

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

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

04 August 2014

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

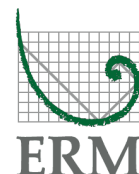
## Environmental Resources Management

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### Second Quarterly Environmental Monitoring & Audit (EM&A) Report

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Client:  Gammon		Project No:  0215660			
Summary:  This document presents the Second Quarterly EM&A Report for Tuen Mun – Chek Lap Kok Link Southern Connection Viaduct Section.		Date: 04 August 2014			
		Approved by:  			
		Mr Craig Reid Partner			
		Certified by:  			
		Mr Jovy Tam ET Leader			
	2 <sup>nd</sup> Quarterly EM&A Report	MM	JT	CAR	04/08/14
Revision	Description	By	Checked	Approved	Date
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.  We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.		Distribution		 <input type="checkbox"/> Internal <input checked="" type="checkbox"/> Public <input type="checkbox"/> Confidential 	





Ref.: HYDHZMBEEM00\_0\_2121L.14

12 August 2014

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

By Fax (3691 2899) and By Post

Attention: Mr. Daniel Ip

Dear Sir,

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

**Contract No. HY/2012/07 TM-CLKL Southern Connection Viaduct Section  
Quarterly EM&A Report for March 2014 to May 2014 (EP-354/2009/B)**

Reference is made to the Quarterly Environmental Monitoring and Audit (EM&A) Report (for March 2014 to May 2014) certified by the ET Leader (ET's ref.: "0215660\_2nd Quarterly EM&A\_20140804.doc" dated 4 August 2014) and provided to us via email on 6 August 2014.

We are pleased to inform you that we have no adverse comments on the captioned quarterly EM&A Report.

Thank you for your kind 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. Matthew Fung (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: 2750 0922)

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). 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*. Another application for variation of environmental permit (VEP) (*EP-354/2009/B*) was granted on 28 January 2014.

The construction phase of the Contract commenced on 31 October 2013 and will be tentatively be 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 second quarterly EM&A report presenting the EM&A works carried out during the period from 1 March 2014 to 31 May 2014 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:

### March 2014

#### ***Marine-based Works***

- Marine piling platform installation;
- Marine Piling at Viaduct B;
- Construction of rockfill platform at Viaduct D landing; and
- Additional marine ground investigation (GI) and laboratory testing.

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

- Satellite container offices erection along seawall;
- Fence installation and relocation of Area 2, Viaduct A, B, C & D;
- Land Piling at Viaduct B;
- Piling platform installation for Viaducts B, D & E; and
- Additional land ground investigation (GI), trial pits & laboratory testing;
- Utility surveys; and
- Slope work of 9SE-B/C8 and 9SE-B/C9

### April 2014

#### ***Marine Works***

- Marine piling platform installation;

- Marine piling at Viaducts B & E;
- Construction of rockfill platform at Viaduct D landing and
- Additional marine ground investigation (GI) and laboratory testing

***Land-based Works***

- Satellite container offices erection along seawall (i.e. CEDD Access Road);
- Fence installation and relocation of Works Area 2, Viaducts A, B, C & D;
- Land Piling at Viaduct B;
- Piling platform installation for Viaducts B, D & E;
- Additional land GI, trial pits & lab testing;
- Utility surveys and
- Slope work of 9SE-B/ C8 and 9SE-B/C9

May 2014

***Marine-based Works***

- Marine piling platform installation;
- Marine piling at Viaducts B & E;
- Construction of rockfill platform at Viaduct D landing and
- Additional marine ground investigation (GI) and laboratory testing

***Land-based Works***

- Satellite container offices erection along seawall (i.e. CEDD Access Road);
- Fence installation and relocation of Area 2, Viaducts A, B, C & D;
- Land Piling at Viaduct B;
- Piling platform installation for Viaducts B, D & E;
- Additional land GI, trial pits & lab testing;
- Utility surveys; and
- Slope work of 9SE-B/C8 and 9SE-B/C9

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

24-hour TSP monitoring	16 sessions
1-hour TSP monitoring	16 sessions
Noise monitoring	16 sessions
Water quality monitoring	40 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 construction noise 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 impact water quality monitoring in the reporting period.

### **Impact Dolphin Monitoring**

Whilst two Action Level exceedances were observed for the quarterly dolphin monitoring data between March 2014 and May 2014, no unacceptable impact from the construction activities of the TM-CLKL Southern Connection Viaduct Section on Chinese White Dolphins was noticeable from general observations during the dolphin monitoring in this reporting quarter. The exceedance is considered to be the natural variation of Chinese White Dolphin ranging pattern upon further investigation.

Daily marine mammal exclusion zone monitoring was undertaken. No sighting of the Indo-Pacific humpback dolphin *Sousa chinensis* (i.e. Chinese White Dolphin) was recorded in the reporting period during the exclusion zone monitoring.

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

No notification of summons and successful prosecution was received in the reporting period.

### **Reporting Change**

There was no reporting change required in the reporting period.

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

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

#### June 2014

##### *Marine Works*

- Marine piling platform installation;
- Marine Piling at Viaduct B & E;
- Construction of rockfill platform at Viaduct D landing and
- Additional marine ground investigation (GI) and laboratory.

##### *Land-based Works*

- Construction of pile cap superstructure of Viaduct B;
- Fence installation and relocation of Works Area 2, Viaduct A, B, C & D;
- Land Piling at Viaduct B;
- Piling platform installation for Viaduct B, D and E;
- Additional land GI, trial pits & lab testing;

- Utility surveys and
- Slope work of Slope 9SE-B/C8, 9SE-B/C9 & 9SE-B/F9.

#### July 2014

##### *Marine Works*

- Construction of Pile caps at Viaduct B;
- Marine piling platform installation;
- Marine Piling at Viaduct B & E;
- Construction of rockfill platform at Viaduct D landing and
- Additional marine ground investigation (GI) and laboratory testing.

##### *Land-based Works*

- Construction of pile cap superstructure of Viaduct B;
- Fence installation and relocation of Works Area 2, Viaduct A, B, C & D;
- Land Piling at Viaduct B;
- Piling platform installation for Viaduct B, C, D and E;
- Additional land GI, trial pits & lab testing;
- Utility surveys and
- Slope work of Slope 9SE-B/C8, 9SE-B/C9 & 9SE-B/F9.

#### August 2014

##### *Marine Works*

- Construction of Pile caps at Viaduct B;
- Marine piling platform installation;
- Marine Piling at Viaduct B, D & E;
- Construction of rockfill platform at Viaduct D landing and
- Additional marine ground investigation (GI) and laboratory testing

##### *Land-based Works*

- Construction of pile cap superstructure of Viaduct B;
- Fence installation and relocation of Works Area 2, Viaduct A, B, C & D;
- Land Piling at Viaduct B;
- Piling platform installation for Viaduct B, C, D and E;
- Additional land GI, trial pits & lab testing;
- Utility surveys and
- Slope work of Slope 9SE-B/C8, 9SE-B/C9 & 9SE-B/F9

#### **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-145/2009), 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. Another application for variation of environmental permit (VEP) (EP-354/2009/B) was granted on 28 January 2014.

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). 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 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.

## 1.2 SCOPE OF REPORT

This is the Second 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 March 2014 to 31 May 2014.

## 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 2950	3691 2899
ENPO / IEC (ENVIRON Hong Kong Ltd.)	ENPO Leader	Y.H. Hui	3465 2888	3465 2899
	IEC	Dr. F.C. Tsang	3465 2828	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

## 1.4 SUMMARY OF CONSTRUCTION WORKS

The construction phase of the Contract commenced on 31 October 2013. The rolling construction programme for the period of March to May 2014 is shown in *Appendix B*.

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

### March 2014

#### *Marine-based Works*

- Marine piling platform installation;
- Marine Piling at Viaduct B;
- Construction of rockfill platform at Viaduct D landing; and
- Additional marine ground investigation (GI) and laboratory testing.

### *Land-based Works*

- Satellite container offices erection along seawall;
- Fence installation and relocation of Area 2, Viaduct A, B, C & D;
- Land Piling at Viaduct B;
- Piling platform installation for Viaducts B, D & E; and
- Additional land ground investigation (GI), trial pits & laboratory testing;
- Utility surveys; and
- Slope work of 9SE-B/C8 and 9SE-B/C9

### April 2014

#### *Marine Works*

- Marine piling platform installation;
- Marine piling at Viaducts B & E;
- Construction of rockfill platform at Viaduct D landing and
- Additional marine ground investigation (GI) and laboratory testing

#### *Land-based Works*

- Satellite container offices erection along seawall (i.e. CEDD Access Road);
- Fence installation and relocation of Works Area 2, Viaducts A, B, C & D;
- Land Piling at Viaduct B;
- Piling platform installation for Viaducts B, D & E;
- Additional land GI, trial pits & lab testing;
- Utility surveys and
- Slope work of 9SE-B/ C8 and 9SE-B/C9

### May 2014

#### *Marine-based Works*

- Marine piling platform installation;
- Marine piling at Viaducts B & E;
- Construction of rockfill platform at Viaduct D landing; and
- Additional marine ground investigation (GI) and laboratory testing

#### *Land-based Works*

- Satellite container offices erection along seawall (i.e. CEDD Access Road);
- Fence installation and relocation of Area 2, Viaducts A, B, C & D;
- Land Piling at Viaduct B;
- Piling platform installation for Viaducts B, D & E;
- Additional land GI, trial pits & lab testing;
- Utility surveys; and
- Slope work of 9SE-B/C8 and 9SE-B/C9.



The general layout plan of the site showing the detailed works areas is shown in *Figures 1.1 to 1.12*. The Environmental Sensitive Receivers in the vicinity of the Project are shown in *Figure 1.13*.

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

**Table 1.2** *Summary of Construction Activities Undertaken during the Reporting Period*

<b>Construction Activities Undertaken</b>
<i>Marine-based Works</i>
<ul style="list-style-type: none"> <li>• Marine piling platform installation;</li> <li>• Marine piling at Viaducts B &amp; E;</li> <li>• Construction of rockfill platform at Viaduct D landing; and</li> <li>• Additional marine ground investigation (GI) and laboratory testing.</li> </ul>
<i>Land-based Works</i>
<ul style="list-style-type: none"> <li>• Satellite container offices erection along seawall (i.e. CEDD Access Road);</li> <li>• Fence installation and relocation of Area 2, Viaducts A, B, C &amp; D;</li> <li>• Land Piling at Viaduct B</li> <li>• Piling platform installation for Viaducts B, D &amp; E</li> <li>• Additional land ground investigation (GI), trial pits &amp; laboratory testing;</li> <li>• Utility surveys; and</li> <li>• Slope work of 9SE-B/C8 and 9SE-B/C9</li> </ul>

## 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 Project EIA reports; and
- Environmental requirement in contract documents.

Key

Site Boundary

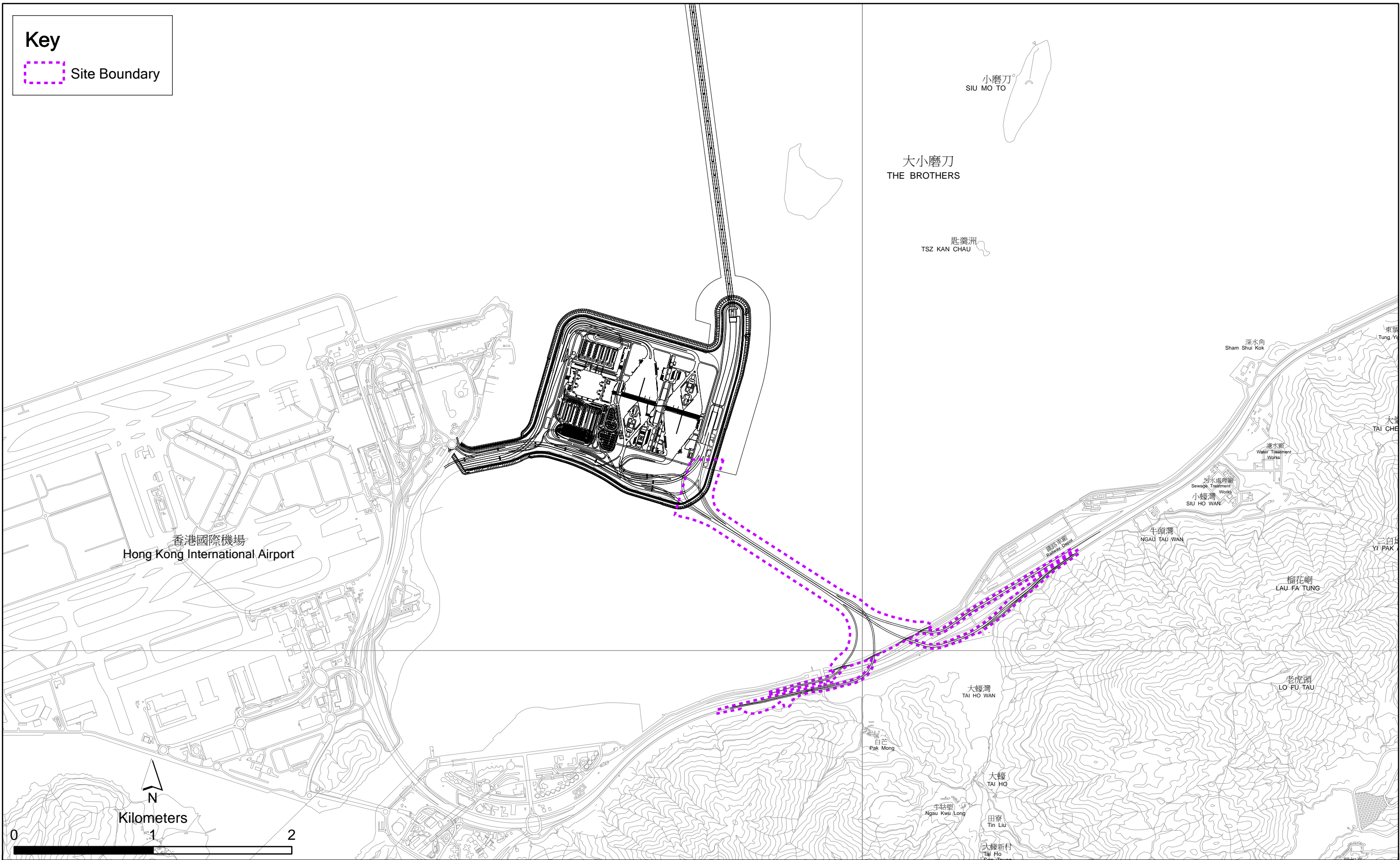
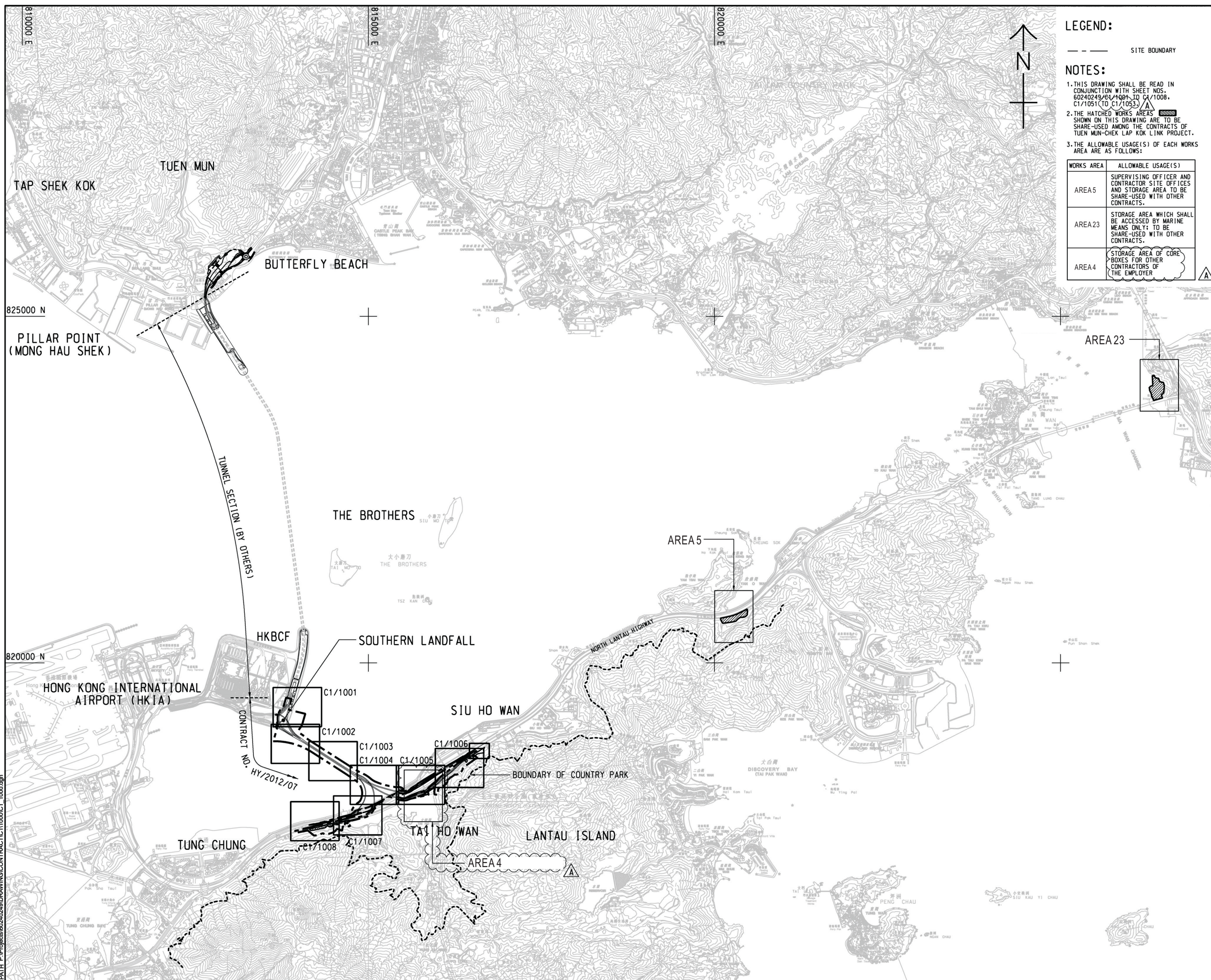


Figure 1.1

General Layout Plan of the Project



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**LEGEND:**

--- SITE BOUNDARY

**NOTES:**

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH SHEET NOS. 60240249/61/1001 TO C1/1008, C1/1051 (TO C1/1053).
2. THE HATCHED WORKS AREAS SHOWN ON THIS DRAWING ARE TO BE SHARE-USED AMONG THE CONTRACTS OF TUEN MUN-CHEK LAP KOK LINK PROJECT.
3. THE ALLOWABLE USAGE(S) OF EACH WORKS AREA ARE AS FOLLOWS:

WORKS AREA	ALLOWABLE USAGE(S)
AREA 5	SUPERVISING OFFICER AND CONTRACTOR SITE OFFICES AND STORAGE AREA TO BE SHARE-USED WITH OTHER CONTRACTS.
AREA 23	STORAGE AREA WHICH SHALL BE ACCESSED BY MARINE MEANS ONLY; TO BE SHARE-USED WITH OTHER CONTRACTS.
AREA 4	STORAGE AREA OF CORE BOXES FOR OTHER CONTRACTORS OF THE EMPLOYER



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

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

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

**CONSULTANT**  
 工程顧問公司  
 AECOM Asia Company Ltd.  
 www.aecom.com

**SUB-CONSULTANTS**  
 分判工程顧問公司

**Fig1.2**

**ISSUE/REVISION**

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**KEY PLAN**

**PROJECT NO.**  
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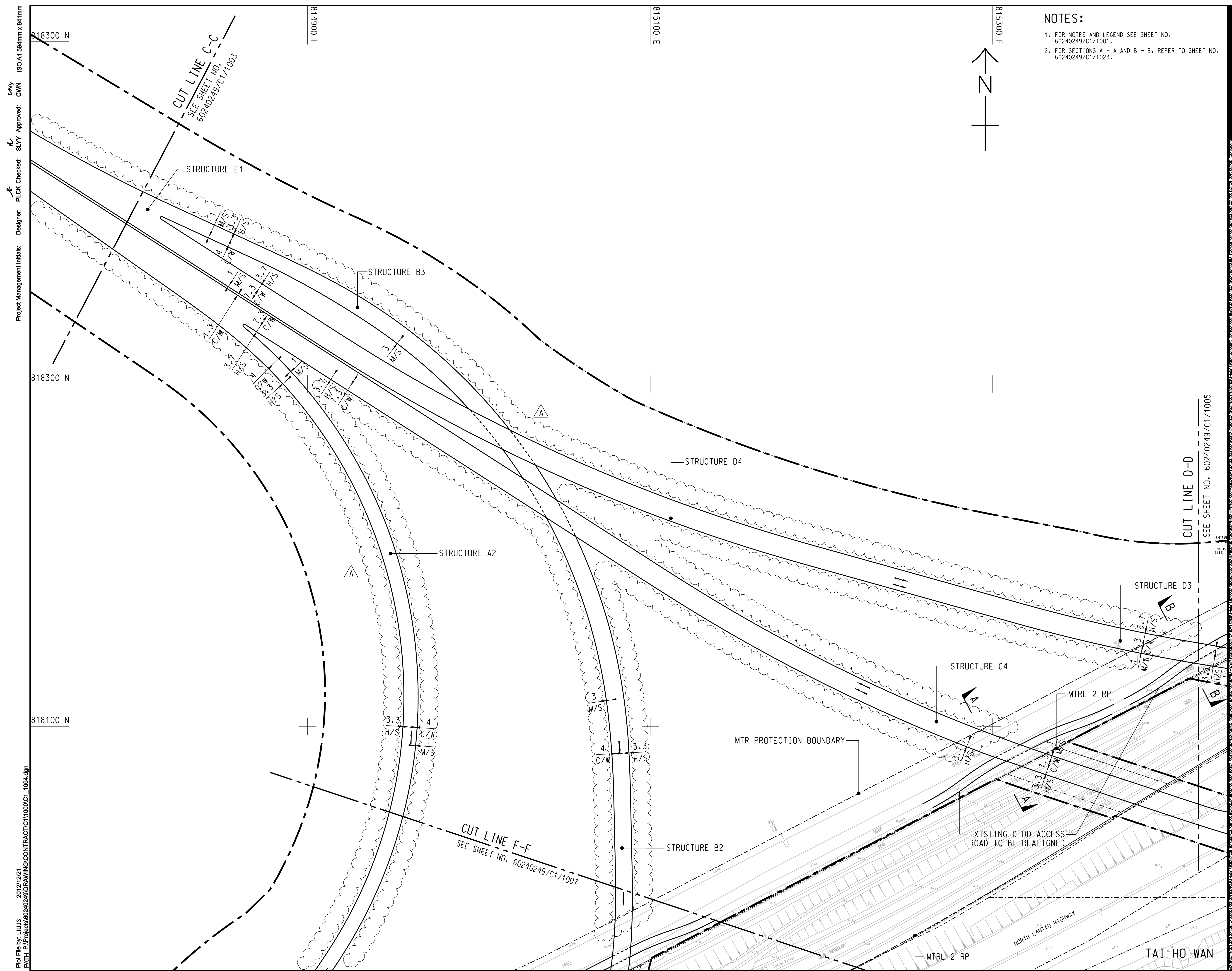
**CONTRACT NO.**  
 合約編號  
 HY/2012/07

**SHEET TITLE**  
 圖紙名稱  
 LOCATION PLAN AND KEY PLAN

**SHEET NUMBER**  
 圖紙編號  
 60240249/C1/1000A

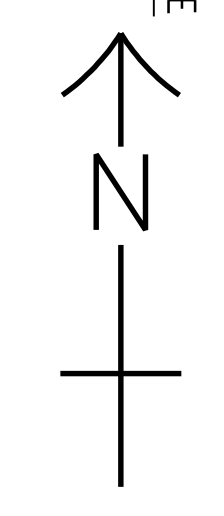
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**NOTES:**

- FOR NOTES AND LEGEND SEE SHEET NO. 60240249/C1/1001.
- FOR SECTIONS A - A AND B - B, REFER TO SHEET NO. 60240249/C1/1023.



**AECOM**

**PROJECT**  
項目

**TUEN MUN - CHEK LAP KOK LINK**

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

**CLIENT**  
業主

路政署  
**HIGHWAYS DEPARTMENT**  
港務大樓香港工程管理局  
Hong Kong - Zhuhai - Macao Bridge  
Hong Kong Project Management Office

**CONSULTANT**  
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Fig1.3

**ISSUE/REVISION**  
修訂

I/R	DATE	DESCRIPTION	CHK.
A	DEC. 12	TENDER ADDENDUM NO.4	CW/CW
-	OCT. 12	TENDER DRAWING	CW/CW

**STATUS**  
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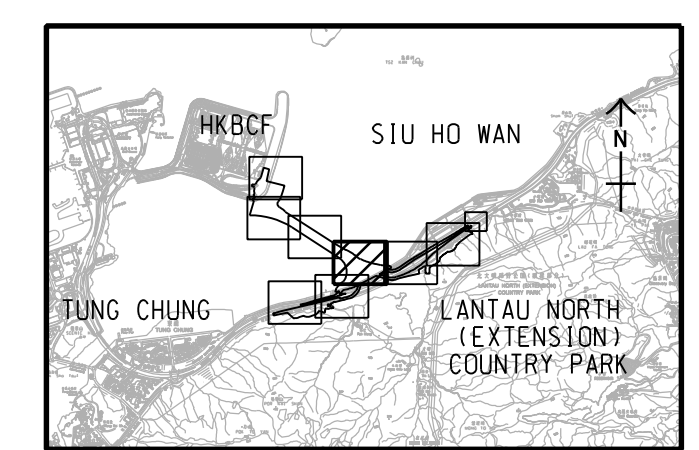
**SCALE**  
比例

A1 1:1000

**DIMENSION UNIT**  
尺寸單位

METRES

**KEY PLAN** 1:100000  
索引圖



**PROJECT NO.**  
項目編號

60240249

**CONTRACT NO.**  
合約編號

HY/2012/07

**SHEET TITLE**  
圖紙名稱

**GENERAL LAYOUT**

**SHEET NUMBER**  
圖紙編號

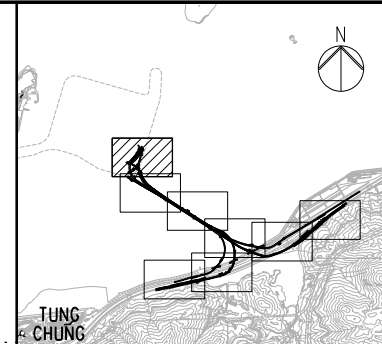
60240249/C1/1004A

SHEET 4 OF 8

Project Management Initials: Designer: PLCK Checked: SLYY Approved: CWN ISO A1 594mm x 841mm  
 2012/12/21  
 P:\Projects\60240249\DRAWING\CONTRACT\C1\1004.dgn

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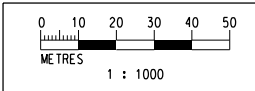


**KEY PLAN**

**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

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



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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管理局  
 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**

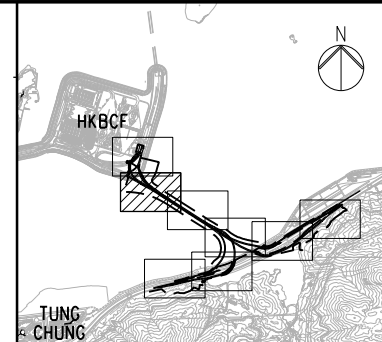
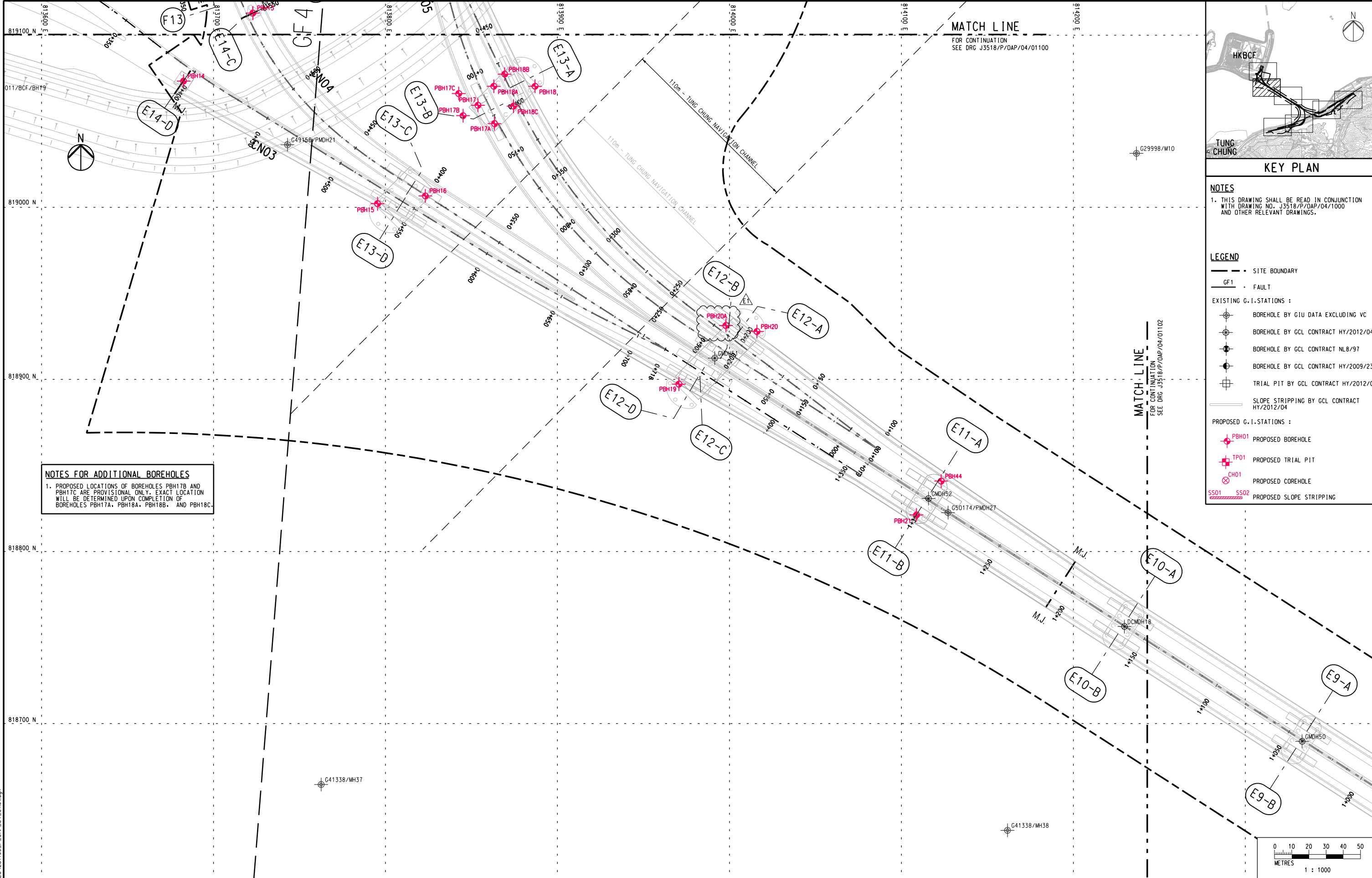
Originator  
**Gammon**

Drawing title  
**PROPOSED GROUND INVESTIGATION PLAN**  
**(1)**  
**Fig 1.4**

Drawing no. **J3518/P/OAP/04/01100** Rev. **C**



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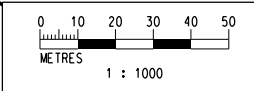
**KEY PLAN**

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

**LEGEND**

	SITE BOUNDARY
	FAULT
<b>EXISTING G.I. STATIONS :</b>	
	BOREHOLE BY GIU DATA EXCLUDING VC
	BOREHOLE BY GCL CONTRACT HY/2012/04
	BOREHOLE BY GCL CONTRACT NLB/97
	BOREHOLE BY GCL CONTRACT HY/2009/23
	TRIAL PIT BY GCL CONTRACT HY/2012/04
<b>PROPOSED G.I. STATIONS :</b>	
	PROPOSED BOREHOLE
	PROPOSED TRIAL PIT
	PROPOSED COREHOLE
	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.

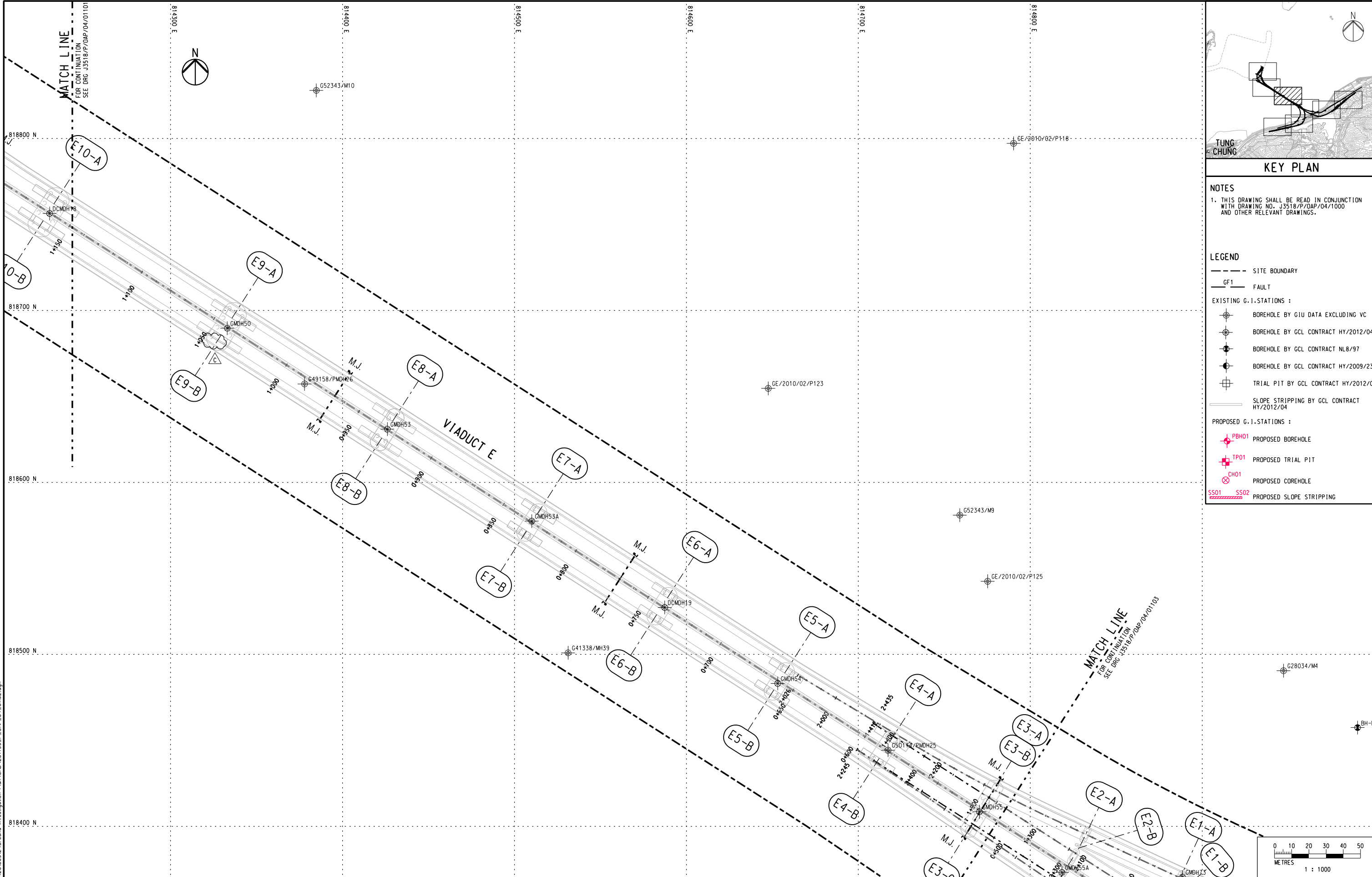


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B	SUBMISSION	RC	07/13					Checked	Approved
C	SUBMISSION	RC	09/13					DS	DOP
D	SUBMISSION	RC	10/13					Scale	1:1000 @ A1 / 1:2000 @ A3
E1	FOR INTERNAL REVIEW	RC	11/13						

<p>Client</p> <p><b>HIGHWAYS DEPARTMENT</b>                  路政署                  港珠澳大橋香港工程管理局                  Hong Kong - Zhuhai - Macao Bridge                  Hong Kong Project Management Office</p>	<p>Project Title</p> <p><b>Contract No. HY/2012/07</b>                  Tuen Mun - Chek Lap Kok Link                  Southern Connection Viaduct Section</p>	<p>Drawing title</p> <p><b>PROPOSED GROUND INVESTIGATION PLAN (2)</b>                  Fig 1.5</p>
<p>Drawing no. <b>J3518/P/OAP/04/01101</b></p>		<p>Rev. <b>E1</b></p>

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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 NLB/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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 Filename : J:\231499\RECORD\20130912 Ground Investigation Plan\CAO\231499\_P\_OAP\_04\_01102.dgn

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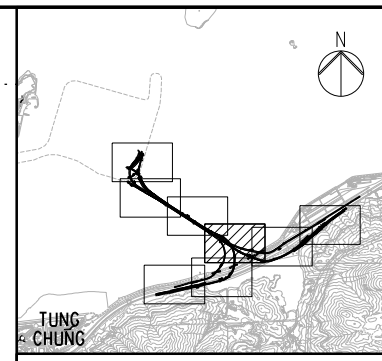
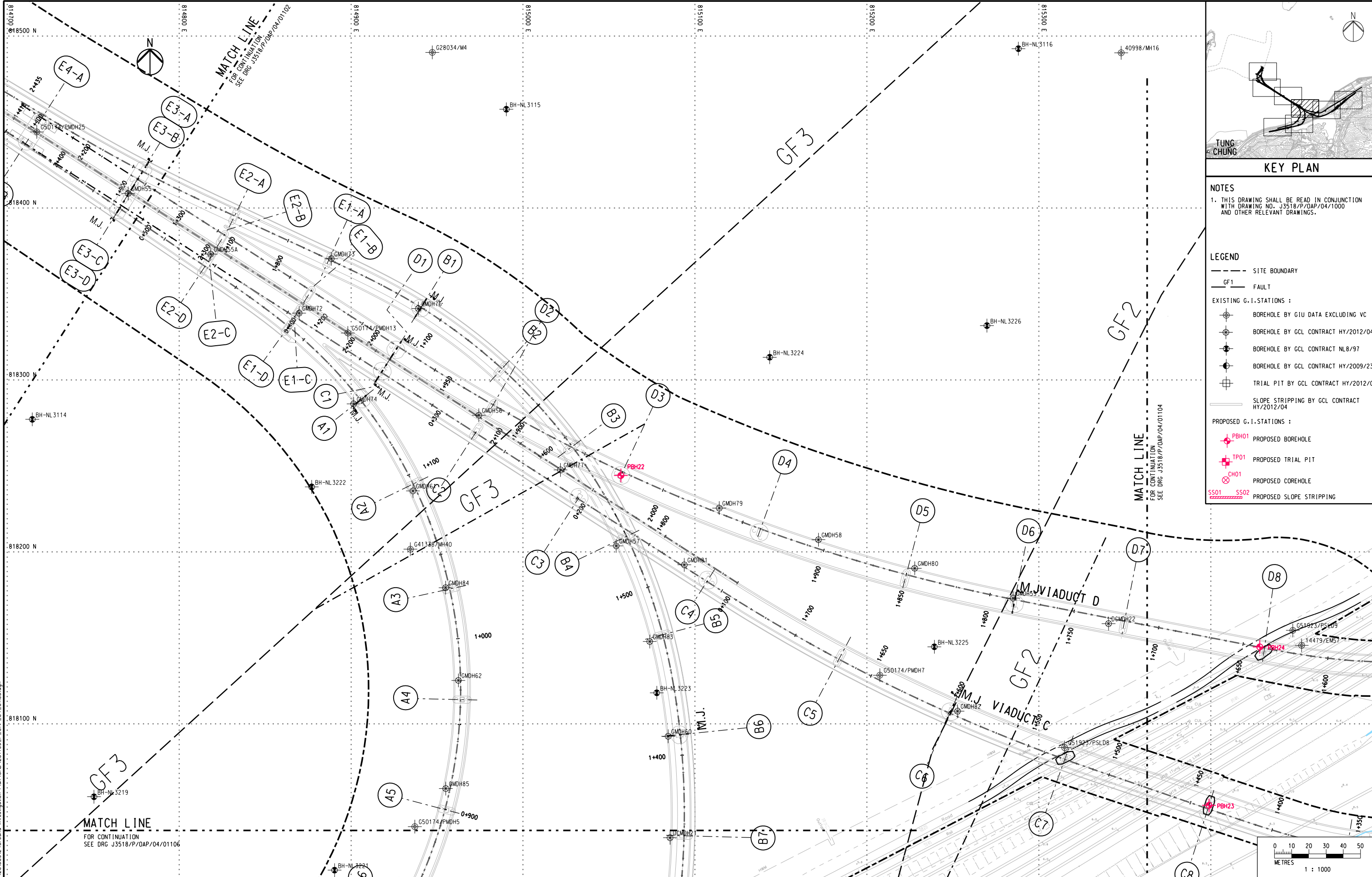
  

Drawn	RL	Date	07/13
Checked	DS	Approved	DOP
Scale	1:1000 @ A1 / 1:2000 @ A3		

Client <b>路政署</b> <b>HIGHWAYS DEPARTMENT</b> 港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office	Project Title <b>Contract No. HY/2012/07</b> <b>Tuen Mun - Chek Lap Kok Link</b> <b>Southern Connection Viaduct Section</b>	Drawing title <b>PROPOSED GROUND INVESTIGATION PLAN</b> <b>(3)</b> <b>Fig 1.6</b>
		Drawing no. <b>J3518/P/OAP/04/01102</b> Rev. <b>C</b>
Supervising Officer 	Contractor 	Originator 



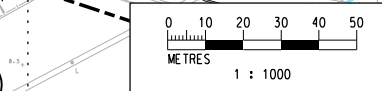
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**KEY PLAN**

**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



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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				

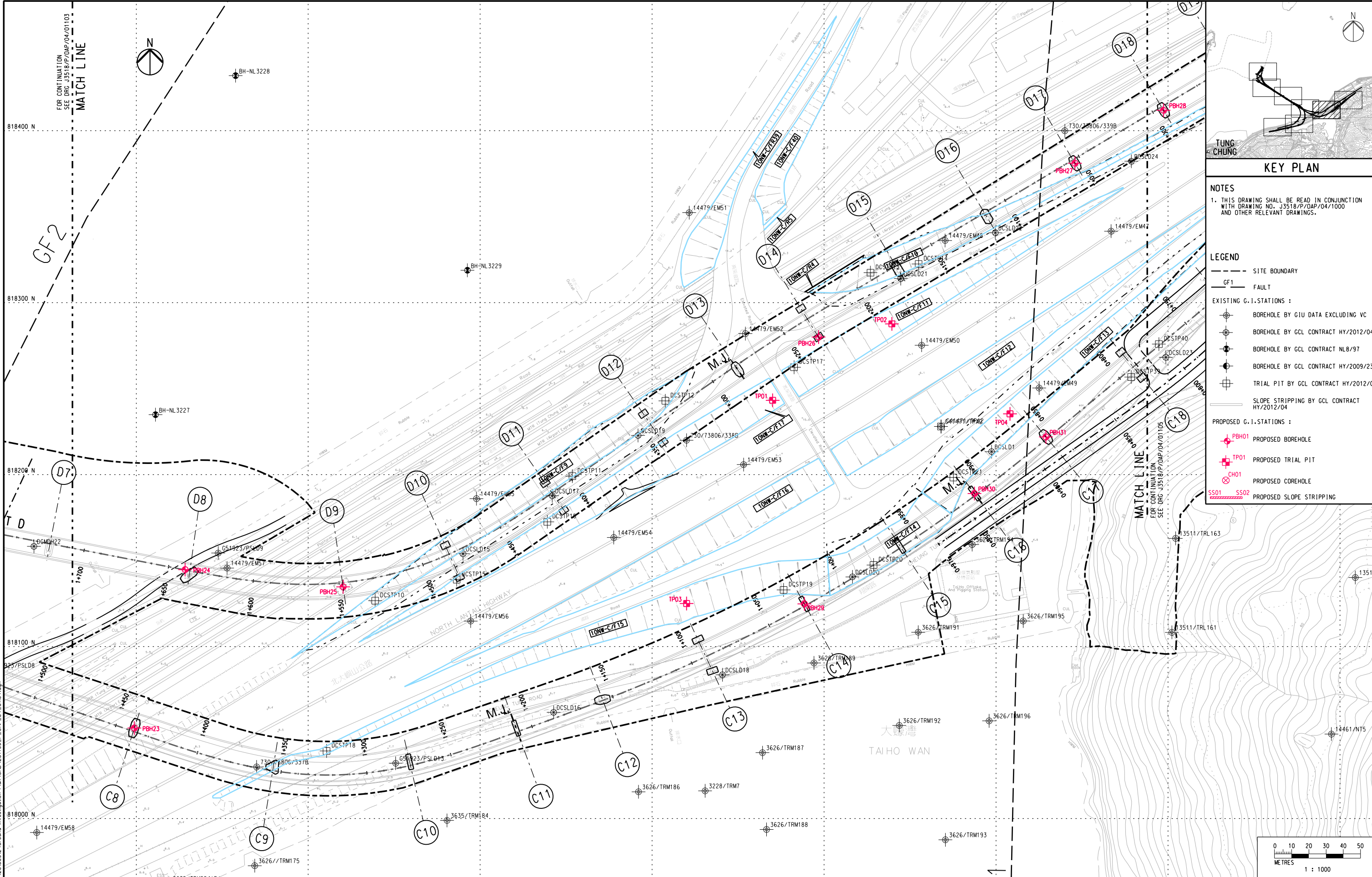
  

Drawn	Date	Client
RL	07/13	路政署 HIGHWAYS DEPARTMENT
Checked	Date	Project Title
DS	Approved	Contract No. HY/2012/07 Tuen Mun - Chek Lap Kok Link Southern Connection Viaduct Section
Scale	1:1000 @ A1 / 1:2000 @ A3	Supervising Officer

			Drawing title <b>PROPOSED GROUND INVESTIGATION PLAN (4)</b> <b>Fig 1.7</b>
			Drawing no. <b>J3518/P/OAP/04/01103</b> Rev. <b>C</b>



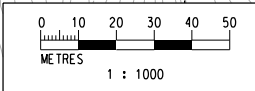
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**KEY PLAN**

**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



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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管理局  
 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  
**PROPOSED GROUND INVESTIGATION PLAN**  
**(5)**  
**Fig 1.8**  
 Drawing no. **J3518/P/OAP/04/01104** Rev. **C**

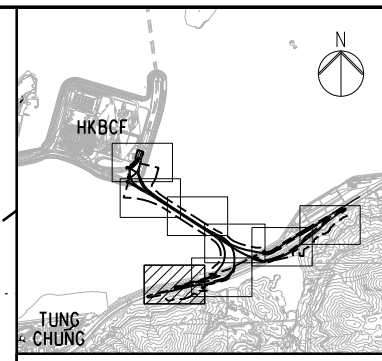
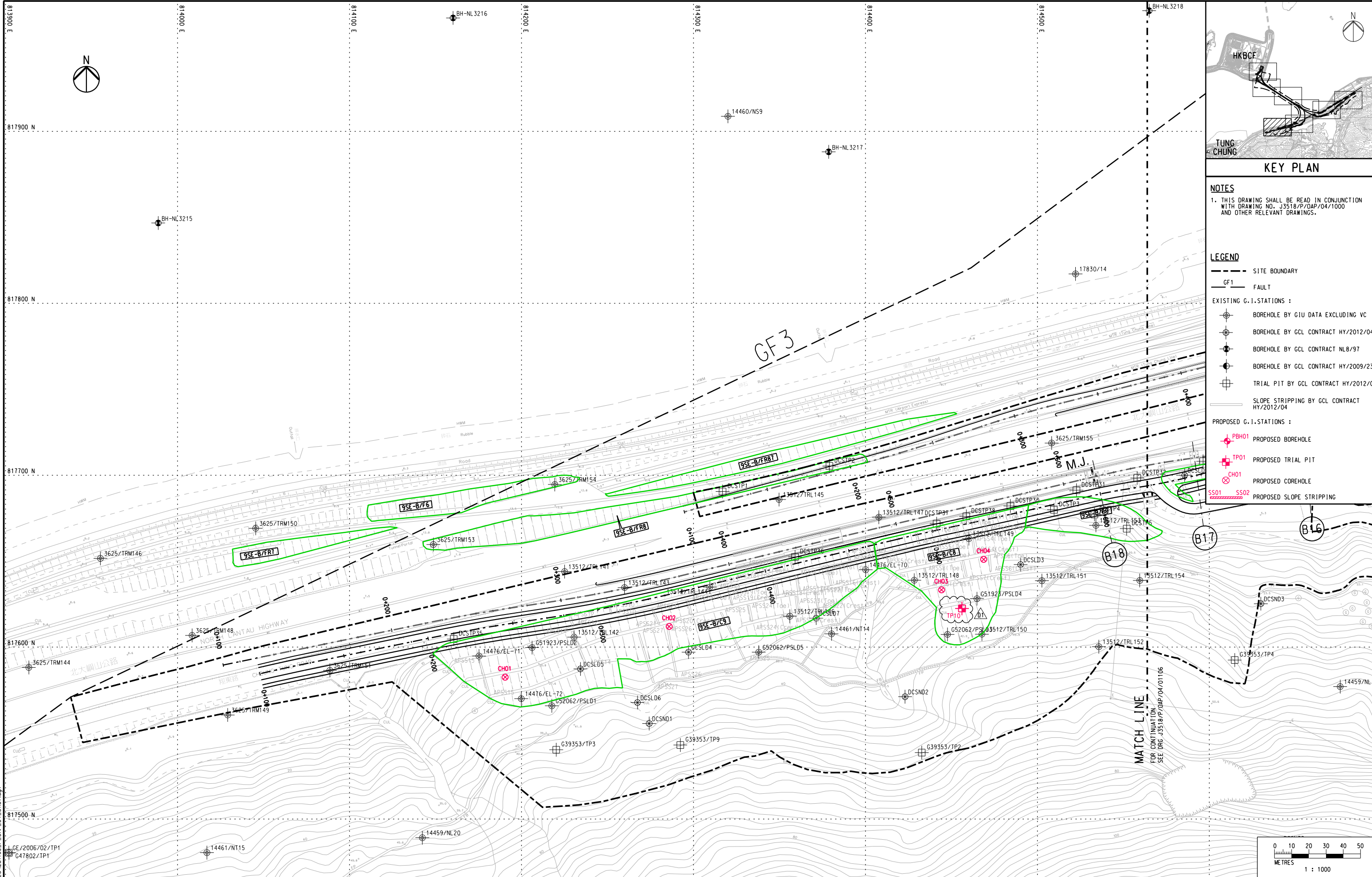
Supervising Officer  
**AECOM**

Contractor  
**Gammon**

Originator  
**ARUP**



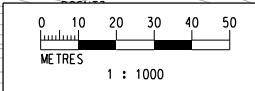
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**KEY PLAN**

**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



Printed by : 07/11/2013  
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B	SUBMISSION	RC	07/13					Checked	Approved
C	SUBMISSION	RC	09/13					DS	DOP
D1	FOR INTERNAL REVIEW	RC	11/13					Scale	
								1:1000 @ A1 / 1:2000 @ A3	

Client  
**路政署**  
**HIGHWAYS DEPARTMENT**  
 港珠澳大橋香港工程管理局  
 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  
**PROPOSED GROUND INVESTIGATION PLAN**  
**(6)**  
**Fig 1.9**  
 Drawing no. **J3518/P/OAP/04/01107** Rev. **D1**

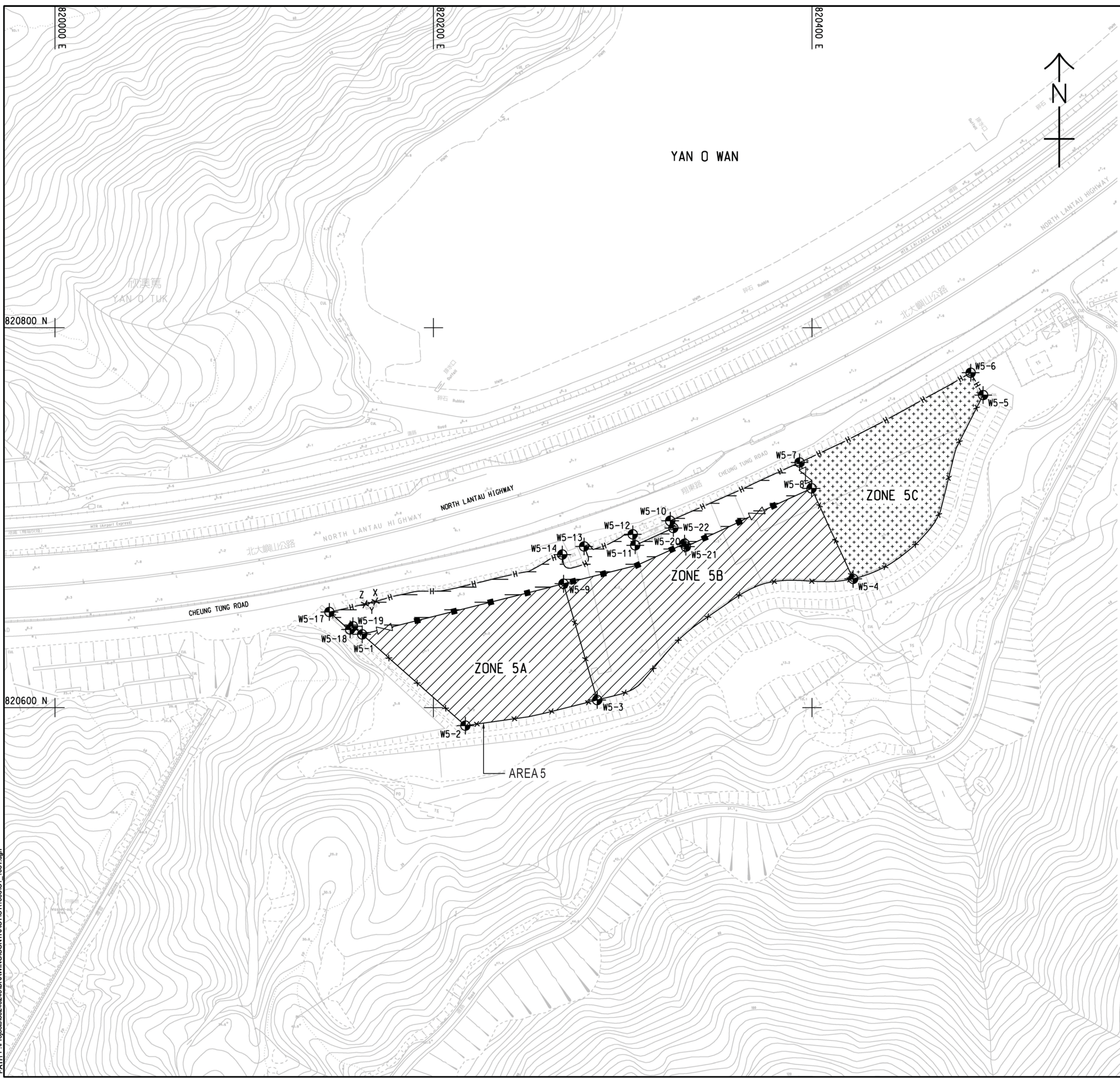
Supervising Officer  
**AECOM**

Contractor  
**Gammon**

Originator  
**ARUP**



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 Project Management Initials: Designer: PLCK Checked: SLYY Approved: CWN  
 ISO A1 594mm x 841mm



**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.
- DEMARICATION 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 ERRECTED 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 ERRECTED 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 SHARED AMONG THE CONTRACTS OF TM-CLKL RELATED CONTRACTS. THE AREAS HATCHED WITH [diagonal lines] ARE TENTATIVELY ALLOCATED FOR THE USE BY THIS CONTRACT.
- THE COMMON AREA SHALL BE CONCRETE PAVED BY THE CONTRACTOR.

**LEGEND:**

- [diagonal lines] WORKS AREA UNDER THIS CONTRACT
- [cross-hatch] COMMON AREA (MAINTAINED UNDER THIS CONTRACT) TO BE SHARE-USED WITH OTHER CONTRACTS
- [stippled] WORKS AREA FOR THIS CONTRACT TO BE EARLY HANDED OVER BY THE CONTRACTOR.
- [H symbol] HOARDING AND GATE (TO BE ERRECTED AND MAINTAINED UNDER THIS CONTRACT)
- [chain link symbol] CHAIN LINK FENCE AND GATE (TO BE ERRECTED AND MAINTAINED BY OTHERS)
- [chain link symbol with X] CHAIN LINK FENCE AND GATE (TO BE ERRECTED AND MAINTAINED UNDER THIS CONTRACT)

**SETTING OUT COORDINATES OF AREA 5**

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



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

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

**CLIENT**  
 業主  
 路政署  
 HONG KONG PROJECT MANAGEMENT OFFICE  
 香港路政署工程管理部  
 Hong Kong - Zhuhai - Macao Bridge  
 香港珠澳跨海大橋

**CONSULTANT**  
 顧問公司  
 AECOM Asia Company Ltd.  
 www.aecom.com

**SUB-CONSULTANTS**  
 分判工程師/顧問公司

Fig 1.10

**ISSUE/REVISION**

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

**STATUS**

修改

**SCALE** 比例  
 A1 1 : 1000  
**DIMENSION UNIT** 尺寸單位  
 METRES

**KEY PLAN**

索引圖

**PROJECT NO.** 項目編號  
 60240249  
**CONTRACT NO.** 合約編號  
 HY/2012/07

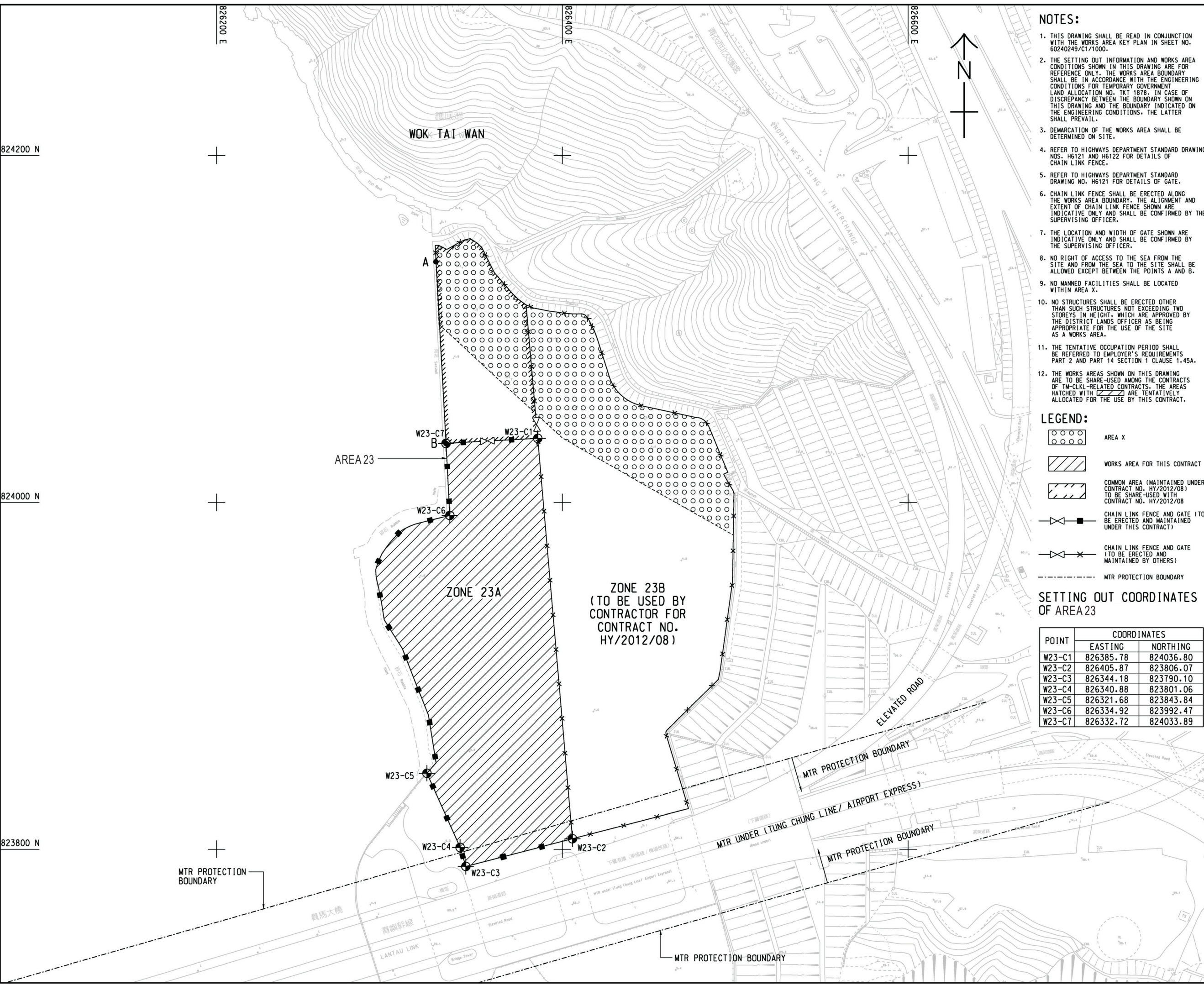
**SHEET TITLE**  
 圖紙名稱  
 WORKS AREA AND HOARDING PLAN

**SHEET NUMBER**  
 圖紙編號  
 60240249/C1/1051

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 Project Management Initials: Designer: PLCK Checked: SLYY Approved: CWN ISO A1 594mm x 841mm



**NOTES:**

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE WORKS AREA KEY PLAN IN SHEET NO. 60240249/C1/1000.
2. 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. TKT 1878. IN CASE OF DISCREPANCY BETWEEN THE BOUNDARY SHOWN ON THIS DRAWING AND THE BOUNDARY INDICATED ON THE ENGINEERING CONDITIONS, THE LATTER SHALL PREVAIL.
3. DEMARCATION OF THE WORKS AREA SHALL BE DETERMINED ON SITE.
4. REFER TO HIGHWAYS DEPARTMENT STANDARD DRAWING NOS. H6121 AND H6122 FOR DETAILS OF CHAIN LINK FENCE.
5. REFER TO HIGHWAYS DEPARTMENT STANDARD DRAWING NO. H6121 FOR DETAILS OF GATE.
6. 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.
7. THE LOCATION AND WIDTH OF GATE SHOWN ARE INDICATIVE ONLY AND SHALL BE CONFIRMED BY THE SUPERVISING OFFICER.
8. NO RIGHT OF ACCESS TO THE SEA FROM THE SITE AND FROM THE SEA TO THE SITE SHALL BE ALLOWED EXCEPT BETWEEN THE POINTS A AND B.
9. NO MANNED FACILITIES SHALL BE LOCATED WITHIN AREA X.
10. 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.
11. THE TENTATIVE OCCUPATION PERIOD SHALL BE REFERRED TO EMPLOYER'S REQUIREMENTS PART 2 AND PART 14 SECTION 1 CLAUSE 1.45A.
12. THE WORKS AREAS SHOWN ON THIS DRAWING ARE TO BE SHARE-USED AMONG THE CONTRACTS OF TM-CLKL-RELATED CONTRACTS. THE AREAS HATCHED WITH ARE TENTATIVELY ALLOCATED FOR THE USE BY THIS CONTRACT.

**LEGEND:**

- AREA X
- WORKS AREA FOR THIS CONTRACT
- COMMON AREA (MAINTAINED UNDER CONTRACT NO. HY/2012/08) TO BE SHARE-USED WITH CONTRACT NO. HY/2012/08
- CHAIN LINK FENCE AND GATE (TO BE ERECTED AND MAINTAINED UNDER THIS CONTRACT)
- CHAIN LINK FENCE AND GATE (TO BE ERECTED AND MAINTAINED BY OTHERS)
- MTR PROTECTION BOUNDARY

**SETTING OUT COORDINATES OF AREA 23**

POINT	COORDINATES	
	EASTING	NORTHING
W23-C1	826385.78	824036.80
W23-C2	826405.87	823806.07
W23-C3	826344.18	823790.10
W23-C4	826340.88	823801.06
W23-C5	826321.68	823843.84
W23-C6	826334.92	823992.47
W23-C7	826332.72	824033.89

**PROJECT**  
項目

**TUEN MUN - CHEK LAP KOK LINK**

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

**CLIENT**  
業主

路政署  
**HIGHWAYS DEPARTMENT**  
港務處大橋及港務工程管理處  
Hong Kong - Zhuhai - Macao Bridge  
Hong Kong Project Management Office

**CONSULTANT**  
工程顧問公司

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**SUB-CONSULTANTS**  
分判工程顧問公司

Fig 1.11

**ISSUE/REVISION**

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

**STATUS**  
階段

**SCALE**  
比例

A1 : 1000

**DIMENSION UNIT**  
尺寸單位

METRES

**KEY PLAN**  
索引圖

**PROJECT NO.**  
項目編號

60240249

**CONTRACT NO.**  
合約編號

HY/2012/07

**SHEET TITLE**  
圖紙名稱

WORKS AREA AND HOARDING PLAN

**SHEET NUMBER**  
圖紙編號

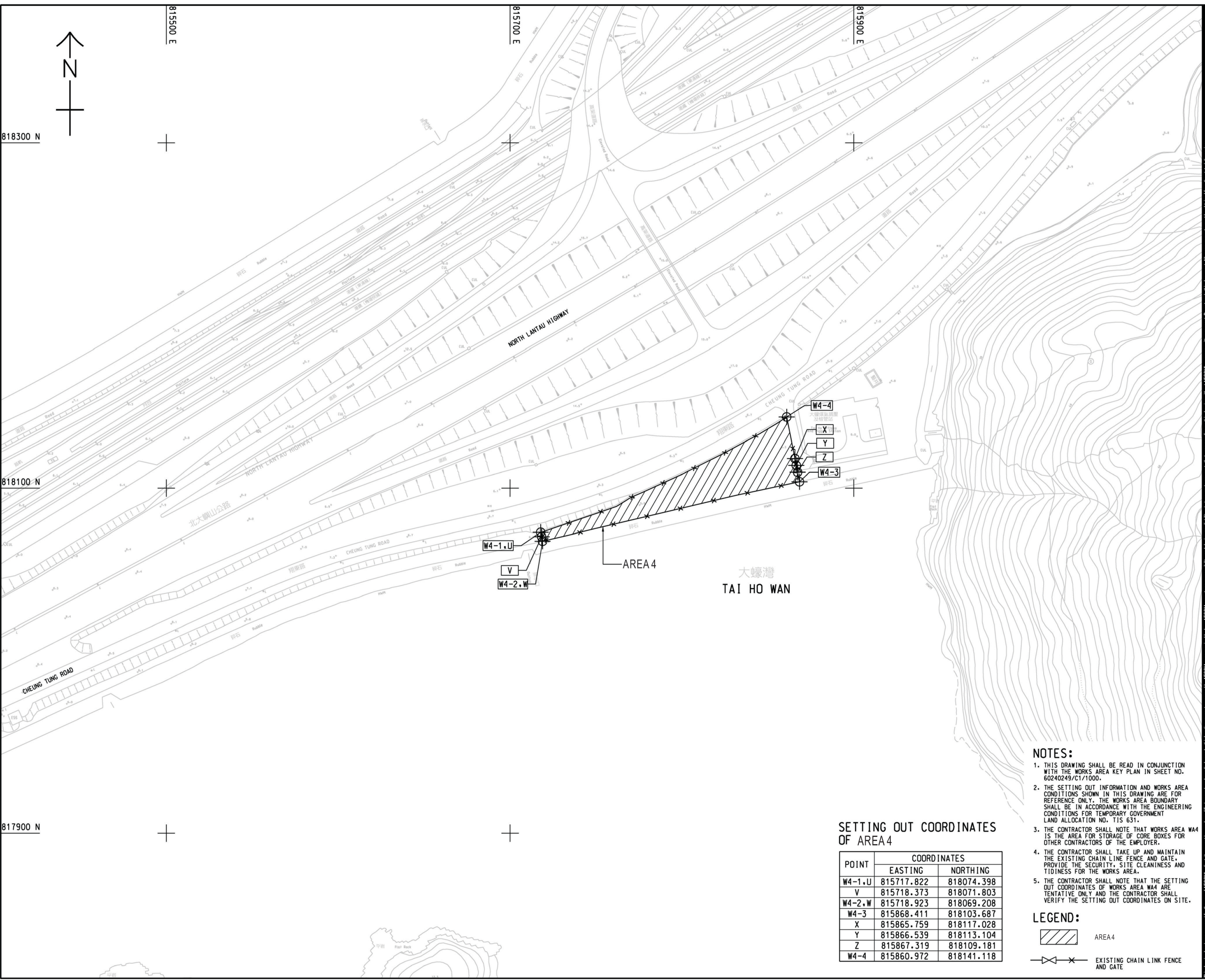
60240249/C1/1052

SHEET 2 OF 2

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Plot File: L:\UJ3\_2012\11\16\_PATL\_P:\p\p\020249\DRAWING\CONTRACT\110000\1\_1053.dgn  
 Project Management Initials: Designer: PLCK Checked: SLYY Approved: CWN  
 ISO A1 594mm x 841mm  
 C:\AECOM



**SETTING OUT COORDINATES OF AREA 4**

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/C1/1000.
- 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. T1S 631.
- THE CONTRACTOR SHALL NOTE THAT WORKS AREA W4 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 W4 ARE TENTATIVE ONLY AND THE CONTRACTOR SHALL VERIFY THE SETTING OUT COORDINATES ON SITE.

**LEGEND:**

- AREA 4
- EXISTING CHAIN LINK FENCE AND GATE



**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**  
 港珠澳大橋香港工程管理部  
 Hong Kong - Zhuhai - Macao Bridge  
 Hong Kong Project Management Office

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Fig 1.12

**ISSUE/REVISION**

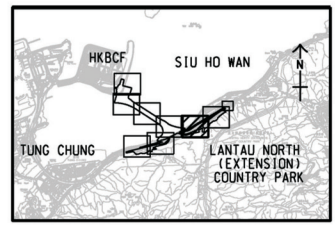
I/R	DATE	DESCRIPTION	CHK.
-	NOV. 12	TENDER ADDENDUM NO. 1	CWY, CWN

**STATUS**  
 階段

**SCALE**  
 比例  
 A1 : 1000

**DIMENSION UNIT**  
 尺寸單位  
 METRES

**KEY PLAN**  
 索引圖



**PROJECT NO.**  
 項目編號  
 60240249

**CONTRACT NO.**  
 合約編號  
 HY/2012/07

**SHEET TITLE**  
 圖紙名稱  
 LOCATION OF AREA 4

**SHEET NUMBER**  
 圖紙編號  
 60240249/C1/1053

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**Key**

- Air Sensitive Receiver
- Noise Sensitive Receiver
- Water Sensitive Receiver
- ▲ Site of Special Scientific Interest (SSSI)
- Known Coral Communities
- Site Boundary

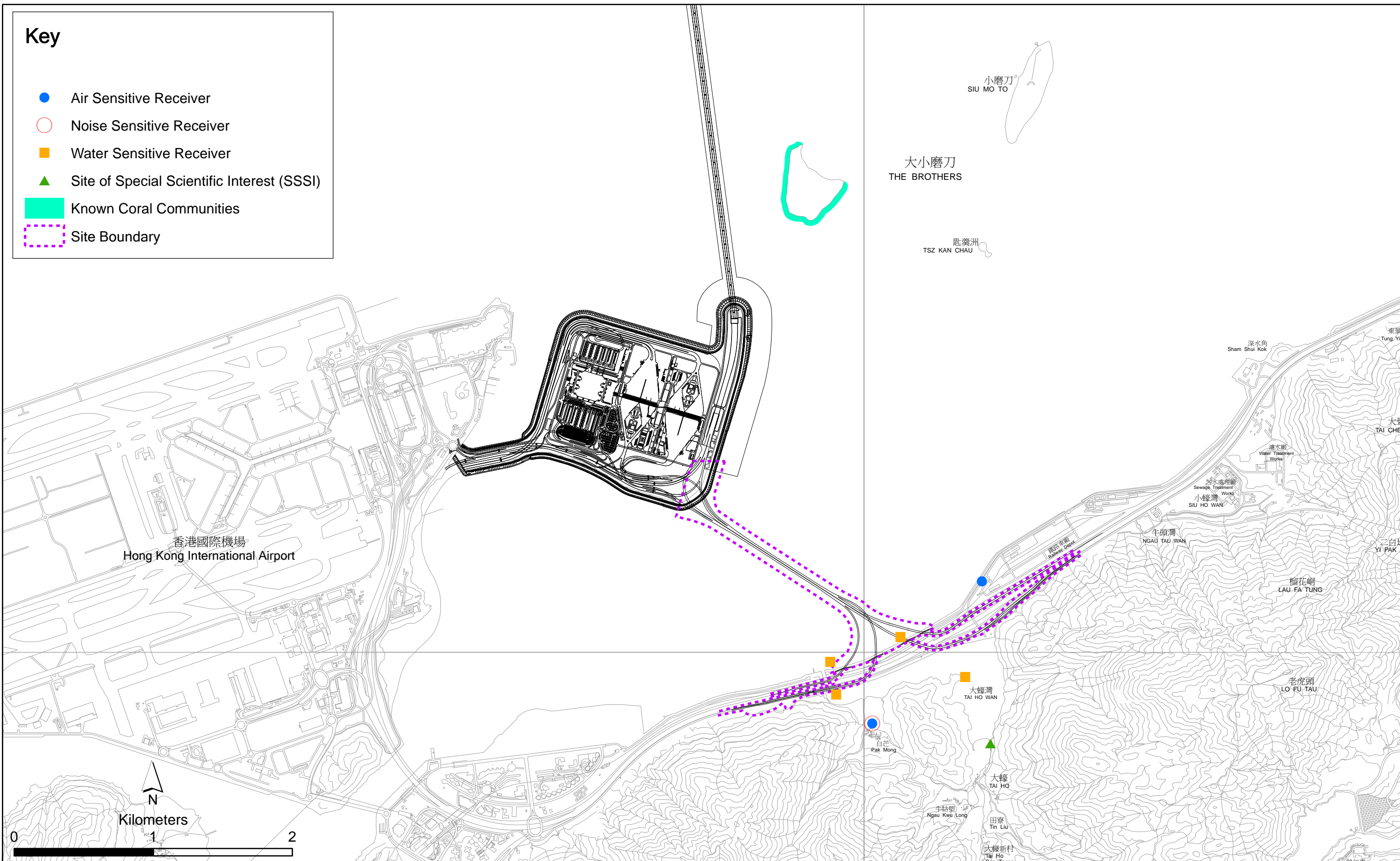


Figure 1.13

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

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Date: 11/4/2014

**Environmental  
Resources  
Management**



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 Hong Kong – Zhuhai – Macao Bridge Hong Kong Projects (HKZMB) during October 2011 has included the two monitoring stations ASR9A and ASR9C for this project. Thus, the baseline monitoring results and Action/ Limit Level presented in HKZMB 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 Level of the air quality monitoring is provided in *Appendix D*.

Air quality monitoring stations ASR9A and ASR9C in Siu Ho Wan MTRC Depot were the proposed locations in accordance with the Updated EM&A Manual. However, authorization of getting access into Siu Ho Wan MTRC Depot is still being sought for the impact monitoring of the EM&A programme for the captioned Contract. Air quality monitoring stations in Siu Ho Wan MTRC Depot (ASR9A and ASR9C) were relocated to Area 4 (ASR8A) and rooftop of Pak Mong Village (ASR8) respectively since November 2013. A proposal for setting up alternative air quality monitoring stations at ASR8A (Area 4) and ASR8 (Rooftop of Pak Mong Village Watch Tower) was submitted on 13 November 2013 which was subsequently approved. Same baseline and Action Level for air quality, as derived from the baseline monitoring data recorded at Siu Ho Wan MTRC Depot, were adopted for these temporary air quality locations (*Figure 2.1; Table 2.1*).

High Volume Samplers (HVSs) were used for carrying out 1-hour and 24-hr TSP monitoring during the reporting period from March to May 2014. The HVS meets all requirements of the Updated EM&A Manual. Brand and model of the equipment is given in *Table 2.2*.

Wind data monitoring equipment has been installed at the rooftop of Pak Mong Village Watch Tower during the reporting period for logging wind

<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**

- Original Monitoring Station
- Alternative Monitoring Station
- Site Boundary

AQMS	X	Y
ASR9A	815847.40	818508.64
ASR9C	816399.52	818946.65
ASR8	815059.45	817488.99
ASR8A	815856.14	818118.14

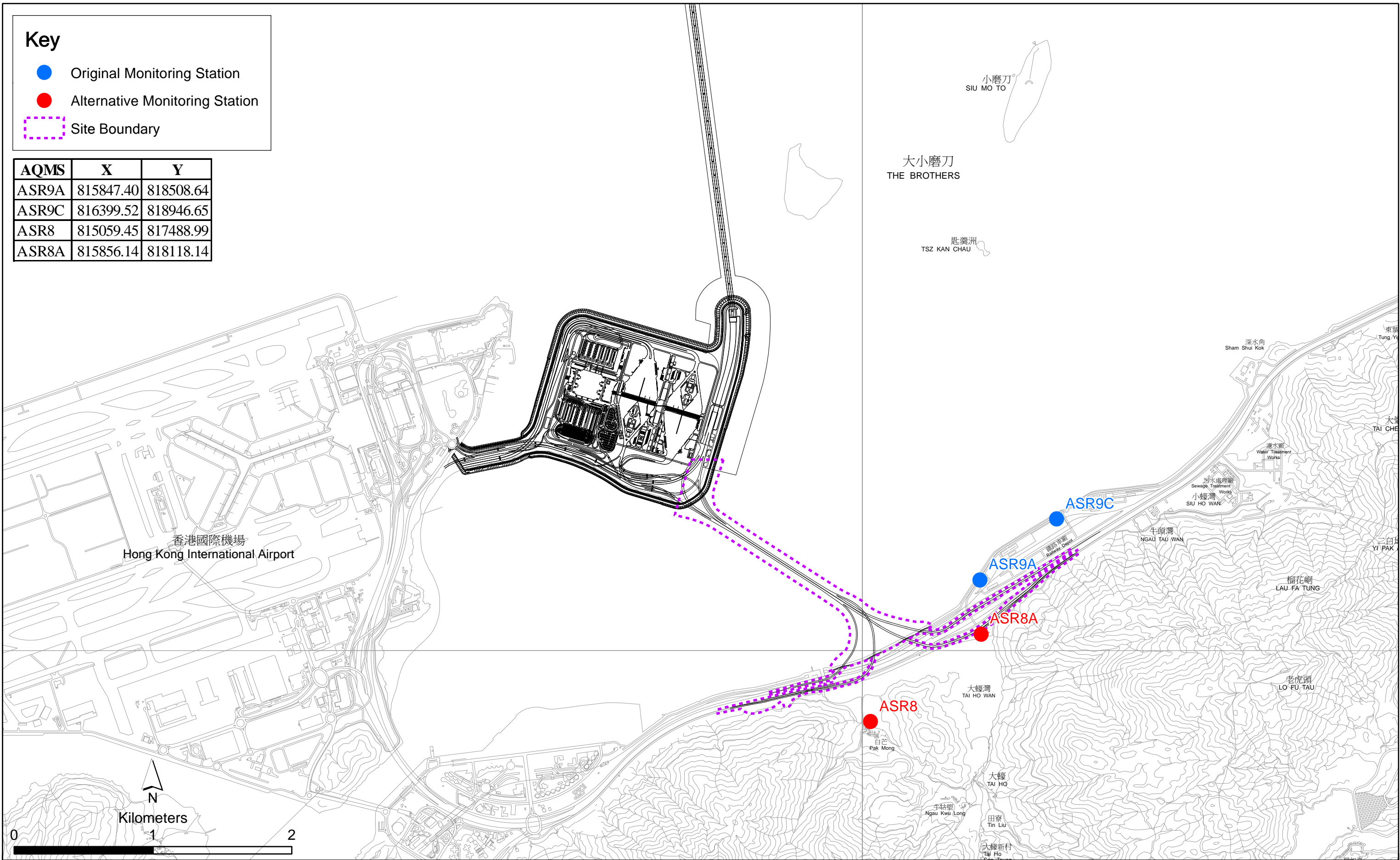


Figure 2.1

**Locations of Air Quality Monitoring Stations**

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Date: 6/12/2013

Remark: Air Quality Monitoring Stations ASR9A and ASR9C (Siu Ho Wan MTRC Depot) proposed in accordance with the Updated EM&A were temporarily relocated to ASR8A and ASR8, respectively.

**Environmental  
Resources  
Management**



speed and wind direction. The wind sensor was setup such as it was clear of obstructions or turbulence caused by building. The wind data monitoring equipment is recalibrated at least once every six months.

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

Monitoring Station	Monitoring Period	Location	Description	Parameters & Frequency
ASR8A	6, 12, 18, 24 and 28 March; 3, 9, 15, 18, 24 and 30 April; 5, 10, 16, 22 and 28 May	Area 4	On ground at the Area 4	<ul style="list-style-type: none"> <li>1-hour Total Suspended Particulates (1-hour TSP, <math>\mu\text{g}/\text{m}^3</math>), 3 times per day every 6 days</li> </ul>
ASR8	6, 12, 18, 24 and 28 March; 3, 9, 15, 18, 24 and 30 April; 5, 10, 16, 22 and 28 May	Pak Mong Village Watch Tower	Rooftop of the premise	<ul style="list-style-type: none"> <li>24-hour Total Suspended Particulates (24-hour TSP, <math>\mu\text{g}/\text{m}^3</math>), daily for 24-hour every 6 days</li> </ul>

Note: <sup>(1)</sup> Air Quality Monitoring Stations ASR9A and ASR9C at Siu Ho Wan MTRC Depot proposed in accordance with the Updated EM&A were temporarily relocated to ASR 8A and ASR8, 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 Speed Sensor	WE550 (S/N:EC0000)
Wind Direction Sensor	WE570 (S/N:ED0000)

### 2.1.2 Action & Limit Levels

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

### 2.1.3 Monitoring Schedule for the Reporting Quarter

The schedules for air quality monitoring in the reporting quarter is 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* and detailed impact air quality monitoring results and meteorological information were reported in the *Fifth to Seventh Monthly EM&A Report*.

**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 ( $\mu\text{g}/\text{m}^3$ )
March 2014	ASR8A	120	58 - 240	394	500
	ASR8	118	70 - 175	393	500
April 2014	ASR8A	101	61 - 165	394	500
	ASR8	106	66 - 173	393	500
May 2014	ASR8A	63	45 - 83	394	500
	ASR8	82	54 - 144	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 ( $\mu\text{g}/\text{m}^3$ )
March 2014	ASR8A	56	37 - 83	178	500
	ASR8	64	45 - 83	178	500
April 2014	ASR8A	67	40 - 109	178	500
	ASR8	63	43 - 89	178	500
May 2014	ASR8A	43	35 - 48	178	500
	ASR8	47	36 - 60	178	500

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 sixteen monitoring events were undertaken within the reporting period, in which no Action or Limit Level exceedances for 1-hr and 24-hr TSP for air quality were recorded during the reporting period.

## 2.2 NOISE MONITORING

The baseline noise monitoring undertaken by the Hong Kong – Zhuhai – Macao Bridge Hong Kong Projects (HKZMB) during the period of 18 October to 1 November 2011 has included the monitoring station NSR1 for this project. Thus, the baseline monitoring results and Action/ Limit Level presented in HKZMB 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 was conducted once per week during the construction phase of the Contract at NSR1.

Monitoring location was set up at NSR 1 in accordance with the Updated EM&A Manual. *Figure 2.2* shows the location of the monitoring station. *Table 2.5* describes the details of the monitoring station.

<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**

- Noise Monitoring Station
- Site Boundary

NMS	X	Y
NSR1	815059.45	817488.99

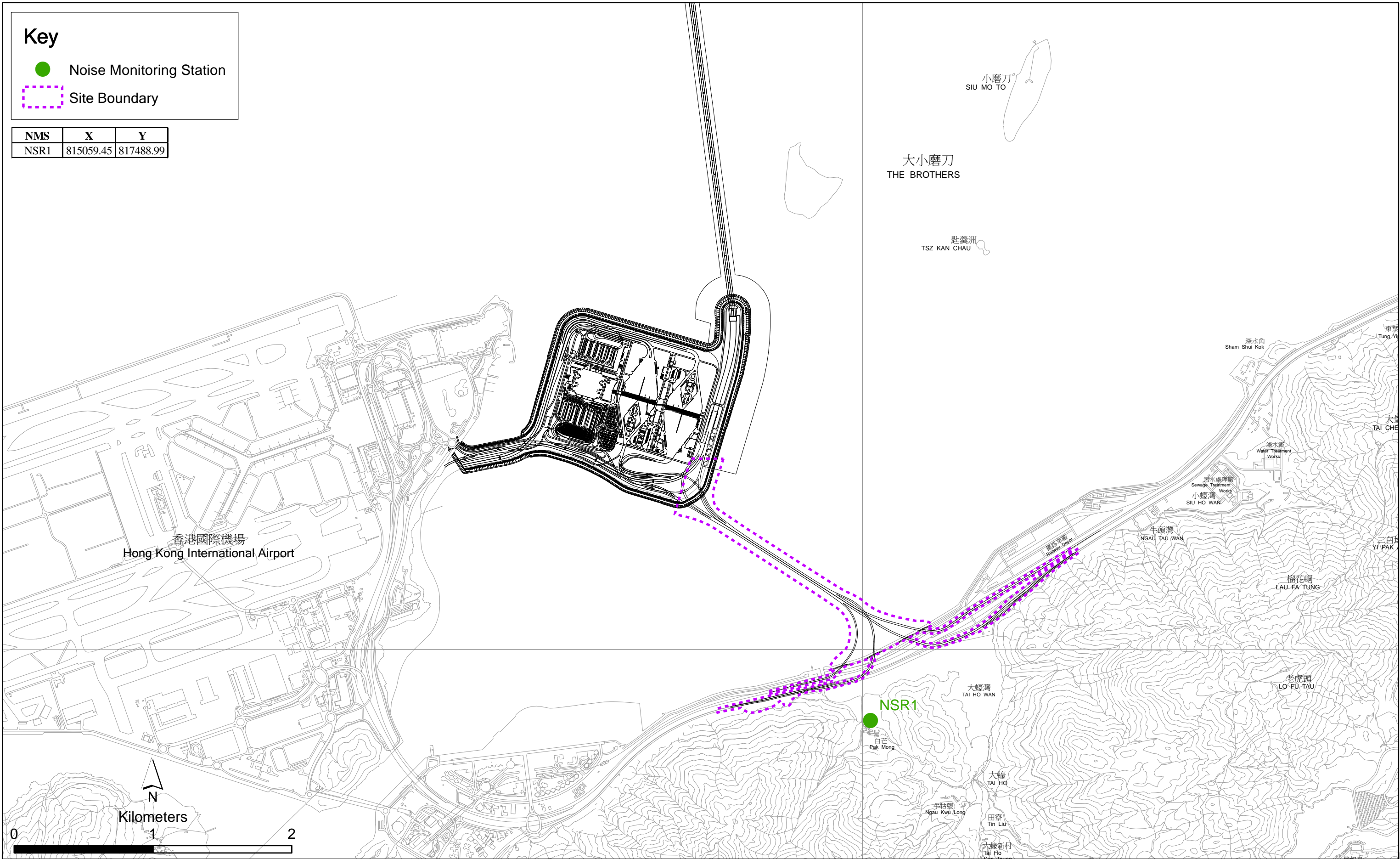


Figure 2.2

Locations of Noise Monitoring Stations

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

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

Monitoring Station	Monitoring Period	Location	Parameters & Frequency
NSR 1	March 2014 to May 2014	Pak Mong Village Watch Tower	<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>

**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 schedules for noise monitoring in the reporting quarter is provided in *Appendix E*.

### 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 *Fifth to Seventh Monthly EM&A Report*.

**Table 2.7** *Summary of Construction Noise Monitoring Results at NSR1 in the Reporting Period*

	Average , dB(A), $L_{eq}$ (30mins)	Range, dB(A), $L_{eq}$ (30mins)	Limit Level, dB(A), $L_{eq}$ (30mins)
March 2014	59	58 - 60	75
April 2014	58	56 - 59	75
May 2014	56	52 - 59	75

A total of sixteen monitoring events were undertaken in the reporting period with no Action Level and Limit Level exceedance recorded at all monitoring stations 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 Hong Kong – Zhuhai – Macao Bridge Hong Kong Projects (HKZMB) between 6 and 31 October 2011 has included all monitoring stations except SR4a for the Project. Thus, the baseline monitoring results except for station SR4a and Action/Limit Level presented in HKZMB 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 (7) 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*

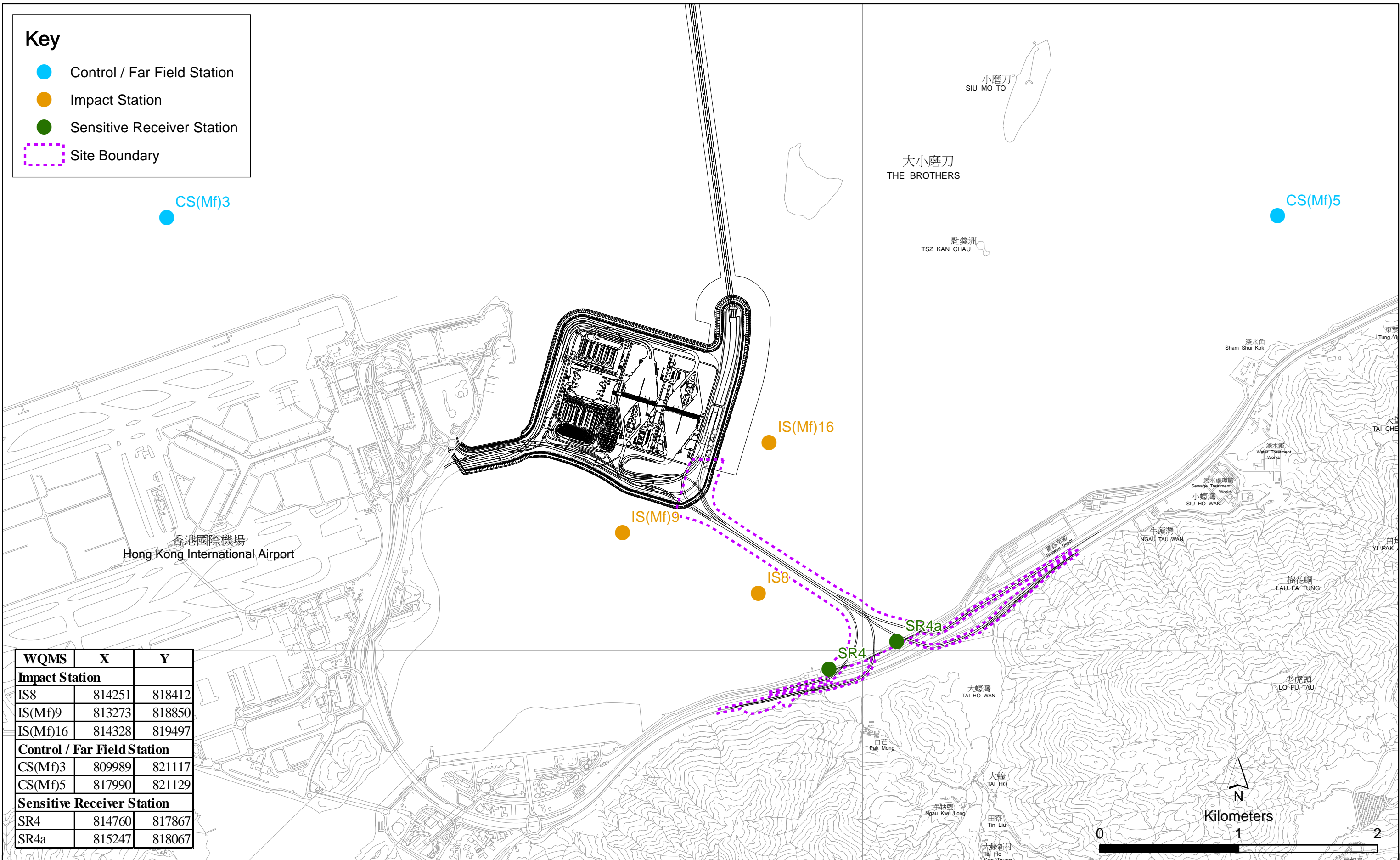
Station ID	Type	Coordinates		*Parameters, unit	Depth	Frequency
		Easting	Northing			
IS(Mf)9	Impact Station (Close to HKBCF construction site)	813273	818850	<ul style="list-style-type: none"> <li>• Temperature(°C)</li> <li>• pH(pH unit)</li> <li>• Turbidity (NTU)</li> <li>• Water depth (m)</li> <li>• 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	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>• DO (mg/L and % of saturation)</li> <li>• SS (mg/L)</li> </ul>		
IS8	Impact Station(Close to HKBCF construction site)	814251	818412			

<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			
SR4	Sensitive receiver (Tai Ho Inlet)	814760	817867		less than 6m, mid-depth may be omitted.	
SR4a	Sensitive receiver	815247	818067			
CS(Mf)3	Control Station	809989	821117			
CS(Mf)5	Control Station	817990	821129			

\*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
Turbidimeter	HACH Model 2100Q
pH meter	HANNA HI8314
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 Level of the water quality monitoring is 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*.

### 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 *Fifth to Seventh Monthly EM&A Report*.

In this reporting period, a total of forty monitoring events were undertaken in which no Action or Limit Level exceedance were recorded during the reporting quarter.

## 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 dolphins. In order to fulfil the EM&A requirements and make good use of available resources, the on-going impact line transect dolphin monitoring data collected by HyD's Contract No. HY/2011/03 Hong Kong-Zhuhai-Macao Bridge. Hong Kong Link Road - Section between Scenic Hill and Hong Kong Boundary Crossing Facilities on the monthly basis is adopted to avoid duplicates of survey effort.

### 2.4.2 Monitoring Equipment

Table 2.10 summarises 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.

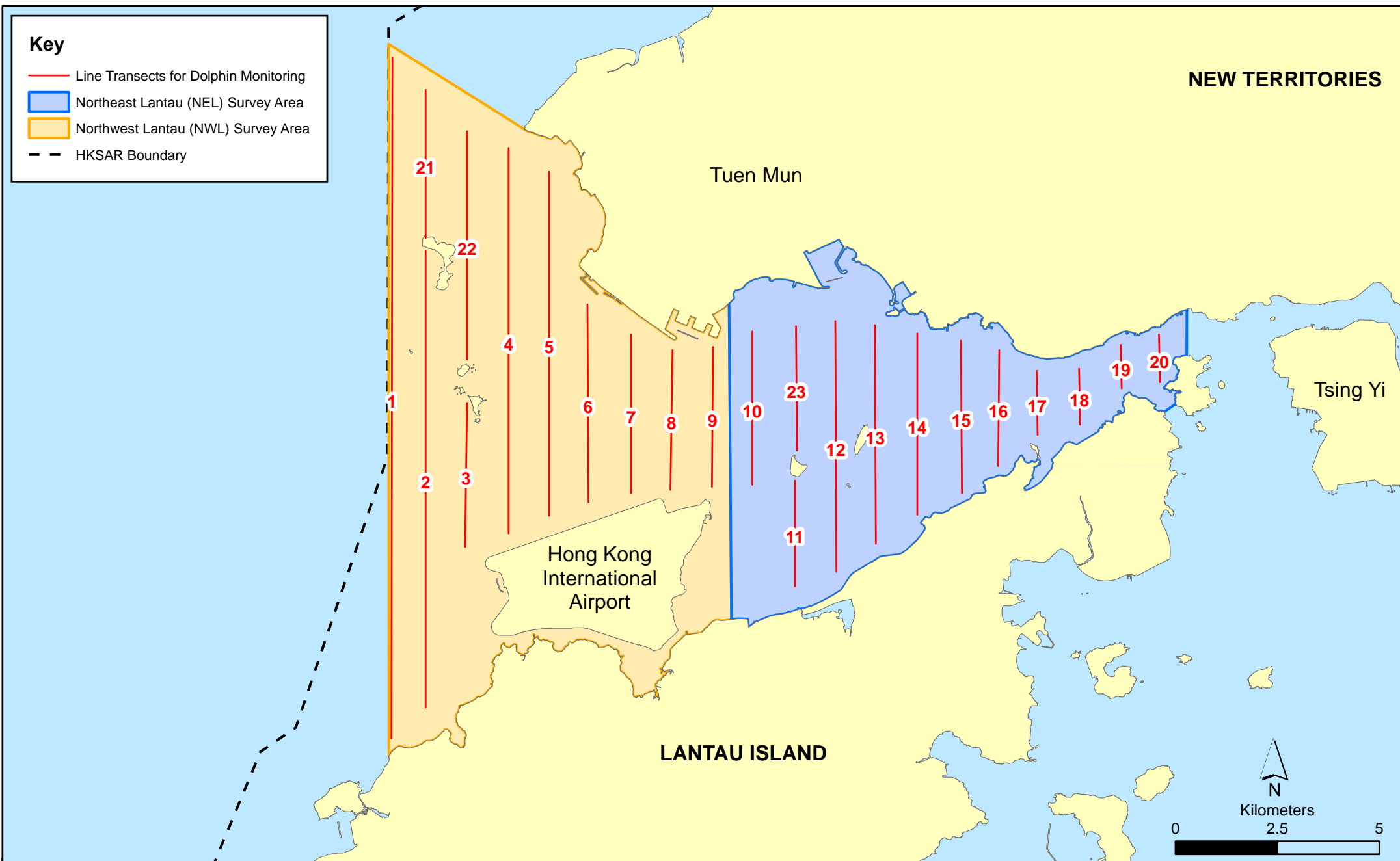


Figure 2.4

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	814577	13	Start Point	816506	819480
1	End Point	804671	831404	13	End Point	816506	824859
2	Start Point	805475	815457	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	820690	19	Start Point	822513	823268
7	End Point	810499	824613	19	End Point	822513	824321
8	Start Point	811508	820847	20	Start Point	823477	823402
8	End Point	811508	824254	20	End Point	823477	824613
9	Start Point	812516	820892	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	818449	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 891.87 km of survey effort was collected, with 87.4% 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,



350.40 km and 541.47 km of survey effort were collected from NEL and NWL survey areas respectively. The total survey effort conducted on primary lines was 642.67 km, while the effort on secondary lines was 249.20 km. Both survey effort conducted on primary and secondary lines were considered as on-effort survey data. The survey efforts are summarized in *Appendix I*.

A total of 31 groups of 103 Chinese White Dolphin sightings were recorded during the six sets of surveys from March to May 2014.

All except one sighting were made during on-effort search. Twenty-five on-effort sightings were made on primary lines, while another five on-effort sightings were made on secondary lines. In this quarterly period, all dolphin groups were sighted in NWL, while none was sighted in NEL.

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**

		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 (5 & 11 Mar 2014)	0.0	0.0
	Set 2 (17 & 25 Mar 2014)	0.0	0.0
	Set 3 (4 & 14 Apr 2014)	0.0	0.0
	Set 4 (16 & 24 Apr 2014)	0.0	0.0
	Set 5 (2 & 19 May 2014)	0.0	0.0
	Set 6 (21 & 26 May 2014)	0.0	0.0
NWL	Set 1 (5 & 11 Mar 2014)	6.4	23.57
	Set 2 (17 & 25 Mar 2014)	13	24.83
	Set 3 (4 & 14 Apr 2014)	4.9	26.88
	Set 4 (16 & 24 Apr 2014)	4.9	11.54
	Set 5 (2 & 19 May 2014)	5.5	18.24
	Set 6 (21 & 26 May 2014)	4.2	9.75

**Table 2.13 Quarterly Average Encounter Rates**

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)		Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)	
	March –May 2014	September - November 2011	March –May 2014	September - November 2011
<b>Northeast Lantau</b>	0.0	6.00 ± 5.05	0.0	22.19 ± 26.81
<b>Northwest Lantau</b>	6.51 ± 3.34	9.85 ± 5.85	19.14 ± 7.19	44.66 ± 29.85

Group size of Chinese White Dolphins ranged from 1-13 individuals per group in North Lantau region during March – May 2014. 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 Encounter Rates**

	Average Dolphin Group Size	
	March – May 2014	September -November 2011
<b>Overall</b>	3.32 ± 2.87 (n = 31)	3.72 ± 3.13 (n = 66)
<b>Northeast Lantau</b>	0.0	3.18 ± 2.16 (n = 17)
<b>Northwest Lantau</b>	3.32 ± 2.87 (n = 31)	3.92 ± 3.40 (n = 49)

During this quarter of dolphin monitoring, no unacceptable impact from the activities of this Contract was recorded from the general observations. 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.

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 250 m marine mammal exclusion zone monitoring was undertaken under this Contract. No sighting of the Indo-Pacific humpback dolphin *Sousa chinensis* (i.e. Chinese White Dolphin) was recorded in the reporting period during the exclusion zone monitoring.

### **2.5 BORED PILING MONITORING**

Marine bored piling monitoring programme for dolphins (ie Land-based Theodolite Tracking, Underwater Noise Monitoring and Acoustic Behavioural Monitoring) was commenced on 3 March 2014 and completed on 25 April 2014. Data analysis was being undertaken for the marine bored piling monitoring programme which will be presented in the Final Monitoring Reports for the Land-based Theodolite Tracking and Underwater Noise and Dolphin Acoustic Behavioural Monitoring.

## 2.6 POST TRANSLOCATION CORAL MONITORING

The second quarterly Coral Post-Translocation Monitoring was conducted on 16 April 2014 and the results were provided in the *Second Quarterly Post-Translocation Coral Monitoring Report*. The findings indicated that the Action or Limit Levels for coral monitoring were not exceeded as increase in percentage of partial mortality was not detected for both the tagged translocated and natural coral colonies when comparing to the pre-translocation dataset.

## 2.7 EM&A SITE INSPECTION

Site inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures under the Contract. Thirteen (13) site inspections were carried out in the reporting quarter on 5, 12, 19, 26 March; 2, 9, 16, 23, 30 April; 7, 13, 21 and 29 May 2014.

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*

Inspection Date	Location & Environmental Observations	Recommendations/ Remarks
5 March 2014	<u>Seafront site</u> <ul style="list-style-type: none"> <li>Plugs of 2 drip drays were missing.</li> <li>A few cans of chemical were not placed in drip tray.</li> </ul>	<u>Seafront site</u> <ul style="list-style-type: none"> <li>The drip drays were plugged.</li> <li>The chemicals were put into drip tray immediately.</li> </ul>
12 March 2014	<u>G38</u> Oil stain was observed near bored pile.	<u>G38</u> Absorbent was deployed immediately.
19 March 2014	<u>B11</u> <ul style="list-style-type: none"> <li>Pavement needed to be cover by tarpaulin sheet.</li> <li>Watering programme had to be carried out regularly for dust suppression.</li> </ul>	<u>B11</u> <ul style="list-style-type: none"> <li>Tarpaulin sheet was provided.</li> <li>Watering programme was carried out regularly for dust suppression.</li> </ul>
26 March 2014	<u>B1</u> <ul style="list-style-type: none"> <li>Oil stain was observed.</li> </ul> <u>Seafront</u> <ul style="list-style-type: none"> <li>Chemical containers were placed without drip tray.</li> </ul>	<u>B1</u> <ul style="list-style-type: none"> <li>Oil stain was removed.</li> </ul> <u>Seafront</u> <ul style="list-style-type: none"> <li>Drip tray was provided.</li> </ul>
2 April 2014	Area 1 <ul style="list-style-type: none"> <li>Stagnant water was found accumulating and overflowing from drip tray of a generator</li> </ul> <u>B15</u> <ul style="list-style-type: none"> <li>Water leakage was observed from a pipe buried underground which transport treated water from sedimentation tank to the discharge point.</li> </ul>	Area 1 <ul style="list-style-type: none"> <li>The Contractor was reminded to take appropriate action to clean up the stagnant water.</li> </ul> <u>B15</u> <ul style="list-style-type: none"> <li>The Contractor was reminded to take appropriate action.</li> </ul>
9 April 2014	<u>E12</u> <ul style="list-style-type: none"> <li>Stagnant water was found accumulated in the drip tray of a generator</li> </ul> <u>G28</u>	<u>E12</u> <ul style="list-style-type: none"> <li>The Contractor was reminded to take appropriate action to clean up the stagnant water.</li> </ul> <u>G28</u>

Inspection Date	Location & Environmental Observations	Recommendations/ Remarks
	<ul style="list-style-type: none"> <li>Two chemical drums were not placed properly in drip tray</li> </ul>	<ul style="list-style-type: none"> <li>The Contractor was reminded to put the chemical drums in place.</li> <li>The Contractor was reminded to implement the acoustic decoupling measures during mechanical device operation.</li> </ul>
16 April 2014	<p>Area 1</p> <ul style="list-style-type: none"> <li>Temporary stockpiles were found partially exposed</li> </ul> <p>Pak Mong</p> <ul style="list-style-type: none"> <li>Existing trees in the project site shall be carefully protected.</li> <li>General refuse was observed in the project site area.</li> </ul>	<p>Area 1</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to cover the temporary stockpiles properly.</li> <li>The Contractor was reminded to protect/transplant the existing trees properly before works commencement.</li> <li>The Contractor was reminded to keep litter free in the Project site.</li> </ul>
23 April 2014	<p>E3</p> <ul style="list-style-type: none"> <li>One of the drip trays for holding the generator was found unplugged with stagnant water leaked from the drain hole.</li> </ul> <p>B3</p> <ul style="list-style-type: none"> <li>The chemical waste drums were placed unattended without drip tray.</li> <li>Drip tray of a generator was not plugged properly.</li> </ul> <p>B5/G23</p> <ul style="list-style-type: none"> <li>Oily floor was observed on G23.</li> <li>Some chemical drums were not placed in drip trays.</li> </ul>	<p>E3</p> <ul style="list-style-type: none"> <li>The Contractor was advised to plug the drain hole of the drip tray properly.</li> </ul> <p>B3</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to place the chemical waste drums properly.</li> <li>The Contractor was reminded to plug the drip tray properly.</li> </ul> <p>B5/G23</p> <ul style="list-style-type: none"> <li>The Contractor took immediate action to clean up oil by chemical absorbance.</li> <li>The Contractor was reminded to place the chemical drums in drip trays.</li> </ul>
30 April 2014	<p>B15</p> <ul style="list-style-type: none"> <li>Trash was observed.</li> </ul> <p>B1</p> <ul style="list-style-type: none"> <li>The welding machine was not placed on isolated pad.</li> </ul>	<p>B15</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to clean up the trash in the project area regularly.</li> <li>The Contractor was advised to implement acoustic decoupling plan properly.</li> </ul>
7 May 2014	<p>Area 1</p> <ul style="list-style-type: none"> <li>General refuse was found disposed in chemical container</li> <li>Litter was found in the project area</li> </ul> <p>Pak Mong</p> <ul style="list-style-type: none"> <li>Chemical container was placed near drainage area</li> </ul>	<p>Area 1</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to dispose general refuse correctly</li> </ul> <p>Pak Mong</p> <ul style="list-style-type: none"> <li>The Contractor put the containers far away from drainage area immediately.</li> </ul>
13 May 2014	<p>B1</p> <ul style="list-style-type: none"> <li>Acoustic decoupling pad was not found at the water pump.</li> </ul> <p>Seafront</p> <ul style="list-style-type: none"> <li>Label was not found on the chemical container</li> <li>Stagnant water was found on the ground</li> <li>General refuse was found scattering at the project area.</li> </ul>	<p>B1</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to deploy a decoupling pad</li> </ul> <p>Seafront</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to label chemicals correctly.</li> <li>The Contractor was reminded to clean up the stagnant water.</li> <li>The Contractor was reminded to maintain good housekeeping.</li> </ul>
21 May 2014	<p>Area 1</p> <ul style="list-style-type: none"> <li>Some chemical containers were found not placed in drip tray.</li> <li>A drip tray was found not plugged.</li> </ul> <p>Rockfill platform at Seafront</p>	<p>Area 1</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to place the chemical containers in drip tray</li> <li>The Contractor was reminded to plug the drip tray.</li> </ul> <p>Rockfill platform at Seafront</p>

Inspection Date	Location & Environmental Observations	Recommendations/ Remarks
	<ul style="list-style-type: none"> <li>Some oil was found under a mobile crane.</li> </ul>	<ul style="list-style-type: none"> <li>The Contractor removed the oil immediately.</li> </ul>
29 May 2014	<p>B16</p> <ul style="list-style-type: none"> <li>Stagnant water was found accumulated in drip tray.</li> <li>Chemical containers were found placed inappropriately.</li> </ul> <p>B15</p> <ul style="list-style-type: none"> <li>Lack of sandbag to prevent surface runoff.</li> <li>Accumulation of general refuses was found.</li> </ul> <p>E9</p> <ul style="list-style-type: none"> <li>Stagnant water was found accumulated in drip tray.</li> </ul>	<p>B16</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to clean up the drip tray.</li> <li>The Contractor was reminded to place chemical containers in drip tray.</li> </ul> <p>B15</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to place more sandbag to prevent surface runoff.</li> <li>The Contractor was reminded to keep good house keeping</li> </ul> <p>E9</p> <ul style="list-style-type: none"> <li>The Contractor was reminded to clean up the drip tray.</li> </ul>

## 2.8 WASTE MANAGEMENT STATUS

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

Wastes generated during this reporting period include mainly construction wastes (inert and non-inert), imported fill, recyclable materials, and marine sediments. 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 <sup>(a)</sup> (m <sup>3</sup> )	Imported Fill (m <sup>3</sup> )	Inert Construction Waste Re-used (m <sup>3</sup> )	Non-inert Construction Waste <sup>(b)</sup> (tonnes)	Recyclable Materials <sup>(c)</sup> (kg)	Chemical Wastes (kg)	Marine Sediment (m <sup>3</sup> )	
							Category L	Category M
March 2014	221	2,098	960	12.39	46,050	0	0	0
April 2014	118	914	80	87.65	15,760	0	0	0
May 2014	1,546	451	40	98.03	8,586	0	386,000	0
Total	1,885	3,463	1,080	198.07	70,396	0	386,000	0

**Notes:**

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

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

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

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

For chemical waste containers, the Contractor was reminded to treat properly and store temporarily in designated chemical waste storage area on site in

accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.

## 2.9 *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-354/2009/A	8 Dec 2010	NA	HyD	Tuen Mun- Chek Lap Kok Link
Environmental Permit	EP-354/2009/B	28 Jan 2014	NA	HyD	Tuen Mun- Chek Lap Kok Link
Construction Dust Notification	361571	5 Jul 2013	NA	GCL	-
Construction Dust Notification	362093	17 Jul 2013	NA	GCL	For Area 23
Billing Account for Disposal	7017735	10 Jul 2013	End of Project	GCL	-
Chemical Waste Registration	5213-961-G2380-13	10 Oct 2013	NA	GCL	Chemical waste produced in Contract HY/2012/07 (Area 1 adjacent to Cheng Tung Road, Siu Ho Wan)
Chemical Waste Registration	5213-961-G2380-14	10 Oct 2013	NA	GCL	Chemical waste produced in Contract HY/2012/07 (Area 2 adjacent to Cheung Tung Road, Pak Mong Village)
Chemical Waste Registration	5213-974-G2588-03	4 Nov 2013	NA	GCL	Chemical waste produced in Contract HY/2012/07 (WA5 adjacent to Cheung Tung Road, Yam O)
Construction Waste Disposal Account	7017735	10 Jul 2013	NA	GCL	Waste disposal in Contract HY/2012/07
Waste Water Discharge License	WT00019017-2014	13 May 2014	31 May 2019	GCL	Discharge for marine portion
Waste Water Discharge License	WT00019018-2014	13 May 2014	31 May 2019	GCL	Discharge for land portion
Construction Noise Permit	Nil	Application in process	NA	GCL	For Piling Works
Construction Noise Permit	GW-RS0419-14	15 May 2014	13 Nov 2014	GCL	For loading & unloading on NLH near Viaducts A & B
Construction Noise Permit	GW-RS0226-14	30 Mar 2014	29 Sep 2014	GCL	For loading & unloading on NLH near Viaduct D
Construction Noise Permit	GW-RS0236-14	27 Mar 2014	14 May 2014	GCL	For loading & unloading on NLH near Viaducts A

License/ Permit	License or Permit No.	Date of Issue	Date of Expiry	License/ Permit Holder	Remarks & B
Construction Noise Permit	GW-RS0280-14	31 Mar 2014	31 May 2014	GCL	For excavation at Pier B9
Construction Noise Permit	GW-RS0299-14	7 Apr 2014	5 Jul 2014	GCL	Pier B8 at CEDD Access Road
Construction Noise Permit	GW-RS0331-14	4 Apr 2014	6 Jul 2014	GCL	Broad permit for works at seafront & marine piers
Construction Noise Permit	GW-RS0338-14	4 Apr 2014	3 Jun 2014	GCL	For bored piling works between Pier E13 and HKBCF
Construction Noise Permit	GW-RS1423-13	11 Dec 2013	30 Apr 2014	GCL	Renewal for marine portion
Construction Noise Permit	GW-RW0123-14	27 Feb 2014	27 Aug 2014	GCL	For night works and works in general holiday at WA5
Dumping Permit/ Loading Permit (Type 1 – Open Sea Disposal)	(4) in EP/MD/14-075	25 Sep 2013	NA	GCL	-
Marine Dumping Permit	EP/MD/14-075	28 Jan 2014	27 Jul 2014	GCL	For dumping Type I Sediment
Marine Dumping Permit	EP/MD/15-028	1 Jun 2014	30 Jun 2014	GCL	For dumping Type I (Dedicated Site) and Type II sediment
Construction Noise Permit	GW-RS1129-13	31 Oct 2013	30 Apr 2014	GCL	For night works and works in general holidays
Construction Noise Permit	GW-RW0925-13	19 Dec 2013	17 Apr 2014	GCL	Renewal of WA5 site office erection
Construction Noise Permit	GW-RS1423-13	11 Dec 2013	30 Apr 2014	GCL	Renewal for marine portion
Construction Noise Permit	GW-RS1413-13	17 Dec 2013	26 Mar 2014	GCL	For loading and unloading on NLH near viaduct A & B
Construction Noise Permit	GW-RS0034-14	14 Jan 2014	29 Mar 2014	GCL	For night works and works in general holiday
Marine Dumping Permit	EP/MD/14-155	1 April 2014	30 April 2014	GCL	For dumping Type I (Dedicated Site) and Type II Sediment



**2.10** *IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES*

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

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

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

For air quality monitoring, a total of sixteen monitoring events were undertaken and no exceedance of Action and Limit Levels were recorded.

For noise monitoring, a total of sixteen monitoring events were undertaken in the reporting quarter and no exceedance of Action and Limit Levels were recorded.

For water quality monitoring, a total of forty monitoring events were undertaken and no exceedance of Action and Limit Levels were recorded.

For impact dolphin monitoring, a total of two Action Level exceedances were recorded. Investigation findings were detailed in *Appendix L*.

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

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

There was no complaint, notification of summon of successful prosecution recorded in the reporting period. Statistics on complaint, notification of summon of successful prosecution are summarized in *Appendix L*.

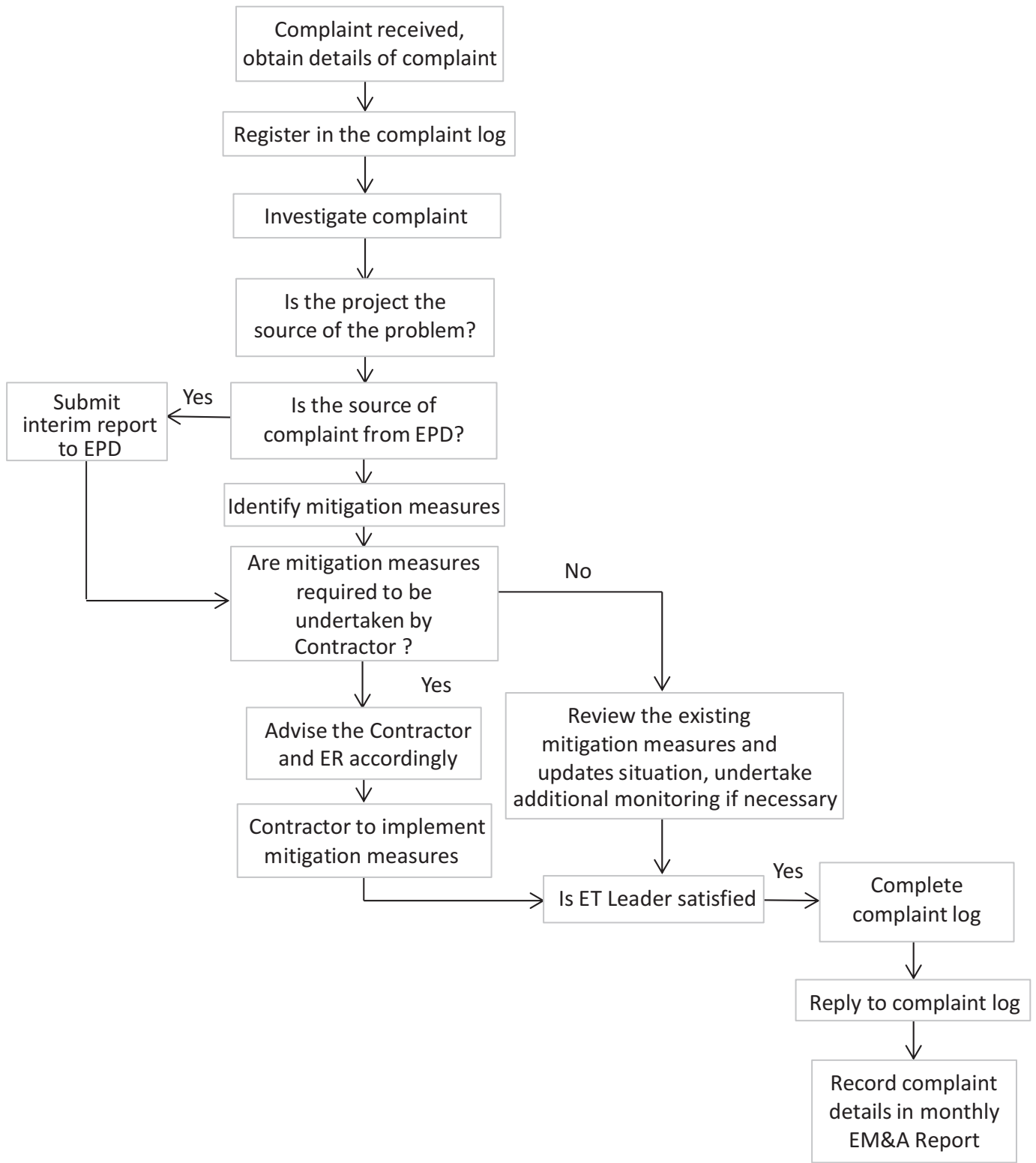


Figure 2.5 Environmental Complaint Handling Procedure

**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:

June 2014**Marine Works**

- Marine piling platform installation;
- Marine Piling at Viaduct B & E;
- Construction of rockfill platform at Viaduct D landing; and
- Additional marine ground investigation (GI) and laboratory.

**Land-based Works**

- Construction of pile cap superstructure of Viaduct B;
- Fence installation and relocation of Works Area 2, Viaduct A, B, C & D;
- Land Piling at Viaduct B;
- Piling platform installation for Viaduct B, D and E;
- Additional land GI, trial pits & lab testing;
- Utility surveys; and
- Slope work of Slope 9SE-B/C8, 9SE-B/C9 & 9SE-B/F9.
- 

July 2014**Marine Works**

- Construction of Pile caps at Viaduct B;
- Marine piling platform installation;
- Marine Piling at Viaduct B & E;
- Construction of rockfill platform at Viaduct D landing; and
- Additional marine ground investigation (GI) and laboratory testing.

**Land-based Works**

- Construction of pile cap superstructure of Viaduct B;
- Fence installation and relocation of Works Area 2, Viaduct A, B, C & D;
- Land Piling at Viaduct B;
- Piling platform installation for Viaduct B, C, D and E;
- Additional land GI, trial pits & lab testing;
- Utility surveys; and
- Slope work of Slope 9SE-B/C8, 9SE-B/C9 & 9SE-B/F9.

August 2014**Marine Works**

- Construction of Pile caps at Viaduct B;
- Marine piling platform installation;
- Marine Piling at Viaduct B, D & E;
- Construction of rockfill platform at Viaduct D landing; and
- Additional marine ground investigation (GI) and laboratory testing.

***Land-based Works***

- Construction of pile cap superstructure of Viaduct B;
- Fence installation and relocation of Works Area 2, Viaduct A, B, C & D;
- Land Piling at Viaduct B;
- Piling platform installation for Viaduct B, C, D and E;
- Additional land GI, trial pits & lab testing;
- Utility surveys; and
- Slope work of Slope 9SE-B/C8, 9SE-B/C9 & 9SE-B/F9.

**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 marine ecology (include dolphin monitoring and post-translocation coral 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

This Second Quarterly EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 March to 31 May 2014, in accordance with the Updated EM&A Manual and the requirements of EP-354/2009/B.

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

A total of 31 groups of 103 Chinese White Dolphin sightings were recorded during the six sets of surveys from March 2014 to May 2014. Whilst two Action Level exceedances were recorded for the quarterly dolphin monitoring data between March and May 2014, no unacceptable impact from the construction activities of the TM-CLKL Southern Connection Viaduct Section on Chinese White Dolphins was noticeable from general observations. Although the dolphins infrequently occurred along the alignment of TM-CLKL Southern Connection Viaduct Section in the past and during the baseline monitoring period, it is apparent that dolphin usage has been significantly reduced in NEL. It is critical to monitor the dolphin usage in North Lantau region in the upcoming quarters, to determine whether the dolphins are continuously affected by the various construction activities in relation to the construction works of the Contract, and whether suitable mitigation measure can be applied to improve the situation.

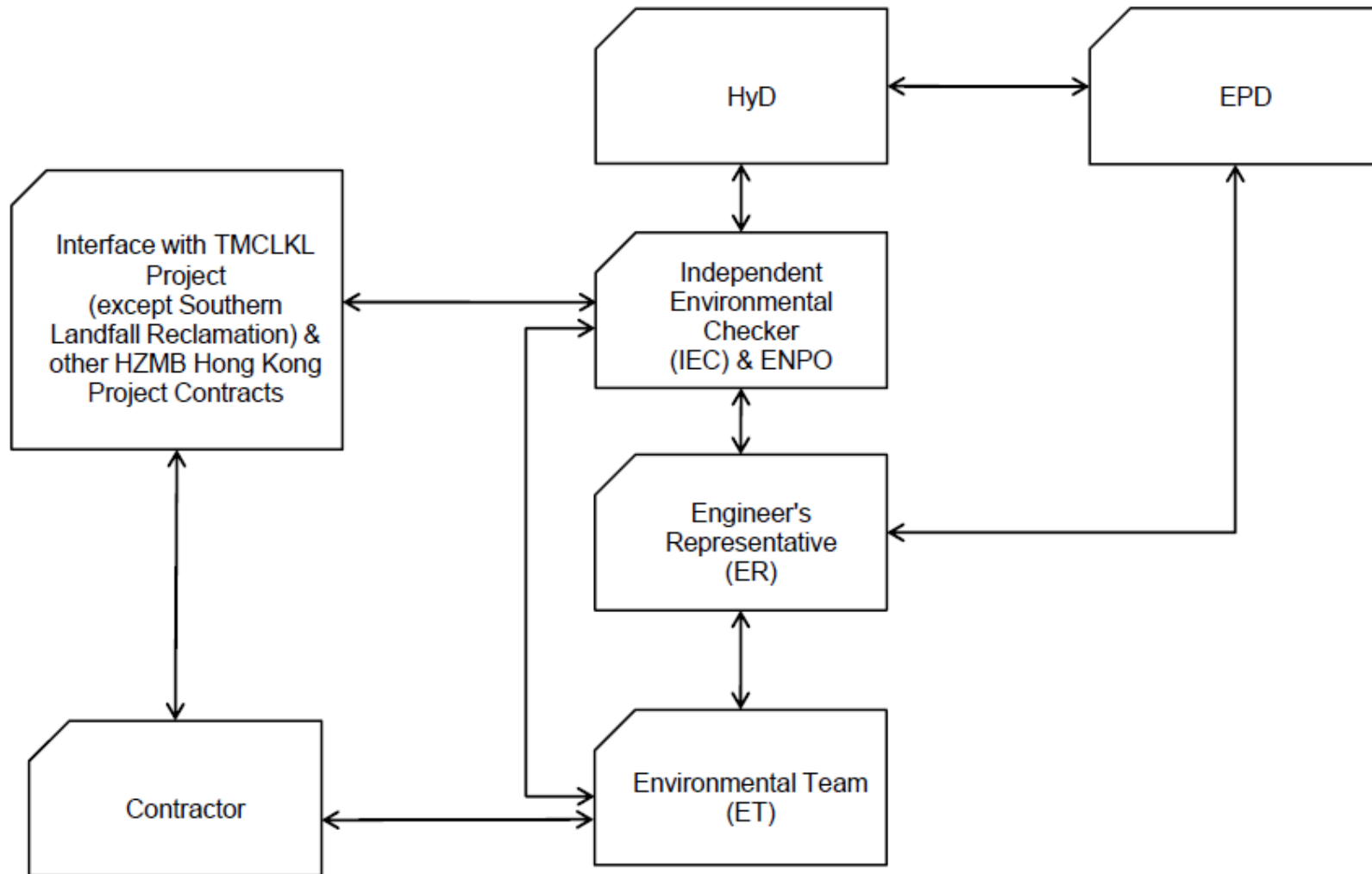
Environmental site inspection was carried out thirteen (13) times in the reporting period. Recommendations on remedial actions were given to the Contractor for the deficiencies identified during the site audits.

No summons/ prosecution were received during the reporting period.

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

Appendix A

## Project Organization for Environmental Works



↔ Line of Communication

Appendix B

## Construction Programme for the Reporting Quarter



















Activity ID	Activity Name	Orig. Dur.	Act. Start / FC Early Start	Physical % Complete	Duration % Complete	Rem. Dur.	Act. Finish / FC Early Finish	Late Start	Late Finish	Total Float	Free Float	2014												
												March			April			May			June			
												24	03	10	17	24	31	07	14	21	28	05	12	19
ARDD0624	Preparation of Waterworks, Drainage & Utility DDA - BP20.01	40	16-May-14	0%	0%	40	11-Jul-14	25-Jun-14	19-Aug-14	27	0													
<b>Viaduct Approach Ramp Retaining Walls</b>																								
<b>Approach Ramp D</b>																								
ARDD0648	Approach D - Receipt of Topographic and Utility Survey	0		0%	0%	0	01-May-14		25-Jul-14	61	3													
ARDD0649	Approach D - Preparation of Approach Ramp D AIP Submission - DP20.00	55	04-Nov-13 A	95%	95%	3	25-Mar-14	11-Jun-14	13-Jun-14	58	0													
ARDD0650	Approach D - IC/SO Approval of Approach Ramp D AIP - DP20.00	68	25-Mar-14	0%	0%	68	27-Jun-14	16-Jun-14	17-Sep-14	58	0													
ARDD0651	Approach D - Preparation of Approach Ramp D DDA Submission - DP20.04	30	06-May-14	0%	0%	30	17-Jun-14	28-Jul-14	05-Sep-14	58	0													
ARDD0652	Approach D - IC/SO Approval of Approach Ramp D DDA - DP20.04	75	17-Jun-14	0%	0%	75	30-Sep-14	08-Sep-14	19-Dec-14	58	0													
<b>Approach Ramp C</b>																								
ARDD0654	Approach C - Receipt of Topographic and Utility Survey	0		0%	0%	0	17-Jun-14		17-Oct-14	88	0													
ARDD0655	Approach C - Preparation of Approach Ramp C AIP Submission -DP20.00 Update	30	21-Mar-14	0%	0%	30	01-May-14	28-Jul-14	05-Sep-14	91	0													
ARDD0656	Approach C - IC/SO Approval of Approach Ramp C AIP -DP20.00	68	02-May-14	0%	0%	68	05-Aug-14	08-Sep-14	10-Dec-14	91	0													
ARDD0657	Approach C - Preparation of Approach Ramp C DDA Submission - DP20.03	30	17-Jun-14	0%	0%	30	29-Jul-14	20-Oct-14	28-Nov-14	88	0													
<b>Approach Ramp B</b>																								
ARDD0660	Approach B - Receipt of Topographic and Utility Survey	0		0%	0%	0	01-May-14		03-Jun-14	23	3													
ARDD0661	Approach B - Preparation of Approach Ramp B AIP Submission - DP20.00 Update	55	09-Dec-13 A	95%	95%	3	25-Mar-14	18-Apr-14	22-Apr-14	20	0													
ARDD0662	Approach B - IC/SO Approval of Approach Ramp B AIP -DP20.00	68	25-Mar-14	0%	0%	68	27-Jun-14	23-Apr-14	25-Jul-14	20	0													
ARDD0663	Approach B - Preparation of Approach Ramp B DDA Submission -DP20.02	30	06-May-14	0%	0%	30	17-Jun-14	04-Jun-14	15-Jul-14	20	0													
ARDD0664	Approach B - IC/SO Approval of Approach Ramp B DDA -DP20.02	75	17-Jun-14	0%	0%	75	30-Sep-14	16-Jul-14	28-Oct-14	20	0													
<b>Approach A</b>																								
ARDD0666	Approach A - Receipt of Topographic and Utility Survey	0		0%	0%	0	17-Jun-14		30-Oct-14	97	0													
ARDD0667	Approach A - Preparation of Approach Ramp A AIP Submission -DP20.00 Update	30	21-Mar-14	0%	0%	30	01-May-14	08-Aug-14	18-Sep-14	100	0													
ARDD0668	Approach A - IC/SO Approval of Approach Ramp AAIP -DP20.00	68	02-May-14	0%	0%	68	05-Aug-14	19-Sep-14	23-Dec-14	100	0													
ARDD0669	Approach A - Preparation of Approach Ramp A DDA Submission -DP20.01	30	17-Jun-14	0%	0%	30	29-Jul-14	31-Oct-14	11-Dec-14	97	0													
<b>Approach F</b>																								
ARDD0672	Approach F - Receipt of Topographic and Utility Survey	0		0%	0%	0	17-Jun-14		29-Sep-14	74	7													
ARDD0673	Approach F - Preparation of Approach Ramp F AIP Submission -DP21.00 Update	40	21-Mar-14	0%	0%	40	15-May-14	24-Jun-14	18-Aug-14	67	0													
ARDD0674	Approach F - IC/SO Approval of Approach Ramp F AIP -DP21.00	68	16-May-14	0%	0%	68	19-Aug-14	19-Aug-14	20-Nov-14	67	0													
<b>Viaduct Pavement</b>																								
ARDD865	Viaduct Pavement - Preparation of AIP Submission - BP02.00	20	25-Mar-14*	0%	0%	20	22-Apr-14	21-May-14	17-Jun-14	40	0													
ARDD867	Viaduct Pavement - IC/SO Approval of AIP - BP02.00	68	22-Apr-14	0%	0%	68	25-Jul-14	18-Jun-14	19-Sep-14	40	0													
<b>Signs, Markings and Street Furniture</b>																								
ARDD0683	IC/SO Approval of Signs, Markings & Street Furniture AIP - BP03.00	68	21-Mar-14	0%	0%	68	24-Jun-14	05-Jun-14	08-Sep-14	54	0													
<b>Landscape</b>																								
ARDD0691	Confirm Acceptance of Reference Design LVIA	0		0%	0%	0	21-Mar-14		20-Nov-14	175	0													
ARDD0692	Prepare Outline Planting Plans	20	21-Mar-14	0%	0%	20	17-Apr-14	21-Nov-14	18-Dec-14	175	0													
ARDD0693	Prepare Outline Irrigation Plans	20	21-Mar-14	0%	0%	20	17-Apr-14	21-Nov-14	18-Dec-14	175	0													
ARDD0694	Preparation of AIP Submission for landscape works	10	18-Apr-14	0%	0%	10	01-May-14	19-Dec-14	01-Jan-15	175	0													
ARDD0695	Updated LVIA Submission to Gov't Depts	10	02-May-14	0%	0%	10	15-May-14	02-Jan-15	15-Jan-15	175	0													
ARDD0696	IC/SO Approval of AIP for landscape works - BP22.00	68	16-May-14	0%	0%	68	19-Aug-14	16-Jan-15	21-Apr-15	175	0													
<b>Remaining Works</b>																								
ARDD0704	Preparation of Remaining Works AIP - ZP01.00	30	29-May-14	0%	0%	30	09-Jul-14	22-Aug-14	02-Oct-14	61	0													
<b>Segment Target Geometry And Erection Engineering</b>																								
<b>Viaduct B</b>																								
ARDD0712	Viaduct B - Erection Sequence Analysis	20	17-Jan-14 A	70%	70%	6	28-Mar-14	02-Apr-14	10-Apr-14	8	0													
ARDD0713	Viaduct B - Target Geometry Analysis	20	10-Feb-14 A	70%	70%	6	28-Mar-14	02-Apr-14	10-Apr-14	8	0													
ARDD0714	Viaduct B - Segment Geometry Schedules	10	10-Feb-14 A	70%	70%	3	25-Mar-14	07-Apr-14	10-Apr-14	11	3													

■ Actual Work  
■ Planned Bar  
■ Critical Bar  
◆ Milestone

Project ID: J3518DWPPrD-U05  
 Layout: J3518-DWP-3MRP submission  
 Filter: TASK filters: 3-Month Lookahead, No Level of Effort, TCSS Design Excluded.

**Tuen Mun - Chek Lap Kok Link - Southern Connection**  
**3-Month Rolling Programme (Page 8 of 18 Pages)**  
**(Progress as of 21-Mar-14)**

Date	Revision	Checked	Approved
21-Mar-14		HW	

**DWG. No.:**  
**J3518/GCL/PGM/3MRP-M10**





Activity ID	Activity Name	Orig. Durn.	Act. Start / FC Early Start	Physical % Complete	Duration % Complete	Rem. Durn.	Act. Finish / FC Early Finish	Late Start	Late Finish	Total Float	Free Float	2014																																					
												March				April				May				June																									
												24	03	10	17	24	31	07	14	21	28	05	12	19	26	02	09	16																					
<b>Deck Segment Installation Equipment</b>																																																	
<b>Launching Gantry 1</b>																																																	
PR60078-2	Launching Gantry 1 Design	122	13-Feb-14 A	30%	30%	85	14-Jun-14	16-Jan-14	11-Apr-14	-64	31																																						
PR60078-4	Launching Gantry 1 Fabrication	151	03-Apr-14	0%	0%	151	31-Aug-14	29-Jan-14	29-Jun-14	-64	0																																						
<b>Lifting Frames</b>																																																	
PR60098	Lifting Frame Technical Specs & Order	76	22-Apr-14	0%	0%	76	06-Jul-14	14-Mar-14	28-May-14	-39	0																																						
<b>Unloading Gantries</b>																																																	
PR60103	Unloading Gantries Procurement Review & Order	32	21-Mar-14	0%	0%	32	21-Apr-14	10-Feb-14	13-Mar-14	-39	0																																						
<b>Type 1</b>																																																	
PR60104	Unloading Gantry Type 1 Design	122	22-Apr-14	0%	0%	122	21-Aug-14	29-Aug-14	28-Dec-14	129	0																																						
PR60106	Unloading Gantry Type 1 Fabrication	185	22-May-14	0%	0%	185	22-Nov-14	07-Feb-15	10-Aug-15	261	0																																						
<b>Type 2</b>																																																	
PR60110	Unloading Gantry Type 2 Design	122	15-Jun-14	0%	0%	122	14-Oct-14	22-Oct-14	20-Feb-15	129	0																																						
<b>Type 3 &amp; 4</b>																																																	
PR60116	Unloading Gantry Type 3 & 4 Design	122	13-Feb-14 A	30%	30%	85	14-Jun-14	21-Nov-14	14-Feb-15	245	52																																						
PR60118	Unloading Gantry Type 3 & 4 Fabrication	185	21-Mar-14	0%	0%	185	21-Sep-14	21-Nov-14	24-May-15	245	0																																						
<b>Deck Segments &amp; Precast Pile Cap Shells</b>																																																	
<b>Preliminaries</b>																																																	
MBBC0010	Set Up Pile Cap Shell Casting Yard & Beds etc	161	02-Dec-13 A	90%	90%	16	10-Apr-14	03-Apr-14	26-Apr-14	12	0																																						
MBBC0012	Pile Cap Shell Mould Design (M1 & M2)	42	02-Dec-13 A	30%	30%	29	29-Apr-14	13-Jul-18	16-Aug-18	1275	1275																																						
MBBC0014	Pile Cap Shell Mould Fabrication & Erection (M1 & M2)	55	02-Dec-13 A	30%	30%	39	12-May-14	08-Mar-14	26-Apr-14	-11	0																																						
MBBE0010	Set Up Precast Segment Casting Yard & Beds etc	176	15-Oct-13 A	70%	70%	53	28-May-14	08-Apr-14	14-Jun-14	14	77																																						
MBBE0012	Precast Segment Mould Design (Viaduct B)	42	15-Oct-13 A	30%	30%	29	29-Apr-14	04-Jan-14	10-Feb-14	-62	0																																						
MBBE0014	Precast Segment Mould Fabrication & Erection (Viaduct B)	52	29-Apr-14	0%	0%	52	03-Jul-14	11-Feb-14	12-Apr-14	-62	0																																						
MBBE0018	Precast Segment Mould Design (Viaduct E5, E6, E7 & E8)	42	15-Oct-13 A	30%	30%	29	29-Apr-14	16-May-14	20-Jun-14	43	0																																						
MBBE0020	Precast Segment Mould Fabrication & Erection (Viaduct E5, E6, E7 & E8)	52	29-Apr-14	0%	0%	52	03-Jul-14	21-Jun-14	21-Aug-14	43	65																																						
MBBE0024	Precast Segment Mould Design (Viaduct E2)	42	15-Oct-13 A	30%	30%	29	29-Apr-14	22-Jul-14	25-Aug-14	97	0																																						
MBBE0026	Precast Segment Mould Fabrication & Erection (Viaduct E2)	52	29-Apr-14	0%	0%	52	03-Jul-14	25-Aug-14	28-Oct-14	97	48																																						
MBBE0030	Precast Segment Mould Design (Viaduct E1)	42	30-May-14	0%	0%	42	19-Jul-14	05-Jul-14	22-Aug-14	29	0																																						
MBBE0036	Precast Segment Mould Design (Viaduct D)	42	30-May-14	0%	0%	42	19-Jul-14	30-Aug-14	21-Oct-14	77	0																																						
<b>Viaduct B</b>																																																	
<b>Precast Pile Caps</b>																																																	
MBBC0120	B: Commence Pile Cap Shell Casting on Approval of DDA	0	12-May-14	0%	0%	0		27-Apr-14		-15	0																																						
<b>General</b>																																																	
<b>H-Piles</b>																																																	
PP7390	Procurement of Viaduct D Socketted H-Piles	70	21-Mar-14	0%	0%	70	18-Jun-14	17-May-14	09-Aug-14	44	24																																						
<b>Reinforcement</b>																																																	
<b>Bored Piles</b>																																																	
PP7020	Rebar - Cut, Bend & Fabricate Pile Cage for Viaduct B Piles	24	14-Jan-14 A	100%	100%	0	20-Mar-14 A																																										
PP7100	Rebar - Cut, Bend & Fabricate Pile Cage for Viaduct E5 & E6 Piles	145	03-Jun-14	0%	0%	145	24-Nov-14	24-Jun-14	13-Dec-14	18	62																																						
PP7170	Rebar - Cut, Bend & Fabricate Pile Cage for Viaduct E7 & E8 Piles	60	03-Jun-14	0%	0%	60	13-Aug-14	25-Apr-14	09-Jul-14	-30	62																																						
PP7240	Rebar - Cut, Bend & Fabricate Pile Cage for Viaduct E2 Piles	106	21-Mar-14	0%	0%	106	31-Jul-14	17-Mar-14	26-Jul-14	-4	10																																						
PP7310	Rebar - Cut, Bend & Fabricate Pile Cage for Viaduct E1 Piles	36	14-Feb-14 A	85%	85%	5	27-Mar-14	28-Jul-14	02-Aug-14	102	43																																						
PP7380	Rebar - Cut, Bend & Fabricate Pile Cage for Viaduct D Piles	25	21-Mar-14	0%	0%	25	23-Apr-14	17-May-14	16-Jun-14	43	23																																						
PP7460	Rebar - Cut, Bend & Fabricate Pile Cage for Viaduct C Piles	46	29-May-14	0%	0%	46	24-Jul-14	22-Aug-14	18-Oct-14	71	0																																						
<b>Marine Pile Caps</b>																																																	
PP7040	Rebar - Cut, Bend & Fabricate for Viaduct B Marine Pile Caps	30	15-Feb-14 A	96%	96.67%	1	21-Mar-14	24-Jul-14	25-Jul-14	99	0																																						

<ul style="list-style-type: none"> <li><span style="color: blue;">■</span> Actual Work</li> <li><span style="color: green;">■</span> Planned Bar</li> <li><span style="color: red;">■</span> Critical Bar</li> <li>◆ Milestone</li> </ul>	Project ID: J3518DWPPrD-U05 Layout: J3518-DWP-3MRP submission Filter: TASK filters: 3-Month Lookahead, No Level of Effort, TCSS Design Excluded.	<b>Tuen Mun - Chek Lap Kok Link - Southern Connection</b> <b>3-Month Rolling Programme (Page 10 of 18 Pages)</b> <b>(Progress as of 21-Mar-14)</b>	Date 21-Mar-14	Revision	Checked HW	Approved	<b>DWG. No.:</b>  <b>J3518/GCL/PGM/3MRP-M10</b>
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Activity ID	Activity Name	Orig. Durn.	Act. Start / FC Early Start	Physical % Complete	Duration % Complete	Rem. Durn.	Act. Finish / FC Early Finish	Late Start	Late Finish	Total Float	Free Float	2014															
												March				April				May				June			
												24	03	10	17	24	31	07	14	21	28	05	12	19	26	02	09
<b>Pier E13</b>																											
<b>E13 (E5cE6c)</b>																											
GFXX093	E13B (E5c/E6c, Dolphin E5c) - Inst.Temp.Working Platform	28	21-Mar-14	0%	0%	28	26-Apr-14	05-Mar-14	07-Apr-14	-14	0																
GFXX094	E13B (E5c/E6c Dolphin E5c) - Predrilling (11 nos)	14	28-Apr-14	0%	0%	14	15-May-14	08-Apr-14	26-Apr-14	-14	76																
<b>Approach from Lantau</b>																											
<b>Viaduct A</b>																											
<b>Viaduct A Foundation Works</b>																											
<b>Viaduct A - Marine Foundation</b>																											
<b>Pier A1 (A2e)</b>																											
GFXX142	A01 (A2e) - Inst.Temp.Working Platform	15	23-Apr-14	0%	0%	15	12-May-14	13-Mar-15	31-Mar-15	266	0																
GFXX143	A01 (A2e) - Pre-drilling (3 nos)	15	13-May-14	0%	0%	15	29-May-14	31-Mar-15	22-Apr-15	266	0																
GFXX144	A01 (A2e) - Bored Piles (1.80m dia. x 3 nos)	88	30-May-14	0%	0%	88	12-Sep-14	22-Apr-15	07-Aug-15	266	0																
<b>Viaduct A - Land Foundation - North Lantau</b>																											
<b>Preliminary Works for Land Piling</b>																											
<b>Milestones</b>																											
ZA10010	MTR approval of protection measures	0		0%	0%	0	21-Mar-14		11-Dec-14	216	82																
<b>Socketted H-Pile Installation (38nos.; 1no. Rig)</b>																											
<b>Pier A11 (A1a) (Workfront no. Awf1)</b>																											
ZA20020	A9 (A1c) to Abutment A - Approval of TTMS	0		0%	0%	0	20-Jun-14		18-Jun-14	-2	0																
ZA20030	A9 (A1c) to Abutment A - Implement TTMS along north side of NLH E/B	2	20-Jun-14	0%	0%	2	21-Jun-14	18-Jun-14	20-Jun-14	-2	0																
<b>Viaduct B</b>																											
<b>Viaduct B Foundation Works</b>																											
<b>Viaduct B - Marine Foundation</b>																											
<b>Milestones</b>																											
GFXX152-1	B07 (B2f) - Fnds start date for piling	0	05-Jun-14	0%	0%	0		10-Apr-14		-42	0																
GFXX157-1	B06 (B3a) - Fnds start date for piling	0	19-May-14	0%	0%	0		11-Apr-14		-27	0																
GFXX162-1	B05 (B3b) - Fnds start date for piling	0	23-Apr-14	0%	0%	0		10-Apr-14		-8	0																
GFXX167-1	B04 (B3c) - Fnds start date for piling	0	14-Apr-14	0%	0%	0		26-Apr-14		9	0																
GFXX170-1	B04 (B3c) - Completion of piling works	0		0%	0%	0	20-Jun-14		30-Jun-14	9	0																
GFXX172-1	B03 (B3d) - Fnds start date for piling	0	07-Apr-14	0%	0%	0		15-Feb-14		-42	0																
GFXX177-1	B02 (B3e) - Fnds start date for piling	0	10-Mar-14 A	100%	100%	0																					
GFXX180-1	B02 (B3e) - Completion of piling works	0		0%	0%	0	26-May-14		11-Jul-14	38	0																
GFXX182-1	B01 (B3f) - Fnds start date for piling	0	28-Feb-14 A	100%	100%	0																					
GFXX185-1	B01 (B3f) - Completion of piling works	0		0%	0%	0	14-May-14		04-Jun-14	17	0																
<b>Pier B1 (B3f)</b>																											
GFXX182	B01 (B3f) - Pre-drilling (3 nos)	10	18-Feb-14 A	100%	100%	0	27-Feb-14 A																				
GFXX183	B01 (B3f) - Bored Piles (1.80m dia. x 3 nos)	45	28-Feb-14 A	80%	46.67%	24	22-Apr-14	11-Apr-14	15-May-14	17	0																
GFXX184	B01 (B3f) - Sonic & Interface Coring	12	23-Apr-14	0%	0%	12	08-May-14	15-May-14	29-May-14	17	0																
GFXX185	B01 (B3f) - Demob from platform	4	09-May-14	0%	0%	4	13-May-14	29-May-14	04-Jun-14	17	0																
<b>Pier B2 (B3e)</b>																											
GFXX176	B02 (B3e) - Inst.Temp.Working Platform	10	14-Feb-14 A	100%	100%	0	26-Feb-14 A																				
GFXX177	B02 (B3e) - Predrilling (2 nos)	8	04-Mar-14 A	100%	100%	0	07-Mar-14 A																				
GFXX178	B02 (B3e) - Bored Piles (2.20m dia. x 2 nos)	45	10-Mar-14 A	32%	24.44%	34	05-May-14	01-Mar-14	11-Apr-14	-17	0																
GFXX179	B02 (B3e) - Sonic & Interface Coring	12	07-May-14	0%	0%	12	20-May-14	21-Jun-14	07-Jul-14	38	0																
GFXX180	B02 (B3e) - Demob from platform	4	21-May-14	0%	0%	4	24-May-14	07-Jul-14	11-Jul-14	38	0																
<b>Pier B3 (B3d)</b>																											
GFXX171	B03 (B3d) - Inst.Temp.Working Platform	10	14-Mar-14 A	50%	50%	5	26-Mar-14	28-Jan-14	06-Feb-14	-42	0																

Actual Work  
 Planned Bar  
 Critical Bar  
 Milestone

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 Layout: J3518-DWP-3MRP submission  
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**Tuen Mun - Chek Lap Kok Link - Southern Connection**  
**3-Month Rolling Programme (Page 14 of 18 Pages)**  
**(Progress as of 21-Mar-14)**

Date	Revision	Checked	Approved
21-Mar-14		HW	

**DWG. No.:**  
**J3518/GCL/PGM/3MRP-M10**













Appendix C

# Environmental Mitigation and Enhancement Measure Implementation Schedules

(Adopted from: CINOTECH (2011) Agreement No.  
CE35/2011 EP Baseline Environmental Monitoring for  
Hong Kong-Zhuhai-Macao Bridge Tuen Mun-Chep 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 off site 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			✓
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 3,600m2 in an area where fishing activities are prohibited.	Area of prohibited fishing activities/Detailed Design/towards end of construction period	TM-CLKL/ HKBCF Design Consultant/ TM-CLKL/ HKBCF Contractor	TMEIA	Y		Y	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 (donar site) and Yam Tsui Wan (receptor site) /Detailed Design/Prior to construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
8.15	6.5	Audit coral translocation success	Yam Tsui Wan (receptor site)/Post translocation	Contractor	TMEIA		Y		✓
7.13	6.5	Undertaken gabion wall works in Stream NL1 in the dry season	North Lantau slope works/dry	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	
			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		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 prior to undertaking any works adjacent to all retained trees, including trees in contractor's works areas. (Tree	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	
		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		✓
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/ Contractor	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		n/a
10.9	7.6	Ensure no run-off into water body adjacent to the Project Area (CM7)	All areas/ detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		<>
10.9	7.6	Avoidance of excessive height and bulk of buildings and structures (CM8)	All areas/ detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
10.9	7.6	Recycle/Reuse all felled trees and vegetation, e.g. mulching (CM9)	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	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	AFCD/HyD/ LCSD
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	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	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 (OM4)	All areas/detailed design/ during construction / during operation	Design Consultant/ Contractor	TMEIA	Y	Y	Y	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	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	Contract mobilisation	Contractor	TMEIA, Works		Y		✓

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
		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.			Branch Technical Circular No. 5/99 for the Trip-ticket System for Disposal of Construction and Demolition Material				
12.6		The Contractor shall apply for and obtain the appropriate licenses for the disposal of public fill, chemical waste and effluent discharges.	Contract mobilisation	Contractor	TMEIA, Land (Miscellaneous Provisions) Ordinance (Cap 28); Waste Disposal Ordinance (Cap 354); Dumping at Sea Ordinance (Cap 466); Water Pollution Control Ordinance.		Y		✓
12.6	8.1	Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedures including waste reduction, reuse and recycling.	Contract Mobilisation	Contractor	TMEIA		Y		✓
12.6	8.1	The extent of cutting operation should be optimised where possible. Earth retaining structures and bored pile walls should be proposed to minimise the extent of cutting.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	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		✓

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
12.6	8.1	Provisions to be made in contract documents to allow and promote the use of recycled aggregates where appropriate.	Detailed Design	Design Consultant	TMEIA	Y			✓
12.6	8.1	The Contractor shall be prohibited from disposing of C&D materials at any sensitive locations. The Contractor should propose the final disposal sites in the EMP and WMP for approval before implementation.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Stockpiled material shall be covered by tarpaulin and /or watered as appropriate to prevent windblown dust/ surface run off.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Excavated material in trucks shall be covered by tarpaulins to reduce the potential for spillage and dust generation.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Wheel washing facilities shall be used by all trucks leaving the site to prevent transfer of mud onto public roads.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Standard formwork or pre-fabrication should be used as far as practicable so as to minimise the C&D materials arising. The use of more durable formwork/plastic facing for construction works should be considered. The use of wooden hoardings should be avoided and metal hoarding should be used to facilitate recycling. Purchasing of construction materials should avoid over-ordering and wastage.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
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	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	
		scrap steel mills. Different areas of the sites should be considered for segregation and storage activities.							
12.6	8.1	All falsework will be steel instead of wood.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	<p>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:</p> <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> <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>	All areas / throughout construction period	Contractor	TMEIA		Y		<>
12.6	8.1	Waste oils, chemicals or solvents shall not be disposed of to drain,	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	
			construction period						
12.6	8.1	Adequate numbers of portable toilets should be provided for on-site workers. Portable toilets should be maintained in reasonable states, which will not deter the workers from utilising them.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Night soil should be regularly collected by licensed collectors.	All areas / throughout construction period	Contractor	TMEIA		Y		n/a
12.6	8.1	General refuse arising on-site should be stored in enclosed bins or compaction units separately from C&D and chemical wastes. Sufficient dustbins shall be provided for storage of waste as required under the Public Cleansing and Prevention of Nuisances By-laws. In addition, general refuse shall be cleared daily and shall be disposed of to the nearest licensed landfill or refuse transfer station. Burning of refuse on construction sites is prohibited.	All areas / throughout construction period	Contractor	TMEIA		Y		<>
12.6	8.1	All waste containers shall be in a secure area on hardstanding;	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Office wastes can be reduced by recycling of paper if such volume is sufficiently large to warrant collection. Participation in a local collection scheme by the Contractor should be advocated. Waste separation facilities for paper, aluminium cans, plastic bottles, etc should be provided on-site.	Site Offices/ throughout construction period	Contractor	TMEIA		Y		<>
12.6	Section 8	EM&A of waste handling, storage, transportation, disposal procedures and documentation through	All areas / throughout	Contractor	EM&A Manual		Y		<>



EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
		the site audit programme shall be undertaken.	construction period						
<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

Remark:

- ✓ 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

## **Proforma for Construction Phase EM&A Programme**

Ref: \_\_\_\_\_

### COMPLAINT LOG

Log Ref.	Date / Location	Complainant/ Date of Contract	Details of Complaint	Investigation / Mitigation Action	File Closed

Filed by Environmental Team Leader: \_\_\_\_\_

Date: \_\_\_\_\_

Ref: \_\_\_\_\_

### IMPLEMENTATION SCHEDULE

EIA Ref*	EM&A Log Ref	Environmental Protection Measures*	Location/ Timing	Implementation Agent	Implementation Stages**			
					Des	C	O	Dec

\* All recommendations and requirements resulted during the Course of EIA/EA Process, including ACE and / or accepted public comment to the proposed project

\*\* Des- Design, C-Construction,O-Operation, Dec- Decommissioning

Signed by Project Proponent: \_\_\_\_\_

Date: \_\_\_\_\_



Ref: \_\_\_\_\_

### IMPLEMENTATION STATUS PROFORMA

Ref**	Environmental Protection Measures*	Implementation Status

\* All recommendations and requirements resulted during the Course of EIA/EA Process, including ACE and / or accepted public comment to the proposed project

\*\* EIA Ref / EM&A Log Ref / Design Document Ref

Signed by Environmental Team Leader: \_\_\_\_\_ Date: \_\_\_\_\_

Audited by Independent Environment Checker: \_\_\_\_\_ Date: \_\_\_\_\_

Ref: \_\_\_\_\_

### DATA RECOVERY SCHEDULE

Date	Air Quality Monitoring									Noise Monitoring						
	Monitoring Station*									Monitoring Station*						
	A02	A06	A07	A21	A24	A34	A36	A40	A42	R2	R5	R7	R14	R16	R21	R24
1																
2																
3																
4																
5																
6																
7																
8																
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27																
28																
29																
30																
31																
% of R																

\* Research type of parameters  
 % of R The percentage of Data Recovery is the natural monitoring over the scheduled monitoring

Signed by Environmental Team Leader: \_\_\_\_\_

Date: \_\_\_\_\_

Ref: \_\_\_\_\_

### SITE INSPECTION PROFORMA

Date	Location	Req t Ref.*	Observation / Deficiency	Mitigation Action** (Responsible Agency)	Date*** of Confirmation

\* EIA Ref / EM&A Log Ref / Design Document Ref / Environmental Protection Contract Clause

\*\* Specific Environmental Mitigation Measures should be stated, such as, equipment, processes, systems, practices or technologies

\*\*\* The required completion date to confirm the specified Environmental Protection Action

This Proforma is an Environmental Protection Instruction for: \_\_\_\_\_ Date: \_\_\_\_\_

Signed by Environmental Team Leader: \_\_\_\_\_ Date: \_\_\_\_\_

Ref: \_\_\_\_\_

### PROACTIVE ENVIRONMENTAL PROTECTION PROFORMA

Ref*	Proposed Construction Method*	Location/ Working Period	Anticipated Impacts	Recommended Mitigation Measures

\* EIA Ref / EM&A Log Ref / Design Ref

\*\* Details of equipment, vehicles, plants, processes, technologies for the option of construction method

Signed by Environmental Team Leader: \_\_\_\_\_ Date: \_\_\_\_\_

Audited by Independent Environment Checker: \_\_\_\_\_ Date: \_\_\_\_\_



Ref: \_\_\_\_\_

### REGULATORY COMPLIANCE PROFORMA

Ref*	Environmental License / Permit*	Control Area / Facility / Location	Effective Date

\* Name of Applicant, Business Corporation, relevant regulation and remark of license / permit conditions

\*\* File reference of the licensee / permittee

Signed by Environmental Team Leader:

\_\_\_\_\_

Date:

\_\_\_\_\_

Audited by Independent Environment Checker:

\_\_\_\_\_

Date:

\_\_\_\_\_

Appendix D

## Summary of Action and Limit Levels

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

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

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

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

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

Parameter	Action Level#	Limit Level#
DO in mg/L <sup>(a)</sup>	<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 <sup>(b), (c)</sup> )	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 mg/L (Depth-averaged <sup>(b), (c)</sup> )	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 Marine Water Quality Monitoring (WQM) Schedule (Mar 14)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						01-Mar
						<b>WQM</b> Mid-Ebb 13:17 (11:29 - 14:59) Mid-Flood 18:54 (17:09 - 20:39)
02-Mar	03-Mar	04-Mar	05-Mar	06-Mar	07-Mar	08-Mar
		<b>WQM</b> Mid-Flood 9:00 (07:15 - 10:45) Mid-Ebb 15:09 (13:24 - 16:54)		<b>WQM</b> Mid-Flood 9:56 (08:11 - 11:41) Mid-Ebb 16:35 (14:50 - 18:20)		<b>WQM</b> Mid-Flood 11:00 (09:15 - 12:45) Mid-Ebb 18:27 (16:42 - 20:12)
09-Mar	10-Mar	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar
		<b>WQM</b> Mid-Ebb 10:13 (09:25 - 11:05) Mid-Flood 14:53 (13:08 - 16:38)		<b>WQM</b> Mid-Ebb 11:36 (09:51 - 13:21) Mid-Flood 17:03 (15:18 - 18:48)		<b>WQM</b> Mid-Ebb 12:27 (10:42 - 14:12) Mid-Flood 18:21 (16:36 - 20:06)
16-Mar	17-Mar	18-Mar	19-Mar	20-Mar	21-Mar	22-Mar
		<b>WQM</b> Mid-Flood 7:55 (06:10 - 09:40) Mid-Ebb 13:57 (12:12 - 15:42)		<b>WQM</b> Mid-Flood 8:50 (07:05 - 10:35) Mid-Ebb 15:08 (13:23 - 16:53)		<b>WQM</b> Mid-Flood 9:55 (08:10 - 11:40) Mid-Ebb 16:40 (14:55 - 18:25)
23-Mar	24-Mar	25-Mar	26-Mar	27-Mar	28-Mar	29-Mar
		<b>WQM</b> Mid-Ebb 8:39 (07:20 - 10:00) Mid-Flood 13:16 (11:31 - 15:01)		<b>WQM</b> Mid-Ebb 10:52 (09:07 - 12:37) Mid-Flood 16:05 (14:20 - 17:50)		<b>WQM</b> Mid-Ebb 12:16 (10:31 - 14:01) Mid-Flood 18:00 (16:15 - 19:45)
30-Mar	31-Mar					

**HY/2012/07 - Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Marine Water Quality Monitoring (WQM) Schedule (Apr 14)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01-Apr	02-Apr	03-Apr	04-Apr	05-Apr
		<b>WQM</b> Mid-Flood 7:46 (06:01 - 09:31) Mid-Ebb 14:04 (12:19 - 15:49)		<b>WQM</b> Mid-Flood 8:43 (06:57 - 10:27) Mid-Ebb 15:22 (13:37 - 17:07)		<b>WQM</b> Mid-Flood 9:41 (07:56 - 11:26) Mid-Ebb 16:48 (15:03 - 18:33)
06-Apr	07-Apr	08-Apr	09-Apr	10-Apr	11-Apr	12-Apr
		<b>WQM</b> Mid-Flood 7:26 (05:41 - 09:11) Mid-Ebb 20:03 (18:18 - 21:48)		<b>WQM</b> Mid-Ebb 10:34 (08:49 - 12:19) Mid-Flood 15:54 (14:09 - 17:39)		<b>WQM</b> Mid-Ebb 11:33 (09:48 - 13:18) Mid-Flood 17:28 (15:43 - 19:13)
13-Apr	14-Apr	15-Apr	16-Apr	17-Apr	18-Apr	19-Apr
		<b>WQM</b> Mid-Ebb 13:02 (11:17 - 14:47) Mid-Flood 19:31 (17:46 - 21:16)		<b>WQM</b> Mid-Flood 7:46 (06:01 - 09:31) Mid-Ebb 14:12 (12:27 - 15:57)		<b>WQM</b> Mid-Flood 8:53 (07:08 - 10:38) Mid-Ebb 15:36 (13:51 - 17:21)
20-Apr	21-Apr	22-Apr	23-Apr	24-Apr	25-Apr	26-Apr
		<b>WQM</b> Mid-Flood 11:29 (09:44 - 13:14) Mid-Ebb 18:35 (16:50 - 20:20)		<b>WQM</b> Mid-Ebb 9:39 (07:54 - 11:24) Mid-Flood 14:48 (13:03 - 16:33)		<b>WQM</b> Mid-Ebb 11:15 (09:30 - 13:00) Mid-Flood 17:01 (15:16 - 18:46)
27-Apr	28-Apr	29-Apr	30-Apr			
		<b>WQM</b> Mid-Ebb 13:06 (11:21 - 14:51) Mid-Flood 19:40 (17:55 - 21:25)				

**HY/2012/07 - Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Marine Water Quality Monitoring (WQM) Schedule (May14)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				01-May	02-May	03-May
				WQM Mid-Flood 7:37 (05:52 - 09:22) Mid-Ebb 14:22 (12:37 - 16:07)		WQM Mid-Flood 8:38 (06:53 - 10:23) Mid-Ebb 15:38 (13:53 - 17:23)
04-May	05-May	06-May	07-May	08-May	09-May	10-May
		WQM Mid-Flood 10:14 (08:29 - 11:59) Mid-Ebb 17:46 (16:01 - 19:31)		WQM Mid-Ebb 8:35 (06:50 - 10:20) Mid-Flood 13:27 (11:42 - 15:12)		WQM Mid-Ebb 10:27 (08:42 - 12:12) Mid-Flood 16:16 (14:31 - 18:01)
11-May	12-May	13-May	14-May	15-May	16-May	17-May
		WQM Mid-Ebb 12:04 (10:19 - 13:49) Mid-Flood 18:40 (16:55 - 20:25)		WQM Mid-Ebb 13:18 (11:33 - 15:03) Mid-Flood 20:15 (18:30 - 22:00)		WQM Mid-Flood 7:55 (06:10 - 09:40) Mid-Ebb 14:42 (12:57 - 16:27)
18-May	19-May	20-May	21-May	22-May	23-May	24-May
		WQM Mid-Flood 10:19 (08:34 - 12:04) Mid-Ebb 17:15 (15:30 - 19:00)		WQM Mid-Ebb 8:00 (06:15 - 09:45) Mid-Flood 13:11 (11:26 - 14:56)		WQM Mid-Ebb 10:05 (08:20 - 11:50) Mid-Flood 15:52 (14:07 - 17:37)
25-May	26-May	27-May	28-May	29-May	30-May	31-May
		WQM Mid-Ebb 12:11 (10:26 - 13:56) Mid-Flood 18:51 (17:06 - 20:36)		WQM Mid-Ebb 13:26 (11:41 - 15:11) Mid-Flood 20:23 (18:38 - 22:08)		WQM Mid-Flood 7:40 (05:55 - 09:25) Mid-Ebb 14:41 (12:56 - 16:26)

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Noise Monitoring Schedule (1 Mar to 31 Mar 2014)**

Noise Monitoring at the rooftop of Pak Mong Village Watch Tower

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

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Air Quality Monitoring Schedule (1 Mar to 31 Mar 2014)**

Air Quality Monitoring at WA4 and rooftop of Pak Mong Village Watch Tower

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						01-Mar
02-Mar	03-Mar	04-Mar	05-Mar	06-Mar	07-Mar	08-Mar
				1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>		
09-Mar	10-Mar	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar
			1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>			
16-Mar	17-Mar	18-Mar	19-Mar	20-Mar	21-Mar	22-Mar
		1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>				
23-Mar	24-Mar	25-Mar	26-Mar	27-Mar	28-Mar	29-Mar
	1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>				1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>	
30-Mar	31-Mar					

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Noise Monitoring Schedule (1 Apr to 30 Apr 2014)**

Noise Monitoring at the rooftop of Pak Mong Village Watch Tower

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01-Apr	02-Apr	03-Apr	04-Apr	05-Apr <i>public holiday</i>
				Noise Monitoring		
06-Apr	07-Apr	08-Apr	09-Apr	10-Apr	11-Apr	12-Apr
			Noise Monitoring			
13-Apr	14-Apr	15-Apr	16-Apr	17-Apr	18-Apr <i>public holiday</i>	19-Apr <i>public holiday</i>
		Noise Monitoring			Noise Monitoring	
20-Apr	21-Apr <i>public holiday</i>	22-Apr	23-Apr	24-Apr	25-Apr	26-Apr
				Noise Monitoring		
27-Apr	28-Apr	29-Apr	30-Apr			
			Noise Monitoring			

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Air Quality Monitoring Schedule (1 Apr to 30 Apr 2014)**

Air Quality Monitoring at WA4 and rooftop of Pak Mong Village Watch Tower

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01-Apr	02-Apr	03-Apr	04-Apr	05-Apr <i>public holiday</i>
				1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>		
06-Apr	07-Apr	08-Apr	09-Apr	10-Apr	11-Apr	12-Apr
			1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>			
13-Apr	14-Apr	15-Apr	16-Apr	17-Apr	18-Apr <i>public holiday</i>	19-Apr <i>public holiday</i>
		1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>			1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>	
20-Apr	21-Apr <i>public holiday</i>	22-Apr	23-Apr	24-Apr	25-Apr	26-Apr
				1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>		
27-Apr	28-Apr	29-Apr	30-Apr			
			1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>			

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.



**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Noise Monitoring Schedule (1 May to 31 May 2014)**

Noise Monitoring at the rooftop of Pak Mong Village Watch Tower

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

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Air Quality Monitoring Schedule (1 May to 31 May 2014)**

Air Quality Monitoring at WA4 and rooftop of Pak Mong Village Watch Tower

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				public holiday 01-May	02-May	03-May
04-May	05-May	public holiday 06-May	07-May	08-May	09-May	10-May
	1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>					1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>
11-May	12-May	13-May	14-May	15-May	16-May	17-May
					1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>	
18-May	19-May	20-May	21-May	22-May	23-May	24-May
				1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>		
25-May	26-May	27-May	28-May	29-May	30-May	31-May
			1-hour TSP - 3 times 24-hour TSP - 1 time  <i>Impact AQM</i>			

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Dolphin Monitoring Survey Schedule (1 March to 31 March 2014)**

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

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

## HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section Impact Dolphin Monitoring Survey Schedule (1 April to 30 April 2014)

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

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section  
Impact Dolphin Monitoring Survey Schedule (1 May to 31 May 2014)**

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

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section**

**Impact Monitoring on Underwater Noise and Dolphin Acoustic Behaviour in Relation to Marine Bored Piling Activities (1 Mar to 31 Mar 2014)**

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

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.



**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section**  
**Impact Monitoring on Underwater Noise and Dolphin Acoustic Behaviour in Relation to Marine Bored Piling Activities (1 Apr to 30 Apr 2014)**

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

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section**  
**Impact Monitoring on Shored-based Theodolite Tracking to Investigate Dolphin Behaviour and Movement in Relation to Marine Bored Piling Activities (1 Mar to 31 Mar 2014)**

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

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

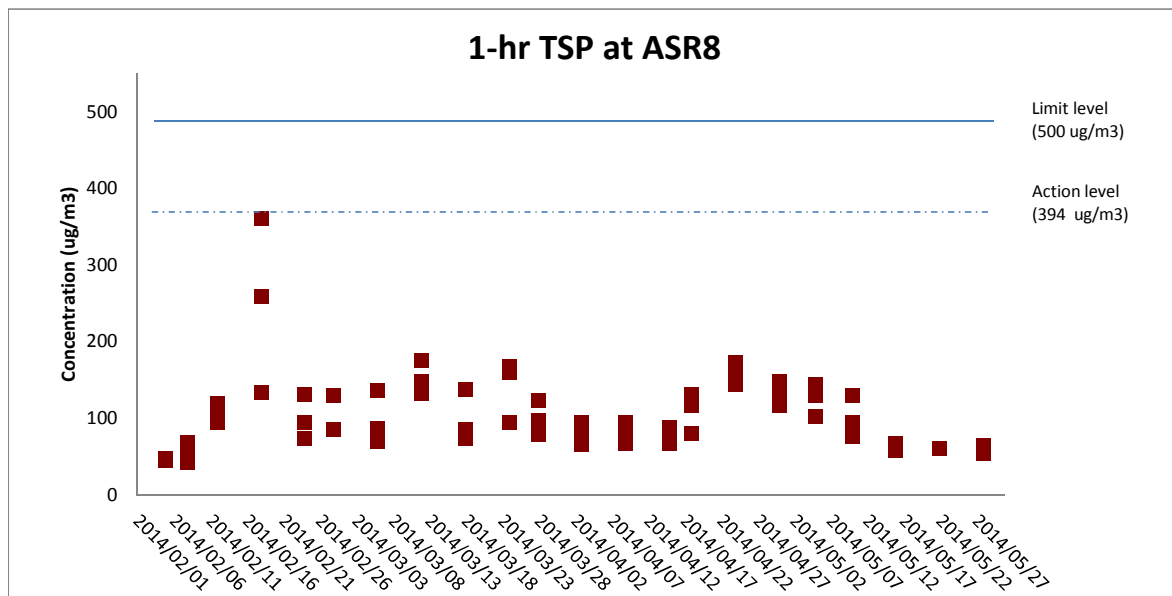
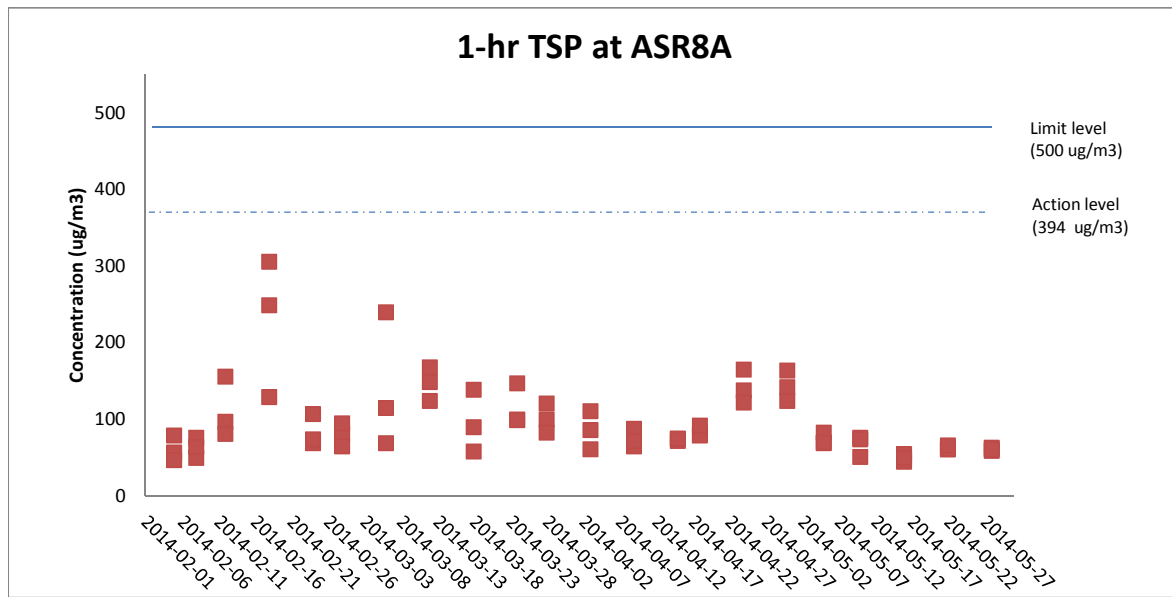
**HY/2012/07 Tuen Mun - Chek Lap Kok Link - Southern Connection Viaduct Section**  
**Impact Monitoring on Shored-based Theodolite Tracking to Investigate Dolphin Behaviour and Movement in Relation to Marine Bored Piling Activities (1 Apr to 30 Apr 2014)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1-Apr	2-Apr	3-Apr	4-Apr	5-Apr
			Theodolite Tracking Survey (Day 20)		Theodolite Tracking Survey (Day 21)	
6-Apr	7-Apr	8-Apr	9-Apr	10-Apr	11-Apr	12-Apr
		Theodolite Tracking Survey (Day 22)	Theodolite Tracking Survey (Day 23)	Theodolite Tracking Survey (Day 24)	Theodolite Tracking Survey (Day 25)	
13-Apr	14-Apr	15-Apr	16-Apr	17-Apr	18-Apr	19-Apr
	Theodolite Tracking Survey (Day 26)	Theodolite Tracking Survey (Day 27)	Theodolite Tracking Survey (Day 28)	Theodolite Tracking Survey (Day 29)		
20-Apr	21-Apr	22-Apr	23-Apr	24-Apr	25-Apr	26-Apr
			Theodolite Tracking Survey (Day 30)			
27-Apr	28-Apr	29-Apr	30-Apr			

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

Appendix F

Impact Air Quality  
Monitoring Graphical  
Presentation

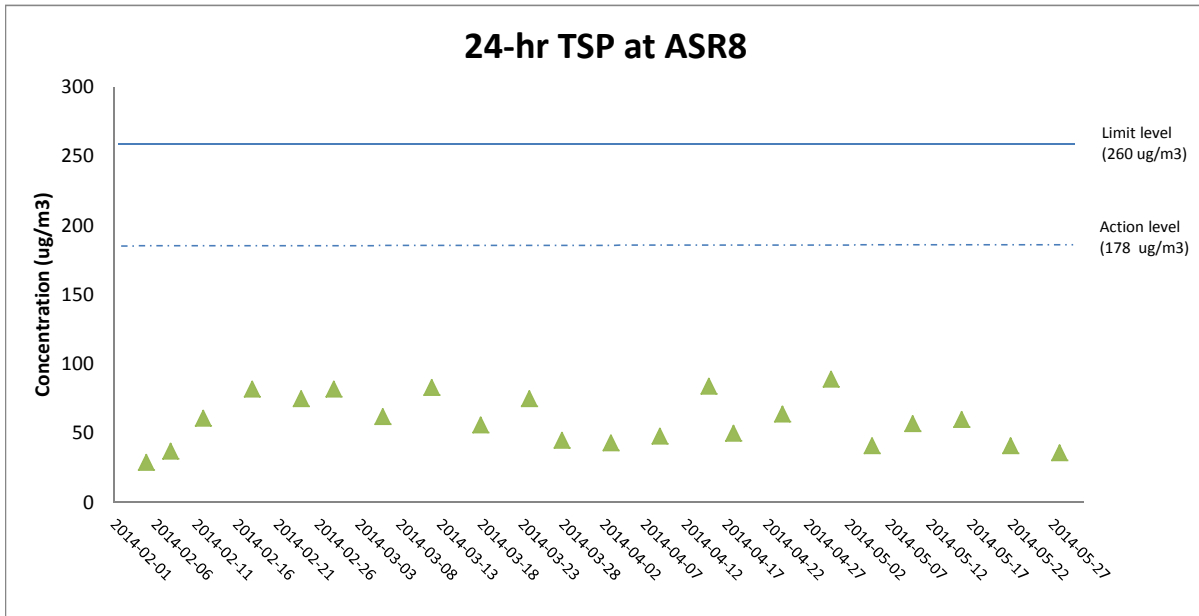
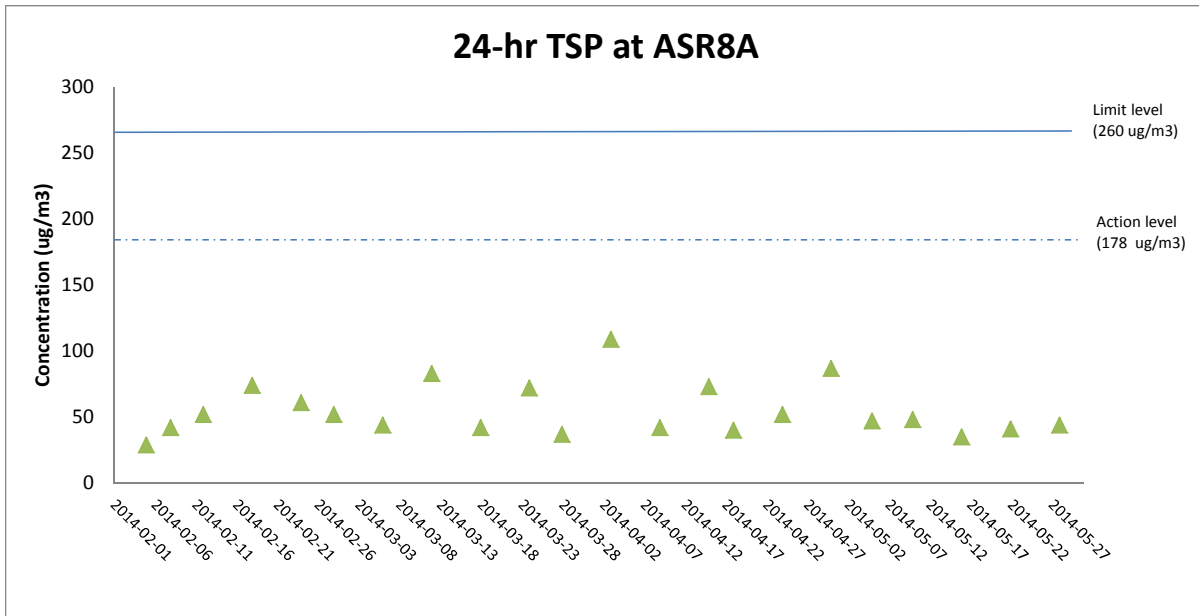


Weather condition within the reporting period varied between sunny to rainy.

Major construction works undertaken within the reporting period include site office erection, fence relocation for Viaduct A, C & D and land piling at Viaduct B.

Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.





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

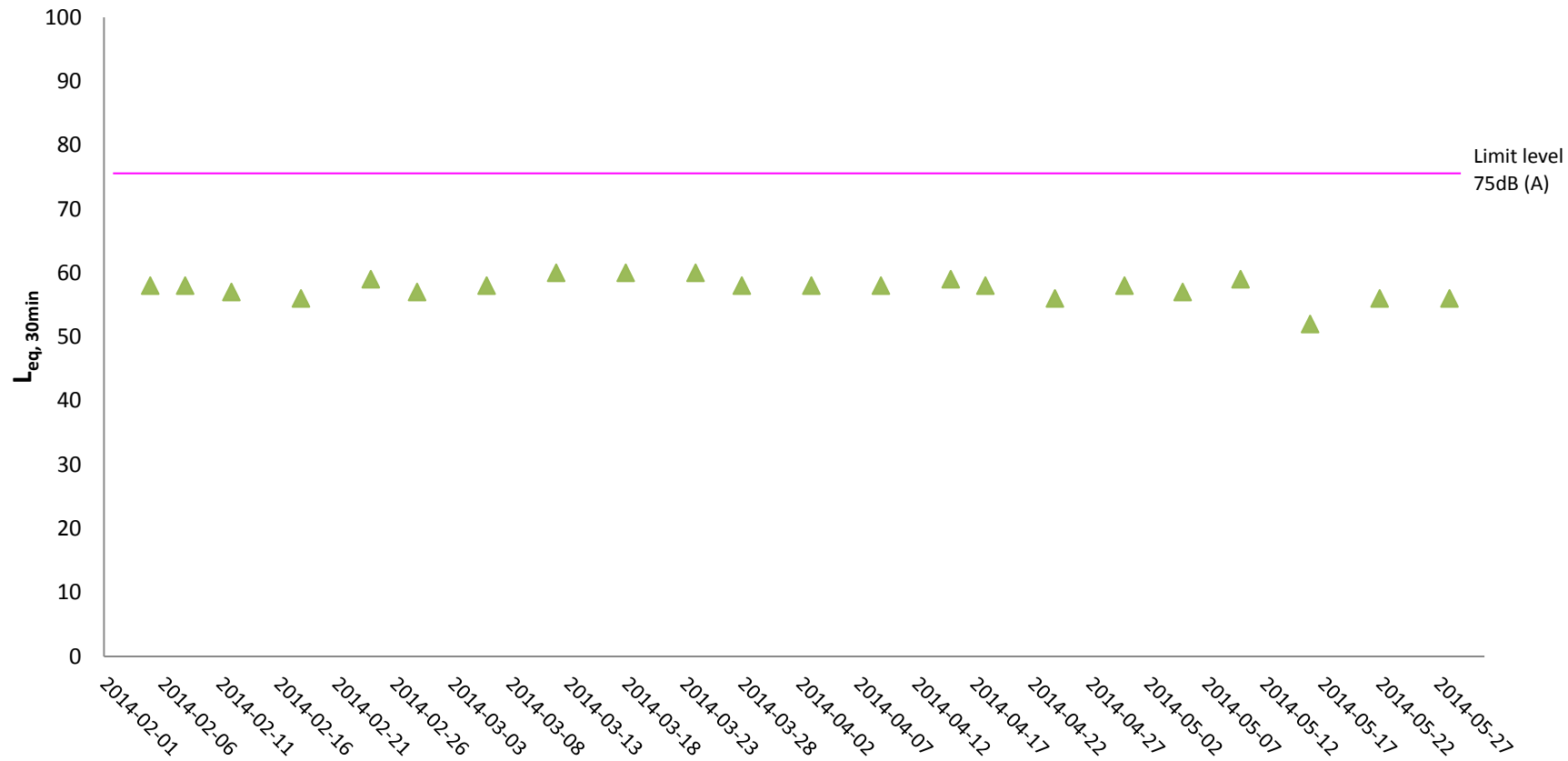
Major construction works undertaken within the reporting period include site office erection, fence relocation for Viaduct A, C & D and land piling at Viaduct A.

Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.

Appendix G

## Impact Noise Monitoring Graphical Presentation

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



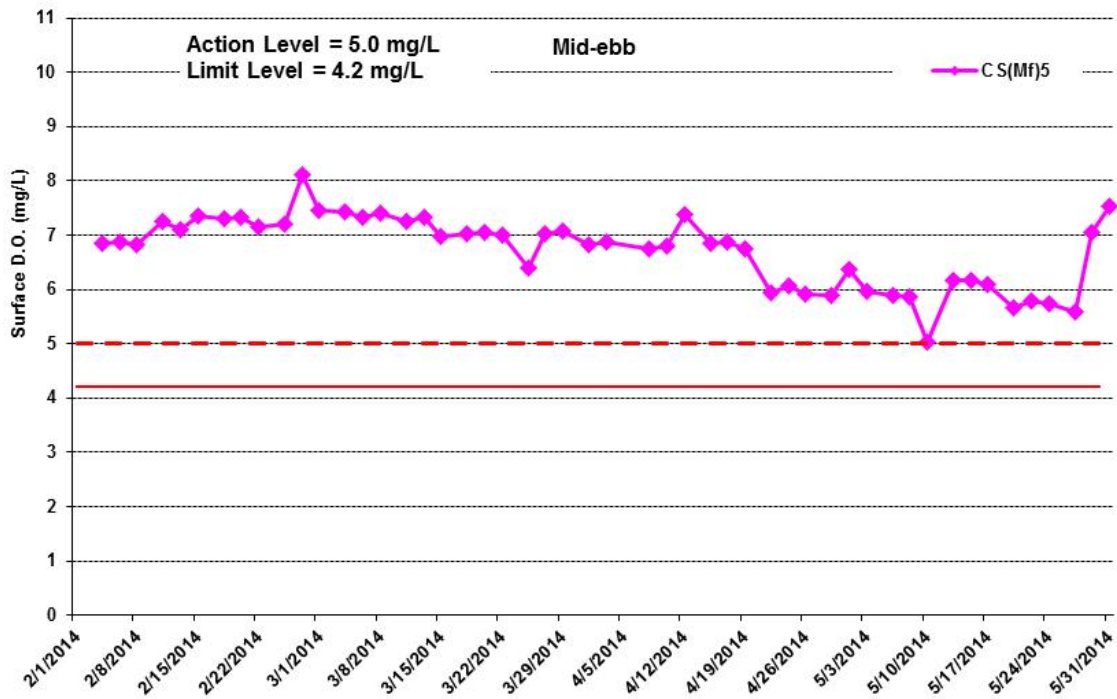
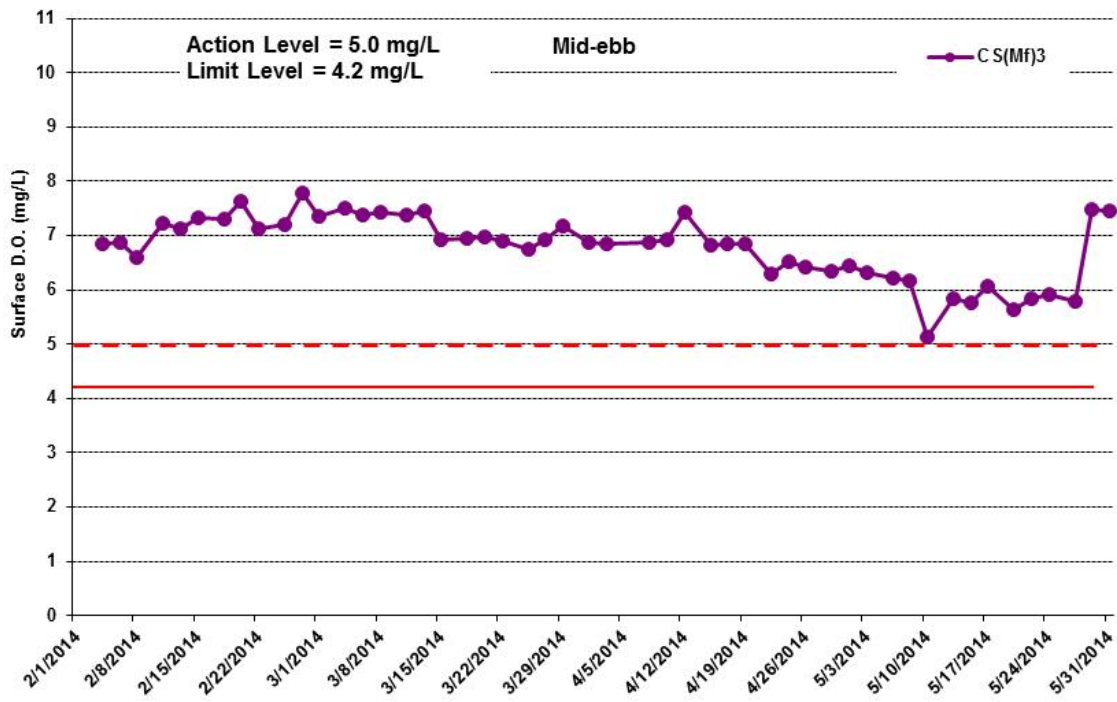
*Weather condition within the reporting period varied between sunny to rainy.*

*Major construction works undertaken within the reporting period include site office erection, fence relocation for Viaduct A, C & D and land piling at Viaduct B.*

*Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.*

Appendix H

# Impact Water Quality Monitoring Graphical Presentation



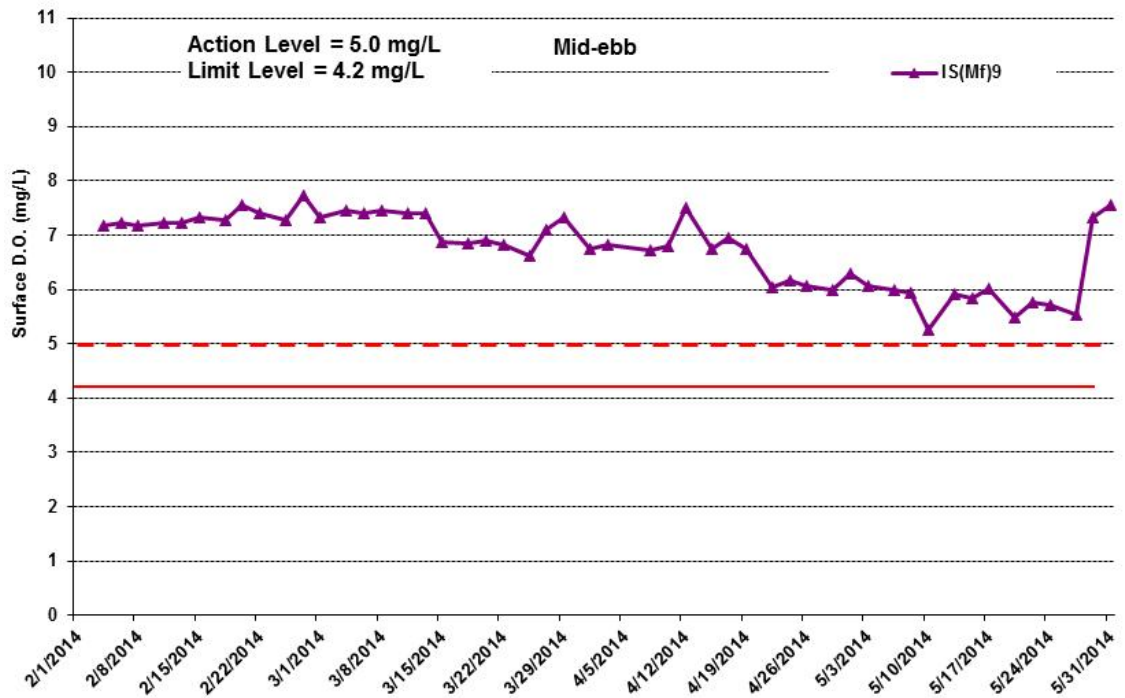
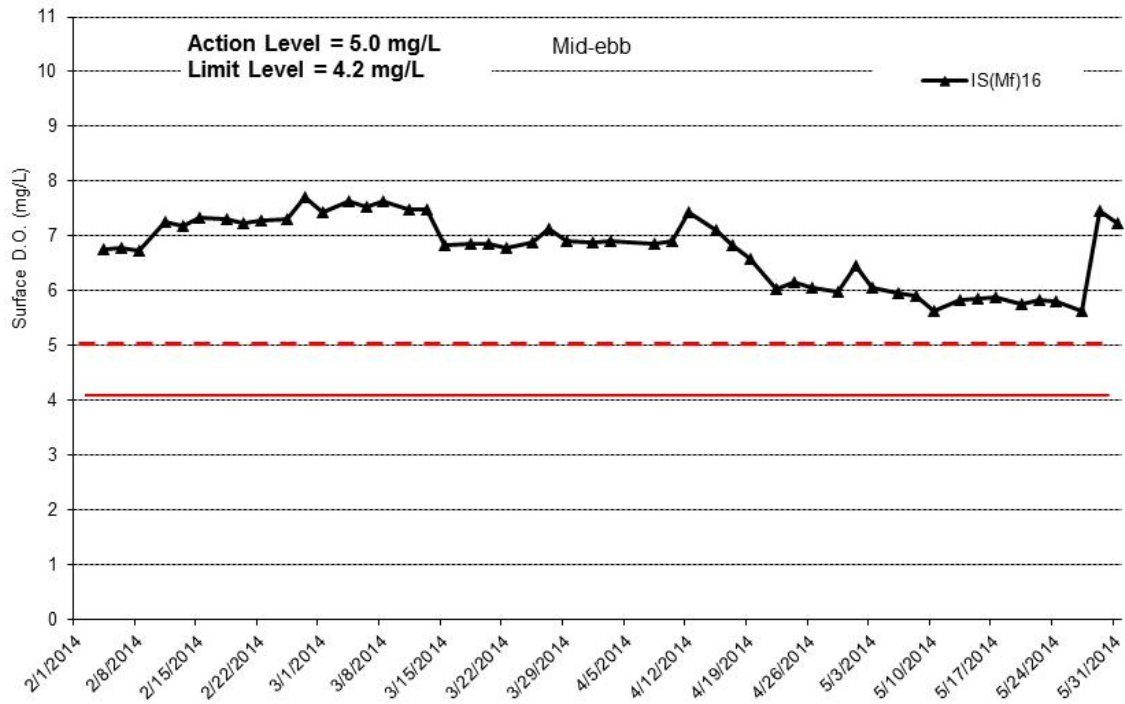
**Figure H1 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-ebb tide between 1 February to 31 May 2014 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**





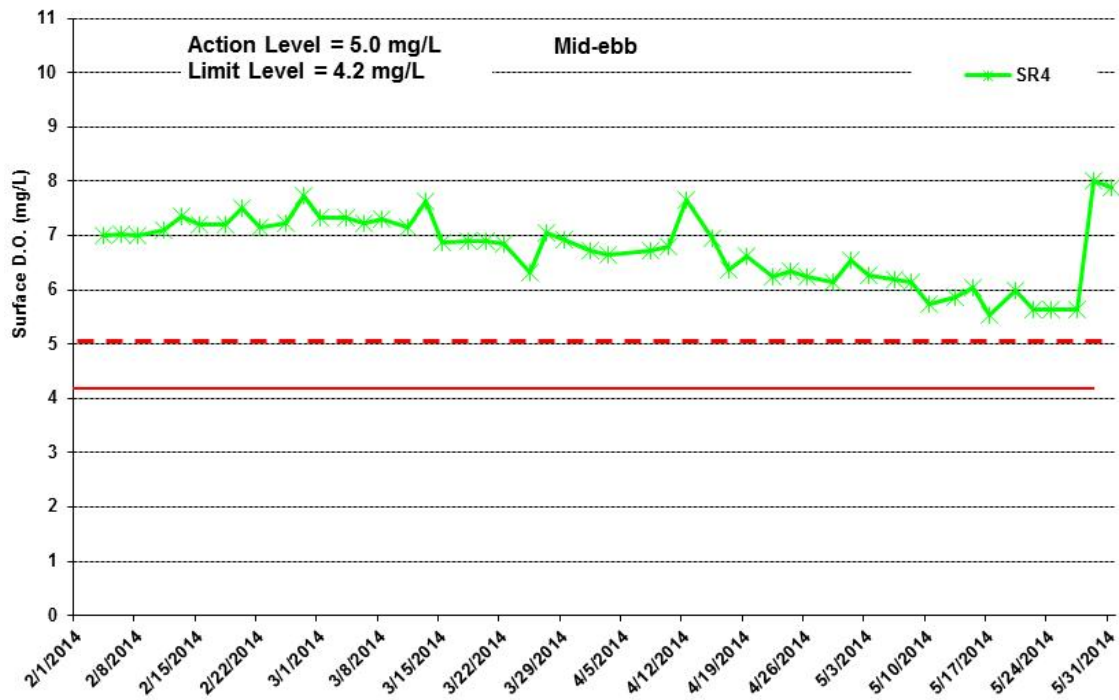
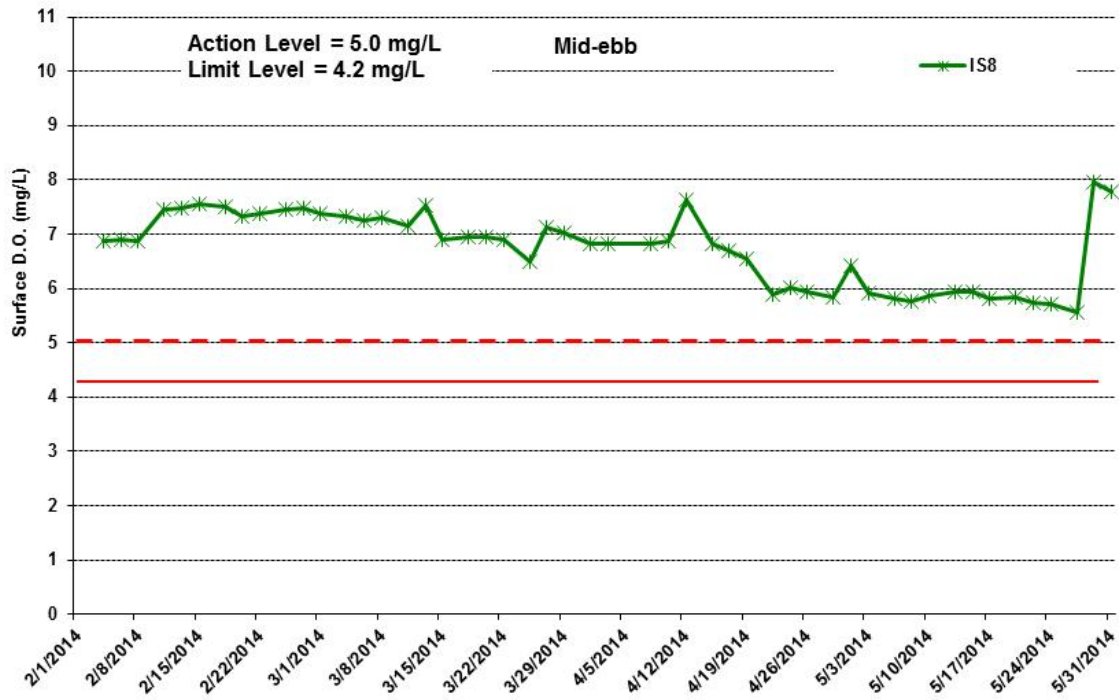


**Figure H2 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-ebb tide between 1 February to 31 May 2014 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**



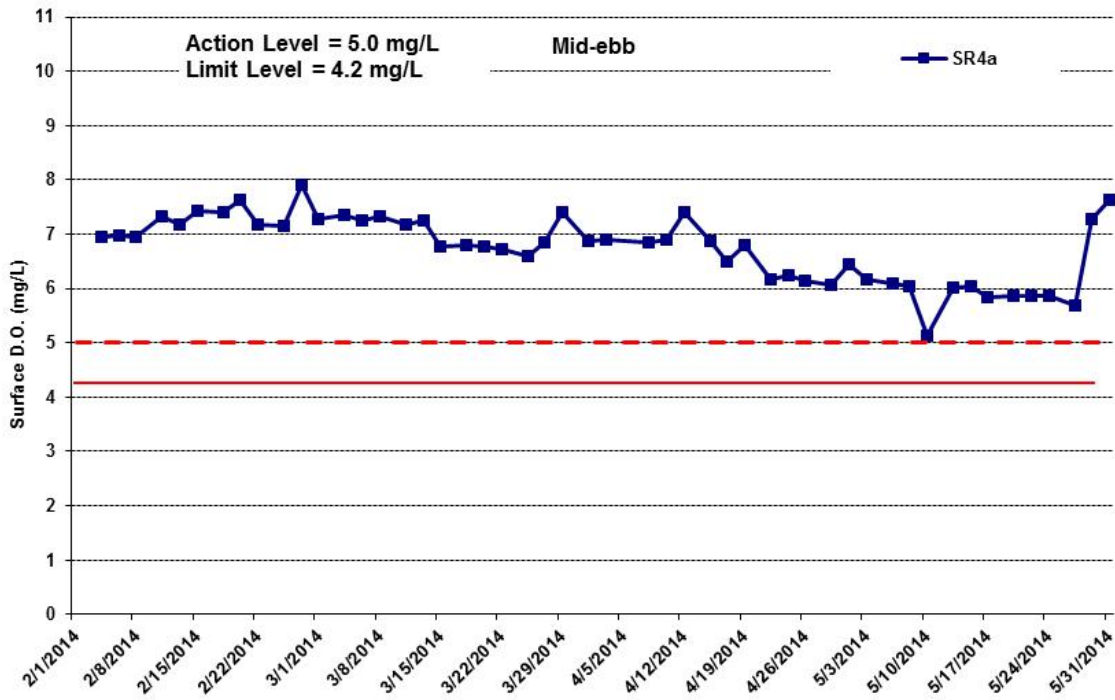


**Figure H3 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-ebb tide between 1 February to 31 May 2014 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**



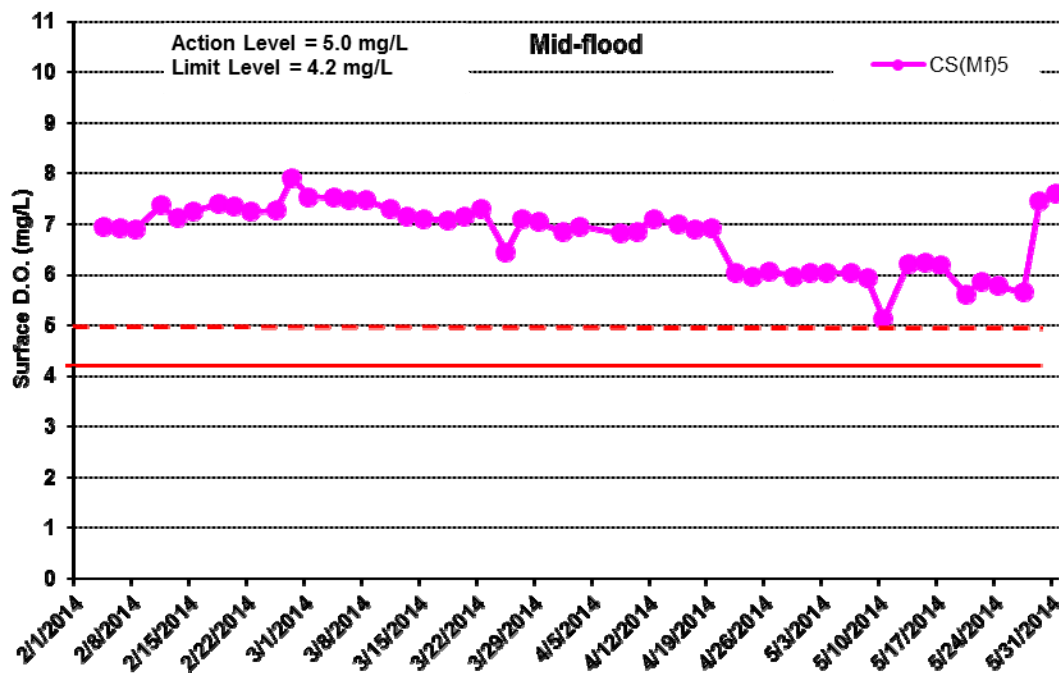
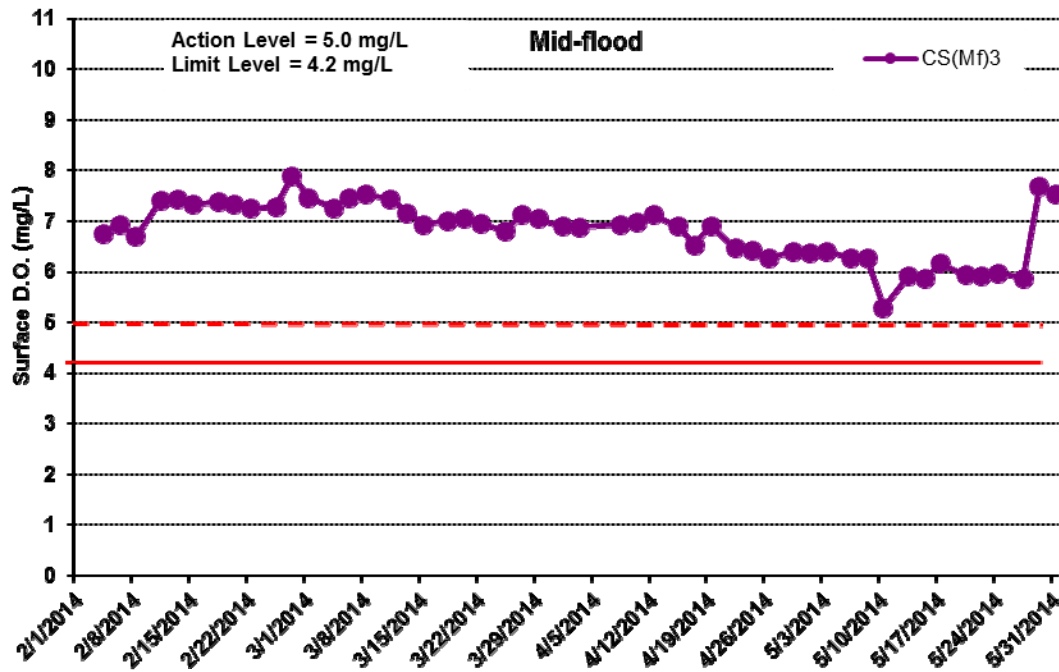


**Figure H4 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-ebb tide between 1 February to 31 May 2014 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**



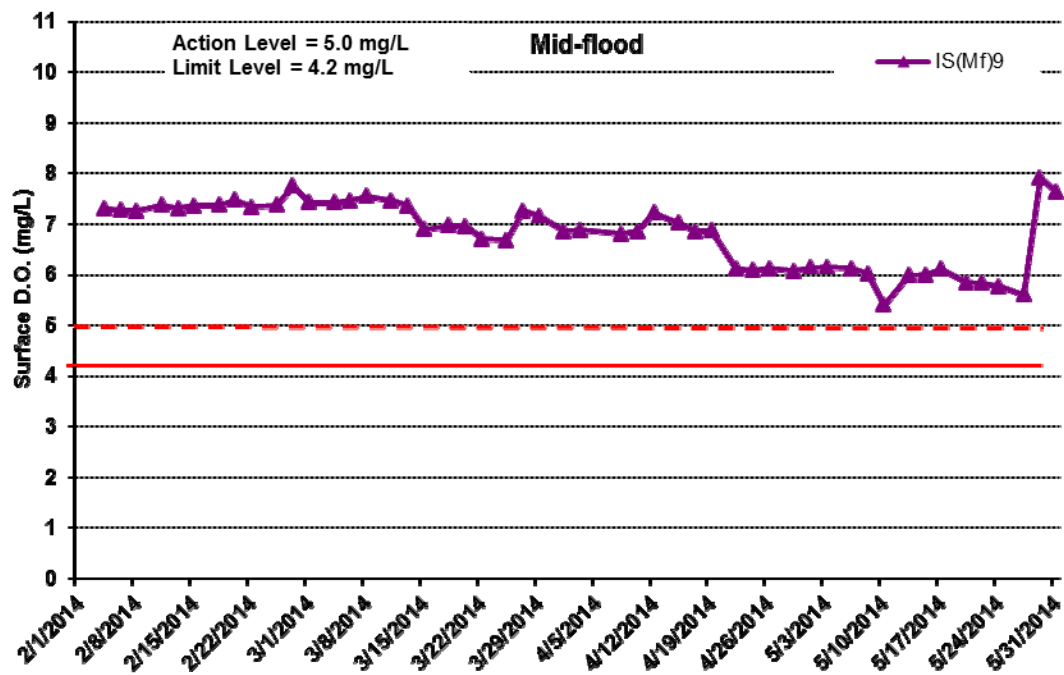
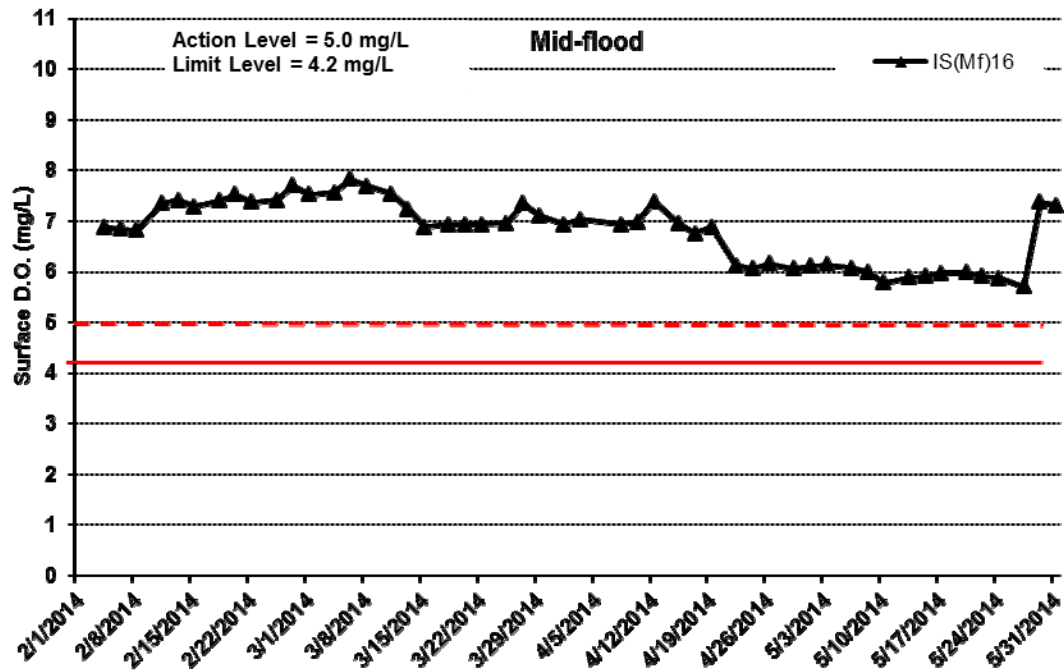


**Figure H5 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-flood tide between 1 February to 31 May 2014 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**





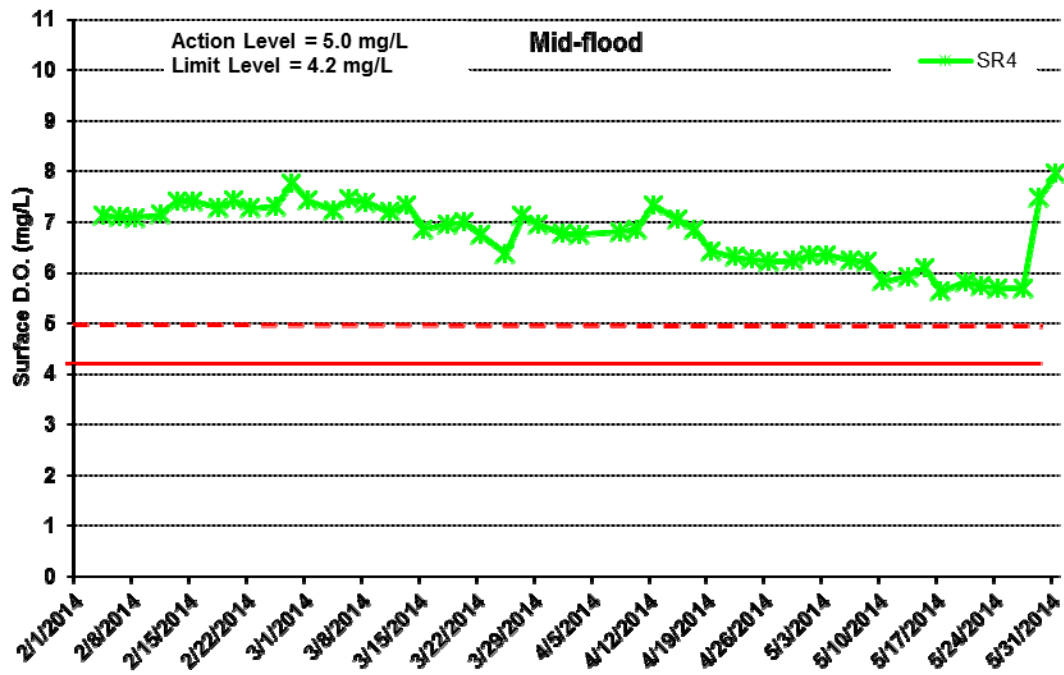
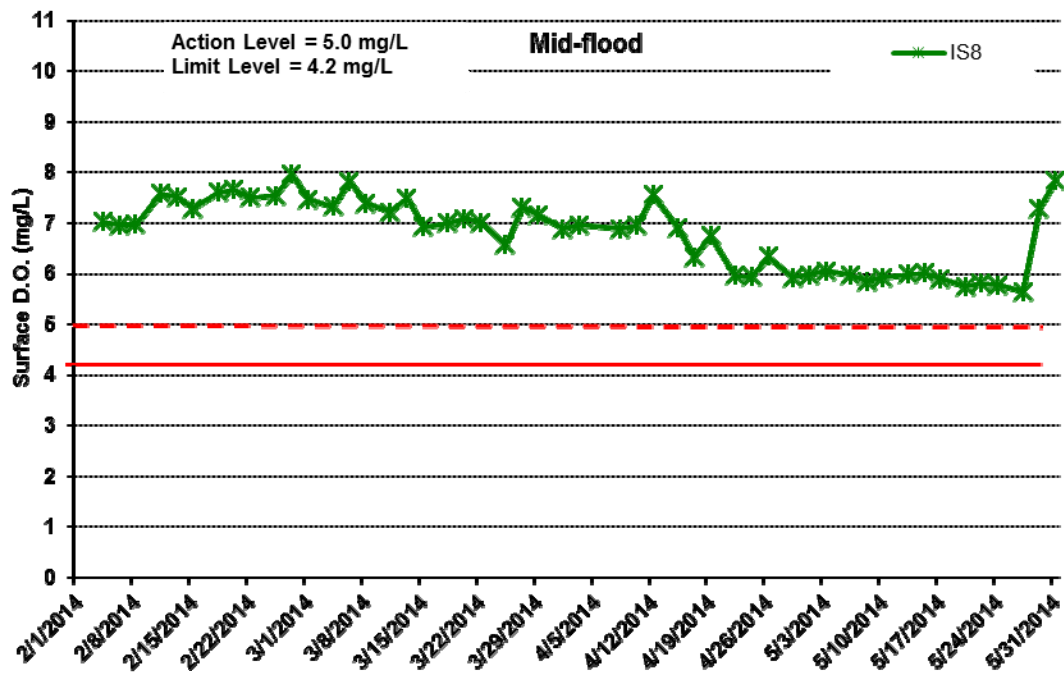
**Figure H6 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-flood tide between 1 February to 31 May 2014 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**





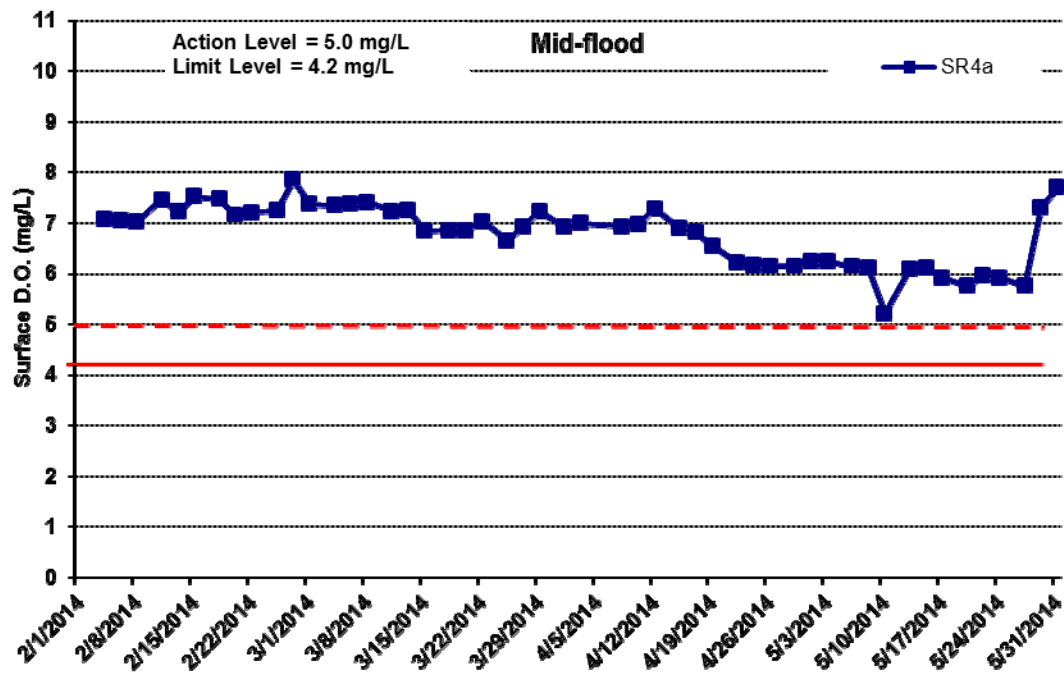


**Figure H7 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-flood tide between 1 February to 31 May 2014 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**



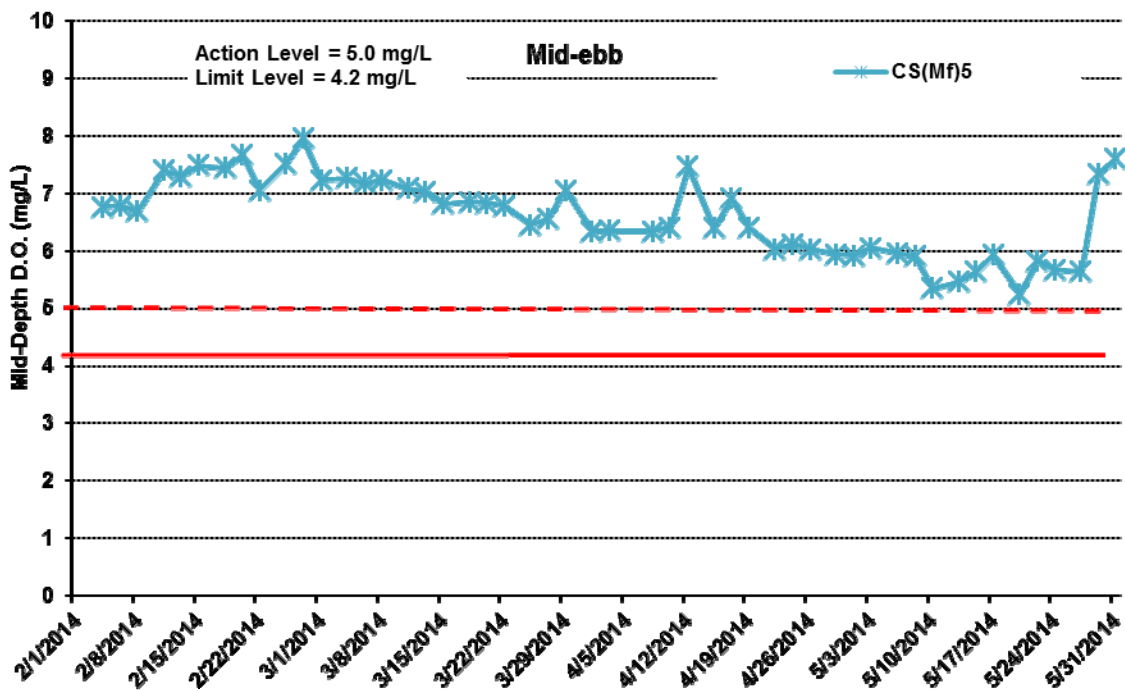
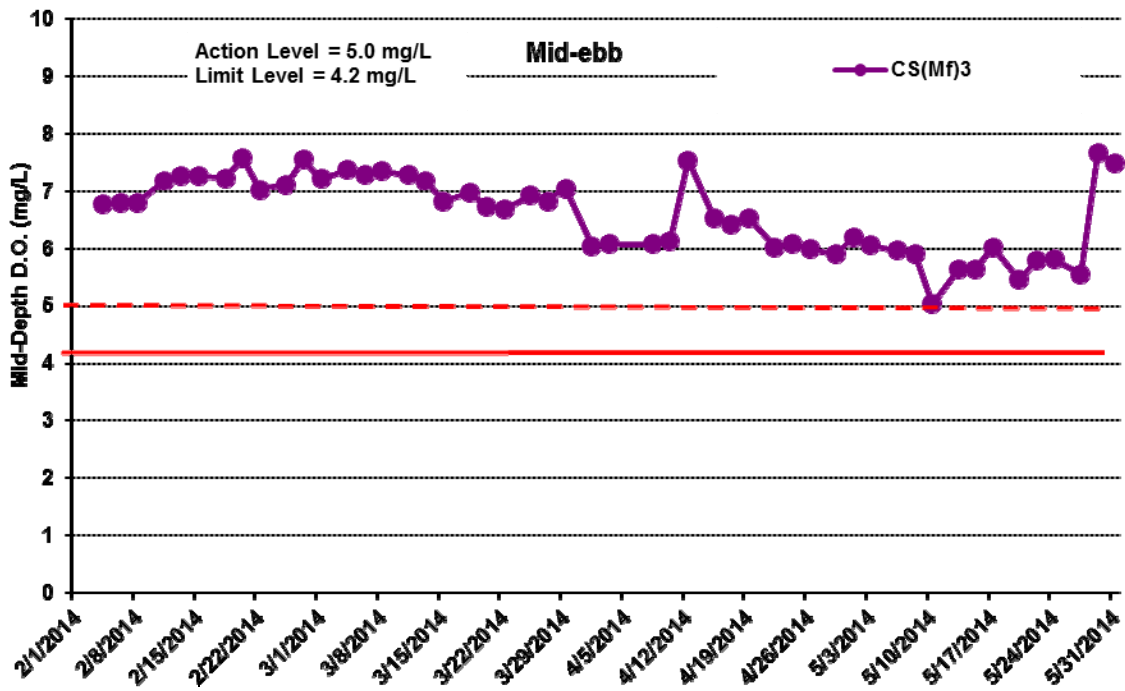


**Figure H8 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-flood tide between 1 February to 31 May 2014 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**

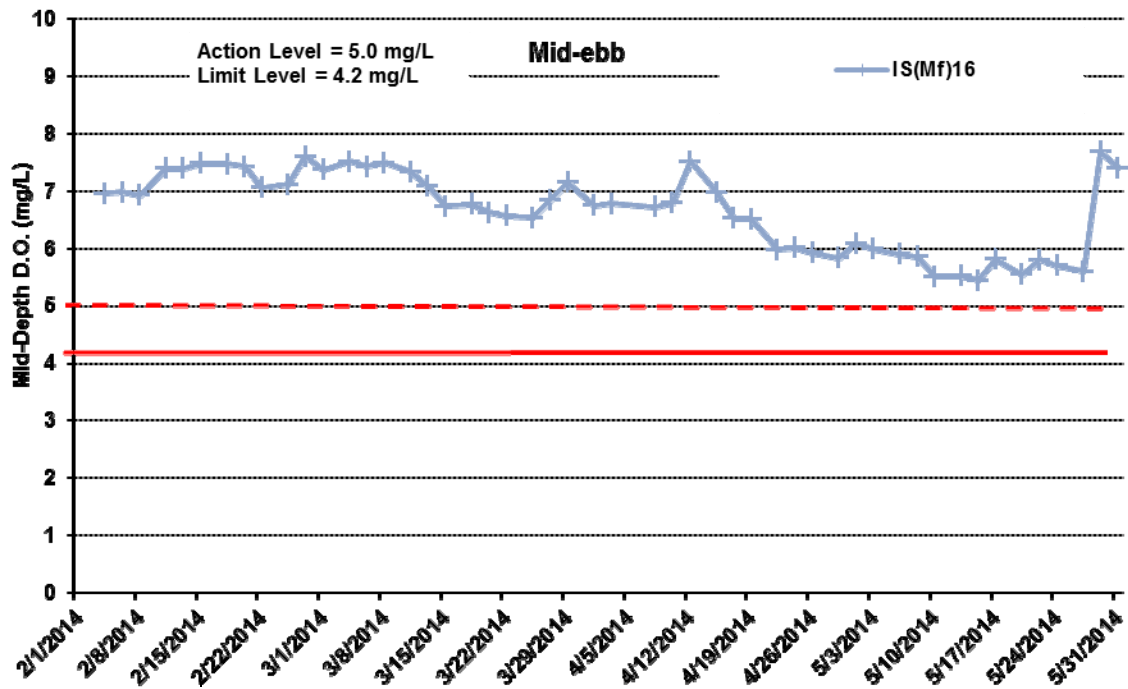




**Figure H9 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters during mid-ebb tide between 1 February to 31 May 2014 at CS(Mf)3 and IS(Mf)5.**  
*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management



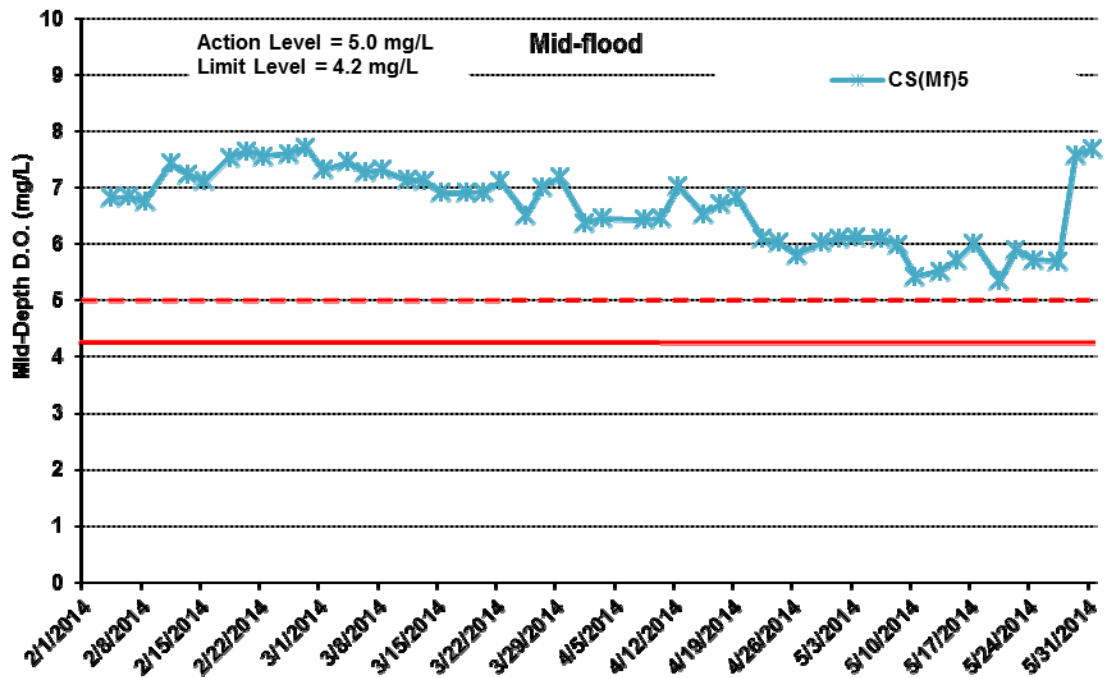
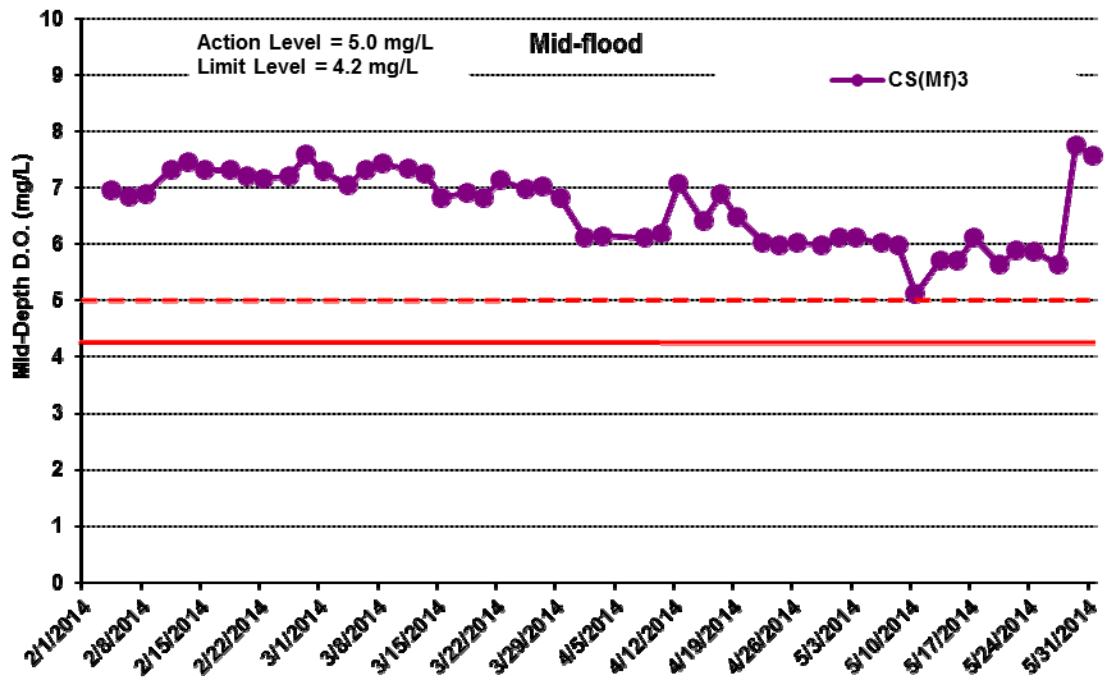


**Figure H10 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters during mid-ebb tide between 1 February to 31 May 2014 at IS(Mf)16.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**



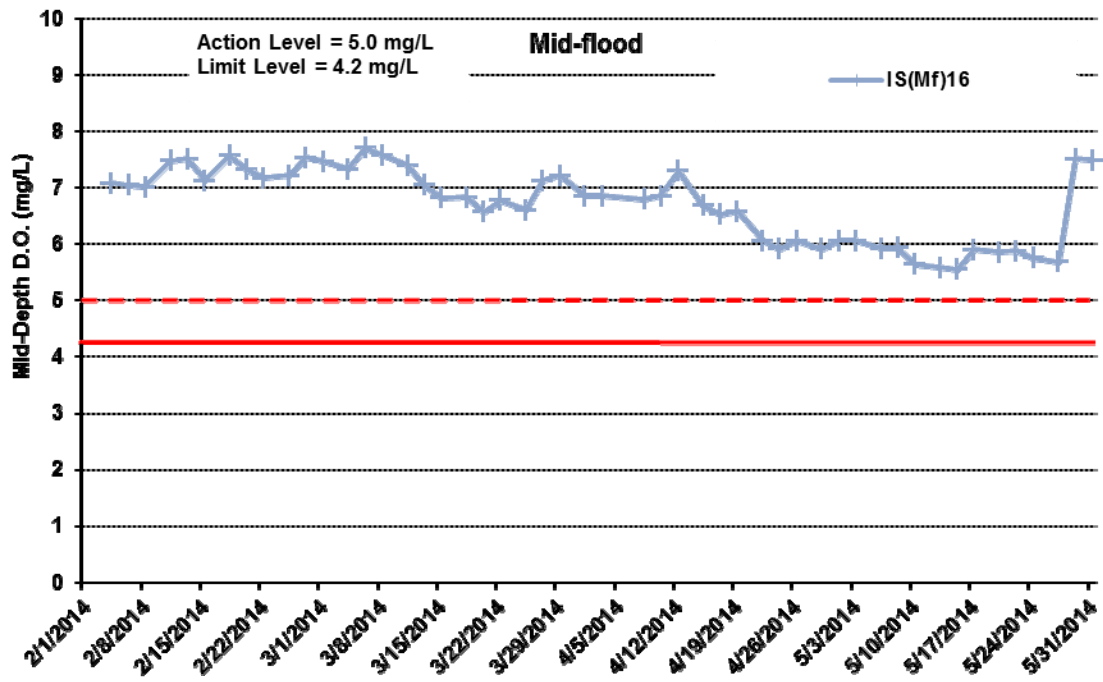


**Figure H11 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters during mid-flood tide between 1 February to 31 May 2014 at CS(Mf)3 and IS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management





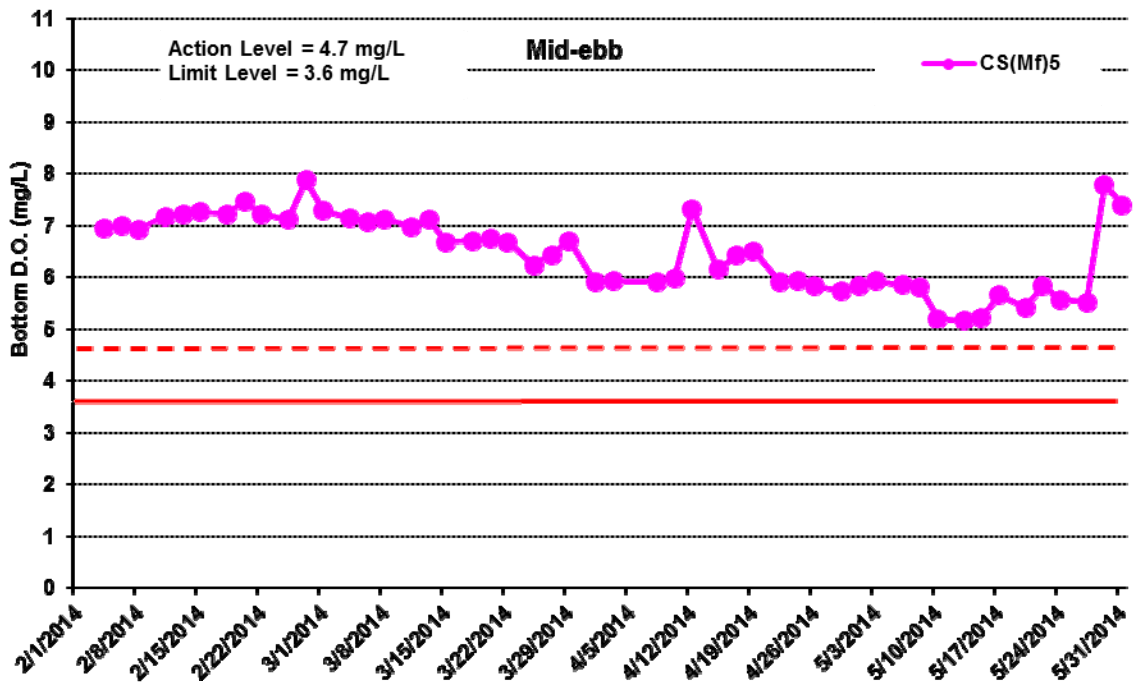
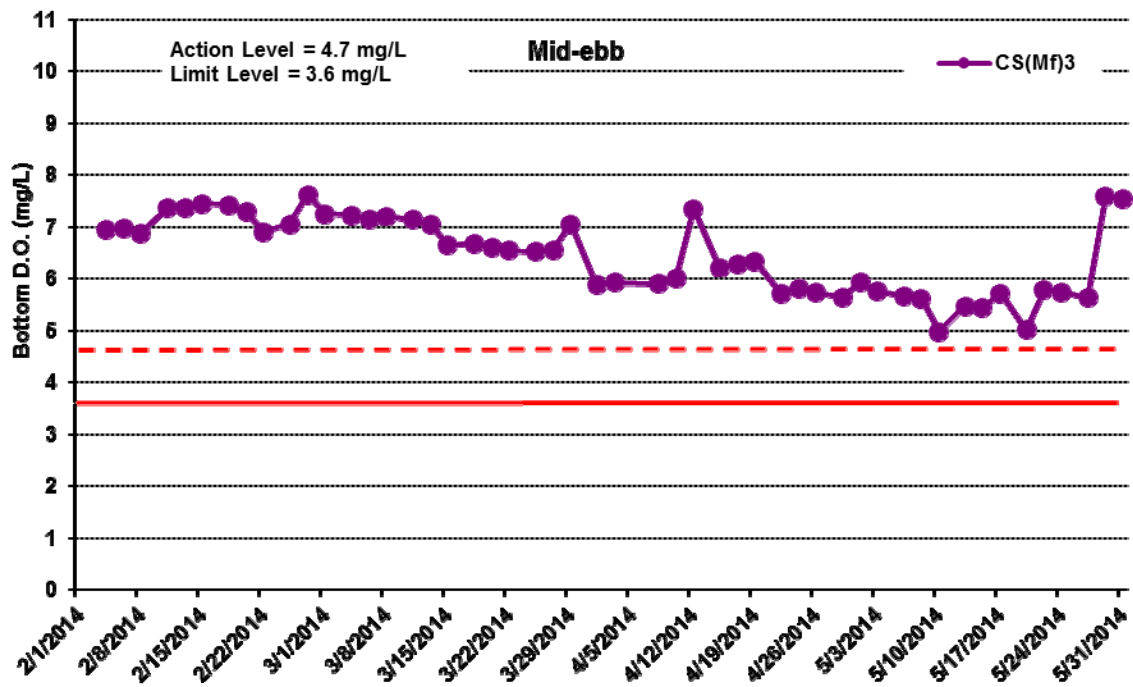
**Figure H12 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters during mid-flood tide between 1 February to 31 May 2014 at IS(Mf)16.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**





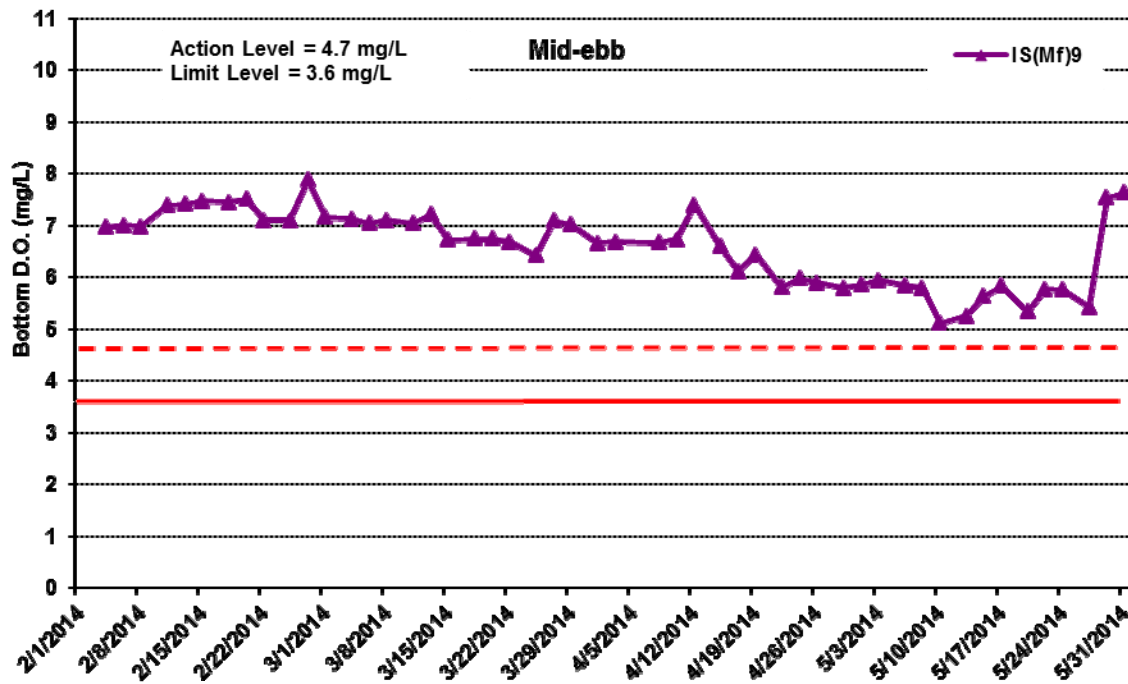
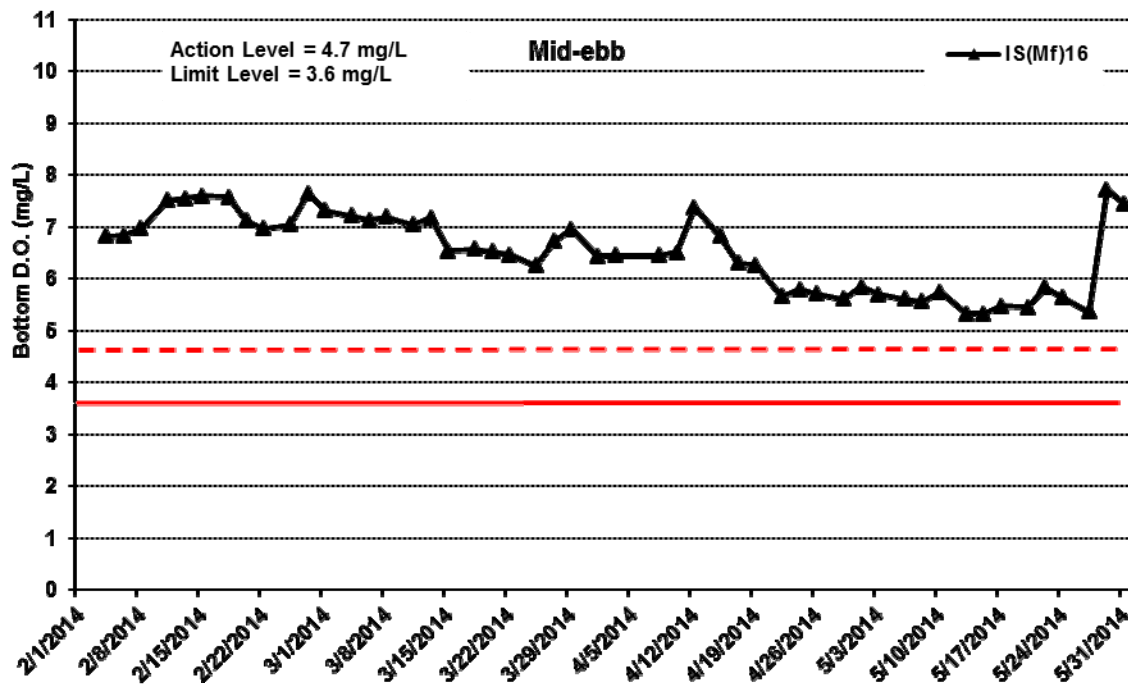


**Figure H13 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-ebb tide between 1 February to 31 May 2014 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management



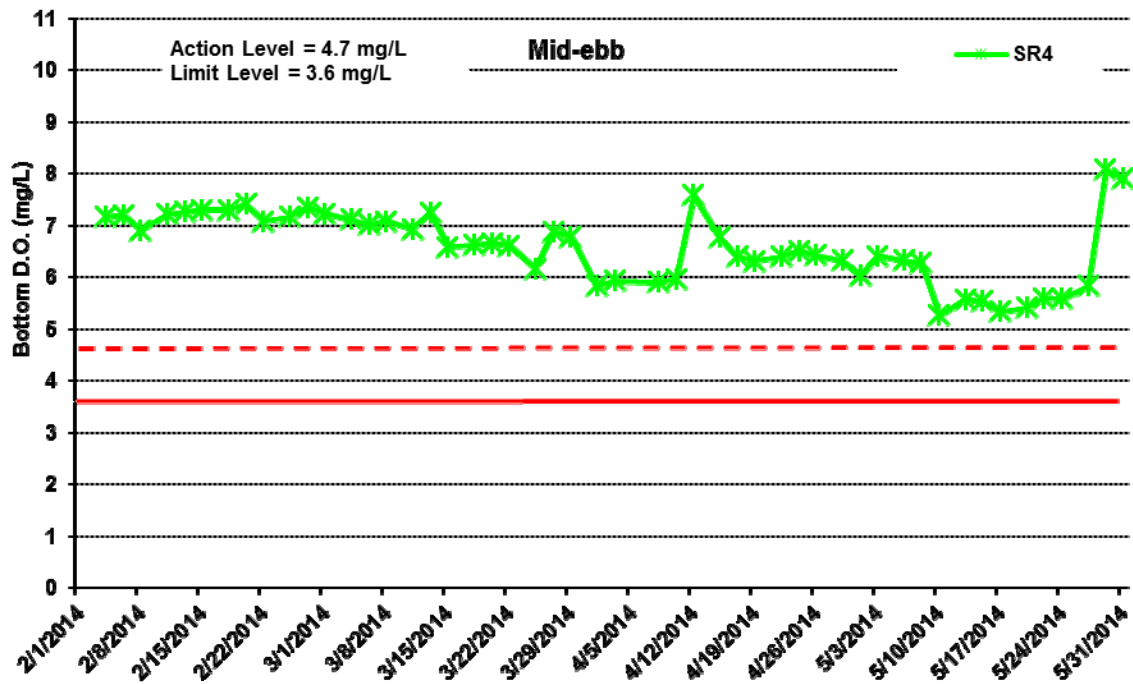
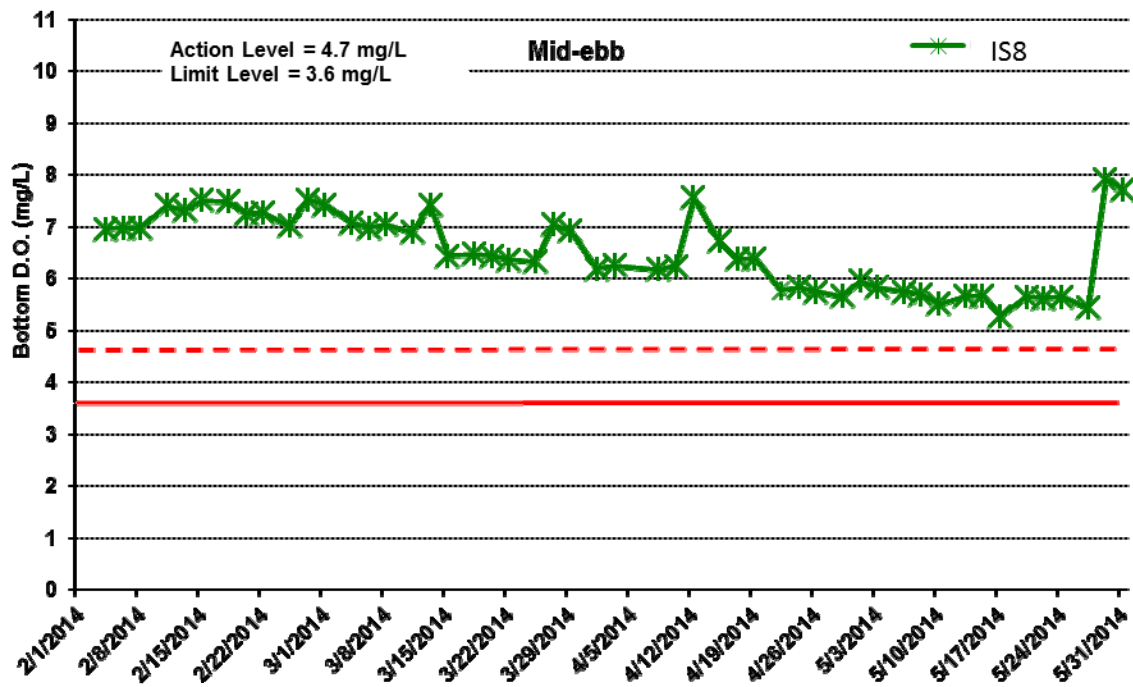


**Figure H14 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-ebb tide between 1 to 28 February 2014 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management



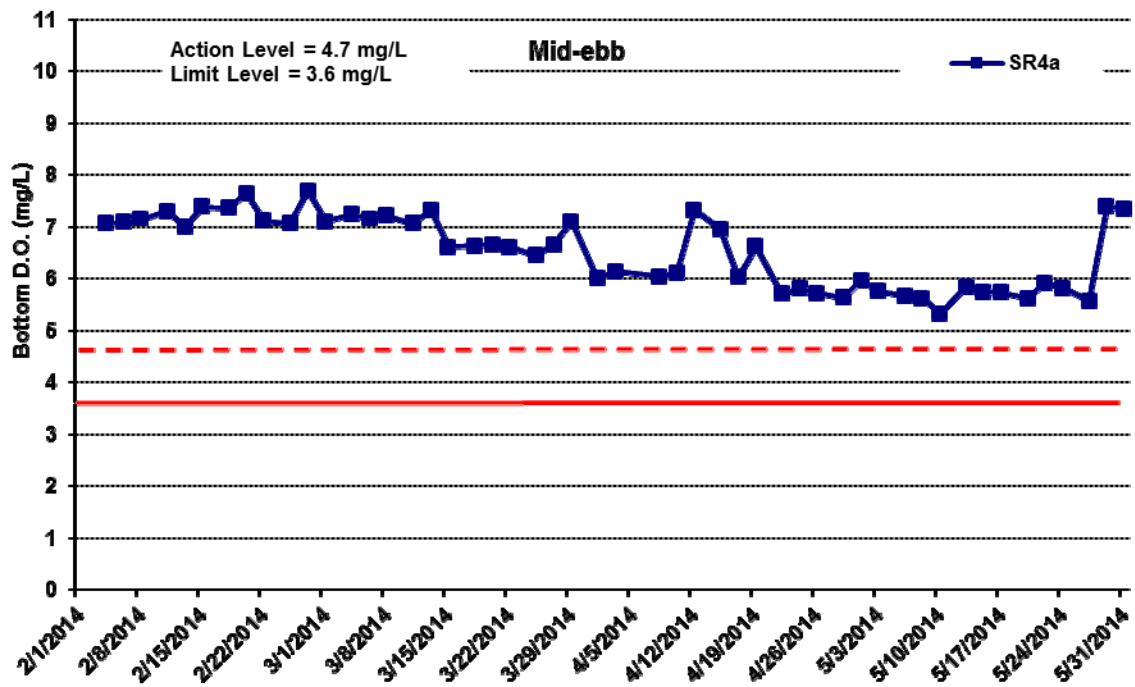


**Figure H15 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-ebb tide between 1 February to 31 May 2014 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management





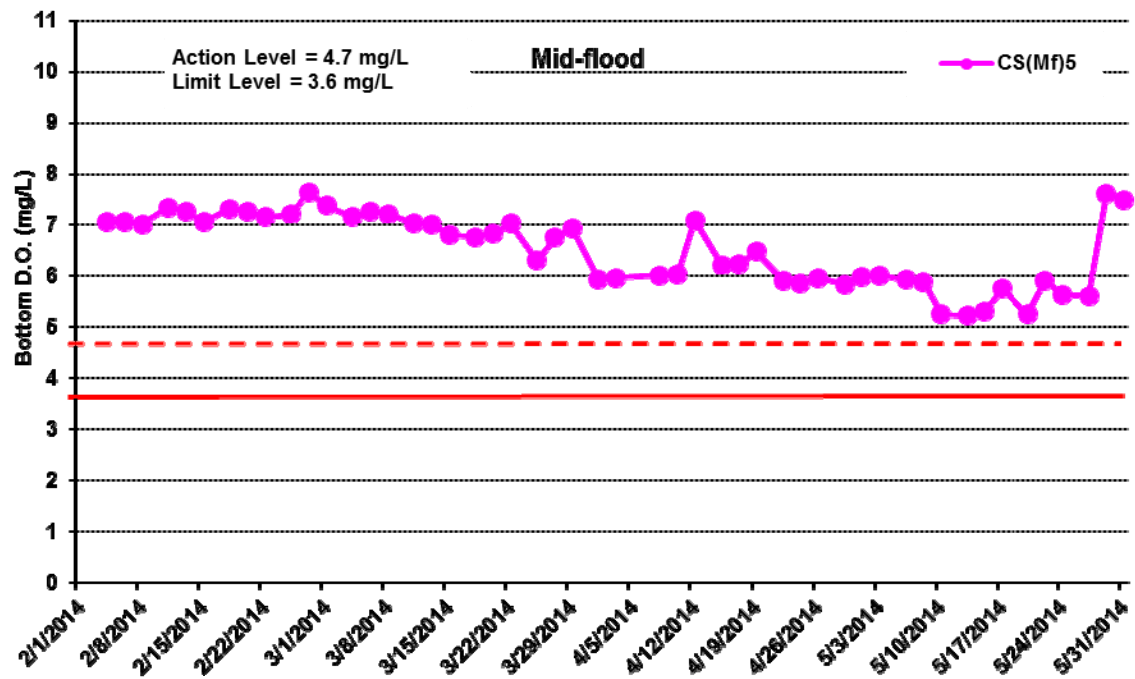
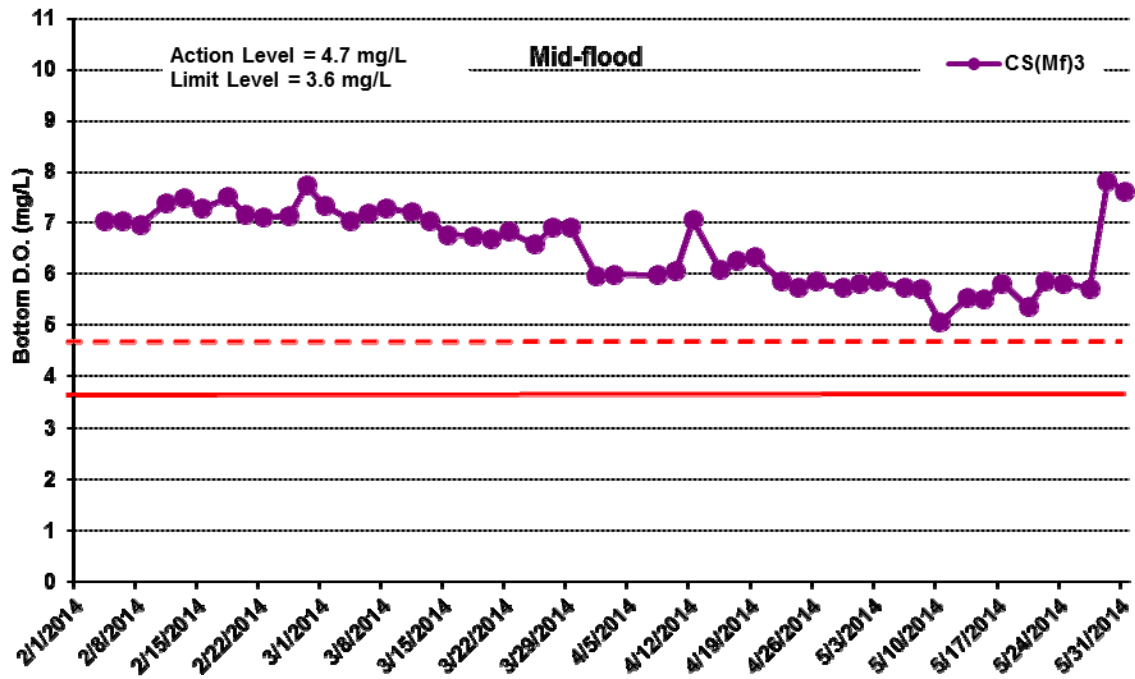
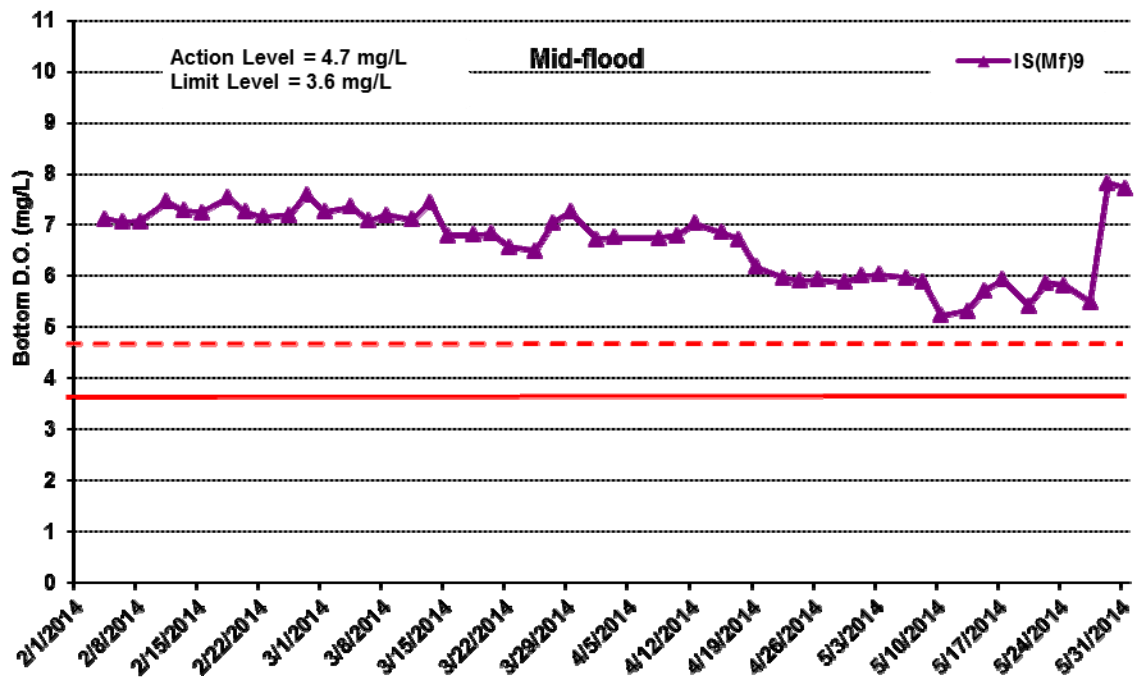
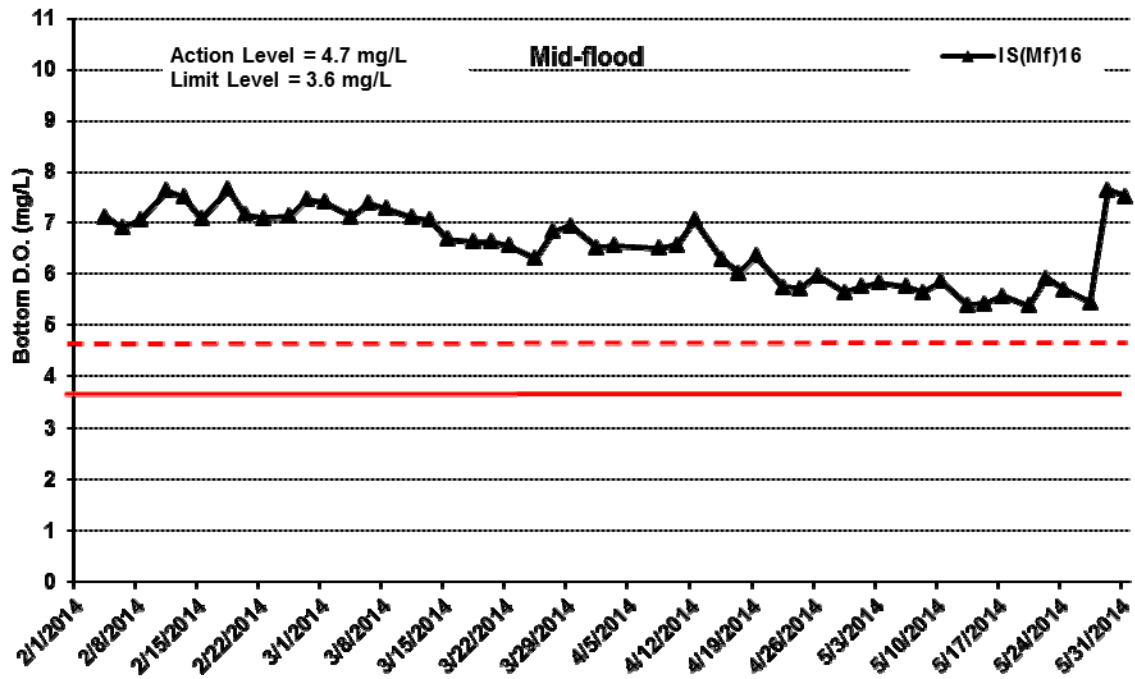


Figure H17 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-flood tide between 1 February to 31 May 2014 at CS(Mf)3 and CS(Mf)5.

(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)

Environmental  
Resources  
Management





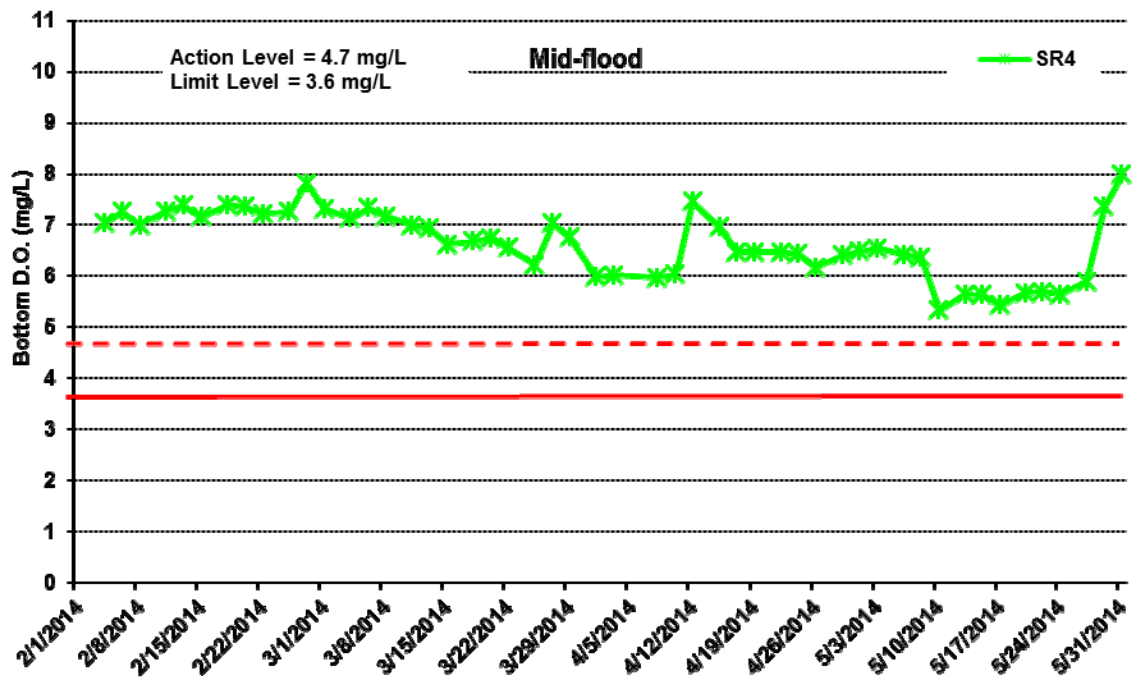
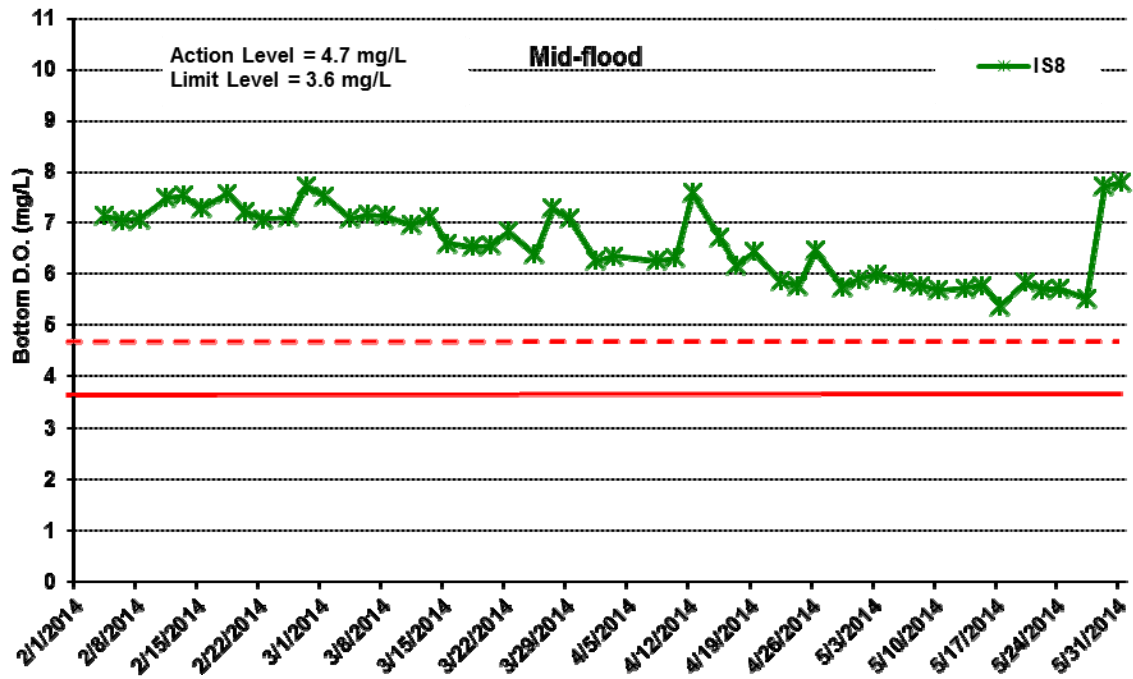
**Figure H18 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-flood tide between 1 February to 31 May 2014 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management





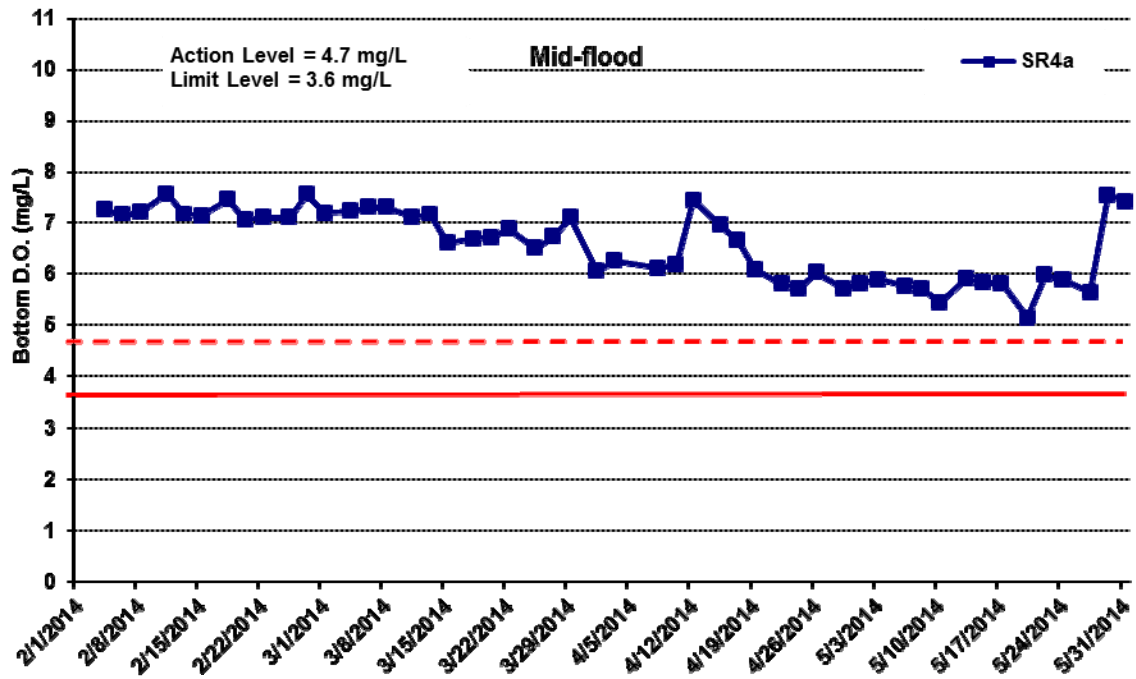


**Figure H19 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-flood tide between 1 February to 31 May 2014 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management



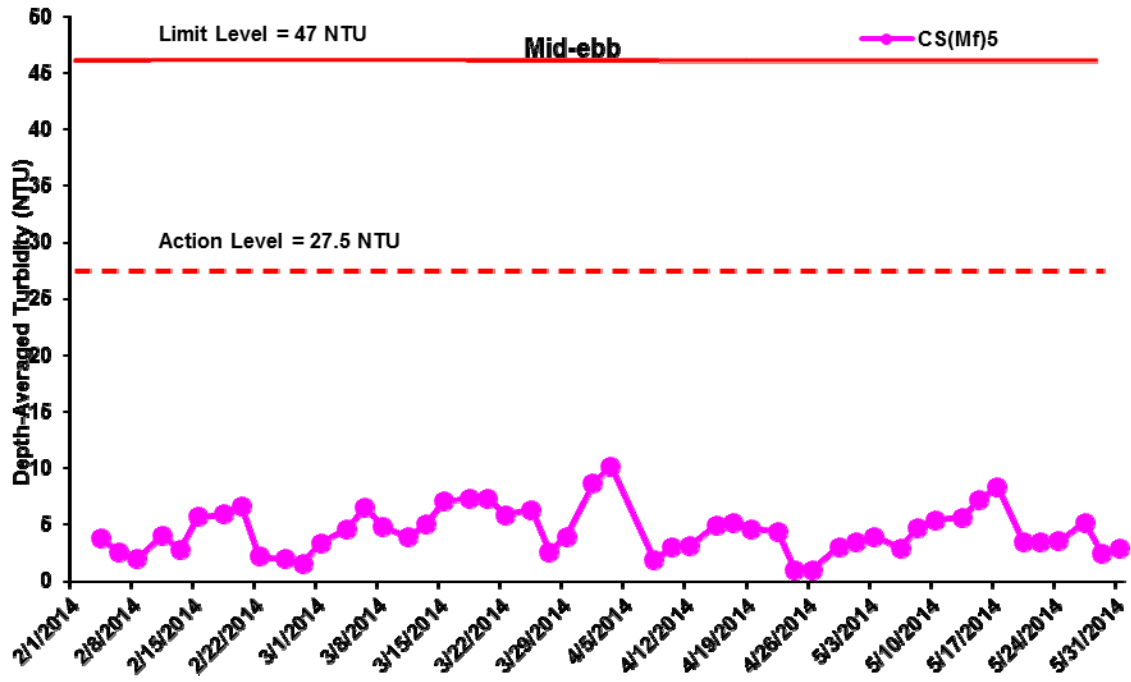
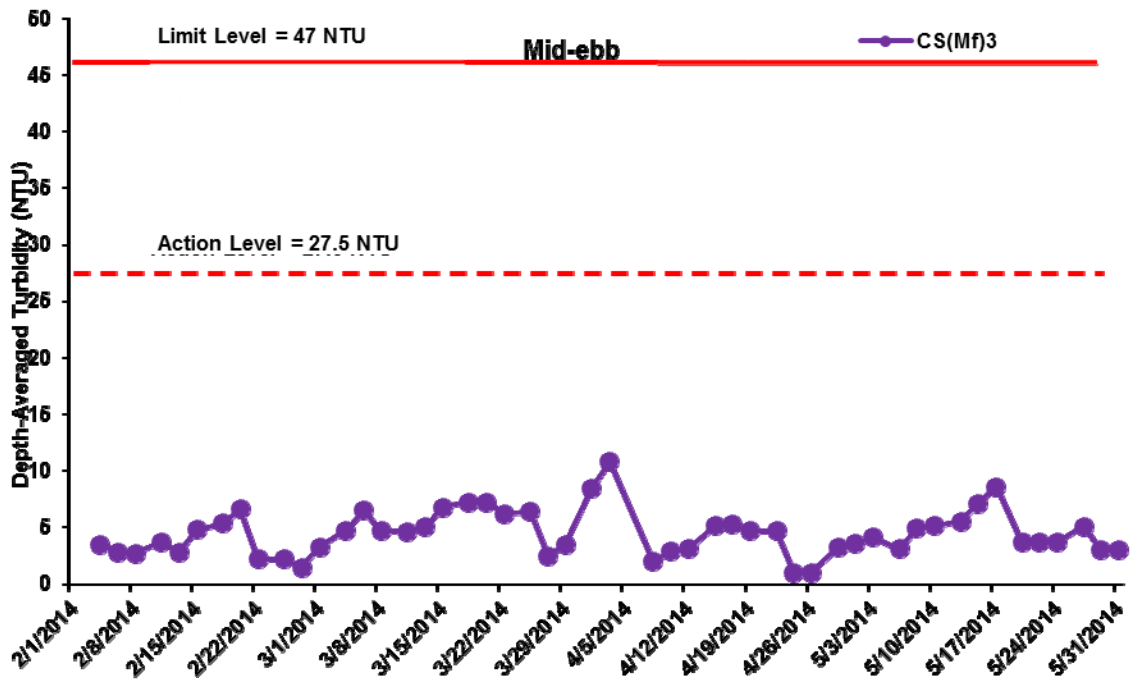


**Figure H20 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-flood tide between 1 February to 31 May 2014 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**



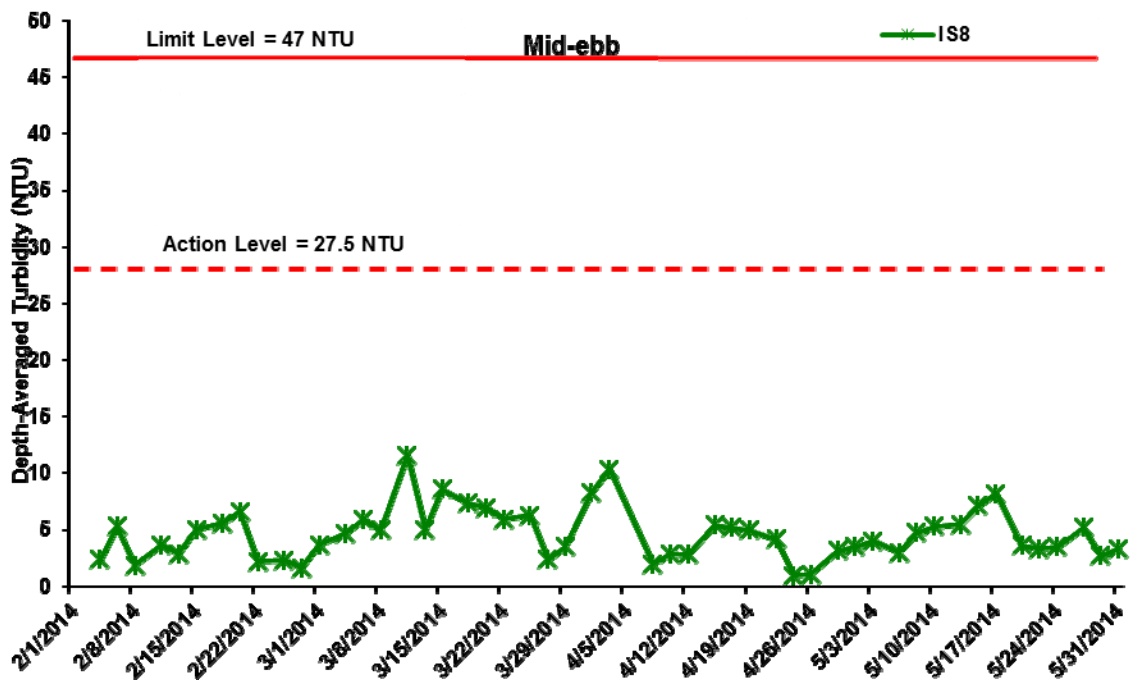
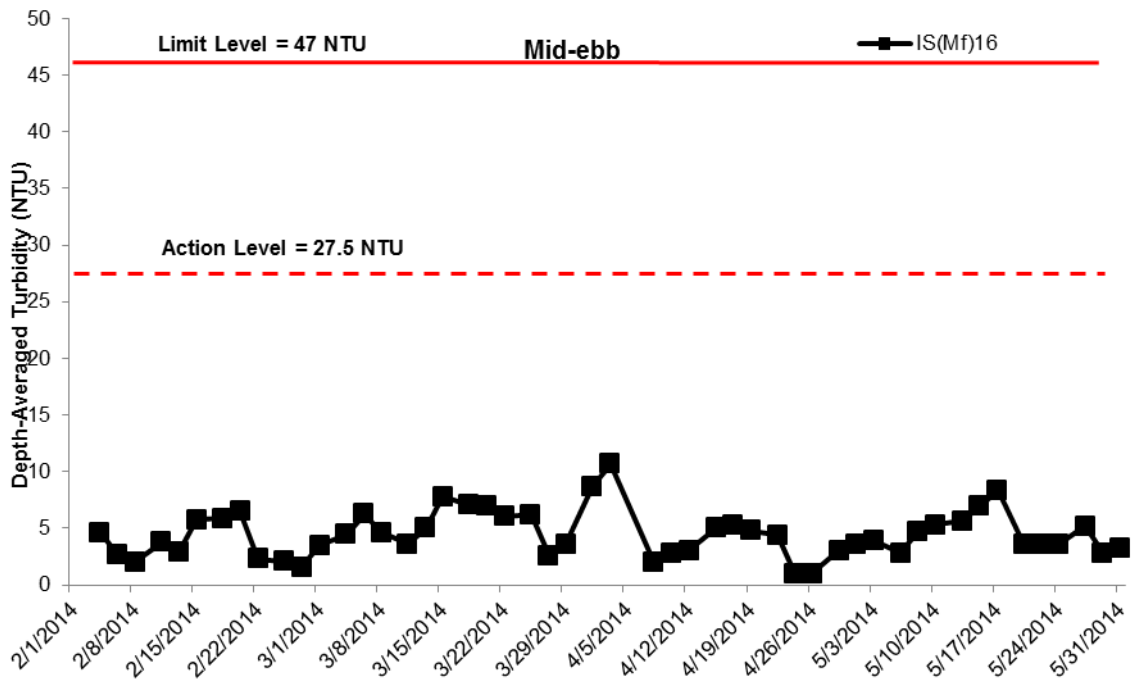


**Figure H21 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-ebb tide between 1 February to 31 May 2014 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**



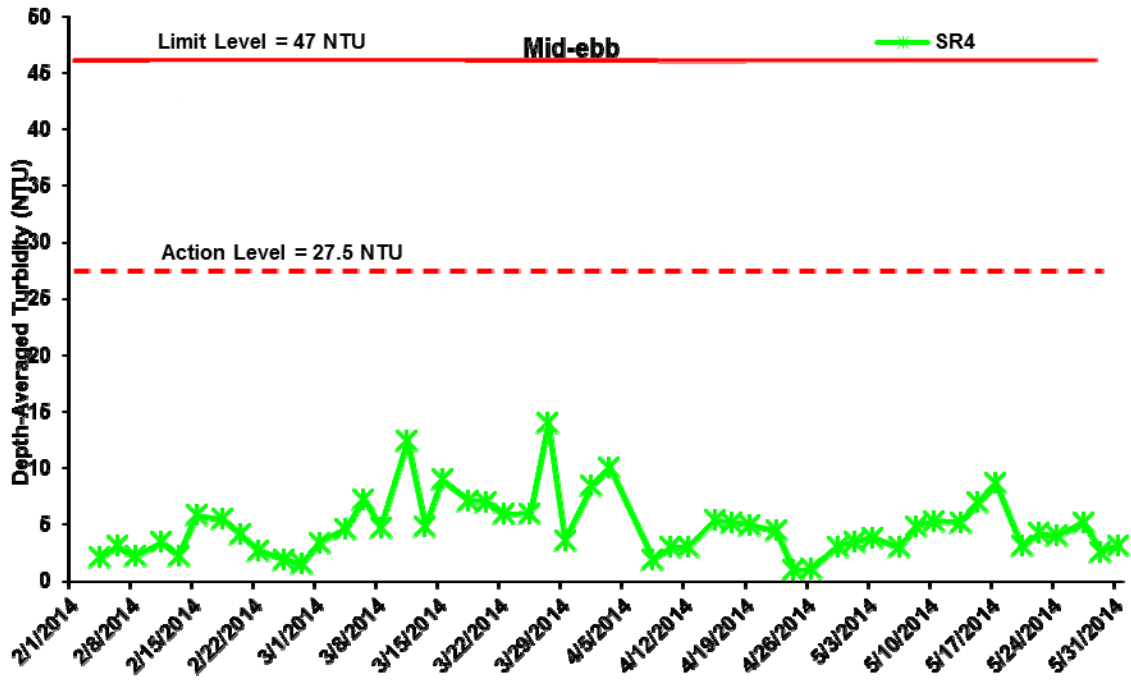
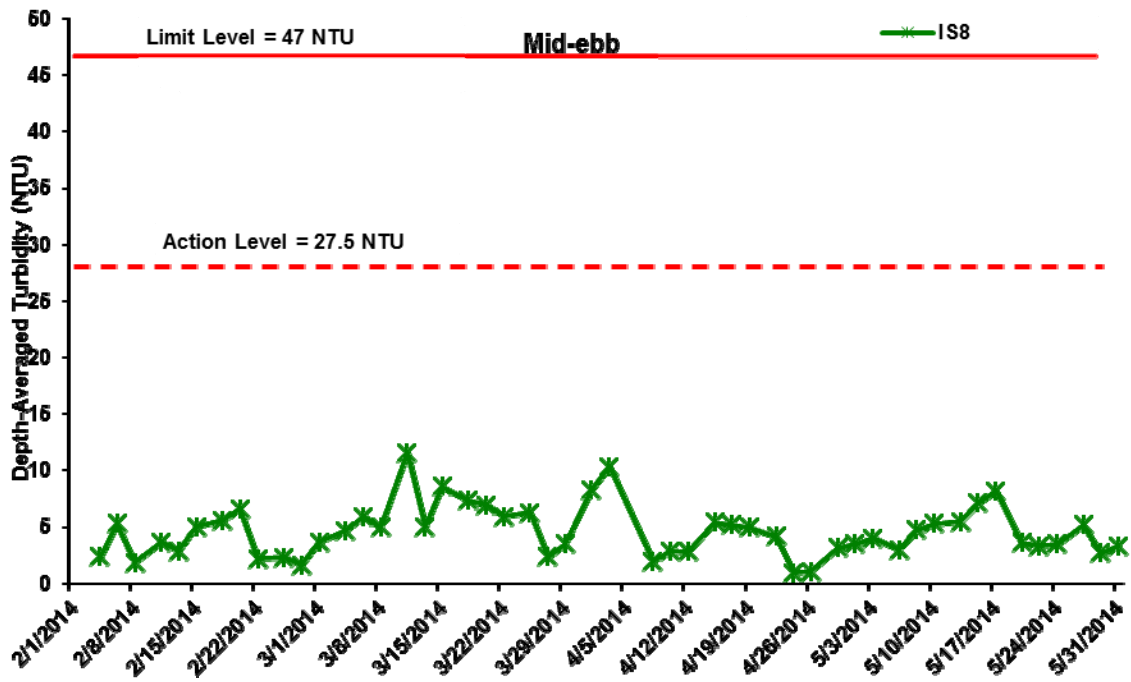


**Figure H22 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-ebb tide between 1 February to 31 May 2014 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management



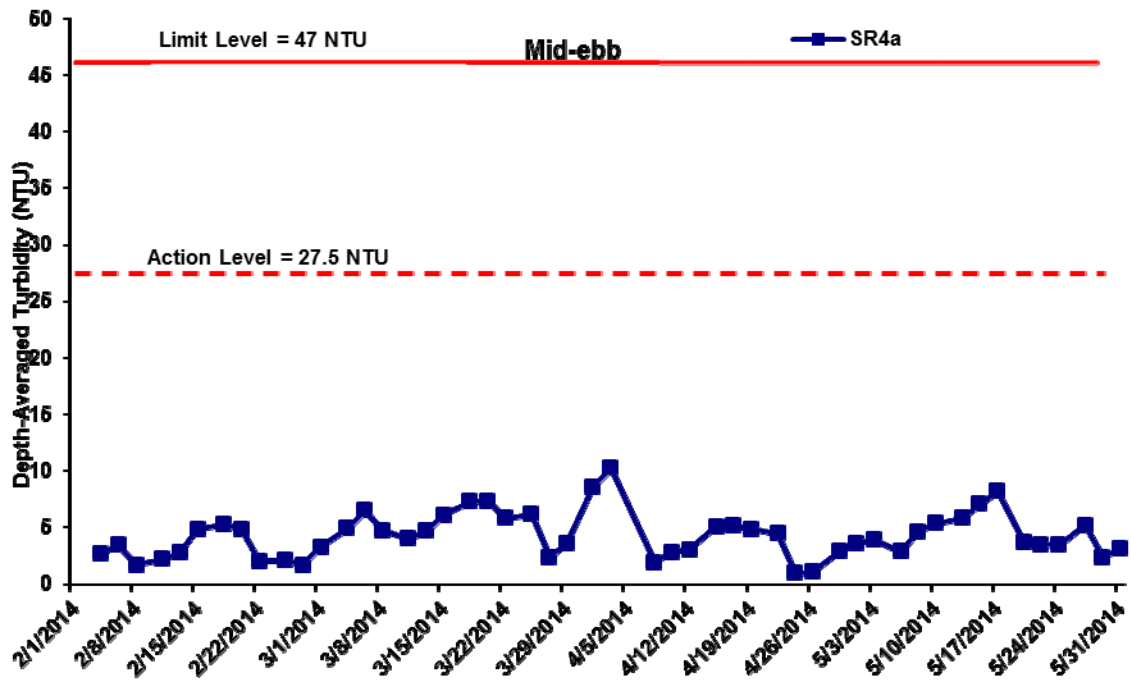


**Figure H23 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-ebb tide between 1 February to 31 May 2014 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management





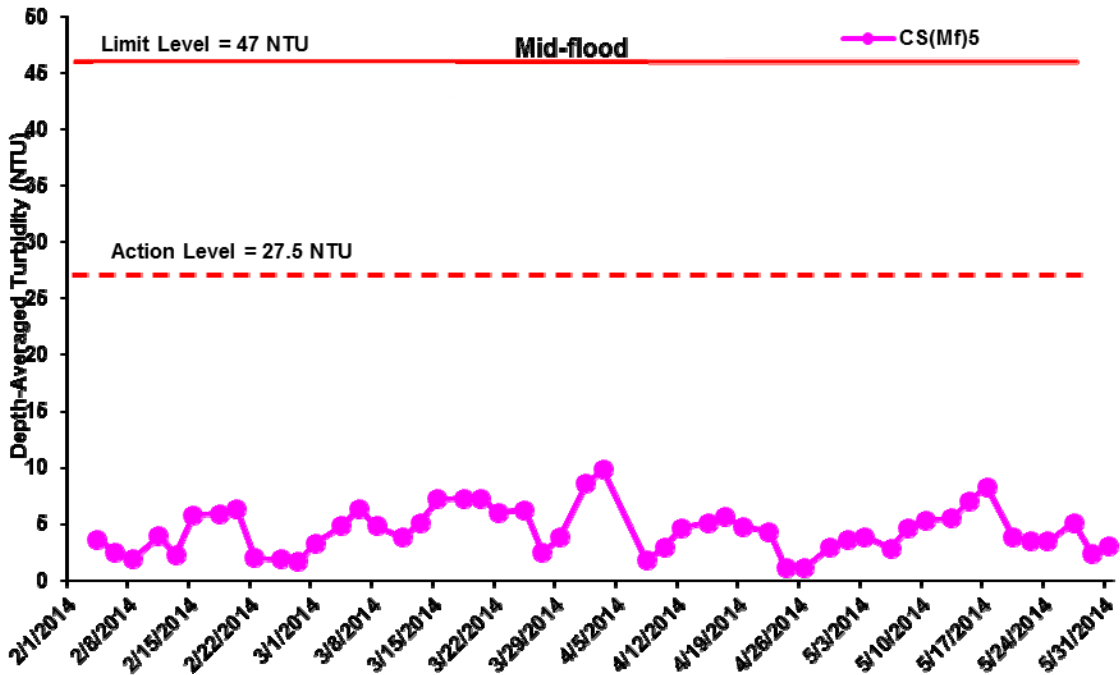
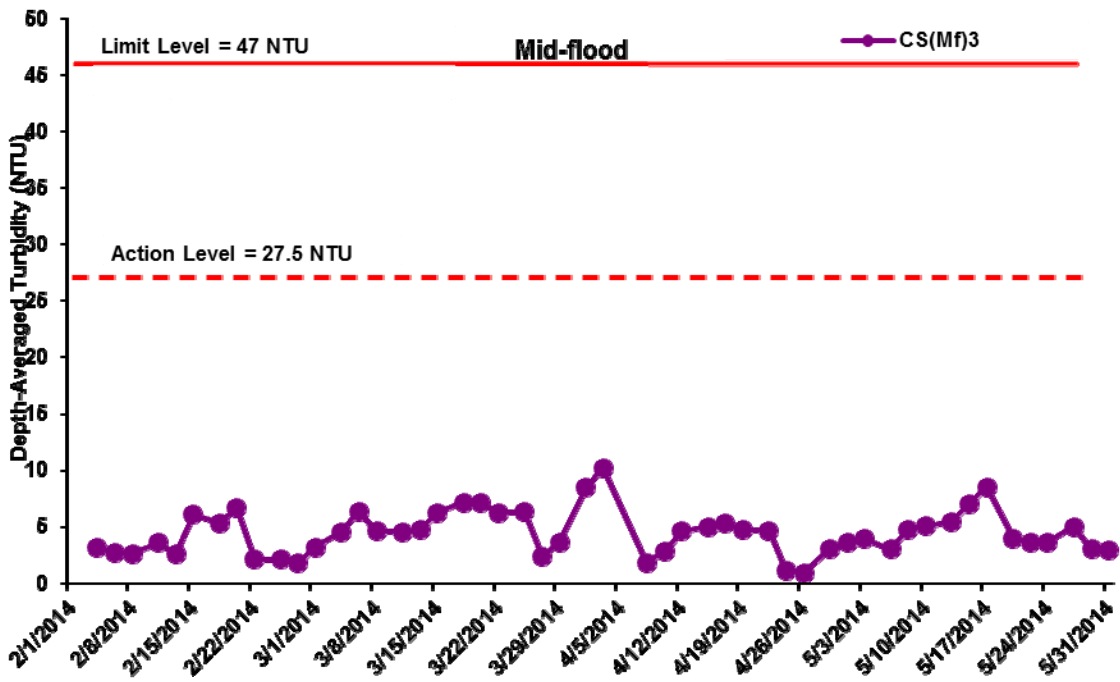
**Figure H24 Impact Monitoring - Mean Level of depth-averaged Turbidity (NTU) during mid-ebb tide between 1 February to 31 May 2014 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**





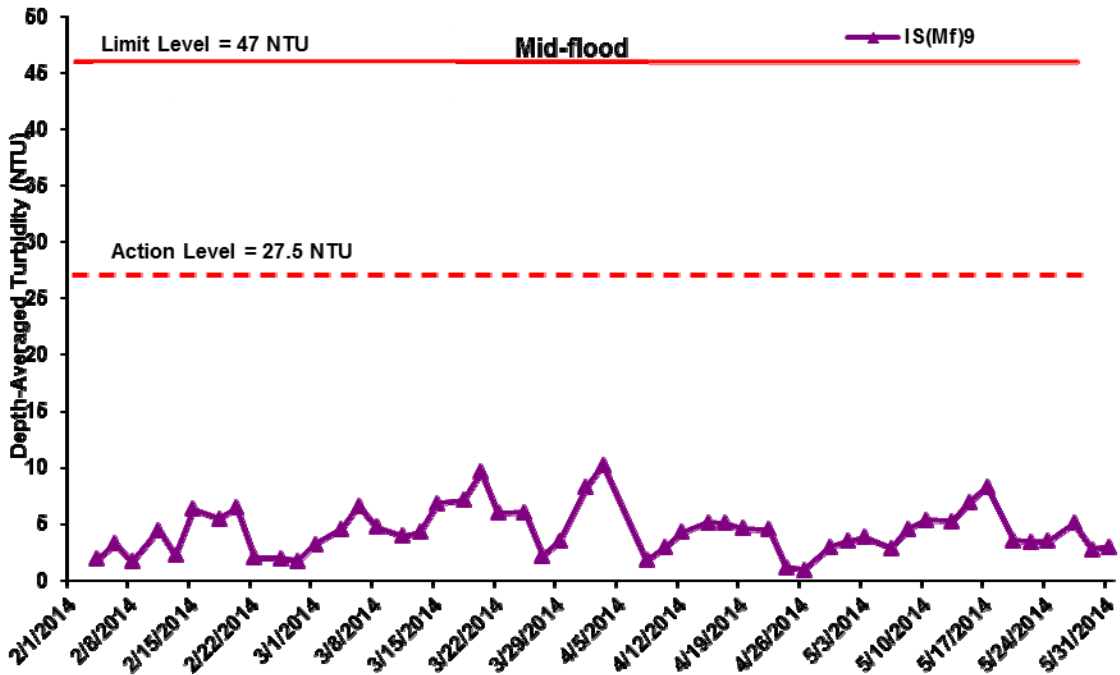
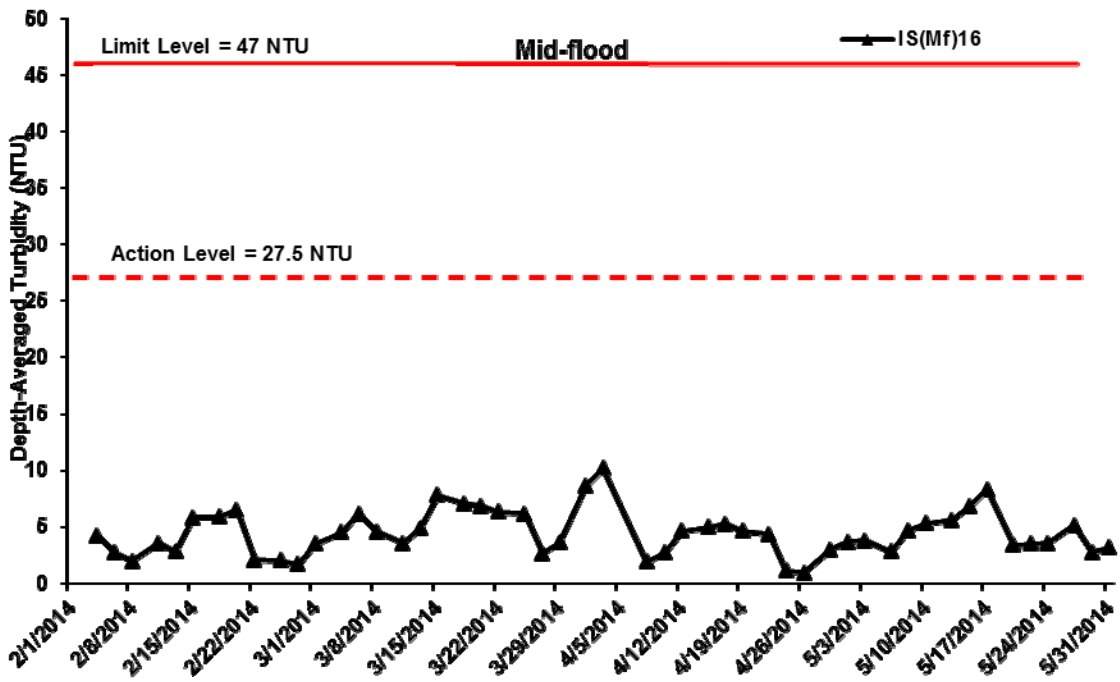


**Figure H25 Impact Monitoring - Mean Level of depth-averaged Turbidity (NTU) during mid-flood tide between 1 February to 31 May 2014 at CS(Mf)3 and CS(MF)5.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management



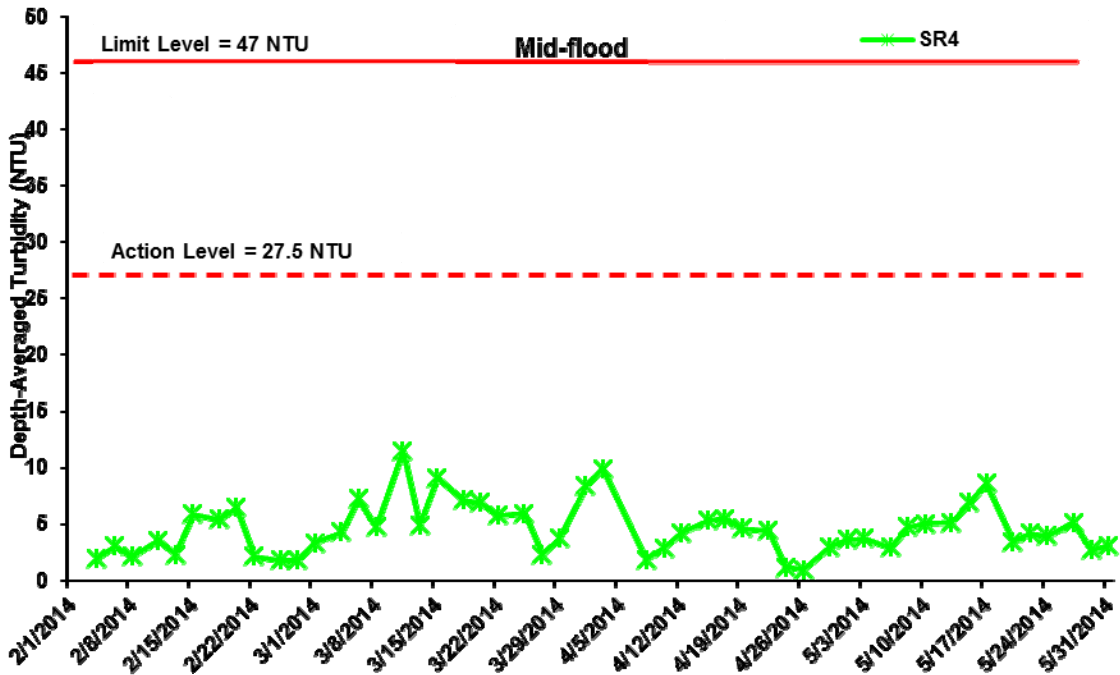
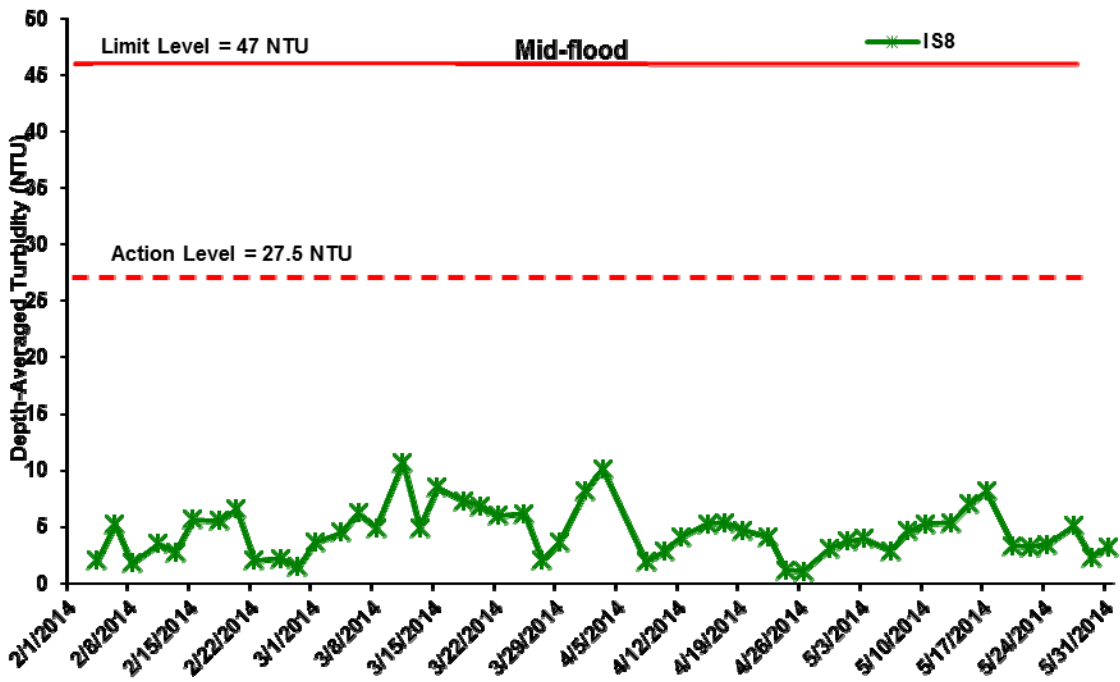


**Figure H26 Impact Monitoring - Mean Level of depth-averaged Turbidity (NTU) during mid-flood tide between 1 February to 31 May 2014 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management



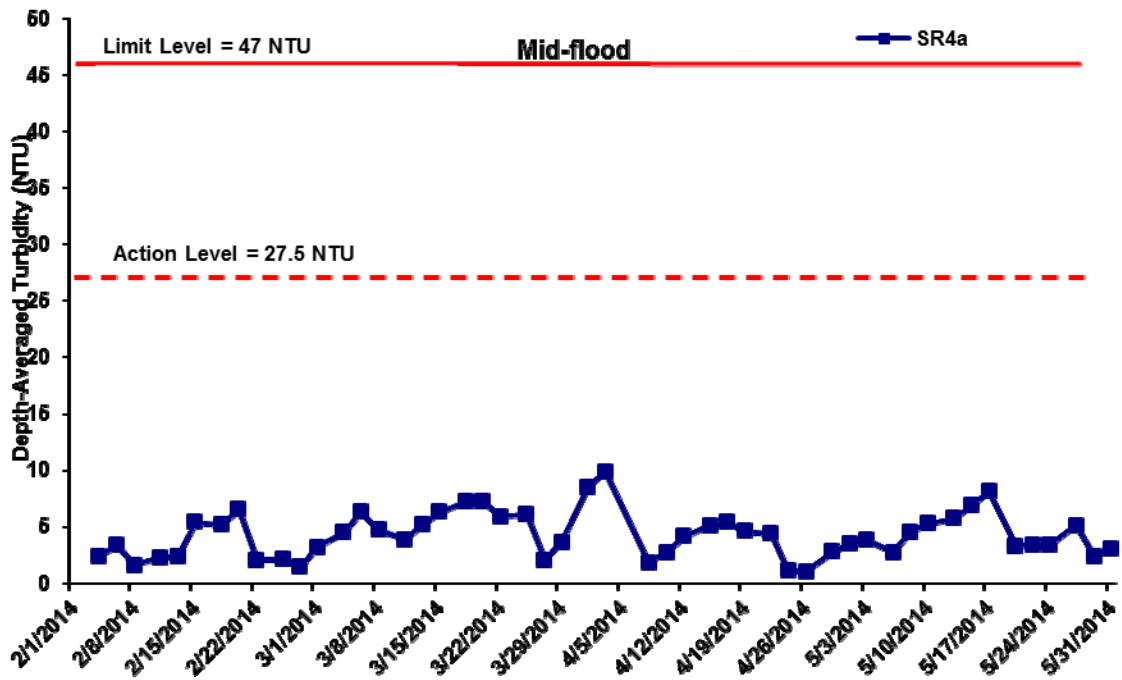


**Figure H27 Impact Monitoring - Mean Level of depth-averaged Turbidity (NTU) during mid-flood tide between 1 February to 31 May 2014 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management



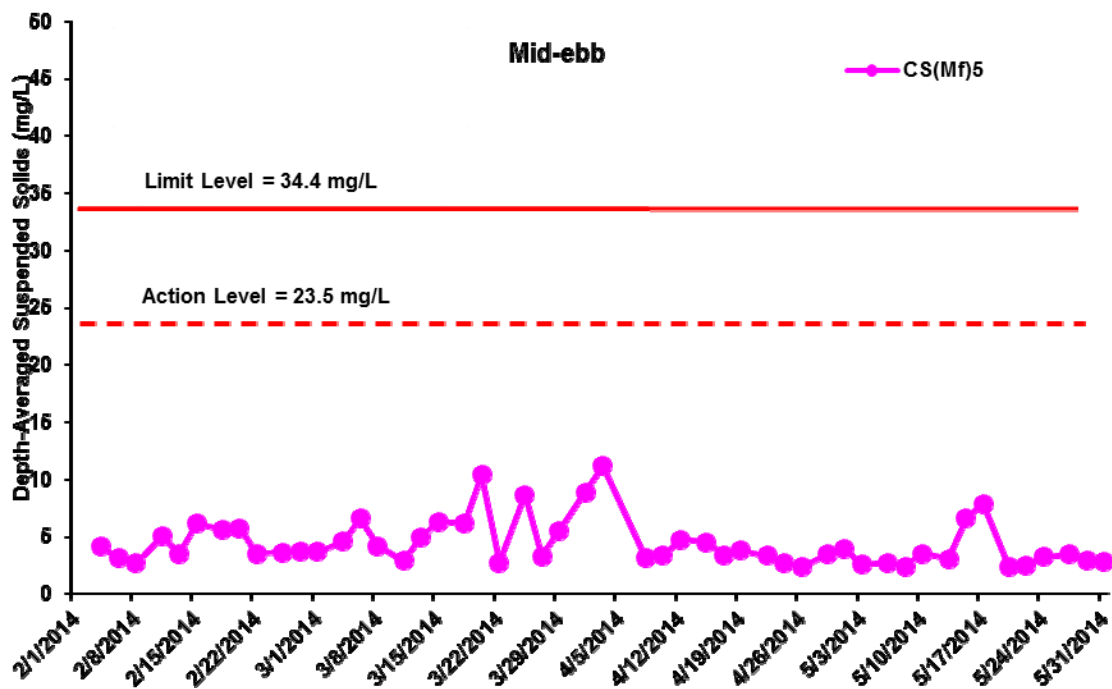
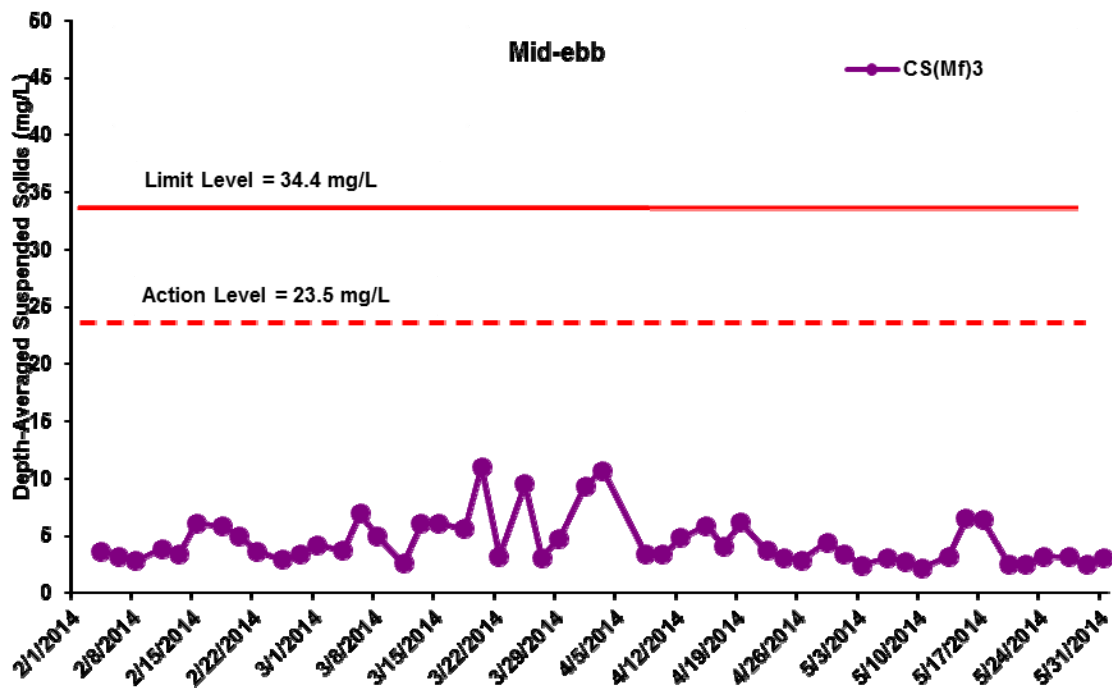


**Figure H28 Impact Monitoring - Mean Level of depth-averaged Turbidity (NTU) during mid-flood tide between 1 February to 31 May 2014 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**



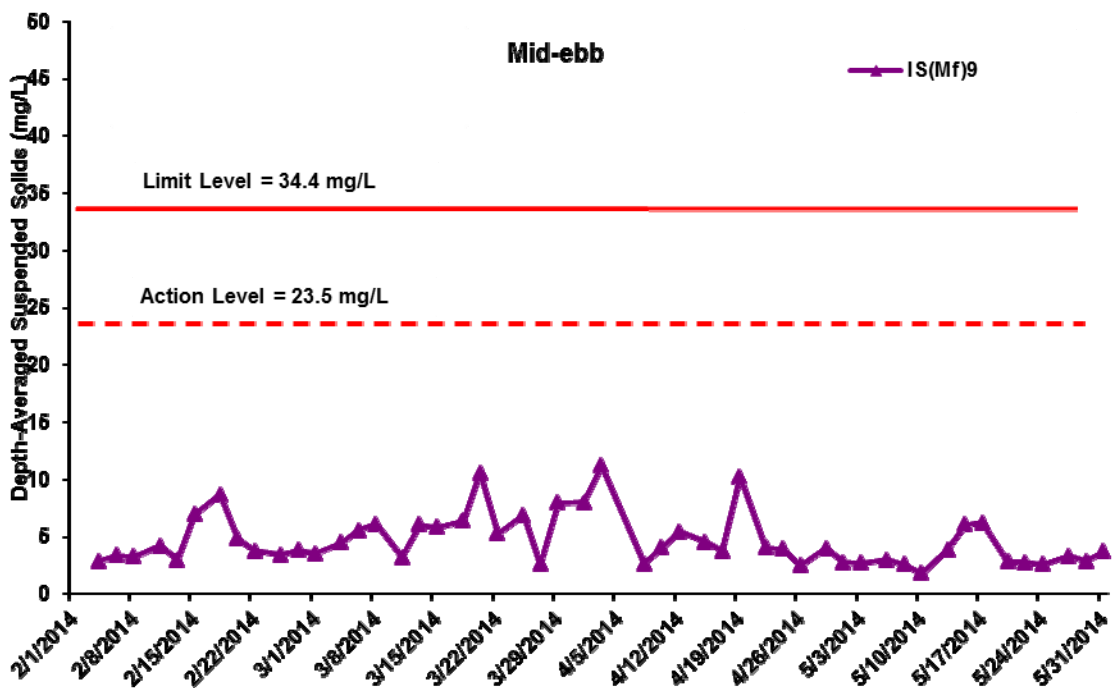
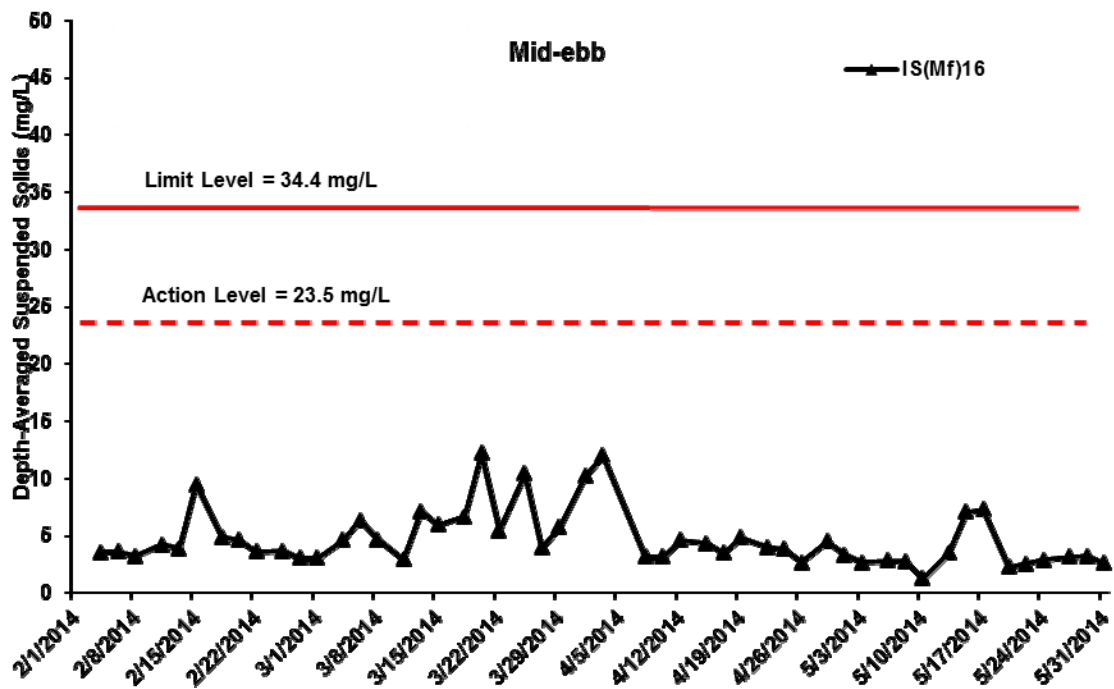


**Figure H29 Impact Monitoring - Mean Level of depth-averaged Suspended Solids (mg/L) during mid-ebb tide between 1 February to 31 May 2014 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management





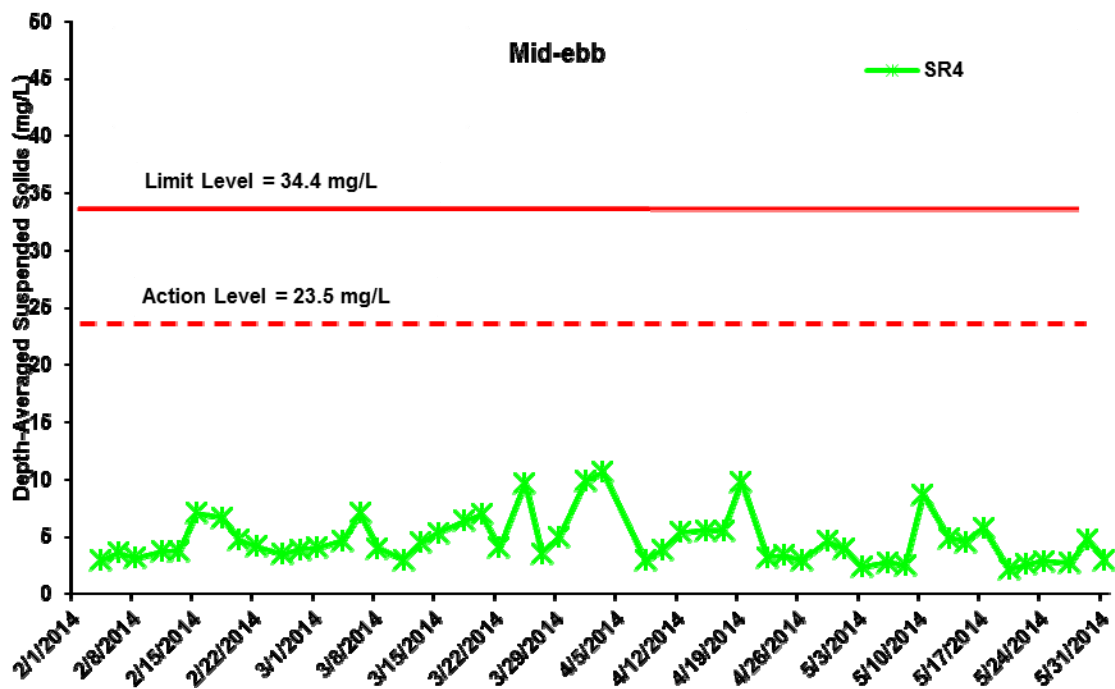
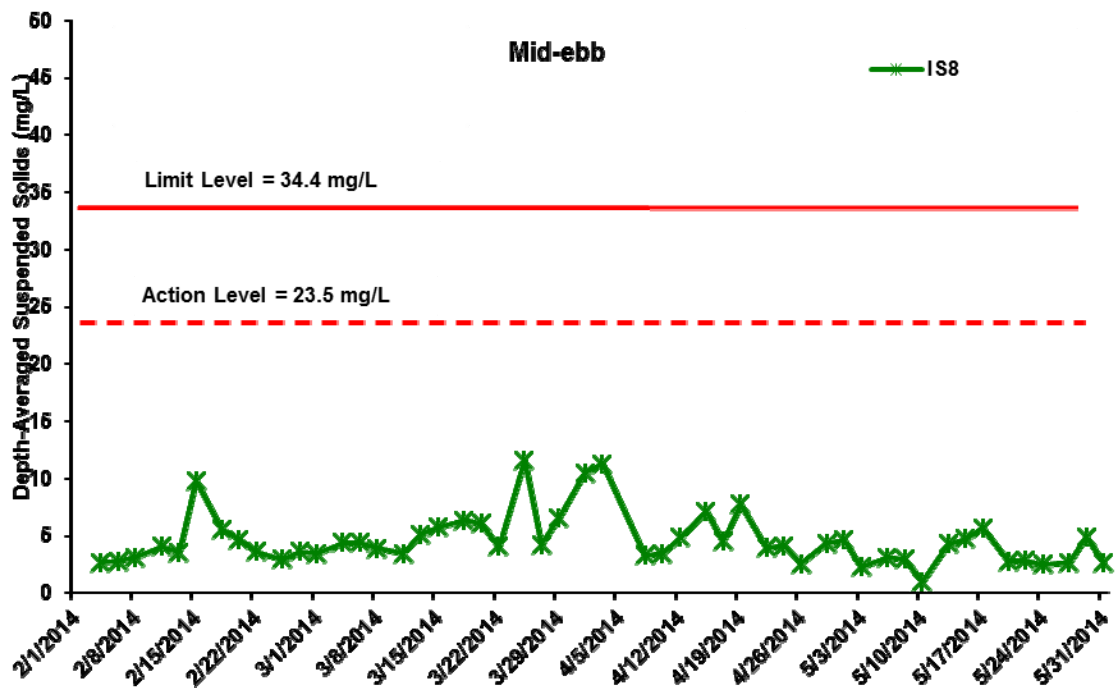
**Figure H30 Impact Monitoring - Mean Level of depth-averaged Suspended Solids (mg/L) during mid-ebb tide between 1 February to 31 May 2014 at IS(Mf)16 and IS(Mf)9.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

Environmental  
Resources  
Management





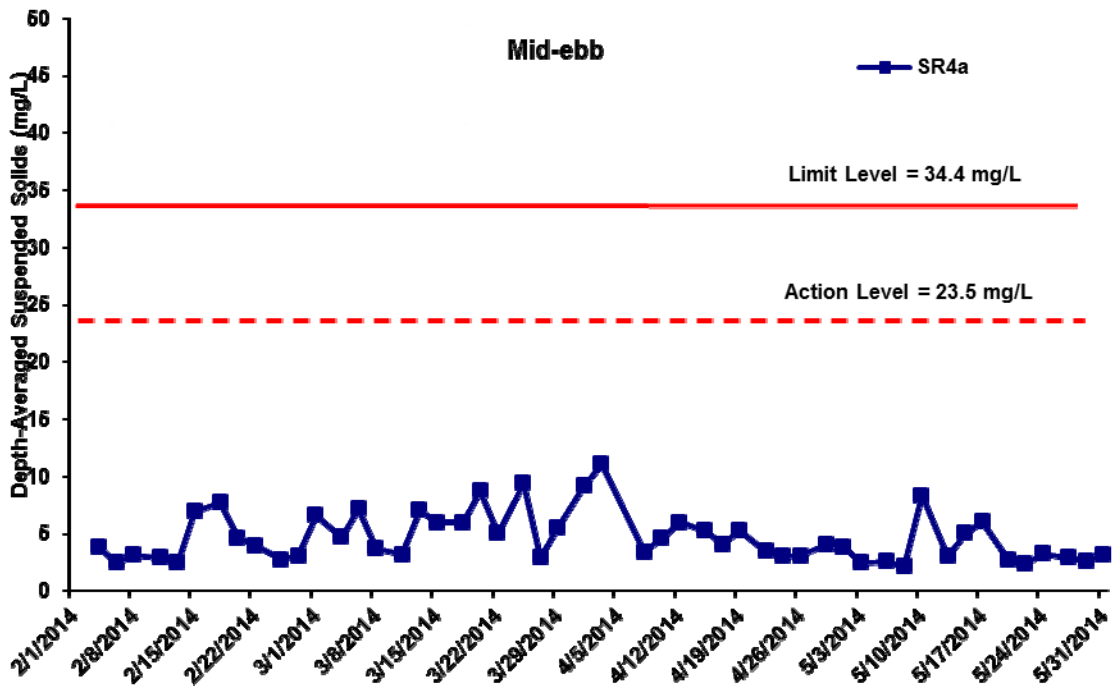


**Figure H31 Impact Monitoring - Mean Level of depth-averaged Suspended Solids (mg/L) during mid-ebb tide between 1 February to 31 May 2014 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**



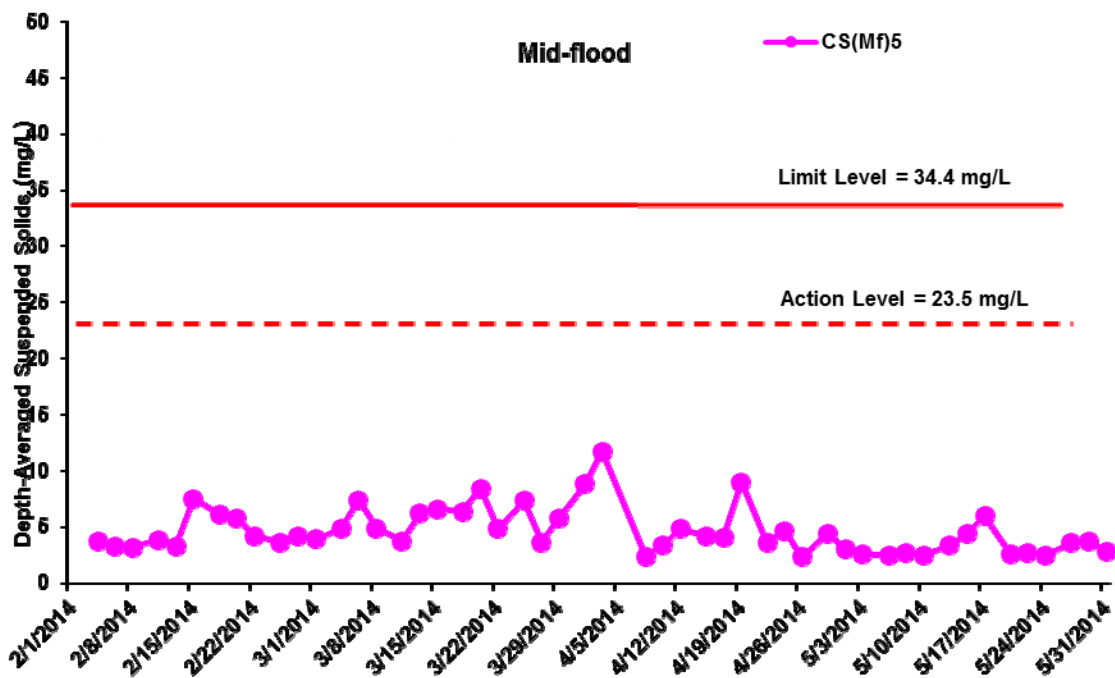
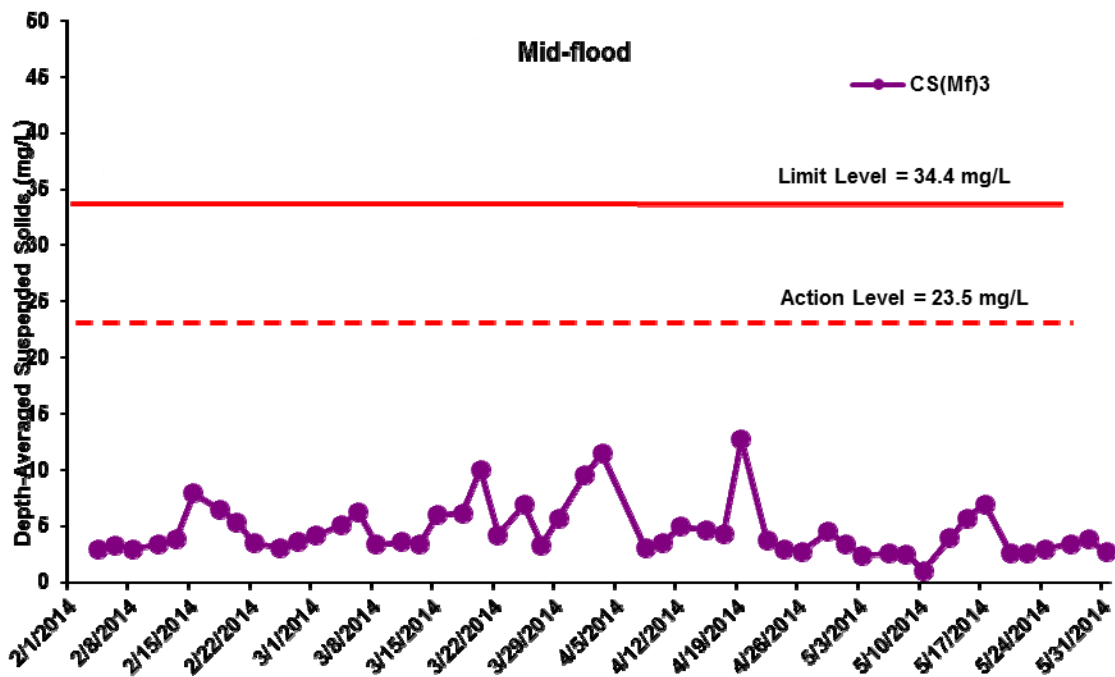


**Figure H32 Impact Monitoring - Mean Level of depth-averaged Suspended Solids (mg/L) during mid-ebb tide between 1 February to 31 May 2014 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**



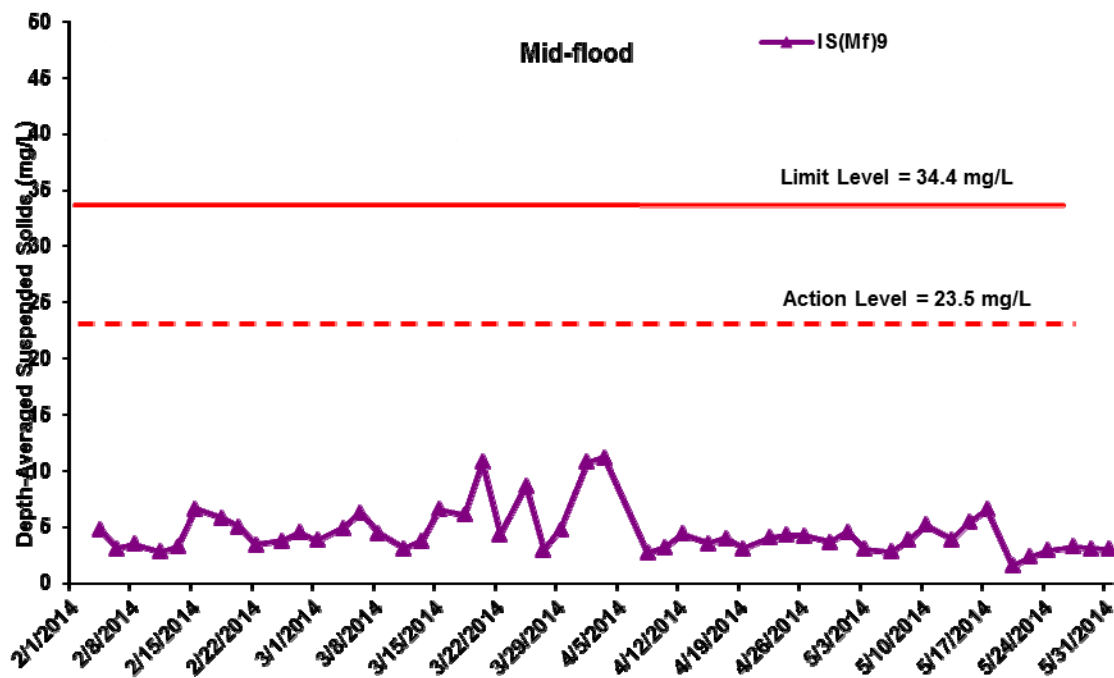
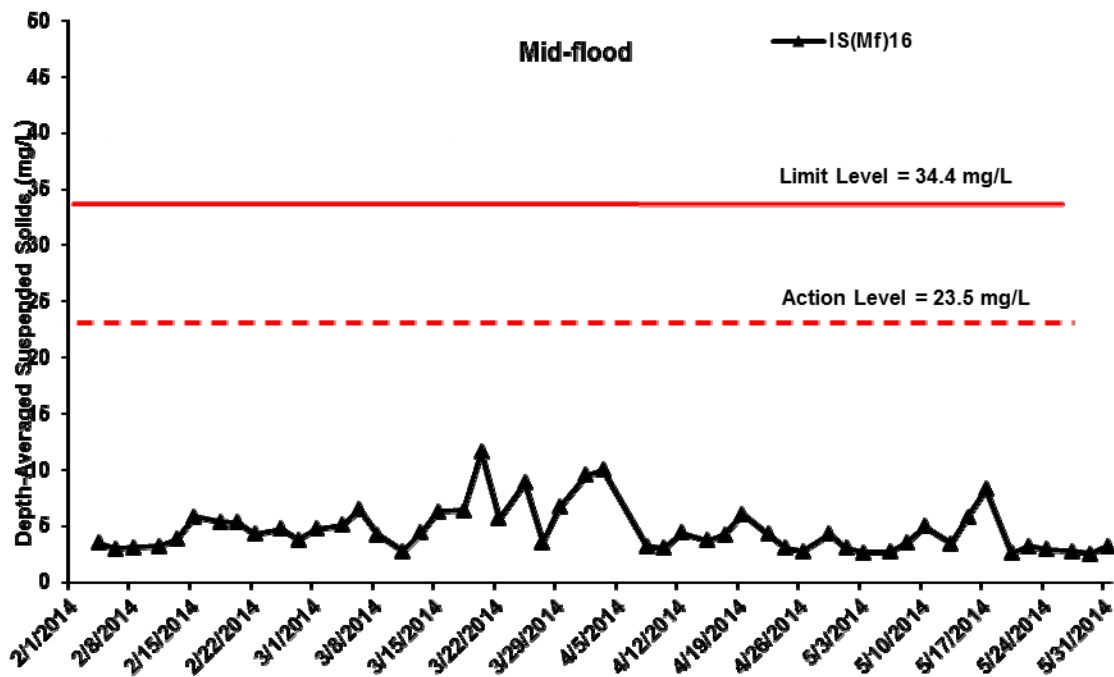


**Figure H33 Impact Monitoring - Mean Level of depth-averaged Suspended Solids (mg/L) during mid-flood tide between 1 February to 31 May 2014 at CS(Mf)3 and CS(Mf)5.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental Resources Management**



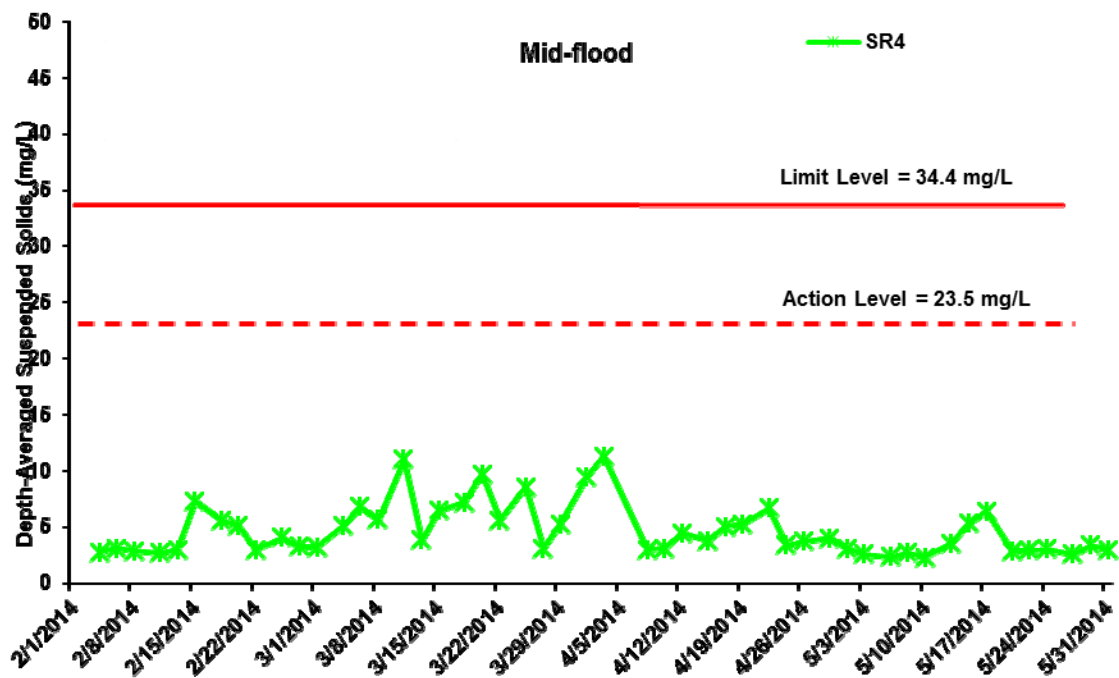
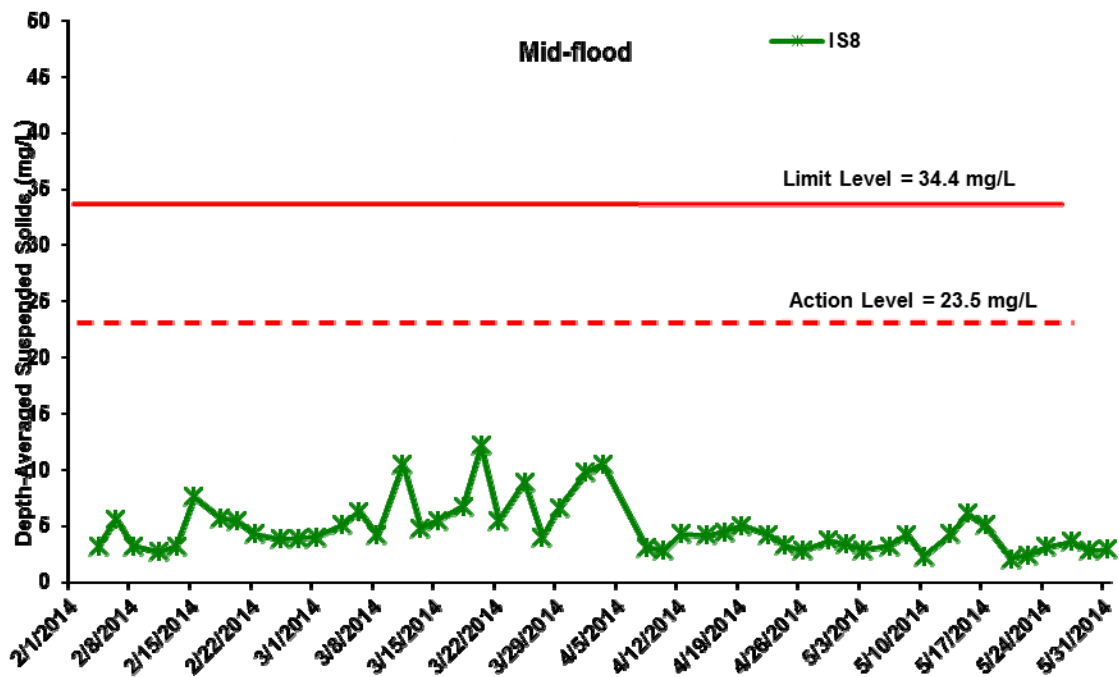


**Figure H34 Impact Monitoring - Mean Level of depth-averaged Suspended Solids (mg/L) during mid-flood tide between 1 February to 31 May 2014 at IS(Mf)16 and IS(Mf)9 .**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental Resources Management**



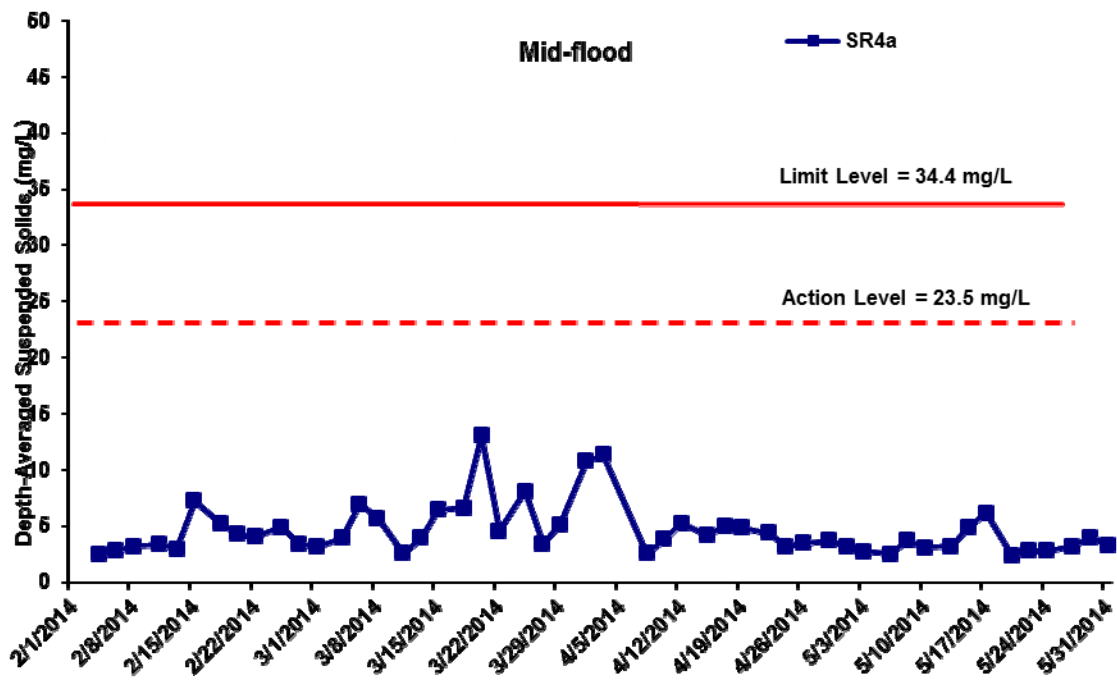


**Figure H35 Impact Monitoring - Mean Level of depth-averaged Suspended Solids (mg/L) during mid-flood tide between 1 February to 31 May 2014 at IS8 and SR4.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**Environmental  
Resources  
Management**





**Figure H36 Impact Monitoring - Mean Level of depth-averaged Suspended Solids (mg/L) during mid-flood tide between 1 February to 31 May 2014 at SR4a.**

*(Weather condition varied between sunny to rainy within the reporting period. Marine works within the reporting period include rockfill platform construction, marine piling platform installation and survey tower erection.)*

**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**

*2<sup>nd</sup> Quarterly Progress Report (March-May 2014)  
submitted to Gammon Construction Limited*

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

8 July 2014

**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 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 second 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 March to May 2014 utilizing the survey data collected by HKLR03 project.

## 2. Monitoring Methodology

### 2.1. Vessel-based Line-transect Survey

- 2.1.1. According to the requirement of the updated EM&A manual, 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 conducted during the HKLR03 dolphin monitoring surveys 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	814577		13	Start Point	816506	819480
1	End Point	804671	831404		13	End Point	816506	824859
2	Start Point	805475	815457		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	820690		19	Start Point	822513	823268
7	End Point	810499	824613		19	End Point	822513	824321
8	Start Point	811508	820847		20	Start Point	823477	823402
8	End Point	811508	824254		20	End Point	823477	824613
9	Start Point	812516	820892		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	818449		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 16 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 2012, 2013). 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 or 60D model), equipped with long telephoto lenses (100-400 mm zoom), were available on board for researchers to take sharp, close-up photographs of dolphins as they surfaced. The images were shot at the highest available resolution and stored on Compact Flash memory cards for downloading onto a computer.
- 2.2.3. All digital images taken in the field were first examined, and those containing potentially identifiable individuals were sorted out. These photographs would then be examined in greater detail, and were carefully compared to the existing Chinese White Dolphin photo-identification catalogue maintained by HKCRP since 1995.
- 2.2.4. Chinese White Dolphins can be identified by their natural markings, such as nicks, cuts, scars and deformities on their dorsal fin and body, and their unique spotting patterns were also used as secondary identifying features (Jefferson 2000).
- 2.2.5. All photographs of each individual were then compiled and arranged in chronological order, with data including the date and location first identified (initial sighting), re-sightings, associated dolphins, distinctive features, and age classes entered into a computer database.

## 2.3. Data Analysis

- 2.3.1. Distribution Analysis – The line-transect survey data was integrated with the Geographic Information System (GIS) in order to visualize and interpret different spatial and temporal patterns of dolphin distribution using sighting positions. Location data of dolphin groups were plotted on map layers of Hong Kong using a desktop GIS (*ArcView*® 3.1) to examine their distribution patterns in details. The dataset was also stratified into different subsets to examine distribution patterns of dolphin groups with different categories of group sizes, young calves and activities.
- 2.3.2. Encounter rate analysis – Encounter rates of Chinese white dolphins (number of on-effort sightings per 100 km of survey effort, and total number of dolphins sighted on-effort per 100 km of survey effort) were calculated in NEL and NWL survey areas in relation to the amount of survey effort conducted during each month of monitoring survey. Only data

collect under Beaufort 3 or below condition would be used for the encounter rate analyses. Dolphin encounter rates were calculated in two ways for comparisons with the HZMB baseline monitoring results as well as to AFCD long-term marine mammal monitoring results.

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

Secondly, the encounter rates were calculated using both primary and secondary survey effort collected under Beaufort 3 or below condition as in AFCD long-term monitoring study. The encounter rate of sightings and dolphins were deduced by dividing the total number of on-effort sightings (STG) and total number of dolphins (ANI) by the amount of survey effort for the quarterly period of March to May 2014.

- 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 March to May 2014, 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 891.87 km of survey effort was collected, with 87.4% 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, 350.40 km and 541.47 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 642.67 km, while the effort on secondary lines was 249.20 km. Both survey effort conducted on primary and secondary lines were considered as on-effort survey data. Summary table of the survey effort is shown in Appendix I.
- 3.1.4. During the six sets of HKLR03 monitoring surveys from March to May 2014, a total of 31 groups of 103 Chinese White Dolphins were sighted. All except one sighting were made during on-effort search. Twenty-five on-effort sightings were made on primary lines, while another five on-effort sightings were made on secondary lines. In this quarterly period, all dolphin groups were sighted in NWL, while none was sighted in NEL. Summary table of the dolphin sightings is shown in Appendix II.

3.2. *Distribution*

3.2.1. Distribution of dolphin sightings made during the HKLR03 monitoring surveys in March to May 2014 is shown in Figure 1. The majority of dolphin sightings were made in the northwestern portion of the North Lantau region. Dolphin sightings were particularly concentrated to the northern and northeastern sides of Lung Kwu Chau, and at the mouth of Deep Bay near Black Point (Figure 1). Other dolphin sightings were scattered between Lung Kwu Chau and Sha Chau, near Pillar Point, Tap Shek Kok and the airport platform. No dolphin was sighted in NEL survey area during the present quarterly period (Figure 1).

3.2.2. Notably, none of the dolphin groups were sighted in the vicinity of TMCLKL northern landfall or southern viaduct section, and the HKLR03/HKBCF reclamation site (Figure 1).

3.2.3. Sighting distribution of the present impact phase monitoring period (March to May 2014) was compared to the one during the baseline monitoring period (September to November 2011). In the present quarter, dolphin disappeared from the NEL region, which was in stark contrast to their frequent occurrence around the Brothers Islands and in the vicinity of HKBCF reclamation site during the baseline period (Figure 1).

3.2.4. Dolphin occurrence in the northwestern portion of North Lantau region was largely similar between the baseline and impact phase quarters. However, during the present impact monitoring period, there appeared to be much fewer dolphins occurred in the middle portion of North Lantau region, where dolphins supposedly moved between their core areas around Lung Kwu Chau and the Brothers Islands (Figure 1). Moreover, a number of dolphin sightings were made to the west of Chek Lap Kok airport (especially near the HKLR09 alignment) during the baseline period, but only one sighting was made there during the present impact phase period.

3.2.5. As the baseline monitoring period was in the autumn season while the present monitoring period was in the spring season, a direct comparison in dolphin distribution between the two quarterly periods of spring months in 2013 and 2014 was also made to avoid the potential bias in seasonal variation (Figure 2).

3.2.6. Between the two spring periods, none of the dolphin sightings was made in NEL in spring 2014, while there were two sightings made in spring 2013. Moreover, more dolphin sightings were made in the middle portion of North Lantau waters and to the west of the airport platform (especially near the HKLR09 alignment) in spring 2013 than in spring 2014.

3.3. *Encounter rate*

3.3.1. During the present quarterly period, the encounter rates of Chinese White Dolphins deduced from the survey effort and on-effort sighting data from the primary transect lines under favourable conditions (Beaufort 3 or below) for each set of the HKLR03 surveys in NEL and NWL are shown in Table 2. The average encounter rates deduced from the six sets of HKLR03 surveys were also compared with the ones deduced from the baseline monitoring period (September – November 2011) (Table 3).

Table 2. Dolphin encounter rates (sightings per 100 km of survey effort) during March – May 2014 deduced from HKLR03 monitoring surveys

SURVEY AREA	HKLR03 DOLPHIN MONITORING DATES	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)	Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)
		Primary Lines Only	Primary Lines Only
Northeast Lantau	Set 1 (5 & 11 Mar 2014)	0.00	0.00
	Set 2 (17 & 25 Mar 2014)	0.00	0.00
	Set 3 (4 & 14 Apr 2014)	0.00	0.00
	Set 4 (16 & 24 Apr 2014)	0.00	0.00
	Set 5 (2 & 19 May 2014)	0.00	0.00
	Set 6 (21 & 26 May 2014)	0.00	0.00
Northwest Lantau	Set 1 (5 & 11 Mar 2014)	6.43	23.57
	Set 2 (17 & 25 Mar 2014)	13.15	24.83
	Set 3 (4 & 14 Apr 2014)	4.89	26.88
	Set 4 (16 & 24 Apr 2014)	4.94	11.54
	Set 5 (2 & 19 May 2014)	5.47	18.24
	Set 6 (21 & 26 May 2014)	4.18	9.75

Table 3. Comparison of average dolphin encounter rates from impact monitoring period (March – May 2014) 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)

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)		Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)	
	March – May 2014	September - November 2011	March – May 2014	September - November 2011
Northeast Lantau	0.00	6.00 ± 5.05	0.00	22.19 ± 26.81
Northwest Lantau	6.51 ± 3.34	9.85 ± 5.85	19.14 ± 7.19	44.66 ± 29.85

3.3.2. To facilitate the comparison with the AFCD long-term monitoring results, the encounter rates were also calculated for the present quarter using both primary and secondary survey effort. The encounter rates of sightings (STG) and dolphins (ANI) in NWL were 6.00 sightings and 17.34 dolphins per 100 km of survey effort respectively, while the encounter rates of sightings (STG) and dolphins (ANI) in NEL were both zero as no sighting was made in this area.

3.3.3. In NEL, the average dolphin encounter rates (both STG and ANI) in the present three-month impact phase were zero, which was the lowest since the HKLR03 dolphin

monitoring commenced in October 2012.

- 3.3.4. On the other hand, the average dolphin encounter rates (STG and ANI) in NWL during the present impact phase monitoring period were much lower (reductions of 34% and 57% respectively) than the ones recorded in the 3-month baseline period, indicating a reduced dolphin usage of this survey area during the present construction period..
- 3.3.5. 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).
- 3.3.6. For the comparison between the baseline period and the present quarter (sixth quarter of the impact phase being assessed), the p-value for the differences in average dolphin encounter rates of STG and ANI were 0.0337 and 0.0535 respectively. If the alpha value is set at 0.1, significant difference was detected between the baseline and present quarters in both dolphin encounter rates of STG and ANI.
- 3.3.7. For the comparison between the baseline period and the cumulative quarters in impact phase (i.e. first six quarters of the impact phase being assessed), the p-value for the differences in average dolphin encounter rates of STG and ANI were 0.0080 and 0.0032 respectively. Even if the alpha value is set at 0.01, significant differences were detected in both the average dolphin encounter rates of STG and ANI (i.e. between the two periods and the locations).
- 3.4. *Group size*
- 3.4.1. Group size of Chinese White Dolphins ranged from 1-13 individuals per group in North Lantau region during March – May 2014. 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 4.

Table 4. Comparison of average dolphin group sizes from impact monitoring period (March – May 2014) and baseline monitoring period (September – November 2011)

	Average Dolphin Group Size	
	March – May 2014	September – November 2011
<b>Overall</b>	3.32 ± 2.87 (n = 31)	3.72 ± 3.13 (n = 66)
<b>Northeast Lantau</b>	0.0	3.18 ± 2.16 (n = 17)
<b>Northwest Lantau</b>	3.32 ± 2.87 (n = 31)	3.92 ± 3.40 (n = 49)

- 3.4.2. The average dolphin group sizes in the entire North Lantau region as well as in NWL waters during March – May 2014 were lower than the ones recorded during the

three-month baseline period (Table 4). In fact, 21 of the 31 groups were composed of 1-3 individuals only, while only one group of dolphins was composed of more than 10 individuals.

3.4.3. Distribution of dolphins with larger group sizes (five individuals or more per group) during the present quarter is shown in Figure 3, with comparison to the one in baseline period. In spring 2014, all larger dolphin groups were clustered to the south and north of Lung Kwu Chau (Figure 3). This distribution pattern was quite different from the baseline period, when the larger dolphin groups were distributed more evenly in NWL waters and a few more in NEL waters with no particular concentration (Figure 3).

### 3.5. *Habitat use*

3.5.1. From March to May 2014, the most heavily utilized habitats by Chinese White Dolphins mainly concentrated to the north and northeast of Lung Kwu Chau (Figures 4a and 4b). None of the grids in NEL recorded the presence of dolphins. Moreover, all grids near TMCLKL alignment, HKLR03/HKBCF reclamation sites or HKLR09 alignment did not record any presence of dolphins during on-effort search in the present quarterly period.

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 will be presented 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 was dramatically different from the present impact monitoring period (Figure 5). During the baseline period, nine grids between Siu Mo To and Shum Shui Kok recorded moderately high to high dolphin densities, which was in contrast to the complete absence of dolphins during the present impact phase period (Figure 5).

3.5.4. On the other hand, the density patterns between the baseline and impact phase monitoring periods were also different in NWL, with higher dolphin usage near Sha Chau, between Pillar Point and airport platform, and along the west boundary of Hong Kong territorial waters during the baseline period (Figure 5).

### 3.6. *Mother-calf pairs*

3.6.1. During the three-month study period, a total of five unspotted juveniles (UJ) were sighted in NWL survey areas. These young calves comprised of 4.9% of all animals sighted, which was lower than the percentage recorded during the baseline monitoring period (6.8%).

3.6.2. These young calves were only present near Lung Kwu Chau or at the mouth of Deep Bay (Figure 6), which was very different from their distribution pattern during the baseline period when young calves were sighted throughout the NWL survey area as well as a few sighted in NEL waters. None of these young calves were sighted in the vicinity of the HKBCF/HKLR03 reclamation sites and HKLR09/TMCLKL alignments during the



present quarter (Figure 6).

3.7. *Activities and associations with fishing boats*

- 3.7.1. A total of five dolphin sightings were associated with feeding and socializing activities during the three-month study period. The percentage of feeding activities comprised of 9.7% of the total number of dolphin sightings, which was slightly lower than the one recorded during the baseline period (11.6%). On the contrary, the percentage of socializing activities during the present impact phase monitoring period (6.5%) was slightly higher than the one recorded during the baseline period (5.4%). None of the dolphin groups was engaged in traveling or milling/resting activity during the present impact monitoring period.
- 3.7.2. Distribution of dolphins engaged in feeding and socializing activities during the present three-month period is shown in Figure 7. The sightings associated with these activities were only found near Lung Kwu Chau but not elsewhere in North Lantau waters, which was drastically different from the distribution pattern of these activities during the baseline period (Figure 7).
- 3.7.3. During the three-month period, none of the 31 dolphin groups was found to be associated with an operating fishing vessels in North Lantau waters. The rare events of fishing boat association in the present and previous quarters were consistently found, and were likely related to the recent trawl ban being implemented in December 2012 in Hong Kong waters.
- 3.8. *Summary of photo-identification works*
- 3.8.1. From March to May 2014, over 3,000 digital photographs of Chinese White Dolphins were taken during the impact phase monitoring surveys for the photo-identification work.
- 3.8.2. In total, 45 individuals sighted 74 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.
- 3.8.3. Most identified individuals were sighted only once or twice during the three-month period, with the exception of six individuals being sighted thrice, and another two individuals (NL48 and NL261) being sighted four to five times.
- 3.8.4. Six well-recognized females (NL33, NL46, NL104, NL145, NL202 and NL233) were accompanied with their calves during their re-sightings. All of these mothers were frequently sighted with their calves throughout the HKLR03 impact phase monitoring period since October 2012.
- 3.9. *Individual range use*
- 3.9.1. Ranging patterns of the 45 individuals identified during the three-month study period were determined by fixed kernel method, and are shown in Appendix V.
- 3.9.2. All individuals sighted in this quarter were utilizing their range use in NWL (especially around Lung Kwu Chau) but have avoided NEL, where some of these individuals 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 during the baseline period.

- 3.9.3. For many individuals that have previously utilized the Brothers Islands as their major core area of activities, they have apparently shifted their range use away from this important habitat (e.g. EL01, NL24, NL33, NL120, NL191, NL260; Appendix V). Such shifts of range use and core area use were also well documented by Hung (2014).

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

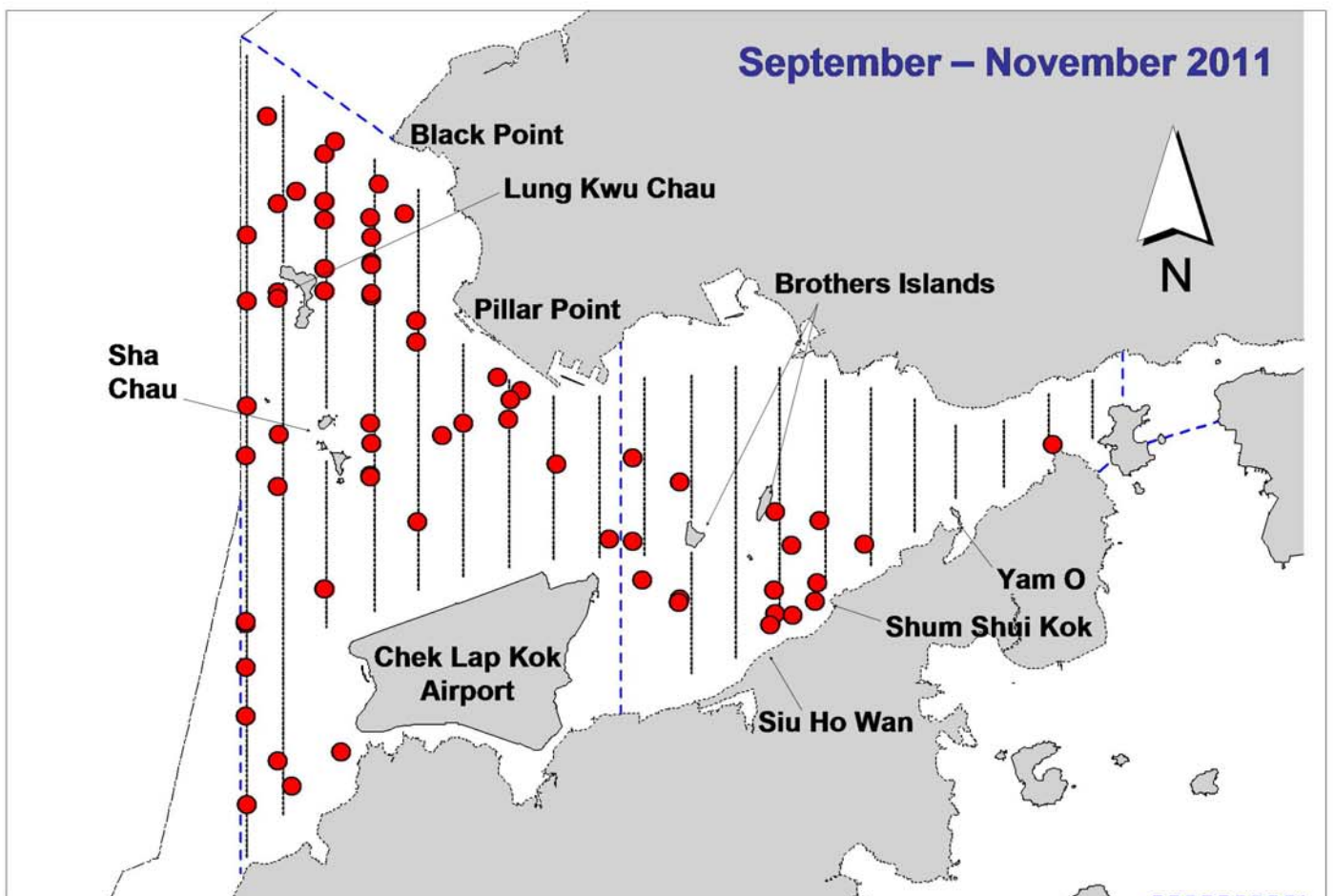
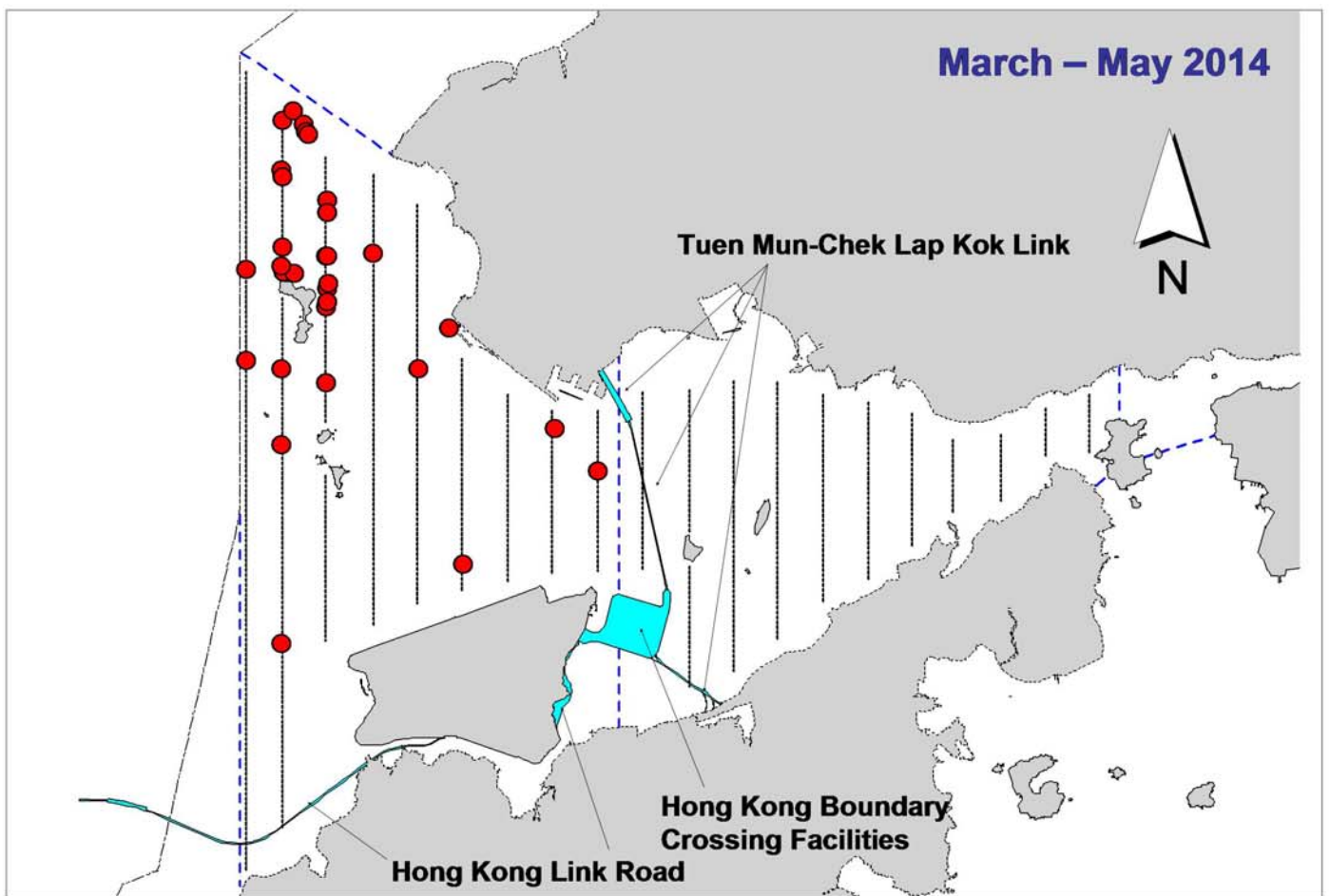


Figure 1. Distribution of Chinese white dolphin sighting in Northwest and Northeast Lantau during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

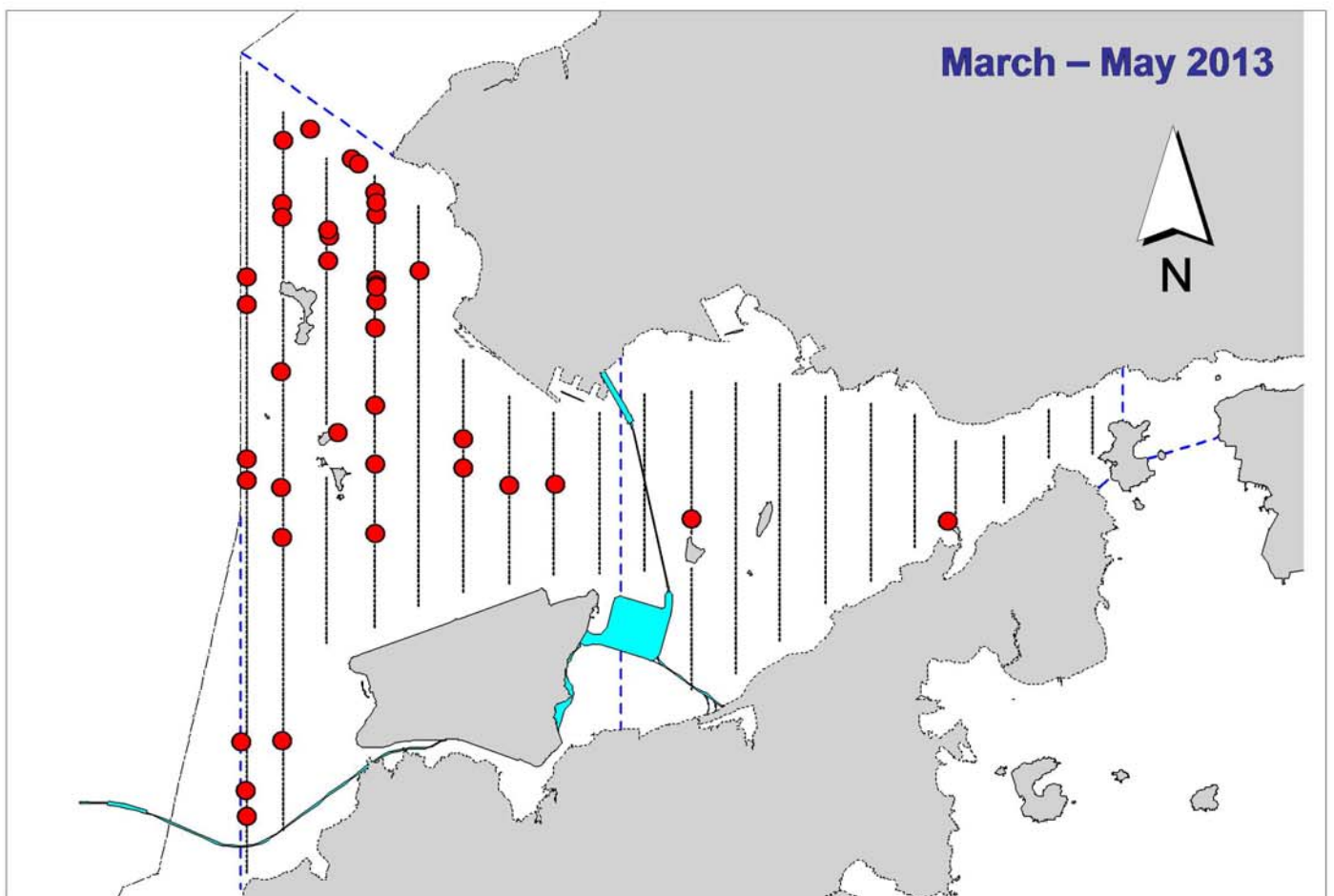
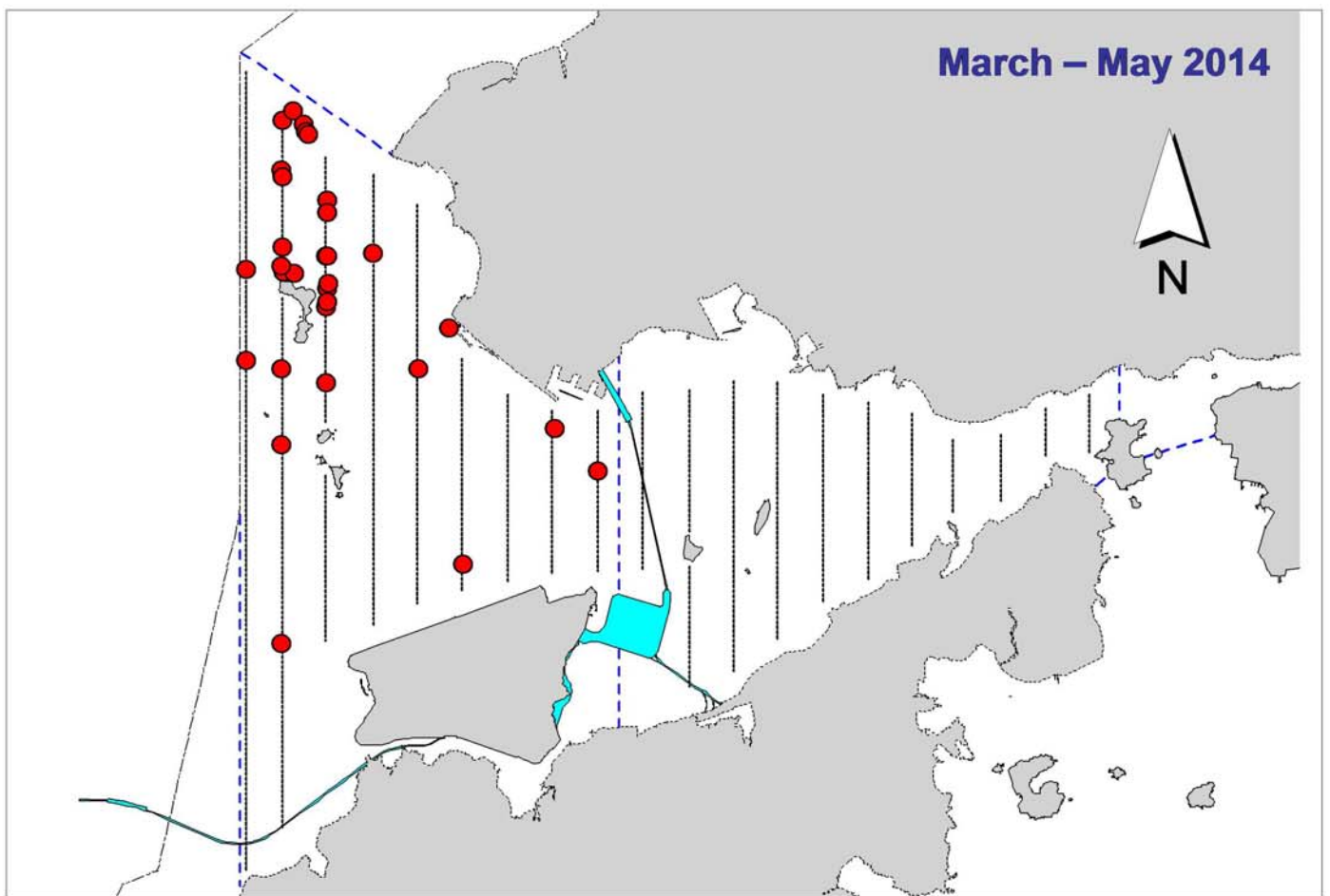


Figure 2. Distribution of Chinese white dolphin sighting in Northwest and Northeast Lantau during the same spring quarter of HKLR03 impact phase in 2014 (top) and 2013 (bottom)

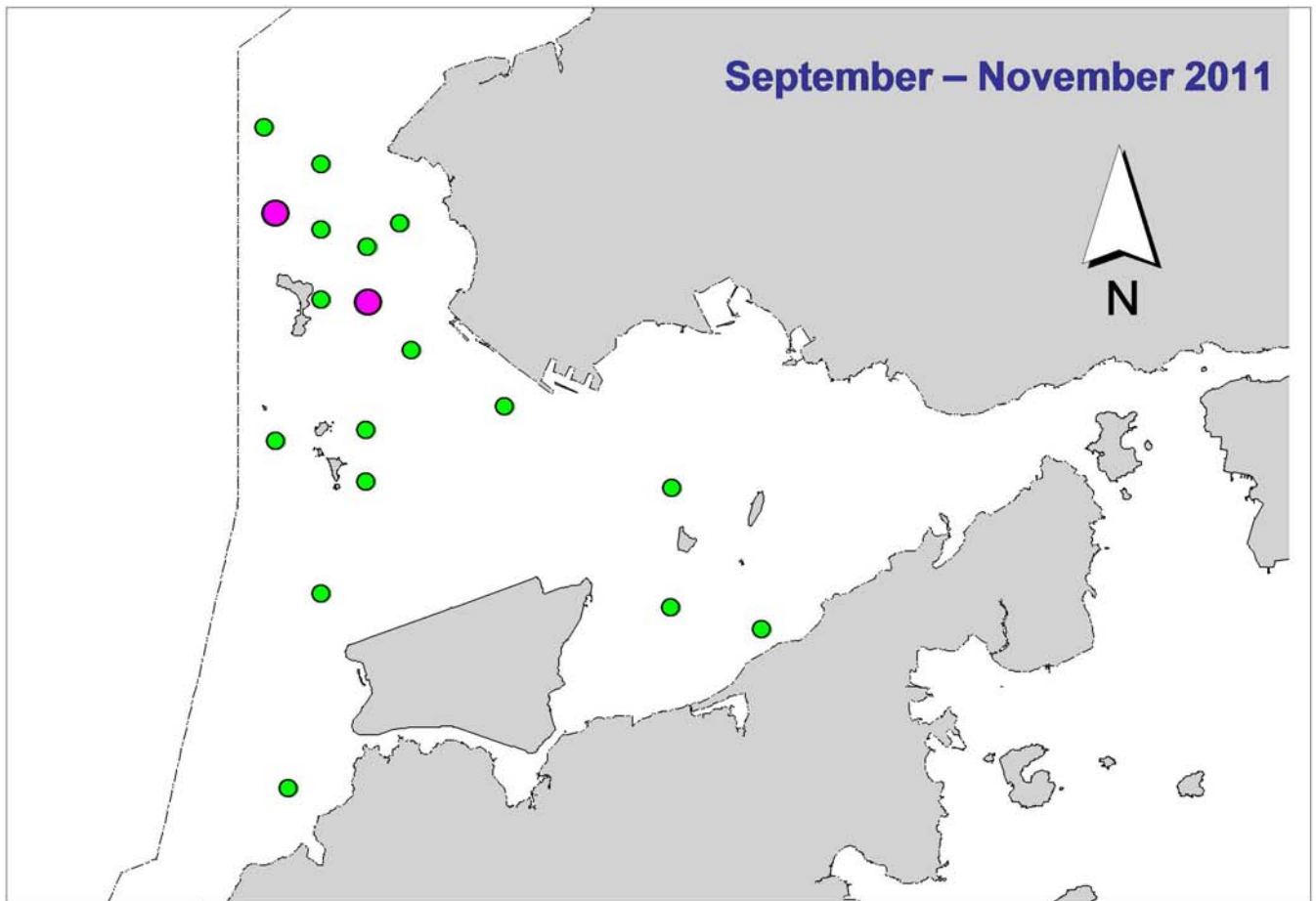
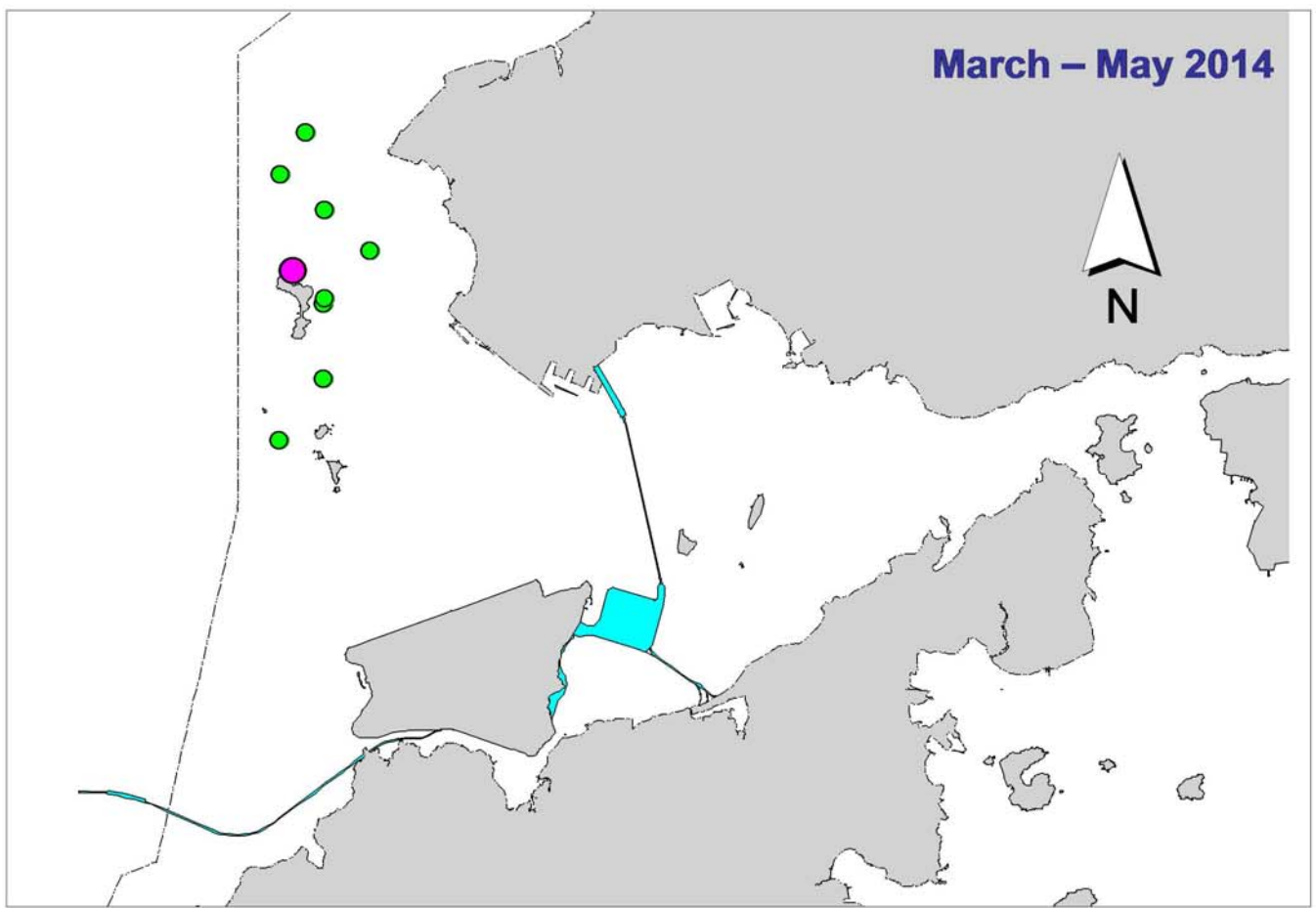


Figure 3. Distribution of Chinese white dolphins with larger group sizes during HKLR03 impact phase (top) and baseline monitoring surveys (bottom) (green dots: group sizes of 5 or more; purple dots: group sizes of 10 or more)



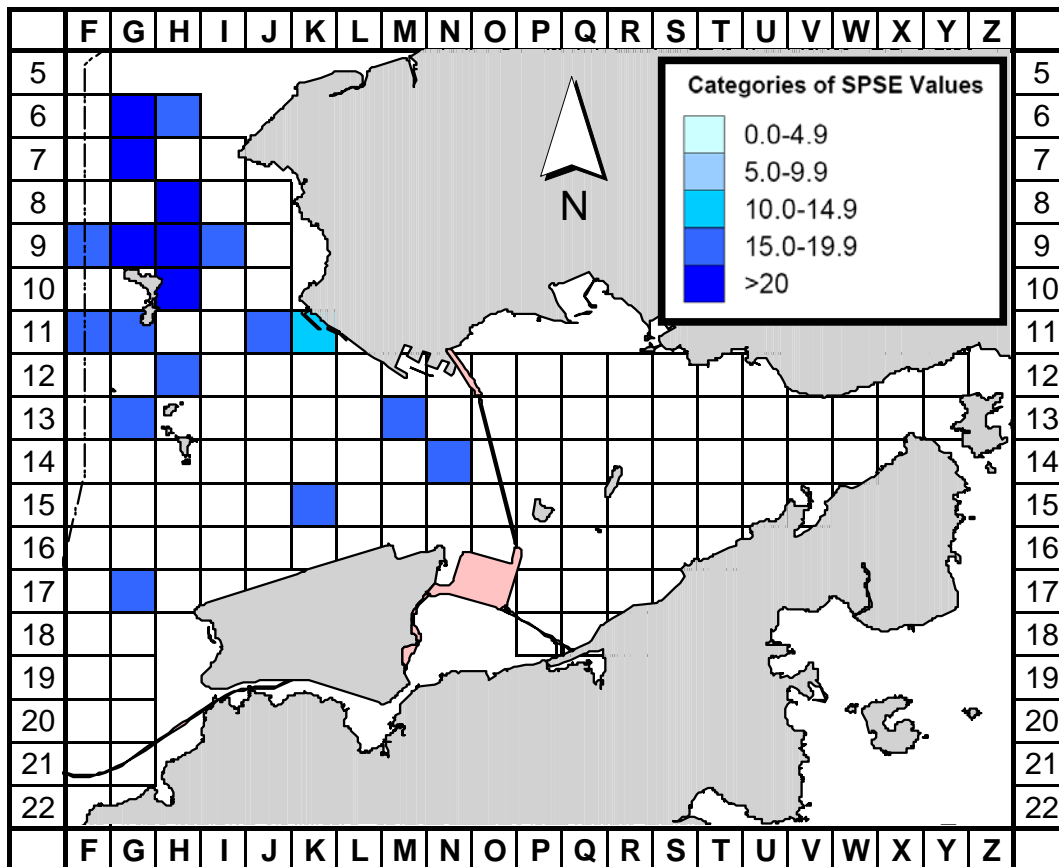


Figure 4a. Sighting density of Chinese white dolphins with corrected survey effort per km<sup>2</sup> in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (Mar-May 14) (SPSE = no. of on-effort sightings per 100 units of survey effort)

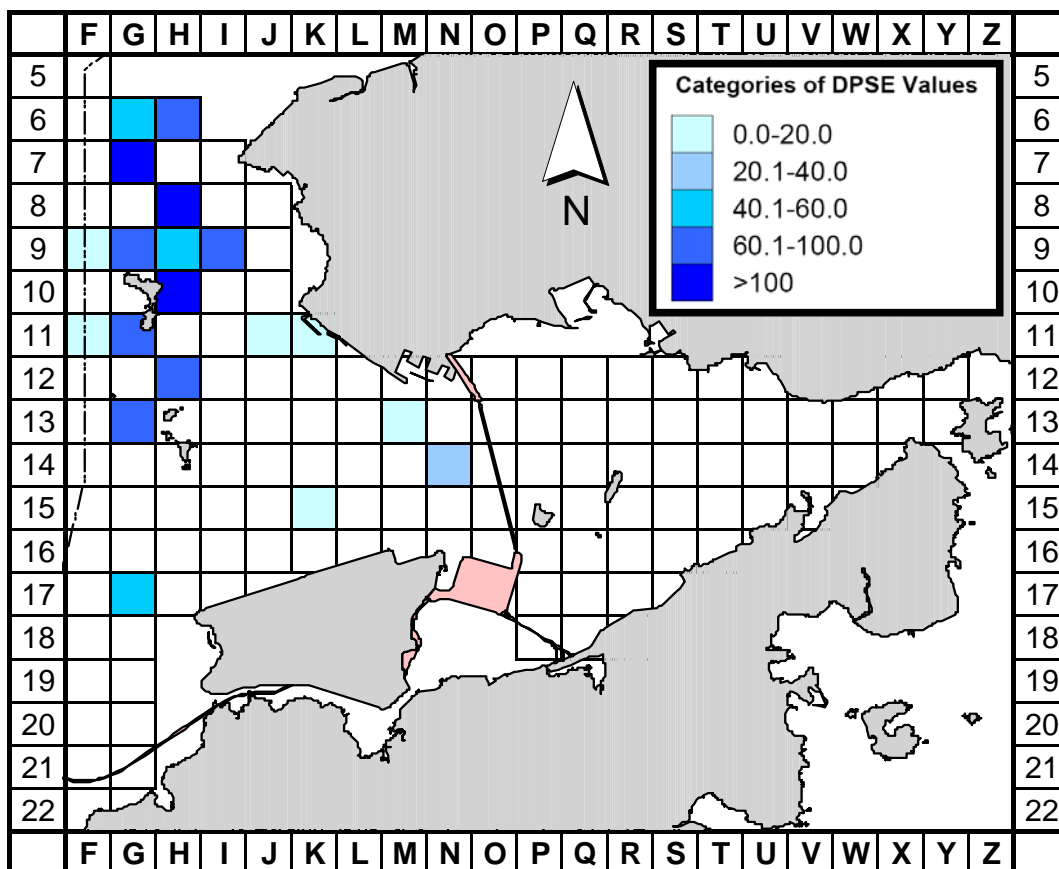


Figure 4b. Density of Chinese white dolphins with corrected survey effort per km<sup>2</sup> in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (Mar-May 14) (DPSE = no. of dolphins per 100 units of survey effort)



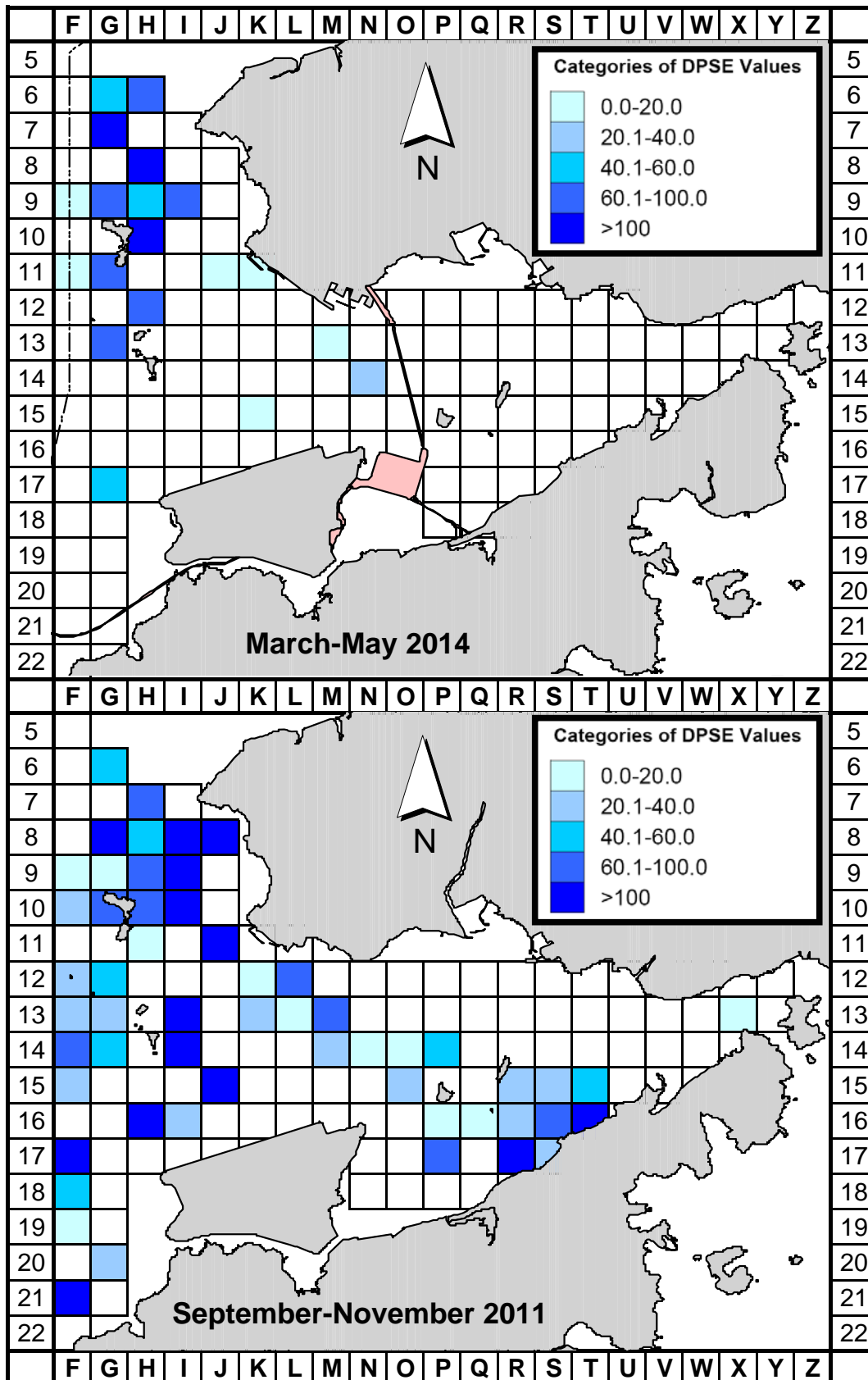


Figure 5. Comparison of density of Chinese white dolphins with corrected survey effort per km<sup>2</sup> in Northwest and Northeast Lantau survey area between the impact monitoring period (March-May 2014) and baseline monitoring period (September-November 2011) (DPSE = no. of dolphins per 100 units of survey effort)

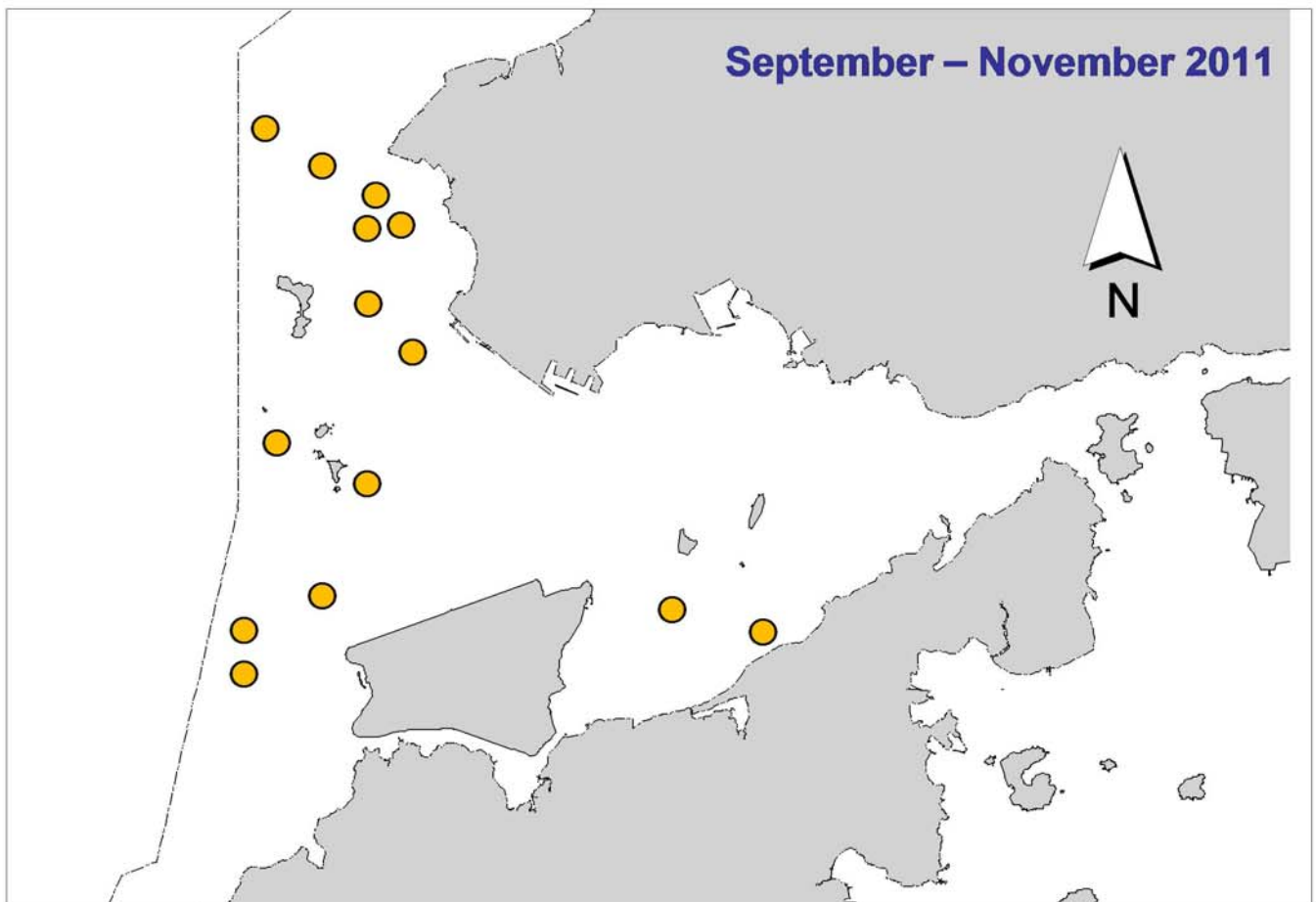
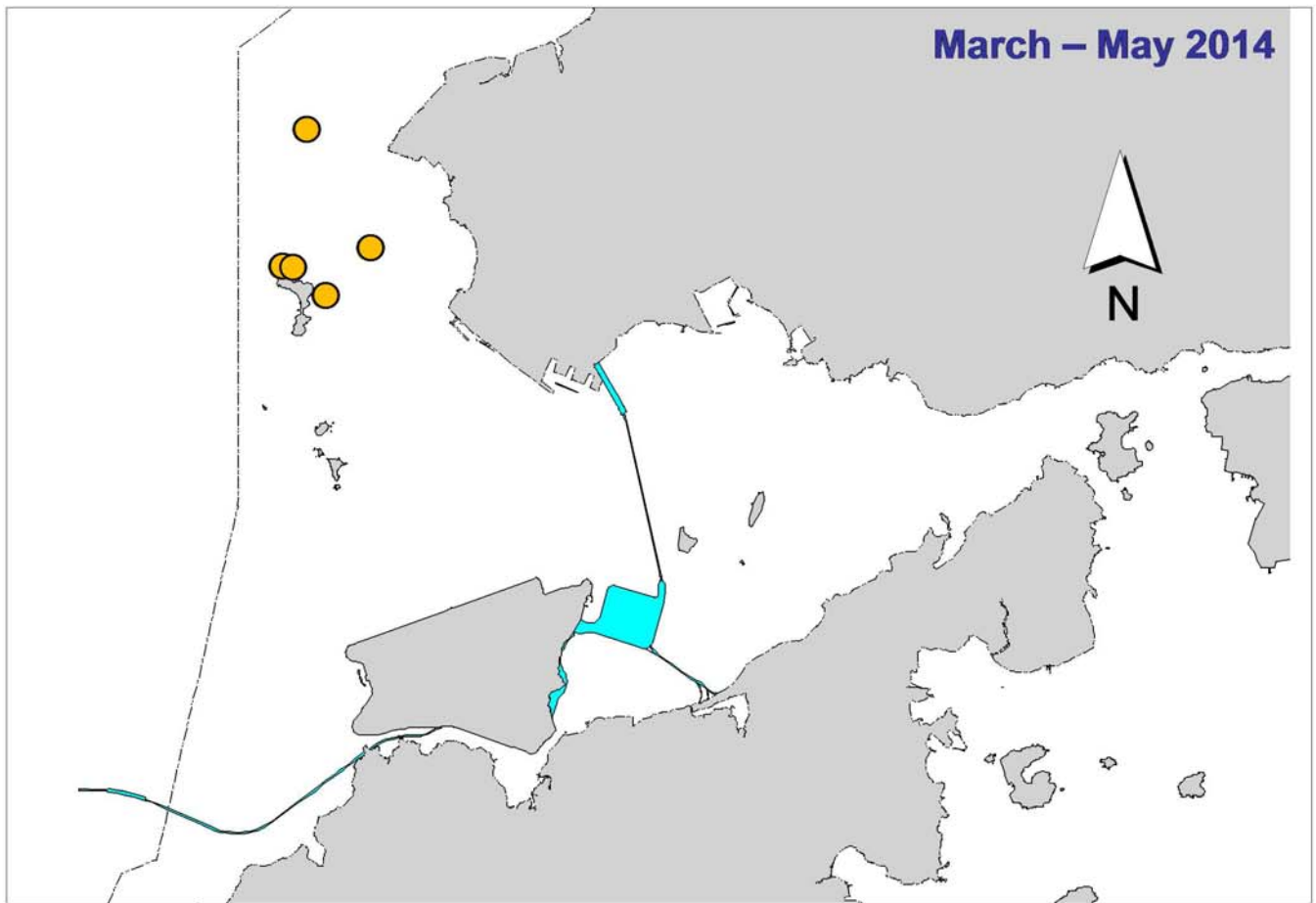


Figure 6. Distribution of young calves of Chinese white dolphins during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

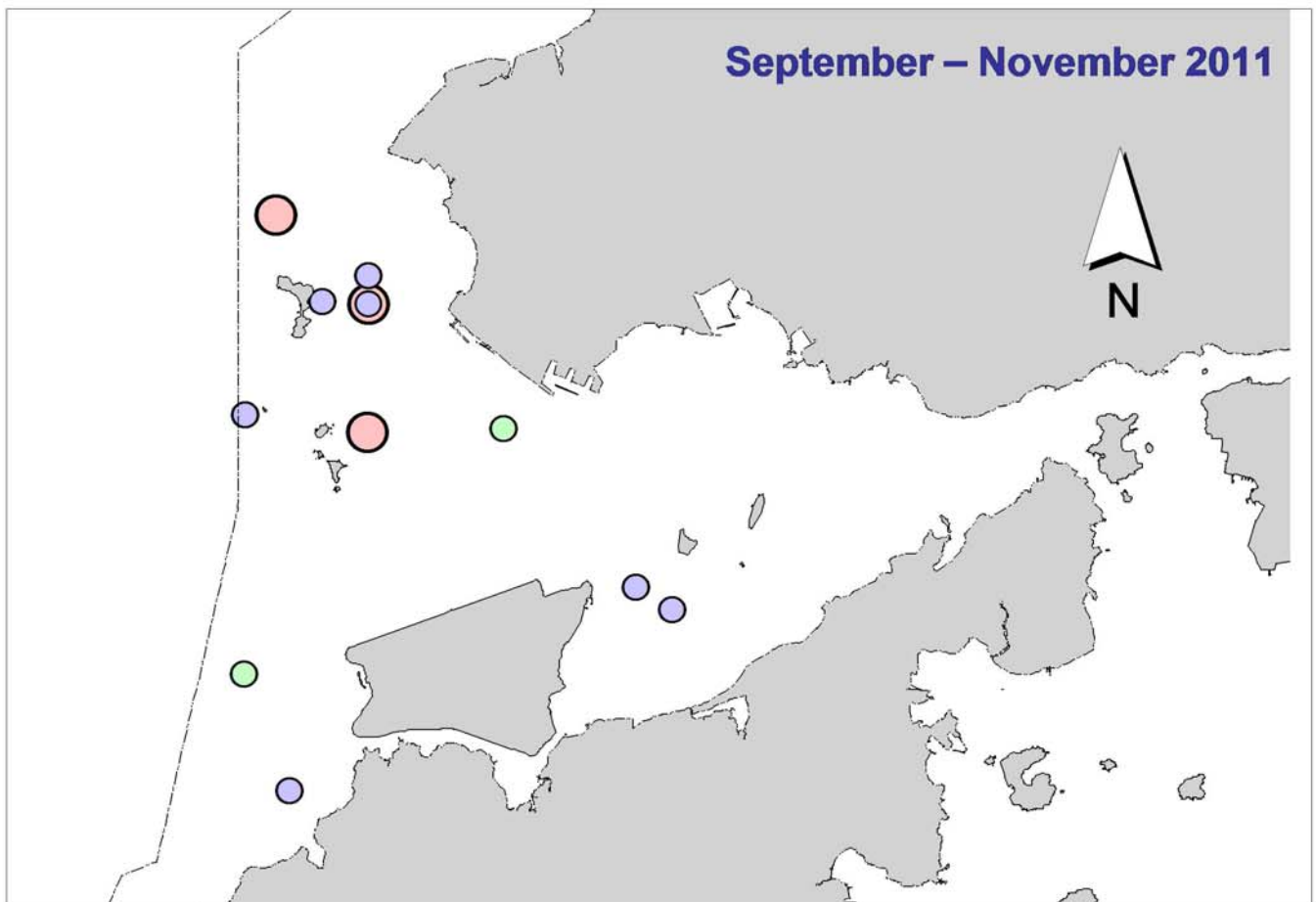
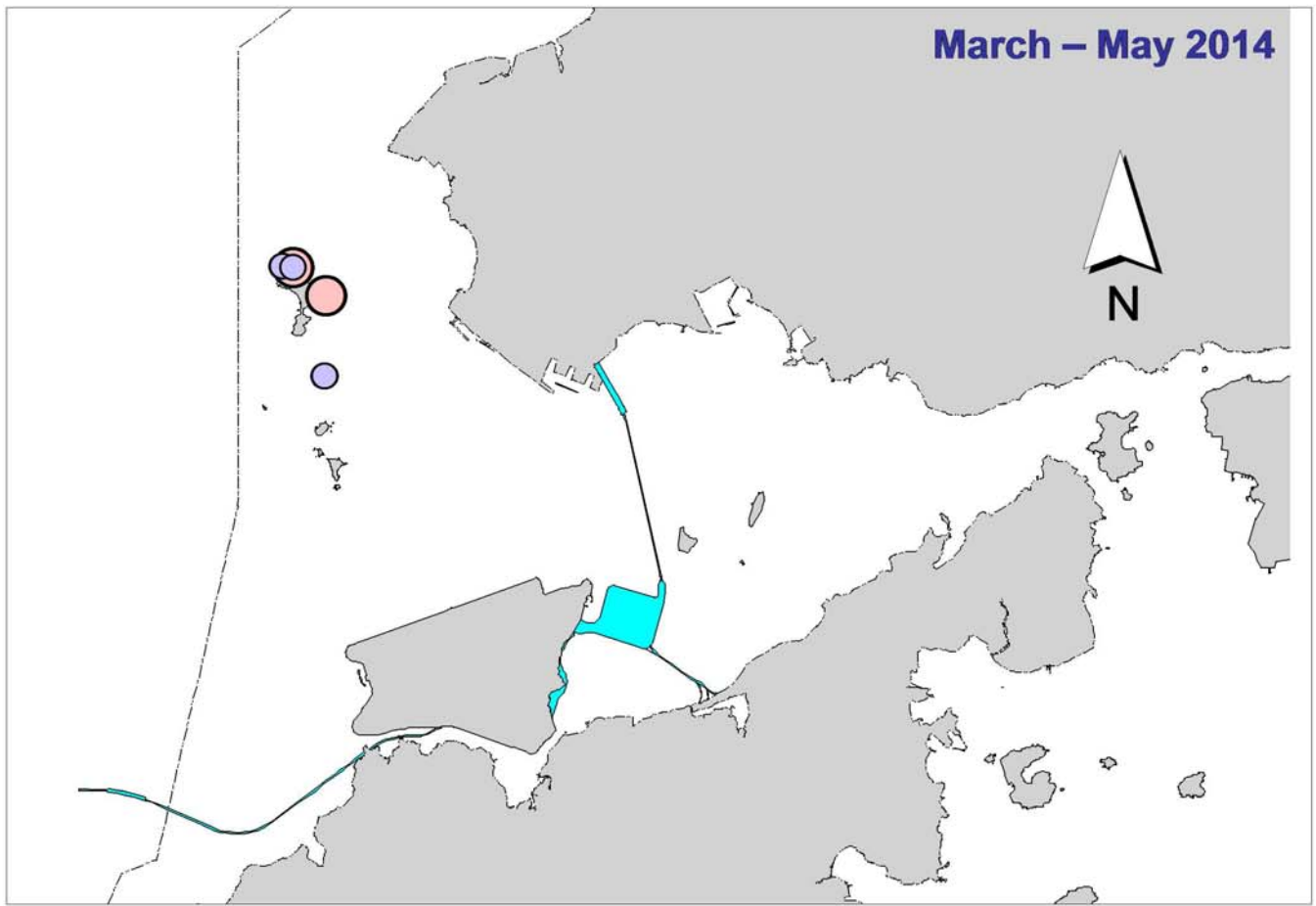


Figure 7. Distribution of Chinese white dolphins engaged in feeding (purple dots), socializing (pink dots) and traveling (green dots) activities during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

## Appendix I. HKLR03 Survey Effort Database (March-May 2014)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
5-Mar-14	NW LANTAU	1	3.88	SPRING	STANDARD31516	HKLR	P
5-Mar-14	NW LANTAU	2	20.76	SPRING	STANDARD31516	HKLR	P
5-Mar-14	NW LANTAU	3	5.93	SPRING	STANDARD31516	HKLR	P
5-Mar-14	NW LANTAU	2	5.25	SPRING	STANDARD31516	HKLR	S
5-Mar-14	NW LANTAU	3	1.96	SPRING	STANDARD31516	HKLR	S
5-Mar-14	NE LANTAU	2	17.99	SPRING	STANDARD31516	HKLR	P
5-Mar-14	NE LANTAU	3	1.69	SPRING	STANDARD31516	HKLR	P
5-Mar-14	NE LANTAU	2	11.02	SPRING	STANDARD31516	HKLR	S
11-Mar-14	NE LANTAU	2	1.40	SPRING	STANDARD31516	HKLR	P
11-Mar-14	NE LANTAU	3	11.82	SPRING	STANDARD31516	HKLR	P
11-Mar-14	NE LANTAU	4	2.90	SPRING	STANDARD31516	HKLR	P
11-Mar-14	NE LANTAU	2	6.16	SPRING	STANDARD31516	HKLR	S
11-Mar-14	NE LANTAU	3	4.12	SPRING	STANDARD31516	HKLR	S
11-Mar-14	NE LANTAU	4	1.40	SPRING	STANDARD31516	HKLR	S
11-Mar-14	NW LANTAU	1	1.70	SPRING	STANDARD31516	HKLR	P
11-Mar-14	NW LANTAU	2	5.31	SPRING	STANDARD31516	HKLR	P
11-Mar-14	NW LANTAU	3	9.08	SPRING	STANDARD31516	HKLR	P
11-Mar-14	NW LANTAU	4	18.01	SPRING	STANDARD31516	HKLR	P
11-Mar-14	NW LANTAU	5	6.14	SPRING	STANDARD31516	HKLR	P
11-Mar-14	NW LANTAU	2	6.91	SPRING	STANDARD31516	HKLR	S
11-Mar-14	NW LANTAU	3	1.40	SPRING	STANDARD31516	HKLR	S
11-Mar-14	NW LANTAU	4	4.25	SPRING	STANDARD31516	HKLR	S
17-Mar-14	NW LANTAU	0	4.79	SPRING	STANDARD31516	HKLR	P
17-Mar-14	NW LANTAU	1	25.88	SPRING	STANDARD31516	HKLR	P
17-Mar-14	NW LANTAU	2	8.51	SPRING	STANDARD31516	HKLR	P
17-Mar-14	NW LANTAU	0	2.51	SPRING	STANDARD31516	HKLR	S
17-Mar-14	NW LANTAU	1	7.24	SPRING	STANDARD31516	HKLR	S
17-Mar-14	NW LANTAU	2	3.21	SPRING	STANDARD31516	HKLR	S
17-Mar-14	NE LANTAU	1	14.20	SPRING	STANDARD31516	HKLR	P
17-Mar-14	NE LANTAU	2	2.36	SPRING	STANDARD31516	HKLR	P
17-Mar-14	NE LANTAU	1	9.07	SPRING	STANDARD31516	HKLR	S
17-Mar-14	NE LANTAU	2	2.17	SPRING	STANDARD31516	HKLR	S
25-Mar-14	NE LANTAU	1	13.41	SPRING	STANDARD31516	HKLR	P
25-Mar-14	NE LANTAU	2	6.67	SPRING	STANDARD31516	HKLR	P
25-Mar-14	NE LANTAU	1	6.73	SPRING	STANDARD31516	HKLR	S
25-Mar-14	NE LANTAU	2	4.19	SPRING	STANDARD31516	HKLR	S
25-Mar-14	NW LANTAU	1	7.45	SPRING	STANDARD31516	HKLR	P
25-Mar-14	NW LANTAU	2	22.31	SPRING	STANDARD31516	HKLR	P
25-Mar-14	NW LANTAU	1	0.96	SPRING	STANDARD31516	HKLR	S
25-Mar-14	NW LANTAU	2	6.58	SPRING	STANDARD31516	HKLR	S
4-Apr-14	NW LANTAU	1	1.41	SPRING	STANDARD31516	HKLR	P
4-Apr-14	NW LANTAU	2	8.57	SPRING	STANDARD31516	HKLR	P
4-Apr-14	NW LANTAU	3	14.93	SPRING	STANDARD31516	HKLR	P
4-Apr-14	NW LANTAU	4	3.00	SPRING	STANDARD31516	HKLR	P
4-Apr-14	NW LANTAU	2	3.16	SPRING	STANDARD31516	HKLR	S
4-Apr-14	NW LANTAU	3	3.00	SPRING	STANDARD31516	HKLR	S
4-Apr-14	NW LANTAU	4	1.00	SPRING	STANDARD31516	HKLR	S
4-Apr-14	NE LANTAU	2	0.80	SPRING	STANDARD31516	HKLR	P
4-Apr-14	NE LANTAU	3	15.53	SPRING	STANDARD31516	HKLR	P
4-Apr-14	NE LANTAU	4	4.16	SPRING	STANDARD31516	HKLR	P
4-Apr-14	NE LANTAU	2	2.20	SPRING	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
4-Apr-14	NE LANTAU	3	8.51	SPRING	STANDARD31516	HKLR	S
14-Apr-14	NE LANTAU	2	0.90	SPRING	STANDARD31516	HKLR	P
14-Apr-14	NE LANTAU	3	9.61	SPRING	STANDARD31516	HKLR	P
14-Apr-14	NE LANTAU	4	6.20	SPRING	STANDARD31516	HKLR	P
14-Apr-14	NE LANTAU	2	1.80	SPRING	STANDARD31516	HKLR	S
14-Apr-14	NE LANTAU	3	6.39	SPRING	STANDARD31516	HKLR	S
14-Apr-14	NE LANTAU	4	2.90	SPRING	STANDARD31516	HKLR	S
14-Apr-14	NW LANTAU	2	1.40	SPRING	STANDARD31516	HKLR	P
14-Apr-14	NW LANTAU	3	14.62	SPRING	STANDARD31516	HKLR	P
14-Apr-14	NW LANTAU	4	23.91	SPRING	STANDARD31516	HKLR	P
14-Apr-14	NW LANTAU	2	2.10	SPRING	STANDARD31516	HKLR	S
14-Apr-14	NW LANTAU	3	7.86	SPRING	STANDARD31516	HKLR	S
14-Apr-14	NW LANTAU	4	2.99	SPRING	STANDARD31516	HKLR	S
16-Apr-14	NW LANTAU	2	4.27	SPRING	STANDARD31516	HKLR	P
16-Apr-14	NW LANTAU	3	24.56	SPRING	STANDARD31516	HKLR	P
16-Apr-14	NW LANTAU	4	2.91	SPRING	STANDARD31516	HKLR	P
16-Apr-14	NW LANTAU	2	2.45	SPRING	STANDARD31516	HKLR	S
16-Apr-14	NW LANTAU	3	4.20	SPRING	STANDARD31516	HKLR	S
16-Apr-14	NE LANTAU	2	3.94	SPRING	STANDARD31516	HKLR	P
16-Apr-14	NE LANTAU	3	15.37	SPRING	STANDARD31516	HKLR	P
16-Apr-14	NE LANTAU	4	1.10	SPRING	STANDARD31516	HKLR	P
16-Apr-14	NE LANTAU	2	1.20	SPRING	STANDARD31516	HKLR	S
16-Apr-14	NE LANTAU	3	9.49	SPRING	STANDARD31516	HKLR	S
24-Apr-14	NW LANTAU	2	1.91	SPRING	STANDARD31516	HKLR	P
24-Apr-14	NW LANTAU	3	29.94	SPRING	STANDARD31516	HKLR	P
24-Apr-14	NW LANTAU	4	8.44	SPRING	STANDARD31516	HKLR	P
24-Apr-14	NW LANTAU	2	0.80	SPRING	STANDARD31516	HKLR	S
24-Apr-14	NW LANTAU	3	9.72	SPRING	STANDARD31516	HKLR	S
24-Apr-14	NW LANTAU	4	2.20	SPRING	STANDARD31516	HKLR	S
24-Apr-14	NE LANTAU	2	5.03	SPRING	STANDARD31516	HKLR	P
24-Apr-14	NE LANTAU	3	10.14	SPRING	STANDARD31516	HKLR	P
24-Apr-14	NE LANTAU	4	1.31	SPRING	STANDARD31516	HKLR	P
24-Apr-14	NE LANTAU	2	7.37	SPRING	STANDARD31516	HKLR	S
24-Apr-14	NE LANTAU	3	3.65	SPRING	STANDARD31516	HKLR	S
2-May-14	NW LANTAU	1	8.33	SPRING	STANDARD31516	HKLR	P
2-May-14	NW LANTAU	2	20.71	SPRING	STANDARD31516	HKLR	P
2-May-14	NW LANTAU	3	11.20	SPRING	STANDARD31516	HKLR	P
2-May-14	NW LANTAU	1	8.11	SPRING	STANDARD31516	HKLR	S
2-May-14	NW LANTAU	2	2.77	SPRING	STANDARD31516	HKLR	S
2-May-14	NW LANTAU	3	1.30	SPRING	STANDARD31516	HKLR	S
2-May-14	NE LANTAU	2	8.93	SPRING	STANDARD31516	HKLR	P
2-May-14	NE LANTAU	3	8.38	SPRING	STANDARD31516	HKLR	P
2-May-14	NE LANTAU	2	7.68	SPRING	STANDARD31516	HKLR	S
2-May-14	NE LANTAU	3	2.51	SPRING	STANDARD31516	HKLR	S
19-May-14	NE LANTAU	1	2.45	SPRING	STANDARD31516	HKLR	P
19-May-14	NE LANTAU	2	13.17	SPRING	STANDARD31516	HKLR	P
19-May-14	NE LANTAU	3	2.63	SPRING	STANDARD31516	HKLR	P
19-May-14	NE LANTAU	4	1.40	SPRING	STANDARD31516	HKLR	P
19-May-14	NE LANTAU	1	1.44	SPRING	STANDARD31516	HKLR	S
19-May-14	NE LANTAU	2	4.97	SPRING	STANDARD31516	HKLR	S
19-May-14	NE LANTAU	3	3.94	SPRING	STANDARD31516	HKLR	S
19-May-14	NW LANTAU	3	14.57	SPRING	STANDARD31516	HKLR	P
19-May-14	NW LANTAU	4	16.43	SPRING	STANDARD31516	HKLR	P

## 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
19-May-14	NW LANTAU	3	4.87	SPRING	STANDARD31516	HKLR	S
19-May-14	NW LANTAU	4	2.01	SPRING	STANDARD31516	HKLR	S
21-May-14	NW LANTAU	1	1.40	SPRING	STANDARD31516	HKLR	P
21-May-14	NW LANTAU	2	13.43	SPRING	STANDARD31516	HKLR	P
21-May-14	NW LANTAU	3	16.59	SPRING	STANDARD31516	HKLR	P
21-May-14	NW LANTAU	1	0.60	SPRING	STANDARD31516	HKLR	S
21-May-14	NW LANTAU	2	4.20	SPRING	STANDARD31516	HKLR	S
21-May-14	NW LANTAU	3	2.50	SPRING	STANDARD31516	HKLR	S
21-May-14	NE LANTAU	2	13.25	SPRING	STANDARD31516	HKLR	P
21-May-14	NE LANTAU	3	6.78	SPRING	STANDARD31516	HKLR	P
21-May-14	NE LANTAU	2	9.07	SPRING	STANDARD31516	HKLR	S
21-May-14	NE LANTAU	3	1.50	SPRING	STANDARD31516	HKLR	S
26-May-14	NW LANTAU	2	21.21	SPRING	STANDARD31516	HKLR	P
26-May-14	NW LANTAU	3	19.14	SPRING	STANDARD31516	HKLR	P
26-May-14	NW LANTAU	2	3.70	SPRING	STANDARD31516	HKLR	S
26-May-14	NW LANTAU	3	9.05	SPRING	STANDARD31516	HKLR	S
26-May-14	NE LANTAU	1	3.10	SPRING	STANDARD31516	HKLR	P
26-May-14	NE LANTAU	2	13.43	SPRING	STANDARD31516	HKLR	P
26-May-14	NE LANTAU	2	10.87	SPRING	STANDARD31516	HKLR	S



## Appendix II. HKLR03 Chinese White Dolphin Sighting Database (March-May 2014)

(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)

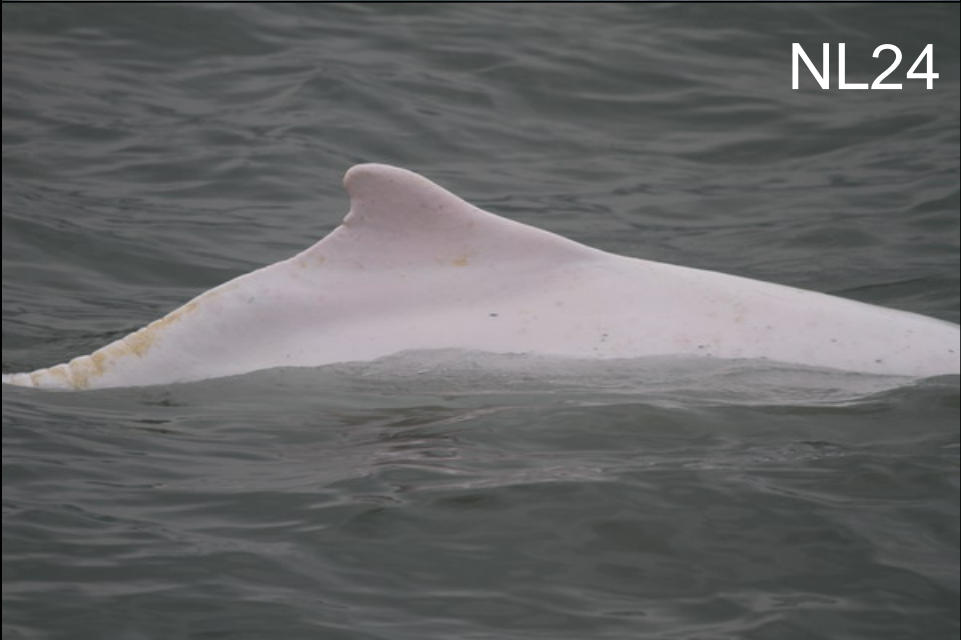
DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
5-Mar-14	1	1053	3	NW LANTAU	2	64	ON	HKLR	827173	805499	SPRING	NONE	P
5-Mar-14	2	1126	13	NW LANTAU	2	ND	OFF	HKLR	827150	805736	SPRING	NONE	
5-Mar-14	3	1323	6	NW LANTAU	2	28	ON	HKLR	827568	807488	SPRING	NONE	P
11-Mar-14	1	1518	2	NW LANTAU	3	86	ON	HKLR	827525	806437	SPRING	NONE	P
17-Mar-14	1	1159	2	NW LANTAU	2	151	ON	HKLR	822985	812516	SPRING	NONE	P
17-Mar-14	2	1411	5	NW LANTAU	1	277	ON	HKLR	824834	806452	SPRING	NONE	P
17-Mar-14	3	1439	1	NW LANTAU	1	36	ON	HKLR	826839	806456	SPRING	NONE	P
17-Mar-14	4	1509	2	NW LANTAU	2	72	ON	HKLR	830273	805938	SPRING	NONE	S
17-Mar-14	5	1541	1	NW LANTAU	1	194	ON	HKLR	827219	804675	SPRING	NONE	P
17-Mar-14	6	1551	1	NW LANTAU	1	125	ON	HKLR	825325	804672	SPRING	NONE	P
25-Mar-14	1	1249	1	NW LANTAU	2	131	ON	HKLR	821041	809495	SPRING	NONE	P
25-Mar-14	2	1452	2	NW LANTAU	2	72	ON	HKLR	826927	806498	SPRING	NONE	P
25-Mar-14	3	1535	3	NW LANTAU	2	299	ON	HKLR	829321	805462	SPRING	NONE	P
25-Mar-14	4	1549	1	NW LANTAU	2	349	ON	HKLR	827693	805469	SPRING	NONE	P
04-Apr-14	1	1021	3	NW LANTAU	3	43	ON	HKLR	819355	805442	SPRING	NONE	P
14-Apr-14	1	1438	8	NW LANTAU	3	94	ON	HKLR	826451	806445	SPRING	NONE	P
14-Apr-14	2	1517	2	NW LANTAU	4	273	ON	HKLR	830117	806010	SPRING	NONE	S
16-Apr-14	1	1048	4	NW LANTAU	2	541	ON	HKLR	825124	805454	SPRING	NONE	P
16-Apr-14	2	1113	1	NW LANTAU	2	385	ON	HKLR	827306	805458	SPRING	NONE	P
16-Apr-14	3	1137	2	NW LANTAU	2	17	ON	HKLR	830362	805465	SPRING	NONE	P
16-Apr-14	4	1150	9	NW LANTAU	2	49	ON	HKLR	830073	806051	SPRING	NONE	S
24-Apr-14	1	1328	1	NW LANTAU	3	123	ON	HKLR	825992	809184	SPRING	NONE	S
02-May-14	1	1128	3	NW LANTAU	3	22	ON	HKLR	830572	805712	SPRING	NONE	S
02-May-14	2	1154	2	NW LANTAU	2	27	ON	HKLR	828677	806460	SPRING	NONE	P
02-May-14	3	1213	7	NW LANTAU	2	522	ON	HKLR	826540	806456	SPRING	NONE	P
02-May-14	4	1333	1	NW LANTAU	1	1233	ON	HKLR	825129	808503	SPRING	NONE	P
19-May-14	1	1405	5	NW LANTAU	4	177	ON	HKLR	829177	805472	SPRING	NONE	P
19-May-14	2	1451	5	NW LANTAU	4	28	ON	HKLR	823530	805461	SPRING	NONE	P
21-May-14	1	1257	1	NW LANTAU	2	242	ON	HKLR	823873	811529	SPRING	NONE	P
26-May-14	1	1209	5	NW LANTAU	3	362	ON	HKLR	828433	806460	SPRING	NONE	P
26-May-14	2	1232	1	NW LANTAU	3	1066	ON	HKLR	827514	806458	SPRING	NONE	P

**Appendix III. Individual dolphins identified during HKLR03 monitoring surveys in March-May 2014**

ID#	DATE	STG#	AREA
CH34	26/05/14	1	NW LANTAU
CH98	25/03/14	3	NW LANTAU
EL01	17/03/14	1	NW LANTAU
	16/04/14	2	NW LANTAU
	21/05/14	1	NW LANTAU
NL24	05/03/14	3	NW LANTAU
	14/04/14	1	NW LANTAU
NL33	02/05/14	3	NW LANTAU
NL46	05/03/14	2	NW LANTAU
	19/05/14	1	NW LANTAU
NL48	11/03/14	1	NW LANTAU
	25/03/14	4	NW LANTAU
	16/04/14	4	NW LANTAU
	02/05/14	1	NW LANTAU
NL49	05/03/14	2	NW LANTAU
NL104	05/03/14	2	NW LANTAU
	05/03/14	3	NW LANTAU
	16/04/14	4	NW LANTAU
NL120	14/04/14	1	NW LANTAU
NL136	11/03/14	1	NW LANTAU
	17/03/14	2	NW LANTAU
	25/03/14	3	NW LANTAU
NL145	16/04/14	1	NW LANTAU
	02/05/14	3	NW LANTAU
NL165	05/03/14	2	NW LANTAU
NL182	24/04/14	1	NW LANTAU
NL191	25/03/14	1	NW LANTAU
NL202	16/04/14	4	NW LANTAU
NL210	02/05/14	2	NW LANTAU
NL213	25/03/14	3	NW LANTAU
NL214	16/04/14	3	NW LANTAU
	02/05/14	1	NW LANTAU
NL220	05/03/14	3	NW LANTAU
NL224	16/04/14	3	NW LANTAU
	02/05/14	1	NW LANTAU
NL226	04/04/14	1	NW LANTAU
NL233	05/03/14	1	NW LANTAU
NL236	05/03/14	2	NW LANTAU
NL259	04/04/14	1	NW LANTAU
	16/04/14	4	NW LANTAU
NL260	19/05/14	2	NW LANTAU

ID#	DATE	STG#	AREA
NL261	05/03/14	3	NW LANTAU
	17/03/14	1	NW LANTAU
	16/04/14	4	NW LANTAU
	02/05/14	3	NW LANTAU
	19/05/14	1	NW LANTAU
NL262	05/03/14	3	NW LANTAU
	16/04/14	4	NW LANTAU
	19/05/14	1	NW LANTAU
NL269	19/05/14	2	NW LANTAU
NL272	05/03/14	2	NW LANTAU
	02/05/14	3	NW LANTAU
NL284	17/03/14	2	NW LANTAU
	19/05/14	1	NW LANTAU
NL286	16/04/14	4	NW LANTAU
NL287	16/04/14	1	NW LANTAU
	02/05/14	3	NW LANTAU
NL295	05/03/14	2	NW LANTAU
	19/05/14	2	NW LANTAU
	26/05/14	1	NW LANTAU
NL296	05/03/14	1	NW LANTAU
	05/03/14	2	NW LANTAU
	26/05/14	1	NW LANTAU
NL300	26/05/14	1	NW LANTAU
NL302	19/05/14	1	NW LANTAU
NL303	19/05/14	1	NW LANTAU
NL306	16/04/14	1	NW LANTAU
NL307	17/03/14	2	NW LANTAU
WL04	05/03/14	2	NW LANTAU
WL05	05/03/14	2	NW LANTAU
WL11	05/03/14	2	NW LANTAU
WL17	17/03/14	2	NW LANTAU
	16/04/14	1	NW LANTAU
WL199	05/03/14	2	NW LANTAU

Appendix IV. Forty-five individual dolphins that were identified during March-May 2014 under HKLR03 impact phase monitoring surveys

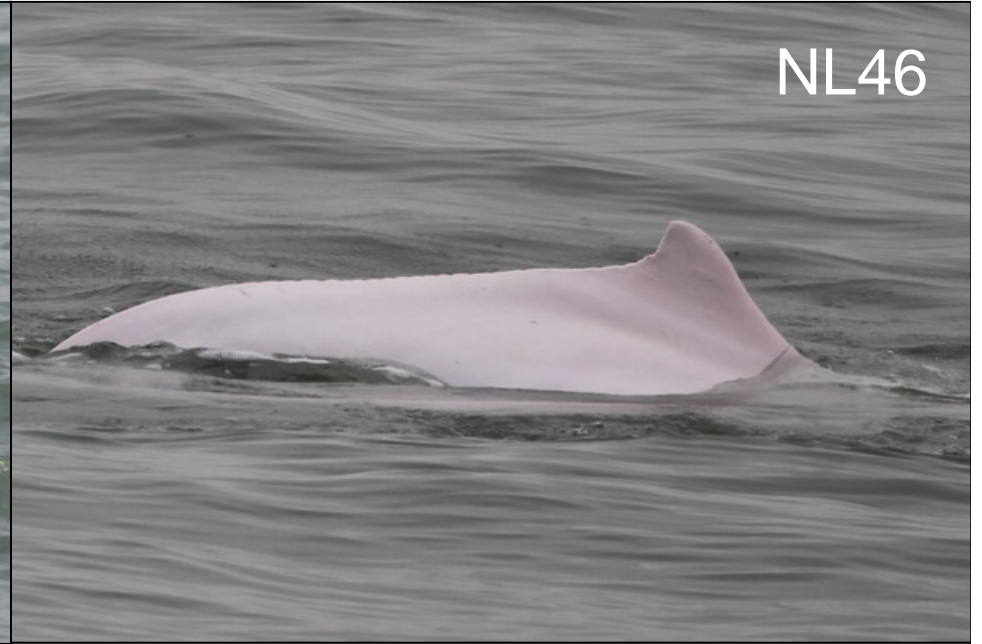


Appendix IV. (cont'd)

NL33



NL46



NL48



NL49





Appendix IV. (cont'd)

NL104



NL120



NL136



NL145



Appendix IV. (cont'd)

NL165



NL182



NL191



NL202





Appendix IV. (cont'd)



Appendix IV. (cont'd)





Appendix IV. (cont'd)



NL259



NL260



NL261



NL262



Appendix IV. (cont'd)



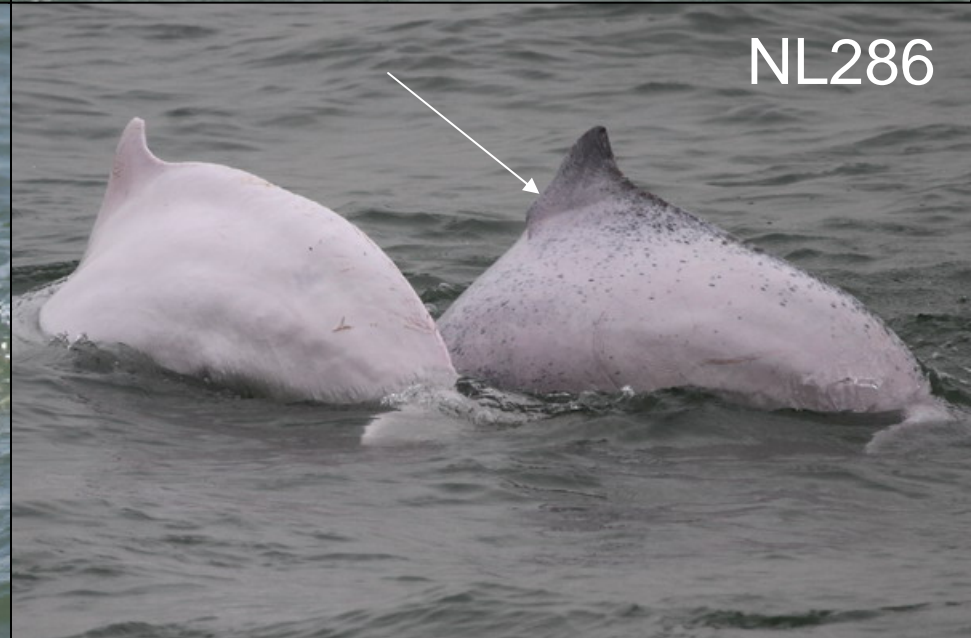
NL269



NL272



NL284



NL286

Appendix IV. (cont'd)

NL287



NL295



NL296



NL300





Appendix IV. (cont'd)

NL302



NL303



NL306



NL307





Appendix IV. (cont'd)

WL04



WL05



WL11



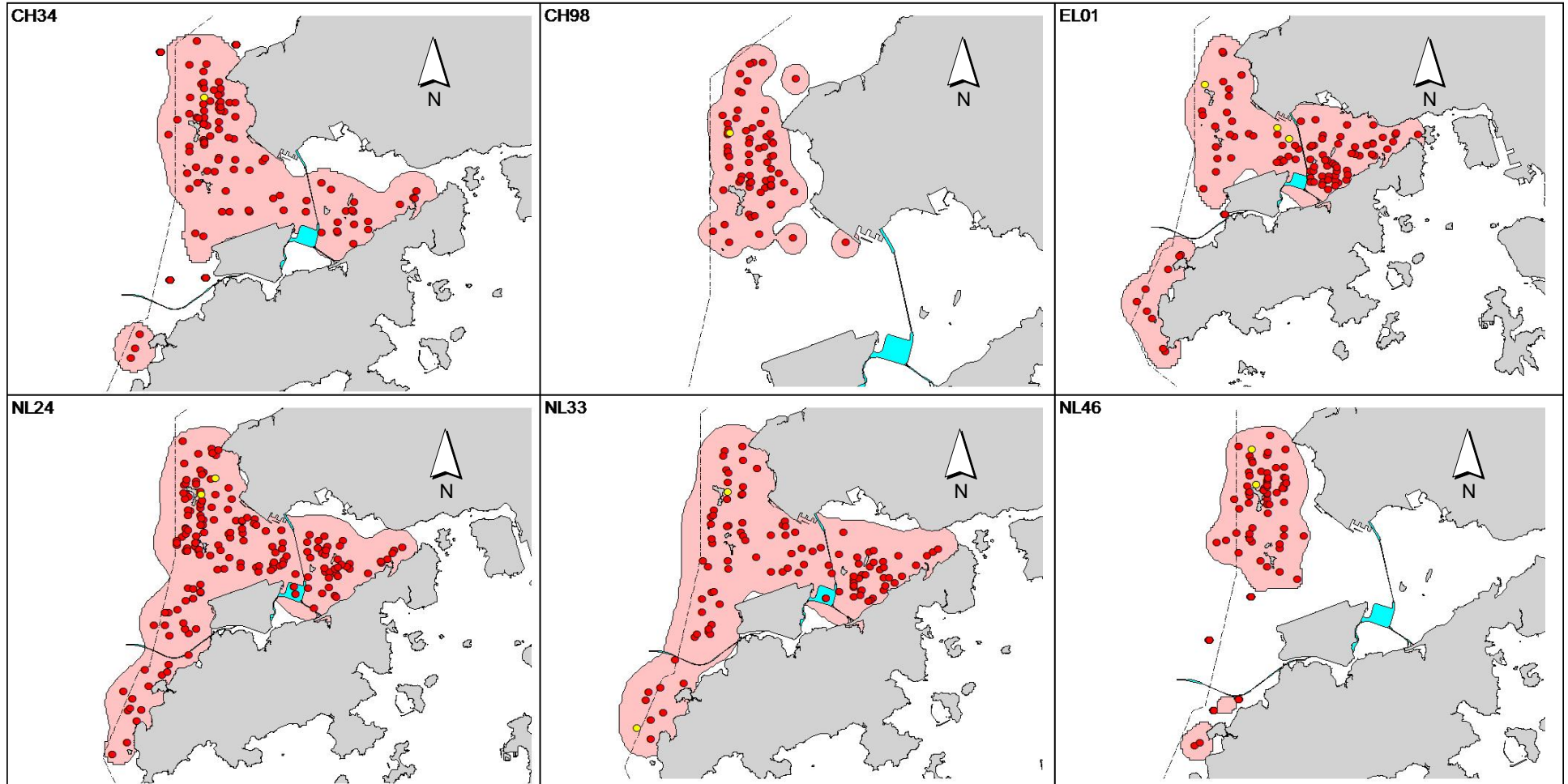
WL17



Appendix IV. (cont'd)

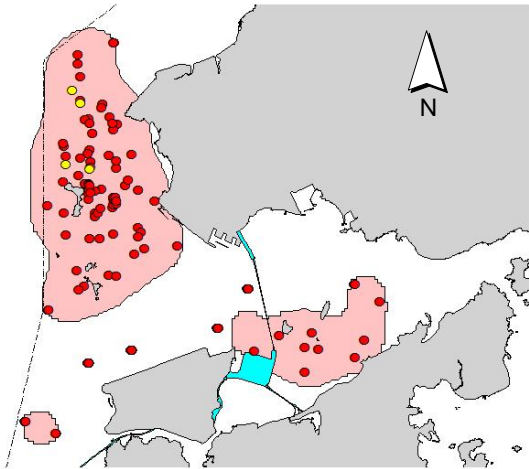


Appendix V. Ranging patterns (95% kernel ranges) of 45 individual dolphins that were sighted during HKLR03 impact phase monitoring period (note: yellow dots indicates sightings made in March-May 2014)

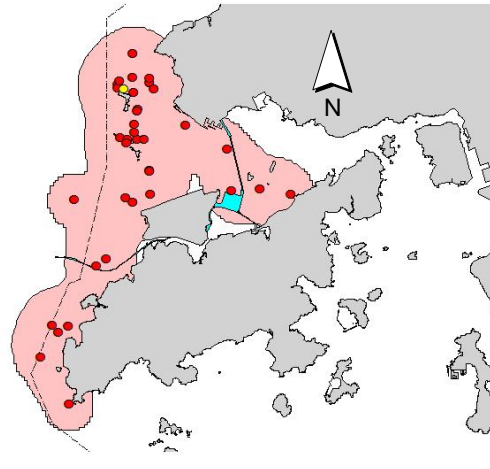


Appendix V. (cont'd)

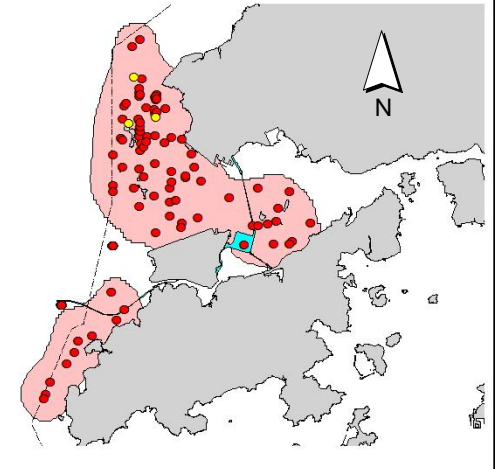
NL48



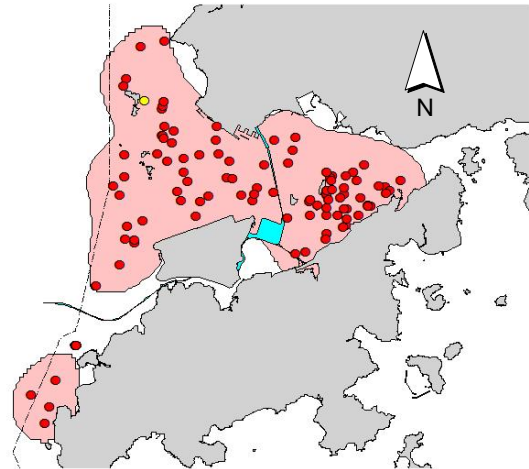
NL49



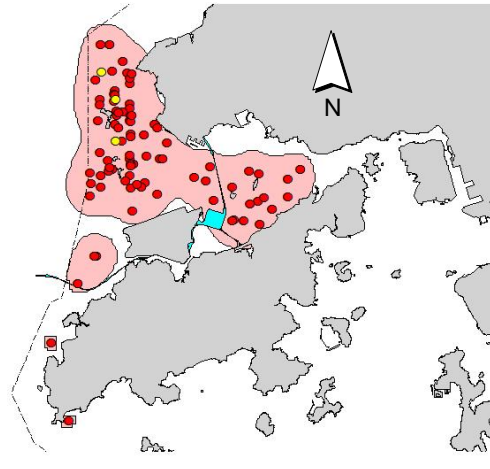
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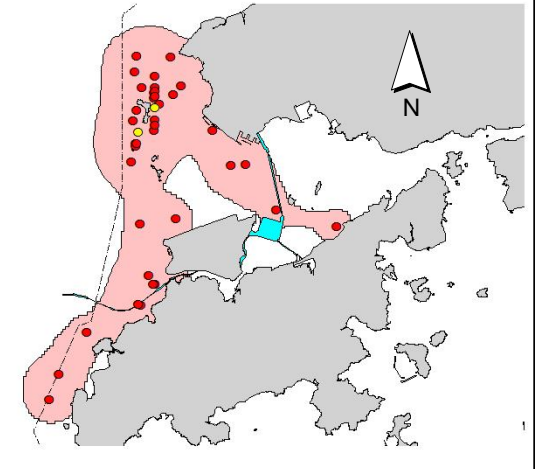
NL120



NL136



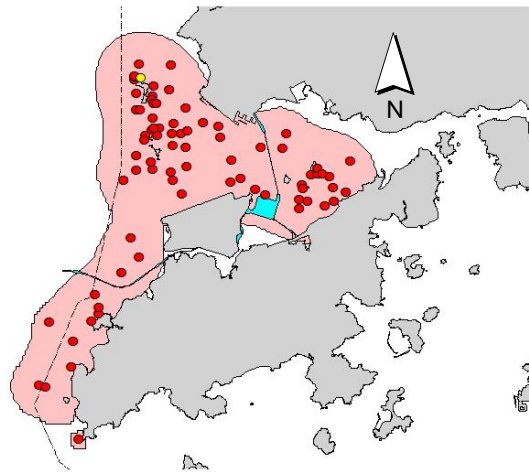
NL145



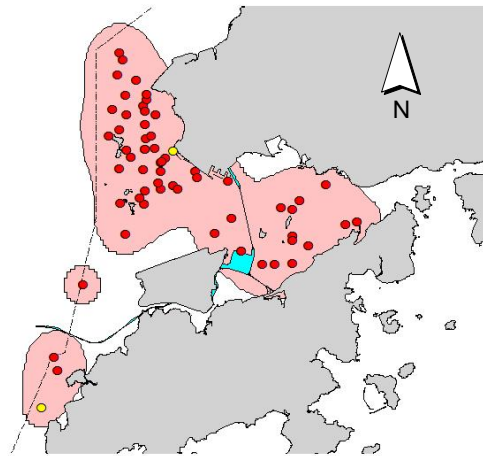


Appendix V. (cont'd)

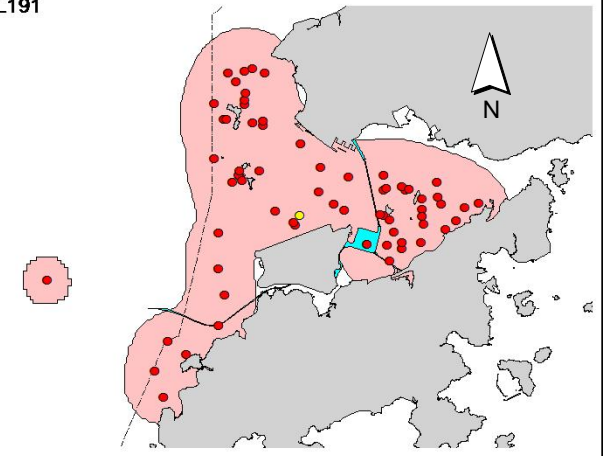
NL165



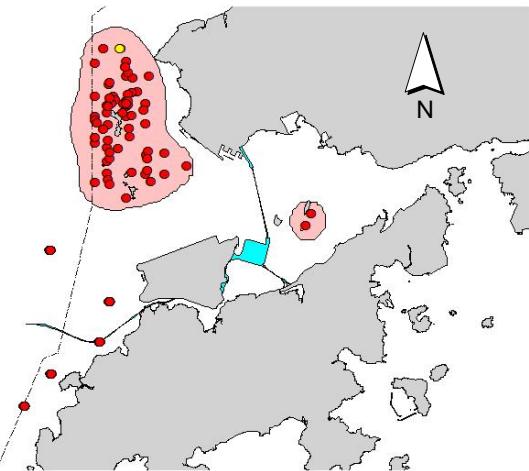
NL182



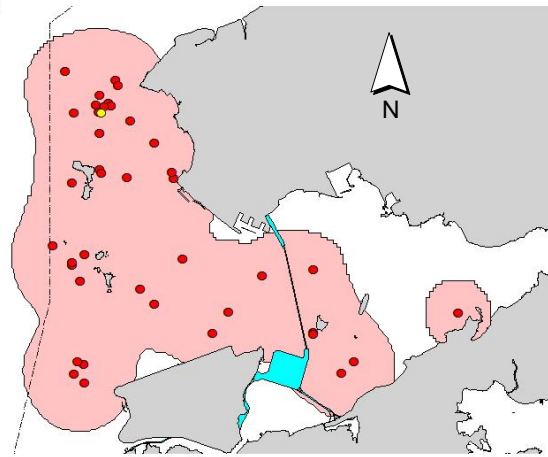
NL191



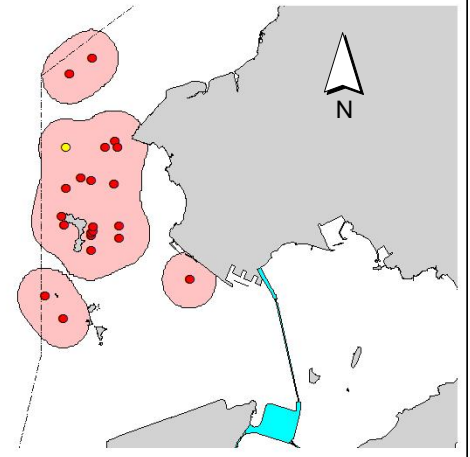
NL202



NL210



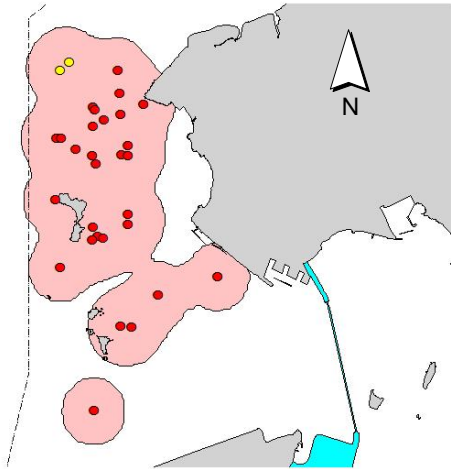
NL213



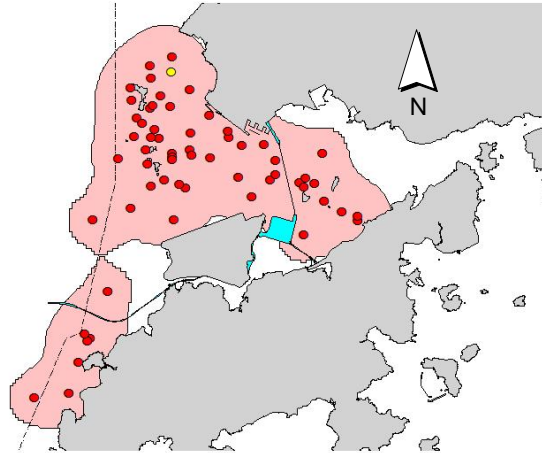


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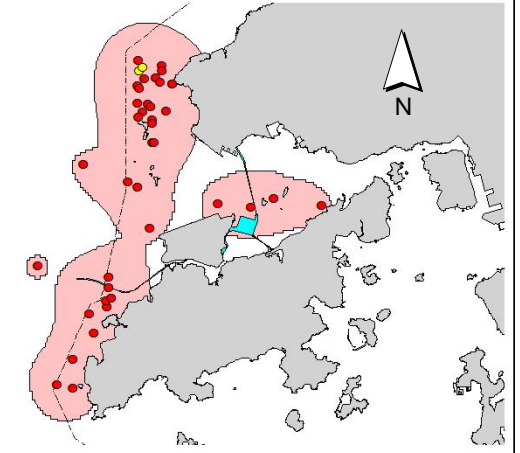
NL214



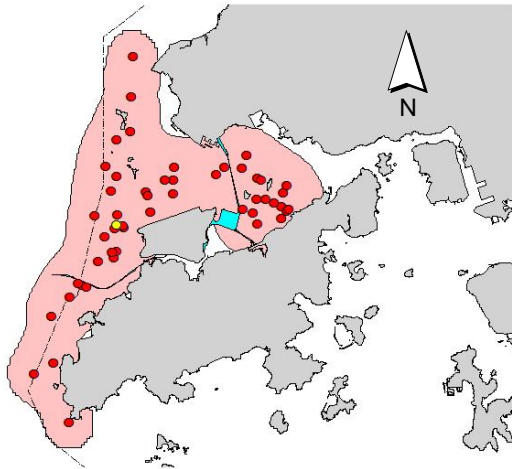
NL220



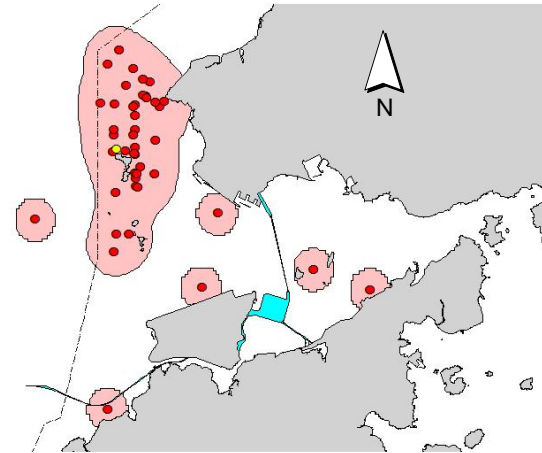
NL224



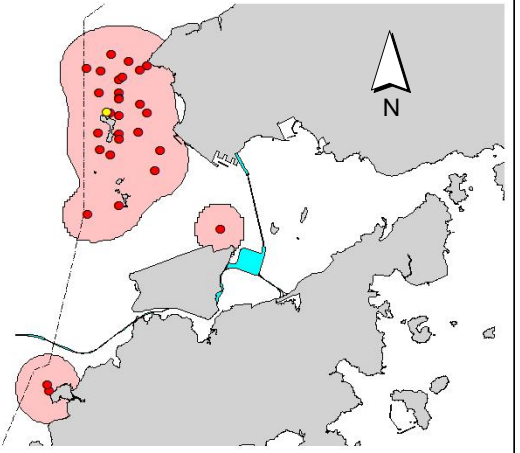
NL226



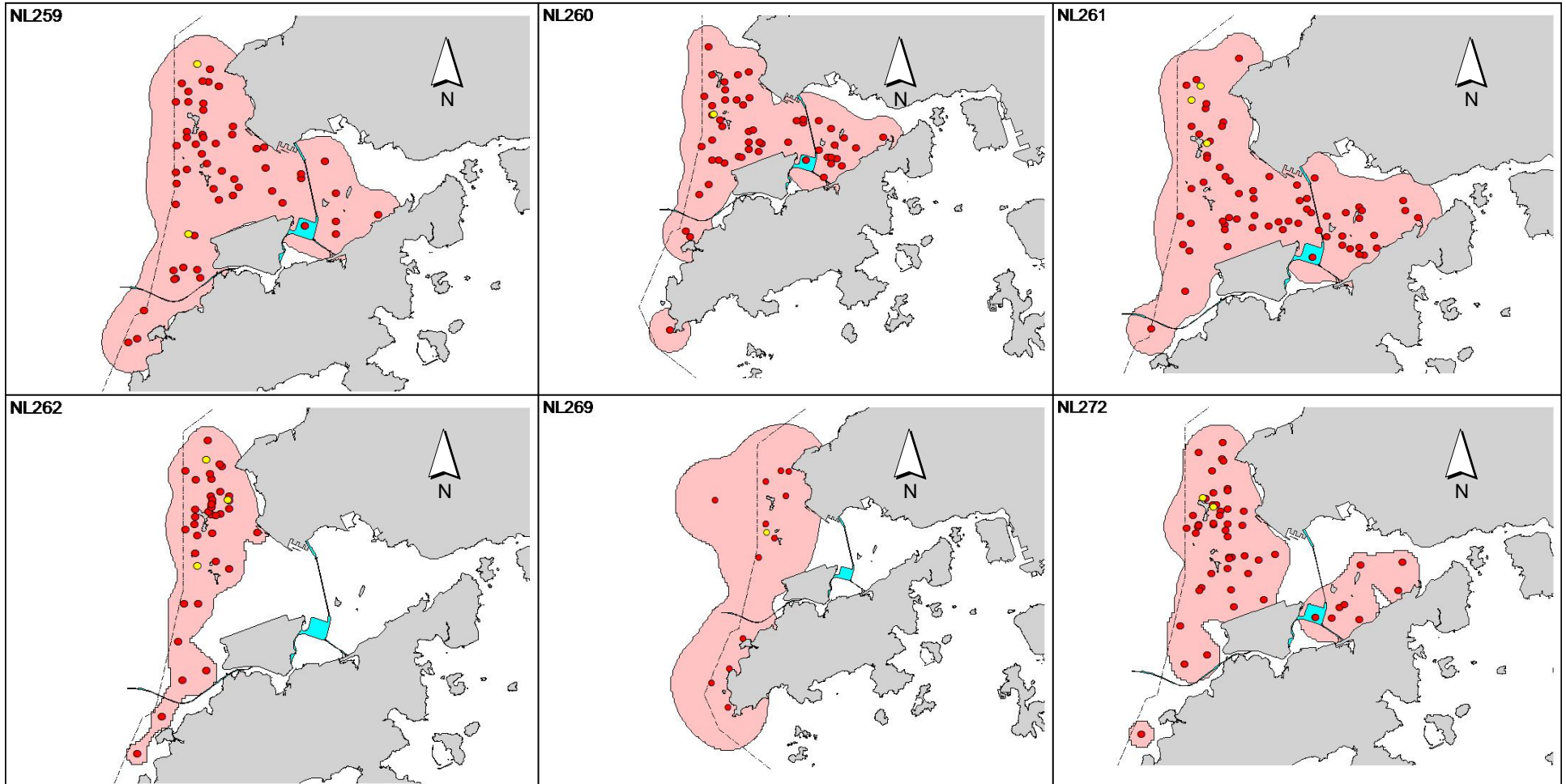
NL233



NL236

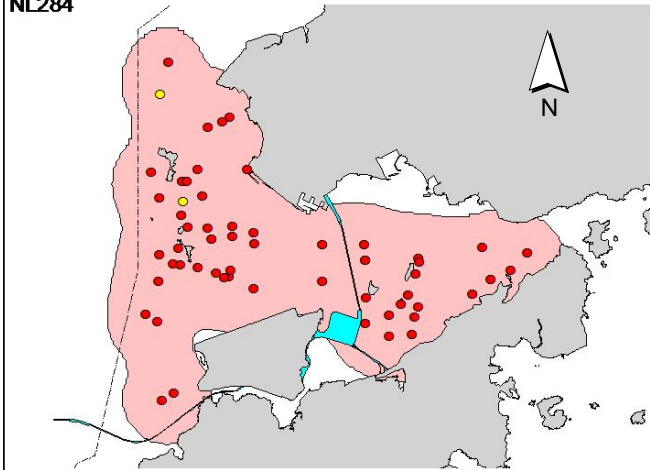


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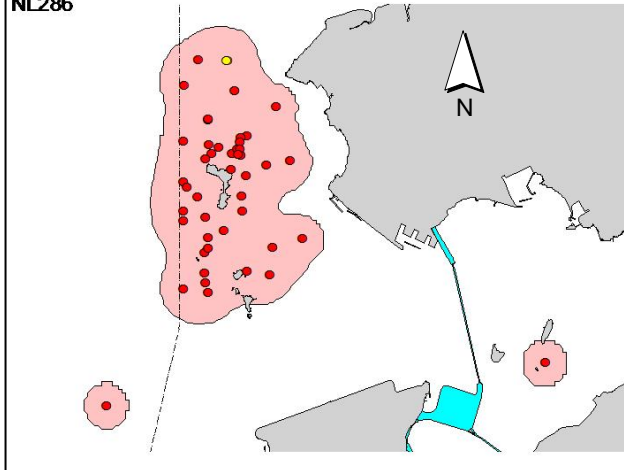


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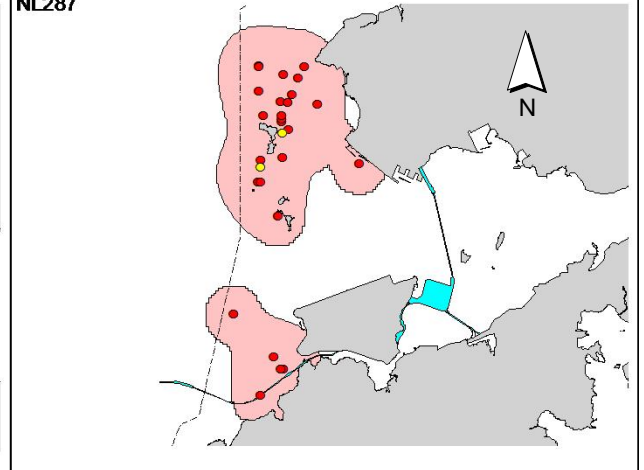
NL284



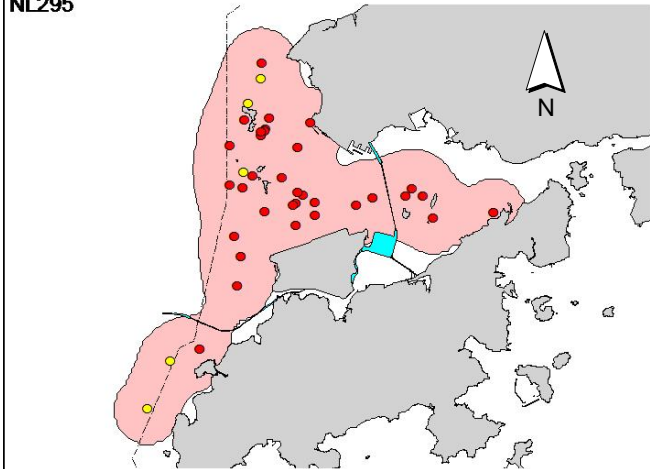
NL286



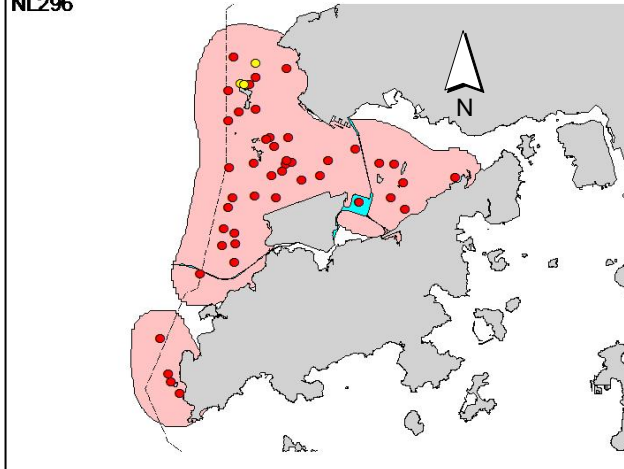
NL287



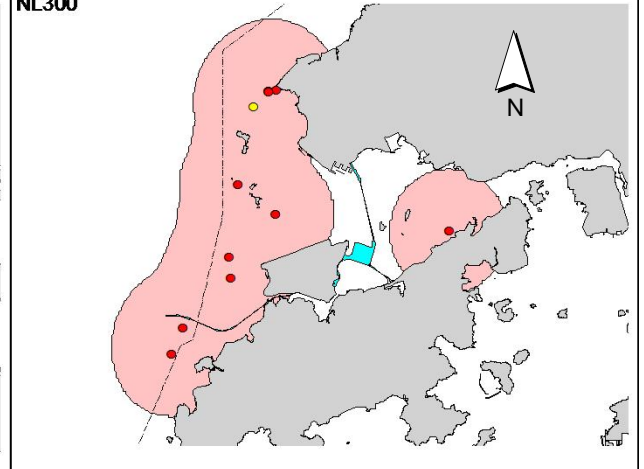
NL295



NL296

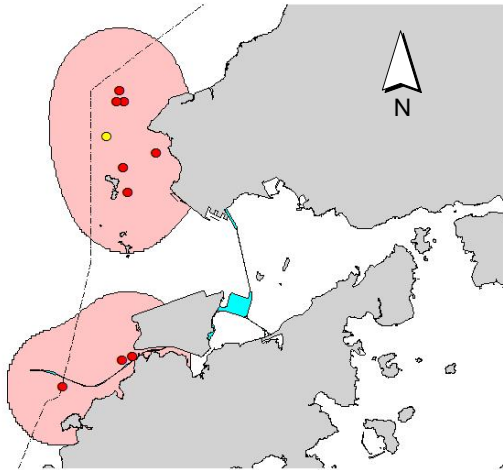


NL300

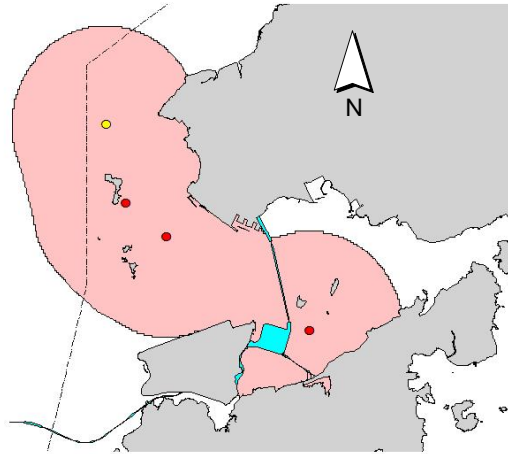


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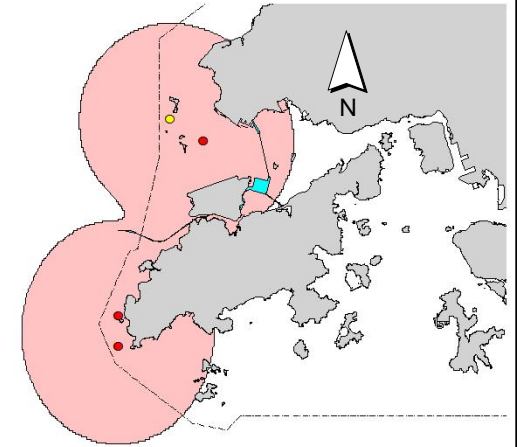
NL302



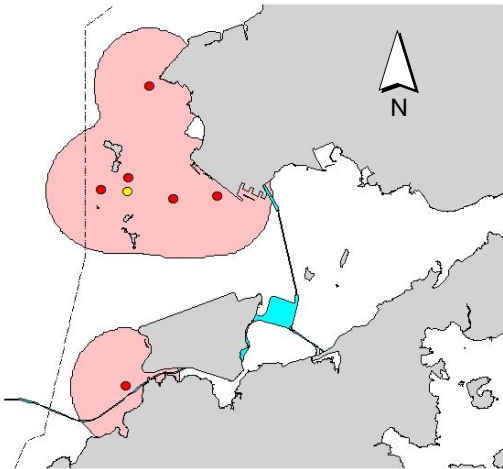
NL303



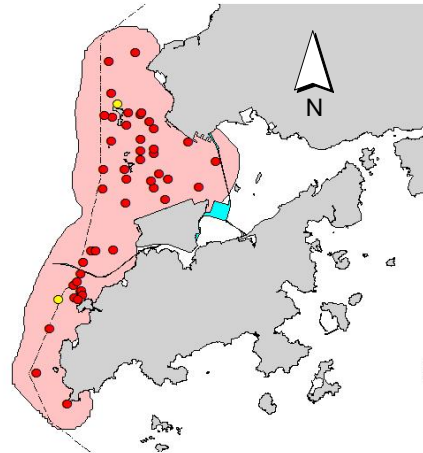
NL306



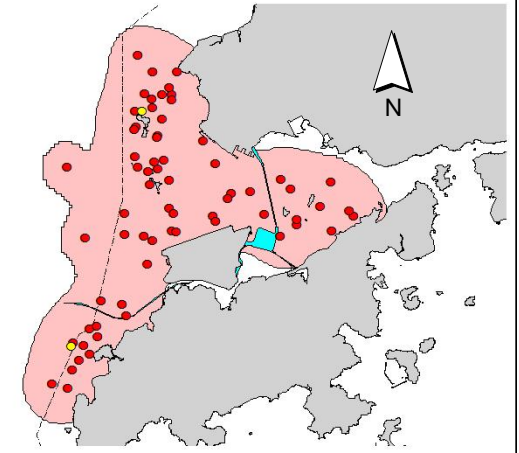
NL307



WL04



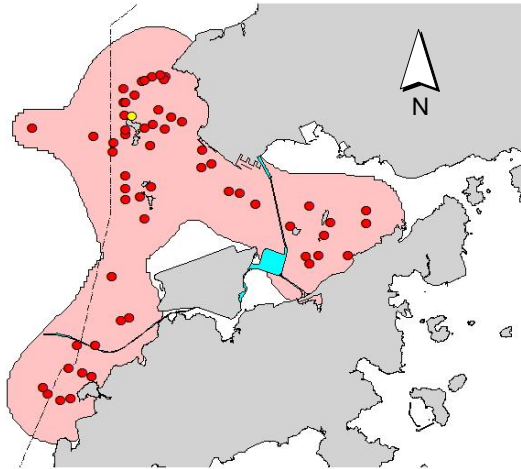
WL05



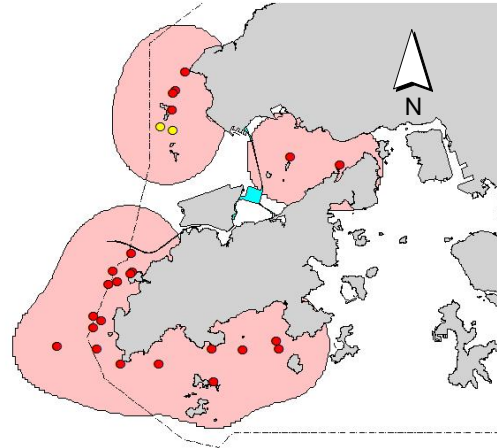


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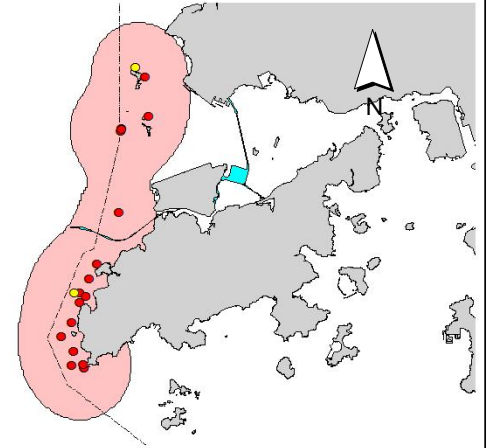
WL11



WL17



WL199





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>

*Appendix J2 Event/ Action Plan for Construction Noise*

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

Event	ET Leader	IEC	SOR	Contractor
Limit level being exceeded by two or more consecutive sampling days	Check monitoring data, all plant, equipment and Contractor's working methods;	Review the proposed mitigation measures submitted by Contractor and advise the SOR accordingly.	Request Contractor to review the working methods.	and consider changes of working methods;
	Discuss mitigation measures with IEC, SOR and Contractor;			Submit proposal of mitigation measures to SOR within 3 working days of notification and discuss with ET, IEC and SOR.
	Repeat measurement on next day of exceedance to confirm findings;	Check monitoring data submitted by ET and Contractor's working method;	Discuss with IEC, ET and Contractor on the proposed mitigation measures;	Take immediate action to avoid further exceedance;
	Identify source(s) of impact;	Discuss with ET and Contractor on possible remedial actions;		Submit proposal of mitigation measures to SOR within 3 working days of notification and discuss with ET, IEC and SOR;
	Inform IEC, contractor, SOR and EPD;			Implement the agreed mitigation measures;
	Check monitoring data, all plant, equipment and Contractor's working methods;	Review the Contractor's mitigation measures whenever necessary to assure their effectiveness and advise the SOR accordingly;	Request Contractor to critically review the working methods;	Resubmit proposals of mitigation measures if problem still not under control;
Discuss mitigation measures with IEC, SOR and Contractor;	Supervise the implementation of mitigation measures.	Make agreement on the mitigation measures to be implemented;	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.	
Ensure mitigation measures are implemented;		Ensure mitigation measures are properly implemented;		
Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days;		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</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</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 Table 5.7, 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 Table 5.8), 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

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 2014 (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	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> )	('000Kg)	('000Kg)	('000Kg)	('000Kg)	('000Kg)	('000Kg)
Jan	0.138	0.011	0.108	-	0.030	-	-	-	-	22.380	-	10.240	-	-	-
Feb	4.809	0.010	0.124	-	0.010	4.674	-	-	-	10.670	-	0.780	-	-	-
Mar	3.279	0.009	0.960	-	0.221	2.098	-	-	0.275	12.390	-	46.050	-	-	-
Apr	1.111	0.000	0.080	-	0.118	0.914	-	-	-	87.650	-	15.760	-	-	-
May	2.038	-	0.040	-	1.546	0.451	386.000	-	-	98.030	-	8.460	0.126	-	-
Jun															
<b>SUB-TOTAL</b>	<b>11.376</b>	<b>0.030</b>	<b>1.312</b>	<b>-</b>	<b>1.926</b>	<b>8.138</b>	<b>386.000</b>	<b>-</b>	<b>-</b>	<b>0.275</b>	<b>231.120</b>	<b>-</b>	<b>81.290</b>	<b>0.126</b>	<b>-</b>
Jul															
Aug															
Sep															
Oct															
Nov															
Dec															
<b>TOTAL</b>	<b>11.376</b>	<b>0.030</b>	<b>1.312</b>	<b>-</b>	<b>1.926</b>	<b>8.138</b>	<b>386.000</b>	<b>-</b>	<b>-</b>	<b>0.275</b>	<b>231.120</b>	<b>-</b>	<b>81.290</b>	<b>0.126</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.



Appendix L

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

Email  
message

**Environmental  
Resources  
Management**

**To** ENVIRON - Hong Kong, Limited (ENPO)

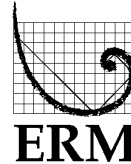
**From** ERM- Hong Kong, Limited

**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** 4 August 2014

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\_Mar2014/May2014\_dolphin\_STG&ANI\_NEL  
0215660\_Mar2014/May2014\_dolphin\_STG&ANI\_NWL

A total of two action level exceedances were recorded in the quarterly impact  
dolphin monitoring data between March 2014 and May 2014.

Regards,



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_Mar2014/May2014_dolphin_STG&ANI_NEL 0212330_Mar2014/May2014_dolphin_STG&ANI_NWL [Total No. of Exceedances = 2]	
Date	March 2014 to May 2014 (monitored) 08 July 2014 (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 = 0.0 & ANI = 0.0
	NWL	STG = 6.5 & ANI = 19.1
	Action Level Exceedances are recorded in the quarterly impact dolphin monitoring at NEL and NWL between March 2014 and May 2014. The exceedances were reported in the approved Seventh Monthly EM&A Report dated 13 June 2014.	
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) and Location (2 levels: NEL and NWL) as fixed factors to examine whether there were any significant differences in the averages encounter rates between the baseline and present impact monitoring quarter. By setting <math>\alpha = 0.1</math> as the significance level in the statistical tests, significant difference in STG (<math>p = 0.0337</math>) and in ANI (<math>p = 0.0535</math>) between baseline and present quarter were detected.</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*, October 2012 to February 2014) and Location (2 levels: NEL and NWL) as fixed factors to examine whether there were any significant differences in the averages encounter rates between the baseline and present impact monitoring quarter. By setting <math>\alpha = 0.1</math> as the significance level in the statistical tests, significant difference in STG (<math>p = 0.0080</math>) and in ANI (<math>p = 0.0032</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 March 2014 and May 2014, the major marine works under <i>Contract No. HY/2012/07</i> included:</p> <ul style="list-style-type: none"> <li>● Survey tower erection;</li> <li>● Marine piling platform installation;</li> <li>● Marine Piling at Viaduct B; and</li> <li>● Construction of rockfill platform at Viaduct D landing.</li> </ul>	

<b>Possible Reason for Action or Limit Level Exceedance(s)</b>	<p>The exceedance is considered to be the natural variation of Chinese white dolphin (CWD) <i>Sousa chinensis</i> ranging pattern and unlikely to be due to the Project, in view of the following:</p> <ul style="list-style-type: none"> <li>• According to the long-term monitoring results of marine mammals collected by AFCD, the Chinese White Dolphin (CWD) <i>Sousa chinensis</i> in spring months (March to May) are usually ranging in waters in north Lantau and outer Deep Bay, but less frequently in NEL.</li> <li>• The <i>Monitoring of Marine Mammals in Hong Kong Waters (2013 – 14)</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 project), which is likely a contributing factor for the decrease in dolphin abundances in NEL.</li> <li>• As per the findings from the EIA report (Section 8.11.9), the major influences on the CWD are marine traffics and bored piling works. The Contractor has implemented the marine traffic control as per the requirements in the EP-354/2009/B and the updated EM&amp;A Manual. Likewise, bored piling works were undertaken within the working rate described in the EP and the approved EIA Report. After reviewing of the daily bored piling records, all daily bored piling work rates in this quarter are under the maximum work rate described in the EP. During this quarter of dolphin monitoring, no adverse impact on CWD due to the activities under this Contract was observed.</li> <li>• Dolphin Exclusion Zone (DEZ) was implemented strictly as the EP Condition 3.1 and EM&amp;A Manual during the period. The implementation details were recorded in the approved monthly reports from March to May. No sighting of dolphin in DEZ was recorded in the reporting quarter.</li> <li>• Seasonal variation in individual ranging pattern which has been well documented in the literatures <sup>(2)</sup> <sup>(3)</sup>.</li> </ul>
<b>Actions Taken / To Be Taken</b>	<p>With reference to the site inspection records in this quarter, the respective marine ecological mitigation measures (including 250 m dolphin exclusion zone, marine bored piling monitoring, underwater acoustic decoupling plan and marine traffic control) have been implemented properly by the Contractor throughout the marine works period. No immediate additional action is considered necessary. The ET will monitor for future trends in exceedance(s).</p>
<b>Remarks</b>	<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>Fifth to Seventh EM&amp;A Monthly Reports</i>.</p>

(1) Hung SKY (2014). Prepared for AFCD. Available from:

[http://www.afcd.gov.hk/english/conservation/con\\_mar/con\\_mar\\_chi/con\\_mar\\_chi\\_chi/con\\_mar\\_chi\\_chi.html](http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi.html)

(2) Jefferson & Hung (2010) A review of the status of the Indo-Pacific Humpback Dolphin (*Sousa chinensis*) in Chinese Waters. *Aquatic Mammals* (30): 149 – 158.

(3) Chen et al., (2010) Distribution, abundance, and individual movements of Indo-Pacific humpback dolphins (*Sousa chinensis*) in the Pearl River Estuary, China. *Mammalia* (74): 117 – 125.

**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	1
	Limit	0	0
Impact Dolphin Monitoring	Action	2	3
	Limit	0	0

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

Reporting Period	Cumulative Statistics		
	Complaints	Notifications of Summons	Successful Prosecutions
This quarter	0	0	0
Total No. received since project commencement	1	0	0