

**Contract No. HY/2012/07  
Tuen Mun – Chek Lap Kok Link –  
Southern Connection Viaduct Section**

***Thirteenth Quarterly Environmental Monitoring  
& Audit (EM&A) Report***

26 October 2017

**Environmental Resources Management**  
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25 Westlands Road  
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Telephone 2271 3000  
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*www.erm.com*

# Contract No. HY/2012/07





## Tuen Mun – Chek Lap Kok Link – Southern Connection Viaduct Section

**Environmental Resources Management**

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*Thirteenth Quarterly Environmental Monitoring & Audit (EM&A) Report*

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Client:  Gammon		Project No:  0215660			
Summary:  This document presents the Thirteenth Quarterly EM&A Report for Tuen Mun – Chek Lap Kok Link Southern Connection Viaduct Section.		Date: 26 October 2017			
		Approved by:  			
		Mr Craig Reid Partner			
		Certified by:  			
		Mr Jovy Tam ET Leader			
	13 <sup>th</sup> Quarterly EM&A Report	VAR	JT	CAR	26/10/17
Revision	Description	By	Checked	Approved	Date
<p>This report has been prepared by Environmental Resources Management the trading name of 'ERM Hong-Kong, Limited', with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.</p> <p>We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.</p>		<p>Distribution</p> <p><input type="checkbox"/> Internal</p> <p><input checked="" type="checkbox"/> Public</p> <p><input type="checkbox"/> Confidential</p>			
		 			

Ref.: HYDHZMBEEM00\_0\_5941L.17

27 October 2017

AECOM  
Supervising Officer's Representative's Office  
780 Cheung Tung Road, Lantau, N.T.

By Fax (3691 2899) and By Post

Attention: Mr. Daniel Ip

Dear Mr. Ip,

**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/2012/07 TM-CLKL Southern Connection Viaduct  
Section  
13th Quarterly EM&A Summary Report (Dec. 2016 to Feb. 2017)**

Reference is made to the 13th Quarterly Environmental Monitoring and Audit (EM&A) Report (December 2016 to February 2017) (ET's ref.: "0215660\_13th Qtr EM&A\_20171026.doc" dated 26 October 2017) certified by the ET Leader and provided to us via e-mail on 26 October 2017.

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. Vico Cheung (By Fax: 3188 6614)  
AECOM – Mr. Conrad Ng (By Fax: 3922 9797)  
ERM – Mr. Jovy Tam (By Fax: 2723 5660)  
Gammon – Mr. Roy Leung (By Fax: 3520 0486)

Internal: DY, YH, ENPO Site

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## EXECUTIVE SUMMARY

Under *Contract No. HY/2012/07*, Gammon Construction Limited (GCL) is commissioned by the Highways Department (HyD) to undertake the design and construction of the Southern Connection Viaduct 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). Ramboll Environ Hong Kong Ltd. was employed by the HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO) in accordance with *Environmental Permit No. EP-354/2009/A*. Further applications for variation of environmental permit (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 southern landfall of TM-CLK Link lies alongside the Hong Kong - Zhuhai - Macao Bridge Hong Kong Boundary Crossing Facilities (HKBCF) where a reclamation area is constructed by *Contract No. HY/2010/02* under *Environmental Permit No. EP-353/2009/K* and *EP-354/2009/D*. Upon the agreement and confirmation between the Supervising Officer Representatives and Contractors of *HY/2010/02* and *HY/2012/07* in September 2015, part of the reclamation area for southern landfall under *EP-353/2009/K* and *EP-354/2009/D* was handed-over to *Contract No. HY/2012/07*. Another part of the southern landfall area under *EP-354/2009/D* was handed-over to *Contract No. HY/2012/07* after completion of reclamation works by *Contract No. HY/2010/02* in June 2016.

The construction phase of the Contract commenced on 31 October 2013 and will be tentatively completed by 2018. The impact monitoring of the EM&A programme, including air quality, noise, water quality and marine ecological monitoring as well as environmental site inspections, commenced on 31 October 2013.

This is the Thirteenth Quarterly EM&A Report presenting the EM&A works carried out during the period from 1 December 2016 to 28 February 2017 for the Southern Connection Viaduct Section in accordance with the Updated EM&A Manual of the TM-CLK Link Project. As informed by the Contractor, major activities in the reporting period included:

### December 2016

#### *Marine Works*

- Uninstallation of marine piling platform;
- Pier construction;

- Launching gantry operation; and
- Installation of deck segment and pier head segment.

#### *Land-based Works*

- Pier construction;
- Re-alignment of Cheung Tung Road;
- Road works along North Lantau Highway;
- Installation of pier head and deck segments; and
- Slope work of Viaducts A, B & C.

#### January 2017

#### *Marine Works*

- Uninstallation of marine piling platform;
- Pier construction;
- Launching gantry operation; and
- Installation of deck segment and pier head segment.

#### *Land-based Works*

- Pier construction;
- Re-alignment of Cheung Tung Road;
- Road works along North Lantau Highway;
- Installation of pier head and deck segments; and
- Slope work of Viaducts A, B & C.

#### February 2017

#### *Marine Works*

- Uninstallation of marine piling platform;
- Pier construction;
- Launching gantry operation; and
- Installation of deck segment and pier head segment.

#### *Land-based Works*

- Pier construction;

- Re-alignment of Cheung Tung Road;
- Road works along North Lantau Highway;
- Installation of pier head and deck segments; and
- Slope work of Viaducts A, B & C.

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

24-hour TSP monitoring	17 sessions
1-hour TSP monitoring	17 sessions
Noise monitoring	17 sessions
Water quality monitoring	37 sessions
Dolphin monitoring	6 sessions
Joint Environmental site inspection	13 sessions

#### **Breaches of Action and Limit Levels for Air Quality**

No exceedance of Action and Limit Levels was recorded for air quality monitoring in the reporting period.

#### **Breaches of Action and Limit Levels for Noise**

No exceedance of Action and Limit Levels was recorded for construction noise monitoring in the reporting period.

#### **Breaches of Action and Limit Levels for Water Quality**

No exceedance of Action and Limit Levels was recorded for water quality monitoring in the reporting period.

#### **Impact Dolphin Monitoring**

One (1) Limit Level exceedance was observed for the quarterly dolphin monitoring data between December 2016 and February 2017. No unacceptable impact from the construction activities of the TM-CLKL Southern Connection Viaduct Section on Indo-Pacific humpback dolphin *Sousa chinensis* (i.e. Chinese White Dolphins) was noticeable from general observations during the dolphin monitoring in this reporting quarter. The exceedance is considered unlikely due to the works of this Project upon further investigation.

Daily marine mammal exclusion zone monitoring was undertaken during the period of marine works under this Contract. No Passive Acoustic Monitoring (PAM) was implemented as the marine piling works were not carried out outside the daylight hours in this reporting period. No sighting of the

Chinese White Dolphin was recorded in the monitoring period during the exclusion zone monitoring.

### **Environmental Complaints, Non-compliance & Summons**

There were two (2) complaints received in the reporting period. One complaint was received from EPD on 13 December 2016 regarding hammering noise nuisance generated during midnights in the reporting period. Another complaint was received from EPD on 13 January 2017 regarding constructional vessels and silt curtain found within the boundary of Brothers Marine Park in the reporting period. Upon investigation, the two complaints are considered not related to this Project.

### **Reporting Change**

There was no reporting change in this reporting period.

### **Upcoming Works for the Next Reporting Period**

Works to be undertaken in the coming quarter include the following:

#### March 2017

##### *Marine Works*

- Uninstallation of marine piling platform;
- Pier construction;
- Launching gantry operation; and
- Installation of deck segment and pier head segment.

##### *Land-based Works*

- Pier construction;
- Re-alignment of Cheung Tung Road;
- Road works along North Lantau Highway;
- Installation of pier head and deck segments; and
- Slope work of Viaducts A, B & C.

#### April 2017

##### *Marine Works*

- Uninstallation of marine piling platform;
- Pier construction;



- Launching gantry operation; and
- Installation of deck segment and pier head segment.

***Land-based Works***

- Pier construction;
- Re-alignment of Cheung Tung Road;
- Road works along North Lantau Highway;
- Installation of pier head and deck segments; and
- Slope work of Viaducts A, B & C.

May 2017

***Marine Works***

- Uninstallation of marine piling platform;
- Pier construction;
- Launching gantry operation; and
- Installation of deck segment and pier head segment.

***Land-based Works***

- Pier construction;
- Re-alignment of Cheung Tung Road;
- Road works along North Lantau Highway;
- Installation of pier head and deck segments; and
- Slope work of Viaducts A, B & C.

**Future Key Issues**

Potential environmental impacts arising from the above upcoming construction activities in the coming quarterly period are mainly associated with air quality, noise, marine water quality, marine ecology and waste management issue.

## 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 (EP-354/2009A) was issued on 8 December 2010. Further applications for variation of environmental permit (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/2012/07*, Gammon Construction Limited (GCL) is commissioned by the Highways Department (HyD) to undertake the design and construction of the Southern Connection Viaduct Section of TM-CLKL ("the Contract") 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). Ramboll Environ Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO) in accordance with *Environmental Permit No. EP-354/2009/A*.

The southern landfall of TM-CLK Link lies alongside the Hong Kong - Zhuhai - Macao Bridge Hong Kong Boundary Crossing Facilities (HKBCF) where a reclamation area is constructed by *Contract No. HY/2010/02* under *Environmental Permit No. EP-353/2009/K* and *EP-354/2009/D*. Upon the agreement and confirmation between the Supervising Officer Representatives and Contractors of *HY/2010/02* and *HY/2012/07* in September 2015, part of the reclamation area for southern landfall under *EP-353/2009/K* and *EP-354/2009/D* was handed-over to *Contract No. HY/2012/07*. Another part of the

southern landfall area under *EP-354/2009/D* was handed-over to *Contract No. HY/2012/07* after completion of reclamation works by *Contract No. HY/2010/02* in June 2016.

The construction phase of the Contract commenced on 31 October 2013 and will be tentatively be completed by 2018. The impact monitoring phase of the EM&A programme, including air quality, noise, water quality and marine ecological monitoring as well environmental site inspections, commenced on 31 October 2013.

The general layout plan of the Contract components is presented in *Figures 1.1 & 1.2a to l*.

## 1.2 SCOPE OF REPORT

This is the Thirteenth Quarterly EM&A Report under the *Contract No. HY/2012/07 Tuen Mun – Chek Lap Kok Link – Southern Connection Viaduct Section*. This report presents a summary of the environmental monitoring and audit works from 1 December 2016 to 28 February 2017.

## 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
SOR (AECOM Asia Company Limited)	Chief Resident Engineer	Daniel Ip	3553 3800	2492 2057
	Resident Engineer	Kingman Chan	3691 3950	3691 2899
ENPO / IEC (Ramboll Environ Hong Kong Ltd.)	ENPO Leader	Y.H. Hui	3465 2850	3465 2899
	IEC	Dr. F.C. Tsang	3465 2851	3465 2899
Contractor (Gammon Construction Limited)	Environmental Manager	Brian Kam	3520 0387	3520 0486
	Environmental Officer	Roy Leung	3520 0387	3520 0486
	24-hour Complaint Hotline		9738 4332	
ET (ERM-HK)	ET Leader	Jovy Tam	2271 3113	2723 5660

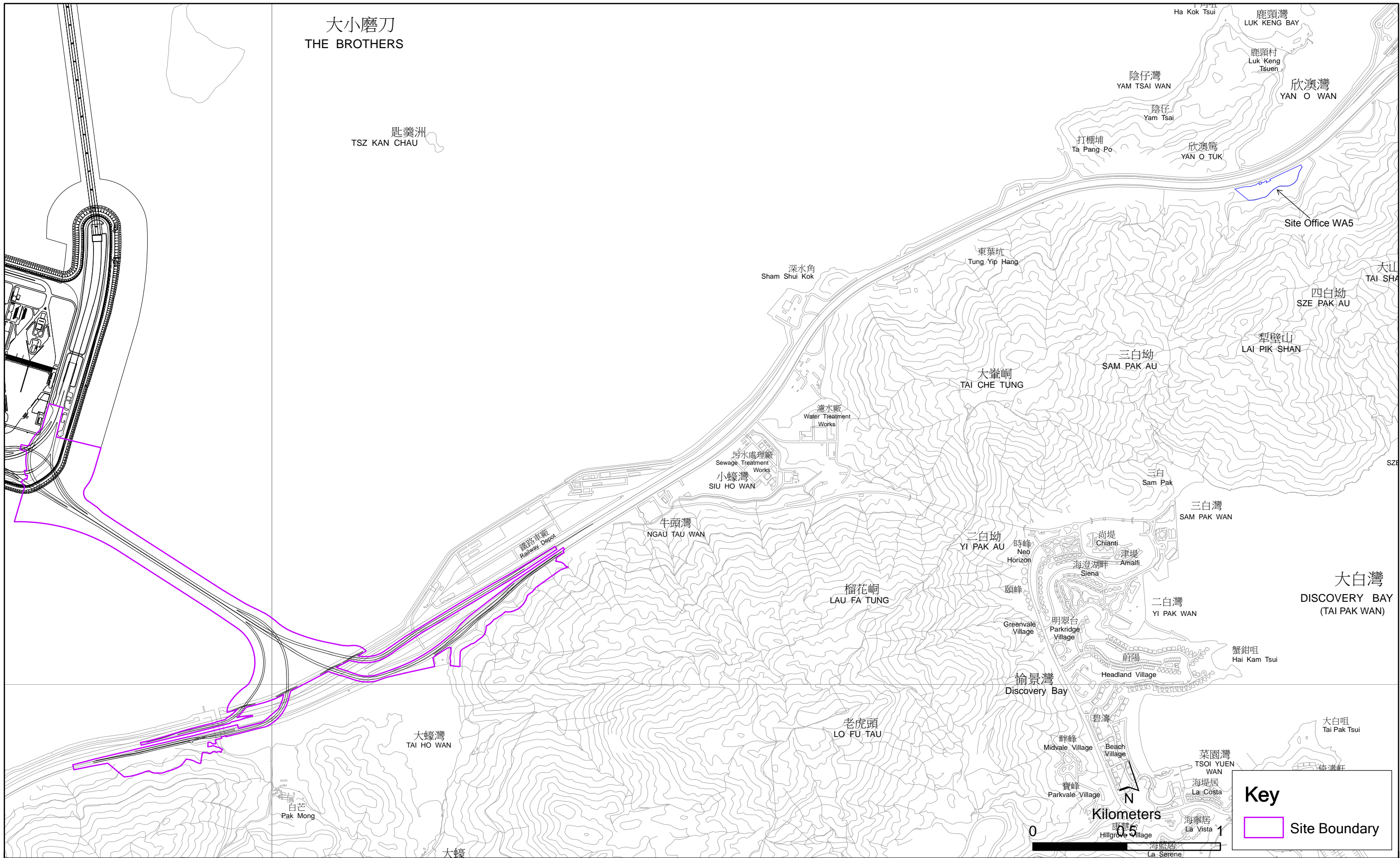


Figure 1.1

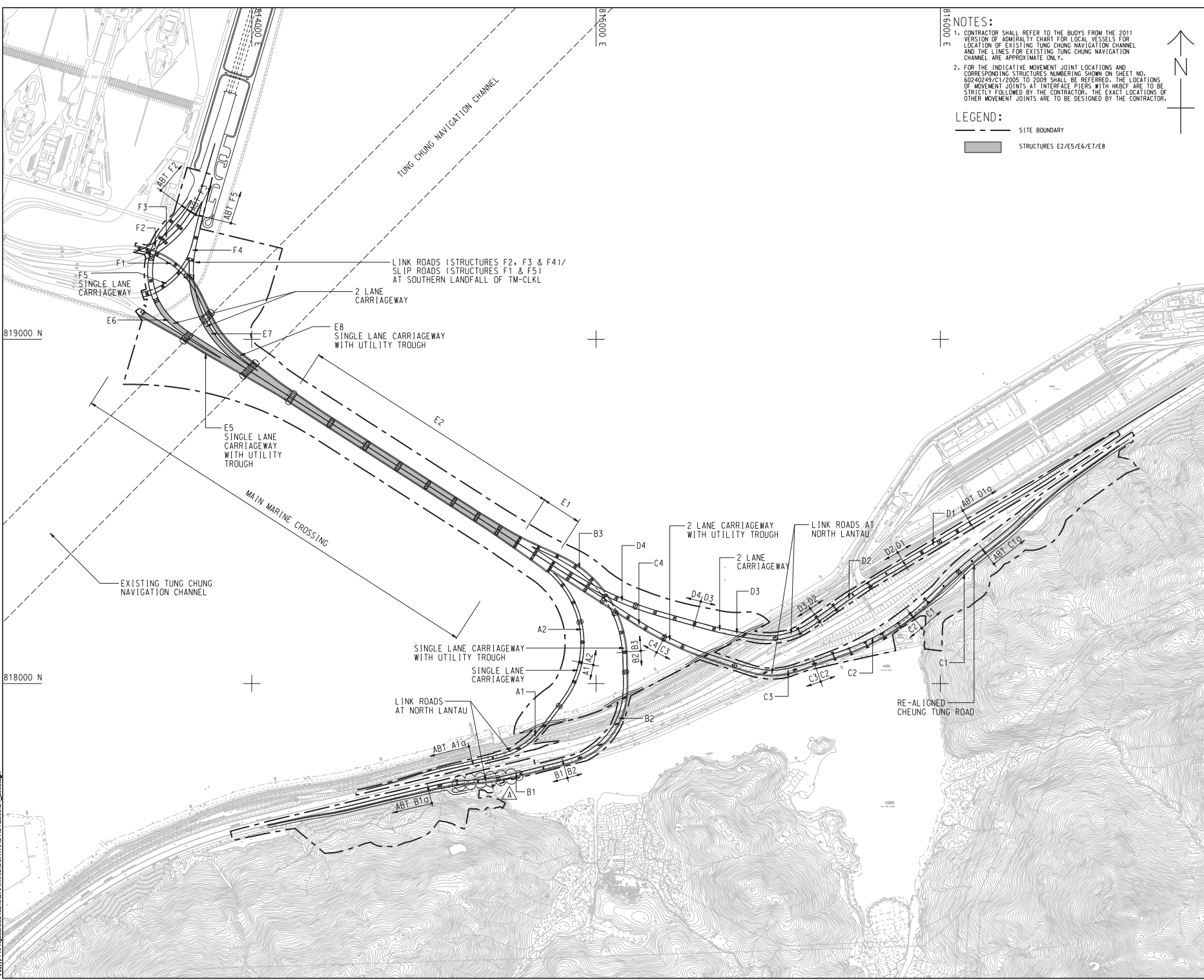
General Layout Plan of the Project

Environmental  
Resources  
Management





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 Project Management: Hinkley  
 Designer: LHM/BB  
 Checker: SLYT  
 Approver: CWN  
 ISO AT 50mm x 61mm  
 Only



**NOTES:**

- CONTRACTOR SHALL REFER TO THE BUOYS FROM THE 2011 VERSION OF ADMIRALTY CHART FOR LOCAL VESSELS FOR LOCATION OF EXISTING TUNG CHUNG NAVIGATION CHANNEL AND THE LINES FOR EXISTING TUNG CHUNG NAVIGATION CHANNEL ARE APPROXIMATE ONLY.
- FOR THE INDICATIVE MOVEMENT JOINT LOCATIONS AND CORRESPONDING STRUCTURES NUMBERING SHOWN ON SHEET NO. 60240249/C1/2005 TO 2009 SHALL BE REFERRED. THE LOCATIONS OF MOVEMENT JOINTS AT INTERFACE PIERS WITH HKBCF ARE TO BE STRICTLY FOLLOWED BY THE CONTRACTOR. THE EXACT LOCATIONS OF OTHER MOVEMENT JOINTS ARE TO BE DESIGNED BY THE CONTRACTOR.

**LEGEND:**

— SITE BOUNDARY

▬ STRUCTURES E2/E5/E6/E7/E8

**AECOM**

**PROJECT**  
TUEN MUN - CHEK LAP KOK LINK

**CONTRACT TITLE**  
TUEN MUN - CHEK LAP KOK LINK - SOUTHERN CONNECTION VIADUCT SECTION

**CLIENT**  
路政署  
HIGHWAYS DEPARTMENT  
港務局  
Hong Kong - Zhuhai - Hainan Bridge  
Hong Kong Project Management Office

**CONSULTANT**  
AECOM Asia Company Ltd.  
www.aecom.com

**SUB-CONSULTANTS**

# Figure 1.2a

**ISSUE/REVISION**

NO.	DATE	DESCRIPTION	CHK.

**STATUS**

SCALE	DIMENSION UNIT
A1 : 6000	METRES

**KEY PLAN**

**PROJECT NO.**  
60240249

**CONTRACT NO.**  
HY/2012/07

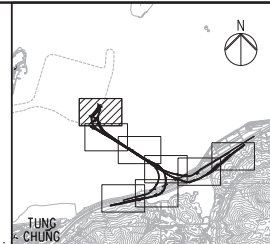
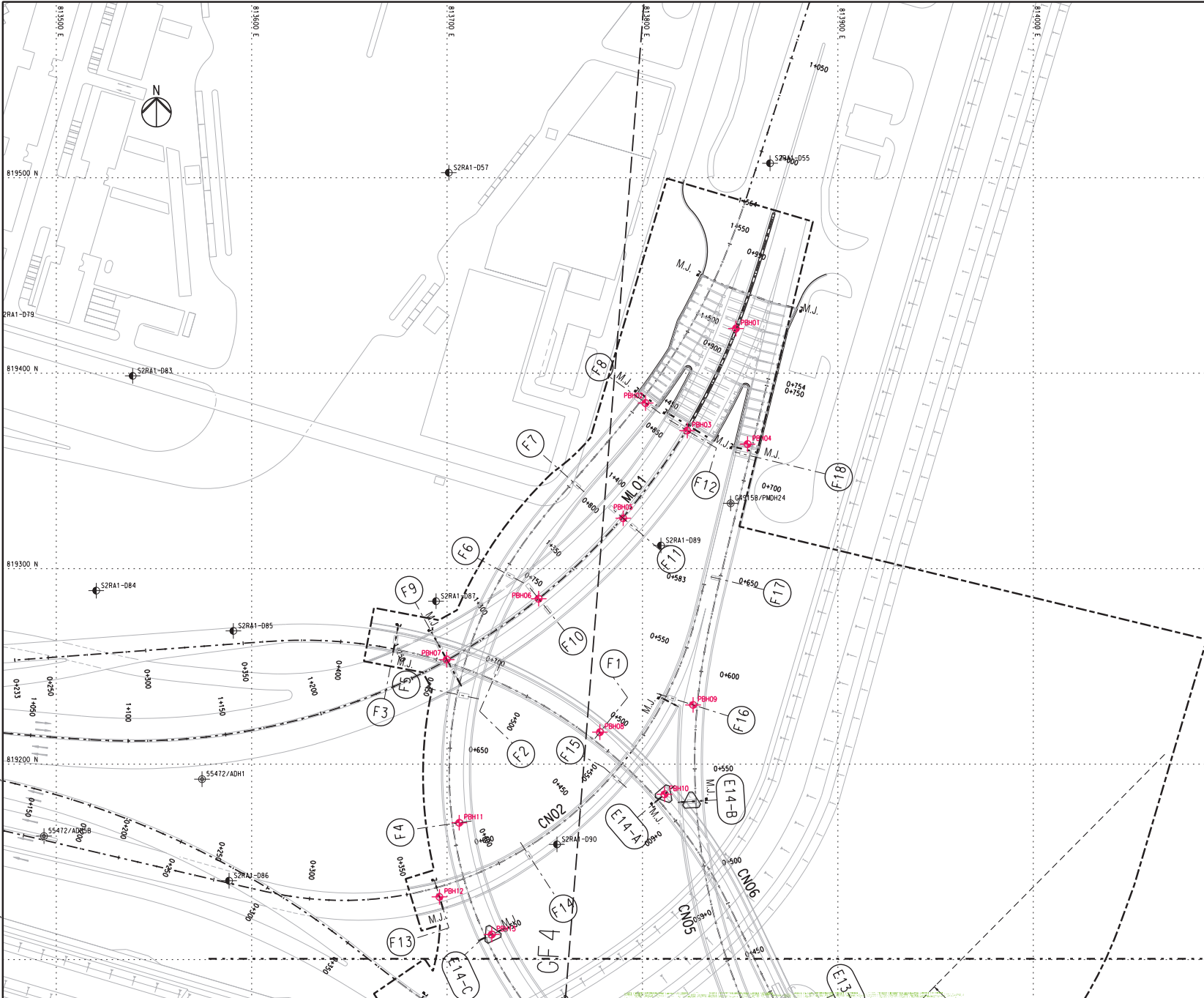
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SOUTHERN CONNECTION  
GENERAL LAYOUT PLAN

**SHEET NUMBER**  
60240249/C1/2000A

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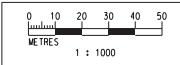


**KEY PLAN**

**NOTES**  
 1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NO. J3518/P/OAP/04/1000 AND OTHER RELEVANT DRAWINGS.

- LEGEND**
- SITE BOUNDARY
  - GF1 FAULT
  - EXISTING G.I.-STATIONS :
    - ⊕ BOREHOLE BY GIU DATA EXCLUDING VC
    - ⊕ BOREHOLE BY GCL CONTRACT HY/2012/04
    - ⊕ BOREHOLE BY GCL CONTRACT NL8/97
    - ⊕ BOREHOLE BY GCL CONTRACT HY/2009/23
    - ⊕ TRIAL PIT BY GCL CONTRACT HY/2012/04
  - PROPOSED G.I.-STATIONS :
    - ⊕ PBH01 PROPOSED BOREHOLE
    - ⊕ TP01 PROPOSED TRIAL PIT
    - ⊕ CH01 PROPOSED COREHOLE
    - SS01 SS02 PROPOSED SLOPE STRIPPING

MATCH LINE  
 FOR CONTINUATION  
 SEE DRG J3518/P/OAP/04/01101



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Rev	Description	By	Date	Rev	Description	By	Date
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B	SUBMISSION	RC	07/13				
C	SUBMISSION	RC	09/13				

Drawn	Date	Client
RL	07/13	HONG KONG HIGHWAYS DEPARTMENT 香港路政處 香港路政處
Checked	Approved	
DS	DOP	
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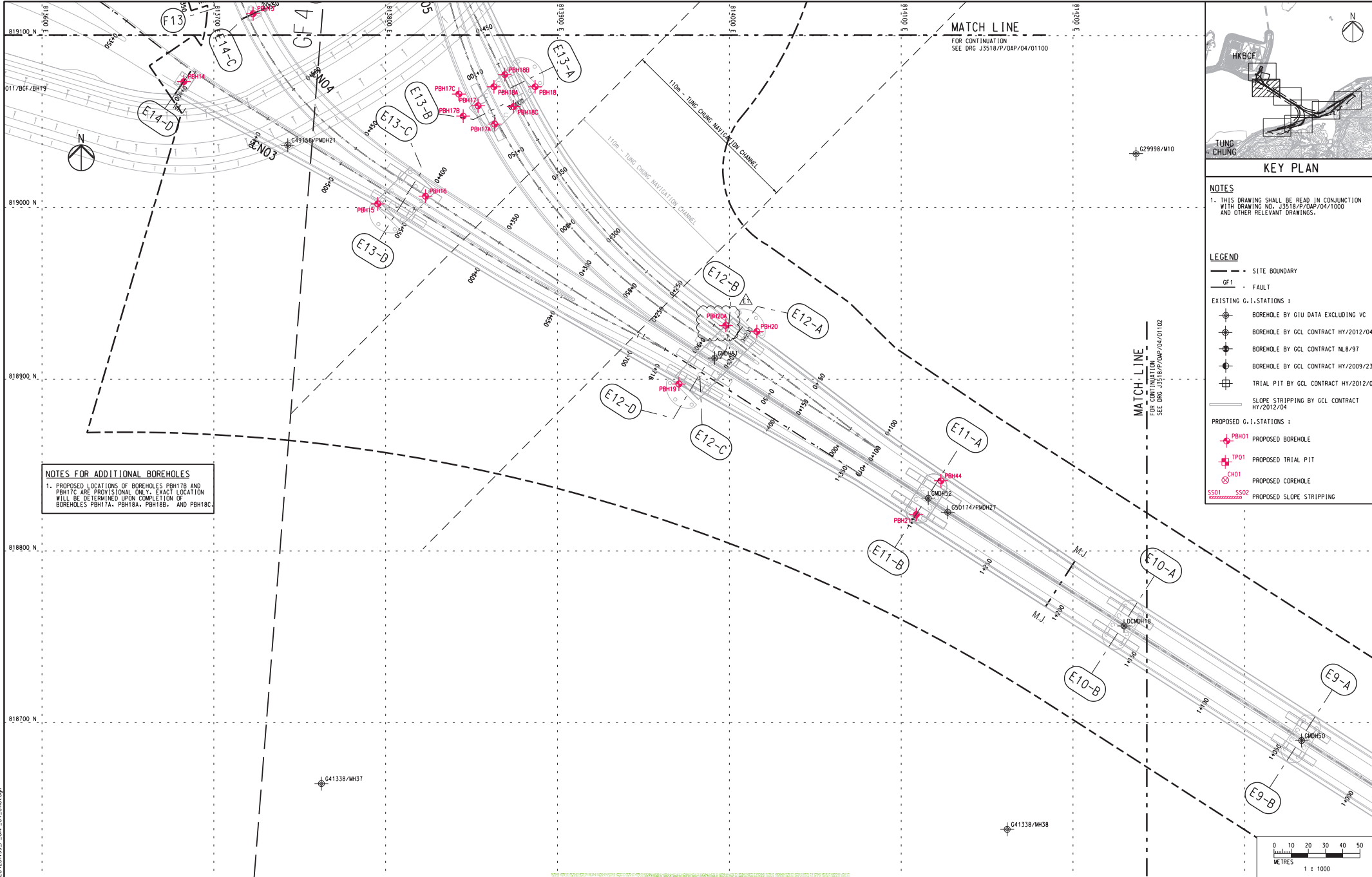
Supervising Officer: **AECOM**  
 Contractor: **GAMMON**

Project Title  
 Contract No. HY/2012/07  
 Tuen Mun - Chek Lap Kok Link  
 Southern Connection Viaduct Section

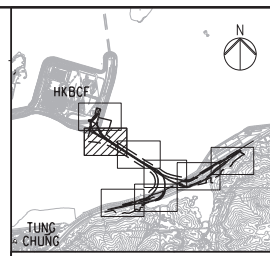
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Originator: **ARUP**

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MATCH LINE  
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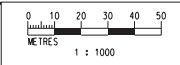


KEY PLAN

NOTES  
1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NO. J3518/P/OAP/04/1000 AND OTHER RELEVANT DRAWINGS.

- LEGEND
- SITE BOUNDARY
  - GF1 FAULT
  - EXISTING G.I. STATIONS:
    - ⊕ BOREHOLE BY GIU DATA EXCLUDING VC
    - ⊕ BOREHOLE BY GCL CONTRACT HY/2012/04
    - ⊕ BOREHOLE BY GCL CONTRACT NL8/97
    - ⊕ BOREHOLE BY GCL CONTRACT HY/2009/23
    - ⊕ TRIAL PIT BY GCL CONTRACT HY/2012/04
  - SLOPE STRIPPING BY GCL CONTRACT HY/2012/04
  - PROPOSED G.I. STATIONS:
    - ⊕ PBH01 PROPOSED BOREHOLE
    - ⊕ TP01 PROPOSED TRIAL PIT
    - ⊕ CH01 PROPOSED COREHOLE
    - SS01 SS02 PROPOSED SLOPE STRIPPING

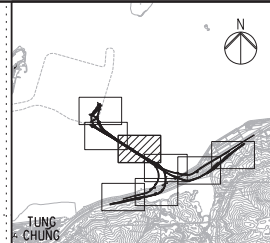
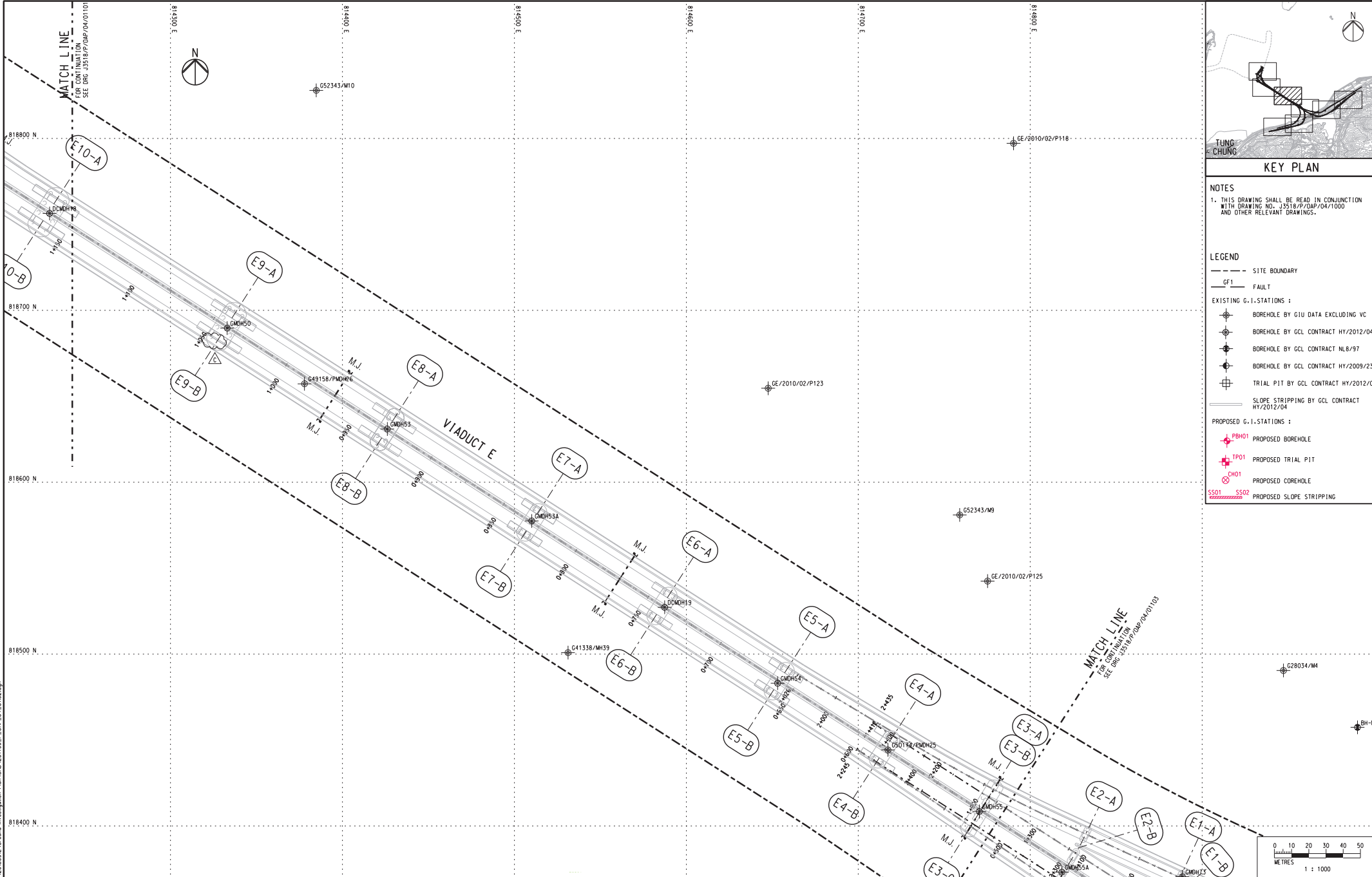
NOTES FOR ADDITIONAL BOREHOLES  
1. PROPOSED LOCATIONS OF BOREHOLES PBH17B AND PBH17C ARE PROVISIONAL ONLY. EXACT LOCATION WILL BE DETERMINED UPON COMPLETION OF BOREHOLES PBH17A, PBH18A, PBH18B, AND PBH18C.



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DO NOT SCALE DRAWING. CHECK ALL DIMENSIONS ON SITE.



**KEY PLAN**

**NOTES**  
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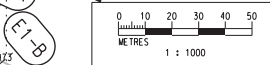
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- SITE BOUNDARY
  - GF1- FAULT

EXISTING G.I.-STATIONS :

    - ⊕ BOREHOLE BY GIU DATA EXCLUDING VC
    - ⊕ BOREHOLE BY GCL CONTRACT HY/2012/04
    - ⊕ BOREHOLE BY GCL CONTRACT NL8/97
    - ⊕ BOREHOLE BY GCL CONTRACT HY/2009/23
    - ⊕ TRIAL PIT BY GCL CONTRACT HY/2012/04
    - SLOPE STRIPPING BY GCL CONTRACT HY/2012/04

PROPOSED G.I.-STATIONS :

    - ⊕ PBH01 PROPOSED BOREHOLE
    - ⊕ TP01 PROPOSED TRIAL PIT
    - ⊕ CH01 PROPOSED COREHOLE
    - SS01 SS02 PROPOSED SLOPE STRIPPING



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Drawn	Date	Checked	Approved
RL	07/13		
DS		DOP	

Scale
1:1000 @ A1 / 1:2000 @ A3

Client

Supervising Officer

Project Title

Contract No. HY/2012/07  
 Tuen Mun - Chek Lap Kok Link  
 Southern Connection Viaduct Section

Contractor

Originator

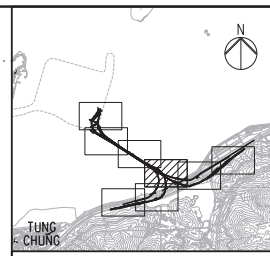
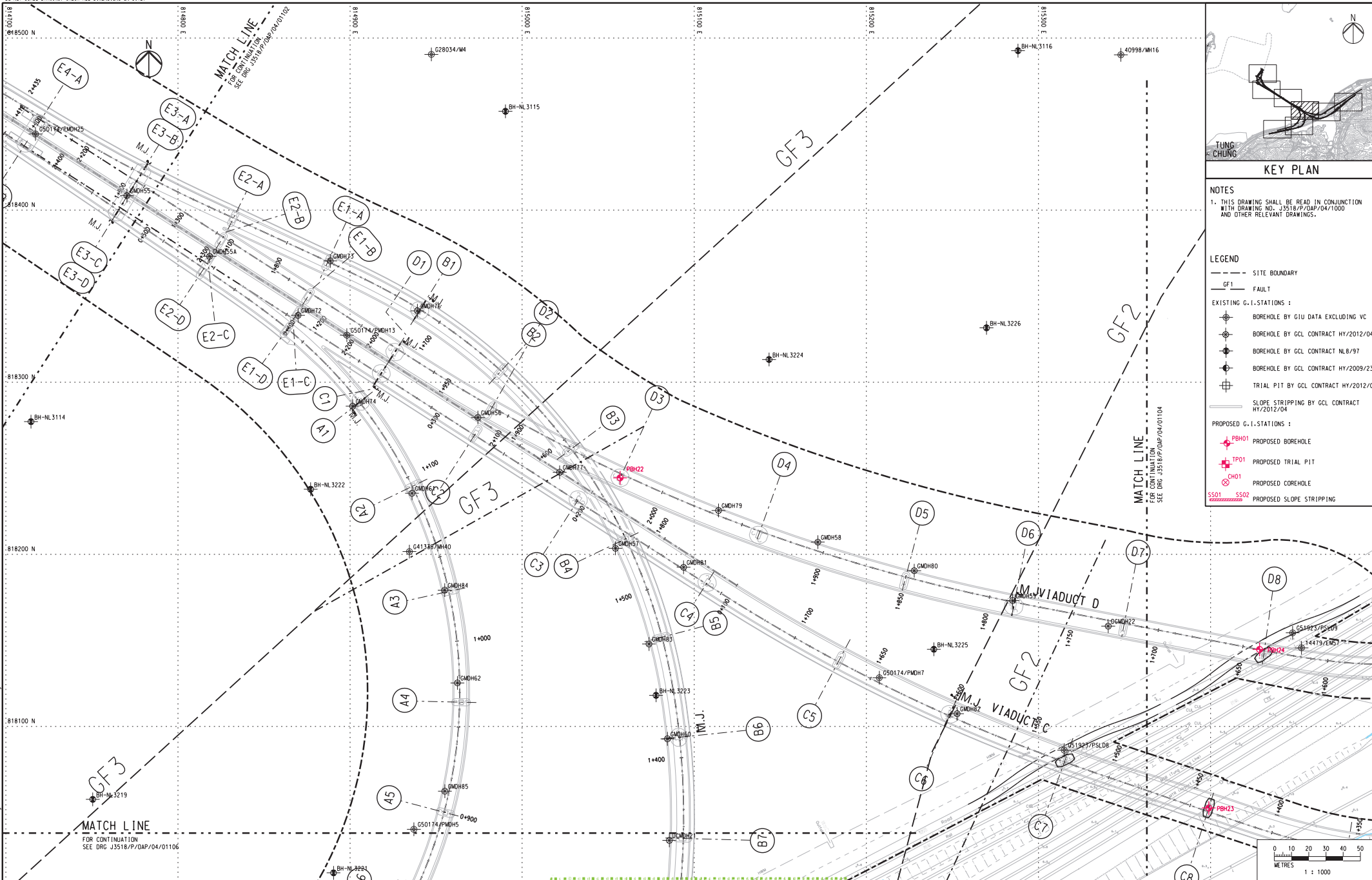
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# Figure 1.2d

Drawing no. J3518/P/OAP/04/01102 Rev. C



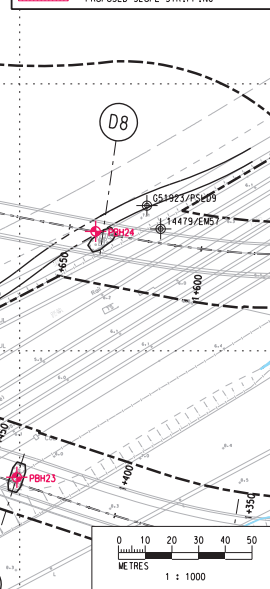
DO NOT SCALE DRAWING. CHECK ALL DIMENSIONS ON SITE.



KEY PLAN

NOTES  
 1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NO. J3518/P/OAP/04/1000 AND OTHER RELEVANT DRAWINGS.

- LEGEND
- SITE BOUNDARY
  - - - FAULT
  - EXISTING G.I.-STATIONS :
    - ⊕ BOREHOLE BY GIU DATA EXCLUDING VC
    - ⊕ BOREHOLE BY GCL CONTRACT HY/2012/04
    - ⊕ BOREHOLE BY GCL CONTRACT NL8/97
    - ⊕ BOREHOLE BY GCL CONTRACT HY/2009/23
    - ⊕ TRIAL PIT BY GCL CONTRACT HY/2012/04
  - PROPOSED G.I.-STATIONS :
    - ⊕ PBH01 PROPOSED BOREHOLE
    - ⊕ TP01 PROPOSED TRIAL PIT
    - ⊕ CH01 PROPOSED COREHOLE
    - SS01 SS02 PROPOSED SLOPE STRIPPING



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B	SUBMISSION	RC	07/13				
C	SUBMISSION	RC	09/13				

Checked	Approved
DS	DOP

Scale
1:1000 @ A1 / 1:2000 @ A3

Client  
 路政署  
 HIGHWAYS DEPARTMENT  
 港珠澳大桥香港工程管理局  
 Hong Kong - Zhuhai - Macao Bridge  
 Hong Kong Project Management Office

Supervising Officer  
 AECOM

Contract No. HY/2012/07  
 Tuen Mun - Chek Lap Kok Link  
 Southern Connection Viaduct Section

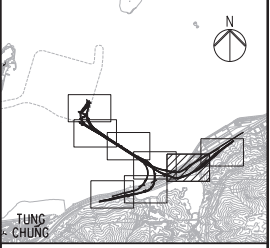
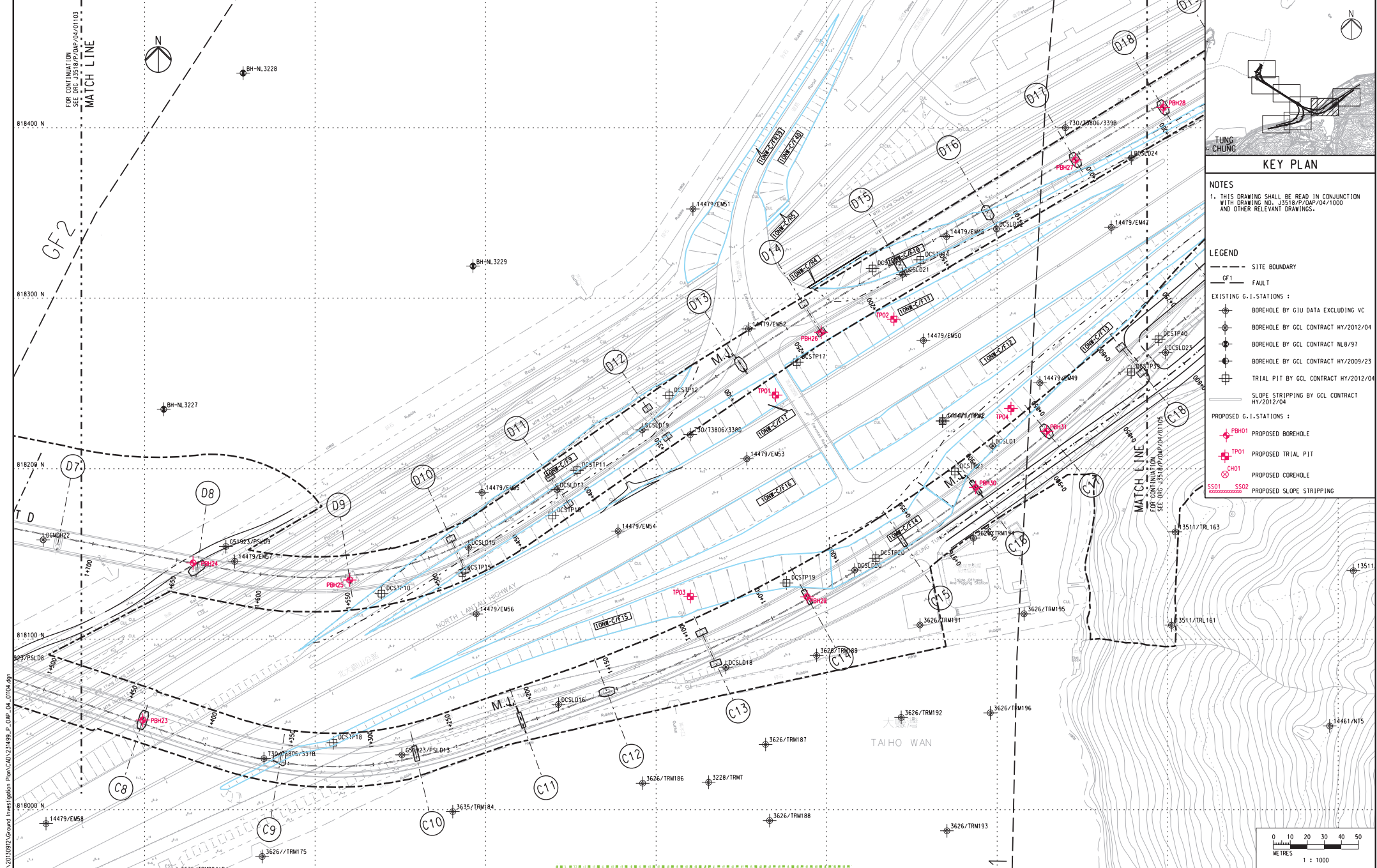
Contractor  
 Gammon

Originator  
 ARUP

Drawing title  
**Figure 1.2e**

Drawing no. J3518/P/OAP/04/01103 Rev. c

DO NOT SCALE DRAWING. CHECK ALL DIMENSIONS ON SITE.



**NOTES**  
 1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NO. J3518/P/OAP/04/1000 AND OTHER RELEVANT DRAWINGS.

- LEGEND**
- - - SITE BOUNDARY
  - GF1 FAULT
  - EXISTING G.I. STATIONS :
    - ⊕ BOREHOLE BY GIU DATA EXCLUDING VC
    - ⊕ BOREHOLE BY GCL CONTRACT HY/2012/04
    - ⊕ BOREHOLE BY GCL CONTRACT NL6/97
    - ⊕ BOREHOLE BY GCL CONTRACT HY/2009/23
    - ⊕ TRIAL PIT BY GCL CONTRACT HY/2012/04
  - PROPOSED G.I. STATIONS :
    - ⊕ PBH01 PROPOSED BOREHOLE
    - ⊕ TP01 PROPOSED TRIAL PIT
    - ⊕ CH01 PROPOSED COREHOLE
    - SS01 SS02 PROPOSED SLOPE STRIPPING



Rev	Description	By	Date	Rev	Description	By	Date	Drawn	Date
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B	SUBMISSION	RC	07/13					Checked	Approved
C	SUBMISSION	RC	09/13					DS	DOP
								Scale	1:1000 @ A1 / 1:2000 @ A3

Client  
 路政署  
 HIGHWAYS DEPARTMENT  
 港珠澳大橋香港工程總處  
 Hong Kong - Zhuhai - Macao Bridge  
 Hong Kong Project Management Office

Supervising Officer  
 AECOM

Project Title  
 Contract No. HY/2012/07  
 Tuen Mun - Chek Lap Kok Link  
 Southern Connection Viaduct Section

Contractor  
 Gammon

Originator  
 ARUP

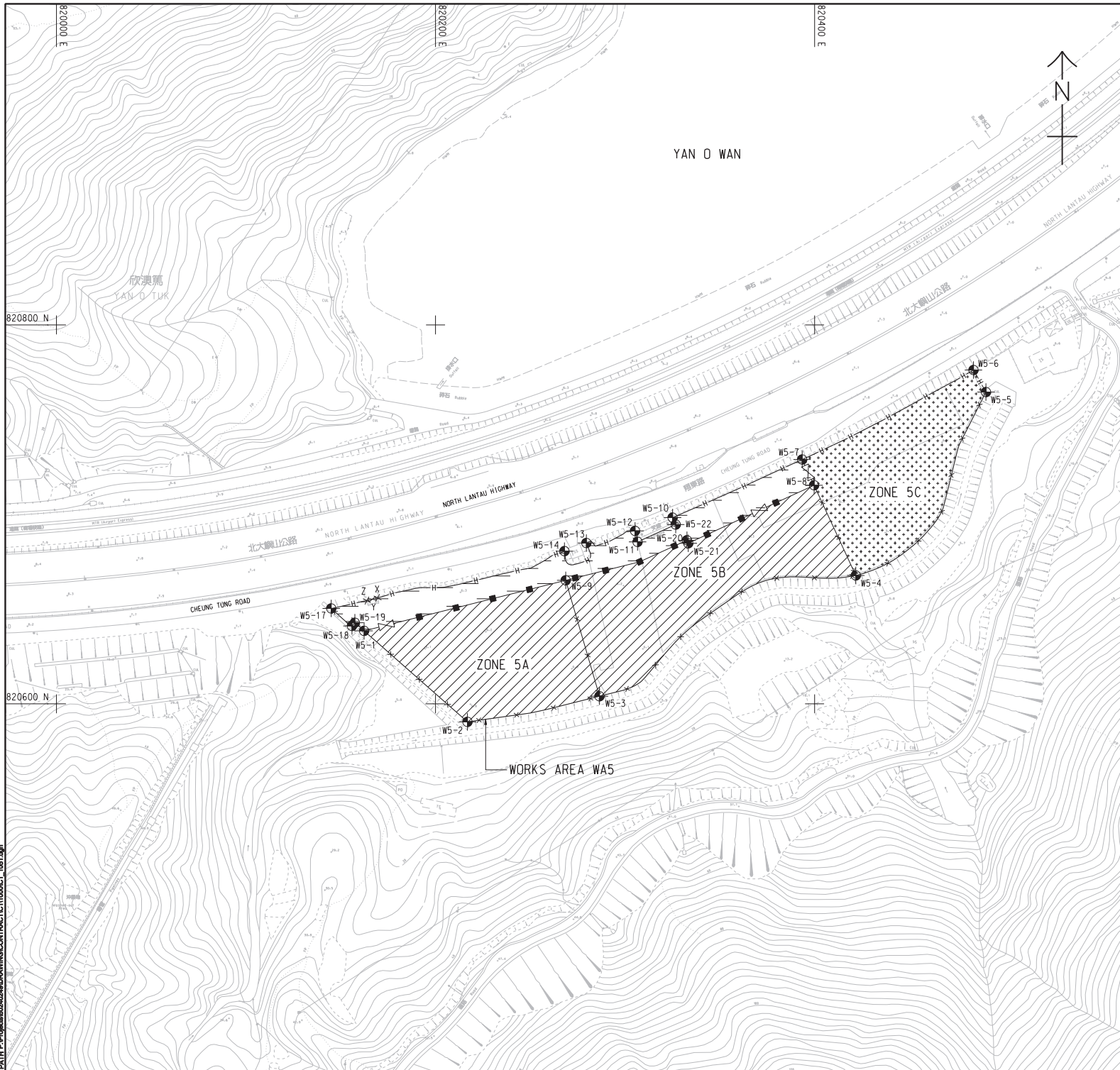
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Drawing no. J3518/P/OAP/04/01104 Rev. C


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









**NOTES:**

- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE WORKS AREA KEY PLAN IN SHEET NO. 60240249/C1/1000.
- THE SETTING OUT INFORMATION AND WORKS AREA CONDITIONS SHOWN IN THIS DRAWING ARE FOR REFERENCE ONLY. THE WORKS AREA BOUNDARY SHALL BE IN ACCORDANCE WITH THE ENGINEERING CONDITIONS FOR TEMPORARY GOVERNMENT LAND ALLOCATION NO. T15 619. IN CASE OF DISCREPANCY BETWEEN THE BOUNDARY SHOWN ON THIS DRAWING AND THE BOUNDARY INDICATED ON THE ENGINEERING CONDITIONS, THE LATTER SHALL PREVAIL.
- DEMARCATION OF THE WORKS AREA SHALL BE DETERMINED ON SITE.
- REFER TO HIGHWAYS DEPARTMENT STANDARD DRAWING NOS. H6110 AND H6111 FOR DETAILS OF HOARDING.
- REFER TO HIGHWAYS DEPARTMENT STANDARD DRAWING NOS. H6121 AND H6122 FOR DETAILS OF CHAIN LINK FENCE.
- REFER TO HIGHWAYS DEPARTMENT STANDARD DRAWING NO. H6121 FOR DETAILS OF GATE.
- CHAIN LINK FENCE SHALL BE ERECTED ALONG THE WORKS AREA BOUNDARY. THE ALIGNMENT AND EXTENT OF CHAIN LINK FENCE SHOWN ARE INDICATIVE ONLY AND SHALL BE CONFIRMED BY THE SUPERVISING OFFICER.
- THE LOCATION AND WIDTH OF GATE SHOWN ARE INDICATIVE ONLY AND SHALL BE CONFIRMED BY THE SUPERVISING OFFICER.
- NO STRUCTURES SHALL BE ERECTED OTHER THAN SUCH STRUCTURES NOT EXCEEDING TWO STOREYS IN HEIGHT, WHICH ARE APPROVED BY THE DISTRICT LANDS OFFICER AS BEING APPROPRIATE FOR THE USE OF THE SITE AS A WORKS AREA.
- THE TENTATIVE OCCUPATION PERIOD SHALL BE REFERRED TO EMPLOYER'S REQUIREMENTS PART 2 AND PART 14 SECTION 1 CLAUSE 1.45A.
- THE WORKS AREAS SHOWN ON THIS DRAWING ARE TO BE SHARE-USED AMONG THE CONTRACTS OF TM-CLK RELATED CONTRACTS. THE AREAS HATCHED WITH  ARE TENTATIVELY ALLOCATED FOR THE USE OF THIS CONTRACT.
- THE COMMON AREA SHALL BE CONCRETE PAVED BY THE CONTRACTOR.

**LEGEND:**

-  WORKS AREA UNDER THIS CONTRACT
-  COMMON AREA (MAINTAINED UNDER THIS CONTRACT) TO BE SHARE-USED WITH OTHER CONTRACTS
-  WORKS AREA FOR THIS CONTRACT TO BE EARLY HANDED OVER BY THE CONTRACTOR.
-  HOARDING AND GATE (TO BE ERECTED AND MAINTAINED UNDER THIS CONTRACT)
-  CHAIN LINK FENCE AND GATE (TO BE ERECTED AND MAINTAINED BY OTHERS)
-  CHAIN LINK FENCE AND GATE (TO BE ERECTED AND MAINTAINED UNDER THIS CONTRACT)

**SETTING OUT COORDINATES OF WORKS AREA W5**

POINT	COORDINATES	
	EASTING	NORTHING
W5-1	820162.308	820638.492
W5-2	820216.839	820590.455
W5-3	820286.496	820603.985
W5-4	820421.757	820667.742
W5-5	820490.425	820764.554
W5-6	820483.839	820776.180
W5-7	820393.451	820728.958
W5-8	820399.746	820715.343
W5-9	820268.674	820665.173
W5-10	820325.075	820698.276
W5-11	820306.587	820685.458
W5-12	820305.269	820691.287
W5-13	820279.580	820684.863
W5-14	820268.027	820680.572
X	820169.407	820655.859
Y	820166.601	820655.172
Z	820163.794	820654.484
W5-17	820144.957	820650.334
W5-18	820155.899	820641.093
W5-19	820157.432	820642.788
W5-20	820332.642	820686.314
W5-21	820333.350	820684.738
W5-22	820326.723	820694.608

**ISSUE/REVISION**

NO.	DATE	DESCRIPTION	CHK.
1	OCT. 12	TENDER DRAWING	CWN

**STATUS**

SCALE	DIMENSION UNIT
A1:1000	METRES

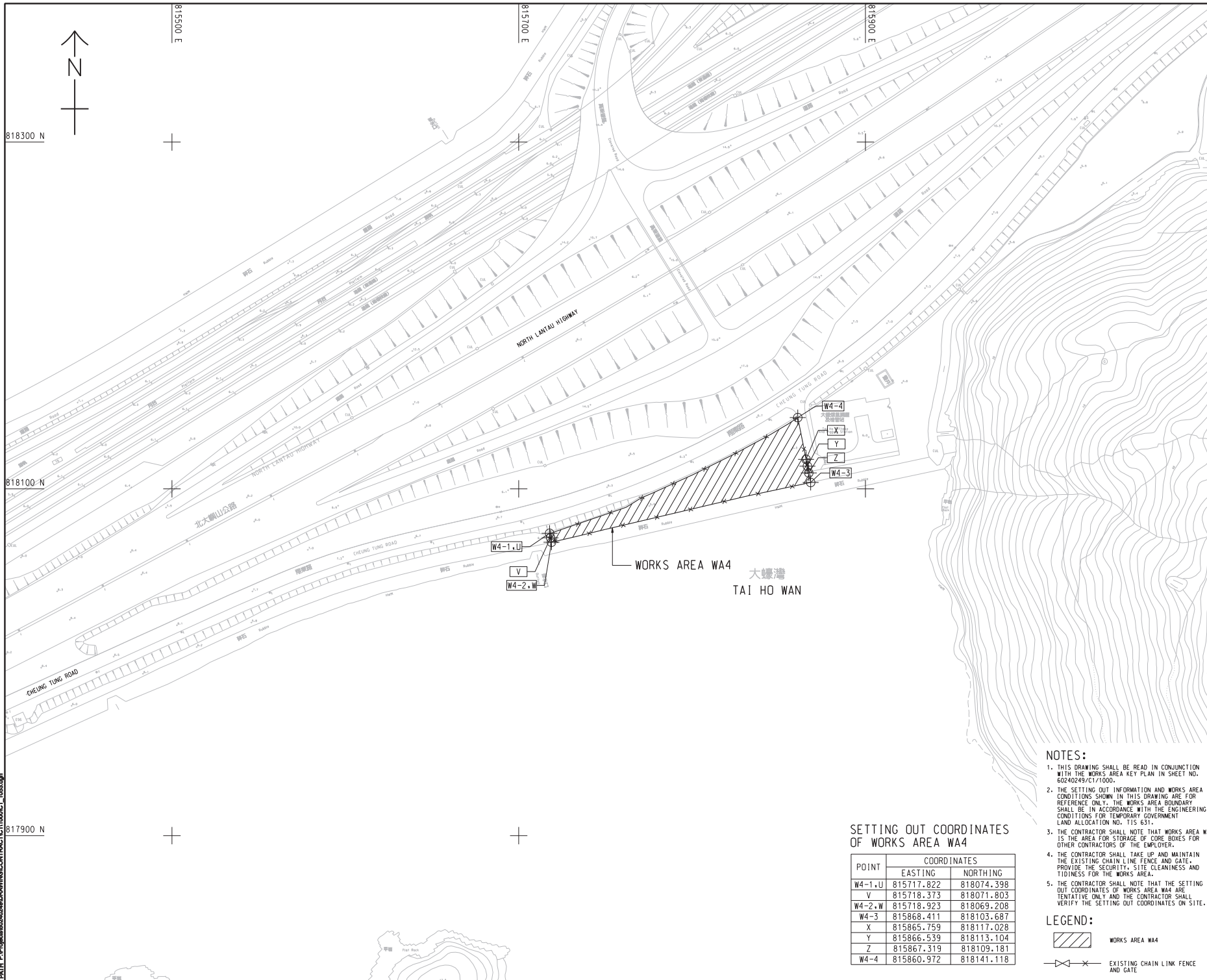
**KEY PLAN**

**Figure 1.2h**

This drawing has been prepared for the use of the contractor. It may not be used, modified, reproduced or reissued without the prior written approval of AECOM. AECOM accepts no responsibility for any errors or omissions in this drawing. The contractor shall be responsible for the accuracy of the information provided in this drawing. AECOM shall not be liable for any errors or omissions in this drawing.







WORKS AREA WA4  
 大蠔灣  
 TAI HO WAN

SETTING OUT COORDINATES OF WORKS AREA WA4

POINT	COORDINATES	
	EASTING	NORTHING
W4-1, U	815717.822	818074.398
V	815718.373	818071.803
W4-2, W	815718.923	818069.208
W4-3	815868.411	818103.687
X	815865.759	818117.028
Y	815866.539	818113.104
Z	815867.319	818109.181
W4-4	815860.972	818141.118

- NOTES:**
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE WORKS AREA KEY PLAN IN SHEET NO. 60240249/C1/100.
  - THE SETTING OUT INFORMATION AND WORKS AREA CONDITIONS SHOWN IN THIS DRAWING ARE FOR REFERENCE ONLY. THE WORKS AREA BOUNDARY SHALL BE IN ACCORDANCE WITH THE ENGINEERING CONDITIONS FOR TEMPORARY GOVERNMENT LAND ALLOCATION NO. T15 631.
  - THE CONTRACTOR SHALL NOTE THAT WORKS AREA WA4 IS THE AREA FOR STORAGE OF CORE BOXES FOR OTHER CONTRACTORS OF THE EMPLOYER.
  - THE CONTRACTOR SHALL TAKE UP AND MAINTAIN THE EXISTING CHAIN LINK FENCE AND GATE. PROVIDE THE SECURITY, SITE CLEANLINESS AND TIDINESS FOR THE WORKS AREA.
  - THE CONTRACTOR SHALL NOTE THAT THE SETTING OUT COORDINATES OF WORKS AREA WA4 ARE TENTATIVE ONLY AND THE CONTRACTOR SHALL VERIFY THE SETTING OUT COORDINATES ON SITE.

**LEGEND:**

WORKS AREA WA4

EXISTING CHAIN LINK FENCE AND GATE

**AECOM**

**PROJECT**  
 TUEN MUN - CHEK LAP KOK LINK

**CONTRACT TITLE**  
 TUEN MUN - CHEK LAP KOK LINK - SOUTHERN CONNECTION VIADUCT SECTION

**CLIENT**  
 路政署 DEPARTMENT OF HIGHWAYS  
 港務局 港務工程管理局  
 Hong Kong + Zhuhai + Hainan Bridge  
 Hong Kong Project Management Office

**CONSULTANT**  
 AECOM Asia Company Ltd.  
 www.aecom.com

**SUB-CONSULTANTS**  
 2/11/2012/16

**Figure 1.2j**

**ISSUE/REVISION**

NO.	DATE	DESCRIPTION	CHK.
1	NOV. 12	TENDER ADDENDUM NO. 1	C/W/H

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**KEY PLAN**

**PROJECT NO.**  
 60240249

**CONTRACT NO.**  
 HY/2012/07

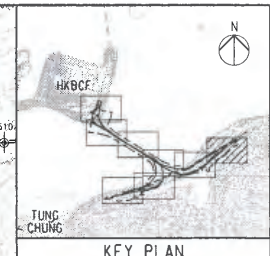
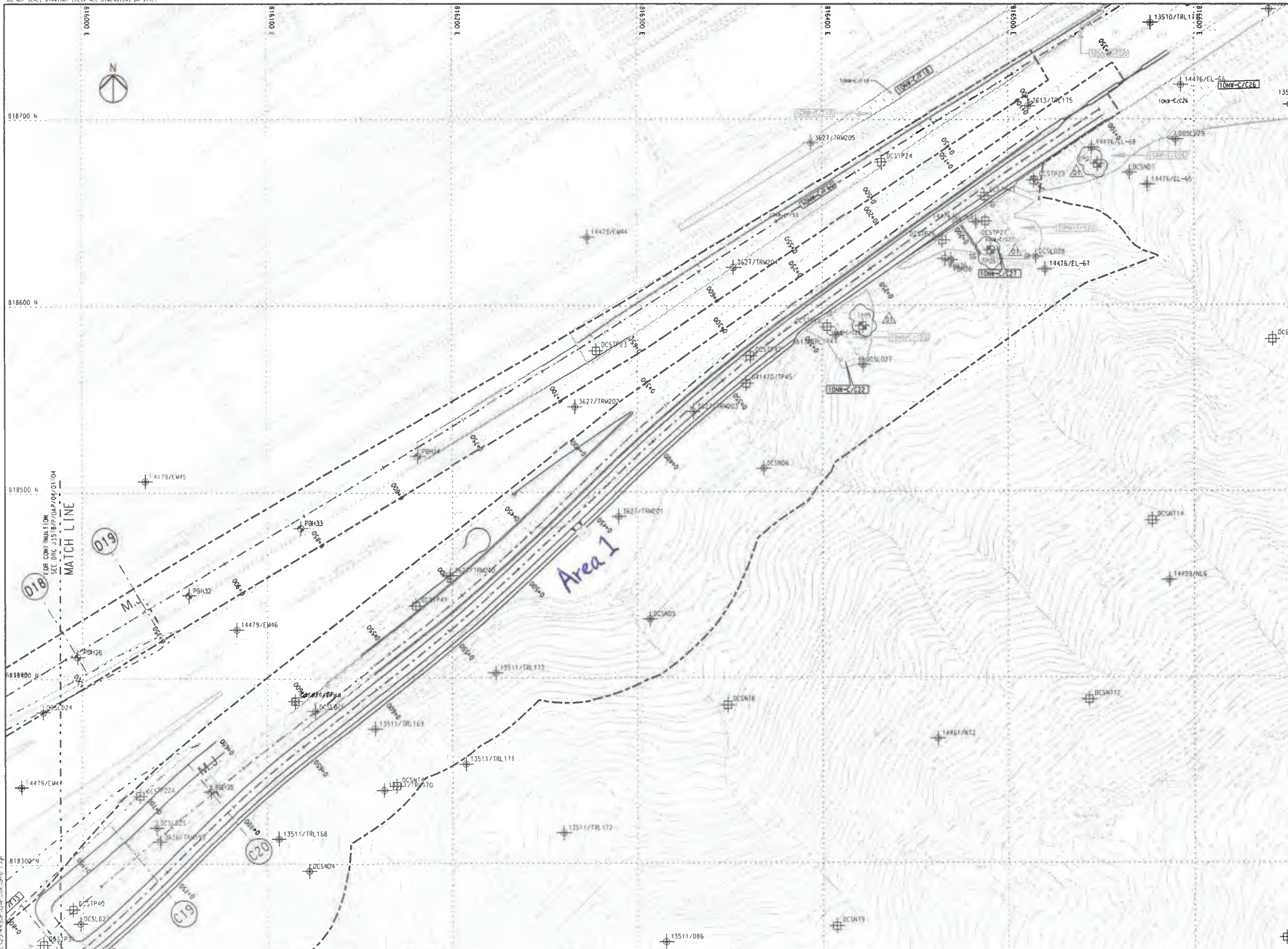
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 WORKS AREA WA4

**SHEET NUMBER**  
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- NOTES**
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NO. J3518/P/OAP/04/1000 AND OTHER RELEVANT DRAWINGS.
- LEGEND**
- SITE BOUNDARY
  - GF1 FAULT
- EXISTING G.I. STATIONS :**
- DCSP1 BOREHOLE BY GIU DATA EXCLUDING VC
  - DCSP2 BOREHOLE BY GCL CONTRACT HY/2012/04
  - DCSP3 BOREHOLE BY GCL CONTRACT N6.8/97
  - DCSP4 BOREHOLE BY GCL CONTRACT HY/2009/23
  - DCSP5 TRIAL PIT BY GCL CONTRACT HY/2012/04
  - DCSP6 SLOPE STRIPPING BY GCL CONTRACT HY/2012/04
- PROPOSED G.I. STATIONS :**
- DCSP7 PROPOSED BOREHOLE
  - DCSP8 PROPOSED TRIAL PIT
  - DCSP9 PROPOSED COREHOLE
  - DCSP10 PROPOSED SLOPE STRIPPING

Rev	Description	By	Date	Rev	Description	By	Date
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Client	路政署 <b>HIGHWAYS DEPARTMENT</b> 港珠澳大桥香港工程指挥部 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office	Project Title	Contract No. HY/2012/07 Tuen Mun - Chek Lap Kok Link Southern Connection Viaduct Section	Drawing title	<b>Figure 1.2k</b>
Supervising Officer	<b>AECOM</b>	Contractor	<b>Gammon</b>	Originator	
Scale	1:1000 @ A1 / 1:2000 @ A3			Drawing no.	J3518/P/OAP/04/01105
				Rev.	D1





**SUMMARY OF CONSTRUCTION WORKS**

The construction phase of the Contract commenced on 31 October 2013. The rolling construction programme for the period of December 2016 to February 2017 is shown in *Appendix B*.

As informed by the Contractor, details of the major works carried out in this reporting period are listed below:

December 2016***Marine Works***

- Uninstallation of marine piling platform;
- Pier construction;
- Launching gantry operation; and
- Installation of deck segment and pier head segment.

***Land-based Works***

- Pier construction;
- Re-alignment of Cheung Tung Road;
- Road works along North Lantau Highway;
- Installation of pier head and deck segments; and
- Slope work of Viaducts A, B & C.

January 2017***Marine Works***

- Uninstallation of marine piling platform;
- Pier construction;
- Launching gantry operation; and
- Installation of deck segment and pier head segment.

***Land-based Works***

- Pier construction;
- Re-alignment of Cheung Tung Road;

- Road works along North Lantau Highway;
- Installation of pier head and deck segments; and
- Slope work of Viaducts A, B & C.

February 2017

***Marine Works***

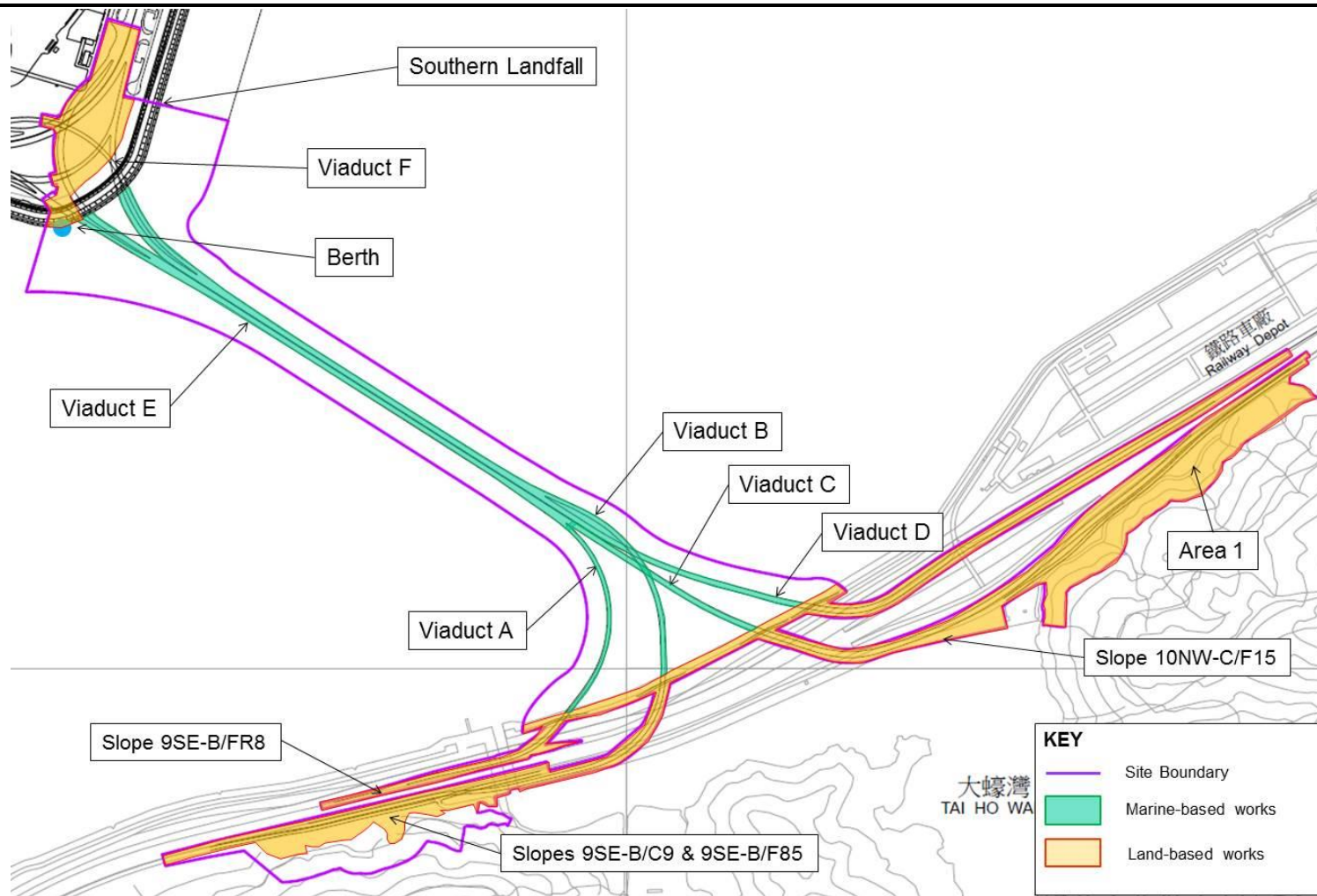
- Uninstallation of marine piling platform;
- Pier construction;
- Launching gantry operation; and
- Installation of deck segment and pier head segment.

***Land-based Works***

- Pier construction;
- Re-alignment of Cheung Tung Road;
- Road works along North Lantau Highway;
- Installation of pier head and deck segments; and
- Slope work of Viaducts A, B & C.

The locations of the construction activities are shown in *Figure 1.3*. The Environmental Sensitive Receivers in the vicinity of the Project are shown in *Figure 1.4*.

Figure 1.3 Locations of Construction Activities in the Reporting Period





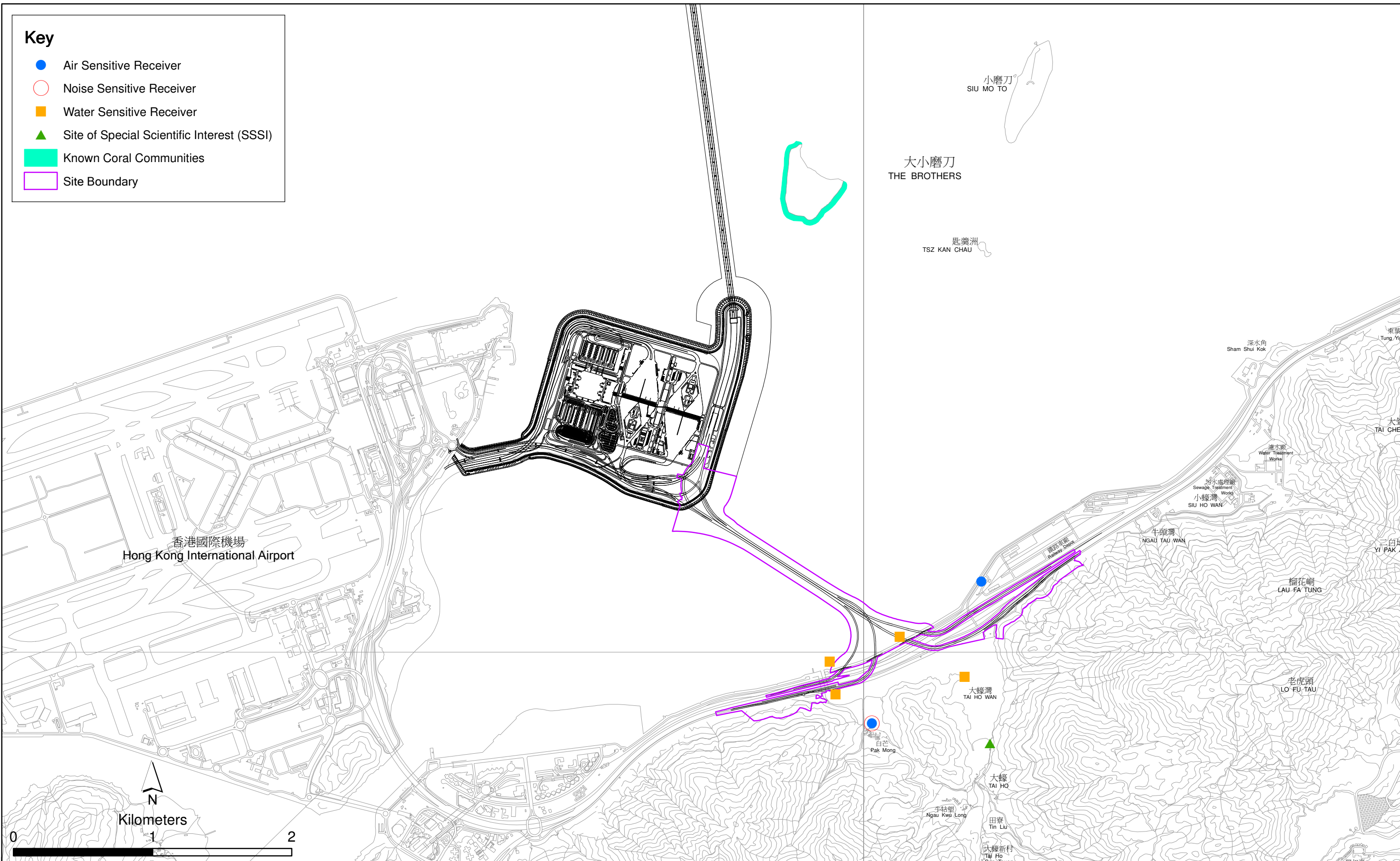


Figure 1.4

Environmental Sensitive Receivers in the Vicinity of Contract No. HY/2012/07  
Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section

File: T:\GIS\CONTRACT\0215660\Mxd\0215660\_Environmental\_Sensitive\_Receiver.mxd  
Date: 18/5/2015

Environmental  
Resources  
Management



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

## 1.5

### ***SUMMARY OF EM&A PROGRAMME REQUIREMENTS***

The EM&A programme required environmental monitoring for air quality, noise, 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 described in the following sections, which include:

- Monitoring parameters;
- Monitoring schedules for the reporting months and forthcoming months;
- Action and Limit levels for all environmental parameters;
- Event Action Plan;
- Results and observations;
- Environmental mitigation measures, as recommended in the approved EIA Report; and
- Environmental requirement in contract documents.

The EM&A programme required environmental monitoring for air quality, noise, 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

The baseline air quality monitoring undertaken by the HZMB Projects during October 2011 included the two monitoring stations ASR9A and ASR9C for this Project. Thus, the baseline monitoring results and Action/Limit Level presented in HZMB Baseline Monitoring Report <sup>(1)</sup> are adopted for this Project.

### 2.1.1 Monitoring Requirements and Equipment

In accordance with the Updated EM&A Manual, impact 1-hour TSP monitoring was conducted three (3) times every six (6) days while the highest dust impact was expected. Impact 24-hour TSP monitoring was carried out once every six (6) days. The Action and Limit Levels of the air quality monitoring is provided in *Appendix D*.

1-hour TSP and 24-hour TSP monitoring were conducted at 2 alternative air quality monitoring stations, ASR8A (Area 4) and ASR9 (entrance of MTR Depot) during the reporting period in accordance with the requirement of the Updated EM&A Manual. The monitoring stations are indicated in *Figure 2.1* and details are presented in *Table 2.1*.

High Volume Samplers (HVSs) were used for carrying out 1-hour and 24-hour TSP monitoring during the reporting period. The HVSs meets all requirements of the Updated EM&A Manual. Brand and model of the equipment are given in *Table 2.2*.

Wind data monitoring equipment was installed at Area 4 during the reporting period for logging wind speed and wind direction. The wind sensor was setup such that it was clear of obstructions or turbulence caused by building. The wind data monitoring equipment is recalibrated at least once every six months.

<sup>(1)</sup> Agreement No. CE 35/2011 (EP) Baseline Environmental Monitoring for Hong Kong - Zhuhai - Macao Bridge Hong Kong Projects - Investigation. Baseline Environmental Monitoring Report (Version C). Submitted on 8 March 2012 and subsequently approved by EPD.



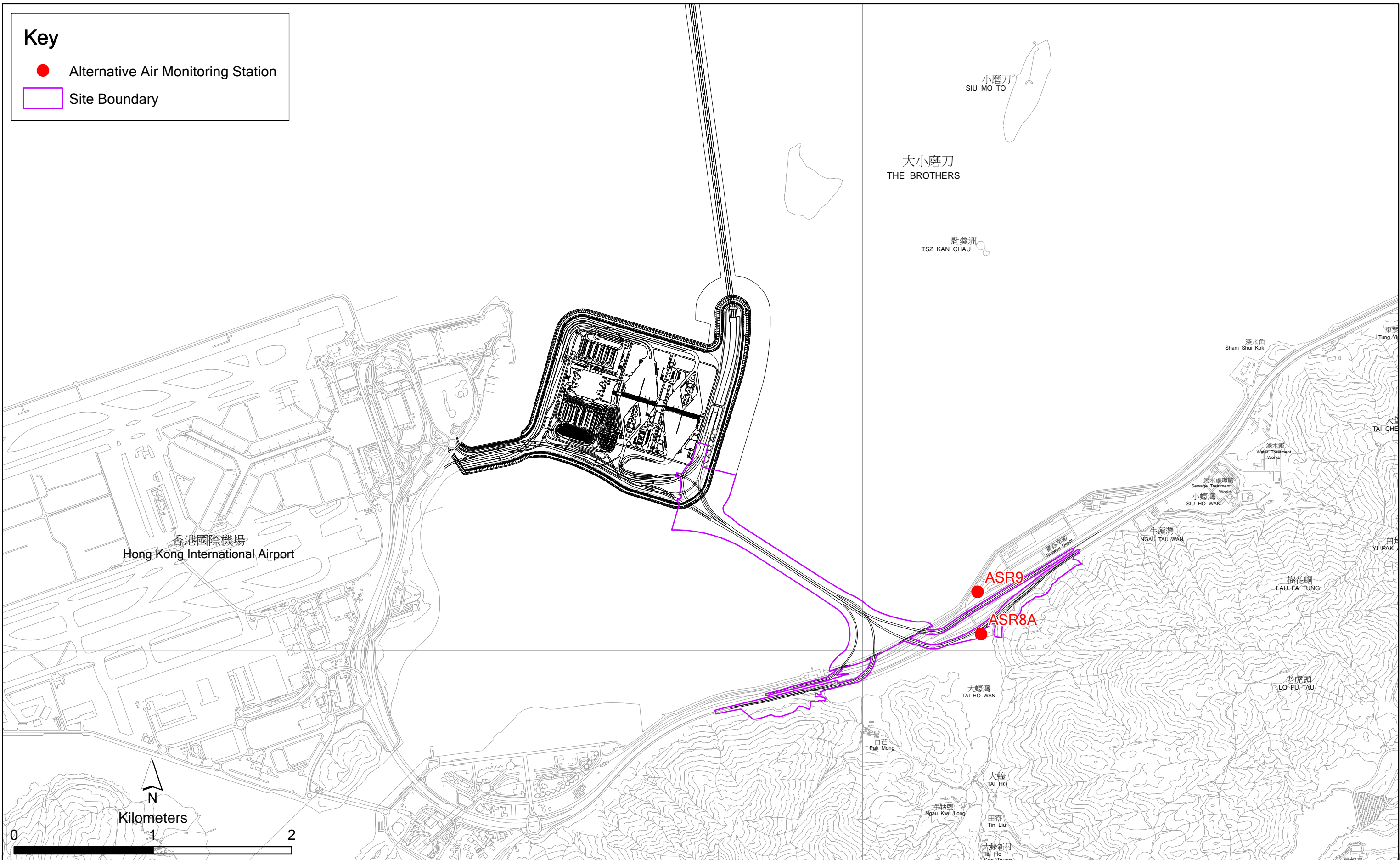


Figure 2.1

Locations of Air Quality Monitoring Stations



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

Monitoring Station <sup>(1)</sup>	Monitoring Period	Location	Description	Parameters & Frequency
ASR8A	1, 7, 13, 19, 22 and 28 December 2016	Area 4	On ground at the works area, Area 4	<ul style="list-style-type: none"> <li>1-hour Total Suspended Particulates (1-hour TSP, µg/m<sup>3</sup>), 3 times per day every 6 days</li> <li>24-hour Total Suspended Particulates (24-hour TSP, µg/m<sup>3</sup>), daily for 24-hour every 6 days</li> </ul>
ASR9	3, 9, 12, 18, 24 and 27 January 2017 2, 8, 14, 20 and 23 February 2017	MTR Depot	On the ground nearby MTR Depot entrance	

Note:

(1) Air Quality Monitoring Stations ASR9A and ASR9C at Siu Ho Wan MTRC Depot proposed in accordance with the Updated EM&A were relocated to ASR9 and ASR8A respectively.

**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 Sensor	Global Water (Wind Speed Sensor: WE550; Wind Direction Sensor: WE570)
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 are provided in *Appendix D*. The Event and Action plan is presented in *Appendix J*.

### 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*

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*. Detailed impact air quality monitoring results and meteorological information were reported in the *Thirty-eighth to Fortieth Monthly EM&A Reports*.

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

Month	Station	Average ( $\mu\text{g}/\text{m}^3$ )	Range ( $\mu\text{g}/\text{m}^3$ )	Action Level ( $\mu\text{g}/\text{m}^3$ )	Limit Level ( $\mu\text{g}/\text{m}^3$ )
December 2016	ASR 8A	87	47 - 125	394	500
	ASR 9	125	62 - 180	393	500
January 2017	ASR 8A	107	58 - 160	394	500
	ASR 9	165	77 - 245	393	500
February 2017	ASR 8A	73	45 - 147	394	500
	ASR 9	86	46 - 147	393	500

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

Month	Station	Average ( $\mu\text{g}/\text{m}^3$ )	Range ( $\mu\text{g}/\text{m}^3$ )	Action Level ( $\mu\text{g}/\text{m}^3$ )	Limit Level ( $\mu\text{g}/\text{m}^3$ )
December 2016	ASR 8A	65	46 - 78	178	260
	ASR 9	80	71 - 94	178	260
January 2017	ASR 8A	62	50 - 81	178	260
	ASR 9	85	72 - 96	178	260
February 2017	ASR 8A	56	47 - 62	178	260
	ASR 9	60	54 - 68	178	260

The major dust sources in the reporting period include construction activities under the Contract as well as nearby traffic emissions.

In this reporting period, a total of 17 monitoring events were undertaken within the reporting period, in which no Action or Limit Level exceedance for 1-hour and 24-hour TSP for air quality was recorded during the reporting period.

## 2.2 NOISE MONITORING

The baseline noise monitoring undertaken by the HZMB Projects during the period of 18 October to 1 November 2011 included the monitoring station NSR1 for this Project. Thus, the baseline monitoring results and Action/Limit Level presented in *HZMB Baseline Monitoring Report* <sup>(1)</sup> are adopted for this Project.

### 2.2.1 Monitoring Requirements and Equipment

In accordance with the Updated EM&A Manual, impact noise monitoring should be conducted once per week during the construction phase of the Contract.

Noise monitoring was conducted at the alternative noise monitoring station, NSR1A (Pak Mong Village Pavilion) during the reporting period in accordance with the requirement of Updated EM&A Manual. *Figure 2.2* shows the location of the monitoring station. *Table 2.5* describes the details of the monitoring station.

Noise monitoring was performed using sound level meter at the designated monitoring station in the reporting quarter. The deployed sound level meter complies with the International Electrotechnical Commission Publications (IEC) 651:1979 (Type 1) and 804:1985 (Type 1) specifications. Acoustic calibrator was deployed to check the sound level meter at a known sound pressure level. Brand and model of the equipment is given in *Table 2.6*.

<sup>(1)</sup> Agreement No. CE 35/2011 (EP) Baseline Environmental Monitoring for Hong Kong - Zhuhai - Macao Bridge Hong Kong Projects - Investigation. Baseline Environmental Monitoring Report (Version C). Submitted on 8 March 2012 and subsequently approved by EPD.

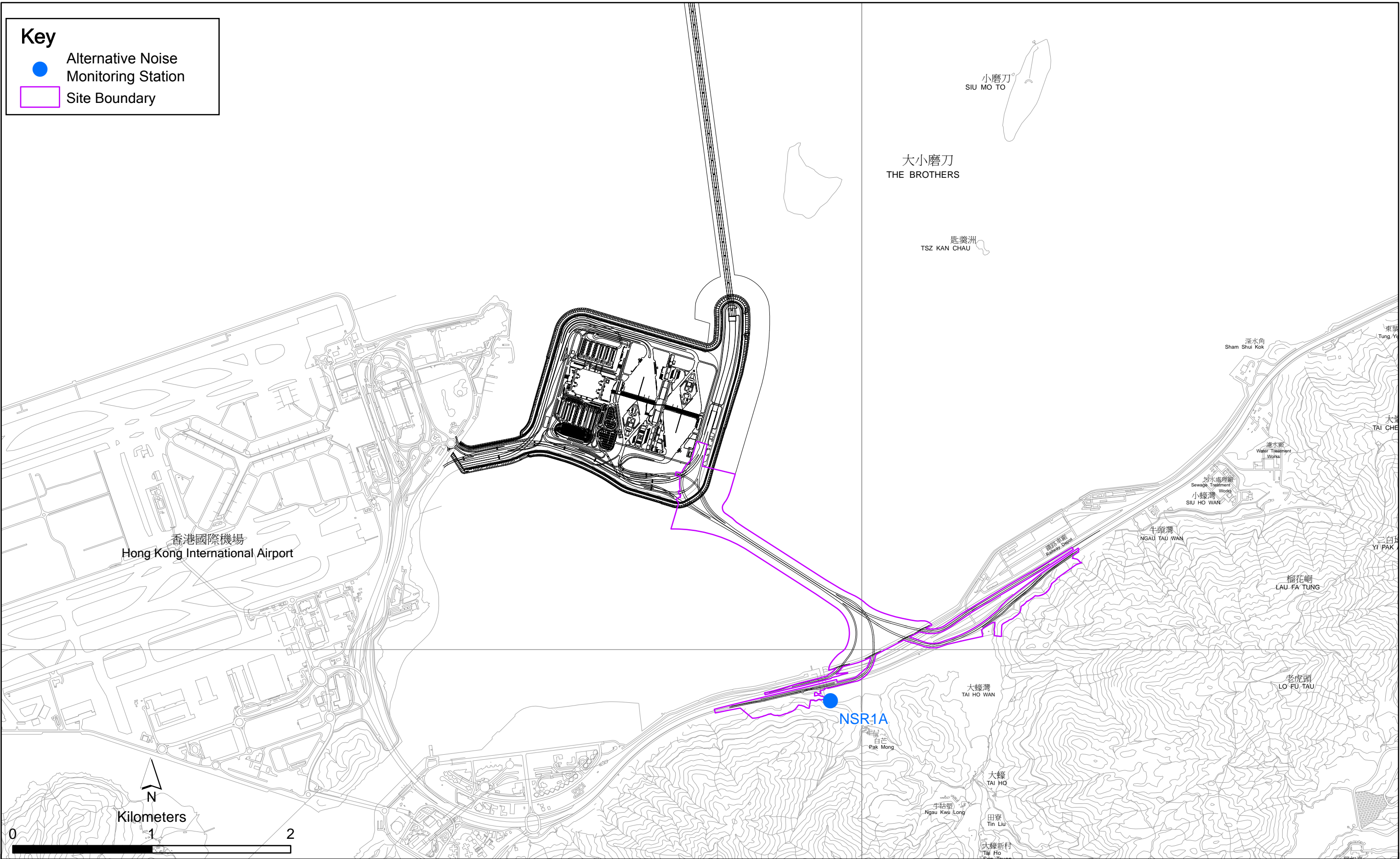


Figure 2.2

Location of Noise Monitoring Station

**Table 2.5** *Location of Impact Noise Monitoring Station and Monitoring Dates in this Reporting Period*

Monitoring Station	Monitoring Period	Location	Parameters & Frequency
NSR1A	1, 7, 13, 19, 22 and 28 December 2016 3, 9, 12, 18, 24 and 27 January 2017 2, 8, 14, 20 and 23 February 2017	Pak Mong Village Pavilion	<ul style="list-style-type: none"> <li>30-mins measurement at each monitoring station between 0700 and 1900 on normal weekdays (Monday to Saturday). <math>L_{eq}</math>, <math>L_{10}</math> and <math>L_{90}</math> would be recorded.</li> <li>At least once a week</li> </ul>

Note:  
(1) Noise Monitoring Station NSR1 at Pak Mong Village proposed in accordance with the Updated EM&A was relocated to NSR1A.

**Table 2.6** *Noise Monitoring Equipment*

Equipment	Brand and Model
Integrated Sound Level Meter	Rion NL-31
Acoustic Calibrator	Rion NC-73

### 2.2.2 *Action and Limit Levels*

The Action and Limit levels of the noise monitoring are provided in *Appendix D*. The Event and Action plan is presented in *Appendix J*.

### 2.2.3 *Monitoring Schedule for the Reporting Quarter*

The schedule for construction noise monitoring in the reporting period is provided in *Appendix F*.

### 2.2.4 *Results and Observations*

The monitoring results for noise monitoring are summarized in *Table 2.7*. Monitoring results are presented graphically in *Appendix G* and detailed impact noise monitoring results are reported in the *Thirty-eighth to Fortieth Monthly EM&A Reports*.

**Table 2.7** *Summary of Construction Noise Monitoring Results at NSR1A in the Reporting Period*

Month	Average, dB(A), $L_{eq}$ (30mins)	Range, dB(A), $L_{eq}$ (30mins)	Limit Level, dB(A), $L_{eq}$ (30mins)
December 2016	60	59 - 61	75
January 2017	60	59 - 61	75
February 2017	62	61 - 63	75

A total of 17 monitoring events were undertaken in the reporting period with no Action Level and Limit Level exceedance recorded at the monitoring station in the reporting period. No action is thus required to be undertaken in accordance with the Event Action Plan presented in *Appendix J*.

Major noise sources during the noise monitoring included construction activities, nearby traffic noise and aircraft noise.



## 2.3

### WATER QUALITY MONITORING

The baseline water quality monitoring undertaken by the HZMB Projects between 6 and 31 October 2011 included all monitoring stations except SR4a for the Project. Thus, the baseline monitoring results except for station SR4a and Action/Limit Level presented in HZMB Baseline Monitoring Report <sup>(1)</sup> are adopted for this Project. Baseline water quality monitoring was conducted at station SR4a from 29 August to 24 September 2013.

#### 2.3.1 Monitoring Requirements and Equipment

Impact water quality monitoring was carried out to ensure that any deterioration of water quality was detected, and that timely action was taken to rectify the situation. Impact water quality monitoring was undertaken three days per week during the construction period at seven water quality monitoring stations in accordance with the Updated EM&A Manual (Figure 2.3; Table 2.8).

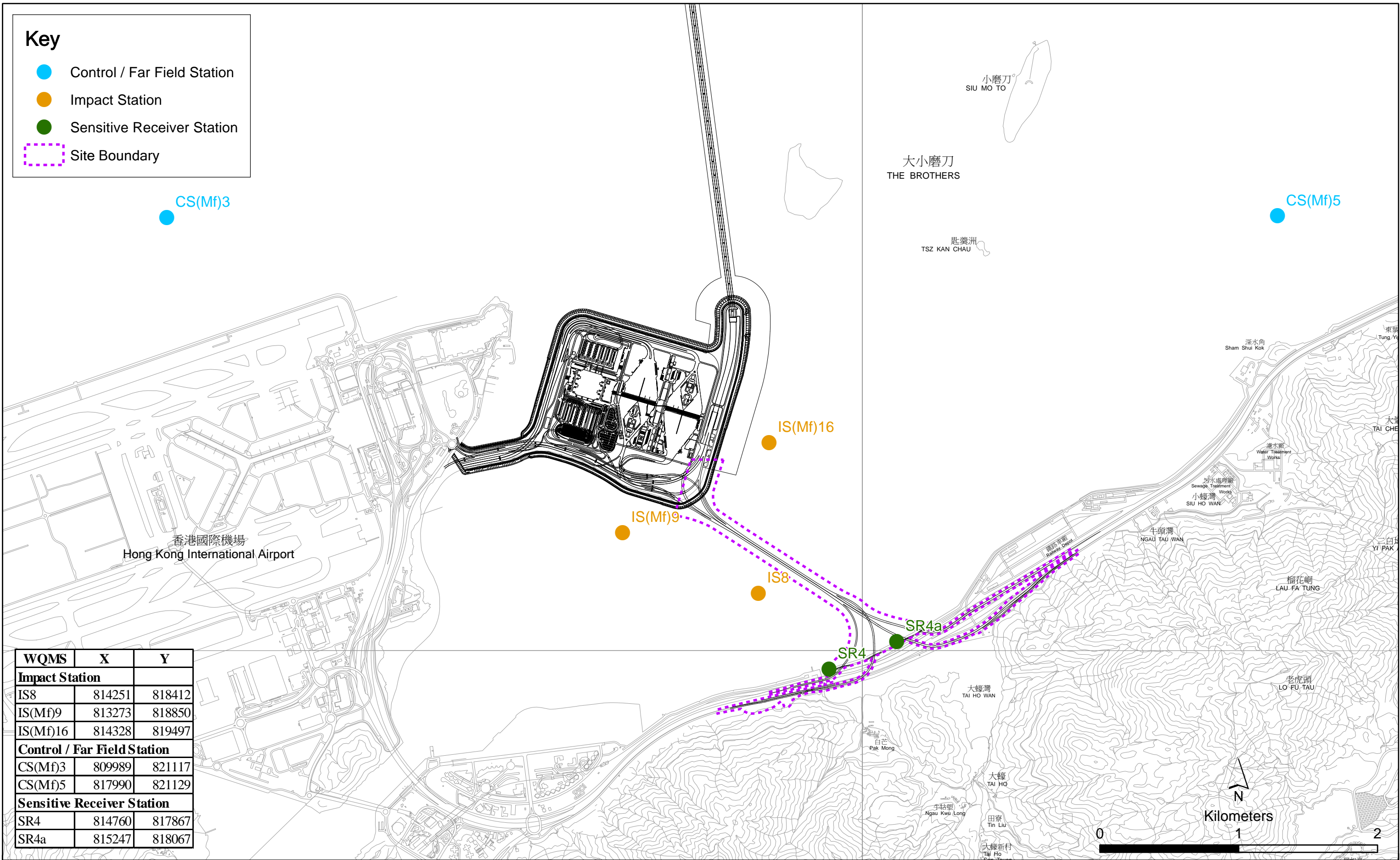
**Table 2.8** *Locations of Water Quality Monitoring Stations and the Corresponding Monitoring Requirements*

Station ID	Type	Coordinates		*Parameters, unit	Depth	Frequency
		Easting	Northing			
IS(Mf)9	Impact Station (Close to HKBCF construction site)	813273	818850	<ul style="list-style-type: none"> <li>• Temperature(°C)</li> <li>• pH(pH unit)</li> <li>• Turbidity (NTU)</li> <li>• Water depth (m)</li> <li>• Salinity (ppt)</li> </ul>	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.
IS(Mf)16	Impact Station (Close to HKBCF construction site)	814328	819497	<ul style="list-style-type: none"> <li>• Dissolved Oxygen (DO) (mg/L and % of saturation)</li> <li>• Suspended Solid (SS) (mg/L)</li> </ul>		
IS8	Impact Station(Close to HKBCF construction site)	814251	818412			
SR4	Sensitive receiver (Tai Ho Inlet)	814760	817867			
SR4a	Sensitive receiver	815247	818067			
CS(Mf)3	Control Station	809989	821117			
CS(Mf)5	Control Station	817990	821129			

<sup>(1)</sup> Agreement No. CE 35/2011 (EP) Baseline Environmental Monitoring for Hong Kong - Zhuhai - Macao Bridge Hong Kong Projects - Investigation. Baseline Environmental Monitoring Report (Version C). Submitted on 8 March 2012 and subsequently approved by EPD.

**Key**

- Control / Far Field Station
- Impact Station
- Sensitive Receiver Station
- Site Boundary



WQMS	X	Y
<b>Impact Station</b>		
IS8	814251	818412
IS(Mf)9	813273	818850
IS(Mf)16	814328	819497
<b>Control / Far Field Station</b>		
CS(Mf)3	809989	821117
CS(Mf)5	817990	821129
<b>Sensitive Receiver Station</b>		
SR4	814760	817867
SR4a	815247	818067

Figure 2.3

Locations of Water Quality Monitoring Stations

Station ID	Type	Coordinates		*Parameters, unit	Depth	Frequency
		Easting	Northing			
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 2.9 summarizes the equipment used in the impact water quality monitoring programme.

**Table 2.9 Water Quality Monitoring Equipment**

Equipment	Brand and Model
DO, Temperature meter and Salinity	YSI Pro2030
Turbidity meter	HACH Model 2100Q
pH meter	HANNA HI8314 / HANNA HI9125
Positioning Equipment	Koden913MK2 with KBG-3 DGPS antenna
Water Depth Detector	Speedtech Instrument SM-5
Water Sampler	Kemmerer 1520 (1520-C25) 2.2L with messenger

### 2.3.2 Action & Limit Levels

The Action and Limit Levels of the water quality monitoring are provided in *Appendix D*.

### 2.3.3 Monitoring Schedule for the Reporting Quarter

The schedules for water quality monitoring in the reporting quarter are provided in *Appendix E*. The water quality monitoring was cancelled on 28 and 31 January 2017 due to suspension of marine works during holiday.

### 2.3.4 Results and Observations

Impact water quality monitoring was conducted at all designated monitoring stations in the reporting period. Monitoring results are presented graphically in *Appendix H* and detailed impact water quality monitoring results were reported in the *Thirty-eighth to Fortieth Monthly EM&A Reports*.

In this reporting period, a total of 37 monitoring events were undertaken with no Action Level and Limit Level exceedance recorded at the monitoring station in the reporting period. No action is thus required to be undertaken in accordance with the Event Action Plan presented in *Appendix J*.

## 2.4 DOLPHIN MONITORING

### 2.4.1 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 Indo-Pacific humpback dolphin *Sousa chinensis* (i.e. Chinese White Dolphin) from the Contract. 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.

### 2.4.2 Monitoring Equipment

Table 2.10 summarizes the equipment used for the impact dolphin monitoring.

Table 2.10 Dolphin Monitoring Equipment

Equipment	Model
Global Positioning System (GPS)	Garmin 18X-PC
Camera	Geo One Phottix
	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

### 2.4.3 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.

### 2.4.4 Monitoring Location

The impact dolphin monitoring was carried out in the NEL and NWL along the line transect as depicted in Figure 2.4. The co-ordinates of all transect lines are shown in Table 2.11 below.

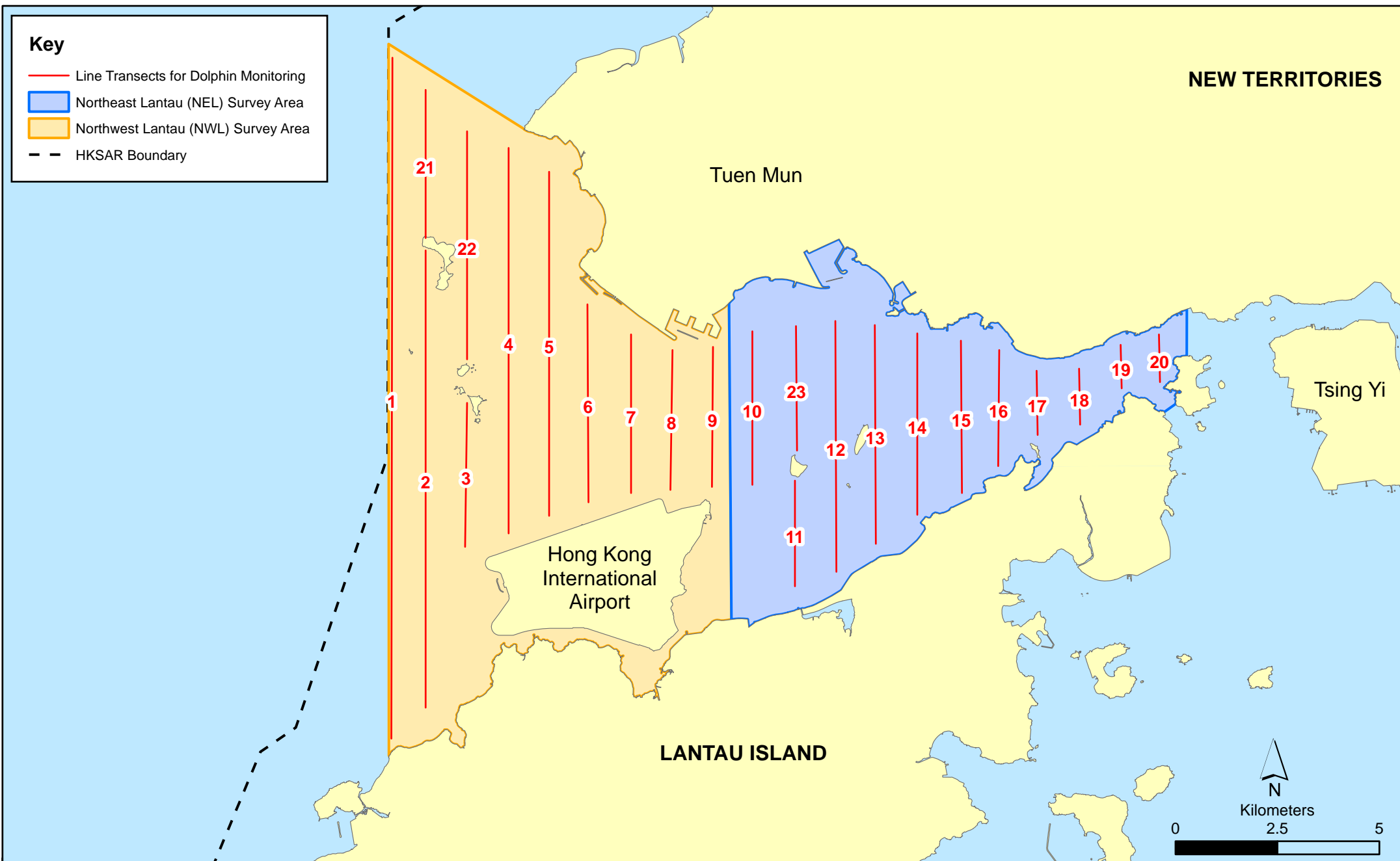


Figure 2.4

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



**Table 2.11 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	805475	815913	14	Start Point	817537	820220
2	End Point	805477	826654	14	End Point	817537	824613
3	Start Point	806464	819435	15	Start Point	818568	820735
3	End Point	806464	822911	15	End Point	818568	824433
4	Start Point	807518	819771	16	Start Point	819532	821420
4	End Point	807518	829230	16	End Point	819532	824209
5	Start Point	808504	820220	17	Start Point	820451	822125
5	End Point	808504	828602	17	End Point	820451	823671
6	Start Point	809490	820466	18	Start Point	821504	822371
6	End Point	809490	825352	18	End Point	821504	823761
7	Start Point	810499	820880	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	820872	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				
12	End Point	815542	824882				

**2.4.5 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 J*.

**2.4.6 Monitoring Schedule for the Reporting Period**

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

**2.4.7 Results & Observations**

A total of 878.35 km of survey effort was collected, with 86.5% 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,

340.00 km and 538.35 km of survey effort were conducted in NEL and NWL survey areas respectively. The total survey effort conducted on primary lines was 632.39 km, while the effort on secondary lines was 245.96 km. Survey effort conducted on both primary and secondary lines were considered as on-effort survey data. The survey efforts are summarized in *Appendix I*.

During the six sets of monitoring surveys in December 2016 to February 2017, a total of seventeen (17) groups of 62 Chinese White Dolphins were sighted. Fourteen (14) dolphin sightings were made during on-effort, while all except one on-effort dolphin sightings were made on primary lines. In this quarterly period, all dolphin groups were sighted in NWL, no sighting of dolphin was sighted in NEL. Summary table of the dolphin sightings is shown in *Appendix II*.

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) in the reporting period with the results presented in *Tables 2.12* and *2.13*.

**Table 2.12 Individual Survey Event Encounter Rates**

Survey Area	Survey period	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: 1 <sup>st</sup> / 6 <sup>th</sup> Dec 2016	0.0	0.0
	Set 2: 16 <sup>th</sup> / 19 <sup>th</sup> Dec 2016	0.0	0.0
	Set 3: 10 <sup>th</sup> /12 <sup>th</sup> Jan 2017	0.0	0.0
	Set 4: 16 <sup>th</sup> / 20 <sup>th</sup> Jan 2017	0.0	0.0
	Set 5: 7 <sup>th</sup> / 9 <sup>th</sup> Feb 2017	0.0	0.0
	Set 6: 16 <sup>th</sup> /21 <sup>st</sup> Feb 2017	0.0	0.0
NWL	Set 1: 1 <sup>st</sup> / 6 <sup>th</sup> Dec 2016	1.58	1.58
	Set 2: 16 <sup>th</sup> / 19 <sup>th</sup> Dec 2016	5.99	22.45
	Set 3: 10 <sup>th</sup> /12 <sup>th</sup> Jan 2017	0.00	0.00
	Set 4: 16 <sup>th</sup> / 20 <sup>th</sup> Jan 2017	6.27	20.38
	Set 5: 7 <sup>th</sup> / 9 <sup>th</sup> Feb 2017	0.00	0.00
	Set 6: 16 <sup>th</sup> /21 <sup>st</sup> Feb 2017	8.99	42.71

Note: Dolphin Encounter Rates are deduced from the six sets of surveys (two surveys in each set) in the reporting period in Northeast (NEL) and Northwest Lantau (NWL)

**Table 2.13** *Quarterly Average Encounter Rates*

Survey Area	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 2016 - February 2017	September - November 2011	December 2016 - February 2017	September - November 2011
Northeast Lantau	0.0	6.00 ± 5.05	0.0	22.19 ± 26.81
Northwest Lantau	3.80 ± 3.79	9.85 ± 5.85	14.52 ± 17.21	44.66 ± 29.85

Note: encounter rates deduced from the baseline monitoring period (September - November 2011) 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 one (1) to eight (8) individuals per group in North Lantau region during December 2016 to February 2017. 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 2.14*.

**Table 2.14** *Comparison of Quarterly Average Group Sizes*

	Average Dolphin Group Size	
	December 2016 - February 2017	September - November 2011
Overall	3.65 ± 2.37 (n = 17)	3.72 ± 3.13 (n = 66)
Northeast Lantau	---	3.18 ± 2.16 (n = 17)
Northwest Lantau	3.65 ± 2.37 (n = 17)	3.92 ± 3.40 (n = 49)

One (1) Limit Level exceedance was observed for the quarterly dolphin monitoring data between December 2016 and February 2017.

During this quarter of dolphin monitoring, no unacceptable impact from the activities of this Contract on Chinese White Dolphins was noticeable from the general observations.

Although the dolphins infrequently occurred along the alignment of TM-CLKL Southern Connection Viaduct in the past and during the baseline monitoring period, it is apparent that dolphin usage has been significantly reduced in both NEL and NWL, and many individuals have shifted away from the important habitat around the Brothers Islands.

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.



## 2.4.8 *Marine Mammal Exclusion Zone Monitoring*

Daily marine mammal exclusion zone monitoring was undertaken during the period of marine works under this Contract. No sighting of Chinese White Dolphin was recorded in the monitoring period during the exclusion zone monitoring.

Passive Acoustic Monitoring (PAM) was decommissioned in this reporting period as no marine piling works was carried out outside the daylight hours since September 2015. Daytime marine mammal exclusion zone was still in effect to cater for temporary staging installation and uninstallation works.

## 2.5 *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. Thirteenth (13) site inspections were carried out in the reporting quarter on 7, 14, 22 and 29 December 2016, 4, 11, 18 and 26 January 2017, 2, 7, 15, 24 and 28 February 2017.

Key observations during the site inspections in this reporting period are summarized in *Table 2.15*.

**Table 2.15** *Specific Observations Identified during the Weekly Site Inspection in this Reporting Period*

<b>Inspection Date</b>	<b>Location &amp; Environmental Observations</b>	<b>Recommendations/ Remarks</b>
7 December 2016	Viaduct B (B17) <ul style="list-style-type: none"> <li>NRMM labels were not displayed on air compressor.</li> <li>Sand bunds were not provided to avoid sediment runoff.</li> <li>Chemical container was not placed in drip tray.</li> </ul> Viaduct C (C17) <ul style="list-style-type: none"> <li>Stockpile was not fully covered by tarpaulin</li> </ul>	Viaduct B (B17) <ul style="list-style-type: none"> <li>The Contractor was reminded to display NRMM labels on air compressor.</li> <li>The Contractor was reminded to provide sand bunds.</li> <li>The Contractor was reminded to remove the chemical containers and placed them in drip tray.</li> </ul> Viaduct C (C17) <ul style="list-style-type: none"> <li>The Contractor was reminded cover stockpile by tarpaulin.</li> </ul>
14 December 2016	Seafront <ul style="list-style-type: none"> <li>Chemical container was not placed in drip tray.</li> </ul> Viaduct E (E13AB) <ul style="list-style-type: none"> <li>NRMM labels were not displayed on generator.</li> </ul> Viaduct E (E4) <ul style="list-style-type: none"> <li>Accumulated general refuse was observed.</li> </ul>	Seafront <ul style="list-style-type: none"> <li>The Contractor was reminded to remove the chemical containers and placed them in drip tray.</li> </ul> Viaduct E (E13AB) <ul style="list-style-type: none"> <li>The Contractor was reminded to display NRMM labels on generator.</li> </ul> Viaduct E (E4) <ul style="list-style-type: none"> <li>The Contractor was reminded to clear accumulated general refuse.</li> </ul>

Inspection Date	Location & Environmental Observations	Recommendations/ Remarks
22 December 2016	<p>Viaduct D (D9)</p> <ul style="list-style-type: none"> <li>Accumulated general refuse was observed.</li> </ul> <p>Viaduct D (D14)</p> <ul style="list-style-type: none"> <li>Chemical containers were not placed in drip tray.</li> </ul> <p>Ramp D</p> <ul style="list-style-type: none"> <li>Accumulated general refuse was observed.</li> </ul>	<p>Viaduct D (D9)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to clear accumulated general refuse.</li> </ul> <p>Viaduct D (D14)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to remove the chemical containers and placed them in drip tray.</li> </ul> <p>Ramp D</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to clear accumulated general refuse.</li> </ul>
29 December 2016	<p>Viaduct E (E8)</p> <ul style="list-style-type: none"> <li>Chemical containers were not placed in drip tray.</li> </ul> <p>Viaduct B (near LG1)</p> <ul style="list-style-type: none"> <li>Chemical containers were not placed in drip tray.</li> <li>Water inside drip tray was observed.</li> <li>NRMM labels were not properly displayed on generator.</li> </ul>	<p>Viaduct E (E8)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to remove the chemical containers and placed them in drip tray.</li> </ul> <p>Viaduct B (near LG1)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to remove the chemical containers and placed them in drip tray.</li> <li>The Contractor was reminded to clear water inside drip tray.</li> <li>The Contractor was reminded to properly display NRMM labels on generator.</li> </ul>
04 January 2017	<p>Viaduct E (E13CD)</p> <ul style="list-style-type: none"> <li>Chemical container was not placed in drip tray.</li> </ul> <p>Southern Landfall (Portion A)</p> <ul style="list-style-type: none"> <li>Chemical container was not placed in drip tray.</li> </ul>	<p>Viaduct E (E13CD)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to remove the chemical containers and placed them in drip tray.</li> </ul> <p>Southern Landfall (Portion A)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to remove the chemical containers and placed them in drip tray.</li> </ul>
11 January 2017	<p>Viaduct B (B16)</p> <ul style="list-style-type: none"> <li>Drip tray was not well-plugged to avoid water runoff.</li> <li>Tidiness should be maintained at site.</li> </ul> <p>Viaduct C (C16)</p> <ul style="list-style-type: none"> <li>Chemical container was not placed in drip tray.</li> </ul>	<p>Viaduct B (B16)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to plug the drip tray.</li> <li>The Contractor was reminded to keep tidiness at site.</li> </ul> <p>Viaduct C (C16)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to remove the chemical containers and placed them in drip tray.</li> </ul>
18 January 2017	<p>Viaduct E (E5)</p> <ul style="list-style-type: none"> <li>Chemical containers were not placed in drip tray.</li> </ul> <p>Southern Landfall (Portion A)</p> <ul style="list-style-type: none"> <li>Labelling of Mp sediment should be displayed properly.</li> </ul>	<p>Viaduct E (E5)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to remove the chemical containers and placed them in drip tray.</li> </ul> <p>Southern Landfall (Portion A)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to display the label properly.</li> </ul>
26 January 2017	<p>Viaduct E (E12)</p> <ul style="list-style-type: none"> <li>Better housekeeping should be maintained.</li> </ul>	<p>Viaduct E (E12)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to keep tidy of the site.</li> </ul>

Inspection Date	Location & Environmental Observations	Recommendations/ Remarks
02 February 2017	<p>Viaduct D (D13)</p> <ul style="list-style-type: none"> <li>Chemical container was not placed in drip tray.</li> <li>Accumulated general refuse was observed at site.</li> </ul> <p>Viaduct D (D18)</p> <ul style="list-style-type: none"> <li>Chemical container was not placed in drip tray.</li> </ul> <p>Ramp D</p> <ul style="list-style-type: none"> <li>Better housekeeping should be maintained.</li> <li>Oil leakage was observed nearby excavator.</li> </ul>	<p>Viaduct D (D13)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to remove the chemical containers and placed them in drip tray.</li> <li>The Contractor was reminded to clear the general refuse.</li> </ul> <p>Viaduct D (D18)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to remove the chemical containers and placed them in drip tray.</li> </ul> <p>Ramp D</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to keep better housekeeping at site.</li> <li>The Contractor was reminded to clear oil leakage.</li> </ul>
07 February 2017	<p>Southern Landfall (Portion A)</p> <ul style="list-style-type: none"> <li>NRMM label should be displayed properly on drill rig.</li> <li>Chemical container was not placed in drip tray</li> <li>Oil leakage was observed nearby power pack.</li> </ul>	<p>Southern Landfall (Portion A)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to display NRMM label properly on drill rig.</li> <li>The Contractor was reminded to remove the chemical containers and placed them in drip tray.</li> <li>The Contractor was reminded to clear oil leakage.</li> </ul>
15 February 2017	<p>Viaduct B (B16)</p> <ul style="list-style-type: none"> <li>Environmental Permit (EP) should be displayed at site or area nearby sensitive receiver.</li> </ul> <p>Viaduct B (B17)</p> <ul style="list-style-type: none"> <li>Watering was not maintained on unpaved area.</li> </ul> <p>Ramp B</p> <ul style="list-style-type: none"> <li>NRMM label should be displayed properly on excavator.</li> <li>Oil leakage was observed nearby excavator.</li> <li>Drip tray was observed not properly plugged.</li> </ul>	<p>Viaduct B (B16)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to display Environmental Permit (EP) at site or area nearby sensitive receiver.</li> </ul> <p>Viaduct B (B17)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to maintain watering on unpaved area.</li> </ul> <p>Ramp B</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to clearly display NRMM label on excavator.</li> <li>The Contractor was reminded to clear oil leakage.</li> <li>The Contractor was reminded to properly plug the drip tray.</li> </ul>
24 February 2017	<p>Viaduct B (Deck Pier B1)</p> <ul style="list-style-type: none"> <li>NRMM label should be displayed on the generator.</li> <li>Stagnant water was observed in the drip tray near air compressor.</li> </ul> <p>Southern Landfall (Portion A)</p> <ul style="list-style-type: none"> <li>Flow direction should be indicated on the pipe.</li> </ul>	<p>Viaduct B (Deck Pier B1)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to display NRMM label on the generator.</li> <li>The Contractor was reminded to clear stagnant water in the drip tray near air compressor.</li> </ul> <p>Southern Landfall (Portion A)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to provide indication of flow direction on the pipe.</li> </ul>
28 February 2017	<p>Viaduct E (E7)</p> <ul style="list-style-type: none"> <li>Chemicals were not placed in drip tray.</li> <li>General refuse was observed at site.</li> </ul> <p>Viaduct E (E12)</p> <ul style="list-style-type: none"> <li>Absorption pad should be provided nearby the drip tray of the generator.</li> </ul>	<p>Viaduct E (E7)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to place chemicals in drip tray.</li> <li>The Contractor was reminded to clear general refuse.</li> </ul> <p>Viaduct E (E12)</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to provide absorption pad nearby the drip tray of the generator.</li> </ul>

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

## 2.6 WASTE MANAGEMENT STATUS

The Contractor has 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), recyclable materials, chemical waste and marine sediment. 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 2.16*.

**Table 2.16 Quantities of Different Waste Generated in the Reporting Period**

Month/ Year	Inert Construction Waste (a) (m <sup>3</sup> )	Imported Fill (m <sup>3</sup> )	Inert Construction Waste Re- used (m <sup>3</sup> )	Non-inert Construction Waste (b) (kg)	Recyclable Materials (c) (kg)	Chemical Wastes (kg)	Marine Sediment (m <sup>3</sup> )	
							Category L	Category M
December 2016	3,397	0	732	130,900	63	0	990	0
January 2017	4,118	0	474	99,840	140	3,400	0	0
February 2017	4,869	0	166	127,270	91	0	0	0
<b>Total</b>	<b>12,384</b>	<b>0</b>	<b>1,372</b>	<b>358,010</b>	<b>294</b>	<b>3,400</b>	<b>990</b>	<b>0</b>

**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*.

## 2.7 ENVIRONMENTAL LICENSES AND PERMITS

The status of environmental licensing and permit is summarized in *Table 2.17* below.



**Table 2.17 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-353/2009/K	11-Apr-16	N/A	HyD	Hong Kong Boundary Crossing Facilities
Environmental Permit	EP-354/2009/D	13-Mar-15	N/A	HyD	Tuen Mun- Chek Lap Kok Link
Construction Dust Notification	361571	05-Jul-13	N/A	GCL	
Construction Dust Notification	362093	17-Jul-13	N/A	GCL	For Area 23
Chemical Waste Registration	5213-951-G2380-17	12-Jun-14	N/A	GCL	Viaducts A, B, C, D & E
Chemical Waste Registration	5213-961-G2380-13	10-Oct-13	N/A	GCL	Chemical waste produced in Contract No. HY/2012/07 (Area 1 adjacent to Cheng Tung Road, Siu Ho Wan)
Chemical Waste Registration	5213-961-G2380-14	10-Oct-13	N/A	GCL	Chemical waste produced in Contract No. HY/2012/07 (Area 2 adjacent to Cheung Tung Road, Pak Mong Village)
Chemical Waste Registration	5213-974-G2588-03	04-Nov-13	N/A	GCL	Chemical waste produced in Contract No. HY/2012/07 (WA5 adjacent to Cheung Tung Road, Yam O)
Construction Waste Disposal Account	7017735	10-Jul-13	N/A	GCL	-
Construction Waste Disposal Account	7019470	03-Mar-14	N/A	GCL	Vessel CHIT Account
Waste Water Discharge License	WT00019017-2014	13-May-14	31-May-19	GCL	Discharge for marine portion
Waste Water Discharge License	WT00019018-2014	13-May-14	31-May-19	GCL	Discharge for land portion
Construction Noise Permit for night works and works in general holidays	GW-RS1045-16	14-Oct-16	13-Apr-17	GCL	For Broad Permit
Construction Noise Permit for night works and works in general holidays	GW-RS1309-16	20-Dec-16	19-Jun-17	GCL	Broad Permit for Whole Site Areas
Construction Noise Permit for night works and works in general holidays	GW-RS0718-16	13-Jul-16	13-Jan-17	GCL	Pre-casted pile cap shell installation at E10-E13
Construction Noise Permit for night works and works in general holidays	GW-RS1044-16	14-Oct-16	13-Apr-17	GCL	Pre-casted pile cap shell installation at E8-E13
Construction Noise Permit for night works and works in general holidays	GW-RS0082-17	15-Feb-17	31-Mar-17	GCL	Water Pipe Works at Tung Chung
Construction Noise Permit for night works and works in general holidays	GW-RW0339-16	17-Jun-16	19-Dec-16	GCL	General works at WA5
Construction Noise Permit for night works and works in general holidays	GW-RW0708-16	20-Dec-16	18-Jun-17	GCL	General works at WA5

License/ Permit	License or Permit No.	Date of Issue	Date of Expiry	License/ Permit Holder	Remarks
Construction Noise Permit for night works and works in general holidays	GW-RS1159-16	24-Nov-16	28-Feb-17	GCL	Broad Permit for Segment Launching at Land Portion
Construction Noise Permit for night works and works in general holidays	GW-RS1158-16	24-Nov-16	31-Dec-16	GCL	Contingency plan for DN1000 works at Tung Chung Seafront Road
Marine Dumping Permit	EP-MD-17-115	20-Oct-16	31-Dec-16	GCL	For dumping Type I sediment
Marine Dumping Permit	EP-MD-17-153	01-Jan-17	30-Jun-17	GCL	For dumping Type I sediment
Marine Dumping Permit	EP-MD-17-141	24-Nov-16	31-Dec-16	GCL	For dumping Type I (Dedicated Site) and Type II sediment
Marine Dumping Permit	EP-MD-17-154	01-Jan-17	31-Jan-17	GCL	For dumping Type I (Dedicated Site) and Type II sediment
Marine Dumping Permit	EP-MD-17-168	01-Feb-17	28-Feb-17	GCL	For dumping Type I (Dedicated Site) and Type II sediment

2.8 **IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES**

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

A summary of the Environmental Mitigation and Enhancement Measure Implementation Schedules (EMIS) is presented in *Appendix C*. The necessary mitigation measures were implemented properly for this Contract.

2.9 **SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT**

Results for 1-hour TSP, 24-hour TSP, construction noise and water quality complied with the Action/ Limit levels in the reporting period.

The construction impact on depth-averaged SS was assessed by comparing the quarterly mean values of depth-averaged SS with the relevant ambient mean values (*Table 2.18*). The monitoring results showed that the quarterly means of depth-averaged SS at all sampling stations during both mid-ebb and mid-flood tides were well below the corresponding ambient means. The depth-averaged SS results suggest that the Project did not cause unacceptable impact on water quality in the reporting period.

**Table 2.18** *Comparison between Quarterly Mean and Ambient Mean Values of Depth-averaged Suspended Solids*

Station	Baseline Mean		Ambient Mean <sup>(a)</sup>		Quarterly Mean (December 2016 to February 2017)	
	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood
CS(Mf)3	9.2	12.8	12.0	16.6	10.4	10.1
CS(Mf)5	9.2	11.5	11.9	14.9	10.5	10.4
SR4	10.3	12.3	13.4	16.0	10.1	10.3
SR4a	9.1	9.8	11.9	12.7	10.1	10.1
IS8	11.3	13.5	14.6	17.6	10.1	10.3
IS(Mf)9	10.9	14.3	14.2	18.5	10.4	10.0
IS(Mf)16	11.4	10.3	14.8	13.4	10.1	10.1

**Notes:**

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

One (1) Limit Level exceedance was recorded for impact dolphin monitoring in this reporting quarter. Following the review of the monitoring data and marine works details as per the procedure stipulated in the Event and Action Plan of the Updated EM&A Manual, no unacceptable impact was associated with the construction works under this Contract that may have affected the dolphin usage in the North Lantau region. Investigation findings were detailed in *Appendix L*.

## 2.10

### ***SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS***

The Environmental Complaint Handling Procedure is provided in *Figure 2.5*.

There were two (2) complaints received in the reporting period. One complaint was received from EPD on 13 December 2016 regarding hammering noise nuisance generated during midnights in the reporting period. Another complaint was received from EPD on 13 January 2017 regarding constructional vessels and silt curtain found within the boundary of Brothers Marine Park in the reporting period. Upon investigation, the two complaints are considered not related to this Project. Statistics on complaint, notification of summons of successful prosecution are summarized in *Appendix L*.



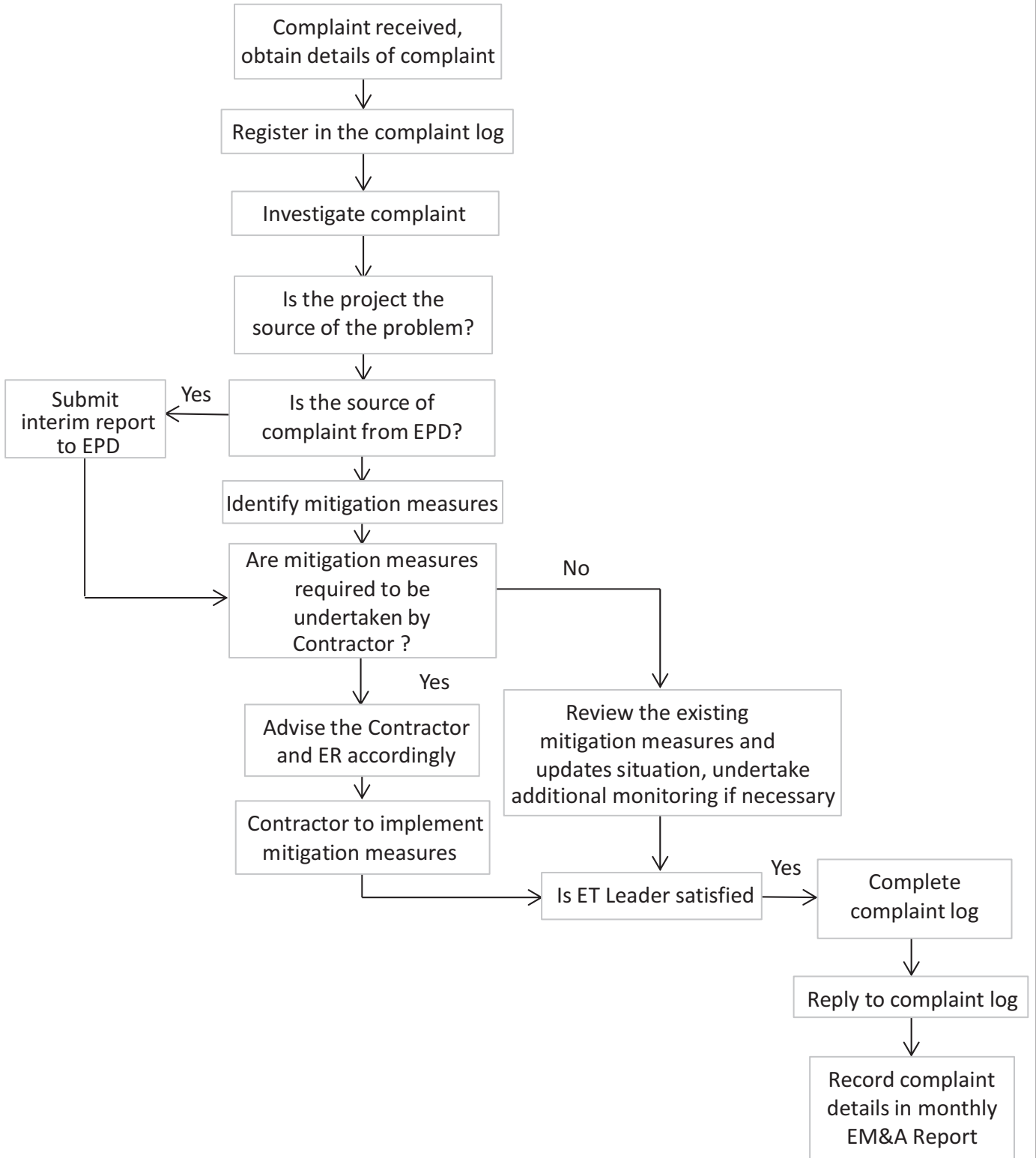


Figure 2.5

Environmental Complaint Handling Procedure

### 3 *FUTURE KEY ISSUES*

#### 3.1 *CONSTRUCTION ACTIVITIES FOR THE COMING QUARTER*

As informed by the Contractor, the major works for the Contract in the coming quarter are summarized below:

##### March 2017

###### *Marine Works*

- Uninstallation of marine piling platform;
- Pier construction;
- Launching gantry operation; and
- Installation of deck segment and pier head segment.

###### *Land-based Works*

- Pier construction;
- Re-alignment of Cheung Tung Road;
- Road works along North Lantau Highway;
- Installation of pier head and deck segments; and
- Slope work of Viaducts A, B & C.

##### April 2017

###### *Marine Works*

- Uninstallation of marine piling platform;
- Pier construction;
- Launching gantry operation; and
- Installation of deck segment and pier head segment.

###### *Land-based Works*

- Pier construction;
- Re-alignment of Cheung Tung Road;
- Road works along North Lantau Highway;

- Installation of pier head and deck segments; and
- Slope work of Viaducts A, B & C.

May 2017

*Marine Works*

- Uninstallation of marine piling platform;
- Pier construction;
- Launching gantry operation; and
- Installation of deck segment and pier head segment.

*Land-based Works*

- Pier construction;
- Re-alignment of Cheung Tung Road;
- Road works along North Lantau Highway;
- Installation of pier head and deck segments; and
- Slope work of Viaducts A, B & C.

**3.2**      *KEY ISSUES FOR THE COMING QUARTER*

Potential environmental impacts arising from the above upcoming construction activities are mainly associated with air quality, noise, marine water quality, marine ecology and waste management issues.

**3.3**      *MONITORING SCHEDULE FOR THE COMING QUARTER*

Impact monitoring for air quality, noise, marine water quality and 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.

#### 4.1 CONCLUSIONS

The Thirteenth Quarterly EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 December 2016 to 28 February 2017, in accordance with the Updated EM&A Manual and the requirements of the *Environmental Permits (EP-354/2009/D and EP-353/2009/K)*.

Neither Action Level nor Limit Level exceedances were observed for air quality, noise and water quality monitoring in this reporting period.

A total of seventeen (17) groups of sixty-two (62) Chinese White Dolphins were sighted during the six sets of survey from December 2016 to February 2017. One (1) Limit Level exceedance was recorded for the quarterly dolphin monitoring data between December 2016 and February 2017, no unacceptable impact from the activities of this Contract on Chinese White Dolphins was noticeable from the general observations. 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.

Environmental site inspection was carried out 13 times in the reporting period. Recommendations on remedial actions were given to the Contractor for the deficiencies identified during the site audits.

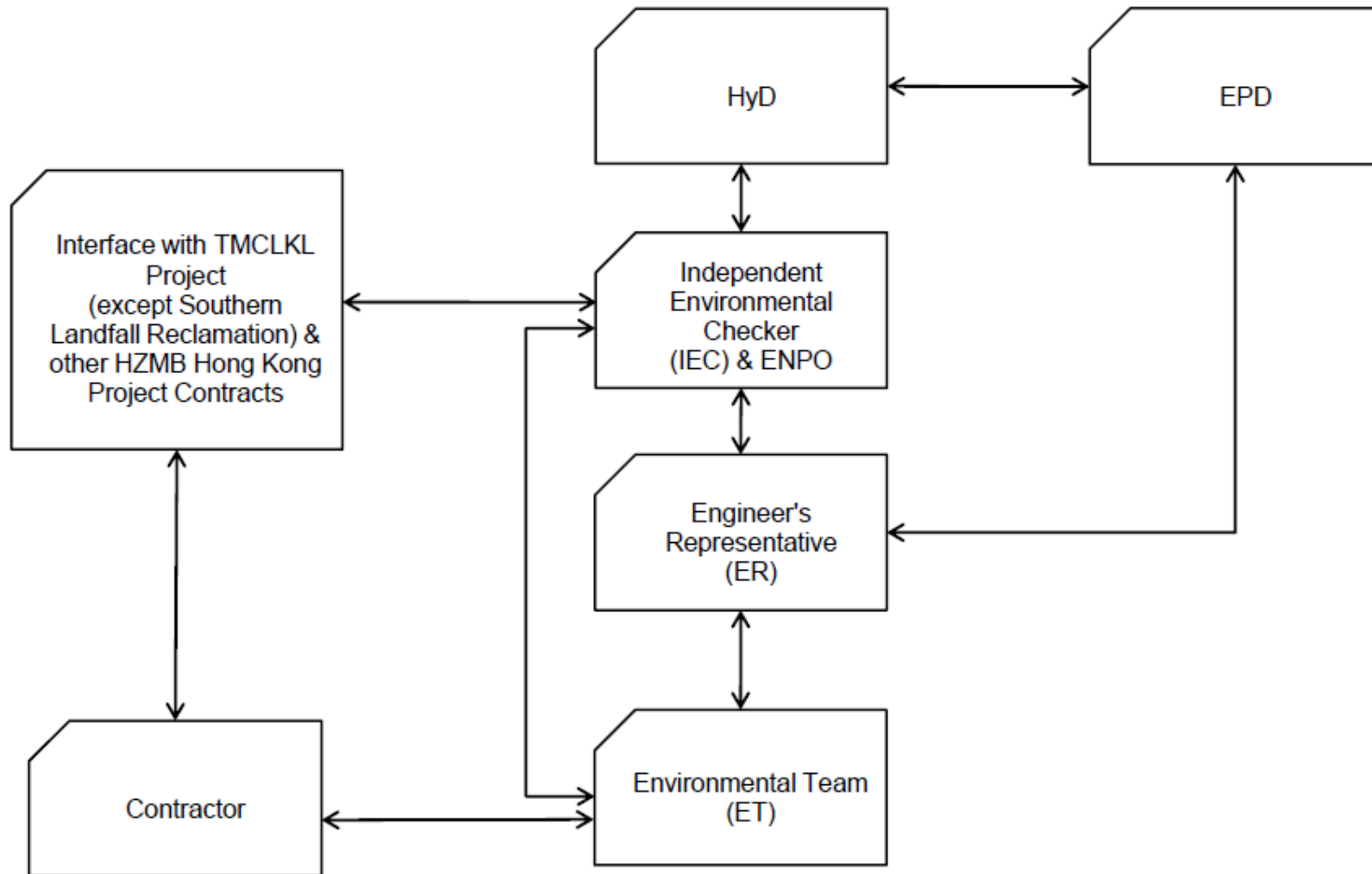
There were two environmental complaints in the reporting period. No notification of summon or successful prosecution in the reporting period.

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



↔ Line of Communication

Appendix B

## Construction Programme for the Reporting Quarter

Activity ID	Activity Name	Orig. Durn.	Act. Start / FC Early Start	Rem. Durn.	Act. Finish / FC Early Finish	Late Start	Late Finish	Total Float	Physical % Complete	2016						2017								
										December						January			February			March		
										21	28	05	12	19	26	02	09	16	23	30	06	13	20	27
<b>Contract Milestones</b>																								
<b>Key Dates for Completion</b>																								
<b>Stage of the Works</b>																								
<b>Completion Date</b>																								
<b>General</b>																								
KD03	KD3 - Stage 3: TCSS Along NLH Near Viaduct C, D (EoT 5-Apr-16)	0		0	21-Dec-16*		05-Apr-16	-259	0%															
<b>Portion Handover Dates</b>																								
<b>Possession of the Works Area</b>																								
<b>Access Dates</b>																								
<b>General</b>																								
POS02-6B	Portion A - Area 6B (To be confirmed)	0	31-Dec-16*	0		15-Dec-15		-382	0%															
<b>Design</b>																								
<b>Detailed Design</b>																								
<b>General Submissions</b>																								
<b>Reports &amp; Manuals</b>																								
<b>General</b>																								
ARDD0037-7	Preparation of Seismic Performance Report Viaduct F - AP12.03	160	21-Aug-15 A	16	11-Jan-17	16-Mar-16	07-Apr-16	-229	100%															
ARDD0037-8	IC/SO Approval of Seismic Performance Report Viaduct F - AP12.03	75	12-Jan-17	75	13-Apr-17	08-Apr-16	08-Jul-16	-229	0%															
ARDD0040-2	IC/SO Approval of Operation and Maintenance Manual - AP08.00	75	20-Oct-15 A	16	11-Jan-17	20-Jun-16	08-Jul-16	-154	0%															
ARDD0042-2	IC/SO Approval of O&M Facility Provisions DDA - BP11.01	75	14-Jan-15 A	16	11-Jan-17	20-Jun-16	08-Jul-16	-154	50%															
<b>Slope Works Near Viaduct A</b>																								
<b>Feature 9SE-B/FR8, B/R1, B/R2</b>																								
<b>Slope Works Design</b>																								
ARDD0596	Preparation of remaining portion of Slope FR8 Combined AIP/DDA - CP11.	35	21-Dec-16	35	06-Feb-17	18-Dec-15	30-Jan-16	-299	0%															
ARDD0596-1	IC/SO Approval of Slope Combined AIP/DDA - CP11.01	60	07-Feb-17	60	21-Apr-17	01-Feb-16	18-Apr-16	-299	0%															
<b>Slope Works Near Viaduct C</b>																								
<b>Feature 10NW-C/C22, C/C26, C/C27, C/F13, C/F14, C/F15</b>																								
<b>Slope Works Design</b>																								
ARDD0589-1	Preparation of Slope Combined AIP/DDA - CP13.01	60	03-Jan-17*	60	16-Mar-17	19-Jul-16	27-Sep-16	-138	0%															
ARDD0589-2	IC/SO Approval of Combined AIP/DDA - CP13.01	28	16-Mar-17	28	13-Apr-17	28-Sep-16	25-Oct-16	-170	0%															
ARDD0590	Newfill slopes PF1 & PF2 Preparation of Combined AIP/DDA - CP13.01	60	21-Dec-16	60	07-Mar-17	05-Jul-16	12-Sep-16	-142	0%															
ARDD0590-1	New fill slopes PF1 & PF2 IC/SO Approval of combined AIP/DDA - CP13.0	28	08-Mar-17	28	10-Apr-17	13-Sep-16	18-Oct-16	-142	0%															
<b>Slope Works Near Viaduct D</b>																								
<b>Feature 10NW-C/R4, C/F9, C/F10, C/F11, C/F17, C/F50</b>																								
<b>Slope Works Design</b>																								
ARDD0603	IC/SO Approval of Slope Combined AIP/DDA -CP14.01	75	16-Dec-14 A	7	30-Dec-16	17-Feb-16	24-Feb-16	-253	75%															
ARDD0603-1	IC/SO Approval of Slope Combined AIP/DDA -CP14.01	0		0	30-Dec-16		24-Feb-16	-253	0%															
<b>Watermain, Drainage &amp; Utility Diversions</b>																								
<b>General</b>																								
<b>Design</b>																								
ARDD0629	IC/SO Approval of Waterworks, Drainage & Utility DDA - BP20.01	75	22-Jul-14 A	22	18-Jan-17	01-Mar-16	29-Mar-16	-242	95%															
ARDD0629-1	IC/SO Approval of Waterworks, Drainage & Utility DDA - BP20.01	0		0	18-Jan-17		29-Mar-16	-242	0%															
ARDD0629-2	Gov't Approval of Submissions for Waterworks, Drainage & Utility Diversior	75	02-Jan-14 A	22	18-Jan-17	01-Mar-16	29-Mar-16	-242	95%															
<b>Viaduct Approach Ramp Retaining Walls</b>																								
<b>Abutment &amp; Approach Ramp B</b>																								
<b>Design</b>																								
ARDD0664	Approach B - IC/SO Approval of Approach Ramp B DDA -DP21.01	75	14-Oct-14 A	4	24-Dec-16	09-Mar-16	12-Mar-16	-235	95%															
ARDD0664-1	Approach B - IC/SO Approval of Approach Ramp B DDA -DP21.01	0		0	24-Dec-16		12-Mar-16	-235	0%															
<b>Abutment &amp; Approach Ramp F</b>																								
<b>Design</b>																								
ARDD0676	Approach F - IC/SO Approval of Approach Ramp F DDA -DP24.01	75	23-Dec-14 A	34	04-Feb-17	13-May-16	23-Jun-16	-184	70%															
ARDD0676-1	Approach F - IC/SO Approval of Approach Ramp F DDA -DP24.01	0		0	04-Feb-17		23-Jun-16	-184	0%															
<b>Segment Target Geometry &amp; Erection Engineering</b>																								
<b>Viaduct A</b>																								

■ Actual Work  
■ Planned Bar  
■ Critical Bar  
◆ Milestone

Project ID: TMCLK-DWPH-M43  
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 Milestones, No Level of Effort.

**Tuen Mun - Chek Lap Kok Link - Southern Connection**  
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31-Oct-16		PKN	GL
30-Nov-...		PKN	GL
03-Jan-17		PKN	GL

**DWG. No.:**  
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Activity ID	Activity Name	Orig. Durn.	Act. Start / FC Early Start	Rem. Durn.	Act. Finish / FC Early Finish	Late Start	Late Finish	Total Float	Physical % Complete	2016							2017																								
										December							January			February				March																	
										21	28	05	12	19	26	02	09	16	23	30	06	13	20	27	06	13	20														
<b>Design</b>																																									
ARDD0717	Viaduct A - Erection Sequence Analysis	31	23-Jan-16 A	0	25-Nov-16 A				100%																																
ARDD0718	Viaduct A - Target Geometry Analysis	20	21-Dec-16	20	16-Jan-17	12-Mar-20	03-Apr-20	952	0%																																
ARDD0719	Viaduct A - Segment Geometry Schedules	10	25-Oct-16 A	0	25-Nov-16 A				100%																																
ARDD0719-5	Viaduct A - Issue Erection Manual	20	21-Dec-16	20	16-Jan-17	06-Feb-16	04-Mar-16	-258	0%																																
<b>Viaduct E5 &amp; E6</b>																																									
<b>Design</b>																																									
ARDD0734	Viaduct E5 & E6 - Segment Geometry Schedules	10	05-May-14 A	34	04-Feb-17	08-Sep-15	19-Oct-15	-383	90%																																
TGP0570	Viaduct E5 & E6 - Issue of Optimised Casting Data and Segment Catalogue	40	30-Apr-15 A	34	04-Feb-17	08-Sep-15	19-Oct-15	-383	90%																																
TGP0590	Viaduct E5 & E6 - Issue Erection Manual	10	06-Feb-17	10	16-Feb-17	20-Oct-15	31-Oct-15	-383	0%																																
<b>Viaduct E7 &amp; E8</b>																																									
<b>Design</b>																																									
ARDD0739	Viaduct E7 & E8 - Segment Geometry Schedules	10	05-May-14 A	34	04-Feb-17	08-Sep-15	19-Oct-15	-383	90%																																
TGP0760	Viaduct E7 & E8 - Issue of Optimised Casting Data and Segment Catalogue	40	31-Jul-15 A	34	04-Feb-17	08-Sep-15	19-Oct-15	-383	90%																																
TGP0790	Viaduct E7 & E8 - Issue Erection Manual	10	06-Feb-17	10	16-Feb-17	20-Oct-15	31-Oct-15	-383	0%																																
<b>Viaduct F</b>																																									
<b>Design</b>																																									
ARDD0752	Viaduct F - Erection Sequence Analysis	13	21-Dec-16*	13	07-Jan-17	09-Oct-15	24-Oct-15	-358	0%																																
ARDD0753	Viaduct F - Target Geometry Analysis	30	09-Jan-17	30	15-Feb-17	26-Oct-15	28-Nov-15	-358	0%																																
ARDD0754	Viaduct F - Segment Geometry Schedules	10	16-Feb-17	10	27-Feb-17	30-Nov-15	10-Dec-15	-358	0%																																
ARDD0754-1	Viaduct F - Issue of Pierhead Segments Bridge F1, F2, F3, F4 & F5	0		0	27-Feb-17		03-Apr-20	919	0%																																
ARDD0754-3	Viaduct F - Issue of Casting Data and Segment Catalogue Bridge F1, F3 (f	0		0	27-Feb-17		03-Apr-20	919	0%																																
ARDD0754-4	Viaduct F - Issue of Casting Data and Segment Catalogue Bridge F2, F4, F	0		0	27-Feb-17		10-Dec-15	-358	0%																																
ARDD0754-5	Viaduct F - Issue Erection Manual	30	28-Feb-17	30	03-Apr-17	11-Dec-15	18-Jan-16	-358	0%																																
<b>Procurement</b>																																									
<b>Deck Segment Installation Equipment</b>																																									
<b>Traveling Hanging Beams</b>																																									
<b>Viaduct A to F</b>																																									
<b>Equipment Delivery</b>																																									
PR67050	Steelworks for THB 3.0 - Batch 1	0		0	21-Dec-16*		03-Apr-20	972	0%																																
PR67060	Steelworks for THB 3.0 - Batch 2	0		0	21-Dec-16*		03-Apr-20	972	0%																																
<b>K-Frames</b>																																									
<b>Viaduct A to F</b>																																									
<b>Equipment Delivery</b>																																									
PR67120	Steelworks for K-Frame	0		0	31-Dec-16*		03-Apr-20	964	0%																																
PR67130	Hydraulic for K-Frame	0		0	27-Jan-17*		03-Apr-20	942	0%																																
<b>Strand Jacks</b>																																									
<b>Viaduct A to F</b>																																									
<b>Equipment Delivery</b>																																									
PR67140	Steelworks for 294T Strand Jack module	0		0	31-Dec-16*		03-Apr-20	964	0%																																
PR67150	Hydraulic for 294T Strand Jack	0		0	27-Jan-17*		03-Apr-20	942	0%																																
<b>Crab</b>																																									
<b>Viaduct A to F</b>																																									
<b>Equipment Delivery</b>																																									
PR67160	Steelworks for 294T Crab - Batch 1	0		0	31-Dec-16*		03-Apr-20	964	0%																																
PR67170	Steelworks for 294T Crab - Batch 2	0		0	14-Jan-17*		03-Apr-20	953	0%																																
<b>Travelling Hanging Beams (Self-Launch)</b>																																									
<b>Viaduct A to F</b>																																									
<b>Equipment Delivery</b>																																									
PR67070	Steelworks for Self-Launching System - Batch 1	0		0	21-Dec-16*		03-Apr-20	972	0%																																
PR67080	Steelworks for Self-Launching System - Batch 2	0		0	21-Dec-16*		03-Apr-20	972	0%																																
PR67090	Steelworks for Self-Launching System - Batch 3	0		0	21-Dec-16*		03-Apr-20	972	0%																																
PR67100	2 nos. Hydraulic Cylinder & Associated Accessories for Spare	0		0	21-Dec-16*		03-Apr-20	972	0%																																
PR67110	Power Pack for Hydraulic System for Self-Launching System	0		0	21-Dec-16*		03-Apr-20	972	0%																																
<b>Precast Deck Segments</b>																																									
<b>Preliminaries</b>																																									

■ Actual Work  
■ Planned Bar  
■ Critical Bar  
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**Tuen Mun - Chek Lap Kok Link - Southern Connection**  
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**(Progress as of 21-Dec-16)**

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										December						January			February			March								
										21	28	05	12	19	26	02	09	16	23	30	06	13	20	27	06	13	20			
<b>Viaduct F</b>																														
<b>General</b>																														
MBBE0054	Precast Segment Mould Design (Viaduct F1 to F5)	42	01-Sep-16 A	16	11-Jan-17	30-Jan-20	17-Feb-20	916	0%																					
MBBE0056	Precast Segment Mould Fabrication & Erection (Viaduct F1 to F5)	52	28-Dec-16	52	02-Mar-17	04-Feb-20	03-Apr-20	916	0%																					
<b>Viaduct A - Bridge A2-A1</b>																														
<b>Segment Manufacture</b>																														
<b>General</b>																														
MBAE0130-1	A: Progressive Segment Manufacture (179 Nr)	180	13-Jun-16 A	115	17-May-17	12-Feb-16	04-Jul-16	-257	44.7%																					
<b>Viaduct E - Bridge E1</b>																														
<b>Segment Manufacture</b>																														
<b>General</b>																														
MBEE0130-5	E1: Progressive Segment Manufacture (188 Nr)	456	08-Apr-15 A	2	22-Dec-16	02-Apr-20	03-Apr-20	970	99.5%																					
<b>Viaduct E - Bridge E2</b>																														
<b>Segment Manufacture</b>																														
<b>General</b>																														
MBEE0130-7	E2: Progressive Segment Manufacture (404 Nr)	376	06-May-15 A	126	31-May-17	21-Dec-15	28-May-16	-297	82.2%																					
<b>Viaduct E - Bridge E5, E6, E7, E8</b>																														
<b>Segment Manufacture</b>																														
<b>General</b>																														
MBEE0130-9	E5-6-7-8: Progressive Segment Manufacture (544Nr)	360	06-May-15 A	206	02-Sep-17	15-Oct-15	27-Jun-16	-353	34.9%																					
<b>Viaduct F - Bridge F1-F5</b>																														
<b>Segment Manufacture</b>																														
<b>General</b>																														
MBFE0130-1	F: Progressive Segment Manufacture (300 Nr)	252	27-Oct-16 A	214	12-Sep-17	15-Apr-16	30-Dec-16	-207	10%																					
<b>Precast Parapets &amp; Barriers</b>																														
<b>Viaduct A to F</b>																														
<b>Precast Parapet Manufacture</b>																														
<b>General</b>																														
PP6011-01	Viaduct A - Precast Parapets/Barriers Production	90	01-Sep-16 A	178	01-Aug-17	02-Feb-16	08-Sep-16	-263	0%																					
PP6011-02	Viaduct B - Precast Parapets/Barriers Production	120	03-May-16 A	152	30-Jun-17	07-Mar-16	08-Sep-16	-237	0%																					
PP6011-03	Viaduct C - Precast Parapets/Barriers Production	120	01-Apr-16 A	128	02-Jun-17	03-Dec-15	12-May-16	-312	0%																					
PP6011-04	Viaduct D - Precast Parapets/Barriers Production	120	01-Mar-16 A	128	02-Jun-17	03-Dec-15	12-May-16	-312	0%																					
PP6011-05	Viaduct E - Precast Parapets/Barriers Production	180	02-Jul-16 A	256	03-Nov-17	08-Dec-15	20-Oct-16	-308	0%																					
<b>Bearings</b>																														
<b>Viaduct A</b>																														
<b>Bearing Design &amp; Manufacture</b>																														
<b>General</b>																														
PPBRA5	SO review & comment on design submission - Viaduct A	36	21-Oct-16 A	10	04-Jan-17	08-Apr-16	19-Apr-16	-213	0%																					
PPBRA6	Bearing Design Amendment & re-issue - Viaduct A	12	05-Jan-17	12	18-Jan-17	20-Apr-16	04-May-16	-213	0%																					
PPBRA7	Manufacture of Bearing - Viaduct A	54	21-Oct-16 A	28	25-Jan-17	31-Mar-16	04-May-16	-219	0%																					
PPBRA8	Testing Bearing - Viaduct A	18	26-Jan-17	18	18-Feb-17	05-May-16	26-May-16	-219	0%																					
PPBRA9	Bearing Delivery - Viaduct A	48	20-Feb-17	48	20-Apr-17	27-May-16	23-Jul-16	-219	0%																					
<b>Viaduct C</b>																														
<b>Bearing Design &amp; Manufacture</b>																														
<b>General</b>																														
PPBRC6	Bearing Design Ammendment & re-issue - Viaduct C	11	21-Dec-16	11	05-Jan-17	16-Mar-20	27-Mar-20	955	0%																					
PPBRC99	Site preparation Bearings for Viaduct C	6	06-Jan-17	6	12-Jan-17	28-Mar-20	03-Apr-20	955	0%																					
<b>Viaduct D</b>																														
<b>Bearing Design &amp; Manufacture</b>																														
<b>General</b>																														
PPBRD99	Site preparation Bearings for Viaduct D	38	21-Dec-16	38	09-Feb-17	22-Feb-16	09-Apr-16	-249	0%																					
<b>Viaduct E</b>																														
<b>Bearing Design &amp; Manufacture</b>																														
<b>General</b>																														

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										December					January					February					March				
										21	28	05	12	19	26	02	09	16	23	30	06	13	20	27	06	13	20		
PP7290	Site preparation Bearings for Viaduct E2	18	27-Apr-16 A	13	07-Jan-17	10-Mar-16	24-Mar-16	-234	0%																				
PP7360	Site preparation Bearings for Viaduct E1	18	10-Feb-15 A	2	22-Dec-16	02-Apr-20	03-Apr-20	970	0%																				
PPBRE3	Bearing design and submission - Viaduct E (E1, E2, E5, E6, E7 & E8)	12	28-Nov-13 A	3	23-Dec-16	08-Dec-15	10-Dec-15	-308	85%																				
PPBRE4	Design check by ICE - Viaduct E (E1, E2, E5, E6, E7 & E8)	24	04-Apr-14 A	3	10-Jan-17	22-Dec-15	24-Dec-15	-308	85%																				
PPBRE5	SO review & comment on design submission - Viaduct E (E1, E2, E5, E6, E7 & E8)	36	26-Sep-14 A	0	24-Jan-17	11-Jan-16	11-Jan-16	-308	100%																				
PPBRE6	Bearing Design Amendment & re-issue - Viaduct E (E1, E2, E5, E6, E7 & E8)	12	25-Jan-17	12	10-Feb-17	12-Jan-16	25-Jan-16	-308	0%																				
PPBRE7	Manufacture of Bearing - Viaduct E (E1, E2, E5, E6, E7 & E8)	54	02-Jun-14 A	13	10-Feb-17	11-Jan-16	25-Jan-16	-308	100%																				
PPBRE8	Testing Bearing - Viaduct E (E1, E2, E5, E6, E7 & E8)	24	03-Aug-15 A	0	25-Feb-17	11-Feb-16	11-Feb-16	-308	100%																				
PPBRE9	Bearing Delivery - Viaduct E (E1, E2, E5, E6, E7 & E8)	48	19-Nov-14 A	59	08-Apr-17	13-Jan-16	24-Mar-16	-308	100%																				
<b>Viaduct F</b>																													
<b>Bearing Design &amp; Manufacture</b>																													
<b>General</b>																													
PPBRF1	Preliminary Design of Bearings - Viaduct F	60	21-Oct-16 A	34	04-Feb-17	29-Jul-15	07-Sep-15	-417	0%																				
PPBRF3	Bearing design and submission - Viaduct F	12	06-Feb-17	12	18-Feb-17	08-Sep-15	21-Sep-15	-417	0%																				
PPBRF4	Design check by ICE - Viaduct F	12	20-Feb-17	12	04-Mar-17	22-Sep-15	07-Oct-15	-417	0%																				
PPBRF5	SO review & comment on design submission - Viaduct F	24	06-Mar-17	24	01-Apr-17	06-Nov-15	03-Dec-15	-393	0%																				
PPBRF7	Manufacture of Bearing - Viaduct F	48	06-Mar-17	48	06-May-17	08-Oct-15	03-Dec-15	-417	0%																				
<b>Movement Joints</b>																													
<b>Viaduct A to F</b>																													
<b>MJ Design &amp; Manufacture</b>																													
<b>General</b>																													
PP6MJ01	Design & Submission of MJ	138	08-Feb-14 A	8	31-Dec-16	10-Mar-16	18-Mar-16	-234	30%																				
PP6MJ02-1	MJ Design Approval	96	26-May-14 A	32	02-Feb-17	01-Mar-16	11-Apr-16	-242	40%																				
PP6MJ02-2	Manufacture & delivery of MJ	150	03-Jan-17	150	08-Jul-17	10-Mar-16	09-Sep-16	-242	0%																				
<b>Construction</b>																													
<b>Foundation &amp; Substructure Works</b>																													
<b>Viaduct A - Bridge A2</b>																													
<b>Pier A1 (A2e)</b>																													
<b>Pier Head Segment</b>																													
A01-C5210	A1 - PHS - Temporary Platform	12	19-Dec-16 A	10	04-Jan-17	15-Feb-16	25-Feb-16	-255	17%																				
A01-C5310	A1 - Install PH Segment A1-A2 (1 nr)	2	05-Jan-17*	2	06-Jan-17	26-Feb-16	27-Feb-16	-255	0%																				
A01-C5320	A1 - Install PH Segment A1-E1 (1 nr)	2	07-Jan-17	2	09-Jan-17	29-Feb-16	01-Mar-16	-255	0%																				
<b>Pier A3 (A2c)</b>																													
<b>Pier Head Segment</b>																													
A03-C5210	A3 - PHS - Temporary Platform	12	01-Mar-17	12	14-Mar-17	08-Apr-16	21-Apr-16	-267	0%																				
A03-C5310	A3 - Install PH Segment (1 nr)	2	15-Mar-17*	2	16-Mar-17	22-Apr-16	23-Apr-16	-267	0%																				
A03-C5410	A3 - PHS Diaphragm - Rebar, Formwork, Concreting	30	17-Mar-17	30	25-Apr-17	25-Apr-16	31-May-16	-267	0%																				
<b>Pier A4 (A2b)</b>																													
<b>Pier Head Segment</b>																													
A04-C5210	A4 - PHS - Temporary Platform	12	26-Jan-17	12	11-Feb-17	01-Mar-16	15-Mar-16	-269	0%																				
A04-C5310	A4 - Install PH Segment (1nr)	2	13-Feb-17*	2	14-Feb-17	15-Mar-16	17-Mar-16	-269	0%																				
A04-C5410	A4 - PHS Diaphragm - Rebar, Formwork, Concreting	30	15-Feb-17	30	21-Mar-17	17-Mar-16	26-Apr-16	-269	0%																				
<b>Pier A5 (A2a)</b>																													
<b>Pier Head Segment</b>																													
A05-C5210	A5 - PHS - Temporary Platform	12	23-Dec-16	12	09-Jan-17	26-Jan-16	12-Feb-16	-270	0%																				
A05-C5310	A5 - Install PH Segment (1 nr)	2	10-Jan-17*	2	11-Jan-17	12-Feb-16	15-Feb-16	-270	0%																				
A05-C5410	A5 - PHS Diaphragm - Rebar, Formwork, Concreting	30	12-Jan-17	30	18-Feb-17	15-Feb-16	21-Mar-16	-270	0%																				
A05-C5420	A5 - PHS Diaphragm - Curing & Striking of Forms	6	20-Feb-17	6	25-Feb-17	21-Mar-16	01-Apr-16	-269	0%																				
<b>Pier A6 (A1f)</b>																													
<b>Pier Head Segment</b>																													
A06-C5210	A6 - PHS - Temporary Platform	12	14-Dec-16 A	6	29-Dec-16	19-Jan-16	25-Jan-16	-275	0%																				
A06-C5310	A6 - Install PH Segment A6-A5 (1 nr)	2	30-Dec-16*	2	31-Dec-16	26-Jan-16	27-Jan-16	-275	0%																				
A06-C5320	A6 - Install PH Segment A6-A7 (1 nr)	2	07-Jan-17*	2	09-Jan-17	28-Jan-16	29-Jan-16	-279	0%																				
<b>Viaduct A - Bridge A1</b>																													
<b>Pier A7 (A1e)</b>																													
<b>Pier Head Segment</b>																													
A07-C5410	A7 - PHS Diaphragm - Rebar, Formwork, Concreting	24	12-Nov-16 A	0	10-Dec-16 A				100%																				

■ Actual Work  
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 Layout: J3518-DWP-3MRP Submission - M43  
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 Milestones, No Level of Effort.

**Tuen Mun - Chek Lap Kok Link - Southern Connection**  
**3-Month Rolling Programme (Page 4 of 13 Pages)**  
**(Progress as of 21-Dec-16)**

Date	Revision	Checked	Approved
31-Oct-16		PKN	GL
30-Nov-...		PKN	GL
03-Jan-17		PKN	GL

**DWG. No.:**  
**J3518/GCL/PGM/3MRP-M43**









Activity ID	Activity Name	Orig. Durn.	Act. Start / FC Early Start	Rem. Durn.	Act. Finish / FC Early Finish	Late Start	Late Finish	Total Float	Physical % Complete	2016						2017												
										December						January			February			March						
										21	28	05	12	19	26	02	09	16	23	30	06	13	20	27	06	13	20	
<b>Pier E7A (E2e2)</b>																												
<b>Pier Head Segment</b>																												
E07A-C5130	E7A - Diaphragm of PHS - Formwork, Rebar, Concreting	71	08-Oct-16 A	0	14-Dec-16 A				100%																			
E07A-C5140	E7A - Remove Rail Beams, Crane	14	21-Dec-16	14	09-Jan-17	28-Jan-16	16-Feb-16	-267	0%																			
E07A-C5145	E7A - Install Infill Segments (4 nr) - THB	18	10-Jan-17	18	02-Feb-17	17-Feb-16	08-Mar-16	-267	0%																			
E07A-C5150	E7A - IFS Stitch & Remove Equipment	10	03-Feb-17	10	14-Feb-17	09-Mar-16	19-Mar-16	-267	0%																			
<b>Pier E7B (E2e1)</b>																												
<b>Pier Head Segment</b>																												
E07B-C5130	E7B - Diaphragm of PHS - Formwork, Rebar, Concreting	76	14-Oct-16 A	22	18-Jan-17	07-Nov-15	02-Dec-15	-334	40%																			
E07B-C5140	E7B - Remove Rail Beams	15	19-Jan-17	15	08-Feb-17	03-Dec-15	19-Dec-15	-334	0%																			
E07B-C5145	E7B - Install Infill Segments (4 nr) - THB	18	06-Mar-17*	18	25-Mar-17	21-Dec-15	13-Jan-16	-355	0%																			
<b>Pier E8A (E2f2)</b>																												
<b>Pier Head Segment</b>																												
E08A-C5130	E8A - Diaphragm of PHS - Formwork, Rebar, Concreting	82	28-Sep-16 A	8	31-Dec-16	27-Oct-15	04-Nov-15	-344	80%																			
E08A-C5140	E8A - Remove Rail Beams, Crane	8	03-Jan-17	8	11-Jan-17	05-Nov-15	13-Nov-15	-344	0%																			
E08A-C5145	E8A - Install Infill Segments (4 nr) - THB	18	12-Jan-17	18	04-Feb-17	14-Nov-15	04-Dec-15	-344	0%																			
E08A-C5150	E8A - IFS Stitch & Remove Equipment	10	06-Feb-17	10	16-Feb-17	05-Dec-15	16-Dec-15	-344	0%																			
<b>Pier E8B (E2f1)</b>																												
<b>Pier Head Segment</b>																												
E08B-C5130	E8B - Diaphragm of PHS - Formwork, Rebar, Concreting	61	26-Oct-16 A	14	09-Jan-17	19-Mar-16	08-Apr-16	-226	60%																			
E08B-C5140	E8B - Remove Rail Beams	8	10-Jan-17	8	18-Jan-17	09-Apr-16	18-Apr-16	-226	0%																			
E08B-C5145	E8B - Install Infill Segments (4 nr) - THB	18	19-Jan-17	18	11-Feb-17	19-Apr-16	10-May-16	-226	0%																			
E08B-C5150	E8B - IFS Stitch & Remove Equipment	10	13-Feb-17	10	23-Feb-17	11-May-16	23-May-16	-226	0%																			
<b>Pier E9A (E2g2)</b>																												
<b>Pier Head Segment</b>																												
E09A-C5130	E9A - Diaphragm of PHS - Formwork, Rebar, Concreting	86	23-Sep-16 A	10	04-Jan-17	21-Dec-15	04-Jan-16	-297	60%																			
E09A-C5140	E9A - Remove Rail Beams, Crane	14	05-Jan-17	14	20-Jan-17	05-Jan-16	20-Jan-16	-297	0%																			
E09A-C5145	E9A - Install Infill Segments (4 nr) - THB	18	06-Feb-17*	18	25-Feb-17	21-Jan-16	13-Feb-16	-307	0%																			
E09A-C5150	E9A - IFS Stitch & Remove Equipment	10	27-Feb-17	10	09-Mar-17	15-Feb-16	25-Feb-16	-307	0%																			
<b>Pier E9B (E2g1)</b>																												
<b>Pier Head Segment</b>																												
E09B-C5130	E9B - Diaphragm of PHS - Formwork, Rebar, Concreting	33	17-Oct-16 A	24	20-Jan-17	13-Feb-16	11-Mar-16	-256	50%																			
E09B-C5140	E9B - Remove Rail Beams	8	21-Jan-17	8	02-Feb-17	12-Mar-16	21-Mar-16	-256	0%																			
<b>Pier E10A (E2h2)</b>																												
<b>Pier Head Segment</b>																												
E10A-C5130	E10A - Diaphragm of PHS - Formwork, Rebar, Concreting	56	15-Oct-16 A	11	05-Jan-17	26-Apr-16	09-May-16	-198	50%																			
E10A-C5140	E10A - Remove Rail Beams, Crane	13	06-Jan-17	13	20-Jan-17	10-May-16	25-May-16	-198	0%																			
E10A-C5145	E10A - Install Infill Segments (4 nr) - THB	17	01-Mar-17*	17	20-Mar-17	26-May-16	15-Jun-16	-228	0%																			
<b>Pier E10B (E2h1)</b>																												
<b>Pier Head Segment</b>																												
E10B-C5130	E10B - Diaphragm of PHS - Formwork, Rebar, Concreting	51	19-Nov-16 A	25	21-Jan-17	15-Apr-16	16-May-16	-207	15%																			
E10B-C5140	E10B - Remove Rail Beams	7	23-Jan-17	7	02-Feb-17	17-May-16	24-May-16	-207	0%																			
E10B-C5145	E10B - Install Infill Segments (4 nr) - THB	18	11-Feb-17*	18	03-Mar-17	25-May-16	15-Jun-16	-214	0%																			
E10B-C5150	E10B - IFS Stitch & Remove Equipment	12	04-Mar-17	12	17-Mar-17	16-Jun-16	29-Jun-16	-214	0%																			
<b>Viaduct E - Bridge E5, E6, E7, E8</b>																												
<b>Pier E11A (E7E8a)</b>																												
<b>Pier Head Segment</b>																												
E11A-C5110	E11A - Temp. Work, Grillages, Spreader Beams, Rail Beams	21	28-Oct-16 A	0	08-Dec-16 A				100%																			
E11A-C5120	E11A - Install PH Segment (4 nr)	9	05-Dec-16 A	0	09-Dec-16 A				100%																			
E11A-C5130	E11A - Diaphragm of PHS - Formwork, Rebar, Concreting	80	10-Dec-16 A	68	16-Mar-17	24-Oct-15	14-Jan-16	-346	5%																			
E11A-C5140	E11A - Remove Rail Beams, Spreader Beams, Crane	14	17-Mar-17	14	01-Apr-17	15-Jan-16	30-Jan-16	-346	0%																			
<b>Pier E11B (E5e6a)</b>																												
<b>Pier Head Segment</b>																												
E11B-C5110	E11B - Temp. Work, Spreader Beams, Rail Beams	21	21-Nov-16 A	0	10-Dec-16 A				100%																			
E11B-C5120	E11B - Install PH Segment (4 nr)	7	12-Dec-16 A	0	18-Dec-16 A				100%																			
E11B-C5130	E11B - Diaphragm of PHS - Formwork, Rebar, Concreting	81	21-Dec-16	81	31-Mar-17	15-May-15	20-Aug-15	-478	0%																			
<b>Pier E12A (E8b)</b>																												
<b>Pile Cap Dolphin</b>																												

Actual Work  
 Planned Bar  
 Critical Bar  
 Milestone

Project ID: TMCLK-DWPH-M43  
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**Tuen Mun - Chek Lap Kok Link - Southern Connection**  
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**(Progress as of 21-Dec-16)**

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**DWG. No.:**  
**J3518/GCL/PGM/3MRP-M43**



Activity ID	Activity Name	Orig. Durn.	Act. Start / FC Early Start	Rem. Durn.	Act. Finish / FC Early Finish	Late Start	Late Finish	Total Float	Physical % Complete	2016						2017												
										December						January			February			March						
										21	28	05	12	19	26	02	09	16	23	30	06	13	20	27	06	13	20	
E13D-C4040	E13D Pier - Curing, CJ, Remove Formwork & Falsework	12	05-Jan-17	12	18-Jan-17	01-Aug-15	14-Aug-15	-424	0%																			
<b>Pier Head Segment / Infill Segment</b>																												
E13D-C5110	E13D - Temp. Work, Grillages, Megashore Towers, Rail Beams	29	19-Jan-17	29	24-Feb-17	15-Aug-15	18-Sep-15	-424	0%																			
E13D-C5120	E13D - Install PH Segment (4 nr)	8	25-Feb-17	8	06-Mar-17	19-Sep-15	29-Sep-15	-424	0%																			
E13D-C5130	E13D - Diaphragm of PHS - Formwork, Rebar, Concreting	77	07-Mar-17	77	12-Jun-17	30-Sep-15	02-Jan-16	-424	0%																			
<b>Pier E14A (E8d)</b>																												
<b>Foundation - Bored Piles</b>																												
E14A-C2140	E14A EB Pile - Excavate, Rebar, Concrete (2nd) P3 - Resume	9	20-Dec-16 A	8	31-Dec-16	25-Jun-15	04-Jul-15	-445	10%																			
E14A-C2210	E14A EB Pile - Curing & Sonic Test	18	03-Jan-17	18	23-Jan-17	06-Jul-15	25-Jul-15	-445	0%																			
E14A-C2220	E14A EB Pile - Full Depth Core & Test	12	24-Jan-17	12	09-Feb-17	27-Jul-15	08-Aug-15	-445	0%																			
<b>Pile Cap</b>																												
E14A-C3110	E14A Pile Cap - Excavate, Break Pile Head	15	10-Feb-17*	15	27-Feb-17	10-Aug-15	26-Aug-15	-445	0%																			
E14A-C3210	E14A Pile Cap - Blinding, Formwork, Rebar, Concrete	19	28-Feb-17	19	21-Mar-17	27-Aug-15	18-Sep-15	-445	0%																			
<b>Pier E14B (E7d)</b>																												
<b>Foundation - Bored Piles</b>																												
E14B-C2140	E14B EB Pile - Excavate, Rebar, Concrete (3rd) P1	19	03-Jan-17*	19	24-Jan-17	04-Jun-15	26-Jun-15	-470	0%																			
E14B-C2210	E14B EB Pile - Curing & Sonic Test	18	25-Jan-17	18	17-Feb-17	27-Jun-15	18-Jul-15	-470	0%																			
E14B-C2220	E14B EB Pile - Full Depth Core & Test	12	18-Feb-17	12	03-Mar-17	20-Jul-15	01-Aug-15	-470	0%																			
<b>Pile Cap</b>																												
E14B-C3110	E14B Pile Cap - Excavate, Break Pile Head	15	17-Mar-17*	15	03-Apr-17	03-Aug-15	19-Aug-15	-481	0%																			
<b>Pier E14C (E6d)</b>																												
<b>Foundation - Bored Piles</b>																												
E14C-C2140	E14C EB Pile - Excavate, Rebar, Concrete (3rd) P2	18	07-Dec-16 A	10	04-Jan-17	21-Sep-15	03-Oct-15	-372	40%																			
E14C-C2210	E14C EB Pile - Curing & Sonic Test	18	05-Jan-17	18	25-Jan-17	05-Oct-15	26-Oct-15	-372	0%																			
<b>Pile Cap</b>																												
E14C-C3110	E14C Pile Cap - Excavate, Break Pile Head	15	26-Jan-17	15	15-Feb-17	27-Oct-15	12-Nov-15	-372	0%																			
E14C-C3210	E14C Pile Cap - Blinding, Formwork, Rebar, Concrete	19	16-Feb-17	19	09-Mar-17	13-Nov-15	04-Dec-15	-372	0%																			
E14C-C3310	E14C Pile Cap - Curing, Remove Formwork, Backfill	12	10-Mar-17	12	23-Mar-17	05-Dec-15	18-Dec-15	-372	0%																			
<b>Pier E14D (E5d)</b>																												
<b>Foundation - Bored Piles</b>																												
E14D-C2130	E14D EB Pile - Excavate, Rebar, Concrete (2nd) P4	18	29-Nov-16 A	7	30-Dec-16	24-Mar-15	31-Mar-15	-518	0%																			
E14D-C2140	E14D EB Pile - Excavate, Rebar, Concrete (3rd) P3	18	13-Jan-17*	18	06-Feb-17	01-Apr-15	25-Apr-15	-528	0%																			
E14D-C2150	E14D EB Pile - Excavate, Rebar, Concrete (4th) P1	18	14-Feb-17*	18	06-Mar-17	27-Apr-15	18-May-15	-534	0%																			
E14D-C2210	E14D EB Pile - Curing & Sonic Test	18	07-Mar-17	18	27-Mar-17	19-May-15	09-Jun-15	-534	0%																			
<b>Viaduct F - Bridge F1</b>																												
<b>Pier F1 (F1b)</b>																												
<b>Foundation - Bored Piles</b>																												
F01-C2130	F1 EB Pile - Excavate, Rebar, Concrete (2nd) P2	21	07-Nov-16 A	0	24-Nov-16 A				100%																			
F01-C2140	F1 EB Pile - Excavate, Rebar, Concrete (3rd) P1	21	25-Nov-16 A	0	10-Dec-16 A				100%																			
F01-C2210	F1 EB Pile - Curing & Sonic Test	18	12-Dec-16 A	10	04-Jan-17	24-Jul-15	04-Aug-15	-421	0%																			
<b>Pile Cap</b>																												
F01-C3110	F1 Pile Cap - Excavate, Break Pile Head	15	05-Jan-17	15	21-Jan-17	05-Aug-15	21-Aug-15	-421	0%																			
F01-C3210	F1 Pile Cap - Blinding, Formwork, Rebar, Concrete	19	23-Jan-17	19	16-Feb-17	22-Aug-15	14-Sep-15	-421	0%																			
F01-C3310	F1 Pile Cap - Curing, Remove Formwork, Backfill	12	17-Feb-17	12	02-Mar-17	15-Sep-15	29-Sep-15	-421	0%																			
<b>Pier</b>																												
F01-C4110	F1 Pier - Scaffold, Rebar, Formwork, Concrete (1st Lift)	13	03-Mar-17	13	17-Mar-17	30-Sep-15	15-Oct-15	-421	0%																			
F01-C4210	F1 Pier - Scaffold, Rebar, Formwork, Concrete (2nd Lift)	18	18-Mar-17	18	08-Apr-17	16-Oct-15	06-Nov-15	-421	0%																			
<b>Pier F2 (F1c)</b>																												
<b>Foundation - Bored Piles</b>																												
F02-C2110	F2 Fr Pile - Set-up Plant & Install Sleeve	6	15-Feb-17*	6	21-Feb-17	01-Jun-15	06-Jun-15	-507	0%																			
F02-C2120	F2 Fr Pile - Excavate, Rebar, Concrete (1st) P1	12	22-Feb-17	12	07-Mar-17	08-Jun-15	22-Jun-15	-507	0%																			
F02-C2130	F2 Fr Pile - Excavate, Rebar, Concrete (2nd) P2	12	08-Mar-17	12	21-Mar-17	23-Jun-15	07-Jul-15	-507	0%																			
<b>Pier F3 (F1d)</b>																												
<b>Foundation - Bored Piles</b>																												
F03-C2130	F3 Fr Pile - Excavate, Rebar, Concrete (1st) P1 - Replacement	15	15-Feb-17*	15	03-Mar-17	26-Jun-15	14-Jul-15	-486	0%																			
F03-C2180	F3 Fr Pile - Excavate, Rebar, Concrete (2nd) P2	15	15-Mar-17*	15	31-Mar-17	15-Jul-15	31-Jul-15	-495	0%																			
<b>Viaduct F - Bridge F2</b>																												
<b>Pier F4 (F2b)</b>																												

■ Actual Work  
■ Planned Bar  
■ Critical Bar  
◆ Milestone

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**DWG. No.:**  
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Activity ID	Activity Name	Orig. Durn.	Act. Start / FC Early Start	Rem. Durn.	Act. Finish / FC Early Finish	Late Start	Late Finish	Total Float	Physical % Complete	2016						2017												
										December						January			February			March						
										21	28	05	12	19	26	02	09	16	23	30	06	13	20	27	06	13	20	
<b>Pier F14 (F5c)</b>																												
<b>Foundation - Bored Piles</b>																												
F13-C3110	F13 Pile Cap - ELS/Excavate, Break Pile Head	22	14-Mar-17*	22	08-Apr-17	30-Nov-15	24-Dec-15	-380	0%																			
<b>Superstructure &amp; Associated Works</b>																												
<b>Viaduct A</b>																												
<b>Bridge A2</b>																												
<b>Deck Span Segment</b>																												
A01-C6210	A1 - Install THB	3	20-Feb-17	3	22-Feb-17	02-Mar-16	04-Mar-16	-287	0%																			
A01-C6310	A1 - End Span to A2 (6 nr) - THB	21	23-Feb-17	21	18-Mar-17	05-Mar-16	01-Apr-16	-287	0%																			
A05-C6210	A5 - Install THB	3	20-Mar-17	3	22-Mar-17	02-Apr-16	06-Apr-16	-287	0%																			
A06-C6210	A6 - Install THB	3	19-Jan-17	3	21-Jan-17	30-Jan-16	02-Feb-16	-287	0%																			
A06-C6310	A6 - End Span to A5 (6 nr) - THB	21	23-Jan-17	21	18-Feb-17	03-Feb-16	01-Mar-16	-287	0%																			
<b>Bridge A1</b>																												
<b>Deck Span Segment</b>																												
A06-C6320	A6 - End Span to A7 (8 nr) - THB	21	23-Jan-17	21	18-Feb-17	03-Feb-16	01-Mar-16	-287	0%																			
A07-C6210	A7 - Install THB	3	19-Dec-16 A	0	19-Dec-16 A				100%																			
A07-C6310	A7 - Cantilever Span (Initial 3 nr) - THB	9	20-Dec-16 A	6	29-Dec-16	28-Nov-15	04-Dec-15	-316	30%																			
A07-C6320	A7 - Install KF	6	30-Dec-16	6	06-Jan-17	05-Dec-15	11-Dec-15	-316	0%																			
A07-C6330	A7 - Cantilever Span (Remaining 13 nr) - KF	18	07-Jan-17	18	27-Jan-17	12-Dec-15	05-Jan-16	-316	0%																			
A08-C6310	A8 - Cantilever Span (Initial 3 nr) - Crane	12	24-Jan-17	12	09-Feb-17	02-Feb-16	18-Feb-16	-289	0%																			
A08-C6410	A8 - Install KF (MTR)	8	14-Mar-17	8	22-Mar-17	19-Feb-16	27-Feb-16	-316	0%																			
A09-C6310	A9 - Cantilever Span (Initial 3 nr) - Crane	12	04-Mar-17	12	17-Mar-17	08-Apr-16	21-Apr-16	-270	0%																			
<b>Viaduct B</b>																												
<b>Bridge B3</b>																												
<b>Deck Finales, E&amp;M and Roadworks</b>																												
VB3-C7710	Viaduct B3 - Parapet Panels	48	16-Dec-16 A	56	02-Mar-17	06-Jun-16	11-Aug-16	-165	1%																			
VB3-C7720	Viaduct B3 - Gantry & TCSS Provisions (KD5)	36	17-Feb-17	36	30-Mar-17	29-Jul-16	08-Sep-16	-165	0%																			
<b>Bridge B2</b>																												
<b>Deck Span Segment</b>																												
B11-C6310	B11 - Cantilever Span (Remaining 16 nr) - THB/Crane	52	29-Dec-16*	52	03-Mar-17	10-Mar-16	16-May-16	-239	0%																			
B12-C6410	B12 - Falsework for End Span to B11	24	04-Mar-17	24	31-Mar-17	11-Jun-16	09-Jul-16	-218	0%																			
<b>Bridge B1</b>																												
<b>Deck Span Segment</b>																												
B12-C6210	B12 - Falsework for End Span to B13	24	31-Dec-16*	24	01-Feb-17	25-Apr-16	24-May-16	-206	0%																			
B12-C6310	B12 - End Span to B13 (7 nr) - Crane	14	02-Feb-17	14	17-Feb-17	25-May-16	10-Jun-16	-206	0%																			
B14-C6310	B14 - Cantilever Span (24 nr) - Crane	48	12-Nov-16 A	2	22-Dec-16	03-Mar-16	04-Mar-16	-240	95%																			
B15-C6310	B15 - Cantilever Span (Initial 8 nr) - Crane	20	06-Dec-16 A	15	10-Jan-17	02-Mar-16	18-Mar-16	-241	20%																			
B15-C6320	B15 - Cantilever Span (Remaining 18 nr) - Crane	32	01-Feb-17*	32	09-Mar-17	19-Mar-16	29-Apr-16	-256	0%																			
B16-C6310	B16 - Cantilever Span (24 nr) - Crane	28	13-Oct-16 A	74	23-Mar-17	13-Feb-16	16-May-16	-256	88%																			
<b>Viaduct C</b>																												
<b>Bridge C3</b>																												
<b>Deck Span Segment</b>																												
C06-C6310	C6 - End Span to C7 (7 nr) - LG2	6	19-Dec-16 A	4	24-Dec-16	23-Sep-15	26-Sep-15	-370	0%																			
C07-C6410	C7 - Launch LG2 from C5 to C7 (MTR)	6	19-Nov-16 A	0	28-Nov-16 A				100%																			
C07-C6510	C7 - Cantilever Span (24 nr) (MTR) - LG2	20	29-Nov-16 A	0	16-Dec-16 A				100%																			
C08-C6210	C8 - Launch LG2 from C6 to C8 (MTR/NLH)	9	28-Dec-16	9	07-Jan-17	29-Sep-15	09-Oct-15	-370	0%																			
C08-C6310	C8 - Cantilever Span (24 nr) (MTR/NLH) - LG2	58	09-Jan-17	58	20-Mar-17	10-Oct-15	17-Dec-15	-370	0%																			
C09-C6310	C9 - Cantilever Span (Initial 12 nr) (NLH) - Crane	24	01-Nov-16 A	0	22-Nov-16 A				100%																			
C10-C6310	C10 - Cantilever Span (22 nr) - Crane	28	18-Dec-16 A	133	08-Jun-17	22-Sep-15	04-Mar-16	-371	9%																			
<b>Bridge C2</b>																												
<b>Deck Span Segment</b>																												
C11-C6210	C11 - Falsework for End Span to C12	24	13-Feb-17	24	11-Mar-17	18-Jan-16	17-Feb-16	-316	0%																			
C11-C6310	C11 - End Span to C12 (4 nr) - Crane	8	13-Mar-17	8	21-Mar-17	18-Feb-16	26-Feb-16	-316	0%																			
C15-C6310	C15 - Cantilever Span (16 nr) - Crane & THB	36	16-Nov-16 A	8	31-Dec-16	28-Nov-15	07-Dec-15	-316	60%																			
C16-C6410	C16 - Falsework for End Span to C15	24	03-Jan-17	24	02-Feb-17	08-Dec-15	07-Jan-16	-316	0%																			

■ Actual Work  
■ Planned Bar  
■ Critical Bar  
◆ Milestone

Project ID: TMCLK-DWPH-M43  
 Layout: J3518-DWP-3MRP Submission - M43  
 Filter: TASK filters: 3-Month Lookahead, No CC  
 Milestones, No Level of Effort.

**Tuen Mun - Chek Lap Kok Link - Southern Connection**  
**3-Month Rolling Programme (Page 11 of 13 Pages)**  
**(Progress as of 21-Dec-16)**

Date	Revision	Checked	Approved
31-Oct-16		PKN	GL
30-Nov-...		PKN	GL
03-Jan-17		PKN	GL

**DWG. No.:**  
**J3518/GCL/PGM/3MRP-M43**







## Appendix C

# Environmental Mitigation and Enhancement Measure Implementation Schedules

(In reference to CINOTECH (2011) Agreement No.  
CE35/2011 EP Baseline Environmental Monitoring for  
Hong Kong-Zhuhai-Macao Bridge Tuen Mun-Chek Lap  
Kok Link - Investigation. Updated EM&A Manual for  
Tuen Mun-Chek Lap Kok Link)

*Contract No. HY/2012/07  
Tuen Mun – Chek Lap Kok Link  
Southern Connection Viaduct 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	
<b>AIR QUALITY</b>									
4.8.1	3.8	An effective watering programme of eight 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	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		✓

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 practicable.	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		✓
<b>NOISE</b>									
5.11	Section 4	Noise monitoring	All existing representative sensitive receivers / during North Lantau Viaduct construction	Contractor	EM&A Manual		Y		✓
<b>WATER QUALITY</b>									
<i>General Marine Works</i>									
6.10	-	Bored piling to be undertaken within a metal casing.	Marine viaducts of TM-CLKL and HKLR/ bored piling	Contractor	TM-EIAO		Y		✓
6.10	-	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		✓



EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
6.10	-	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		✓
6.10	-	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		✓
6.10	-	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		✓
6.10	-	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		✓
6.10	-	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 conditions.		Y		✓
6.10	-	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		✓
<i>Temporary Staging work</i>									
	5.2	Regular inspection for the accumulation of floating refuse and collection of floating refuse if required	During temporary staging works	Contractor			Y		✓
	5.2	Provision of temporary drainage system on the temporary staging for collection of construction site runoff to allow appropriate treatment before discharge into the sea	During temporary staging works	Contractor			Y		↔
	5.2	Wastewater generated from construction works such as bored / drilling water will be collected, treated, neutralized and de-silted through silt trap or sedimentation tank before disposal	During temporary staging works	Contractor			Y		✓
	5.2	One additional water quality monitoring station is	During temporary	Contractor			Y		✓

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
		proposed at station SR4a In case elevated SS or turbidity is identified during the water quality monitoring, the source of pollution will be tracked down and be removed as soon as possible. In case depletion of dissolved oxygen is identified, artificial aeration will be arranged at the monitoring station SR4a,	staging works						
<i>Land Works</i>									
6.10	-	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		✓
6.10	-	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		✓
6.10	-	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		✓
6.10	-	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		✓
6.10	-	Temporary access roads should be surfaced with crushed stone or gravel.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.10	-	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		✓
6.10	-	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		↔

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
6.10	-	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		↔
6.10	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		✓
6.10	-	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		✓
6.10	-	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		✓
6.10	-	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		✓
6.10	-	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		✓
6.10	-	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		✓
6.10	-	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 offsite disposal.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.10	-	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		✓
6.10	-	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		✓

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
6.10	-	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		✓
6.10	-	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		✓
6.10	-	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	✓
6.10	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		✓
<i>Water Quality Monitoring</i>									
6.10	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. One year operation phase water quality monitoring at designated stations	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 monitoring for a year.	Contractor	EM&A Manual		Y	Y	✓
<b>ECOLOGY</b>									
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	Specification for bored piling monitoring	Detailed Design	Design Consultant	TMEIA	Y			n/a
8.14	6.3	Implement any recommendations of the bored piling monitoring	Southern marine viaduct/ Throughout	Contractor	TMEIA		Y		✓

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
			construction during bored piling						
8.14	6.3,6.5	Avoidance of peak CWD calving season in May and June for driving of metal caissons during bored piling works	Southern marine viaduct/ May and June during bored piling	Contractor	TMEIA		Y		n/a
8.14	6.3,6.5	Specification and implementation of 250m dolphin exclusion zone.	All marine bored piling and temporary staging works areas/Detailed Design/ during all marine bored piling and temporary staging works	Design Consultant/ Contractor	TMEIA	Y	Y		✓
8.15	6.3, 6.5	Specification and deployment of an artificial reef of an area of 3,600 m <sup>2</sup> 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 enforced 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 marine bored piling and the whole lifespan of temporary staging works.	All areas/ Detailed Design/ during marine bored piling and temporary staging works	Design Consultant/ Contractor	TMEIA	Y	Y		✓
8.15	6.3, 6.4	Pre-construction phase survey and coral translocation	Tai Ho Wan (donor site) and Yam Tsui Wan (receptor site) /Detailed Design/Prior to construction	Design Consultant/ Contractor	TMEIA	Y	Y		n/a
8.15	6.5	Audit coral translocation success	Yam Tsui Wan (receptor site)/Post translocation	Contractor	TMEIA		Y		<b>Completed in October 2014</b>
7.13	6.5	Undertaken gabion wall works in Stream NL1 in the dry season	North Lantau slope works/dry	Contractor	TMEIA		Y		n/a



EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
			season/construction phase						
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. To be approved by AFCD/LCSD
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		↔
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		✓
<b>LANDSCAPE AND VISUAL</b>									
10.9	7.6	Round angle, patterned finishes, and oval shaped pier were considered in the viaduct design, and further details will be developed under ACABAS submission (DM3)	All areas/detailed design	Design Consultant	TMEIA	Y			n/a
10.9	7.6	Details of the street furniture will be developed in the detailed design stage (DM4)	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	Existing trees on boundary of the Project Area shall be carefully protected during construction. Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
		prior to undertaking any works adjacent to all retained trees, including trees in contractor's works areas. (Tree protection measures will be detailed at Tree Removal Application stage) (CM1)							
10.9	7.6	Trees unavoidably affected by the works shall be transplanted where practical. Trees will be transplanted straight to their final receptor site and not held in a temporary nursery. A detailed Tree Transplanting Specification shall be provided in the Contract Specification. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme (CM2)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓ Tree transplanted as Contract Specification
10.9	7.6	Hillside and roadside screen planting to proposed roads, associated structures and slope works (CM3).	All areas/detailed design/ during construction/post construction	Design Consultant/	TMEIA	Y	Y		✓
10.9	7.6	Hydroseeding or sheeting of soil stockpiles with visually unobtrusive material (in earth tone) (CM4)	All areas/detailed design/ during construction/post construction	Design Consultant/ Contractor	TMEIA	Y	Y		↔
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		✓
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		✓

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
10.9	7.6	Recycle/Reuse all felled trees and vegetation, e.g. mulching (CM9)	All areas/ detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		n/a No felled trees or vegetation suitable for recycle
10.9	7.6	Compensatory tree planting shall be provided to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Felling Application process under ETWBTC 3/2006 (CM10).	All areas/ detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
10.9	7.6	Re-vegetation of affected woodland/shrubland with native species (OM1)	All areas/ detailed design/ during construction/ during operation	Design Consultant/ Contractor	TMEIA	Y	Y	Y	n/a. To be implemented by AFCD/HyD/ L CSD
10.9	7.6	Tall buffer screen tree / shrub / climber planting should be incorporated to soften hard engineering structures and facilities (OM2)	All areas/ detailed design/ during construction/ during operation	Design Consultant/ Contractor	TMEIA	Y	Y	Y	n/a To be implemented by HyD/LCSD
10.9	7.6	Streetscape elements (e.g. paving, signage, street furniture, lighting etc.) shall be sensitively designed in a manner that responds to the local context, and minimises potential negative landscape and visual impacts. Lighting units should be directional and minimise unnecessary light spill (OM3)	All areas/ detailed design/ during construction / during operation	Design Consultant/ Contractor	TMEIA	Y	Y	Y	n/a. To be implemented by HyD/LCSD
10.9	7.6	Structure, ornamental tree / shrub / climber planting should be provided along roadside amenity strips, central dividers and newly formed slopes to enhance the townscape quality and further greenery enhancement	All areas/ detailed design/ during construction / during operation	Design Consultant/ Contractor	TMEIA	Y	Y	Y	n/a. To be implemented by

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
		(OM4)							HyD/LCSD
10.9	7.6	Aesthetically pleasing design (visually unobtrusive and non-reflective) as regard to the form, material and finishes	All areas/ detailed design/ during construction / during operation	Design Consultant/ Contractor	TMEIA	Y	Y	Y	n/a. To be implemented by HyD
<b>WASTE</b>									
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	All areas / throughout	Contractor	TMEIA		Y		✓

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
		where possible. Earth retaining structures and bored pile walls should be proposed to minimise the extent of cutting.	construction period						
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		✓
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			n/a
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	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	All areas / throughout construction period	Contractor	TMEIA		Y		✓



EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
		materials should avoid over-ordering and wastage.							
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: <ul style="list-style-type: none"> <li>- suitable for the substance to be held, resistant to corrosion, maintained in good conditions and securely closed;</li> <li>- Having a capacity of &lt;450L unless the specifications have been approved by the EPD; and</li> <li>- Displaying a label in English and Chinese according to the instructions prescribed in Schedule 2 of the Regulations. Clearly labelled and used solely for the storage of chemical wastes;</li> <li>- Enclosed with at least 3 sides;</li> <li>- 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;</li> </ul>	All areas / throughout construction period	Contractor	TMEIA		Y		↔

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
		<ul style="list-style-type: none"> <li>- Adequate ventilation;</li> <li>- Sufficiently covered to prevent rainfall entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and</li> <li>- Incompatible materials are adequately separated.</li> </ul>							
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			✓
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 hard standing;	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			✓
12.6	8.1	Office wastes can be reduced by recycling of	Site Offices/	Contractor	TMEIA	Y			✓

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
		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.	throughout construction period						
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		✓
<b>CULTURAL HERITAGE</b>									
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

**Notes:**

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

**Status:**

- ✓ 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

Appendix D

## Summary of Action and Limit Levels

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

<b>Parameters</b>	<b>Action</b>	<b>Limit</b>
24 Hour TSP Level in $\mu\text{g}/\text{m}^3$	ASR9A/ ASR8A = 178 ASR9C/ ASR8/ ASR9 = 178	260
1 Hour TSP Level in $\mu\text{g}/\text{m}^3$	ASR9A/ ASR8A = 394 ASR9C/ ASR8/ ASR9 = 393	500

**Table D2** *Action and Limit Levels for Construction Noise (0700-1900 hrs of normal weekdays)*

<b>Time Period</b>	<b>Action</b>	<b>Limit</b>
0700-1900 hrs on normal weekdays	When one documented complaint is received	75* dB(A)

**Table D3** *Action and Limit Levels for Water Quality*

<b>Parameter</b>	<b>Action Level#</b>	<b>Limit Level#</b>
DO in $\text{mg}/\text{L}$ (a)	<u>Surface and Middle</u> <b>5.0 mg/L</b>	<u>Surface and Middle</u> <b>4.2 mg/L</b>
	<u>Bottom</u> <b>4.7 mg/L</b>	<u>Bottom</u> <b>3.6 mg/L</b>
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., <b>27.5 NTU</b>	130% of upstream control station at the same tide of the same day and 99%-ile of baseline data, i.e., <b>47.0 NTU</b>
SS in $\text{mg}/\text{L}$ (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., <b>23.5 mg/L</b>	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., <b>34.4 mg/L</b>

**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



Parameter	Action Level#	Limit Level#
(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 D4** *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	
<b>Notes:</b>		
1.	STG means quarterly encounter rate of number of dolphin sightings, which is <b>6.00 in NEL</b> and <b>9.85 in NWL</b> during the baseline monitoring period	
2.	ANI means quarterly encounter rate of total number of dolphins, which is <b>22.19 in NEL</b> and <b>44.66 in NWL</b> 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 D5** *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	[STG < 2.4 & ANI < 8.9] and [STG < 3.9 & ANI < 17.9]	

Appendix E

## EM&A Monitoring Schedules

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Noise Monitoring Schedule (1 to 31 December 2016)**

Alternative Noise Monitoring at Pak Mong Village Entrance

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

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Air Quality Monitoring Schedule (1 to 31 December 2016)**

Alternative Air Quality Monitoring at WA4 and MTRC Depot Entrance

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

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Noise Monitoring Schedule (1 to 31 January 2017)**

Alternative Noise Monitoring at Pak Mong Village Entrance

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

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Air Quality Monitoring Schedule (1 to 31 January 2017)**

Alternative Air Quality Monitoring at WA4 and MTRC Depot Entrance

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

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Noise Monitoring Schedule (1 to 28 February 2017)**

Alternative Noise Monitoring at Pak Mong Village Entrance

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

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Air Quality Monitoring Schedule (1 to 28 February 2017)**

Alternative Air Quality Monitoring at WA4 and MTRC Depot Entrance

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



**HY/2012/07 - Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Marine Water Quality Monitoring (WQM) Schedule (December 2016)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				01-Dec	02-Dec	03-Dec
				<b>WQM</b> Mid-Flood 8:46 (07:01 - 10:31) Mid-Ebb 14:11 (12:26 - 15:56)		<b>WQM</b> Mid-Flood 10:02 (08:17 - 11:47) Mid-Ebb 15:25 (13:40 - 17:10)
04-Dec	05-Dec	06-Dec	07-Dec	08-Dec	09-Dec	10-Dec
		<b>WQM</b> Mid-Flood 12:41 (10:56 - 14:26) Mid-Ebb 18:12 (16:35 - 19:50)		<b>WQM</b> Mid-Flood 14:30 (12:45 - 16:15) Mid-Ebb 20:53 (19:08 - 22:38)		<b>WQM</b> Mid-Ebb 9:18 (07:33 - 11:03) Mid-Flood 15:50 (14:05 - 17:35)
11-Dec	12-Dec	13-Dec	14-Dec	15-Dec	16-Dec	17-Dec
		<b>WQM</b> Mid-Ebb 12:18 (10:33 - 14:03) Mid-Flood 17:49 (16:04 - 19:34)		<b>WQM</b> Mid-Flood 8:35 (06:50 - 10:20) Mid-Ebb 14:00 (12:15 - 15:45)		<b>WQM</b> Mid-Flood 10:13 (08:28 - 11:58) Mid-Ebb 15:32 (13:47 - 17:17)
18-Dec	19-Dec	20-Dec	21-Dec	22-Dec	23-Dec	24-Dec
		<b>WQM</b> Mid-Flood 12:45 (11:00 - 14:30) Mid-Ebb 18:24 (16:39 - 20:09)		<b>WQM</b> Mid-Ebb 6:58 (05:13 - 08:43) Mid-Flood 14:28 (12:43 - 16:13)		<b>WQM</b> Mid-Ebb 9:44 (07:59 - 11:29) Mid-Flood 15:47 (14:02 - 17:32)
25-Dec	26-Dec	27-Dec	28-Dec	29-Dec	30-Dec	31-Dec
		<b>WQM</b> Mid-Ebb 12:06 (10:21 - 13:51) Mid-Flood 17:20 (15:35 - 19:05)		<b>WQM</b> Mid-Flood 8:02 (06:17 - 09:47) Mid-Ebb 13:18 (11:33 - 15:03)		<b>WQM</b> Mid-Flood 9:09 (07:24 - 10:54) Mid-Ebb 14:29 (12:44 - 16:14)

**HY/2012/07 - Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Marine Water Quality Monitoring (WQM) Schedule (January 2017)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01-Jan	02-Jan	03-Jan	04-Jan	05-Jan	06-Jan	07-Jan
		<b>WQM</b> Mid-Flood 11:02 (09:17 - 12:47) Mid-Ebb 16:39 (14:54 - 18:24)		<b>WQM</b> Mid-Flood 12:35 (10:50 - 14:20) Mid-Ebb 18:49 (17:04 - 20:34)		<b>WQM</b> Mid-Ebb 7:23 (05:38 - 09:08) Mid-Flood 14:16 (12:31 - 16:01)
08-Jan	09-Jan	10-Jan	11-Jan	12-Jan	13-Jan	14-Jan
		<b>WQM</b> Mid-Ebb 11:18 (09:33 - 13:03) Mid-Flood 16:43 (14:58 - 18:28)		<b>WQM</b> Mid-Ebb 13:02 (11:17 - 14:47) Mid-Flood 18:16 (16:31 - 20:01)		<b>WQM</b> Mid-Flood 9:07 (07:22 - 10:52) Mid-Ebb 14:29 (12:44 - 16:14)
15-Jan	16-Jan	17-Jan	18-Jan	19-Jan	20-Jan	21-Jan
		<b>WQM</b> Mid-Flood 11:02 (09:17 - 12:47) Mid-Ebb 16:34 (14:49 - 18:19)		<b>WQM</b> Mid-Flood 12:16 (10:31 - 14:01) Mid-Ebb 18:23 (16:38 - 20:08)		<b>WQM</b> Mid-Ebb 6:47 (05:02 - 08:32) Mid-Flood 13:47 (12:02 - 15:32)
22-Jan	23-Jan	24-Jan	25-Jan	26-Jan	27-Jan	28-Jan
		<b>WQM</b> Mid-Ebb 11:04 (09:19 - 12:49) Mid-Flood 16:07 (14:22 - 17:52)		<b>WQM</b> Mid-Ebb 12:24 (10:39 - 14:09) Mid-Flood 17:30 (15:45 - 19:15)		<b>WQM is cancelled due to suspension of marine works.</b>
29-Jan	30-Jan	31-Jan				
		<b>WQM is cancelled due to suspension of marine works.</b>				

**HY/2012/07 - Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Marine Water Quality Monitoring (WQM) Schedule (February 2017)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			01-Feb	02-Feb	03-Feb	04-Feb
				<b>WQM</b> Mid-Flood 10:50 (09:05 - 12:35) Mid-Ebb 16:56 (15:11 - 18:41)		<b>WQM</b> Mid-Flood 12:22 (10:37 - 14:07) Mid-Ebb 19:11 (17:26 - 20:56)
05-Feb	06-Feb	07-Feb	08-Feb	09-Feb	10-Feb	11-Feb
		<b>WQM</b> Mid-Ebb 10:15 (08:30 - 12:00) Mid-Flood 15:33 (13:48 - 17:18)		<b>WQM</b> Mid-Ebb 12:09 (10:24 - 13:54) Mid-Flood 17:24 (15:39 - 19:09)		<b>WQM</b> Mid-Flood 8:04 (06:19 - 09:49) Mid-Ebb 13:33 (11:48 - 15:18)
12-Feb	13-Feb	14-Feb	15-Feb	16-Feb	17-Feb	18-Feb
		<b>WQM</b> Mid-Flood 9:31 (07:46 - 11:16) Mid-Ebb 15:10 (13:25 - 16:55)		<b>WQM</b> Mid-Flood 10:22 (08:37 - 12:07) Mid-Ebb 16:22 (14:37 - 18:07)		<b>WQM</b> Mid-Flood 11:28 (09:43 - 13:13) Mid-Ebb 18:10 (16:25 - 19:55)
19-Feb	20-Feb	21-Feb	22-Feb	23-Feb	24-Feb	25-Feb
		<b>WQM</b> Mid-Ebb 9:52 (09:00 - 10:45) Mid-Flood 14:20 (12:35 - 16:05)		<b>WQM</b> Mid-Ebb 11:28 (09:43 - 13:13) Mid-Flood 16:27 (14:42 - 18:12)		<b>WQM</b> Mid-Ebb 12:39 (10:54 - 14:24) Mid-Flood 18:00 (16:15 - 19:45)
26-Feb	27-Feb	28-Feb				
		<b>WQM</b> Mid-Flood 8:28 (06:43 - 10:13) Mid-Ebb 14:19 (12:34 - 16:04)				

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Dolphin Monitoring Survey Schedule (1 to 31 December 2016)**

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

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Dolphin Monitoring Survey Schedule (1 to 31 January 2017)**

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

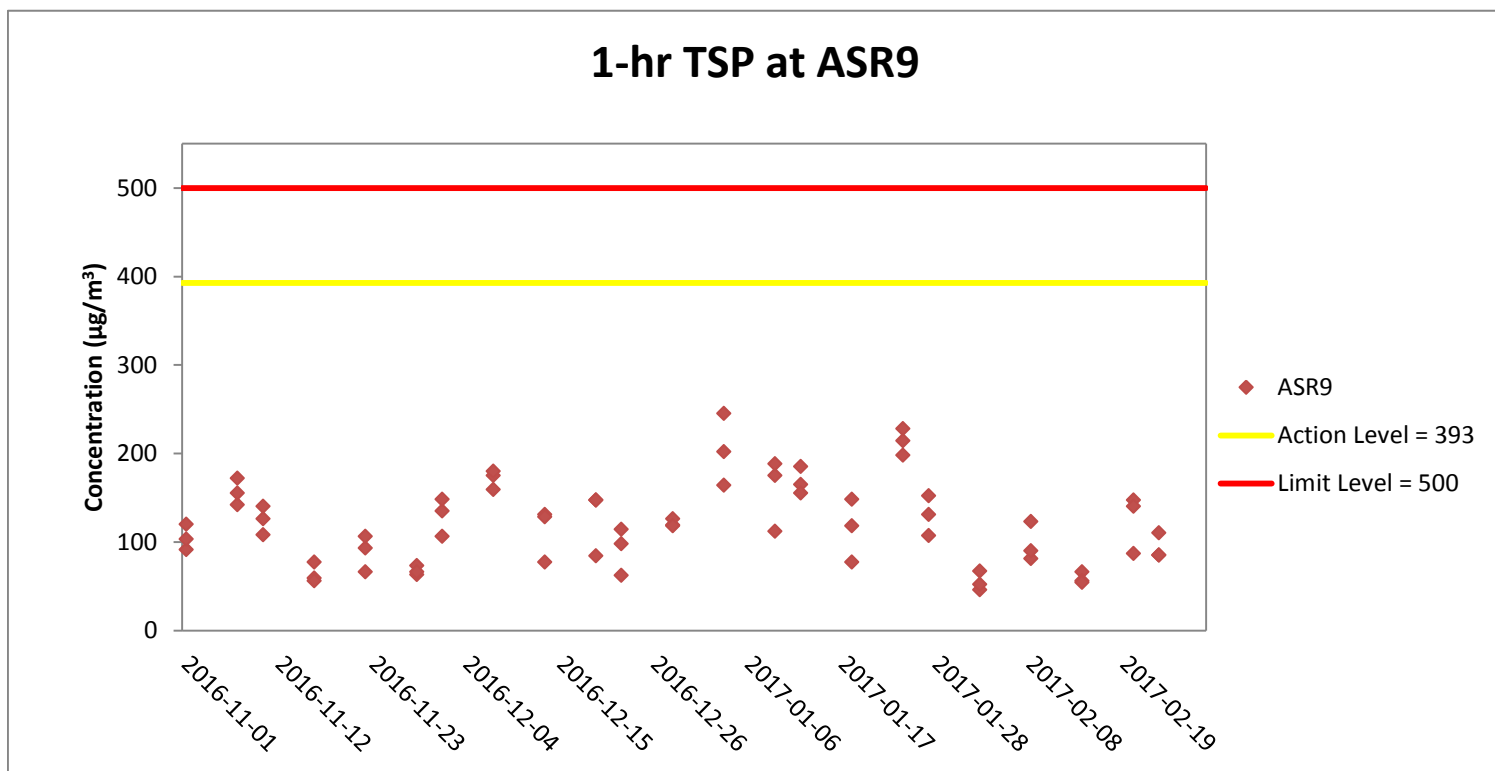
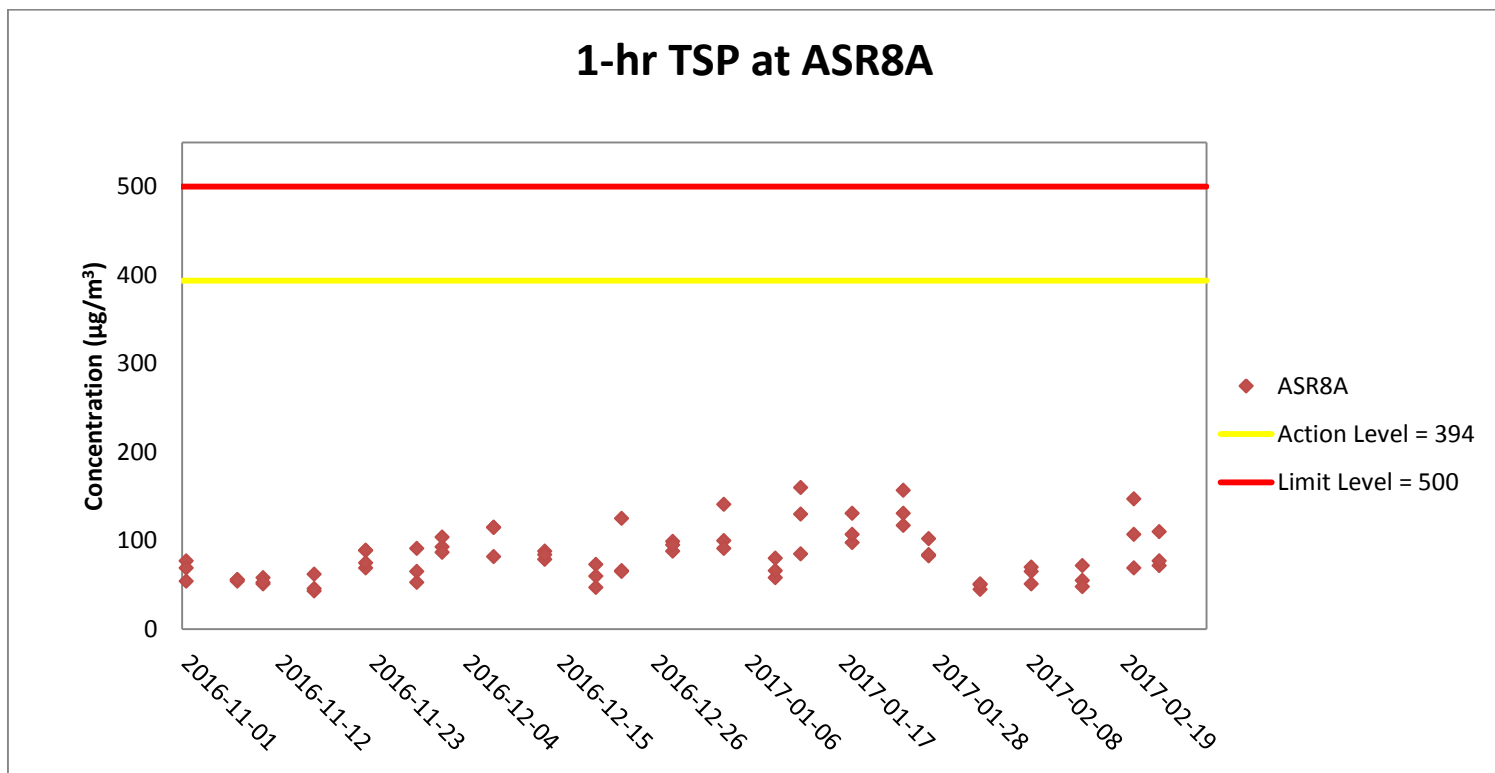


**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Dolphin Monitoring Survey Schedule (1 to 28 February 2017)**

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

Appendix F

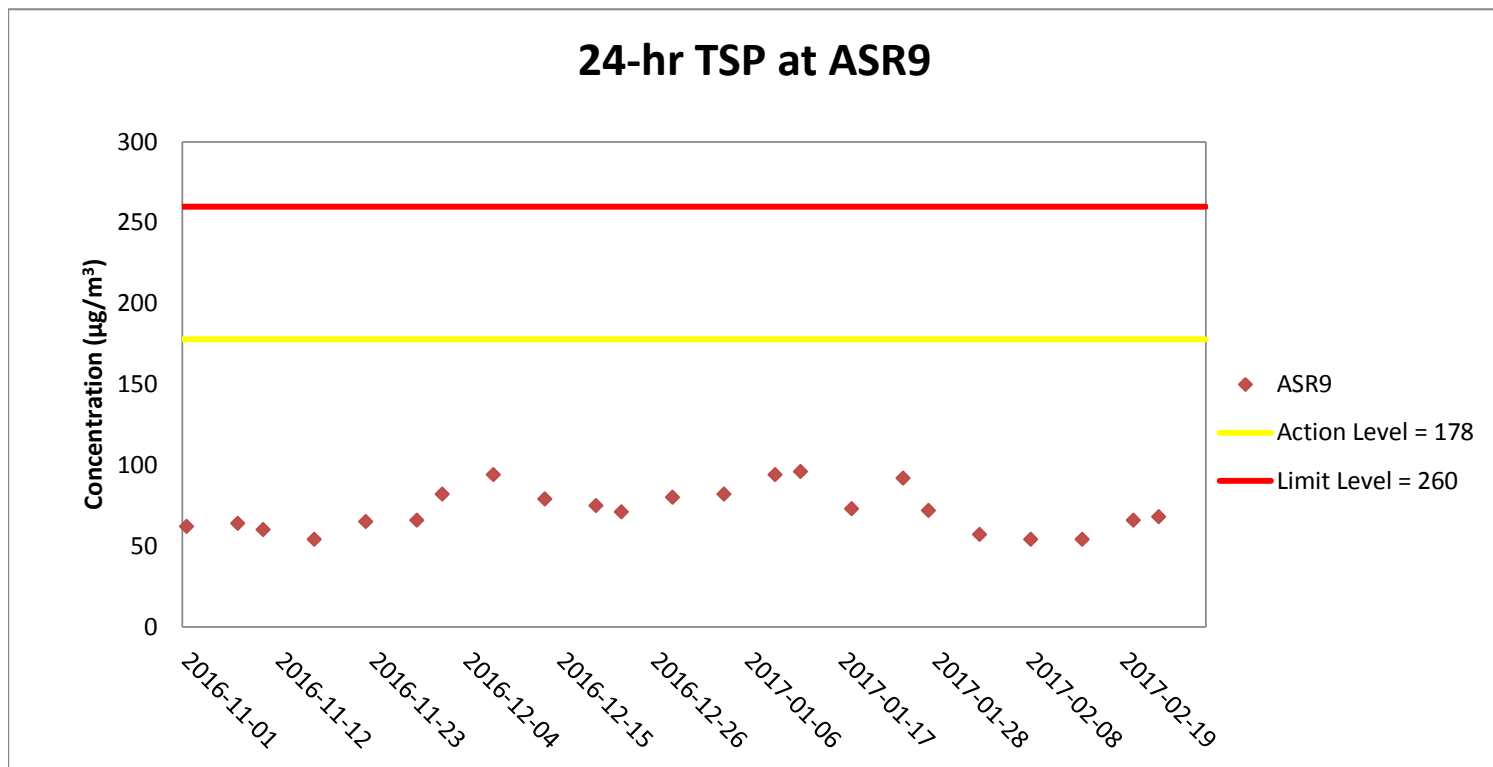
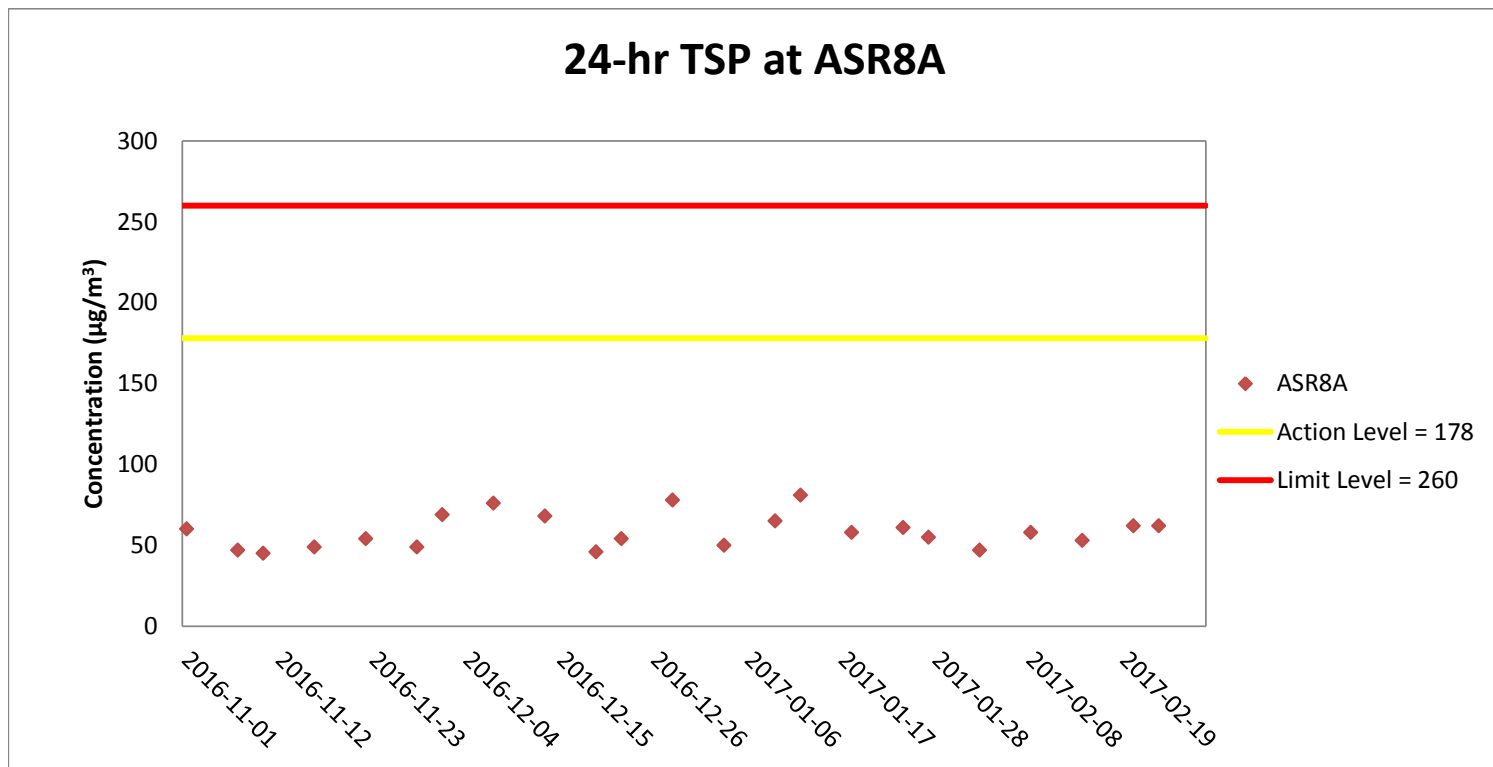
Impact Air Quality  
Monitoring Graphical  
Presentation



Weather condition within the reporting period varied between sunny to rainy.

Major construction works undertaken within the reporting period include Pier construction; Re-alignment of Cheung Tung Road; Road works along North Lantau Highway; Installation of pier head and deck segments; and Slope work of Viaducts A, B & C.

Marine works within the reporting period include Construction and installation of pile caps; Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.



Weather condition within the reporting period varied between sunny to rainy.

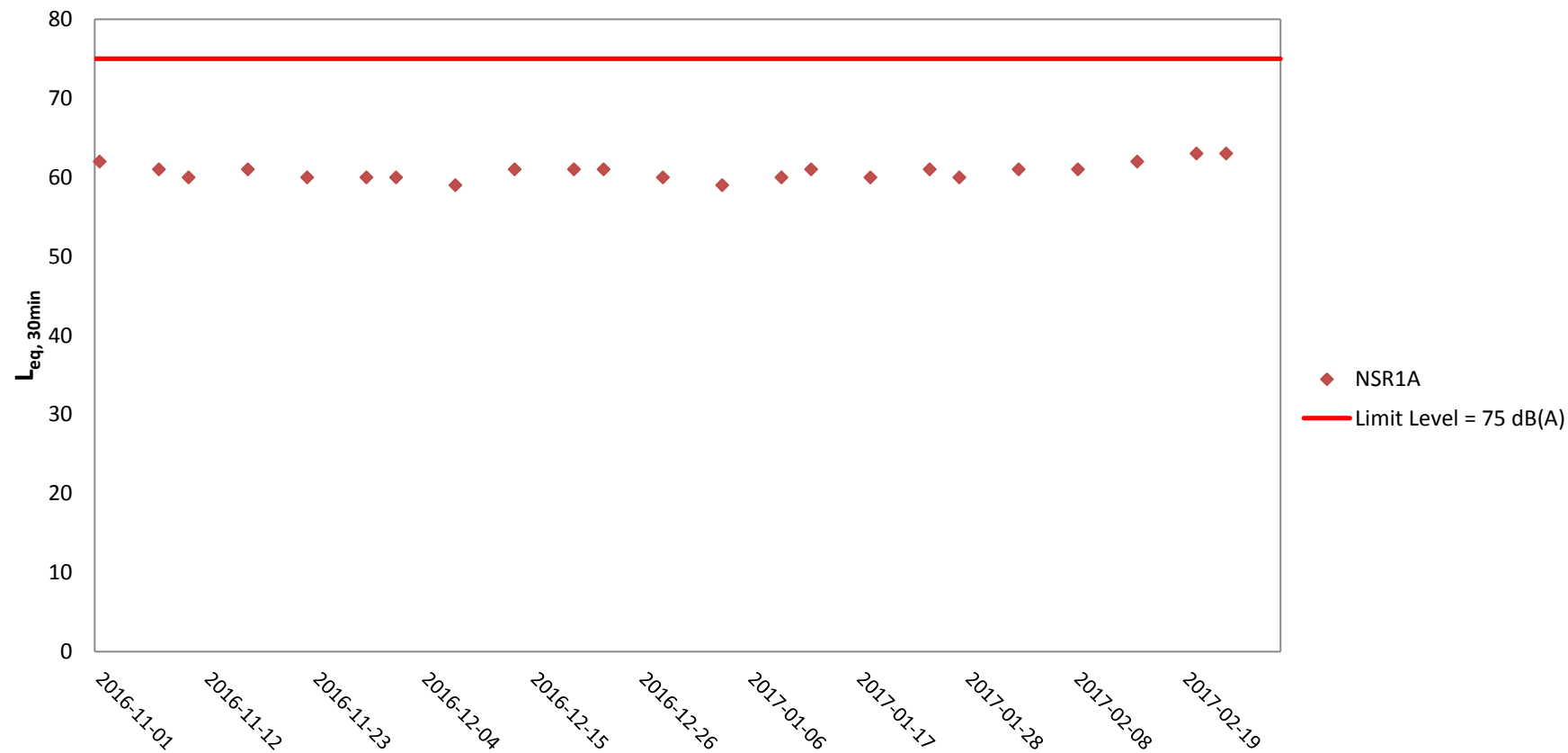
Major construction works undertaken within the reporting period include Pier construction; Re-alignment of Cheung Tung Road; Road works along North Lantau Highway;; Installation of pier head and deck segments; and Slope work of Viaducts A, B & C.

Marine works within the reporting period include Construction and installation of pile caps; Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.

Appendix G

## Impact Noise Monitoring Graphical Presentation

### Noise Monitoring Results at NSR 1A ( $L_{eq, 30min}$ )



Weather condition within the reporting period varied between sunny to rainy.

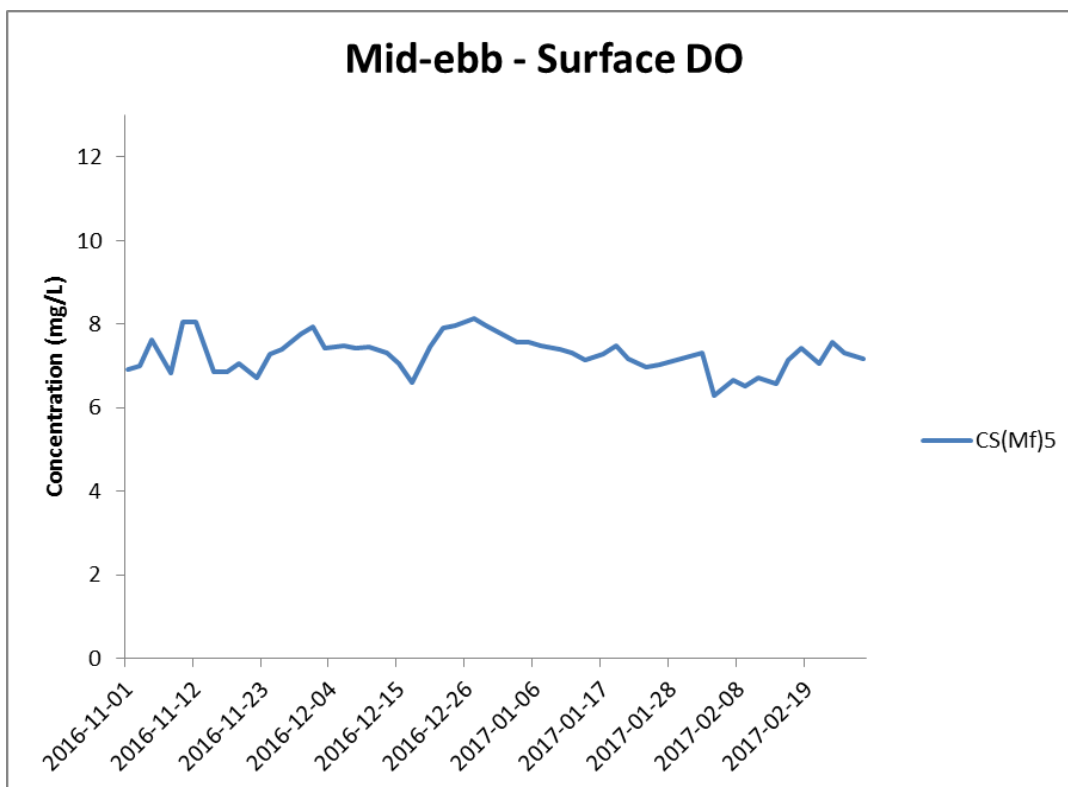
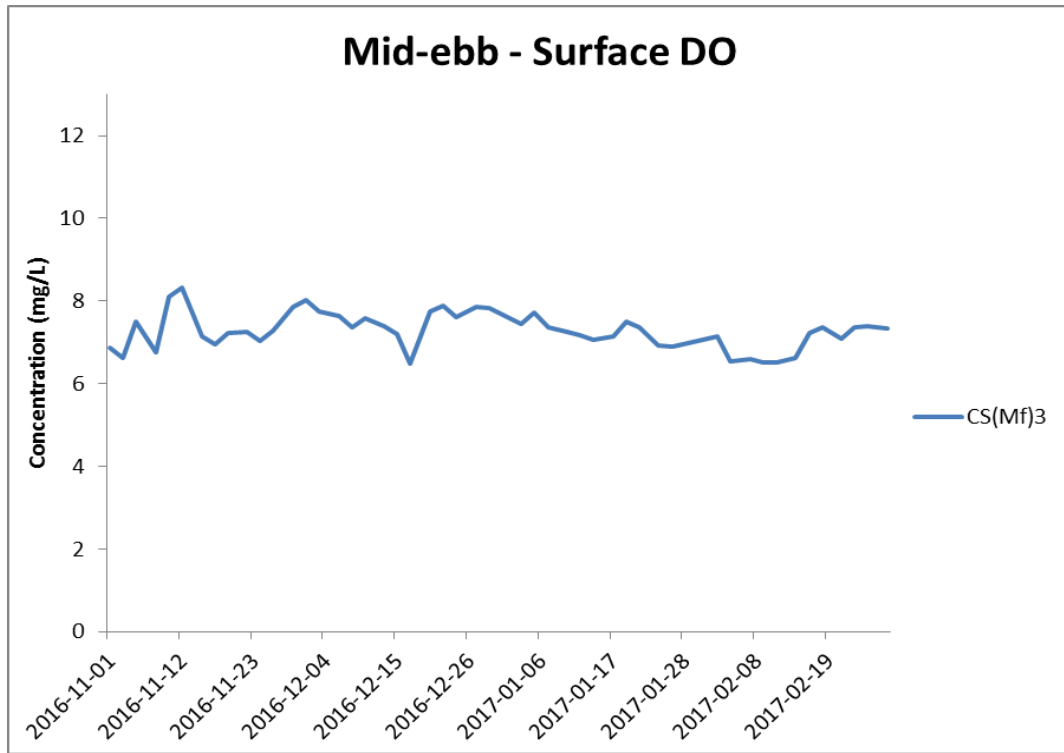
Major construction works undertaken within the reporting period include Pier construction; Re-alignment of Cheung Tung Road; Road works along North Lantau Highway; Installation of pier head and deck segments; and Slope work of Viaducts A, B & C.

Marine works within the reporting period include Construction and installation of pile caps; Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.



Appendix H

# Impact Water Quality Monitoring Graphical Presentation

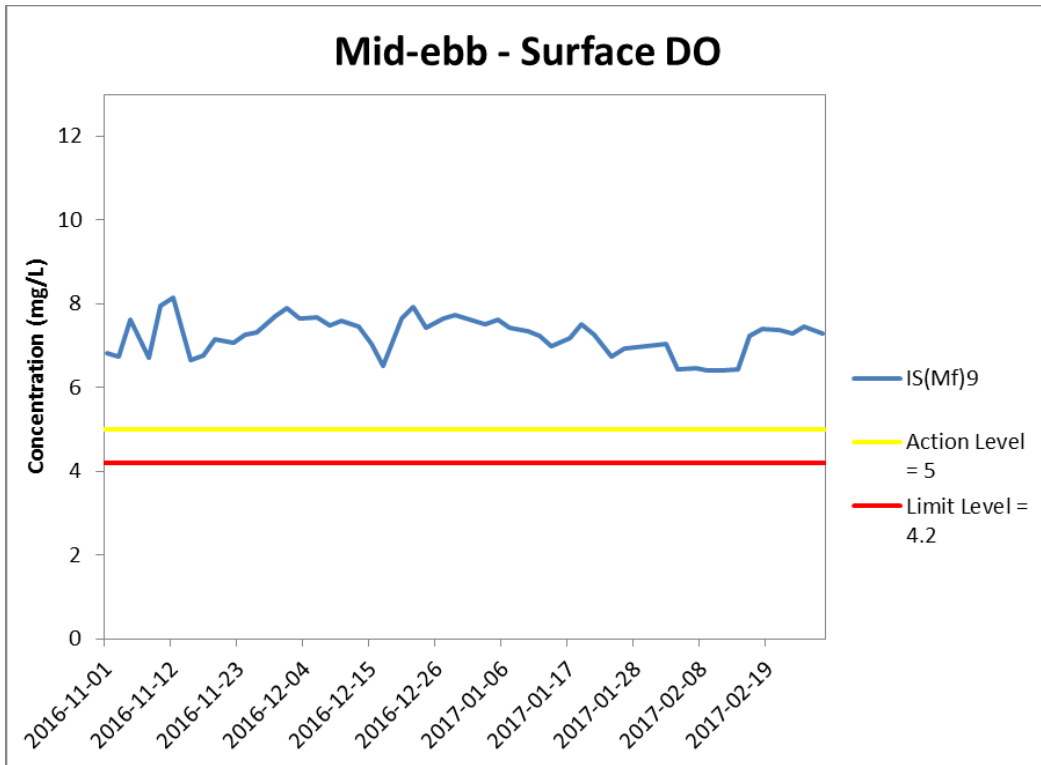
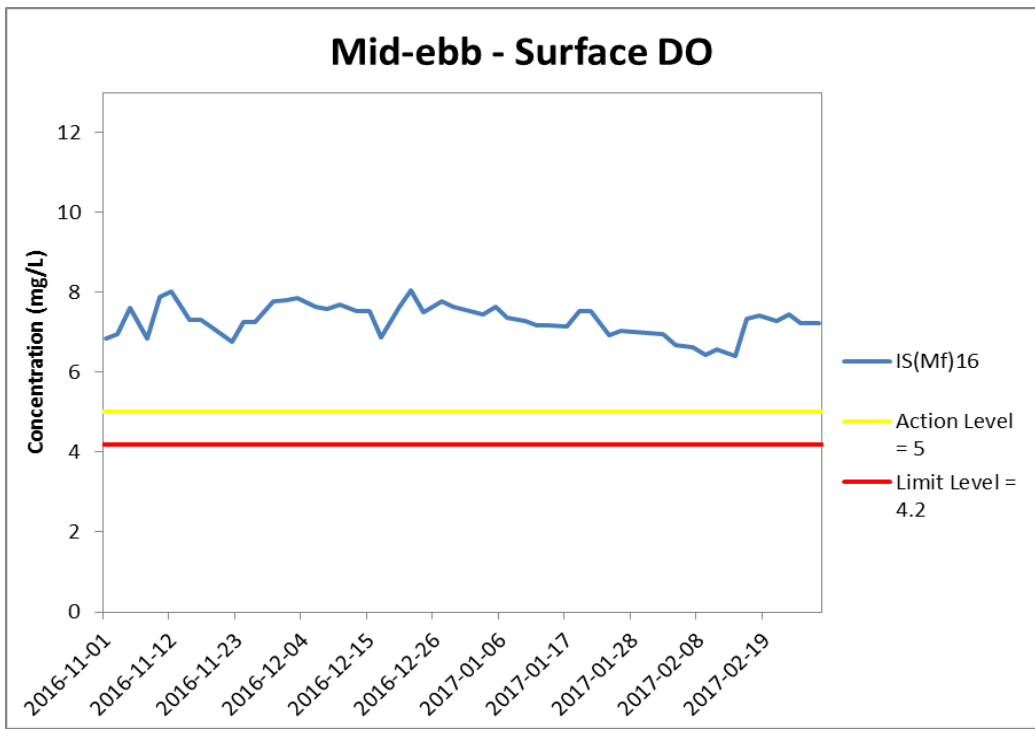


**Figure H1 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-ebb tide between 1 November 2016 and 28 February 2017 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
 Resources  
 Management**



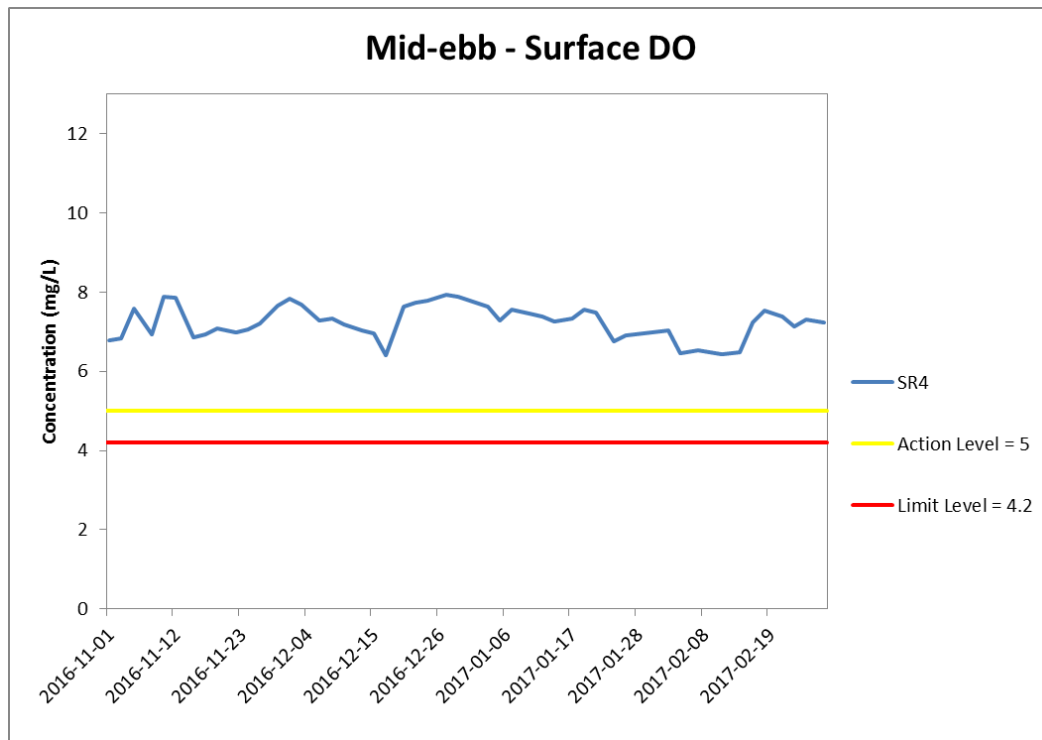
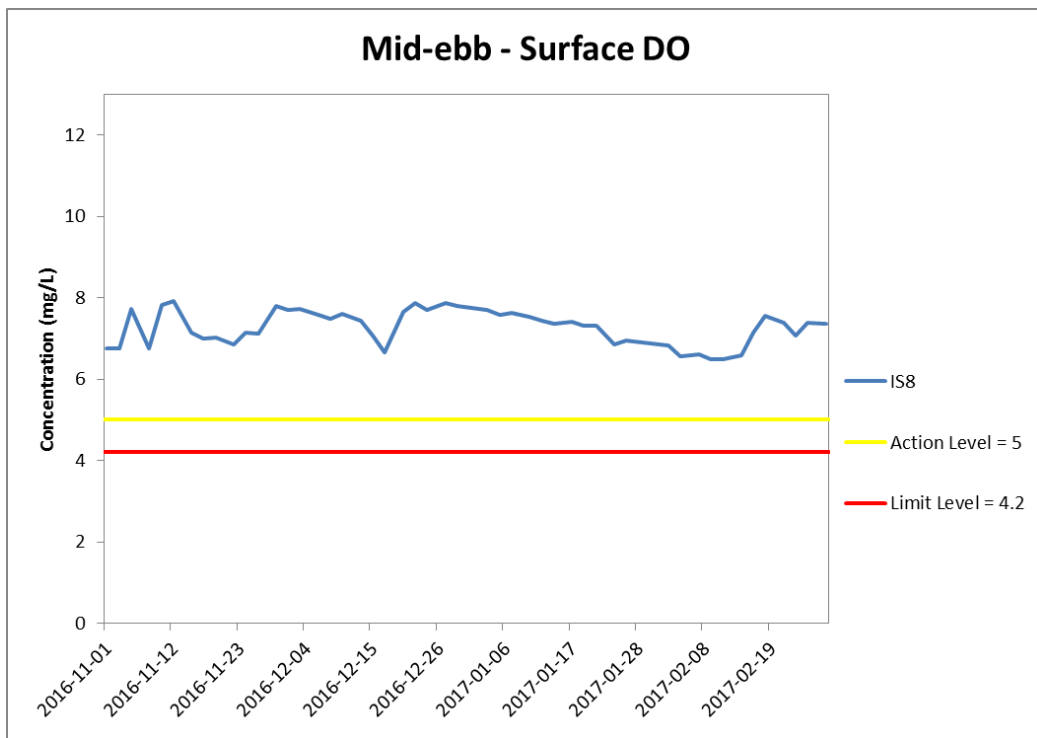


**Figure H2 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-ebb tide between 1 November 2016 and 28 February 2017 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
 Resources  
 Management**



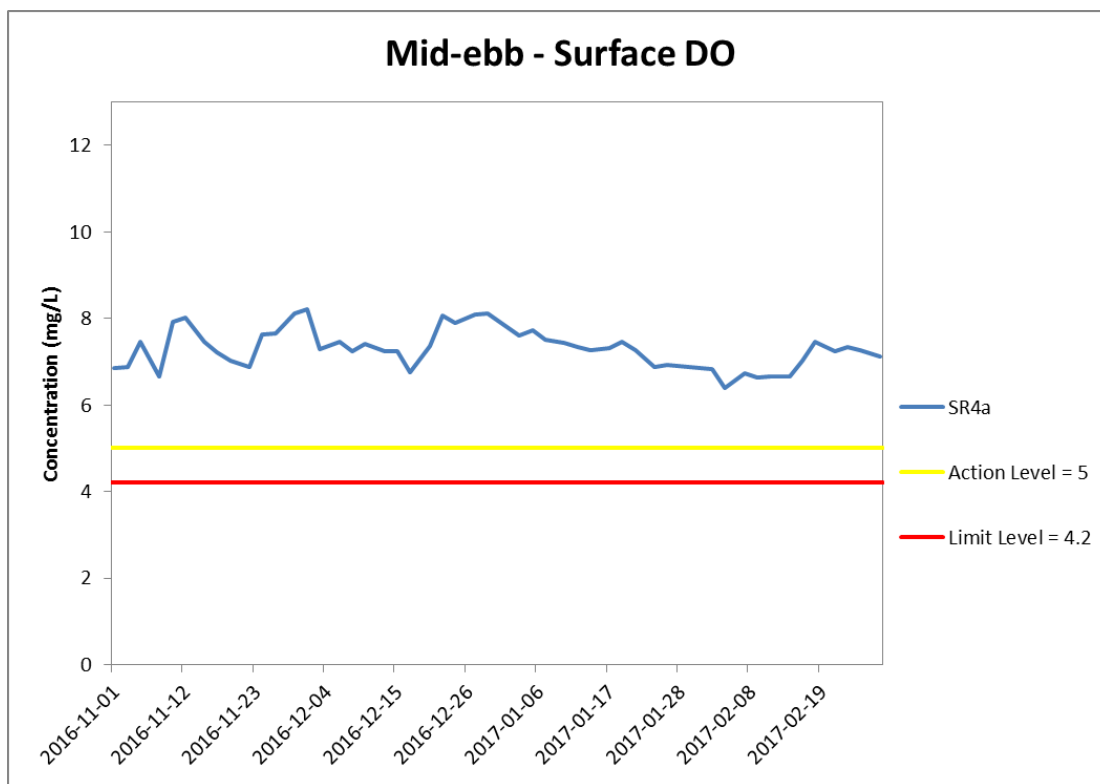


**Figure H3 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-ebb tide between 1 November 2016 and 28 February 2017 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period.) WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
Resources  
Management**

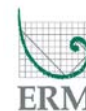


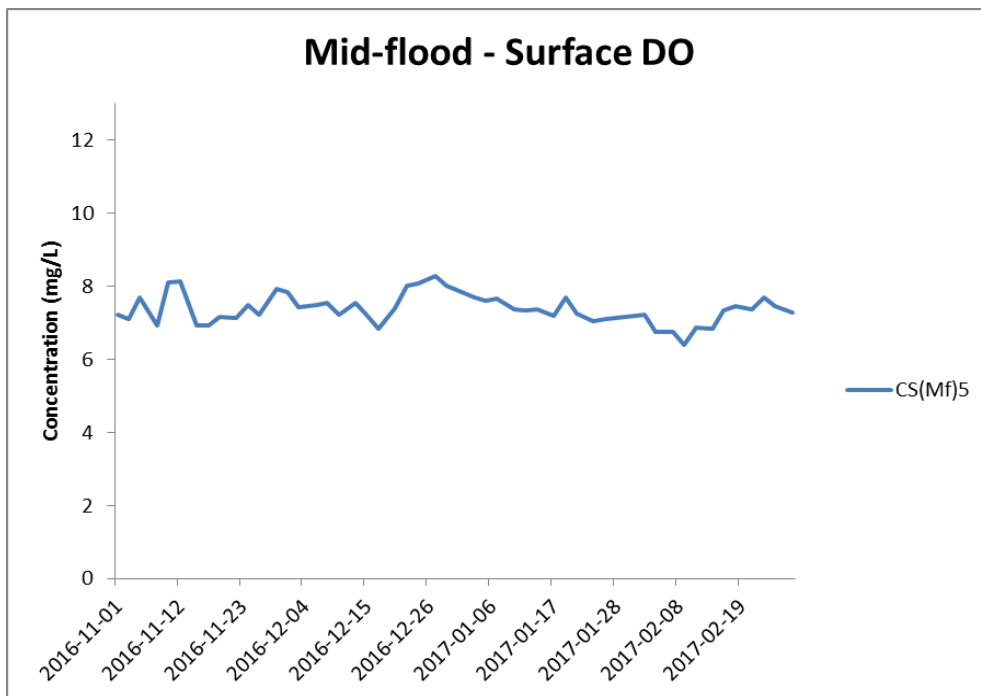
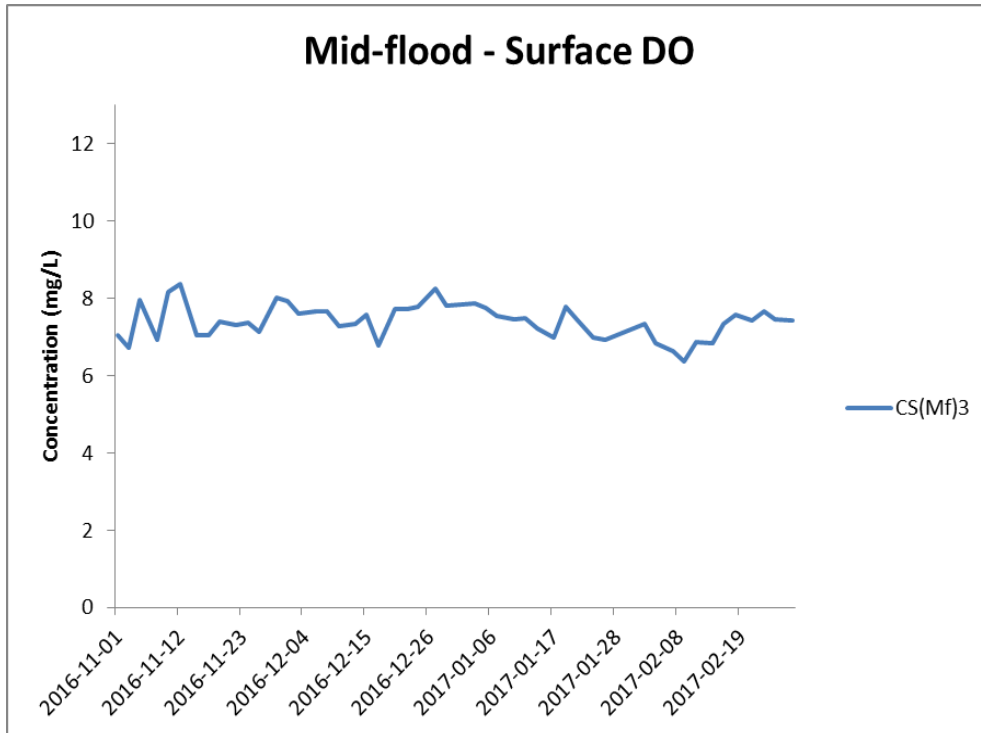


**Figure H4 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-ebb tide between 1 November 2016 and 28 February 2017 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period.) WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
Resources  
Management**





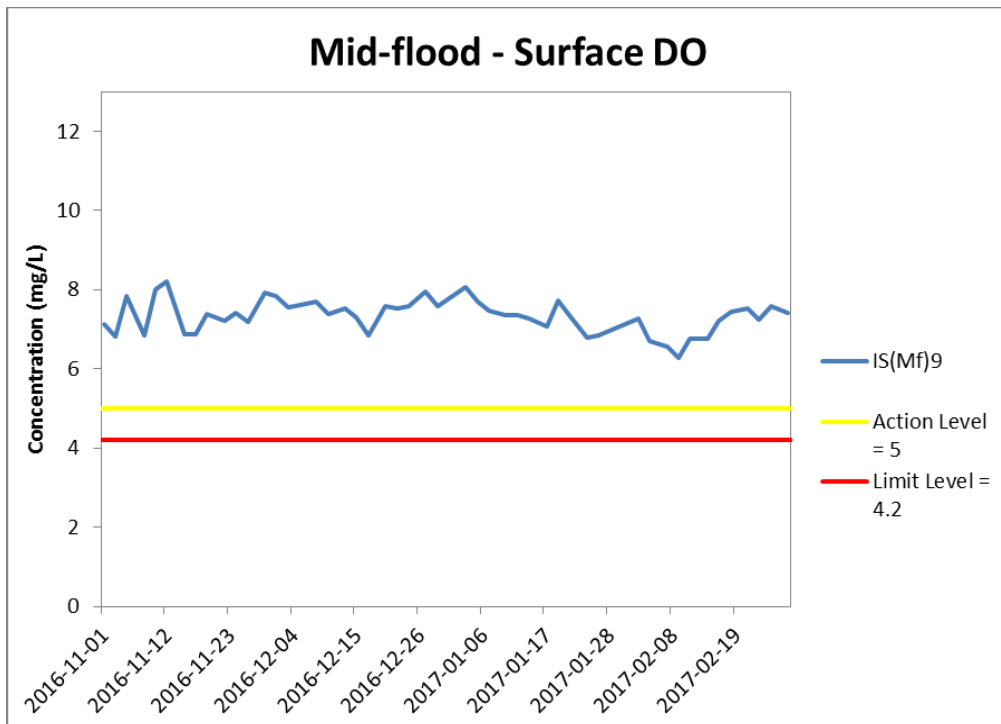
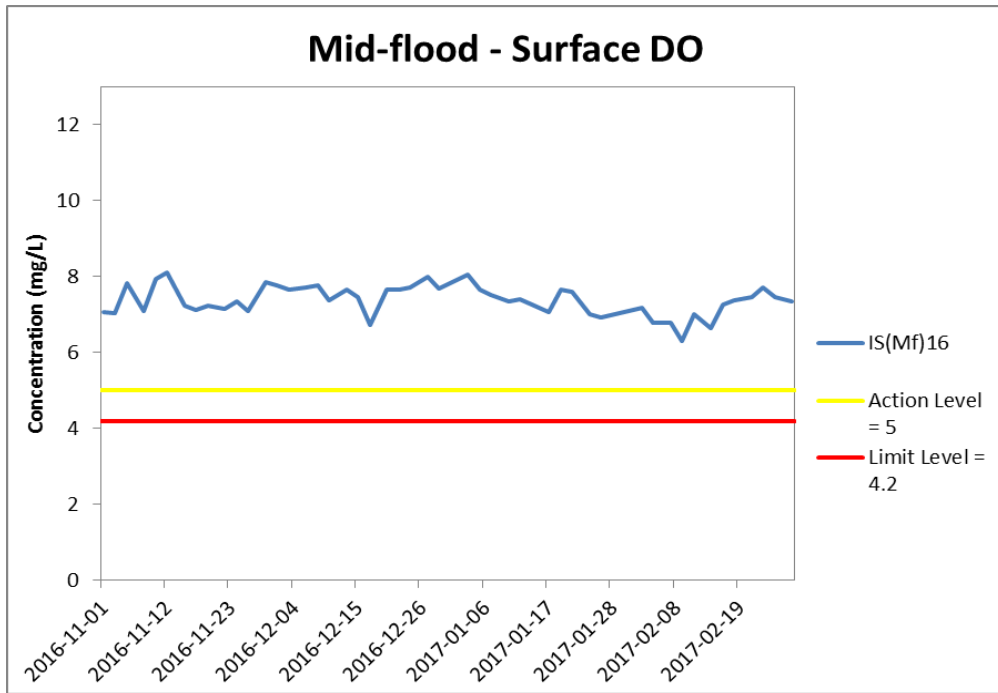
**Figure H5 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-flood tide between 1 November 2016 and 28 February 2017 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
 Resources  
 Management**





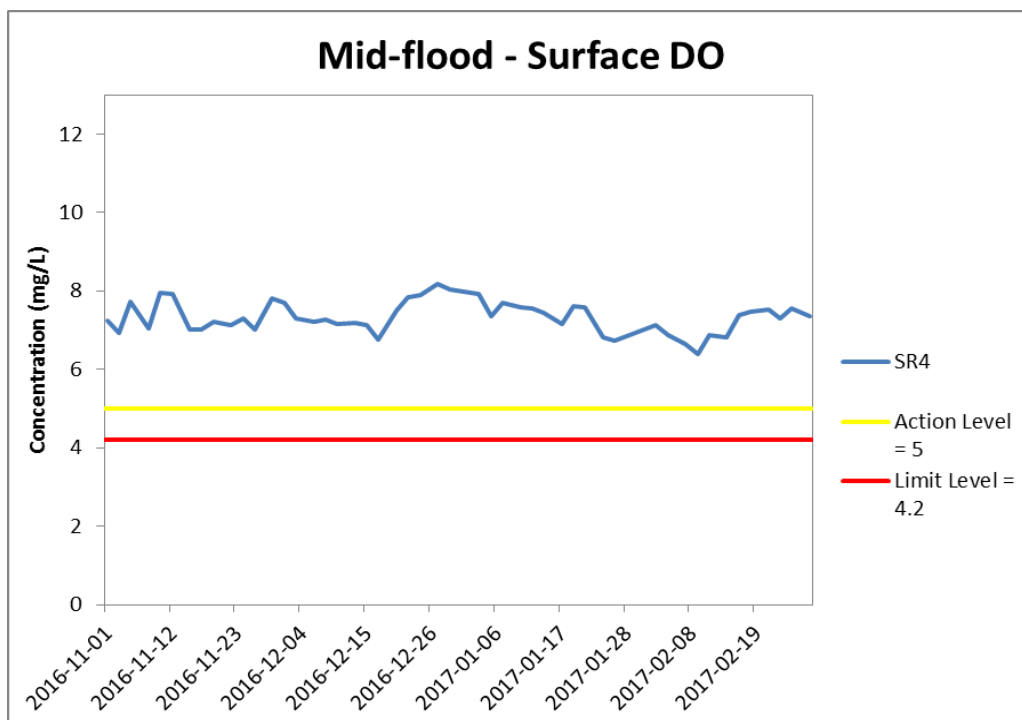
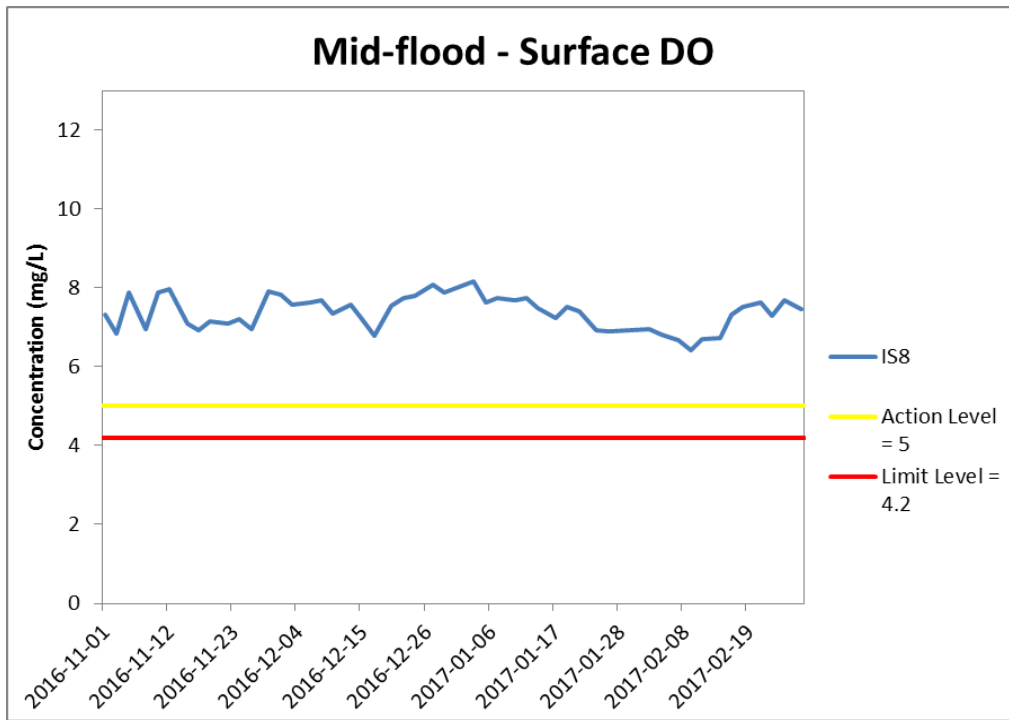


**Figure H6 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-flood tide between 1 November 2016 and 28 February 2017 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period.) WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
Resources  
Management**



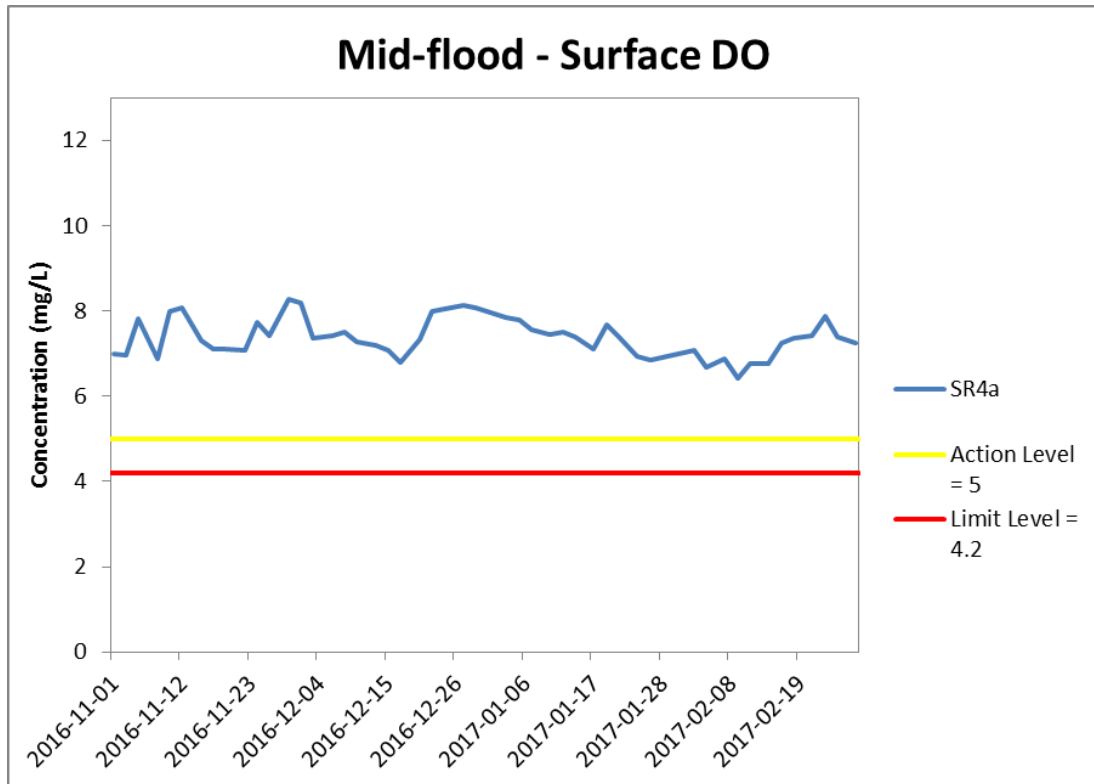


**Figure H7 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-flood tide between 1 November 2016 and 28 February 2017 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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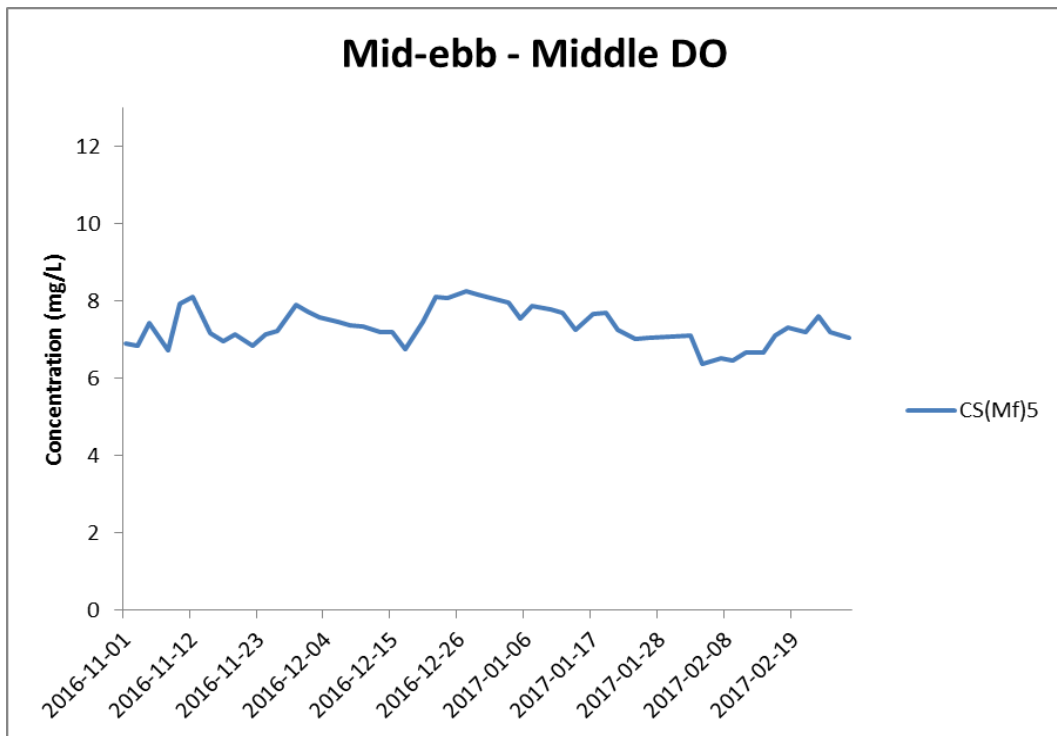
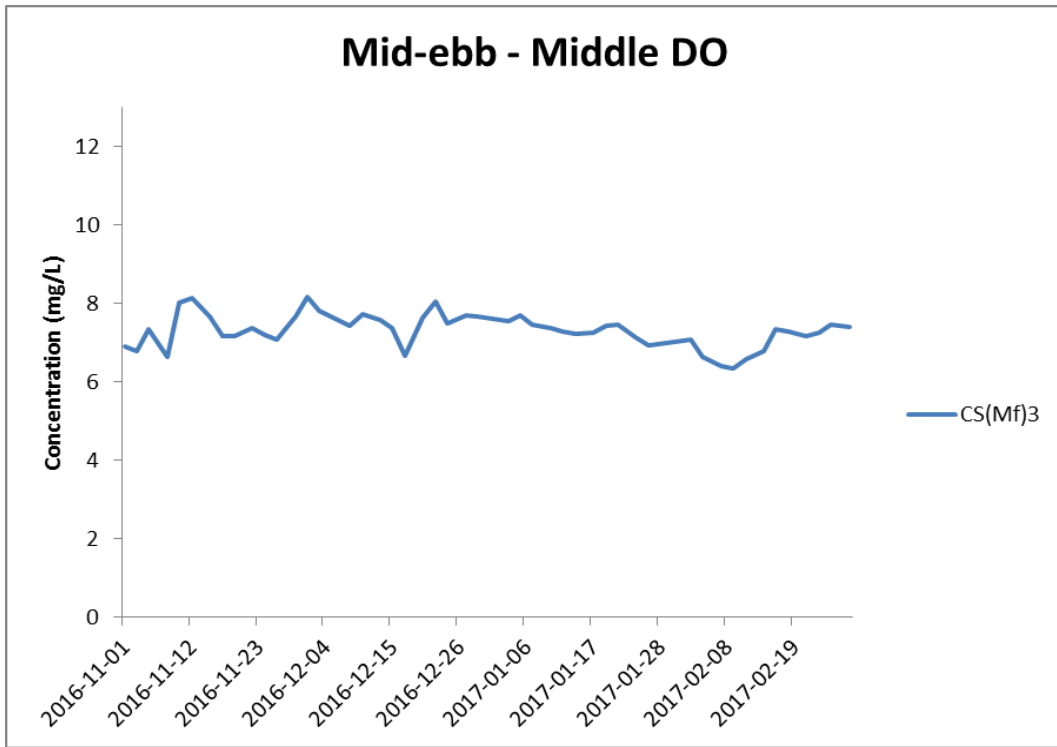


**Figure H8 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-flood tide between 1 November 2016 and 28 February 2017 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
 Resources  
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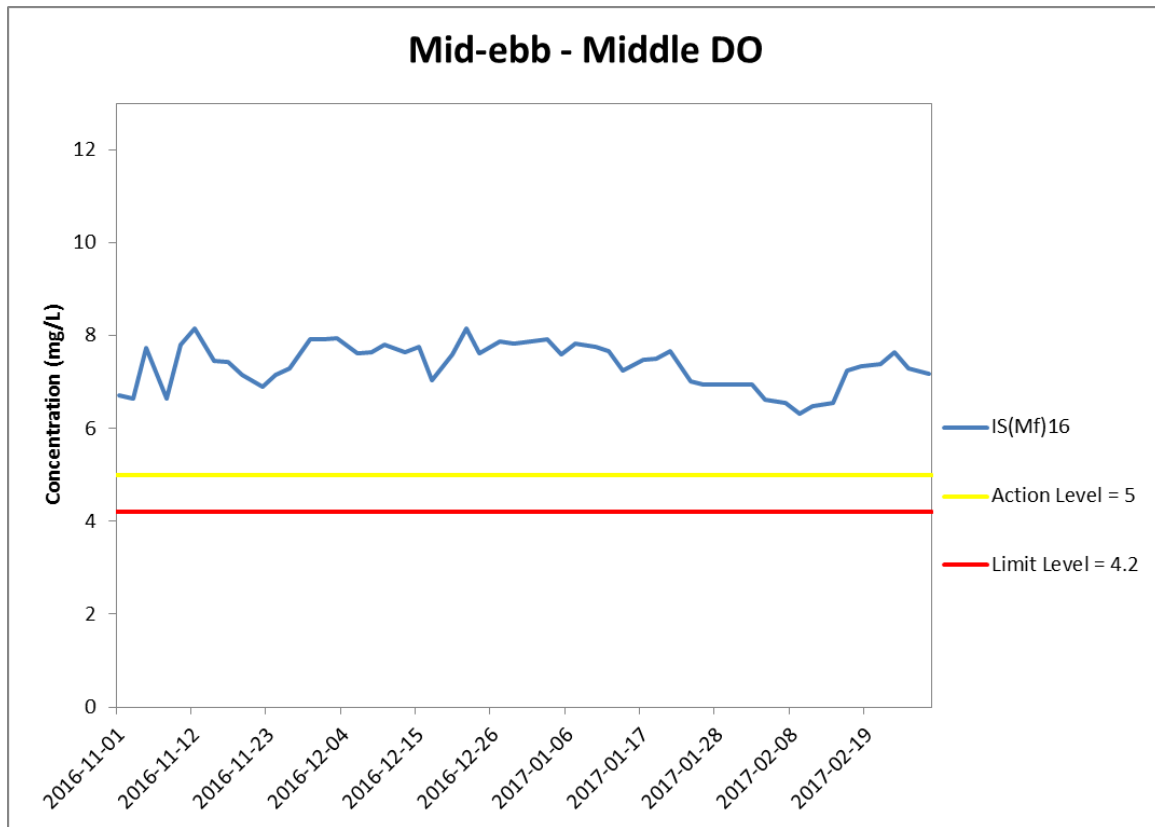


**Figure H9 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters during mid-ebb tide between 1 November 2016 and 28 February 2017 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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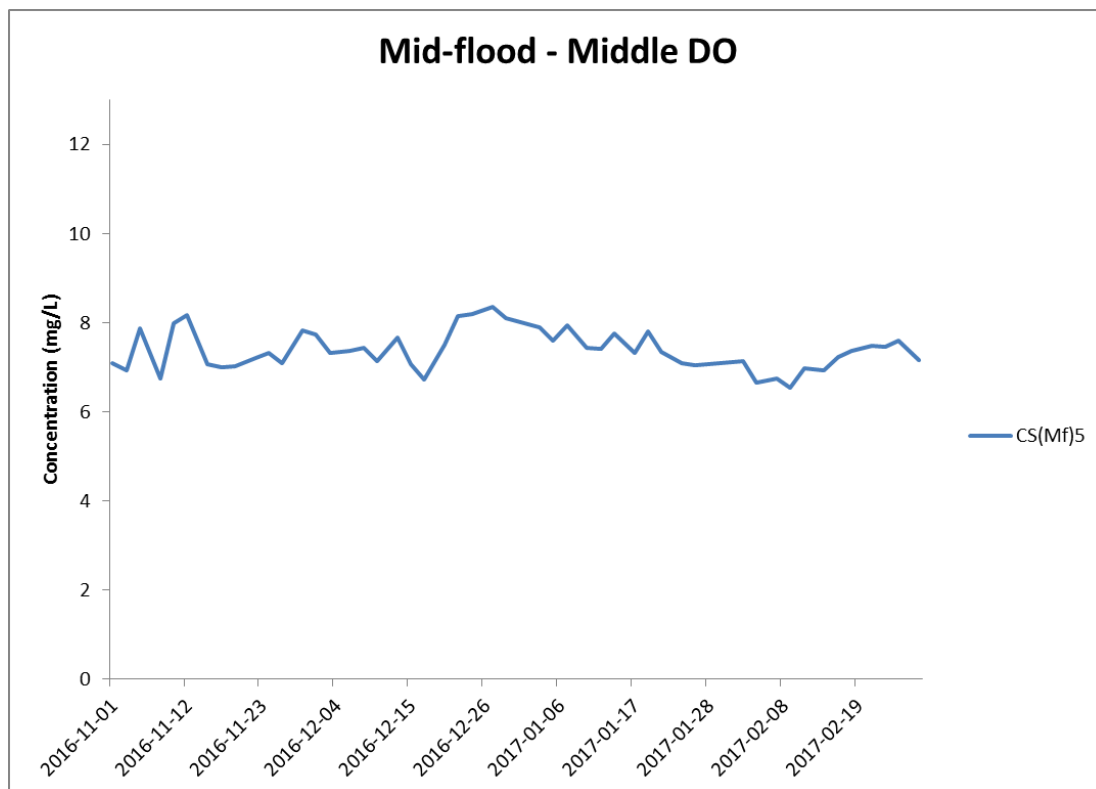
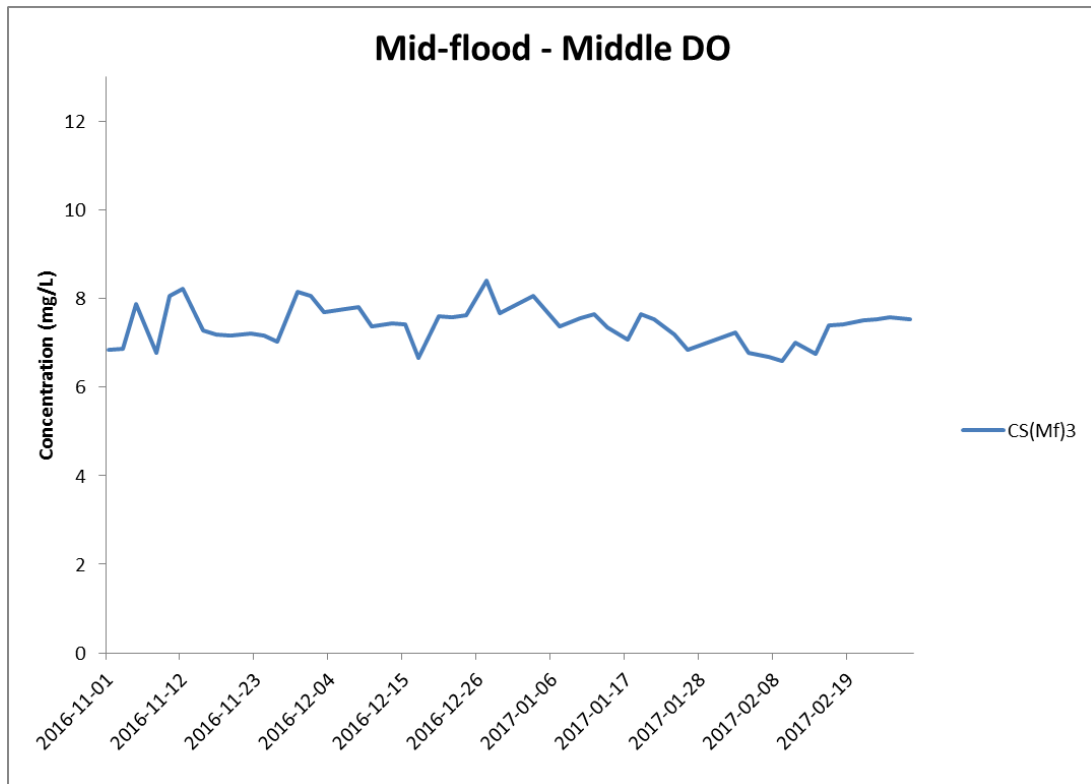


**Figure H10 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters during mid-ebb tide between 1 November 2016 and 28 February 2017 at IS(Mf)16.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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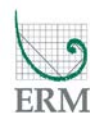




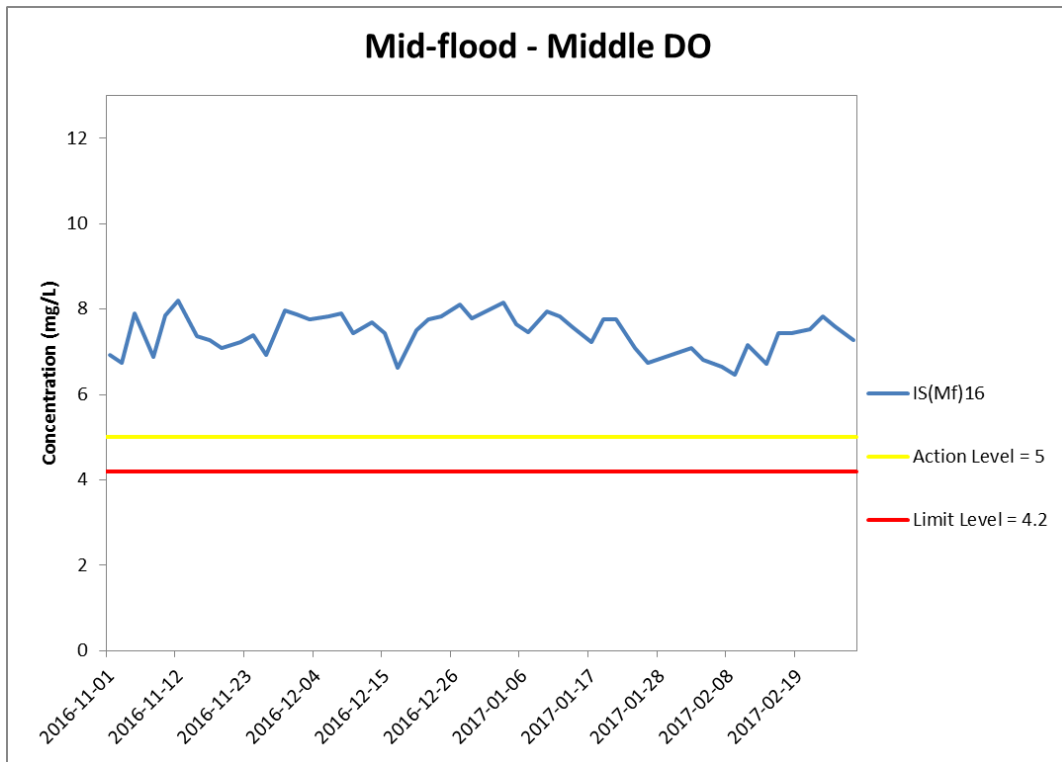
**Figure H11 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters during mid-flood tide between 1 November 2016 and 28 February 2017 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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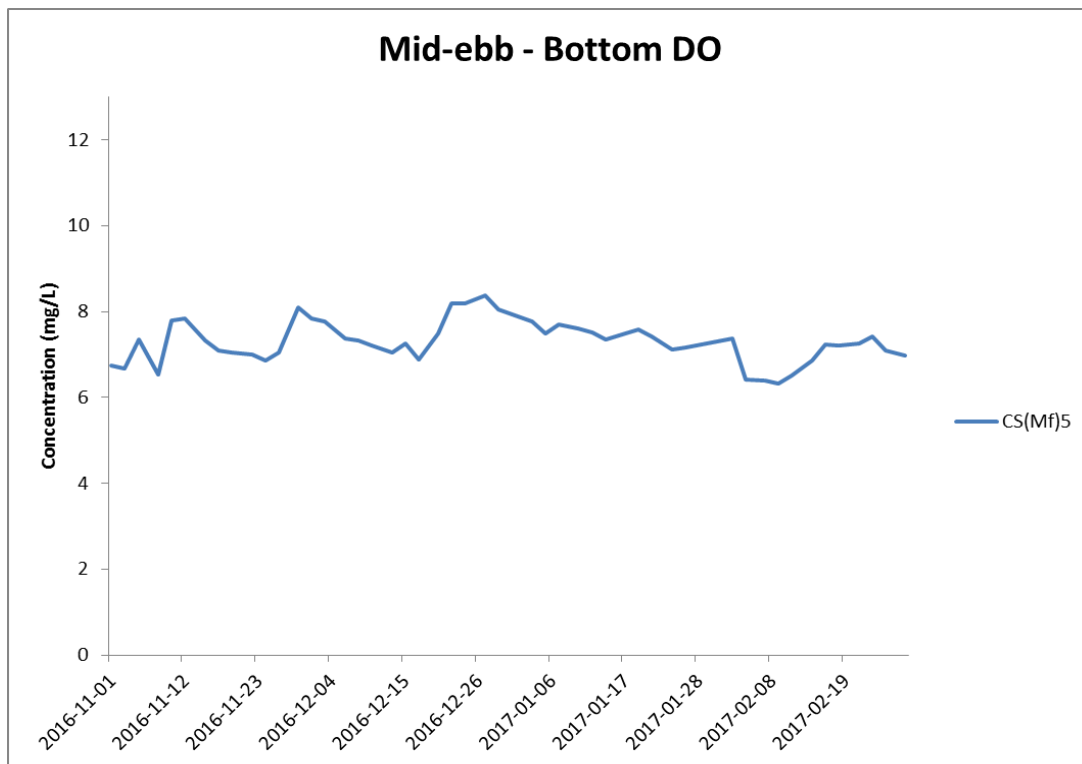
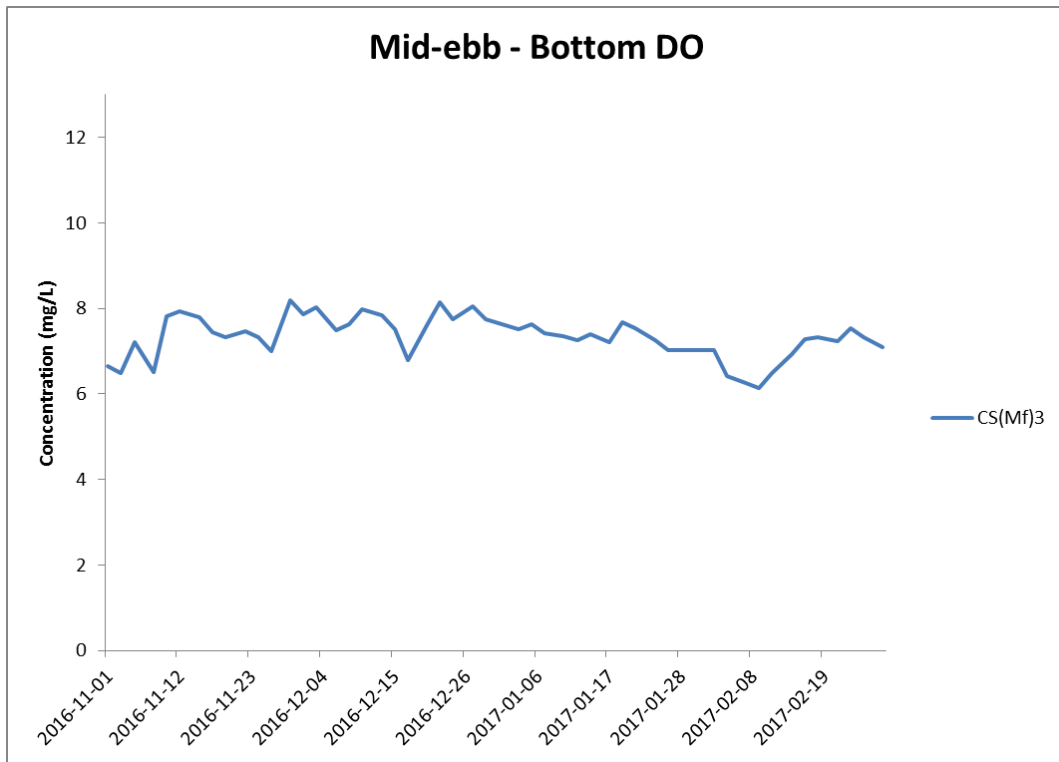


**Figure H12 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters during mid-flood tide between 1 November 2016 and 28 February 2017 at IS(Mf)16.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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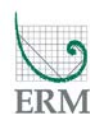


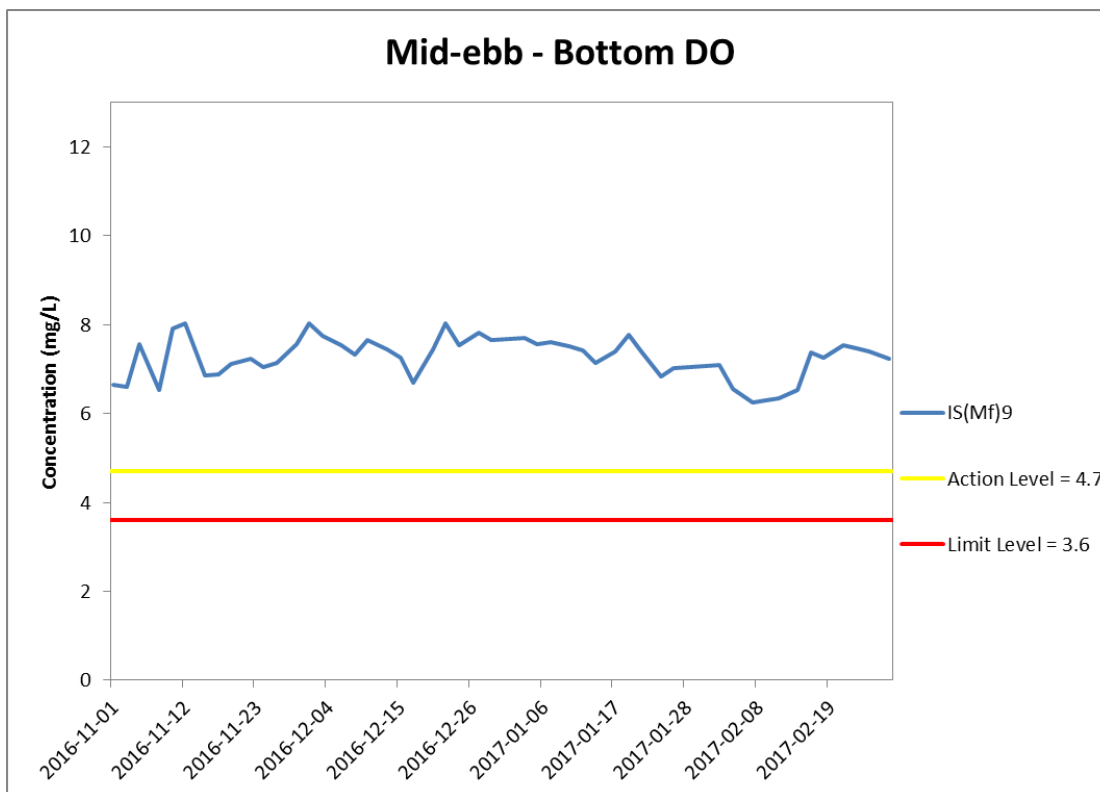
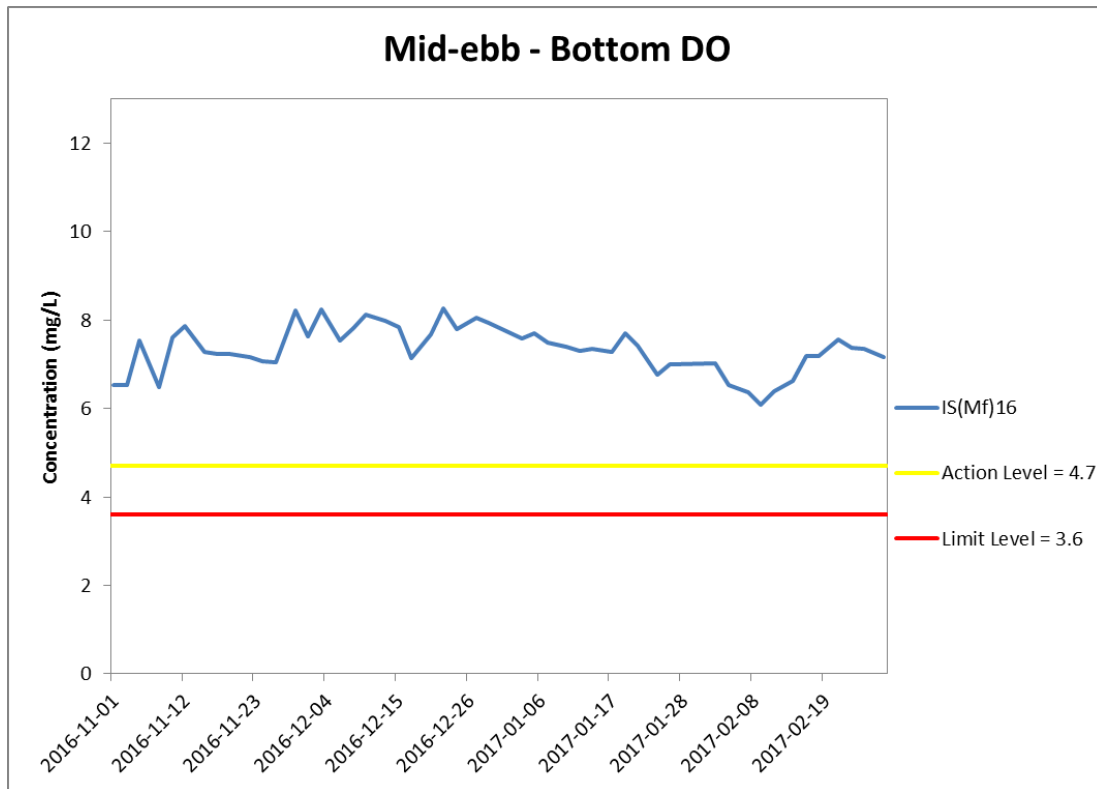


**Figure H13 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-ebb tide between 1 November 2016 and 28 February 2017 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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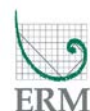


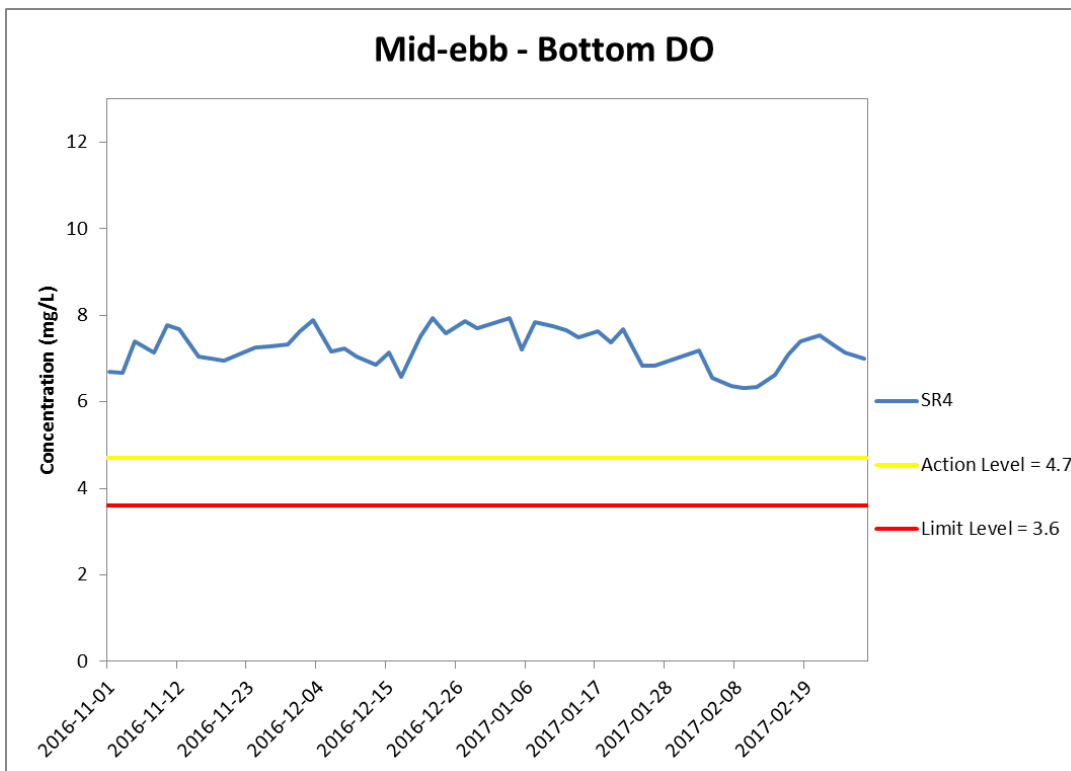
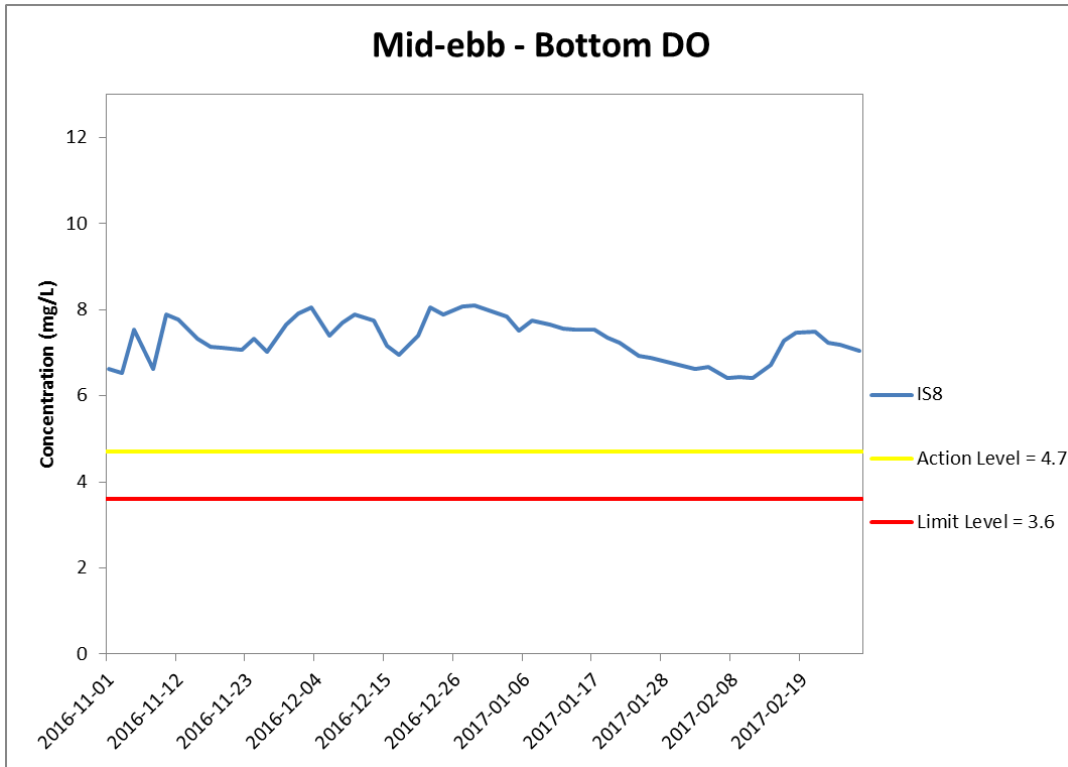


**Figure H14 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-ebb tide between 1 November 2016 and 28 February 2017 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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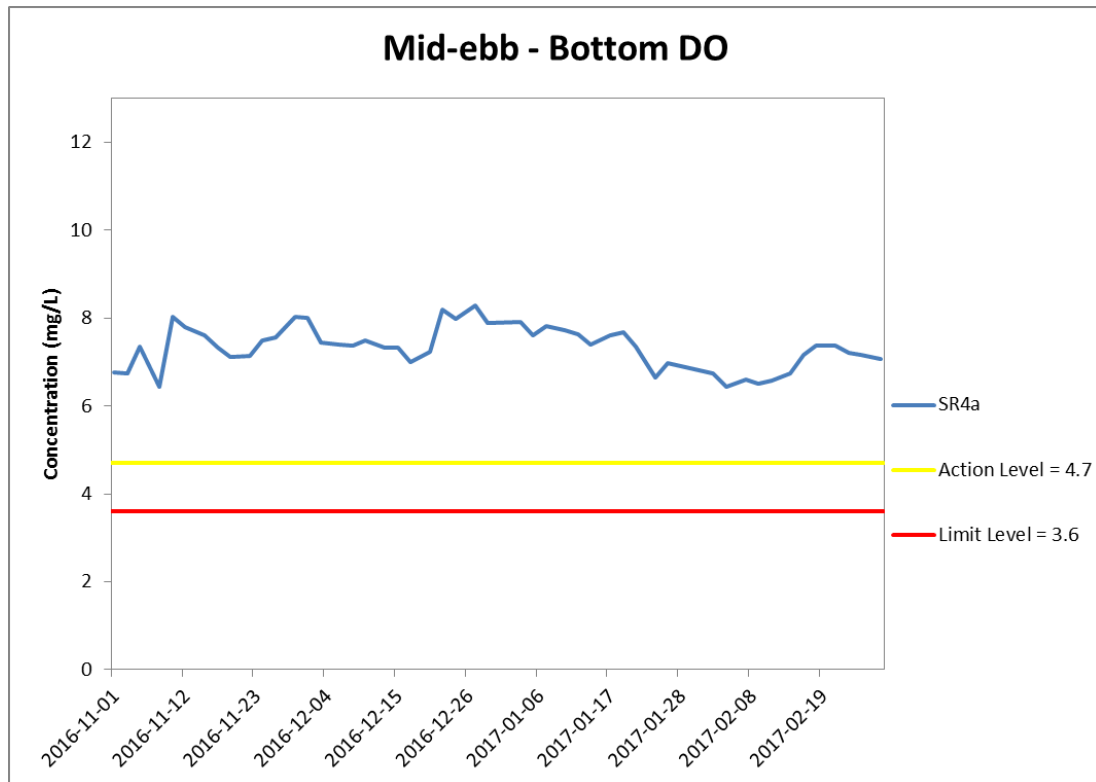


**Figure H15 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-ebb tide between 1 November 2016 and 28 February 2017 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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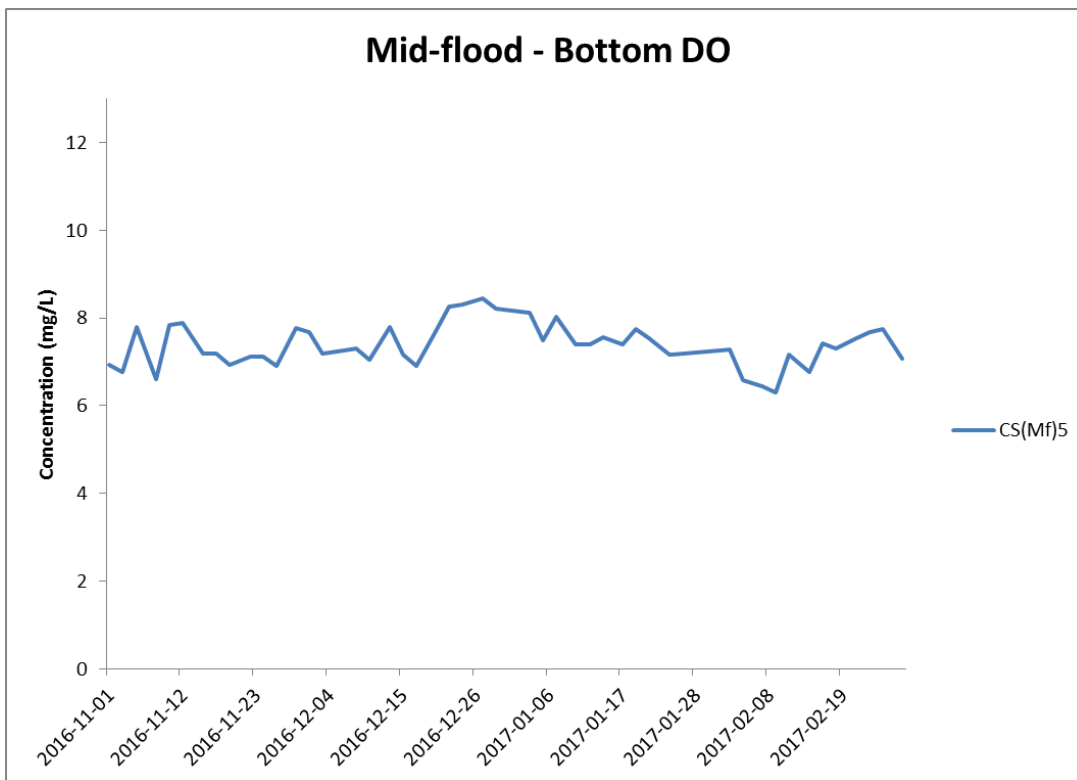
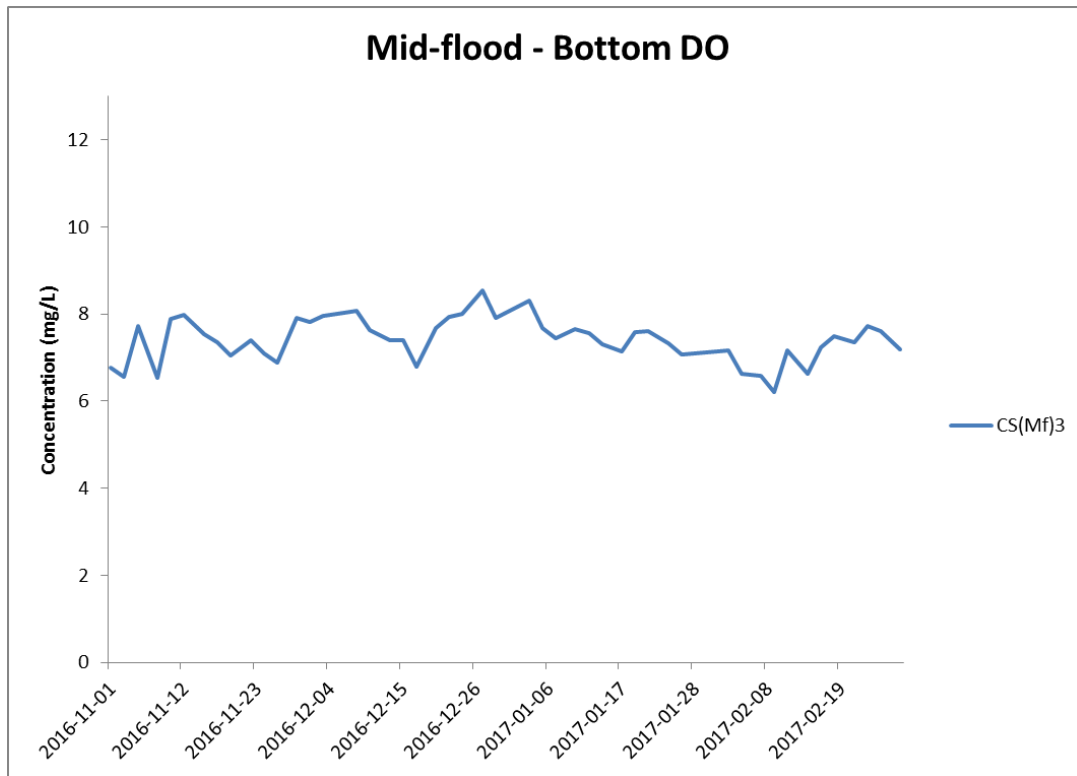


**Figure H16 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-ebb tide between 1 November 2016 and 28 February 2017 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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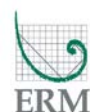




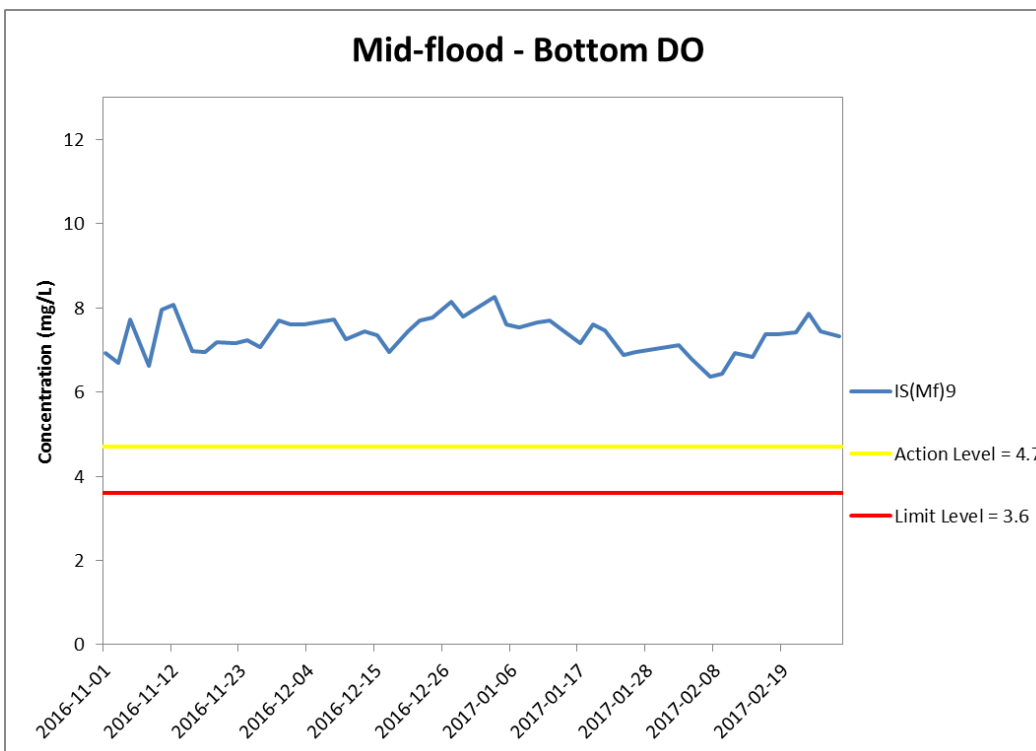
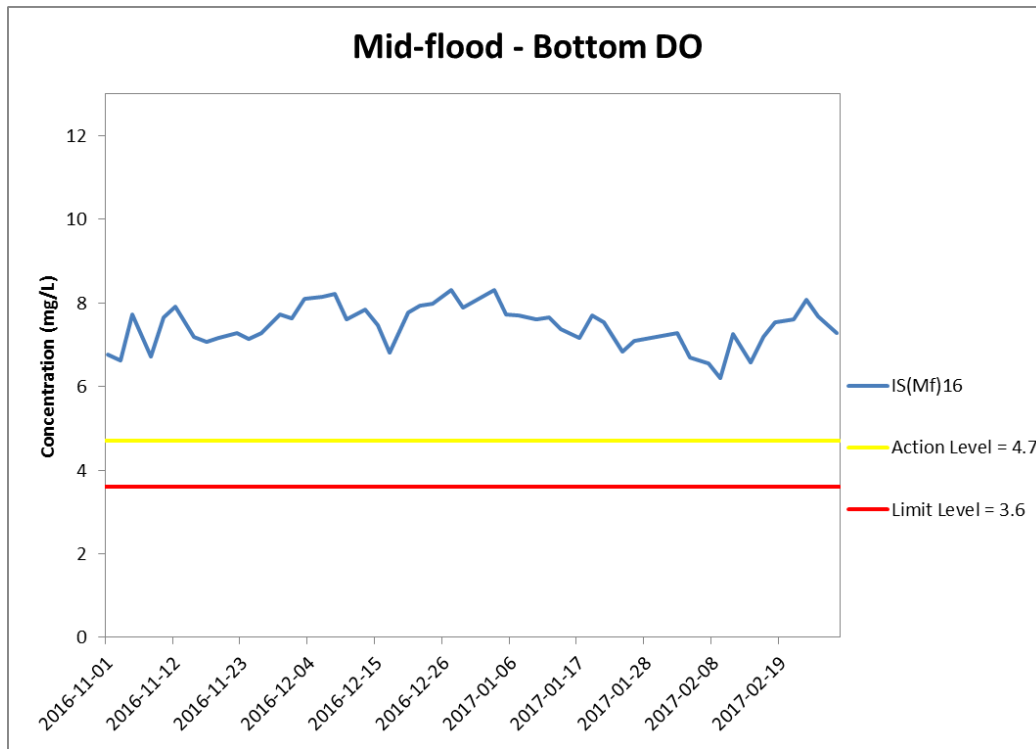
**Figure H17 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-flood tide between 1 November 2016 and 28 February 2017 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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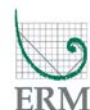


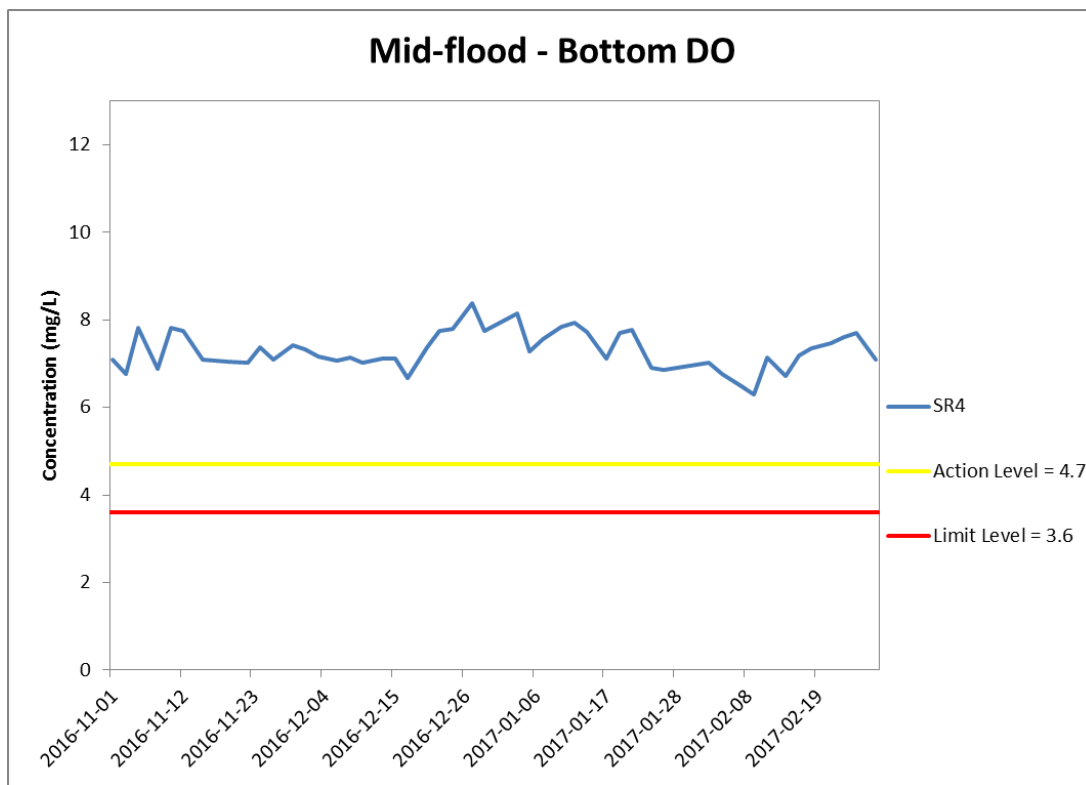
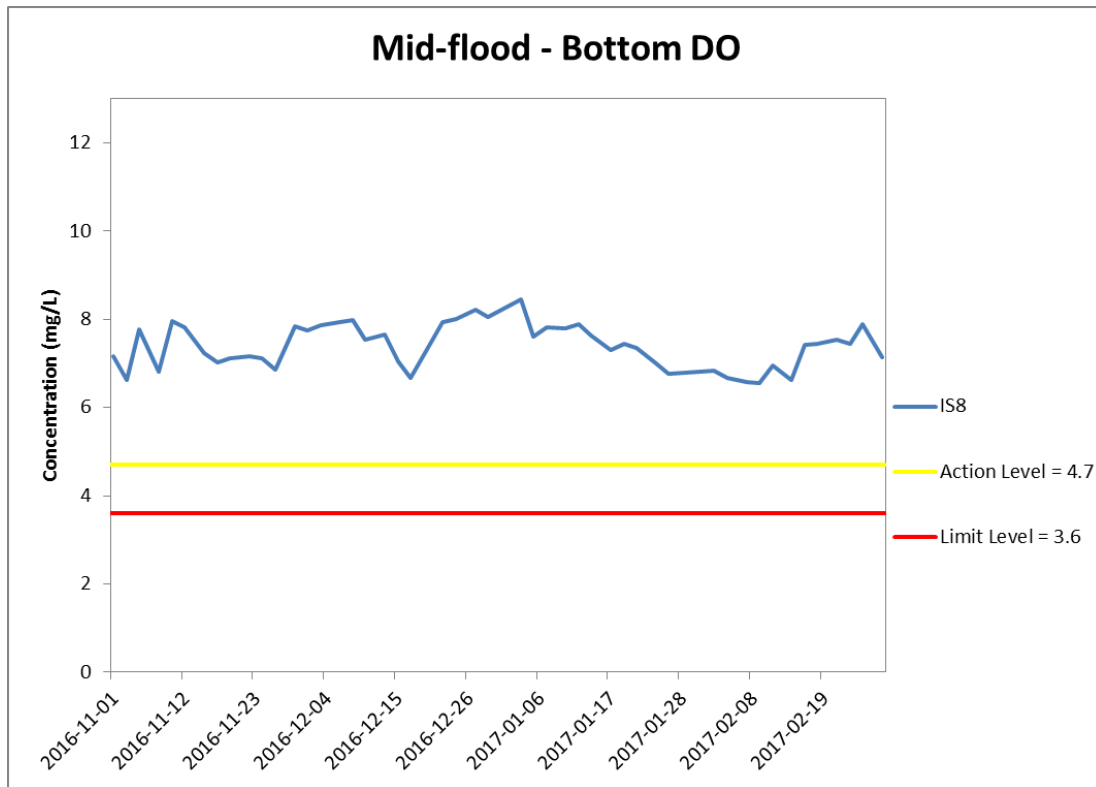


**Figure H18 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-flood tide between 1 November 2016 and 28 February 2017 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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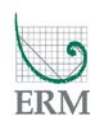


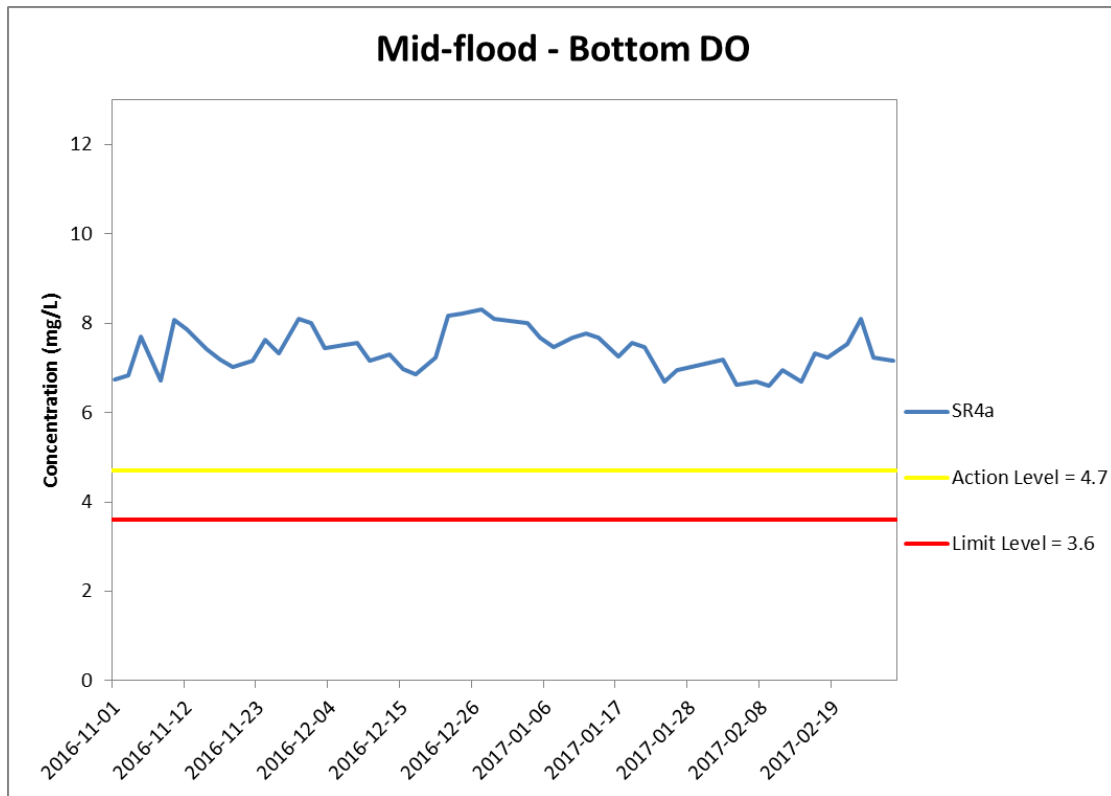


**Figure H19 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-flood tide between 1 November 2016 and 28 February 2017 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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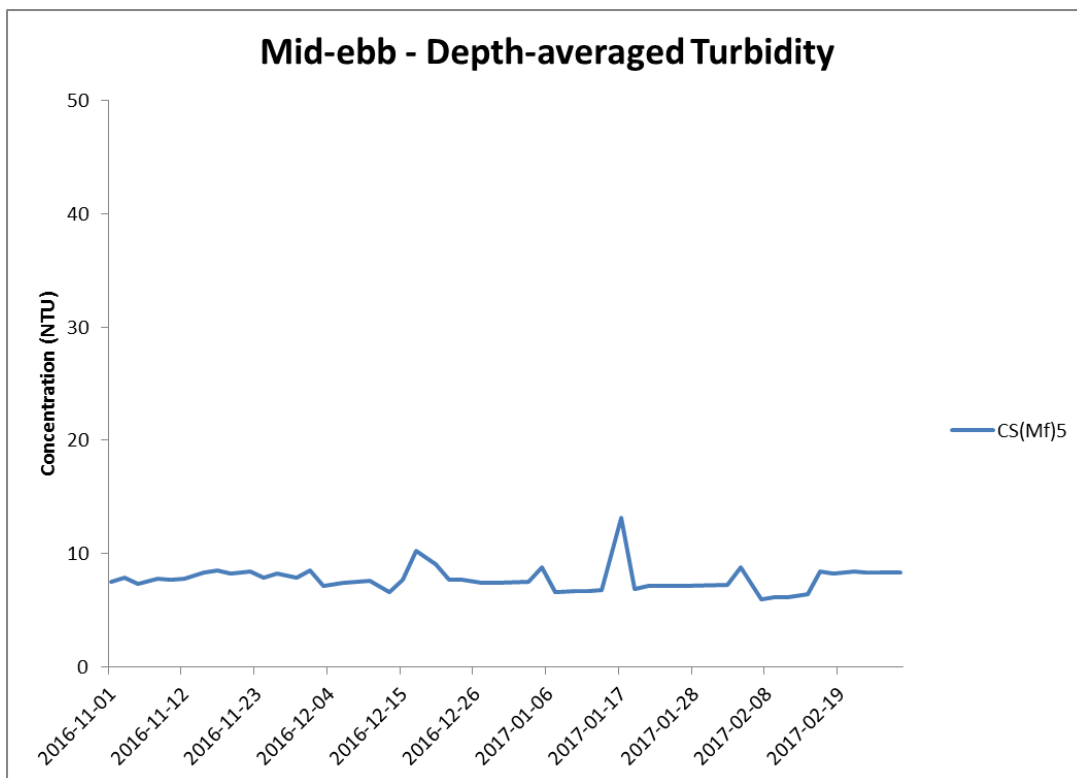
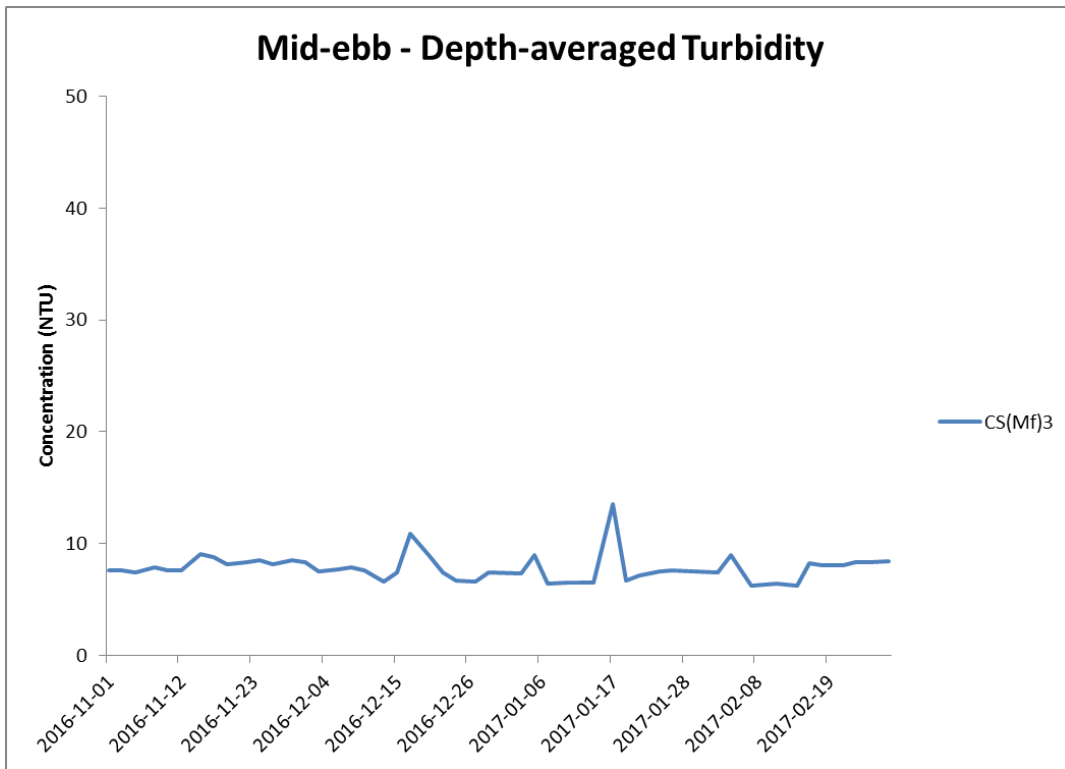


**Figure H20 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-flood tide between 1 November 2016 and 28 February 2017 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

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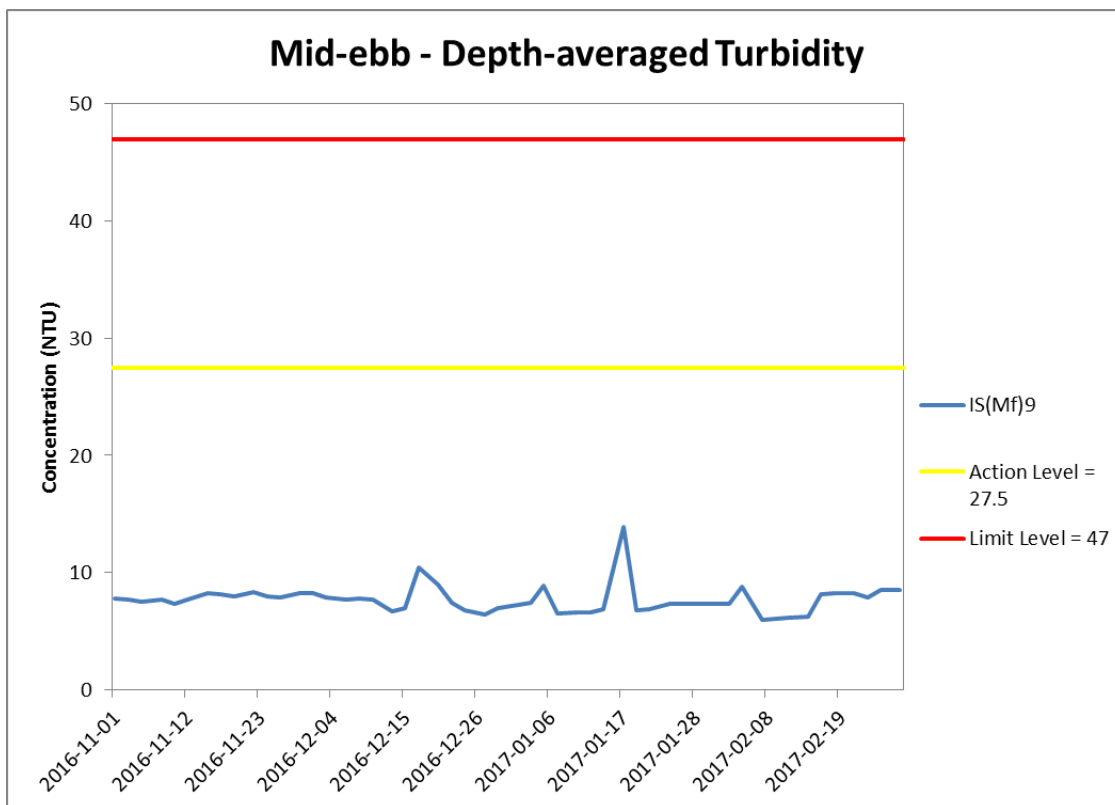
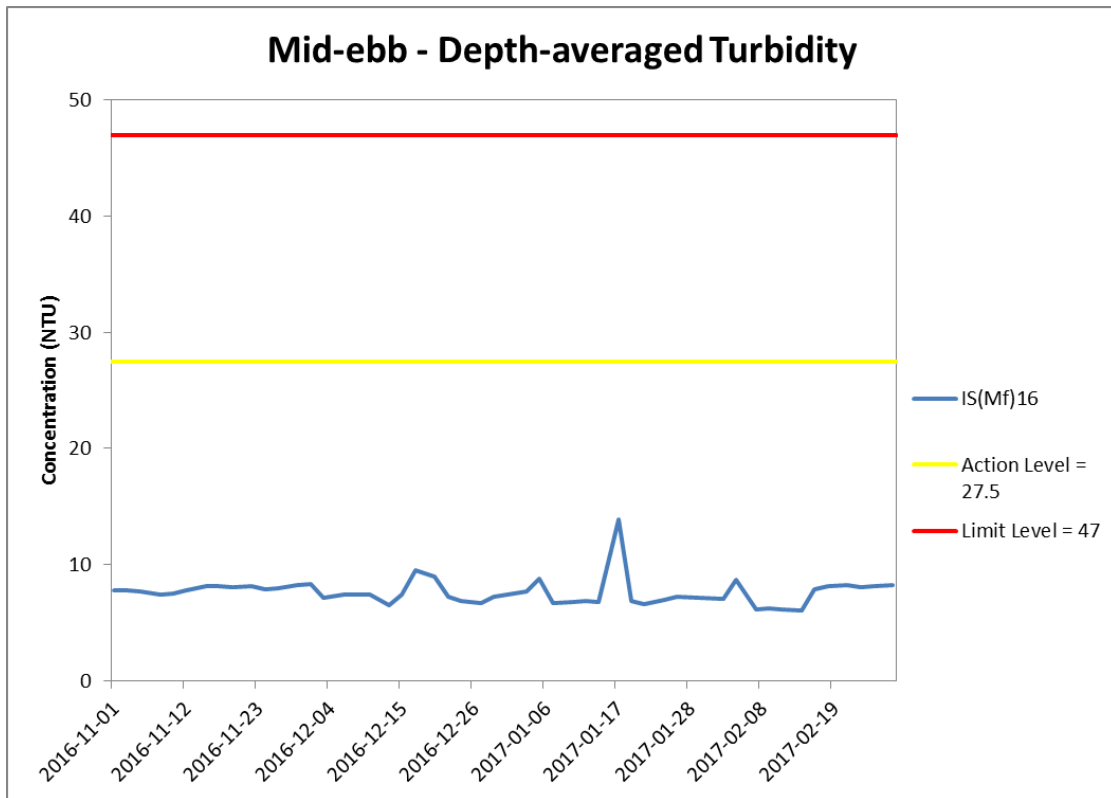


**Figure H21 Impact Monitoring - Mean Level of depth-averaged Turbidity (NTU) during mid-ebb tide between 1 November 2016 and 28 February 2017 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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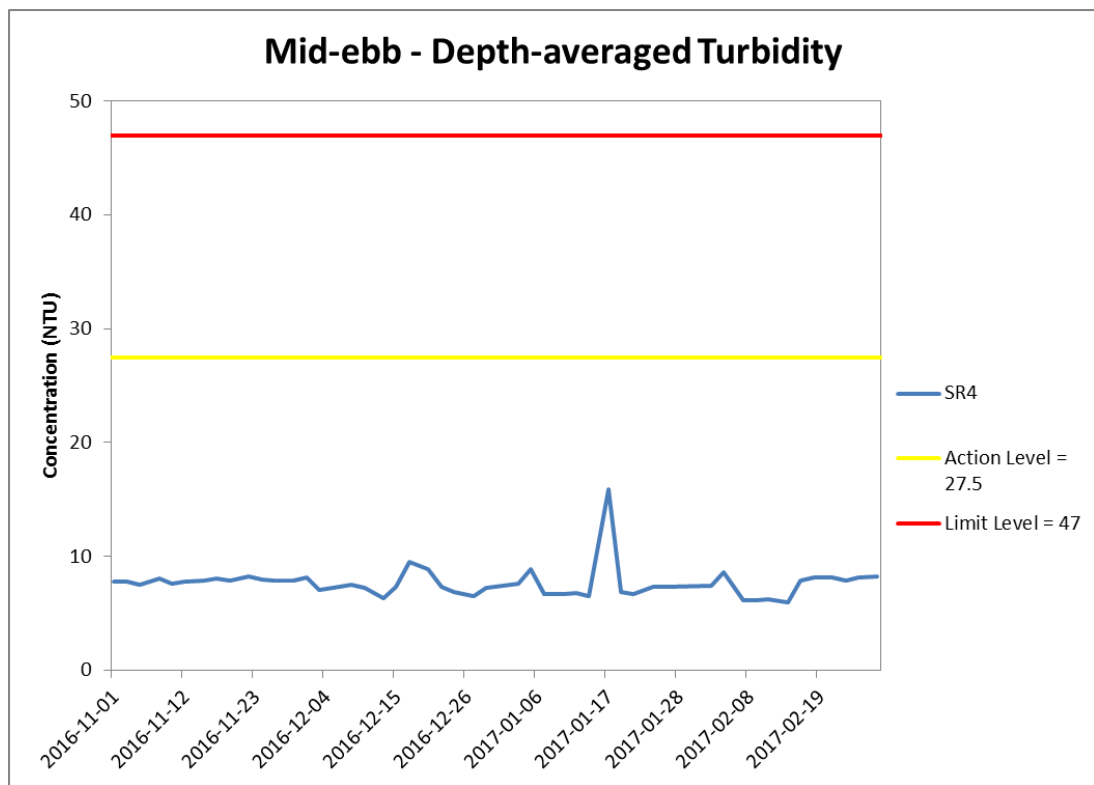
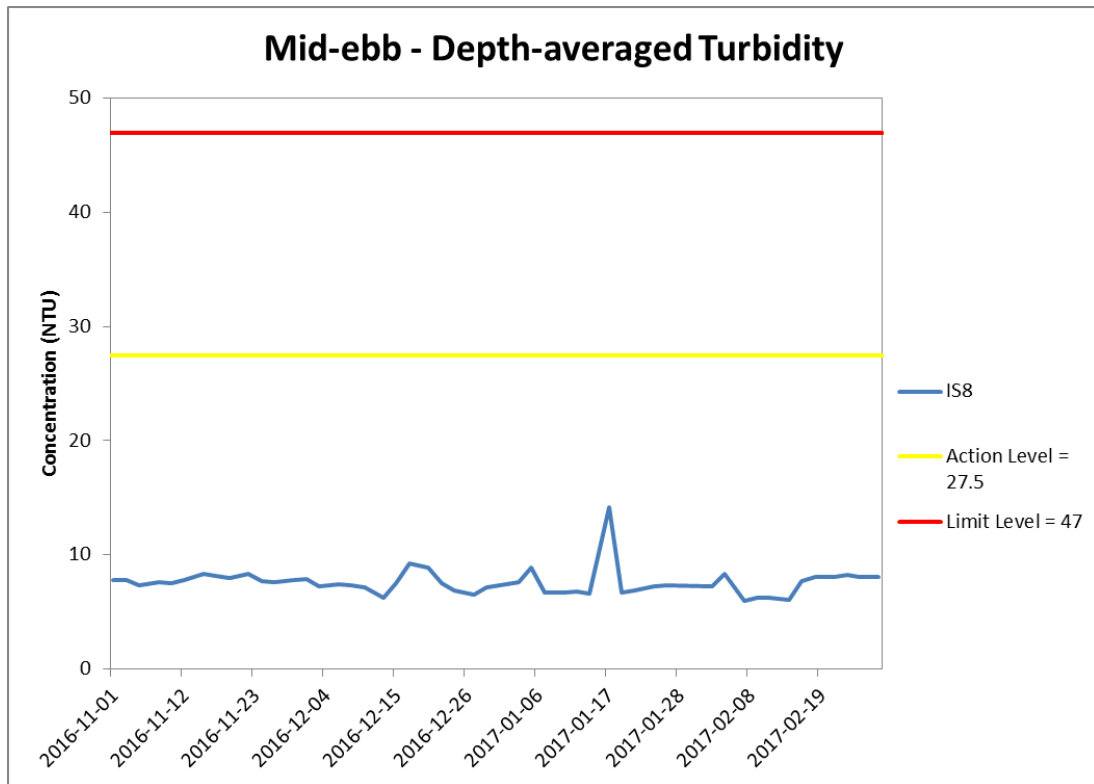


**Figure H22 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-ebb tide between 1 November 2016 and 28 February 2017 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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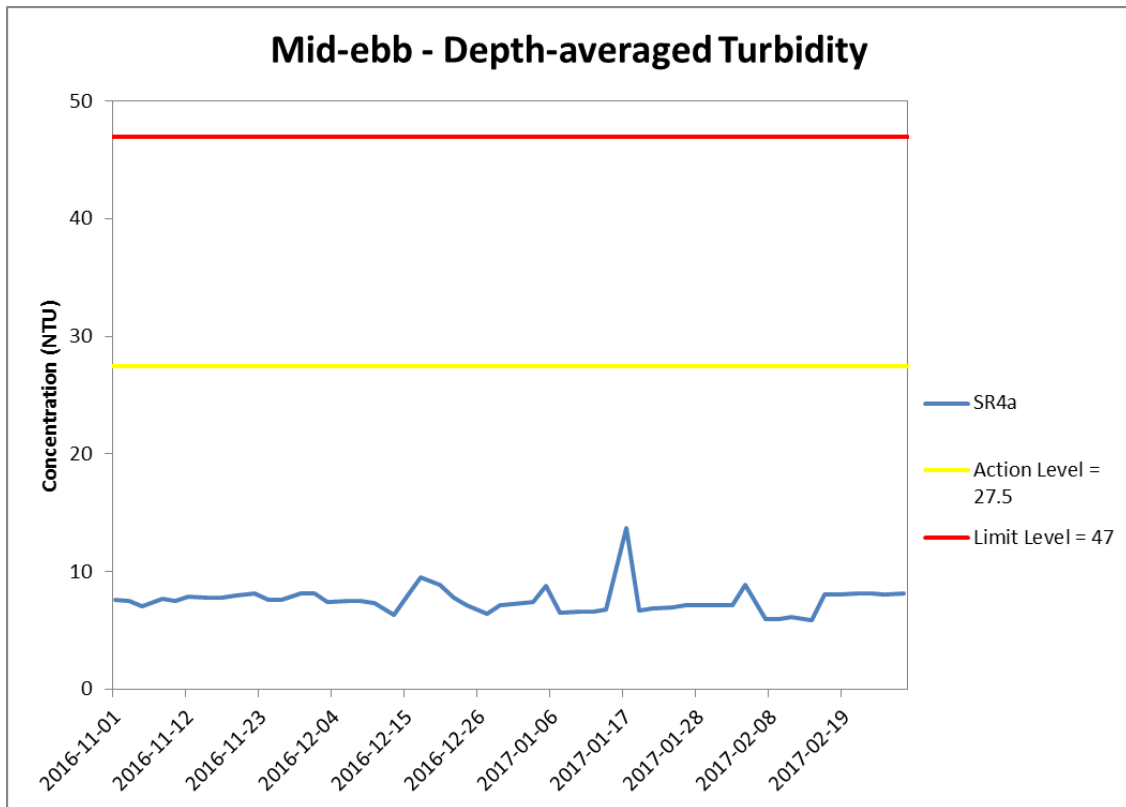
**Figure H23 Impact Monitoring - Mean Level of depth-averaged Turbidity (NTU) during mid-ebb tide between 1 November 2016 and 28 February 2017 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period.)*  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.

**Environmental  
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Management**





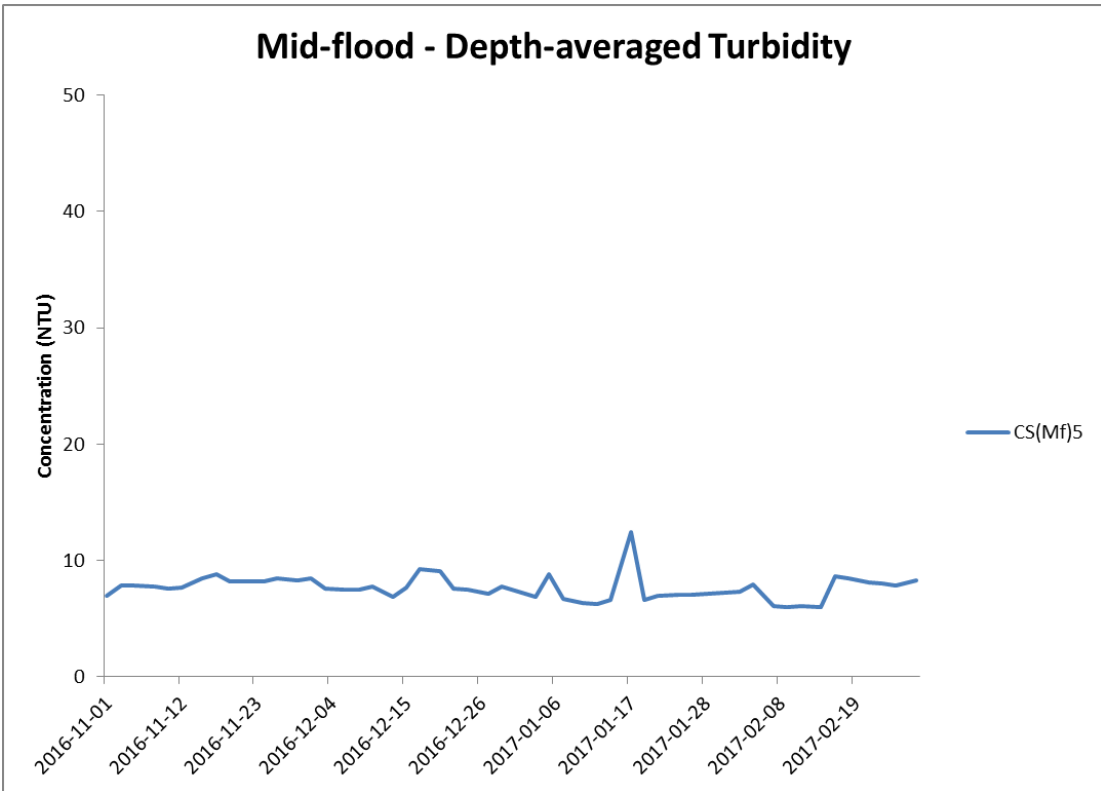
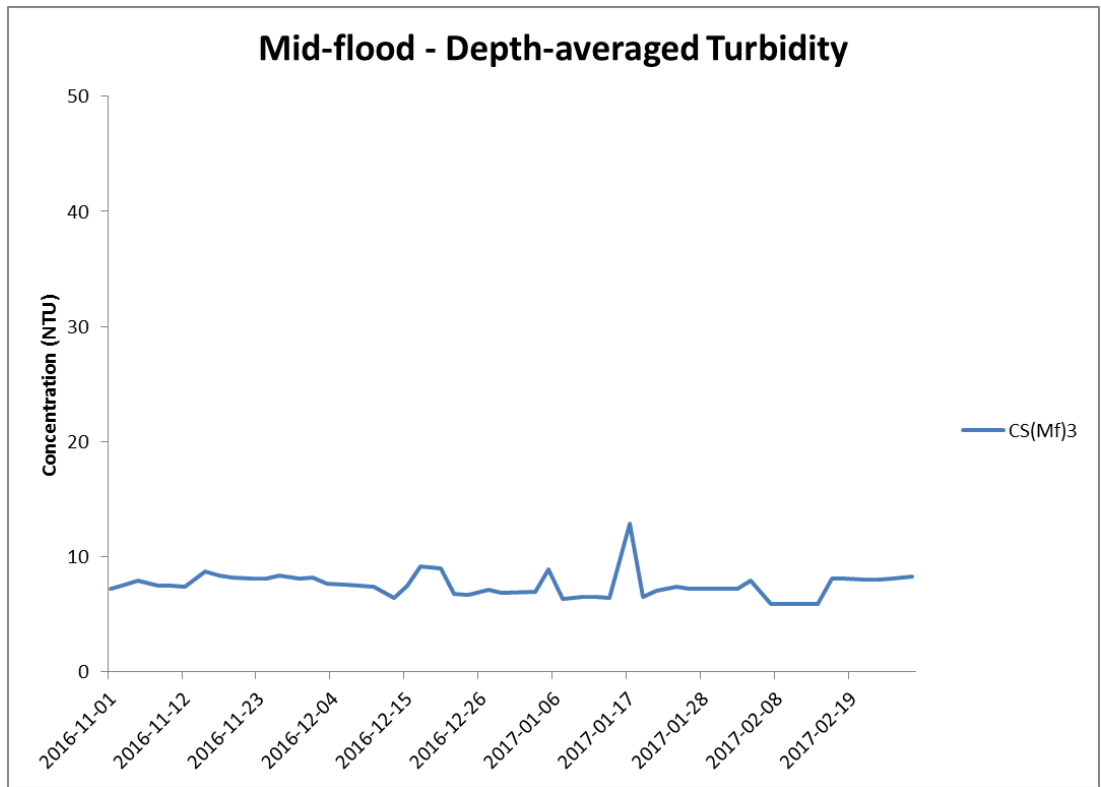


**Figure H24 Impact Monitoring - Mean Level of depth-averaged Turbidity (NTU) during mid-ebb tide between 1 November 2016 and 28 February 2017 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

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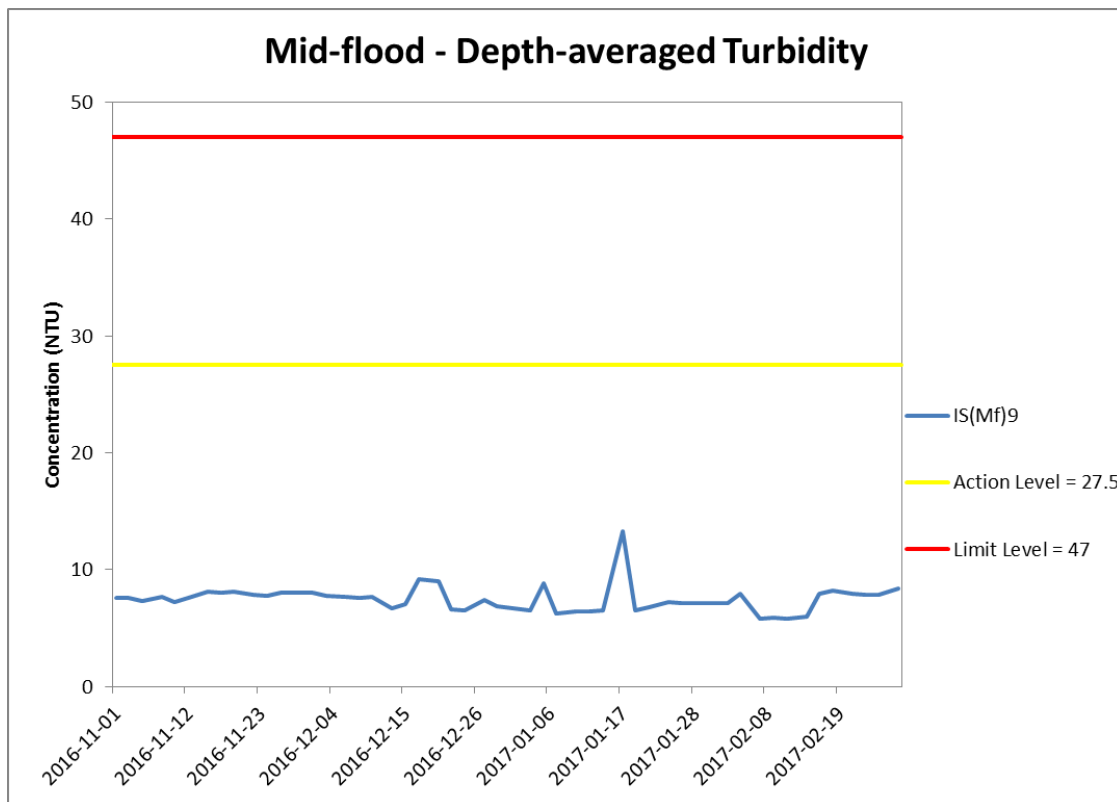
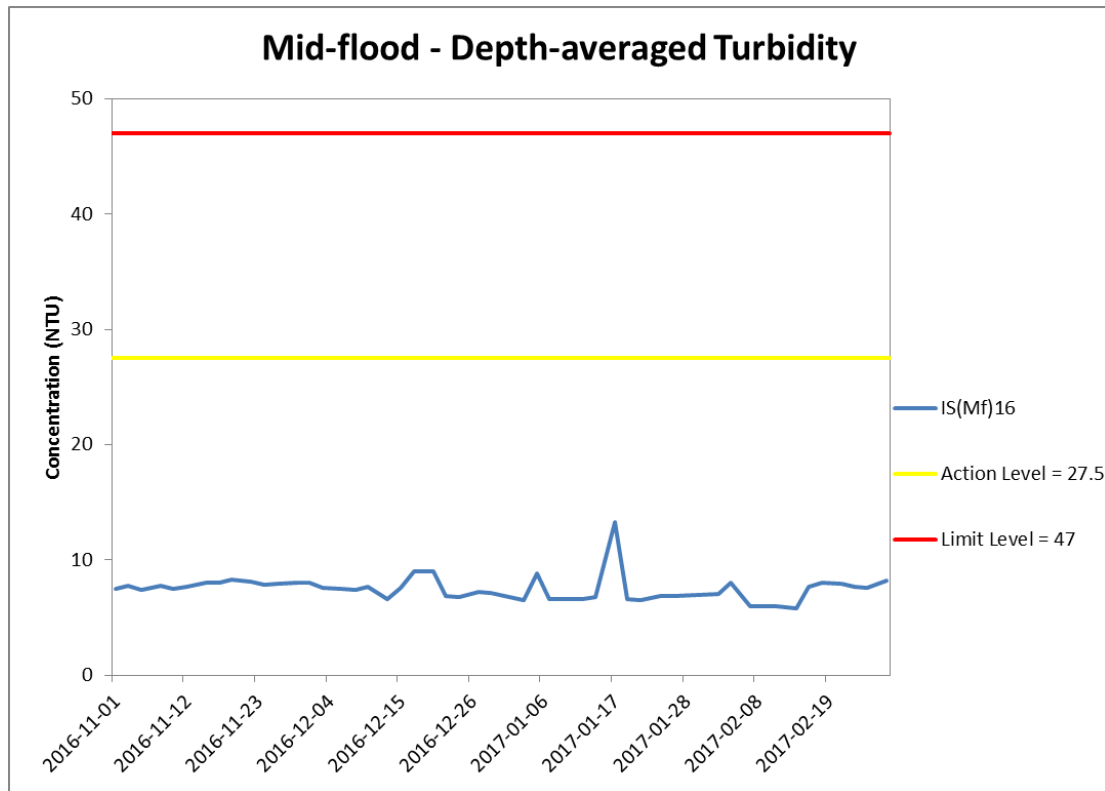


**Figure H25 Impact Monitoring - Mean Level of depth-averaged Turbidity (NTU) during mid-flood tide between 1 November 2016 and 28 February 2017 at CS(Mf)3 and CS(MF)5.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
 Resources  
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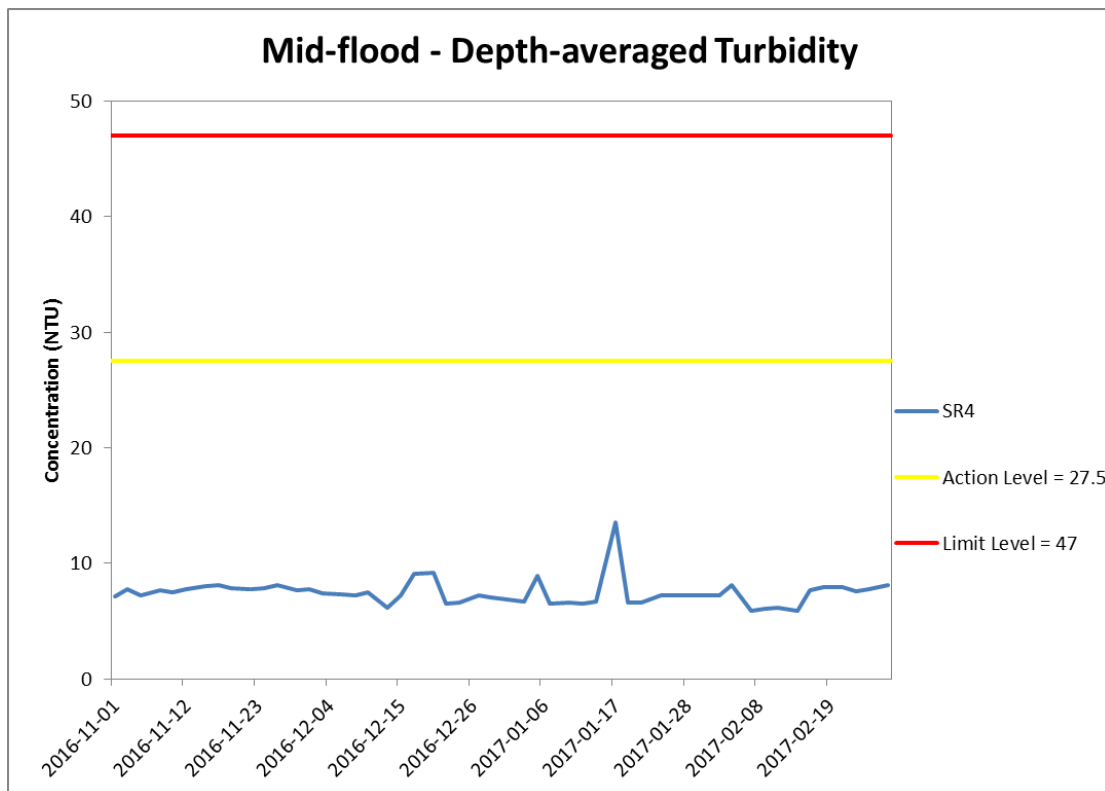
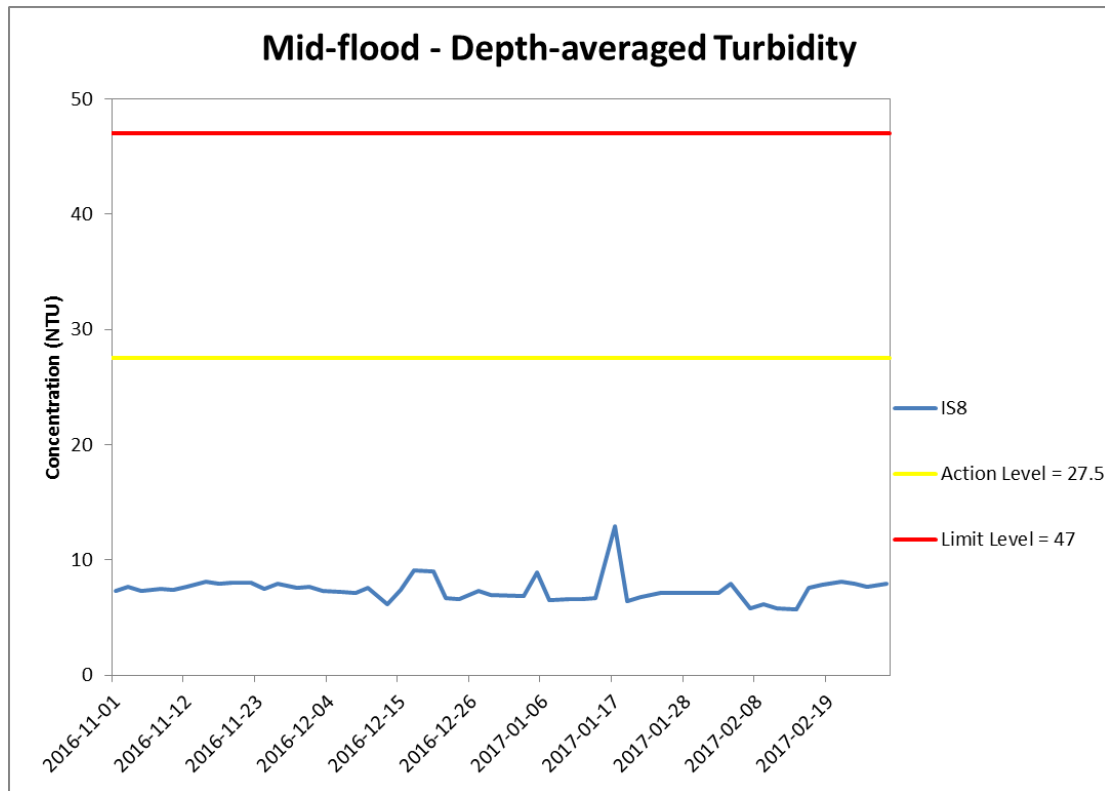


**Figure H26 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-flood tide between 1 November 2016 and 28 February 2017 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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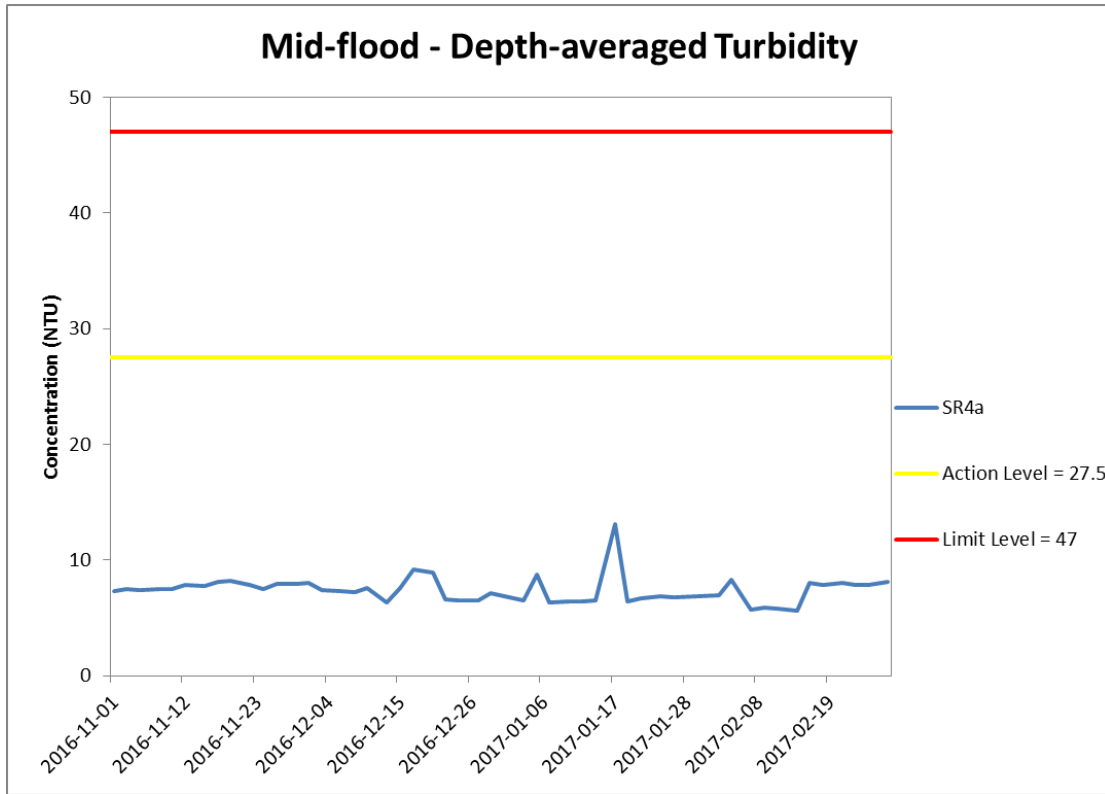


**Figure H27 Impact Monitoring - Mean Level of depth-averaged Turbidity (NTU) during mid-flood tide between 1 November 2016 and 28 February 2017 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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Management**



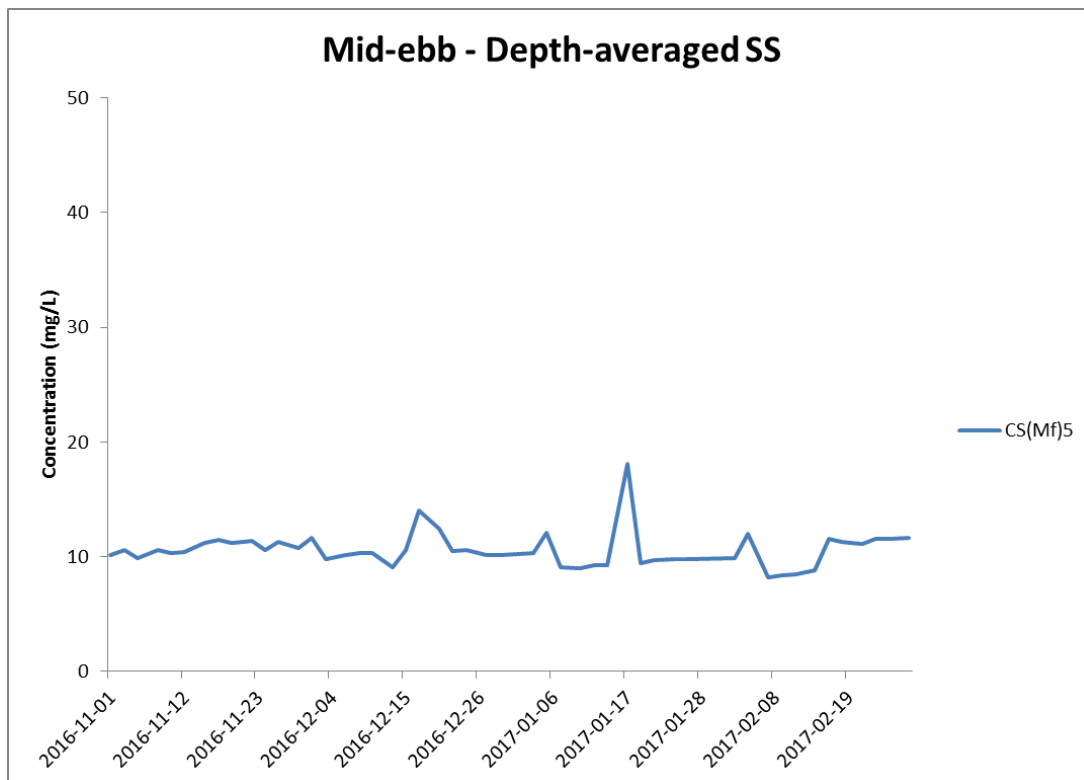
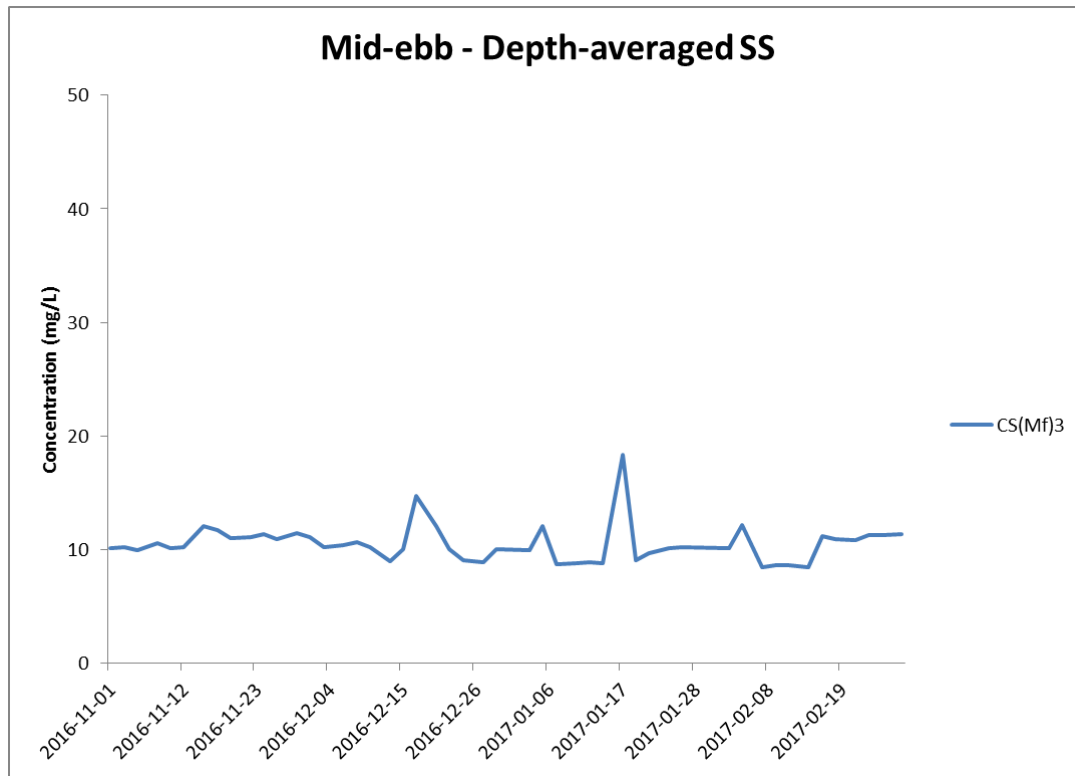


**Figure H28 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-flood tide between 1 November 2016 and 28 February 2017 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
 Resources  
 Management**



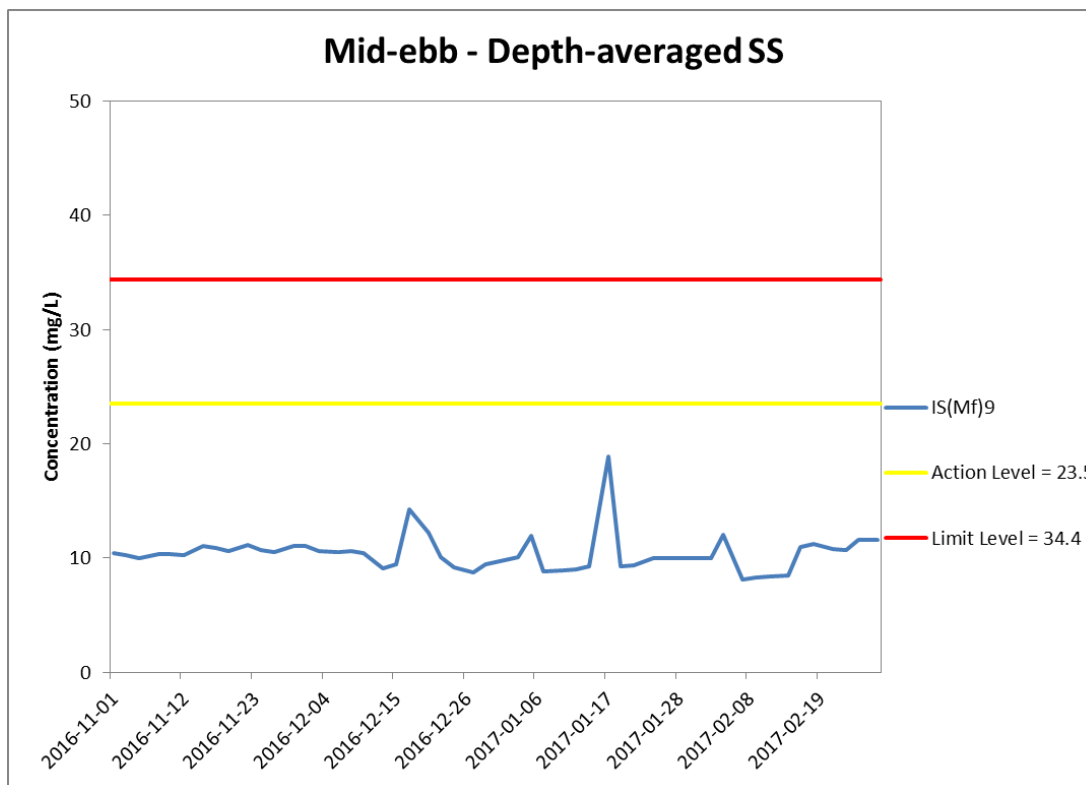
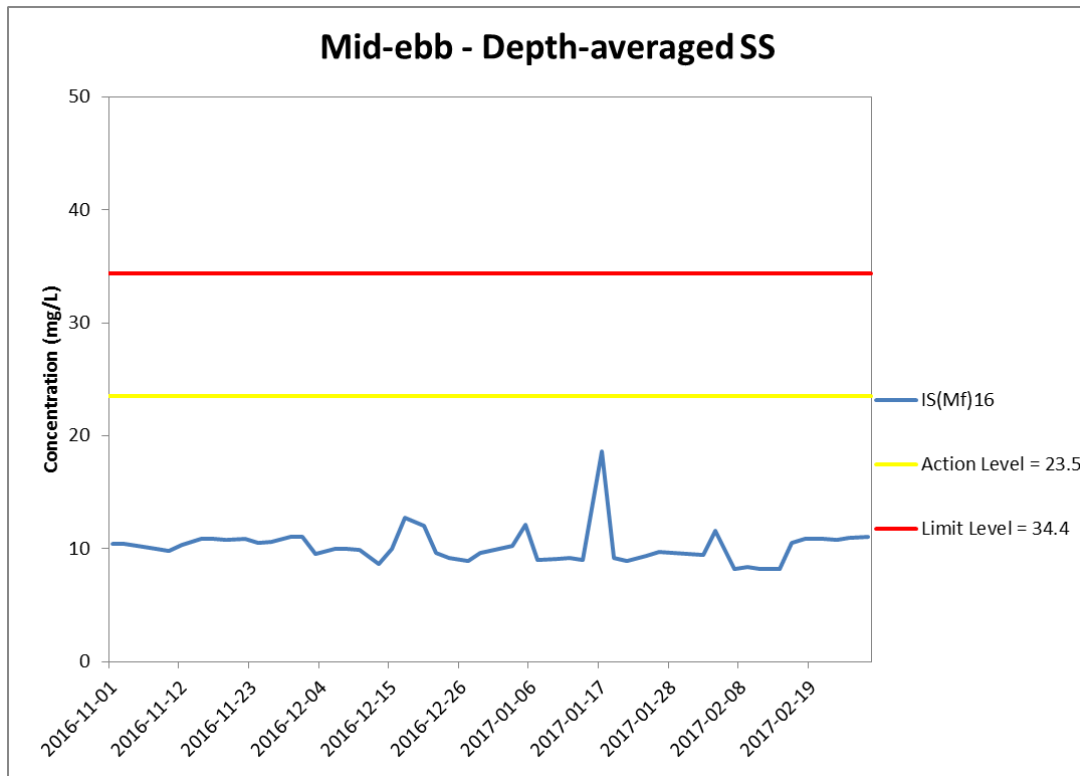


**Figure H29 Impact Monitoring – Mean depth-averaged level of Suspended Solids (mg/L) during mid-ebb tide between 1 November 2016 and 28 February 2017 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
Resources  
Management**





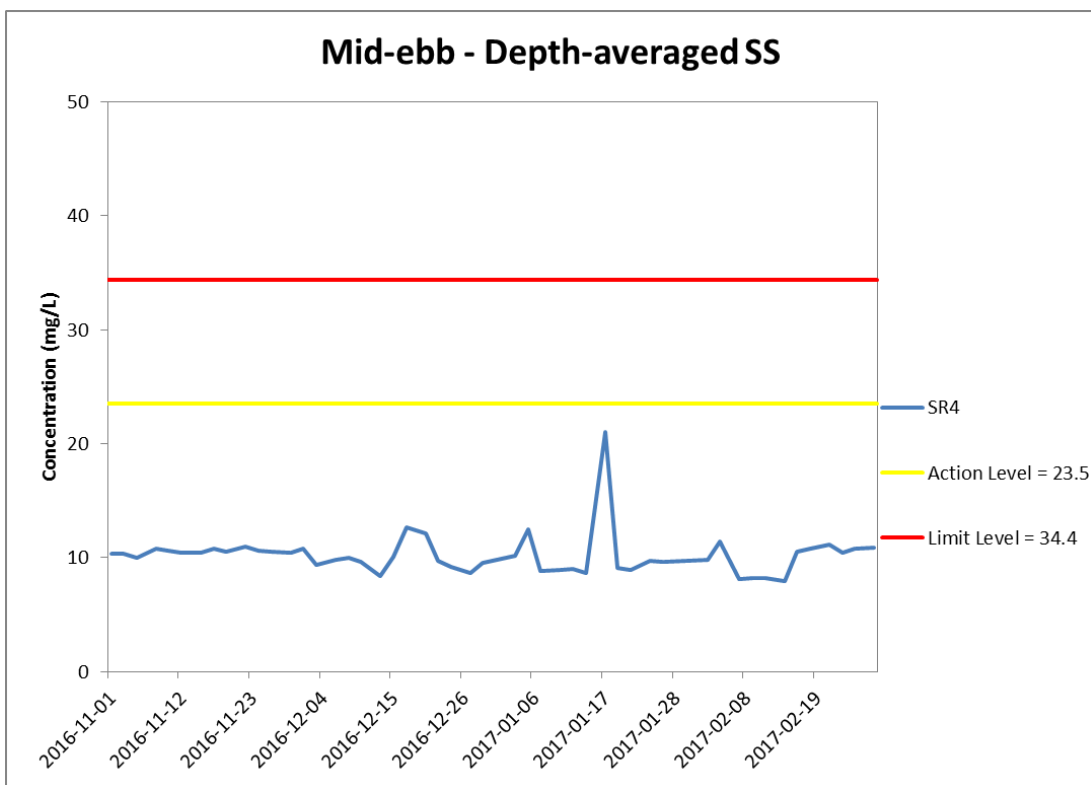
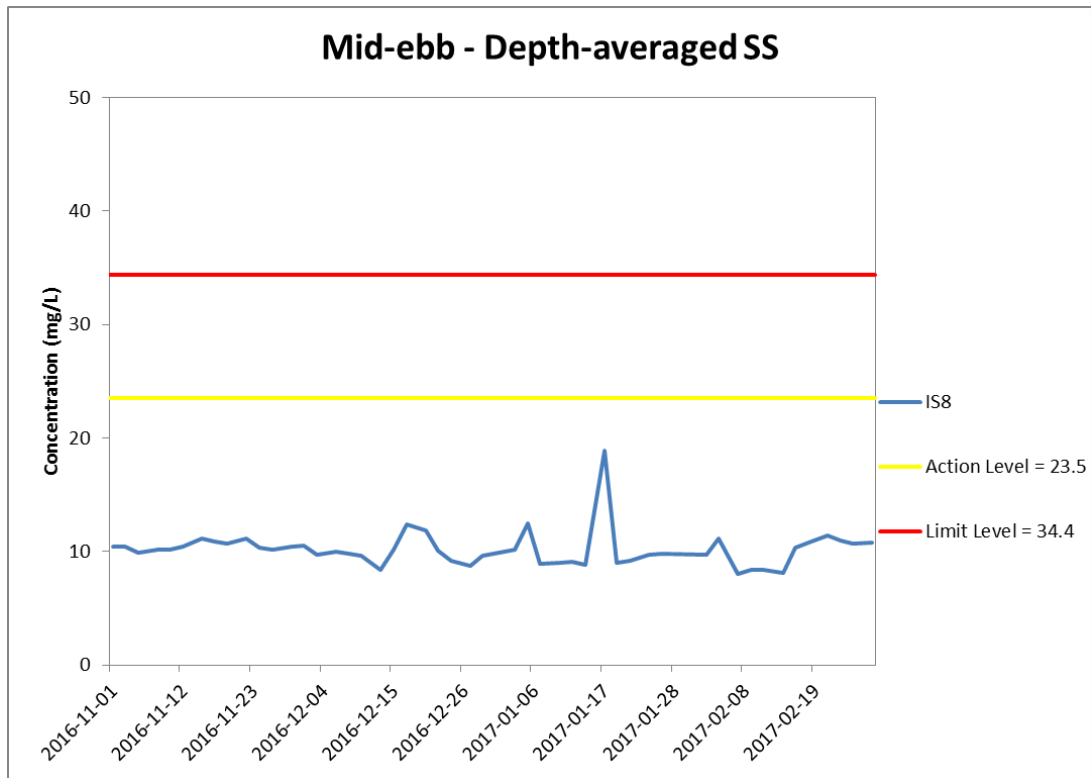
**Figure H30 Impact Monitoring – Mean depth-averaged level of Suspended Solids (mg/L) during mid-ebb tide between 1 November 2016 and 28 February 2017 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
 Resources  
 Management**





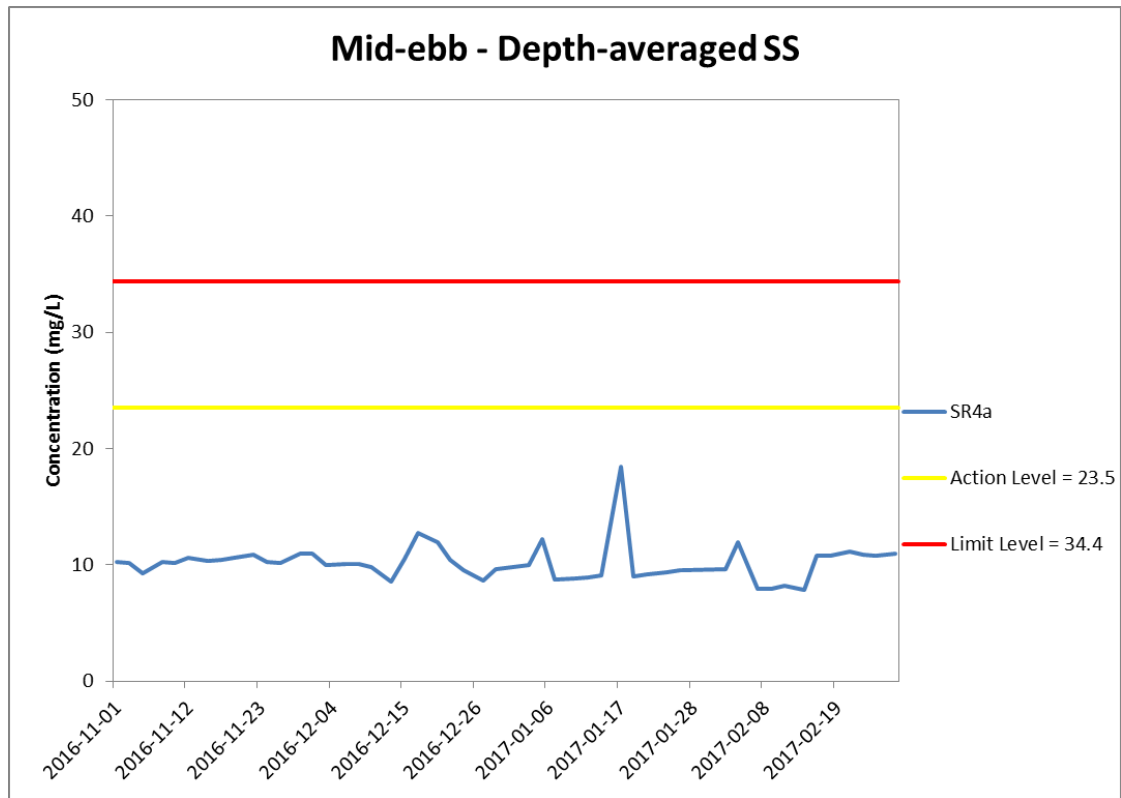


**Figure H31 Impact Monitoring – Mean depth-averaged level of Suspended Solids (mg/L) during mid-ebb tide between 1 November 2016 and 28 February 2017 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
 Resources  
 Management**



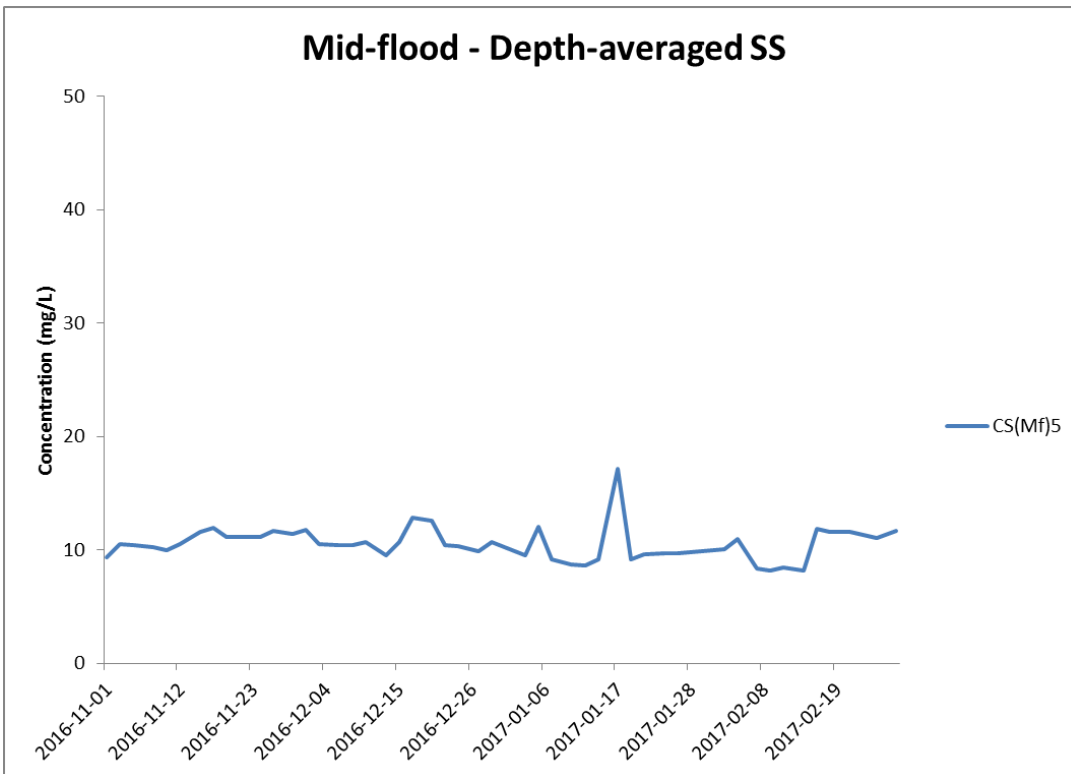
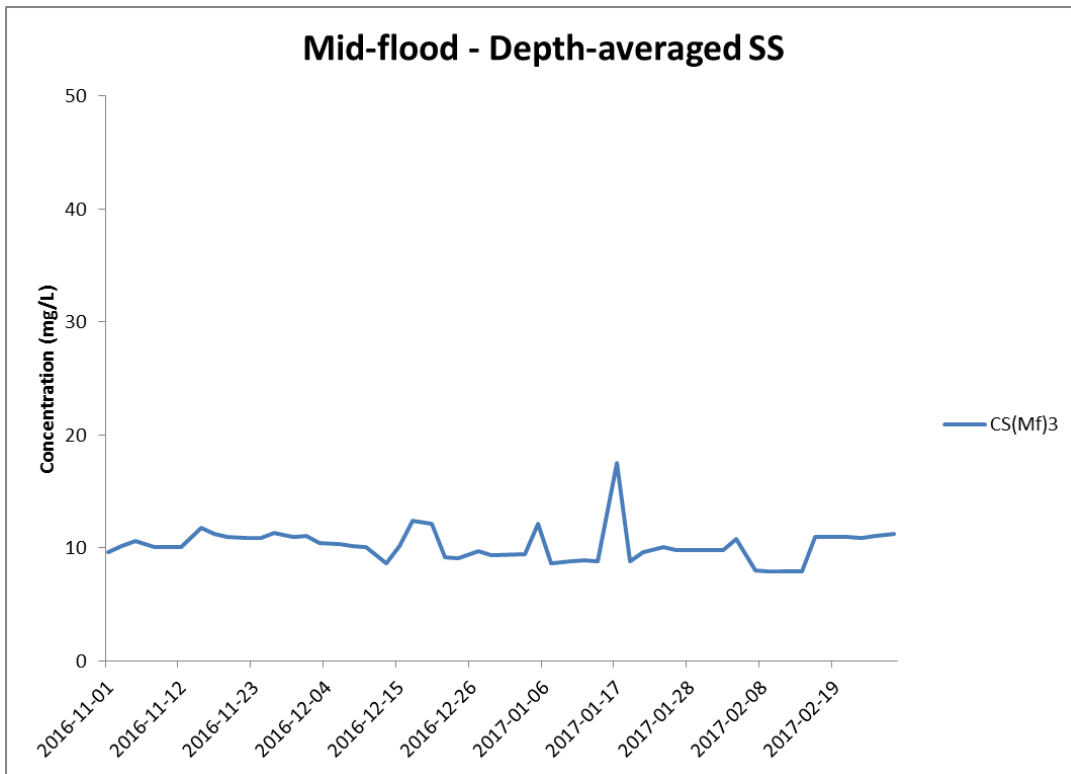


**Figure H32 Impact Monitoring - Mean depth-averaged level of Suspended Solids (mg/L) during mid-ebb tide between 1 November 2016 and 28 February 2017 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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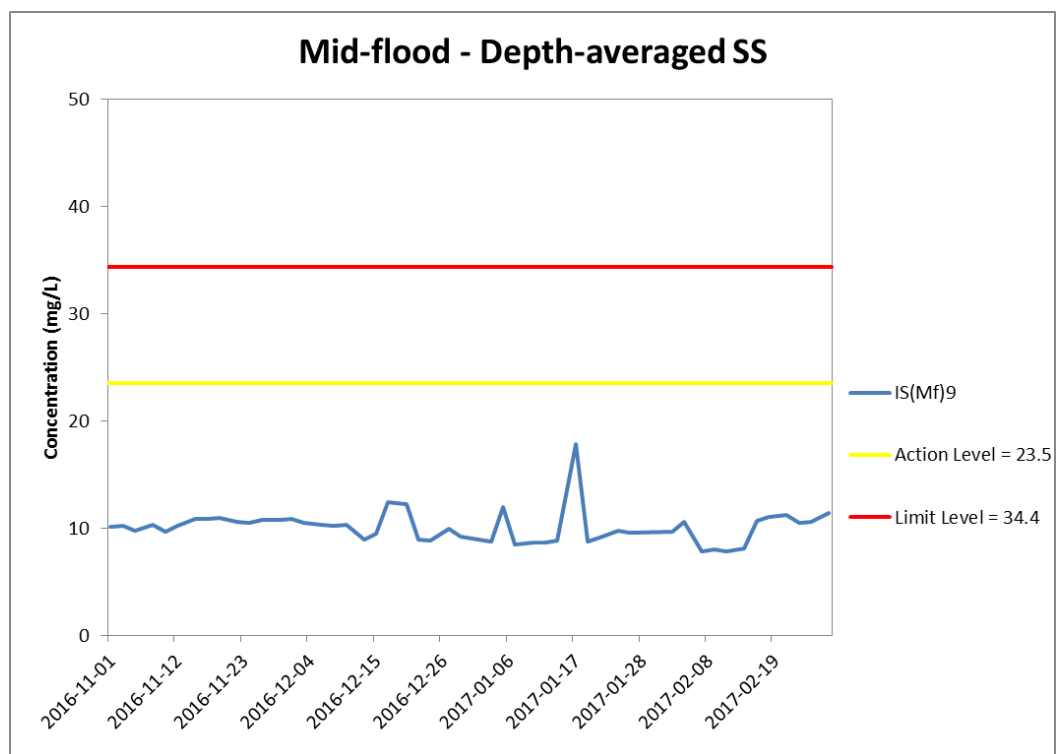
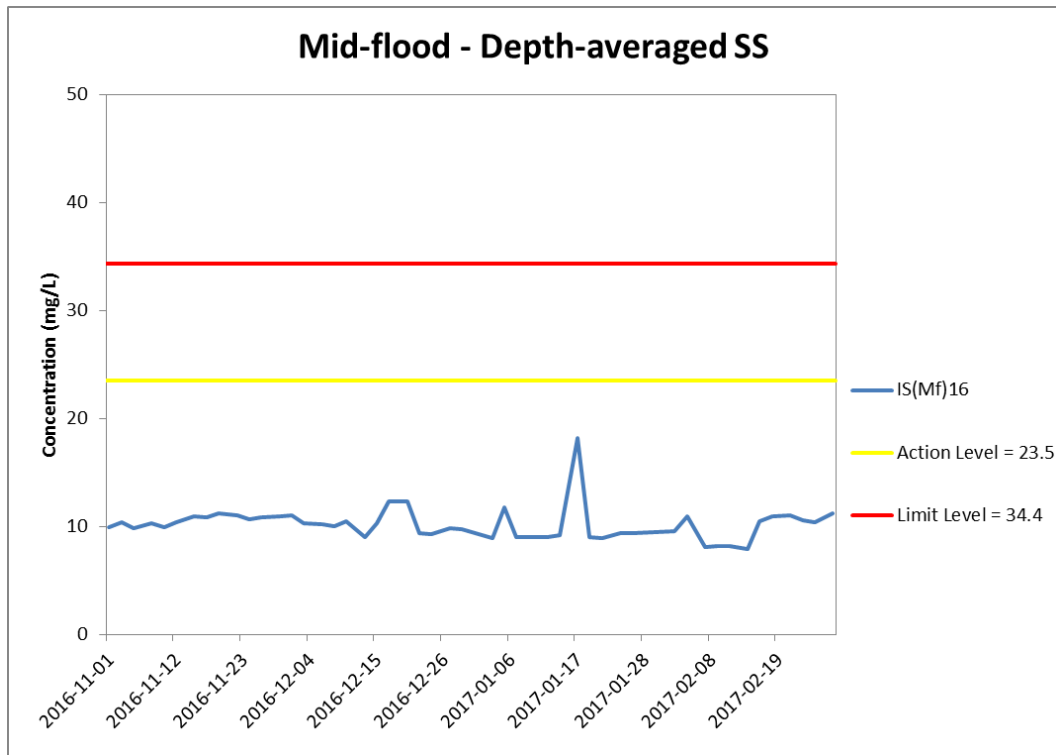


**Figure H33 Impact Monitoring – Mean depth-averaged level of Suspended Solids (mg/L) during mid-flood tide between 1 November 2016 and 28 February 2017 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
 Resources  
 Management**



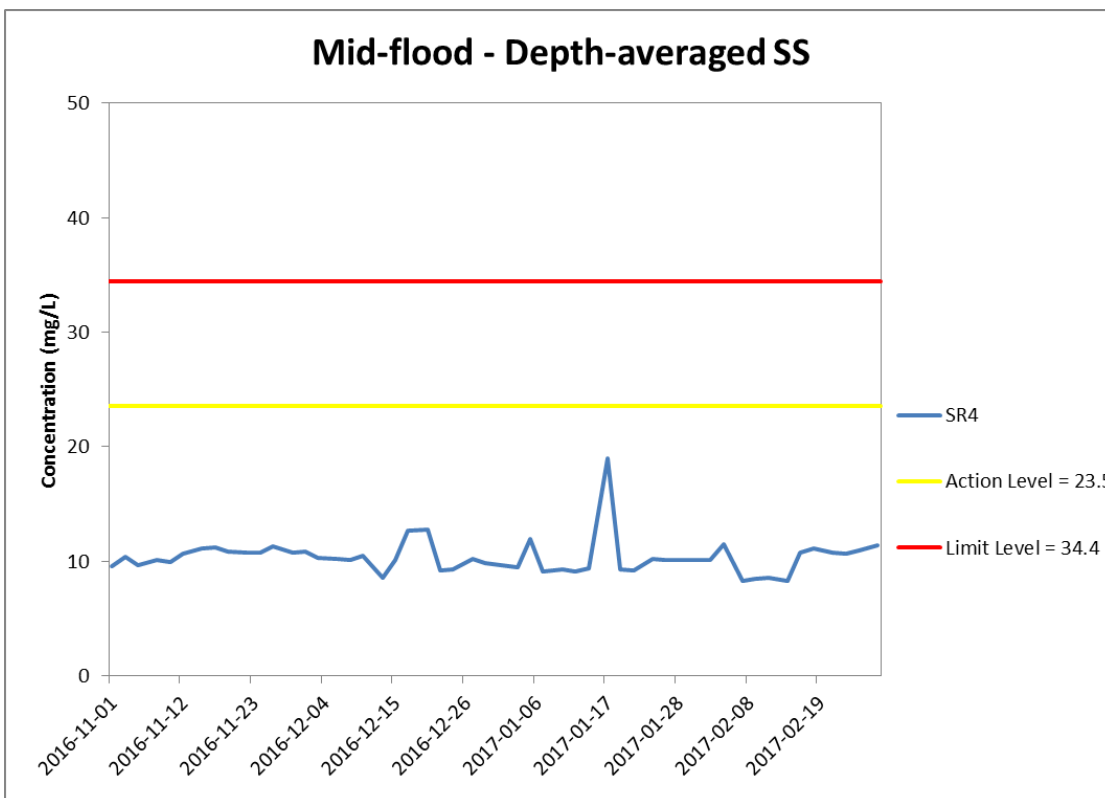
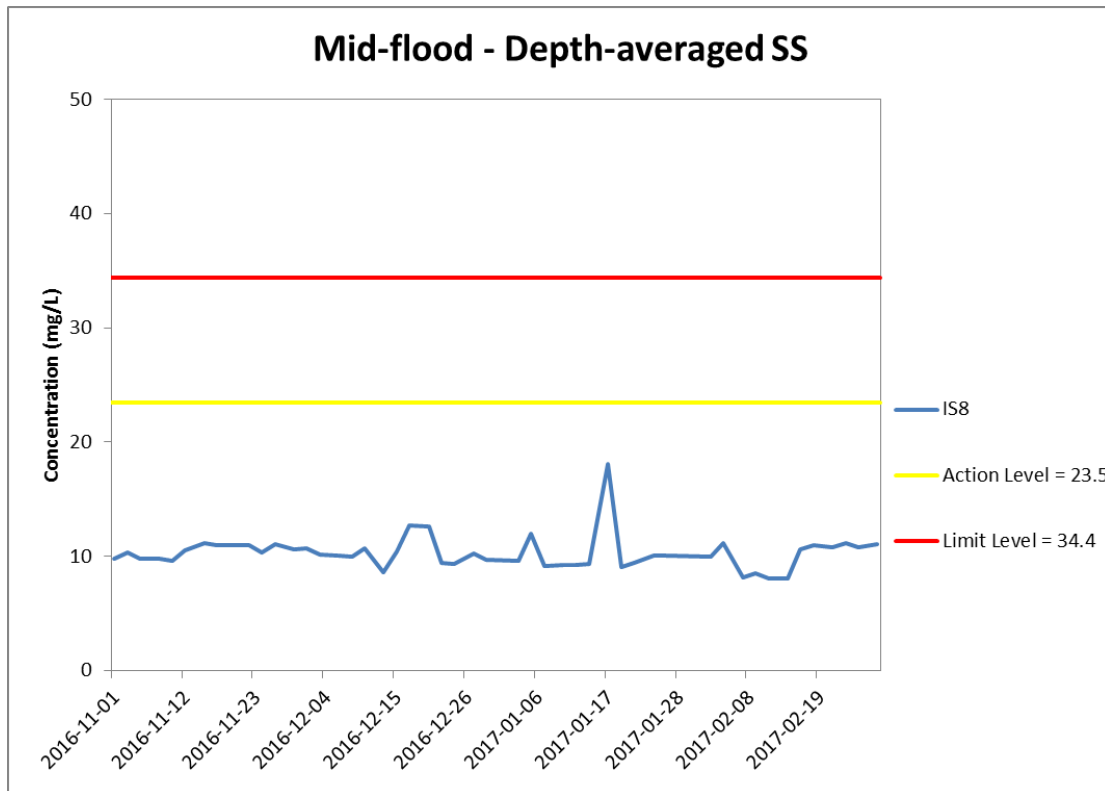


**Figure H34 Impact Monitoring – Mean depth-averaged level of Suspended Solids (mg/L) during mid-flood tide between 1 November 2016 and 28 February 2017 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
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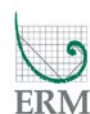


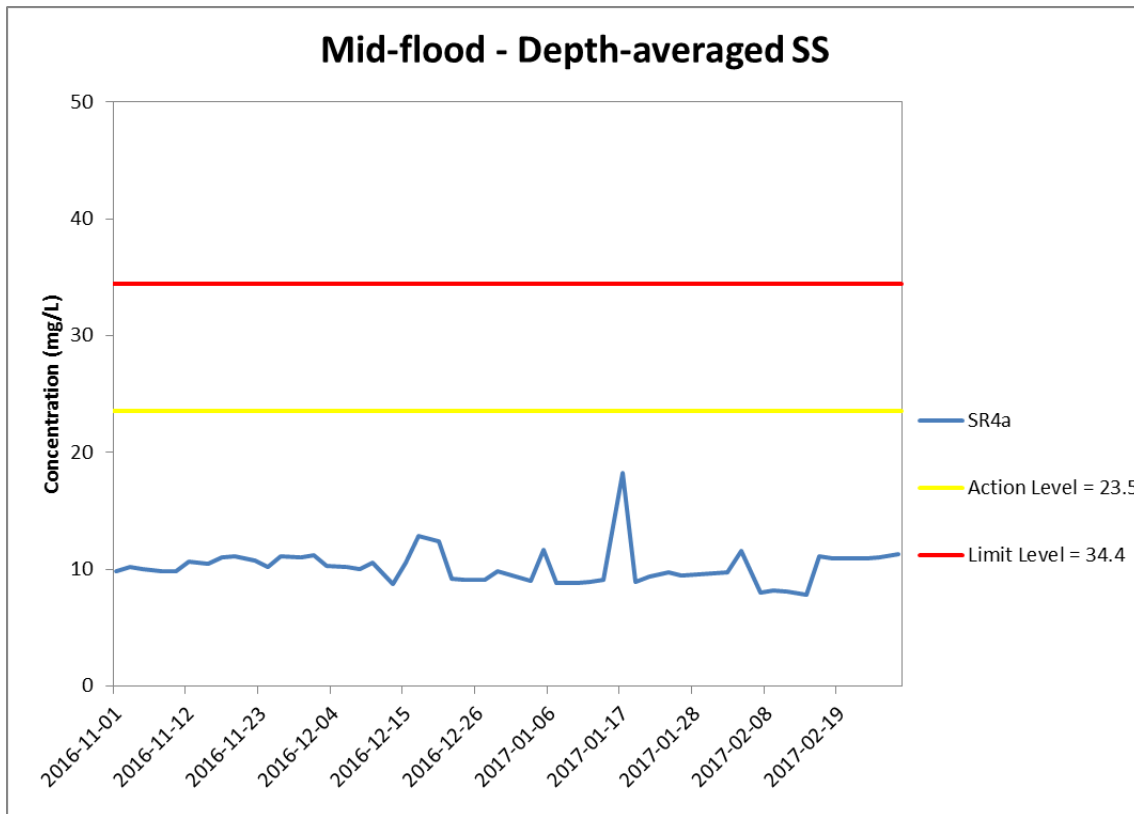


**Figure H35 Impact Monitoring – Mean depth-averaged level of Suspended Solids (mg/L) during mid-flood tide between 1 November 2016 and 28 February 2017 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
 Resources  
 Management**

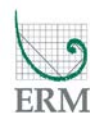




**Figure H36 Impact Monitoring - Mean depth-averaged level of Suspended Solids (mg/L) during mid-flood tide between 1 November 2016 and 28 February 2017 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period.)  
 WQM on 28 and 31 January 2017 were cancelled due to suspension of marine works during holiday. Marine works within the reporting period include Uninstallation of marine piling platform; Pier construction; Launching gantry operation; and Installation of deck segment and pier head segment.*

**Environmental  
 Resources  
 Management**



Appendix I

## Impact Dolphin Monitoring Survey Results



**CONTRACT NO. HY/2012/07**

**Hong Kong-Zhuhai-Macao Bridge Tuen Mun – Chek Lap Kok Link  
(Southern Connection Viaduct Section)  
Dolphin Quarterly Monitoring**

*13<sup>th</sup> Quarterly Progress Report (December 2016-February 2017)  
submitted to Gammon Construction Limited*

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

4 June 2017

**1. Introduction**

- 1.1. The Tuen Mun-Chek Lap Kok Link (TM-CLKL) comprises a 1.6 km long dual 2-lane viaduct section between the Hong Kong Boundary Crossing Facilities (HKBCF) and the North Lantau Highway and associated roads at Tai Ho. Gammon Construction Limited (hereinafter called the “Contractor”) was awarded as the main contractor of “Contract No. HY/2012/07 – Hong Kong-Zhuhai-Macao Bridge Tuen Mun-Chek Lap Kok Link – Southern Connection Viaduct Section”.
- 1.2. According to the updated Environmental Monitoring and Audit (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 as well as the TM-CLKL Northern Connection Sub-Sea Tunnel Section (HY/2012/08)
- 1.3. In November 2013, the Director of Hong Kong Cetacean Research Project (HKCRP), Dr. Samuel Hung, has been appointed by Gammon Construction Limited as the dolphin specialist for the TM-CLKL Southern Viaduct 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 the 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 13<sup>th</sup> quarterly progress report under the TM-CLKL construction phase dolphin monitoring programme submitted to the Gammon Construction Limited, summarizing the results of the surveys findings during the period of December 2016 to February 2017, 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	805475	815913	14	Start Point	817537	820220
2	End Point	805477	826654	14	End Point	817537	824613
3	Start Point	806464	819435	15	Start Point	818568	820735
3	End Point	806464	822911	15	End Point	818568	824433
4	Start Point	807518	819771	16	Start Point	819532	821420
4	End Point	807518	829230	16	End Point	819532	824209
5	Start Point	808504	820220	17	Start Point	820451	822125
5	End Point	808504	828602	17	End Point	820451	823671
6	Start Point	809490	820466	18	Start Point	821504	822371
6	End Point	809490	825352	18	End Point	821504	823761
7	Start Point	810499	820880	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	820872		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					
12	End Point	815542	824882					

- 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 19 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 2015, 2016). For each monitoring vessel survey, a 15-m inboard vessel with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area.
- 2.1.3. Two experienced observers (a data recorder and a primary observer) made up the on-effort survey team, and the survey vessel transited different transect lines at a constant speed of 13-15 km per hour. The data recorder searched with unaided eyes and filled out the datasheets, while the primary observer searched for dolphins and porpoises continuously through 7 x 50 *Fujinon* marine binoculars. Both observers searched the sea ahead of the vessel, between 270° and 90° (in relation to the bow, which is defined as 0°). One to two additional experienced observers were available on the boat to work in shift (i.e. rotate every 30 minutes) in order to minimize fatigue of the survey team members. All observers were experienced in small cetacean survey techniques and identifying local cetacean species.
- 2.1.4. During on-effort survey periods, the survey team recorded effort data including time, 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<sup>®</sup> 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<sup>2</sup> grids among NWL and NEL survey areas on GIS. Sighting densities (number of on-effort sightings per km<sup>2</sup>) and dolphin densities (total number of dolphins from on-effort sightings per km<sup>2</sup>) 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 sightings per 100 units of survey effort. In addition, the derived unit for actual dolphin density was termed DPSE, representing the number of dolphins per 100 units of survey effort. Among the 1-km<sup>2</sup> 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<sup>2</sup> grid within the study area:

$$\text{SPSE} = ((S / E) \times 100) / \text{SA}\%$$
$$\text{DPSE} = ((D / E) \times 100) / \text{SA}\%$$

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<sup>®</sup> 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 2016 to February 2017, 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 878.35 km of survey effort was collected, with 86.5% 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, 340.00 km and 538.35 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 632.39 km, while the effort on secondary lines was 245.96 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 2016 to February 2017, a total of 17 groups of 62 Chinese White Dolphins were sighted. Fourteen of the 17 dolphin sightings were made during on-effort during this quarter, while all except one on-effort dolphin sightings were made on primary lines. A summary table of dolphin sightings is shown in Appendix II.

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

### 3.2. *Distribution*

3.2.1. Distribution of dolphin sightings made during the HKLR03 monitoring surveys from December 2016 to February 2017 is shown in Figure 1. Dolphin sightings made in the present quarter were mainly located to the north of Lung Kwu Chau and at the northwestern end of NWL survey area (Figure 1). A few sightings were also made to the west of airport platform adjacent to the western territorial boundary (Figure 1). On the other hand, the dolphins were completely absent from the central and western portions of North Lantau waters as in previous quarters (Figure 1).

3.2.2. Notably, all dolphin sightings were located far away from the alignment of TM-CLKL as well as the HKBCF and HKLR03 reclamation sites (Figure 1). On the contrary, two dolphin groups were sighted adjacent to the HKLR09 alignment near Sham Wat (Figure 1).

3.2.3. Sighting distribution of dolphins during the present impact phase monitoring period (December 2016 to February 2017) was drastically different from the one during the baseline monitoring period (September to November 2011) (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 16 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, much fewer dolphins occurred in this survey area (mostly to the north of Lung Kwu Chau at the northwestern corner of the survey area) than during the baseline period, when many dolphin groups were frequently sighted between Lung Kwu Chau and Black Point, around Sha Chau, near Pillar Point and to the west of the Chek Lap Kok Airport (Figure 1).

3.2.5. Another comparison in dolphin distribution was made between the five quarterly periods of winter months in 2012-17 (Figure 2). Among the five winter periods, dolphins were regularly sighted in NWL waters in 2012-13 and 2013-14, but their usage there has gradually diminished in the three subsequent winter periods, with the only occurrences mostly concentrated within and around the Sha Chau and Lung Kwu Chau Marine Park (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



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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 2016 – February 2017

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 (1 & 6 Dec 2016)	0.00	0.00
	Set 2 (16 & 19 Dec 2016)	0.00	0.00
	Set 3 (10 & 12 Jan 2017)	0.00	0.00
	Set 4 (16 & 20 Jan 2017)	0.00	0.00
	Set 5 (7 & 9 Feb 2017)	0.00	0.00
	Set 6 (16 & 21 Feb 2017)	0.00	0.00
Northwest Lantau	Set 1 (1 & 6 Dec 2016)	1.58	1.58
	Set 2 (16 & 19 Dec 2016)	5.99	22.45
	Set 3 (10 & 12 Jan 2017)	0.00	0.00
	Set 4 (16 & 20 Jan 2017)	6.27	20.38
	Set 5 (7 & 9 Feb 2017)	0.00	0.00
	Set 6 (16 & 21 Feb 2017)	8.99	42.71

Table 3. Comparison of average dolphin encounter rates from impact monitoring period (December 2016 – February 2017) 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;  $\pm$  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 2016 – February 2017	September – November 2011	December 2016 – February 2017	September – November 2011
Northeast Lantau	0.0	6.00 $\pm$ 5.05	0.0	22.19 $\pm$ 26.81
Northwest Lantau	3.80 $\pm$ 3.79	9.85 $\pm$ 5.85	14.52 $\pm$ 17.21	44.66 $\pm$ 29.85

3.3.2. To facilitate the comparison with the AFCD long-term monitoring results, the encounter rates were also calculated for the present quarter using both primary and secondary survey effort. The encounter rates of sightings (STG) and dolphins (ANI) in NWL were 2.91 sightings and 10.73 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 16 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.

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)

	<b>Encounter rate (STG)</b> (no. of on-effort dolphin sightings per 100 km of survey effort)	<b>Encounter rate (ANI)</b> (no. of dolphins from all on-effort sightings per 100 km of survey effort)
<b>September-November 2011 (Baseline)</b>	6.00 ± 5.05	22.19 ± 26.81
<b>December 2012-February 2013 (Impact)</b>	3.14 ± 3.21	6.33 ± 8.64
<b>March-May 2013 (Impact)</b>	0.42 ± 1.03	0.42 ± 1.03
<b>June-August 2013 (Impact)</b>	0.88 ± 1.36	3.91 ± 8.36
<b>September-November 2013 (Impact)</b>	1.01 ± 1.59	3.77 ± 6.49
<b>December 2013-February 2014 (Impact)</b>	0.45 ± 1.10	1.34 ± 3.29
<b>March-May 2014 (Impact)</b>	0.00	0.00
<b>June-August 2014 (Impact)</b>	0.42 ± 1.04	1.69 ± 4.15
<b>September-November 2014 (Impact)</b>	0.00	0.00
<b>December 2014-February 2015 (Impact)</b>	0.00	0.00
<b>March-May 2015 (Impact)</b>	0.00	0.00
<b>June-August 2015 (Impact)</b>	0.44 ± 1.08	0.44 ± 1.08
<b>September-November 2015 (Impact)</b>	0.00	0.00
<b>December 2015-February 2016 (Impact)</b>	0.00	0.00
<b>March-May 2016 (Impact)</b>	0.00	0.00
<b>June-August 2016 (Impact)</b>	0.00	0.00
<b>September-November 2016 (Impact)</b>	0.00	0.00
<b>December 2016-February 2017 (Impact)</b>	0.00	0.00

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 61.4% and 67.5% respectively) were only small fractions of the ones recorded during the three-month baseline period, indicating a dramatic decline in dolphin usage of this survey area as well during the present impact phase period (Table 5).

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**;  $\pm$  denotes the standard deviation of the average encounter rates)

	<b>Encounter rate (STG)</b> (no. of on-effort dolphin sightings per 100 km of survey effort)	<b>Encounter rate (ANI)</b> (no. of dolphins from all on-effort sightings per 100 km of survey effort)
<b>September-November 2011 (Baseline)</b>	9.85 $\pm$ 5.85	44.66 $\pm$ 29.85
<b>December 2012-February 2013 (Impact)</b>	<b>8.36 <math>\pm</math> 5.03</b>	<b>35.90 <math>\pm</math> 23.10</b>
<b>March-May 2013 (Impact)</b>	7.75 $\pm$ 3.96	24.23 $\pm$ 18.05
<b>June-August 2013 (Impact)</b>	6.56 $\pm$ 3.68	27.00 $\pm$ 18.71
<b>September-November 2013 (Impact)</b>	8.04 $\pm$ 1.10	32.48 $\pm$ 26.51
<b>December 2013-February 2014 (Impact)</b>	<b>8.21 <math>\pm</math> 2.21</b>	<b>32.58 <math>\pm</math> 11.21</b>
<b>March-May 2014 (Impact)</b>	6.51 $\pm$ 3.34	19.14 $\pm$ 7.19
<b>June-August 2014 (Impact)</b>	4.74 $\pm$ 3.84	17.52 $\pm$ 15.12
<b>September-November 2014 (Impact)</b>	5.10 $\pm$ 4.40	20.52 $\pm$ 15.10
<b>December 2014-February 2015 (Impact)</b>	<b>2.91 <math>\pm</math> 2.69</b>	<b>11.27 <math>\pm</math> 15.19</b>
<b>March-May 2015 (Impact)</b>	0.47 $\pm$ 0.73	2.36 $\pm$ 4.07
<b>June-August 2015 (Impact)</b>	2.53 $\pm$ 3.20	9.21 $\pm$ 11.57
<b>September-November 2015 (Impact)</b>	3.94 $\pm$ 1.57	21.05 $\pm$ 17.19
<b>December 2015-February 2016 (Impact)</b>	<b>2.64 <math>\pm</math> 1.52</b>	<b>10.98 <math>\pm</math> 3.81</b>
<b>March-May 2016 (Impact)</b>	0.98 $\pm$ 1.10	4.78 $\pm$ 6.85
<b>June-August 2016 (Impact)</b>	1.72 $\pm$ 2.17	7.48 $\pm$ 10.98
<b>September-November 2016 (Impact)</b>	2.86 $\pm$ 1.98	10.89 $\pm$ 10.98
<b>December 2016-February 2017 (Impact)</b>	<b>3.80 <math>\pm</math> 3.79</b>	<b>14.52 <math>\pm</math> 17.21</b>

3.3.5. During the same winter quarters, dolphin encounter rates in NWL during 2016-17 was slightly higher than the previous two winter periods, but was still much lower than the ones in the winter periods of 2012-13 and 2013-14 (Table 5). Such temporal trend should be closely monitored in the upcoming monitoring quarters whether the dolphin occurrence would continue to increase as the construction activities of HZMB works have been mostly completed in coming months.

- 3.3.6. As recently discussed in Hung (2016), the dramatic decline in dolphin usage of NEL waters in the past few years (including the declines in abundance, encounter rate and habitat use in NEL, as well as shifts of individual core areas and ranges away from NEL waters) was possibly related to the HZMB construction works that were commenced since 2012. It appeared that such noticeable decline has already extended to NWL waters progressively in the past few years, and with no sign of recovery even the HZMB-related construction activities has well past the peak.
- 3.3.7. 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).
- 3.3.8. For the comparison between the baseline period and the present quarter (17<sup>th</sup> quarter of the impact phase being assessed), the p-values for the differences in average dolphin encounter rates of STG and ANI were 0.0110 and 0.0440 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.
- 3.3.9. For the comparison between the baseline period and the cumulative quarters in impact phase (i.e. the first 17 quarters of the impact phase being assessed), the p-values for the differences in average dolphin encounter rates of STG and ANI were 0.000003 and 0.000001 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).
- 3.3.10. 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. This 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 2016).
- 3.3.11. To ensure the continuous usage of North Lantau waters by the dolphins, every possible measure should be implemented by the contractors and relevant authorities of HZMB-related works to minimize all disturbances to the dolphins.
- 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 2016 to February 2017. 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 2016 – February 2017) and baseline monitoring period (September – November 2011) (Note:  $\pm$  denotes the standard deviation of the average group size)

	Average Dolphin Group Size	
	December 2016 – February 2017	September – November 2011
<b>Overall</b>	3.65 $\pm$ 2.37 (n = 17)	3.72 $\pm$ 3.13 (n = 66)
<b>Northeast Lantau</b>	---	3.18 $\pm$ 2.16 (n = 17)
<b>Northwest Lantau</b>	3.65 $\pm$ 2.37 (n = 17)	3.92 $\pm$ 3.40 (n = 49)

- 3.4.2. The average dolphin group size in NWL waters during December 2016 to February 2017 was slightly lower than the one recorded during the three-month baseline period (Table 6). Most of these dolphin groups were composed of 1-4 individuals only, while there were five medium-sized groups of 5-8 individuals.
- 3.4.3. Distribution of the larger dolphin groups (i.e. five individuals or more per group) during the present quarter is shown in Figure 3, with comparison to the one in baseline period. During the winter months of 2016-17, the five medium-sized groups were sighted to the north of Lung Kwu Chau, near Sha Chau, and to the west of the airport platform (Figure 3). Such distribution pattern was very different from the baseline period, when the larger dolphin groups were more frequently sighted and more evenly distributed in NWL waters, with a few more sighted in NEL waters (Figure 3).
- 3.5. *Habitat use*
- 3.5.1. From December 2016 to February 2017, the more important habitats utilized by Chinese White Dolphins were mostly concentrated around Lung Kwu Chau and to the north of the island (Figures 4a and 4b). Two grids located to the west of the airport platform and adjacent to HKLR09 alignment also recorded moderate to high densities of dolphins. On the contrary, all grids near TMCLKL alignment as well as HKLR03/HKBCF reclamation sites did not record any presence of dolphins at all during on-effort search in the present quarterly period (Figures 4a and 4b).
- 3.5.2. However, 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 will be collected throughout the impact phase monitoring programme.
- 3.5.3. 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).

- 3.5.4. The density patterns were also very different in NWL between the baseline and impact phase monitoring periods, with higher 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, the only areas with moderate to high dolphin densities were restricted to the waters near Lung Kwu Chau during the present impact phase period (Figure 5).
- 3.6. *Mother-calf pairs*
- 3.6.1. During the present quarterly period, three unspotted juveniles were sighted with their mothers in the North Lantau region. These sightings of young calves were located near Sha Chau and to the west of the airport platform (Figure 6).
- 3.6.2. The infrequent occurrence of young calves in the present quarter was very different from their regular occurrence in North Lantau waters during the baseline period (Figure 6). This should be of a serious concern, and the occurrence of young calves in North Lantau waters should be closely monitored in the upcoming quarters.
- 3.7. *Activities and associations with fishing boats*
- 3.7.1. Four of the 17 dolphin groups were engaged in feeding activities, while none of them 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 activities (23.5%) was much higher than the one recorded during the baseline period (11.6%). However, it should be noted the sample size on total numbers of dolphin sightings during the present quarter (17 dolphin groups) was much lower than the baseline period (66 dolphin groups).
- 3.7.3. Distribution of dolphins engaged in various activities during the present impact phase period and the baseline period is shown in Figure 6. The four dolphin groups engaged in feeding activities were sighted around Lung Kwu Chau, Sha Chau as well as to the west of Shum Wat adjacent to the HKLR09 alignment during the present quarterly period, which was very different from the baseline period when various dolphin activities occurred throughout the North Lantau region (Figure 6).
- 3.7.4. Notably, none of the 17 dolphin groups was found to be associated with any operating fishing vessel during the present impact phase period.
- 3.8. *Summary of photo-identification works*
- 3.8.1. From December 2016 to February 2017, over 2,100 digital photographs of Chinese White Dolphins were taken during the impact phase monitoring surveys for the photo-identification work.
- 3.8.2. In total, 26 individuals sighted 43 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. Nine individuals (NL46, NL98, NL104, NL136, NL182, NL210, NL321 WL145 and WL275) were re-sighted twice, while two individuals (NL202 and NL286) were both re-sighted five times during the three-month period



(Appendix III).

- 3.8.3. Notably, six of these 26 individuals (CH105, NL98, NL120, NL123, NL182 and NL226) were also sighted in West Lantau waters during the HKLR09 monitoring surveys from December 2016 to February 2017, showing their extensive individual movements across different survey areas.
- 3.9. *Individual range use*
- 3.9.1. Ranging patterns of the 26 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 (NL98, NL120, NL123, NL182 and NL226) consistently utilized North Lantau waters in the past have extended their range use to WL during the present quarter. 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, as such shift could possibly be related to the HZMB-related construction works (see Hung 2015, 2016).

#### 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 southern connection viaduct 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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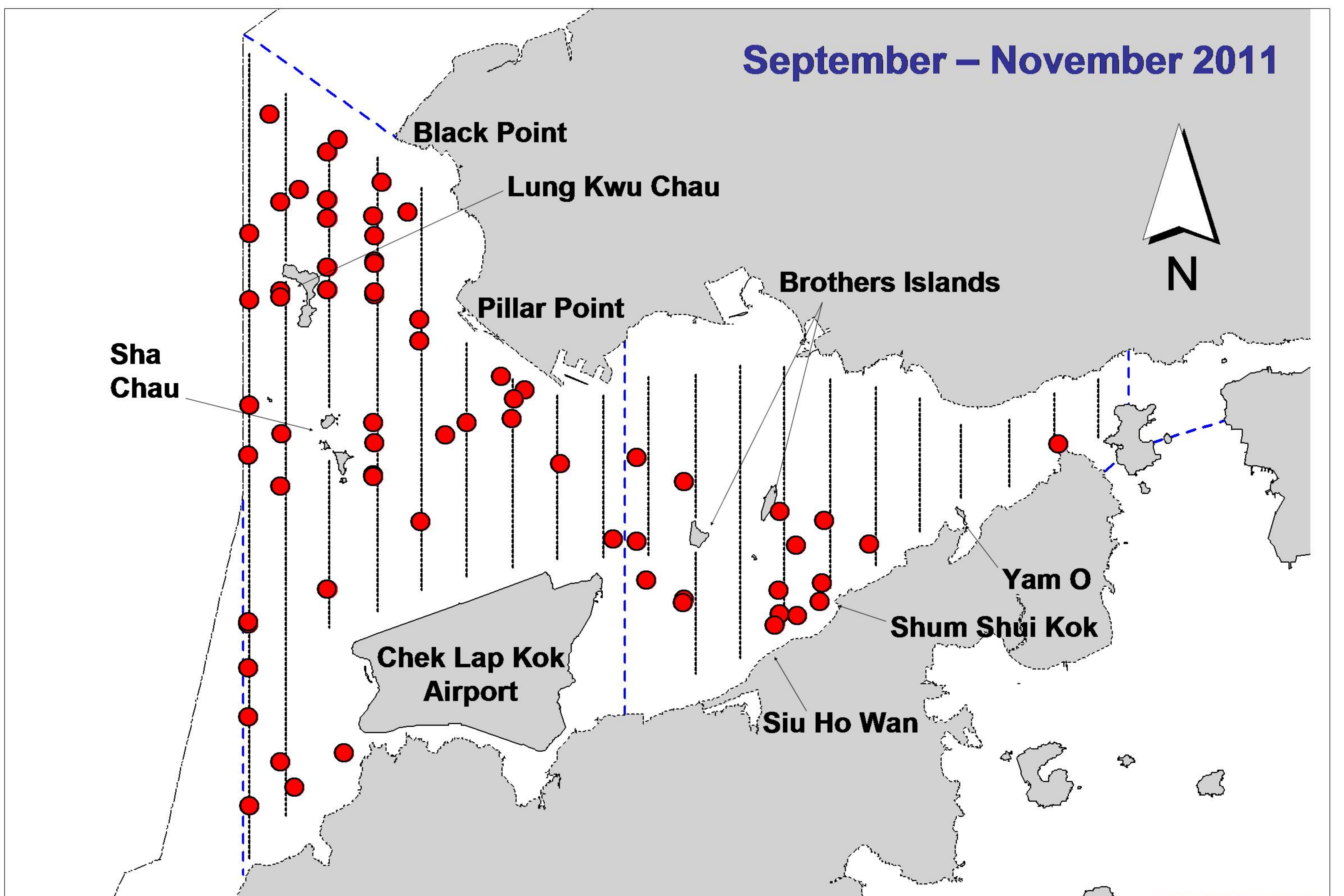
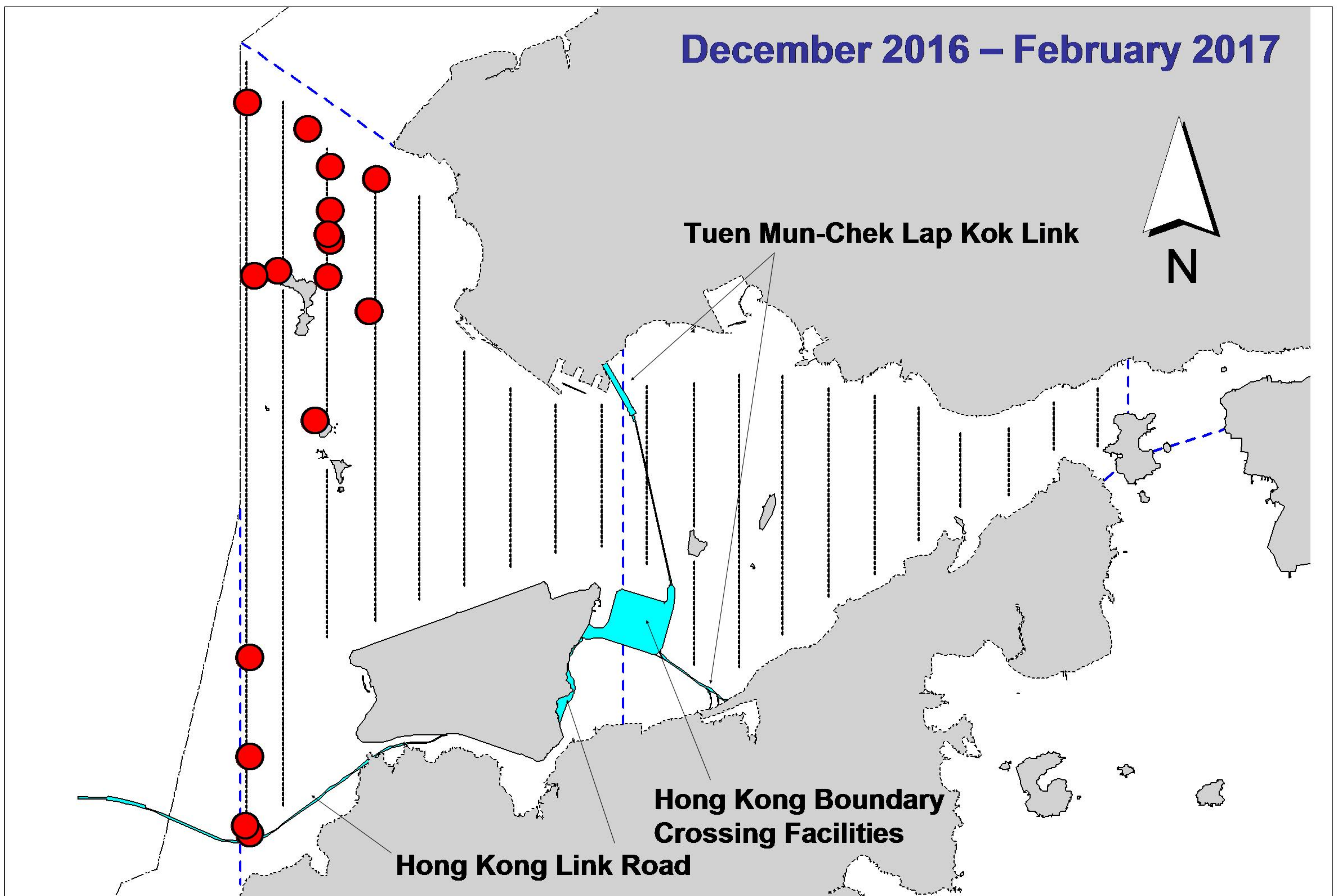


Figure 1. Distribution of Chinese white dolphin sighting in Northwest and Northeast Lantau during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)



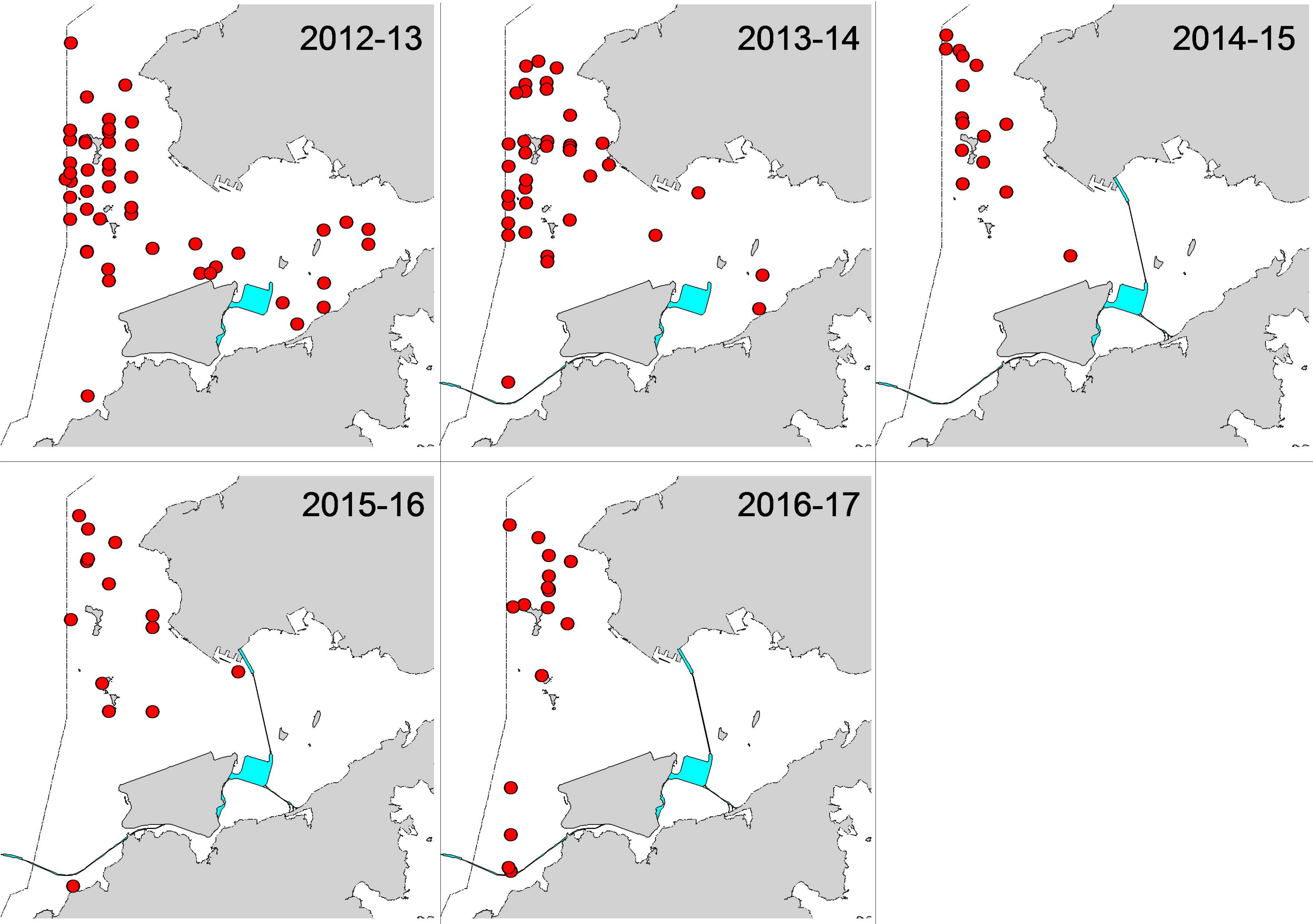


Figure 2. Distribution of Chinese white dolphin sightings in Northwest and Northeast Lantau during the past five winter quarters (December-February) of HKLR03 impact phase in 2012-17



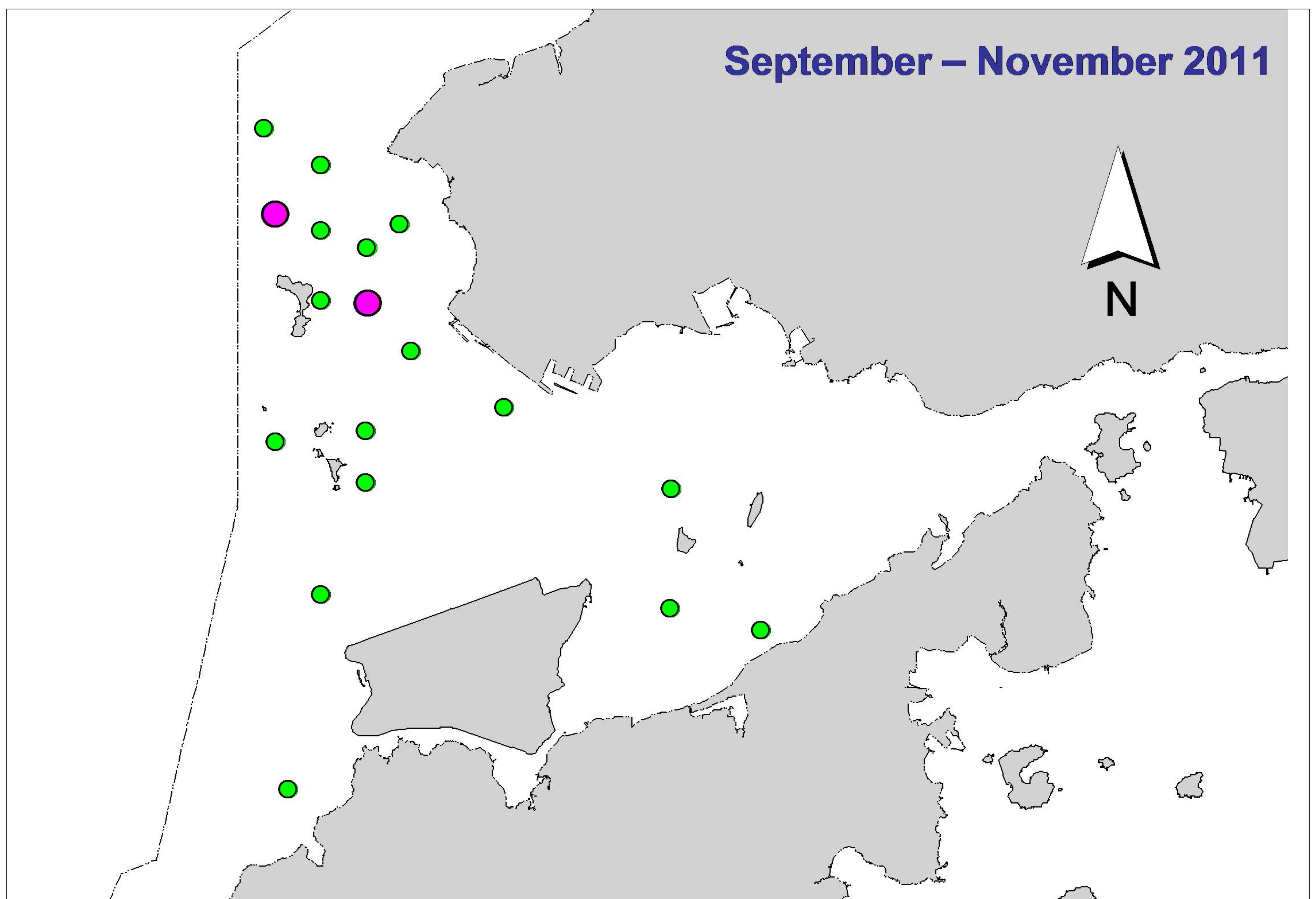
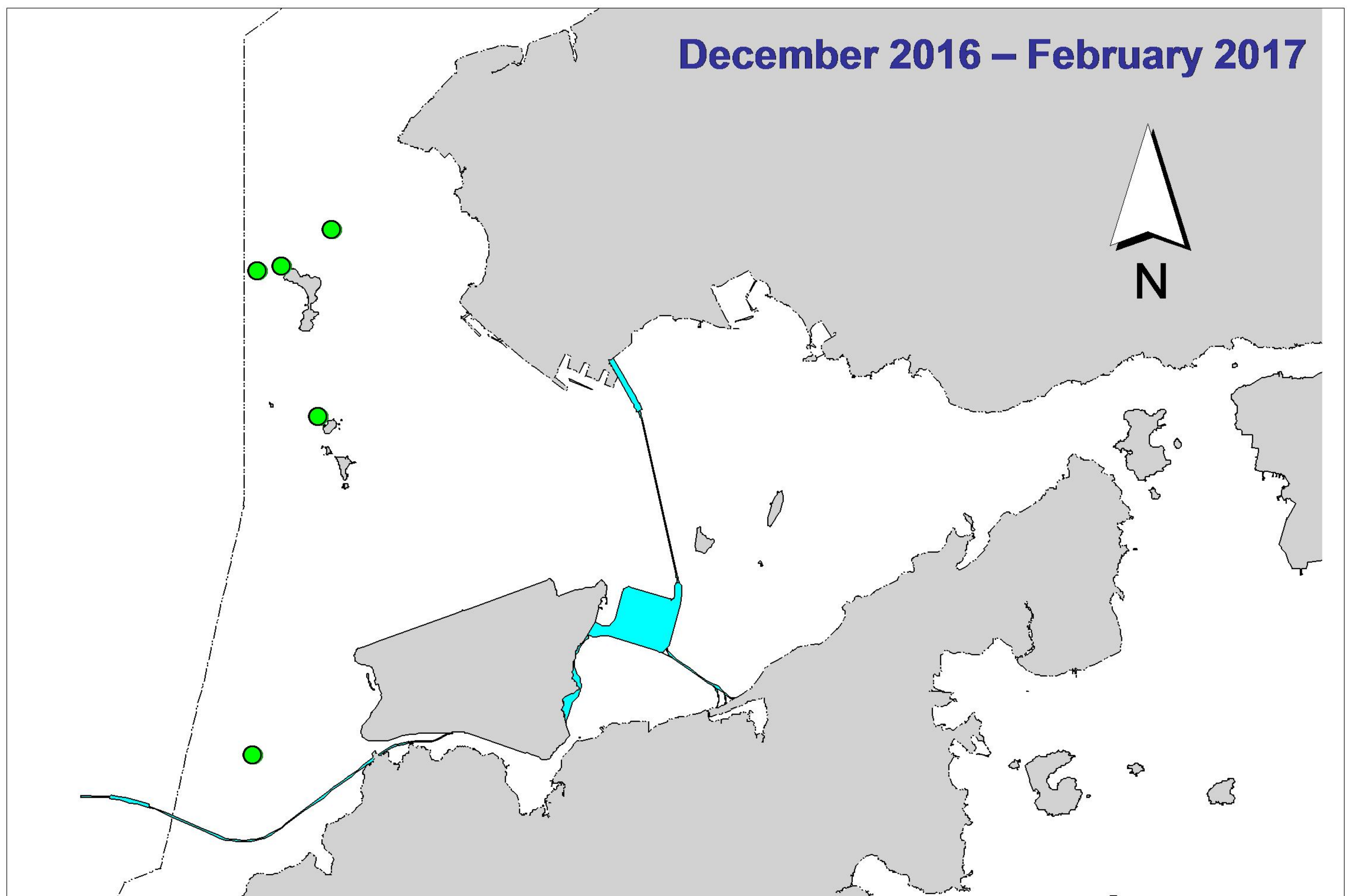


Figure 3. Distribution of Chinese white dolphins with larger group sizes during HKLR03 impact phase (top) and baseline monitoring surveys (bottom) (green dots: group sizes of 5 or more; purple dots: group sizes of 10 or more)



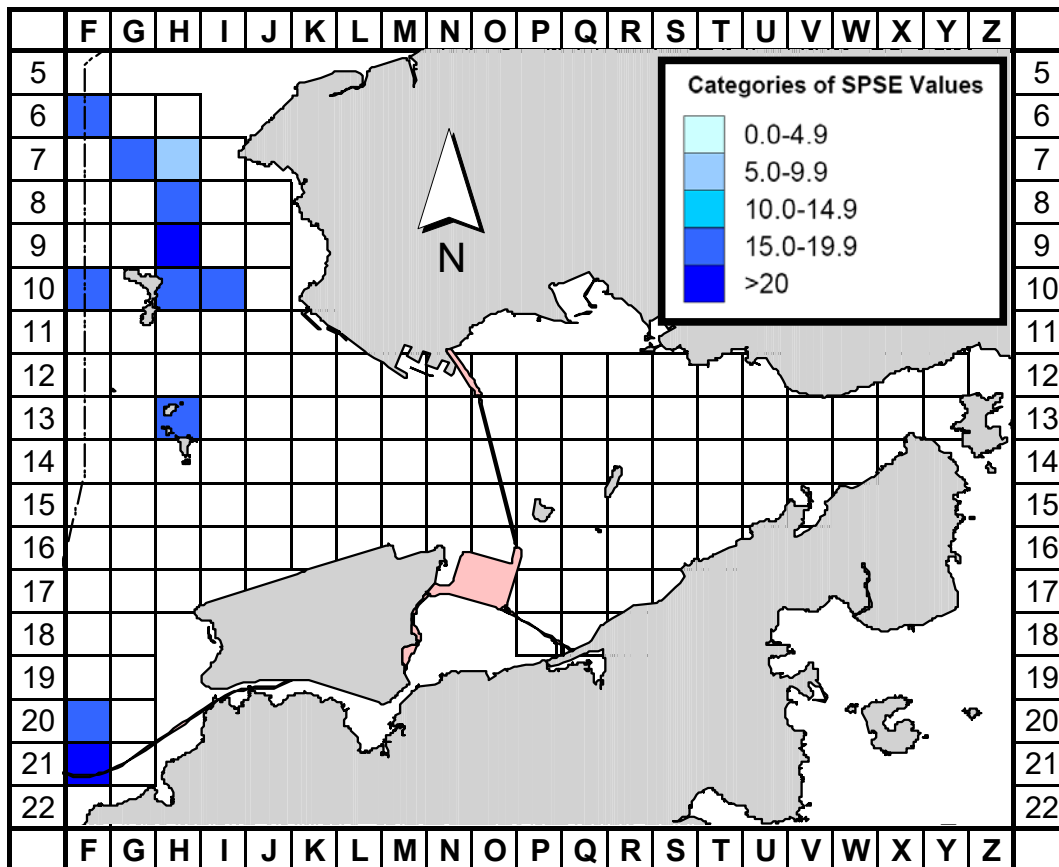


Figure 4a. Sighting density of Chinese white dolphins with corrected survey effort per km<sup>2</sup> in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (Dec16-Feb17) (SPSE = no. of on-effort sightings per 100 units of survey effort)

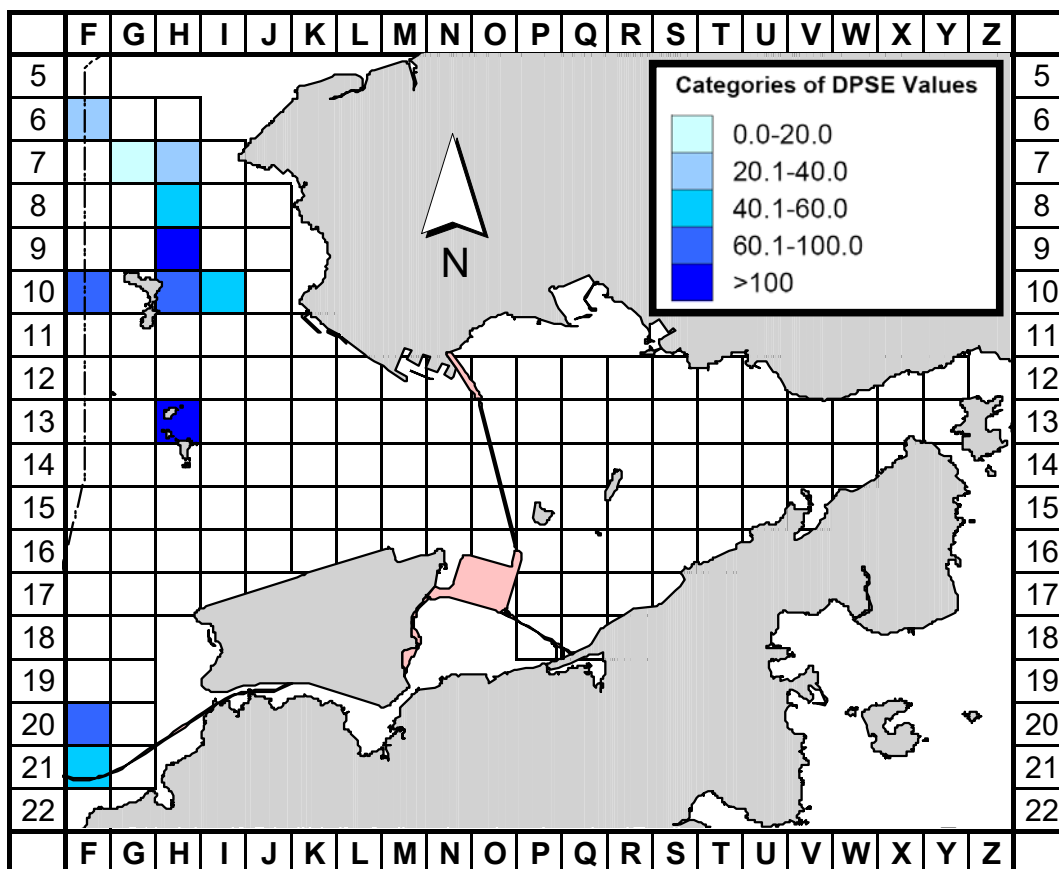


Figure 4b. Density of Chinese white dolphins with corrected survey effort per km<sup>2</sup> in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (Dec16-Feb17) (DPSE = no. of dolphins per 100 units of survey effort)

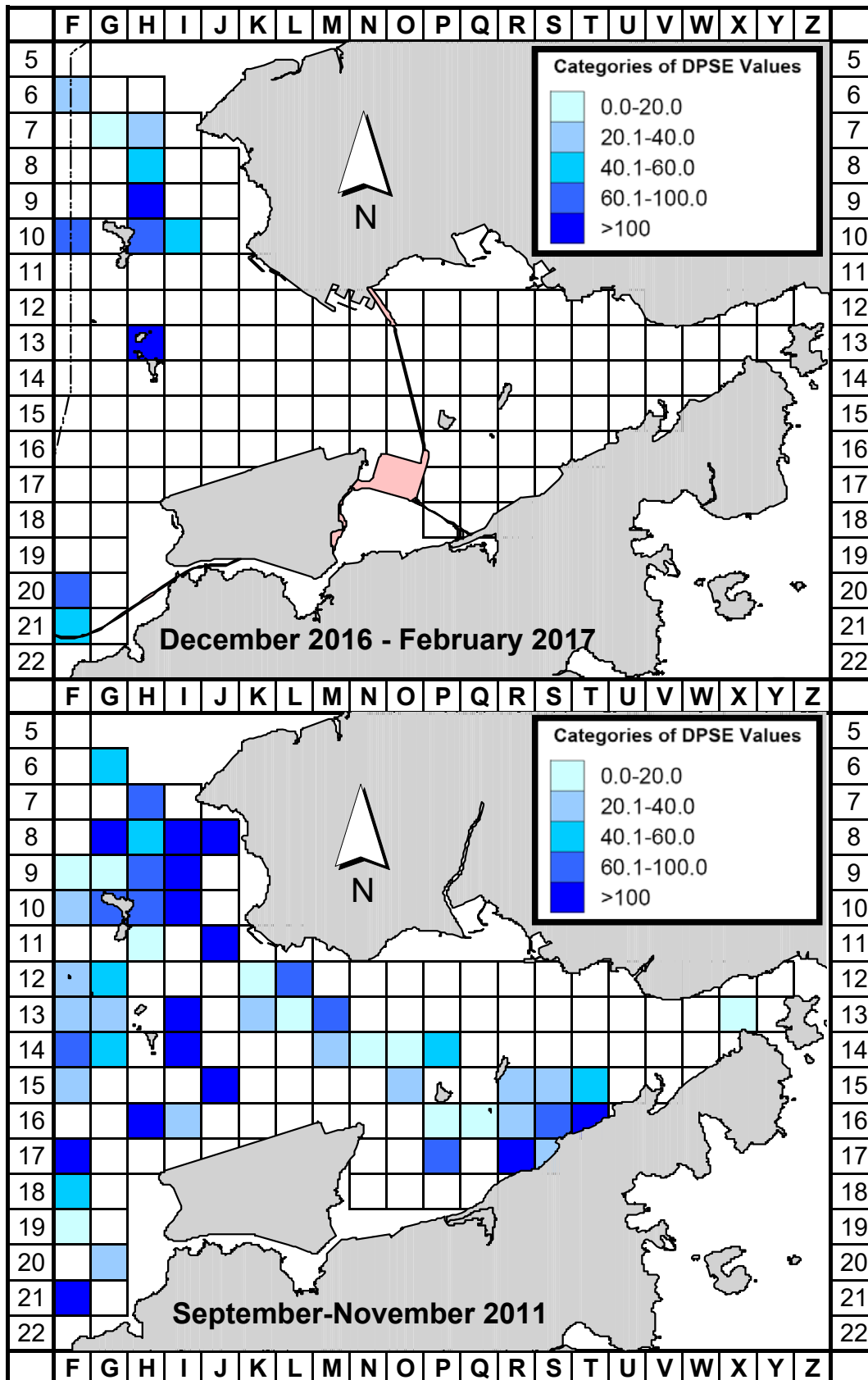


Figure 5. Comparison of density of Chinese white dolphins with corrected survey effort per km<sup>2</sup> in Northwest and Northeast Lantau survey area between the impact monitoring period (December 2016 - February 2017) and baseline monitoring period (September-November 2011) (DPSE = no. of dolphins per 100 units of survey effort)



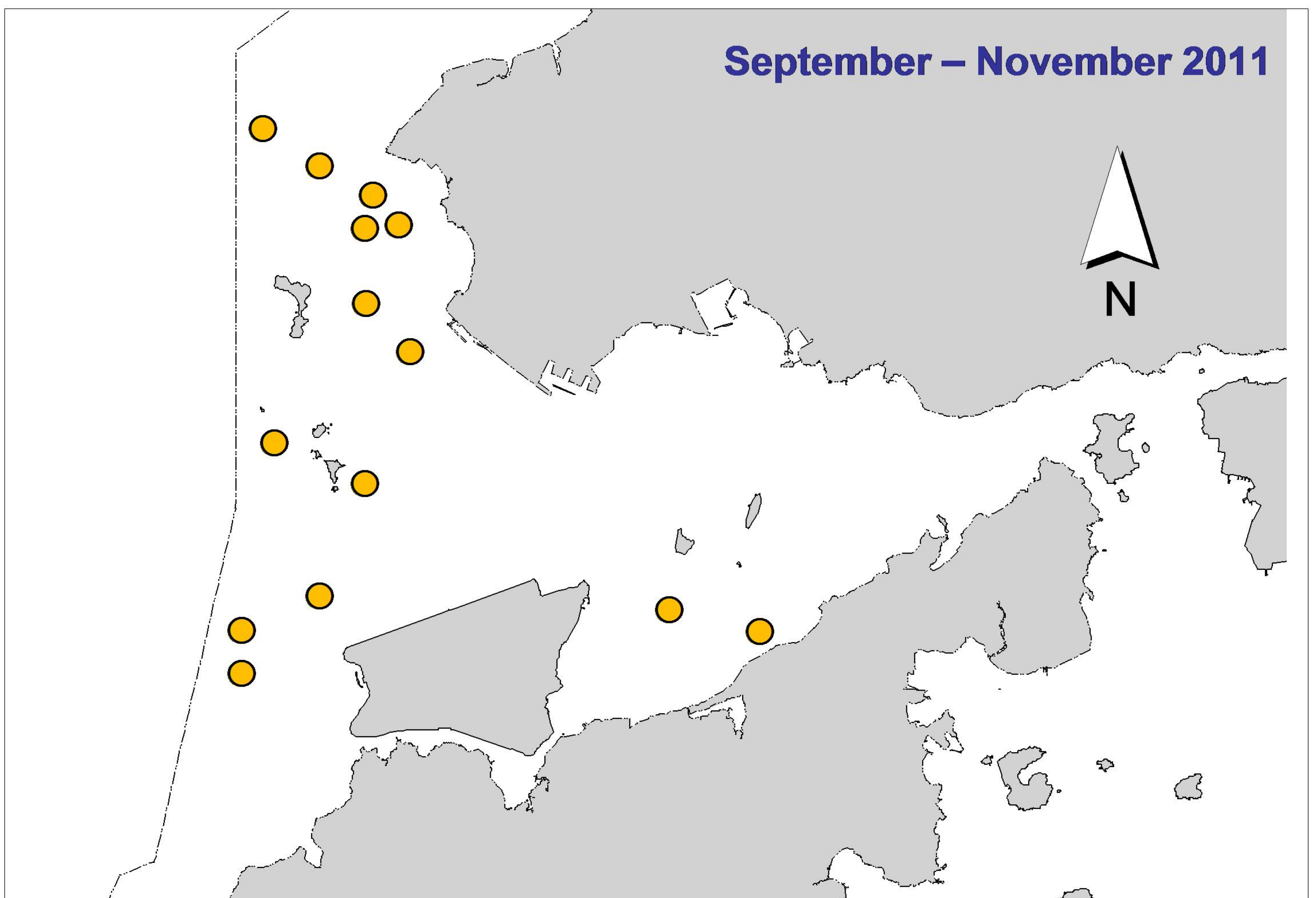
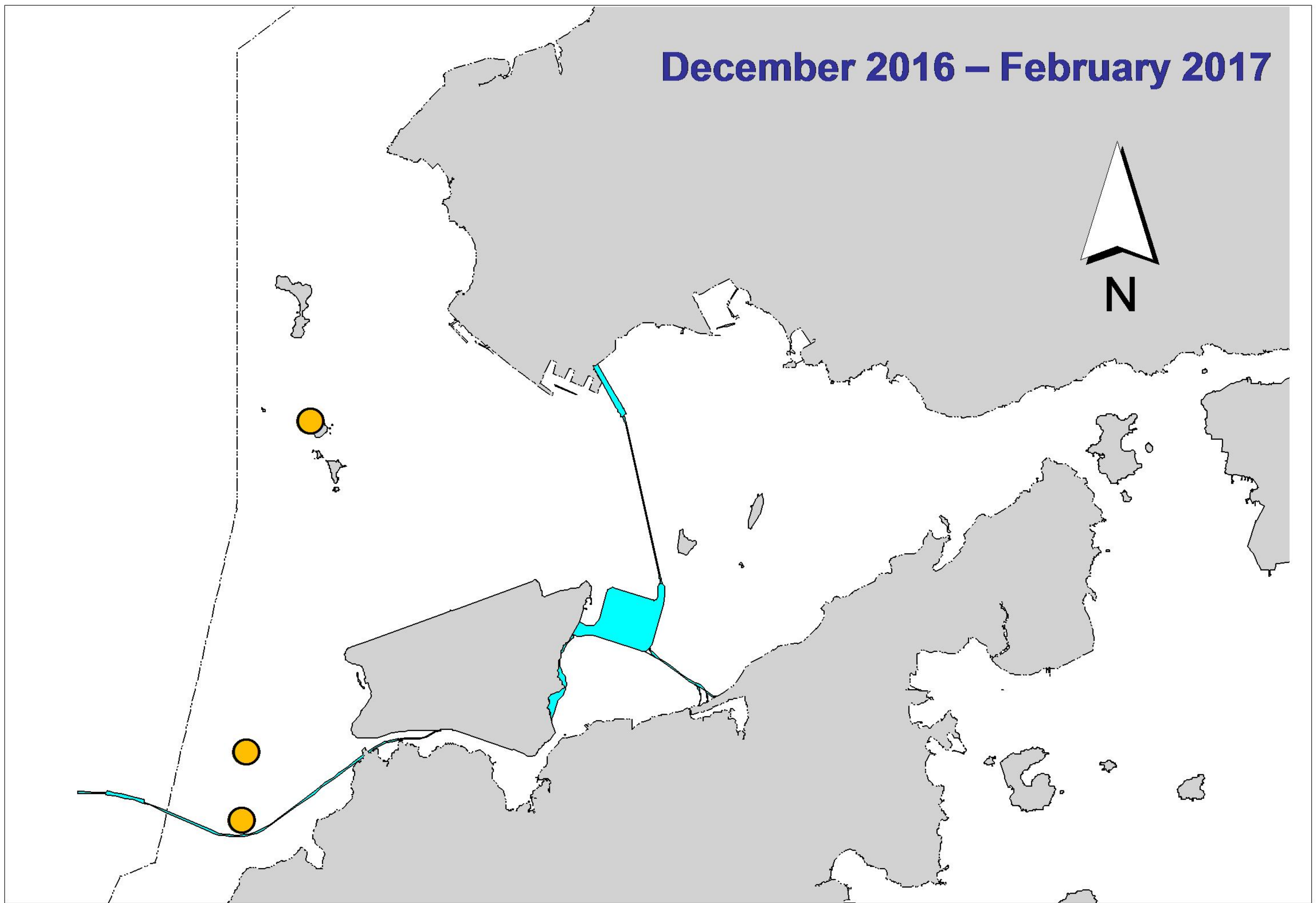


Figure 6. Distribution of young calves of Chinese white dolphins during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)



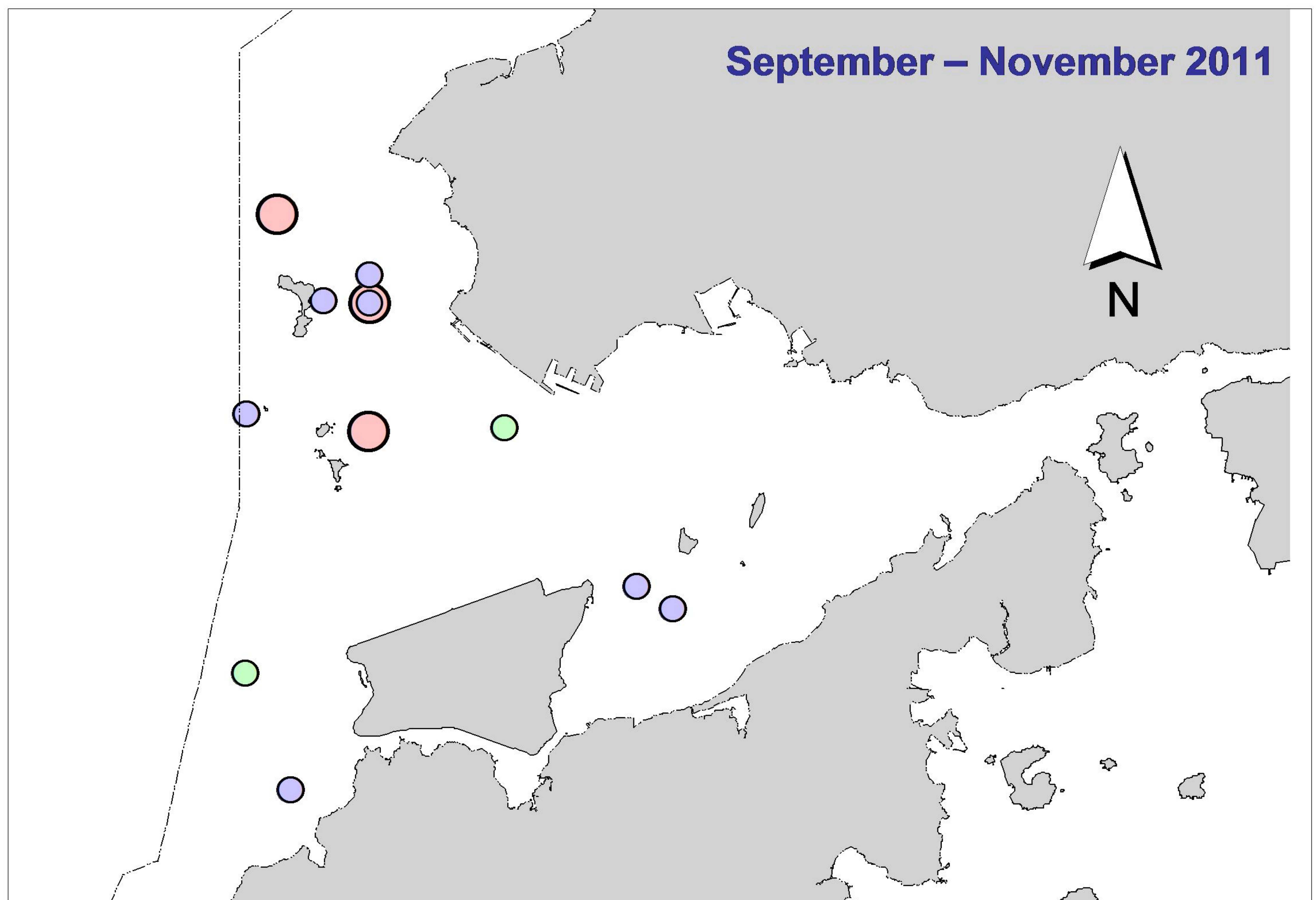
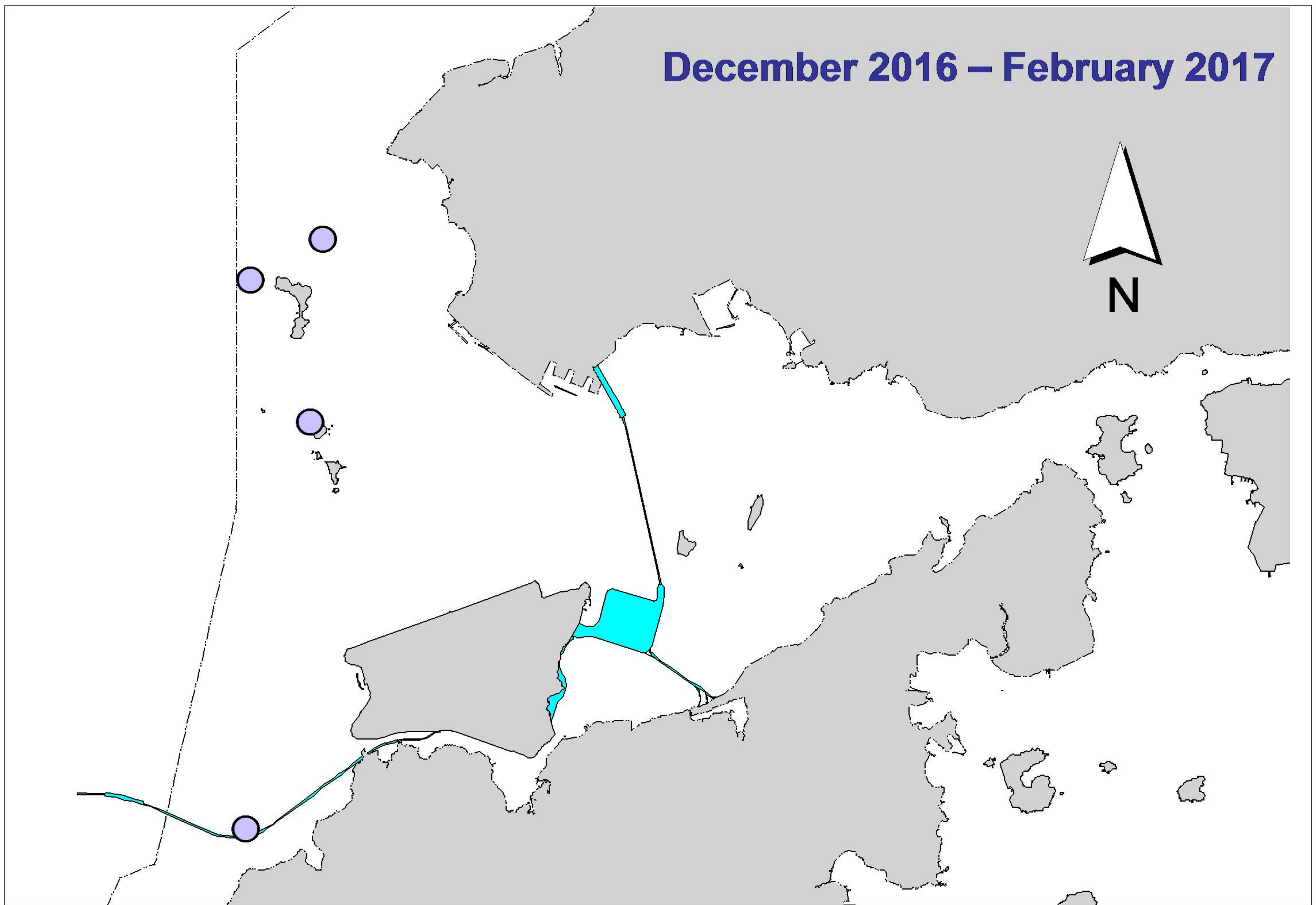


Figure 7. Distribution of Chinese white dolphins engaged in feeding (purple dots), socializing (pink dots) and traveling (green dots) activities during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)



## Appendix I. HKLR03 Survey Effort Database (Dec 2016 - Feb 2017)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
1-Dec-16	NE LANTAU	1	1.10	WINTER	STANDARD36826	HKLR	P
1-Dec-16	NE LANTAU	2	14.04	WINTER	STANDARD36826	HKLR	P
1-Dec-16	NE LANTAU	3	2.70	WINTER	STANDARD36826	HKLR	P
1-Dec-16	NE LANTAU	2	6.99	WINTER	STANDARD36826	HKLR	S
1-Dec-16	NE LANTAU	3	2.87	WINTER	STANDARD36826	HKLR	S
1-Dec-16	NW LANTAU	2	7.78	WINTER	STANDARD36826	HKLR	P
1-Dec-16	NW LANTAU	3	30.29	WINTER	STANDARD36826	HKLR	P
1-Dec-16	NW LANTAU	4	2.10	WINTER	STANDARD36826	HKLR	P
1-Dec-16	NW LANTAU	2	0.10	WINTER	STANDARD36826	HKLR	S
1-Dec-16	NW LANTAU	3	12.43	WINTER	STANDARD36826	HKLR	S
6-Dec-16	NE LANTAU	2	8.24	WINTER	STANDARD36826	HKLR	P
6-Dec-16	NE LANTAU	3	12.45	WINTER	STANDARD36826	HKLR	P
6-Dec-16	NE LANTAU	2	5.56	WINTER	STANDARD36826	HKLR	S
6-Dec-16	NE LANTAU	3	5.85	WINTER	STANDARD36826	HKLR	S
6-Dec-16	NW LANTAU	2	3.30	WINTER	STANDARD36826	HKLR	P
6-Dec-16	NW LANTAU	3	21.96	WINTER	STANDARD36826	HKLR	P
6-Dec-16	NW LANTAU	4	6.80	WINTER	STANDARD36826	HKLR	P
6-Dec-16	NW LANTAU	2	2.34	WINTER	STANDARD36826	HKLR	S
6-Dec-16	NW LANTAU	3	5.60	WINTER	STANDARD36826	HKLR	S
16-Dec-16	NE LANTAU	2	1.84	WINTER	STANDARD36826	HKLR	P
16-Dec-16	NE LANTAU	3	15.94	WINTER	STANDARD36826	HKLR	P
16-Dec-16	NE LANTAU	4	2.10	WINTER	STANDARD36826	HKLR	P
16-Dec-16	NE LANTAU	2	2.56	WINTER	STANDARD36826	HKLR	S
16-Dec-16	NE LANTAU	3	8.66	WINTER	STANDARD36826	HKLR	S
16-Dec-16	NW LANTAU	2	8.49	WINTER	STANDARD36826	HKLR	P
16-Dec-16	NW LANTAU	3	22.63	WINTER	STANDARD36826	HKLR	P
16-Dec-16	NW LANTAU	2	3.41	WINTER	STANDARD36826	HKLR	S
16-Dec-16	NW LANTAU	3	4.41	WINTER	STANDARD36826	HKLR	S
19-Dec-16	NW LANTAU	2	25.43	WINTER	STANDARD36826	HKLR	P
19-Dec-16	NW LANTAU	3	10.26	WINTER	STANDARD36826	HKLR	P
19-Dec-16	NW LANTAU	2	6.14	WINTER	STANDARD36826	HKLR	S
19-Dec-16	NW LANTAU	3	5.93	WINTER	STANDARD36826	HKLR	S
19-Dec-16	NE LANTAU	2	2.66	WINTER	STANDARD36826	HKLR	P
19-Dec-16	NE LANTAU	3	12.82	WINTER	STANDARD36826	HKLR	P
19-Dec-16	NE LANTAU	2	4.15	WINTER	STANDARD36826	HKLR	S
19-Dec-16	NE LANTAU	3	5.57	WINTER	STANDARD36826	HKLR	S
10-Jan-17	NE LANTAU	2	4.00	WINTER	STANDARD36826	HKLR	P
10-Jan-17	NE LANTAU	3	14.60	WINTER	STANDARD36826	HKLR	P
10-Jan-17	NE LANTAU	2	8.90	WINTER	STANDARD36826	HKLR	S
10-Jan-17	NE LANTAU	3	2.10	WINTER	STANDARD36826	HKLR	S
10-Jan-17	NW LANTAU	2	0.70	WINTER	STANDARD36826	HKLR	P
10-Jan-17	NW LANTAU	3	28.52	WINTER	STANDARD36826	HKLR	P
10-Jan-17	NW LANTAU	4	2.10	WINTER	STANDARD36826	HKLR	P
10-Jan-17	NW LANTAU	2	2.10	WINTER	STANDARD36826	HKLR	S
10-Jan-17	NW LANTAU	3	5.88	WINTER	STANDARD36826	HKLR	S
12-Jan-17	NW LANTAU	2	11.90	WINTER	STANDARD31516	HKLR	P
12-Jan-17	NW LANTAU	3	28.60	WINTER	STANDARD31516	HKLR	P
12-Jan-17	NW LANTAU	2	11.00	WINTER	STANDARD31516	HKLR	S
12-Jan-17	NW LANTAU	3	2.30	WINTER	STANDARD31516	HKLR	S
12-Jan-17	NE LANTAU	2	16.82	WINTER	STANDARD31516	HKLR	P
12-Jan-17	NE LANTAU	2	8.97	WINTER	STANDARD31516	HKLR	S
12-Jan-17	NE LANTAU	3	1.00	WINTER	STANDARD31516	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
16-Jan-17	NW LANTAU	2	17.83	WINTER	STANDARD36826	HKLR	P
16-Jan-17	NW LANTAU	3	19.51	WINTER	STANDARD36826	HKLR	P
16-Jan-17	NW LANTAU	2	10.47	WINTER	STANDARD36826	HKLR	S
16-Jan-17	NW LANTAU	3	2.70	WINTER	STANDARD36826	HKLR	S
16-Jan-17	NE LANTAU	2	10.30	WINTER	STANDARD36826	HKLR	P
16-Jan-17	NE LANTAU	3	6.40	WINTER	STANDARD36826	HKLR	P
16-Jan-17	NE LANTAU	2	9.60	WINTER	STANDARD36826	HKLR	S
20-Jan-17	NW LANTAU	2	0.70	WINTER	STANDARD31516	HKLR	P
20-Jan-17	NW LANTAU	3	25.76	WINTER	STANDARD31516	HKLR	P
20-Jan-17	NW LANTAU	4	4.64	WINTER	STANDARD31516	HKLR	P
20-Jan-17	NW LANTAU	2	1.20	WINTER	STANDARD31516	HKLR	S
20-Jan-17	NW LANTAU	3	6.20	WINTER	STANDARD31516	HKLR	S
20-Jan-17	NE LANTAU	2	13.65	WINTER	STANDARD31516	HKLR	P
20-Jan-17	NE LANTAU	3	5.69	WINTER	STANDARD31516	HKLR	P
20-Jan-17	NE LANTAU	2	10.46	WINTER	STANDARD31516	HKLR	S
7-Feb-17	NE LANTAU	2	0.61	WINTER	STANDARD36826	HKLR	P
7-Feb-17	NE LANTAU	3	8.22	WINTER	STANDARD36826	HKLR	P
7-Feb-17	NE LANTAU	4	10.00	WINTER	STANDARD36826	HKLR	P
7-Feb-17	NE LANTAU	2	0.96	WINTER	STANDARD36826	HKLR	S
7-Feb-17	NE LANTAU	3	5.61	WINTER	STANDARD36826	HKLR	S
7-Feb-17	NE LANTAU	4	4.60	WINTER	STANDARD36826	HKLR	S
7-Feb-17	NW LANTAU	2	1.58	WINTER	STANDARD36826	HKLR	P
7-Feb-17	NW LANTAU	3	16.98	WINTER	STANDARD36826	HKLR	P
7-Feb-17	NW LANTAU	4	12.66	WINTER	STANDARD36826	HKLR	P
7-Feb-17	NW LANTAU	3	5.78	WINTER	STANDARD36826	HKLR	S
7-Feb-17	NW LANTAU	4	1.80	WINTER	STANDARD36826	HKLR	S
9-Feb-17	NE LANTAU	2	4.59	WINTER	STANDARD31516	HKLR	P
9-Feb-17	NE LANTAU	3	12.25	WINTER	STANDARD31516	HKLR	P
9-Feb-17	NE LANTAU	2	5.54	WINTER	STANDARD31516	HKLR	S
9-Feb-17	NE LANTAU	3	4.53	WINTER	STANDARD31516	HKLR	S
9-Feb-17	NW LANTAU	2	2.18	WINTER	STANDARD31516	HKLR	P
9-Feb-17	NW LANTAU	3	8.68	WINTER	STANDARD31516	HKLR	P
9-Feb-17	NW LANTAU	4	28.37	WINTER	STANDARD31516	HKLR	P
9-Feb-17	NW LANTAU	3	7.37	WINTER	STANDARD31516	HKLR	S
9-Feb-17	NW LANTAU	4	6.00	WINTER	STANDARD31516	HKLR	S
16-Feb-17	NW LANTAU	2	36.29	WINTER	STANDARD36826	HKLR	P
16-Feb-17	NW LANTAU	2	10.85	WINTER	STANDARD36826	HKLR	S
16-Feb-17	NE LANTAU	1	0.70	WINTER	STANDARD36826	HKLR	P
16-Feb-17	NE LANTAU	2	14.21	WINTER	STANDARD36826	HKLR	P
16-Feb-17	NE LANTAU	2	7.08	WINTER	STANDARD36826	HKLR	S
16-Feb-17	NE LANTAU	3	1.81	WINTER	STANDARD36826	HKLR	S
21-Feb-17	NW LANTAU	3	8.20	WINTER	STANDARD36826	HKLR	P
21-Feb-17	NW LANTAU	4	18.51	WINTER	STANDARD36826	HKLR	P
21-Feb-17	NW LANTAU	5	3.99	WINTER	STANDARD36826	HKLR	P
21-Feb-17	NW LANTAU	2	1.00	WINTER	STANDARD36826	HKLR	S
21-Feb-17	NW LANTAU	3	2.40	WINTER	STANDARD36826	HKLR	S
21-Feb-17	NW LANTAU	4	1.40	WINTER	STANDARD36826	HKLR	S
21-Feb-17	NW LANTAU	5	2.80	WINTER	STANDARD36826	HKLR	S
21-Feb-17	NE LANTAU	2	1.20	WINTER	STANDARD36826	HKLR	P
21-Feb-17	NE LANTAU	3	13.40	WINTER	STANDARD36826	HKLR	P
21-Feb-17	NE LANTAU	4	5.12	WINTER	STANDARD36826	HKLR	P
21-Feb-17	NE LANTAU	2	0.70	WINTER	STANDARD36826	HKLR	S
21-Feb-17	NE LANTAU	3	4.70	WINTER	STANDARD36826	HKLR	S
21-Feb-17	NE LANTAU	4	5.58	WINTER	STANDARD36826	HKLR	S

## Appendix II. HKLR03 Chinese White Dolphin Sighting Database (December 2016 - February 2017)

(Abbreviations: 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 Line)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
1-Dec-16	1	1337	1	NW LANTAU	3	233	ON	HKLR	827758	806489	WINTER	NONE	P
16-Dec-16	1	1308	3	NW LANTAU	3	74	ON	HKLR	826206	807351	WINTER	NONE	P
16-Dec-16	2	1359	8	NW LANTAU	3	ND	OFF	HKLR	827051	805334	WINTER	NONE	
19-Dec-16	1	1105	6	NW LANTAU	2	17	ON	HKLR	826942	804829	WINTER	NONE	P
19-Dec-16	2	1204	4	NW LANTAU	2	272	ON	HKLR	829219	806502	WINTER	NONE	P
19-Dec-16	3	1222	2	NW LANTAU	2	26	ON	HKLR	827680	806489	WINTER	NONE	P
16-Jan-17	1	1027	1	NW LANTAU	2	84	ON	HKLR	815336	804713	WINTER	NONE	P
16-Jan-17	2	1041	5	NW LANTAU	3	22	ON	HKLR	816920	804716	WINTER	NONE	P
16-Jan-17	3	1211	3	NW LANTAU	3	121	ON	HKLR	828289	806500	WINTER	NONE	P
16-Jan-17	4	1226	4	NW LANTAU	2	200	ON	HKLR	826916	806446	WINTER	NONE	P
7-Feb-17	1	1259	3	NW LANTAU	3	ND	OFF	HKLR	828941	807511	WINTER	NONE	
9-Feb-17	1	1510	1	NW LANTAU	4	515	ON	HKLR	829996	805999	WINTER	NONE	S
16-Feb-17	1	1006	2	NW LANTAU	2	325	ON	HKLR	815481	804610	WINTER	NONE	P
16-Feb-17	2	1027	2	NW LANTAU	2	ND	OFF	HKLR	818991	804710	WINTER	NONE	
16-Feb-17	3	1115	2	NW LANTAU	2	1311	ON	HKLR	830541	804672	WINTER	NONE	P
16-Feb-17	4	1139	7	NW LANTAU	2	98	ON	HKLR	827813	806448	WINTER	NONE	P
16-Feb-17	5	1210	8	NW LANTAU	2	4	ON	HKLR	823927	806152	WINTER	NONE	P

**Appendix III. Individual dolphins identified during HKLR03 monitoring surveys in December 2016 - February 2017**

ID#	DATE	STG#	AREA
CH34	19/12/16	1	NW LANTAU
CH105	16/02/17	5	NW LANTAU
NL46	16/12/16	2	NW LANTAU
	16/01/17	3	NW LANTAU
NL98	16/12/16	2	NW LANTAU
	16/02/17	5	NW LANTAU
NL104	19/12/16	1	NW LANTAU
	16/02/17	4	NW LANTAU
NL120	16/12/16	1	NW LANTAU
NL123	16/02/17	5	NW LANTAU
NL136	16/12/16	2	NW LANTAU
	16/01/17	3	NW LANTAU
NL182	01/12/16	1	NW LANTAU
	16/12/16	2	NW LANTAU
NL202	16/12/16	2	NW LANTAU
	19/12/16	1	NW LANTAU
	19/12/16	3	NW LANTAU
	16/01/17	4	NW LANTAU
	16/02/17	4	NW LANTAU
NL203	19/12/16	2	NW LANTAU
NL210	16/01/17	4	NW LANTAU
	09/02/17	1	NW LANTAU
NL226	16/12/16	1	NW LANTAU
NL260	16/02/17	5	NW LANTAU
NL269	16/01/17	2	NW LANTAU
NL286	16/12/16	2	NW LANTAU
	19/12/16	1	NW LANTAU
	19/12/16	3	NW LANTAU
	16/01/17	4	NW LANTAU
	16/02/17	4	NW LANTAU
NL296	16/12/16	1	NW LANTAU
NL320	16/02/17	4	NW LANTAU
NL321	19/12/16	1	NW LANTAU
	16/02/17	4	NW LANTAU

ID#	DATE	STG#	AREA
WL17	19/12/16	2	NW LANTAU
WL28	16/01/17	2	NW LANTAU
WL145	16/01/17	2	NW LANTAU
	16/02/17	1	NW LANTAU
WL179	16/02/17	5	NW LANTAU
WL234	16/01/17	3	NW LANTAU
WL261	16/02/17	5	NW LANTAU
WL275	07/02/17	1	NW LANTAU
	16/02/17	4	NW LANTAU



Appendix IV. Twenty-six individual dolphins that were identified during December 2016 to February 2017 under HKLR03 impact phase monitoring surveys



Appendix IV. (cont'd)

NL104



NL120



NL123



NL136





Appendix IV. (cont'd)

NL182



NL202



NL203



NL210



Appendix IV. (cont'd)

NL226



NL260



NL269



NL286





Appendix IV. (cont'd)

NL296



NL320



NL321



WL17





Appendix IV. (cont'd)

WL28



WL145



WL179



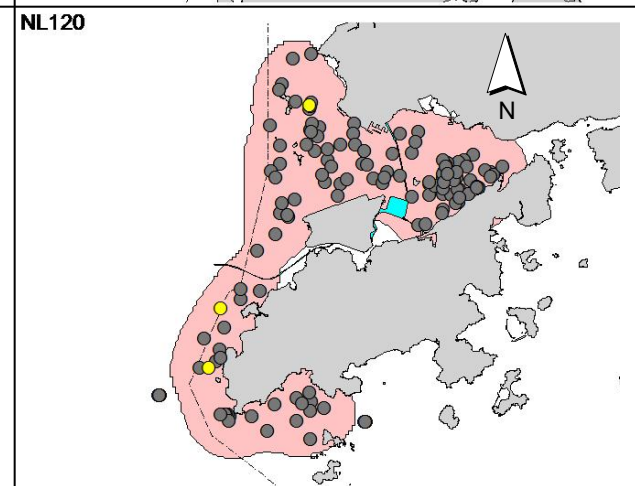
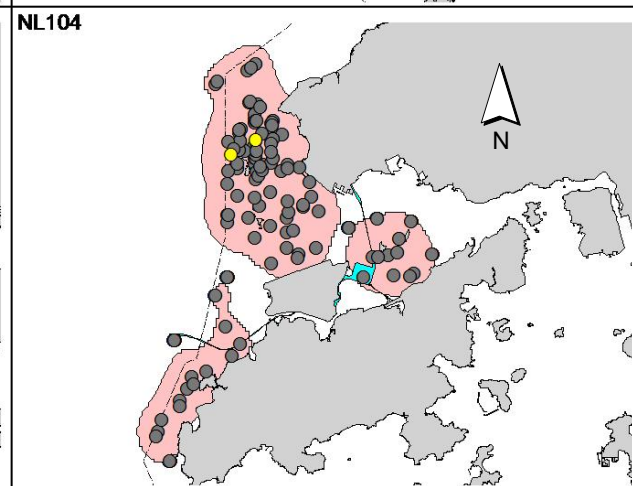
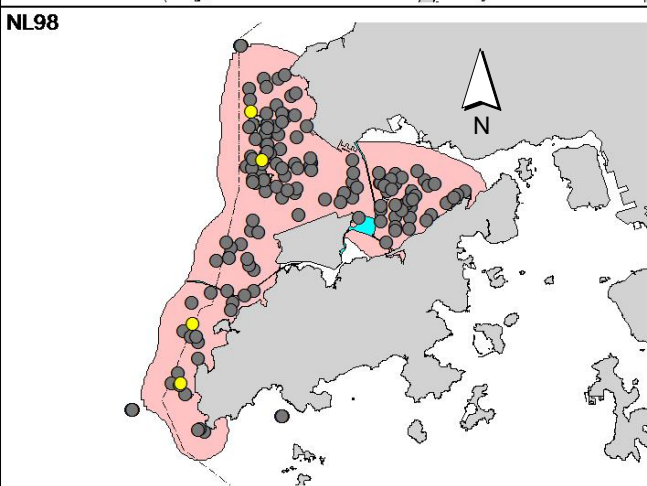
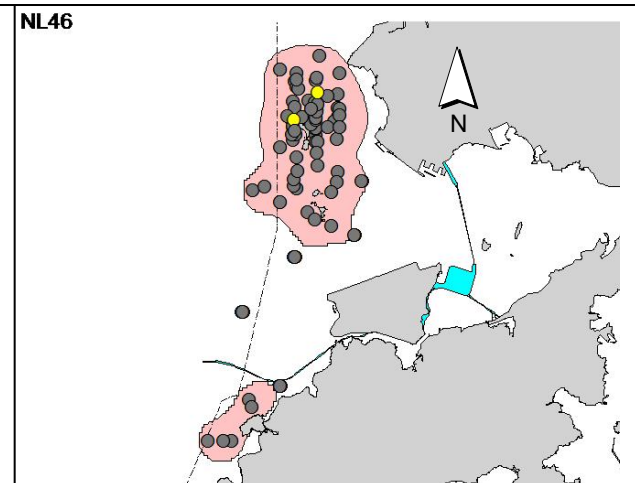
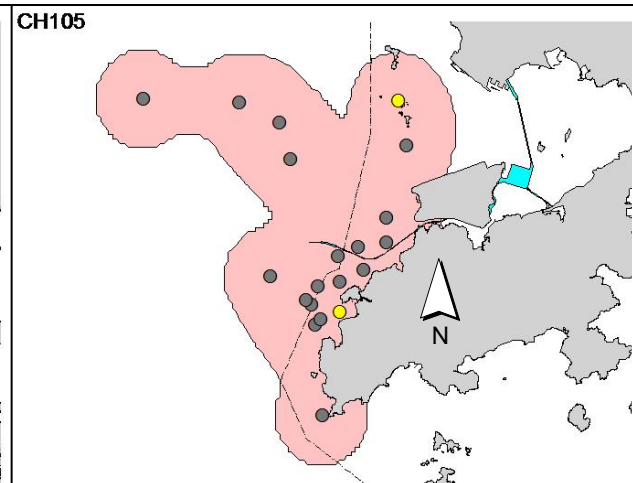
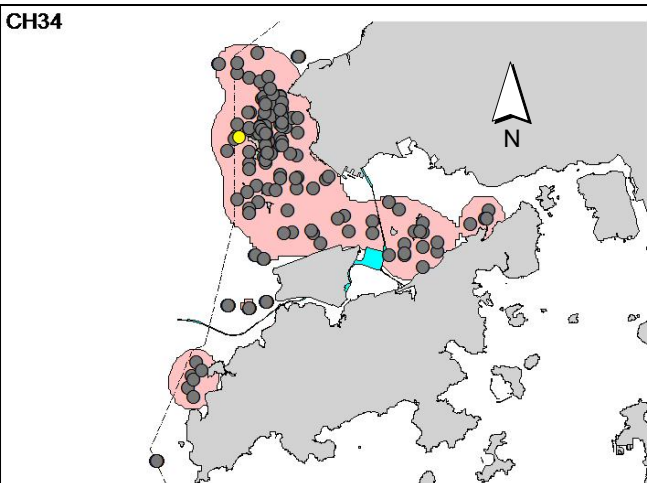
WL234



Appendix IV. (cont'd)

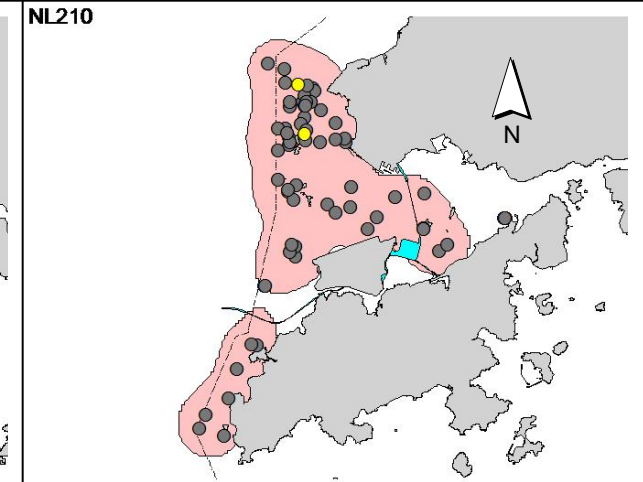
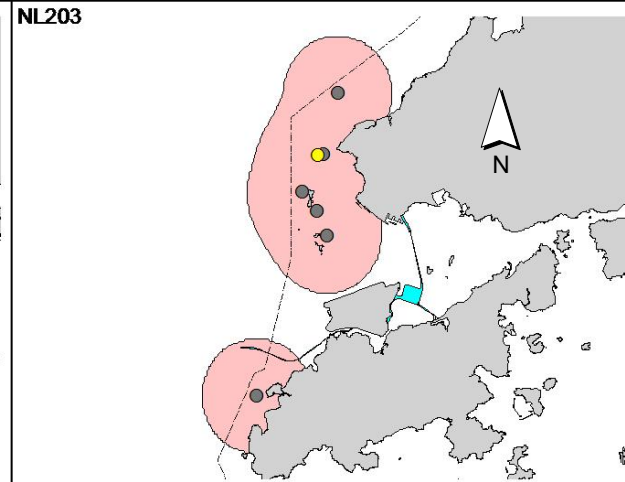
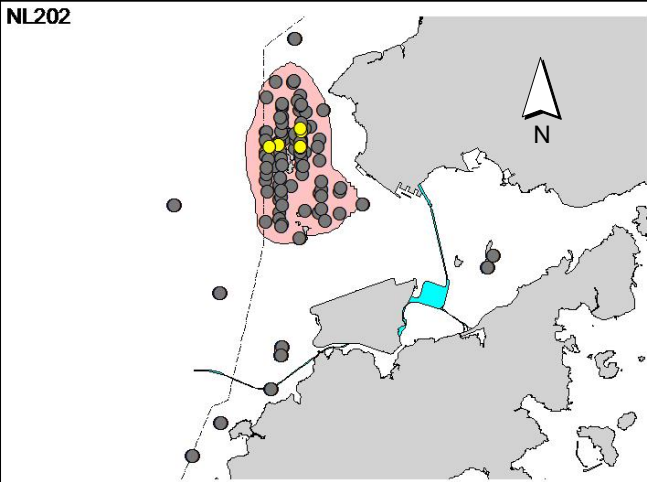
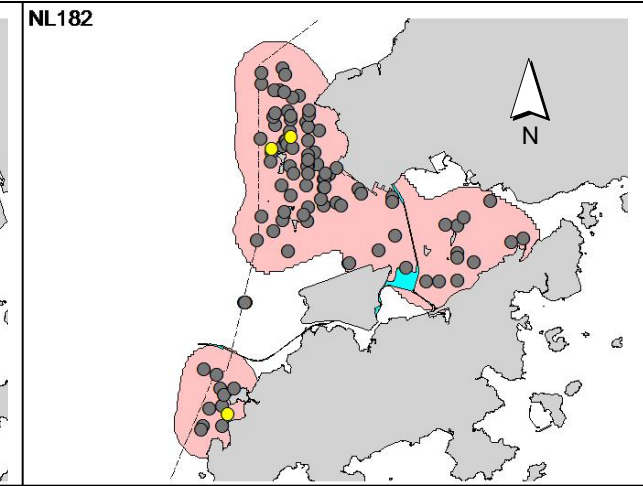
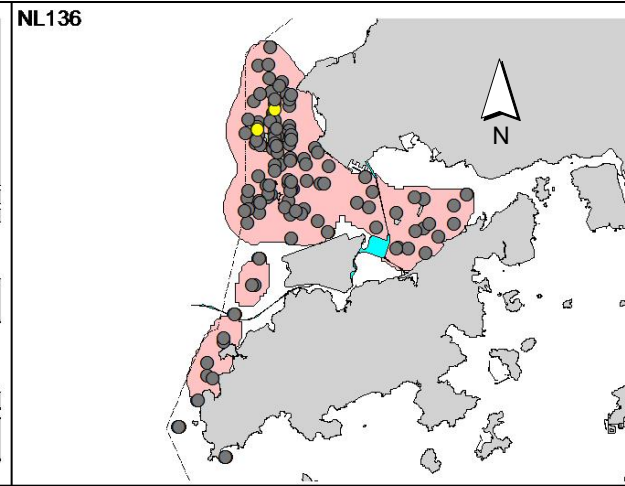
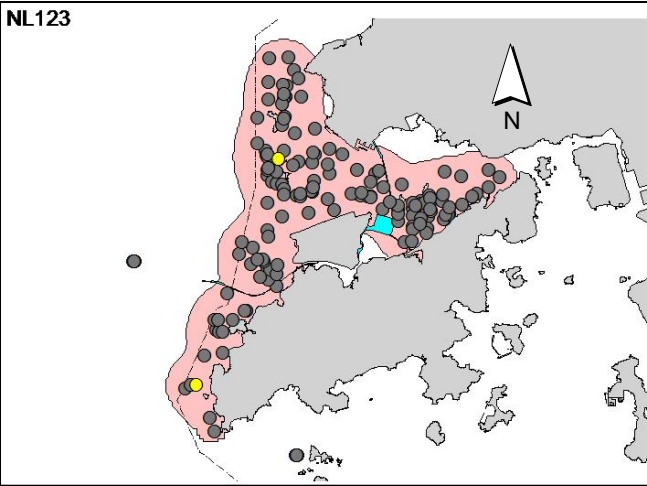


Appendix V. Ranging patterns (95% kernel ranges) of 26 individual dolphins that were sighted during HKLR03 impact phase monitoring period (note: yellow dots indicates sightings made in December 2016 – February 2017 during HZMB-related monitoring surveys)

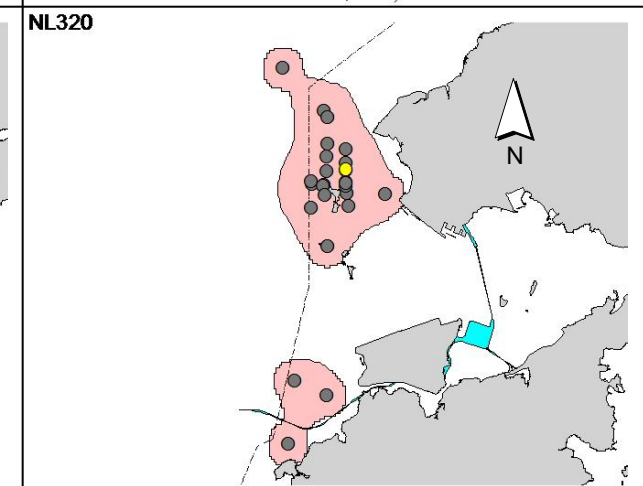
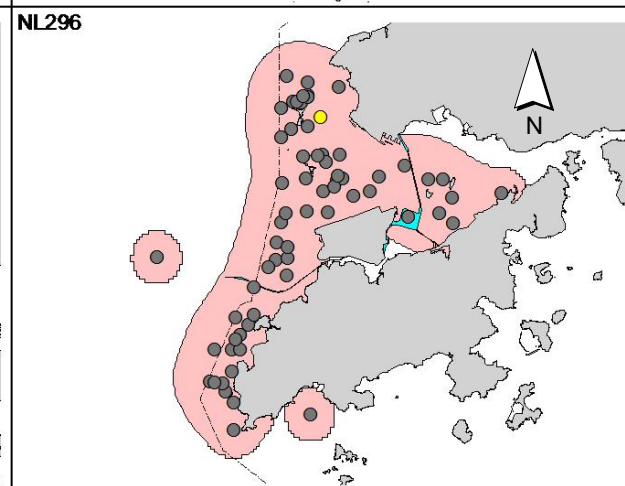
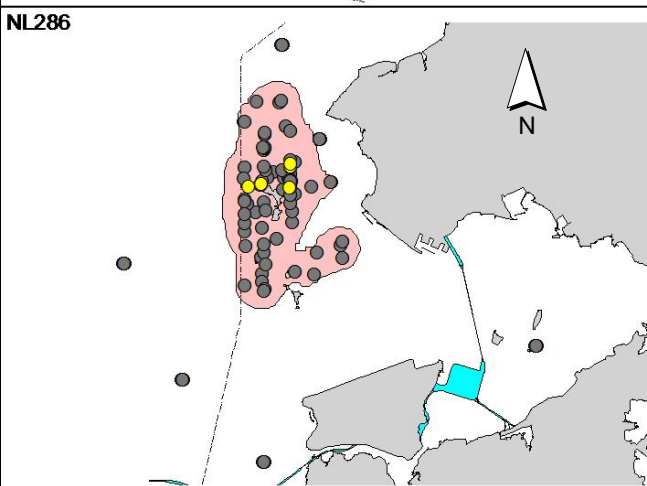
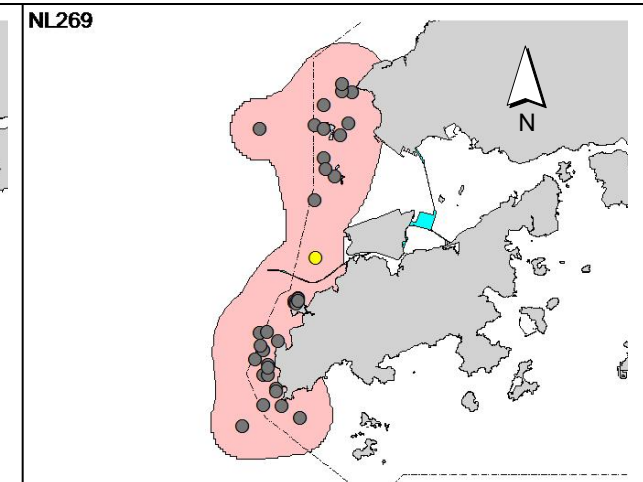
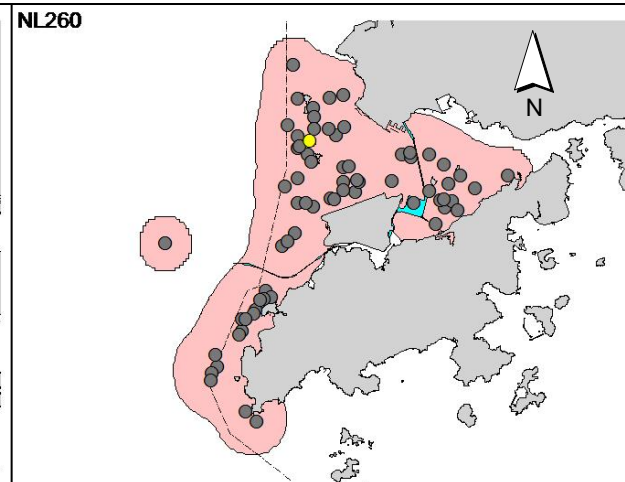
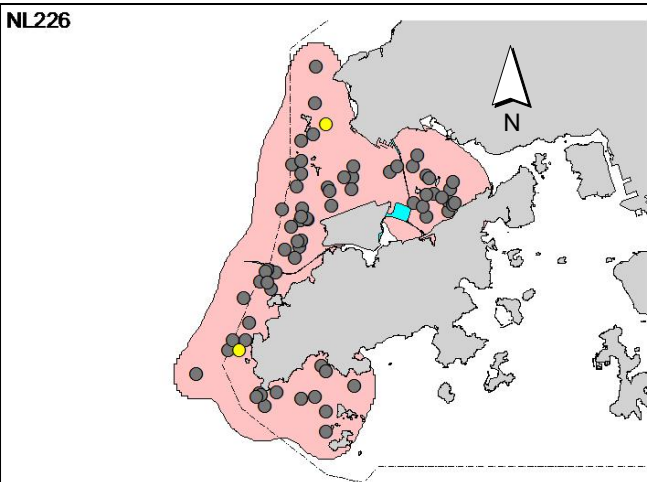




Appendix V. (cont'd)

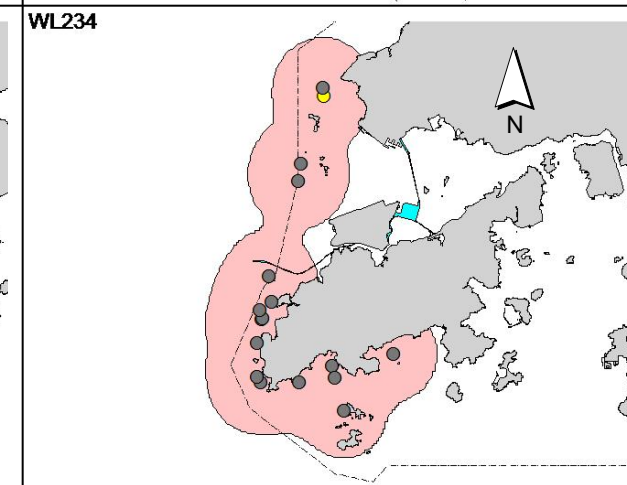
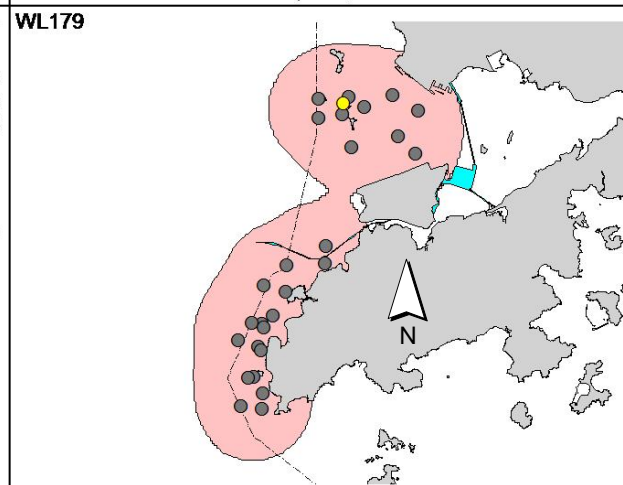
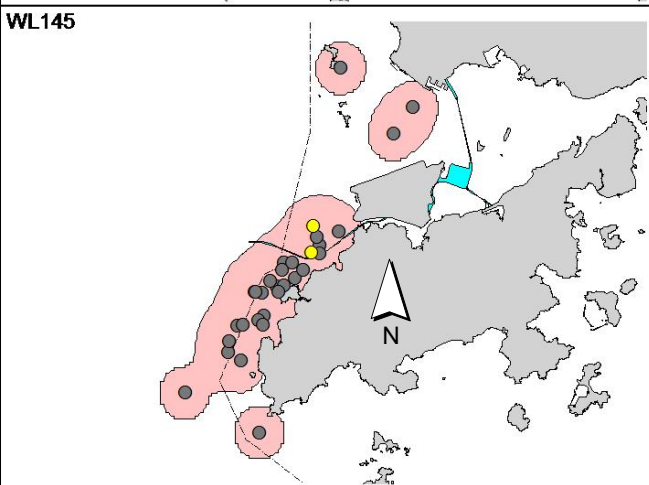
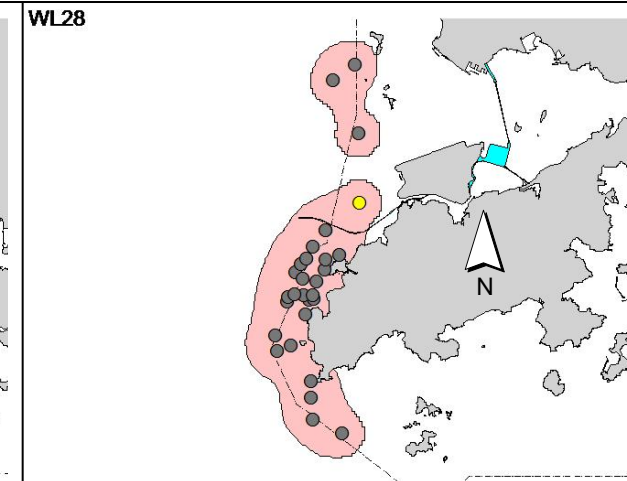
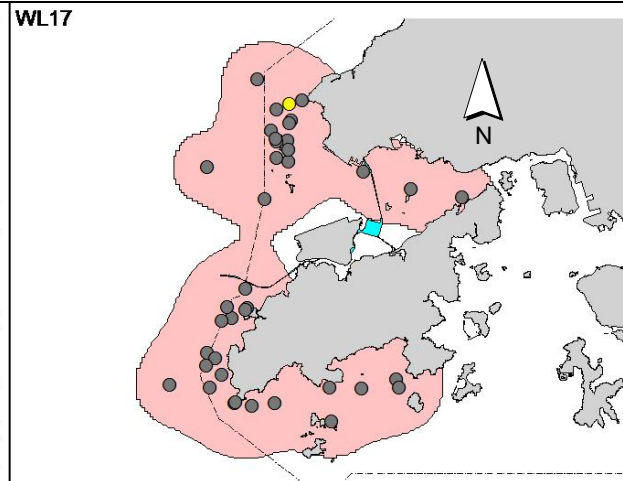
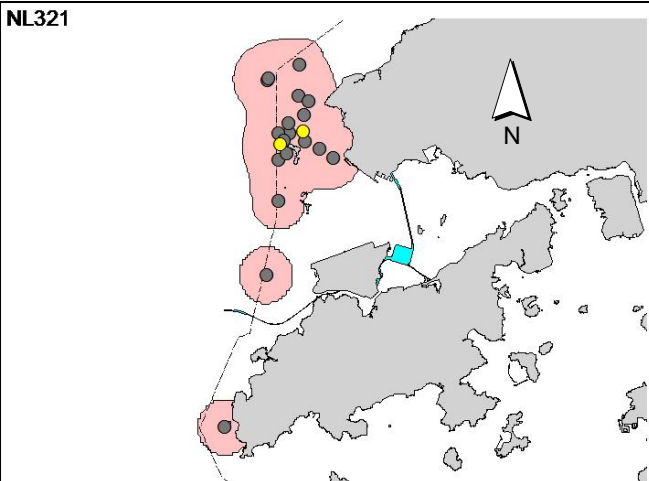


Appendix V. (cont'd)

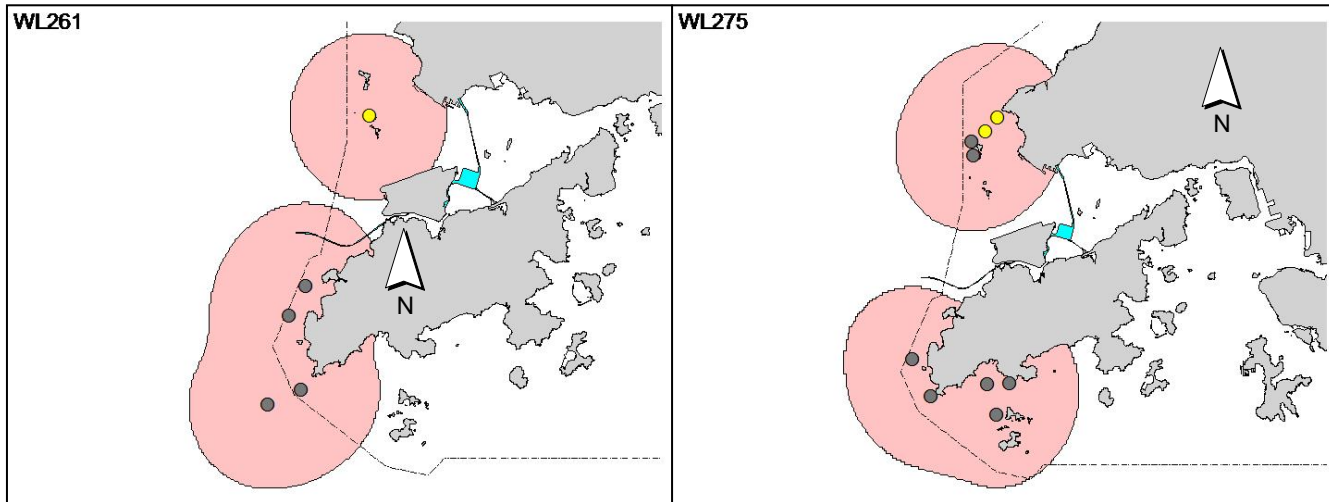




Appendix V. (cont'd)



Appendix V. (cont'd)



Appendix J

## Event Action Plan

*Appendix J1 Event/ Action Plan for Air Quality*

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

ACTION				
EVENT	ET <sup>(1)</sup>	IEC <sup>(1)</sup>	SOR <sup>(1)</sup>	Contractor
<b>Limit Level</b>				
1. Exceedance for one sample	1. Identify the source. 2. Inform the SOR and the DEP. 3. Repeat measurement to confirm finding. 4. Increase monitoring frequency to daily. 5. Assess effectiveness of Contractor's remedial actions and keep the IEC, the DEP and the SOR informed of the results.	1. Check monitoring data submitted by the ET. 2. Check Contractor's working method. 3. Discuss with the ET and the Contractor on possible remedial measures. 4. Advise the SOR on the effectiveness of the proposed remedial measures. 5. Supervisor implementation of remedial measures.	1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. Ensure remedial measures are properly implemented.	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to IEC within 3 working days of notification 3. Implement the agreed proposals 4. Amend proposal if appropriate
2. Exceedance for two or more consecutive samples	1. Notify the IEC, the SOR, the DEP and the Contractor. 2. Identify the source. 3. Repeat measurements to confirm findings. 4. Increase monitoring frequency to daily. 5. Carry out analysis of the Contractor's working procedures to determine possible mitigation to be implemented. 6. Arrange meeting with the IEC and the SOR to discuss the remedial actions to be taken. 7. Assess effectiveness of the Contractor's remedial actions and keep the IEC, the DEP and	1. Discuss amongst the SOR, ET and the Contractor on the potential remedial actions. 2. Review the Contractor's remedial actions whenever necessary to assure their effectiveness and advise the SOR accordingly. 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. 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. Submit proposals for remedial actions to IEC within 3 working days of notification. 3. Implement the agreed proposals. 4. Resubmit proposals if problem still not under control. 5. Stop the relevant activity of works as determined by the SOR until the exceedance is abated.



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the SOR informed of the results.

8. If exceedance stops cease  
additional monitoring.

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*Appendix J2 Event/ Action Plan for Construction Noise*

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

**Appendix J3**      **Event/ Action Plan for Water Quality**

<b>Event</b>	<b>ET Leader</b>	<b>IEC</b>	<b>SOR</b>	<b>Contractor</b>
Action level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>Repeat in situ measurement on next day of exceedance to confirm findings;</li> <li>Identify source(s) of impact;</li> <li>Inform IEC, contractor and SOR;</li> <li>Check monitoring data, all plant, equipment and Contractor's working methods.</li> </ol>	<ol style="list-style-type: none"> <li>Check monitoring data submitted by ET and Contractor's working methods.</li> </ol>	<ol style="list-style-type: none"> <li>Confirm receipt of notification of non-compliance in writing;</li> <li>Notify Contractor.</li> </ol>	<ol style="list-style-type: none"> <li>Inform the SOR and confirm notification of the non-compliance in writing;</li> <li>Rectify unacceptable practice;</li> <li>Amend working methods if appropriate.</li> </ol>
Action level being exceeded by two or more consecutive sampling days	<ol style="list-style-type: none"> <li>Repeat measurement on next day of exceedance to confirm findings;</li> <li>Identify source(s) of impact;</li> <li>Inform IEC, contractor, SOR and EPD;</li> <li>Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>Discuss mitigation measures with IEC, SOR and Contractor;</li> <li>Ensure mitigation measures are implemented;</li> <li>Increase the monitoring frequency to daily until no exceedance of Action level;</li> </ol>	<ol style="list-style-type: none"> <li>Check monitoring data submitted by ET and Contractor's working method;</li> <li>Discuss with ET and Contractor on possible remedial actions;</li> <li>Review the proposed mitigation measures submitted by Contractor and advise the SOR accordingly;</li> <li>Supervise the implementation of mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>Discuss with IEC on the proposed mitigation measures;</li> <li>Ensure mitigation measures are properly implemented;</li> <li>Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>Inform the Supervising Officer and confirm notification of the non-compliance in writing;</li> <li>Rectify unacceptable practice;</li> <li>Check all plant and equipment and consider changes of working methods;</li> <li>Submit proposal of additional mitigation measures to SOR within 3 working days of notification and discuss with ET, IEC and SOR;</li> <li>Implement the agreed mitigation measures.</li> </ol>
Limit level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>Repeat measurement on next day of exceedance to confirm findings;</li> <li>Identify source(s) of impact;</li> </ol>	<ol style="list-style-type: none"> <li>Check monitoring data submitted by ET and Contractor's working method;</li> <li>Discuss with ET and Contractor</li> </ol>	<ol style="list-style-type: none"> <li>Confirm receipt of notification of failure in writing;</li> <li>Discuss with IEC, ET and Contractor on the proposed</li> </ol>	<ol style="list-style-type: none"> <li>Inform the SOR and confirm notification of the non-compliance in writing;</li> <li>Rectify unacceptable practice;</li> </ol>

Event	ET Leader	IEC	SOR	Contractor
	3. Inform IEC, contractor, SOR and EPD;	on possible remedial actions;	mitigation measures;	
	4. Check monitoring data, all plant, equipment and Contractor's working methods;	3. Review the proposed mitigation measures submitted by Contractor and advise the SOR accordingly.	3. Request Contractor to review the working methods.	3. Check all plant and equipment and consider changes of working methods;
	5. Discuss mitigation measures with IEC, SOR and Contractor;			4. Submit proposal of mitigation measures to SOR within 3 working days of notification and discuss with ET, IEC and SOR.
	1. Repeat measurement on next day of exceedance to confirm findings;	1. Check monitoring data submitted by ET and Contractor's working method;	1. Discuss with IEC, ET and Contractor on the proposed mitigation measures;	1. Take immediate action to avoid further exceedance;
Limit level being exceeded by two or more consecutive sampling days	2. Identify source(s) of impact;	2. Discuss with ET and Contractor on possible remedial actions;	2. Request Contractor to critically review the working methods;	2. Submit proposal of mitigation measures to SOR within 3 working days of notification and discuss with ET, IEC and SOR;
	3. Inform IEC, contractor, SOR and EPD;		3. Make agreement on the mitigation measures to be implemented;	3. Implement the agreed mitigation measures;
	4. Check monitoring data, all plant, equipment and Contractor's working methods;	3. Review the Contractor's mitigation measures whenever necessary to assure their effectiveness and advise the SOR accordingly;	4.	4. Resubmit proposals of mitigation measures if problem still not under control;
	5. Discuss mitigation measures with IEC, SOR and Contractor;	4. Supervise the implementation of mitigation measures.	5. Ensure mitigation measures are properly implemented;	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.
	6. Ensure mitigation measures are implemented;		6.	
	7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days;		7. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit level.	

**Appendix J4**      **Implementation of Event-Action Plan for Dolphin Monitoring**

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



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

**Appendix J5**      *Event and Action Plan on Dolphin Acoustic Behaviour*

EVENT	ACTION			
	ET Leader	IEC	SO	Contractor
<u>Action Level</u>				
With the numerical values presented in <i>Table 5.7 of Baseline Monitoring Report</i> , when any of the response variable for dolphin acoustic behaviour recorded in the construction phase monitoring is 20% lower or higher than that recorded in the baseline monitoring (see <i>Table 5.8 of Baseline Monitoring Report</i> ), or when there is a difference of 20% in dolphin acoustic signal detection at nighttime period at Site C1 only, the action level should be triggered	<ol style="list-style-type: none"> <li>1. Repeat statistical data analysis to confirm findings;</li> <li>2. Review all available and relevant data to ascertain if differences are as a result of natural variation or seasonal differences;</li> <li>3. Identify source(s) of impact;</li> <li>4. Inform the IEC, SO and Contractor;</li> <li>5. Check monitoring data;</li> <li>6. Carry out audit to ensure all dolphin protective measures are implemented fully and additional measures be proposed if necessary</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET and Contractor;</li> <li>2. Discuss monitoring with the ET and the Contractor;</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with the IEC the repeat monitoring and any other measures proposed by the ET;</li> <li>2. Make agreement on measures to be implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the SO and confirm notification of the non-compliance in writing;</li> <li>2. Discuss with the ET and the IEC and propose measures to the IEC and the SO;</li> <li>3. Implement the agreed measures.</li> </ol>

EVENT	ACTION			
	ET Leader	IEC	SO	Contractor
<p><u>Limit Level</u></p> <p>With the numerical values presented in <i>Table 5.7 of Baseline Monitoring Report</i>, when any of the response variable for dolphin acoustic behaviour recorded in the construction phase monitoring is 40% lower or higher than that recorded in the baseline monitoring (see <i>Table 5.8 of Baseline Monitoring Report</i>), or when there is a difference of 40% in dolphin acoustic signal detection at nighttime at Site C1 only, the limit level should be triggered</p>	<ol style="list-style-type: none"> <li>1. Repeat statistical data analysis to confirm findings;</li> <li>2. Review all available and relevant data to ascertain if differences are as a result of natural variation or seasonal differences;</li> <li>3. Identify source(s) of impact;</li> <li>4. Inform the IEC, SO and Contractor;</li> <li>5. Check monitoring data;</li> <li>6. Carry out audit to ensure all dolphin protective measures are implemented fully and additional measures be proposed if necessary</li> <li>7. Discuss additional dolphin monitoring and any other potential mitigation measures (eg consider to temporarily stop relevant portion of construction activity) with the IEC and Contractor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET and Contractor;</li> <li>2. Discuss monitoring with the ET and the Contractor;</li> <li>3. Review proposals for additional monitoring and any other measures submitted by the Contractor and advise ER accordingly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with the IEC the repeat monitoring and any other measures proposed by the ET;</li> <li>2. Make agreement on measures to be implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the SO and confirm notification of the non-compliance in writing;</li> <li>2. Discuss with the ET and the IEC and propose measures to the IEC and the SO;</li> <li>3. Implement the agreed measures.</li> </ol>

Abbreviations: ET – Environmental Team, IEC – Independent Environmental Checker, SO – Supervising Office, DEP – Director of Environmental Protection

Appendix K

## Quarterly Summary of Waste Flow Table

Contract No. : HY/2012/07

Tuen Mun Chek Lap Kok Link – Southern Connection Viaduct Section

Monthly Summary Waste Flow Table for 2016 (Year)

Month/Material	Actual Quantities of Inert C&D Materials Generation						Actual Quantities of C&D wastes Generation						Actual Quantities of Recyclables Generation			
	Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed as Public Fills	Imported Fill	Marine Sediment, Cat. L	Marine Sediment, Cat. Mp	Marine Sediment, Cat. Mf	Marine Sediment, Cat. H	Chemical Waste	General Refuse	Metals	Felled trees	Paper/ cardboard packaging	Plastics
Unit	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000Kg)	('000Kg)	('000Kg)	('000Kg)	('000Kg)	('000Kg)
Jan	1.941	0.263	0.606	-	1.334	-	-	-	-	-	-	69.400	-	-	0.105	-
Feb	0.783	0.185	0.092	-	0.692	-	-	-	-	-	-	85.890	-	-	0.112	-
Mar	1.502	0.429	0.537	-	0.965	-	-	-	-	2.000	-	88.360	-	-	-	-
Apr	1.354	0.402	0.789	-	0.565	-	-	-	-	3.000	-	79.580	-	8.640	0.084	-
May	1.057	0.192	0.617	-	0.440	-	-	-	-	3.000	-	75.620	-	-	-	-
Jun	0.499	0.277	0.116	-	0.383	-	-	-	-	-	-	103.270	-	-	0.105	-
<b>SUB-TOTAL</b>	<b>7.136</b>	<b>1.747</b>	<b>2.757</b>	<b>-</b>	<b>4.379</b>	<b>0.000</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>8.000</b>	<b>502.120</b>	<b>-</b>	<b>8.640</b>	<b>0.406</b>	<b>-</b>	<b>-</b>
Jul	0.507	0.211	0.230	-	0.277	-	-	-	-	2.200	-	94.760	-	1.540	0.350	-
Aug	1.294	0.144	0.684	-	0.610	-	-	-	-	-	-	116.990	-	9.790	0.098	-
Sep	2.584	0.155	0.270	-	2.314	-	-	-	-	-	-	130.060	-	-	0.105	-
Oct	2.338	0.180	0.156	-	2.183	-	-	-	-	-	-	141.300	-	-	0.028	-
Nov	3.873	0.328	0.536	-	3.337	-	0.473	-	-	1.567	-	138.270	-	-	0.063	-
Dec	4.129	0.322	0.732	-	3.397	-	0.990	-	-	-	-	130.900	-	-	0.063	-
<b>TOTAL</b>	<b>21.860</b>	<b>3.087</b>	<b>5.364</b>	<b>-</b>	<b>16.496</b>	<b>-</b>	<b>1.463</b>	<b>-</b>	<b>-</b>	<b>11.767</b>	<b>1,254.400</b>	<b>-</b>	<b>19.970</b>	<b>1.113</b>	<b>-</b>	<b>-</b>

Notes :

- 1 - The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.
- 2 - Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material.
- 3 - Broken concrete for recycling into aggregates.
- 4 - Assumed 5 kg per damaged water-filled barrier.
- 5 - Disposed as Public Fills includes Hard Rock and Large Broken Concrete.



Contract No. : HY/2012/07

Tuen Mun Chek Lap Kok Link – Southern Connection Viaduct Section

Monthly Summary Waste Flow Table for 2017 (Year)

Month/Material	Actual Quantities of Inert C&D Materials Generation						Actual Quantities of C&D wastes Generation						Actual Quantities of Recyclables Generation			
	Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed as Public Fills	Imported Fill	Marine Sediment, Cat. L	Marine Sediment, Cat. Mp	Marine Sediment, Cat. Mf	Marine Sediment, Cat. H	Chemical Waste	General Refuse	Metals	Felled trees	Paper/ cardboard packaging	Plastics
Unit	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000m <sup>3</sup> )	('000Kg)	('000Kg)	('000Kg)	('000Kg)	('000Kg)	('000Kg)
Jan	4.591	0.717	0.474	-	4.118	-	-	-	-	-	3.400	99.840	-	-	0.140	-
Feb	5.034	1.585	0.166	-	4.869	-	-	-	-	-	-	127.720	-	-	0.091	-
Mar	-	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Apr	-	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May	-	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jun	-	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>SUB-TOTAL</b>	<b>9.626</b>	<b>2.302</b>	<b>0.639</b>	<b>-</b>	<b>8.987</b>	<b>0.000</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3.400</b>	<b>227.560</b>	<b>-</b>	<b>0.000</b>	<b>0.231</b>	<b>-</b>
Jul	-	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug	-	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sep	-	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oct	-	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nov	-	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dec	-	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>9.626</b>	<b>2.302</b>	<b>0.639</b>	<b>-</b>	<b>8.987</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3.400</b>	<b>227.560</b>	<b>-</b>	<b>-</b>	<b>0.231</b>	<b>-</b>

Notes :

- 1 - The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.
- 2 - Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material.
- 3 - Broken concrete for recycling into aggregates.
- 4 - Assumed 5 kg per damaged water-filled barrier.
- 5 - Disposed as Public Fills includes Hard Rock and Large Broken Concrete.

Appendix L

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

*Appendix L1 Cumulative Statistics on Exceedances*

		Total No. recorded in this quarter	Total No. recorded since project commencement
1-Hr TSP	Action	0	0
	Limit	0	0
24-Hr TSP	Action	0	2
	Limit	0	0
Noise	Action	0	0
	Limit	0	0
Water Quality	Action	0	2
	Limit	0	0
Impact Dolphin Monitoring	Action	0	9
	Limit	1	8

*Appendix L2 Cumulative Statistics on Complaints, Notifications of Summons and Successful Prosecutions*

Reporting Period	Cumulative Statistics		
	Complaints	Notifications of Summons	Successful Prosecutions
This quarter	2	0	0
Total No. received since project commencement	8	0	0



**ENVIRONMENTAL COMPLAINT/ ENQUIRY FORM**

**Complaint/ Enquiry Received\***

Date: 13 December 2016  
Time: Undisclosed  
From: Environmental Protection Department (EPD)  
Via: Email

**Complainant/ Enquirer\*:**

Name: Undisclosed  
Tel: Undisclosed  
Address: Undisclosed  
Media: ~~Dust~~ Noise ~~Water Quality~~ ~~Other~~

Description: On 13 December 2016, a complaint was received by the EPD from Seaview Crescent regarding the hammering noise nuisance generated during midnights over the past month. The complainant believed that the noise source was possibly from construction sites of the Hong Kong Zhuhai Macao Bridge Projects. The Environmental Team (ET) received the complaint notification from the Independent Environmental Checker (IEC) on 14 December 2016.

**Investigation Report & Response**

The Construction Noise Permit (CNP) for night-time works (CNP no. GW-RS1159-16) and night-time working record were reviewed immediately upon receiving the complaint. Night-time works under this Contract in recent months were mainly segment erection works over the MTR tracks, North Lantau Highway and Cheung Tung Road. Under the Noise Control Ordinance, the works area of this Contract is located in non-designated area such that hammering would be allowed with reference to Technical Memorandum on Noise from Construction Work in Designated Areas. According to the Contractor, hammering was involved only occasionally during night-time between 14 November 2016 and 13 December 2016. In addition, works area under this Contract was located far from where the complainant lived i.e. distance between Seaview Crescent and the closest works area at night was approximate 2.7km (refer to the diagram below), therefore it is believed that noise generated at the sites is unlikely to be heard by the complainant.

Besides, the Contractor has been implementing the Restricted Hours Permit-to-Work System to monitor works at night or during holidays. Under the system, works that carried out during restricted hours would be reviewed to ensure works were in compliance with CNP requirement. Additionally, PMEs within the Contract works boundary were operated in accordance with the conditions stipulated in the CNP. Based on the above, the night-time works under this Contract are considered complying with the corresponding requirements stipulated in the CNP granted and the complaint is considered invalid for the Contract.



*Mitigation Measures and Follow-Up Actions Recommended to Contractor*

The Contractor has been reminded to implement all relevant noise mitigation measures recommended or specified in the EIA Report, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to avoid causing noise nuisance to the Public.

The Contractor is also reminded to ensure that the construction plant deployed for the works during restricted hours is in strict compliance with the relevant CNP granted.

Date of File Closed :            16 December 2016  
\_\_\_\_\_

Approved and Filed by:



(Jovy Tam, ET Leader)  
Date: 16 December 2016





**ENVIRONMENTAL COMPLAINT/ ENQUIRY FORM**

<b>Complaint/ <del>Enquiry</del> Received*</b>
Date: 13 January 2017 Time: Undisclosed From: Agriculture, Fisheries and Conservation Department (AFCD) Via: Email
<b>Complainant/ <del>Enquirer</del>*:</b> Name: Undisclosed Tel: Undisclosed Address: Undisclosed Media: <del>Dust</del> <del>Noise</del> <del>Water Quality</del> Other Description: On 12 January 2017, a complaint was made by the AFCD to HyD regarding constructional vessels and silt curtain found within the boundary of Brothers Marine Park (BMP) on 4 and 5 January 2017. Two observations were reported by AFCD, 1) Twenty-two barges/tug boats were observed anchored inside the BMP (see <i>Figure 1</i> ) and 2) A section of silt curtain enclosing the Hong Kong Boundary Crossing Facilities (HKBCF) project site was found inside the BMP or in close vicinity of the boundary of BMP. The Contractor received the complaint notification on 13 January 2017.

***Investigation Report & Response***

<p>Record of constructional vessels and operation records were reviewed immediately upon receiving the complaint. None of the construction vessels in the list provided by AFCD was employed under this Contract. Major marine works under this Contract carried out this month were mainly installation of deck segments and pier head segments, pier construction and launching gantry operations. All Contract related construction vessels were found working inside the project site boundary under this Contract. According to ET's weekly site inspection on 4 January 2017, barges/tug boats were observed located at the south of HKBCF, mainly near Viaduct A and Viaduct D within the project site boundary. None of them were observed operating or anchoring outside the project site boundary under this Contract (<i>Figure 2</i>).</p> <p>In addition, silt curtain enclosing the HKBCF was not deployed under this Contract. Therefore, the observation on silt curtain found inside the BMP or in close vicinity of the boundary of BMP was considered not related to this Contract.</p> <p>Based on the above, it is reasonable to consider that the complaint was not related to the Contract.</p>
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***Mitigation Measures and Follow-Up Actions Recommended to Contractor***

<p>The complaint is considered not related to this Contract and thus no further action is required. The ET will keep checking on the operation of construction vessels.</p>
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Date of File Closed :                      13 January 2017  
\_\_\_\_\_

Approved and Filed by:

(Jovy Tam, ET Leader)  
Date: 13 January 2017

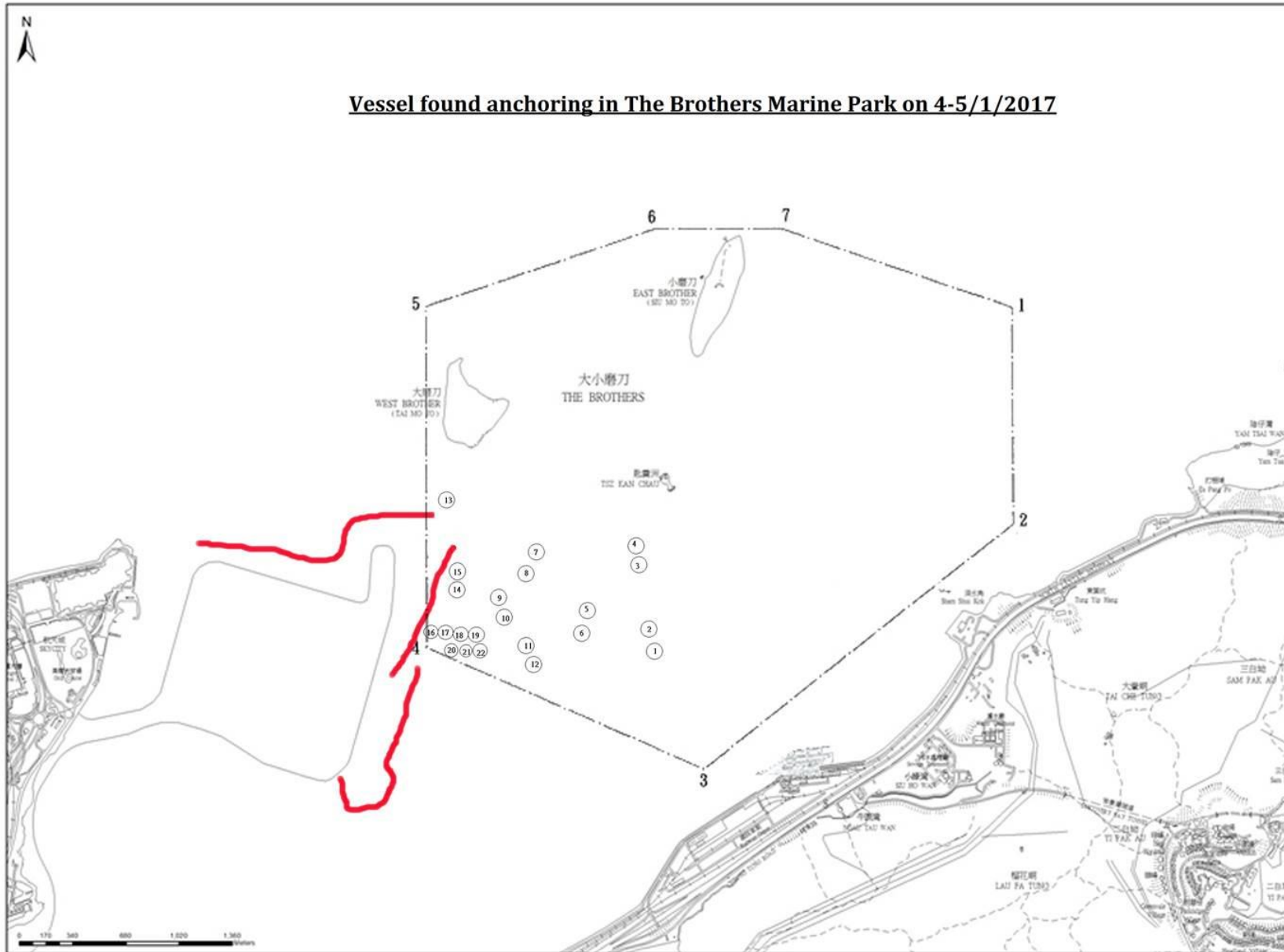


Figure 1 – Observed barges/tug boats inside Brothers Marine Park on 4-5/1/2017

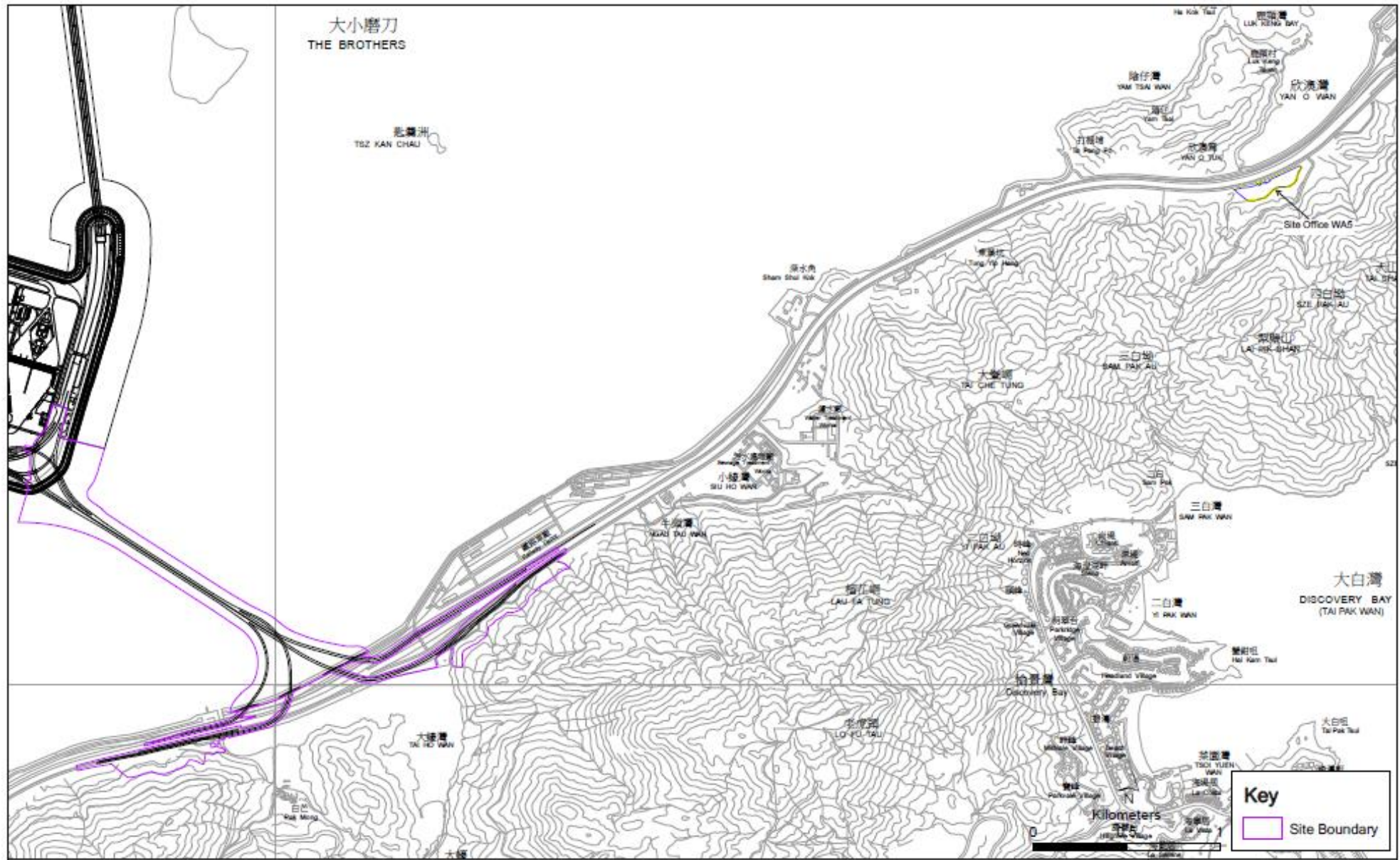


Figure 2 – Project site boundary under this Contract

Email  
message

Environmental  
Resources  
Management

**To** Ramboll Environ - Hong Kong, Limited (ENPO)

**From** ERM- Hong Kong, Limited

**Ref/Project number** Contract No. HY/2012/07 Tuen Mun–Chek Lap  
Kok Link–Southern Connection Viaduct Section

**Subject** Notification of Exceedance for Impact Dolphin  
Monitoring

**Date** 26 October 2017

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



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Dear Sir or Madam,

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

0215660\_Dec2016/Feb2017\_dolphin\_STG&ANI\_NEL&NWL

A total of one limit level exceedance was recorded in the quarterly impact  
dolphin monitoring data between December 2016 and February 2017.

Regards,

A handwritten signature in black ink, appearing to read 'Jovy Tam', is positioned above the printed name.

Mr Jovy Tam  
Environmental Team Leader

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ERM-Hong Kong, Limited

CONTRACT NO. HY/2012/07

TUEN MUN – CHEK LAP KOK LINK –  
SOUTHERN CONNECTION VIADUCT SECTION

Impact Dolphin Monitoring  
Notification of Exceedance

Log No.	0215660_Dec2016/Feb2017_dolphin_STG&ANI_NEL&NWL [Total No. of Exceedance = 1]	
Date	December 2016 to February 2017 (monitored) 05 June 2017 (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 = 3.80 & ANI = 14.52
	One Limit Level Exceedance was recorded in the quarterly impact dolphin monitoring at NEL and NWL between December 2016 and February 2017. The exceedance was reported in the approved <i>Fortieth Monthly EM&amp;A Report</i> dated 8 March 2017.	
Statistical Analyses	<p>Further to the review of the available and relevant dolphin monitoring data in the EM&amp;A under this Contract, statistical analyses were conducted as follows:</p> <ul style="list-style-type: none"> <li>A two-way ANOVA with repeated measures and unequal sample size was conducted using Period (2 levels: baseline vs impact – present impact quarter, December 2016 to February 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 present impact monitoring quarter. By setting <math>\alpha = 0.05</math> as the significance level in the statistical tests, significant differences in STG (<math>p = 0.0110</math>) and ANI (<math>p = 0.0440</math>) were detected between Periods.</li> <li>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 February 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 <math>\alpha = 0.00005</math> as the significance level in the statistical tests, significant difference in STG (<math>p = 0.000003</math>) and in ANI (<math>p = 0.000001</math>) between Cumulative Period and Location were detected.</li> </ul> <p>* Note: The commencement date under <i>Contract No. HY/2012/07</i> is 31 October 2013.</p>	
Works Undertaken (in the monitoring quarter)	<p>In the quarter between December 2016 and February 2017, the major marine works under <i>Contract No. HY/2012/07</i> included:</p> <ul style="list-style-type: none"> <li>Uninstallation of marine piling platform;</li> <li>Pier construction;</li> <li>Launching gantry operation; and</li> <li>Installation of deck segment and pier head segment.</li> </ul>	



<p><b>Possible Reason for Action or Limit Level Exceedance(s)</b></p>	<p>The potential factors that may have contributed to the observed exceedance are reviewed below:</p> <ul style="list-style-type: none"> <li>• Blocking of CWD travelling corridor: The <i>Monitoring of Marine Mammals in Hong Kong Waters (2015 – 16)</i> <sup>(1)</sup> 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.</li> <li>• Marine works of the Contract: As per the findings from the EIA report (<i>Section 8.11.9</i>), the major influences on the Chinese White Dolphin (CWD) <i>Sousa chinensis</i> under this Contract are marine traffics and bored piling works. The <i>Monitoring of Marine Mammals in Hong Kong Waters (2015-2016)</i> also reported that CWD decline were likely influenced by reclamation works, bored piling and intensive marine traffic from construction activities. Based on these possible reasons, the corresponding marine works and implementation of mitigation measures are reviewed. This Contract does not have any reclamation works, thus no habitat loss was caused by reclamation. In the reporting period, the Contractor implemented the marine traffic control as per the requirements in the <i>EP-354/2009/D</i> and the updated <i>EM&amp;A Manual</i>. 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. All of the marine bored piling works of this Contract was completed in September 2015. Thus, underwater noise emission from this Contract had been substantially reduced in this reporting period when comparing to the previous quarters. During dolphin monitoring in this quarter, no unacceptable impact on CWD due to the activities under this Contract was observed.</li> <li>• Impact on water quality: According to the findings in the water quality monitoring results at the impact monitoring stations between December 2016 and February 2017, there was no exceedance on WQM. Impact mean levels of depth-averaged SS at all sampling stations during both mid-ebb and mid-flood tides were well below the corresponding ambient levels. The WQM results imply that no unacceptable impact on water quality was associated with the marine works under this Contract, and thus no indirect impacts on marine habitat quality due to change in water quality is observed in this Contract.</li> </ul> <p>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.</p>
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(1) Hung SKY (2016). Prepared for AFCD. Available at: [https://www.afcd.gov.hk/english/conservation/con\\_mar/con\\_mar\\_chi/con\\_mar\\_chi\\_chi/files/Final\\_Report\\_2015\\_16.pdf](https://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/files/Final_Report_2015_16.pdf)

<p><b>Actions Taken/ To Be Taken</b></p>	<p>With reference to the site inspection records in this quarter, the respective marine ecological mitigation measures have been implemented properly by the Contractor throughout the marine works period, including:</p> <ol style="list-style-type: none"> <li>1. 250m dolphin exclusion zone;</li> <li>2. Acoustic decoupling plan;</li> <li>3. Training to workers;</li> <li>4. Offsite vessel routing control in accordance with Regular Marine Travel Routes Plan, including routing control within existing and proposed marine park boundaries;</li> <li>5. Vessels speed limited at 5 knots and 10 knots within existing and proposed marine park boundaries and site boundary respectively;</li> <li>6. Idling and mooring of working vessels within site boundary;</li> </ol> <p>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).</p> <p>A joint team meeting was held on 29 May 2017 for discussion on CWD trend, with attendance of ENPO, HyD, Representatives of Resident Site Staff (RSS), Representatives of Environmental Team (ET) for Contract No. HY/2010/02, HY2011/03, 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 contractor to ensure the relevant measures are fully implemented. The ETs were also reminded to update the BMP boundary in the Regular Marine Travel Route Plan. The participants were requested by ENPO to collect and report the marine traffic statistics. 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 Brothers Marine Park (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 / transshipment 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. The ETs were also reminded that starting from January 2016, high-speed ferry (HSF) from the SkyPier would be re-routed north to the northern edge of the Sha Chau and Lung Kwu Chau Marine Park that had the highest density of CWD in the NWL. While the HSF would reduce speed to 15 knots, the associated disturbance might still affect CWD in the area. It implied that the CWDs in the area should be closely followed.</p>
<p><b>Remarks</b></p>	<p>The results of impact water quality and impact dolphin monitoring, the status of implemented marine ecological mitigation measures are documented in the approved <i>Thirty-Eighth to Fortieth Monthly EM&amp;A Reports</i>. Comparison on water quality between impact and baseline periods is elaborated in the <i>13<sup>th</sup> Quarterly EM&amp;A Report</i>.</p>