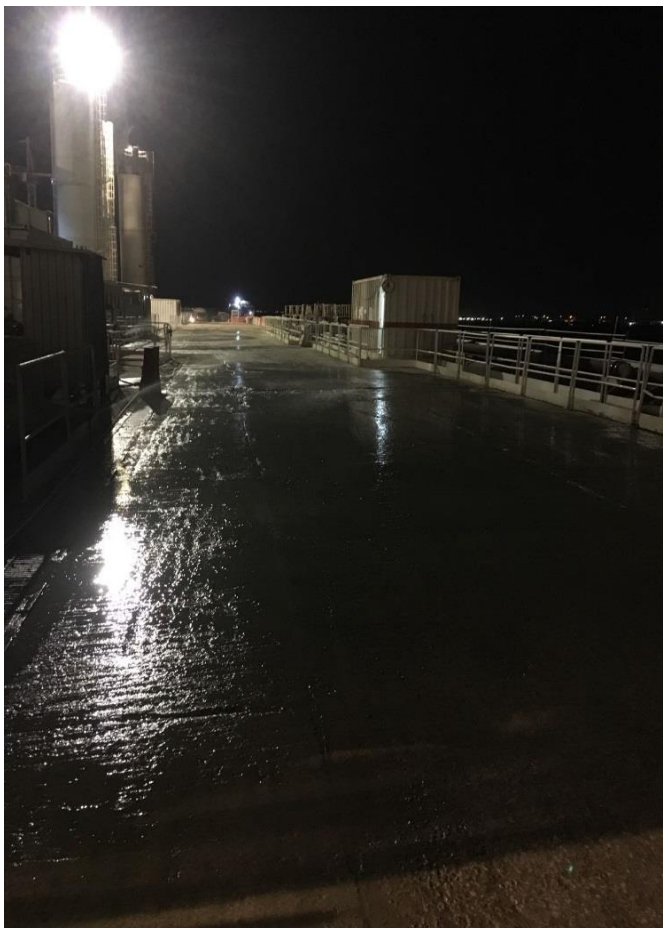
View of the site from Tuen Mun Pier

ERM

Annex A Photo taken during the site inspection on 1 February 2018



Site conditions at night-time



Site conditions at night-time

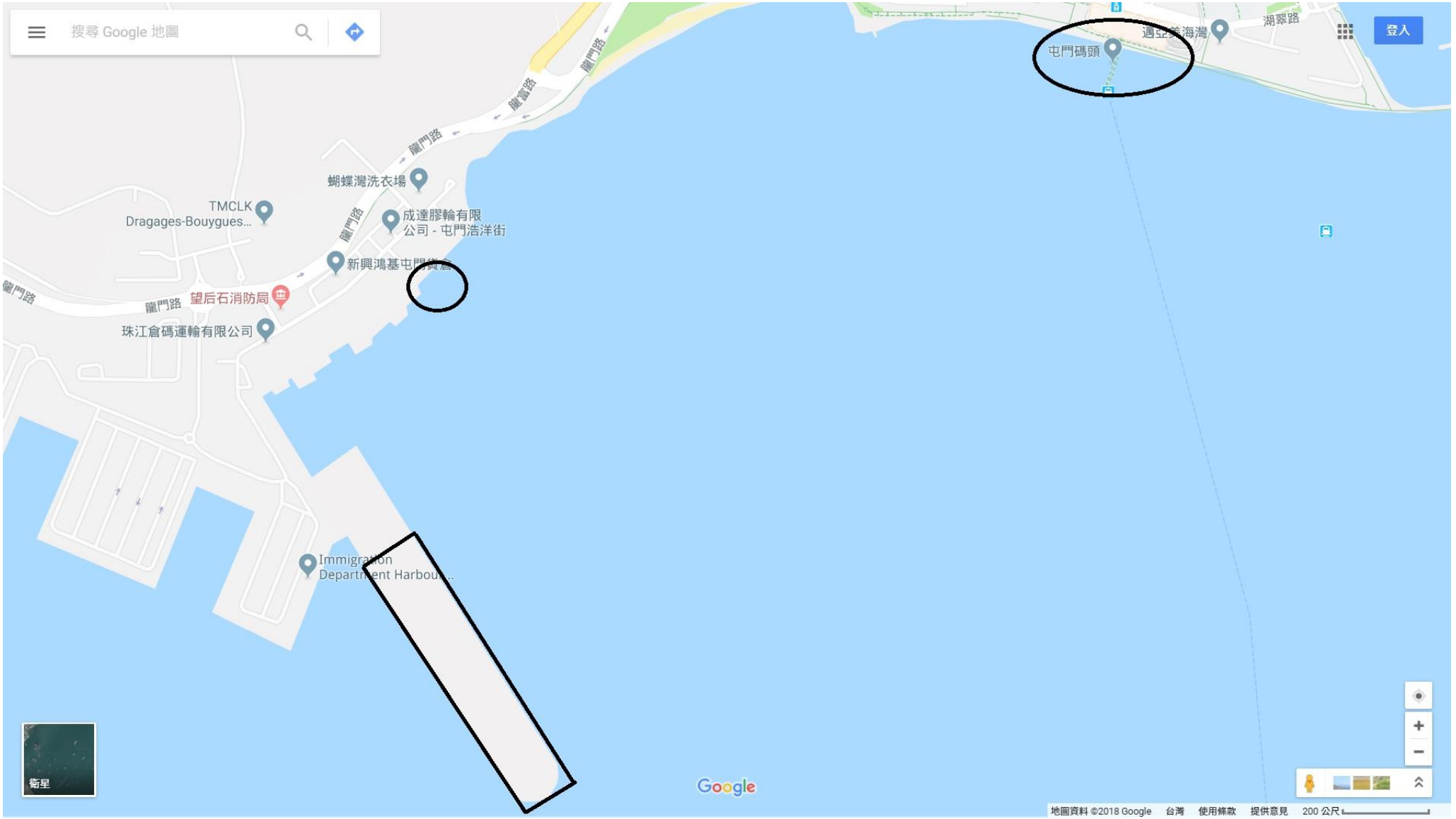
ERM

Annex A Photo taken during the site inspection on 14 February 2018

Lighting at the main site access

Lighting at the main site access

Lighting at the main site access



Location of night-time inspection

Environmental
Resources
Management

ERM

Distance between the site and Tuen Mun Pier

Environmental Resources Management

ERM

Dragages Hong Kong / Bouygues Travaux Publics — 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: 29 Jan 2018 to 至 04 Feb 2018

	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。

Appendix K

Waste Flow Table

Monthly Summary Waste Flow Table

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

Monthly Summary Waste Flow Table for December 2017 [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	1097.465	0.000	0.000	0.000	1097.465
Jan-2017	60.781	0.000	0.000	0.000	60.781
Feb-2017	17.367	0.000	0.000	0.000	17.367
Mar-2017	7.508	0.000	0.000	0.000	7.508
Apr-2017	15.603	0.000	0.000	0.000	15.603
May-2017	12.358	0.000	0.000	0.000	12.358
Jun-2017	0.194	0.000	0.000	0.000	0.194
Half Year Sub-total	113.811	0.000	0.000	0.000	113.811
Jul-2017	0.652	0.000	0.000	0.000	0.652
Aug-2017	1.624	0.000	0.000	0.000	1.624
Sep-2017	0.886	0.000	0.000	0.000	0.886
Oct-2017	0.706	0.000	0.000	0.000	0.706
Nov-2017	3.259	0.000	0.000	0.000	3.259
Dec-2017	3.574	0.000	0.000	0.000	3.574
Project Total Quantities	1221.977	0.000	0.000	0.000	1221.977

Month	**Actual Quantities of <u>Non-inert</u> 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	1.850	1.850	3.150	3.150	6.870	6.870	9.450	9.450	4.935
Jan-2017	0.000	0.000	0.000	0.000	0.000	0.000	3.400	3.400	0.257
Feb-2017	0.000	0.000	0.200	0.200	0.000	0.000	0.000	0.000	0.340
Mar-2017	0.000	0.000	0.000	0.000	0.000	0.000	6.100	6.100	0.286
Apr-2017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.237
May-2017	0.000	0.000	0.000	0.000	0.000	0.000	10.400	10.400	0.300
Jun-2017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.317
Half Year Sub-total	0.000	0.000	0.200	0.200	0.000	0.000	19.900	19.900	1.737
Jul-2017	0.000	0.000	0.200	0.200	0.000	0.000	0.000	0.000	0.272
Aug-2017	141.990	141.990	0.200	0.200	0.000	0.000	0.000	0.000	0.305
Sep-2017	0.000	0.000	0.200	0.200	0.000	0.000	0.000	0.000	0.300
Oct-2017	132.270	132.270	0.000	0.000	0.000	0.000	0.000	0.000	0.244
Nov-2017	343.270	343.270	0.200	0.200	0.000	0.000	3.800	3.800	0.345
Dec-2017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.121
Project Total Quantities	619.380	619.380	4.150	4.150	6.870	6.870	33.150	33.150	7.914

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)
3.000	0.000	0.000	0.000	3.000

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)
50.000	0.000	0.000	0.000	0.200

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 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	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					
Apr-2018					
May-2018					
Jun-2018					
Half Year Sub-total					
Jul-2018					
Aug-2018					
Sep-2018					
Oct-2018					
Nov-2018					
Dec-2018					
Project Total Quantities	1230.904	0.000	0.000	0.000	1230.904

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	619.380	619.380	4.150	4.150	6.870	6.870	33.150	33.150	8.259
Jan-2018	0.000	0.000	0.200	0.200	0.000	0.000	2.800	2.800	0.272
Feb-2018	0.000	0.000	0.200	0.200	0.000	0.000	0.000	0.000	0.258
Mar-2018									
Apr-2018									
May-2018									
Jun-2018									
Half Year Sub-total									
Jul-2018									
Aug-2018									
Sep-2018									
Oct-2018									
Nov-2018									
Dec-2018									
Project Total Quantities	619.380	619.380	4.350	4.350	6.870	6.870	35.950	35.950	8.789

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)
2.000	0.000	0.000	0.000	2.000

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)
50.000	0.000	0.000	0.000	0.200

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).